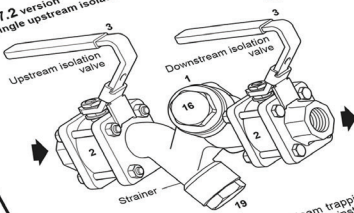


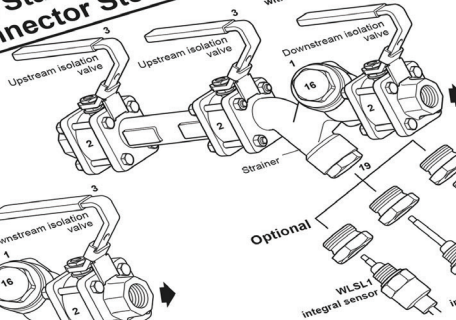
**spirax/sarco**

## STS17.2 Stainless Steel Compact Pipeline Connector Steam Trapping Station

STS17.2 version  
with single upstream isolation



STS17.2 version  
with double upstream isolation



### Description

The STS17.2 compact pipeline connector steam trapping station has been designed to provide a convenient ready to install trapping solution, which includes: upstream and downstream isolation valves (2), body incorporating universal connector + strainer (1) and check valve blanking plug (16).

### Available types

The STS17.2 is available with either single or double upstream isolation.  
The STS17.2 trapping solution incorporates Spirax Sarco universal connector, which allows speedy trap maintenance. The following swivel connector steam traps (sold separately) can be used with this pipeline connector enabling it to be tailored to suit any application:

- UTD62 thermodynamic steam trap.
- UFB30 ball float steam trap.
- UBP32 balanced pressure steam trap.
- USM bimetallic steam trap.

### Standards

These products fully comply with the requirements of the European Pressure Equipment Directive 97/23/EC.

### Certification

These products are available with certification to EN 10204 3.1. Note: All certification/inspection requirements must be stated at the time of order placement. For other certification contact Spirax Sarco.

### Sizes and pipe connections

1/2", 3/4" and 1" screwed NPT or socket weld. (BSP optional)  
1/2", 3/4" and 1" ASME 150 and ASME 300  
(DN15, DN20 and DN25 flanged EN 1092 PN40 optional)  
Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only in the interests of development and improvement of the product, we reserve the right to change the specification.

### Optional extras

Integral sensor type SSL1 (steam only) or WLSL1 (for waterlogging) for use with PTC or WLSL1 with DIODE for use with RTD are available as optional extras, to enable operational monitoring of the steam trap. Please note that the optional Spirax SSL1 and WLSL1 sensors must not be fitted when the STS17.2 is installed in a vertical application.

BDV1 blowdown valve is also available for cleaning the strainer during operation. Care should be taken when using the BDV1 blowdown valve as the discharge may be hot. Please note that a BDV1 cannot be used when a Spirax sensor has been chosen to be part of the unit.

Retrofit double isolation valve and spool piece to convert a single upstream isolation version to double isolation.

Insulation jacket is available to reduce heat loss and energy wastage. See separate literature.

### Materials

No.	Part	Material	Material
1	Body	Stainless steel	ASTM A351 Gr. CF8
2	Isolation ball valves	Stainless steel	ASTM A182 F316L
3	Handle	Mild steel ENP coated	
16	Check valve blanking plug	Stainless steel	ASTM A276 431
19	Strainer cap	Stainless steel	ASTM A582 416

TI-P128-22-US 7.16

# Product Handbook

## the complete product line

2nd edition

First for Steam Solutions

EXPERTISE | SOLUTIONS | SUSTAINABILITY

**spirax/sarco**





# Spirax Sarco, Inc.

# Product Handbook

Second Edition

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Second Edition

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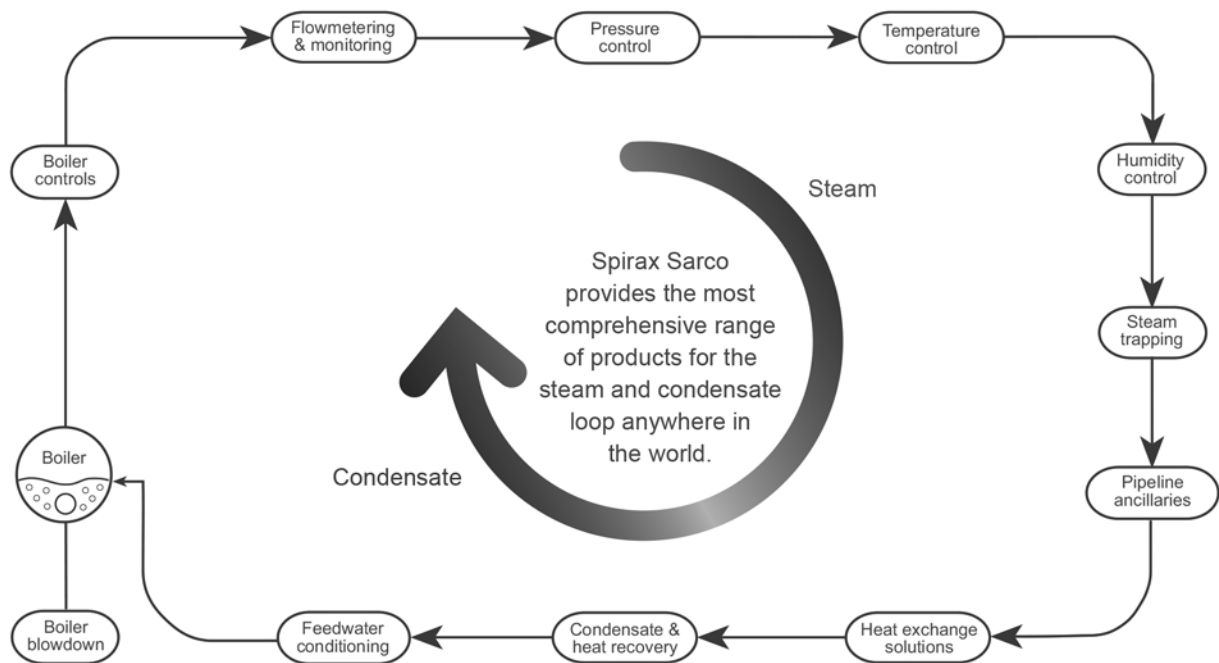
## Our product range - designed to meet your challenges

We offer our customers a complete range of products that cover the entire steam and condensate loop from spare parts, steam trap stations, a complete plant room package, a blowdown valve to a complete boiler house. Whatever your requirement we can help you.

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## How To Use This Book

Accepted international designations for limiting conditions are used throughout this catalog. An explanation of Pressure Shell Design Conditions and Limiting Operating Conditions follows:

### **Pressure Shell Design Conditions:**

- PMA - Maximum Allowable Pressure
- TMA - Maximum Allowable Temperature

These are the maximum pressures and temperatures to which the pressure shell (body, cover, bolting, etc.) of the product may be safely and permanently exposed. The product may or may not operate properly at these maximum conditions; the internal parts may be damaged or destroyed, but the pressure-retaining components will not break or become permanently distorted. It is sometimes permissible to exceed the maximum allowable conditions temporarily. For example, a cold hydraulic test at 1-1/2 times the cold PMA is usually permitted.

Because the maximum allowable pressure depends on the temperature, there is no one value for PMA. Quoting only the cold PMA without mentioning the corresponding temperature could be misleading. PMA is usually given at three temperatures:

- Cold
- Maximum Allowable Saturated Steam Temperature
- Maximum Allowable Temperature

There is only one value for maximum allowable temperature (TMA); the corresponding pressure range is given in this literature.

PMA and TMA are strictly safety related. They have very little to do with the actual operation of the product.

### **Limiting Operating Conditions:**

- Maximum Operating Pressure - PMO
- Maximum Operating Temperature

PMO is the maximum fluid (steam, gas or liquid) pressure at which the product will operate properly. Depending on the type of product, PMO may or may not be related to temperature. Unless otherwise indicated, the downstream pressure is assumed to be 0 psig.

Maximum operating temperature may depend on superheat tolerance, internal materials (e.g. neoprene o-rings), pressure shell design conditions, or any combination of these factors. Depending on the type of product, it usually varies with the actual operating pressure.

An example on the opposite page graphically illustrates limiting conditions.

## Example of Limiting Conditions

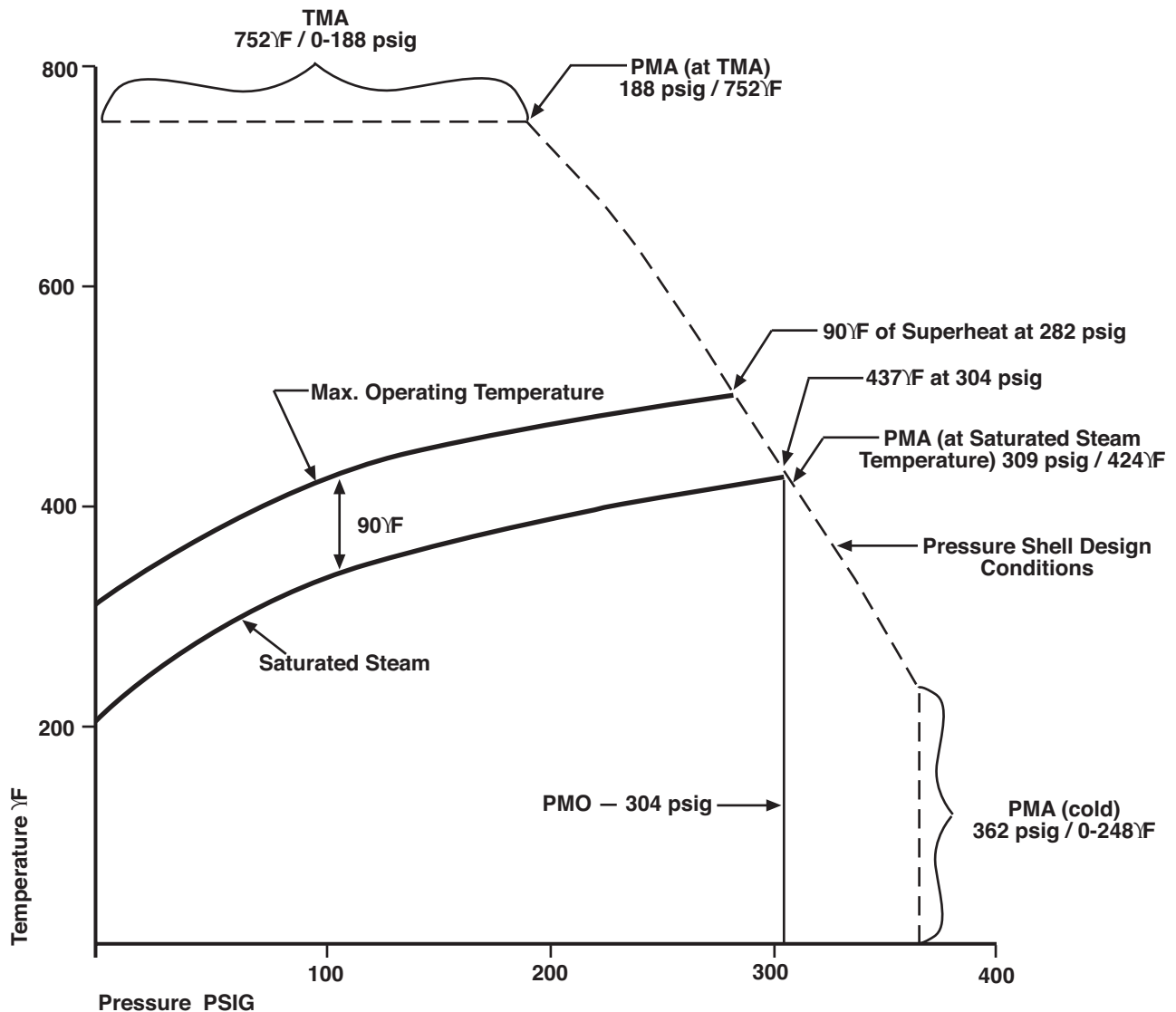
### **BPT21 Steel-Bodied Balanced Pressure Thermostatic Steam Trap**

#### **Limiting Operating Conditions**

Maximum Operating Pressure (PMO)	304 PSIG
Maximum Operating Temperature	437°F at 304 PSIG; 90°F of Superheat at Operating Pressures below 282 PSIG

#### **Pressure Shell Design Conditions**

PMA (Maximum Allowable Pressure)	362 PSIG/0-248°F 309 PSIG/424°F 188 PSIG/752°F
TMA (Maximum Allowable Temperature)	752°F/0-188 PSIG



# spirax sarco

## Product Handbook

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# Control Valves

for temperature, pressure and flow control.



**Getting maximum productivity from any fluid control system requires accurate and reliable control of pressure, temperature and flow to obtain optimum conditions.**



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## Steam Sizing Chart

### Determining the Value $C_v$

$C_v$  calculation is an interactive process requiring knowledge of valve dynamics, piping geometry factors, and outlet velocities. In practice, this sizing chart is based on empirical values and will cater for most applications.

This chart is for example only. A complete chart for sizing is overleaf.

### How To Use the Chart

**Example 1.** To find  $C_v$  value for critical flow application.

Steam Demand	1500 lb/hr
Upstream Pressure	55 psi guage 70 psi absolute

Refer to Selection Chart Opposite.

- 1) Draw 1500 lb/hr flow line (A-B)
- 2) Draw a horizontal line from 70 psi absolute to critical pressure drop line (C-D). At this intersection drop a vertical line.
- 3) At the crossing point of these two lines, read off the  $C_v$  value required, i.e.  $C_v$  13
- 4) Select valve size required from the appropriate valve type technical information sheet.

**Example 2.** To find  $C_v$  value for non critical flow application.

Steam Demand	500 lb/hr
Upstream Pressure	85 psi guage 100 psi absolute
Downstream Pressure	65 psi guage 85 psi absolute

- 1) Draw 500 lb/hr flow line.
- 2) Draw a horizontal line from 100 psi absolute  
At the intersection with 20 psi pressure drop, draw a vertical line.
- 3) At the crossing point with the 500 lb/hr horizontal line read off the  $C_v$  value required, i.e.  $C_v$  3.8
- 4) Select valve size required from the appropriate valve type technical information sheet.

### How to Use Formula

Proceed by calculating the required  $C_v$  from given flow data, having prior determined whether the flow is critical or sub-critical. The following equations have been adapted from the ISA S75.01 standard to allow for practical everyday use without significant sacrifice in accuracy.

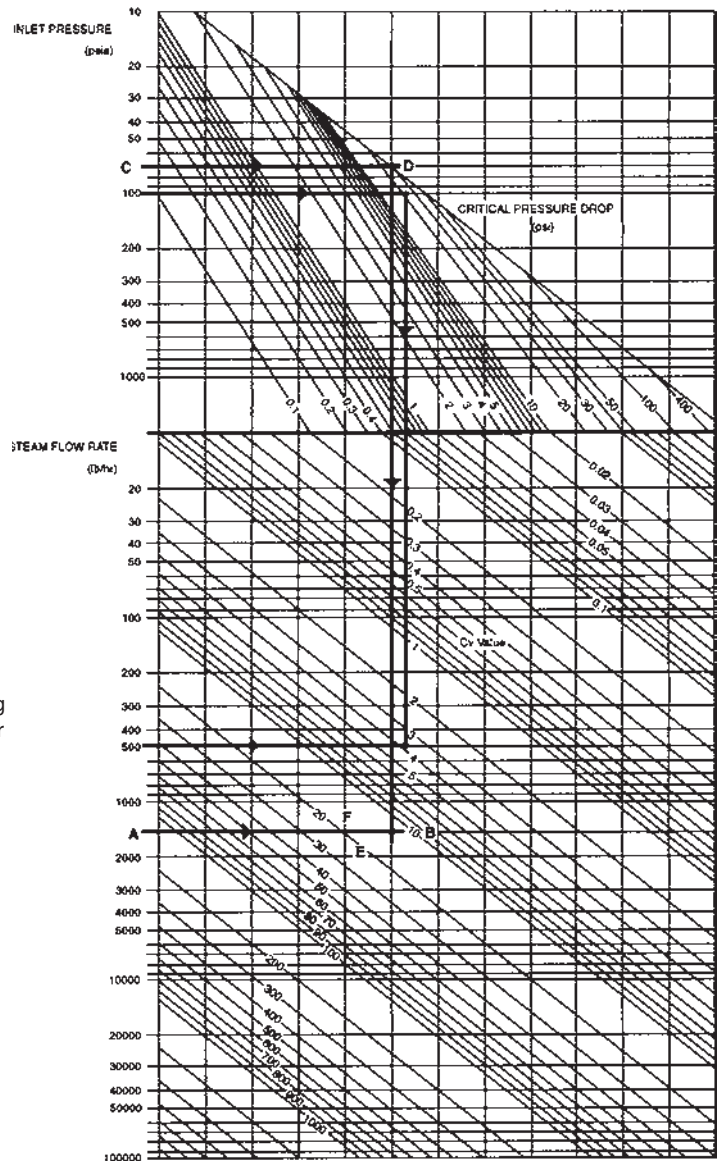
#### For Steam Service

Subcritical Flow	Critical Flow
When $\Delta P$ is less than .81 ( $P_1/2$ )	When $\Delta P$ is greater than .81 ( $P_1/2$ )

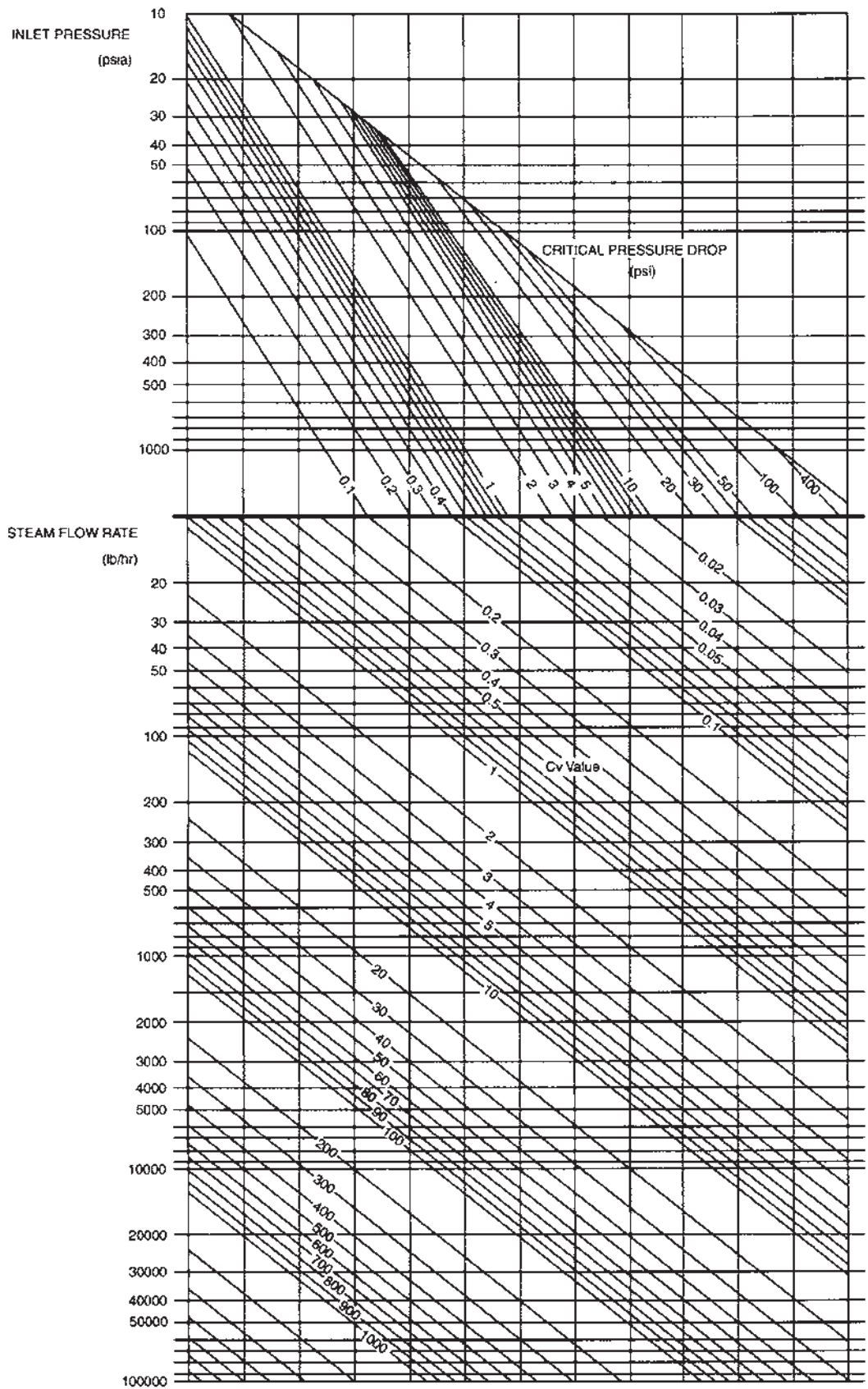
#### For Saturated Steam

$$C_v = \frac{w}{2.1 \sqrt{\Delta P (P_1 + P_2)}} \quad \left| \quad C_v = \frac{w}{1.647 (P_1)} \right.$$

$C_v$  = Valve Coefficient  
 $P_1$  = Upstream Pressure, psia  
 $P_2$  = Downstream Pressure, psia  
 $\Delta P$  = Pressure drop  $P_1 - P_2$ , psia  
 $w$  = Flow Rate, lb/h



# Steam Capacity Chart





## PM Series Pneumatic Actuators for B Series Control Valves

### Description

PM Series compact multi-spring diaphragm actuators are available in three sizes to suit the requirements of our ½" to 2" B Series control valves at various pressures. Actuators are available with an optional, top-mounted hand-wheel. A full stainless steel version is also available on special request.

While many of these actuators will be operated directly by a 3-15 psig control signal, any of the Spirax Sarco range of positioners can be mounted with the optional spindle adaptor (part no. 3578000).

### Available Types and Options

Standard version with corrosion resistant paint finish.

Full stainless steel version to special enquiry.

Spring-to-retract spindle.

Spring-to-extend spindle.

### Technical Data

Ambient temperature range	-4F to 230°F
Maximum air pressure	60 psig
Stem travel	¾"
Air supply connection	¼" NPT

### Materials

Diaphragm housing	Carbon Steel
Yoke	Ductile Iron
Diaphragm	Reinforced Nitrile
Gaskets	Neoprene
Springs	Steel (50CR4V2)
Bolts and nuts	Carbon/alloy steel

### Available Spares

Diaphragm kit  
Spring Kit  
Spindle seal kit



### Selection Guide

Type	PM
	PMS
Actuator size	2 = 36 sq.in
	3 = 60 sq.in
	7 = 109 sq.in
Spindle travel	2 = ¾"
Spring range	0 = 3-15 psig
	1 = 3-9 psig
	2 = 9-15 psig
Spring action	E = Spring extend
	R = Spring retract
Manual override	H = Handwheel

PM

3

2

0

E

Example:  
1 x PM320E pneumatic actuator.



# PM Series Pneumatic Actuators for B Series Control Valves

## Maximum differential pressures for ANSI/FCI 70-2 Class IV and VI shut-off

Note: The actuator must be fully vented to achieve the differential pressures shown below. If the control system does not allow the actuator to be vented, please contact Spirax Sarco for assistance.

### Spring Retract

Closes B Series 2-way valve and closes top seat of B Series 3-way valve on loss of air.

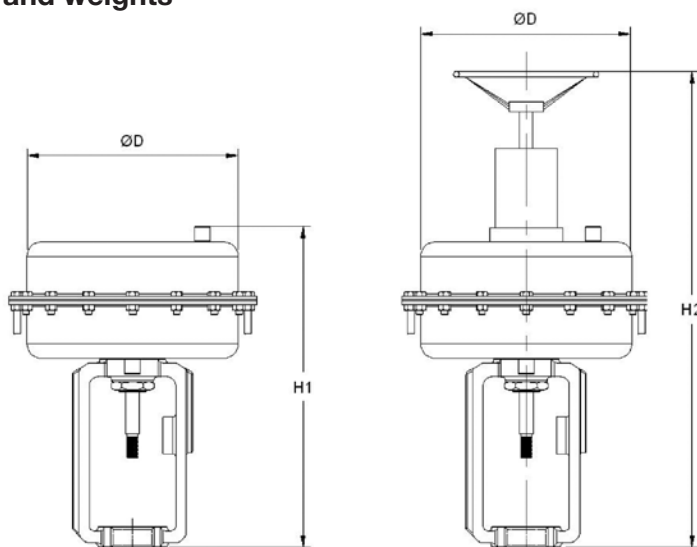
Model	Net Spring Range (psig)	Min. Air Pressure (psig)	1/2"		3/4"		1"		1-1/4"		1-1/2"		2"	
			Cv 6	Cv 3.5	Cv 8	Cv 6	Cv 13	Cv 8	Cv 20	Cv 13	Cv 28	Cv 20	Cv 50	Cv 28
PM220R	3 - 15	20	250	250	149	250	83	130	44	75	26	37	13	21
	6 - 18	23	250	250	250	250	205	250	114	197	76	107	45	71
PM221R	3 - 9	20	250	250	149	250	83	130	44	75	26	37	13	21
PM222R	9 - 15	20	250	250	250	250	250	250	184	250	126	177	77	121
PM320R	3 - 15	20					165	250	91	157	60	84	35	54
	6 - 18	23					250	250	209	250	144	202	88	138
PM321R	3 - 9	20					165	250	91	157	60	84	35	54
PM322R	9 - 15	20					250	250	250	250	228	250	141	222
PM720R	3 - 15	20							187	250	128	180	78	123
	6 - 18	23							250	250	250	250	175	250
PM721R	3 - 9	20							187	250	128	180	78	123

### Spring Extend

Opens B Series 2-way valve and closes bottom seat of B Series 3-way valve on loss of air.

Model	Net Spring Range (psig)	Air Pressure (psig)	1/2"		3/4"		1"		1-1/4"		1-1/2"		2"	
			Cv 6	Cv 3.5	Cv 8	Cv 6	Cv 13	Cv 8	Cv 20	Cv 13	Cv 28	Cv 20	Cv 50	Cv 28
PM220E	3 - 15	18	250	250	149	250	83	130	44	75	26	37	13	21
		20	250	250	250	250	164	250	91	157	60	84	34	54
		25	250	250	250	250	250	250	208	250	143	201	87	137
		30							250	250	226	250	140	221
PM320E	3 - 15	18			250	250	165	250	91	157	60	84	35	54
		20			250	250	250	250	170	250	116	163	70	110
		25							250	250	250	250	159	250

### Approximate dimensions and weights (inches and pounds)



Actuator Model	Diameter D	H1	H2	Weight
PM200	9.25	9.31	16.67	20
PM300	11.22	11.6	22.66	42
PM700	15.43	14.7	27.52	49

# spirax sarco

## B Series 1/2" to 2" 2-Way and 3-Way Bronze Control Valves

### Description

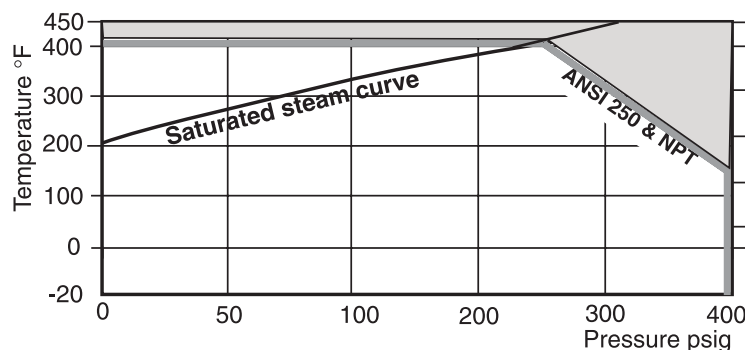
The B Series is a light-industrial bronze control valve range for pressure, flow and temperature control of steam, gases and liquids. Available in 2-Way and 3-Way body configurations for modulating control with PM Series pneumatic actuators or Belimo NV or AF Series electric actuators. For enhanced control, any of the extensive range of Spirax Sarco positioners may be fitted to pneumatic actuators.

### Technical Specifications

Body sizes	1/2", 3/4", 1", 1-1/4", 1-1/2", 2"	
Body material	ASTM B62	
Connection	Screwed NPT	
Body rating	400 psig @150°F / 250 psig @ 400°F (ASME B16. 15 Class 250)	
Characteristic	2-Way: Equal Percentage or Linear	3-Way: Linear
Rangeability	50:1	
Temperature range	-20° to 400°F	
Leakage Rate	Metal Seating (2 Way and 3 Way Valves)	ANSI/FCI 70-2, Class IV
	PTFE Soft seating (2 Way, Equal Percentage only)	ANSI/FCI 70-2, Class VI



### Operating Range



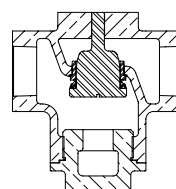
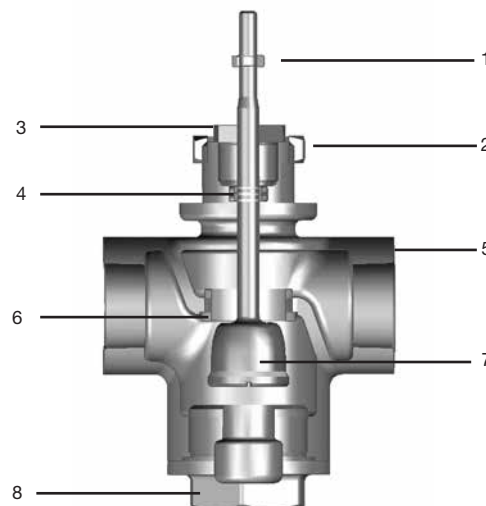
Product not to be used in this region.

### Materials

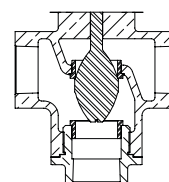
No.	Part	Material
1	Locknut	Stainless Steel
2	Bonnet Nut	Steel
3	Gland Nut	Brass
4*	Stem Seal	PTFE/EPDM
5	Body	Cast Bronze
6	Seat	Stainless Steel
7*	Head and Stem	Stainless Steel
8	Plug	Cast Bronze

### Spare Parts

Available spare parts are indicated by \* in materials list above.



Detail of Soft  
Seal Option



Detail of  
3-Way Option

Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only. In the interests of development and improvement of the product, we reserve the right to change the specification.

TI-1-620-US 10.15

## B Series 1/2" to 2" 2-Way and 3-Way Bronze Control Valves

### Dimensions and Weights (inches and pounds)

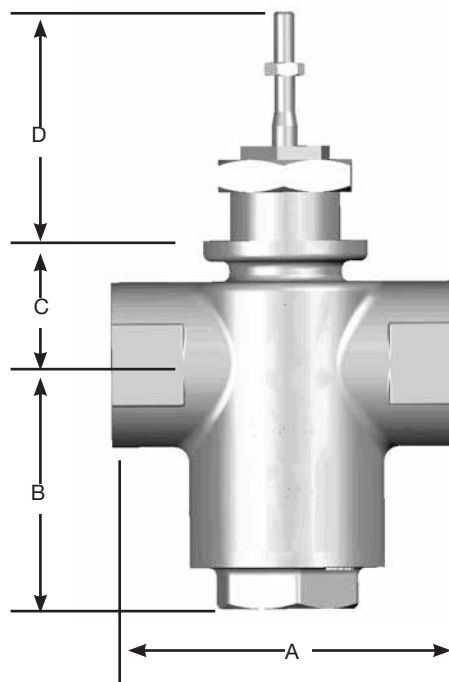
Size	A End to End	B Bottom to Centerline	C Centerline to Actuator Shoulder	D Actuator Shoulder to end of stem (closed position)	Weight
1/2"	3.5	2.5	1.4	90	4
3/4"	3.5	2.5	1.4	90	4
1"	4.25	3	1.5	90	4.8
1-1/4"	5.3	3.8	2.0	90	10
1-1/2"	5.3	3.8	2.0	90	10
2"	6.6	4.5	2.3	90	17

### Control Valve Selection Guide

Valve Size	1/2", 3/4", 1", 1-1/4", 1-1/2", 2"	<input type="text" value="2"/>
Valve Series	B Series	<input type="text" value="B"/>
Valve Characteristic	L = Linear E = Equal percentage M = Mixing linear (3-way)	<input type="text" value="E"/>
Design standards	A= ANSI/ASTM specifications	<input type="text" value="A"/>
Body Material	5 = Bronze	<input type="text" value="5"/>
Connections	1 = Threaded NPT	<input type="text" value="1"/>
Seating option	G = Soft seal (PTFE) (Equal Percentage Only)	<input type="text"/>
C <sub>v</sub>	To be specified	<input type="text" value="50"/>
Connection Type	To be specified	<input type="text" value="NPT"/>

### How To Order

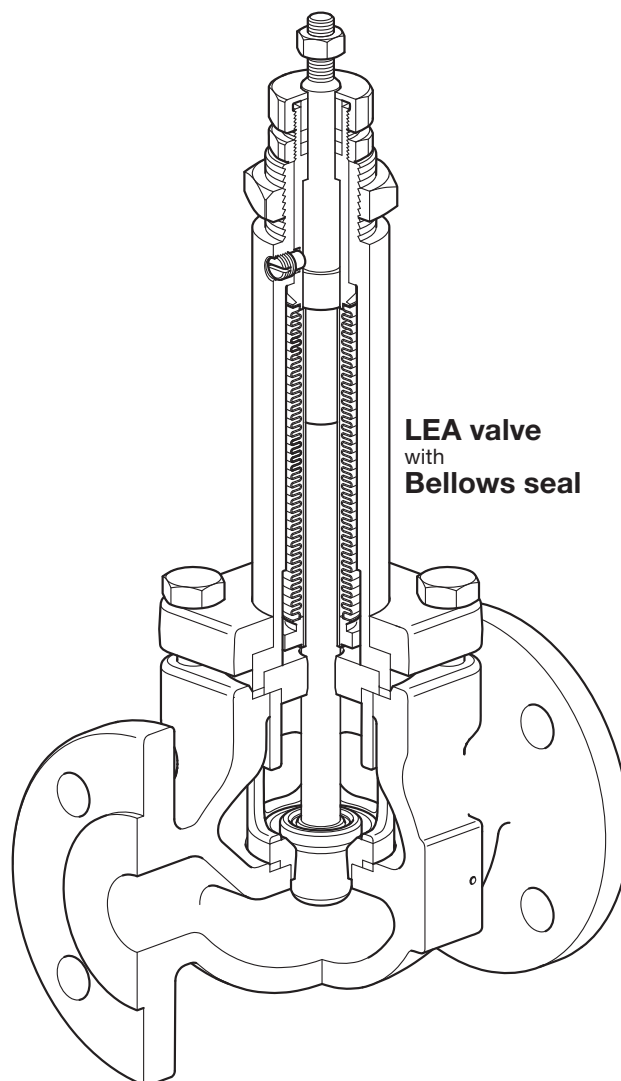
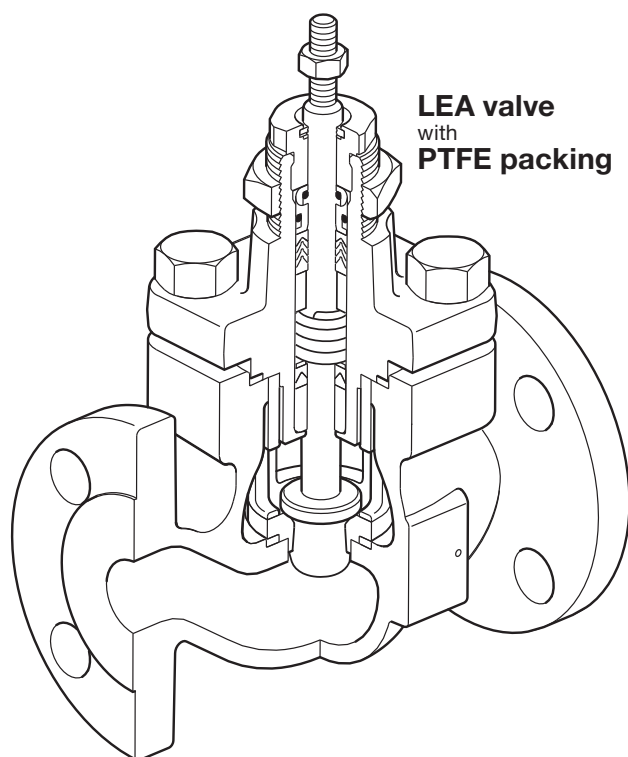
Example: 1 x 2" BEA51 C<sub>v</sub> 50 NPT. Control Valve with PM720R actuator.



## SPIRA-TROL Two-port Control Valves ASME Standard LEA, LFA and LLA ½" to 4"

### Description

SPIRA-TROL is a range of two-port single seat globe valves with cage retained seats conforming to ASME standard. These valves are available in three body materials in sizes ranging from ½" to 4". When used in conjunction with a pneumatic or electric linear actuator they provide characterized modulating or on/off control.



### Sizes and pipe connections

Body material	Connections		Type	Size range
Cast iron	Screwed	NPT	LEA31	½", ¾", 1", 1¼", 1½" and 2"
	Flanged	ASME class 125	LEA33	1", 1½", 2", 2½", 3" and 4"
Carbon steel	Flanged	ASME class 150	LEA43	½", ¾", 1", 1½", 2", 2½", 3" and 4"
Stainless steel	Flanged	ASME class 150	LEA63	½", ¾", 1", 1½", 2", 2½", 3" and 4"

# SPIRA-TROL Two-port Control Valves

## ASME Standard LEA, LFA and LLA ½" to 4"

### SPIRA-TROL valve characteristic - options:

<b>LEA</b>	<b>Equal percentage (E)</b> - Suitable for most modulating process control applications providing good control at all flowrates.
<b>LFA</b>	<b>Fast opening (F)</b> - For on/off applications only.
<b>LLA</b>	<b>Linear (L)</b> - Primarily for liquid flow control where the differential pressures across the valve are constant.

**Important note:** Throughout this document, reference has been made to the standard LEA control valve. With the exception of trim type, the LEA, LFA, and LLA control valves are identical.

### SPIRA-TROL valve options:

<b>Stem sealing</b>	<b>PTFE chevron seals</b>	Standard
	<b>Bellows / graphite secondary seals (D)</b>	Zero emissions and high temperature applications
	<b>Graphite packing</b>	High temperature applications
<b>Seating</b>	<b>Metal-to-metal</b>	431 stainless steel - standard 316L stainless steel
	<b>Soft seating</b>	Up to 392°F - PTFE for Class VI shut-off
	<b>Hard facing</b>	316L stainless steel with Stellite 6 facing - for more arduous applications
<b>Bonnet type</b>	Standard bonnet	
	Extended bonnet for large pipe lagging or hot / cold applications	
<b>Trim</b>	Standard trim	
	Low noise and anti-cavitation trim (see TI-S24-59)	

### SPIRA-TROL valves are compatible with the following actuators and positioners:

<b>Electric</b>	EL7200, AEL5 and AEL6 series
<b>Pneumatic</b>	PN1000, PN9000 and PN2000 series
<b>Positioners</b>	PP5 (pneumatic) or EP5 (electropneumatic)
	ISP5 (intrinsically safe electropneumatic)
	SP400 and SP500 (microprocessor based electropneumatic)
	SP300 (digital communications)

Refer to the relevant Technical Information sheet for further details.

### Standards

Designed in accordance with EN 60534. This product fully complies with the requirements of the European Pressure Equipment Directive 97 / 23 / EC and carries the **CE** mark when so required.

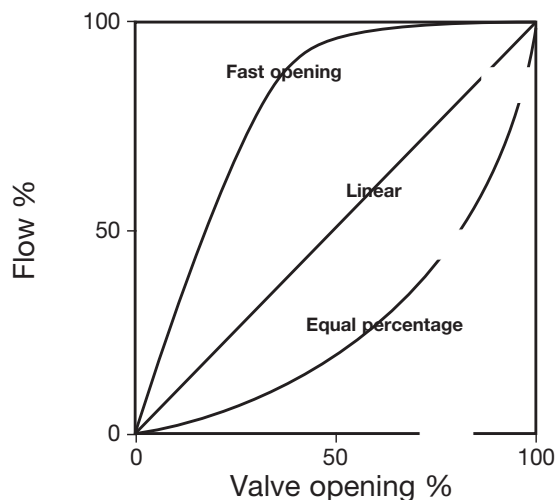
### Certification

This product is available with certification to EN 10204 3.1. **Note:** All certification / inspection requirements must be stated at the time of order placement.

### Technical data

<b>Plug design</b>		Parabolic
<b>Leakage</b>	Metal-to-metal	Balanced and Unbalanced Class IV
		Unbalanced (optional) Class V
	Soft seal	Balanced Class IV
		Unbalanced Class VI
<b>Rangeability</b>	Equal	50:1
	Linear	30:1
	Fast	10:1
<b>Travel</b>	½" - 2"	¾"
	2½" - 4"	1¾"

### Typical flow characteristic curves



# SPIRA-TROL Two-port Control Valves

## ASME Standard LEA, LFA and LLA ½" to 4"

### Materials

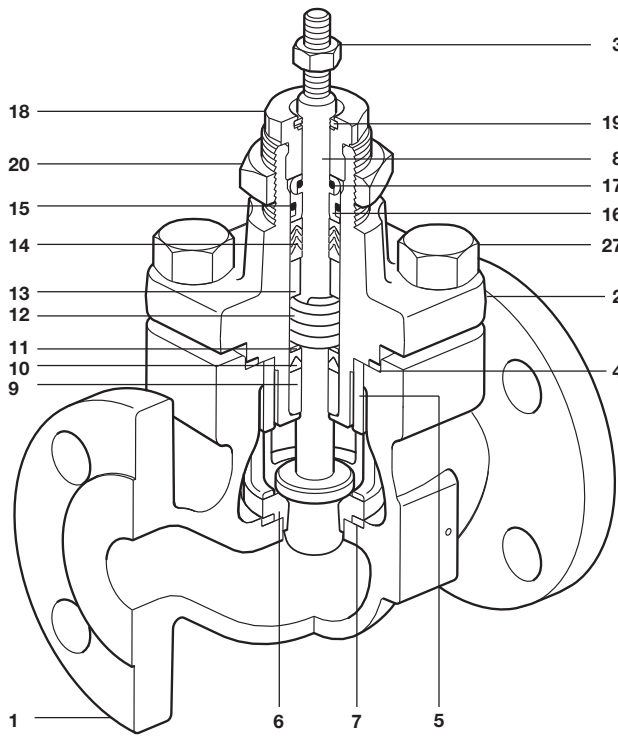
Body material	No.	Part	Type	Material
Cast iron	1	Body	LEA31 and LEA33	Cast iron ASTM A126B
	2	Bonnet ½" - 2"	LEA31 and LEA33	Ductile iron ASTM A395
		2½" - 4"	LEA31 and LEA33	Ductile iron ASTM A395
	2a	Bonnet extension	LEA31 and LEA33	Carbon steel ASTM A216 WCB or A105N
Carbon steel	1	Body	LEA43	Cast steel ASTM A216 WCB
	2	Bonnet ½" - 2"	LEA43	Carbon steel ASTM A105N
		2½" - 4"	LEA43	Cast steel ASTM A216 WCB
	2a	Bonnet extension	LEA43	Carbon steel ASTM A216 WCB or A105N
Stainless steel	1	Body	LEA63	Stainless steel ASTM A351 CF8M
	2	Bonnet	LEA63	Stainless steel ASTM A351 CF8M
	2a	Bonnet extension	LEA63	Stainless steel
All versions	2b	Bellows	All versions	Stainless steel
	2c	Extended bonnet	LEA63	Stainless steel A351 CF8M
			All others	Carbon steel A216 WCB
	3	Stem lock-nut	All versions	Stainless steel
	4	Bonnet gasket	All versions	Reinforced exfoliated graphite
	5	Seat retainer	All versions	Stainless steel
	6	Valve seat ring	All versions	Stainless steel, except FULL PEEK soft seat
	7	Seat gasket	All versions	Reinforced exfoliated graphite
	8	Valve plug and stem	All versions	Stainless steel
	9 *	Lower stem guide	All versions	Glass filled PTFE, except Nitronic bush option
	10 *	Lower stem wiper	All versions	PTFE
	11 *	Packing guard washer	All versions	Stainless steel
	12 *	Spring	All versions	Stainless steel
	13	Packing spacer	All versions	Stainless steel
	14 *	Chevron packing set	All versions	PTFE
	15 *	Outer 'O' ring	All versions	Viton
	16 *	Upper stem guide	All versions	Glass filled PTFE, except Nitronic bush option
	17 *	Inner 'O' ring	All versions	Viton
	18	Gland nut	All versions	Stainless steel
	19	Scraper ring	All versions	PTFE
	20	Actuator clamp nut	All versions	Plated carbon steel
	21	Bellows assembly	All versions	Stainless steel
	22	Bonnet extension gasket	All versions	Reinforced exfoliated graphite
	23	Top plate (bonnet extension only)	All versions	Stainless steel
	24	Lower spindle bearing housing	All versions	Stainless steel
	25	Lower spindle bearing	All versions	Stainless steel
	26	Spindle lock and anti-rotation nut	All versions	Stainless steel
	27	Bonnet nuts	LEA63	Stainless steel ASTM A194 Gr. 8M
			All others	Steel ASTM A194 Gr. 2H
		Set screws	All others	Steel 8.8
	28	Standard bonnet studs	LEA63	Stainless steel ASTM A193 Gr. B8 M2
			All others	Steel ASTM A193 Gr. B7

### Graphite packing

High temperature packing	9	Lower and upper stem guide		Stellite 6
	16			
	14	Grafoil packing		Graphite rings
	10, 11, 12, 15, 17, 19		Not used	

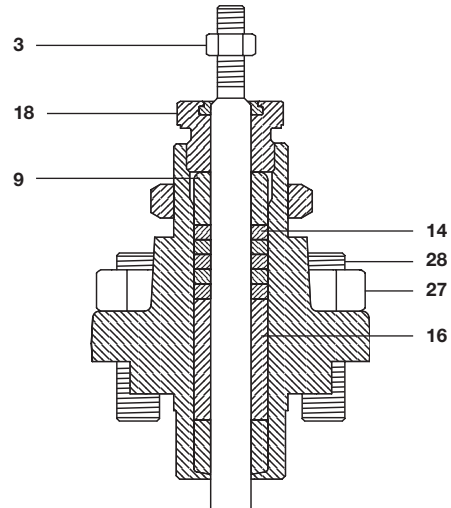
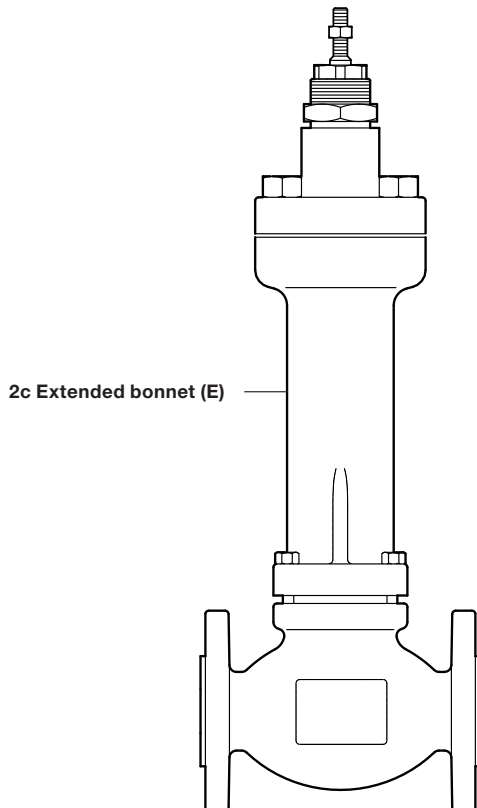


# SPIRA-TROL Two-port Control Valves ASME Standard LEA, LFA and LLA 1/2" to 4"

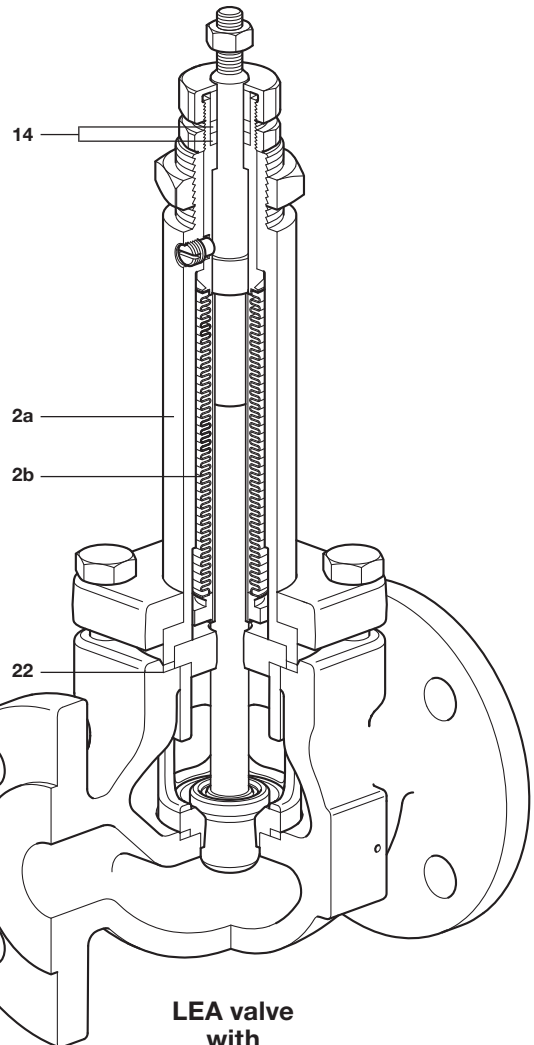


**LEA valve  
with PTFE packing**

**LEA valve with  
extended bonnet (E)**



**Bonnet with graphite packing**



**LEA valve  
with  
bellows seal (D)**

# SPIRA-TROL Two-port Control Valves

## ASME Standard LEA, LFA and LLA ½" to 4"

### C<sub>v</sub> values

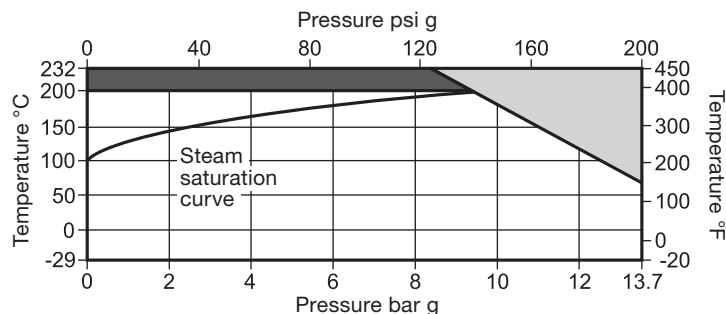
Valve size			½"	¾"	1"	1¼"	1½"	2"	2½"	3"	4"
Standard trim	Full port	Equal %	5.0	7.5	12.0	16.0	30.0	45.0	75.0	120.0	190.0
		Linear	5.0	7.5	12.0	16.0	30.0	45.0	75.0	120.0	190.0
		Fast opening	5.0	7.5	12.0	16.0	32.0	50.0	88.0	136.0	210.0
	Reduced trim 1	Equal %	2.5	5.5	8.5	18.0	16.0	33.0	48.0	85.0	130.0
		Linear	2.5	5.5	8.5	12.0	18.0	33.0	48.0	85.0	130.0
	Reduced trim 2	Equal %	1.8	2.5	6.0	8.5	13.0	18.0	36.0	50.0	90.0
		Linear	1.8	2.5	6.0	8.5	13.0	18.0	36.0	50.0	90.0
	Reduced trim 3	Equal %	1.0	1.88	3.0	6.0	9.0	14.0	18.0	38.0	53.0
		Linear	1.0	1.8	3.0	6.0	9.0	14.0	18.0	38.0	53.0
Microflute			0.5	0.5	0.5						
			0.2	0.2	0.2						
			0.1	0.1	0.1						
			0.07	0.07	0.07						
			0.01	0.01	0.01						

**Notes:** - Special C<sub>v</sub> on request  
- For low noise and anticavitation C<sub>v</sub> please see TI-S24-59

### Pressure/temperature limits - LEA31 and LEA33 cast iron valve body

Screwed NPT

Flanged  
ASME class 125



**Note:**

When the process fluid temperature is sub-zero and the ambient temperature is below 41°F, the external moving parts of the valve and actuator must be heat traced to maintain normal operation.

- The product **must not** be used in this region.
- PTFE soft seated valves are limited to a maximum operating temperature of 392°F.

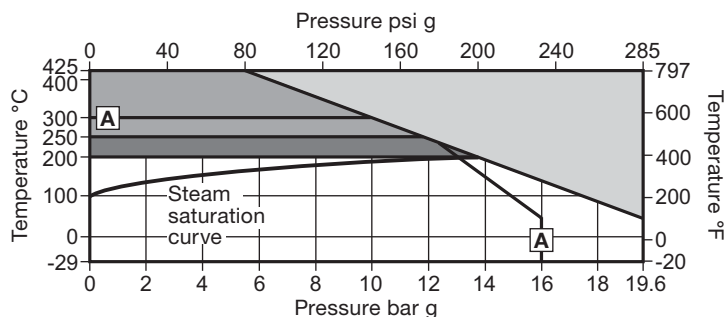
Body design conditions			ASME 125
Maximum design pressure			200 psi g @ 150°F
Maximum design temperature			450°F @ 125 psi g
Minimum design temperature			-20°F
Maximum operating temperature	Standard packing PTFE chevron	- Option P or N	450°F
	PTFE soft seat	- Option G	392°F
See the SPIRA-TROL selection guide on page 18 for the full list of available options	Graphite packing	- Option H	450°F
	Extended bonnet with PTFE chevron	- Option E	450°F
	Extended bonnet with graphite packing	- Option E	450°F
	Bellows	- Option D	450°F
Minimum operating temperature	Note: For lower operating temperatures consult Spirax Sarco		-20°F
Maximum differential pressures	See relevant actuator Technical Information sheet.		
Maximum cold hydraulic test pressure of:	300 psi g		

# SPIRA-TROL Two-port Control Valves

## ASME Standard LEA, LFA and LLA ½" to 4"

### Pressure/temperature limits - LEA43 carbon steel valve body

Flanged  
ASME class 150



Please note - Bellows sealed valves (Option D) are limited to A - A.

#### Note:

When the process fluid temperature is sub-zero and the ambient temperature is below 41°F, the external moving parts of the valve and actuator must be heat traced to maintain normal operation.

- The product **must not** be used in this region.
- High temperature graphite packing is required for use in this region. **Note:** Soft seated valves cannot be used in this region.
- PTFE soft seated valves are limited to a maximum operating temperature of 482°F.

Body design conditions		ASME 150
Maximum design pressure		285 psi g @ 100°F
Maximum design temperature		800°F @ 80 psi g
Minimum design temperature		-20°F
Maximum operating temperature	Standard packing PTFE chevron - Option P or N	482°F
	PTFE soft seat - Option G	392°F
	Graphite packing - Option H	800°F
	Extended bonnet with PTFE chevron - Option E	482°F
	Extended bonnet with graphite packing - Option E	800°F
See the SPIRA-TROL selection guide on page 18 for the full list of available options	Bellows (A - A on the LEA43 chart) - Option D	572°F
	Note: For lower operating temperatures consult Spirax Sarco	-20°F
Minimum operating temperature		-20°F
Maximum differential pressures		See relevant actuator Technical Information sheet.
Maximum cold hydraulic test pressure of:		428 psi g

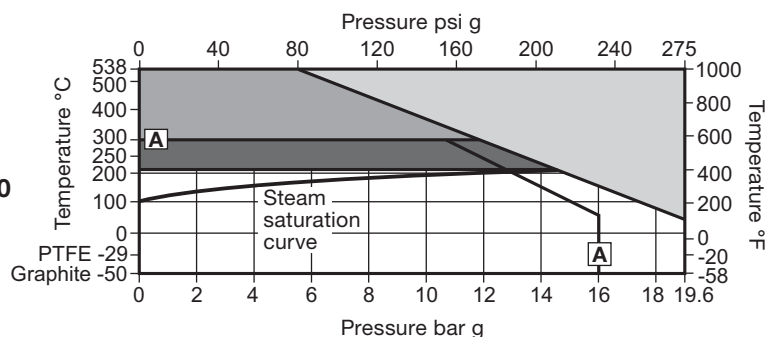
For valve operating above 572°F extended bonnet is recommended for actuator suitability.

# SPIRA-TROL Two-port Control Valves

## ASME Standard LEA, LFA and LLA ½" to 4"

### Pressure/temperature limits - LEA63 stainless steel valve body

**Flanged**  
**ASME class 150**



**Please note** - Bellows sealed valves (Option D) are limited to A - A.

**Note:**

When the process fluid temperature is sub-zero and the ambient temperature is below 41°F, the external moving parts of the valve and actuator must be heat traced to maintain normal operation.

- The product **must not** be used in this region.
- High temperature graphite packing is required for use in this region. **Note:** Soft seated valves cannot be used in this region.
- PTFE soft seated valves are limited to a maximum operating temperature of 482°F.

Body design conditions			ASME 150
Maximum design pressure			275 psi g @ 100°F
Maximum design temperature			1 000°F @ 20 psi g
Minimum design temperature			-58°F
Maximum operating temperature	Standard packing PTFE chevron	- Option P or N	482°F
	PTFE soft seat	- Option G	392°F
	Graphite packing	- Option H	1 000°F
See the SPIRA-TROL selection guide on page 18 for the full list of available options	Extended bonnet with PTFE chevron	- Option E	482°F
	Extended bonnet with graphite packing	- Option E	1 000°F
	Bellows (A - A on the LEA63 chart)	- Option D	572°F
Minimum operating temperature		PTFE packing	-20°F
Note: For lower operating temperatures consult Spirax Sarco		Graphite packing	-58°F
Maximum differential pressures See relevant actuator Technical Information sheet.			
Maximum cold hydraulic test pressure of:			413 psi g

For valve operating above 572°F extended bonnet is recommended for actuator suitability.

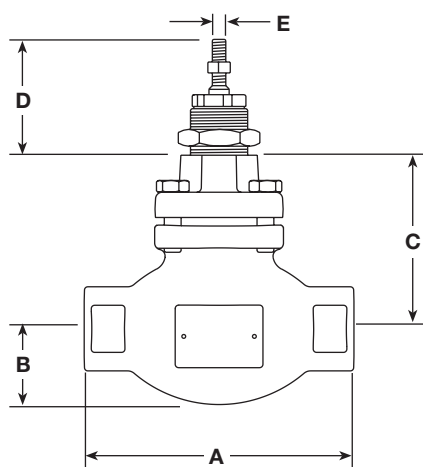
# SPIRA-TROL Two-port Control Valves

## ASME Standard LEA, LFA and LLA ½" to 4"

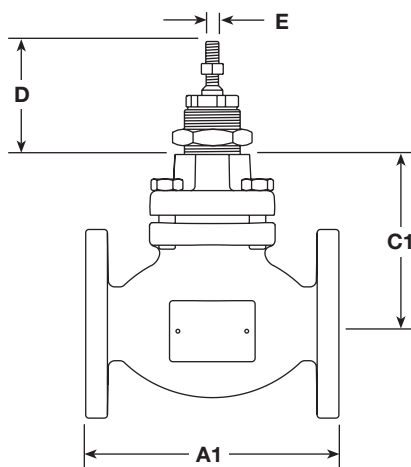
### Dimensions for the SPIRA-TROL two-port control valve

approximate in inches

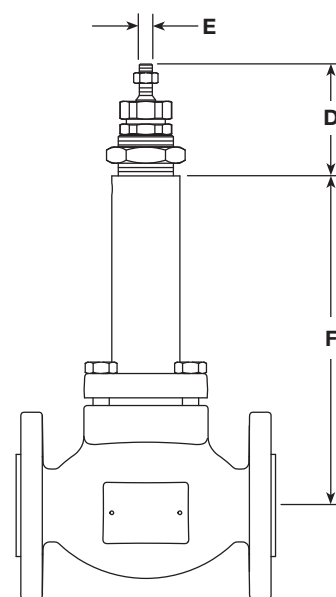
Valve size	Screwed NPT			Flanged LEA valves			D	E Thread	F	
	A	B	C	C1	A1	C1			Bellows seals	Extended bonnet
½"	6½"	1¾"	4"	4"	7¼"	4"	2¾"	M8	9"	13.25"
¾"	6½"	1¾"	4"	4"	7¼"	4"			9"	13.25"
1"	7¾"	2¼"	4"	4"	7¼"	4"			9"	13.25"
1¼"	8½"	2¼"	5"	5"	8¾"	5"			10½"	13.94"
1½"	9¼"	2½"	5"	5"	8¾"	5"			10½"	13.94"
2"	10½"	3"	5"	5"	10"	5"			10½"	13.94"
2½"				8"	10½"	7⅞"	3"	M12	14½"	16.38"
3"				8"	11¾"	7⅞"			14½"	16.38"
4"				8½"	13¾"	8½"			15"	17"



Screwed version



Flanged version



Bellows sealed or  
extended bonnet version

### Weights for the SPIRA-TROL two-port control valve

approximate in lbs

Valve size	LEA31	LEA33	LEA43	LEA63	Additional bellows and Extended bonnet
½"	16	16	16	16	10
¾"	16	18	18	18	
1"	22	30	30	30	
1¼"	25	29	31	31	12
1½"	31	31	36	36	
2"	33	38	38	38	
2½"		84	78	78	21
3"		91	89	89	
4"		132	124	124	28

# SPIRA-TROL Two-port Control Valves

## ASME Standard LEA, LFA and LLA ½" to 4"

### Dimensions / weights for the PN actuator range

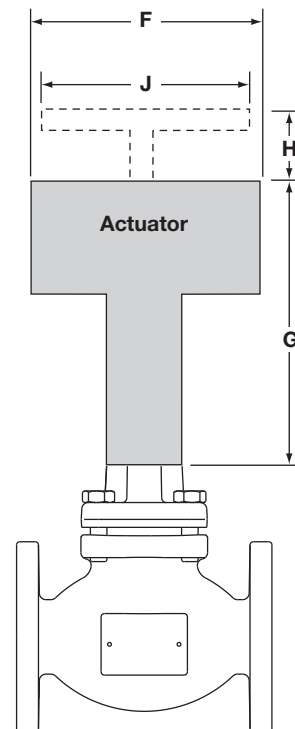
approximate in inches and lbs

Actuator range	F	G	H	J	Weight	
	inches	inches	inches	inches	Actuator lbs	With handwheel lbs
PN1500 and PN2500	16"	46"			121.00	
PN1600 and PN2600	18 <sup>5</sup> / <sub>16</sub> "	46"			154.00	
PN9100E and variants	10 "	6A"	2 <sup>3</sup> / <sub>16</sub> "	8 "	13.25	+13.00
PN9100R and variants			5 <sup>1</sup> / <sub>2</sub> "			+5.50
PN9200E and variants	11 "	11 "	2 <sup>3</sup> / <sub>16</sub> "	8 "	37.50	+15.75
PN9200R and variants			5 <sup>1</sup> / <sub>2</sub> "			+8.50
PN9320E and variants	12 "	15 <sup>9</sup> / <sub>16</sub> "	2 <sup>9</sup> / <sub>16</sub> "	13 <sup>3</sup> / <sub>4</sub> "	59.50	+15.75
PN9320R and variants			15 "			+8.50
PN9330E and variants	13 "	15 <sup>9</sup> / <sub>16</sub> "	2 <sup>9</sup> / <sub>16</sub> "	13 <sup>3</sup> / <sub>4</sub> "	59.50	+15.75
PN9330R and variants			15 "			+8.50

### Dimensions / weights for the EL and AEL actuator ranges

approximate in inches and lbs

Actuator range	F inches	G inches	Weight lbs
EL7200 series	4"	18 <sup>1</sup> / <sub>2</sub> "	6.5
AEL55 and AEL65	7"	22"	22.0
AEL51, AEL52, AEL53, AEL62 and AEL63	7"	18"	11.0
AEL54 and AEL64	7"	19"	15.5
AEL56 and AEL66	9"	30"	44.0



# SPIRA-TROL Two-port Control Valves

## ASME Standard LEA, LFA and LLA ½" to 4"

### Spare parts

#### SPIRA-TROL - L series

The spare parts available are shown in solid outline. Parts drawn in broken line are not supplied as spares.

**Note:** When placing an order for spare parts please specify clearly the full product description as found on the label of the valve body, as this will ensure that the correct spare parts are supplied.

#### Available spares

Actuator clamping nut		<b>A</b>
Gasket set	(Non-bellows sealed)	<b>B, G</b>
	PTFE chevrons	<b>C</b>
Stem seal kits	PTFE to Graphite conversion kit	<b>C1</b>
	Graphite packing	<b>C2</b>
Plug stem and seat kit	(No gaskets supplied)	<b>D, E</b>
PTFE soft seat seal		<b>H</b>
		<b>B, G, C1</b>
Stem packing and gasket		<b>B, G, C</b>
		<b>B, G, C2</b>
Soft seat set		<b>H1</b>

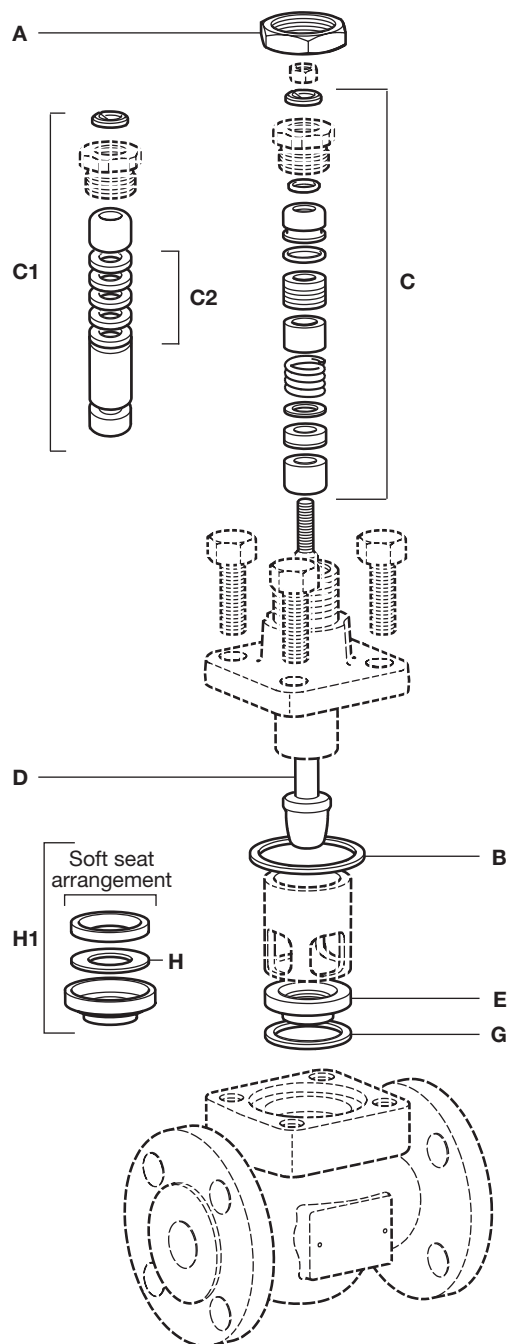
Specify if reduced trim.

#### How to order spares

Always order spares by using the description given in the column headed 'Available spares', and state the size and type of valve including the full product description of the product.

#### How to fit spares

Full fitting instructions are given in the Installation and Maintenance Instructions supplied with the spare.





# SPIRA-TROL Two-port Control Valves

## ASME Standard LEA, LFA and LLA ½" to 4"

### Spare parts

#### SPIRA-TROL - L series with bellows seal

The spare parts available are shown in solid outline. Parts drawn in broken line are not supplied as spares.

**Note:** When placing an order for spare parts please specify clearly the full product description as found on the label of the valve body, as this will ensure that the correct spare parts are supplied.

#### Available spares

<b>Actuator clamping nut</b>	<b>A</b>
<b>Gasket set</b> (Non-bellows sealed)	<b>B, G</b>
<b>Stem seal kit</b> Graphite packing and gasket set	<b>C2</b>
<b>Plug stem and seat kit</b> (No gaskets supplied)	<b>D, E</b>
<b>Bellows seal assembly</b>	<b>F</b>
<b>PTFE soft seat seal</b>	<b>H</b>
<b>Soft seat set</b>	<b>H1</b>

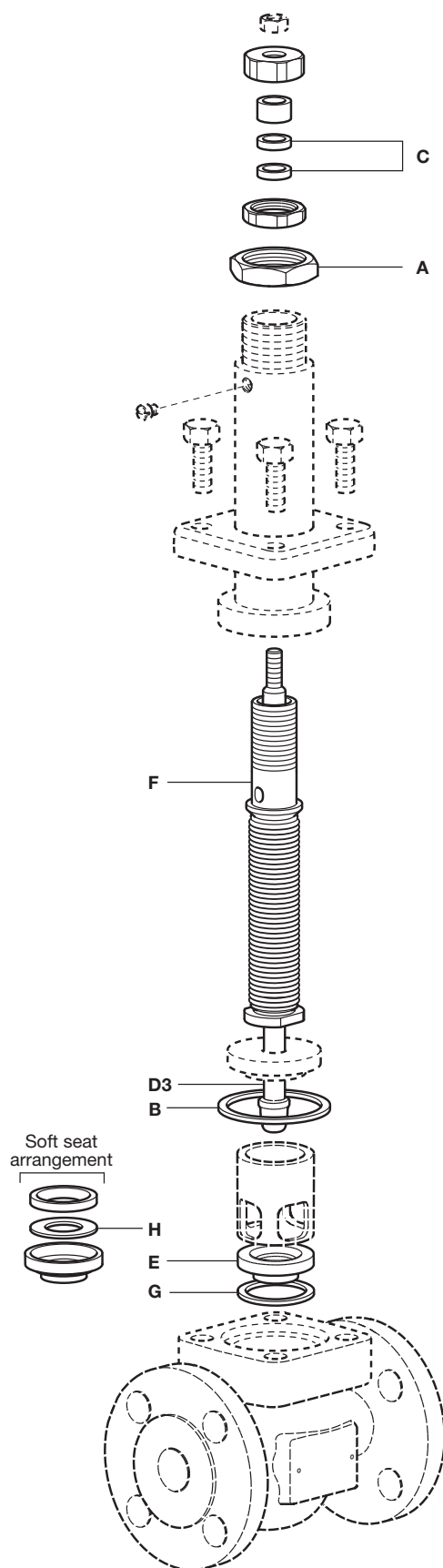
Specify if reduced trim.

#### How to order spares

Always order spares by using the description given in the column headed 'Available spares', and state the size and type of valve including the full product description of the product.

#### How to fit spares

Full fitting instructions are given in the Installation and Maintenance Instructions supplied with the spare.



# SPIRA-TROL Two-port Control Valves

## ASME Standard LEA, LFA and LLA ½" to 4"

### SPIRA-TROL selection guide:

Valve size	ASME standard = ½", ¾", 1", 1¼", 1½", 2", 2½", 3" and 4"	
Valve series	L = L series 2-port control valve	L
Valve characteristic	E = Equal percentage F = Fast opening L = Linear	E
Flange type	A = ASME	A
Flow	Blank = under T = over	Blank
Connections	3 = Cast iron 4 = Carbon steel 6 = Stainless steel	4
Connections	1 = Screwed 3 = Flanged	3
Stem sealing	P = PTFE H = Graphite N = PTFE / Nitronic bush (½" to 2" only) D = Bellows	P
Seating	T = 431 stainless steel G = PTFE soft seat S = 316L stainless steel W = 316L with stellite 6 facing	T
Type of trim	S = Standard trim A1 = 1 stage anticavitation A2 = 2 stage anticavitation P1 = 1 stage low noise cage P2 = 2 stage low noise cage P3 = 3 stage low noise cage	S
Trim balancing	U = Unbalanced B = Balanced (only available LEA series)	U
Bonnet type	S = Standard E = Extended	S
Bolting	S = Standard bolting	S
Finish	Blank = Standard finish N = Nickel plated	Blank
Series	2 = .2	0.2
Cvs	To be specified	Cvs 12
Connection type	To be specified	Flanged ASME Class 150

### Selection example:

1"	-	L	E	A	4	3	P	T	S	U	S	S	.2	-	Cvs 12	-	Flanged ASME Class 150
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### How to order

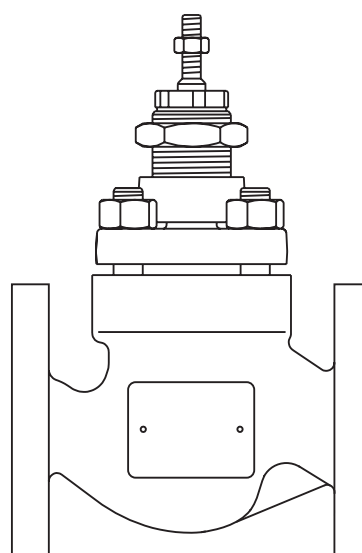
**Example:** 1 off Spirax Sarco SPIRA-TROL 1" LEA43PTSUSS.2 Cvs 12 two-port control valve having flanged connections.



## SPIRA-TROL Two-port Control Valves ASME Standard KEA, KFA and KLA ½" to 8"

### Description

SPIRA-TROL is a range of two-port single seat globe valves with cage retained seats conforming to ASME standard. These valves are available in three body materials in sizes ranging from ½" to 8". When used in conjunction with a pneumatic or electric linear actuator they provide characterized modulating or on/off control.



**KEA, KFA and KLA**  
½" to 8"

### Sizes and pipe connections

Body material	Connections	Type	Size range
Carbon steel	Threaded NPT	<b>KEA41</b>	½", ¾", 1", 1¼", 1½" and 2"
	Socket weld	<b>KEA42</b>	½", ¾", 1", 1¼", 1½" and 2"
	Flanged ASME 300	<b>KEA43</b>	½", ¾", 1", 1½", 2", 2½", 3" and 4"
	ASME 150 and ASME 300	<b>KEA43</b>	6" to 8"
Stainless steel	Threaded NPT	<b>KEA61</b>	½", ¾", 1", 1¼", 1½" and 2"
	Socket weld	<b>KEA62</b>	½", ¾", 1", 1¼", 1½" and 2"
	Flanged ASME 300	<b>KEA63</b>	½", ¾", 1", 1½", 2", 2½", 3" and 4"
	ASME 150 and ASME 300	<b>KEA63</b>	6" and 8"
SG iron	Flanged ASME 125 and ASME 250	<b>KEA73</b>	1", 1½", 2", 2½", 3", 4", 6" and 8"

# SPIRA-TROL Two-port Control Valves

## ASME Standard KEA, KFA and KLA ½" to 8"

### SPIRA-TROL valve characteristic - options:

<b>KEA</b>	<b>Equal percentage (E)</b> - Suitable for most modulating process control applications providing good control at all flowrates.
<b>KFA</b>	<b>Fast opening (F)</b> - For on/off applications only.
<b>KLA</b>	<b>Linear (L)</b> - Primarily for liquid flow control where the differential pressures across the valve are constant.

**Important note:** Throughout this document, reference has been made to the standard KE or KEA control valve. With the exception of trim type, the KEA, KFA, and KLA control valves are identical.

### SPIRA-TROL valve options:


<b>Stem sealing</b>	<b>PTFE chevron seals</b>	Standard
	<b>Graphite packing</b>	High temperature applications
	<b>Bellows / PTFE (B)</b>	Zero emissions and thermal fluids
	<b>Bellows / graphite (C)</b>	Zero emissions, high temperature applications and thermal fluids
	<b>Bellows / graphite secondary seals (D)</b>	Zero emissions and high temperature applications
<b>Seating</b>	<b>Metal-to-metal</b>	431 stainless steel - standard 316L stainless steel - ½" to 4" only
	<b>Soft seating</b>	Up to 392°F - PTFE for Class VI shut-off
	<b>Hard facing</b>	316L stainless steel with Stellite 6 facing - for more arduous applications
<b>Bonnet type</b>	Standard bonnet	
	Extended bonnet for large pipe lagging or hot / cold applications	
<b>Trim</b>	Standard trim	
	Low noise and anti-cavitation trim (see TI-S24-59)	

### SPIRA-TROL valves are compatible with the following actuators and positioners:

<b>Electric</b>	EL7200, AEL5 and AEL6 series
<b>Pneumatic</b>	PN1000, PN2000, PN9000 and TN2000 series
<b>Positioners</b>	PP5 (pneumatic) or EP5 (electropneumatic)
	ISP5 (intrinsically safe electropneumatic)
	SP400 and SP500 (microprocessor based electropneumatic)
	SP300 (digital communications)

**Note:** Reference the product specific Technical Information sheet for further details.

### Standards

Designed in accordance with EN 60534. This product fully complies with the requirements of the European Pressure Equipment Directive 97 / 23 / EC and carries the  mark when so required.

### Certification

This product is available with certification to EN 10204 3.1. **Note:** All certification / inspection requirements must be stated at the time of order placement.

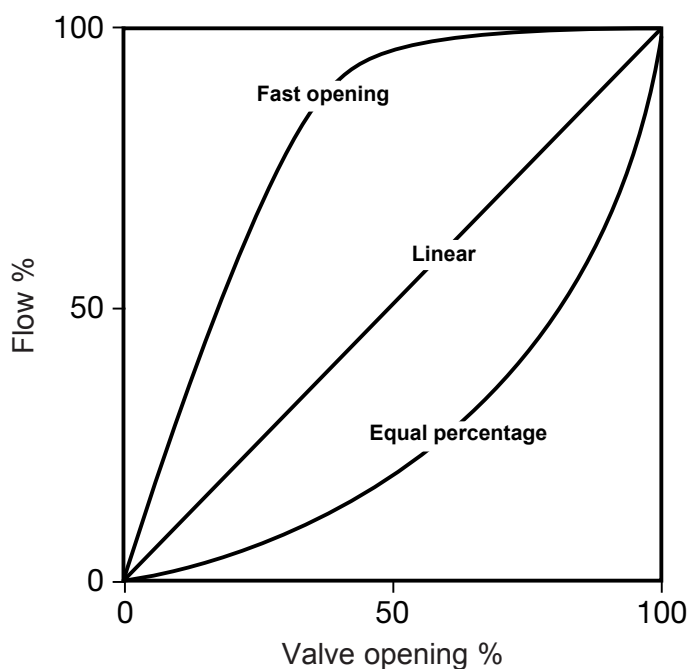
# SPIRA-TROL Two-port Control Valves

## ASME Standard KEA, KFA and KLA ½" to 8"

### Technical data

<b>Plug design</b>		Parabolic	
<b>Leakage</b>	Metal-to-metal	Balanced (6" and 8" only)	Class IV
		Unbalanced	Class IV (Class V is optional)
	Soft seal	Balanced (6" and 8" only)	Class IV
		Unbalanced	Class VI
<b>Rangeability</b>	Equal		50:1
	Linear		30:1
	Fast		10:1
<b>Travel</b>	(½" - 2")	(¾")	
	(1½" - 4")	(1⅞")	
	(5" - 8")	(2¾")	

### Typical flow characteristic curves



# SPIRA-TROL Two-port Control Valves

## ASME Standard KEA, KFA and KLA ½" to 8"

### Materials - ½" to 4"

Body material	Type	No.	Part	Material
Carbon steel	KEA41 KEA42 KEA43	1	Body	Cast steel ASTM A216 WCB
		2	Bonnet	½" to 2" Forged steel ASTM A105N
				2½" to 4" Cast steel ASTM A216 WCB
		2a	Bonnet extension	Cast steel ASTM A216 WCB
		2c	Extended bonnet	Cast steel ASTM A216 WCB
Stainless steel	KEA61 KEA62 KEA63	1	Body	Stainless steel ASTM A351 CF8M
		2	Bonnet	
		2a	Bonnet extension	Stainless steel ASTM A351 CF8M
		2c	Extended bonnet	
SG iron	KEA71 KEA73	1	Body	SG iron ASTM A395
		2	Bonnet	
		2a	Bonnet extension	Cast steel ASTM A216 WCB
		2c	Extended bonnet	
All versions		2b	Bellows	Stainless steel
		3	Stem lock-nut	Stainless steel
		4	Bonnet gasket	Reinforced exfoliated graphite
		5	Seat retainer	Stainless steel
		6	Valve seat ring	Stainless steel
		7	Seat gasket	Reinforced exfoliated graphite
		8	Valve plug and stem	Stainless steel
		9 *	Lower stem guide	Glass filled PTFE
		10	Lower stem wiper	PTFE
		11 *	Packing guard washer	Stainless steel
		12 *	Spring	Stainless steel
		13	Packing spacer	Stainless steel
		14 *	Chevron packing set	PTFE
		15 *	Outer 'O' ring	Viton
		16 *	Upper stem guide	Glass filled PTFE
		17 *	Inner 'O' ring	Viton
		18	Gland nut	Stainless steel
		19	Scraper ring	PTFE
		20	Actuator clamp nut	KEA6_ Stainless steel
				Others Plated carbon steel
		21	Bellows assembly	Stainless steel
		22	Bonnet extension gasket	Reinforced exfoliated graphite
		23	Top plate (used on bonnet extension only)	Stainless steel
		24	Lower spindle bearing housing	Stainless steel
		25	Lower spindle bearing	Stellite 6 or stainless steel for KE43, KE71 and KE73
		26	Spindle lock and anti-rotation nut	Stainless steel
		27 and 28 For nuts and studs, see page 8		

### \* Graphite packing

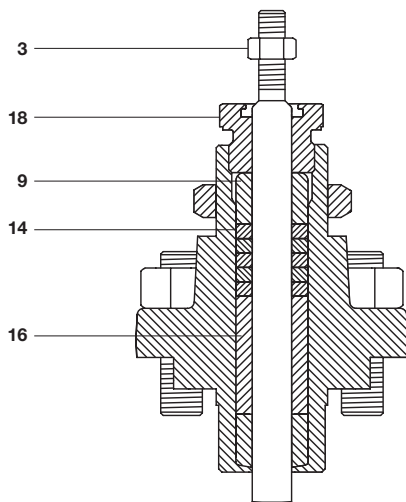
High temperature packing	9 16	Lower and upper stem guide	Stellite 6
	14	Grafoil packing	Graphite rings
	10, 11, 12, 15, 17 and 19		Not used



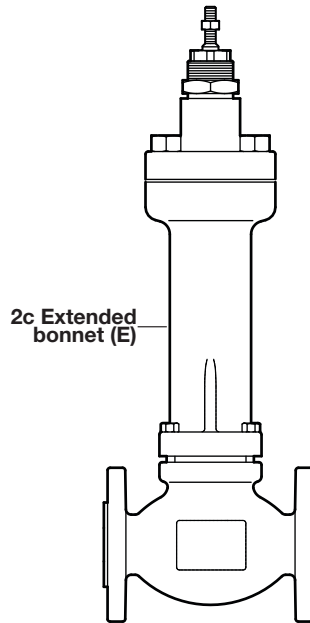
# SPIRA-TROL Two-port Control Valves

## ASME Standard KEA, KFA and KLA 1/2" to 8"

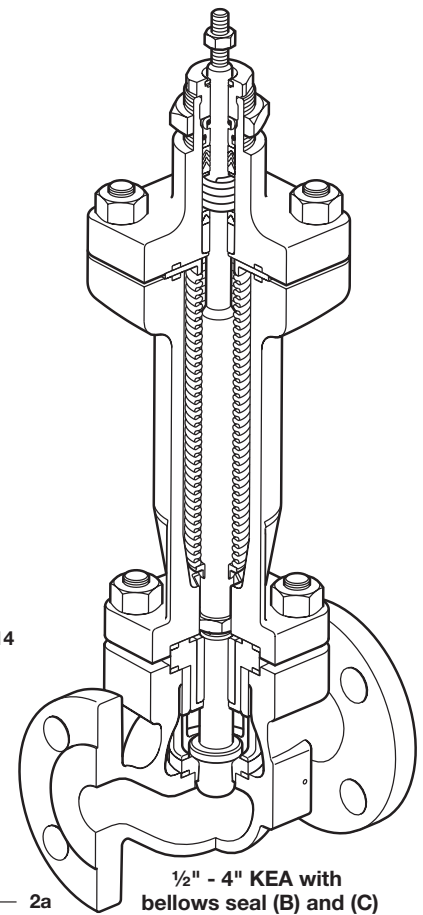
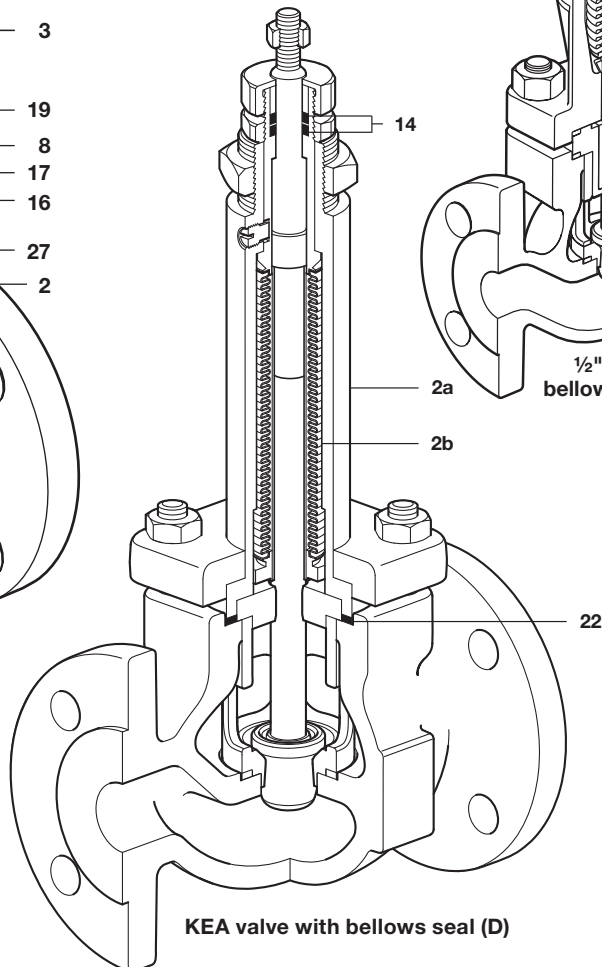
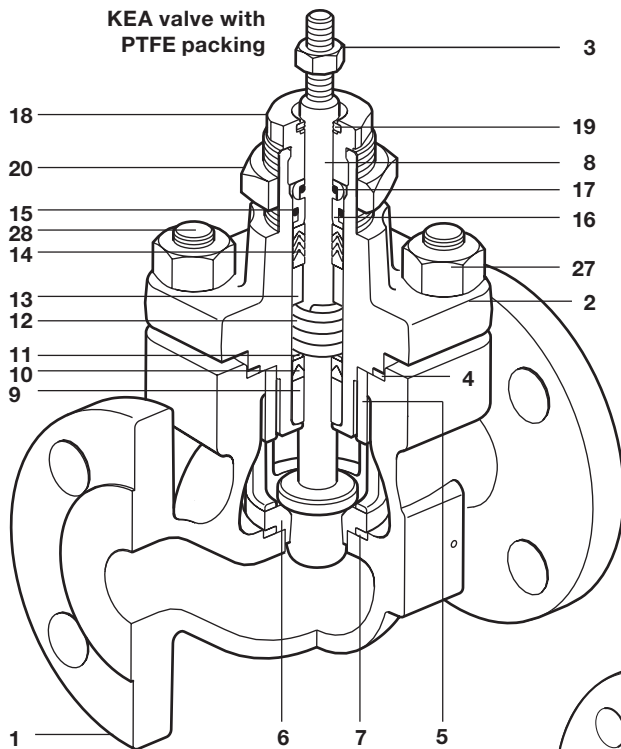
KEA valve with  
graphite packing



KEA valve with  
extended bonnet (E)



KEA valve with  
PTFE packing



KEA valve with bellows seal (D)

# SPIRA-TROL Two-port Control Valves

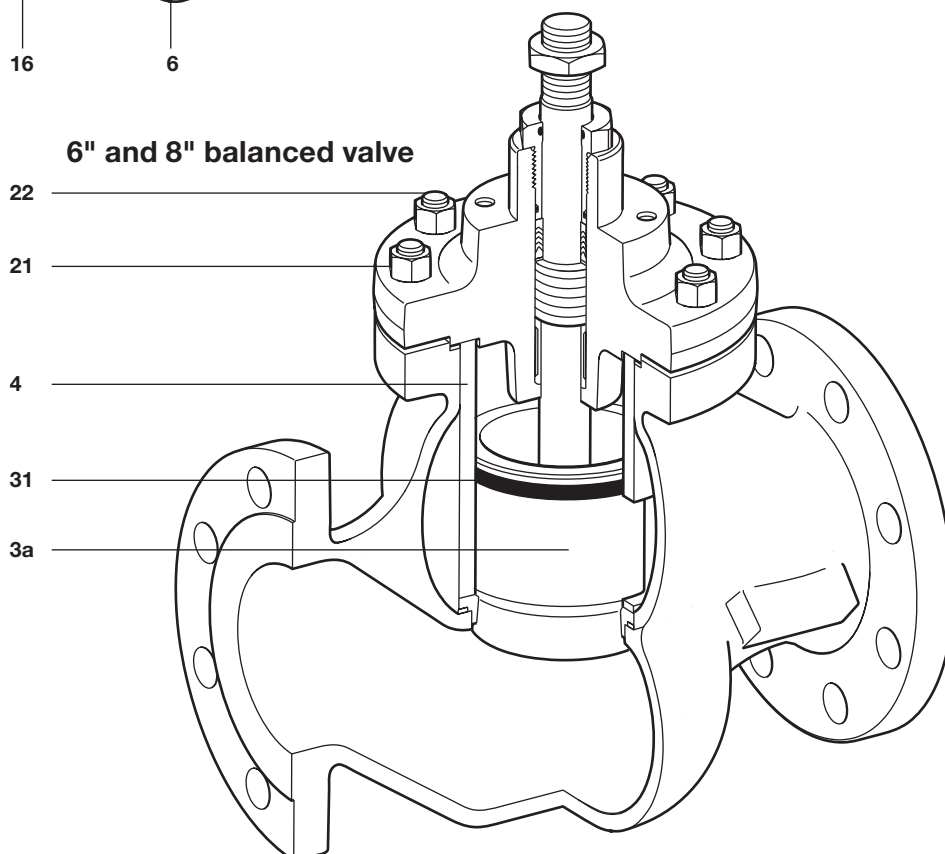
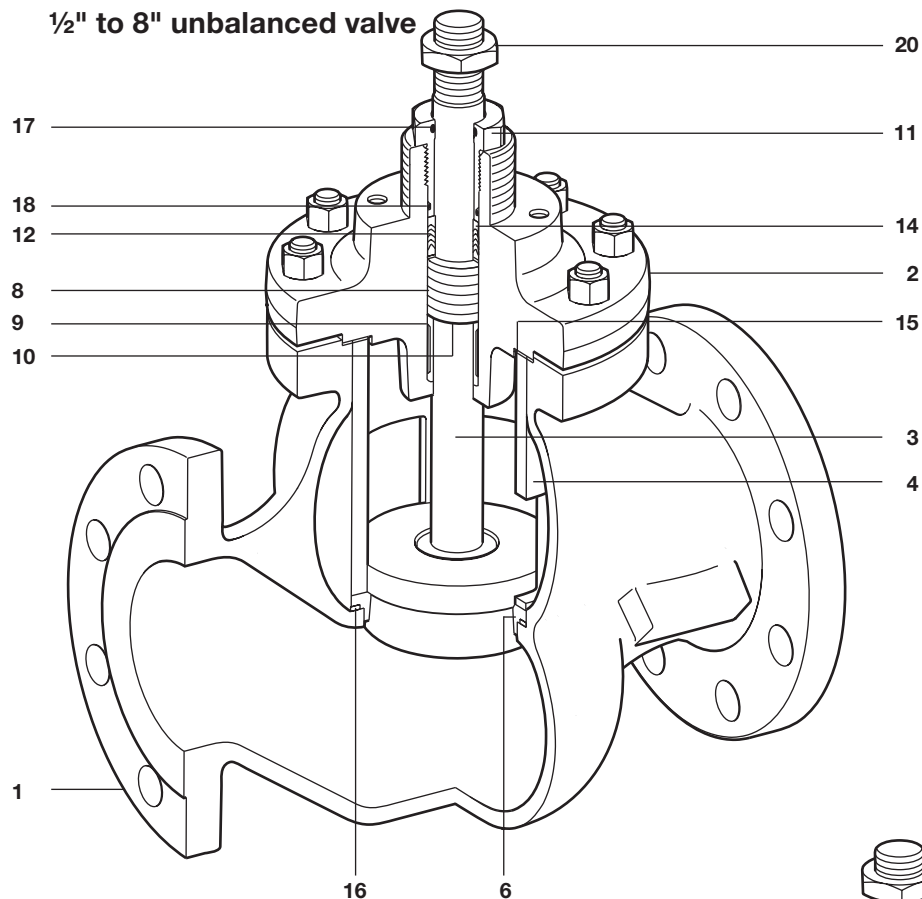
## ASME Standard KEA, KFA and KLA ½" to 8"

### Materials - 6" to 8"

Body material	Type	No.	Part	Material	
Carbon steel	KEA43	1	Body	Cast steel	ASTM A216 WCB
		2	Bonnet	Cast steel	ASTM A216 WCB
Stainless steel	KEA63	1	Body	Stainless steel	ASTM A351 CF8M
		2	Bonnet		
SG iron	KEA73	1	Body	SG iron	ASTM A395
		2	Bonnet		
All versions		3	Plug and stem assembly	Stainless steel	
		4	Cage	Stainless steel	
		6	Valve seat ring	Stainless steel	
		9	Bearing	Stellite	
		10	Spacer (not used in DN125 valves)	Stainless steel	
		11	Gland nut	Stainless steel	
		14	Washer	Stainless steel	
		15	Bonnet gasket	Stainless steel / graphite	
		16	Seat gasket	Stainless steel / graphite	
		20	Stem nut	Stainless steel	
		21	Standard bonnet nut	KEA43 Carbon steel	ASTM A194 2H
				KEA63 Stainless steel	ASTM A194 8M
				KEA73 Carbon steel	ASTM A194 2H
			High temperature bonnet nut	Stainless steel	DIN ISO 3506 A2
		22	Standard stud	KEA43 Carbon steel	ASTM A193 B7
				KEA63 Stainless steel	ASTM A193 B8M2
				KEA73 Carbon steel	ASTM A193 B7
PTFE gland versions		8	Spring	Stainless steel	
		12	Chevron packing set	PTFE	
		17	Stem 'O' ring	Viton	
		18	Bonnet 'O' ring	Viton	
High temperature gland versions		26	Gland packing	Graphite	
Balanced versions		3a	Plug and stem assembly	Stainless steel	
		29	Cage	Stainless steel	
		31	Balanced seal	Graphite	

# SPIRA-TROL Two-port Control Valves

## ASME Standard KEA, KFA and KLA ½" to 8"

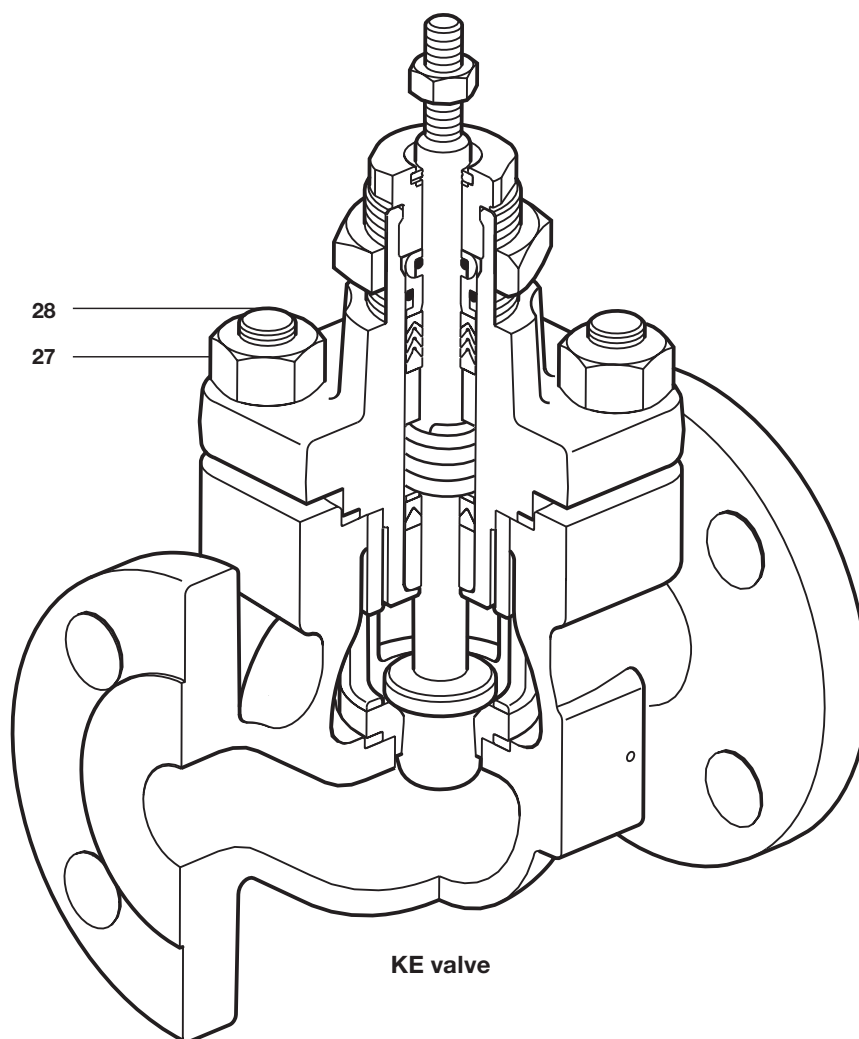


# SPIRA-TROL Two-port Control Valves

## ASME Standard KEA, KFA and KLA ½" to 8"

### Materials - Nuts and studs ½" to 4"

Body material	No.	Part	Material	
All versions	27	Standard bonnet studs KEA4_ KEA6_ KEA7_	Steel	ASTM A194 Gr.2H
			Steel	ASTM A193 Gr.B7
			Steel	ASTM A193 Gr. B8 M2
	28	Standard bonnet studs KEA4_ KEA6_ KEA7_	Steel	ASTM A193 Gr. B7
			Steel	ASTM A193 Gr. B7



# SPIRA-TROL Two-port Control Valves

## ASME Standard KEA, KFA and KLA ½" to 8"

### C<sub>v</sub> values

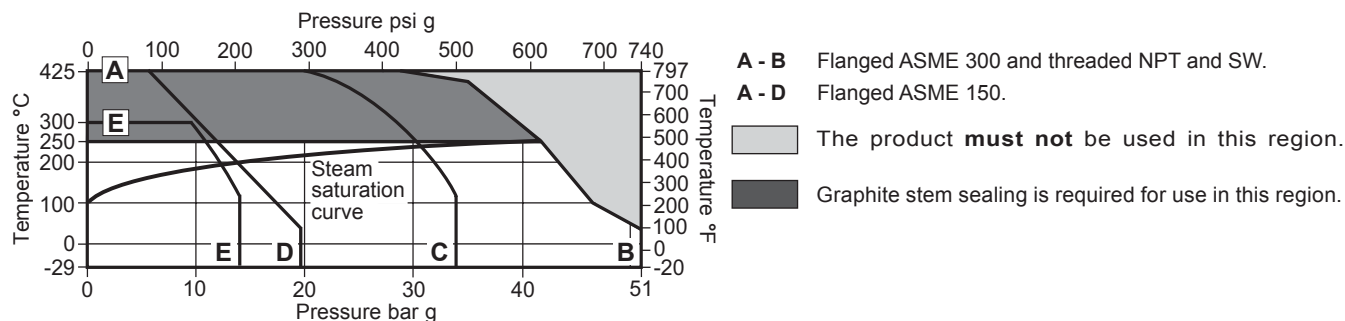
Valve size		(½" )	(¾")	(1")	(1¼")	(1½")	(2")	(2½")	(3")	(4")	(5")	(6")	(8")
Standard trim	Full port	Equal %	5.0	7.5	12.0	16.0	30	45	75	120	190	433	679
		Linear	5.0	7.5	12.0	16.0	30	45	75	120	190	456	749
		Fast opening	5.0	7.5	12.0	16.0	32	50	88	136	210	456	749
	Reduced trim 1	Equal %	2.5	5.5	8.5	18.0	16	33	48	85	130	336	433
		Linear	2.5	5.5	8.5	12.0	18	33	48	85	130	336	433
	Reduced trim 2	Equal %	1.8	2.5	6.0	8.5	13	18	36	50	90	154	271
		Linear	1.8	2.5	6.0	8.5	13	18	36	50	90	154	271
	Reduced trim 3	Equal %	1.0	1.8	3.0	6.0	9	14	18	38	53	120	191
		Linear	1.0	1.8	3.0	6.0	9	14	18	38	53	120	191
	Reduced trim 4	Equal %		1.0	1.8		6	9		18			
		Linear		1.0	1.8		6	9		18			
	Reduced trim 5	Equal %			1.0			6					
		Linear			1.0			6					
Microflute			0.50	0.50	0.50								
			0.20	0.20	0.20								
			0.10	0.10	0.10								
			0.07	0.07	0.07								
			0.01	0.01	0.01								
			0.20	0.20	0.20								
			0.10	0.10	0.10								
			0.07	0.07	0.07								
			0.01	0.01	0.01								

**Note:** For low noise and anti-cavitation C<sub>v</sub> please see TI-S24-59

# SPIRA-TROL Two-port Control Valves

## ASME Standard KEA, KFA and KLA ½" to 8"

### Pressure/temperature limits - KEA41, KEA42 and KEA43 (Carbon steel)



#### Notes:

- Where the process fluid temperature is sub-zero and the ambient temperature is below 41°F, the external moving parts of the valve and actuator must be heat traced to maintain normal operation.
- When selecting a valve with a bellows sealed bonnet, the pressure/temperature limits of the bellows must be read in conjunction with the valve pressure/temperature limits shown above.
- As standard the KEA, KFA, KLA series two-port control valves are supplied with the PTFE stem sealing option.

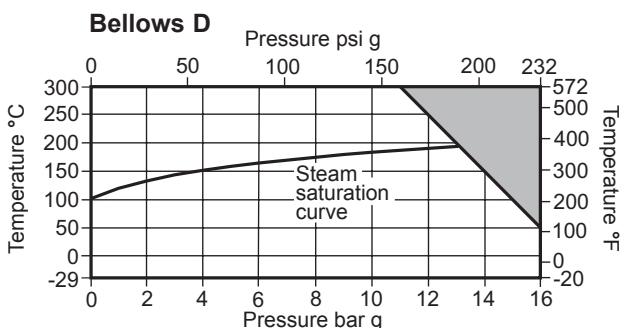
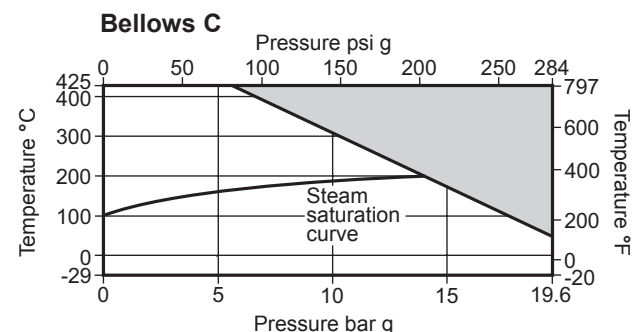
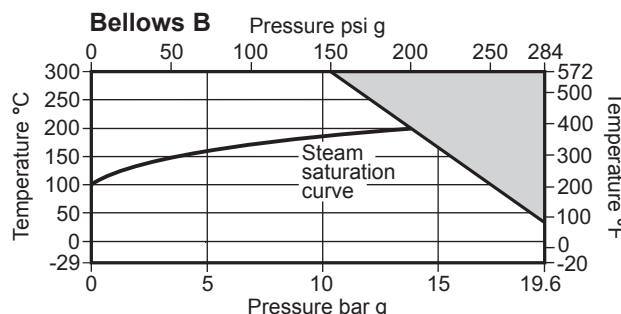
Body design conditions		ASME 150 and ASME 300
Maximum design pressure	ASME 150 (6" to 8" only)	284 psi g @ 100°F
	ASME 300	740 psi g @ 100°F
Maximum design temperature		800°F
Minimum design temperature		-20°F
Maximum operating temperature	PTFE soft seat (G)	392°F
	Standard packing PTFE chevron	482°F
	Extended bonnet (E) with PTFE chevron	
	Graphite packing (H)	800°F
	Extended bonnet (E) with graphite packing	

Note: We recommend that an extended bonnet (E) with graphite packing is used where valve operation is above 572°F.

### Maximum operating temperature - Bellows only

**Note:** When selecting a valve with a bellows sealed bonnet, the pressure/temperature limits of the bellows must be read in conjunction with the valve pressure/temperature limits shown above.

The product **must not** be used in this region.



**Minimum operating temperature** -20°F

**Note:** For lower operating temperatures consult Spirax Sarco.

**Maximum differential pressures**

See relevant actuator Technical Information sheet

**Maximum cold hydraulic test pressure of:**

1 100 psi g

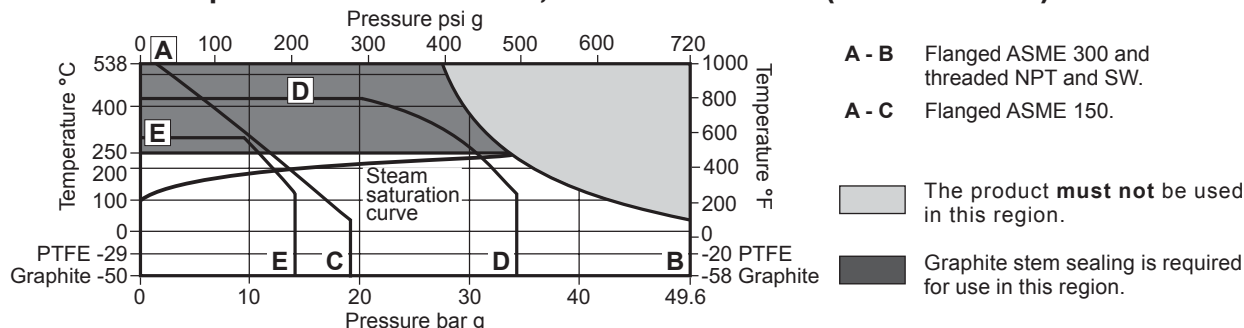
**Warning:** If the valve is fitted with a bellows it must be removed if hydraulic testing is to be done.



# SPIRA-TROL Two-port Control Valves

## ASME Standard KEA, KFA and KLA 1/2" to 8"

### Pressure/temperature limits - KEA61, KEA62 and KEA63 (Stainless steel)



#### Notes:

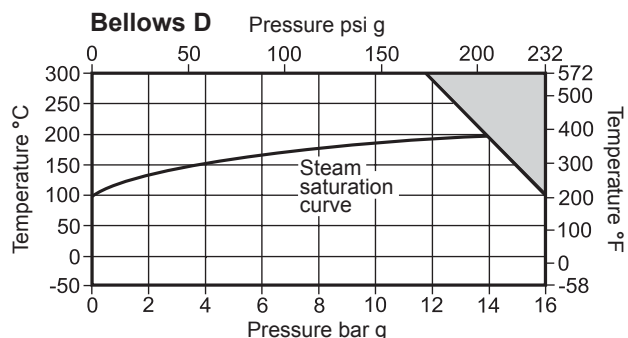
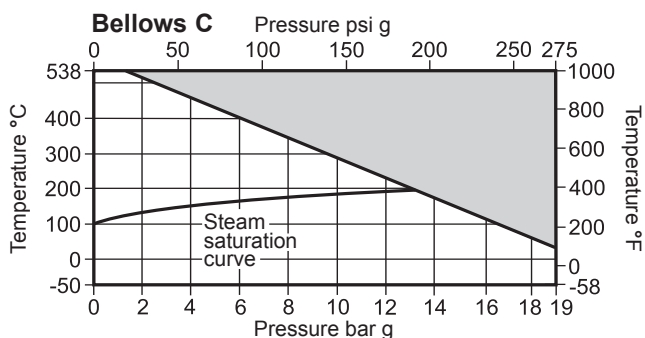
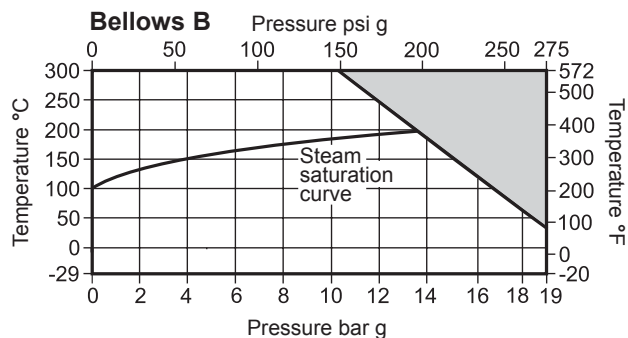
- Where the process fluid temperature is sub-zero and the ambient temperature is below +41°F, the external moving parts of the valve and actuator must be heat traced to maintain normal operation.
- When selecting a valve with a bellows sealed bonnet, the pressure/temperature limits of the bellows must be read in conjunction with the valve pressure/temperature limits shown above.
- As standard the KEA, KFA, KLA series two-port control valves are supplied with the PTFE stem sealing option.

Body design conditions		ASME 150 and ASME 300
Maximum design pressure	ASME 150 (6" to 8" only)	275 psi g @ 100°F
	ASME 300	720 psi g @ 100°F
Maximum design temperature		1000°F
Minimum design temperature		-58°F
Maximum operating temperature	PTFE soft seat (G)	392°F
	Standard packing PTFE chevron	
	Extended bonnet (E) with PTFE chevron	482°F
	Graphite packing (H)	
	Extended bonnet (E) with graphite packing	1000°F

Note: We recommend that an extended bonnet (E) with graphite packing is used where valve operation is above 572°F.

### Maximum operating temperature - Bellows only

Note: When selecting a valve with a bellows sealed bonnet, the pressure/temperature limits of the bellows must be read in conjunction with the valve pressure/temperature limits shown above.

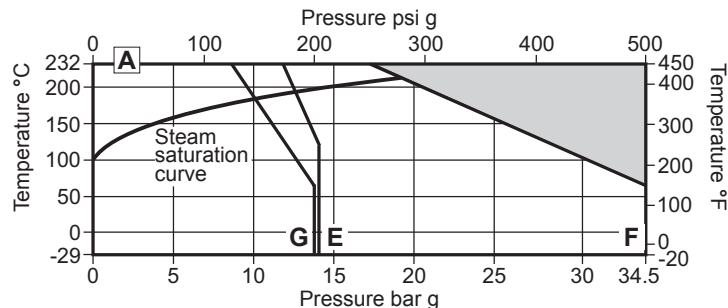


Minimum operating temperature	PTFE packing	-20°F
Note: For lower operating temperatures consult Spirax Sarco.	Graphite packing	-58°F
Maximum differential pressures	See relevant actuator Technical Information sheet	
Maximum cold hydraulic test pressure of:		1087.5 psi g
Warning: If the valve is fitted with a bellows it must be removed if hydraulic testing is to be done.		

# SPIRA-TROL Two-port Control Valves

## ASME Standard KEA, KFA and KLA ½" to 8"

### Pressure/temperature limits - KEA71 and KEA73 (SG iron)



A - F Flanged ASME 250 and threaded NPT and SW.

A - G Flanged ASME 125.

■ The product **must not** be used in this region.

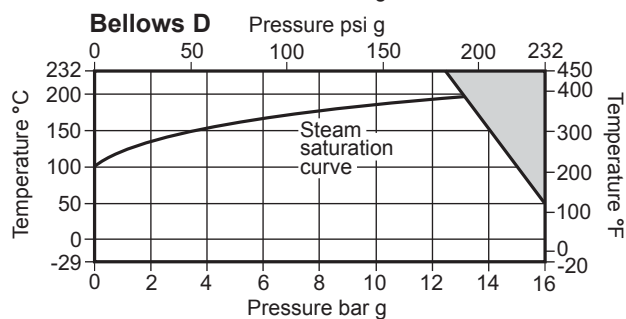
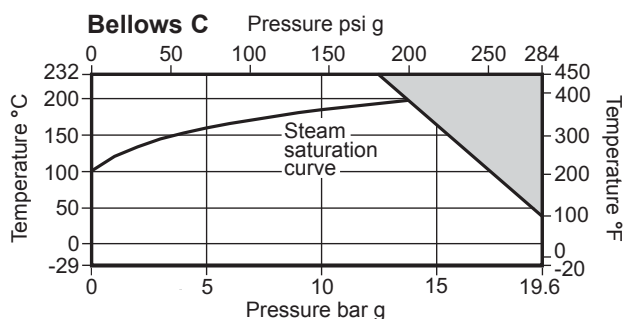
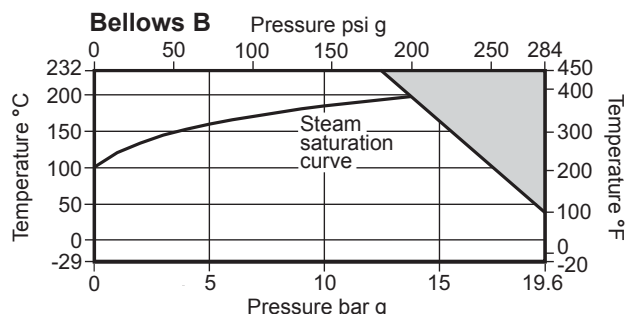
#### Notes:

- Where the process fluid temperature is sub-zero and the ambient temperature is below +41°F, the external moving parts of the valve and actuator must be heat traced to maintain normal operation.
- When selecting a valve with a bellows sealed bonnet, the pressure/temperature limits of the bellows must be read in conjunction with the valve pressure/temperature limits shown above.
- As standard the KEA, KFA, KLA series two-port control valves are supplied with the PTFE stem sealing option.

Body design conditions		ASME 125 and ASME 250
Maximum design pressure	ASME 125	200 psi g @ 150°F
	ASME 250	500 psi g @ 150°F
Maximum design temperature		450°F
Minimum design temperature		-20°F
Maximum operating temperature	PTFE soft seat (G)	392°F
	Standard packing PTFE chevron	
	Graphite packing (H)	
	Extended bonnet (E) with PTFE chevron	450°F
	Extended bonnet (E) with graphite packing	

### Maximum operating temperature - Bellows only

**Note:** When selecting a valve with a bellows sealed bonnet, the pressure/temperature limits of the bellows must be read in conjunction with the valve pressure/temperature limits shown above.



Minimum operating temperature -20°F

**Note:** For lower operating temperatures consult Spirax Sarco.

Maximum differential pressures	See relevant actuator Technical Information sheet	
Maximum cold hydraulic test pressure of:	ASME 125	300 psi g
	ASME 250	750 psi g

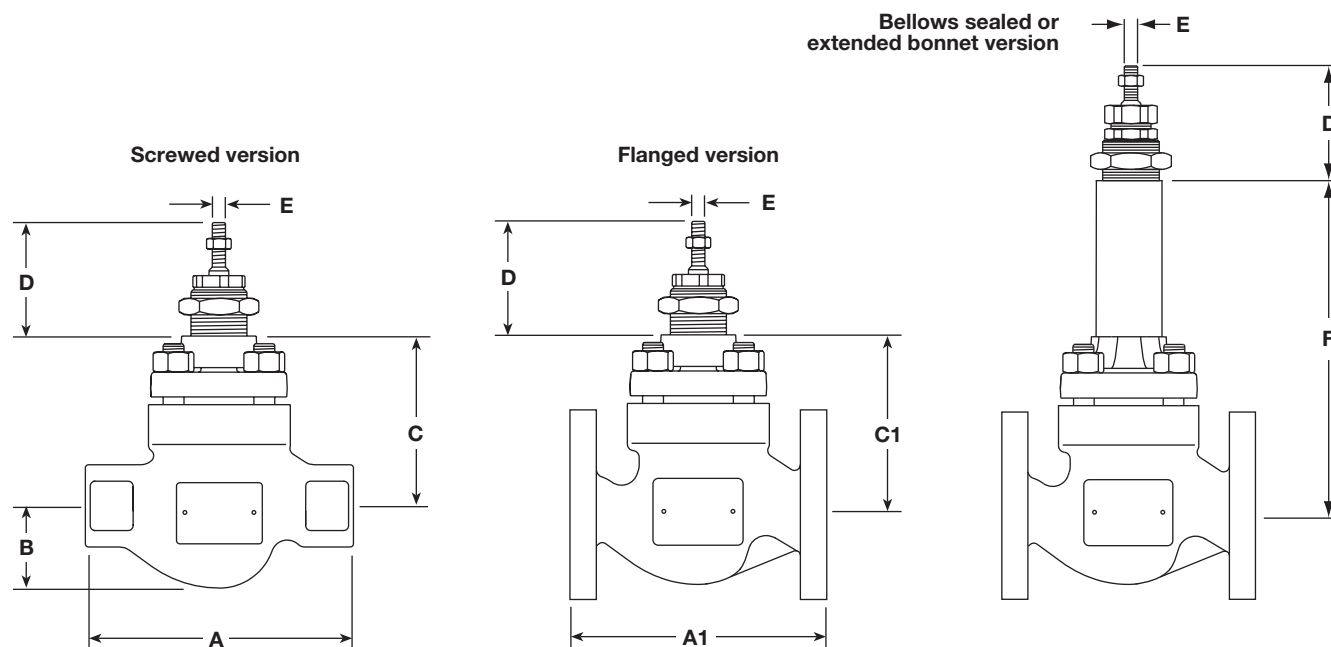
**Warning:** If the valve has a bellows it must be removed if hydraulic testing is to be done.

# SPIRA-TROL Two-port Control Valves

## ASME Standard KEA, KFA and KLA ½" to 8"

Dimensions for the SPIRA-TROL two-port control valve approximate in inches

Valve size	Screwed			Flanged			D	E	F		
	NPT			KEA valves							
	A	B	C	A1		C1			Thread	Bellows seals	Extended bonnet
				ASME 125 and 150	ASME 250 and 300						
1½"	6½"	1¾"	4"		7½"	4"	2¾"	M8	9"	13.25"	
¾"	6½"	1¾"	4"		7½"	4"					
1"	7¾"	2¼"	4"	7¼"	7¾"	4"			10½"	19.94	
1¼"	8½"	2¼"	5"			5"					
1½"	9¼"	2½"	5"	8¾"	9¼"	5"					
2"	10½"	3"	5"	10"	10½"	5"	3"	M12	14½"	19.38"	
2½"				10½"	11½"	7⅞"			14½"		
3"				11¾"	12½"	7⅞"			15"	17"	
4"				13¾"	14½"	8½"				21 ⅕"	
5"										21 ⅞"	
6"				17¾"	18⅝"	11"	4 7⁄8"	M30		21 7⁄8"	
8"				21⅜"	22⅜"	13½"				24½"	



# SPIRA-TROL Two-port Control Valves

## ASME Standard KEA, KFA and KLA 1/2" to 8"

Weights for the SPIRA-TROL two-port control valve approximate in lbs

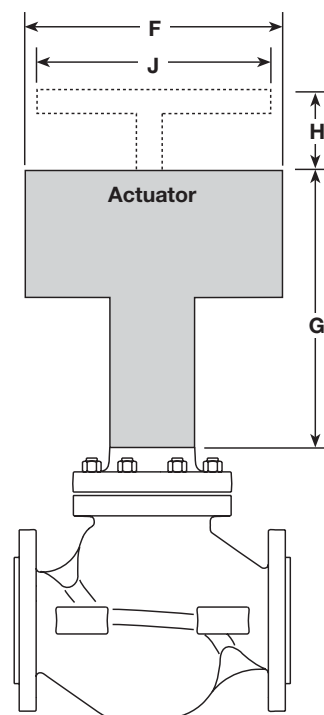
Valve size	KEA valves				Additional bellows and Extended bonnet	Additional balanced
	KEA43	KEA63	KEA73	KEA41 KEA42 KEA61 KEA62 KEA71		
1/2"	16	16	16	16	10	
3/4"	18	18	18	16		
1"	20	20	20	22		
1 1/4"	31	31	29	25	12	
1 1/2"	36	36	31	31		
2"	38	40	38	33		
2 1/2"	78	78	84		21	
3"	86	89	91			
4"	124	124	132		28	
5"					35	4.4
6"	286	286	286		35	7
8"	462	462	462		35	22

# SPIRA-TROL Two-port Control Valves

## ASME Standard KEA, KFA and KLA ½" to 8"

Dimensions / weights for the PN actuator range approximate in inches and lbs

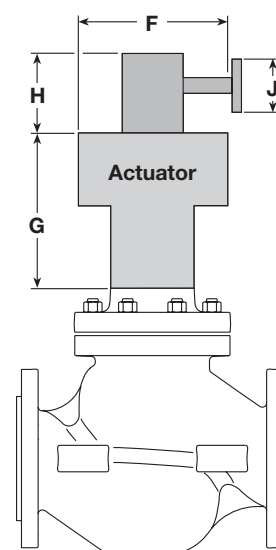
Actuator range and variants	F inches	G inches	H inches	J inches	Weight	
					Actuator lbs	With handwheel lbs
PN1500 and PN2500	16"	46"			121.00	
PN1600 and PN2600	18 <sup>5</sup> / <sub>16</sub> "	46"			154.00	
PN9100E	10 <sup>7</sup> / <sub>8</sub> "	6A"	2 <sup>3</sup> / <sub>16</sub> "	8 <sup>7</sup> / <sub>8</sub> "	13.25	+13.00
PN9100R			5 <sup>1</sup> / <sub>2</sub> "			+5.50
PN9200E	11 <sup>7</sup> / <sub>8</sub> "	11 <sup>7</sup> / <sub>8</sub> "	2 <sup>3</sup> / <sub>16</sub> "	8 <sup>7</sup> / <sub>8</sub> "	37.50	+15.75
PN9200R			5 <sup>1</sup> / <sub>2</sub> "			+8.50
PN9320E	12 <sup>7</sup> / <sub>8</sub> "	15 <sup>9</sup> / <sub>16</sub> "	2 <sup>9</sup> / <sub>16</sub> "	13 <sup>3</sup> / <sub>4</sub> "	59.50	+15.75
PN9320R			15 <sup>9</sup> / <sub>16</sub> "			+8.50
PN9330E	13 <sup>3</sup> / <sub>8</sub> "	15 <sup>9</sup> / <sub>16</sub> "	2 <sup>9</sup> / <sub>16</sub> "	13 <sup>3</sup> / <sub>4</sub> "	59.50	+15.75
PN9330R			15 <sup>9</sup> / <sub>16</sub> "			+8.50
PN9400	20 <sup>1</sup> / <sub>2</sub> "		28 <sup>1</sup> / <sub>4</sub> "		583	+116.00
TN2277E	21"	34"	13"	13"	561	+103.00
TN2277NDA	21"	34"			475	



Top mounted handwheel

Dimensions / weights for the EL and AEL actuator ranges approximate in inches and lbs

Actuator range	F inches	G inches	Weight lbs
EL3500	5 <sup>1</sup> / <sub>4</sub> " x 6 <sup>1</sup> / <sub>4</sub> "	9 <sup>1</sup> / <sub>2</sub> "	3.0
EL3500 SE and SR	5 <sup>1</sup> / <sub>4</sub> " x 6 <sup>1</sup> / <sub>4</sub> "	11"	6.0
AEL55 and AEL65	7"	22"	22.0
AEL51, AEL52, AEL53, AEL62 and AEL63	7"	18"	11.0
AEL54 and AEL64	7"	19"	15.5
AEL56 and AEL66	9"	30"	44.0



Side mounted handwheel

# SPIRA-TROL Two-port Control Valves

## ASME Standard KEA, KFA and KLA ½" to 8"

### Spare parts

#### SPIRA-TROL two-port control valve ½" to 4"

The spare parts available are shown in solid outline. Parts drawn in broken line are not supplied as spares.

**Note:** When placing an order for spare parts please specify clearly the full product description as found on the label of the valve body, as this will ensure that the correct spare parts are supplied.

#### Available spares - K series

Actuator clamping nut	A
Gasket set (Non-bellows sealed)	B, G
PTFE chevrons	C
Stem seal kits PTFE to Graphite conversion kit	C1
Graphite packing	C2
* Equal percentage trim (No gaskets supplied)	D, E
Plug stem and seat kit Fast opening trim (No gaskets supplied)	D1, E
Linear trim (No gaskets supplied)	D2, E
PTFE soft seat seal	H

\* Specify if reduced trim.

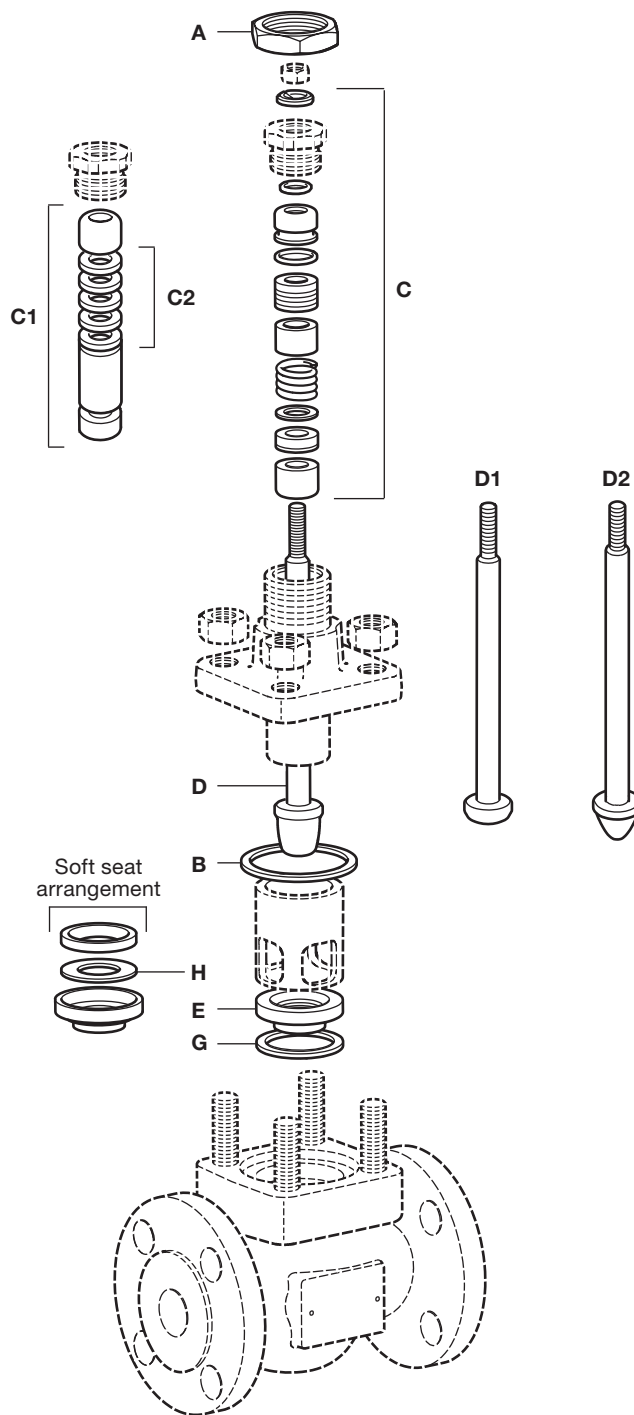
#### How to order spares

Always order spares by using the description given in the column headed 'Available spares', and state the size and type of valve including the full product description of the product.

**Example:** 1 - PTFE stem seal kit for a Spirax Sarco 1" SPIRA-TROL two-port KEA43 PTSUSS.2 Cv<sub>s</sub> 12 control valve.

#### How to fit spares

Full fitting instructions are given in the Installation and Maintenance Instructions supplied with the spare.



# SPIRA-TROL Two-port Control Valves

## ASME Standard KEA, KFA and KLA ½" to 8"

### Spare parts

#### SPIRA-TROL two-port control valve Balanced and unbalanced 6" to 8"

The spare parts available are shown in solid outline. Parts drawn in broken line are not supplied as spares.

**Note:** When placing an order for spare parts please specify clearly the full product description as found on the label of the valve body, as this will ensure that the correct spare parts are supplied.

#### Available spares - K series

Gasket set	Balanced	B, G
Non bellows sealed	Unbalanced	A, B, G
	PTFE chevrons	C3
Stem seal kit	PTFE to Graphite conversion kit (DN15 to DN100)	C4
	Graphite packing	C5
Plug stem and seat kit	Balanced (No gaskets supplied)	A, D, E
	Unbalanced (No gaskets supplied)	D, E

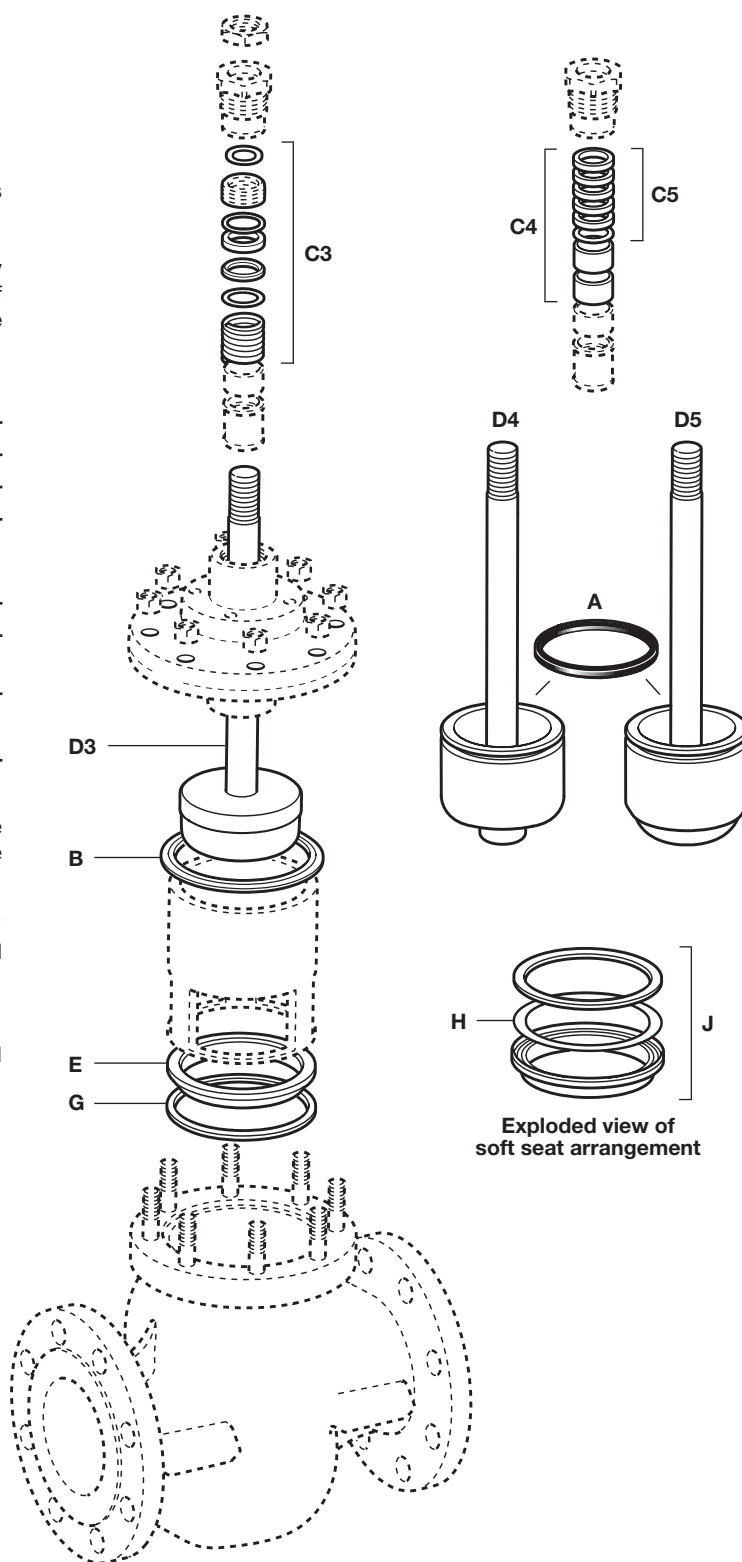
#### How to order spares

Always order spares by using the description given in the column headed 'Available spares', and state the size and type of valve including the full product description of the product.

**Example:** 1 - PTFE stem seal kit for a Spirax Sarco 6" SPIRA-TROL two-port KEA43 PTSBSS.2 C<sub>VS</sub> 433 control valve.

#### How to fit spares

Full fitting instructions are given in the Installation and Maintenance Instructions supplied with the spare.





# SPIRA-TROL Two-port Control Valves

## ASME Standard KEA, KFA and KLA ½" to 8"

### Spare parts

#### SPIRA-TROL two-port control valve with bellows seal - Type D ½" to 4"

The spare parts available are shown in solid outline. Parts drawn in broken line are not supplied as spares.

**Note:** When placing an order for spare parts please specify clearly the full product description as found on the label of the valve body, as this will ensure that the correct spare parts are supplied.

#### Available spares - K series

Actuator clamping nut	A
Gasket set (Bellows sealed)	B, G
Stem seal kit Graphite secondary seal and gasket set	C3
* Equal percentage trim (No gaskets supplied)	D6, E
Plug stem and seat kit Fast opening trim (No gaskets supplied)	D7, E
Linear trim (No gaskets supplied)	D8, E
Bellows seal assembly	F
PTFE soft seat seal	H

\* Specify if reduced trim.

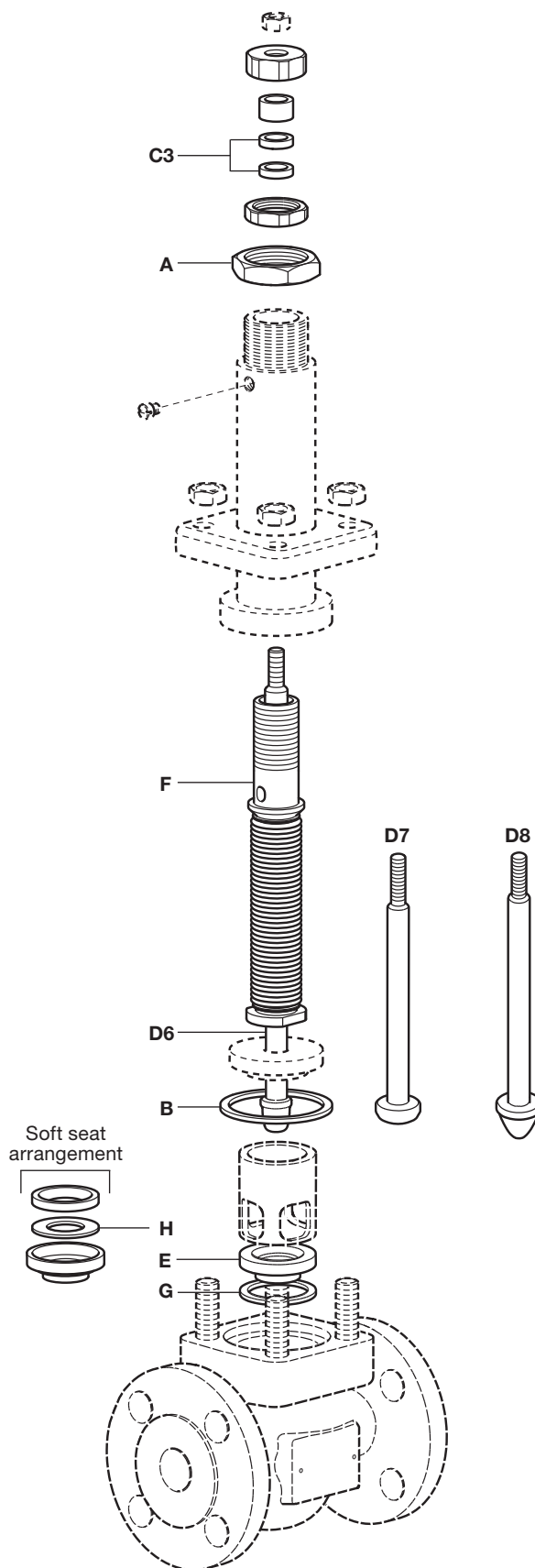
#### How to order spares

Always order spares by using the description given in the column headed 'Available spares', and state the size and type of valve including the full product description of the product.

**Example:** 1 - Graphite stem seal kit for a Spirax Sarco 1" SPIRA-TROL two-port KEA43B TSUSS.2 C<sub>VS</sub>12 control valve.

#### How to fit spares

Full fitting instructions are given in the Installation and Maintenance Instructions supplied with the spare.



# SPIRA-TROL Two-port Control Valves

## ASME Standard KEA, KFA and KLA ½" to 8"

### Spare parts

#### SPIRA-TROL two-port control valve with bellows seal - Types B and C ½" to 4"

The spare parts available are shown in solid outline. Parts drawn in broken line are not supplied as spares.

**Note:** When placing an order for spare parts please specify clearly the full product description as found on the label of the valve body, as this will ensure that the correct spare parts are supplied.

#### Available spares - K series

<b>Actuator clamping nut</b>	<b>A</b>
<b>Gasket set</b> (Bellows sealed)	<b>B, G</b>
PTFE chevrons	<b>C</b>
<b>Stem seal kits</b> PTFE to Graphite conversion kit	<b>C1</b>
Graphite packing	<b>C2</b>
* <b>Equal percentage trim</b> (No gaskets supplied)	<b>D9, E</b>
<b>Plug stem and seat kit</b> <b>Fast opening trim</b> (No gaskets supplied)	<b>D10, E</b>
<b>Linear trim</b> (No gaskets supplied)	<b>D11, E</b>
<b>Bellow seal assembly</b>	<b>F</b>
* <b>PTFE soft seat seal</b>	<b>H</b>

Specify if reduced trim.

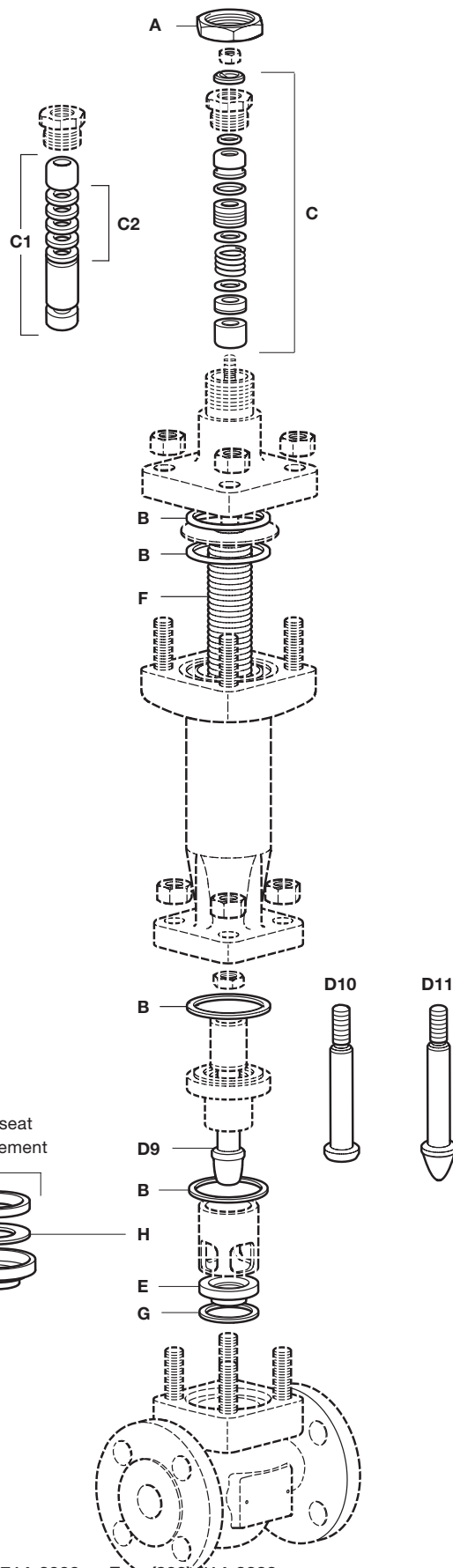
#### How to order spares

Always order spares by using the description given in the column headed 'Available spares', and state the size and type of valve including the full product description of the product.

**Example:** 1 - PTFE stem seal kit for a Spirax Sarco 1" SPIRA-TROL two-port KEA43B TSUSS.2 C<sub>VS</sub>12 control valve.

#### How to fit spares

Full fitting instructions are given in the Installation and Maintenance Instructions supplied with the spare.



# SPIRA-TROL Two-port Control Valves

## ASME Standard KEA, KFA and KLA 1/2" to 8"

### SPIRA-TROL selection guide:

<b>Valve size</b>	ASME standard = 1/2", 3/4", 1", 1 1/4", 1 1/2", 2", 2 1/2", 3", 4", 5", 6", and 8"	<b>1"</b>
<b>Valve series</b>	K = K series 2-port control valve	<b>K</b>
<b>Valve characteristic</b>	E = Equal percentage F = Fast opening L = Linear	<b>E</b>
<b>Flange type</b>	A = ASME	<b>A</b>
<b>Flow</b>	Blank = under T = over	<b>Blank</b>
<b>Body material</b>	4 = Carbon steel 6 = Stainless steel 7 = SG iron	<b>4</b>
<b>Connections</b>	1 = Threaded 2 = Socket weld 3 = Flanged	<b>3</b>
<b>Stem sealing</b>	B = Bellows / PTFE secondary seals C = Bellows / graphite secondary seals D = Bellows / graphite secondary seals H = Graphite P = PTFE	<b>P</b>
<b>Seating</b>	G = PTFE soft seat S = 316L stainless steel T = 431 stainless steel W = 316L with stellite 6 facing	<b>T</b>
<b>Type of trim</b>	A1 = 1 stage anti-cavitation A2 = 2 stage anti-cavitation P1 = 1 stage low noise cage P2 = 2 stage low noise cage P3 = 3 stage low noise cage S = Standard trim	<b>S</b>
<b>Trim balancing</b>	B = Balanced (available for 6" and 8" valves only) U = Unbalanced	<b>U</b>
<b>Bonnet type</b>	E = Extended S = Standard	<b>S</b>
<b>Bolting</b>	H = High temperature S = Standard	<b>S</b>
<b>Finish</b>	Blank = Standard N = ENP coating	
<b>Series</b>	2 = .2	<b>.2</b>
<b>Cvs</b>	To be specified	<b>Cvs 16</b>
<b>Connection type</b>	To be specified	<b>Flanged Class 300</b>

### Selection example:

1 1/2"	-	K	E	A	4	3	P	T	S	U	S	S		.2	-	Cvs 16	-	Flanged Class 300
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### How to order

**Example:** 1 off Spirax Sarco SPIRA-TROL 1 1/2" KEA43PTSUSS.2 Cvs 16 two-port control valve having flanged ASME Class.



## STERI-TROL Clean Service 'S' series Two-port and Three-Port Control Valves - DN15 (1/2") to DN100 (4")

### Description

STERI-TROL 'S' series are 316L stainless steel, two-port and three-port control valves. They are designed for mixing/diverting fluids (three-port only), and for on/off and modulating control of clean steam, pure steam and process fluids. The valve is operated by a pneumatic actuator and may be interfaced with a control system using any of the Spirax Sarco range of positioners.

### Available types

<b>SA</b>	Two-port angle pattern design
<b>SH</b>	Two-port horizontal pattern design
<b>SQ</b>	Three-port design

### Valve characteristics - options:

<b>SAE</b> <b>SHE</b>	<b>Equal percentage (E)</b> - Suitable for most modulating process control applications good control providing at low flowrates.
<b>SAL</b> <b>SHL</b> <b>SQL</b>	<b>Linear (L)</b> - Primarily for liquid flow control where the differential pressure across the valve is constant.

**Important note:** Throughout this document, reference has been made to the standard SAE control valve. With the exception of the trim type and porting arrangement, the SAE, SHE, SAL and SHL control valves are virtually identical.

### Approvals and certification

Compliant to ASME BPE 2002. FDA, 3A and USP 26 Class VI approved sealing materials. Designed in accordance with 3A's and EHEDG. EN 10204 type 3.1 certificates supplied as standard. Surface finish certificate available on request.

### Valve seating - options:

<b>S</b>	<b>Metal-to-metal (as standard)</b> - Stainless steel
<b>V</b>	<b>Soft seal</b> - White Viton to provide a tight shut-off.

### Valve stem sealing - options:

<b>E</b>	<b>EPDM (as standard)</b> - 3A and FDA approved
<b>V</b>	<b>White Viton</b> - 3A, FDA and USP 26 Class VI approved

### The STERI-TROL can be used with the following actuators and positioners:

<b>Electric</b>	AEL5
<b>Pneumatic</b>	PNS3000, PNS4000, PN9000E and PN9000R series
	PP5 (pneumatic) or EP5 (electropneumatic)
<b>Positioners</b>	ISP5 (intrinsically safe electropneumatic)
	SP300 (digital communications)

Refer to the relevant actuator Technical Information sheet for further details.

### Sizes and end connections

Connections*	Size range
Tube end / butt weld, screwed, flanged and sanitary clamp*	DN15, DN20, DN25, DN32, DN40, DN50, DN65, DN80 and DN100 1/2", 3/4", 1", 1 1/4", 1 1/2", 2", 2 1/2", 3" and 4"

**\*Note:** Other end connections are available. If you require a pipe end connection which has not been mentioned within this document, please contact Spirax Sarco sales office for further advice and information regarding availability.

Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only.  
In the interests of development and improvement of the product, we reserve the right to change the specification.

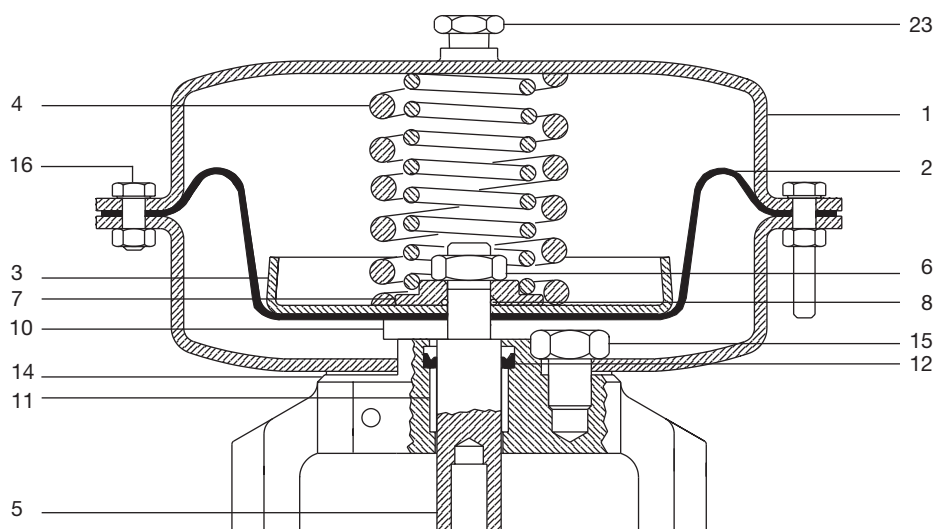


### Technical data

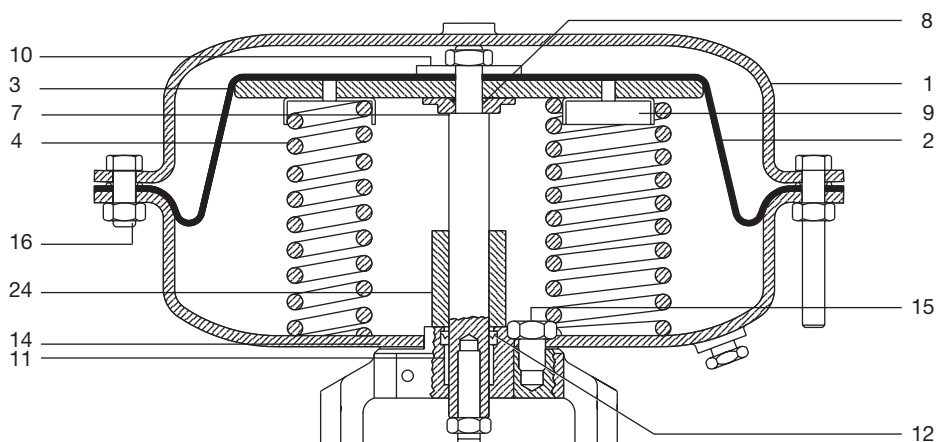
<b>Plug design</b>	DN15 to DN100	Parabolic
<b>Leakage</b>	Metal-to-metal	IEC 534-4 Class IV
	Soft seal	IEC 534-4 Class VI
<b>Rangeability</b>	Equal percentage	50:1
	Linear	30:1
<b>Travel</b>	DN15 to DN50 (1/2" to 2")	3/4"
	DN65 to DN100 (2 1/2" to 4")	1 3/16"
<b>Surface finish</b>	Internal (Mechanical or electro polished)	16 Ra
	External	< 24 Ra

## Materials

## PNS3000 series



## PNS4000 series



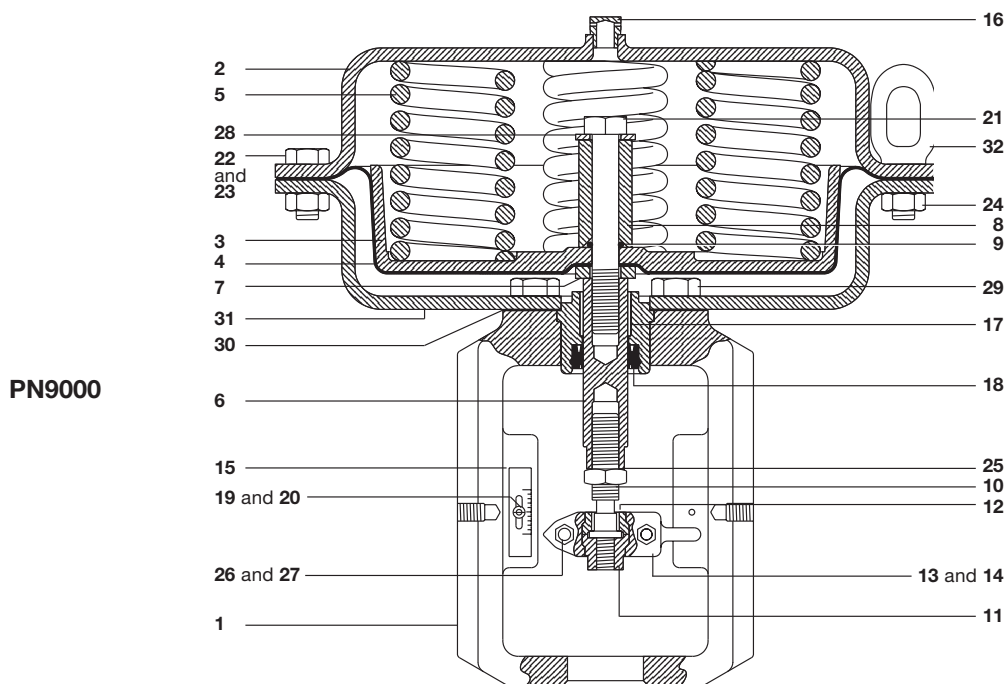
## PNS3000 and PNS4000 series actuators

No.	Part	Material
1	Diaphragm housing	Stainless steel 304
2	Diaphragm	Reinforced nitrile rubber
3	Diaphragm plate	Pressed steel
4	Springs	Spring steel
5	Spindle	Stainless steel
6	Lock-nut	Stainless steel
7	Spacer	Zinc plated steel
8	'O' ring	Rubber
9	Spring guide	Zinc plated steel
10	Diaphragm clamp	Zinc plated steel
11	Bearing	Bronze
12	'V' ring	Rubber

No.	Part	Material
13	Yoke	Stainless steel 304
14	Gasket	Non asbestos fibre
15	Fixing screwed	Stainless steel
16	Housing bolts and nuts	Stainless steel
17	Top adaptor	Stainless steel
18	Lock-nut	Stainless steel
19	Bottom adaptor	Stainless steel
20	Connectors	Stainless steel
21	Connectors bolts and nuts	Stainless steel
22	Travel indicator	Aluminium
23	Cap (with vent hole)	Nickel plated brass
24	Spacer	Zinc plated steel

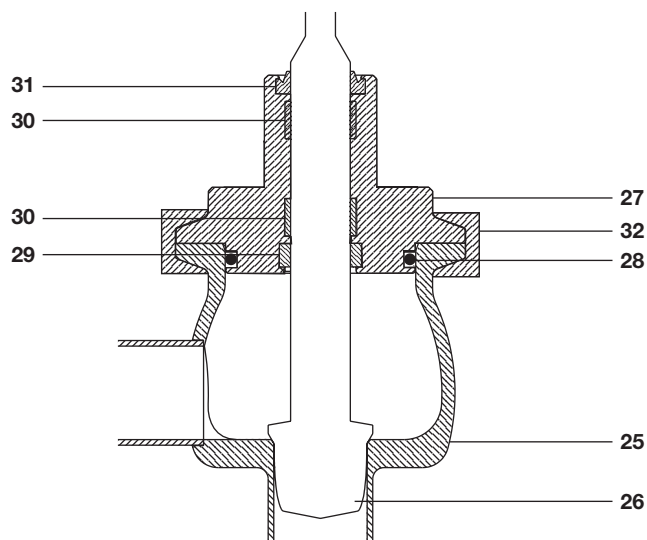
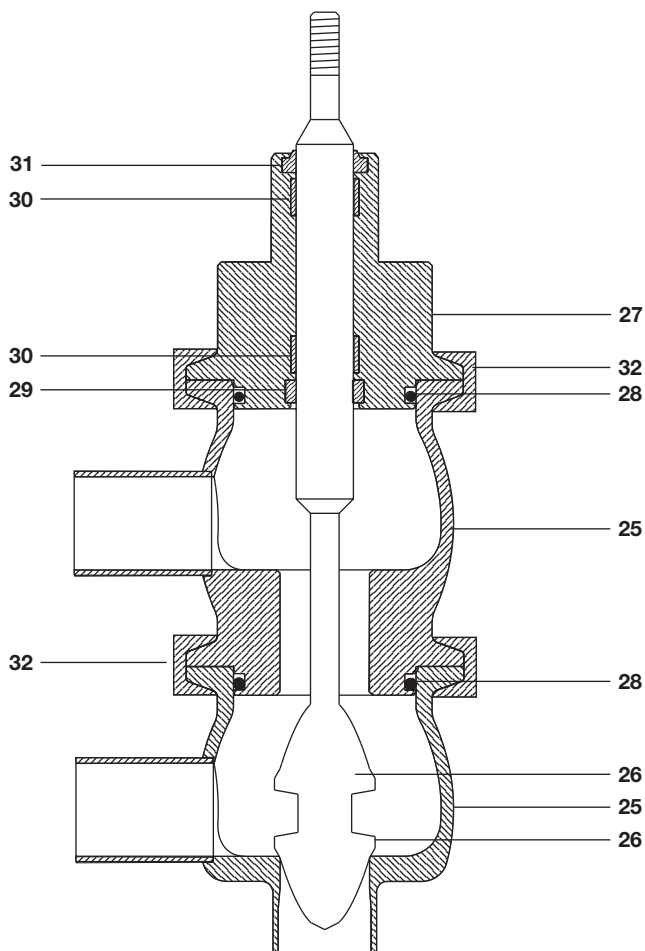
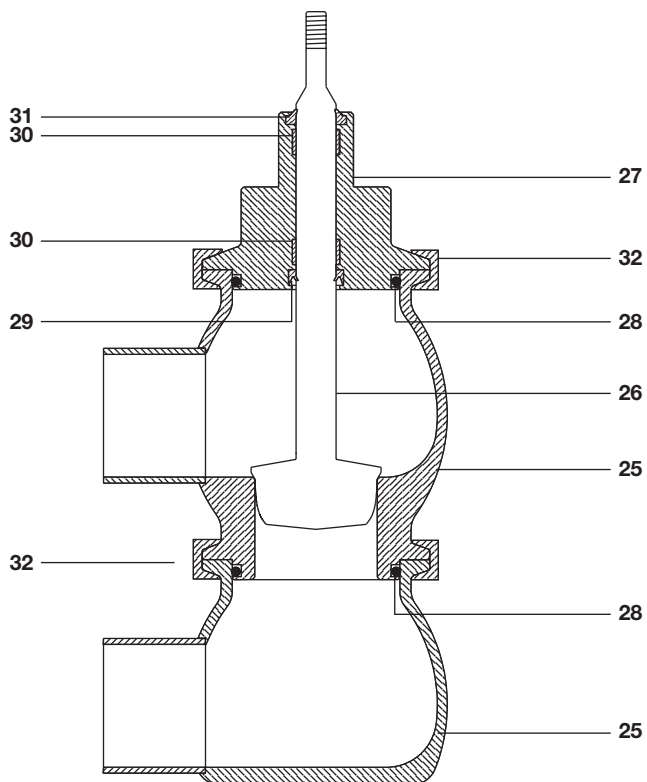
## PN 9000 series actuators

No.	Part	Material	
1	Yoke	SG iron	
2	Upper diaphragm housing	Carbon steel (plated)	
3	Diaphragm plate	Aluminium	
4	Diaphragm	Reinforced NBR	
5	Spring	Spring steel	
6	Spindle	Stainless steel	
7	Washer	Carbon steel (plated)	
8	Spacer	Carbon steel (plated)	
9	'O' ring	Viton	
10	Connector	Carbon steel (plated)	
11	Adaptor	Carbon steel (plated)	
12	Collar	Carbon steel (plated)	
13	Clamp front	Stainless steel	
14	Clamp rear	Stainless steel	
15	Scale	Stainless steel	
16	Vent plug	Brass	
17	Bearing	PTFE /steel composite	
18	Seal	Polyurethane	
19	Pan head screw	Carbon steel (plated)	
20	Nyloc nut	Carbon steel (plated)	
21	Bolt	Carbon steel (plated)	Gr. 8.8
22	Hex. head screw (short)	Carbon steel (plated)	Gr. 8.8
23	Hex. head screw (long)	Carbon steel (plated)	Gr. 8.8
24	Nut	Carbon steel (plated)	Gr. 8.8
25	Lock-nut	Carbon steel (plated)	
26	Socket head screw	Carbon steel (plated)	Gr. 8.8
27	Nut	Carbon steel (plated)	Gr. 8.8
28	Washer	Carbon steel (plated)	
29	Screw	Carbon steel (plated)	Gr. 8.8
30	Gasket	Reinforced graphite	
31	Lower diaphragm housing	Carbon steel (plated)	
32	Lifting eye	Cast steel	



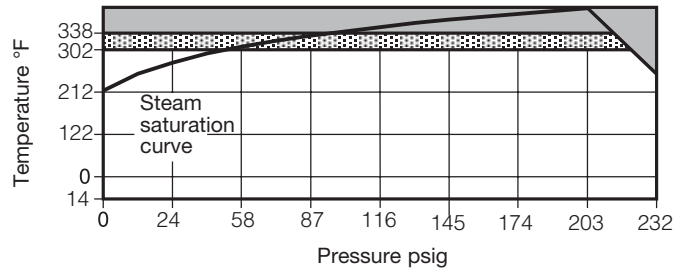
**SA, SH and SQ control valves**


No.	Part	Material
25	Body	Stainless steel 316L
		Stainless steel 316L
26	Valve plug, stem and soft seal	Stainless steel 316L
		Stainless steel 316L and white Viton or EPDM
27	Bonnet	Stainless steel 316L
28	Body seal	White Viton or EPDM
29	Stem seal	White Viton or EPDM
30	Stem bushes	PTFE-FC
31	Seal washer	White Viton or EPDM
32	Body clamp	Stainless steel 304


**SA 2-port control valve****SQ 3-port control valve****SH 2-port control valve**



## Pressure / temperature limits



 The product **must not** be used in this region.

 Viton (V) stem seals **must be selected** for use in this region.  
**Note:** the EPDM (E) stem seals are limited to 302°F

Body design conditions		PN16
Maximum design pressure		232 psig @ 248°F
Maximum design temperature		662°F @ 145 psig
Minimum design temperature		-4°F
Maximum operating temperature	EPDM (E)	302°F
	Viton (V)	338°F
Minimum operating temperature		14°F
<b>Note:</b> For lower operating temperatures consult Spirax Sarco.		
Maximum differential pressure		See following pages
Designed for a maximum cold hydraulic test pressure of:		348 psig

## Cv (Kv) values (SA and SH models)

Flow characteristic	Valve size	Cv (Kvs) by valve size and trim reduction								
		½"(DN15)	¾"(DN20)	1"(DN25)	1¼"(DN32)	1½"(DN40)	2"(DN50)	2½"(DN65)	3"(DN80)	4"(DN100)
	Travel	¾" (20 mm)						1⅜" (30 mm)		
Equal percentage and linear	Standard	4.7 (4)	7.4 (6.3)	12 (10)	19 (16)	29 (25)	42 (36)	74(63)	117 (100)	187 (160)
	Reduction 1	-	4.7 (4)	7.4 (6.3)	12 (10)	19 (16)	29 (25)	42 (36)	74 (63)	117 (100)
	Reduction 2	-	-	4.7 (4)	7.4 (6.3)	12 (10)	19 (16)	29 (25)	42 (36)	74 (63)
	Reduction 3	-	-	-	4.7 (4)	7.4 (6.3)	12 (10)	19 (16)	29 (25)	42 (36)

## Cv (Kv) values (SQ model)

Flow characteristic	Valve size	Cv (Kvs) by valve size and trim reduction								
		½"(DN15)	¾"(DN20)	1"(DN25)	1¼"(DN32)	1½"(DN40)	2"(DN50)	2½"(DN65)	3"(DN80)	4"(DN100)
	Travel	¾" (20 mm)						1⅜" (30 mm)		
Linear	Standard	4.7 (4)	7.4 (6.3)	12 (10)	19 (16)	29 (25)	42 (36)	74(63)	117 (100)	187 (160)

## Micro-flow trim for all valves < = 1" (DN25) (SA and SH only)

Micro-flow trim	Travel	3/4" (20 mm)				
	Trim size	1/8"	3/16"	1/4"	1/4"	3/8"
Linear characteristic	Cv (Kvs)	.47 (0.4)	.74 (0.63)	1.17 (1.0)	1.9 (1.6)	2.9 (2.5)

For conversion:  $K_v = C_v (US) \times 0.855$      $C_v(UK) = C_v (US) \times 0.833$

### Notes:

- Lower Cv (Kv) values are available to special order.
- Micro-filter and Equal percentage trim not available for the SQ 3-port control valve.

## Maximum differential pressures for Class IV shut-off SA and SH valves

### PNS3000 spring-to-extend actuators

Valve size			1/2"	3/4"	1"	1 1/4"	1 1/2"	2"	2 1/2"	3"	4"
Kv			4	6	10	16	25	36	63	100	160
Cv			4.7	7.4	12	19	29	42	74	117	187
Travel (inches)			3/4"						1 3/16"		
Actuator	Spring range	Positioner required	Maximum differential pressure Class IV (psi)								
PNS3220	3 - 15	Optional	120	59	20	-	-	-	-	-	-
	6 - 18	Optional	232	203	103	58	35	-	-	-	-
PNS3320	3 - 15	Optional	232	232	232	58	35	-	-	-	-
	6 - 18	Optional	232	232	232	165	110	55	-	-	-
PNS3326	15 - 45	Yes	232	232	186	232	232	184	-	-	-
PNS3420	3 - 15	Optional	232	232	232	112	73	33	-	-	-
	6 - 18	Optional	232	232	232	232	186	99	-	-	-
PNS3426	15 - 45	Yes	-	-	232	232	232	232	-	-	-
PNS3430	6 - 18	Optional	-	-	-	-	-	-	49	29	17
PNS3436	15 - 45	Yes	-	-	-	-	-	-	155	100	67

### PN9000 spring-to-extend actuators

Valve size			1/2"	3/4"	1"	1 1/4"	1 1/2"	2"	2 1/2"	3"	4"
Kv			4	6	10	16	25	36	63	100	160
Cv			4.7	7.4	12	19	29	42	74	117	187
Travel (inches)			3/4"						1 3/16"		
Actuator	Spring range	Positioner required	Maximum differential pressure Class IV (psi)								
PN9120E	6 - 18	Optional	203	116	58	29	15	-	-	-	-
PN9126E	15 - 30	Yes	232	232	218	131	87	44	-	-	-
PN9123E	30 - 60	Yes	232	232	232	232	218	116	-	-	-
PN9220E	3 - 15	Optional	232	232	145	87	44	15	-	-	-
	6 - 18	Optional	232	232	232	218	145	73	-	-	-
PN9226E	15 - 30	Yes	232	232	232	232	232	232	-	-	-
PN9223E	30 - 60	Yes	232	232	232	232	232	232	-	-	-
PN9320E	3 - 15	Optional	232	232	232	203	145	73	-	-	-
	6 - 18	Optional	232	232	232	232	232	174	-	-	-
PN9330E	6 - 18	Yes	-	-	-	-	-	-	87	58	44
PN9336E	15 - 30	Yes	-	-	-	-	-	-	232	174	116
PN9337E	36 - 50	Yes	-	-	-	-	-	-	232	232	232

## Maximum differential pressures for Class IV shut-off SA and SH valves

### PNS4000 spring-to-retract actuators

Valve size				1/2"	3/4"	1"	1 1/4"	1 1/2"	2"	2 1/2"	3"	4"
Kv				4	6	10	16	25	36	63	100	160
Cv				4.7	7.4	12	19	29	42	74	117	187
Travel (inches)				3/4"						1 3/16"		
Actuator	Spring range	Positioner required	Air pressure required	Maximum differential pressure Class IV (psi)								
PNS4220	3 - 15	Optional	20	232	203	103	58	35	-	-	-	-
	3 - 15	Yes	30	232	232	232	219	148	77	-	-	-
	3 - 15	Yes	45	232	232	232	232	232	184	-	-	-
	3 - 15	Yes	60	232	232	232	232	232	232	-	-	-
PNS4320	3 - 15	Optional	20	232	232	232	165	110	55	-	-	-
	3 - 15	Yes	30	232	232	232	232	232	184	-	-	-
	3 - 15	Yes	45	232	232	232	232	232	232	-	-	-
PNS4420	3 - 15	Optional	20	-	-	232	232	186	99	-	-	-
	3 - 15	Yes	30	-	-	232	232	232	232	-	-	-
	3 - 15	Yes	45	-	-	232	232	232	232	-	-	-
PNS4430	3 - 15	Optional	20	-	-	-	-	-	-	49	29	17
	3 - 15	Yes	30	-	-	-	-	-	-	155	100	67
	3 - 15	Yes	45	-	-	-	-	-	-	232	218	148
	3 - 15	Yes	60	-	-	-	-	-	-	232	232	229

### PN9000 spring-to-retract actuators

Valve size			1/2"	3/4"	1"	1 1/4"	1 1/2"	2"	2 1/2"	3"	4"
Kv			4	6	10	16	25	36	63	100	160
Cv			4.7	7.4	12	19	29	42	74	117	187
Travel (inches)			3/4"						1 3/16"		
Actuator	Spring range	Positioner required	Maximum differential pressure Class IV (psi)								
PN9120R	3 - 15	Optional	232	232	232	232	232	232	-	-	-
	6 - 18	Optional	232	232	232	232	232	232	-	-	-
PN9126R	15 - 30	Yes	232	232	232	232	232	232	-	-	-
PN9123R	30 - 60	Yes	232	232	232	232	232	116	-	-	-
PN9220R	3 - 15	Optional	232	232	232	232	232	232	-	-	-
	6 - 18	Optional	232	232	232	232	232	232	-	-	-
PN9226R	15 - 30	Yes	232	232	232	232	232	232	-	-	-
PN9223R	30 - 60	Yes	232	232	232	232	232	232	-	-	-
PN9320R	3 - 15	Optional	232	232	232	232	232	232	-	-	-
	6 - 18	Optional	232	232	232	232	232	232	-	-	-
PN9330R	6 - 18	Yes	-	-	-	-	-	-	232	232	232
PN9336R	15 - 30	Yes	-	-	-	-	-	-	232	232	232
PN9337R	36 - 50	Yes	-	-	-	-	-	-	116	73	44

## Maximum differential pressures for Class VI shut-off (soft seat seal only) SA and SH valves

### PNS3000 spring-to-extend actuators

Valve size			1/2"	3/4"	1"	1 1/4"	1 1/2"	2"	2 1/2"	3"	4"
Kv			4	6	10	16	25	36	63	100	160
Cv			4.7	7.4	12	19	29	42	74	117	187
Travel (inches)			3/4"						1 3/16"		
Actuator	Spring range	Positioner required	Maximum differential pressure Class VI (psi)								
PNS3220	6 - 18	Optional	175	122	44	33	19	-	-	-	-
PNS3320	3 - 15	Optional	175	122	44	33	19	-	-	-	-
	6 - 18	Optional	232	232	132	107	74	33	-	-	-
PNS3326	15 - 45	Yes	232	232	232	232	232	122	-	-	-
PNS3420	3 - 15	Optional	232	216	87	70	46	19	-	-	-
	6 - 18	Optional	232	232	219	180	128	64	-	-	-
PNS3426	15 - 45	Yes	-	-	232	232	232	196	-	-	-
PNS3430	6 - 18	Optional	-	-	-	-	-	-	32	25	-
PNS3436	15 - 45	Yes	-	-	-	-	-	-	107	86	54

### PN9000 spring-to-extend actuators

Valve size			1/2"	3/4"	1"	1 1/4"	1 1/2"	2"	2 1/2"	3"	4"
Kv			4	6	10	16	25	36	63	100	160
Cv			4.7	7.4	12	19	29	42	74	117	187
Travel (inches)			3/4"						1 3/16"		
Actuator	Spring range	Positioner required	Maximum differential pressure Class VI (psi)								
PN9120E	6 - 18	Optional	102	58	15	15	-	-	-	-	-
PN9126E	15 - 30	Yes	232	232	102	87	58	29	-	-	-
PN9123E	30 - 60	Yes	232	232	232	218	145	73	-	-	-
PN9220E	3 - 15	Optional	232	160	58	44	29	15	-	-	-
	6 - 18	Optional	232	232	174	145	102	44	-	-	-
PN9226E	15 - 30	Yes	232	232	232	232	232	160	-	-	-
PN9223E	30 - 60	Yes	232	232	232	232	232	232	-	-	-
PN9320E	3 - 15	Optional	232	232	160	131	102	44	-	-	-
	6 - 18	Optional	232	232	232	232	218	116	-	-	-
PN9330E	6 - 18	Yes	-	-	-	-	-	-	58	44	29
PN9336E	15 - 30	Yes	-	-	-	-	-	-	189	145	87
PN9337E	36 - 50	Yes	-	-	-	-	-	-	232	232	232

# Maximum differential pressures for Class VI shut-off (soft seat seal only) SA and SH valves

## PNS4000 spring-to-retract actuators

Valve size				1/2"	3/4"	1"	1 1/4"	1 1/2"	2"	2 1/2"	3"	4"
Kv				4	6	10	16	25	36	63	100	160
Cv				4.7	7.4	12	19	29	42	74	117	187
Travel (inches)				3/4"							1 3/16"	
Actuator	Spring range	Positioner required	Air pressure required	Maximum differential pressure Class VI (psi)								
PNS4220	3 - 15	Optional	20	175	122	44	33	19	-	-	-	-
	3 - 15	Yes	30	232	232	175	144	100	48	-	-	-
	3 - 15	Yes	45	232	232	232	232	232	122	-	-	-
	3 - 15	Yes	60	232	232	232	232	232	196	-	-	-
PNS4320	3 - 15	Optional	20	232	232	132	107	74	33	-	-	-
	3 - 15	Yes	30	232	232	232	232	232	122	-	-	-
	3 - 15	Yes	45	232	232	232	232	232	232	-	-	-
PNS4420	3 - 15	Optional	20	-	-	219	180	128	64	-	-	-
	3 - 15	Yes	30	-	-	232	232	232	196	-	-	-
	3 - 15	Yes	45	-	-	232	232	232	232	-	-	-
PNS4430	3 - 15	Optional	20	-	-	-	-	-	-	32	25	-
	3 - 15	Yes	30	-	-	-	-	-	-	107	86	54
	3 - 15	Yes	45	-	-	-	-	-	-	232	190	122
	3 - 15	Yes	60	-	-	-	-	-	-	232	232	190

## PN9000 spring-to-retract actuators

Valve size			1/2"	3/4"	1"	1 1/4"	1 1/2"	2"	2 1/2"	3"	4"
Kv			4	6	10	16	25	36	63	100	160
Cv			4.7	7.4	12	19	29	42	74	117	187
Travel (inches)			3/4"						1 3/16"		
Actuator	Spring range	Positioner required	Maximum differential pressure Class VI (psi)								
PN9120R	3 - 15	Optional	232	232	232	232	232	232	-	-	-
	6 - 18	Optional	232	232	232	232	232	218	-	-	-
PN9126R	15 - 30	Yes	232	232	232	232	232	174	-	-	-
PN9123R	30 - 60	Yes	232	232	232	232	232	73	-	-	-
PN9220R	3 - 15	Optional	232	232	232	232	232	232	-	-	-
	6 - 18	Optional	232	232	232	232	232	232	-	-	-
PN9226R	15 - 30	Yes	232	232	232	232	232	232	-	-	-
PN9223R	30 - 60	Yes	232	232	232	232	232	232	-	-	-
PN9320R	3 - 15	Optional	232	232	232	232	232	232	-	-	-
	6 - 18	Optional	232	232	232	232	232	232	-	-	-
PN9330R	6 - 18	Yes	-	-	-	-	-	-	232	232	232
PN9336R	15 - 30	Yes	-	-	-	-	-	-	232	232	203
PN9337R	36 - 50	Yes	-	-	-	-	-	-	87	58	44

## Maximum differential pressures for Class IV metal seated SQ valves

For pure control applications providing control across the full valve opening range but not guaranteeing shut-off to a greater level than the minimum flowrate based on the valves 30:1 turndown.

### PNS3000 spring-to-extend actuators

Valve size			1/2"	3/4"	1"	1 1/4"	1 1/2"	2"	2 1/2"	3"	4"
Kv			4	6	10	16	25	36	63	100	160
Cv			4.7	7.4	12	19	29	42	74	117	187
Travel (inches)			3/4"						1 3/16"		
Actuator	Spring range	Positioner required	Maximum differential pressure Class IV (psi)								
PNS3320	3 - 15	Optional	232	203	103	58	35	-	-	-	-
	6 - 18	Optional	232	232	232	165	110	55	-	-	-
PNS3326	15 - 30	Yes	232	232	232	232	232	184	-	-	-
PNS3420	3 - 15	Optional	232	232	186	112	73	33	-	-	-
	6 - 18	Optional	232	232	232	232	186	99	-	-	-
PNS3426	15 - 45	Yes	-	-	232	232	232	232	-	-	-
PNS3430	6 - 18	Optional	-	-	-	-	-	-	49	29	17
PNS3436	15 - 45	Yes	-	-	-	-	-	-	155	100	67

### PN9000 spring-to-extend actuators

Valve size			1/2"	3/4"	1"	1 1/4"	1 1/2"	2"	2 1/2"	3"	4"
Kv			4	6	10	16	25	36	63	100	160
Cv			4.7	7.4	12	19	29	42	74	117	187
Travel (inches)			3/4"						1 3/16"		
Actuator	Spring range	Positioner required	Maximum differential pressure Class IV (psi)								
PN9120E	3 - 15	Optional	160	29	15	-	-	-	-	-	-
	6 - 18	Optional	232	131	58	29	15	-	-	-	-
PN9126E	15 - 30	Yes	232	232	232	145	102	44	-	-	-
PN9123E	30 - 60	Yes	232	232	232	232	218	116	-	-	-
PN9220E	3 - 15	Optional	232	232	232	87	58	29	-	-	-
	6 - 18	Optional	232	232	232	218	145	87	-	-	-
PN9226E	15 - 30	Yes	232	232	232	232	232	232	-	-	-
PN9223E	30 - 60	Yes	232	232	232	232	232	232	-	-	-
PN9320E	3 - 15	Optional	232	232	232	232	145	73	-	-	-
	6 - 18	Optional	232	232	232	232	232	189	-	-	-
PN9330E	6 - 18	Yes	-	-	-	-	-	-	102	58	44
PN9336E	15 - 30	Yes	-	-	-	-	-	-	232	174	116
PN9337E	36 - 50	Yes	-	-	-	-	-	-	116	73	44

## Maximum differential pressures for Class IV metal seated SQ valves

For pure control applications providing control across the full valve opening range but not guaranteeing shut-off to a greater level than the minimum flowrate based on the valves 30:1 turndown.

### PNS4000 spring-to-retract actuators

Valve size			1/2"	3/4"	1"	1 1/4"	1 1/2"	2"	2 1/2"	3"	4"
Kv			4	6	10	16	25	36	63	100	160
Cv			4.7	7.4	12	19	29	42	74	117	187
Travel (inches)			3/4"						1 3/16"		
Actuator	Spring range	Positioner required	Maximum differential pressure Class IV (psi)								
PNS4320	0.2 – 1.0	Optional	232	203	103	58	35	-	-	-	-
	0.4 – 1.2	Optional	232	232	232	165	110	55	-	-	-
PNS4326	1.0 – 3.0	Yes	232	232	232	232	232	184	-	-	-
PNS4420	0.2 – 1.0	Optional	232	232	186	112	73	33	-	-	-
	0.4 – 1.2	Optional	232	232	232	232	186	99	-	-	-
PNS4426	1.0 – 3.0	Yes	-	-	232	232	232	232	-	-	-
PNS4430	0.4 – 1.2	Optional	-	-	-	-	-	-	49	29	17
PNS4436	1.0 – 3.0	Yes	-	-	-	-	-	-	155	100	67
PNS4534	0.8 – 1.5	Yes	-	-	-	-	-	-	197	128	86
PNS4634	0.8 – 1.5	Yes	-	-	-	-	-	-	232	193	131

### PN9000 spring-to-retract actuators

Valve size			1/2"	3/4"	1"	1 1/4"	1 1/2"	2"	2 1/2"	3"	4"
Kv			4	6	10	16	25	36	63	100	160
Cv			4.7	7.4	12	19	29	42	74	117	187
Travel (inches)			3/4"						1 3/16"		
Actuator	Spring range	Positioner required	Maximum differential pressure Class IV (psi)								
PN9120R	0.4 – 1.2	Optional	102	58	15	15	-	-	-	-	-
PN9126R	1.0 – 2.0	Yes	232	232	102	87	58	29	-	-	-
PN9123R	2.0 – 4.0	Yes	232	232	232	218	145	73	-	-	-
PN9220R	0.2 – 1.0	Optional	232	160	58	44	29	145	-	-	-
	0.4 – 1.2	Optional	232	232	174	145	102	44	-	-	-
PN9226R	1.0 – 2.0	Yes	232	232	232	232	232	160	-	-	-
PN9223R	2.0 – 4.0	Yes	232	232	232	232	232	232	-	-	-
PN9320R	0.2 – 1.0	Optional	232	232	160	131	102	44	-	-	-
	0.4 – 1.2	Optional	232	232	232	232	218	116	-	-	-
PN9330R	0.4 – 1.2	Yes	-	-	-	-	-	-	58	44	29
PN9336R	1.0 – 2.0	Yes	-	-	-	-	-	-	189	145	87
PN9337R	2.5 – 3.5	Yes	-	-	-	-	-	-	87	58	44

**Valve dimensions (approximate in inches)**

Valve Size	Connection and Dimensions								
	Tube end		Threaded	Sanitary clamp	Flanged	Dimensions common to all connections			
	A	B	A and B	A and B	A and B	B1	C	D	E
1/2"	2.86	0.98	-	1.71	3.67	0.57	2.61	1.76	2.29
3/4"	2.86	1.06	-	1.80	3.88	0.65	2.61	1.76	2.29
1"	2.86	1.63	2.24	2.46	4.08	0.82	2.98	2.33	3.27
1 1/4"	2.86	1.76	2.69	2.63	4.29	0.94	3.06	2.33	3.43
1 1/2"	2.86	2.00	2.86	2.85	4.69	1.10	3.27	2.33	3.84
2"	3.47	2.20	3.35	3.63	5.10	1.31	3.71	2.65	4.73
2 1/2"	4.29	2.78	4.29	3.63	5.92	1.76	3.88	3.47	4.65
3"	4.29	3.39	4.49	3.89	6.33	2.12	4.94	3.47	6.78
4"	5.31	3.92	6.12	4.67	7.14	2.45	5.43	3.96	7.35

**Valve weights (lb)**

Valve size	Model SA				Model SH				Model SQ			
	Sanitary clamp and screwed	Tube end	Flanged PN6	Flanged PN10 PN16	Sanitary clamp and screwed	Tube End	Flanged PN6	Flanged PN10 PN16	Sanitary clamp and screwed	Tube end	Flanged PN6	Flanged PN10 PN16
1/2"	3.3	2.2	4.4	5.5	4.4	3.3	5.5	6.6	-	-	-	-
3/4"	3.3	2.2	5.5	7.7	4.4	3.3	6.6	8.8	5.5	4.4	7.7	9.9
1"	5.5	4.4	7.7	9.9	7.7	6.6	9.9	12.1	8.8	7.7	11.0	13.2
1 1/4"	6.6	4.4	9.9	12.1	8.8	7.7	13.2	15.4	11.0	9.9	15.4	16.5
1 1/2"	6.6	5.5	11.0	13.2	9.9	8.8	15.4	17.6	12.1	11.0	17.6	18.7
2"	8.8	6.6	14.3	19.8	13.2	11.0	18.7	24.2	16.5	14.3	22.0	26.4
2 1/2"	14.3	12.1	20.9	27.5	22.0	18.7	27.5	34.1	20.9	17.6	26.4	41.8
3"	17.6	15.4	28.6	34.1	27.5	24.2	38.5	44.0	29.7	26.4	40.7	46.2
4"	24.2	22.0	36.3	41.8	37.4	34.1	49.5	55.0	41.8	37.4	52.8	58.3

**PNS3000/4000 actuator dimensions and weights (approximate) in inches and lb.**

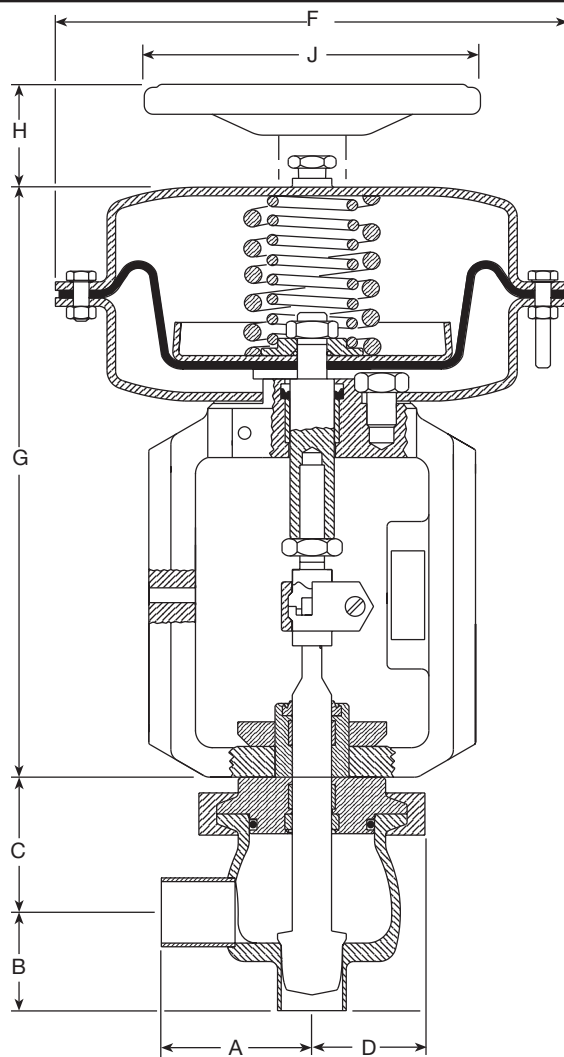
Actuator type	F	G	H	Weight	Weight with hand-wheel
PNS3200 and PNS4200 series	8.53	9.80	-	15.84	-
PNS3300 and PNS4300 series	11.63	10.78	4.61	24.64	29.70
PNS3420 and PNS4420 series	13.71	10.73	4.61	44.00	49.06
PNS3430 and PNS4430 series	13.71	13.39	6.41	44.00	52.14
PNS3530 series	16.53	14.98	6.41	49.72	57.86
PNS3630 series	18.98	16.33	6.41	83.60	91.74

**PN9000 actuator dimensions and weights (approximate) in inches and lb.**

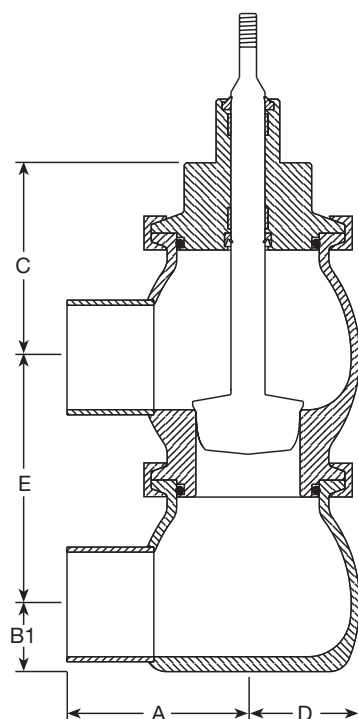
Actuator range	F	G	H	J	Weight	Weight with Hand-wheel
PN9100E and variants	11.22	6.94	2.24	9.18	13.20	26.09
PN9100R and variants	11.22	6.94	5.71	9.18	13.20	18.70
PN9200E and variants	12.24	12.24	2.24	14.29	37.40	53.24
PN9200R and variants	12.24	12.24	5.71	14.29	37.40	53.24
PN9320E and variants	13.27	15.92	2.65	14.29	59.40	75.24
PN9320R and variants	13.27	15.92	6.12	14.29	59.40	67.69
PN9330E and variants	13.67	15.92	2.65	14.29	59.40	75.24
PN9330R and variants	13.67	15.92	6.12	14.29	59.40	67.69



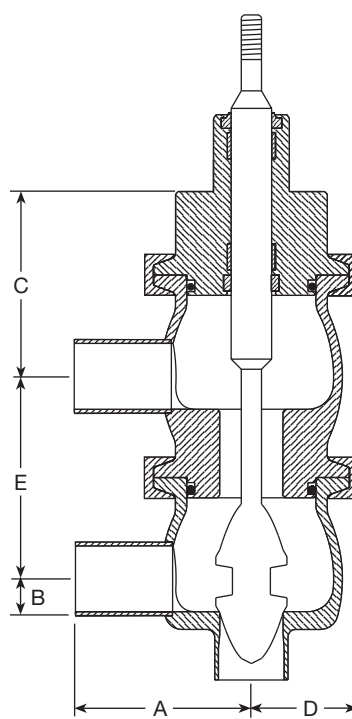
Actuator and SA valve



SH valve

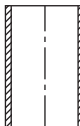

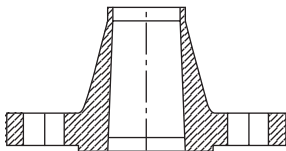
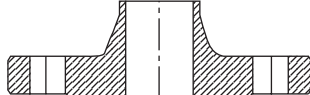
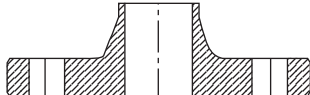
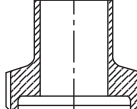
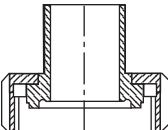
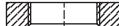


SQ valve



## Connection codes

The codes specified below represent a small selection of pipe end connections that are available. If the connection required is not specified below please contact Spirax Sarco.

Connection		Specification	Code	
Butt weld		DIN 11850 (Series 2)	OO	
		ISO 2037 / SMS 3008	OA	
		EN ISO 1127	OB	
		BS 4825 (Pt 1)	OC	
		ASME BPE	OD	
Sanitary clamp		ASME BPE (Tri-clamp®)	AO	
		BS 4825 (Pt 3)	BO	
		ISO 2852	CO	
		DIN 32676	SO	
ANSI 150		ANSI B 16.5	FA	
Flanged	PN16		DIN 2633	FD
With smooth sealing face		EN 1092 PN6	FE	
		EN 1092 PN10	FF	
		EN 1092 PN16	FG	
Aseptic-thread (fitted on pipe)		DIN 11864 T1 Form A	GS	
		DIN 11864 T1 Form B	GT	
		DIN 11887 (11851)	GU	
		SMS 3008	GV	
Aseptic-clamp and nut		DIN 11864 T1 Form A	BS	
		DIN 11864 T1 Form B	BT	
Screwed connection		DIN ISO 228	XG	
		NPT ANSI-BI. 20.1-1983	XN	

## How to order

### Ordering a control valve

<b>Valve size</b>	1/2", 3/4", 1", 1 1/4", 1 1/2", 2", 2 1/2", 3" and 4"	<b>1/2"</b>
<b>Valve series</b>	SA = Two-port angle pattern design SH = Two-port horizontal design SQ = Three-port valve design	<b>SA</b>
<b>Valve characteristic</b>	E = Equal percentage (SA and SH models only) L = Linear	<b>E</b>
<b>Body material</b>	6 = 316L stainless steel	<b>6</b>
<b>Connection standard</b>	See previous page	<b>SO</b>
<b>Seating option</b>	S = Stainless steel V = White Viton (FDA, 3A and USP26 Class VI approved)	<b>S</b>
<b>Stem and body sealing option</b>	E = EPDM (FDA and 3A approved) V = White Viton (FDA, 3A and USP26 Class VI approved)	<b>V</b>
<b>Centre face dimensions (A)</b>	0 = Standard 1 = Other please specify (mm)	<b>0</b>
<b>Centre face dimensions (B)</b>	0 = Standard 1 = Other please specify (mm)	<b>0</b>
<b>Internal surface finish</b>	0 = Standard 16 Ra micron mechanically polished 1 = 16 Ra micron electropolished 2 = Other please specify	<b>0</b>
<b>C<sub>v</sub></b>	To be specified (non standard C <sub>v</sub> to special order)	<b>4 • 7</b>

Ordering a:	PNS pneumatic actuator	PN or PNP pneumatic actuator	
<b>Type</b>	PNS = Pneumatic stainless steel	PN = Pneumatic epoxy coated PNP = Pneumatic electroless nickel plated (ENP)	<b>PNS</b>
<b>Series and action</b>	3 = 3000 multi-spring (spring-to-extend) 4 = 4000 multi-spring (spring-to-retract)	9 = 9000E multi-spring (spring-to-extend) 9 = 9000R multi-spring (spring-to-retract)	<b>3</b>
<b>Diaphragm size</b>	2 3 4	1 2 3	<b>3</b>
<b>Travel</b>	2 = 3/4" 3 = 1 3/16"	2 = 3/4" 3 = 1 3/16"	<b>2</b>
<b>Spring range</b>	0 = 3-15 psig (6-18 psig) 6 = 15-45 psig	0 = 3-15 psig (6-18 psig) 3 = 30-60 psig 6 = 15-30 psig 7 = 36-50 psig	<b>0</b>
<b>Option</b>	Blank = Standard H = Handwheel *	Blank = Standard H = Handwheel *	

\*Not available in stainless steel

### Ordering example:

1 off Spirax Sarco STERI-TROL type 1/2" SAE6SOSV0004 and 1 pneumatic actuator type PNS3320. Having a spring range of 6 to 18 psig.

## Spare parts

The available spares are identified by the part numbers listed below. When placing an order for spare parts, always specify the actuator or the valve model (shown on the data plate) and the name of the part as described below.

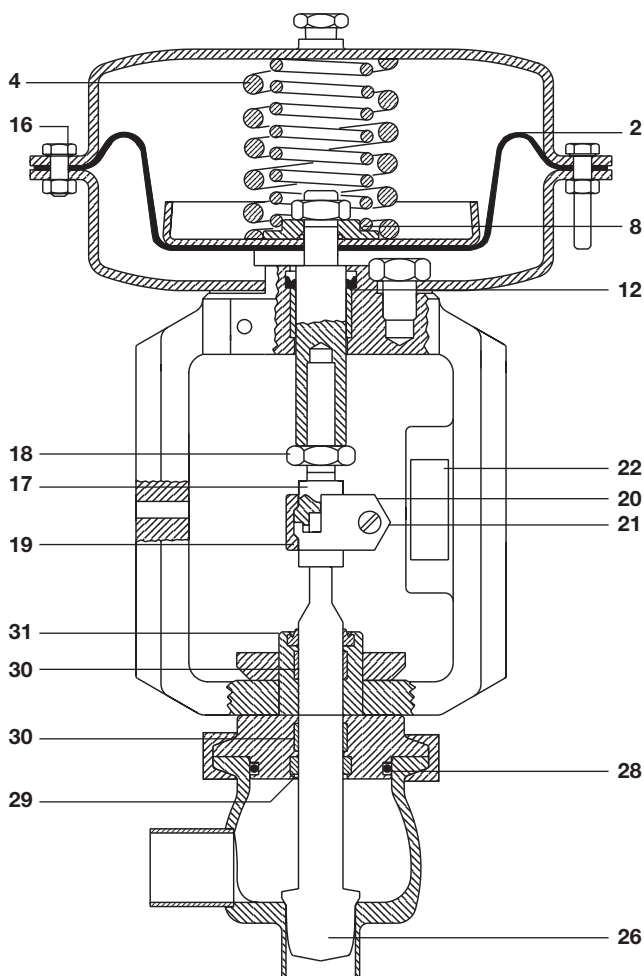
### Available spares for the SA, SH and SQ control valves and the PNS3000 and PNS4000 series actuators

Description		Part number
Actuator	Stem seal kit ('O' ring and 'V' ring)	8 and 12
	Diaphragm kit (diaphragm 'O' ring and 'V' ring)	2, 8 and 12
	Travel indicator	22
	Spring kit (set of springs, included 3 off longer hex, head bolts and nut on some spring range)	4 and 16
	Linkage kit (lock-nut, top adaptor connectors, bolts and nuts)	17, 18, 19, 20 and 21
Valve	Valve stem seal set (excluding bonnet seal)	29, 30 and 31
	SA, SH and SQ models Bonnet seal	EPDM (packet of 3)
		Viton (packet of 3)
	Plug and stem	(Equal percentage or Linear)
		26

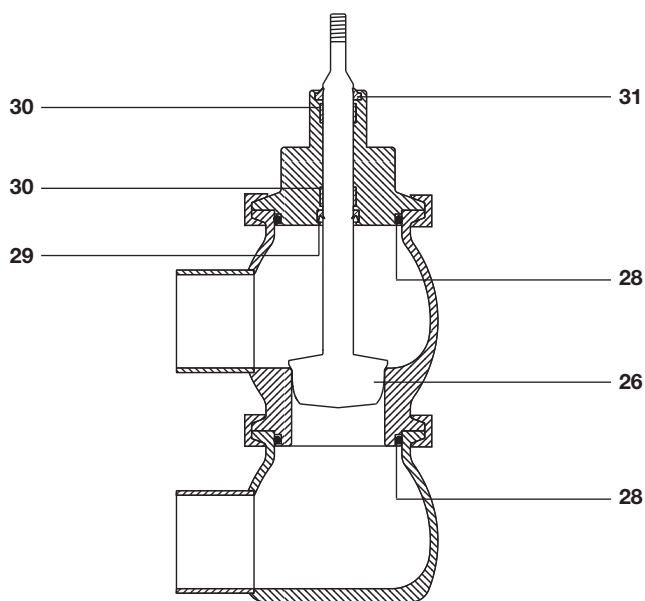
### Spare parts ordering example:

1 off Valve stem seal set for a STERI-TROL DN15 SAE6SOSV0004 two-port control valve.

1 off Stem seal kit for a type PNS3320 pneumatic actuator having a spring range 6 to 18 psig.



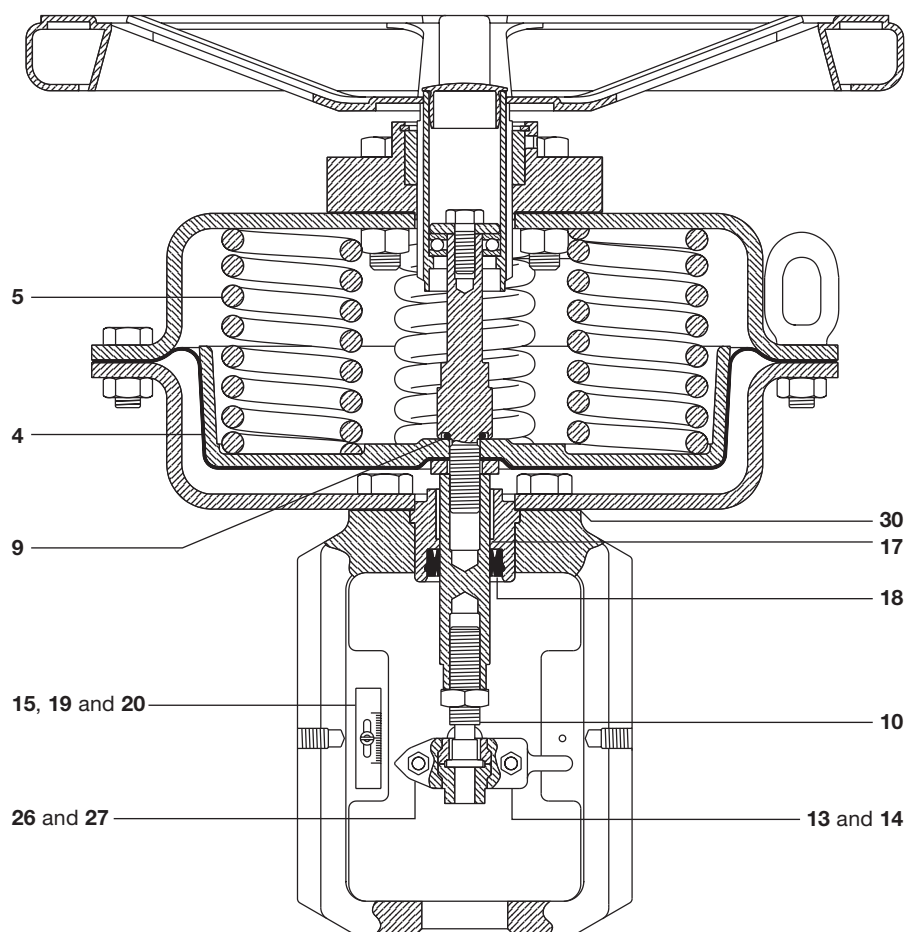
Actuator and SA valve



SH valve

## Available spares for the PN9000 series actuators

	Description	Part number
Actuator	Stem seal kit 'O' ring and 'V' ring	17, 18 and 30
	Diaphragm kit Diaphragm 'O' ring and 'V' ring	4 and 9
	Travel indicator	15, 19 and 20
	Spring kit Set of springs, included 3 off longer hex, head bolts and nut on some spring range	5
	Linkage kit Lock-nut, top adaptor connectors, bolts and nuts	10, 13, 14, 26 and 27





## TN2000 Series Pneumatic Piston Actuators for 6" and 8" SPIRA-TROL Series Control Valves

### Description

The TN2000 series pneumatic piston actuators are designed for use with 6" and 8" SPIRA-TROL control valves. There are three versions available: Single-acting (with spring), Double-acting (with spring) and Double-acting (no spring) for matching the requirements of valves at various differential pressures and in a variety of applications.

### Available types

**SE** = Single-acting, spring-extend

**SR** = Single-acting, spring-retract

**DE** = Double-acting, spring assisted (extend)

**DR** = Double-acting, spring assisted (retract)

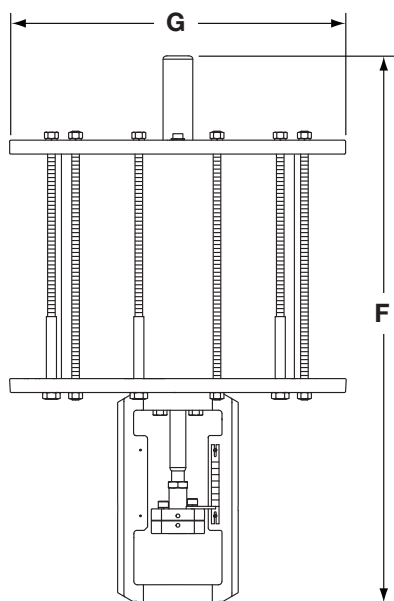
**DA** = Double-acting, no spring

### Optional extra

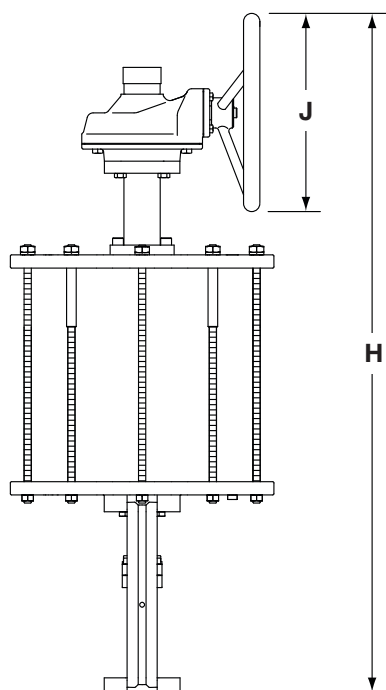
Manual handwheel

### Technical data

Temperature range	5°F to 230°F (-15°C to +110°C)
Maximum operating inlet pressure	150 psig (10 bar g)
Air supply connection	3/8" screwed NPT
Actuator travel	2 3/4" (70 mm)



TN2277SE



TN2277SRH

### Dimensions / weights (approximate) inches and pounds

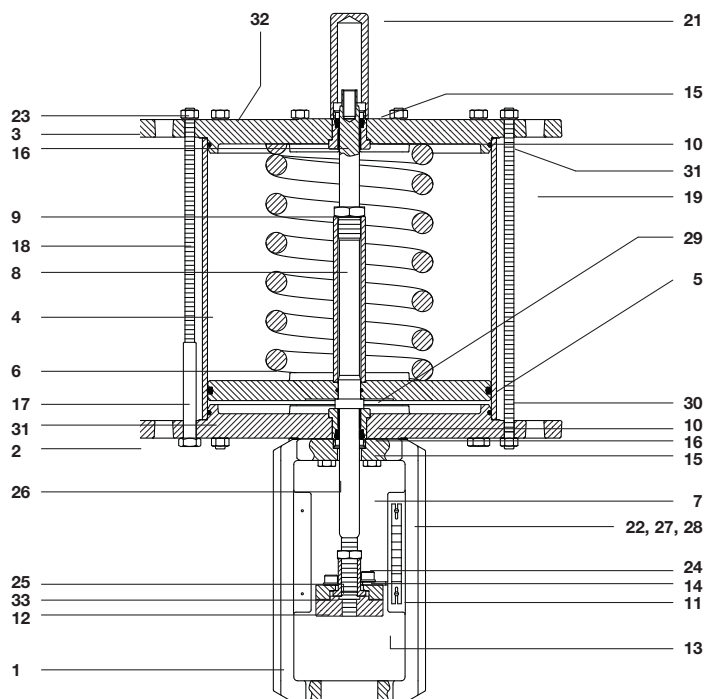
Actuator range	F	G	H	J	Weight	
					Actuator	With handwheel
TN2277SE and variants	34	21	47	13	255	+ 4.6
TN2277DE and variants	34	21	47	13	255	+ 4.6
TN2277SR and variants	34	21	44.5	13	255	+ 4.2
TN2277DR and variants	34	21	44.5	13	255	+ 4.2
TN227NDA and variants	34	21	-	13	216	-

Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only.  
In the interests of development and improvement of the product, we reserve the right to change the specification.

TI-P327-01-US 11.11

# TN2000 Series Pneumatic Piston Actuators for 6" and 8" SPIRA-TROL Series Control Valves

## Materials



No.	Part	Material
1	Yoke	SG iron
2	Lower cylinder end cap	SG iron BS EN 1563 GJS 400 18U-LT
3	Upper cylinder end cap	SG iron BS EN 1563 GJS 400 18U-LT
4	Cylinder	Composite tube
5	Piston	SG iron
6	Spring	Chrome vanadium steel
7	Spindle	Stainless steel
8	Spindle sleeve	Carbon steel (plated)
9	Lock-nut	M27 Carbon steel (plated)
10	Bearing and seal insert	Carbon steel (plated)
11	Indicator plate	Stainless steel
12	Top connector	Carbon steel (plated)
13	Bottom connector	Carbon steel (plated)
14	Connector	Stainless steel
15	Rod seal wiper	Polyurethane
16	DU plain bearing	PTFE / steel composite
17	Long nut	Carbon steel (plated)
18	Nut and threaded bar	Carbon steel (plated)
19	Threaded bar	M12 Carbon steel (plated)
20	3/8" NPT vent plug (not shown)	LD Polyethylene
21	Cover	PVC
22	Scale	Stainless steel
23	Nut	M12 Carbon steel (plated)
24	Lock-nut	M20 Stainless steel
25	Cap screw	Carbon steel (plated)
26	Bolt	M12 Stainless steel
27	Pan head screw	Carbon steel (plated)
28	Nut	M2.5 Carbon steel (plated)
29	'O' ring	Fluorocarbon rubber (Viton)
30	'O' ring	Fluorocarbon rubber (Viton)
31	'O' ring	Fluorocarbon rubber (Viton)
32	Spring washer	M12 Carbon steel (plated)
33	Spring washer	M10 Carbon steel (plated)

# TN2000 Series

## Pneumatic Piston Actuators

### for 6" and 8" SPIRA-TROL Series Control Valves

#### How to use the sizing data:

The following tables supply guidance as to the sizing of the TN2000 when it is used on the SPIRA-TROL K and L series control valves.

#### To select a suitable actuator:

- Identify the column containing the valve and gland material selected.
- Identify the maximum operating pressure condition, including any transient pressures likely to occur, within the selected column.
- Read back to the left hand side of the table to identify the suitable actuator for the application.

For conditions outside of those illustrated please contact Spirax Sarco.

**NOTE:** DE, DR and DA actuators require a double acting positioner. SE and SR actuators require a single acting positioner.

## Unbalanced flow under applications

**Caution 1:** Maximum operating air pressure onto the actuator must not exceed 150 psig.

**Caution 2:** DE and DR versions must not exceed 120 psig.

### Maximum differential pressures for Class IV shut-off Unbalanced valves

KEA with PTFE (P) or Graphite stem seal (H)

Actuator	Actuator operating air pressure (psig)	Valve maximum differential pressure			
		6"		8"	
		PTFE	Graphite	PTFE	Graphite
TN2277SE	60 min.	33	29	-	-
TN2277DE	90	522	518	279	277
	120	685	681	371	369
TN2277SR	105	276	276	145	145
TN2277NDA	75	326	322	169	167
	90	407	403	215	212
	105	489	485	261	258
	120	570	566	306	304
	135	652	648	352	350
	150	733	729	398	396

### Maximum differential pressures for Class VI shut-off Soft seated unbalanced valves

KEA with PTFE (P) or Graphite stem seal (H)

Actuator	Actuator operating air pressure (psig)	Valve maximum differential pressure			
		6"		8"	
		PTFE	Graphite	PTFE	Graphite
TN2277SE	60 min.	110	106	62	60
TN2277DE	90	599	595	337	335
	120	740	740	429	426
TN2277SR	105	362	348	203	203
TN2277NDA	75	403	399	226	224
	90	484	480	272	270
	105	566	562	318	316
	120	647	643	364	362
	135	729	725	410	407
	150	740	740	456	453



# TN2000 Series

## Pneumatic Piston Actuators

### for 6" and 8" SPIRA-TROL Series Control Valves

#### Unbalanced flow over applications

Recommended for On-Off Applications ONLY

Caution 1: Maximum operating air pressure onto the actuator must not exceed 150 psig.

Caution 2: DE and DR versions must not exceed 120 psig.

#### Maximum differential pressures for Class IV shut-off Unbalanced valves

KEA with PTFE (P) or Graphite stem seal (H)

Actuator	Actuator operating air pressure (psig)	Valve maximum differential pressure			
		6"		8"	
		PTFE	Graphite	PTFE	Graphite
TN2277SE	60 min.	450	450	251	251
TN2277SR	60 min.	189	185	106	103
TN2277DR	60	521	517	291	288
	90	687	683	383	381
	120	740	740	476	474
TN227NDA	75	392	388	219	217
	90	475	471	265	263
	105	558	554	311	309
	120	641	637	358	355
	135	724	720	404	402
	150	740	740	450	448

#### Maximum differential pressures for Class VI shut-off Soft seated unbalanced valves

KEA with PTFE (P) or Graphite stem seal (H)

Actuator	Actuator operating air pressure (psig)	Valve maximum differential pressure			
		6"		8"	
		PTFE	Graphite	PTFE	Graphite
TN2277SE	60 min.	460	455	256	254
TN2277SR	105	189	185	106	103
TN2277DR	60	521	517	291	288
	90	687	683	383	381
	120	740	740	476	474
TN227NDA	75	392	388	219	217
	90	475	471	265	263
	105	558	554	311	309
	120	641	637	348	355
	135	724	720	404	402
	150	740	740	450	448

# TN2000 Series

## Pneumatic Piston Actuators

### for 6" and 8" SPIRA-TROL Series Control Valves

#### Balanced applications

#### Maximum differential pressures for Class IV shut-off Balanced valves

KEA with PTFE (P) or Graphite stem seal (H)

Actuator	Actuator operating air pressure (psig)	Valve maximum differential pressure					
		DN125		DN150		DN200	
		PTFE	Graphite	PTFE	Graphite	PTFE	Graphite
TN2277SE	60 min.	740	740	740	740	740	-
TN2277DE	15	740	740	740	740	740	740
TN2277SR	105	740	740	740	740	740	740
TN227NDA	75	740	740	740	740	740	740
	90	740	740	740	740	740	740
	105	740	740	740	740	740	740
	120	740	740	740	740	740	740
	135	740	740	740	740	740	740
	150	740	740	740	740	740	740

Actuator	Condition	Thrust (lbf)
TN2277SE	Spring thrust	3,150
TN2277SR	Spring thrust	3,150
TN227NDA	75 psi g	10,900
	90 psi g	13,140
	105 psi g	15,380
	120 psi g	17,610
	135 psi g	19,840
	150 psi g	22,070

#### TN2000 series selection guide:

Type	TN
Series	2 = 2000 series
Actuator size	2 = 993 cm <sup>2</sup>
Valve travel	7 = 70 mm
Spring rating	7 = with spring N = double-acting (no spring)
Action	SE = Single-acting, spring-extend
	SR = Single-acting, spring-retract
	DE = Double-acting, spring assisted (extend)
	DR = Double-acting, spring assisted (retract)
	DA = Double-acting, no spring
Manual override	H = Handwheel (optional) not available for the NDA version

#### Selection example:

TN	2	2	7	7	SE	
----	---	---	---	---	----	--

#### How to order

Example: 1 off Spirax Sarco TN2277SE pneumatic piston actuator.

# TN2000 Series

## Pneumatic Piston Actuators

### for 6" and 8" SPIRA-TROL Series Control Valves

#### TN2000 series selection guide:

##### Spare parts

The spare parts available are common across the range of actuators detailed in this document. No other parts are available as spares.

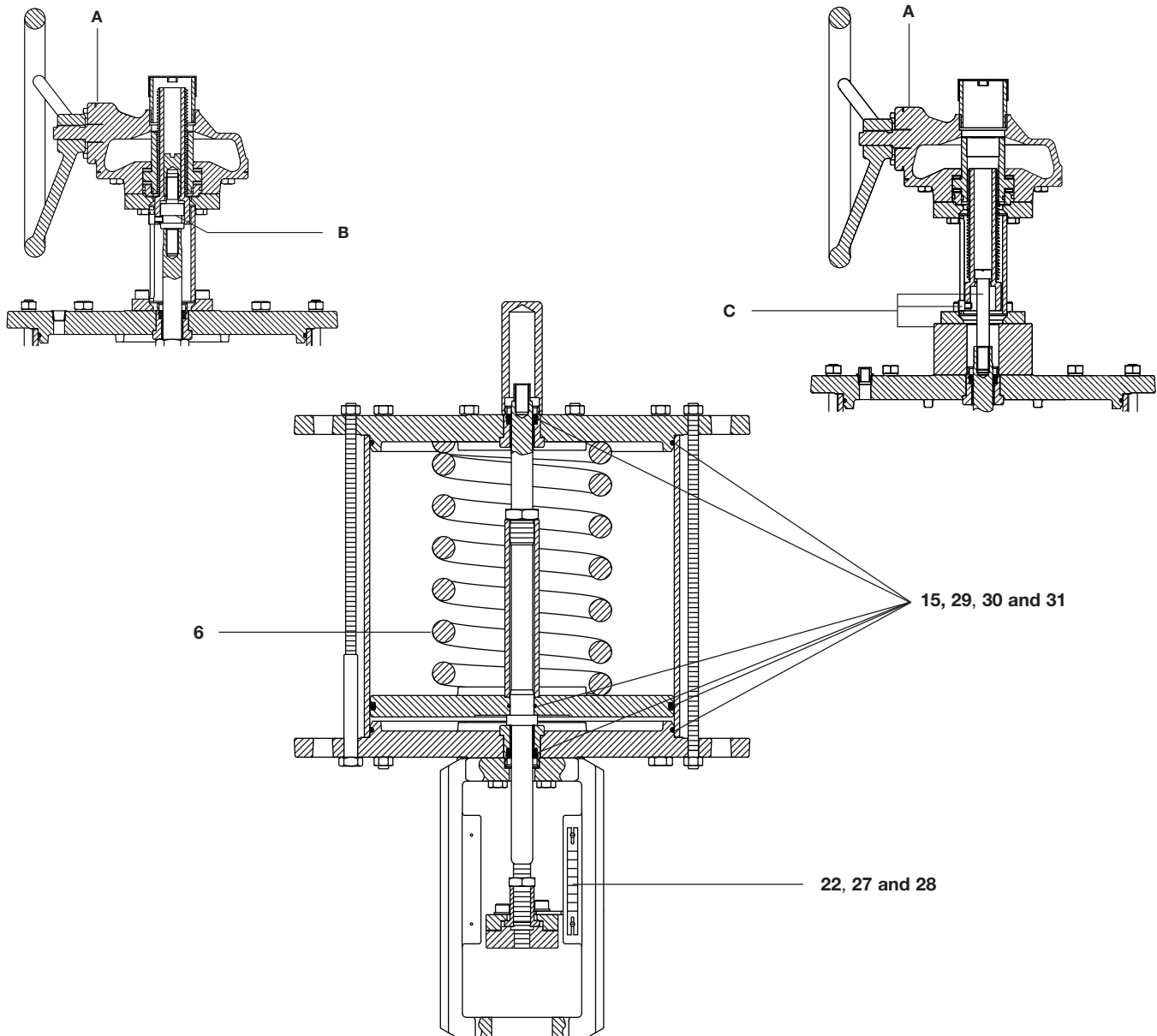
##### Available spares

'O' ring kit	15, 29, 30, 31
Travel indicator kit	22, 27, 28
Spring	6
Handwheel	A
EH kit	B
RH kit	C

##### How to order spares

Always order spares by using the description given in the column headed 'Available spares' and state the actuator model.

**Example:** 1 - 'O' ring kit for a Spirax Sarco TN2277SE pneumatic piston actuator.





## PN9000 Series Pneumatic Actuators for SPIRA-TROL K and L Series Control Valves

### Description

The PN9000 series actuators are a compact range of linear actuators that are available in 3 diaphragm sizes for matching the requirements of valves at various differential pressures.

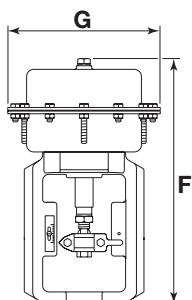
Each actuator is fitted with a mechanical travel indicator and incorporates a fully-rolling diaphragm, which provides good linearity over the operating stroke.

<b>Available types</b>	<b>PN</b> = Standard	<b>Suffix E</b> = Spring-extend
	<b>PNP</b> = Electroless nickel plated	<b>Suffix R</b> = Spring-retract
<b>Optional extra</b>	<b>Manual handwheel</b>	<b>Suffix H</b>
	<b>Stainless steel bolting</b>	<b>Suffix S</b>

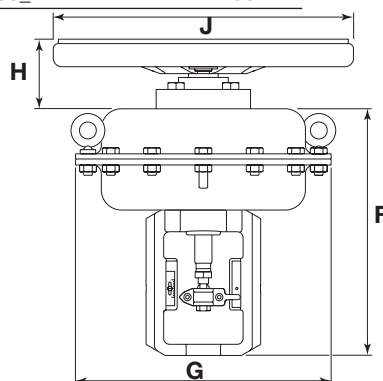
**Important note:** Throughout this document, reference has been made to the PN actuator.

### Technical data

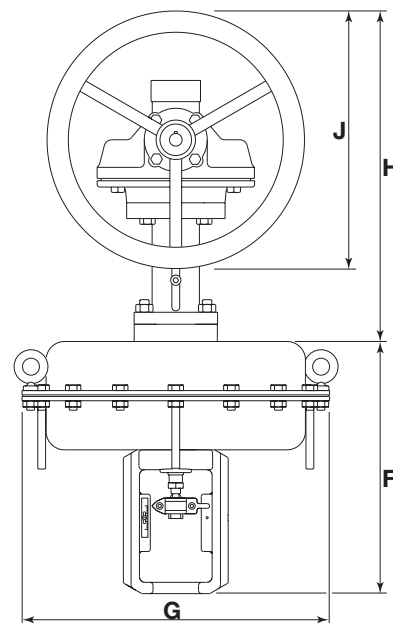
<b>Temperature range</b>	- 4°F to 230°F (- 20°C to +110°C)	
<b>Maximum operating inlet pressure</b>	<b>PN9100</b>	87 psig (6 bar g)
	<b>PN9200</b>	87 psig (6 bar g)
	<b>PN9300</b>	58 psig (4 bar g)
<b>Air supply connection</b>	¼" NPT	
<b>Actuator travel</b>	<b>PN9100</b>	20 mm
	<b>PN922_ and PN932_</b>	20 mm
	<b>PN923_ and PN933_</b>	30 mm



PN9100



PN9200EH



PN9337RH

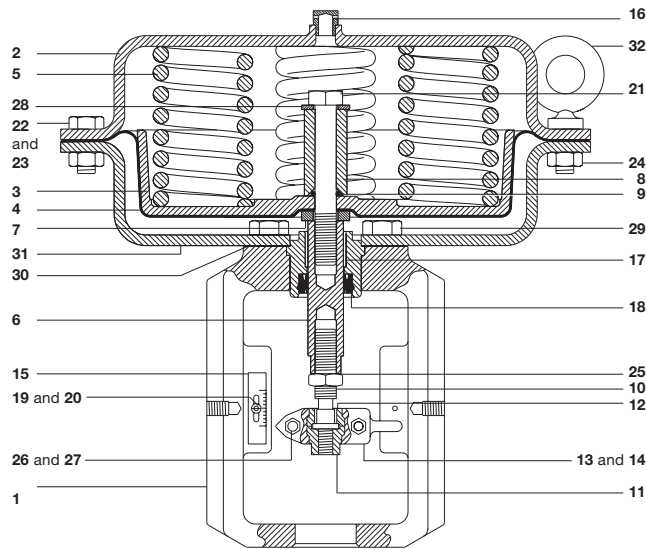
Actuator Range	Dimensions								Weights			
	F		G		H		J		Actuator		Handwheel	
	mm	in	mm	in	mm	in	mm	in	Kg	lb	Kg	lb
PN9100E and variants	275	10.8	170	6.7	55	2.2	225	8.9	6	13.2	5.86	12.9
PN9100R and variants	275	10.8	170	6.7	140	5.5	225	8.9	6	13.2	2.5	5.5
PN9200E and variants	300	11.8	300	11.8	68	2.7	350	13.8	17	37.4	7.2	15.8
PN9200R and variants	300	11.8	300	11.8	152	6.0	350	13.8	17	37.4	3.77	8.3
PN9230E and variants	360	14.2	300	11.8	65	2.6	350	13.8	17	37.4	3.77	8.3
PN9230R and variants	360	14.2	300	11.8	152	6.0	350	13.8	17	37.4	3.77	8.3
PN9320E and variants	325	12.8	390	15.4	65	2.6	350	13.8	27	59.4	7.2	15.8
PN9320R and variants	325	12.8	390	15.4	152	6.0	350	13.8	27	59.4	3.77	8.3
PN9330E and variants	335	13.2	390	15.4	65	2.6	350	13.8	27	59.4	7.2	15.8
PN9330R and variants	335	13.2	390	15.4	152	6.0	350	13.8	27	59.4	3.77	8.3
PN9336E and variants	335	13.2	390	15.4	65	2.6	350	13.8	27	59.4	7.2	15.8
PN9336R and variants	335	13.2	390	15.4	152	6.0	350	13.8	27	59.4	3.77	8.3
PN9337E and variants	335	13.2	390	15.4	410	16.1	350	13.8	27	59.4	21	46.2
PN9337R and variants	335	13.2	390	15.4	410	16.1	350	13.8	27	59.4	21	46.2

Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only.  
In the interests of development and improvement of the product, we reserve the right to change the specification.

TI-P357-30-US 7.12

# PN9000 Series Pneumatic Actuators for SPIRA-TROL K and L Series Control Valves

## Materials



No.	Part	Material		
1	Yoke	SG iron		
2	Upper diaphragm housing	Carbon steel (plated)		
3	Diaphragm plate	Aluminium		
4	Diaphragm	Reinforced NBR		
5	Spring	Spring steel		
6	Spindle	Stainless steel		
7	Washer	Carbon steel (plated)		
8	Spacer	Carbon steel (plated)		
9	'O' ring	Viton		
10	Connector	Stainless steel	BS 970 431 S29	
11	Adaptor	Stainless steel	BS 970 431 S29	
12	Collar	PN9000	Carbon steel	
		PNP9000	Stainless steel	
		PN9000S	Stainless steel 316L	
13	Clamp front	Stainless steel		
14	Clamp rear	Stainless steel		
15	Scale	Stainless steel		
16	Vent plug	Brass		
17	Bearing	PTFE/steel composite		
18	Seal	Polyurethane		
19	Pan head screw Nyloc nut	PN9000	Carbon steel (plated)	
		PNP9000	Stainless steel	A2 - 70
		PN9000S	Stainless steel	A2 - 70
21	Bolt	Carbon steel (plated)	Gr. 8.8	
22	Hex. head screw (short)	PN9000	Carbon steel (plated)	Gr. 8.8
23	Hex. head screw (long)	PNP9000	Stainless steel	A2 - 70
24	Nut	PN9000S	Stainless steel	A2 - 70
25	Lock-nut	PN9000	Carbon steel (plated)	
		PNP9000	Stainless steel	A2 - 70
		PN9000S	Stainless steel	A2 - 70
26	Socket head screw Nut	PN9000	Carbon steel (plated)	Gr. 8.8
		PNP9000	Stainless steel	A2 - 70
		PN9000S	Stainless steel	A2 - 70
28	Washer	Carbon steel (plated)		
29	Screw	Carbon steel (plated)		Gr. 8.8
30	Gasket	Reinforced graphite		
31	Lower diaphragm housing	Carbon steel (plated)		
32	Lifting eye	PN9000	Cast steel	
		PNP9000	Cast steel	
		PN9000S	Stainless steel 316L	

# PN9000 Series Pneumatic Actuators for SPIRA-TROL K and L Series Control Valves

## Spare parts

The only spares available are clearly indicated below and are common for both spring-extend and spring-retract versions.

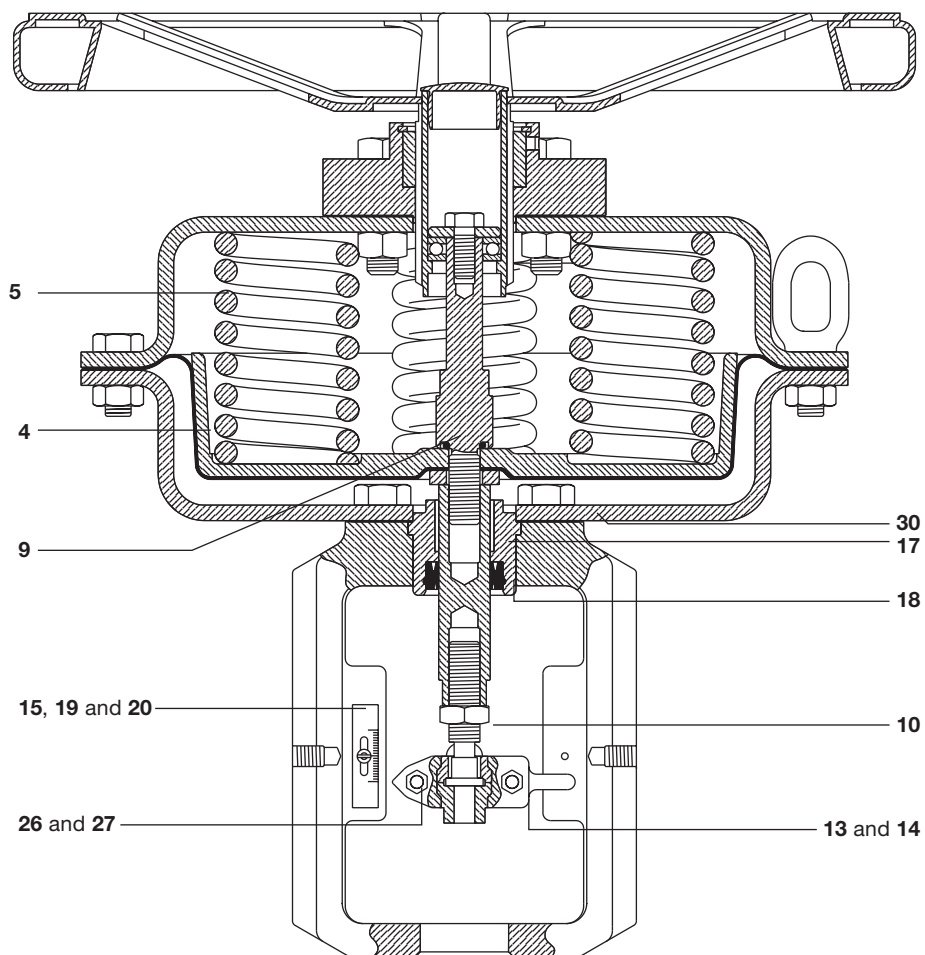
### Available spares

Stem seal kit	17, 18, 30
Diaphragm kit	4, 9
Travel indicator kit	15, 19, 20
Spring kit	5
Linkage kit (suitable for Mk1 and SPIRA-TROL valves)	10, 13, 14, 26, 27

## How to order spares

Always order spares by using the description given in the column headed 'Available spares' and state the actuator model.

**Example:** 1 - Stem seal kit for a PN9120 pneumatic actuator.



# PN9000 Series Pneumatic Actuators for SPIRA-TROL K and L Series Control Valves

## How to use the sizing data:

The following tables supply guidance as to the sizing of the PN9000 when it is used on the SPIRA-TROL K and L series valves.

Two conditions are illustrated in tabular form:

**Class IV shut-off** - Providing shut-off of the valve to the requirements of BS 5793-4 (IEC 60534-4) class IV.

**Class VI shut-off** - Providing shut-off of the valve to the requirements of BS 5793-4 (IEC 60534-4) class VI.

## To select a suitable actuator:

- Identify the column containing the valve and gland material selected.
- Identify the maximum operating pressure condition, including any transient pressures likely to occur, within the selected column.
- Read back to the left hand side of the table to identify the suitable actuator for the application.

For conditions outside of those illustrated please contact Spirax Sarco.

## Maximum differential pressures for Class IV shut-off - PN9000E

### PTFE or Graphite stem seal

Actuator	Spring Range	Maximum Differential Pressures (psi)																	
		1/2"		3/4"		1"		1 1/4"		1 1/2"		2"		2 1/2"		3"		4"	
		PTFE	Graph	PTFE	Graph	PTFE	Graph	PTFE	Graph	PTFE	Graph	PTFE	Graph	PTFE	Graph	PTFE	Graph	PTFE	Graph
PN9126E	15 - 30	403	186	297	126	170	55	138	49	34		14							
PN9122E	9 - 15	140		89		31		30											
PN9123E	30 - 60	740	740	740	673	536	422	422	333	156	118	101	74						
PN9220E	3 - 15	201		137		63		55											
PN9220E	6 - 18	691	475	525	354	322	208	256	168	85	46	50	23	14					
PN9230E	6 - 18													14					
PN9226E	15 - 30	740	740	740	740	740	740	740	740	346	307	236	209						
PN9236E	16 - 30													118	92	68	51	36	26
PN9222E	9 - 15	740	740	740	740	608	493	477	389	180	142	119	91						
PN9223E	30 - 60	740	740	740	740	740	740	740	740	740	740	546	519						
PN9233E	31 - 60													293	267	180	163	106	95
PN9320E	3 - 15	677	460	513	342	315	200	250	162	82	44	49	21						
PN9320E	6 - 18	740	740	740	740	740	712	646	557	254	215	171	143						
PN9330E	6 - 18													81	55	44	28	21	11
PN9322E	9 - 15	740	740	740	740	740	740	740	740	442	404	305	278						
PN9336E	15 - 30													288	261	176	160	103	93
PN9332E	9 - 15													157	131	93	76	51	41
PN9337E	36 - 51													740	740	506	489	309	299

### Bellows and PTFE or Graphite stem seal

Actuator	Spring Range	Maximum Differential Pressure (psi)																	
		1/2"		3/4"		1"		1 1/4"		1 1/2"		2"		2 1/2"		3"		4"	
		PTFE	Graph	PTFE	Graph	PTFE	Graph	PTFE	Graph	PTFE	Graph	PTFE	Graph	PTFE	Graph	PTFE	Graph	PTFE	Graph
PN9226E	15 - 30	360	360	360	360	360	360	360	327	154	115	100	72						
PN9236E	16-30	360	360	360	360	360	360	360	327	154	115	100	72						
PN9222E	9 - 15	149		96		36		34											
PN9223E	30 - 60	360	360	360	360	360	360	360	360	360	360	360	360						
PN9233E	31 - 60													185	159	111	94	63	52
PN9320E	6 - 18	360	345	360	251	254	139	203	114	62	23	34							
PN9322E	9 - 15	360	360	360	360	360	360	360	360	250	212	168	141						
PN9336E	15 - 30													180	154	107	91	61	50
PN9332E	9 - 15													49	23	24			
PN9337E	36 - 51													360	360	360	360	266	256

# PN9000 Series Pneumatic Actuators for SPIRA-TROL K and L Series Control Valves

Maximum differential pressures for Class VI shut-off - PN9000E

## PTFE or Graphite stem seal

Actuator	Spring Range	Maximum Differential Pressure (psi)																	
		1/2"		3/4"		1"		1 1/4"		1 1/2"		2"		2 1/2"		3"		4"	
		PTFE	Graph	PTFE	Graph	PTFE	Graph	PTFE	Graph	PTFE	Graph	PTFE	Graph	PTFE	Graph	PTFE	Graph	PTFE	Graph
PN9120E	3 - 15	61		48		31		24											
PN9120E	6 - 18	199		157		104		80		34		24							
PN9125E	6-30	199		157		104		80		34		24							
PN9122E	9 - 15	352	135	277	106	185	71	143	54	61	23	43	16						
PN9126E	15 - 30	615	398	485	314	324	210	251	162	108	69	76	49						
PN9123E	30 - 60	740	740	740	740	690	576	534	446	230	192	164	137						
PN9220E	3 - 15	413	196	326	155	217	103	168	79	72	34	51	24						
PN9220E	6 - 18	740	687	713	542	477	362	369	280	159	120	113	86						
PN9230E	3 - 15													61	34	39	22	24	13
PN9222E	9 - 15	740	740	740	740	740	648	590	501	254	216	181	154						
PN9226E	15 - 30	740	740	740	740	740	740	740	740	420	381	299	272						
PN9236E	16 - 30													165	139	106	89	66	55
PN9223E	30 - 60	740	740	740	740	740	740	740	740	740	740	609	582						
PN9233E	30 - 60													340	313	217	200	135	125
PN9320E	3 - 15	740	672	702	531	469	355	363	274	156	118	111	84						
PN9320E	6 - 18	740	740	740	740	740	740	740	670	328	289	233	206						
PN9322E	9 - 15	740	740	740	740	740	740	740	740	516	478	368	340						
PN9330E	6 - 18													128	102	82	65	51	40
PN9336E	15 - 30													334	308	214	197	133	123
PN9332E	9 - 15													204	178	130	114	81	71
PN9337E	36 - 51													740	740	544	527	339	328

## Bellows and PTFE or Graphite stem seal

Actuator designation	Spring Range	Maximum Differential Pressure (psi)																	
		1/2"		3/4"		1"		1 1/4"		1 1/2"		2"		2 1/2"		3"		4"	
		PTFE	Graph	PTFE	Graph	PTFE	Graph	PTFE	Graph	PTFE	Graph	PTFE	Graph	PTFE	Graph	PTFE	Graph	PTFE	Graph
PN9123E	30 - 60	225		178		118		91		39		27							
PN9222E	9 - 15	360	145	285	114	190	75	147	58	63	24	44	17						
PN9226E	15 - 30	360	360	360	360	360	360	360	360	228	189	162	135						
PN9236E	16 - 30													58	31	37	20	23	12
PN9223E	30 - 60	360	360	360	360	360	360	360	360	360	360	360	360						
PN9233E	30 - 60													232	206	148	131	92	82
PN9320E	6 - 18	360	360	360	360	360	294	316	227	136	97	97	69						
PN9322E	9 - 15	360	360	360	360	360	360	360	360	324	286	231	204						
PN9330E	6 - 18													21		13			
PN9332E	9 - 15													96	70	61	45	38	28
PN9336E	15 - 30													227	201	145	128	90	80
PN9337E	36 - 51													360	360	360	360	296	285



# PN9000 Series Pneumatic Actuators for SPIRA-TROL K and L Series Control Valves

Maximum differential pressures for Class IV shut-off - PN9000R

## PTFE or Graphite stem seal

Actuator	Spring Range	Air Pressure	Maximum Differential Pressure (psi)																	
			1/2"		3/4"		1"		1 1/4"		1 1/2"		2"		2 1/2"		3"		4"	
			PTFE	Graph	PTFE	Graph	PTFE	Graph	PTFE	Graph	PTFE	Graph	PTFE	Graph	PTFE	Graph	PTFE	Graph	PTFE	Graph
PN9120R	3 - 15	30	450	234	334	163	195	81	158	69	42		20							
		40	740	712	712	541	448	333	353	265	127	88	80	53						
		50	740	740	740	740	700	586	549	460	211	173	141	113						
		60	740	740	740	740	740	740	740	656	296	258	201	174						
		70	740	740	740	740	740	740	740	740	381	342	261	234						
		90	740	740	740	740	740	740	740	740	550	512	382	355						
PN9220R	3 - 15	20	640	424	485	314	296	181	235	147	76	37	44	17						
		30	740	740	740	740	740	740	740	740	376	337	258	230						
		40	740	740	740	740	740	740	740	740	675	637	472	444						
		50	740	740	740	740	740	740	740	740	740	740	685	658						
		60	740	740	740	740	740	740	740	740	740	740	740	740						
		70	740	740	740	740	740	740	740	740	740	740	740	740						
PN9230R	3 - 15	90	740	740	740	740	740	740	740	740	740	740	740	740						
		30													130	104	76	59	41	30
		40													251	224	153	136	89	78
		50													371	345	230	213	137	126
		60													491	465	307	290	185	174
		70													611	585	384	367	233	222
PN9320R	3 - 15	90													740	740	537	521	329	318
		20	740	740	740	740	740	659	605	517	236	197	158	131						
		30	740	740	740	740	740	740	740	740	740	740	579	552						
		40	740	740	740	740	740	740	740	740	740	740	740	740						
		50	740	740	740	740	740	740	740	740	740	740	740	740						
		60	740	740	740	740	740	740	740	740	740	740	740	740						
PN9330R	6 - 18	70																		
		20																		
		30													243	216	147	131	86	75
		40													480	453	299	282	180	170
		50													716	690	451	434	275	264
		60													740	740	602	586	369	359

## Bellows and PTFE or Graphite stem seal

Actuator	Spring Range	Air Pressure	Maximum Differential Pressure (psi)																	
			1/2"		3/4"		1"		1 1/4"		1 1/2"		2"		2 1/2"		3"		4"	
			PTFE	Graph	PTFE	Graph	PTFE	Graph	PTFE	Graph	PTFE	Graph	PTFE	Graph	PTFE	Graph	PTFE	Graph	PTFE	Graph
PN9120R	3 - 15	50	324	107	234	63	128	14	106	17	20									
		60	360	360	360	360	360	266	301	213	104	66	64	37						
		70	360	360	360	360	360	360	360	360	189	151	125	97						
		90	360	360	360	360	360	360	360	360	358	320	245	218						
PN9220R	3 - 15	30	360	360	360	360	360	360	360	360	184	145	121	94						
		40	360	360	360	360	360	360	360	360	360	360	335	307						
		50	360	360	360	360	360	360	360	360	360	360	360	360						
		60	360	360	360	360	360	360	360	360	360	360	360	360						
		70	360	360	360	360	360	360	360	360	360	360	360	360						
PN9230R	3 - 15	90	360	360	360	360	360	360	360	360	360	360	360	360						
		30													23					
		40													143	117	84	67	46	35
		50													263	237	161	144	94	83
		60													360	357	238	221	142	131
PN9320R	3 - 15	70													360	360	315	298	190	179
		90													360	360	360	360	286	275
		20	360	245	343	172	201	86	162	73	44		21							
		30	360	360	360	360	360	360	360	360	360	360	360	360						
		40	360	360	360	360	360	360	360	360	360	360	360	360						
PN9330R	6 - 18	50	360	360	360	360	360	360	360	360	360	360	360	360						
		60	360	360	360	360	360	360	360	360	360	360	360	360						
		30													135	109	79	62	43	32
		40													360	346	230	213	137	127
		50													360	360	360	360	232	221
		60													360	360	360	360	326	316

# PN9000 Series Pneumatic Actuators for SPIRA-TROL K and L Series Control Valves

Maximum differential pressures for Class VI shut-off - PN9000R

## PTFE or Graphite stem seal

Actuator	Spring Range	Air Pressure	Maximum Differential Pressure (psi)																	
			1/2"		3/4"		1"		1 1/4"		1 1/2"		2"		2 1/2"		3"		4"	
			PTFE	Graph	PTFE	Graph	PTFE	Graph	PTFE	Graph	PTFE	Graph	PTFE	Graph	PTFE	Graph	PTFE	Graph	PTFE	Graph
PN9120R	3 - 15	20	185		146		97		75		31		22							
		30	663	446	523	352	349	235	270	181	116	78	83	55						
		40	740	740	740	729	602	487	466	377	201	162	143	116						
		50	740	740	740	740	740	740	740	661	573	285	247	203	176					
		60	740	740	740	740	740	740	740	740	740	370	332	264	236					
		70	740	740	740	740	740	740	740	740	740	455	416	324	297					
		90	740	740	740	740	740	740	740	740	740	624	586	445	417					
PN9220R	3 - 15	20	740	636	673	502	450	335	348	259	150	111	107	79						
		30	740	740	740	740	740	740	740	740	450	411	320	293						
		40	740	740	740	740	740	740	740	740	740	711	534	507						
		50	740	740	740	740	740	740	740	740	740	740	740	721						
		60	740	740	740	740	740	740	740	740	740	740	740	740						
		70	740	740	740	740	740	740	740	740	740	740	740	740						
		90	740	740	740	740	740	740	740	740	740	740	740	740						
PN9230R	3 - 15	20													57	31	36	20	22	12
		30													177	151	113	96	70	60
		40													297	271	190	173	118	108
		50													418	392	267	250	166	156
		60													538	512	344	327	214	204
		70													658	632	421	404	262	252
		90													740	740	575	558	358	348
PN9320R	3 - 15	20	740	740	740	740	740	740	718	629	310	271	221	193						
		30	740	740	740	740	740	740	740	740	740	740	642	615						
		40	740	740	740	740	740	740	740	740	740	740	740	740						
		50	740	740	740	740	740	740	740	740	740	740	740	740						
		60	740	740	740	740	740	740	740	740	740	740	740	740						
PN9330R	6 - 18	20													52	26	33	17	21	10
		30													289	263	185	168	115	105
		40													526	500	337	320	210	199
		50													740	737	488	472	304	294
		60													740	740	640	623	399	388

## Bellows and PTFE or Graphite stem seal

Actuator	Spring Range	Air Pressure	Maximum Differential Pressure (psi)																		
			1/2"		3/4"		1"		1 1/4"		1 1/2"		2"		2 1/2"		3"		4"		
			PTFE	Graph	PTFE	Graph	PTFE	Graph	PTFE	Graph	PTFE	Graph	PTFE	Graph	PTFE	Graph	PTFE	Graph	PTFE	Graph	
PN9120R	3 - 15	40	58		45		30		23												
		50	360	319	360	252	282	168	218	130	94	55	66	39							
		60	360	360	360	360	360	360	360	360	325	178	140	127	99						
		70	360	360	360	360	360	360	360	360	263	225	187	160							
		90	360	360	360	360	360	360	360	360	360	360	308	281							
PN9220R	3 - 15	30	360	360	360	360	360	360	360	360	258	219	184	156							
		40	360	360	360	360	360	360	360	360	360	360	360	360							
		50	360	360	360	360	360	360	360	360	360	360	360	360							
		60	360	360	360	360	360	360	360	360	360	360	360	360							
		70	360	360	360	360	360	360	360	360	360	360	360	360							
PN9230R	3 - 15	90	360	360	360	360	360	360	360	360	360	360	360	360							
		30														70	43	44	28	27	17
		40														190	164	121	105	75	65
		50														310	284	198	181	123	113
		60														360	360	275	258	171	161
PN9320R	3 - 15	70														360	360	352	335	219	209
		90														360	360	360	360	315	305
		20	360	360	360	360	355	241	275	186	118	80	84	57							
		30	360	360	360	360	360	360	360	360	360	360	360	360							
		40	360	360	360	360	360	360	360	360	360	360	360	360							
PN9330R	6 - 18	50	360	360	360	360	360	360	360	360	360	360	360	360							
		60	360	360	360	360	360	360	360	360	360	360	360	360							
		30														182	156	116	99	72	62
		40														360	360	268	251	167	156
		50														360	360	360	360	261	251
		60													360	360	360	360	356	345	

# PN9000 Series Pneumatic Actuators for SPIRA-TROL K and L Series Control Valves

## PN9000 series selection guide:

Type	PN = Polyester powder coated (standard)	<b>PNP</b>
	PNP = Electroless nickle plated	
Series	9 = 9000 series	<b>9</b>
Actuator size	1 = 100 cm <sup>2</sup>	<b>3</b>
	2 = 340 cm <sup>2</sup>	
	3 = 670 cm <sup>2</sup>	
Valve travel	2 = 20 mm	<b>3</b>
	3 = 30 mm	
Spring rating	0 = 0.2 to 1.0 bar (option for 0.4 to 1.2 bar)	<b>7</b>
	3 = 2.0 to 4.0 bar	
	5 = 0.4 to 2.0 bar (PN9100 series only)	
	6 = 1.0 to 2.0 bar	
Spring action	7 = 2.5 to 3.5 bar (PN933_ series only)	<b>E</b>
	E = Spring-extend	
Manual override	R = Spring-retract	
	H = Handwheel (optional)	
Stainless steel bolting	S = Stainless steel bolting (optional)	

## How to order/selection example:

1 off Spirax Sarco PNP9337E pneumatic actuator.

## PN1000 Series Spring Extend Pneumatic Actuators (for 6" and 8" Spira-Trol Valves)

### Description

A range of single spring linear actuators having 2 diaphragm sizes for matching the requirements of different valves at various differential pressures. Each actuator is fitted with a combined mechanical stroke indicator and anti-rotation guard. The actuators are designed for easy conversion from spring extend to spring retract, and vice versa, without the need for special tools.

### Available types

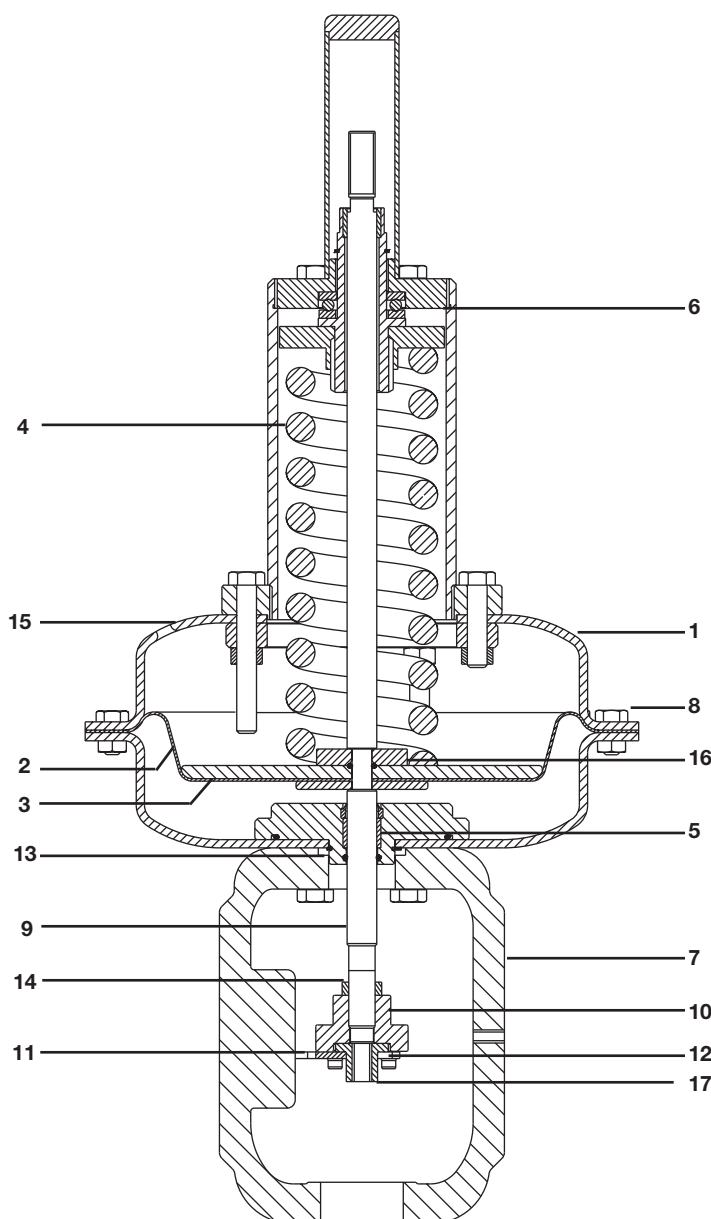
Spring extend spindle actuators:  
PN1600

### Technical data

Temperature range	-20°C to +110°C (-4°F to +230°F)
Maximum operating pressure	4.5 bar (65 psi)
Air supply connection	1/4" NPT

### Materials

No.	Part	Material
1	Diaphragm housing	Carbon steel
2	Diaphragm	Reinforced nitrile rubber
3	Diaphragm plate	Stainless steel
4	Spring	Spring steel
5	Spindle guide	Bronze
6	Bearing	Hardened steel
7	Yoke	Cast steel
8	Housing securing nuts and bolts	Zinc plated steel
9	Spindle	Stainless steel
10	Connector	Zinc plated steel
11	Travel indicator	Stainless steel
12	Lock plate	Zinc plated steel
13	'O' ring	Nitrile rubber
14	Lock-nut	Zinc plated steel
15	Cap with vent hole	Nickel plated brass
16	Spring location washer	Zinc plated steel
17	Valve spindle adapter	Stainless steel



# PN1000 Series Spring Extend Pneumatic Actuators (for 6" and 8" Spira-Trol Valves)

## Differential pressures for KE and KEA series valves and PN1000 series actuators

Note: The differential pressures stated in the tables below are limited by the maximum operating pressures of the selected control valve.

Differential Pressures for PN1000 actuator - Unbalanced Flow Under - Class 4 - Spring Extend

Actuator	Actuator		Max air pressure	Maximum Differential Pressure (psi)			
				6"		8"	
	Closed	Open		PTFE	Graph	PTFE	Graph
PN1670	6	18	60				
PN1676	15	30	60				
PN1673	30	60	60	83	79	32	30

Differential Pressures for PN1000 actuator - Unbalanced Flow Over - Class 4 - Spring Extend

Actuator	Actuator		Max air pressure	Maximum Differential Pressure (psi)			
				6"		8"	
	Closed	Open		PTFE	Graph	PTFE	Graph
PN1670	6	18	65	329	333	184	187
PN1676	15	30	65	281	285	158	160
PN1673	30	60	65	202	206	113	115

Differential Pressures for PN1000 actuator - Balanced - Class 4 - Spring Extend

Actuator	Actuator		Max air pressure	Maximum Differential Pressure (psi)			
				6"		8"	
	Closed	Open		PTFE	Graph	PTFE	Graph
PN1670	6	18	65				
PN1676	15	30	65				
PN1673	30	60	65	740	740	740	740

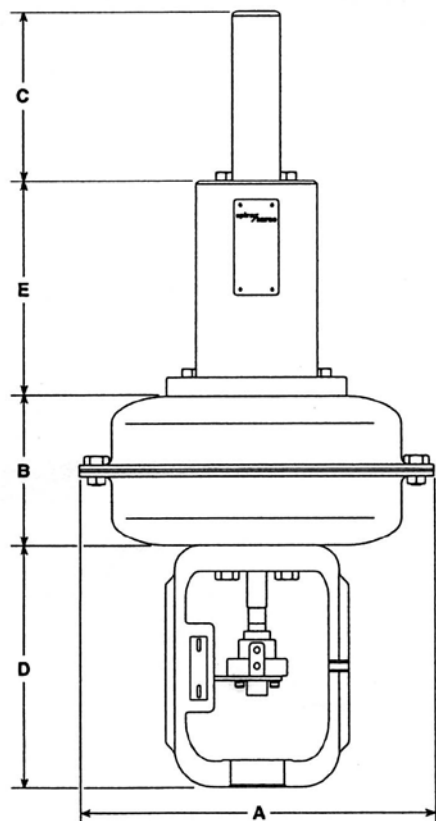
Differential Pressures for PN1000 actuator - Unbalanced Flow Under - Class 6 - Spring Extend

Actuator	Actuator		Max air pressure	Maximum Differential Pressure (psi)			
				6"		8"	
	Closed	Open		PTFE	Graph	PTFE	Graph
PN1670	6	18	60	28	24	43	13
PN1676	15	30	60	77	73	43	41
PN1673	30	60	60	159	155	90	87

Differential Pressures for PN1000 actuator - Unbalanced Flow Over - Class 6 - Spring Extend

Actuator	Actuator		Max air pressure	Maximum Differential Pressure (psi)			
				6"		8"	
	Closed	Open		PTFE	Graph	PTFE	Graph
PN1670	6	18	65	329	333	184	187
PN1676	15	30	65	281	285	158	160
PN1673	30	60	65	202	206	113	115

# PN1000 Series Spring Extend Pneumatic Actuators (for 6" and 8" Spira-Trol Valves)



## Installation

Actuators should be mounted on the valve with the stem in a vertical position. Installation and Maintenance Instructions are supplied with the product.

## Spare parts

Information regarding available spare parts is given on TI-P357-23-US.

## PN1000 series actuator selection table

Selection should be made in conjunction with the differential pressure chart shown above and the following code:

Actuation	PN	= Pneumatic	<input type="text" value="PN"/>
Actuator action	1	= Spring to extend	<input type="text" value="1"/>
Diaphragm size	6		<input type="text" value="6"/>
Actuator travel	7	= 70 mm	<input type="text" value="7"/>
Spring range	0	= 0.4 to 1.2 bar (6 to 18 psi)	<input type="text" value="3"/>
	3	= 2.0 to 4.0 bar (30 to 60 psi)	
	6	= 1.0 to 2.0 bar (15 to 30 psi)	
Yoke type	B	= Type B for valve sizes: DN150 - 200 (6" to 8")	<input type="text" value="B"/>

## How to order

**Example:** 1 off Spirax Sarco PN1553B actuator, set to 30 to 60 psig.

## Dimensions/weights approximate in mm (inches) and kg (pounds)

Actuator	Actuator diaphragm			D	E	Weight
	A	B	C			
PN1600	465 (18-5/16")	515 (20-1/4")	150 (6")	247 (9-3/4")	250 (9-7/8")	70 (154)



# spirax sarco

## Belimo AFB Series Electric Actuators for

## 1/2" to 2" B Series and SPIRA-TROL L & K Series Control Valves

### Description

The Belimo AF Series actuators are suitable for either two position or modulating control. These actuators can be used with B Series or SPIRA-TROL L and K Series control valves.

#### Multi-Function Technology (MFT)

An integrated microprocessor allows for a variety of parameters, including control signal type, to be configured in the factory or the field with a PC and Belimo software.

#### Manual Operation

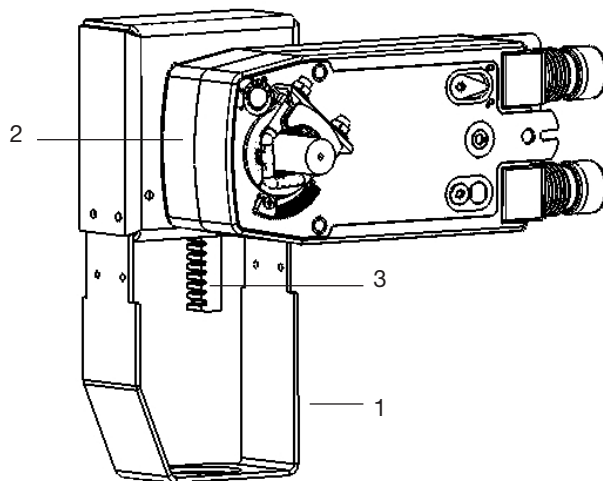
A 5mm Allen wrench can be used to manually operate the actuator. Turning the wrench clockwise will extend the spindle. Spindle position will be retained until power is applied to the actuator.

#### Overload Protection

The actuator is protected against short circuiting and reverse polarity. The spindle stroke is adapted automatically and is overload protected.

#### Operational Display

The stroke is physically shown by a travel indicator on the actuator yoke.



### Available Types

Actuator Model	Valve action in event of power failure	
	B Series	SPIRA-TROL
AFB24-MFT-US	Optional*	Optional*
2 x AFB24-MFT-US	Optional*	Optional*

\*Power failure action should be specified at the time of order and will determine the actuator to yoke mounting orientation.

### Materials of Construction

No.	Component	Material
1	Yoke	Steel
2	Base	Aluminum die casting
3	Cover	Steel

### Ambient Limits

Storage temperature	-40°F to 176°F (-40°C to 80°C) at 5 to 95% RH
Ambient temperature	-22°F to 122°F (-30°C to 50°C) at 5 to 95% RH
Maximum valve media temperature	338°F (170°C)*

\* Equivalent to a saturated steam pressure of 100psig (6.9barg)

### Agency Listings

General	cULus acc. to UL60730-1A/-2-14, CAN/CSA E60730-1:02, CE acc. to 2004/108/EC & 2006/95/EC
Housing	NEMA 2, IP54, Enclosure Type 2

### Spares

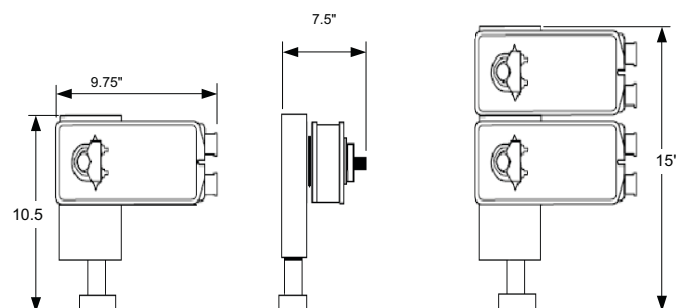
No spare parts are available for this actuator range

### Dimensions and Weights

Weight	AFB24-MFT-US	12.8 lb
	2xAFB24-MFT-US	20.6 lb
Dimensions	See below	

### Specifications

Supply Voltage	24 VAC 50/60 Hz or 24 VDC
Transformer Sizing	10 VA (Class 2 power supply)
Power Consumption	7.5W running, 3W holding
Electrical Connection	3 ft., 18 GA appliance cable, 1/2" conduit fitting
Running Time Motor	70 - 220 sec
Running Time Spring	<20 sec
Overload Protection	Electronic throughout stroke
Control Signal	2 to 10 VDC, 0.5mA max
(to be specified at time of order)	4 to 20 mA w/ 500Ω resistor
	Pulse Width Modulation (pulse width to be specified by customer)
	Floating Point
	On/Off
	100KΩ for 2 to 10VDC,
Input Impedance	500Ω for 4 to 20 mA,
	1500Ω for Pulse Width Modulation (PWM)
Feedback	2 to 10 VDC, 0.5mA max
Maximum Stroke	3/4" (20mm)
Spindle Force	AFB24-MFT US 230lbf (1023N)
	2 x AFB24-MFT US 343lbf (1525N)
Position Indication	Visual indicator
Manual Override	3/16 Allen (supplied) 5mm hex



Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only. In the interests of development and improvement of the product, we reserve the right to change the specification.

TI-1-519-US 8.13



## Installation and Wiring

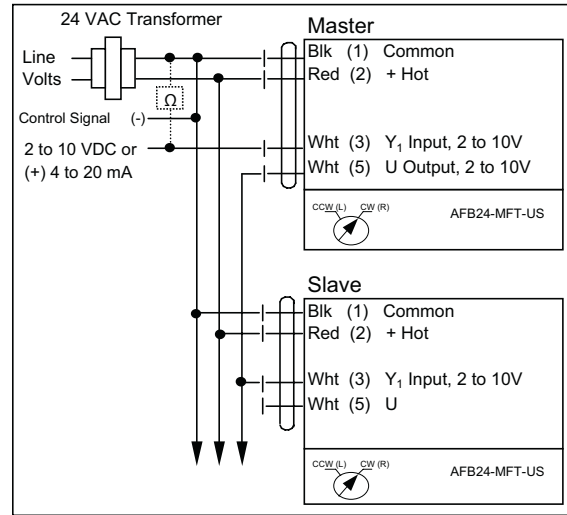
The valves should be installed in the horizontal line. Allow 6" for the cover removal and 12" for complete actuator removal. These actuators should never be mounted underneath the valve as condensation can build up and result in a failure of the actuator. Full instructions are supplied with the product. The diagram below shows the wiring schematic. For AFB-MFT-US actuators, connect as shown in the 'Master' schematic. For 2 x AFB-MFT-US actuators, one actuator motor should be connected as a 'Master' and the other as a 'Slave' unit, as shown in the schematic.

## Differential Pressures (psi)

**Note:** Due to temperature capability limitations, maximum saturated steam inlet pressure is 100 psig. For reduced capacity valves, use the differential pressures for the next valve size down.

### B Series 2-Way and 3-Way Control Valves

ANSI/FCI 70-2 Class IV Shut-off (metal seated trim) for 2-way valves and Class III for 3-way (mixing) valves



**Note:** Please contact Belimo for other wiring information.

Model	Thrust (lbf)	1/2"		3/4"		1"		1-1/4"		1-1/2"		2"	
		FB	RB	FB	RB	FB	RB	FB	RB	FB	RB	FB	RB
Class IV													
AFB24-MFT	311	150	150	150	150	150	150	150	150	118	150	73	115
2xAFB24-MFT	464	150	150	150	150	150	150	150	150	150	150	119	150
Class VI													
AFB24-MFT	311	150	150	150	150	150	150	150	150	150	150	122	150
2xAFB24-MFT	464	150	150	150	150	150	150	150	150	150	150	150	150

### SPIRA-TROL Series Control Valves

#### Class IV Shut-Off

Model	Thrust (N)	Theoretical Maximum Differential Pressure (psi)											
		1/2"		3/4"		1"		1 - 1/4"		1 - 1/2"		2"	
		PTFE	Graph	PTFE	Graph	PTFE	Graph	PTFE	Graph	PTFE	Graph	PTFE	Graph
AFB24-MFT	1383	708	491	538	367	331	217	263	174	88	49	53	25
2xAFB24-MFT	2063	725	725	725	725	591	476	464	375	175	136	115	87

AFB24	½"		¾"		1"		1 - ¼"		1 - ½"		2"	
Cv	PTFE	Graph	PTFE	Graph	PTFE	Graph	PTFE	Graph	PTFE	Graph	PTFE	Graph
Full	708	491	538	367	331	217	263	174	88	49	53	25
Red 1	725	725	681	464	495	324	340	225	203	114	74	35
Red 2	725	725	725	725	626	410	507	336	262	147	170	82
Red 3	725	725	725	725	725	725	642	426	391	220	220	105

2X AFB24	½"		¾"		1"		1 - ¼"		1 - ½"		2"	
Cv	PTFE	Graph	PTFE	Graph	PTFE	Graph	PTFE	Graph	PTFE	Graph	PTFE	Graph
Full	725	725	725	725	591	476	464	375	175	136	115	87
Red 1	725	725	725	725	725	711	599	485	404	315	161	122
Red 2	725	725	725	725	725	725	725	725	521	407	371	282
Red 3	725	725	725	725	725	725	725	725	725	607	479	365

#### Class VI Shut-Off

Model	Thrust (N)	Theoretical Maximum Differential Pressure (psi)											
		1/2"		3/4"		1"		1 - 1/4"		1 - 1/2"		2"	
		PTFE	Graph	PTFE	Graph	PTFE	Graph	PTFE	Graph	PTFE	Graph	PTFE	Graph
AFB24-MFT	1383	725	703	725	555	485	371	376	287	162	123	115	88
2xAFB24-MFT	2063	725	725	725	725	725	630	576	488	249	210	177	150

AFB24	½"		¾"		1"		1 - ¼"		1 - ½"		2"	
Cv	PTFE	Graph	PTFE	Graph	PTFE	Graph	PTFE	Graph	PTFE	Graph	PTFE	Graph
Full	725	703	725	555	485	371	376	287	162	123	115	88
Red 1	725	725	725	703	725	554	485	370	374	285	161	123
Red 2	725	725	725	725	725	701	724	553	483	368	373	284
Red 3	725	725	725	725	725	725	725	700	721	550	481	367

2X AFB24	½"		¾"		1"		1 - ¼"		1 - ½"		2"	
Cv	PTFE	Graph	PTFE	Graph	PTFE	Graph	PTFE	Graph	PTFE	Graph	PTFE	Graph
Full	725	725	725	725	725	630	576	488	249	210	177	150
Red 1	725	725	725	725	725	725	725	630	575	486	248	210
Red 2	725	725	725	725	725	725	725	726	725	628	574	485
Red 3	725	725	725	725	725	725	725	725	725	725	725	626



## AEL5 Series Electric Linear Actuators for ½" to 4" Control Valves

### Description

The AEL5 series electric actuators are reversible having linear output.

### Available types

AEL5 actuators are available with 4 supply variants, **230 Vac (2-wire, single phase)**, **115 Vac**, **24 Vac** and **24 Vdc** all being suitable for a VMD (Valve Motor Drive) input power signal. At extra cost, actuators can be fitted with a positioner input card that can accept a 4 - 20 mA or 2 - 10 Vdc control signal - Please note that this option is not available for the 24 Vdc supply variant.

AEL5 actuators can be ordered with or without a potentiometer, those ordered with will be fitted with a 1 kΩ potentiometer as standard.

The potentiometer can be used in conjunction with the positioner for a 2 - 10 V or 4 - 20 mA input signal, or as feedback for VMD. Also available are auxiliary limit switches and anti-condense heater. See TI-P358-28 for further details on the accessories.

**These actuators can be used with the following valves**, in conjunction with an appropriate valve adaptor and mounting flange.

<b>Valves</b>	<b>2-port</b>	SPIRA-TROL or C Series
	<b>3-port</b>	QL33, QL43, QL63 and QL73 mixing and diverting valves

**Note:** A mounting flange and valve adaptor is required to mount the actuator to a valve. See the associated tables below:

### Mounting flange selection

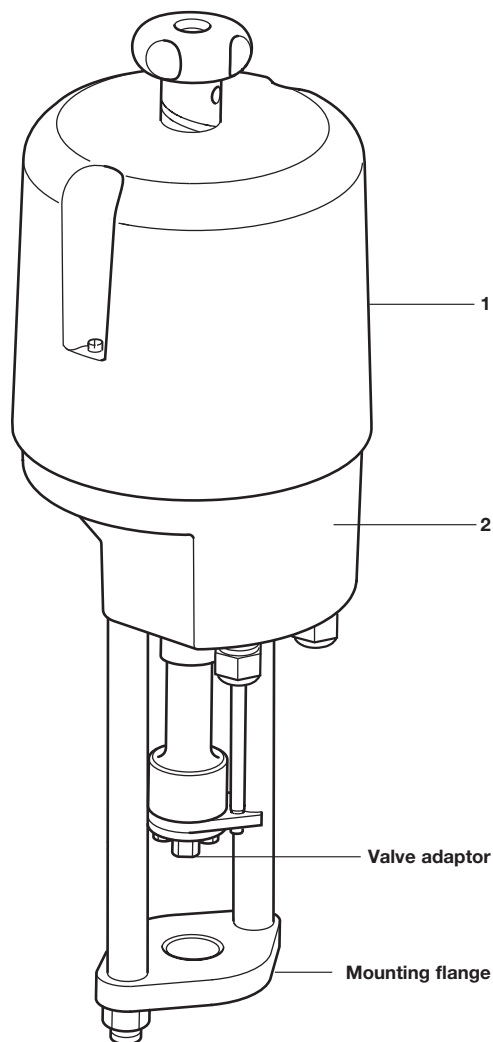
Valve type and size		Actuator	
		AEL51_ AEL52_ AEL53_ AEL54_ AEL55_	AEL56_
<b>L, K, and Q Series</b>	½" to 2"	EL5970	
<b>L Series</b>	2½" to 4"	EL5971	
<b>K and Q Series</b>	2½" to 4"	EL5971	EL5972

### Valve adaptor selection

Valve type and size		Valve stem	AEL51_	AEL52_	AEL53_	AEL54_	AEL55_	AEL56_
<b>L, K, and Q Series</b>	½" to 2"	M8 thread	AEL6911	AEL6911	AEL6911	AEL6911	AEL6911	
	2½" to 4"	M12 thread	Integrated	Integrated	Integrated	Integrated	Integrated	EL5945

### Materials

No.	Part		Material
<b>1</b>	Case	225 to 1798 lbf	Polycarbonate
		3147 to 5620 lbf	Die-cast aluminium
<b>2</b>	Housing		Die-cast aluminium



# AEL5 Series

## Electric Linear Actuators

### for ½" to 4" Control Valves

#### Technical data

Actuator type	AEL51_	AEL52_	AEL53_	AEL54_	AEL55_	AEL56_
Supply voltage	230 Vac (2-wire single phase), 115 Vac, 24 Vac, (24 Vdc) ±10%					
Supply frequency	50 Hz / 60 Hz / (continuous)					
Maximal power consumption VA Note: power consumption is relative to 50/60 Hz / (continuous) respectively	25.5 / 25.9 / (41)	37 / 40 / (24)	44 / 47 / (41)	72 / 68 / (41)	53 / 55 / (93)	100 / 86 / (NA)
Stroke in (mm)	2 (50mm)	2 (50mm)	2 (50mm)	2 (50mm)	2½ (65mm)	4 (100mm)
Actuator speed mm/s Note: Speed is relative to 50/60 Hz / (continuous) respectively	0.25 / 0.3 / (1)	0.5 / 0.6 / (0.5)	0.5 / 0.6 / (1)	0.65 / 0.78 / (0.5)	0.45 / 0.54 / (0.5)	1 / 1.2 / (1)
Enclosure rating	IP65 (for outdoor installations provide adequate shelter)					
Actuator thrust lbf (kN)	225 (1kN)	450 (2kN)	1,011 (4.5kN)	1,798 (8kN)	3,147 (14kN)	5,620 (25kN)
Ambient limits	-4°F to 140°F (Caution: -4°F to 122°F with positioner card fitted)					
Motor	Synchronous motor for 225 lbf to 3147 lbf Asynchronous motor for 5620 lbf (Alternative current) or Brushed direct current motor (Direct current)					
Terminations	1.5 mm <sup>2</sup>					
Manual override	Handwheel					
Conduit entries	2 x M20 x 1.5 (for 225 to 3147 lbf) and 3 x M20 x 1.5 (for 5620 lbf)					
Positioner power consumption VA	1					

For alternative speed versions please contact Spirax Sarco

#### Approvals

This equipment is CE marked and conforms to the following:

- EN 50081-1 and EN 50082-2 (EMC)
- EN 61010-1/A2 (Safety), following the provisions of directives 89/336/EEC amended by 92/31/EEC and 93/68/EEC (EMC) and 72/73/EEC amended by 93/68/EEC (LVD).

# AEL5 Series

## Electric Linear Actuators

### for 1/2" to 4" Control Valves

Maximum differential pressures for modulating duties only -  
KEA and LEA 2-port valves  
with PTFE or Graphite stem seal

Valve size		1/2"		3/4"		1"		1-1/4"		1-1/2"		2"		2-1/2"		3"		4"	
Cv		5.0		7.5		12		16		30		45		75		120		190	
Valve travel		3/4"												1 3/16"					
Actuator	Voltage	Maximum differential pressure psi																	
		PTFE	Graphite	PTFE	Graphite	PTFE	Graphite	PTFE	Graphite	PTFE	Graphite	PTFE	Graphite	PTFE	Graphite	PTFE	Graphite	PTFE	Graphite
AEL51211	230	580	432	507	340	333	228	261	174	115	75	81	54	44	17	28	10	17	6
AEL51212	115	580	432	507	340	333	228	261	174	115	75	81	54	44	17	28	10	17	6
AEL51213	24	580	432	507	340	333	228	261	174	115	75	81	54	44	17	28	10	17	6
AEL52211	230	580		580		580		561	471	242	203	173	145	94	68	59	44	38	26
AEL52212	115	580		580		580		561	471	242	203	173	145	94	68	59	44	38	26
AEL52213	24	580		580		580		561	471	242	203	173	145	94	68	59	44	38	26
AEL53211	230					580		580		563	522	400	373	222	196	142	125	88	78
AEL53212	115					580		580		563	522	400	373	222	196	142	125	88	78
AEL53213	24					580		580		563	522	400	373	222	196	142	125	88	78
AEL54211	230							580		580		580		402	376	257	232	160	149
AEL54212	115							580		580		580		402	376	257	232	160	149
AEL54213	24							580		580		580		402	376	257	232	160	149
AEL55311	230											580		580		454	438	283	273
AEL55312	115											580		580		454	438	283	273
AEL55313	24											580		580		454	438	283	273
AEL56411	230													580		580		508	497
AEL56412	115													580		580		508	497
AEL56413	24													580		580		508	497

with Bellows and PTFE or Graphite stem seal

Valve size		1/2"		3/4"		1"		1-1/4"		1-1/2"		2"		2-1/2"		3"		4"	
Cv		5.0		7.5		12		16		30		45		75		120		190	
Valve travel		¾"												1⅜"					
Actuator	Voltage	Maximum differential pressure psi																	
		PTFE	Graphite	PTFE	Graphite	PTFE	Graphite	PTFE	Graphite	PTFE	Graphite	PTFE	Graphite	PTFE	Graphite	PTFE	Graphite	PTFE	Graphite
AEL52211	230	287	71	228	57	152	38	117	29	51	12	36	9						
AEL52212	115	287	71	228	57	152	38	117	29	51	12	36	9						
AEL52213	24	287	71	228	57	152	38	117	29	51	12	36	9						
AEL53211	230	580		580		580		580		370	319	264	236	115	88	73	57	45	35
AEL53212	115	580		580		580		580		370	319	264	236	115	88	73	57	45	35
AEL53213	24	580		580		580		580		370	319	264	236	115	88	73	57	45	35
AEL54211	230							580		580		580	558	294	268	189	171	117	106
AEL54212	115							580		580		580	558	294	268	189	171	117	106
AEL54213	24							580		580		580	558	294	268	189	171	117	106
AEL55311	230									580		580		580	577	384	368	241	231
AEL55312	115									580		580		580	577	384	368	241	231
AEL55313	24									580		580		580	577	384	368	241	231
AEL56411	230											580		580		580		465	454
AEL56412	115											580		580		580		465	454
AEL56413	24											580		580		580		465	454

# AEL5 Series

## Electric Linear Actuators

### for 1/2" to 4" Control Valves

Maximum differential pressures for class IV shut-off -  
KEA and LEA 2-port valves  
with PTFE or Graphite stem seal

Valve size		1/2"		3/4"		1"		1-1/4"		1-1/2"		2"		2-1/2"		3"		4"	
Cv		5.0		7.5		12		16		30		45		75		120		190	
Valve travel		3/4"												1 3/16"					
Actuator	Voltage	Maximum differential pressure psi																	
		PTFE	Graphite	PTFE	Graphite	PTFE	Graphite	PTFE	Graphite	PTFE	Graphite	PTFE	Graphite	PTFE	Graphite	PTFE	Graphite	PTFE	Graphite
AEL51211	230	431	215	319	145	174	69	149	61	38		17							
AEL51212	115	431	215	319	145	174	69	149	61	38		17							
AEL51213	24	431	215	319	145	174	69	149	61	38		17							
AEL52211	230	580		580		566	461	445	348	165	128	109	81	46	20	21.8	4		
AEL52212	115	580		580		566	461	445	348	165	128	109	81	46	20	21.8	4		
AEL52213	24	580		580		566	461	445	348	165	128	109	81	46	20	21.8	4		
AEL53211	230			580		580		580		486	447	336	309	174	148	103	87	58	48
AEL53212	115			580		580		580		486	447	336	309	174	148	103	87	58	48
AEL53213	24			580		580		580		486	447	336	309	174	148	103	87	58	48
AEL54211	230							580		580		580		354	328	218	189	129	116
AEL54212	115							580		580		580		354	328	218	189	129	116
AEL54213	24							580		580		580		354	328	218	189	129	116
AEL55311	230									580		580		580		416	399	252	242
AEL55312	115									580		580		580		416	399	252	242
AEL55313	24									580		580		580		416	399	252	242
AEL56411	230													580		580		477	464
AEL56412	115													580		580		477	464
AEL56413	24													580		580		477	464

with Bellows and PTFE or Graphite stem seal

Valve size		1/2"		3/4"		1"		1-1/4"		1-1/2"		2"		2-1/2"		3"		4"	
Cv		5.0		7.5		12		16		30		45		75		120		190	
Valve travel		¾"												1⅜"					
Actuator	Voltage	Maximum differential pressure psi																	
		PTFE	Graphite	PTFE	Graphite	PTFE	Graphite	PTFE	Graphite	PTFE	Graphite	PTFE	Graphite	PTFE	Graphite	PTFE	Graphite	PTFE	Graphite
AEL52211	230	70		33															
AEL52212	115	70		33															
AEL52213	24	70		33															
AEL53211	230	580		580		580		580		278	241	187	160	57	31	26	10	9	
AEL53212	115	580		580		580		580		278	241	187	160	57	31	26	10	9	
AEL53213	24	580		580		580		580		278	241	187	160	57	31	26	10	9	
AEL54211	230							580		580		506	479	236	210	142	125	80	70
AEL54212	115							580		580		506	479	236	210	142	125	80	70
AEL54213	24							580		580		506	479	236	210	142	125	80	70
AEL55311	230									580		580		545	363	339	322	204	193
AEL55312	115									580		580		545	363	339	322	204	193
AEL55313	24									580		580		545	363	339	322	204	193
AEL56411	230													580		580		428	418
AEL56412	115													580		580		428	418
AEL56413	24													580		580		428	418

# AEL5 Series

## Electric Linear Actuators

### for 1/2" to 4" Control Valves

Maximum differential pressures for Class VI shut off -

KEA and LEA 2-port valves

with PTFE or Graphite stem seal

Valve size		1/2"		3/4"		1"		1-1/4"		1-1/2"		2"		2-1/2"		3"		4"	
Cv		5.0		7.5		12		16		30		45		75		120		190	
Valve travel		3/4"												1 3/16"					
Actuator	Voltage	Maximum differential pressure psi																	
		PTFE	Graphite	PTFE	Graphite	PTFE	Graphite	PTFE	Graphite	PTFE	Graphite	PTFE	Graphite	PTFE	Graphite	PTFE	Graphite	PTFE	Graphite
AEL51211	230	580	431	508	336	334	225	261	173	112	74	80	52	42	16				
AEL51212	115	580	431	508	336	334	225	261	173	112	74	80	52	42	16				
AEL51213	24	580	431	508	336	334	225	261	173	112	74	80	52	42	16				
AEL52211	230	580		580		580		557	468	241	202	160	144	93	67	59	42	36	26
AEL52212	115	580		580		580		557	468	241	202	160	144	93	67	59	42	36	26
AEL52213	24	580		580		580		557	468	241	202	160	144	93	67	59	42	36	26
AEL53211	230					580		580		560	521	392	371	220	194	141	125	87	77
AEL53212	115					580		580		560	521	392	371	220	194	141	125	87	77
AEL53213	24					580		580		560	521	392	371	220	194	141	125	87	77
AEL54211	230							580		580		580		400	374	255	239	160	148
AEL54212	115							580		580		580		400	374	255	239	160	148
AEL54213	24							580		580		580		400	374	255	239	160	148
AEL55311	230											580		580		454	437	283	273
AEL55312	115											580		580		454	437	283	273
AEL55313	24											580		580		454	437	283	273
AEL56411	230													580		580		580	
AEL56412	115													580		580		580	
AEL56413	24													580		580		580	

with Bellows and PTFE or Graphite stem seal

Valve size		1/2"		3/4"		1"		1-1/4"		1-1/2"		2"		2-1/2"		3"		4"	
Cv		5.0		7.5		12		16		30		45		75		120		190	
Valve travel		3/4"												1 3/16"					
Actuator	Voltage	Maximum differential pressure psi																	
		PTFE	Graphite	PTFE	Graphite	PTFE	Graphite	PTFE	Graphite	PTFE	Graphite	PTFE	Graphite	PTFE	Graphite	PTFE	Graphite	PTFE	Graphite
AEL52211	230	287	71	228	57	152	38	117	29	36	9								
AEL52212	115	287	71	228	57	152	38	117	29	36	9								
AEL52213	24	287	71	228	57	152	38	117	29	36	9								
AEL53211	230	580		580		580		580		370	332	264	236	115	88	73	57	45	35
AEL53212	115	580		580		580		580		370	332	264	236	115	88	73	57	45	35
AEL53213	24	580		580		580		580		370	332	264	236	115	88	73	57	45	35
AEL54211	230							580		580		580	555	294	268	189	171	117	106
AEL54212	115							580		580		580	555	294	268	189	171	117	106
AEL54213	24							580		580		580	555	294	268	189	171	117	106
AEL55311	230											580		580	576	384	368	239	229
AEL55312	115											580		580	576	384	368	239	229
AEL55313	24											580		580	576	384	368	239	229
AEL56411	230											580		580		580		465	454
AEL56412	115											580		580		580		465	454
AEL56413	24											580		580		580		465	454

# AEL5 Series

## Electric Linear Actuators

### for 1/2" to 4" Control Valves

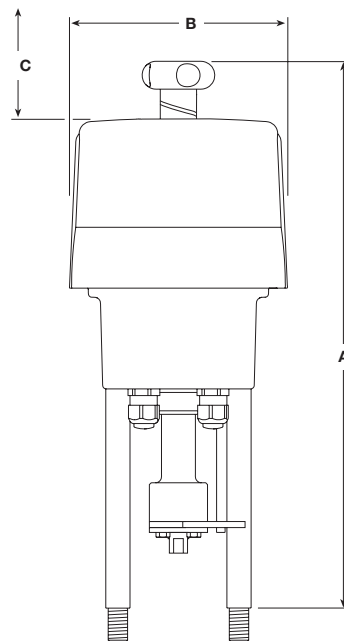
Maximum differential pressures for modulating duties only  
QL 3-port valves

with PTFE or Graphite stem seal

Valve size		1/2"		3/4"		1"		1-1/4"		1-1/2"		2"		2-1/2"		3"		4"	
Cv		4.6		7.3		11.6		18.6		29		41.8		73.1		116		185.6	
Valve travel		3/4"												1 3/16"					
Actuator	Voltage	Maximum differential pressure psi																	
		PTFE	Graphite	PTFE	Graphite	PTFE	Graphite	PTFE	Graphite	PTFE	Graphite	PTFE	Graphite	PTFE	Graphite	PTFE	Graphite	PTFE	Graphite
AEL51211	230	386	174	386	174	222	93	133	54	81	29	46	14	16		6		1.5	
AEL51212	115	386	174	386	174	222	93	133	54	81	29	46	14	16		6		1.5	
AEL51213	24	386	174	386	174	222	93	133	54	81	29	46	14	16		6		1.5	
AEL52211	230	580	574	580	574	466	336	283	203	178	128	107	75	54	33	33	19	16	9
AEL52212	115	580	574	580	574	466	336	283	203	178	128	107	75	54	33	33	19	16	9
AEL52213	24	580	574	580	574	466	336	283	203	178	128	107	75	54	33	33	19	16	9
AEL53211	230	580		580		580		580		423	373	260	228	149	129	102	87	54	46
AEL53212	115	580		580		580		580		423	373	260	228	149	129	102	87	54	46
AEL53213	24	580		580		580		580		423	373	260	228	149	129	102	87	54	46
AEL54211	230									580		473	439	284	264	196	181	107	100
AEL54212	115									580		473	439	284	264	196	181	107	100
AEL54213	24									580		473	439	284	264	196	181	107	100
AEL55311	230											580		438	418	303	290	168	161
AEL55312	115											580		438	418	303	290	168	161
AEL55313	24											580		438	418	303	290	168	161
AEL56411	230													580		580		367	358
AEL56412	115													580		580		367	358
AEL56413	24													580		580		367	358

#### Dimensions / weights (approximately) in inches and lbs

Model	A	B	C	Weight
AEL51_	18	7	5.4	10.0
AEL52_	18	7	5.4	10.6
AEL53_	18	7	5.4	11.0
AEL54_	20	7	6	15.0
AEL55_	22.4	9	9	22.0
AEL56_	32	9	11	44.0





# AEL5 Series

## Electric Linear Actuators

### for ½" to 4" Control Valves

#### Safety information, installation and maintenance

For full details see the Installation and Maintenance Instructions (IM-P358-26) supplied with the product.

#### Installation and wiring note:

The valve should be installed in the horizontal line. The position of the actuator will depend on the type of valve to which it is fitted and the temperature of the media. However, it is not recommended that the actuators be fitted directly below the valve or in a wet environment.

#### Disposal

This product is recyclable. No ecological hazard is anticipated with the disposal of this product, providing due care is taken.

#### Selection example

Control valve	¾" LEA43 PTSUSS.2 Cv 7.5 Flanged ANSI 150
Maximum ΔP	290 psi
Electrical supply	230 Vac
Control signal	4 - 20 mA
Actuator selected	AEL51211
Positioner required	AEL5961 (Potentiometer must also be selected)
Valve adaptor	AEL6911
Mounting flange	EL5970

#### How to order

<b>Product</b>	<b>A</b> = Actuator	<b>A</b>
<b>Type</b>	<b>E</b> = Electric	<b>E</b>
<b>Movement</b>	<b>L</b> = Linear	<b>L</b>
<b>Series</b>	<b>5</b>	<b>5</b>
<b>Thrust lbf (kN)</b>	<b>1</b> = 225 lbf (1kN)	<b>1</b>
	<b>2</b> = 450 lbf (2kN)	
	<b>3</b> = 1,011 lbf (4kN)	
	<b>4</b> = 1,798 lbf (8kN)	
	<b>5</b> = 3,147 lbf (14kN)	
	<b>6</b> = 5,620 lbf (25kN)	
<b>Stroke in (mm)</b>	<b>2</b> = 1" (50mm) (AEL51_, AEL52_, AEL53_ and AEL54_ series only)	<b>2</b>
	<b>3</b> = 2½" (65mm) (AEL55_ series only)	
	<b>4</b> = 4" (100mm) (AEL56_ series only)	
<b>Maximum speed (mm/s)</b>	<b>1</b> = 0 - 0.4 in/sec	<b>1</b>
<b>Supply voltage</b>	<b>1</b> = 230 Vac (2-wire, single phase)	<b>1</b>
	<b>2</b> = 115 Vac	
	<b>3</b> = 24 Vac	
	<b>4</b> = 24 Vdc (not available for AEL56_)	
<b>Control signal*</b>	<b>F</b> = Integral 24 V VMD (only for actuators with 24 V supply voltage)	<b>J</b>
	<b>G</b> = Integral 115 V VMD (only for actuators with 115 V supply voltage)	
	<b>J</b> = Integral 230 V VMD (only for actuators with 230 V supply voltage)	
<b>Failure mode</b>	<b>X</b> = No mechanical/electrical fail safe device	<b>X</b>
<b>Potentiometer</b>	<b>A</b> = With 1 kΩ potentiometer	<b>A</b>
	<b>S</b> = Without	

\* For 0/2 - 10 Vdc and 0/4 - 20 mA modulating control signal the appropriate positioner card must be ordered at time of order. Potentiometer "A" option must also be selected. See TI-P358-28-US

#### How to order example

1 each Spirax Sarco AEL51211JXA electric linear actuator for use with a 4" SPIRA-TROL two-port KEA43 control valve.





## Accessories for the AEL5 Series of Electric Linear Actuators

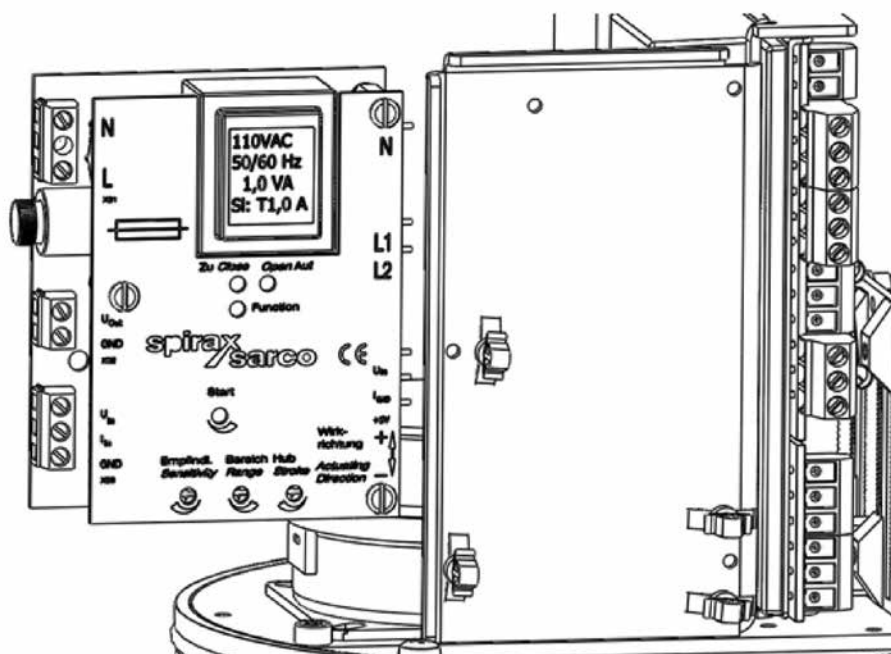
### Available types and technical data

<b>AEL5961</b>	230 Vac positioner card	Power consumption 1 VA
<b>AEL5962</b>	115 Vac positioner card	Power consumption 1 VA
<b>AEL5963</b>	24Vac posit ioner card (except for AEL54213 _ , AEL55313 _ and AEL56413 _)	Power consumption 1 VA
<b>AEL5964</b>	24 Vac positioner card (for AEL54213 _ , AEL55313 _ and AEL56413 _ actuators only)	Power consumption 1 VA
<b>AEL5951</b>	2 auxiliary limit switches (Electronic card)	5 A - 230 Vac - including cams, mounting kit and PCB
<b>AEL5952</b>	Auxiliary feedback potentiometer	1000 ohms $\frac{3}{4}$ " to $1\frac{3}{16}$ " stroke, including mounting kit and pinion
<b>AEL5952.1</b>	Tandem feedback potentiometer	2 x 1000 ohms $\frac{3}{4}$ " to $1\frac{3}{16}$ " stroke, including mounting kit and pinion
<b>AEL5952.2</b>	Tandem feedback potentiometer	2 x 1000 ohms      1" maximum stroke, including mounting kit and pinion
<b>AEL5952.3</b>	Auxiliary feedback potentiometer	2000 ohms $\frac{3}{4}$ " to $1\frac{3}{16}$ " stroke, including mounting kit and pinion
<b>AEL5952.4</b>	Tandem feedback potentiometer	2 x 2000 ohms $\frac{3}{4}$ " to $1\frac{3}{16}$ " stroke, including mounting kit and pinion
<b>AEL5952.5</b>	Auxiliary feedback potentiometer	500 ohms $\frac{3}{4}$ " to $1\frac{3}{16}$ " stroke, including mounting kit and pinion
<b>AEL5953</b>	Tandem feedback potentiometer	2 x 1000 ohms $\frac{3}{4}$ " to $1\frac{3}{16}$ " and $1\frac{3}{16}$ " to 1" stroke, including mounting kit and pinion
<b>AEL5954</b>	115 - 230 V anti-condensate heater	
<b>AEL5956</b>	24 V anti-condensate heater	
<b>AEL5981</b>	Position transmitter	2 wire 4 - 20 mA
<b>AEL5982</b>	Position transmitter	3 wire 0 / 4 - 20 mA

The potentiometer must use its whole range (almost 1 full turn). To facilitate different actuator strokes replacement pinion kits are available. Please contact Spirax Sarco for further information.

<b>Special parts</b>	Pinion 25 teeth with AEL5_	For stroke $\leq \frac{3}{4}$ "
	Pinion 30 teeth with AEL5_	For stroke between $\frac{3}{4}$ " to $1\frac{3}{16}$ "
	Pinion 50 teeth with AEL5_	For stroke between $1\frac{3}{16}$ " to 1"
	Pinion 65 teeth with AEL5_	For stroke between 1" to $2\frac{1}{2}$ "
	Pinion 75 teeth with AEL5	For stroke between $2\frac{1}{8}$ " to $2\frac{3}{4}$ "

For information on AEL5 series actuators see TI-P358-25



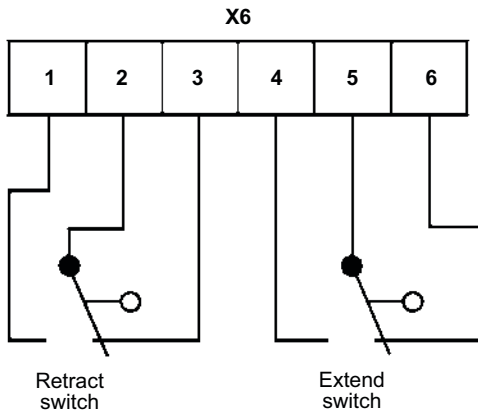
*Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only. In the interests of development and improvement of the product, we reserve the right to change the specification.*

TI-P358-28-US 10.15

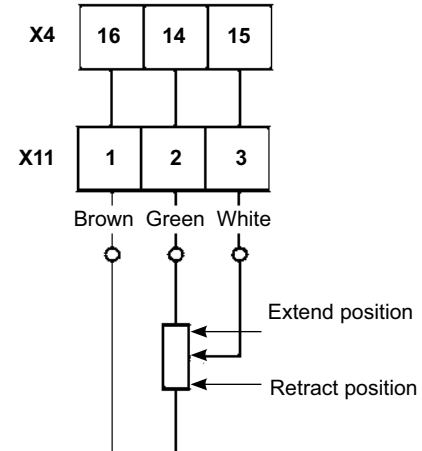
# Accessories for the AEL5 Series of Electric Linear Actuators

**Wiring diagrams** (Note: X0, X4, X5, X6, X8 and X9 refer to termination board location)

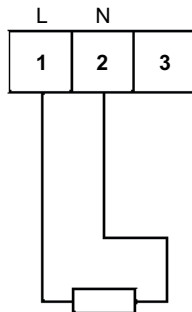
**AEL5951 auxiliary switches**



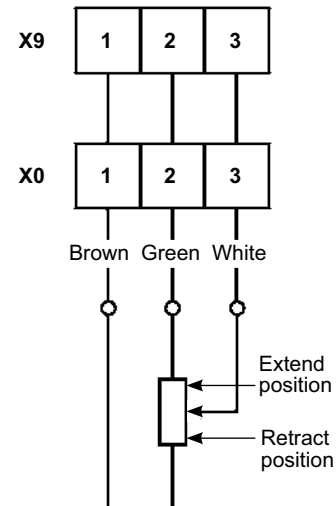
**AEL5952 feedback potentiometer and  
AEL5953 1st output from tandem potentiometer**



**Anti-condense heater  
AEL5954 110 - 250 V and AEL5956 12 - 36 V**



**AEL5953  
2nd output from tandem potentiometer**



# Accessories for the AEL5 Series of Electric Linear Actuators

Positioner card layout

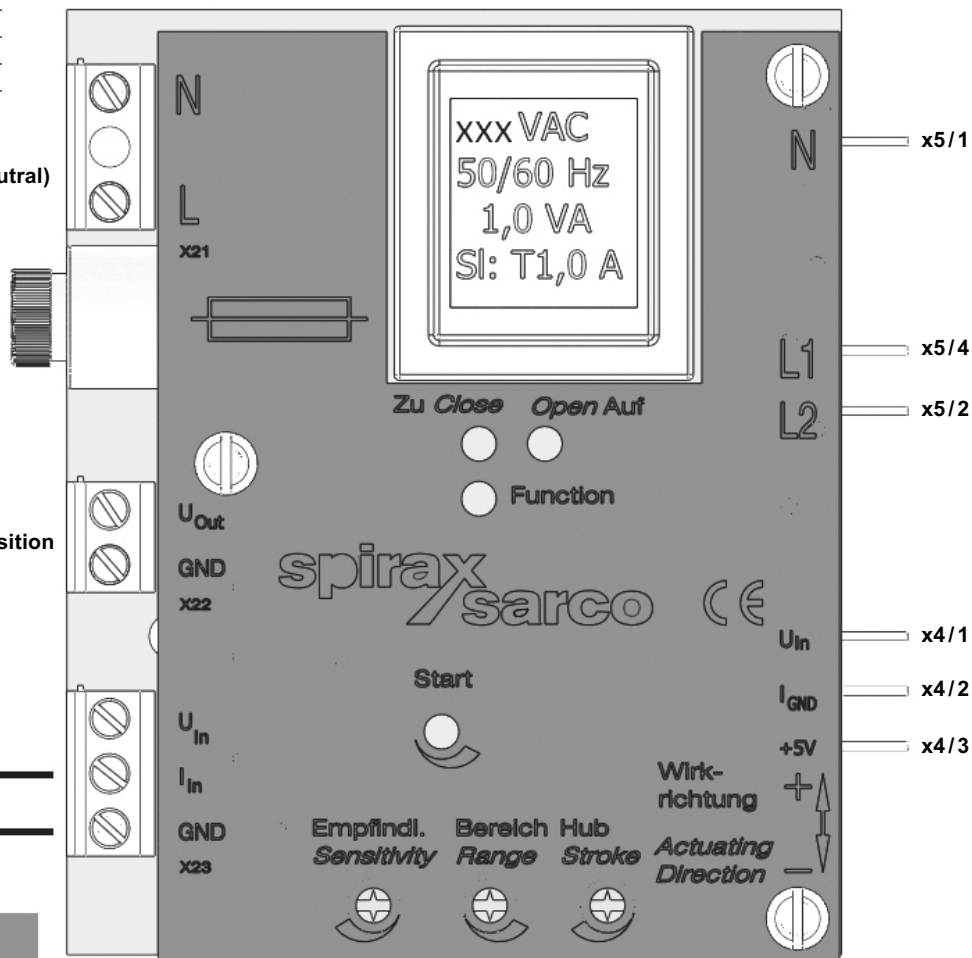
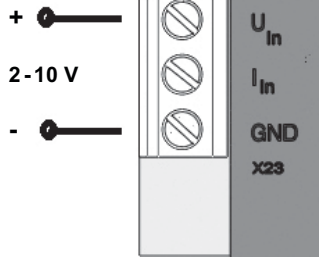
## Positioner card input impedance

Signal	Resistance
2-10 V	50 k $\Omega$
4-20 mA	100 $\Omega$

Power Supply  
(Phase and Neutral)

Feedback position

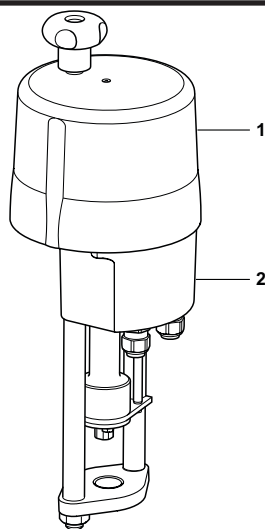
4-20 mA





# spirax sarco

## AEL6 Series Smart Electric Actuators for ½" to 4" Control Valves



### Materials

No.	Part		Material
1	Case	517 lbf to 1798 lbf	Polycarbonate
		3147 lbf to 5620 lbf	Die-cast aluminium
2	Housing		Die-cast aluminium
3	Guidance		Red brass

### Description

The AEL6 series electric actuators are reversible having linear output.

### Available types

The actuators are available with 4 supply variants: 230 Vac (2-wire, single phase), 115 Vac, 24 Vac and 24 Vdc. The standard version is available for VMD

(Valve Motor Drive), 0 / 4 - 20 mA or 0 / 2 - 10 Vdc input control signals. These actuators can be used with the following valves, in conjunction with an appropriate valve adaptor and mounting flange:

Control valves	2-port SPIRA-TROL
	3-port QL43 and QL73 mixing and diverting valves

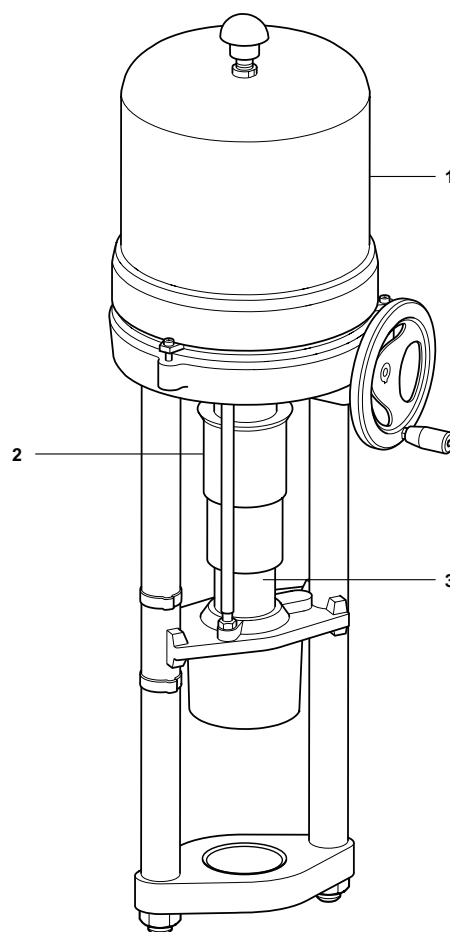
**Note:** A mounting flange and valve adaptor is required to mount the actuator to a valve. See the associated tables below:

### Mounting flange selection

Valve type and size		Actuator	
		AEL62_, AEL63_, AEL64_, AEL65_	AEL66_
L, K, and Q Series	½" to 2"	EL5970	
L Series	2 ½" to 4"	EL5971	
K Series	2 ½" to 4"	EL5971	EL5972

### Valve adaptor selection

Valve type and size		Valve stem	AEL62_	AEL63_	AEL64_	AEL65_	AEL66_
L, K, and Q Series	½" to 2"	M8 thread	AEL6911	AEL6911	AEL6911	AEL6911	
	2 ½" to 4"	M12 thread	Integrated	Integrated	Integrated	Integrated	EL5945



# AEL6 Series

## Smart Electric Actuators

### for ½" to 4" Control Valves

#### Technical data

Actuator type	AEL6221_	AEL6321_	AEL6323_	AEL6421_	AEL6422_	AEL6532_	AEL6631_
Supply voltage	230 Vac (2-wire, single phase), 115 Vac, 24 Vac, 24 Vdc						
Supply frequency	50 Hz / 60 Hz / continuous						
Maximal power consumption VA Note: power consumption is relative to 50 / 60 Hz / continuous respectively	13	19	57	25	72	65	88
Stroke (mm) inches	2 (50)	2 (50)	2 (50)	2 (50)	2 (50)	2½ (65)	2⅓ (60 *)
Actuator speed mm/s Note: Speed is relative to 50 / 60 Hz / continuous respectively	0.9	0.9	4.5	0.7	1.7	1.3	0.4
Enclosure rating	IP65 (for outdoor installations, provide adequate shelter)						
Actuator thrust (kN) lbf	517 (2.3)	1,012 (4.5)	1,012 (4.5)	1,798 (8)	1,798 (8)	3,147 (14)	5,620 (25)
Ambient limits	-4°F to 140°F (-20°C to 60°C)						
Analog position set valve input	Adjustable: 0 / 4 - 20 mA or 0 / 2 - 10 Vdc						
Positioner function	Dead-band adjustable between 0.5 - 5% of set value range, maximum resolution 0.1 mA or 0.05 V at 2" (50 mm) stroke						
Active valve position feedback	Adjustable: 0 / 4 - 20 mA or 0 / 2 - 10 Vdc						
Automatic commissioning	Drives to torque dependant stop(s) and moves through the whole valve travel. Autoscale of set value and feedback in accordance to valve travel						
Characteristic curve correction	Up to 16 interpolation points, input inaccuracy 1%						
Torque increase	Adjustable up to 150% torque for up to 2.5s to break away a valve in the end position						
Status indication	2 LEDs under actuator cover						
Internal fault monitoring	Torque, position set value, active value, position, temperature of electronic board						
Diagnostics function	Stores cumulated operation data (motor and total running time, number of motor starts) and data sets of current values (set value, feedback value, torque, temperature)						

#### \*Notes:

1. 115 Vac and 230 Vac models of the AEL6631\_ have a stroke limited to 2⅓ (60 mm).
2. 24 Vac and 24 Vdc models of the AEL6631\_ are capable of up to 4" (100 mm) stroke.

#### Optional extras:

- Additional position switches - AEL6951 (NC) and AEL6952 (NO)
- Local control - (non retrofitable for the AEL66\_) - AEL6955 (2.3 to 14 kN) and AEL6956 (25 kN)
- Fault indicator relay - AEL6973
- Communication software including data cable - AEL6957
- Space heater - AEL6953 (24 Vac) and AEL6954 (115 Vac and 230 Vac)

#### Approvals

This equipment is CE marked and conforms to the following:

- EEC regulation 89 / 336 - EEC for Electromagnetical compatibility and 72 / 23 - EEC for low voltage directive.
- EN 61000 - 2 -2 / 2001 and EN 61000 - 6 - 4 for EMC, and 61010 - 1 / 1995 for safety.

#### How to use the sizing data:

The following tables supply guidance as to the sizing of the AEL6 series actuator when it is used on the SPIRA-TROL K and L series valves.

#### Three conditions are illustrated in tabular form:

**L and K Series** - 2-port valve: Class IV shut-off - Providing shut-off of the valve to the requirements of ANSI/FCI 70-2 class IV.

**L and K Series** - 2-port valve: Class VI shut-off - Providing shut-off of the valve to the requirements of ANSI/FCI 70-2 class VI.

**QL** - 3-port valve: Class IV shut-off - Providing shut-off of the valve to the requirements of ANSI/FCI 70-2 class IV.

#### To select a suitable actuator:

- Identify the column containing the valve size and gland material selected.
- Identify the maximum operating pressure condition, including any transient pressures likely to occur, within the selected column.
- Read back to the left hand side of the table to identify the suitable actuator for the application.

For conditions outside of those illustrated please contact Spirax Sarco.

# AEL6 Series

## Smart Electric Actuators

### for 1/2" to 4" Control Valves

#### Maximum differential pressures for Class IV shut-off

Valve size	1/2"		3/4"		1"		1 1/4"		1 1/2"		2"		2 1/2"		3"		4"	
	PTFE	Graph	PTFE	Graph	PTFE	Graph	PTFE	Graph	PTFE	Graph	PTFE	Graph	PTFE	Graph	PTFE	Graph	PTFE	Graph
Travel (mm)	20	20	20	20	20	20	20	20	20	20	20	20	30	30	30	30	30	30
Seat dia (mm)	16	16	18	18	22	22	25	25	38	38	45	45	60	60	75	75	95	95
Seat area (mm <sup>2</sup> )	201	201	254	254	380	380	491	491	1134	1134	1590	1590	2827	2827	4418	4418	7088	7088
Seat circumference (mm)	50	50	57	57	69	69	79	79	119	119	141	141	188	188	236	236	298	298
Stem diameter (mm)																		
Stem pressure area (mm <sup>2</sup> )																		
Recommended pinch for Class IV shut-off (N/m)	6000	6000	6000	6000	6000	6000	5000	5000	5000	5000	5000	5000	5000	5000	5000	5000	5000	5000
Required seating thrust (N)	302	302	339	339	415	415	393	393	597	597	707	707	942	942	1178	1178	1492	1492
Static gland packing friction	100	400	100	400	100	400	100	400	100	400	100	400	150	660	150	660	150	660
Bellows Seal (N)	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500	2100	2100	2100	2100	2100	2100
Total thrust needed to close valve (N)	402	702	439	739	515	815	493	793	697	997	807	1107	1092	1602	1328	1838	1642	2152

#### PTFE or Graphite stem seal

Actuator	Min thrust (N)	Maximum Differential Pressures (psi)																	
		1/2"		3/4"		1"		1 1/4"		1 1/2"		2"		2 1/2"		3"		4"	
		PTFE	Graph	PTFE	Graph	PTFE	Graph	PTFE	Graph	PTFE	Graph	PTFE	Graph	PTFE	Graph	PTFE	Graph	PTFE	Graph
AEL6221	2300	740	740	740	740	681	567	534	445	205	167	136	109	62	36	32	15	13	
AEL6321	4500			740	740	740	740	740	740	486	448	337	309	175	149	104	87	58	48
AEL6323	4500			740	740	740	740	740	740	486	448	337	309	175	149	104	87	58	48
AEL6421	8000							740	740	740	740	656	628	354	328	219	202	130	120
AEL6422	8000							740	740	740	740	656	628	354	328	219	202	130	120
AEL6532	14000									740	740	740	740	662	636	416	399	253	242
AEL6631	25000													740	740	740	740	478	467

#### Bellows and PTFE or Graphite steam seal

Actuator	Min thrust (N)	Maximum Differential Pressure (psi)																	
		1/2"		3/4"		1"		1 1/4"		1 1/2"		2"		2 1/2"		3"		4"	
		PTFE	Graph	PTFE	Graph	PTFE	Graph	PTFE	Graph	PTFE	Graph	PTFE	Graph	PTFE	Graph	PTFE	Graph	PTFE	Graph
AEL6221	2300	287	71	206	35	109		91		13									
AEL6321	4500	360	360	360	360	360	360	360	360	294	256	200	173	67	41	35	18	16	
AEL6323	4500	360	360	360	360	360	360	360	360	294	256	200	173	67	41	35	18	16	
AEL6421	8000							360	360	360	360	360	360	247	220	150	133	87	77
AEL6422	8000							360	360	360	360	360	360	247	220	150	133	87	77
AEL6532	14000									360	360	360	360	360	360	347	330	210	199
AEL6631	25000													360	360	360	360	360	360



# AEL6 Series

## Smart Electric Actuators

### for 1/2" to 4" Control Valves

#### Maximum differential pressures for Class VI shut-off (soft seal)

Valve size	1/2"		3/4"		1"		1 1/4"		1 1/2"		2"		2 1/2"		3"		4"	
	PTFE	Graph	PTFE	Graph	PTFE	Graph	PTFE	Graph	PTFE	Graph	PTFE	Graph	PTFE	Graph	PTFE	Graph	PTFE	Graph
Travel (mm)	20	20	20	20	20	20	20	20	20	20	20	20	30	30	30	30	30	30
Seat dia (mm)	16	16	18	18	22	22	25	25	38	38	45	45	60	60	75	75	95	95
Seat area (mm <sup>2</sup> )	201	201	254	254	380	380	491	491	1134	1134	1590	1590	2827	2827	4418	4418	7088	7088
Seat circumference (mm)	50	50	57	57	69	69	79	79	119	119	141	141	188	188	236	236	298	298
Stem diameter (mm)																		
Stem pressure area (mm <sup>2</sup> )																		
Recommended pinch for Class IV shut-off (N/m)	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150
Required seating thrust (N)	8	8	8	8	10	10	12	12	18	18	21	21	28	28	35	35	45	45
Static gland packing friction	100	400	100	400	100	400	100	400	100	400	100	400	150	660	150	660	150	660
Bellows Seal (N)	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500	2100	2100	2100	2100	2100	2100
Total thrust needed to close valve (N)	108	408	108	408	110	410	112	412	118	418	121	421	178	688	185	695	195	705

#### PTFE or Graphite stem seal

Actuator	Min thrust (N)	Maximum Differential Pressure (psi)																	
		1/2"		3/4"		1"		1 1/4"		1 1/2"		2"		2 1/2"		3"		4"	
		PTFE	Graph	PTFE	Graph	PTFE	Graph	PTFE	Graph	PTFE	Graph	PTFE	Graph	PTFE	Graph	PTFE	Graph	PTFE	Graph
AEL6221	2300	740	740	740	740	740	721	646	558	279	241	199	171	109	83	69	53	43	33
AEL6321	4500					740	740	740	740	560	522	399	372	222	195	142	125	88	78
AEL6323	4500					740	740	740	740	560	522	399	372	222	195	142	125	88	78
AEL6421	8000							740	740	740	740	718	691	401	375	256	240	160	149
AEL6422	8000							740	740	740	740	718	691	401	375	256	240	160	149
AEL6532	14000							740	740	740	740	740	740	709	683	453	437	282	272
AEL6631	25000											740	740	740	740	740	740	507	497
AEL6221	25000													740	740	740	740	507	497

#### Bellows and PTFE or Graphite stem seal

Actuator	Min thrust (N)	Maximum Differential Pressure (psi)																	
		1/2"		3/4"		1"		1 1/4"		1 1/2"		2"		2 1/2"		3"		4"	
		PTFE	Graph	PTFE	Graph	PTFE	Graph	PTFE	Graph	PTFE	Graph	PTFE	Graph	PTFE	Graph	PTFE	Graph	PTFE	Graph
AEL6221	2300	360	283	360	223	263	149	203	115	87	49	62	35	1	-25	0	-16	0	-10
AEL6321	4500	360	360	360	360	360	360	360	360	360	330	262	235	114	88	73	56	45	35
AEL6323	4500	360	360	360	360	360	360	360	360	360	330	262	235	114	88	73	56	45	35
AEL6421	8000							360	360	360	360	360	360	293	267	188	171	117	106
AEL6422	8000							360	360	360	360	360	360	293	267	188	171	117	106
AEL6532	14000											360	360	360	360	360	360	239	229
AEL6631	25000													360	360	360	360	360	360

# AEL6 Series

## Smart Electric Actuators

### for 1/2" to 4" Control Valves

#### Dimensions / weights (approximately) in inches and pounds

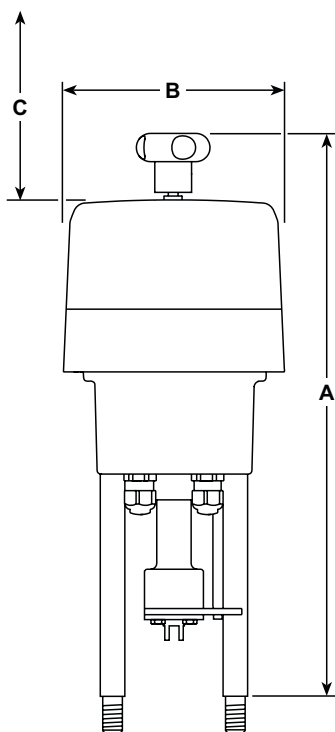
Model	A	B	C	Weight
AEL6221-	18	7	5.9	15.4
AEL6231-	18	7	5.9	15.4
AEL6323-	18	7	5.9	15.4
AEL6421-	19.3	7	5.9	22.0
AEL6422-	19.3	7	5.9	22.0
AEL6532-	21.9	7.1	6.8	26.4
AEL6631-	29.9	8.9	10.9	44.0

#### Safety information, installation and maintenance

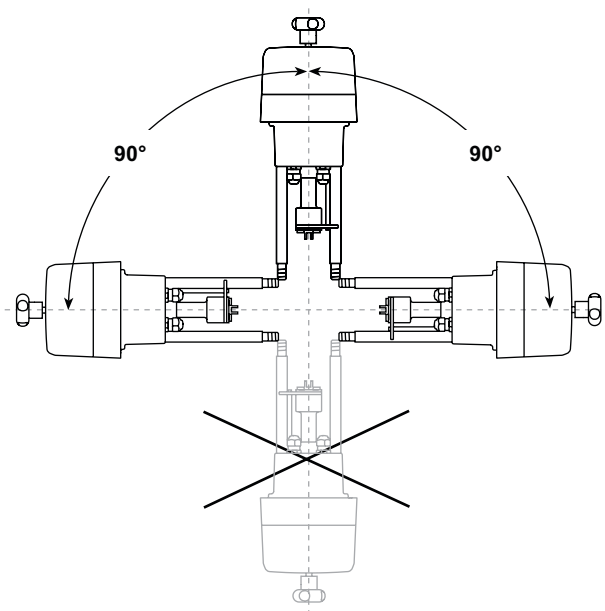
For full details see the Installation and Maintenance Instructions that are supplied with the product.

#### Installation and wiring note:

The valve should be installed in a horizontal pipeline. The position of the actuator will depend on the type of valve to which it is fitted and the temperature of the media. However, it is not recommended that the actuators be fitted at more than 90° from the vertical position or in a wet environment.



#### Mounting Position



# AEL6 Series

## Smart Electric Actuators for 1/2" to 4" Control Valves

### AEL6 series actuators - Product nomenclature and selection example:

Product	A = Actuator	A
Type	E = Electric	E
Movement	L = Linear	L
Series	6	6
Thrust lbf (kN)	2 = 517 (2.3) 3 = 1,102 (4.5) 4 = 1,798 (8) 5 = 3,147 (14) 6 = 5,620 (25)	2
Stroke in (mm)	2 = 2 (50) 3 = 2 1/3 - 2 3/4 (60 - 70) (AEL65_ and AEL66_ series only)	2
Maximum speed (mm / s)	1 = 0 - 1.0 (AEL62_, AEL63_, AEL64 and AEL66_ series only) 2 = 1.1 - 2.0 (AEL64_ and AEL65_ series only) 3 = 2.1 - 4.5 (AEL63_ series only)	1
Supply voltage	1 = 230 Vac (2-wire, single phase) 2 = 115 Vac 3 = 24 Vac and 24 Vdc	1
Control signal	F = 24 V VMD, 0 / 2 - 10 Vdc and 0 / 4 - 20 mA (supply voltage 3 only) G = 115 V VMD, 0 / 2 - 10 Vdc and 0 / 4 - 20 mA (supply voltage 2 only) H = 24 V VMD, 0 / 2 - 10 Vdc and 0 / 4 - 20 mA (supply voltage 2 only) J = 230 V VMD, 0 / 2 - 10 Vdc and 0 / 4 - 20 mA (supply voltage 1 only) K = 24 V VMD, 0 / 2 - 10 Vdc and 0 / 4 - 20 mA (supply voltage 1 only)	J
Failure mode	X = No mechanical / electrical fail safe device S = Super capacitor fail safe (Standard, SSI Offering)	S

### How to order / selection example:

**Example :** A 115 Vac fail safe electric actuator to suit a 1" control valve with PTFE stem seals, to have class IV shut-off against a 150 psi differential pressure. There is no requirement for high actuating speed, the control signal is 4-20mA.

#### Selection:

1 off Spirax Sarco AEL6221-2PS electric actuator.



## Rotork CVL Electric Actuators For SPIRA-TROL Control Valves

### Description

The Rotork CVL range of electric actuators offers a highly accurate and responsive method of automating our SPIRA-TROL and C Series control valves. They can interface with a number of control signals and communication protocols and are suitable for use in most industrial environments with available hazardous areas enclosures. They are full duty rated capable of continuous, un-restricted modulation. Super-capacitors provide power to drive the valve to a safe position in the event of a loss of the power supply. Set-up is achieved through an auto-calibration routine with further configuration completed via software through a Bluetooth® link.

### Features

**Fast travel speed** – the actuator can open or close a valve between 3 seconds for ¾" travel valve and 20 seconds for a 2" travel valve.

**Multiple control signal options** – the standard actuator operates on a 4-20mA signal and provides 4-20mA position feedback (an auxiliary 24V d/c supply is required to drive this loop). Options are available to allow interfacing with HART®, Profibus or Foundation Fieldbus network control.

**Status indication relay** – a user configurable relay is available for status and availability indication. This can be configured to indicate a number of parameters.

**Valve diagnostics** – a data-logger is provided which helps detect potential valve problems before they occur. It stores operational data relating to the valve position and load which can be monitored over time.

**Dual Sensor™ technology** – two independent position sensors minimize backlash and positional errors.

**Brushless DC motor** – highly reliable, maintenance free and provides full, continuous, unrestricted modulation duty (S9).

**Double sealing** – provides ingress protection to IP68.

**Power supply flexibility** – Incorporated within each AC actuator is a switch mode power supply, which can accept a range of input voltages from 100-240 VAC 50/60 Hz. An optional 24 VDC supply can be catered for.

**Reserve power** – For fail-to-position action on loss of supply, the actuator can be fitted with an optional reserve power-pack, which consists of 'super capacitors'. The reserve power-pack will allow the actuator to move to a predetermined position on power failure.

**Drive-train** – simple yet durable spur gear drive, lubricated for life with proven durability.

**Anti Back Drive Mechanism** – the actuator is capable of resisting any back drive from the valve up to 125% of the rated force. For applications where loss of power requires increased "fail-in-position" capability, an optional solenoid locking mechanism is available.



### Technical information

Linearity (4-20mA signal)		≥0.5% full scale
Resolution (4-20mA signal)		≥0.1% of signal
Signal voltage drop		7 V @ 20 mA
Duty rating		S9 (continuous modulation)
Ambient temperature	Standard	-22°F to 158°F
	Low temp. (option)	-40°F to 140°F
Enclosure	Standard	NEMA 4&6, IP68
	Haz. Area (option)	Class I, Div 1, Groups B,C,D Class II, Div 1, Groups E,F,G
Finish		Polyester powder coated
Manual override		optional
Status relay	Single pole, normally open, 8A/120VAC/30VDC	
Power consumption	Stationary	4.7W @ 110 VAC
	Full load	32.1W @ 110 VAC
	Peak	58.2W @ 110 VAC

Model	Min. thrust (lb.f)	Rated thrust (lb.f)	Max. stroke (inches)	Spindle speed (inches/sec)	Full stroke time* (sec)
CVL500	200	500	1.5	0.25	6
CVL1000	400	1000	2	0.1	20
CVL1500	600	1500	2	0.1	20

\* Time shown is for the maximum actuator stroke. This time is reduced further for valves with a shorter stroke e.g. A ½" SPIRA-TROL has a stroke of ¾", when fitted with a CVL500 it will open or close in 3 seconds.

Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only.  
In the interests of development and improvement of the product, we reserve the right to change the specification.

TI-1-523-US 12.09

# Rotork CVL Electric Actuators For SPIRA-TROL Control Valves

## Differential Pressures for SPIRA-TROL Control Valves with Rotork CVL Electric Actuators

Class IV Shut-off

PTFE and Graphite Stem Seals

Actuator	Maximum Differential Pressures (psi)																	
	1/2"		3/4"		1"		1 1/4"		1 1/2"		2"		2 1/2"		3"		4"	
	PTFE	Graph	PTFE	Graph	PTFE	Graph	PTFE	Graph	PTFE	Graph	PTFE	Graph	PTFE	Graph	PTFE	Graph	PTFE	Graph
CVL500	740	740	740	740	652	538	511	423	195	157	129	102	58	32	29	13	12	
CVL1000					740	740	740	740	480	441	332	305	172	146	102	86	57	47
CVL1500							740	740	740	726	535	507	286	260	175	159	103	92

Class VI Shut-off

PTFE and Graphite Stem Seals

Actuator	Maximum Differential Pressure (psi)																	
	1/2"		3/4"		1"		1 1/4"		1 1/2"		2"		2 1/2"		3"		4"	
	PTFE	Graph	PTFE	Graph	PTFE	Graph	PTFE	Graph	PTFE	Graph	PTFE	Graph	PTFE	Graph	PTFE	Graph	PTFE	Graph
CVL500	740	740	740	740	740	692	624	535	269	231	192	164	105	79	67	50	42	31
CVL1000					740	740	740	740	554	515	394	367	219	193	140	123	87	77
CVL1500							740	740	740	740	597	570	333	307	213	196	133	122

Class IV Shut-off

Bellows Stem Seals with PTFE and Graphite Secondary Packing

Actuator	Maximum Differential Pressure (psi)																	
	1/2"		3/4"		1"		1 1/4"		1 1/2"		2"		2 1/2"		3"		4"	
	PTFE	Graph	PTFE	Graph	PTFE	Graph	PTFE	Graph	PTFE	Graph	PTFE	Graph	PTFE	Graph	PTFE	Graph	PTFE	Graph
CVL500	233	16	162		80		45											
CVL1000	740	740	740	740	740	740	702	613	273	234	182	155	55	29	26			
CVL1500					740	740	740	740	557	519	385	358	169	143	99	82	54	43

Class VI Shut-off

Bellows Stem Seals with PTFE and Graphite Secondary Packing

Actuator	Maximum Differential Pressure (psi)																	
	1/2"		3/4"		1"		1 1/4"		1 1/2"		2"		2 1/2"		3"		4"	
	PTFE	Graph	PTFE	Graph	PTFE	Graph	PTFE	Graph	PTFE	Graph	PTFE	Graph	PTFE	Graph	PTFE	Graph	PTFE	Graph
CVL500	445	228	351	180	234	120	181	92	77	39	55	28						
CVL1000					740	740	740	740	362	323	258	230	111	85	71	54	44	34
CVL1500					740	740	740	740	646	608	460	433	225	199	144	127	90	79

# Rotork CVL Electric Actuators For SPIRA-TROL Control Valves

## Options and nomenclature

Actuator model range	CV – Control valve actuator	CV
Transmission	L - Linear	L
Size	500 – 500 lb.f (2,224 N) 1000 – 1,000 lb.f (4,448 N) 1500 – 1,500 lb.f (6,672 N)	500
Power Supply	Blank – 110/230 VAC D – 24 VDC	
Control Signal	Blank – 4-20 mA H – 4-20 mA + HART F – Foundation Fieldbus P – Profibus-PA	H
Back-up power	Blank – Programmable fail-safe S – Stay-put	
Manual over-ride	Blank – None M – Manual Override (hand wheel)	M
Enclosure	Blank – NEMA 4&6/IP68 X – FM Explosion proof	X
Temperature rating	Blank: -22°F to 158°F L – -40°F to 140°F	

Example: CVL500HCM Electric actuator

## Commissioning

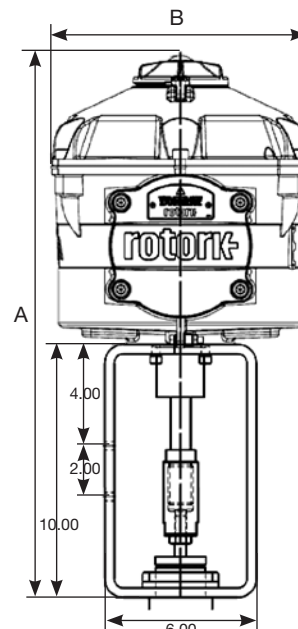
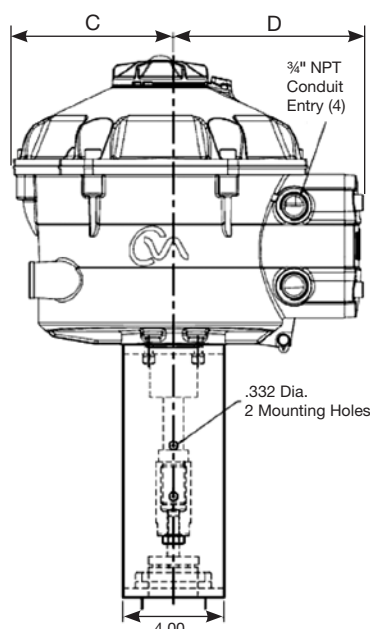
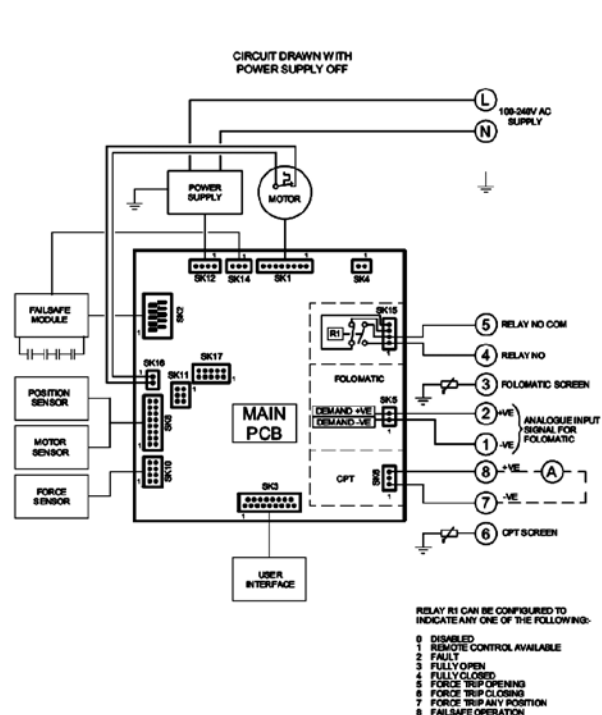
For actuators controlled by a 4-20mA analog signal, they will arrive from the factory fully set-up (according to our standard configuration) and ready to install. If a special configuration is required, we will set-up the actuator provided we are given the requirements at the time of the order.

Local configuration can be done using a Bluetooth enabled PDA/Smart-phone running a windows O/S or a Bluetooth enabled PC. The Rotork Enlight software must be installed and is available for free download from the Rotork website at [www.rotork.com](http://www.rotork.com).

Alternatively, if the HART option card is installed, a HART communicator or PC with HART interface and software can be used.

## Dimensions and weights (in and lb)

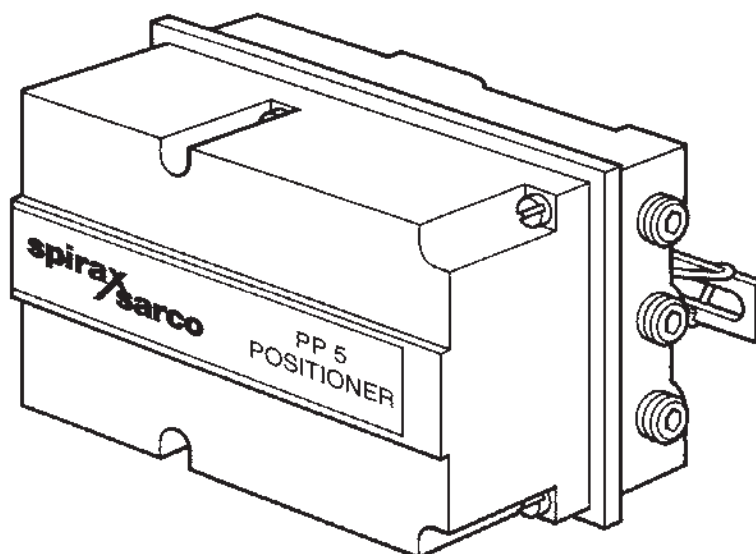
Actuator	Valve Size	A	B	C	D	Weight
CVL500	½" to 4"	19.82	8.95	6.2	6.13	40
CVL1000	½" to 4"	21.4	10.14	6.3	7.51	53
CVL1500	½" to 4"	21.4	10.14	6.3	7.51	53







## PP5 Pneumatic Positioner



### Description

The PP5 positioner is a single acting unit, requiring a 3 - 15 psi signal and is for use with linear pneumatic actuators. The positioner compares the output signal from a pneumatic controller (or transducer) with the valve position feedback, and varies the pneumatic output signal to the actuator accordingly. The valve position is; therefore, guaranteed for any controller output signal and the effects of varying valve differential pressure, stem friction and diaphragm hysteresis are overcome. The positioners can also be used where the controller output signals are of too low a magnitude to be used directly with high pressure actuators. A mounting kit is supplied with each positioner for mounting either to columns or yoke in accordance with NAMUR Standard. Safety covers are provided.

The positioners can be used with the following actuators:  
PN9000 and TN2000 Series.

### Technical Data

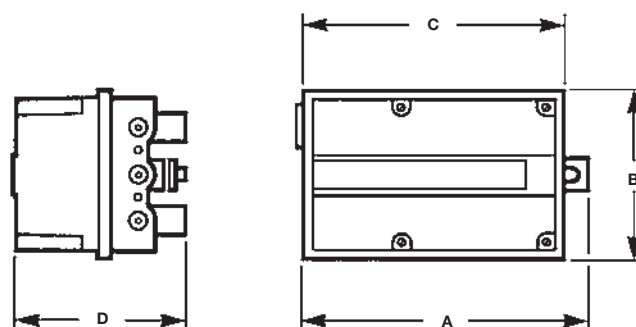
Input signal range	3 - 15 psi (0.2 to 1 bar)
Output signal range	0 to 100% supply air pressure
Supply air pressure	20 to 90 psig (1.4 to 6 barg)
Stroke range	.4 to 4" (10 to 100mm)
Amplification	Adjustable
Hysteresis	Less than 0.5%
Enclosure rating	IP65
Steady State Air consumption	13.06 ft <sup>3</sup> /h at 90 psi (0.7m <sup>3</sup> /hr at 6 bar)
Pneumatic connections	1/4" NPT
Ambient conditions	-4° F to 250° F (-20 to 80°C)

### How To Specify

1- PP5 pneumatic positioner

### Dimensions (nominal) in inches and millimeters

A	B	C	D	Weight
7.0	4.3	6.5	4.3	5.5 lb
175	110	165	110	2.8 kg



### Materials

Base plate and cover

Die cast aluminum with  
anti corrosive paint

Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only.  
In the interests of development and improvement of the product, we reserve the right to change the specification.

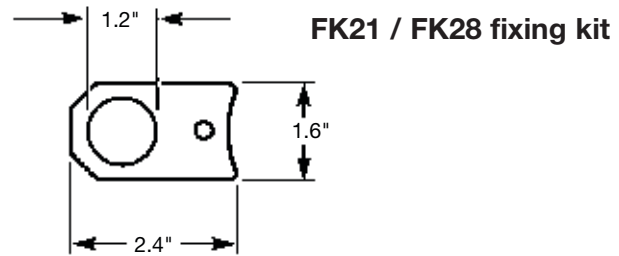


# PP5 Pneumatic Positioner

## Accessories

A fixing kit is available to mount an air filter / regulator to the pneumatic actuator.

Fixing kit	Actuator type
FK21	PN9100 Series
FK28	PN9200 or PN9300 Series



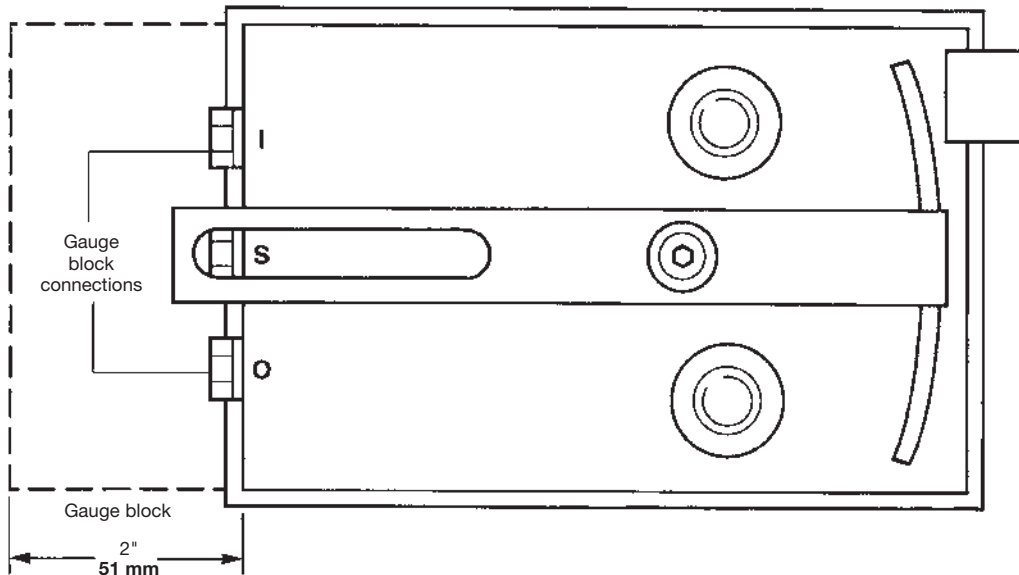
## Installation

Full details are contained in the appropriate Installation & Maintenance Instructions supplied with the product.

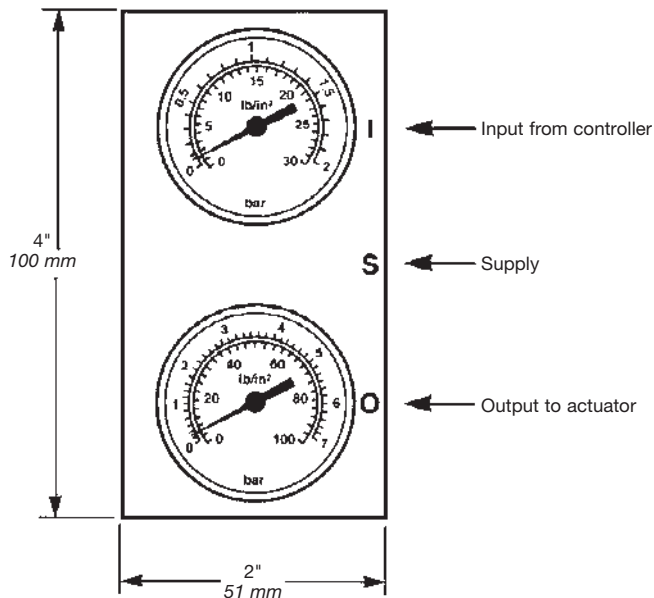
## Air Connections (rear view)

Air Connections 1/4" NPT

Positioner (rear view)



Gauge Block (front view)

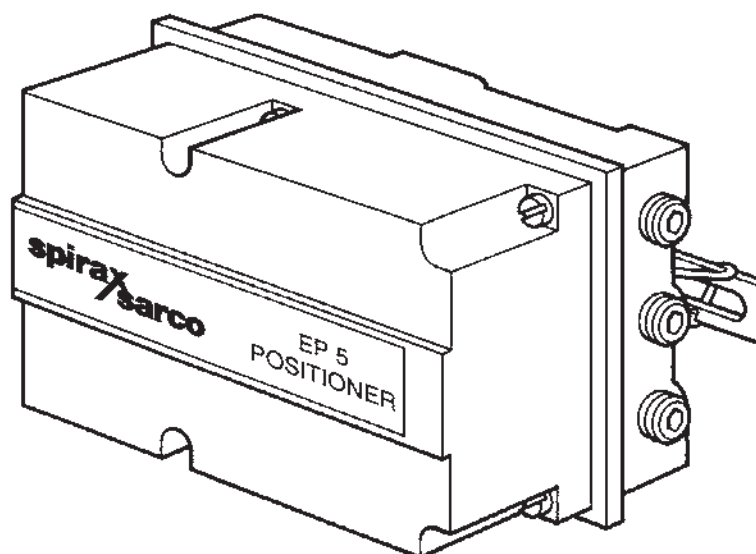


## Spares

Gauge	0-30 psi output
Gauge	0-60 psi output
Gauge	0-100 psi output
Springs and pneumatic tube set	
Set of gaskets, diaphragms and orifice	
Amplifying relay set	
Block for gauges	



## EP5 Electro Pneumatic Positioner ISP5 Intrinsically Safe E/P Positioner



### Description

The EP5 is a 2-wire Positioner requiring a 4-20 mA input signal, and is for use with linear pneumatic actuators. The positioner compares the electrical signal from a controller with the valve position feedback, and varies a pneumatic output signal to the actuator accordingly. The valve position is therefore guaranteed for any controller output signal and the effects of varying differential pressure, stem friction and diaphragm hysteresis are overcome. A mounting kit is supplied with each positioner for mounting to either columns or yoke in accordance with IEC60534-6-1 standards.

The positioners can be used with the following actuators:  
PN1000/2000, 3000/4000, 9000.

### How To Specify

1- EP5 Electro pneumatic positioner.

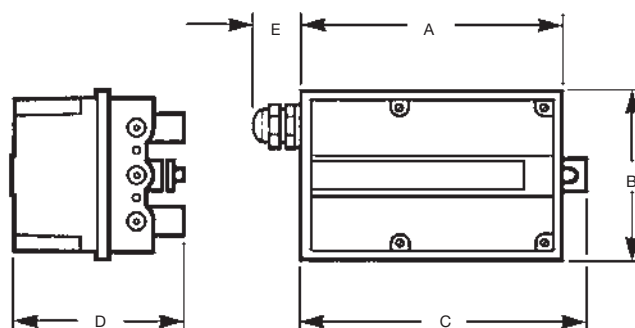
### Dimensions

(nominal) in inches and millimeters

A	B	C	D	E	Weight
6.5	4.3	7.0	4.3	1.0	5.5 lb
165	110	175	110	30	2.8 kg

### Technical Data

Input signal range	4-20 mA
Output signal range	0 to 100% supply air pressure
Supply air pressure	20 to 90 psig (1.4 to 6 barg)
Stroke range	.4" to 4" (10 to 100 mm)
Sensitivity	Less than 0.2% span
Linearity	1.0% span
Hysteresis	Less than 0.5%
Input impedance	200 ohms
I Max	50 mA
Temperature Limitations	0 to 175° F (-15 to +65°C)
Enclosure rating	IP54 (approximate equivalent of Nema 3 enclosure) ISP4 Intrinsically safe to EEx.ia IIc T6.T5.T4 (CESI) (approximate equivalent of FM Class I and II, Div. 1, Groups A, B, C, D)
Steady State Air consumption	13.06 ft <sup>3</sup> /h at 90 psi (0.7 m <sup>3</sup> /h at 6 bar)
Pneumatic connections	1/4" NPT
Electrical connections	PG 13.5



### Materials

Body and cover

Die cast aluminum with  
anti corrosive paint

# EP5 Electro Pneumatic Positioner

## ISP5 Intrinsically Safe E/P Positioner

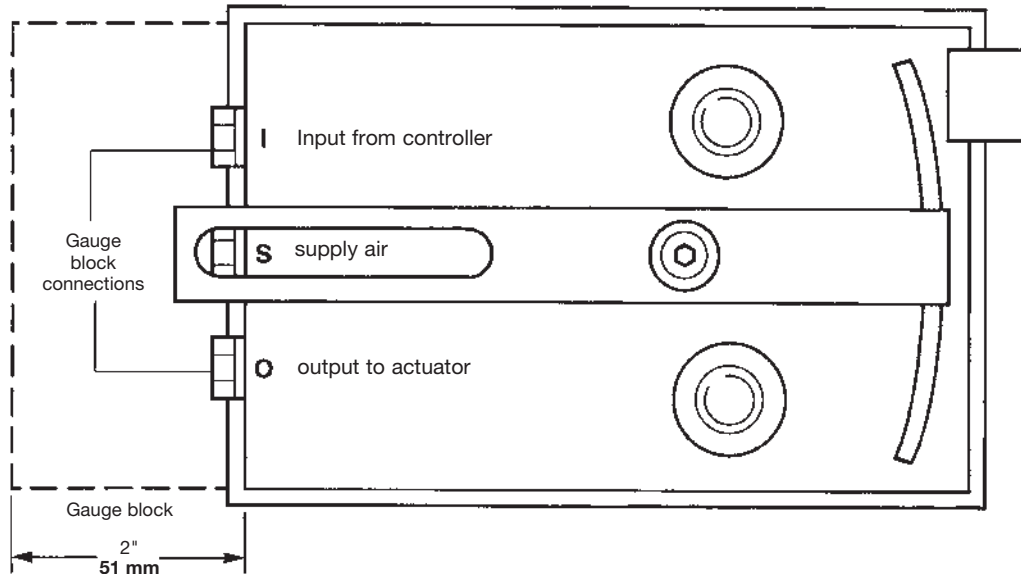
### Installation

Full details are contained in the appropriate Installation & Maintenance Instructions supplied with the product.

### Air & Electrical Connections (rear view)

Air Connection 1/4" NPT  
Cable Connection PG 13.5

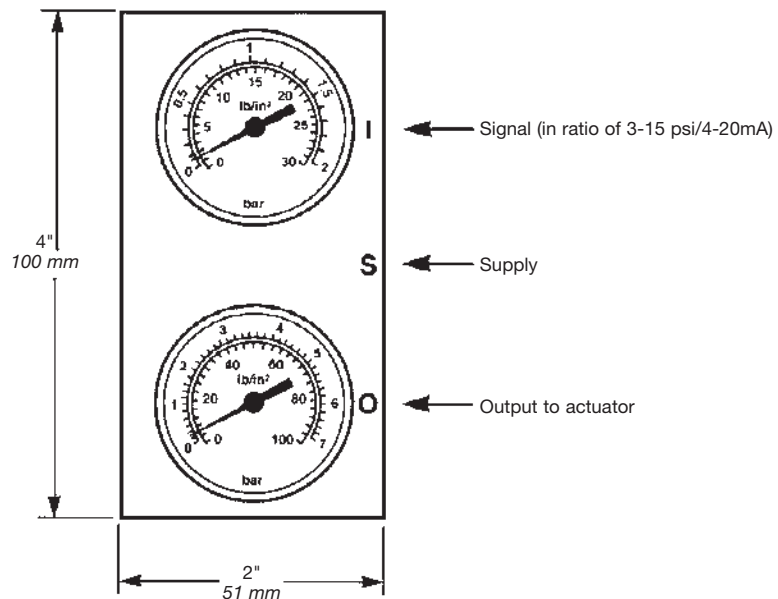
Positioner (rear view)



### Spares

Gauge	0-30 psi output
Gauge	0-60 psi output
Gauge	0-100 psi output
Springs and pneumatic tube set	
Set of gaskets, diaphragms and orifice	
Amplifying relay set	
Block for gauges	

Gauge Block (front view)





## SP400

### Electropneumatic Smart Positioner

#### Description

The SP400 smart valve positioner is a loop powered device that is able to drive linear and quarter turn pneumatic valves. A 4-20 mA input signal determines the valve set point. Precise control is maintained through valve position feedback that automatically varies the pneumatic output pressure to overcome the effects of stem friction and flow forces to maintain desired valve position. Indication of valve position is provided through a continuous digital display of % travel. Valve position feedback is retrieved by means of a non contact technology based on Hall effect. The pneumatics are based on piezvalve technology - Therefore, high resolution, high reliability, vibration insensitivity and extremely low air consumption is guaranteed at steady state.

The SP400 includes many smart functions that can be fully programmed through menu driven software using an integral keypad and LCD alphanumeric data. The absence of mechanical linkages between the valve stem and the positioner, drastically simplifies and reduces the time required for the mounting procedure. Moreover the software has been designed to simplify operations as much as possible: commissioning requires just assembling the SP400 to the valve and pressing one button. The SP400 is supplied with a NAMUR standard mounting kit for attachment to yoke or pillar mounted actuators. For quarter turn valves, a mounting kit compliant to VDI/VDE 3845 is supplied.

#### Air supply

The SP400 smart positioner must be provided with a high quality air supply. A Spirax Sarco MPC2 filter regulator with coalescing filter or equivalent must be used. A fixing kit is available to mount the MPC2 filter regulator onto the actuator. For further product data regarding the MPC2 see Technical Information sheet TI-1-609-US.

#### Applications

The SP400 can be used with the following pneumatic actuators:

**PN1000 and PN2000 series**

**PNS3000 and PNS4000 series**

**PN9000 series**

**TN2277SE and TN2277SR**

#### Optional extras

<b>Gauge block</b>	Complete manifold block with two two pressure gauges (supply pressure and pressure to the actuator)
--------------------	---

#### Materials

Part	Material	Finish
<b>Case and cover</b>	Die cast aluminium	Anti-corrosive paint to RAL5010
<b>Magnet bracket</b>	Die cast aluminium	

For the  
programmable  
functions see  
page 2



SP400 with front cover closed



SP400 with front cover removed

#### Technical data

<b>Input signal range</b>	4 - 20 mA nominal
<b>Minimum input signal</b>	3.6 mA
<b>Input impedance</b>	280 Ω
<b>Minimum air supply pressure</b>	15 psig above minimum spring range pressure
<b>Maximum air supply pressure</b>	100 psig
<b>Air quality</b>	Air supply must be dry, oil and dust free to ISO 8573-1 class 2:3:1
<b>Output pressure</b>	0 to 100% supply pressure
<b>Stroke range</b>	Linear valves ½" to 4" Quarter turn valves 5° to 120°
<b>Action</b>	Single action/fail vent
<b>Operating temperature</b>	14°F to 176°F
<b>Maximum air flow</b>	5 cfm @ 90 psig 2.5 cfm @ 20 psig
<b>Steady state air consumption</b>	Less than 0.01 scfm
<b>Air connections</b>	Screwed ¼" NPT
<b>Cable gland</b>	M20
<b>Electrical connections</b>	Spring clamp terminals for 15 to 32 AWG
<b>Enclosure rating</b>	IP65
<b>Characteristics</b>	Linear
<b>Resolution (maximum)</b>	0.1% F.S. (Full Scale)
<b>Shut-off</b>	1%
<b>Shipping weight</b>	4.85 lb

Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only.  
In the interests of development and improvement of the product, we reserve the right to change the specification.

TI-P343-36-US 02.11

# SP400 Electropneumatic Smart Positioner

## Dimensions (approximate) in inches

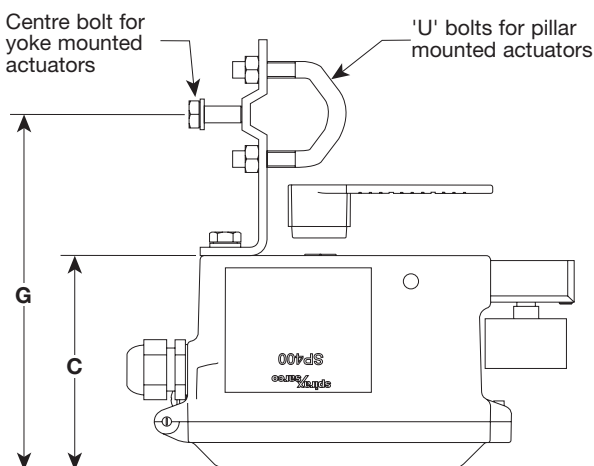
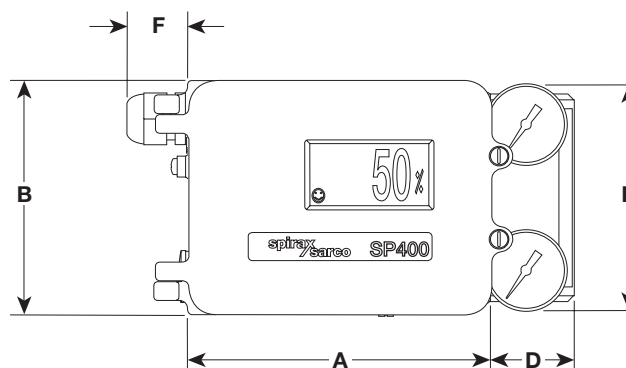
A	B	C	D	E	F	G
5.7	4.4	4.1	1.6	4.3	1.2	6.8

## Programmable functions

<b>Autostroke</b>	Automatic commissioning routine
<b>Valve type</b>	2-port or 3-port
<b>% travel</b>	Selectable 0 - 100% or 100% - 0% depending on valve/actuator configuration
<b>Control action</b>	Direct or reverse action (4-20 or 20-4 mA)
<b>Split range</b>	OFF range 4-20 mA
	Low range 4-13 mA
	High range 11-20 mA
<b>Deadband</b>	0.5%
	1.5%
	3.0%
	5.0%
<b>Reset</b>	Resets all programmed values
<b>Input signal</b>	Visualisation of input mA signal

## Available spares

<b>Pressure gauge</b>	Pressure gauge only Available ranges: 0 to 30 psig, 0 to 60 psig or 0 to 100 psig
<b>Filter plug kit</b>	Plug plus 3 off filters and 'O' rings



## Safety information, installation and maintenance

Full details are contained in the SP400 electropneumatic smart positioner Installation and Maintenance Instructions (IM-P343-37) supplied with the product.

## Positioner nomenclature guide

Positioner series	SP400	SP400
<b>Movement/action</b>	0 = Linear, single action 1 = Rotary, single action	0
<b>Retransmission + software switches</b>	0 = Not mounted	0
<b>Enclosure</b>	0 = Standard	0
<b>Approvals</b>	0 = Standard	0
<b>24 V power supply</b>	0 = Not mounted	0
<b>Remote sensor</b>	0 = No	0
<b>Extended stroke</b>	0 = No	0
<b>Gauge block</b>	0 = Not mounted G2 = Full scale 30 psig G4 = Full scale 60 psig G7 = Full scale 100 psig	G4

**Selection example:** SP400 0 0 0 0 0 0 0 G4

## How to order

Please include all the required optional extras as described on the first page.

**Example:** 1 off Spirax Sarco SP400 000 000 0G4 electropneumatic smart linear positioner equipped with gauge block for full scale pressure of 60 psig.

**Caution:** The SP400 smart positioner must have a high quality air supply. A Spirax Sarco MPC2 filter regulator with coalescing filter or equivalent must be used.

# spirax sarco

## SP500

**HART**  
COMMUNICATION PROTOCOL

# Electropneumatic Smart Positioner

## Description

The SP500 smart valve positioner is a loop powered device that is able to drive linear and quarter turn pneumatic valves. A 4-20 mA input signal determines the valve set point. Precise control is maintained through valve position feedback that automatically varies the pneumatic output pressure to overcome the effects of stem friction and flow forces to maintain desired valve position. Indication of valve position is provided through a continuous digital display of % travel. Valve position feedback is retrieved by means of a non contact technology based on Hall effect. The pneumatics are based on piezovalue technology - Therefore, high resolution, high reliability, vibration insensitivity and extremely low air consumption is guaranteed at steady state.

The SP500 includes many smart functions that can be fully programmed through menu driven software using an integral keypad and LCD alphanumeric data. Valve commissioning is simplified through an autostroke routine and LCD data of programming status, software travel switch status, mA input signal and valve diagnostics data. Moreover, the absence of mechanical linkages between the valve stem and the positioner, drastically simplifies and reduces the time required for the mounting procedure. The SP500 is supplied with a NAMUR standard mounting kit for attachment to yoke or pillar mounted actuators. For quarter turn valves, a mounting kit compliant to VDI/VDE 3845 is supplied.

The SP500 smart valve positioner supports optional expansion to include the HART® communication protocol, enabling complete configuration using a PC or handheld device.

## Air supply

The SP500 smart positioner must be provided with a high quality air supply. A Spirax Sarco MPC2 filter regulator with coalescing filter or equivalent must be used. A fixing kit is available to mount the MPC2 filter regulator onto the actuator. For further product data regarding the MPC2 see Technical Information sheet TI-1-609-US.

## Applications

The SP500 can be used with the following pneumatic actuators:

**PN1000 and PN2000 series, PN9000 series, PM series, PNS3000 and PNS4000 series, and the TN2277SE and TN2277SR**

## Optional extras

<b>Gauge block</b>	Complete manifold block with two pressure gauges (supply pressure and pressure to the actuator)
<b>Retransmission and switch board</b>	4 - 20 mA valve position retransmission and 2 adjustable software switches
<b>Power supply board</b>	Allows 4 wire configuration: 2 for 4 - 20 mA input signal and 2 for independent 24 V power supply reducing positioner impedance to 50 Ω
<b>HART® board</b>	Enables communication using the HART® protocol

## Materials

Part	Material	Finish
<b>Case and cover</b>	Die cast aluminium	Anti-corrosive paint to RAL5010
<b>Magnet bracket</b>	Die cast aluminium	

Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only.  
In the interests of development and improvement of the product, we reserve the right to change the specification.

For the  
programmable  
functions see  
page 2



SP500 with front cover closed



SP500 with front cover removed

## Technical data

<b>Input signal range</b>	4 - 20 mA nominal
<b>Minimum input signal</b>	3.4 mA
<b>Input impedance</b>	Standard 280 Ω With aux. power supply 50 Ω
<b>Minimum air supply pressure</b>	15 psig above minimum spring range pressure
<b>Maximum air supply pressure</b>	100 psig
<b>Air quality</b>	Air supply must be dry, oil and dust free to ISO 8573-1 class 2:3:1
<b>Output pressure</b>	0 to 100% supply pressure
<b>Stroke range</b>	Linear valves ½" to 4" Quarter turn valves 5° to 120°
<b>Action</b>	Single action/fail vent
<b>Operating temperature</b>	14°F to 176°F
<b>Maximum air flow</b>	2.5 cfm @ 20 psig 5 cfm @ 90 psig
<b>Steady state air consumption</b>	Less than 0.01 scfm
<b>Air connections</b>	Screwed ¼" NPT
<b>Cable gland</b>	M20
<b>Electrical connections</b>	Spring clamp terminals for 15 to 32 AWG
<b>Enclosure rating</b>	IP65
<b>Characteristics</b>	Linear, Equal % (ratio 1:50) or Fast opening (ratio 50:1)
<b>Resolution (maximum)</b>	0.1% F.S. (Full Scale)
<b>4 - 20 mA retransmit (optional)</b>	4 - 20 mA retransmission of valve position
<b>Software travel switches (optional)</b>	Two software configured travel switches 1 x normally closed 1 x normally open
<b>Shipping weight</b>	4.85 lb

TI-P343-34-US 6.12

# SP500 Electropneumatic Smart Positioner

## Programmable functions

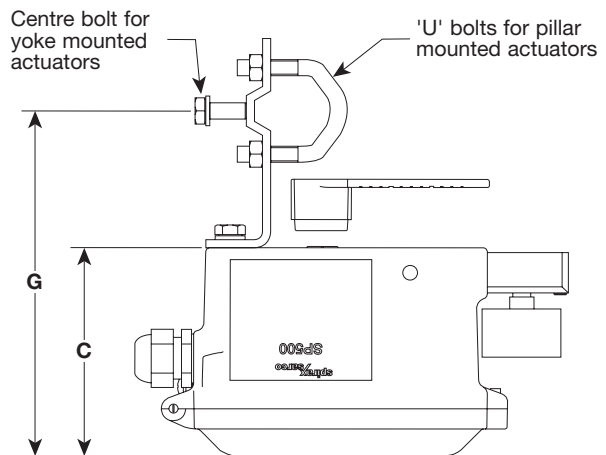
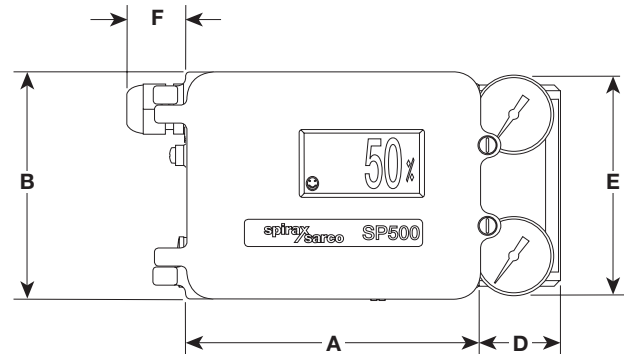
<b>Autostroke</b>	Automatic commissioning routine
<b>Valve type</b>	2-port or 3-port
<b>% travel</b>	Selectable 0 - 100% or 100% - 0% depending on valve/actuator configuration
<b>Control action</b>	Direct or reverse action (4-20 or 20-4 mA)
<b>Travel limits</b>	Setting of minimum and maximum travel limits
<b>Signal span</b>	4-20 mA or split ranged (minimum span 4 mA)
<b>Deadband</b>	Positional accuracy (minimum 0.2% to max. 10% of valve travel)
<b>Tight shut-off</b>	Fully vent or inflate at preset input signals
<b>Characteristic</b>	Linear, = % or fast opening input signal to valve travel relationship
<b>Travel time</b>	Slows down valve opening or closing
<b>Travel switches</b>	Software configured travel switch setting (range 0 - 100%)
<b>Reset</b>	Resets all programmed values
<b>Calibrate</b>	Centering
<b>Input signal</b>	Visualisation of input mA signal
<b>Auto operation / vent</b>	Option of automatic operation or vent (actuator) whilst reprogramming
<b>Data logging</b>	Diagnostic record of total number of valve strokes and completed hours run time.

## Available spares

<b>Pressure gauge</b>	Pressure gauge only Available ranges: 0 to 30 psig, 0 to 60 psig, 0 to 100 psig
<b>Filter plug kit</b>	Plug plus 3 off filters and 'O' rings
<b>Retransmission and switch board</b>	4 - 20 mA valve position retransmission and 2 adjustable software switches
<b>Power supply board</b>	Allows 4 wire configuration: 2 for 4 - 20 mA input signal and 2 for independent 24 V power supply reducing positioner impedance to 50 $\Omega$
<b>HART® board</b>	enables communication using the HART® protocol

## Dimensions (approximate) inches

A	B	C	D	E	F	G
5.7	4.4	4.1	1.6	4.3	1.2	6.8



## Safety information, installation and maintenance

Full details are contained in the SP500 electropneumatic smart positioner Installation and Maintenance Instructions (IM-P343-35) supplied with the product.

## Positioner nomenclature guide

<b>Positioner series</b>	SP500 = SP500 SP501 = SP500 with HART® communication protocol	SP500
<b>Movement / action</b>	0 = Linear, single action 1 = Rotary, single action	0
<b>Retransmission + software switches (optional)</b>	0 = Not mounted R = Mounted	R
<b>Enclosure</b>	0 = Standard	0
<b>Approvals</b>	0 = Standard	0
<b>24 V power supply (optional)</b>	0 = Not mounted P = Mounted	0
<b>Remote sensor</b>	0 = No	0
<b>Extended stroke</b>	0 = No	0
<b>Gauge block</b>	0 = Not mounted G2 = Full scale 30 psig G4 = Full scale 60 psig G7 = Full scale 100 psig	G4

**Selection example:** SP500 0 R 0 0 0 0 0 G4

**How to order** Please include all the required optional extras as described on the first page.

**Example:** 1 off Spirax Sarco SP500 0R00000G4 electropneumatic smart positioner equipped with retransmission and software switches board plus gauge block for full scale pressure of 60 psig.

**Caution:** The SP500 smart positioner must have a high quality air supply. A Spirax Sarco MPC2 filter regulator with coalescing filter or equivalent must be used.







## IPC4A Convertor

### Description

The IPC4A converter is a two wire, wall mounted, electropneumatic converter requiring a standard 4-20 mA input signal to provide a 3 - 15 psi compressed air output signal.

The converter is compatible with Spirax Sarco linear pneumatic actuators series PN5000 and PN6000 and the PP4 pneumatic positioner.

### Applications

The convertor can be used with the following actuators:

Actuator types	PN5000 series
	PN6000 series

### Technical data

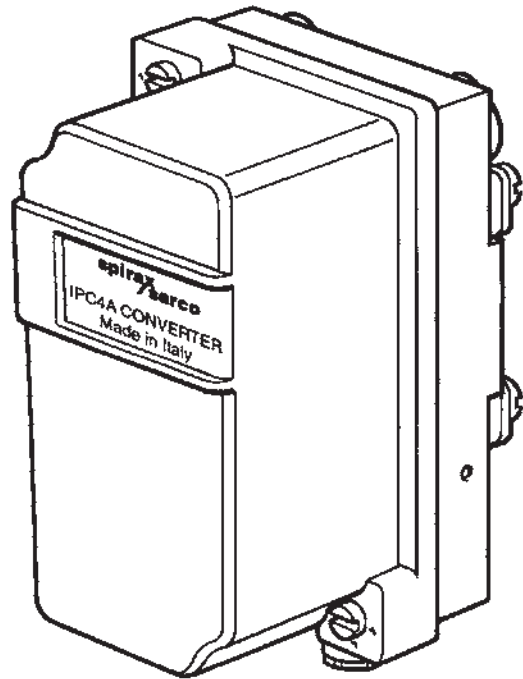
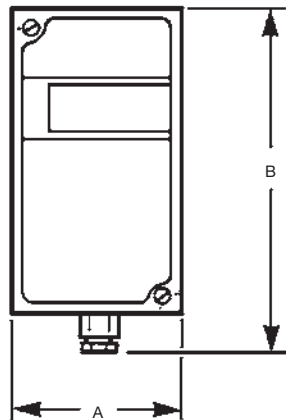
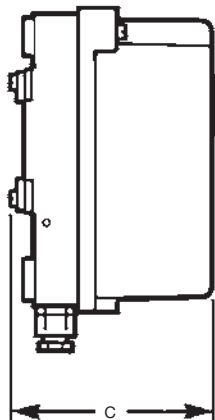
Input signal range	4-20 mA
Output signal range	3-15 psi
Supply air pressure	Minimum 20 psi
	Maximum 50.7 psig
Enclosure rating	IP54
Air consumption	.4 scfm (average)
Pneumatic connections	1/8" NPT
Electrical connections	PG9
Working temperature	0 to 175° F
Input impedance	220 ohms
I Max	50 mA
Linearity	0.5%
Hysteresis	0.2%

### Materials

Base plate	Die cast aluminum with anti corrosive paint
Cover	Reinforced polymer (ABS)

### Dimensions (approximate) in inches and pounds

A	B	C	Weight
3.0	6.0	3.3	2.0 lb



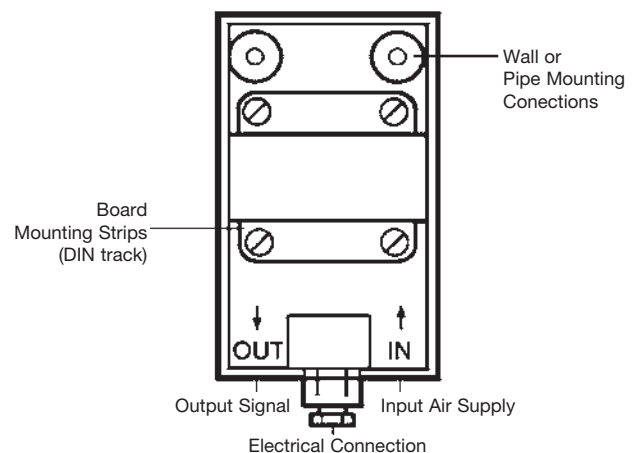
### Safety information, installation and maintenance

Full details are contained in the appropriate Installation and Maintenance Instructions supplied with the product.

### Air and electrical connections

Air connections 1/8" NPT

Electrical connection PG9



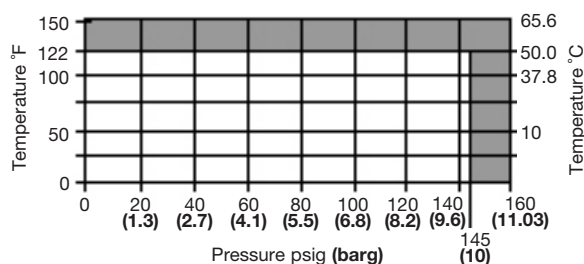


## MPC2 High Efficiency Compressed Air Filter/Regulator

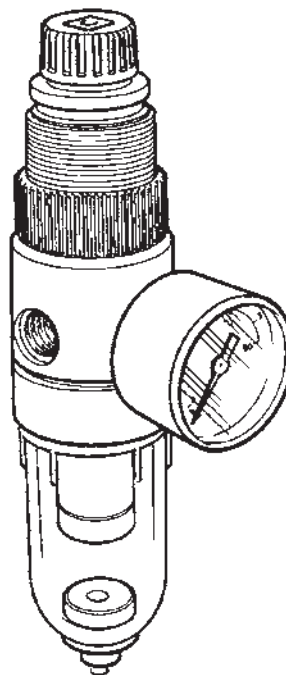
Spirax Sarco high efficiency oil removing filter/regulator. To provide very high quality compressed air, with accurate pressure control, for pneumatic actuators and general purpose systems.

Model	MPC2
Sizes	1/4"
Connections	1/4" O.D. Tube
Construction	Aluminum/Polycarbonate
Pressure Range	0 to 100 psig

### Limiting Operating Conditions



■ The product should not be used in shaded area.



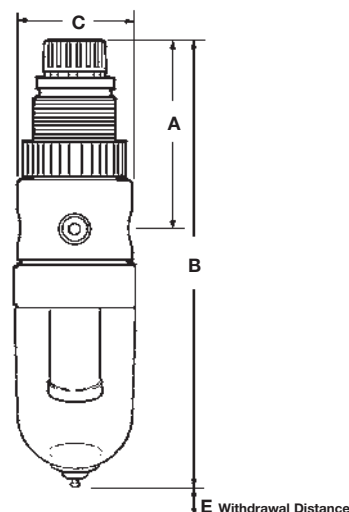
### Construction Materials

No.	Part	Material
1	Body	Aluminum
2	Body Finish	Electrophoretic Epoxy Internal and External
3	Bowl	Polycarbonate
4	Bonnet Assembly	Polycarbonate
5	Filter Element	MicroFibre/Stainless Steel
6	Valve	Nitrile

### Pressure Gauge

1-1/2" gauge with face in psi and bar is supplied with each MPC2.

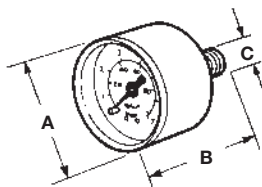
Pressure Range: 0 to 100 psig (0 - 7 barg)



### Dimensions

(nominal) in inches and millimeters

Size	A	B	C
1-1/2"	1.5	1.8	
	40	47	R1/8"



### Dimensions (nominal) in inches and millimeters

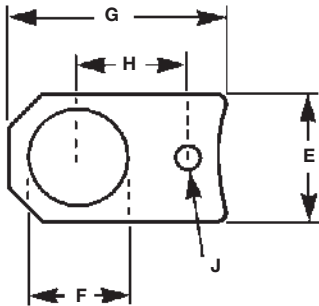
Size	A	B	C	E	Weight
1/4"	2.5	6.1	1.6	1	1 lb
	65	155	41	25	0.2 kg

Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only.  
In the interests of development and improvement of the product, we reserve the right to change the specification.

# MPC2 High Efficiency Compressed Air Filter/Regulator

## FK21 Fixing Kit

All MPC2's come complete with FK21 Fixing Kits to allow direct mounting onto the Spirax Sarco range of PN Pneumatic Actuators.

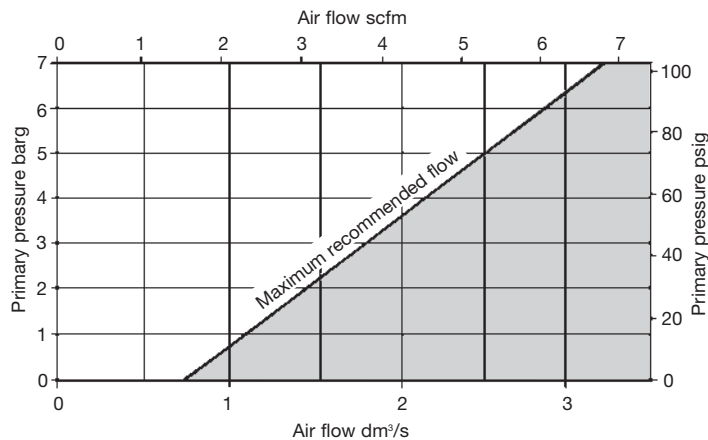


**Dimensions (nominal)**  
in inches and millimeters

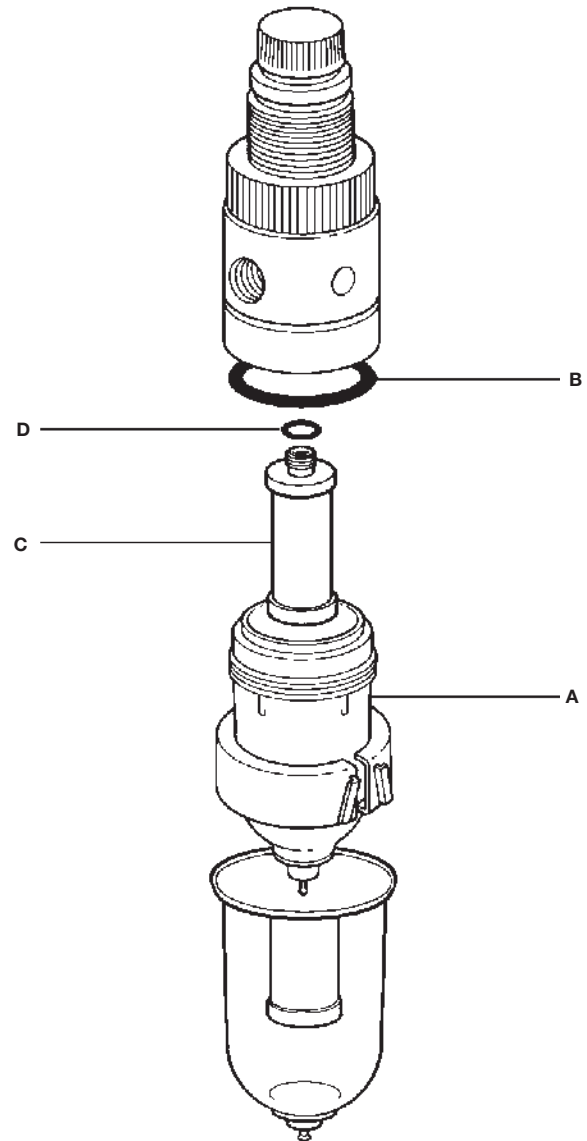
E	F	G	H	J
1.5	1.2	2.4	1.26	0.31
40.0	30.5	61.5	32.0	8.2

## Performance Selection

For any specified **primary** filtration pressure, there is a maximum recommended air flow rate. Keeping within this, will ensure that the element performance maintains the stated high efficiency levels, particularly for the removal of oil and water contaminants.



## Spare Parts



Bowl Assembly (specify with or without Drain) A,B  
Element and O Ring Set B, C, D

### How to order

Example: 1 Element and 'O' ring set for 1/4" Spirax-Monnier Filter/Regulator Type MPC2

# spirax sarco

## Stonel Position Transmitter

### Description

The Stonel Limit Switch is for use with the K Series pneumatic control valves and PN5000/6000 actuators. It is mounted on the PN5000/6000 actuators and can provide visual indication if the valve is fully open, fully closed, partially open (0-100%) or partially closed (0-100%). By comparing flow rates over time with your valve position, you can determine valve wear.

The Stonel Position Transmitter provides a precise 4-20mA signal on a two-wired DC loop to provide exact valve position. Additionally, two solid state sensors are provided for use in AC and DC computer input circuits.

### Technical Data

#### Model No. PQ5XE2R

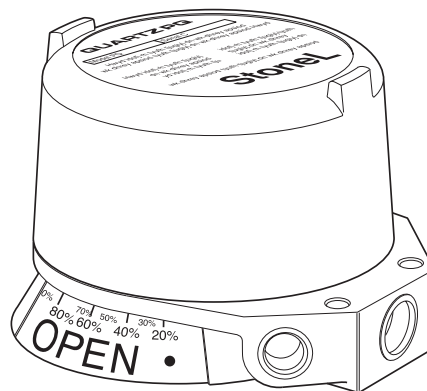
Junction Features	(1) 3/4" NPT and (1) 1/2" NPT conduit entries
Visual Indicator	OPEN - Green CLOSED - Red

Enclosure Rating (Aluminum Cover)	Factory Mutual and Canadian Standards approved for: Class I: Groups C & D. Divisions 1 and 2. Class II: Groups E, F, G. Division 1. Class II: Groups F & G. Division 2. NEMA 4, 4X and 6
--------------------------------------	--

Output Signal	Two wire, 4-20mA
Recommended Supply	24VDC, 50mA minimum
Voltage Range	10 to 40 VDC at terminals
Maximum Loading	700 ohms @ 24 VDC
Sensors	2XSST Solid State Sensors
Electrical Ratings	0.3A @ 120VAC (continuous)
Temperature Range	-40° to 180°F (-40° to 82°C)
Operating Life	unlimited
Maximum Voltage	6.5 volts @ 10 mA
Drop	7.0 volts @ 100 mA
Minimum Current for LED Illumination	2.0 mA

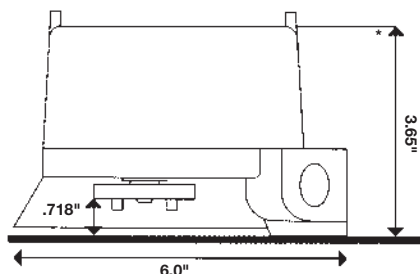
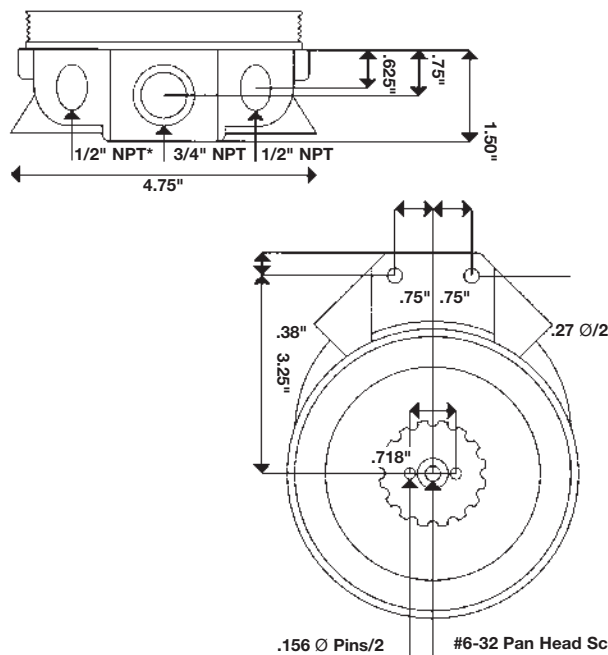
### Construction Materials

Part	Material
Cover Features	Epoxy coated anodized aluminum cover (optional clear Lexan cover)
O-Ring Seals	Viton
Shaft and Drive	All materials are 303 or 316 stainless steel
Internal Fasteners	Stainless Steel



### Installation

Full details are contained in the appropriate Installation & Maintenance Instructions supplied with the product.



\* The 1/2" Conduit Entry is Located on the Left Side of the 3/4" Conduit Entry

## Stonel Limit Switch

### Description

The Stonel Limit Switch is for use with the K Series pneumatic control valves and PN5000/6000 actuators. It is mounted on the PN5000/6000 actuators and can provide visual indication if the valve is fully open, fully closed, partially open (0-100%) or partially closed (0-100%).

The Stonel Limit Switch has fully adjustable cams which allow the switches to be set to be actuated at any desired valve travel.

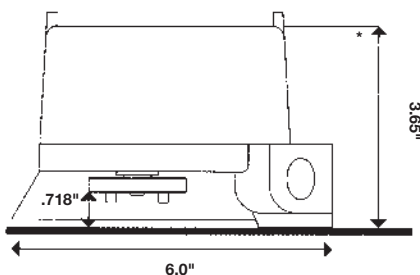
### Technical Data

#### Model No. PQ2SE2R

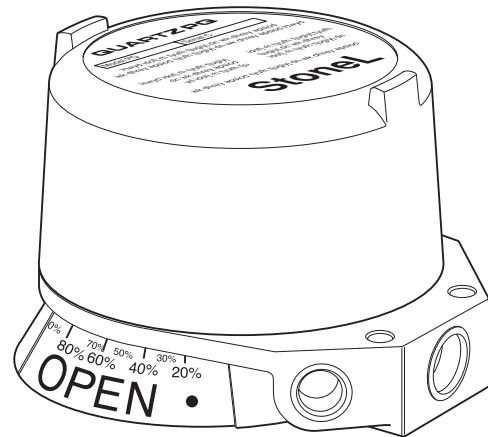
Function	2 switches
Switch Data	2x SPDT. Maxx-Guard LED Proximity switches
Junction Features	(1) 3/4" NPT and (1) 1/2" NPT conduit entries
Visual Indicator	OPEN - Green CLOSED - Red
Enclosure Rating (Aluminum Cover)	Factory Mutual and Canadian Standards approved for: Class I: Groups C & D. Divisions 1 and 2. Class II: Groups E, F, G. Division 1. Class II: Groups F & G. Division 2. NEMA 4, 4X and 6
Sensors	SPDT
Electrical Ratings	0.3A @ 120VAC
Temperature Range	-23° to 180°F (-40° to 82°C)
Seal	Hermetically Sealed
Operating Life	5,000,000 cycles
Maximum Voltage	3.5 volts @ 10 mA
Drop	6.5 volts @ 100 mA
Minimum Current for LED Illumination	2.0 mA

### Construction Materials

Part	Material
Cover Features	Epoxy coated anodized aluminum cover (optional clear Lexan cover)
O-Ring Seals	Viton
Shaft and Drive	All materials are 303 or 316 stainless steel
Internal Fasteners	Stainless Steel

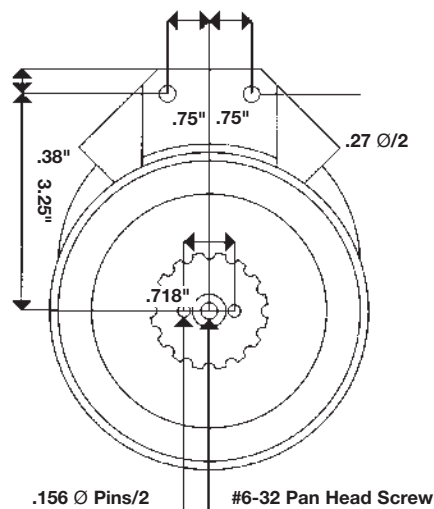
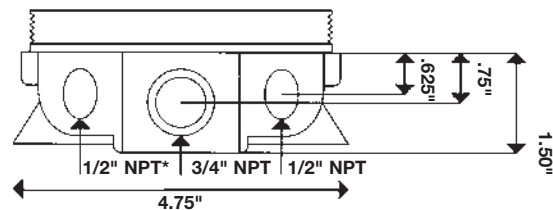


\* The 1/2" Conduit Entry is Located on the Left Side of the 3/4" Conduit Entry



### Installation

Full details are contained in the appropriate Installation & Maintenance Instructions supplied with the product.



## PN600 Series Pneumatic Controllers

### Description

The PN600 series pneumatic controllers provide temperature or pressure control providing a 3 - 15 psi output signal with proportional (plus manual reset) or proportional plus integral control action. An optional stainless steel pocket type W30S is available for use with temperature sensors.

The range of pneumatic controllers can be used in conjunction with PN5000 and PN6000 series linear actuators and PP4 pneumatic positioners.

### Available Types

#### Temperature control

Model	Control function	Scale range
662-T5-M5*	Proportional (+ Manual reset)	212°F
662-T5-M5	Proportional (+ Manual reset)	122 - 302°F
662-T5-M5*	Proportional (+ Manual reset)	77 - 257°F
662-T5SY-M5	Proportional (+ Manual reset)	77 - 257°F
663-T5-M5*	Proportional + Integral	212°F
663-T5-M5	Proportional + Integral	122 - 302°F
663-T5-M5*	Proportional + Integral	77 - 257°F
663-T5SY-M5	Proportional + Integral	77 - 257°F

T5 = Nitrogen filled sensing bulb and capillary

SY = Sensing bulb for sterile applications

M5 = 5 metres capillary tube (\* Option of 10 metres - Suffix 'M10')

#### Pressure Control

622	Proportional (+ Manual reset)	0 - 102 psi
622	Proportional (+ Manual reset)	0 - 290 psi
623	Proportional + Integral	0 - 102 psi
623	Proportional + Integral	0 - 290 psi

#### Other options available include:-

Pneumatic receiver for 3 to 15 psi g input signal.

Electromechanical receiver for 4-20 mA, 0-10 Vdc, RTD Pt100 or thermocouple input signal.

#### Other scale ranges available:-

Pressure (psi)	Scale span options up to 7,250 psi
Temperature (°F)	Scale span options for:- 122, 167, 212, 302, 392, 572 and 752°F

### Measuring elements

#### Pressure

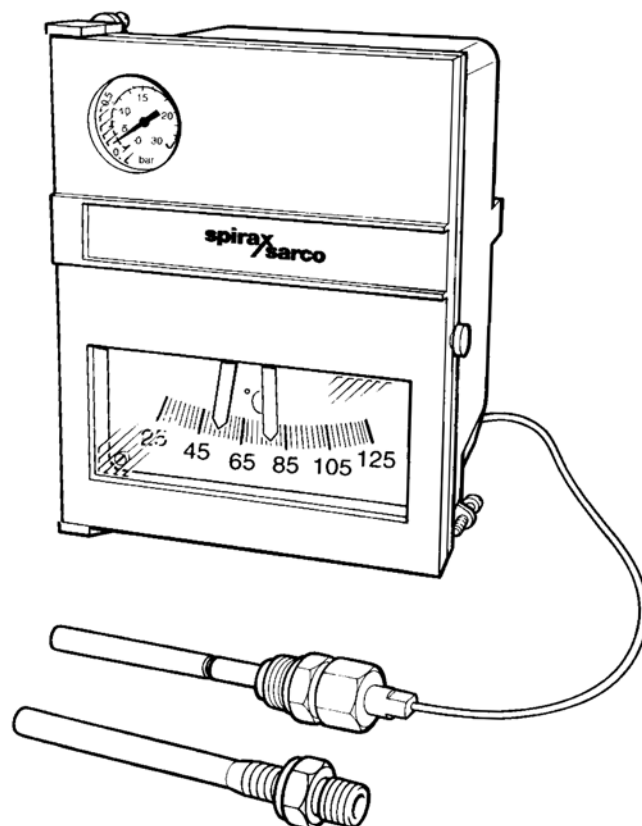
Bourdon tube	AISI 316L stainless steel
Connection	NPT
Maximum pressure	+25% of scale range

#### Temperature

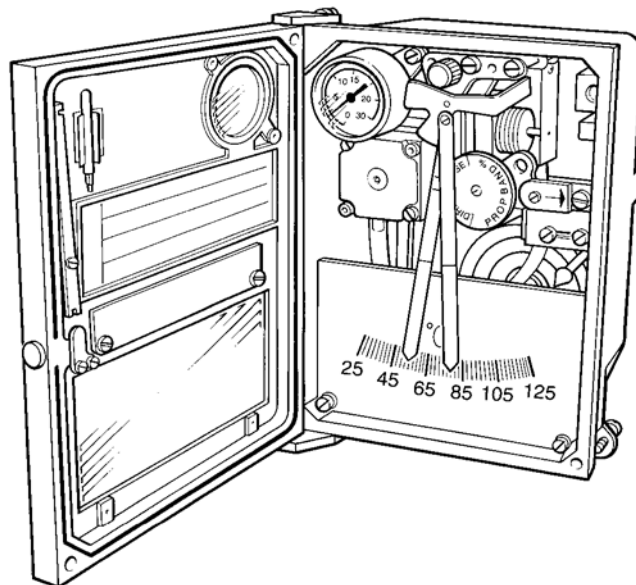
Bulb and capillary	AISI 316L stainless steel - Cylindrical bulb for liquids - Sanitary bulb for sterile applications (Option available with spiral bulb for air / gas)
Bulb connection	NPT
Capillary length	16.5 ft 32 ft (in some ranges) (Other options available)
Max. measured temperature	+25% of scale range

#### Pocket - Type W30S (optional)

Material	AISI 316L	Stainless steel
Connection	NPT	
Maximum pressure	PN40	



Optional pocket type W30S



Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only.  
In the interests of development and improvement of the product, we reserve the right to change the specification.

# PN600 Series Pneumatic Controllers

## Technical data

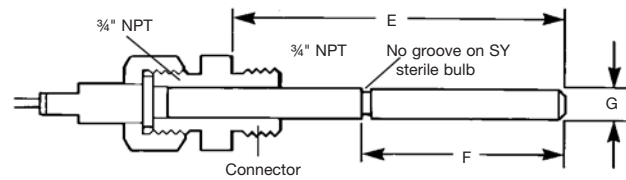
### Controller

Enclosure rating	IP54 (Standard) IP55 (Optional)
Scale length	100mm
Pointers	Measured value - black Set point - red
Gauges	Output signal pressure (bar/psi g)
Control mode	Proportional (5-200% of scale range) Integral (0.1 to 20 repeats per minute)
Output signal	2.9 - 14.5 psi
Control action	Direct or reverse action - Field reversible
Set point adjustment	Manual adjustment
Accuracy	1% of range span
Sensitivity	0.2% of range span
Repeatability	0.5% of range span
Linearity	0.5% of range span
Air supply	20.3 psi
Air consumption	.4 scfm (average)
Air connections	1/4 " NPT
Ambient temperature limits	5°F to 149°F
Mounting	Wall or flush panel mounted
Weight	7.7 lbs

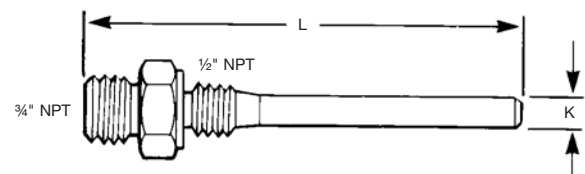
## Dimensions inches (millimeters)

Controller			
A	B	C	D
7.8 (202)	5.7 (144)	5.3 (136)	.67 (17)
Temperature Sensing Bulb			
E	F	G	
4.7 (200)	4.7 (120)	.5 (13)	
Panel Mounting Cut Out			
H	J		
5.5 (138)	7.4 (188)		
Pocket			
K	L		
0.6 (16)	8.2 (210)		

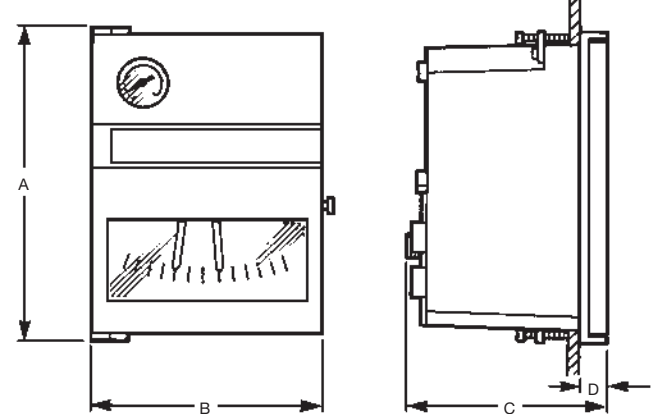
Sensor



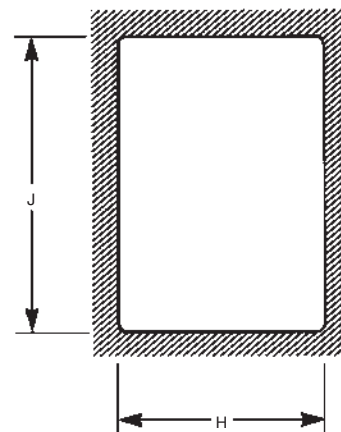
Pocket (optional replacing standard connector)



Controller



Panel cut-out





# spirax sarco

## SX80 Process Controller

### Description

The SX80 controller is a 1/16 DIN panel mounted unit, suitable for single and multiple set point applications utilising the Spirax Sarco range of pneumatic or electric control valves and electrical and electropneumatic instruments. The SX80 has both VMD (3 point) and analogue (4-20 mA) outputs in the same unit and features quick start codes for ease of commissioning.



### SX80 features:

- **Universal input** - Resistance thermometers, thermocouples, mA and mV.
- **Universal output** - VMD (valve motor drive), mA and voltage for continuous, relay and logic for switching control.
- **Auxiliary power supply** - For external transmitter requiring 18 Vdc.
- **Text messages** - Scrolling text messages can be configured to alert the user to process conditions.
- **Quick codes** - 5-digit quick codes enable easy set-up and commissioning of the controllers.

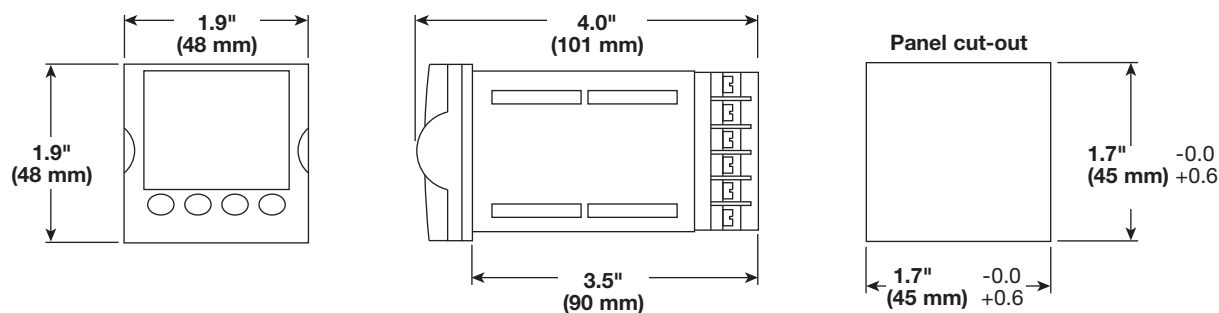
### Approvals

These controllers conform to the Council Directive 93/68/EEC and the regulations on the essential protection requirements in Electrical Apparatus EN 61010-1: 90

- **EMC emissions specification:** EN 61326-1: 1997 Class B (including amendments A1, A2 and A3).
- **EMC immunity specification:** EN 61326-1: 1997 Industrial locations (including amendments A1, A2 and A3).

**See overleaf for SX80 Process Controller technical data**

### Dimensions (approximate) in inches (mm)



**How to order example:** 1 off Spirax Sarco SX80 process controller.

*Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only.  
In the interests of development and improvement of the product, we reserve the right to change the specification.*

TI-P323-28-US 12.13



# SX80

## Process Controller

### Technical data

#### General details

Mounting arrangement	Panel mounted 1/16 DIN
Power supply	85 to 265 Vac, 6 W maximum
Electrical connections	Screw connection terminal block
Panel sealing	IP65 – plug in from front panel, NEMA 4X
Operating temperature/humidity	0 to 55°C, 5 to 85% RH
Atmospheres	Not suitable for use in explosive or corrosive atmospheres
Electromagnetic compatibility (EMC)	EN 61326
Electrical safety BS EN 61010	Installation Category II
Weight	0.6 lb (250 g)
Approvals	CE

#### Process variable inputs

Calibration accuracy	< ±0.25% reading ±1 LSD
Resolution	< 0.5 µV with 1.6 second filter
Input filter	Off to 59.9 seconds
RTD	3 wire Pt100 DIN 43760
Bulb current	0.2 mA
Universal linear mA	4 - 20 mA, 0 - 20 mA, using external shunt resistor 2.49 Ω
Linear input range	-10 to 80 mV
Thermocouples	K, J, N, R, S, B, L, T, C, custom
Sampling rate	4 Hz (250 ms)
Cold junction accuracy	< ±1°C at 25°C ambient
Accuracy linear mA	< 0.1% reading
Input impedance	100 MΩ
Number of set points	3
User calibration	2 point gain and offset

#### Transmitter power supply

Isolation	300 Vac double isolated
Output voltage	18 V ±15%
Current	30 mA maximum
Load regulation	< 1 V over 25 mA

#### Control action

Proportional band	1 - 9999 Engineering units or 0.01 to 300 %age or 0.1 - 3000
Integral time	Off - 9999
Derivative time	Off - 9999
Error band	One shot tune, or natural frequency tune. The controller will automatically select the best method according to the process conditions.
Auto tuning	Hysteresis from 0.01 to 300.0 or 0.1 to 3000 Engineering units
On-off control	1 - 9999 Engineering units or 0.01 to 300 %age or 0.1 - 3000
Cut back	To minimise overshoot on critical processes.
Auto / manual modes	Selectable from keyboard.

#### Relays

Isolation	300 Vac double insulated
Output range	0 – 20 mA, 4 – 20 mA
Resolution	13.5 bits
Contact rating	Maximum 2 A @ 264 Vac resistive
<b>Note:</b> Maximum 2 A per terminal limit applies where relays have common terminals (2 amps maximum for terminal AB).	

#### Logic inputs (x2)

Contact closure	Open >1200R Closed <300R
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#### Isolated dc output

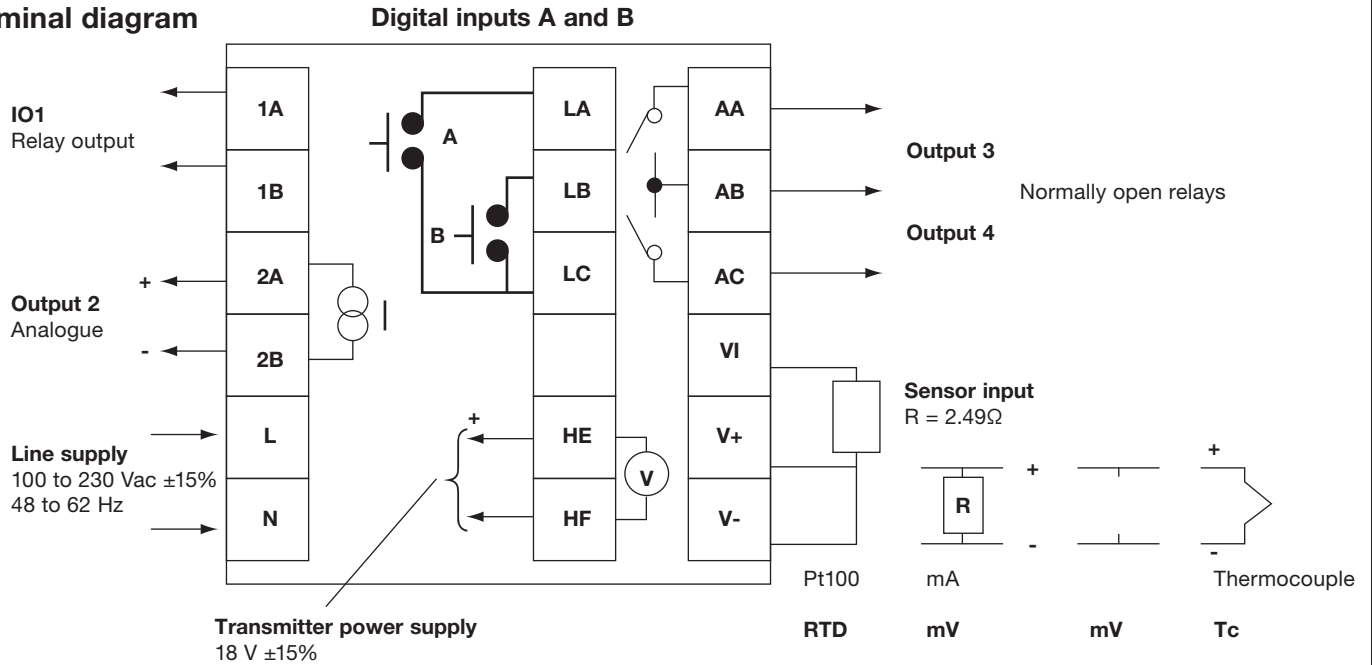
Isolation	300 Vac double insulated
Output range	0 – 20 mA, 4 – 20 mA
Resolution	13.5 bits

# SX80 Process Controller

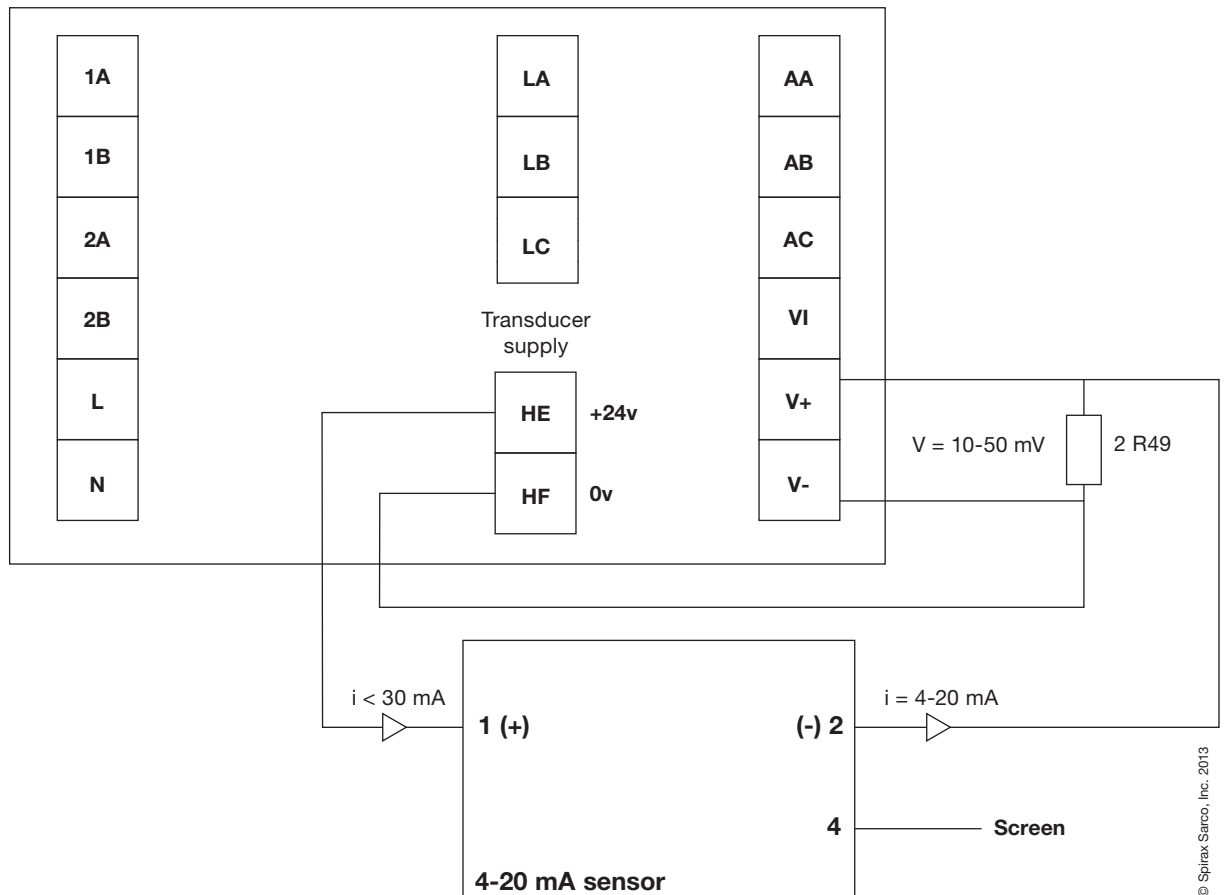
## Wiring diagrams

**Warning:** Safe operation of this product can only be guaranteed if it is properly installed, commissioned, used and maintained by qualified personnel as stated in the IMI supplied with the unit. It is the duty of the Company Safety Officer to ensure that the product specific data and Safety information within the supplied IMI has been fully understood and complied with.

## Terminal diagram



## Wiring diagram for connecting a 4-20 mA transmitter







## SX90 Process Controller

### Description

The SX90 is a panel mounted 1/8th DIN controller, suitable for constant set point control of systems having fixed pre-programmed set points. The controller has universal inputs, and outputs using PID for close control of industrial processes. The SX90 controller is for use with the Spirax Sarco range of pneumatic and electric control valves and electrical and electropneumatic instruments.

### SX90 features:

- **Universal input** - Resistance thermometers, thermocouples, mA and mV.
- **Universal output** - VMD (valve motor drive), mA and voltage for continuous, relay and logic for switching control.
- **Auxiliary power supply** - For external transmitter requiring 24 Vdc.
- **Set point** - The SX90 can operate with local set point, remote set point, or a choice of 4 set points can be selected.
- **Ramps** - There are 2 independent ramps (ramp up and ramp down) for rate of change from one set point to another.
- **Remote set point** - For cascade control (master/slave) using 2 controllers working together, or to remotely control the set point.
- **Retransmission** - For retransmission of the process value, set value, or as second analogue output.
- **Event alarm** - 4 programmable relay outputs for deviation, band, and process alarms.
- **Quick codes** - 5-digit quick codes enable easy set-up and commissioning of the controllers
- **Serial communications** - For connecting via a serial port RS 485 (5 wire), up to 64 controllers into a supervisory system.
- **Auto/man** - The automatic to manual mode can be changed via the key board, or logic inputs.
- **Logic inputs** - 3 logic inputs to provide a variety of selectable functions.
- **Potentiometer Input** - For feedback of valve position.
- **Text messages** - Scrolling text messages can be configured to alert the user to process conditions.
- **Forced output** - Forced output level defined by instrument parameter and activated by a logic input or by writing to the parameter.



### Approvals

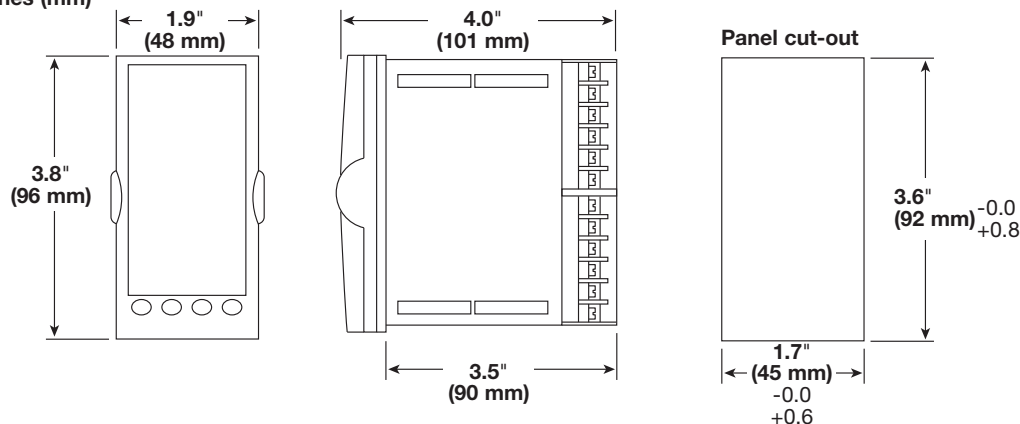
These controllers conform to the Council Directive 93/68/EEC and the regulations on the essential protection requirements in Electrical Apparatus EN 61010-1.90.

- **EMC emissions specification:** EN 61326-1: 1997 Class B (including amendments A1, A2 and A3).
- **EMC immunity specification:** EN 61326-1: 1997 Industrial locations (including amendments A1, A2 and A3).

See the next two pages for SX90 Process Controller technical data

### Dimensions

(approximate) in inches (mm)



**How to order example:** 1 off Spirax Sarco SX90 process controller.

Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only.  
In the interests of development and improvement of the product, we reserve the right to change the specification.

TI-P323-30-US-US 12.13

# SX90

## Process Controller

### Technical data

#### General details

Mounting arrangement	Panel mounted 1/8 DIN
Power supply	85 to 265 Vac, 9 W maximum
Electrical connections	Screw connection terminal block
Panel sealing	IP65 – plug in from front panel, NEMA 4X
Operating temperature/humidity	0 to 55°C, 5 to 85% RH
Atmospheres	Not suitable for use in explosive or corrosive atmospheres
Electromagnetic compatibility (EMC)	EN 61326
Electrical safety BS EN 61010	Installation Category II
Weight	0.8 lb (350 g)
Approvals	CE

#### Process variable inputs

Calibration accuracy	< ±0.25% reading ±1 LSD
Resolution	< 0.5 µV with 1.6 sec filter
Input filter	Off to 59.9 seconds
RTD	3 wire Pt100 DIN 43760
Bulb current	0.2 mA
Universal linear mA	4 - 20 mA, 0 - 20 mA, using external shunt resistor 2.49 Ω
Linear input range	-10 to 80 mV
Thermocouples	K, J, N, R, S, B, L, T, C, custom
Sampling rate	4 Hz (250 ms)
Cold junction accuracy	<±1°C at 25°C ambient
Accuracy linear mA	< 0.1% reading
Input impedance	100 MΩ
Number of set points	3 plus remote set point
User calibration	2 point gain and offset

#### Transmitter power supply

Isolation	300 Vac double isolated
Output voltage	18 V ±15%
Current	30 mA maximum
Load regulation	< 1 V over 25 mA

#### Control action

Proportional band	1 - 9999 Engineering units or 0.01 to 300 %age or 0.1 - 3000
Integral time	Off - 9999
Derivative time	Off - 9999
Error band	One shot tune, or natural frequency tune. The controller will automatically select the best method according to the process conditions.
Auto tuning	Hysteresis from 0.01 to 300.0 or 0.1 to 3000 Engineering units
On-Off control	1 - 9999 Engineering units or 0.01 to 300 %age or 0.1 - 3000
Cut back	To minimise overshoot on critical processes.
Auto / manual modes	Selectable from keyboard.

#### Relays

Isolation	300 Vac double insulated
-----------	--------------------------

#### Logic inputs (x2)

Contact closure	Open > 1200R, Closed < 300R
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#### Comms

Isolation	300 Vac double isolation
Hardware	EIA 485 5 wire (EIA 422 compatible)
Protocol	Modbus RTU slave

# SX90

## Process Controller

### Remote set point input

Isolation	300 Vac double isolation
Calibration accuracy	< $\pm 0.25\%$ reading $\pm 1$ LSD
Sampling rate	4 Hz (250 ms)
Resolution	>14 bits – 0.5 mV for 0 – 10 V input, 2 $\mu$ A for 4 – 20 mA
Input impedance	> 222 K $\Omega$ (Volts) 2.49 $\Omega$ (Current)
Linear input range	0 – 10 V, 0 – 20 mA
Input filter	Off to 59.9 seconds
Zero offset	User adjustable over full range
User calibration	2 point gain and offset

### Pot input

Pot resistance range	100 – 10 k $\Omega$
Excitation voltage	0.46 to 0.54 V
Resolution	0.006% of Span (>14Bits)
Sample rate	1 Hz
Short circuit pot detection	< 25 $\Omega$
Open circuit pot detection	> 2 M $\Omega$
Open circuit wiper detection	> 5 M $\Omega$
Contact rating	Maximum 2A @ 264 Vac resistive <b>Note:</b> Maximum 2A per terminal limit applies where relays have common terminals. (2 amps maximum for terminal AB)

### Outputs

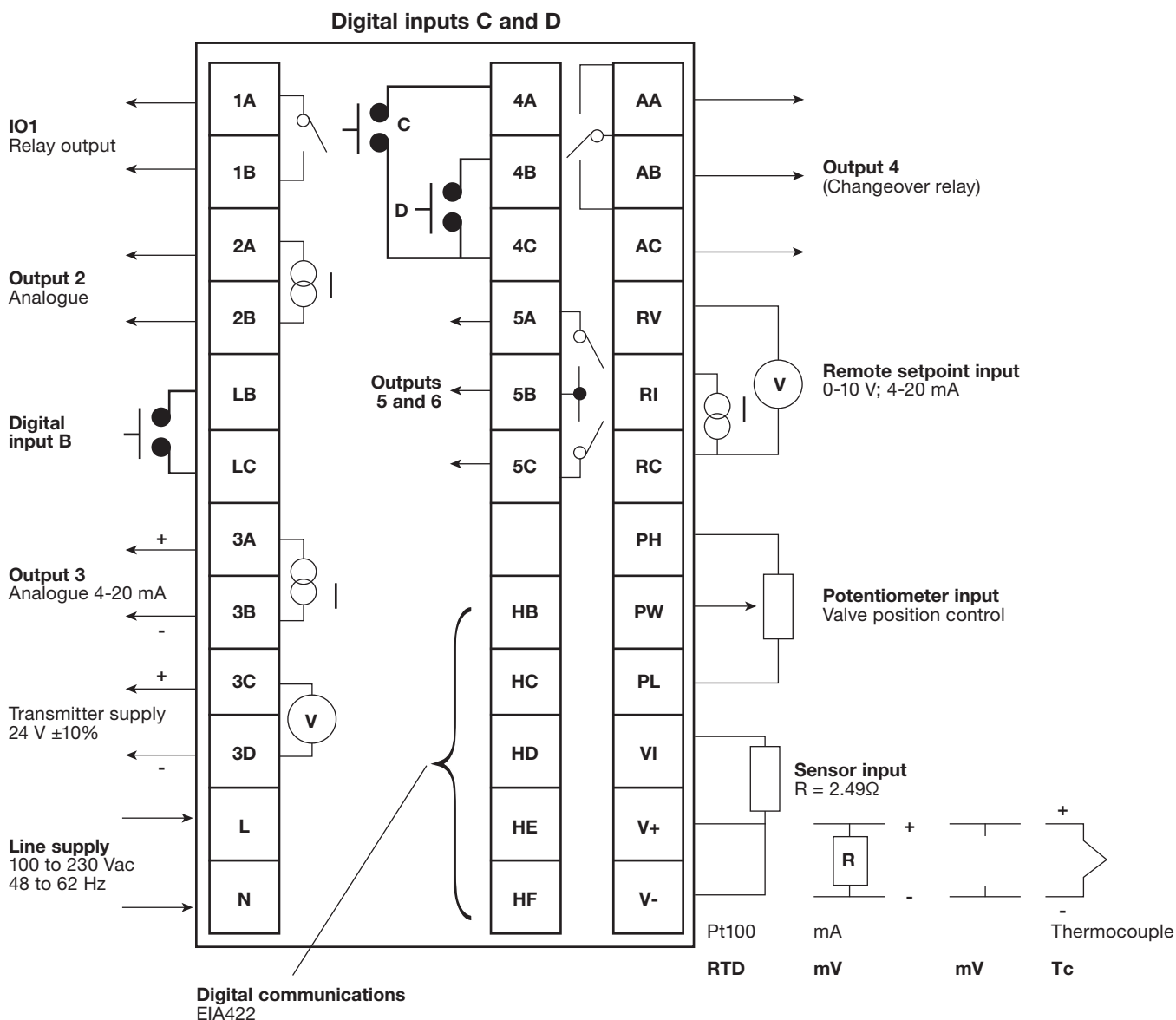
Output 1	SPST N/O contact
Output 2	0 – 20 mA, 4 – 20 mA, 300 Vac double insulated, 13.5 bits resolution (<550 $\Omega$ )
Output 3	0 – 20 mA, 4 – 20 mA, 300 Vac double insulated, 13.5 bits resolution (<550 $\Omega$ )
Output 4	Changeover relay contacts
Outputs 5 and 6 (VMD)	2 SPST interlocked N/O relays
Input filter	Off to 59.9 seconds
Zero offset	User adjustable over full range
User calibration	2 point gain and offset
Open circuit wiper detection	> 5 M $\Omega$

# SX90 Process Controller

## Wiring diagrams

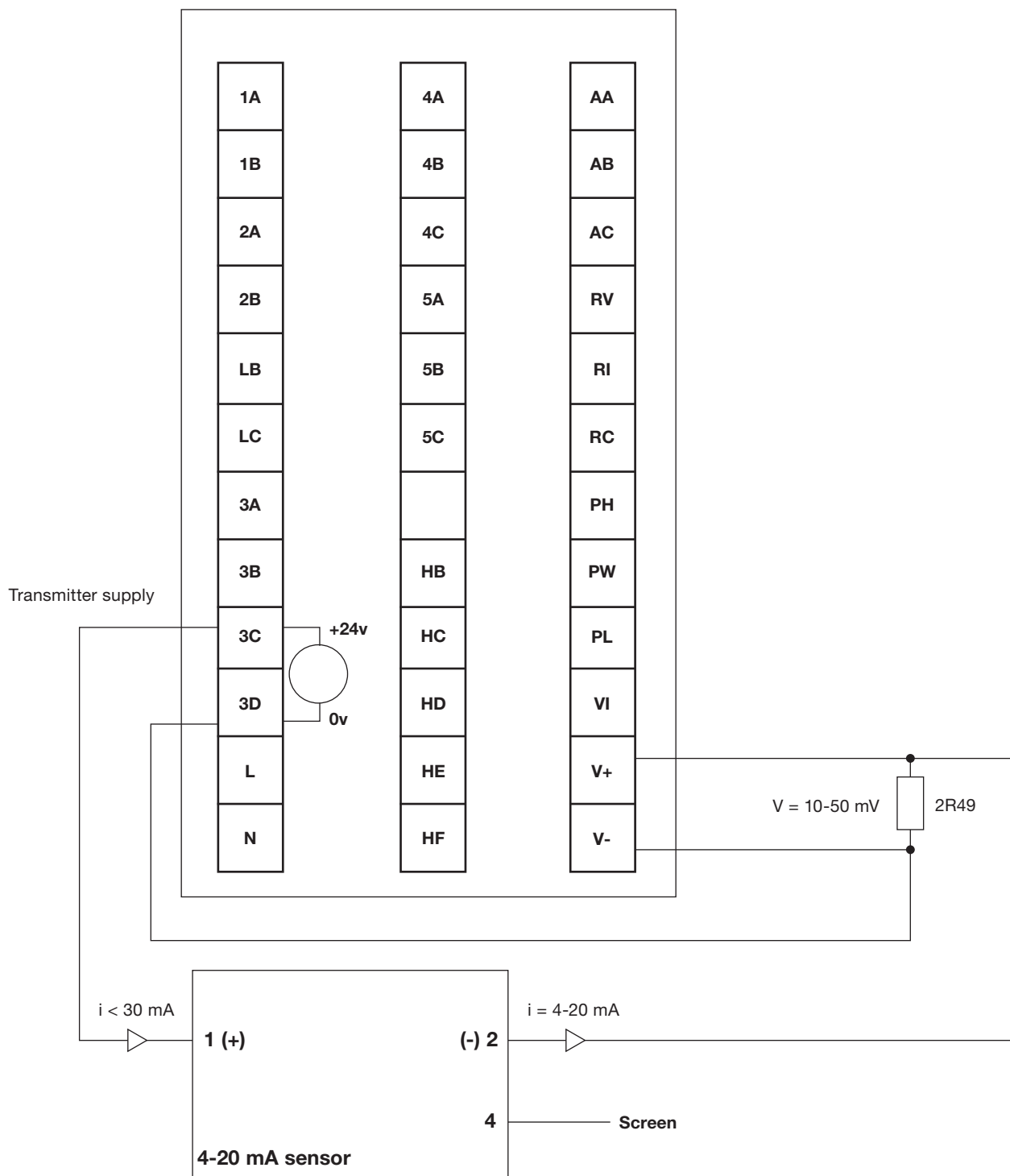
**Warning:** Safe operation of this product can only be guaranteed if it is properly installed, commissioned, used and maintained by qualified personnel as stated in the IMI supplied with the unit. It is the duty of the Company Safety Officer to ensure that the product specific data and Safety information within the supplied IMI has been fully understood and complied with.

## Terminal diagram



# SX90 Process Controller

Wiring diagram for connecting the 4-20 mA transmitter









## PF6 Series

### Stainless Steel Piston Actuated On/Off Valves

#### Description

A 2-port pneumatically actuated on / off stainless steel valve for use on steam, water, air, oil and gases.

A pneumatic signal acts on the actuator piston to open or close the valve with a spring return action.

The valve plugs have a PTFE soft seal (**G**) to provide a tight shut-off. A valve position indicator is included on standard and flow regulator models.

**Valves are available with one of three sizes of actuator:**

**Type 1** (45 mm), **Type 2** (63 mm) and **Type 3** (90 mm) with the following action options:

**- NC (Normally Closed)**

These valves are designed for flow over the seat (port 1 to 2). Recommended for pneumatic applications. Not recommended for water applications.

**- NO (Normally Open)**

These valves are designed for flow under the seat (port 2 to 1). Can be used to prevent waterhammer on valve closure in liquid applications.

**- BD (Bi-Directional normally closed)**

These valves are designed for special applications that require flow in both directions and incorporates an anti-waterhammer design for liquid applications flowing under the seat (port 2 to 1). Note: To help prevent the possibility of waterhammer on liquid applications flowing over the seat (port 1 to 2) the pressure should not exceed 15 psig.



#### Optional extras (see 'Valve selection guide', page 7):

- Travel switch
- Flow regulator

#### Sizes, pipe connections and actuator combinations

Valve type	Pipe connections	Actuator type	1/2"	3/4"	1"	1-1/4"	1-1/2"	2"
PF61G	NPT or BSP	1 PTFE version	•	•				
		2 PTFE version	•	•	•	•	•	•
		H version	•	•	•			
		3 PTFE version			•	•	•	•
		H version			•	•	•	•
		2 PTFE version	•	•	•	•	•	•
PF63G	Flanged to ANSI Class 150 or EN 1092 (welded on flanges)	H version	•	•	•			
		3 PTFE version			•	•	•	•
		H version			•	•	•	•
		1 PTFE version	•	•				
PF65G	Sanitary clamp to ISO 2852	2 PTFE version	•	•	•	•	•	•
		3 PTFE version			•	•	•	•
		Note: clamp and clamp gasket are not included						

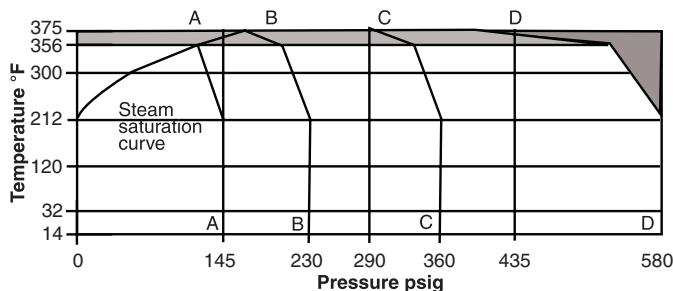
#### Available range

Valve action	BSP or NPT	Butt weld	Flanged (EN 1092 or ANSI)	Socket weld	Sanitary clamp
<b>NC - Normally Closed (flow over seat)</b>	PF61G - 1NC	PF62G - 1NC	-	PF64G - 1NC	PF65G - 1NC
	PF61G - 2NC	PF62G - 2NC	PF63G - 2NC	PF64G - 2NC	PF65G - 2NC
	PF61G - 3NC	PF62G - 3NC	PF63G - 3NC	PF64G - 3NC	PF65G - 3NC
<b>NO - Normally Open (flow under seat)</b>	PF61G - 1NO	PF62G - 1NO	-	PF64G - 1NO	PF65G - 1NO
	PF61G - 2NO	PF62G - 2NO	PF63G - 2NO	PF64G - 2NO	PF65G - 2NO
	PF61G - 3NO	PF62G - 3NO	PF63G - 3NO	PF64G - 3NO	PF65G - 3NO
<b>BD - Bi-Directional normally closed (flow over or under seat)</b>	PF61G - 1BD	PF62G - 1BD	-	PF64G - 1BD	PF65G - 1BD
	PF61G - 2BD	PF62G - 2BD	PF63G - 2BD	PF64G - 2BD	PF65G - 2BD
	PF61G - 3BD	PF62G - 3BD	PF63G - 3BD	PF64G - 3BD	PF65G - 3BD

# PF6 Series

## Stainless Steel Piston Actuated On/Off Valves

### Pressure / temperature limits



The product **must not** be used in this region or beyond the body design conditions quoted in the table below as damage to the internals will occur.

A - A PN10  
B - B PN16 and ANSI 150  
C - C PN25  
D - D PN40

<b>Body design</b> 1/2" - 2"	NPT, BSP	1/2" - 2"
	Flanged ANSI 150	
<b>conditions</b>	Sanitary clamp compatible connections PN10 1/2" - 2"	
PMA	Maximum allowable pressure	Refer to the graph left
TMA	Maximum allowable temperature	356°F
Minimum allowable temperature 14°F		
PMO	Maximum operating pressure	130 psig @ 356°F
TMO	Maximum operating temperature	356°F
Minimum operating temperature (Note: For lower operating temperatures consult Spirax Sarco.) 14°F		
ΔΔPMX	Maximum differential pressure	(see page 4)
Designed for a maximum cold hydraulic test pressure of: 1.5 x PMA (PN rating)		
PTMX	Maximum test pressure is equal to the √ΔPMX	

### Technical details

<b>Leakage</b>	PTFE soft seal	ANSI class V1
<b>Flow characteristic</b>	Fast opening	On/off
<b>Flow direction</b>	PF6_G-NC	Flow over seat
	PF6_G-NO	Flow under seat
	PF6_G-BD	Flow over seat
		Flow under seat
<b>Pilot media</b>	Air or water	140°F maximum
<b>Actuator rotation</b>	360°	
<b>Actuator type and size</b>	<b>Pilot connection</b>	<b>Maximum pilot pressure</b>
	Type 1 = 45 mm diameter 1/8" BSP	150 psig
	Type 2 = 63 mm diameter 1/4" BSP	150 psig
	Type 3 = 90 mm diameter 1/4" BSP	115 psig

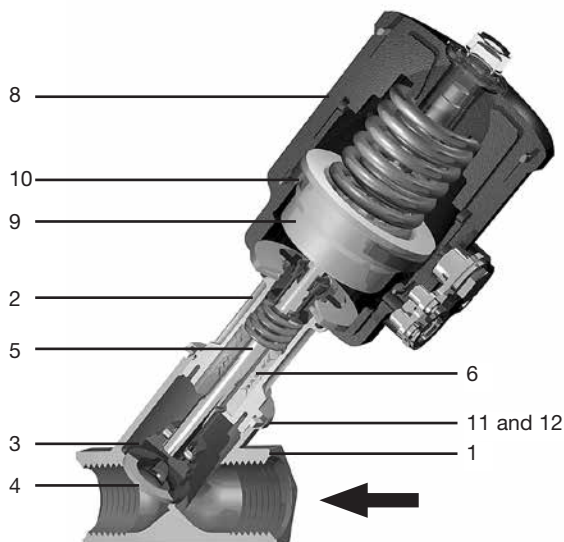
### C<sub>v</sub> values

Size	1/2"	3/4"	1"	1-1/4"	1-1/2"	2"
C <sub>v</sub> s	4.9	9.0	22	31	49	60

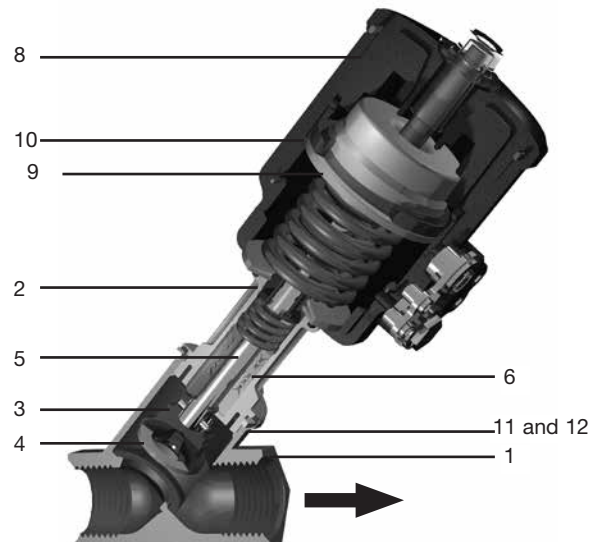
# PF6 Series

## Stainless Steel Piston Actuated On/Off Valves

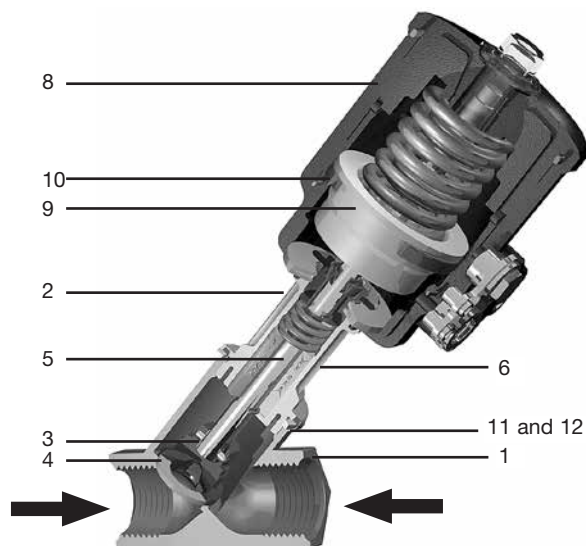
### NC (Normally Closed)



### NO (Normally Open)



### BD (Bi-Directional normally closed)



### Materials

No.	Part	Material	
1	Body	Stainless steel	AISI 316L
2	Bonnet	Stainless steel	AISI 316L
3	Plug	Stainless steel	AISI 316L
4	Valve plug seal	PTFE	
5	Valve stem	Stainless steel	AISI 316
6	Stem seals	PTFE chevrons	
7	Stem 'O' ring	Viton	
8	Actuator housing	Glass filled polyamide	
9	Piston	Glass filled polyamide	
10	Piston lip seal	Viton	
11	Gasket	PTFE	
12	'O' ring	Viton	

# PF6 Series

## Stainless Steel Piston Actuated On/Off Valves

### ΔPMX - Maximum differential pressures for PF6 piston actuated valves

#### \*Notes:

1. Maximum differential pressure for saturated steam service is 130 psig.
2. Sanitary clamp connections are limited to PN10 pressure rating.
3. ANSI flange connections are limited to ANSI 150 pressure rating.

#### PF6 G-NC (Normally closed)

Model	Valve size	Actuator diameter (mm)	Flow direction (port 1 to 2)	*Maximum differential pressure (psig)	Pilot Pressure	
					Minimum (psig)	Maximum (psig)
PF6_G-1NC	1/2"	45	over seat	230	26	150
	3/4"	45	over seat	230	26	150
PF6_G-2NC	1/2"	63	over seat	290	22	150
	3/4"	63	over seat	290	22	150
	1"	63	over seat	290	22	150
	1-1/4"	63	over seat	230	41	150
	1-1/2"	63	over seat	230	41	150
	2"	63	over seat	160	41	150
PF6_G-3NC	1"	90	over seat	290	15	115
	1-1/4"	90	over seat	230	41	115
	1-1/2"	90	over seat	230	41	115
	2"	90	over seat	220	41	115

\* See Notes at the top of this page

#### PF6 G-NO (Normally open)

Model	Valve size	Actuator diameter (mm)	Flow direction (port 2 to 1)	*Maximum differential pressure (psig)	Pilot Pressure	
					Minimum (psig)	Maximum (psig)
PF6_G-1NO	1/2"	45	under seat	230	26	150
	3/4"	45	under seat	230	26	150
PF6_G-2NO	1/2"	63	under seat	230	22	150
	3/4"	63	under seat	230	22	150
	1"	63	under seat	230	22	150
	1-1/4"	63	under seat	230	22	150
	1-1/2"	63	under seat	230	22	150
	2"	63	under seat	175	22	150
PF6_G-3NO	1"	90	under seat	230	15	115
	1-1/4"	90	under seat	230	15	115
	1-1/2"	90	under seat	230	15	115
	2"	90	under seat	230	15	115

\* See Notes at the top of this page

#### PF6\_G-BD (Bi-Directional normally closed)

Model	Valve size	Actuator diameter (mm)	Flow direction (port 1 to 2)	*Maximum differential pressure (port 1 to 2) (psig)	Flow direction (port 2 to 1)	*Maximum differential pressure (port 2 to 1) (psig)	Pilot pressure	
							Minimum (psig)	Maximum (psig)
PF6_G-1BD	1/2"	45	over seat	230	under seat	230	60	150
	3/4"	45	over seat	230	under seat	100	60	150
PF6_G-2BD	1/2"	63	over seat	230	under seat	230	55	150
	3/4"	63	over seat	230	under seat	230	55	150
	1"	63	over seat	230	under seat	160	55	150
	1-1/4"	63	over seat	230	under seat	87	55	150
	1-1/2"	63	over seat	175	under seat	60	55	150
	2"	63	over seat	115	under seat	36	55	150
PF6_G-3BD	1"	90	over seat	230	under seat	205	48	115
	1-1/4"	90	over seat	230	under seat	175	48	115
	1-1/2"	90	over seat	230	under seat	115	48	115
	2"	90	over seat	205	under seat	73	48	115

\* See Notes at the top of this page

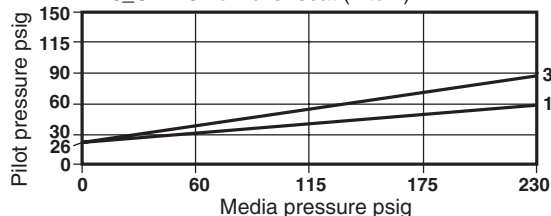
# PF6 Series

## Stainless Steel Piston Actuated On/Off Valves

Pilot / media pressure relationship

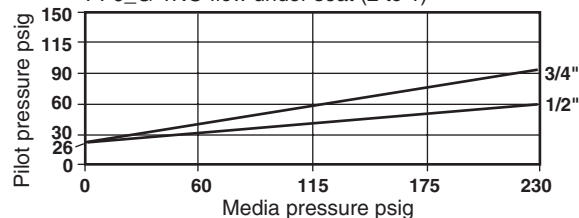
### PF6\_G-NC (Normally Closed)

PF6\_G-1NC flow over seat (1 to 2)

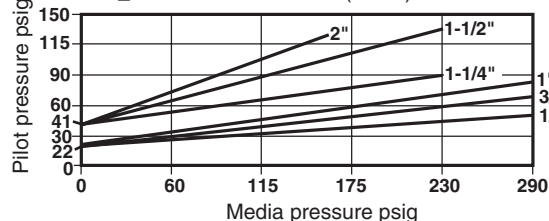


### PF6\_G-NO (Normally Open)

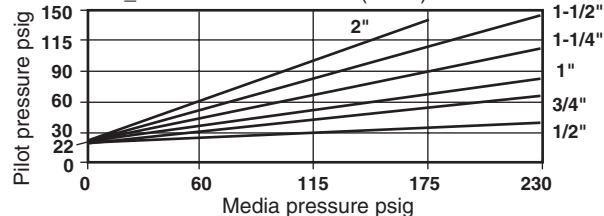
PF6\_G-1NO flow under seat (2 to 1)



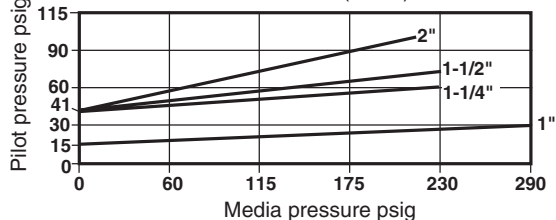
PF6\_G-2 NC flow over seat (1 to 2)



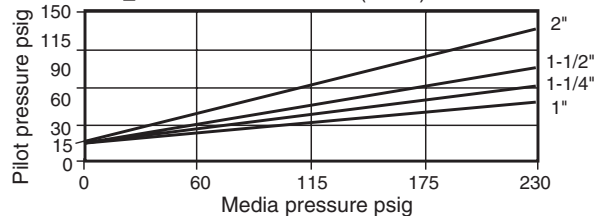
PF6\_G-2NO flow under seat (2 to 1)



PF6\_G-3 NC flow over seat (1 to 2)

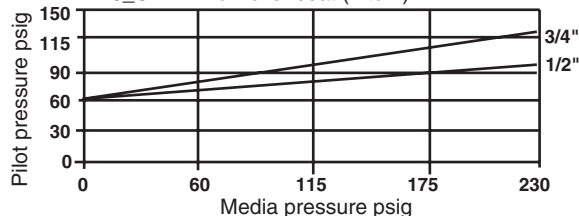


PF6\_G-3NO flow under seat (2 to 1)

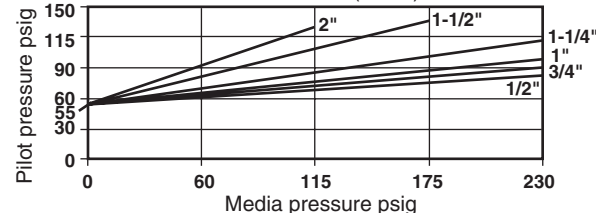


### PF6\_G-BD (Bi-Directional normally closed)

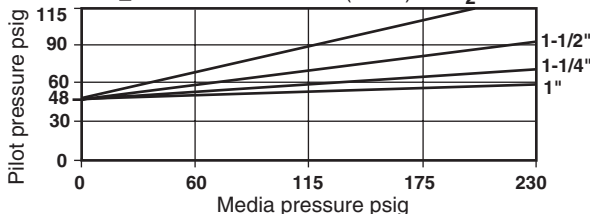
PF6\_G-1BD flow over seat (1 to 2)



PF6\_G-2BD flow over seat (1 to 2)



PF6\_G-3BD flow over seat (1 to 2)



# PF6 Series

## Stainless Steel Piston Actuated On/Off Valves

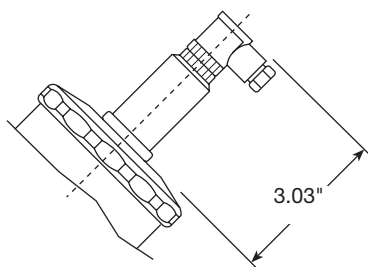
Dimensions and weights (approximate) in inches and lbs.

Valve size	Actuator type and size	Screwed, socket weld and butt weld					Sanitary clamp (to ISO 2852)				Flanged				
		A1	B1	C	D†	Weight	A2	B2	C	Weight	EN 1092 A3	ANSI 150 A4	B3	C	Weight
1/2 "	1 (45 mm)	2.56	5.67	4.85	.20	1.8	4.02	6.43	4.85	1.9	-	-	-	-	-
	2 (63 mm)	2.56	7.56	6.74	.20	2.7	4.02	8.28	6.70	2.9	5.12	5.51	8.59	7.65	5.5
3/4 "	1 (45 mm)	2.96	6.11	4.97	.28	2.0	4.49	6.58	4.93	2.5	-	-	-	-	-
	2 (63 mm)	2.96	7.80	6.93	.28	2.9	4.49	8.55	6.93	3.3	5.91	6.00	9.30	8.28	6.4
1 "	2 (63 mm)	3.55	8.35	7.29	.32	3.3	5.08	9.10	7.29	4.0	6.31	6.50	9.42	8.20	8.2
	3 (90 mm)	3.55	8.79	7.72	.32	4.9	5.08	9.58	7.73	5.3	6.31	6.50	9.85	8.63	9.5
1-1/4 "	2 (63 mm)	4.33	8.87	7.60	.39	4.2	5.52	9.46	7.57	5.3	7.09	7.26	9.93	8.51	12.2
	3 (90 mm)	4.33	9.22	7.96	.39	5.3	5.52	9.89	8.04	6.2	7.09	7.26	10.37	8.95	13.0
1-1/2 "	2 (63 mm)	4.73	9.06	7.80	.47	5.3	6.27	9.81	7.76	6.2	7.88	8.00	10.13	8.67	14.2
	3 (90 mm)	4.73	9.42	8.16	.47	5.8	6.27	10.25	8.24	7.1	7.88	8.00	10.56	9.14	15.2
2 "	2 (63 mm)	5.91	9.77	8.16	.63	6.4	7.49	10.52	8.12	8.0	9.06	9.00	10.84	9.06	19.0
	3 (90 mm)	5.91	10.13	8.51	.63	7.3	7.49	11.00	8.55	8.9	9.06	9.00	11.27	9.46	20.0

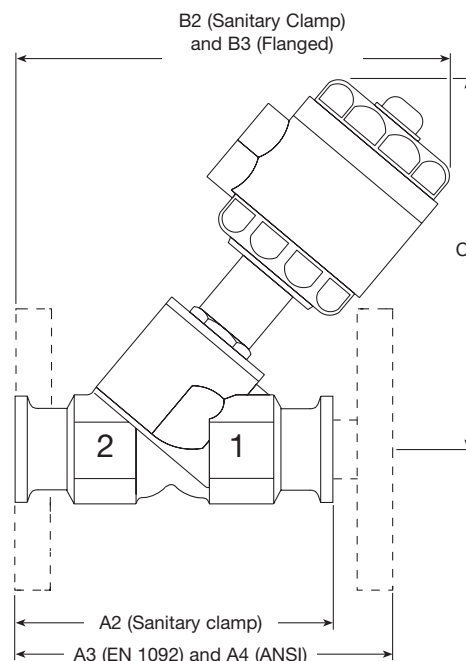
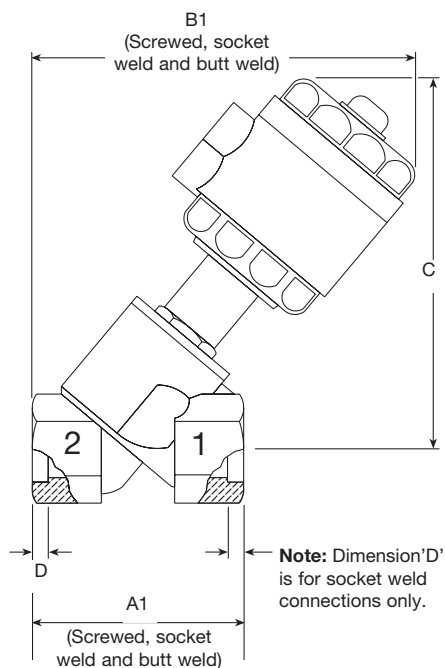
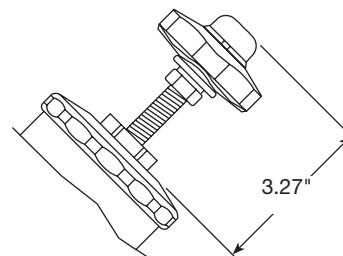
**Notes:** \* Add 0.5 lbs. for travel switch or flow regulator options (not available for use with the Type 1 actuator).

† Dimension 'D' is for socket weld connections only.

\* Travel switch



\* Flow regulator



# PF6 Series

## Stainless Steel Piston Actuated On/Off Valves

### Valve selection guide

<b>Valve type</b>	P = Piston valve	P
<b>Valve characteristic</b>	F = Fast opening	F
<b>Body material</b>	6 = Stainless steel	G
	1 = BSP or NPT	
<b>Connections</b>	3 = Flanged EN 1092 or ANSI Class 150 (welded on flanges)	1
	5 = Sanitary clamp ISO 2852	
<b>Valve plug seal</b>	G = PTFE	G
<b>Actuator type</b>	1 = 45 mm diameter	
	2 = 63 mm diameter	2
	3 = 90 mm diameter	
<b>Valve position</b>	NC = Normally Closed	
	NO = Normally Open	NC
	BD = Bi-Directional	
<b>Valve size</b>	1/2", 3/4", 1", 1-1/4", 1-1/2", 2"	1"
<b>Optional</b>	I = Travel switch Provides indication of open or closed valve position through a magnetic reed switch with volt free contacts. Maximum rating: Voltage (V) = 500 V, Current (I) = 0.5 A, Power (P) = 30 VA.	I
	R = Flow regulator Available on Type 2 and Type 3 actuators with suffix 'I' if this option is required. Provides manual control of maximum flow through the valve. Can also provide manual shut-off on normally open valves. Available on Type 2 and Type 3 actuators with suffix 'R' if this option is required.	

**Note:** Shaded areas represent fixed parameters

<b>Valve selection guide example</b>	PF6	1	G	2	NC	1" NPT	I	SS, 63mm, Normally Closed, NPT TravelSwitch
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### How to order

**Example:** 1 of Spirax Sarco PF61G-2NC-1" NPT- I stainless steel piston actuated on/off valve having NPT connections, with travel switch

### Spare parts

A seal kit is available for all valve and actuator sizes comprising: Piston lip seal, stem 'O' ring, valve head seal (PTFE), body seal and 'O' ring.

### How to order spare seal kits

Always order spares by specifying the valve size, type and date code (given on the actuator label i.e. 120 = week 12, year 2000).

**Example:** 1 of Seal kit for a 1" PF61G-2NC, date code 120.

### Safety information, installation and maintenance

For full details, see the Installation and Maintenance Instructions supplied with the product.

**Installation note:** These valves can be mounted in any orientation. The actuator can be rotated 360° in the direction indicated on the product label to facilitate easy pilot mounting connection.



# PF6 Series

## Stainless Steel Piston Actuated On/Off Valves

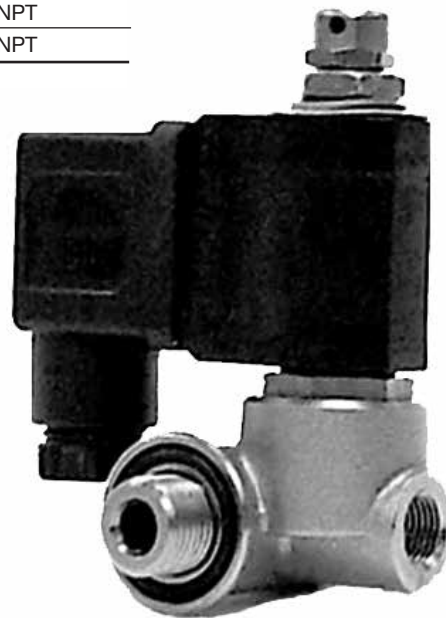
### Associated equipment

#### Pilot solenoid

Type DM 3-port two way electropneumatic pilot solenoid valve that can be directly mounted (banjo connection) to the PF61G-NC, NO and BD series piston actuated valves to provide actuator pilot pressure to open normally closed or close normally open valves. Suitable for air or water operating media. The valve is supplied with a DIN connector. For full details refer to the relevant Technical Information Sheet.

### Available types

Model	Type	Actuator	Frequency/ Voltage	Actuator Connection	Line Connection
DM11N	1	45 mm	230/50 or 240/60 Vac	1/8" BSP	1/8" NPT
DM12N	1	45 mm	110/50 or 120/60 Vac	1/8" BSP	1/8" NPT
DM13N	1	45 mm	24/50 or 24/60 Vac	1/8" BSP	1/8" NPT
DM14N	1	45 mm	24 Vdc	1/8" BSP	1/8" NPT
DM21N	2	63 mm	230/50 or 240/60 Vac	1/4" BSP	1/8" NPT
DM22N	2	63 mm	110/50 or 120/60 Vac	1/4" BSP	1/8" NPT
DM23N	2	63 mm	24/50 or 24/60 Vac	1/4" BSP	1/8" NPT
DM24N	2	63 mm	24 Vdc	1/4" BSP	1/8" NPT
DM31N	3	90 mm	230/50 or 240/60 Vac	1/4" BSP	1/8" NPT
DM32N	3	90 mm	110/50 or 120/60 Vac	1/4" BSP	1/8" NPT
DM33N	3	90 mm	24/50 or 24/60 Vac	1/4" BSP	1/8" NPT
DM34N	3	90 mm	24 Vdc	1/4" BSP	1/8" NPT





## PF51G Bronze Piston Actuated On/Off Valves

### Description

A 2-port pneumatically actuated on / off bronze valve for use on water, air, oil and gases. It can also be used on lower specification steam applications.

A pneumatic signal acts on the actuator piston to open or close the valve with a spring return action. The valve plugs have a PTFE soft seal (**G**) to provide a tight shut-off. A valve position indicator is included on standard and flow regulator models.

Valves are available with one of three sizes of actuator:

**Type 1** (45 mm), **Type 2** (63 mm) and **Type 3** (90 mm) with the following action options:

- **NC (Normally Closed)**

These valves are designed for flow over the seat (port 1 to 2).

Recommended for pneumatic applications. Not recommended for water applications.

- **NO (Normally Open)**

These valves are designed for flow under the seat (port 2 to 1).

Can be used to prevent waterhammer on valve closure in liquid applications.

- **BD (Bi-Directional normally closed)**

These valves are designed for special applications that require flow in both directions and incorporates an anti-waterhammer design for liquid applications flowing under the seat (port 2 to 1). **Note:** To help prevent the possibility of waterhammer on liquid applications flowing over the seat (port 1 to 2) the pressure should not exceed 15 psig.



### Optional extras (see 'Valve selection guide', page 7):

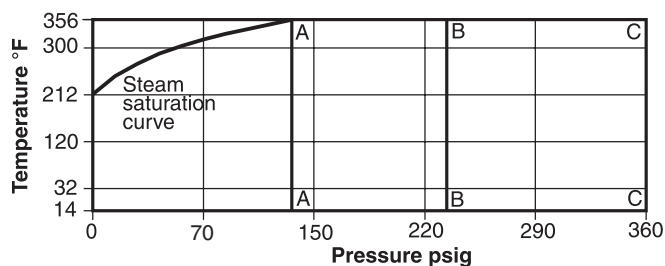
- Travel switch.
- Flow regulator.

### Sizes, pipe connections and actuator combinations

Valve type	Pipe connections	Valve action	Actuator type	Model	Sizes					
					1/2"	3/4"	1"	1-1/4"	1-1/2"	2"
PF51G	Screwed BSP or NPT	NC - Normally Closed (flow over seat)	1	PF51G - 1NC	•	•	•			
			2	PF51G - 2NC	•	•	•	•	•	•
			3	PF51G - 3NC			•	•	•	•
		NO - Normally Open flow under seat	1	PF51G - 1NO	•	•	•			
			2	PF51G - 2NO	•	•	•	•	•	•
			3	PF51G - 3NO			•	•	•	•
		BD - Bi-Directional normally closed (flow over or flow under seat)	1	PF51G - 1BD	•	•	•			
			2	PF51G - 2BD	•	•	•	•	•	•
			3	PF51G - 3BD			•	•	•	•

# PF51G Bronze Piston Actuated On/Off Valves

## Pressure / temperature limits



- A - A Maximum operating pressure on saturated steam 130 psig  
 B - B Maximum operating pressure on size 2" 230 psig  
 C - C Maximum operating pressure on sizes 1/4" to 1-1/2" 360 psig

Body Design Conditions		Screwed BSP or NPT	1/2" - 2"
PMA	Maximum allowable pressure		360 psig
TMA	Maximum allowable temperature		356°F
Minimum allowable temperature			14°F
PMO	Maximum operating pressure	130 psig @ 356°F	
TMO	Maximum operating temperature		356°F
Minimum operating temperature		(Note: For lower operating temperatures consult Spirax Sarco.) 14°F	
ΔΔPMX	Maximum differential pressure		(see page 4)
Designed for a maximum cold hydraulic test pressure of:			1.5 x PMA (PN rating)
<b>Note:</b> With internals fitted, test pressure must not exceed $\sqrt{\Delta PMX}$			

## Technical details

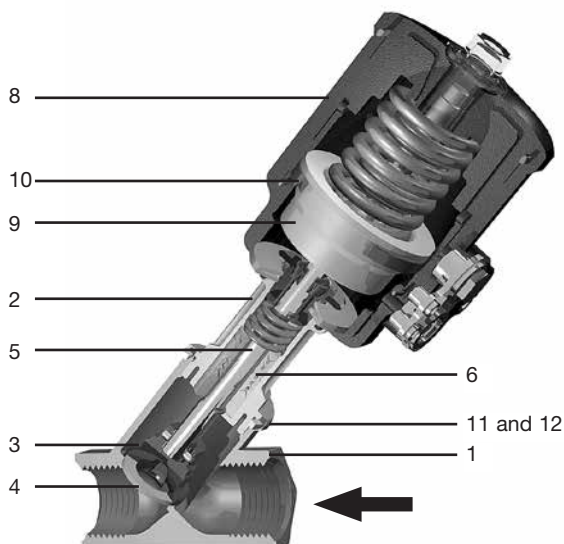
Leakage		PTFE soft seal	ANSI class V1
Flow characteristic		Fast opening	On/off
Flow direction	PF51G- NC	Flow over seat	Port 1 to 2
	PF51G- NO	Flow under seat	Port 2 to 1
	PF51G-BD	Flow over seat	Port 1 to 2
		Flow under seat	Port 2 to 1
Pilot media		Air or water	140°F maximum
Actuator rotation		360°	
		Pilot connection	Maximum pilot pressure
Actuator type and size	Type 1 = 45 mm diameter	1/8" BSP	150 psig
	Type 2 = 63 mm diameter	1/4" BSP	150 psig
	Type 3 = 90 mm diameter	1/4" BSP	115 psig

## C<sub>v</sub> values

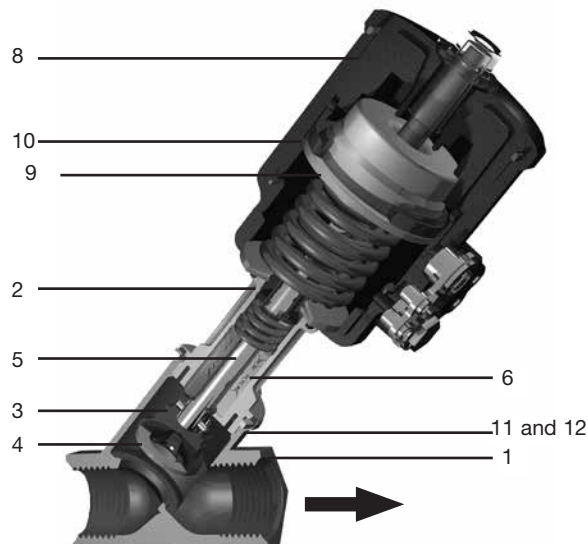
<b>Size</b>	1/2"	3/4"	1"	1-1/4"	1-1/2"	2"
<b>C<sub>v</sub>s</b>	4.7	8.8	20	29	46	58

# PF51G Bronze Piston Actuated On/Off Valves

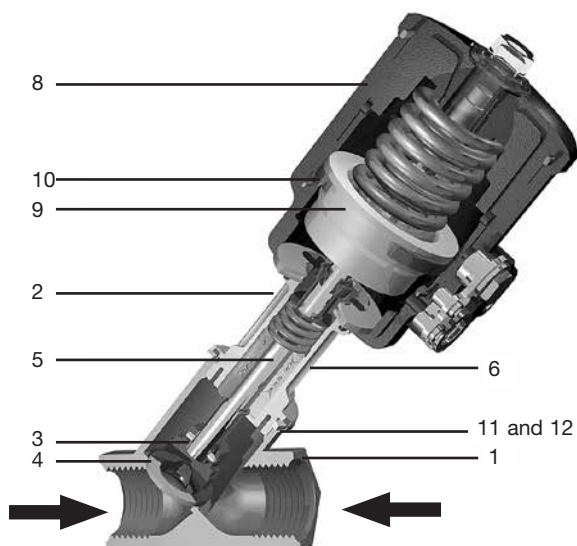
## NC (Normally Closed)



## NO (Normally Open)



## BD (Bi-Directional normally closed)



### Materials

No.	Part	Material
1	Body	Bronze EN1982 CC491K
2	Bonnet	Brass EN 12165 CW617N
3	Plug	Stainless steel AISI 316L
4	Plug seal	PTFE
5	Valve stem	Stainless steel AISI 316
6	Stem seals	PTFE chevrons
7	Stem 'O' ring	Viton
8	Actuator housing	Glass filled polyamide
9	Piston	Glass filled polyamide
10	Piston lip seal	Viton
11	Gasket	PTFE

# PF51G Bronze

## Piston Actuated On/Off Valves

**ΔPMX - Maximum differential pressures for PF51G piston actuated valves**

### PF51G-NC (Normally closed)

Model	Valve size	Actuator diameter (mm)	Flow direction (port 1 to 2)	Maximum differential pressure (psig)	Pilot Pressure	
					Minimum (psig)	Maximum (psig)
PF51G-1NC	1/2"	45	over seat	230	26	150
	3/4"	45	over seat	230	26	150
	1"	45	over seat	230	26	150
PF51G-2NC	1/2"	63	over seat	290	22	150
	3/4"	63	over seat	290	22	150
	1"	63	over seat	290	22	150
	1-1/4"	63	over seat	230	44	150
	1-1/2"	63	over seat	230	44	150
	2"	63	over seat	160	44	150
PF51G-3NC	1"	90	over seat	290	15	115
	1-1/4"	90	over seat	230	36	115
	1-1/2"	90	over seat	230	36	115
	2"	90	over seat	220	36	115

### PF51G-NO (Normally open)

Model	Valve size	Actuator diameter (mm)	Flow direction (port 2 to 1)	Maximum differential pressure (psig)	Pilot Pressure	
					Minimum (psig)	Maximum (psig)
PF51G-1NO	1/2"	45	under seat	230	26	150
	3/4"	45	under seat	230	26	150
	1"	45	under seat	230	26	150
PF51G-2NO	3/4"	45	under seat	230	22	150
	1"	63	under seat	230	22	150
	1-1/4"	63	under seat	230	22	150
	1-1/2"	63	under seat	230	22	150
	2"	63	under seat	175	22	150
PF51G-3NO	1"	90	under seat	230	15	115
	1-1/4"	90	under seat	230	15	115
	1-1/2"	90	under seat	230	15	115
	2"	90	under seat	230	15	115

### PF51G-BD (Bi-Directional normally closed)

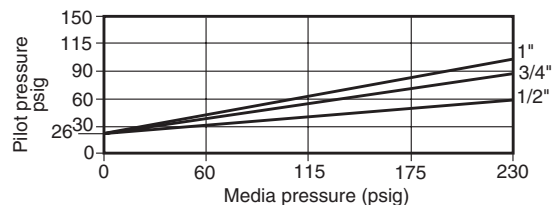
Model	Valve size	Actuator diameter (mm)	Flow direction (port 1 to 2)	Maximum differential pressure (port 1 to 2) (psig)	Flow direction (port 2 to 1)	Maximum differential pressure (port 2 to 1) (psig)	Pilot pressure	
							Minimum (psig)	Maximum (psig)
PF51G-1BD	1/2"	45	over seat	230	under seat	230	73	150
	3/4"	45	over seat	230	under seat	100	73	150
	1"	45	over seat	230	under seat	73	73	150
PF51G-2BD	3/4"	63	over seat	230	under seat	230	55	150
	1"	63	over seat	230	under seat	160	55	150
	1-1/4"	63	over seat	230	under seat	87	55	150
	1-1/2"	63	over seat	175	under seat	60	55	150
	2"	63	over seat	115	under seat	36	55	150
PF51G-3BD	1"	90	over seat	230	under seat	205	48	115
	1-1/4"	90	over seat	230	under seat	175	48	115
	1-1/2"	90	over seat	230	under seat	115	48	115
	2"	90	over seat	205	under seat	73	48	115

# PF51G Bronze Piston Actuated On/Off Valves

Pilot / media pressure relationship

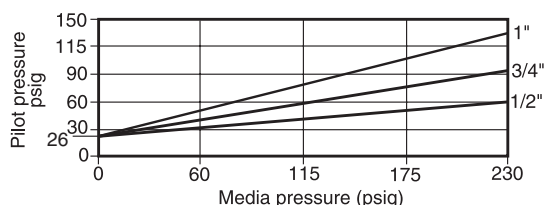
## PF51G-NC (Normally Closed)

### PF51G-1NC flow over seat (1 to 2)

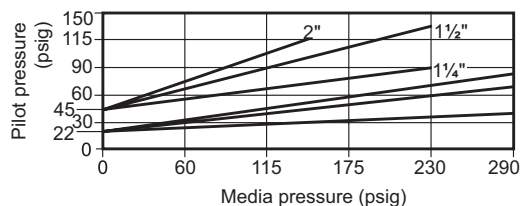


## PF51G-NO (Normally Open)

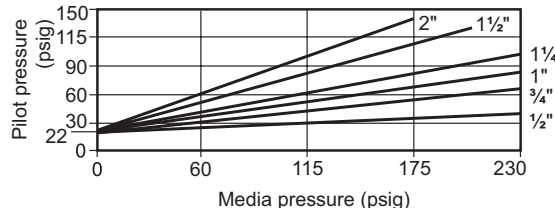
### PF51G-1NC flow under seat (2 to 1)



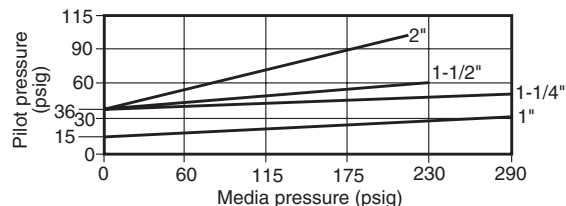
### PF51G-2NC flow over seat (1 to 2)



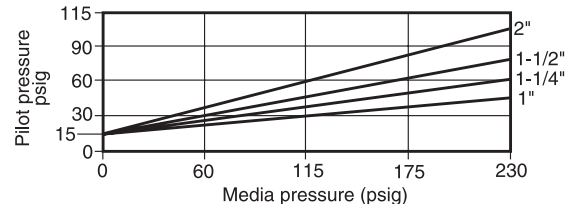
### PF51G-2NO flow under seat (2 to 1)



### PF51G-3NC flow over seat (1 to 2)

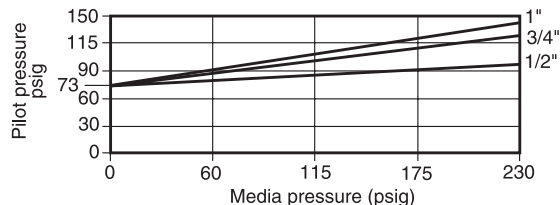


### PF51G-1NC flow under seat (2 to 1)

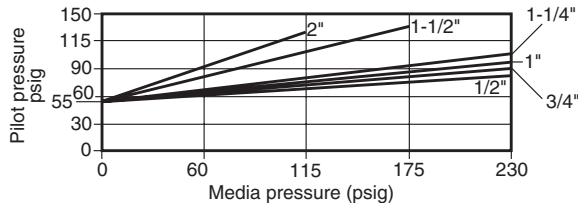


## PF51G-BD (Bi-Directional normally closed)

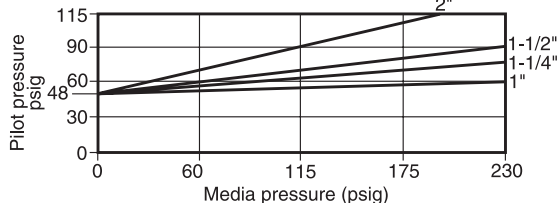
### PF51G-1BD flow over seat (1 to 2)



### PF51G-2BD flow over seat (1 to 2)



### PF51G-3BD flow over seat (1 to 2)



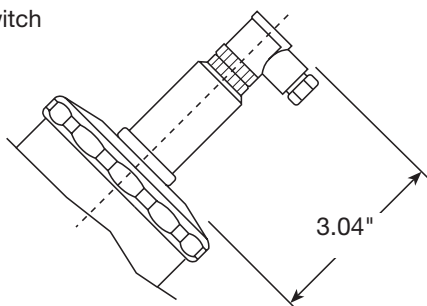
# PF51G Bronze Piston Actuated On/Off Valves

Dimensions and weights (approximate) in inches and lbs.

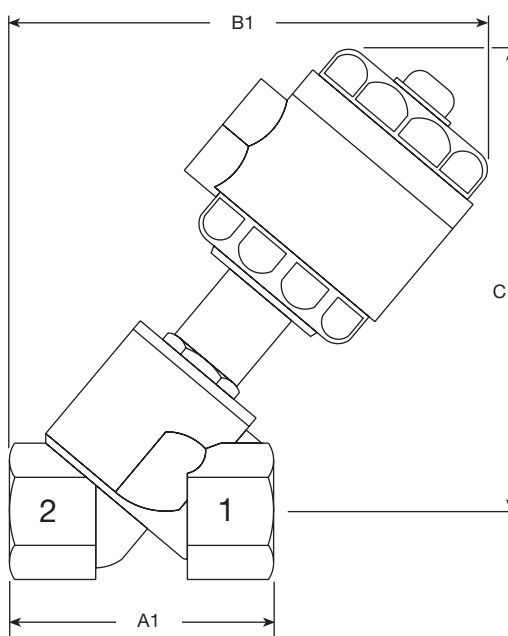
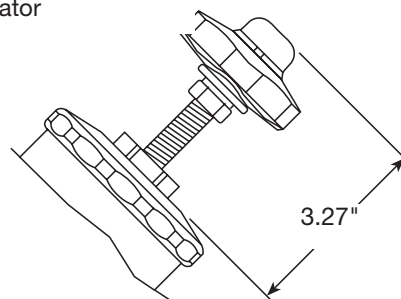
Valve size	Actuator type and size	A1	B1	C	D	Weight
1/2 "	1 (45 mm)	2.56	5.67	5.36	4.85	1.8
	2 (63 mm)	2.56	7.56	7.25	6.74	2.7
3/4"	1 (45 mm)	2.96	5.87	5.60	4.97	2.0
	2 (63 mm)	2.96	7.80	7.57	6.94	2.9
1"	1 (45 mm)	3.55	5.87	6.35	5.56	2.5
	2 (63 mm)	3.55	8.35	8.08	7.29	3.3
	3 (90 mm)	3.55	8.79	8.51	7.73	4.9
1-1/4"	2 (63 mm)	4.33	8.87	8.55	7.61	4.2
	3 (90 mm)	4.33	9.22	8.94	7.96	5.3
1-1/2"	2 (63 mm)	4.73	9.06	8.87	7.80	5.3
	3 (90 mm)	4.73	9.42	9.26	8.16	5.8
2"	2 (63 mm)	5.91	9.77	9.50	8.16	6.4
	3 (90 mm)	5.91	10.13	9.85	8.51	7.3

**Notes:** \* Add 0.4 lbs. for travel switch or flow regulator options (not available for use with the Type 1 actuator).

\* Travel switch



\* Flow regulator



# PF51G Bronze Piston Actuated On/Off Valves

## Valve selection guide

<b>Valve type</b>	P = Piston valve	P
<b>Valve characteristic</b>	F = Fast opening	F
<b>Body material</b>	5 = Bronze	5
<b>Connections</b>	1 = Screwed BSP or NPT	1
<b>Valve plug seal</b>	G = PTFE	G
<b>Actuator type</b>	1 = 45 mm diameter (for valve sizes 1/2" to 1")	2
	2 = 63 mm diameter (for valve sizes 1/2" to 2")	
	3 = 90 mm diameter (for valve sizes 1" to 2")	
<b>Valve position</b>	NC = Normally Closed	NC
	NO = Normally Open	
	BD = Bi-Directional	
<b>Valve size</b>	1/2", 3/4", 1", 1-1/4", 1-1/2", 2"	1
Provides indication of open or closed valve position through a magnetic reed switch with volt free contacts.		
<b>Optional</b>	I = Travel switch	Maximum rating: Voltage (V) = 500 V, Current (I) = 0.5 A, Power (P) = 30 VA.
	Available on Type 2 and Type 3 actuators with suffix 'I' if this option is required.	
	Provides manual control of maximum flow through the valve.	
	R = Flow regulator	Can also provide manual shut-off on normally open valves. Available on Type 2 and Type 3 actuators with suffix 'R' if this option is required.

**Note:** Shaded areas represent fixed parameters

### Valve selection guide example

PF6 1 G 2 NC 1" NPT

## How to order

**Example:** 1 of Spirax Sarco PF51G-2NC-1" NPT bronze piston actuated on/off valve having screwed BSP connections.

## Spare parts

A seal kit is available for all valve and actuator sizes comprising: Piston lip seal, stem 'O' ring, valve head seal (PTFE) body seal.

### How to order spare seal kits

Always order spares by specifying the valve size, type and date code (given on the actuator label i.e. 120 = week 12, year 2000).

**Example:** 1 of Seal kit for a PF51G-2NC-1" NPT, date code 120.

## Safety information, installation and maintenance

For full details, see the Installation and Maintenance Instructions supplied with the product.

**Installation note:** These valves can be mounted in any orientation. The actuator can be rotated 360° in the direction indicated on the product label to facilitate easy pilot mounting connection.



# PF51G Bronze Piston Actuated On/Off Valves

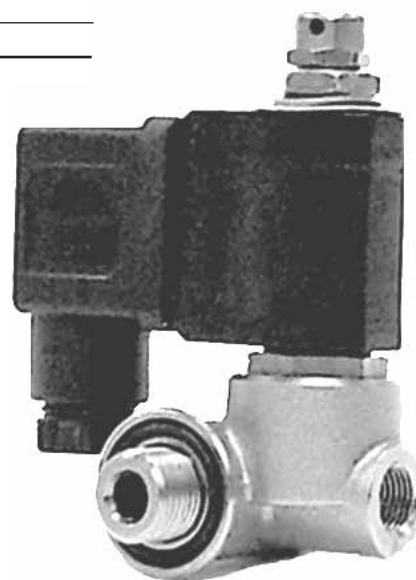
## Associated equipment

### Pilot solenoid

Type DM 3-port two way electropneumatic pilot solenoid valve that can be directly mounted (banjo connection) to the PF51G-NC, NO and BD series piston actuated valves to provide actuator pilot pressure to open normally closed or close normally open valves. Suitable for air or water operating media. The valve is supplied with a DIN connector. For full details refer to the relevant Technical Information Sheet.

### Available types

Model	Type	Actuator	Frequency/ Voltage	Actuator Connection	Line Connection
DM11N	1	45 mm	230/50 or 240/60 Vac	1/8" BSP	1/8" NPT
DM12N	1	45 mm	110/50 or 120/60 Vac	1/8" BSP	1/8" NPT
DM13N	1	45 mm	24/50 or 24/60 Vac	1/8" BSP	1/8" NPT
DM14N	1	45 mm	24 Vdc	1/8" BSP	1/8" NPT
DM21N	2	63 mm	230/50 or 240/60 Vac	1/4" BSP	1/8" NPT
DM22N	2	63 mm	110/50 or 120/60 Vac	1/4" BSP	1/8" NPT
DM23N	2	63 mm	24/50 or 24/60 Vac	1/4" BSP	1/8" NPT
DM24N	2	63 mm	24 Vdc	1/4" BSP	1/8" NPT
DM31N	3	90 mm	230/50 or 240/60 Vac	1/4" BSP	1/8" NPT
DM32N	3	90 mm	110/50 or 120/60 Vac	1/4" BSP	1/8" NPT
DM33N	3	90 mm	24/50 or 24/60 Vac	1/4" BSP	1/8" NPT
DM34N	3	90 mm	24 Vdc	1/4" BSP	1/8" NPT





## DM Pilot Solenoid Valves for use with Piston Actuated Valves

### Description

A 3 way normally closed electropneumatic pilot solenoid valve that can be directly mounted (banjo connection) to the PF51G, and PF61G-NC, NO and BD series piston actuated valves.

Suitable for air, water or inert gas operating media. The valve is supplied with a DIN connector and fitted with manual override as standard.

### Available types

Model	Actuator	Voltage/Frequency	Actuator Connection
DM11N	45mm	240/60 VAC	1/8" BSP
DM12N	45mm	120/60 VAC	1/8" BSP
DM13N	45mm	24/60 VAC	1/8" BSP
DM14N	45mm	24 VDC	1/8" BSP
DM21N	63mm	240/60 VAC	1/4" BSP
DM22N	63mm	120/60 VAC	1/4" BSP
DM23N	63mm	24/60 VAC	1/4" BSP
DM24N	63mm	24 VDC	1/4" BSP
DM31N	90mm	240/60 VAC	1/4" BSP
DM32N	90mm	120/60 VAC	1/4" BSP
DM33N	90mm	24/60 VAC	1/4" BSP
DM34N	90mm	24 VDC	1/4" BSP

### Technical details

Mounting	Banjo connection	
Manual override	Fitted as standard	
Connector DIN 43650	Form B	DM11N, DM12N, DM13N, and DM14N
	Form B	DM21N, DM22N, DM23N, and DM24N
	Form A	DM31N, DM32N, DM33N, and DM34N
	DM11N to DM14N	1/8" NPT
Pilot media connection	DM21N to DM24N	1/8" NPT
	DM31N to DM34N	1/8" NPT
Coil consumption	DM11N, DM12N	AC 9VA (holding)
	DM13N, DM14N	AC 14VA (inrush)
		DC 6W
	DM21N, DM22N	AC 9VA (holding)
	DM23N, DM24N	AC 14VA (inrush)
		DC 6W
	DM31N, DM32N	AC 15VA (holding)
	DM33N, DM34N	AC 30VA (inrush)
		DC 10W

### Limiting conditions

Maximum media temperature	140°F
Minimum media temperature	14°F
Protection class	IP65 (with connector)
Operating pressure	0 - 150 psig

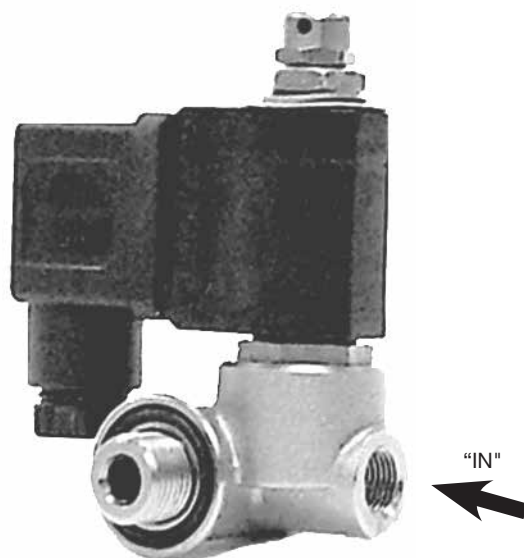
### Materials

Part	Material
Body	ELNP Niploy coated brass
Seal	FKM

### Spare parts

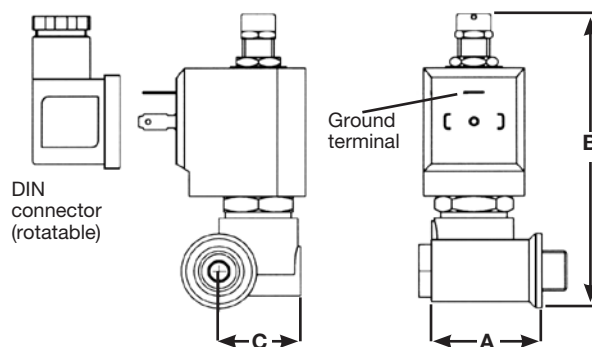
Coil and/or DIN connector available, consult Spirax Sarco, Inc.

Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only. In the interests of development and improvement of the product, we reserve the right to change the specification.



### Dimensions / weights (approximate) in inches and lbs.

Type	A	B	C	Weight
DM11N, DM12N, DM13N and DM14N	1.22	3.03	1.06	0.60
DM21N, DM22N, DM23N and DM24N	1.38	3.07	1.06	0.60
DM31N, DM32N, DM33N and DM34N	1.38	3.74	1.06	0.84



Note: DM31N Series shown

### Installation

The valve can be directly mounted (banjo connection) onto the actuator.

### How to order

Example: 1-DM21N Pilot Solenoid Valve 240 VAC



## MDM Manifold Pilot Solenoid Valves for use with Piston Actuated Valves

### Description

A series of 3 way normally closed, solenoid operated, manifold pilot valves that are joined together and supply pressure to operate a corresponding number of Piston Actuated Valves. This manifold assembly may be mounted in any position. They are suitable for air or water media.

Standard for each manifold valve is a manual override button, FKM seals, a strain relief electrical connector with IP65 protection.

### Technical details

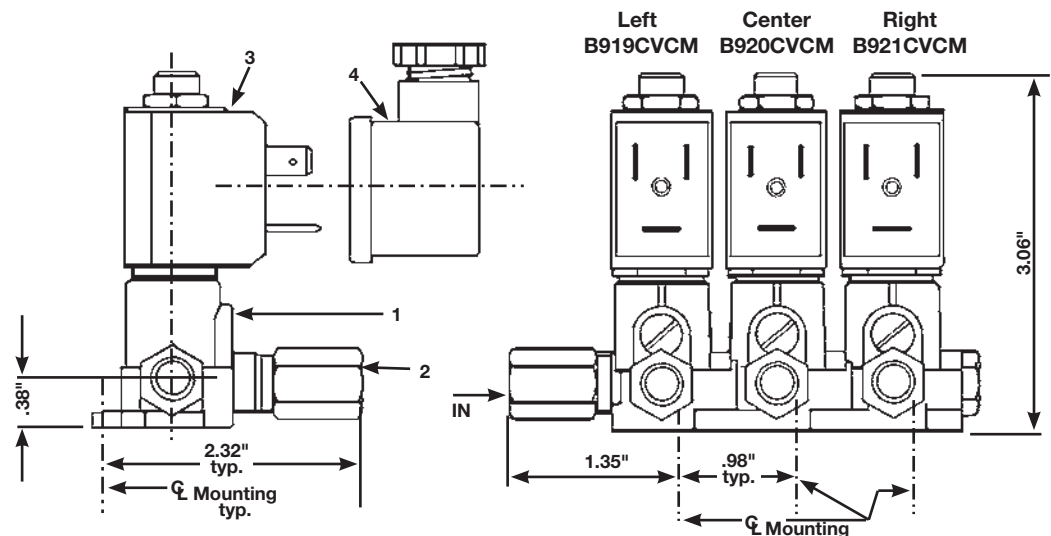
Construction material:	Body — Brass Seals — Viton
Mounting:	Universal, any position Accepts #6 machine screws
Manual Override:	Slotted 180° turn-button
Pilot Valve Connections:	1/8" NPT common "IN" 1/8" NPT individual "OUT"
Electrical Connection:	DIN 43650 Form B
Coil Consumption:	AC: 9 VA (holding) 14 VA (inrush) DC: 7 W

### Limiting conditions

Maximum media temperature:	140°F
Minimum media temperature:	14°F
Protection class:	IP65 (with DIN connector)
Operating pressure:	0 - 150 psig

### Dimensions / weights (approximate) in inches and lbs.

Station	C inches	Weight pounds
2	3.00	1.3
3	4.00	1.9
4	5.00	2.5
5	6.00	3.1
6	7.00	3.7
7	8.00	4.3
8	9.00	4.9



Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only.  
In the interests of development and improvement of the product, we reserve the right to change the specification.

TI-8-500-US 6.14

# MDM Manifold Pilot Solenoid Valves for use with Piston Actuated Valves

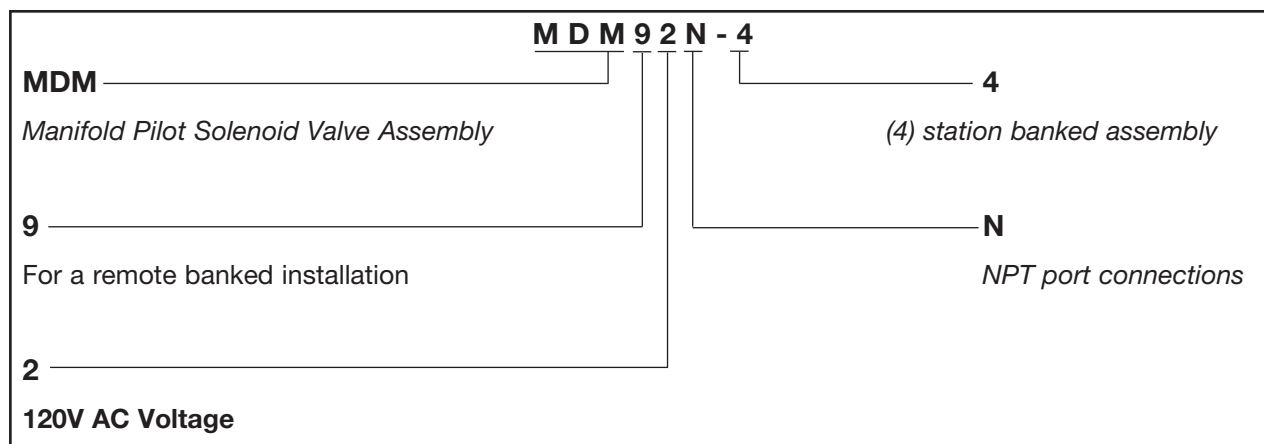
## Installation

The manifold pilot solenoid valve assembly can be directly mounted to a system plate in any position. Incoming pilot pressure to connect with the *common* "IN" port (end). Outgoing pilot pressure to connect from the *individual* "OUT" ports (sides).

Each "Out" port line to connect to a corresponding Piston Actuated Valve actuator. Note: When attaching to the PAV's with 63mm or 90mm actuator heads, it will be necessary to bush up from 1/8" NPT to 1/4" NPT.

## Order Information

Example: **MDM92N-4**  
A (4) station manifold Pilot Solenoid Valve assembly, 120V AC,  
1/8" NPT for a 45mm or 63mm Piston Actuate Valve.



## Available Types

Model Number	Pav Actuator	Voltage/Frequency	Port Connections
MDM91N-X*	45, 63mm**	240V AC	1/8" NPT
MDM92N-X*	45, 63mm**	120V AC	1/8" NPT
MDM93N-X*	45, 63mm**	24V AC	1/8" NPT
MDM93N-X*	45, 63mm**	24V DC	1/8" NPT

\* X denotes number of manifold stations. Number may be from (2) to (8) depending on amount of PAV's requiring service. For information on additional stations, consult Spirax Sarco, Inc.

\*\*90mm Actuators, consult Spirax Sarco, Inc.

Materials		
No.	Description	Part No.
1	Valve - Left Valve - Center Valve - Right	B919CVCM B920CVCM B921CVCM
2	Adaptor	72415
3	Coil	270R - 240VAC 240R - 120VAC 220R - 24VAC 225R - 24VDC
4	Connector DIN 43650	001

## VAD

### Variable Area Desuperheaters

## Desuperheater overview

Steam used in process plants can be superheated, that is, heated to a temperature above saturation. The excess of temperature above its saturation is called 'superheat'.

Desuperheated steam is more efficient in the transfer of thermal energy, consequently desuperheaters are used to bring the outlet steam temperature closer to that of saturation for the steam pressure.

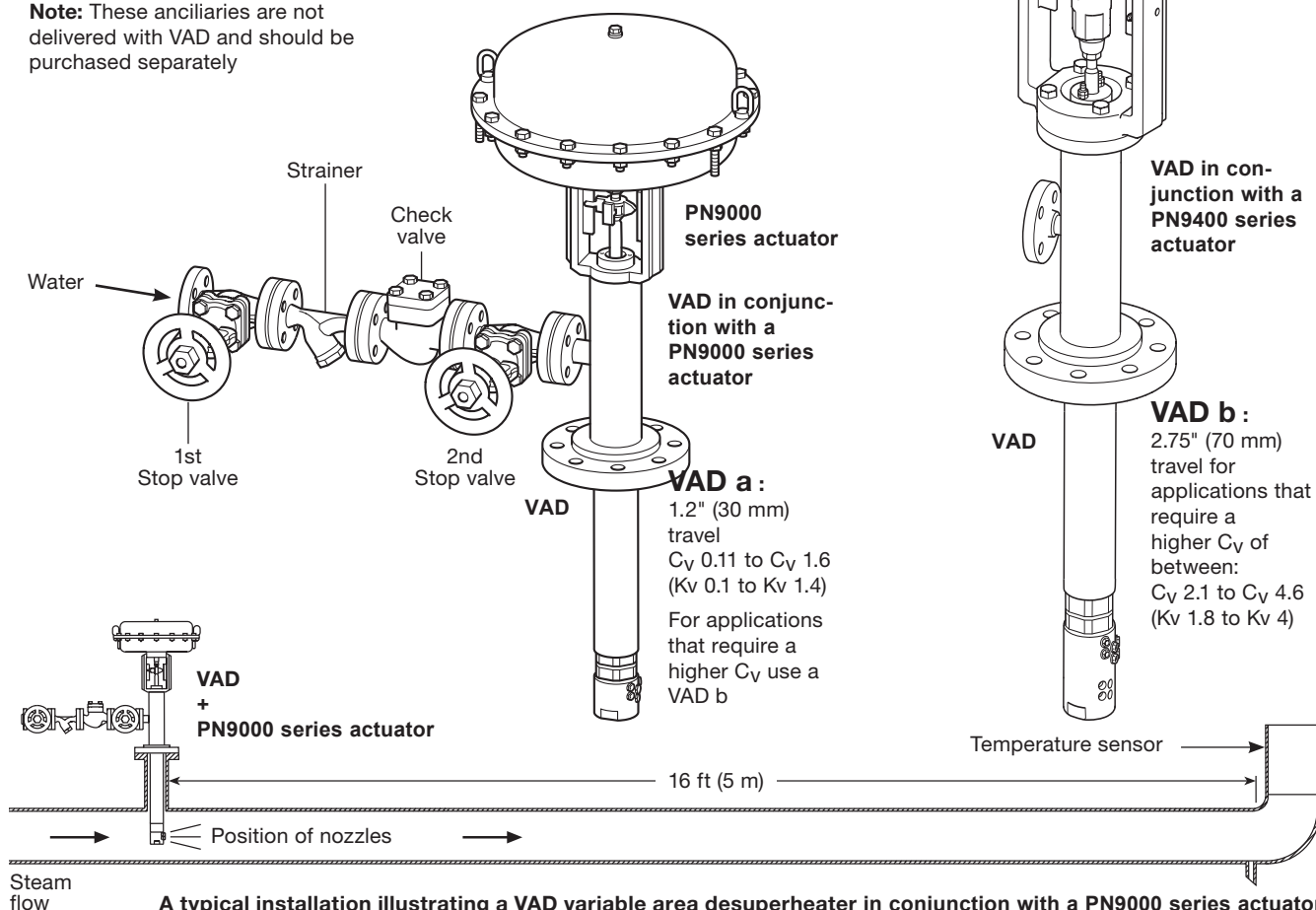
Desuperheaters reduce the temperature of superheated process steam by introducing finely atomized cooling water droplets into the steam flow. As the droplets evaporate, sensible heat from the superheated steam is converted into latent heat of vaporization.

**As standard** the VAD is supplied with an actuator. The following **optional extras** can be supplied if requested when placing an order: **Positioner, Regulator and Limit switch.**

**A typical desuperheater installation is shown below:**

<b>1st stop valve</b>	Required to isolate the system from inlet water.
<b>Strainer</b>	Required with 100 mesh screen to maintain the water supply in a condition that wont block the desuperheater nozzles.
<b>Check valve</b>	Required to prevent steam from flowing back into the water inlet - The preferred selection would be an LCV lift check valve as it will give optimum performance in this application.
<b>2nd stop valve</b>	Required to isolate the system for maintenance.

**Note:** These ancillaries are not delivered with VAD and should be purchased separately



**A typical installation illustrating a VAD variable area desuperheater in conjunction with a PN9000 series actuator**

Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only. In the interests of development and improvement of the product, we reserve the right to change the specification.

# VAD

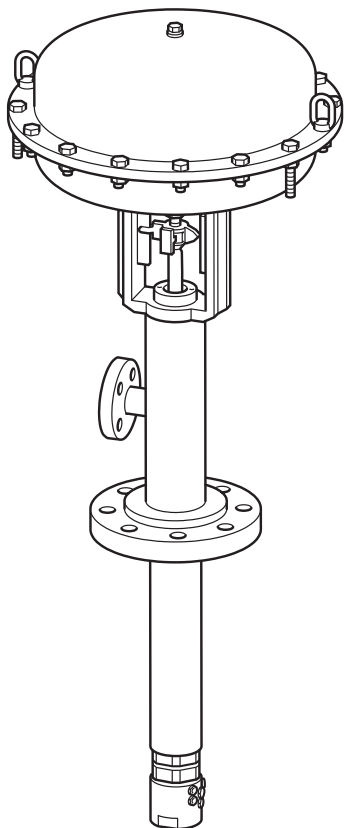
## Variable Area Desuperheaters

### General description

Spirax Sarco VAD variable area desuperheaters reduce the temperature of superheated steam by spraying atomized water through a variable area nozzle, producing near-saturated steam for a wide steam turndown ratio (max 50:1). There are two VAD options available depending on the  $C_V$  value and control rangeability required for the application.

#### VAD a

in conjunction with a PN9000 series actuator  
1.2" (30 mm) travel  $C_V$  0.11 to  $C_V$  1.6 (Kv 0.1 to Kv 1.4)



#### Description

The **VAD a** variable area desuperheater has been designed to perform between a  $C_V$  of 0.11 to  $C_V$  1.6 (Kv 0.1 to Kv 1.4)

The main advantages of the Spirax Sarco VAD is its full modularity, as the components can be adjusted to meet each individual application needs; on site if needed. The nozzle can also be replaced to accommodate a change in flow requirement. The cooling water is atomized through a number of nozzles which are successively opened by the linear movement of a plug controlled by the actuator.

As standard, it is designed and coupled with the PN9000 Series actuator 1.2" (30 mm) travel.

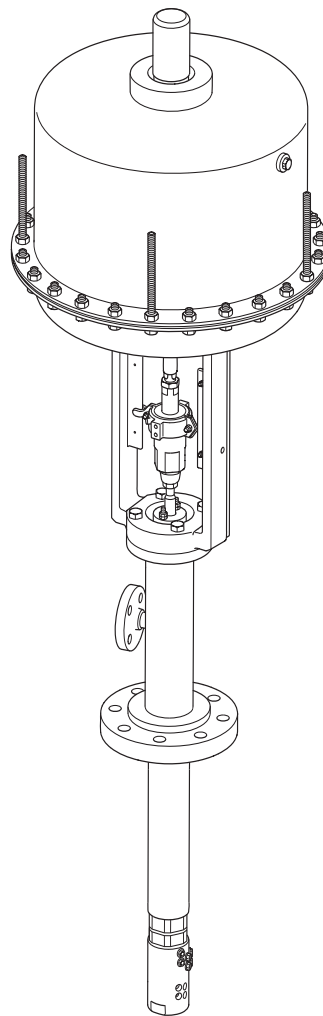
The steam branch line connection is 3" (DN80) as standard, but could be customized at the required dimension.

The water connection is 1/2" (DN15) as standard, but could be customized.

The standard dimensional lengths of the top and bottom pipe extensions of the desuperheater, as well as the position of the water connection, are shown on the corresponding pages, but please note that these can be customized to meet any specific application to meet your needs.

#### VAD b

in conjunction with a PN9400 series actuator  
2.75" (70 mm) travel  $C_V$  2.1 to  $C_V$  4.6 (Kv 1.8 to Kv 4)



#### Description

As standard, the **VAD b** is designed to and coupled with the PN9400 Series actuator. The water atomization is done through up to 18 nozzles which are successively opened with the linear move of the plug.

The steam branch line connection is 3" (DN80) as standard, but could be customized at the required dimension.

The water connection is 1/2" (DN15) as standard, but could be customized or increased for a higher  $C_V$  than 4.6

The standard dimensional lengths of the top and bottom pipe extensions of the desuperheater, as well as the position of the water connection are shown on the corresponding pages, but please note that these can be customized to meet any specific application to meet your needs.



# VAD

## Variable Area Desuperheaters

### Typical applications:

- To reduce the temperature of steam discharged from turbine by-pass systems on power plants for heat exchangers, and dump stations.
- To improve heat transfer of indirect contact heat exchangers - shell and tube, plate type, and reactor heating jackets.
- To reduce the temperature of steam on direct contact applications - food cooking kettles, in-line steam heaters, tobacco drying plant and paper mills.

### Features:

- Low cost simple, robust design.
- Minimal steam pressure drop.
- Flexible design options.

### Standards and approvals

Spirax Sarco desuperheaters are available built to ASME B 16.34 design code. Also available are ASME VIII Division 1.

This product fully complies with the requirements of the European Pressure Equipment Directive 97 / 23 / EC and carries the CE mark when so required.

Welding is in accordance with ASME IX.

Connections (EN 1092 or ASME B16.5) are sized to suit the process conditions.

Standard ASTM materials of construction include: Carbon steel, Stainless steel, and Chrome molybdenum steel.

### Certification

The following certificates / documents can be supplied at an additional cost:

- Material certificates to EN 10204 3.1 with a corresponding material location diagram.
- NDT reports.

### Air signal

The VAD lift should be controlled by use of a positioner, the maximum **air pressure on the actuator should be limited to 60 psig (4 barg)**. **The fail safe position of the standard VAD unit is in the shut off position, spring-retract and will shut off water when retracted.** **Optionally**, if request at the point of order, the unit can be supplied in the fail safe open position and the unit nomenclature will be denoted by an 'E' (for spring-extend) in the description i.e. VAD a E.

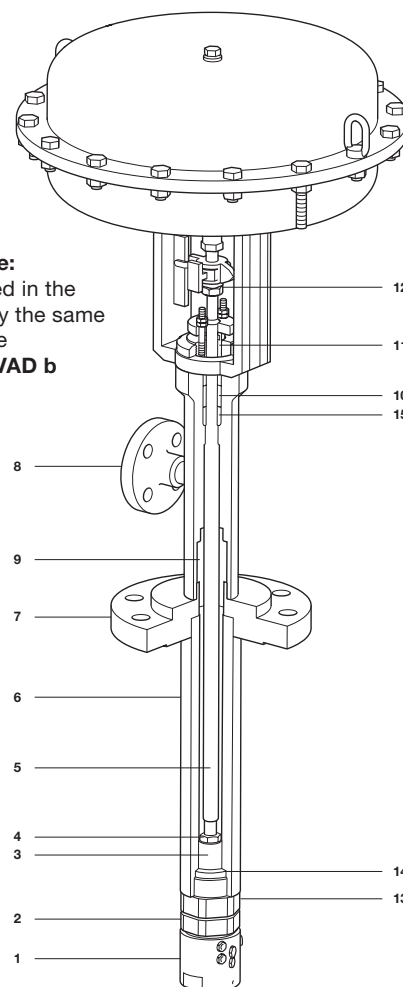
### Positioners

Compatible with PP5, EP5, ISP5, SP400 and SP500 positioners.

### Material

No.	Part	Material	
1	Nozzle	Stainless steel	AISI 431
2	Seat	Stainless steel	AISI 431
3	Plug	Stainless steel	
4	Lock-nut	Stainless steel	
5	Stem	Stainless steel	AISI 431
6	Bottom pipe extension	Carbon steel	
7	Main steam flange	Carbon steel	ASTM A105N
8	Water flange	Carbon steel	ASTM A105N
9	Top pipe extension	Carbon steel	ASTM A105N
10	Packing	Graphite	
11	Packing bolting	Stainless steel	
12	Nut	Stainless steel	
13	Setting nut	Stainless steel	
14	Seat gasket	Graphite	
15	Stem bearing	Stellite Grade 6	

**Alternative material:** Depending on the condition of use, Spirax Sarco can change the carbon steel body material to alloy steel or stainless steel.



**Please note:**  
The parts identified in the illustration are exactly the same for both the **VAD a** and the **VAD b**



# VAD

## Variable Area Desuperheaters

### Pressure / temperature limits:

The Spirax Sarco VAD variable area desuperheater has a carbon steel body as standard but can be produced in any material grade to special order.

'4' denotes a carbon steel desuperheater

'6' denotes an austenitic stainless steel desuperheater

'8' denotes an alloy steel desuperheater

**Please note** that the pressure and temperature limits for the VAD product range is governed by the flange connection of choice:

	Flanges	PMA psig @ °F (bar g @ °C)	TMA °F @ psig (°C @ bar g)
<b>VAD4</b>	ASME 150	284 @ 100°F (19.6 @ 38°C)	800°F @ 80 (425°C @ 5.5)
	ASME 300	746 @ 100°F (51.5 @ 38°C)	800°F @ 420 (425°C @ 28.8)
	ASME 600	1480 @ 100°F (102.1 @ 38°C)	800°F @ 835 (425°C @ 57.5)
	ASME 900	2220 @ 100°F (153.2 @ 38°C)	800°F @ 1250 (425°C @ 86.3)
	ASME 1500	3700 @ 100°F (255.3 @ 38°C)	800°F @ 2085 (425°C @ 143.8)
	ASME 2500	6170 @ 100°F (425.5 @ 38°C)	800°F @ 3475 (425°C @ 239.7)
<b>VAD6</b> (316)	ASME 150	275 @ 100°F (19.0 @ 38°C)	1000°F @ 20.5 (538°C @ 1.4)
	ASME 300	720 @ 100°F (49.6 @ 38°C)	1000°F @ 365 (538°C @ 25.2)
	ASME 600	1440 @ 100°F (99.3 @ 38°C)	1000°F @ 725 (538°C @ 50.0)
	ASME 900	2160 @ 100°F (148.9 @ 38°C)	1000°F @ 1090 (538°C @ 75.2)
	ASME 1500	3600 @ 100°F (248.2 @ 38°C)	1000°F @ 1820 (538°C @ 125.5)
	ASME 2500	4000 @ 100°F (413.7 @ 38°C)	1000°F @ 3030 (538°C @ 208.9)
<b>VAD8</b> (A182 F11 Cl.2)	ASME 150	285 @ 100°F (19.8 @ 38°C)	1000°F @ 20.5 (538°C @ 1.4)
	ASME 300	750 @ 100°F (51.7 @ 38°C)	1000°F @ 215 (538°C @ 14.9)
	ASME 600	1500 @ 122°F (103.4 @ 50°C)	1000°F @ 430 (538°C @ 29.8)
	ASME 900	2250 @ 122°F (155.1 @ 50°C)	1000°F @ 650 (538°C @ 44.7)
	ASME 1500	3750 @ 122°F (258.6 @ 50°C)	1000°F @ 1080 (538°C @ 74.5)
	ASME 2500	6250 @ 122°F (430.9 @ 50°C)	1000°F @ 1800 (538°C @ 124.1)

# VAD

## Variable Area Desuperheaters

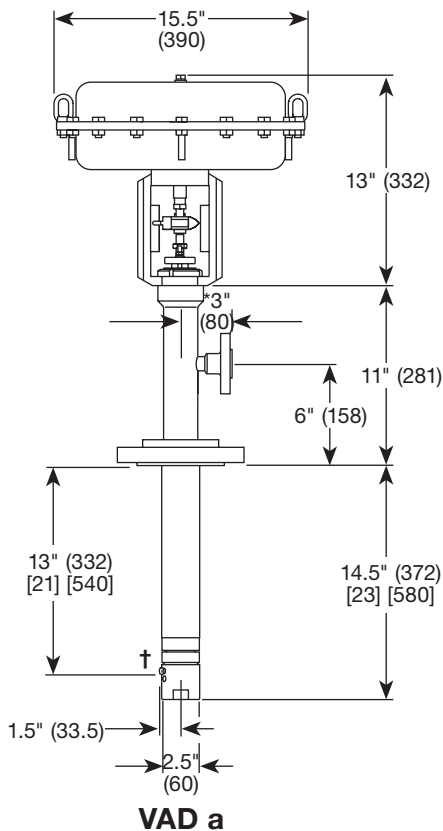
**Dimensions/weights** (approximate) in inches and pounds (mm and kg)

Dimensionally there are **two versions** available the '**Standard**' and the '**L**' version for use on larger pipelines of 12" (300 mm).

**Please note** that the dimensions in brackets [ ] are for the 'L' version.

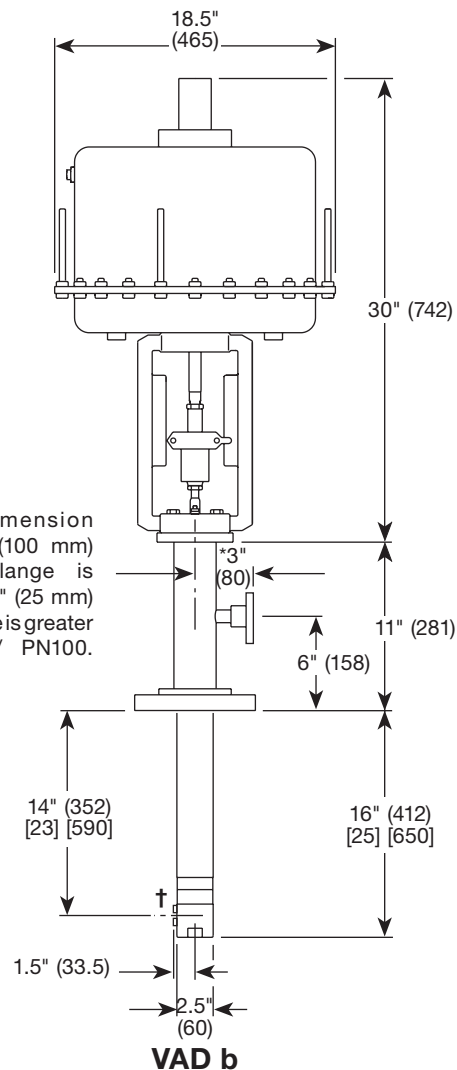
### Weights

<b>VAD a</b>	80 lbs (35 kg)
<b>VAD b</b>	155 lbs (70 kg)



### \*Please note:

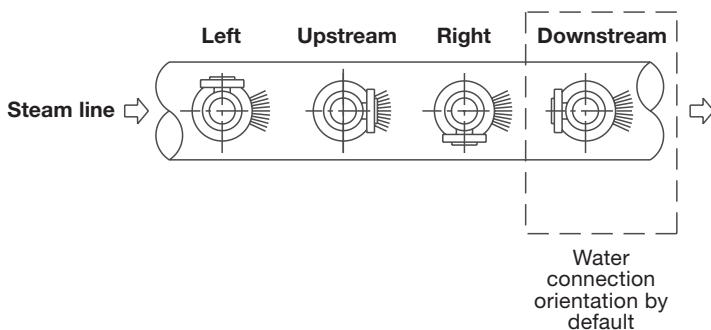
This dimension becomes 4" (100 mm) when the flange is greater than 1" (25 mm) or the pressure is greater than A600 / PN100.



### † Please note - Nozzles

When installing the VAD into its application **the nozzles must face towards the direction of the steam flow**. To suit the layout of the water pipeline, the inlet water flange is available in 4 different locations, please see the orientation diagram below:

### Orientation



# VAD

## Variable Area Desuperheaters

### Safety information, installation and maintainance

For full details see the Installation and Maintenance Instructions that are supplied with the product.

#### Installation note:

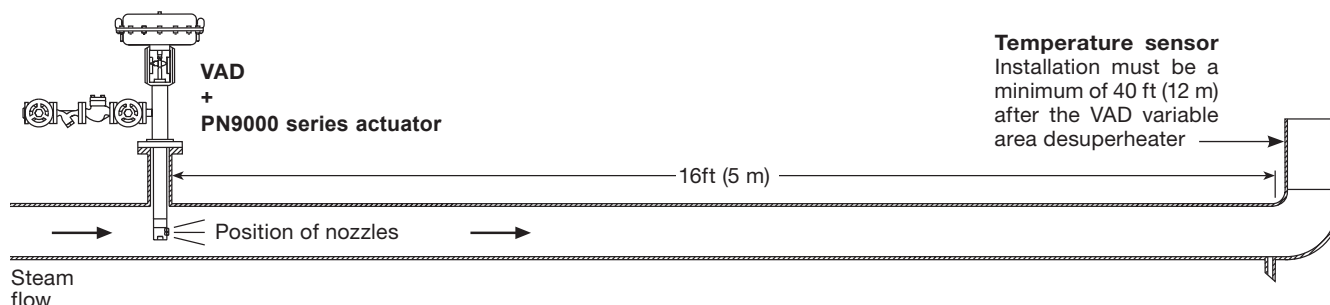
Desuperheaters may be installed either horizontally or vertically with the steam flowing upwards.

Spirax Sarco strongly advises against installations in which the steam flow is vertically downwards.

In the case of a horizontal installation the cooling water connection should ideally point downstream, as this gives the best orientation for drainage of fluids in a shutdown situation. Other orientations are acceptable for satisfactory operation, but drainage is not as effective.

In a vertical installation we recommend that, the cooling water pipework should be brought to the desuperheater from below the corresponding connections on the desuperheater. This will provide the best layout for drainage of fluids on shutdown.

The VAD must be sited in location on the pipeline that offers a stable flow - An unstable flow will affect the mixing efficiency of the VAD.



The **temperature sensor** should be located a minimum distance of 40 ft (12 m) after the VAD, however for optimum temperature control it is recommended that it be installed at the point of use.

A **minimum length of 16 ft (5 m)** should be present before a pipe elbow. A thermal sleeve is recommended to protect the elbow from corrosion and erosion.

The **steam pipeline** should be of at least 6" (DN150). At steam line sizes up to and including 20" NB, we recommend the thermal sleeve is manufactured from pipe which is one size smaller than the steam line. Above 20" NB steam line size, we recommend the thermal sleeve is two sizes smaller.

Pipe size should ensure a minimum 16 ft/sec (5m/s) velocity in each flowrate, in case of lower value please contact Spirax Sarco.

**Water** must be supplied with more than 45 psi (3 bar) differential pressure to the steam.

#### Disposal

The product is recyclable. No ecological hazard is anticipated with disposal of this product, providing due care is taken.

The location of the VAD in the pipeline must be such that it offers a stabilized flow. Unstabilized flow will affect the mixing efficiency.

The VAD must be sited in location on the pipeline that offers a stable flow - Unstabilized flow will affect the mixing efficiency.

# VAD

## Variable Area Desuperheaters

### How to order

Please send the following process data to Spirax Sarco so that we can select the optimum solution for your application.

#### Minimum information required to size the desuperheater:

- Maximum and minimum superheated steam condition (Pressure, temperature and flowrate).
- Required outlet steam temperature.
- Available water condition (Pressure and temperature).

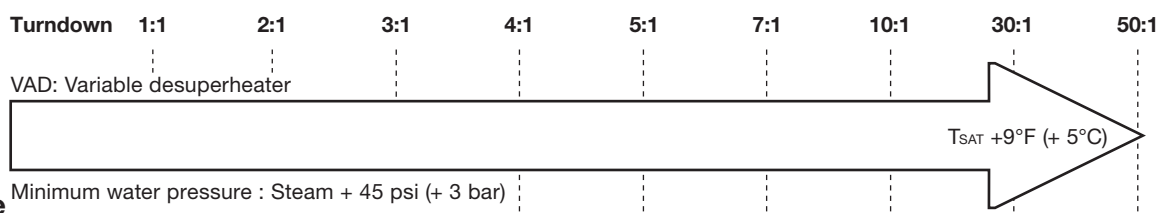
		Minimum	Nominal	Maximum
<b>Superheated steam</b>	Pressure			
	Temperature			
	Flow			
<b>Steam outlet</b>	Temperature			
<b>Water</b>	Pressure			
	Temperature			

<b>Additional information</b>	Please state if you require any of the following, the number(s) required and nomenclature if known:	<b>Positioner(s)</b>	<b>Air regulator(s)</b>	<b>Limit switch(s)</b>
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Further information, that if supplied, will help in selecting the optimal solution for your application:

<b>Design pressure</b>	
<b>Design temperature</b>	
<b>Superheated steam size</b>	
<b>Required flanged desuperheaters flange</b>	
<b>Required flanged water flange</b>	
<b>Fail safe position - Specify either Open or Closed</b>	

### Selection chart



### Cv (Kv) table

Desuperheater	VAD a	VAD b
<b>Travel</b>	1.2 (30 mm)	2.75 (70 mm)
<b>Rangeability</b>	1:20	1:40
<b>Maximum turndown</b>	50:1	50:1
<b>Cv (Kv) standard</b>	1.6 (1.40)	4.6 (4.0)
	1.15 (1.00)	4.3 (3.7)
	0.7 (0.60)	3.8 (3.3)
	0.6 (0.54)	3.3 (2.9)
	0.5 (0.45)	2.9 (2.5)
	0.45 (0.40)	2.4 (2.1)
	0.25 (0.20)	2.1 (1.8)
	0.11 (0.10)	

**Note:** For lower or higher Cv please contact Spirax Sarco





## Direct Contact Desuperheaters



### Description

Spirax Sarco direct contact desuperheaters reduce the temperature of superheated steam to produce steam temperatures approaching saturation temperature to cool the superheated steam, water is entrained and flashed into vapor by absorbing heat from the steam.

### Typical applications:

- To reduce the temperature of steam discharged from turbine by-pass systems on power plants for heat exchangers and dump stations.
- To improve heat transfer of indirect contact heat exchangers - shell and tube, plate type, and reactor heating jackets.
- To reduce the temperature of steam on direct contact applications - food cooking kettles, in-line steam heaters, tobacco drying plant and paper mills.


Send us your requirements using our Desuperheater Enquiry Form available from our website.

### Features:

- Low cost simple, robust design.
- No moving parts to wear.
- Minimal steam pressure drop.
- Flexible design options.

### Standards and approvals

Spirax Sarco desuperheaters are available built to ASME B 31.3 design code. Also available are ASME III Division 1.

This product fully complies with the requirements of the European Pressure Equipment Directive 97/23/EC and carries the  mark when so required.

Welding is in accordance with ASME IX.

Connections (EN 1092 or ASME B16.5) are sized to suit the process conditions.

Standard ASTM materials of construction include: Carbon steel, Stainless steel, and Chrome molybdenum steel.

### Certification (included as standard):

1. Desuperheater general arrangement drawing.
  2. Installation, operation and maintenance instructions.
  3. Hydrostatic test certificate.
  4. Letter of conformity.
- The following certificates/documents can be supplied at an additional cost.
5. Material certificates to EN 10204 3.1 with a corresponding material location diagram.
  6. NDT reports.

### Pressure/temperature limits

Spirax Sarco desuperheaters are custom products, individually designed to meet user defined process conditions.

Mechanical design pressure and mechanical design temperature limitations are stated on the desuperheater data sheet available from our online sizing software. These limits are also stated on the product nameplate.

Pressure/temperature ratings for these products will be in accordance with ASME B16.5-1996 or EN 1092-1:2007 as appropriate.

# Direct Contact Desuperheaters

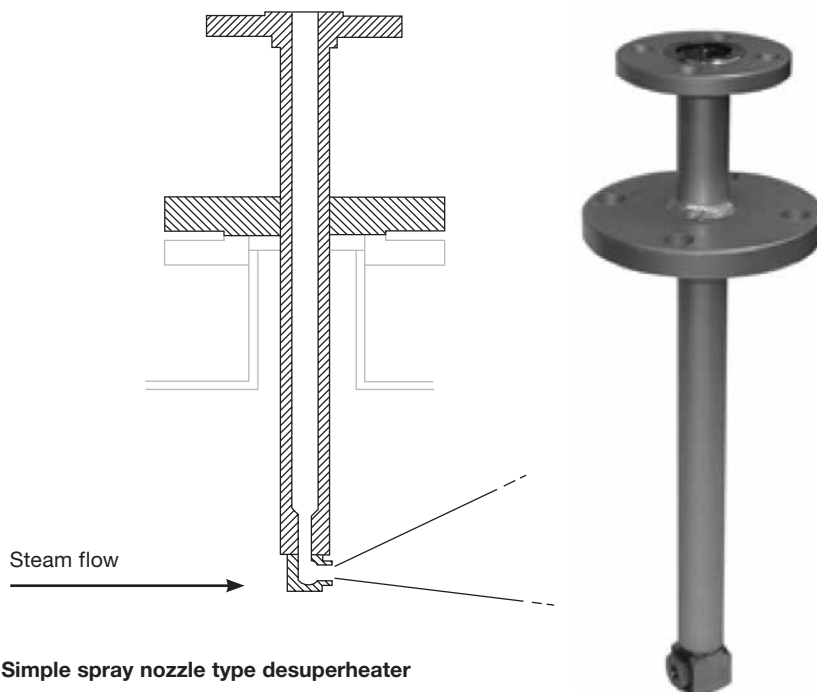
## Available types

### Spray type desuperheaters

A simple type of in-line desuperheater with cooling water injected into the centre of the unit via an atomizing nozzle sprayed in the direction of the steam flow. **Spirax Sarco spray type desuperheaters are available in two options:-**

#### 1. Spray nozzle desuperheater (SND)

The assembly is designed for mounting on a suitable flanged branch on the steam pipework. A thermal sleeve installed downstream of the unit is recommended.



Simple spray nozzle type desuperheater

#### Applications:

- Relatively constant load handling duties.
- Retrofitting a desuperheater to an existing steam line.
- Large steam lines where an STD could be cost prohibitive.

#### Mechanical design temperature and flange rating

<700°F (<374°C)	ASME 150, ASME 300, ASME 600, ASME 900, ASME 1500 + PN16, PN25, PN40, PN63 and PN100 Slip-on
700 - 800°F (374 - 425°C)	ASME 150, ASME 300, ASME 600, ASME 900, ASME 1500 + PN16, PN25, PN40, PN63 and PN100 Weld neck
795 - 1094°F (375 - 590°C)	ASME 150, ASME 300, ASME 600, ASME 900, ASME 1500 Weld neck (Slip-on N/A)

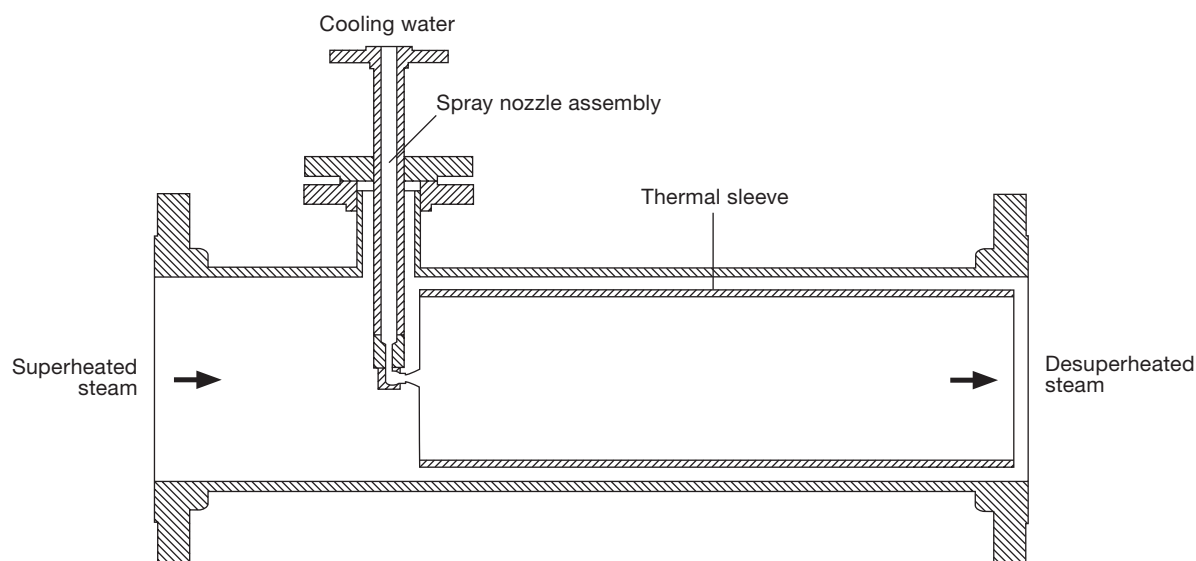
#### Materials

Component	Mechanical design temperature up to and including 800°F (425°C)	Mechanical design temperature above 800°F (425°C) up to and including 1094°F (590°C)
Pipe	ASTM A106 Grade B	ASTM A335 P11
Flanges	ASTM A105N	ASTM A182 F11
Spray nozzle	ASTM A182 F316L	ASTM A182 F11
Nozzle holder	ASTM A350 LF2N	ASTM A182 F11

# Direct Contact Desuperheaters

## 2. Spray type desuperheater (STD)

A complete Desuperheater ready for installation, including spray nozzle, nozzle housing, thermal sleeve and flanged shell.



### Applications:

- Relatively constant load handling duties.
- Dumping steam application.
- Control of downstream temperature not critical.

### Mechanical design temperature and flange rating

<700°F (<374°C)	ASME 150, ASME 300, ASME 600 + PN16, PN25, PN40 Slip-on (Weld neck optional)
700 - 977°F (374 - 525°C)	ASME 150, ASME 300, ASME 600 + PN16, PN25, PN40 Weld neck (Slip-on N/A)
705 - 1094°F (375 - 590°C)	ASME 150, ASME 300, ASME 600, ASME 900, ASME 1500 Weld neck (Slip-on N/A)

### Materials

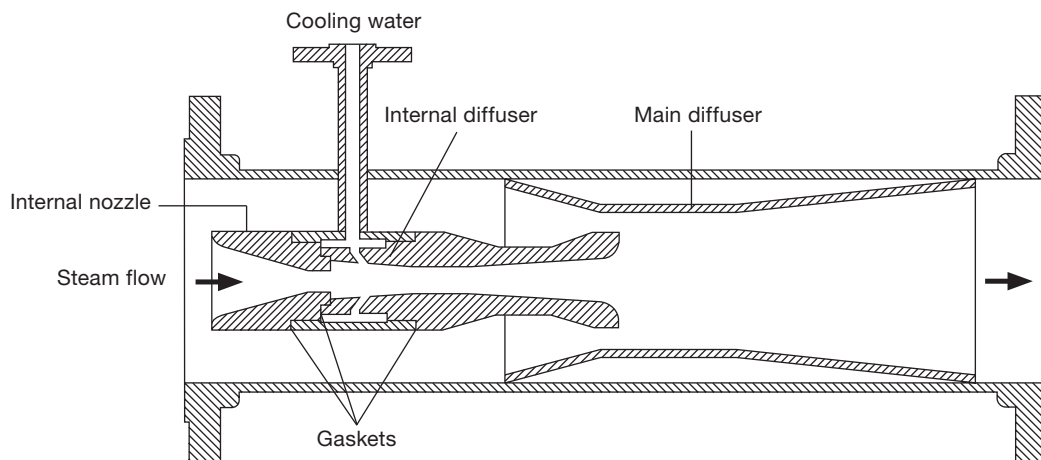
Component	Mechanical design temperature up to and including 800°F (425°C)	Mechanical design temperature above 800°F (425°C) up to and including 1094°F (590°C)
Shell	ASTM A106 Grade B	ASTM A335 P11
Water branch	ASTM A106 Grade B	ASTM A335 P11
Flanges	ASTM A105N	ASTM A182 F11
Spray nozzle	ASTM A182 F316L	ASTM A182 F11
Nozzle holder	ASTM A350 LF2N	ASTM A182 F11
Thermal sleeve	ASTM A312 TP316L	ASTM A335 P11



# Direct Contact Desuperheaters

## Venturi type desuperheaters (VTD)

The venturi principle is used to create regions of high velocity and turbulence which produces intimate contact between the steam and cooling water.



### Application

- Suitable for most general plant applications, except where high turndowns on cooling water are required.
- Flow turndowns between 3:1 and 10:1 depending on conditions.

### Mechanical design temperature and flange rating

<b>&lt; 700 ° F</b> <b>(&lt;374°C)</b>	ASME 150, ASME 300, ASME 600 + PN16, PN25, PN40 Slip-on (Weld neck optional)
<b>700 - 977°F</b> <b>(374 - 525°C)</b>	ASME 150, ASME 300, ASME 600 + PN16, PN25, PN40 Weld neck (Slip-on N/A)
<b>705 - 1094°F</b> <b>(375 - 590°C)</b>	ASME 300, ASME 600, ASME 900, ASME 1500 + PN10, PN16, PN25, PN40, PN63 and PN100 Weld neck (Slip-on N/A)

### Materials

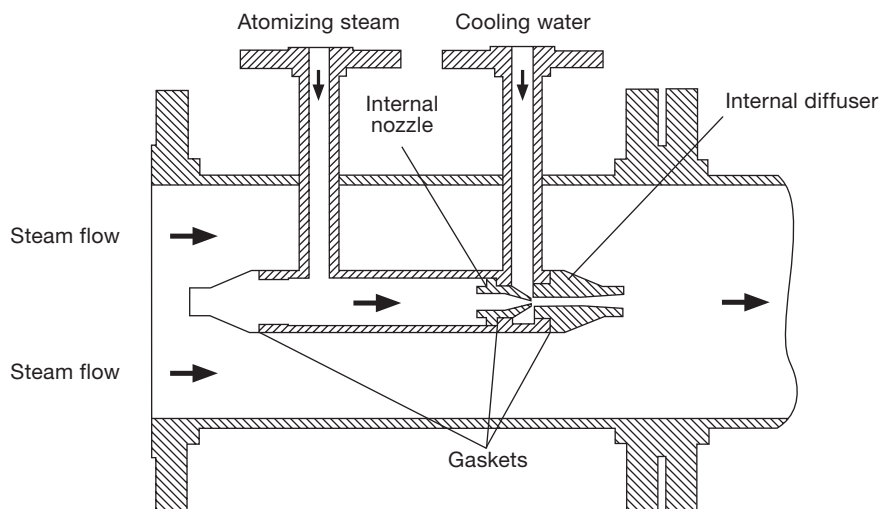
Component	Mechanical design temperature up to and including 800°F (425°C)	Mechanical design temperature above 800°F (425°C) up to and including 1094°F (590°C)
<b>Shell</b>	Sizes 1 to 2: ASTM A350 LF2N Size 3 and above: ASTM A106 Grade B	Sizes 1 to 2: ASTM A182 F11 Size 3 and above: ASTM A335 P11
<b>Water branch</b>	Sizes 1 to 2: ASTM A350 LF2N Size 3 and above: ASTM A106 Grade B	Sizes 1 to 2: ASTM A182 F11 Size 3 and above: ASTM A335 P11
<b>Flanges</b>	Sizes 1 to 2: ASTM A350 LF2N Size 3 and above: ASTM A105N	ASTM A182 F11
<b>Nozzle</b>	ASTM A182 F316L	ASTM A182 F11
<b>Internal diffuser</b>	Sizes 1 to 2: Not applicable Size 3 and above: ASTM A182 F316L	Sizes 1 to 2: Not applicable Size 3 and above: ASTM A182 F11
<b>Internal housing</b>	Sizes 1 to 2: Not applicable Size 3 and above: ASTM A350 LF2N	Sizes 1 to 2: Not applicable Size 3 and above: ASTM A182 F11
<b>Main diffuser</b>	Sizes 1 to 4: ASTM A350 LF2N Sizes 6 and 8: ASTM A240 / ASTM A312 316L Size 10: BS EN 10130:2006 DC01 Size 12 and above: ASTM A516 Gr70	Sizes 1 to 4: ASTM A182 F11 Sizes 6 and above: ASTM A387 Gr11
<b>Internal seals</b>	Soft copper	Soft copper

# Direct Contact Desuperheaters

## Steam atomizing desuperheaters (SAD)

A high pressure auxiliary steam supply is used to atomize the incoming water within the diffuser of the unit.

The auxiliary steam pressure needs to be at least 1.5 times the desuperheater inlet pressure with a minimum pressure of 45 psig (3 bar g).



## Application

- High turndown applications where auxiliary steam is available, eg ;combined pressure reducing/desuperheating stations.

## Mechanical design temperature and flange rating

<700°F (<374°C)	ASME 150, ASME 300, ASME 600 + PN16, PN25, PN40 Slip-on (Weld neck optional)
700 - 977°F (374 - 525°C)	ASME 150, ASME 300, ASME 600 + PN16, PN25, PN40 Weld neck (Slip-on N/A)

## Materials

Component	Mechanical design temperature up to and including 800°F (425°C)	Mechanical design temperature above 800°F (425°C) up to and including 1094°F (590°C)
Shell	ASTM A106 Grade B	ASTM A335 P11
Atomising steam branch	ASTM A106 Grade B	ASTM A335 P11
Water branch	ASTM A106 Grade B	ASTM A335 P11
Flanges	ASTM A105N	ASTM A182 F11
Nozzle	ASTM A182 F316L	ASTM A182 F11
Diffuser	ASTM A182 F316L	ASTM A182 F11
Internal housing	ASTM A350 LF2N	ASTM A182 F11
Internal seals	Soft copper	Soft copper

# Direct Contact Desuperheaters

## Sizing and selection

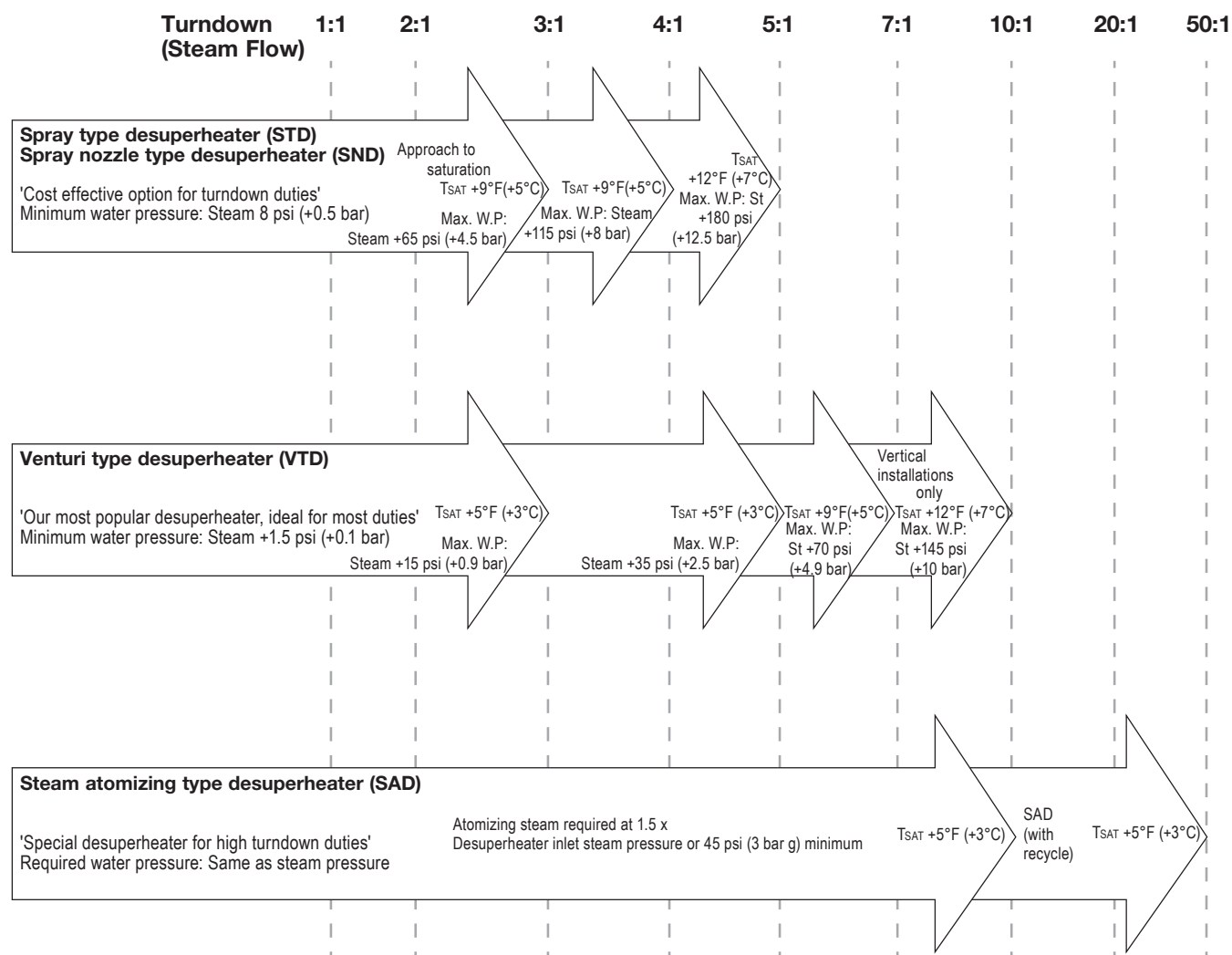
There are a number of factors which must be considered in determining the best type of desuperheater for the job. Such factors are:-

1. Residual superheat.
2. Turndown.
3. Accuracy of final temperature.
4. Available pressure drop.
5. Cooling water pressure.
6. Auxiliary higher pressure steam available for atomizing.
7. Cost.

With so many factors, it is not an easy task to develop a decision tree to aid selection, but the charts below have been developed to assist engineers in desuperheater selection.

Please read this first chart in conjunction with the note at the bottom of the page.

## Desuperheater selection chart

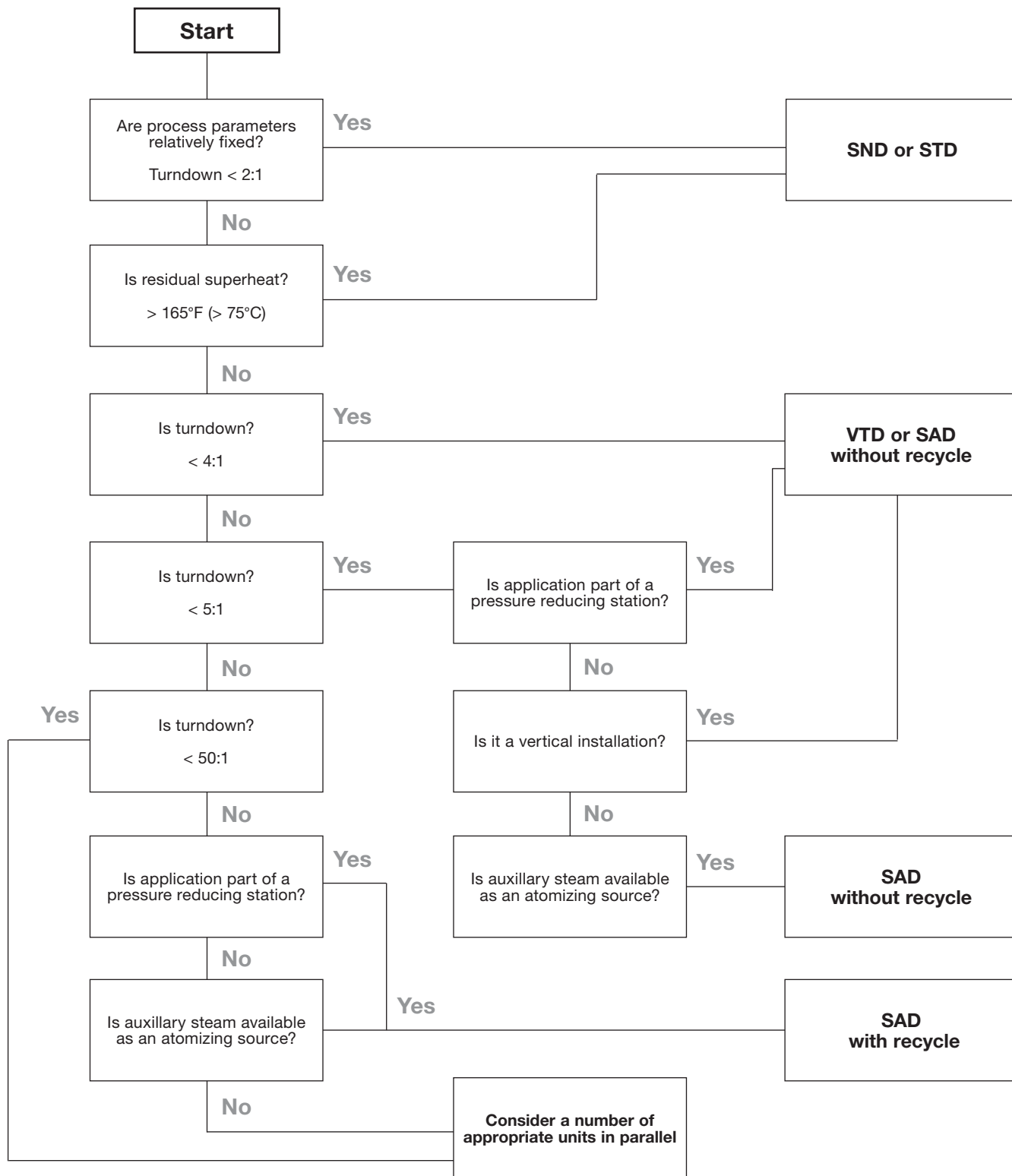


**Note:** For VTD's, turndowns above 7:1 must not be offered until design checks have been made by Spirax Sarco.

# Direct Contact Desuperheaters

## Which desuperheater is right for my application?

This is a general guide and does not represent every option available. Please contact us if you have any queries regarding selection for your specific application.



### Sizing and selection software

It is necessary to use our online sizing and selection software so that the desuperheater can be correctly specified and ordered. The software will generate a desuperheater data sheet and general assembly detail drawing of the resulting product. Please refer to TI-P475-06-US 'Desuperheater Online Programme Sizing Guidance' for further information.

# Direct Contact Desuperheaters

## Safety information, installation and maintenance

For full details see the Installation and Maintenance Instruction that are supplied with the product.

### Installation note

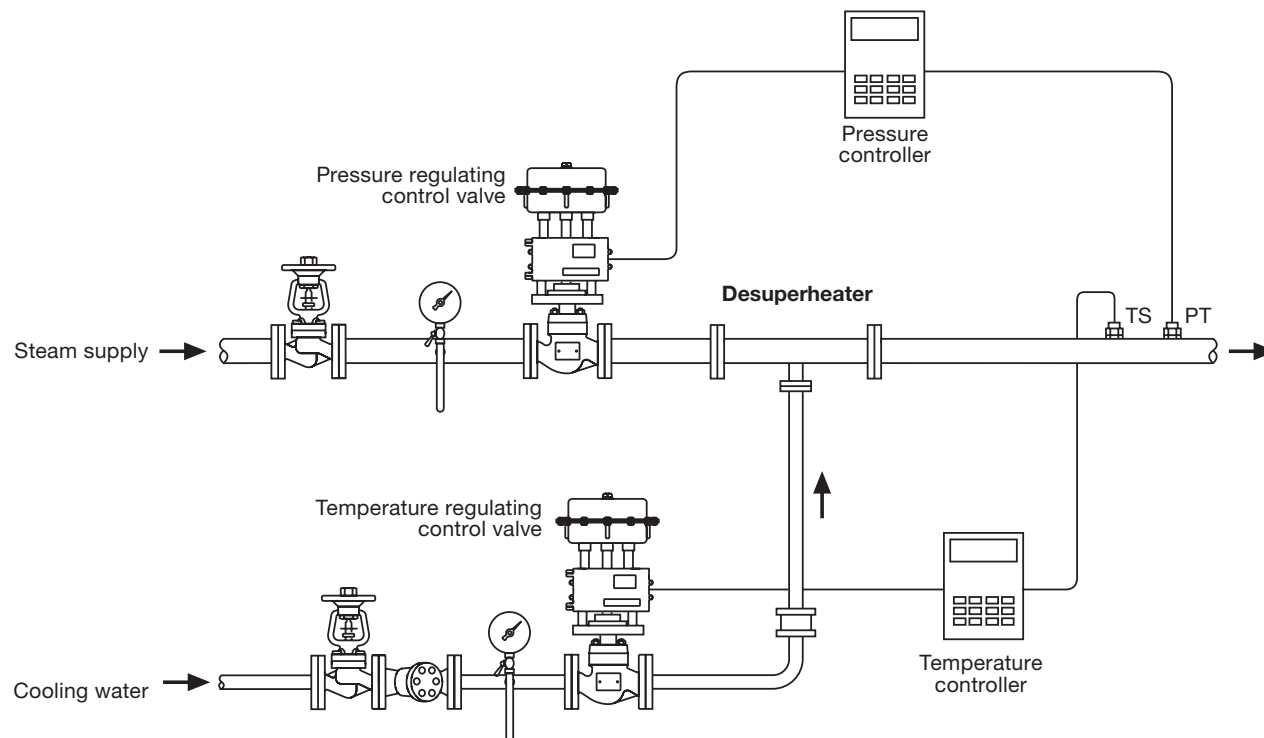
Desuperheaters may be installed either horizontally or vertically with the steam flowing upwards. Spirax Sarco strongly advises against installations in which the steam flow is vertically downwards.

In the case of a horizontal installation the cooling water connection (and the atomizing steam connection on a steam atomizing desuperheater) should ideally point downwards, as this gives the best orientation for drainage of fluids in a shutdown situation. Other orientations are acceptable for satisfactory operation, but drainage is not as effective.

In a vertical installation we recommend that, the cooling water pipework (and atomizing steam pipework, if applicable) should be brought to the Desuperheater from below the corresponding connections on the desuperheater. This will provide the best layout for drainage of fluids on shutdown.

## Desuperheating and pressure reducing stations

Spirax Sarco can provide complete desuperheating and pressure reducing stations including control valves, temperature sensors, pressure transmitters, instrumentation and pipework, all mounted on a support skid.



Combined desuperheating and pressure reducing station for venturi and spray type desuperheaters

# Direct Contact Desuperheaters

## Sizes

Spirax Sarco desuperheaters are specified by their nominal inlet and outlet size in inches. For example a 3" (80 mm) connection is referred to as Size 3, a 10" (250 mm) would be Size 10.

## Dimensions and weights

Please refer to the general assembly detail drawing generated by the sizing and selection software for details of specific desuperheaters.

## Selection guide

		Example
<b>Desuperheater type</b>	STD, SND, VTD and SAD	<b>VTD</b>
<b>Steam inlet / outlet size, inches (mm)</b>	¾" - 18" (20 mm - 450 mm)	<b>3" (080)</b>
<b>Shell / pipe material</b>	CS - Carbon steel A106 Grade B. For VTD sizes 1 to 2, CS = A350 LF2N material CM - Chrome molybdenum A182 F11	<b>CS</b>
<b>Steam end connections</b>	ASME 150, ASME 300, ASME 600, ASME 900, ASME 1500 PN16, PN25, PN40, PN63 and PN100	<b>ASME 600</b>

## How to order

1 off Spirax Sarco Size 3 desuperheater model VTD080CS having ASME 600 RF slip-on flanged connections. (Attach the desuperheater Data Sheet with your order).

## Spare parts

For units with fixed internals, spare parts are not available.

Spare parts and internal diffuser removal tools are available for units fitted with removable internals.

For guidance ;

For VTD units 2" or smaller the internals are fixed

For VTD units 12" or larger the internals are fixed

For VTD units between 3" and 10" the internals are removable

All STD units have fixed cooling water branch and nozzle

Removable STD internals available as an 'optional extra'

All SAD units have removable internals

Please quote the equipment model number and serial number from the nameplate when requesting parts.





## Desuperheater Online Program Sizing Guidance

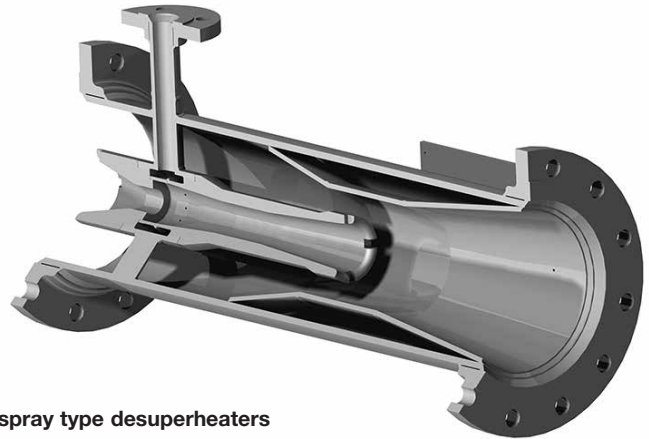
### Desuperheater overview

In typical process plants, process steam is usually superheated, or heated to a temperature above saturation. The difference between the saturation temperature and the actual temperature of the steam is called 'superheat'.

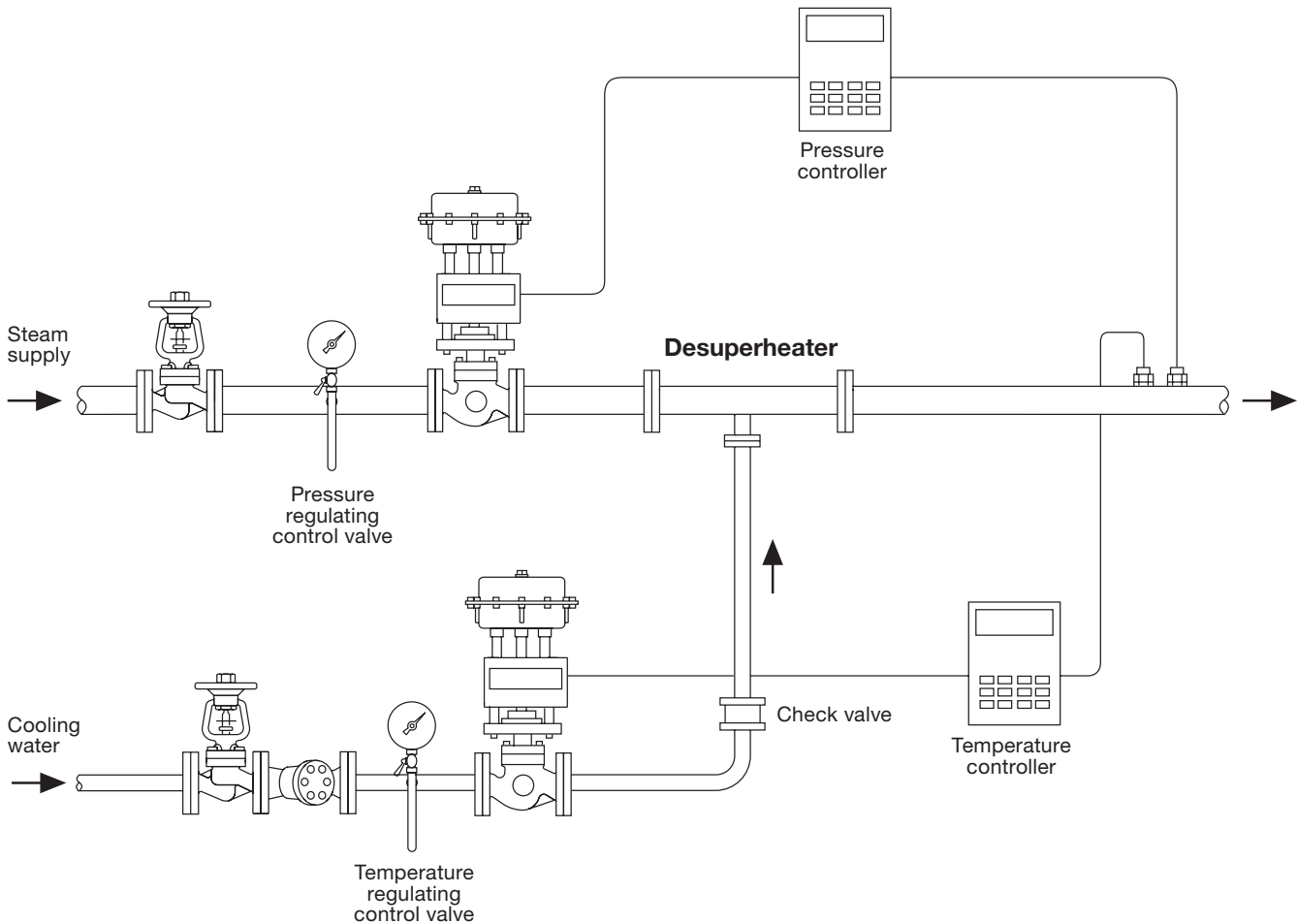
Desuperheated steam is more efficient in the transfer of thermal energy, consequently desuperheaters are used to bring the outlet degree of superheat closer to that of saturation.

Desuperheaters reduce the temperature of superheated process steam by introducing finely atomized cooling water droplets into the steam flow. As the droplets evaporate, sensible heat from the superheated steam is converted into latent heat of vaporization.

A typical desuperheater installation is shown below:



### Combined pressure reducing / desuperheating station for venturi and spray type desuperheaters



Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only.  
In the interests of development and improvement of the product, we reserve the right to change the specification.

TI-P475-06-US 10.15



# Desuperheater Online Program Sizing Guidance

## Desuperheater selection

There are various types of desuperheater available so evaluation of the process duty is crucial to ensure selection of the right equipment. Turndown capability, pressure drop and outlet superheat play lead roles in desuperheater design and selection:

### **Turndown: (Maximum steam flowrate ÷ Minimum steam flowrate)**

Turndown represents the variability of the steam flowrate. For many processes, turndown is very small or fixed. Generally, the higher the turndown, the more complicated the Desuperheater design.

### **Outlet superheat:**

Although desuperheaters are capable of desuperheating to the saturation temperature of the steam, typically, desuperheaters are designed to produce steam temperatures at 5°F to 9°F (3°C to 5°C) above saturation. This is because it becomes increasingly difficult to control the process (and there is very little advantage) at lower temperatures.

### **Steam pressure drop (for venturi type desuperheaters):**

For most pressure systems, a 6 to 10 psig (0.4 to 0.7 bar g) drop is considered reasonable. It should be noted that as the required turndown increases, so does the pressure drop. This is because there is a minimum acceptable pressure drop at the minimum flowrate case that ensures sufficient velocity to atomize the water droplets. Therefore, as the maximum steam flowrate increases, so does the velocity and hence the maximum pressure drop.

### **Water pressure drop (for spray type desuperheaters):**

It should be noted that as the required turndown increases, the required cooling water pressure also increases.

#### **General 'Rule-of-thumb':**

Over-specifying the thermal load or process requirements is detrimental to efficient operation and will increase the cost of the desuperheater (and its controls). Under specifying the operating range can result in a unit that cannot handle all operating cases.

Each type of Spirax Sarco desuperheater, employs a different method to create water droplets. The process by which the water droplets are created is usually referred to as 'atomization'.

It must be remembered that the evaporation of the water droplets (and hence cooling of the steam) is a time dependent process and does not occur instantaneously. Consequently, most of the desuperheating does not occur in the desuperheater itself, but in the pipework immediately downstream. Therefore, the design of the downstream pipework is a crucial factor in a successful desuperheater installation.

It is important that the water droplets remain suspended in the downstream pipework for as long as possible. To ensure this, it is necessary to maintain sufficient turbulence in the downstream piping by keeping the velocity relatively high – higher than is usually encountered in steam distribution systems up to 200 ft/sec (60 m/s). This is the reason why desuperheaters and their associated pipework are often (not always) smaller than the distribution system in which they are being installed.

# Desuperheater Online Program Sizing Guidance

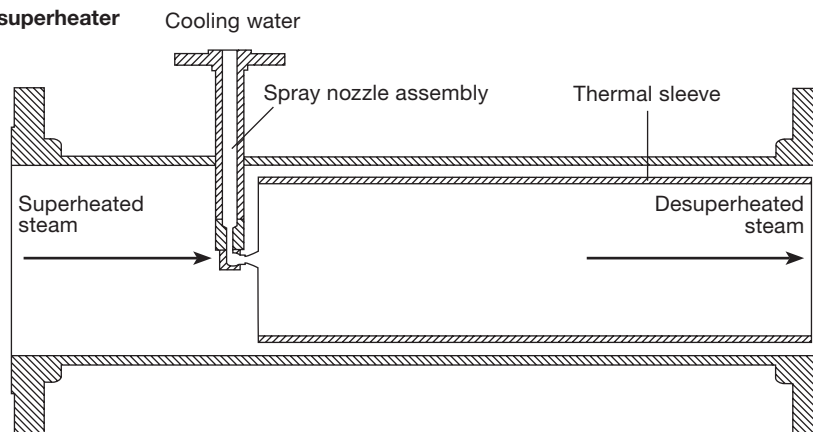
## Types of desuperheater

From the preceding paragraphs, it is easy to understand why there has to be a period of good contact between the droplets of cooling water the superheated steam. If good contact is lost, the water can no longer absorb heat effectively from the steam, evaporation stops and the desuperheating process comes to a halt.

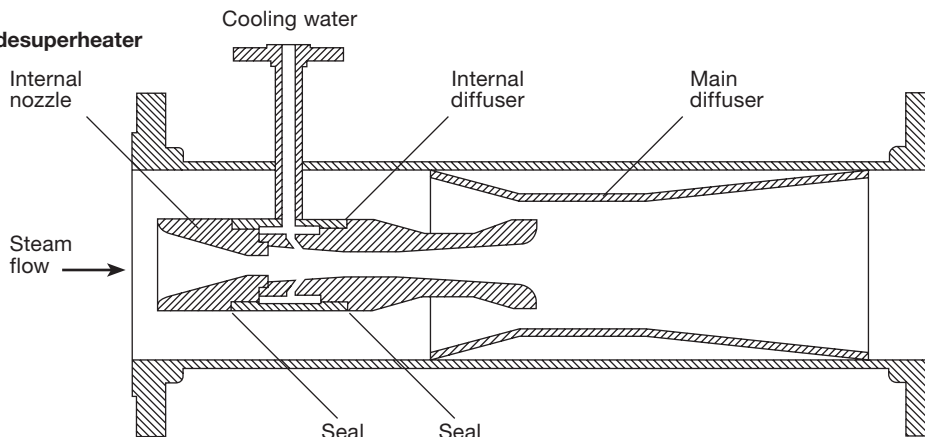
When the steam velocity is too low, 'water droplet fall-out' occurs and a pool of water is formed which runs along the bottom of pipe. At this point good contact between cooling water and the steam is lost and effective desuperheating will not occur. By following the guidelines presented in this document or using the Spirax Sarco online sizing software, problems due to droplet fall-out can be avoided.

There are three basic types of Spirax Sarco desuperheater (shown below) which all use a different method to atomize the cooling water droplets. Each one has its own merits and the desuperheater selection chart shown on the following page determines which type should be selected.

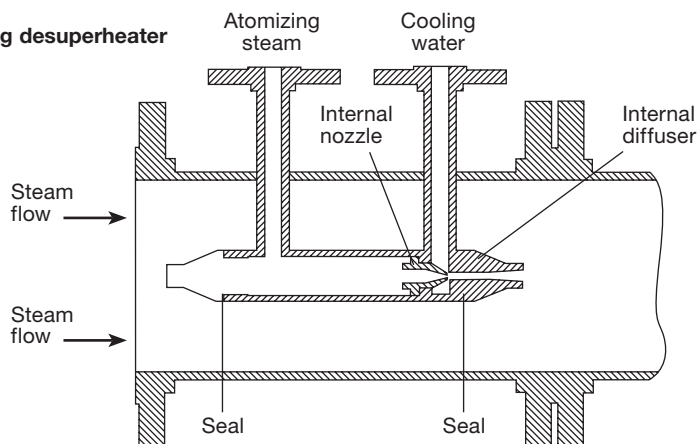
### Complete spray type desuperheater



### Venturi type desuperheater



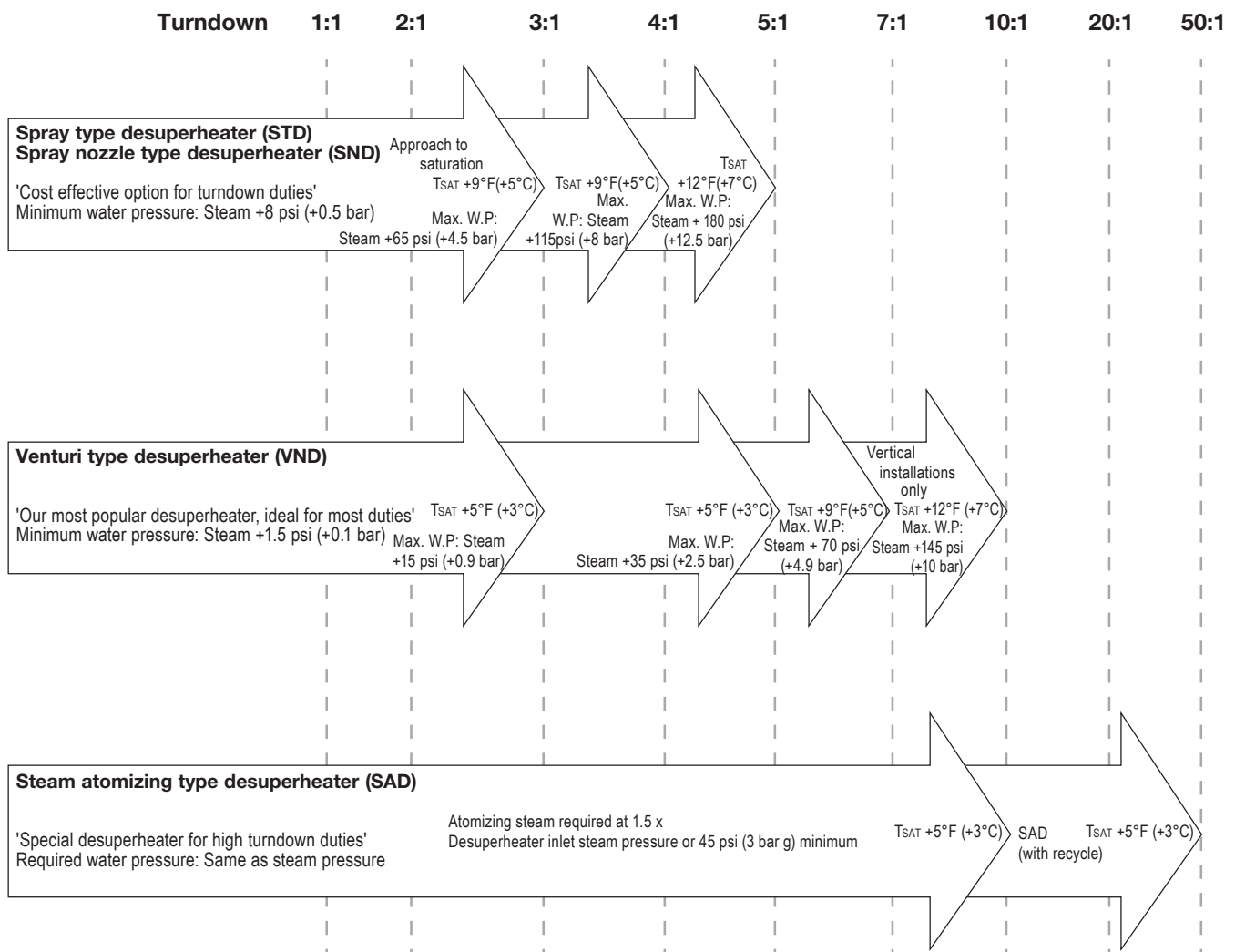
### Steam atomizing desuperheater



Finer droplets, therefore smaller  
absorption length and / or better  
turndown and approach to saturation

# Desuperheater Online Program Sizing Guidance

## Desuperheater selection chart



## Other considerations

### Desuperheater orientation

Desuperheaters may be installed either horizontally or vertically (with the steam flowing upwards). In a vertical installation, increased turndown can be achieved; as the steam and water are countered by gravity, the water is less likely to fall out of suspension. Spirax Sarco strongly advises against installations in which the steam flow is vertically downwards, as the opposite would occur.

In the case of a horizontal installation, the cooling water connection and the atomizing steam connection on a SAD (steam atomizing desuperheater) should ideally point downwards, as this gives the best orientation for drainage of fluids in a shutdown situation. Other orientations are acceptable for satisfactory operation, but drainage is not as effective.

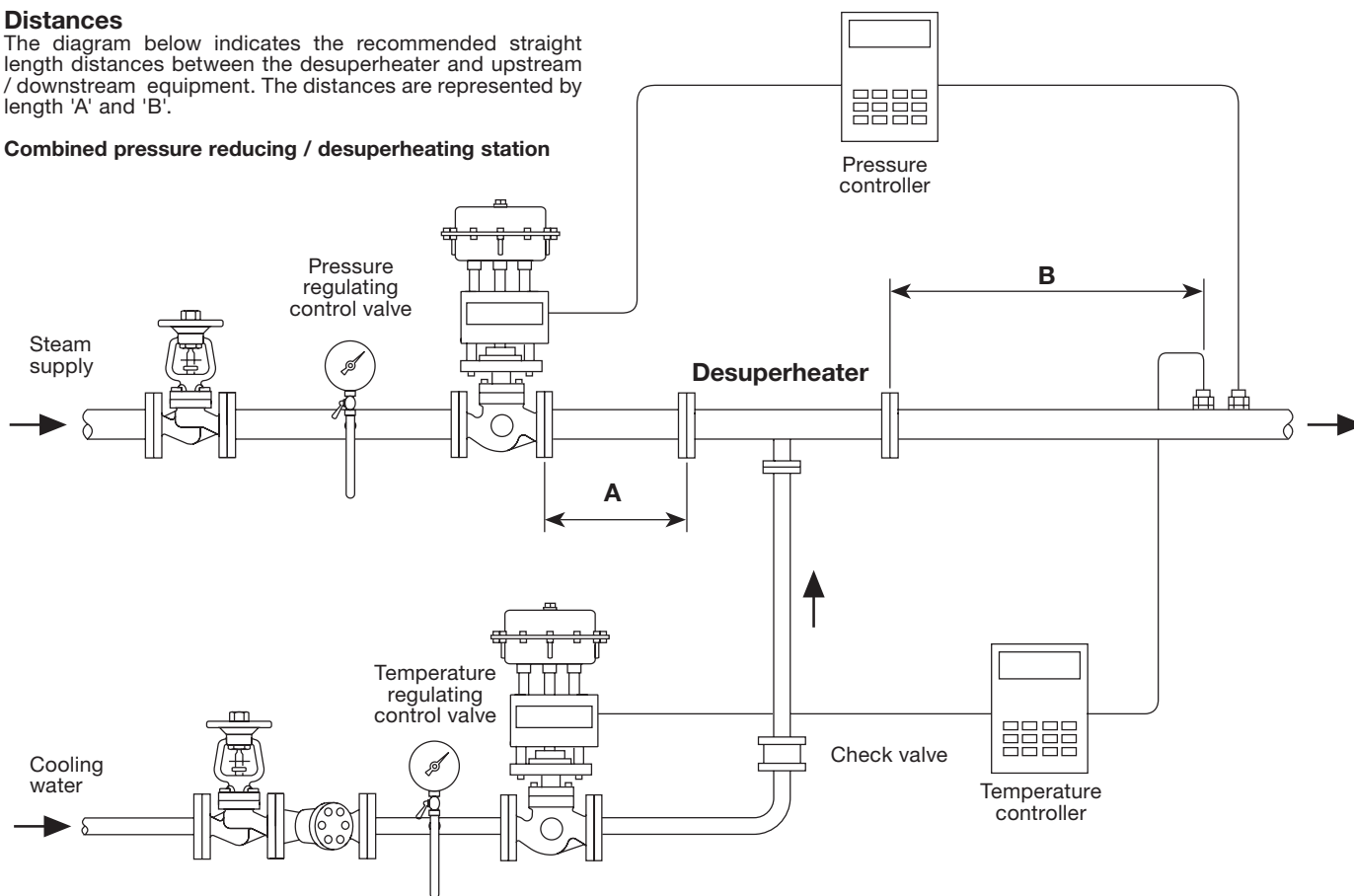
In a vertical installation we recommend that, the cooling water pipework (and atomizing steam pipework, if applicable) should be brought to the desuperheater from below the corresponding connections on the desuperheater. This will provide the best layout for drainage of fluids on shutdown.

# Desuperheater Online Program Sizing Guidance

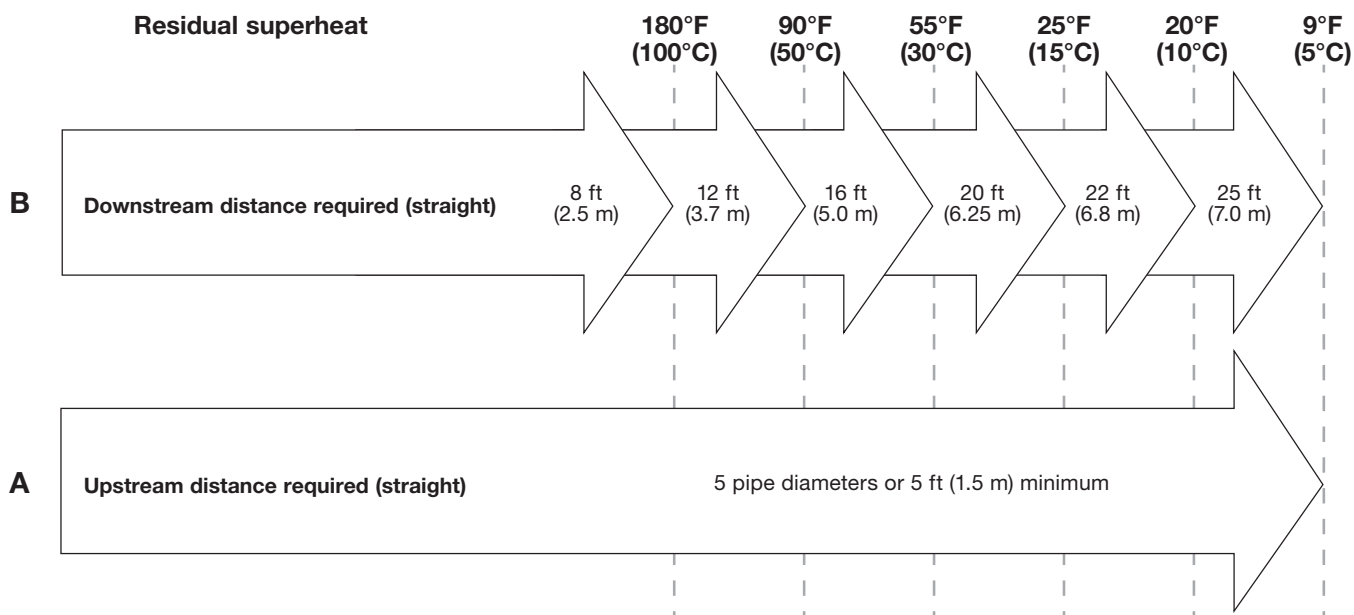
## Distances

The diagram below indicates the recommended straight length distances between the desuperheater and upstream / downstream equipment. The distances are represented by length 'A' and 'B'.

### Combined pressure reducing / desuperheating station



### Recommended distances for location of pressure and temperature sensors and equipment:



'The greater the residual superheat, the faster the water droplets are absorbed'

# Desuperheater Online Program Sizing Guidance

## Other considerations (continued)

### Cooling water supply

Typical cooling water supply options are as follows:

- Boiler feedwater (BFW) (taken from the pressure side of the boiler feedpump).
- Demineralized water.
- De-ionized water.
- Condensate.

Town's water or process water may also be used, but depending on hardness, salts may be deposited on the inside of downstream pipework and the face of valve seats and plugs.

### Cooling water quality

The quality of the injected water is important. The TDS (Total Dissolved Solids) of the injection water should be as low as possible since all these solids will come out of solution and be deposited on the faces of valves and could block up the small orifices in the desuperheater nozzles.

### Cooling water temperature

Generally, the hotter the better. This is because hot droplets need to absorb less heat to reach their flash temperature than cold ones. Hence, hot droplets will evaporate more quickly, producing a more efficient desuperheating process. Using hot water also has the additional advantage that smaller amounts of water will fall onto the inside walls of the pipework.

Because of the benefits of using hot water, it is logical to insulate the water supply pipes to minimize heat loss.

### Cooling water pressure and flowrate

In order to inject the cooling water, its pressure at the desuperheater nozzle must be equal to or greater than the operating steam pressure in the pipe. The requirement varies from one type of desuperheater to another, but typical minimum values are:

- Spray type desuperheater steam pressure +8 psi (+ 0.5 bar)
- Venturi type desuperheater steam pressure +1.5 psi (+ 0.1 bar)
- Steam atomizing type desuperheater equal to steam pressure

For the spray and Venturi type desuperheaters, the highest water inlet pressure required will be at the highest cooling water flowrate.

It should be noted that the water flowrate is a function of the square of the pressure difference between cooling water and the steam. So if the water flowrate is to be increased by a factor of 4 for example, then the pressure difference must increase by a factor of  $4^2 = 16$ . This is the reason why it is important not to over-specify the turndown as high cooling water pressures are quickly reached (especially with spray type desuperheaters).

If an independent or booster pump is used, a recirculation loop will be required to ensure that there is always flow through the pump.

### Cooling water control valve

A pressure drop will be required over the water control valve. We have already said that ideally the water should be as hot as possible so care is needed to ensure that flashing conditions do not exist across the control valve.

### Superheated steam pressure control

It is desirable that a constant steam supply pressure be maintained.

The temperature of the steam after the desuperheater controls the amount of water added. The higher the temperature, the more the control valve will open and the greater the amount of water that is added. Usually the target is to reduce the steam temperature to within a small margin of saturation temperature. In virtually all applications the upstream pressure will be controlled and constant, however, if the superheated steam supply pressure is increased, the saturation temperature will also increase. The set value on the Controller will not change, and an excessive amount of water will be added as the control system tries to achieve the set temperature. This would result in very wet saturated steam with its resulting problems.

### Control

In this document we have frequently used the term 'turndown' to describe the performance of the different types of desuperheater. However, as far as an installation is concerned, it should be remembered that the desuperheater is only one element of a desuperheating station. Obviously, if the controls that are fitted have lower turndown than the desuperheater, then the turndown of the desuperheater station will be reduced.

For example, in a particular pressure reducing / desuperheating station, the rangability of the cooling water valve may not be as high as the desuperheater. In this case it will be the rangability of the water control valve that limits the turndown of the desuperheating station.

### Separator station

In applications where there must be no moisture present in the resulting steam (such as prior to a turbine for example) it is recommended that a separator is installed downstream of the desuperheater. This will protect downstream pipework and equipment from the effects of moisture in the event of a control system failure or abnormal operating conditions, for example at start-up.

The separator must be located after the temperature sensor thereby giving the water droplets as much time as possible to evaporate.

# Desuperheater

## Online Program Sizing Guidance

### Strainer

Spirax Sarco recommend that a strainer is incorporated in the cooling water supply line to protect both the cooling water control valve and the small bores within the desuperheater from becoming blocked.

### Isolation valves

To allow maintenance to be safely carried out, isolation valves are recommended upstream of:

- The superheated steam pressure control valve.
- The cooling water control valve.

### Safety valve

In applications involving simultaneous pressure reduction, a safety relief valve may be needed to protect both the desuperheater and downstream equipment from the effects of:

- Excess pressure in the event of pressure control system failure.
- Excess temperature in the event of temperature control system failure.

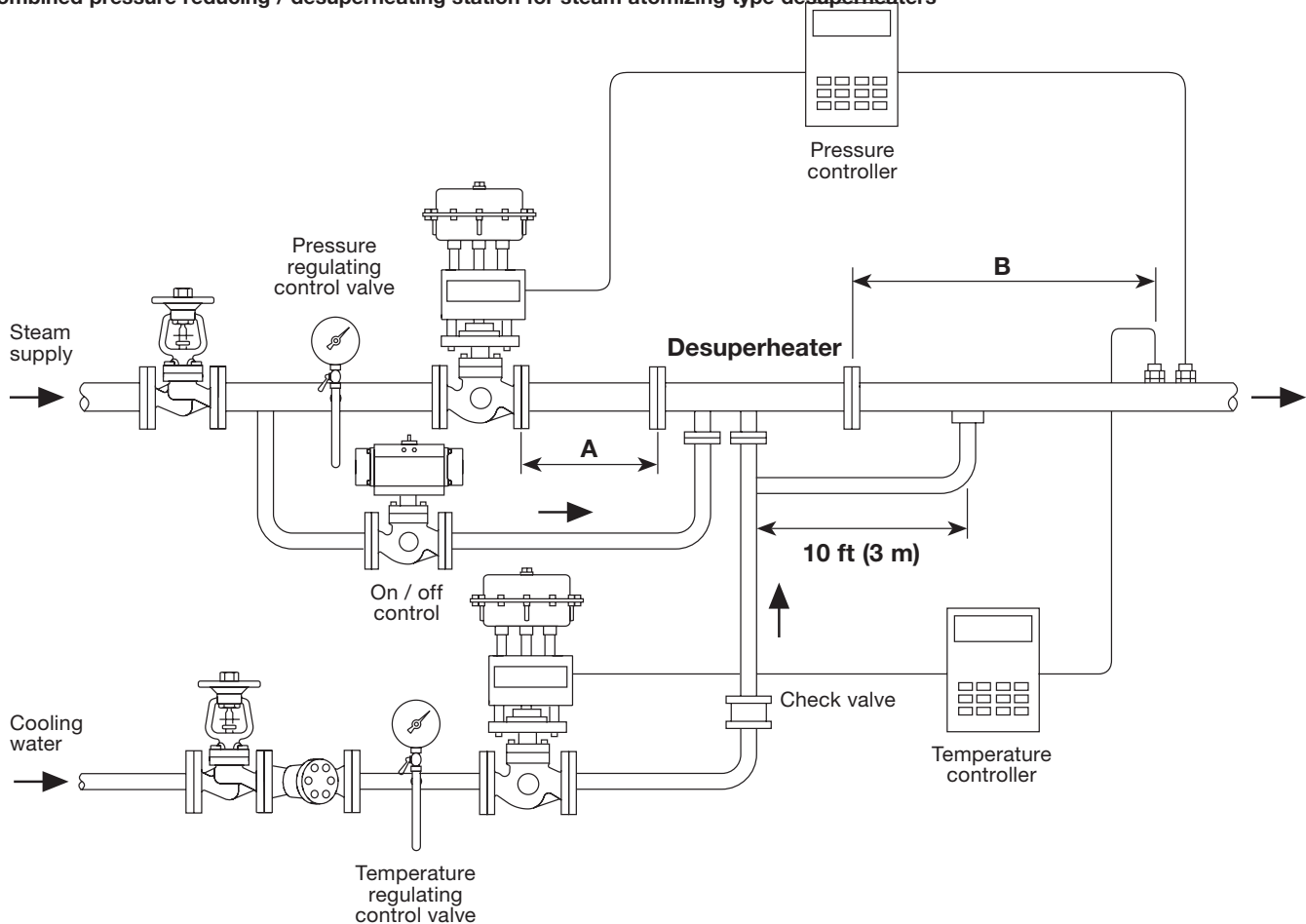
It is essential that the desuperheater and downstream equipment are suitable for the maximum temperature of the superheated steam. This is to protect these items in the event of a failure of both the pressure and temperature control systems.

### Recycle loop

For SAD steam atomizing desuperheaters with a very high turndown a 'catchpot and recycle loop' are often installed as shown on the diagram below. The recycled condensate is hot which leads to faster absorption.

The desuperheater generates a small suction effect to draw the recycle water back to the desuperheater ensuring that the water doesn't 'by-pass' the desuperheater.

### Combined pressure reducing / desuperheating station for steam atomizing type desuperheaters



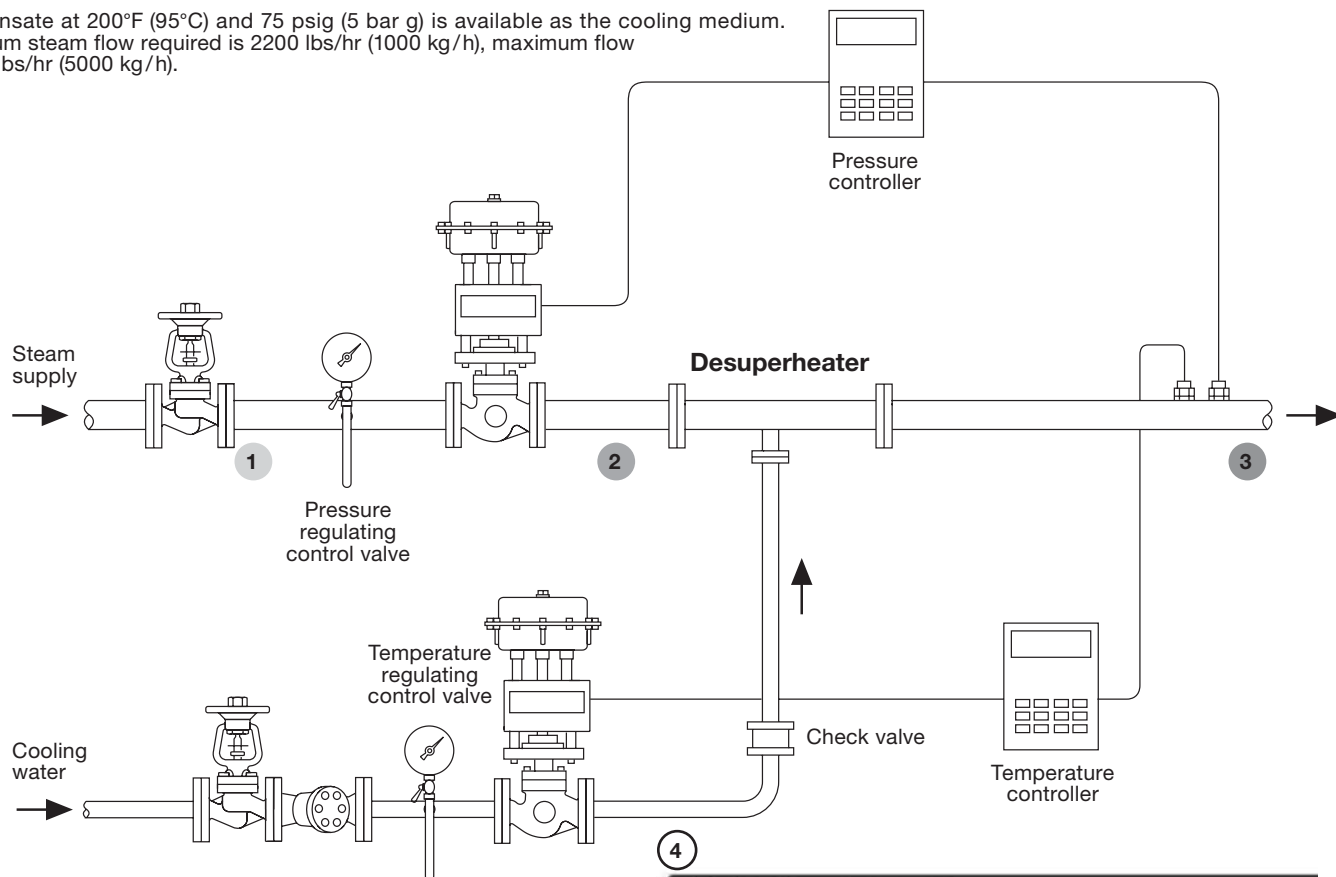
# Desuperheater

## Online Program Sizing Guidance

### Detailed example

Steam is required to heat a vessel jacket at 30 psig (2 bar g) and 275°F (133.7°C). A low pressure steam supply is available at 145 psig (10 bar g) and 390°F (200°C) for this purpose.

Condensate at 200°F (95°C) and 75 psig (5 bar g) is available as the cooling medium. Minimum steam flow required is 2200 lbs/hr (1000 kg/h), maximum flow 11000 lbs/hr (5000 kg/h).



### Method

As the turndown required equals 5:1 and the application involves simultaneous pressure reduction, this would seem to be a good application for a venturi type desuperheater (VTD). Please note that a steam atomizing desuperheater (SAD) could also be used for this duty, but the overall installation cost would be higher due to the greater complexity of the installation.

As already stated, it is not possible to control at the saturated temperature of the steam so any associated temperature controller should have a set point of 5°F (3°C) above the saturation temperature (which is 275°F (136.7°C) in this example).

We can use the Spirax Sarco Online Sizing Program to calculate the unit size (available at [www.spiraxsarco.com/uk](http://www.spiraxsarco.com/uk) with password). The form would be completed as follows:

The steam temperature at the inlet to the desuperheater is calculated by the program automatically and is shown on the datasheet.

Once the calculation button is pressed the software will calculate the required cooling water pressure and flowrate. It will also calculate the pressure drop across the unit. The user will see a summary screen, at which point the desired flange rating can be selected and then the 'Save & Email' button can be pressed. You will then receive an e-mail with a drawing and datasheet to your chosen e-mail address.

#### Venturi Type Desuperheater Quote

Welcome to the Transvac Online Quote system. Please complete the details below.

Client Reference			
Is there a pressure reducing valve upstream? <input checked="" type="radio"/> Yes <input type="radio"/> No			
Turndown <input type="radio"/> Fixed <input checked="" type="radio"/> Not Fixed			
<b>Upstream of Let-down Valve</b>			
Design	Case 1	Case 2	
Pressure bar(g)	10	10	10
Temperature °C	200	200	200
<b>Desuperheater Inlet Conditions</b>			
Design	Case 1	Case 2	
Pressure bar(g)	2	2	2
Temp in °C			
Design Flowrate	5000	3000	1000
CW Temp	95	95	95
<b>Desuperheater Outlet Conditions</b>			
Design	Case 1	Case 2	
<input checked="" type="radio"/> Tsat+3°C	<input checked="" type="radio"/> Tsat+3°C	<input checked="" type="radio"/> Tsat+3°C	
<input type="radio"/> Other	<input type="radio"/> Other	<input type="radio"/> Other	
Temperature °C			
<b>Mechanical Design Conditions</b>			
Steam Side	Water Side		
Pressure bar(g)	15	15	
Temperature °C	220		
Calculate > (it may take a few minutes to calculate)			

# Desuperheater

## Online Program Sizing Guidance

**Detailed example (continued)** The datasheet generated by the program for this example is as follows:

Spirax Sarco Venturi Type Desuperheater Data Sheet								v 1.4
1	Client :	Spirax-Sarco Limited			Client Project Ref :			
2	Client's Ref :	EXAMPLE CALCULATION			Plant Location :			
3	Spirax Sarco Ref :	VTD01582			Equip. Item No. :			
4	Description :	Size 6 Venturi Type Desuperheater			No. OFF :	1		
5	Unit Ref :	VTD150°CS6F0			Operation :			
6	Drawing No. :	DE-VTDSDSO			Serial No. :			
7	Unit Size :	6						
2	<b>INLET CONDITIONS</b>	Case 1	Case 2	Case 3	<b>CONDITIONS UPSTREAM OF LET-DOWN VALVE</b>			
	Flowrate (kg/hr)	5000	3000	1000	Case 1	Case 2	Case 3	1
	Pressure (bar g)	2.302	2.108	2.012	10	10	10	
	Temperature (°C)	179.7	179.2	178.9	200	200	200	
4	<b>COOLING MEDIUM</b>	Case 1	Case 2	Case 3				
	Flowrate (kg/hr)	193.5	116.1	38.7				
	Pressure (bar g)	5.34	3.2	2.13				
	Temperature (°C)	95	95	95				
17	Medium -	Water						
3	<b>DISCHARGE CONDITIONS</b>	Case 1	Case 2	Case 3				
	Pressure (bar g)	2	2	2				
	Temperature (°C)	136.7	136.7	136.7				
	Flowrate (kg/hr)	5193.5	3116.1	1038.7				
23								
24	<b>MATERIALS OF CONSTRUCTION</b>				Flanges	Carbon Steel ASTM A 105		
25	Main Body	Carbon Steel ASTM A 106 Grade B			Gaskets	Soft Copper		
26	Inner Nozzle	Stainless Steel BS 970 S11/13			Inner Body	Carbon Steel ASTM A350 LF2		
27	Inner Venturi	Stainless Steel BS 970 S11/13			Main Venturi	C.Steel BS 1501-151/161-430A/B		
28								
29	<b>MECHANICAL DESIGN</b>	Steam	Water		<b>CONNECTION DETAILS</b>			
30		Side	Side			Size	Rating	
31	Max.Design Pressure (bar g)	15	15		Inlet Steam	6	300 LB	
32	Max. Design Temperature (°C)	220	220		Discharge Steam	6	300 LB	
33	Internal Corrosion Allowance (mm)	1.5	1.5		Cooling Medium	1	300 LB	
34	Mechanical Design Code	ASME B31.3			Flange Type	ASME B16.5 Slip-On		
35	Welding Standard	To Code						
36	External Surface Finish	High Temp. Silicone Aluminium						
37	Weight (kg)	68						
38								
39	<b>DIMENSIONS</b>							
40	A (" NB)	6						
41	B (mm)	178						
42	C (mm)	127						
43	D (mm)	533						
44	E (mm)	660			Note: Letters refer to Drawing			
0	Issued for sizing only				PDA	08/01/2010		
Rev	Description				By	Date	Checked Date	

A Spirax Sarco Size 6 venturi type desuperheater has been selected. It can be seen from the 'Cooling Medium' section that the maximum cooling water pressure required is 35 psig (5.34 bar g) consequently a water booster pump should also be installed (as the cooling water is only available at 75 psig (5 bar g)).

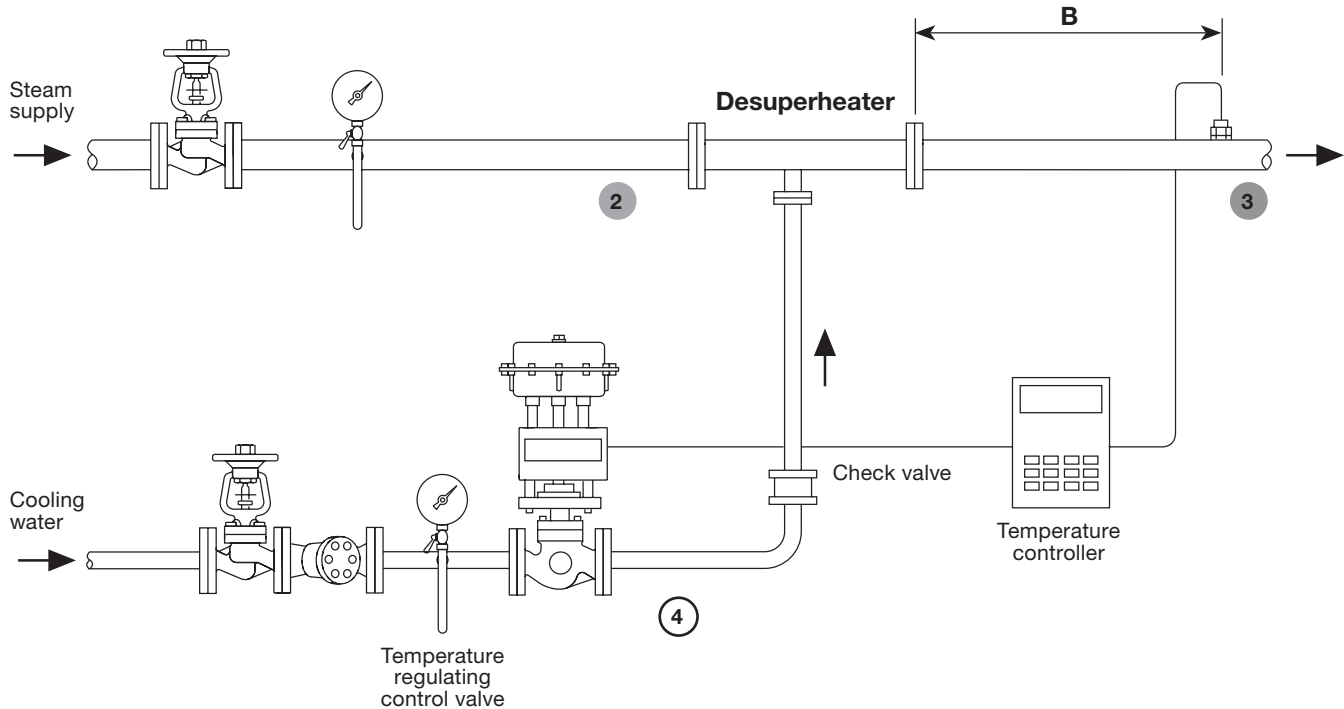
The program has calculated a steam pressure drop across the desuperheater of 4.4 psig (0.302 bar g) (maximum). As there is a pressure reducing valve installed, the program has automatically added this pressure drop to the desuperheater inlet pressure to 'compensate' for the pressure drop. This will ensure that the outlet pressure from the desuperheater is 30 psig (2 bar g). The datasheet therefore shows the correct pressures and flowrates for sizing both the pressure reducing valve and the water control valve.



# Desuperheater Online Program Sizing Guidance

## Detailed example 2

Steam is required at 75 psig (5 bar g) (saturated) for use in a Shell & Tube Heat Exchanger. The Client has steam available at 75 psig (5 bar g), 660°F (350°C). Minimum steam flow is 18,750 lbs/hr (8 500 kg/h), maximum is 55,000 lbs/hr (25 000 kg/h). Boiler feedwater at 70°F(20°C) is available as the cooling medium.



## Method

As the turndown is approximately 3:1 we can select any type of Desuperheater. There are 3 options:

### SAD - Steam atomising desuperheater

This would require atomizing steam at 110 psig (7.5 bar g) min.

### VTD - Venturi type desuperheater

This could be selected, however, this desuperheater is not part of a pressure reducing station, consequently if we select a VTD venturi type desuperheater, the discharge steam pressure will be reduced by the pressure drop across the unit. The steam could be desuperheated to  $T_{sat} + 5^{\circ}\text{F}$  (+3°C).

### STD - Spray type desuperheater

The unit is capable of handling the turndown with no steam-side pressure drop and can desuperheat to  $T_{sat} + 9^{\circ}\text{F}$  (+5°C).

In this case the client states that  $T_{sat} + 9^{\circ}\text{F}$  (+5°C) is acceptable so we will select an STD.

The Spirax Sarco Online Spray Type Desuperheater Sizing Program would be completed as shown opposite:

**Spray Type Desuperheater Quote**

Welcome to the Transvac Online Quote system. Please complete the details below.

Client Reference	DETAILED EXAMPLE 2		
Is there a pressure reducing valve upstream?	<input type="radio"/> Yes <input checked="" type="radio"/> No		
Turndown	<input type="radio"/> Fixed <input checked="" type="radio"/> Not Fixed		

**Upstream of Let-down Valve**

	Design	Case 1	Case 2
Pressure bar(g)			
Temperature °C			

**Desuperheater Inlet Conditions**

	Design	Case 1	Case 2
Pressure bar(g)	5	5	5
Temp In °C	350	350	350
Flowrate kg/h	25000	18000	8500
CW Temp °C	25	25	25

**Desuperheater Outlet Conditions**

	Design	Case 1	Case 2
<input checked="" type="radio"/> $T_{sat} + 5^{\circ}\text{C}$ <input type="radio"/> Other	<input checked="" type="radio"/> $T_{sat} + 5^{\circ}\text{C}$ <input type="radio"/> Other	<input checked="" type="radio"/> $T_{sat} + 5^{\circ}\text{C}$ <input type="radio"/> Other	
Temperature °C			

**Mechanical Design Conditions**

	Steam Side	Water Side
Pressure bar(g)	10	30
Temperature °C	374	

(it may take a few minutes to calculate)

# Desuperheater

## Online Program Sizing Guidance

**Detailed example 2 (continued)** A Spirax Sarco Size 10 spray type desuperheater has been selected. The maximum cooling water pressure required is 140 psig (9.79 bar g) and there is a negligible steam-side pressure drop.

### Spirax Sarco Spray Type Desuperheater Data Sheet

v2.0

1	Client :	Spirax-Sarco Limited			Client Project Ref :		
2	Client's Ref :	DETAILED EXAMPLE 2			Plant Location :		
3	Spirax Sarco Ref :	STD00519			Equip. Item No. :		
4	Description :	Size 10 Spray Type Desuperheater			No. OFF :	1	
5	Unit Ref :	Size STD250CS6F0			Operation :		
6	Drawing No. :	DESTD00519-1			Serial No. :		
7	Unit Size :	10					
8	<b>INLET CONDITIONS</b>	Case 1	Case 2	Case 3	<b>CONDITIONS UPSTREAM OF LET-DOWN VALVE</b>		
9	Flowrate (kg/hr)	25000	18000	8500	Case 1	Case 2	Case 3
10	Pressure (bar g)	5	5	5			
11	Temperature (°C)	350	350	350			
12							
13	<b>COOLING MEDIUM</b>	Case 1	Case 2	Case 3			
14	Flowrate (kg/hr)	3733	2678.8	1269.2			
15	Pressure (bar g)	9.79	7.48	5.55			
16	Temperature (°C)	25	25	25			
17	Medium -	Water					
18							
19	<b>DISCHARGE CONDITIONS</b>	Case 1	Case 2	Case 3			
20	Pressure (bar g)	5	5	5			
21	Temperature (°C)	163.9	163.9	163.9			
22	Flowrate (kg/hr)	28733	20687.8	9769.2			
23							
24	<b>MATERIALS OF CONSTRUCTION</b>				Nozzle Housing	Carbon Steel ASTM A 350 LF2	
25	Main Body	Carbon Steel ASTM A 106 Grade B			Flanges	Carbon Steel ASTM A 105	
26	Water Branch	Carbon Steel ASTM A 106 Grade B			Gaskets	Soft Copper	
27	Thermal Sleeve	Stainless Steel ASTM A312 TP316L			Spray Nozzle	Stainless Steel	
28							
29	<b>MECHANICAL DESIGN</b>	Steam	Water		<b>CONNECTION DETAILS</b>		
30		Side	Side			Size	Rating
31	Max.Design Pressure (bar g)	10	30		Inlet Steam	10	300 LB
32	Max. Design Temperature (°C)	374	374		Discharge Steam	10	300 LB
33	Internal Corrosion Allowance (mm)	1.5	1.5		Cooling Medium	2	300 LB
34	Mechanical Design Code -	ASME B31.3			Flange Type	ASME B16.5 Slip-On	
35	Welding Standard -	To Code					
36	External Surface Finish -	High Temp. Silicone Aluminium					
37	Weight (kg)	180					
38							
39	<b>DIMENSIONS</b>						
40	A (" NB)	10					
41	B (mm)	430					
42	C (mm)	250					
43	D (mm)	800					
44	E (mm)	1050			Note: Letters refer to Drawing		
0	Issued for sizing only			PDA	22/01/2010		
Rev	Description			By	Date	Checked	Date

# Desuperheater Online Program Sizing Guidance

## Typical applications

The following is a list of applications where desuperheaters have been supplied:

### Power generation

To reduce the temperature of steam discharged from turbine bypass systems to that required for other parts of the plant.

- Turbine washing

### Process industries

In process industries, desuperheaters are used as part of a system for reducing the temperature and pressure of steam from boilers to economic levels of operation.

### Paper and board industry

- Paper drying machines

### Food industry

- Steam cooking kettles
- Evaporator heat exchanger
- Product conditioning

### Textile industry

- Fabric finishing autoclaves

### Tobacco industry

- Tobacco leaf drying plants

### Chemical and pharmaceutical industry

- Reactor heater jackets and coils
- Steam supply to process heaters

### Oil and petrochemical industry

- Vacuum distillation start-up heaters
- Steam supply to process heaters
- Let-down station and turbine bypass
- Thermocompressor discharge
- Mechanical vapour re-compression

### Brewing and distilling industry

- Steam heating system

### Boiler and turbine installations

- Power generation
- Ship building
- Coffee
- Chemical

# Flowmeters

for steam, liquids and gases.



Our range of Flowmeters are suitable for accurate measurement of steam, liquids and gases in pipe sizes 1/2" to 80" at flowing pressures to 5,000 psig and flowing temperatures to 842°F.

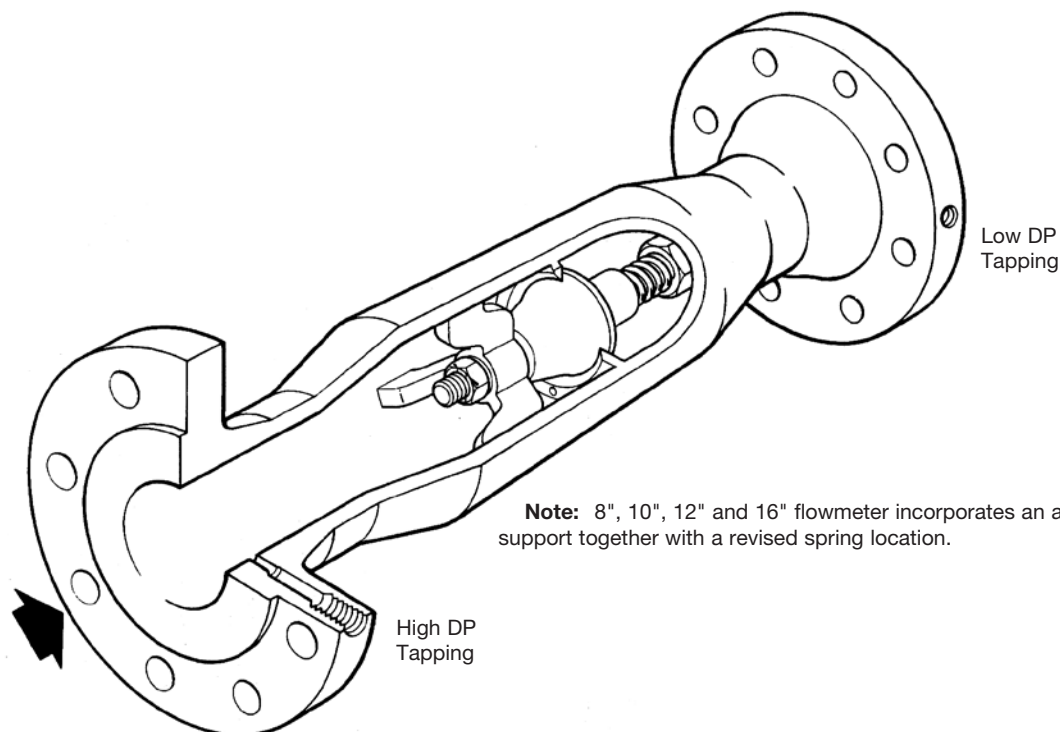




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## Gilflo Flowmeters - 'B' Pipeline Unit



**Note:** 8", 10", 12" and 16" flowmeter incorporates an additional shaft support together with a revised spring location.

### Description

The Gilflo 'B' flowmeter is installed in the pipeline and produces a differential pressure which is related to the rate of flow. It can be used with most industrial fluids, gases and both saturated and superheated steam.

### Sizes and Pipe Connections

2", 3", 4", 6", 8", 10", 12" and 16"

Flanges available to ANSI B.16.5 class 300

### Limiting Conditions

Minimum operating pressure	9 psig
Maximum operating pressure	740 psig
Minimum operating temperature	-58°F
Maximum operating temperature	842°F
Maximum viscosity	30 centipoise

### Turndown

The Gilflo will provide accurate measurement over a flow range of 100:1.

### Accuracy

To achieve accuracy of a  $\pm 1\%$  of reading, all Gilflo meters must be used in conjunction with a device capable of performing electronic linearism such as:

- M750 Flow Computer
- Customer's EMS, DCS or equivalent
- M800 Steam Flow Computer
- M800 Gas Flow Computer

**Note:** When used with M800 flow computers, Gilflo accuracy is  $\pm 1\%$  of reading from 5% to 100% of maximum rated flow. For flows from 1% to 5% of maximum rated flow, accuracy will be better than  $\pm 1\%$  FSD.

### Repeatability

The Gilflo is repeatable to better than 0.25%.

### Pressure Drop

Less than 140 inches  $H_2O$  (349 mbar) at rated capacity

### Flow Capacity

To determine the maximum flow capacity of a Gilflo 'B', it is necessary to calculate the equivalent water flowrate ( $Q_w$ ). See under the section "Sizing the Gilflo 'B' flowmeter".

### Materials of Construction

Body	Carbon Steel	ASTM A105/A106/A234
Internals	Mostly Stainless Steel	S304/S316
Spring	Inconel X750	

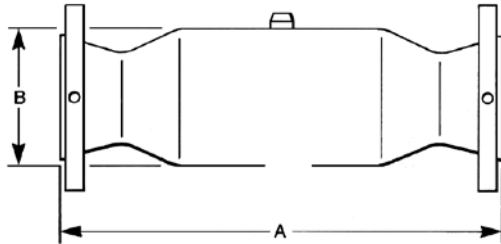


# Gilflo Flowmeters - 'B' Pipeline Unit

## Dimensions / Weights (approximate) in inches and lbs

SIZE	A	B	Weight
2"	19	3.5	31
3"	21	4.5	48
4"	28	6.6	105
6"	31	8.6	191
8"	39	12.7	270
10"	57	16	565
12"	63	18	748
16"	79	24	1980

H.P. and L.P. pressure tapings are threaded 1/4" NPT (female).  
On 16" meter, the pressure tapings are on the body.



## Installation

A separate installation booklet is supplied with each Gilflo 'B' flowmeter. The following main points are given for guidance:

- The Gilflo should be installed with a minimum of 6 straight pipe diameters upstream and 3 downstream. No valves, fittings or cross sectional changes permitted within these pipe lengths. Where an increase in pipe diameter is necessary upstream of a Gilflo flowmeter, the length of straight pipe should be increased to 12 diameters. Similarly, where a Gilflo flowmeter is installed downstream of two 90° bends in two planes, a pressured reducing valve or a partially open valve, 12 pipe diameters should be allowed.
- The Gilflo flowmeter should normally be mounted horizontally. Vertical installation (with flow vertically downward) is also permissible and must be specified when ordering. Ensure flow is in the correct direction and avoid reverse flow.
- For steam applications, good basic steam engineering practice should be followed:
  - Ensure all pipework is adequately insulated.
  - Ensure correct line drainage through adequate trapping.
  - Where practicable, fit a steam separator upstream of the flowmeter. This should be drained using a float trap set.
  - Ensure good alignment and support of all associated pipework.
  - Achieve line size reduction by the use of eccentric reducers.
  - Avoid close installation (less than 25 pipe diameters) upstream or downstream of a pressure reducing valve or modulating valve.

See the "Gilflo flowmeters - system overview" TI-8-008-US which provides information of a Gilflo metering system.

size	Q <sub>e</sub> max (gpm)	15 psig	50 psig	75 psig	100 psig	150 psig	200 psig	400 psig
2"	94	1625	2353	2748	3096	3690	4203	5842
3"	308	5332	7721	9018	10162	12110	13793	19172
4"	494	8559	12394	14475	16311	19438	22139	30773
6"	1202	20825	30156	35220	39687	47295	53868	74876
8"	2136	37004	53585	62582	70520	84040	95719	133050
10"	2938	50894	73700	86075	96993	115587	131651	182995
12"		5100	88356	127948	149431	168385	200666	228554
16"		8284	143530	207845	242744	273534	325972	371275

**Note:** These capacities are based on a differential pressure across the meter of 140 inches H<sub>2</sub>O (349 mbar).  
Minimum flow is 1% of maximum (100:1 turndown).

## Maintenance

There are no user serviceable parts within the 'Gilflo' Spool flowmeter. Mechanical checks to confirm correct operation are described in the manuals that accompanies the flowmeters.

## Sizing the Gilflo 'B' Flowmeter

- Determine Equivalent Water Flowrate (Q<sub>e</sub>) in U.S. gpm using formulas:

### Liquids:

$$Q_e = \frac{m}{500} \sqrt{\frac{D_e}{D_i}} \quad \text{or} \quad Q_e = Q_i \sqrt{\frac{D_i}{D_e}}$$

Q<sub>e</sub> = equivalent flow rate of water at 70°F (U.S. gpm)  
m = maximum flow rate of service liquid (lb/hr)  
D<sub>e</sub> = density of water at calibration (62.305 lb/ft<sup>3</sup>)  
D<sub>i</sub> = density of service liquid (lb/ft<sup>3</sup>)  
Q<sub>i</sub> = maximum flow rate of service liquid (US gpm)

### Gases:

$$Q_e = \frac{(0.0158) \times m}{\sqrt{D \times \frac{P_f}{P_s} \times \frac{T_s}{T_f}}}$$

$$\text{or} \quad Q_e = (0.948) \times Q_g \sqrt{D \times \frac{P_s}{P} \times \frac{T_f}{T_s}}$$

T<sub>s</sub> = standard atmospheric pressure (14.7 psia)  
Q<sub>e</sub> = water equivalent flow rate at 70°F (U.S. gpm)  
m = maximum flow rate of gas (lb/hr)  
D = gas density at 14.7 psia, 520°R (60°F) (lb/ft<sup>3</sup>)  
P<sub>f</sub> = flowing pressure of gas (psia)  
P<sub>s</sub> = standard atmospheric pressure (14.7 psia)  
T<sub>s</sub> = standard absolute temperature (520°R)  
T<sub>f</sub> = flowing temperature of gas (°R = °F + 460)  
Q<sub>g</sub> = maximum flow rate of gas (SCFM)

### Steam:

$$Q_e = (0.0158) \times m \sqrt{v}$$

Q<sub>e</sub> = water equivalent flow rate at 70°F (U.S. gpm)  
m = maximum flow rate of steam (lb/hr)  
v = specific volume of steam at normal pressure and temperature (ft<sup>3</sup>/lb)

- Select from the table below the meter with a Q<sub>e</sub> max. that most closely matches (but exceeds) the application Q<sub>e</sub> determined in step 1.

**Note:** These equivalent water flowrates are based on a differential pressure of 140 inches H<sub>2</sub>O (349 mbar). For saturated steam flow measurement, the table below gives flow capacities in lb/h.

## How To Order

1 - 6" our Gilflo 'B' flowmeter flanged to ANSI B-16-5 class 300.

TI-8-006-US 12.09





## Gilflo Flowmeters - System Overview

### Description

The Gilflo flowmetering system consists of 2 major parts:-

1. The Gilflo pipeline unit. This may be a Gilflo 'B' or 'Spool' design. This is installed in the line where the flow is to be measured. Using impulse pipework, this is connected to:-
2. The M610 DP Transmitter Assembly. This measures the differential pressure across the Gilflo pipeline unit and converts it to a 4-20 mA output signal. This output signal can be used in a number of ways:-
  - a-To drive a suitable chart recorder or act as an input to an EMS/DCS. This gives a non-compensated signal proportional to rate of flow.
  - b-To supply an M750 Display Unit. This gives a non-compensated display of totalized flow and rate of flow.
  - c-To supply an M800 series Flow Computer, whose keypad allows the user to select the parameters to be viewed as well as allowing access to the numerous facilities available. The diagram shows these configurations.

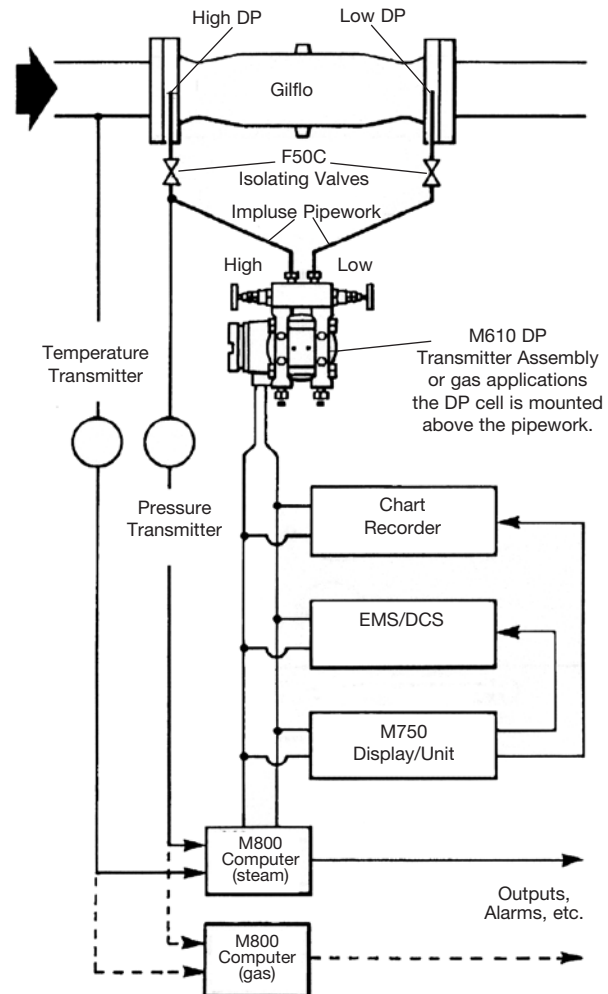
**Note:-** The Gilflo pipeline unit can be used to measure the flow of most industrial liquids, gases and vapors within the pressure and temperature limits detailed in the TIS's. Full density compensation from pressure and temperature transmitters is available when using the M800 series Flow Computer for steam applications or the M800 Series Flow Computer for gas applications. See TIS's for details.

### Installation

Care must be taken to meet all the requirements of the Installation and Maintenance Instructions that are included with the equipment.

#### Installation points to watch:-

1. Ensure all pipework is adequately supported and properly aligned.
2. The Gilflo pipeline unit should be selected on capacity rather than line size. Where pipe size reduction on steam systems is necessary, use eccentric reducers to avoid waterlogging.
3. The minimum recommended lengths of straight pipe are 6D upstream and 3D downstream.
4. Take care to ensure the correct direction of flow as indicated by the arrow on the meter body.
5. Take precautions to avoid reverse flow through the meter.
6. Avoid installing the meter downstream of a pressure reducing valve (especially on steam systems) as this may cause inaccuracies and/or possible damage. Similarly avoid installing the meter downstream of a partially open valve.
7. Remember that actuated valves may cause rapid pressure fluctuations which could cause damage.
8. On steam or liquid systems take care to ensure that all impulse lines remain full to prevent damage to the DP transmitter through contact with steam or high temperature liquid.
9. For steam applications, care should be taken to ensure adequate line drainage, trapping etc., so as to avoid condensate slugs impacting the meter. Where practical, steam separators should be fitted. These should be drained using a float trap set.
10. For gas applications ensure that the DP cell and impulse lines are positioned above the pipework. Also ensure that the impulse lines allow free drainage of moisture away from the DP cell and back into the pipeline.



### Electrical wiring

All electrical wiring must be carried out to the appropriate standards. Full wiring interconnection details are included with the equipment.

### How to specify

For details of how to specify each part of your chosen system refer to individual TIS's listed in the Associated Equipment section.

### Associated Equipment

M610	DP Transmitter Assembly	TI-P335-10 US
Gilflo 'B'	Pipeline Unit	TIS 8.006
Gilflo 'Spool'	Pipeline Unit	TIS 8.005
M750	Display Unit	TI-P332-08 US
F50C	Isolating Valve	TIS 8.401
M800	Steam Flow Computer	TI-P331-04-US
M800	Gas Flow Computer	TI-P333-24-US



## Gilflo ILVA Flowmeters

### Description

The Gilflo ILVA flowmeter operates on the spring loaded variable area principle and produces a differential pressure related to the rate of flow. It can be used with both saturated and superheated steam, gases and most industrial fluids.

### Limiting Conditions

The maximum pressure and temperature limitations are the same as the specified flange ratings with an overall maximum temperature of 842°F. Minimum operating temperature -58°F. Minimum operating pressure 9 psig. Maximum viscosity 30 centipoise.

### Turndown

The Gilflo ILVA will provide accurate measurement over a flow range of 100:1.

### Accuracy

To achieve accuracy of a  $\pm 1\%$  of reading, all Gilflo ILVA meters must be used in conjunction with a device capable of performing electronic linearism such as:

- M750 Flow Computer
- Customer's EMS, DCS or equivalent
- M800 Steam Flow Computer
- M800 Gas Flow Computer

Note: When used with M800 flow computers, Gilflo ILVA accuracy is  $\pm 1\%$  of reading from 5% to 100% of maximum rated flow. For flows from 1% to 5% of maximum rated flow, accuracy will be better than  $\pm 1\%$  FSD.

### Repeatability

The Gilflo ILVA is repeatable to better than 0.25%.

### Pressure Drop

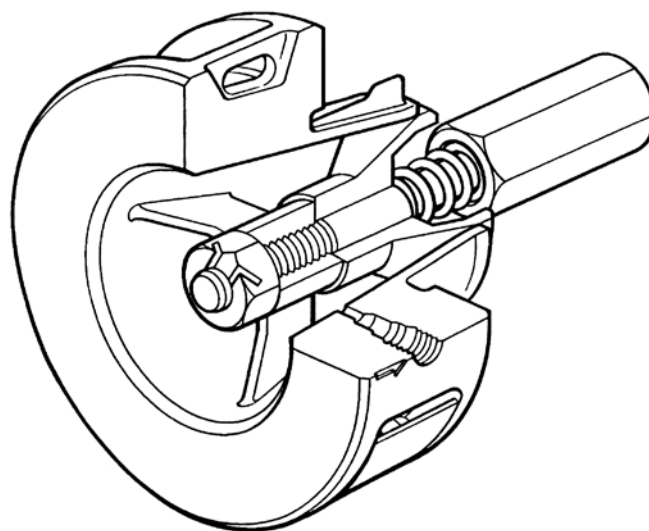
The pressure drop across the Gilflo ILVA pipeline unit is 200 inches water gauge at maximum rated flow.

### Flow Capacity

To determine the capacity of the Gilflo ILVA for different fluids, it is necessary to calculate the Equivalent Water Flowrate  $Q_e$  (in U.S. gpm) as described under the section "sizing the Gilflo ILVA" then selecting the appropriate size of meter from the table.

### Construction Materials

Body	Stainless Steel S.316
Internals	431 S29/S303/S304/S316
Spring	Inconel X750 or equivalent



### Sizes and Pipe Connections

2", 3", 4", 6", and 8"

Suitable for fitting between the following flanges  
ANSI B 16.5 class 150, 300, 600.

### How to Specify

6" Gilflo ILVA flowmeter for installation between ANSI 150 flanges. Body material 316 stainless steel. Flow medium saturated steam at 150 psig, maximum flow 20,000 lb/h.

For a general description of the Gilflo ILVA metering system, see TIS 8.010 which also gives details of associated equipment.

Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only.  
In the interests of development and improvement of the product, we reserve the right to change the specification.

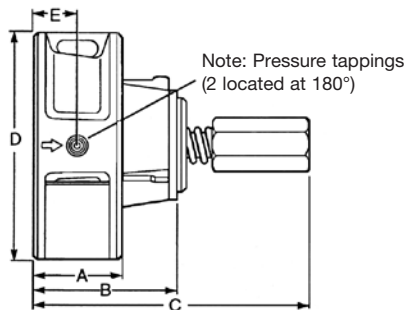
TI-8-009-US 10.07

# Gilflo ILVA Flowmeters

## Dimensions (approximate) in inches and lbs.

Size	A	B	C	D	E	Weight (lb)
2"	1.38	2.48	5.51	4.06	.69	4.4
3"	1.77	3.07	5.91	5.43	.89	8.6
4"	2.36	4.06	8.07	6.38	1.48	18.3
6"	2.95	5.28	11.81	8.58	1.48	31.3
8"	3.35	6.34	14.17	10.75	1.67	52.0

Note: Pressure tappings are threaded 1/4" NPT



## Installation

A separate installation booklet is supplied with each Gilflo ILVA flowmeter. The following main points are given here for guidance:

1. The Gilflo ILVA should be mounted with a minimum of 6 straight pipe diameters upstream and 3 downstream. No valves, fittings or cross sectional changes are permitted within these pipe lengths. Where an increase in nominal pipe diameter is required upstream of the meter, the length of straight pipe should be increased to 12 diameters. Similarly, where a Gilflo ILVA is installed downstream of two 90 degree bends in two planes, a pressure reducing valve or a partially open valve, 12 upstream pipe diameters should be allowed.
2. Care should be taken to install the Gilflo ILVA concentrically in the line. If this is not done, flow measurement errors may occur.
3. The ILVA meter should be mounted horizontally. For vertical installations, consult your representative.
4. For steam applications, good basic steam engineering practices should be followed:  
Correct line drainage through adequate trapping.  
Good alignment and support of associated pipework.  
Line size changes achieved by the use of eccentric reducers.
5. See TIS 8.010 which provides an overview of the Gilflo ILVA metering system and further installation details.

## Maintenance

There are no user serviceable parts in the Gilflo ILVA. A visual check together with confirmation that the orifice/cone reference dimension is within tolerance is possible. Full details are included in the manual that accompanies the meter.

## Sizing the Gilflo ILVA for Saturated Steam - lb/h

Maximum flow rates in lb/h at different pressures (psig)

**Note:** Maximum steam flow rates are calculated at a differential pressure across the Gilflo ILVA pipeline unit of 200 ins H<sub>2</sub>O.

Size		15 psig	50 psig	75 psig	100 psig	150 psig	200 psig	400 psig	600 psig
2"	Maximum flow	682	988	1153	1299	1549	1764	2451	3009
	Minimum flow	7	10	12	13	15	18	25	30
3"	Maximum flow	2677	3877	4528	5103	6081	6926	9627	11815
	Minimum flow	27	39	45	51	60	69	96	118
4"	Maximum flow	5492	7953	9288	10466	12473	14206	19747	24236
	Minimum flow	55	79	93	105	125	142	197	242
6"	Maximum flow	13273	19220	22448	25295	30144	34333	47723	58571
	Minimum flow	132	192	224	252	301	343	477	585
8"	Maximum flow	26088	37778	44121	49718	59249	67483	93801	115123
	Minimum flow	260	377	441	497	592	674	938	1151

## Sizing the Gilflo ILVA Meter

In order to determine the flow capacity of a Gilflo ILVA pipeline unit, it is necessary to calculate the Equivalent Water Flowrate (Q<sub>e</sub>) based on the anticipated actual flow.

Figure 2 is then used to select the appropriate unit.

1. Determine Equivalent Water Flowrate (Q<sub>e</sub>) in U.S. gpm:

### Liquids:

$$Q_e = \frac{m}{500} \sqrt{\frac{D_e}{D_i}} \quad \text{or} \quad Q_e = Q_i \sqrt{\frac{D_i}{D_e}}$$

Q<sub>e</sub> = equivalent flow rate of water at 70°F (U.S. gpm)

m = maximum flow rate of service liquid (lb/hr)

D<sub>e</sub> = density of water at calibration (62.305 lb/ft<sup>3</sup>)

D<sub>i</sub> = density of service liquid (lb/ft<sup>3</sup>)

Q<sub>i</sub> = maximum flow rate of service liquid (US gpm)

### Gases:

$$Q_e = \sqrt{D} \times \frac{(0.0158) \times m}{\frac{P_f}{P_s} \times \frac{T_s}{T_f}}$$

$$\text{or } Q_e = (0.948) \times Q_g \sqrt{D} \times \frac{P_s}{P_f} \times \frac{T_f}{T_s}$$

Q<sub>e</sub> = water equivalent flow rate at 70°F (U.S. gpm)

m = maximum flow rate of gas (lb/hr)

D = gas density at 14.7 psia, 520°R (60°F) (lb/ft<sup>3</sup>)

P<sub>f</sub> = flowing pressure of gas (psia)

P<sub>s</sub> = standard atmospheric pressure (14.7 psia)

T<sub>s</sub> = standard absolute temperature (520°R)

T<sub>f</sub> = flowing temperature of gas (°R = °F + 460)

Q<sub>g</sub> = maximum flow rate of gas (SCFM)

### Steam:

$$Q_e = (0.0158) \times m \sqrt{v}$$

Q<sub>e</sub> = water equivalent flow rate at 70°F (U.S. gpm)

m = maximum flow rate of steam (lb/hr)

v = specific volume of steam at normal

pressure and temperature (ft<sup>3</sup>/lb)

2. Select from the table below the Gilflo ILVA meter with a maximum Q<sub>e</sub> that closely matches (but exceeds) the application Q<sub>e</sub> determined in step 1.

Meter size	Max. Q <sub>e</sub> U.S. gpm	Max. DP ins Wg
2"	40	200
3"	158	200
4"	317	200
6"	781	200
8"	1,535	200

# spirax sarco

## Gilflo ILVA Flowmeter 10" and 12"

### Description

The Gilflo ILVA flowmeter operates on the spring loaded variable area principle and produces a differential pressure related to the rate of flow. It can be used with most industrial fluids, gases and both saturated and superheated steam. A general description of the ILVA flowmetering system and its associated equipment is given in a separate TI sheet.

### Sizes and pipe connections

10" and 12"

Suitable for fitting between the following flanges:

EN 1092 PN16, PN25 and PN40.

ASME (ANSI) B 16.5 Class 150, 300 and 600.

JIS 20.

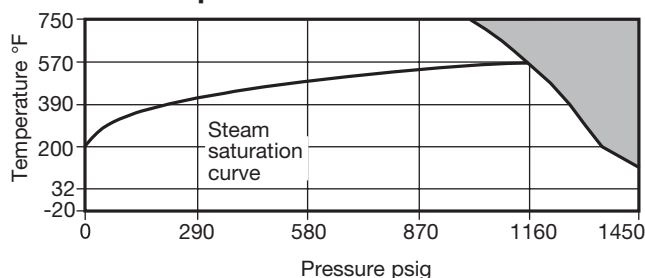
KS 20.

The Gilflo ILVA flowmeter should be installed in pipework manufactured to BS 1600 or ASME (ANSI) B 36.10 Schedule 40. For different pipe standards/schedules, downstream spool pieces with an equivalent internal diameter to BS 1600 or ASME (ANSI) B 36.10 Schedule 40 should be used. If this is not possible, please contact Spirax Sarco Limited.

### Materials

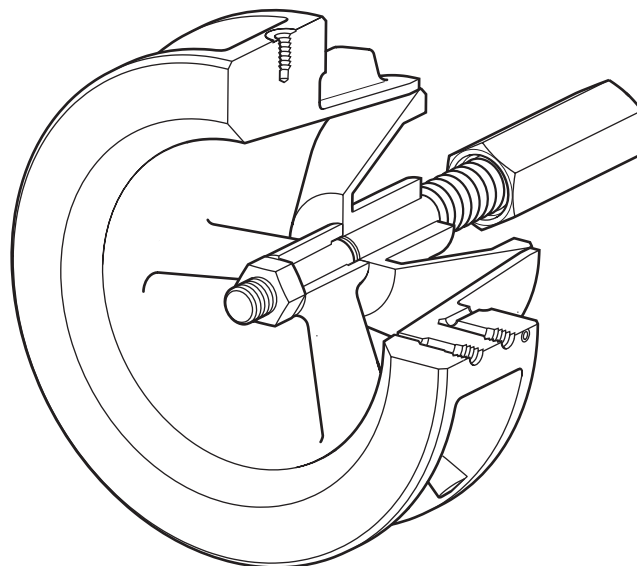
Part	Material
Body	Cast stainless steel S.316 (CF8M/1.4408)
Internals	431 S29/S303/S304/S316
Spring	Inconel X750

### Pressure/temperature limits



The product **must not** be used in this region.

Body design conditions	ASME (ANSI) 600
PMA Maximum allowable pressure	1450 psig @ 120°F
TMA Maximum allowable temperature	750°F @ 1000 psig
Minimum allowable temperature	-20°F
PMO Maximum operating pressure is dependant on the flange specification	
Minimum operating pressure	9 psig
TMO Maximum operating temperature	750°F @ 1000 psig
Minimum operating temperature	-20°F
<b>Note:</b> For lower operating temperatures consult Spirax Sarco	
Maximum viscosity	30 centipoise
ΔPMX Maximum differential pressure	200 in
Designed for a maximum cold hydraulic test pressure of	2248 psig



### Performance

The Gilflo ILVA is used in conjunction with linearising electronics such as the M800 flow computer or M750 display unit. Alternatively the output signal linearisation can be performed on an EMS/BEMS or equivalent.

Accuracy when used with M800 or M750:

±1% of measured value from 5% to 100% of maximum rated flow.

±0.1% FSD from 1% to 5% of maximum rated flow.

Repeatability better than 0.25%

Turndown: up to 100:1

**Caution:** The steam mass flow transmitters are uniquely configured at the factory to work with a single, specific Gilflo ILVA flowmeter. For correct operation the configured transmitter must always be installed with its allocated flowmeter. Labels on the packaging give the serial numbers of the matched products.

### Pressure drop

The maximum pressure drop across the Gilflo ILVA pipeline unit is 498 m bar (200 ins water gauge) at maximum rated flow.

### Flow capacity

To determine the capacity of the Gilflo ILVA for different fluids, it is necessary to calculate the equivalent water flowrate  $Q_E$  (in l/min) as described in Step 1, under the section 'sizing the Gilflo ILVA' then selecting the appropriate size of flowmeter from the Table under Step 2 overleaf.

### How to order

Spirax Sarco 10" Gilflo ILVA flowmeter for installation between ANSI Class 300 flanges. The body material is to be 316 stainless steel. The flow medium will be saturated steam at 145 psig and the maximum flow will be 61,730 lbs/hr. For a general description of the Gilflo ILVA metering system, see TI-8-010-US which also gives details of associated equipment.

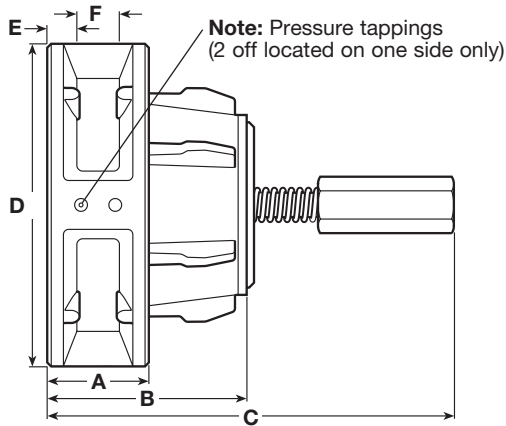
# Gilflo ILVA Flowmeter

## 10" and 12"

### Dimensions/weights (approximate) in inches and pounds

Size	A	B	C	D	E	F	Weight
10"	4.1	8	17.5	13	1.4	1.4	91.5
12"	4.7	9.8	20.9	15.2	1.7	1.4	147.7

**Note:-** Pressure tapings are threaded 1/4" NPT



### Safety information, installation and maintenance

For full details see the Installation and Maintenance Instructions supplied with the product.

#### Installation note:

The following main points are given here for guidance:

1. The Gilflo ILVA should be mounted with a minimum of 6 straight pipe diameters upstream and 3 downstream. No valves, fittings or cross sectional changes are permitted within these pipe lengths. Where an increase in nominal pipe diameter is required upstream of the flowmeter, the length of straight pipe should be increased to 12 diameters. Similarly, where a Gilflo ILVA is installed downstream of two 90 degree bends in two planes, a pressure reducing valve or a partially open valve, 12 upstream pipe diameters should be allowed.
2. It is important that the internal upstream and downstream diameters of pipe are smooth. Ideally seamless pipes should be used. It is recommended that slip-on flanges be used to avoid any intrusive weld beads on the internal diameter of the pipe.
3. Care should be taken to install the Gilflo ILVA concentrically in the line. If this is not done, flow measurement errors may occur.
4. The Gilflo ILVA should be mounted horizontally. For vertical installations, consult Spirax Sarco.
5. For steam applications, good basic steam engineering practices should be followed:
  - Correct line drainage through adequate trapping.
  - Good alignment and support of associated pipework.
  - Line size changes achieved by the use of eccentric reducers.

#### Maintenance note:

There are no user serviceable parts in the Gilflo ILVA. A visual check together with confirmation that the orifice/cone reference dimension is within tolerance is possible.

### Sizing the Gilflo ILVA for saturated steam - lb/h

Maximum flowrates in lb/h at different pressures (psig)

**Note:** Maximum steam flowrates are calculated at a differential pressure across the Gilflo ILVA pipeline unit of 200 ins H2O.

Size	Steam pressure psig	15	44	73	102	145	174	218	290	363	435	580
10"	Maximum flow	33786	47675	57708	66128	76959	83379	92162	105216	116909	127654	147172
	Minimum flow	344	476	578	661	769	833	919	1052	1168	1276	1473
12"	Maximum flow	48782	67514	81723	93646	108983	118075	130514	148999	165558	114638	208414
	Minimum flow	487	675	820	939	1091	1179	1303	1490	1658	1808	2083

### Sizing the Gilflo ILVA Meter

In order to determine the flow capacity of a Gilflo ILVA pipeline unit, it is necessary to calculate the Equivalent Water Flowrate ( $Q_e$ ) based on the anticipated actual flow.

Figure 2 is then used to select the appropriate unit.

1. Determine Equivalent Water Flowrate ( $Q_e$ ) in U.S. gpm:

#### Liquids:

$$Q_e = \frac{m}{500} \sqrt{\frac{D_e}{D_i}} \quad \text{or} \quad Q_e = Q_i \sqrt{\frac{D_i}{D_e}}$$

$Q_e$  = equivalent flow rate of water at 70°F (U.S. gpm)

$m$  = maximum flow rate of service liquid (lb/hr)

$D_e$  = density of water at calibration (62.305 lb/ft<sup>3</sup>)

$D_i$  = density of service liquid (lb/ft<sup>3</sup>)

$Q_i$  = maximum flow rate of service liquid (US gpm)

#### Gases:

$$Q_e = \sqrt{D} \times \frac{(0.0158) \times m}{\frac{P_i}{P_s} \times \frac{T_s}{T_i}}$$

$$\text{or } Q_e = (0.948) \times Q_g \sqrt{D} \times \frac{P_s}{P_i} \times \frac{T_i}{T_s}$$

$Q_e$  = water equivalent flow rate at 70°F (U.S. gpm)

$m$  = maximum flow rate of gas (lb/hr)

$D$  = gas density at 14.7 psia, 520°R (60°F) (lb/ft<sup>3</sup>)

$P_i$  = flowing pressure of gas (psia)

$P_s$  = standard atmospheric pressure (14.7 psia)

$T_s$  = standard absolute temperature (520°R)

$T_i$  = flowing temperature of gas (°R = °F + 460)

$Q_g$  = maximum flow rate of gas (SCFM)

#### Steam:

$$Q_e = (0.0158) \times m \sqrt{v}$$

$Q_e$  = water equivalent flow rate at 70°F (U.S. gpm)

$m$  = maximum flow rate of steam (lb/hr)

$v$  = specific volume of steam at normal pressure and temperature (ft<sup>3</sup>/lb)

2. Select from the table below the Gilflo ILVA meter with a maximum  $Q_e$  that closely matches (but exceeds) the application  $Q_e$  determined in step 1.

Flowmeter type	Max. $Q_e$ U.S. gpm	Maximum pressure drop Ins Wg
10"	2047	200
12"	2900	200



## Gilflo ILVA Flowmeters System Overview

### Description

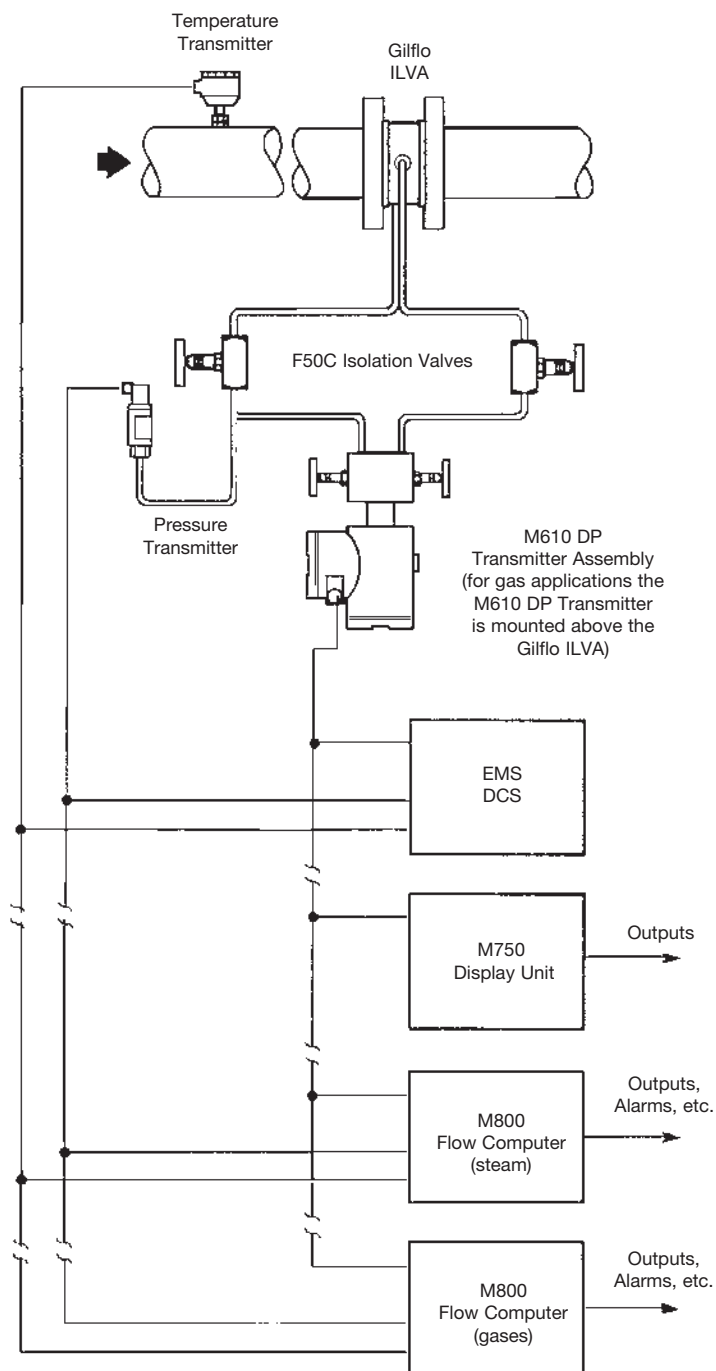
The Gilflo ILVA metering system consists of 2 major parts:

1. The Gilflo ILVA pipeline unit. This is installed in the line where the flow is to be measured. Using impulse pipework, this is connected to:
2. The M610 DP transmitter assembly. This measures the differential pressure across the Gilflo ILVA pipeline unit and converts it to a 4-20mA output signal. This output signal can be used in a number of ways:
  - a- To act as a suitable input to an EMS/DCS which can be programmed by the user to carry out the linearizing of the output signal based on the calibration data that is supplied with each Gilflo ILVA meter. Additional inputs from the pressure and temperature transmitters can be used to carry out density compensation for compressible flow applications.
  - b- To supply an M750 Display Unit. This gives a non-compensated display of rate of flow and totaled flow. It is suitable for liquid, gas and steam applications where density compensation is not required.
  - c- To supply an M800 (steam) or (gas) Flow Computer. Use of the pressure and temperature transmitters enables automatic density compensation to be carried out for compressible flow applications. See relevant TIS's for details of pressure/temperature limits for M800 Flow Computers.

The Gilflo ILVA pipeline unit can be used to measure the flow of most industrial liquids, gases and vapors within the pressure and temperature limits detailed in the TIS's.

### Installation

Care must be taken to meet all the requirements of the Installation and Maintenance Instructions that are included with the equipment.



# Gilflo ILVA Flowmeters - System Overview

## Installation points to watch:

1. Ensure that all pipework is adequately supported and properly aligned. Specialcare should be taken to ensure that the Gilflo ILVA pipeline unit is concentrically mounted in the line. (Special installation kits area available to order for sizes 2" to 8").
2. The Gilflo ILVA pipeline unit should be selected on capacity rather than line size. Where line size changes on steam systems are necessary, use eccentric reducers to avoid buildup of condensate.
3. The minimum recommended lengths of straight pipe upstream and downstream are 6D and 3D respectively. See TIS (ref TIS 8.009) for Gilflo ILVA for more details.
4. Take care to ensure the correct direction of flow as indicated by the arrow on the meter body.
5. Take care to avoid reverse flow through the meter.
6. Avoid installing the meter downstream of a pressure reducing valve (especially on steam systems) as this may cause inaccurate readings. Similarly, avoid installing the meter downstream of a partially open valve.
7. Remember that actuated valves may cause rapid pressure fluctuations which could cause damage.
8. On steam or liquid systems, the M610 DP transmitter assembly is mounted below the meter. Take care to ensure that all impulse lines remain full to prevent damage to the DP transmitter through contact with steam or high temperature liquid.
9. For steam applications, care should be taken to ensure adequate line drainage, trapping etc. so as to avoid condensate slugs impacting the meter. Where practical, steam separators should be fitted. These should be drained using a float trap set.
10. For gas applications, the M610 DP transmitter assembly is installed above the pipework. Ensure that the impulse lines allow free drainage of moisture away from the DP transmitter and back into the pipeline.

## Electrical wiring

All electrical wiring must be carried out to the appropriate standards.  
Full wiring interconnection details are included with the equipment.

## Associated equipment

Item	Description	Technical literature
M610	DP transmitter assembly	TI-P335-10 US
Gilflo ILVA	Pipeline unit	TIS 8.009
M750	Display unit	TI-P332-08 US
F50C	Isolation valve	TIS 8.401
M800	Steam flow computer	TI-P331-04-US
M800	Gas flow computer	TI-P333-24-US



## TVA Flowmeter for Saturated Steam Service

### Description

The Spirax Sarco TVA flowmeter is designed for use on saturated steam only and operates on the target principle, by measuring the force produced on a moving cone by the fluid flow. This strain is then converted into density compensated mass flowrate and is transmitted via a single loop powered 4-20 mA and pulsed output. TVA flowmeters also incorporate a totalised flow function and RS 232 Modbus communications.

### Sizes and pipe connections

2", 3" and 4"

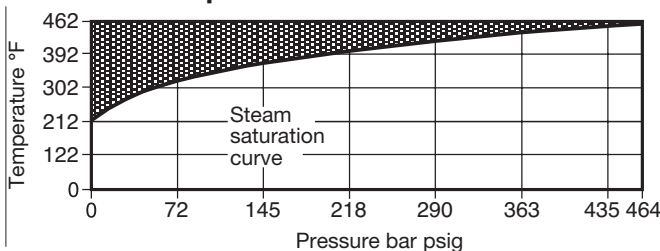
The TVA flowmeter is of wafer design, suitable for fitting between the following flanges: ASME (ANSI) B 16.5 Class 150 and Class 300

#### Note:

The Spirax Sarco TVA flowmeter should be installed in pipework manufactured to BS 1600 or ASME (ANSI) / ASME B 36.10 Schedule 40.

For systems with different standards/schedules, spool pieces manufactured from BS 1600 or ASME (ANSI) / ASME B 36.10 Schedule 40 pipe should be used. If this is not possible, please contact Spirax Sarco.

### Pressure/temperature limits

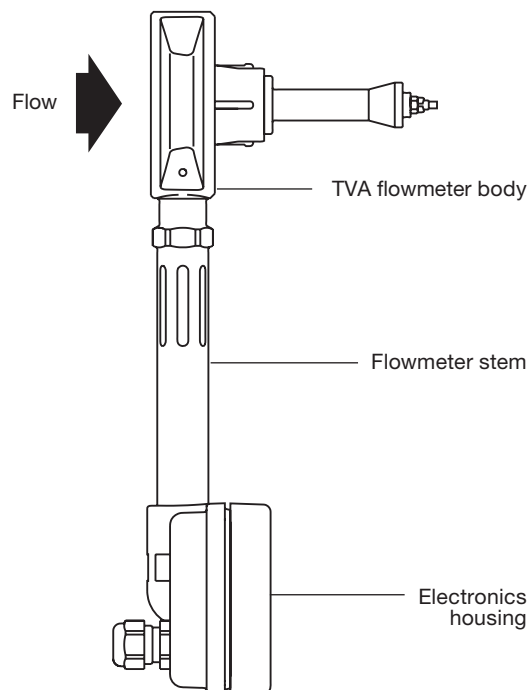


The product should not be used in this region due to software limitations.

Maximum design pressure	464 psig @ 462°F
Maximum design temperature	462°F
Minimum design temperature	32°F
Maximum operating pressure	Horizontal flow 464 psig @ 462°F Vertical flow 101 psig @ 338 F
Minimum operating pressure	9 psig
Maximum operating temperature (saturation)	462°F
Minimum operating temperature	32°F
<b>Note:</b> For lower operating temperatures consult Spirax Sarco	
Maximum electronics ambient temperature	131°F
Maximum electronics humidity level	90% RH (non-condensing)
Designed for a maximum cold hydraulic test pressure of	754 psig

### Materials

Flowmeter body	Stainless steel S.316 1.4408 CF8M
Internals	431 S29/S303/S304/S316
Spring	Inconel X750 or equivalent
Flowmeter stem	Stainless steel 300 series
Electronics housing	Aluminium LM25



### Technical data

IP rating	IP65 with correct cable glands
Power supply	Loop powered nominal 24 Vdc
Outputs	4 - 20 mA (proportional to mass flow) Pulsed output ( $V_{max}$ 28 Vdc $R_{min}$ 10 k $\Omega$ )
Communication port	Modbus EIA 232C (RS 232)

### Performance

The TVA flowmeter has inbuilt electronics which give a density compensated output. An LCD display is incorporated within the electronics head. The M750 display unit can be used to provide a remote display function if required, utilising the 4 - 20 mA output.

#### System uncertainty, to 95% confidence (2 STD): (in accordance with ISO 17025)

±2% of measured value from 10% to 100% of maximum rated flow.

±0.2% FSD, from 2% to 10% of maximum rated flow.

Turndown : up to 50:1

As the TVA flowmeter is a self contained unit, the uncertainty quoted is for the complete system. Many flowmeters claim a pipeline unit uncertainty and for a true system uncertainty, the individual uncertainty values of any associated equipment, such as DP cells, need to be added to the pipeline value.

### Pressure drop

The pressure drop across the TVA is nominally 300 ins water gauge at maximum rated flow for the 2", and 200 inches water gauge for the 3" and 4".



# TVA

## Flowmeter for Saturated Steam Service

**Dimensions/weights (approximate) in inches and pounds**

Size	A	B	C	D	E	Weight
2"	1.4	4.1	12.7	6.3	2.6	5.9
3"	1.8	5.4	13.1	6.3	2.6	9.7
4"	2.4	6.4	13.5	8.5	2.6	16.0

**TVA flowmeter flow capacities and pressure drops**

Flowmeter Type	Maximum QE US gal/min	Maximum DP Wg
2"	80	300
3"	203	200
4"	317	200

### Sizing the TVA flowmeter for saturated steam (lb/hr)

(Horizontal orientation)

Maximum flowrates in lb/hr at different pressures (psig).

**Notes:**

- 1 - Maximum steam flowrates are calculated at maximum differential pressure.
- 2 - For vertical capacities please contact Spirax Sarco.
- 3 - The table below is a guide only.

Size	Steam pressure psig	15	44	73	102	145	174	218	290	363	435	464	psig
2"	Maximum flow	1,365	1,894	2,297	2,637	3,075	3,336	3,695	4,228	4,707	5,148	5,311	lb/hr
	Minimum flow	26	37	46	53	62	66	73	84	95	104	132	lb/hr
3"	Maximum flow	3,501	4,859	5,895	6,768	7,895	8,565	9,482	10,851	12,081	13,215	13,633	lb/hr
	Minimum flow	71	97	117	134	159	172	190	216	243	265	284	lb/hr
4"	Maximum flow	5,456	7,573	9,187	10,547	12,304	13,347	14,778	16,912	18,827	20,593	21,246	lb/hr
	Minimum flow	108	152	183	212	247	267	295	337	377	412	425	lb/hr

### Safety information, installation and maintenance

For full details see the Installation and Maintenance Instructions (IM-P337-51 and IM-P337-52) supplied with the product.

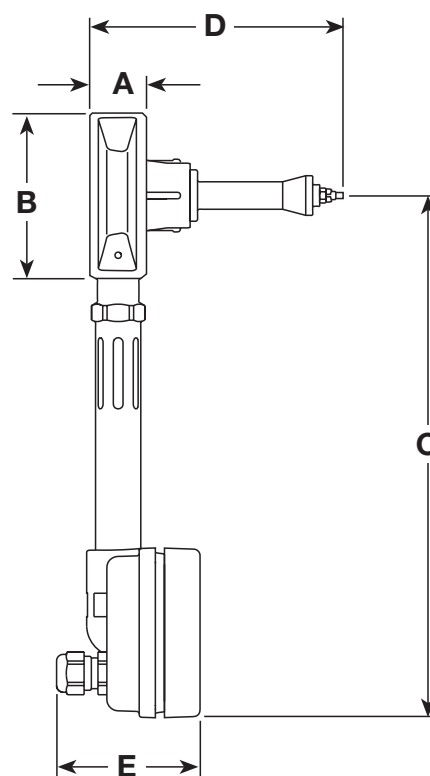
**The following main points are given for guidance only:**

1. The TVA flowmeter should be mounted with a minimum of 6 straight pipe diameters upstream and 3 downstream. No valves, fittings or cross sectional changes are permitted within these pipe lengths. Where an increase in nominal pipe diameter is required, upstream of the flowmeter, the length of straight pipe should be increased to 12 diameters. Similarly, where a Spirax Sarco TVA is installed downstream of two 90 degree bends in two planes, a pressure reducing valve or a partly open valve, 12 upstream pipe diameters should be allowed.
2. It is important that the internal upstream and downstream diameters of pipe are smooth. Ideally seamless pipes should be used and there should be no intrusive weld beads on the internal diameter. It is also recommended that slip-on flanges are used to avoid this.
3. Care should be taken to install the TVA flowmeter concentrically in the line. If this is not done, flow measurement errors may occur.
4. The TVA flowmeter can be installed in any orientation up to a line pressure of 101 psig.
5. As for all steam flowmetering installations, good basic steam engineering practices should be followed:
  - Correct line drainage through adequate trapping.
  - Good alignment and support of associated pipework.
  - Line size changes achieved by the use of eccentric reducers.
  - Do not lag (insulate) the TVA body or the mating flanges.

### How to order

**Example:** 1 off Spirax Sarco 4" TVA flowmeter for installation between ASME (ANSI) B 16.5 Class 150 flanges for use on saturated steam at 145 psig - Maximum flow 12,304 lb/hr.

**Note:** For details of the optional remote display see the relevant Spirax Sarco M750 literature.



## Orifice Plate Flowmeters

### M410 Orifice Plate and Carrier Assembly

#### Description

The M410 Orifice Plate and Carrier assembly is a primary flow element consisting of a tab handled square edged orifice plate and optional carrier. The orifice plate is designed and manufactured to meet the requirements of ASME-MFC-3M in all respects and is suitable for the measurement of the rate of flow of most liquids, gases and steam. The tab handled orifice plate can be used:

- a: on its own fitted between flanges with pressure tapings in the users pipework or flanges.  
or
- b: fitted into a carrier with integral flange tapings designed to fit between customer flanges.

#### Limiting Conditions

The pressure and temperature limitations of both the tab handled plate and the carrier assembly are the same as the specified flange ratings.

#### Performance

The performance of an orifice plate metering system can be greatly influenced by installation variables, so the figures given below are for guidance only:

<b>Accuracy:</b>	typically +/- 3% of actual flow. (equivalent to +/- 1.5% full scale deflection at 50% of rated maximum flow).
<b>Repeatability:</b>	typically +/- 0.3%.
<b>Turndown:</b>	typically 4:1.

#### Pipe Sizes Available

Tab handled plates with or without carriers are available to suit the following pipe sizes:

1", 1-1/2", 2", 2-1/2", 3", 4", 5", 6", 8", 10", 12", 14", 16", 18", 20", 24"

#### Connections

Tab handled plates and carriers are available to suit the following flange specifications:

ANSI B 16.5 class 150, 300, 600.

#### Construction Materials

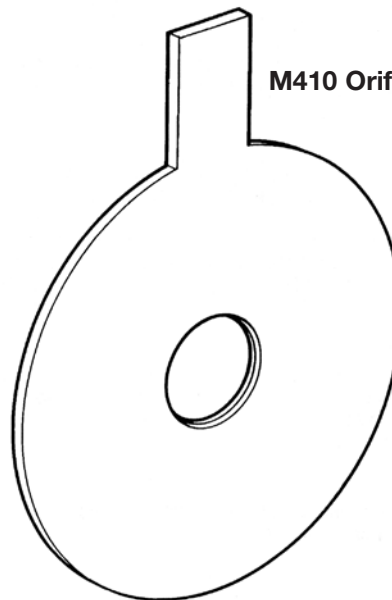
Tab handled orifice plate	Stainless Steel Grade 316
Carrier	passivated zinc plated carbon steel
Gaskets	exfoliated graphite

#### Pressure tapings

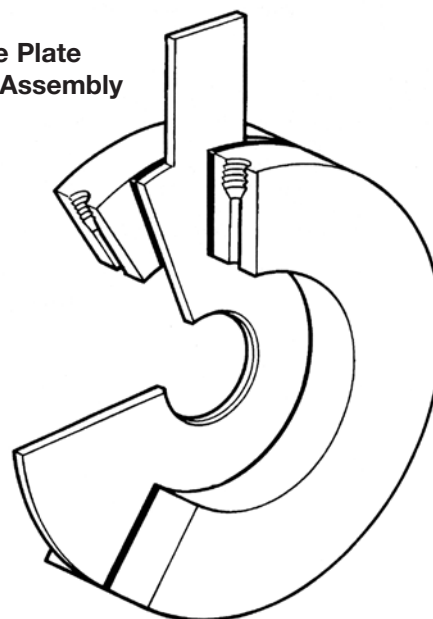
When the tab handled orifice plates are used without the optional carrier, it is the responsibility of the user to provide appropriate pressure tapings in either the flanges or upstream and downstream pipework in line with ASME-MFC-3M.

The optional carrier assembly incorporates upstream and downstream pressure tapings threaded 1/2" NPT. These tapings are 1 inch either side of the orifice plate face in line with the requirements of ASME-MFC-3M

M410 Orifice Plate



M410 Orifice Plate and Carrier Assembly



# Orifice Plate Flowmeters

## M410 Orifice Plate and Carrier Assembly

### Associated Equipment

M800 series steam flow computer	TI-P331-04-US
M800 series gas flow computer	TI-P333-24-US
M750 display unit	TI-P332-08 US
M610 DP transmitter assembly	TI-P335-10 US
F50C isolation valve	TIS 8.401
EL2270 temperature sensor	TIS 8.402
EL2271 temperature sensor & transmitter assy.	TIS 8.402
EL2810 temperature transmitter	TIS 8.402
EL2600 pressure transmitter	TIS 8.403

For a general description of orifice plate flowmetering systems, see TIS 8.202 (density compensated system) and TIS 8.201(non density compensated system).

### Installation

It is important that all details of the installation conform to ASME-MFC-3M. Of special note, is the long, straight lengths of pipe that must be present upstream of the orifice plate. As an approximate guide, 20 to 30 pipe diameters upstream and 5 downstream should be adequate but it is recommended that reference is made to the relevant standard. A summary of the basic requirements is included with the M410 equipment.

### Maintenance

A visual inspection of the orifice plate should be made at regular intervals to check for dirt buildup, damage or a loss of sharpness of the upstream edge of the plate. Replacement orifice plates and gaskets are available from Spirax Sarco.

### How to Specify

M410 Orifice plate primary element with/without optional carrier assembly conforming to ASME-MFC-3M.

### How to Order

1- Orifice plate and carrier assembly.

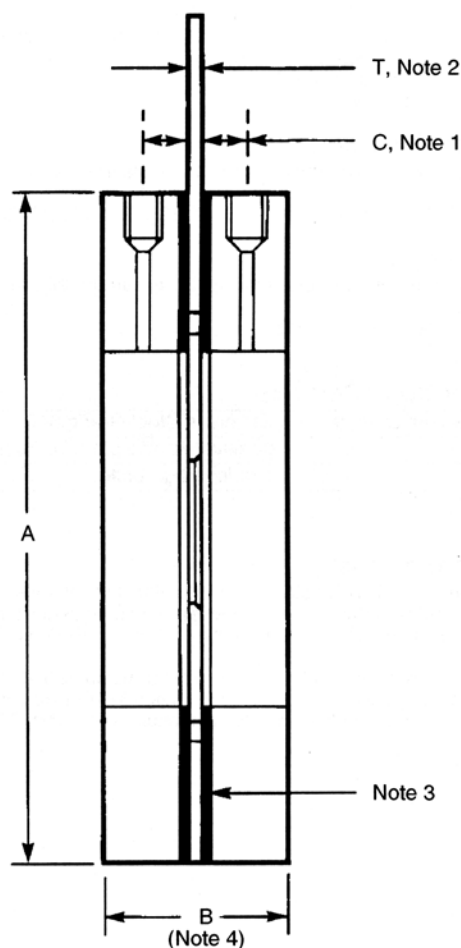
**Important note:** In order that a correctly sized orifice plate can be supplied, it is essential that full details of the installation and estimated flow rates are supplied. This is best done using an orifice plate customer data sheet (TIS 8.203) info available from your local representative.

### Notes:

- 1: Dimension C is 1 inch for all sizes.
- 2: For line sizes 1" to 10", orifice plate thickness T is 3mm, 12" and above, T is 6mm.
- 3: Gaskets are 1.6 mm thick.
- 4: For line sizes up to 14", carrier assembly thickness B is 82mm, 16" and above, B is 85mm.
- 5: Maximum weights shown are based on ANSI 600 flanges.

### Dimension (approximate) in inches

Inches	ANSI 150 A	ANSI 300 A	ANSI 600 A	Maximum Weight Lb
1	2.63	2.87	2.87	5.20
1-1/2	3.37	3.75	3.75	8.20
2	4.12	4.37	4.37	10.82
2-1/2	4.87	5.13	5.13	13.69
3	5.37	5.88	5.88	17.44
4	6.87	7.13	7.63	30.31
5	7.75	8.5	9.5	46.25
6	8.75	9.88	10.5	51.83
8	11	12.13	12.62	68.89
10	13.37	14.25	15.75	105.71
12	16.13	16.62	18	129.50
14	17.75	19.12	19.37	132.72
16	22.61	21.25	22.25	189.58
18	21.62	23.5	24.12	208.07
20	23.87	25.75	26.87	259.46
24	28.25	30.5	31.13	322.69



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TI-8-200-US 10.07

## Orifice Plate Flowmeters

### Orifice Plate Flowmetering System (density compensated)

#### Description

The Orifice Plate Metering system is suitable for measuring the rate of flow of steam, liquids and most gases. For steam and gas flowmetering applications, it is important to take account of changes in flowing density due to flowing pressure and temperature variations. If ignored these changes in flow density will cause significant measurement errors. Liquids being non-compressible do not suffer from this problem and generally density compensation is not required. Compatible Flow Computers, Pressure and Temperature Transmitters are listed in the Associated equipment section.

#### Options available:

The Orifice Plate Metering package is available in a number of options to suit most requirements. For applications requiring density compensation, select one of the four basic options and add a flow computer and pressure/temperature measuring equipment as required:

- |          |   |
|----------|---|
| Option 1 | M410 orifice plate and gaskets  |
| Option 2 | M410 orifice plate, gaskets and M610 DP transmitter assembly  |
| Option 3 | M410 orifice plate, gaskets, carrier ring assembly and F50C isolation valves                                  |
| Option 4 | M410 orifice plate, gaskets, carrier ring assembly and F50C isolation valves and M610 DP transmitter assembly |

**M410 orifice plate.** This is installed in the line at the point where the flow is to be measured. It produces a differential pressure proportional to the rate of flow.

**F50C isolation valves.** These are used to isolate the impulse lines close to the orifice plate.

**M610 DP transmitter assembly.** This is installed close to the orifice plate and converts the differential pressure to a 4-20mA signal for retransmission to other equipment. The M610 is supplied ready fitted with a 3 way manifold which acts as secondary isolation and pressure equalization valve.

#### Associated Equipment

**EL2600 Pressure transmitter.** This is installed in the impulse piping (high pressure side) and provides a pressure signal for density compensation.

**EL2271 Temperature sensor and transmitter assembly.** This is installed in the line upstream of the orifice plate and provides a temperature signal for density compensation. (Suitable for temperatures up to 482°F).

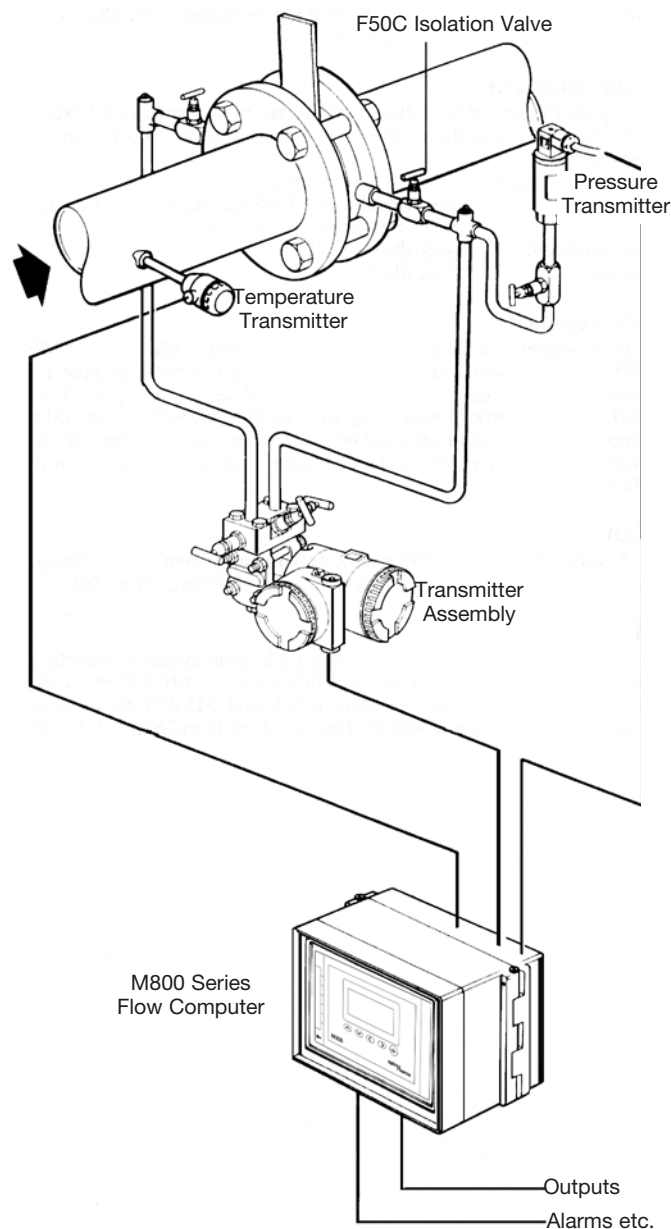
**EL2270 Temperature sensor.** This is a Pt100 temperature sensor that is installed in the line to provide a temperature signal to the remote M800 temperature transmitter. (Suitable for temperatures up to 932°F).

**M800 Temperature transmitter.** This is a remote temperature transmitter for use in conjunction with the EL2270 temperature sensor for applications with temperatures between 482°F and 932°F.

**M800 Series Steam flow computer.** This flow computer is suitable for use with orifice plates on saturated and superheated steam flow applications. It uses the flow, pressure and temperature signals to carry out necessary density compensation calculations for all steam conditions up to a maximum of 609 psig/932°F. Outputs to drive the DP, pressure and temperature transmitters are standard.

**M800 Series Gas flow computer.** Details as for the M800 gas flow computer except that the M800 gas flow computer is for gas applications.

M410 Orifice plate and Carrier assembly



Typical configuration shown here is for a superheated steam application. Gas applications will differ slightly.

# Orifice Plate Flowmeters

## Orifice Plate Flowmetering System (density compensated)

### Density Compensated System Requirements

In addition to a M410 assembly (Option 1 - 4), the following components are required:

#### Saturated Steam

Either a EL2600 pressure transmitter or a EL2271 temperature transmitter (substitute with EL2270 for temperatures above 482°F), and a M800 series steam flow computer.

#### Superheated Steam

Both a EL2600 pressure transmitter and a EL2271 temperature transmitter (substitute with EL2270 for temperatures above 482°F), and a M800 series steam flow computer.

#### Gases

Both a EL2600 pressure transmitter and a EL2271 temperature transmitter (substitute with EL2270 for temperatures above 482°F), and a M800 series gas flow computer.

### Performance

The performance of an orifice plate metering system can be greatly influenced by installation variables, so the figures given below are for guidance only:

Accuracy:	typically +/- 3% of actual flow. (equivalent to +/- 1.5% full scale deflection at 50% of rated maximum flow).
Repeatability:	typically +/- 0.3%.
Turndown:	typically 4:1.

### Installation

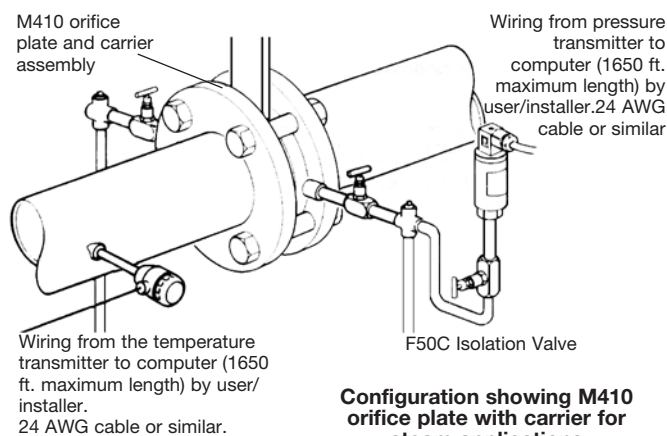
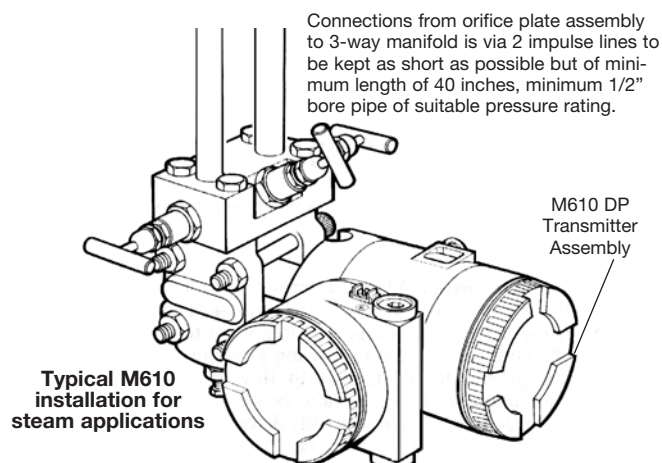
It is important that all details of the installation conform to ASME-MFC-3M. Of special note, is the long, straight lengths of pipe that must be present upstream of the orifice plate. As an approximate guide, 20 to 30 pipe diameters upstream and 5 downstream should be adequate but it is recommended that reference is made to the relevant standard. A summary of the basic requirements is included with the M410 equipment.

### How to Specify

1- M410 Orifice plate flowmeter system with automatic density compensation to meet requirements of ASME-MFC-3M.

### How to Order

1- M410 Orifice Plate Steam Metering System to include tab handled plate and carrier, F50C isolation valves, M610 DP transmitter assembly, EL2600 pressure transmitter and M800 Steam Flow Computer.





## Orifice Plate Flowmeters

### Orifice Plate Flowmetering System (non-compensated)

#### Description

The Orifice Plate Metering system is suitable for measuring the rate of flow of steam, liquids and most gases. For steam and gas flowmetering applications where the operating pressure and temperature are steady, it is not necessary to incorporate any means of automatic density compensation. Liquids, being non compressible, are not significantly affected by pressure and temperature variations and so density compensation is not normally required.

#### Options Available:

The Orifice Plate Metering package is available in a number of options to suit most requirements. For non density compensated applications, the following options are available :

- Option 1 M410 orifice plate and gaskets
- Option 2 M410 orifice plate, gaskets and M610 DP transmitter assembly
- Option 3 M410 orifice plate, gaskets, carrier ring assembly and F50C isolation valves
- Option 4 M410 orifice plate, gaskets, carrier ring assembly, F50C isolation valves and M610 DP transmitter assembly

#### Description

**M410 orifice plate.** This is installed in the line at the point where the flow is to be measured. It produces a differential pressure proportional to the rate of flow.

**F50C isolation valves:** These are used to isolate the impulse lines close to the orifice plate.

**M610 DP transmitter assembly:** This is installed close to the orifice plate and converts the differential pressure to a 4-20mA signal for retransmission to other equipment. The M610 is supplied ready fitted with a 3 way manifold which acts as secondary isolation and pressure equalization valve.

#### Associated Equipment

**M750 Display Unit.** This is a panel mounting flow indicator that displays flow rate and total flow, with analog and digital outputs available. The M750 supplies 19v DC to power the M610 DP transmitter.

#### Performance

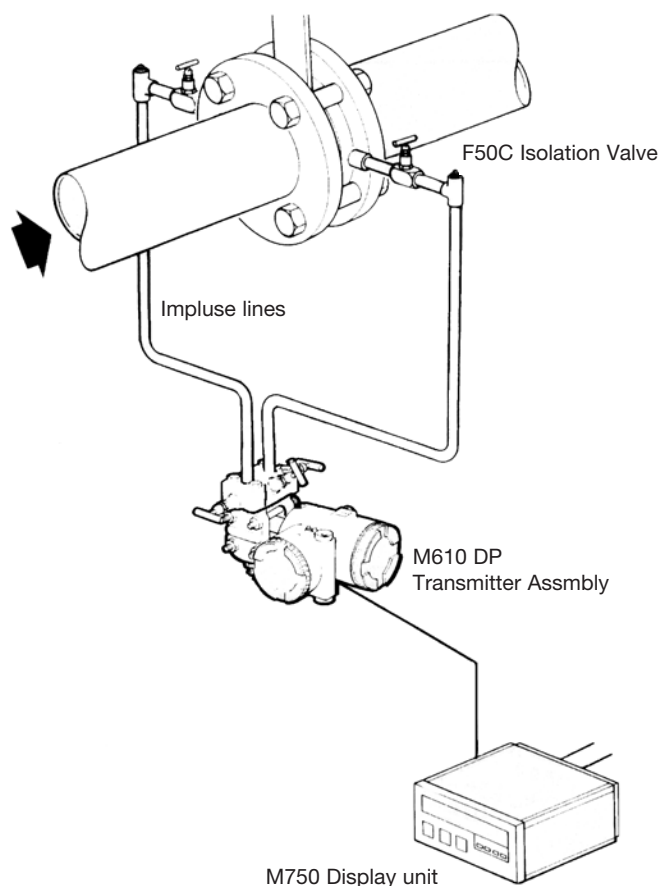
The performance of an orifice plate metering system can be greatly influenced by installation variables, so the figures given below are for guidance only:

- Accuracy: typically +/- 3% of actual flow (equivalent to +/- 1.5% full scale deflection at 50% of rated maximum flow).
- Repeatability: typically +/- 0.3%.
- Turndown: typically 4:1.

#### Installation

It is important that all details of the installation conform to ASME-MFC-3M. Of special note, is the long, straight lengths of pipe that must be present upstream of the orifice plate. As an approximate guide, 20 to 30 pipe diameters upstream and 5 diameters downstream should be adequate but it is recommended that reference is made to the relevant standard. A summary of the basic requirements is included with the M410 equipment.

M410 Orifice Plate and Carrier Assembly



#### How to Specify

1- M410 Orifice plate flowmeter system conforming to ASME-MFC-3M.

#### How to Order

1- M410 Orifice Plate Steam Metering System to include tab handled plate and carrier, F50C isolation valves, M610 DP transmitter assembly and M750 Display Unit. ( Full details as specified on Customer Data Sheet TIS 8.203)



# Orifice Plate Flowmeters

## Customer Data Sheet

This Customer Data Sheet is intended to gather together all relevant information necessary to size and specify an Orifice Plate Flowmetering System. All equipment will be supplied to the customer based on the information received.

<b>Company Name</b>	
<b>Address</b>	
<b>Contact</b>	
<b>Project reference</b>	
<b>Notes</b>	

Please complete all sections and supply drawings, sketches etc. where appropriate.

### Section A: Working Fluid Details

Name of fluid (e.g. steam, water, air )				
State of fluid (e.g. liquid, vapor, gas)				
	<b>Min value</b>	<b>Normal value</b>	<b>Max value</b>	<b>Units</b>
Flowing Pressure				
Flowing Temperature				
Flowing Density				
Estimated rate of flow				

#### Notes:

The pressure drop at specified maximum rate of flow will be 100 inches water gauge unless otherwise stated. Below 25% of specified maximum rate of flow, system accuracy cannot be guaranteed due to turndown limitations of orifice plates.

### Section B: Pipeline Details

	<b>Value</b>
Nominal pipe size (inches)	
Pipe inside diameter (inches)	
Pipe schedule	
Flange rating (ANSI)	
Number of straight pipe diameters upstream	
Number of straight pipe diameters downstream	
Pipe material	
DP Trapping position*	

\*If ordering plate only (no carrier) specify tapping position (corner, flange, D & D/2, or 2.5D & 8D).

Please provide a sketch showing all details of pipework including any valves, bends, fittings etc in the area where the M410 orifice plate is to be fitted. This is important as the performance of all orifice plates can be affected greatly by installation factors. Using the information from sections A and B the correct orifice plate sizing will be accomplished.

### Section C: M410 Kit Options

The Orifice Plate is available in 4 basic kits. To create a complete metering system, additional components should be selected. The composition of the system is dependent on whether or not density compensation is required.

**Note: Check all items required.**

Option		Check
1	M410 orifice plate and gaskets	
2	M410 orifice plate, gaskets, M610 DP transmitter assembly	
3	M410 orifice plate, gaskets, carrier rings and 2 F50C isolation valves	
4	M410 orifice plate, gaskets, carrier rings, 2 F50C isolation valves and M610 DP transmitter assembly	

### Section D: Associated Transmitters Required for Density Compensated Systems

Item	Range length	Insert	Check	See TIS #
EI 2600 pressure transmitter				8.403
EL2270 temperature transmitter				8.402
EL2271 temperature sensor & transmitter				8.402
Temperature Sensor Pocket				8.402
M800 steam flow computer				TI-P331-04-US

### Section E: Associated Flow Computers

Item	Supply (volts)	Check	See TIS #
M750 uncompensated panel mtd. display			TI-P332-08-US
M800 steam flow computer, wall mtd. *			TI-P331-04-US
M800 steam flow computer, panel mtd. *			TI-P331-04-US
M800 gas flow computer, wall mtd. *			TI-P333-24-US
M800 gas flow computer, panel mtd. *			TI-P333-24-US

\*Provide density compensation

## M750 Display Unit

### Description

The M750 is an intelligent digital panel display unit that can accept inputs from a wide variety of sensors and digitally process and display the signal. In addition, it has the facility to accept up to two 'Option pods', which can be either isolated 4-20 mA retransmission or two normally open alarm relays. The M750 is fully programmable for any specific application from the front panel.

The M750 totaliser function enables non-volatile storage of the integrated total to be maintained within the unit, even after loss of power. The output option pods can be selected to operate on either Process Variable (rate) or Total.

The M750 is ideally suited as a display unit for use with our flowmeters. It can provide an indication of flowrate and totalized flow for Gilflo, ILVA, DIVA, orifice plates and vortex flowmeters as well as providing a 19 Vdc loop power supply where required.

The unit can be used 'stand-alone' or, utilizing the Modbus serial communications, as part of a larger system.

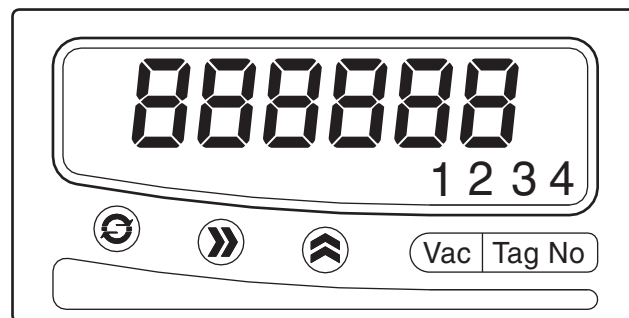
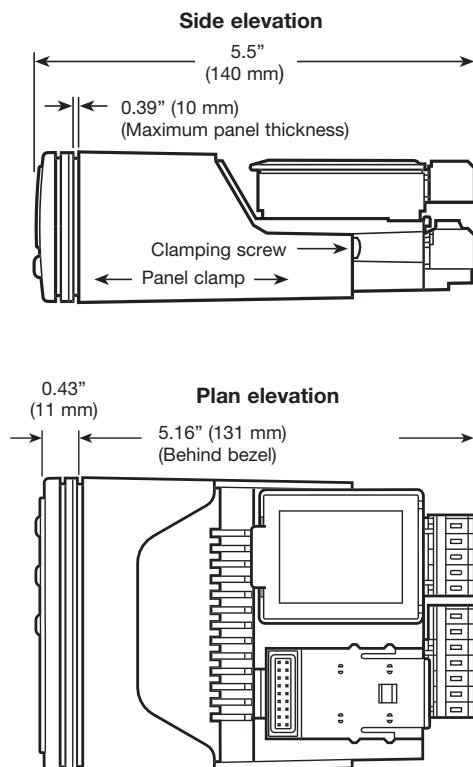
### Technical data

See overleaf.

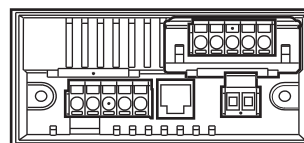
### Weight

0.5 lbs (230 grams)

### Dimensions approximate in inches (millimeters)

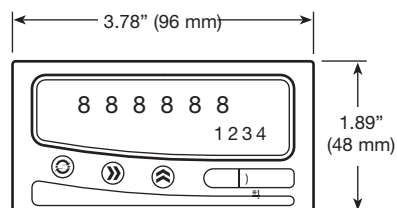


Rear elevation

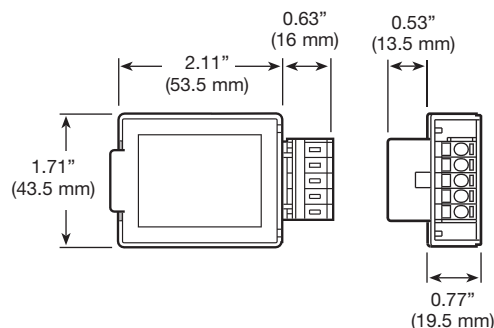


Front elevation

**Panel cut out**  
3.62" (92 mm) x 1.77" (45 mm)



Option pod



### How to specify:

M750 panel mounted digital display unit that accepts all commonly used process signals, designed to allow current retransmission or dual relay output option pods to be easily installed without the need for dismantling or recalibration.

### How to order

Example: 1 off M750 display unit complete with dual relay and current retransmission option pods.



# M750 Display Unit

## Technical data at 68°F (20°C)

<b>Power supply</b>	90-264 Vac 50/60 Hz	
	90-253 Vac 50/60 Hz for compliance with LVD and UL	
	BS EN 61010-1 for connection to an installation over-voltage	
	Category II supply	
<b>Power consumption</b>	Pollution degree 2	
	10 VA (worst case)	
<b>Isolation (tested to)</b>	500 V	
	Supply to I/O 3750 V	
<b>Relay supply</b>	BS EN 61010-1 for connection to an installation over-voltage	
	Category II supply	
	Pollution degree 2	
	Sealing to panel	
<b>Environmental</b>	Ambient operating temperature	NEMA 4 (IP65) -22°F to +140°F (-30 to +60°C)
	Ambient storage	-58°F to +185°F (-50 to +85°C)
	Ambient humidity	10 to 90% RH
	EMC: Emissions and immunity	BS EN 61326
	Safety	BS EN 61010-1
<b>Universal input types</b>	<b>Sensor</b>	<b>Sensor range and linearisation</b>
<b>Sensor and Sensor range and linearisation</b>	<b>mA</b>	4-20 mA, 0-20 mA, 0-10 mA
	<b>RTD</b>	Pt 100, NI 120, custom
	<b>T/C</b>	K, J, T, R, S, B, N, L, B, E, Custom*
	<b>mV</b>	± 100 mV
	<b>Volts</b>	0-10v, 0-5v, 1-5v, 0-1v
	<b>Minimum span</b>	Any span within the range can be selected, but the recommended span is > 10% of range.
<b>Current input</b>	<b>Basic accuracy</b>	0.05% FS plus +/- 0.05% of reading
	<b>Thermal drift</b>	200 ppm/°C
	<b>Input impedance</b>	20 Ω
	<b>Linearity</b>	Linear, X <sup>1/2</sup> , X <sup>3/2</sup> , X <sup>5/2</sup> , Custom*

**A 19 V @ 25 mA isolated power supply is provided to power the current loop.**

\* Custom can be up to 60 co-ordinate pairs or up to 7 segments of 15th order polynomial.

## Option pods

The M750 has interchangeable output pods that are automatically recognised by the unit. The dual relay pod has two independent mains rated relays that can be configured for high or low alarms or pulse output. The isolated re-transmission pod provides 0-10 mA, 0-20 mA or 4-20 mA active or passive outputs.

## Output options

### Dual relay alarm pod

**Two independent mains rated relay outputs**, which can operate as alarms or pulsed output

<b>Contacts</b>	2 x changeover relays with common	
<b>Ratings</b>	ac	dc
<b>Maximum load</b>	5 A@250 V	5 A@30 V (inductive load 2 A)
<b>Maximum power</b>	1 250 VA	150 W
<b>Maximum switching</b>	253 volts	125 volts
<b>Termination</b>	Standard 5 way tension clamp connector	

### Isolated 4-20 mA re-transmission pod

Isolated analogue retransmission for use with chart recorders, Building Management Systems, etc.

<b>Ranges</b>	0-10 mA (Active or Passive),	0-20 mA (Active or Passive),	4-20 mA (Active or Passive)
<b>Minimum current output</b>	0 mA		
<b>Maximum current output</b>	23 mA		
<b>Accuracy</b>	0.07% FS		
<b>Maximum output load</b>	Active 1 K Ω		
	Passive [(Vsupply - 2)/20] K Ω		
<b>Maximum external supply voltage</b>	30 V (Passive mode)		
<b>Isolation</b>	500 Vac		
<b>Termination</b>	5-way tension clamp connector		

## Communications

<b>RS485 Modbus communications</b>	The M750 is available with RS485 serial communications using MODBUS RTU protocol as standard.
<b>Physical layer</b>	4 wire or 2 wire half duplex RS485
<b>Protocol</b>	Modbus RTU format
<b>Isolation</b>	500 Vac
<b>Maximum fan out</b>	32 units (this can be increased with repeaters)
<b>Termination standard</b>	RS485



## M610 Series II DP Transmitter Assembly

### Description

The M610 Series II DP transmitter assembly is designed to accept a differential pressure input from a primary flow element such as an orifice plate or Gilflo flowmeter and convert it into an analogue 4-20 mA output signal. The standard version comes with digital communications in the form of HART® 5.2 which is superimposed on the 4-20 mA output. The 3-way manifold which is supplied already assembled to the DP transmitter acts as a means of secondary isolation and as a pressure equalisation valve to check the zero of the DP transmitter.

The M610 Series II DP transmitter assembly consists of two items:

- A high accuracy (0.1%) differential pressure transmitter.
- A 3-way carbon steel isolation manifold.

**Note:** These items are supplied already assembled.

### Pipe connections

The process ports on the 3-way manifold are threaded 1/2" NPT at 2.126" (54mm) centers.

### Electrical connections

M20 x 1.5 screwed terminals.

### M610 Series II technical data

<b>Span</b>	0 - 52.2" H <sub>2</sub> O (0 - 13 kPa) minimum
	0 - 522" H <sub>2</sub> O (0 - 130 kPa) maximum
<b>Output</b>	4 - 20 mA dc and HART® protocol 5.2
<b>Power supply</b>	16 V to 45 Vdc (for non-certified application)
	16 V to 28 Vdc (for E Ex ia 11c T4 / T5)
<b>Pressure limits</b>	-14.5 to 2030 psig
<b>Temperature limits</b>	-40°F to +185°F (ambient for non-certified application)
	-40°F to +212°F (process)
<b>Accuracy</b>	± 0.1% of calibrated span to include effects of linearity, hysteresis and repeatability.
<b>Materials of construction</b>	Body - Stainless steel.
	Diaphragm - Austenitic stainless steel 316L
	3-way manifold - Carbon steel
	Fluid fill - Silicone oil
<b>Intrinsic safety</b>	ATEX Ex II 1GD - E EX ia 11c T4/T5
<b>Enclosure rating</b>	NEMA 6/6P (IEC IP67)
<b>EMC emissions and immunity</b>	To BS EN 61326:1997

**Note:** If HART® communications are required in intrinsically safe applications, barriers must be used which are designed to pass the HART® signal.

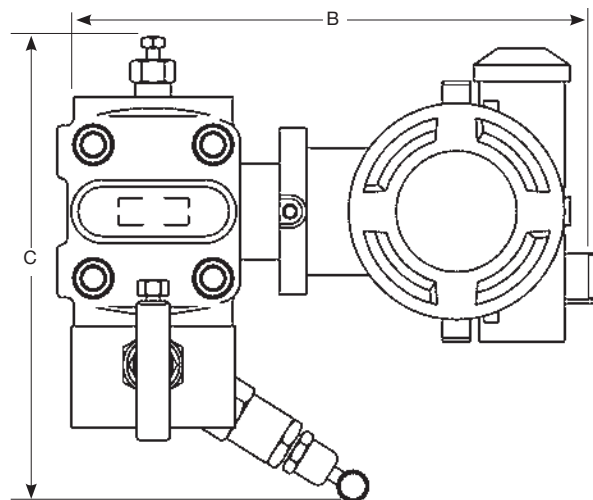
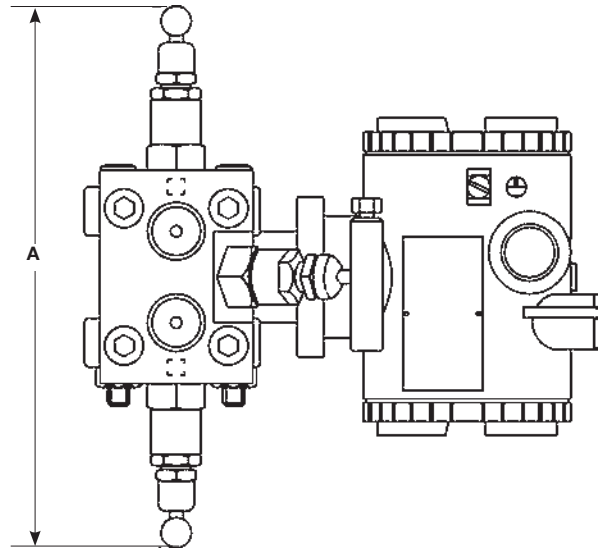
### Calibration

The M610 Series II DP transmitter assembly is supplied with a span factor set to suit a particular application. However, should load conditions and/or details of actual installation change, the range of the M610 can be adjusted within the limits 0 - 52.2" H<sub>2</sub>O (0 - 13 kPa) and 0 - 522" H<sub>2</sub>O (0 - 130 kPa) as described in the Installation and Maintenance Instructions supplied with the product.

### Installation

Full installation details are given in the literature that accompanies the M610 Series II DP transmitter assembly.

*Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only. In the interests of development and improvement of the product, we reserve the right to change the specification.*



### Dimensions / weights (approximate) in inches and lbs.

A	B	C	DP transmitter	3-Way manifold	M610 assembly
8.7"	7.6"	6.9"	14.3 lb	2.2 lb	16.5 lb

### How to order

Example: 1 off M610 Series II DP transmitter assembly calibrated to give an output of 20 mA at an applied differential pressure of specified value.

### Associated equipment

Orifice plate flowmeter.  
Gilflo flowmeter system.



## Scanner 2000 Steam Mass Flow Transmitter

### Description

The Scanner 2000 steam mass flow transmitter takes its inputs from a primary flowmeter, (Gilflo or ILVA) through impulse lines. It converts the differential and static pressure into a corrected mass flowrate of saturated steam, which is accessible via the RS485 Modbus link or optionally via a 4 - 20 mA signal.

### Configuration

Scanner 2000 steam mass flow transmitters are uniquely configured at the factory to work with a single, specific Gilflo or ILVA flowmeter, for a specific flow application.

For correct operation the Scanner 2000 transmitter must be installed with its allocated flowmeter. A label on the packaging gives the serial number of the matched product.

The Scanner 2000 can be configured using an RS485 equipped PC with the supplied configuration software.

#### Note:

A DB9 Serial RS232 to RS485 converter will otherwise be required to connect your PC to the Scanner 2000.

If your PC only has USB ports a USB to DB9 Serial port converter will be required. These are available from most electronic equipment suppliers.

### Available types and approvals

Explosion proof types available:

#### CSA

- Class 1, Div 1, Groups B, C and D
- Type 4 Enclosure
- T6 Temperature Class

#### ATEX

- ATEX II 2 GD
- Ex d IIC T6 (-40°F to 158°F) or
- Ex td A21 IP68 T85C (-40°F to 158°F)
- All Scanner 2000's are compliant

### Features

In head LCD providing local indication of density compensated rate and total saturated steam flow.

RS485 Modbus RTU slave functionality for remote indication, data logging and configuration.

### Associated equipment

- Gilflo flowmeter
- ILVA flowmeter
- M750 flow indicator
- Optional local display

### Materials

Enclosure	Cast aluminium (painted with epoxy and polyurethane)	
Body	Stainless steel	AISI 316
3-way manifold	Stainless steel	AISI 316
Fluid fill	Silicone oil	

### Pipe connections

The process ports on the 3-way manifold are threaded ½" NPT connections at 2½" (54 mm) center.

### Electrical connections



¾" NPT	Non approved and ATEX units
¾" NPT	CSA units

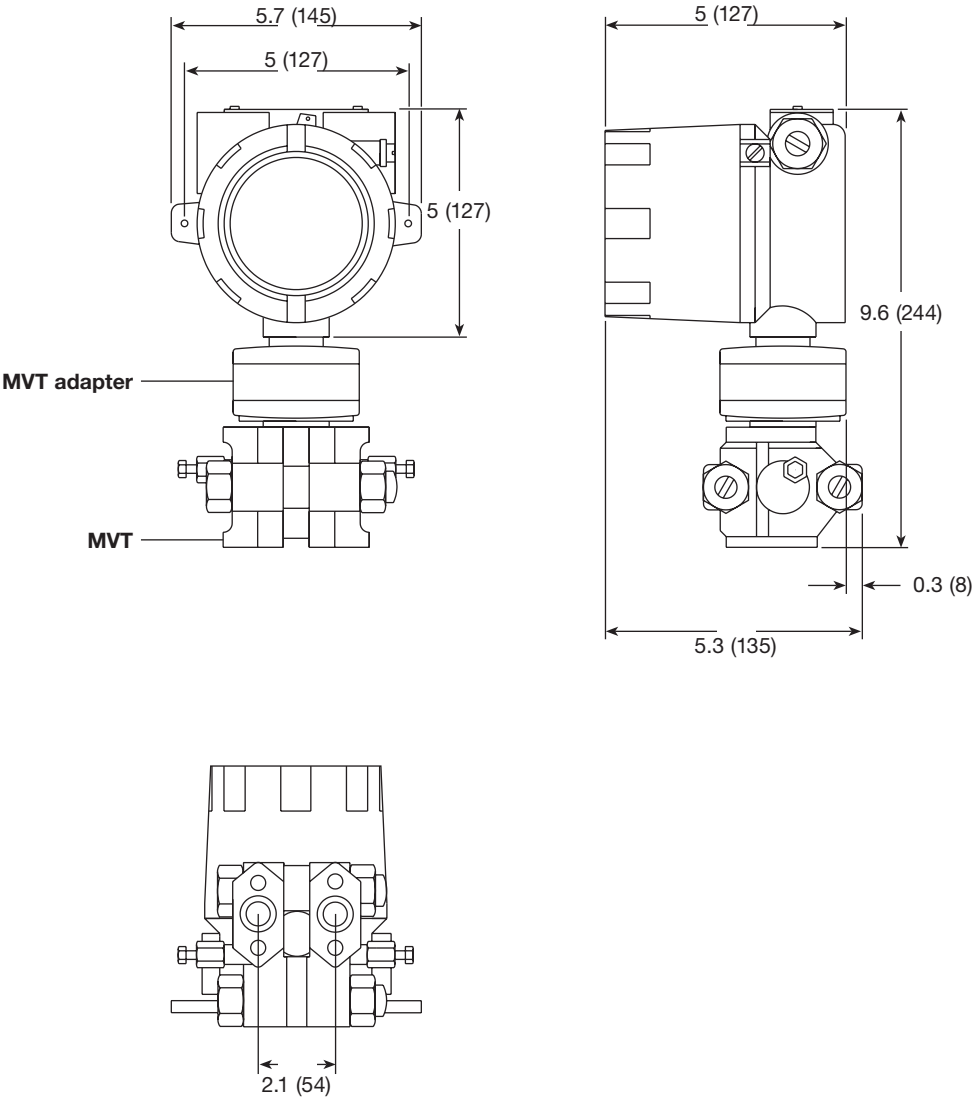
### Technical data

Range	Minimum 2" H <sub>2</sub> O (.498 KPa)
	Maximum 200" H <sub>2</sub> O (49.8 KPa)
Outputs	4 - 20 mA (expansion board required)
	RS485 Modbus RTU slave (baud rate 300 to 38.4 K)
	Solid state relay, configurable as pulse or alarm
Power supply	6 V to 30 Vdc at 31 mA
Pressure limits	155 bar
Temperature limits	-40°F to 158°F (-40°C to 70°C)
	LCD contrast is reduced below -22°F (-30°C)
Accuracy	±0.05% for Spans >10% of the URL
	±0.005 (URL/SPAN) for Spans <10% of the sensor
Enclosure rating	IEC IP68

# Scanner 2000

## Steam Mass Flow Transmitter

Dimensions (approximate) inches (mm)



Weights (approximate) in lbs (kg)

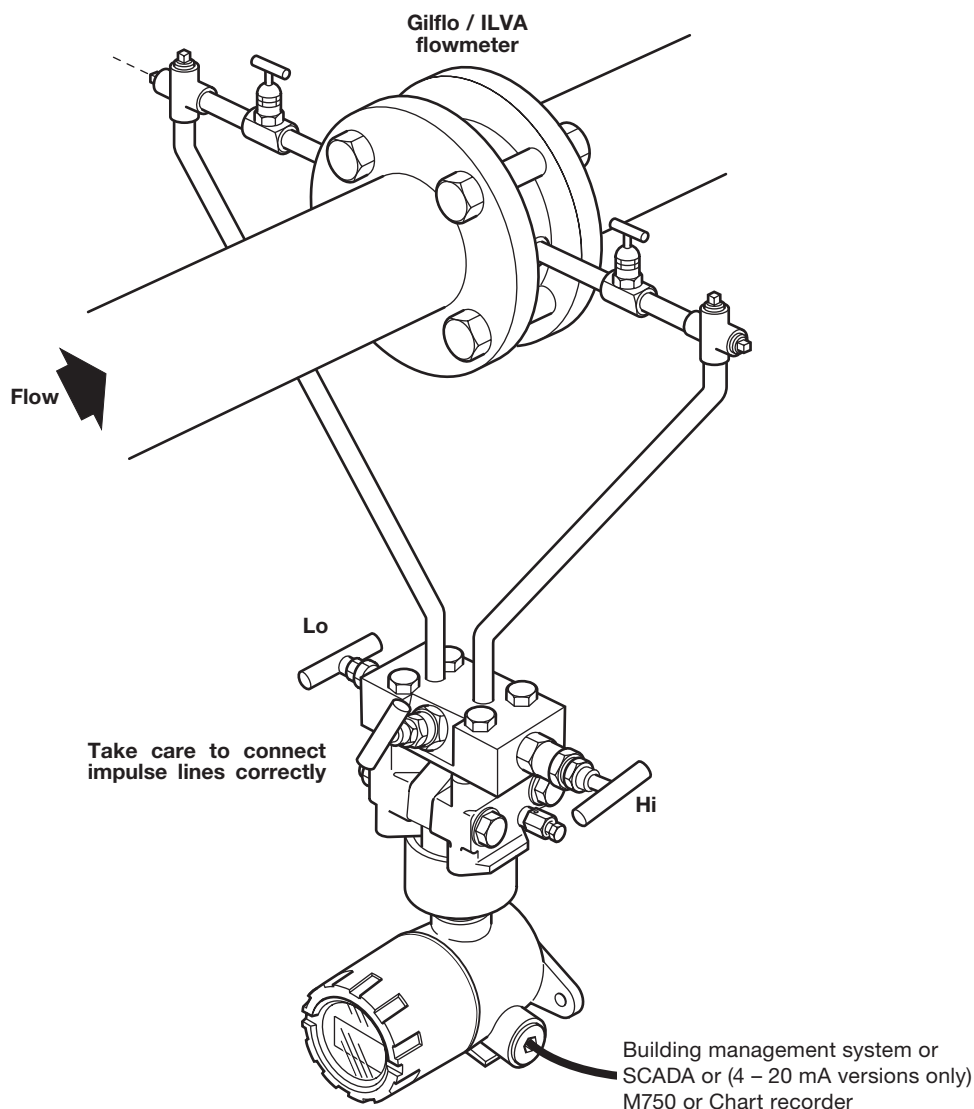
DP transmitter	3-way manifold	Scanner 2000 assembly
11 (5)	2.2 (1)	13.2 (6)

### Safety information, Installation and Maintenance

**Warning:** This document does not give sufficient information for safe installation of the product.  
Full details are given in the Installation and Maintenance Instructions supplied with the Scanner 2000.

# Scanner 2000 Steam Mass Flow Transmitter

## Typical installation



## How to order

The following information will allow us to uniquely configure the Scanner 2000 for each application prior to despatch.

Parameter	Range of values	Customer requirement	Notes
Flowmeter type	Gilflo or ILVA		Specific flowmeter type
Gilflo / ILVA serial number	-		Required for existing flowmeters only
Analog output units	kg/h, lb/h, Btu/h, or kJ/h		Specific required units
Analog output scaling (4 mA)	kg/h, lb/h, Btu/h, or kJ/h		Normally zero
Analog output scaling (20 mA)	kg/h, lb/h, Btu/h, or kJ/h		Normally maximum required flowrate
Maximum range $\Delta p$	2" to 200" H <sub>2</sub> O (0.498 to 49.8 KPa)		From Gilflo and ILVA sizing sheet
Steam quality (Dryness fraction)	60 to 100%		Set at 100% unless otherwise specified

**Example:** 1 off Scanner 2000 steam mass flow transmitter configured for use with a 3" (DN80) ILVA flowmeter passing 4400 lb/h of saturated steam at 101 psig.



## Model F50C Isolating Valve

### Description

The F50C is a needle type isolating valve designed for primary isolation in flow metering applications with steam and other industrial fluids.

### Material

No	Part	Materials
1	Body	Carbon steel zinc plated and passivated
2	Seals	Graphoil (not shown)

Maximum operating pressure: 5990 psig  
Maximum operating temperature: 806 degrees F

### Dimensions (approximate) in inches

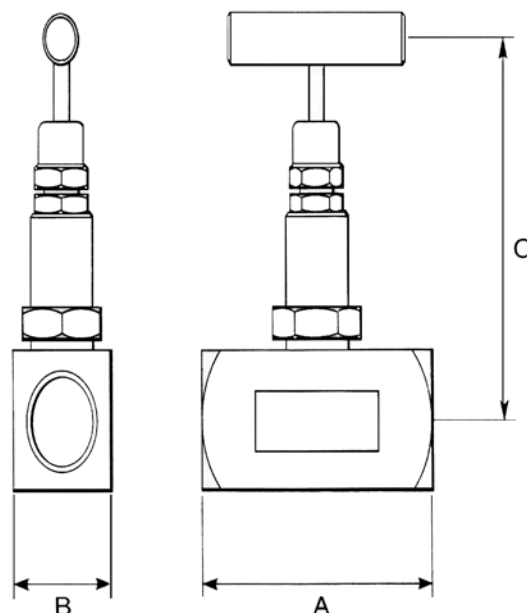
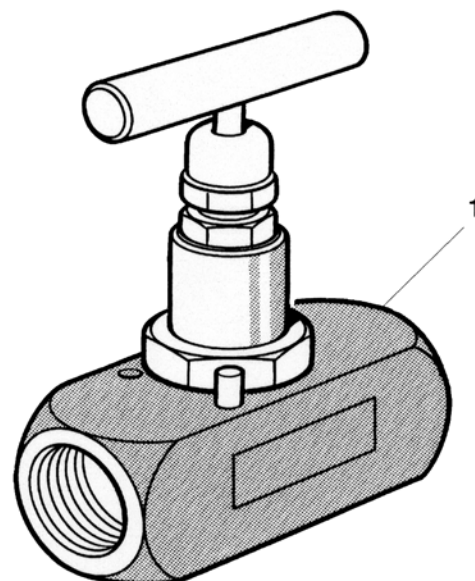
A	B	C	Weight
2.6	1.1	3	1.1 lb

### Connections

0.5" NPT female (both ends).

### How To Specify

Model F50C Isolating Valve.



## EL2270 and EL2271 Temperature Probes

### Description

#### EL2270

The EL2270 is a Pt100 platinum resistance temperature sensor for general industrial use. The sensing device is an RTD 3 wire device that meets EN 60751: Class A. This sensor can be connected directly to any temperature indicator or controller that has a 3 wire Pt100 input. A quick response version [1.5" (40 mm) insertion length only] is also available for applications such as plate heat exchanger control. A miniature version of the EL2270 may also be ordered. This has a 1/4" BSP taper thread, and a tip length of 1.5" (39 mm).

#### EL2271

The EL2271 is a combined Pt100 sensor and transmitter assembly. The sensing element is a 3 wire device that meets EN 60751: Class A and the transmitter has a 4 - 20 mA output. The transmitter (only) meets ATEX II 1G EExia IIC/IIB T4/T5/T6. A comprehensive standard range is normally available from stock. Non-standard ranges can be obtained to special order, subject to a low limit of -58°F (-50°C), and a maximum of 932°F (+500°C). The 4 - 20 mA output can be connected directly to any temperature indicator, controller or flow computer that has a 4 - 20 mA input. Contact your local representative for further details. Transmitters with 3 point calibration are available to special order.

### Pockets (thermowells)

#### General

Three types of pockets are available:

1. Thin wall with a 1/2" NPT process connection for non-flow applications only.
2. Drilled taper with a 1/2" NPT process connection.
3. Hygienic, to 3A sanitary standard, with a 1 1/2" sanitary clamp connection (ASME BPE) electropolished to 0.4 µm (a Declaration of Conformity is available).

**Note:** No pocket is available for the miniature EL2270.

Material	316 stainless steel
Maximum temperature	932°F (500°C)

#### Selection

Pockets are sized to suit the probe tip length 'D', and are specified as 'pocket to suit a \_\_\_ inch (mm) probe'.

**Note 1** - The pocket dimension 'F' is 1" (25 mm) shorter than the probe length 'D', which appears to be incorrect. The reason is that the threaded body of the pocket acts as a stand-off, and therefore allows adequate clearance between the probe tip and the end of the pocket.

**Note 2** - Pockets to suit 8.86" (225 mm) and 28.5" (725 mm) probes are for non-flow applications only [maximum flow velocity 2.13 fps (0.65 m/sec)].

### Dimensions (approximate) in inches (mm)

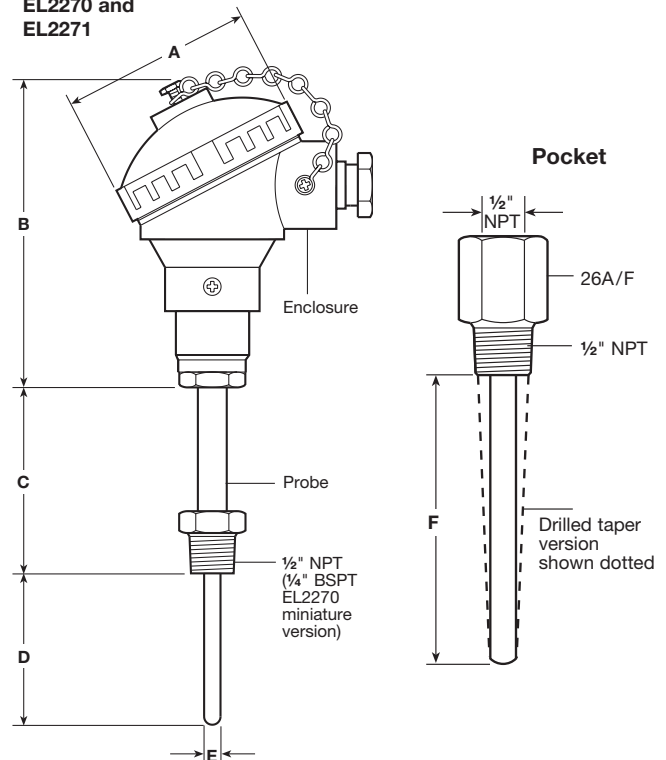
Product range	EL2270*			EL2271
	Standard	Miniature	Quick response and duplex quick response	
A	3.5" (88)	2.25" (58)	3.5" (88)	3.5" (88)
B	5" (130)	2.4" (62)	6" (150)	5" (130)
C	3" (75)	2.5" (63)	3" (75)	3" (75)
D	1", 2", 3", 4", 9", 28.5" (25, 50, 75, 125, 225, 725)	1.54" (39)	1.57" (40)	1", 2", 3", 4" (25, 50, 75, 125)
E	.25" (6)	.25" (6)	.18" (4.5)	.25" (6)

**Notes:** The quick response EL2270 is only available with an insertion length of 40 mm.

#### Pockets

Product range	Standard		Hygienic 1 1/2" sanitary clamp connector Fabricated
	Fabricated	Solid drilled	
F	7.87", 27.6" (200, 700)	1", 2", 4" (25, 50, 100)	1", 2", 4", 7.87" (25, 50, 100, 200)

EL2270 and EL2271





## Mechanical data

	EL2270*	EL2271
Product range	<b>Note:</b> A quick response version of the EL2270 is also available to order	
Enclosure	KNE - aluminium alloy - epoxy coated	KNE - aluminium alloy - epoxy coated
Probe	316 stainless steel	316 stainless steel
Process connection	1/2" NPT	1/2" NPT
Electrical connection	M20 with cable gland fitted to BS 4568 Part 1	M20 with cable gland fitted to BS 4568 Part 1
Enclosure rating	IP65	IP65
Maximum ambient temperature	158°F (70°C)	Maximum 185°F (85°C) (dependant on ATEX requirement)

\* The EL2270 quick response sensor has a time constant of 1.7 seconds.

## Electrical data

Available ranges	-58°F (-50°C) to 932°F (+500°C)	-58°F (-50°C) to 932°F (+500°C) 46°F (0°C) to 212°F (+100°C) 212°F (100°C) to + 482°F (250°C)
Output	Pt100 to EN 60751: Class A	Loop powered 4 - 20 mA
Output on sensor failure	-	23 mA typical
Supply	-	10 to 30 Vdc
Maximum loop resistance	-	636 Ω at 24 Vdc 909 Ω at 30 Vdc
Transmitter - Thermal drift measuring deviation	-	± 0.1% / 10 K <sub>TAMB</sub> per EN 60770 ± 0.2%

## Approvals

Ex-protection per Directive 94/9/EC ATEX. Intrinsic Safety per EN 50020	-	ATEX II 1G EExia IIC/IIB T4/T5/T6 (Transmitter only)
Permissible ambient temperature	-	-58°F (-50°C) ... 185°F (+85°C) with T4 -58°F (-50°C) ... 158°F (+75°C) with T5 -58°F (-50°C) ... 140°F (+60°C) with T6
Maximum values for connection of the current loop circuit (connections + and -)	-	U <sub>o</sub> = 30 Vdc I <sub>o</sub> = 120 mA P <sub>i</sub> = 800 mW C <sub>i</sub> = 6.2 μF L <sub>i</sub> = 110 μH
Maximum values for connection of the sensor circuit (connections 1 up to 3)	-	U <sub>o</sub> = 6.4 Vdc I <sub>o</sub> = 42.6 mA P <sub>o</sub> = 37.1 mW <b>Group II B:</b> C <sub>o</sub> = 500 μF L <sub>o</sub> = 50 mH <b>Group IIC:</b> C <sub>o</sub> = 20 μF L <sub>o</sub> = 10 mH
EMC emissions and susceptibility	-	EMC directive 89/336/EEC EN 61326:1997 / A1, 1998 / A2.2001

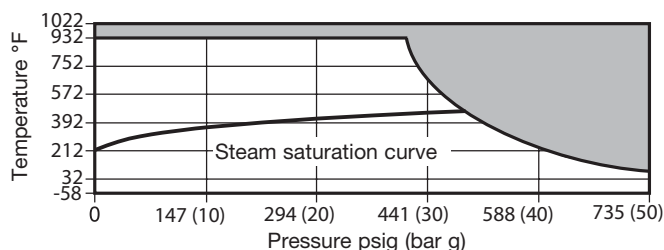
## Pressure/temperature limits

The **EL2270** and **EL2271** temperature probes can be used in applications where the process temperature is within the following limits. Where greater temperatures and pressures are present, the temperature probe should be fitted with a pocket.

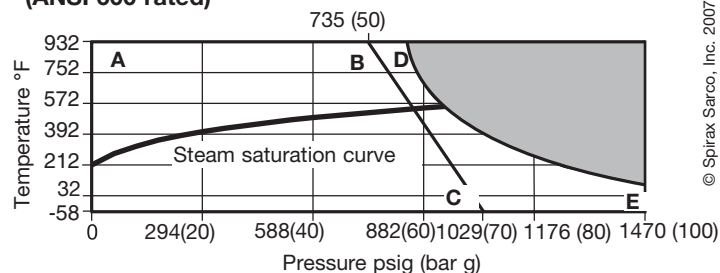
For air and steam applications, flow velocities must be below 147 fps (45 m/s) 105 fps (32 m/s for fabricated pockets).

For liquids a recommended velocity is 16 fps (5 m/s) [27.5 in. (700 mm) and 7.87 in. (200 mm) non-flow applications only].

**Pressure and temperature limits of temperature probe. (ANSI 300 rated)**



**Pressure and temperature limits of standard pockets. (ANSI 600 rated)**



TI-P322-06-US 10.15

## EL2600 Pressure Transmitter and 'U' Syphons

### Description

The EL2600 is a combined pressure sensor and transmitter which is designed for general and industrial use. It has a 2-wire 4-20 mA current loop, and a 1/4" NPT process connection. Two syphon tube and valve assemblies are available, one with a maximum design pressure of 362 psig, and one with a maximum design pressure of 1160 psig.

### Available ranges

Calibrated pressure range	Overpressure P max (psig)
0-23.2 psig, 36 psig	145
0-1.45 psig	145
0-3.62 psig	29
0-8.7 psig	58
0-14.5 psig	72
0-23.2 psig, 36 psig	145
0-58 psig	246
0-87 psig, 0-145 psig	507
0-232 psig, 362 psig	1160
0-580 psig	1740
0-870 psig	2900
0-1450 psig*	4640
0-2320 psig*	7250
0-3626 psig*	11600

**Note:** High pressure 'spikes' above maximum overpressure, even of very short (milli-seconds) duration, could damage sensors. If pressure peaks are likely to occur in your application, we recommend the use of a pressure snubber. Alternatively, a higher range pressure transmitter could be used, though this would mean some loss of signal resolution.

### Process connection

For fluids below 212°F the EL2600 may be mounted directly via its 1/4" NPT connection.

Above 212°F, a 'U' syphon and isolating valve must be fitted between the EL2600 and the vessel or pipeline.

\*No 'U' syphon is available for these ranges, therefore maximum operating temperature is limited to 212°F

### Limiting conditions

#### Pressure/temperature limits EL2600

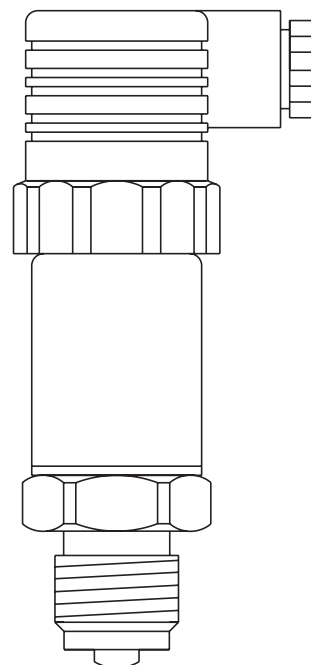
Minimum operating temperature	-22°F (medium)
	-4°F -20°C (ambient)
Maximum operating temperature	212°F (medium)
(without syphon tube)	176°F 80°C (ambient)

#### Low pressure syphon tube/valve

Maximum design pressure	362 psig
Maximum design temperature	500°F
Maximum working conditions	304 psig @ 422°F

#### High pressure syphon tube

Maximum design pressure	1160 psig
Maximum design temperature	842°F
Maximum working conditions	870 psig @ 842°F



### Technical data

Sensor type	0-23 psig to 0-230 psig	Piezoresistive
	0-580 psig to 0-5800 psig	Thin film
Supply voltage	10 Vdc to 30 Vdc	
Accuracy	≤ 0.5%	
Repeatability	≤ 0.05 of span	
Hysteresis	≤ 0.1% of span	
Protection rating	IP65	

### Approvals

EMC emissions	BS EN 61326: 1997 A1 and A2 Table 4
EMC susceptibility	BS EN 61326: 1997 A1 and A2 Table 4
	ANNEX A

### Materials

#### EL2600

Part	Material
Body	Stainless steel 316L WS 1.4435
Connector	Moulded plastic Polyamide PA 66

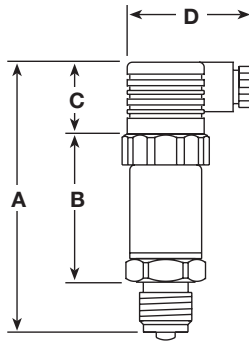
#### Low pressure syphon tube assembly (Valve ordered separately)

Part	Material
Tube	Carbon steel ASTM A 106 Gr. B. Phosphated
Valve	Body Brass
	Handle Phenolic

#### High pressure syphon tube assembly

Part	Material
Tube	Carbon steel BS3602: Part.1 1987 CFS 360 (zinc plated/passivated).
Valve	Body Carbon steel
	Seat PEEK/Polymain

## EL2600



## Dimensions/weights (approximate) inches and pounds

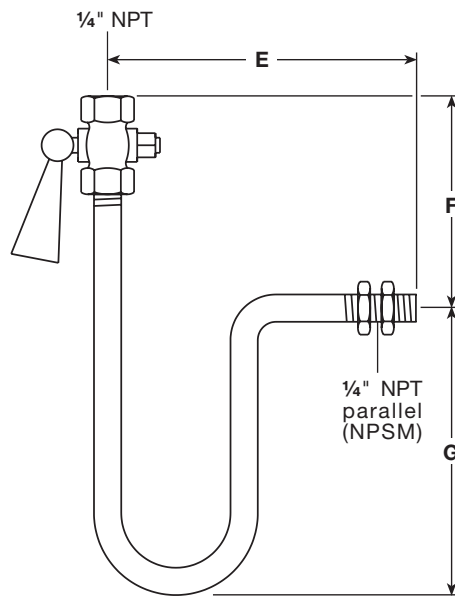
### EL2600

A	B	C	D	Weight
4.1	2.25	1.1	1.9	0.44

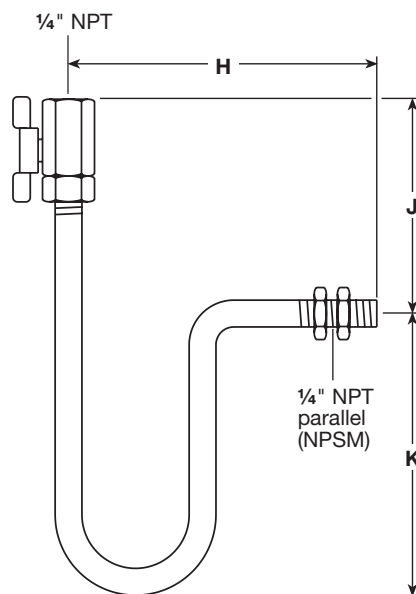
### 'U' Syphon and isolating valve

E	F	G	H	J	K	Weight
6.3	2	6	63	2.4	6	1.1

## Low pressure 'U' syphon



## High pressure 'U' syphon



## Safety information, installation and maintenance

This document does not contain sufficient information to install the product safely. See the Installation and Maintenance Instructions supplied with the product.

### Safety note:

You attention is drawn to Safety Information Leaflet IM-GCM-10.

### Installation note:

It is essential to use a 'U' syphon and valve for temperatures above 100°C to avoid damage to the unit.

### Maintenance note:

No specific maintenance is required, but we recommend inspection and re-calibration of the transmitter once a year.

## How to order

**Example:** 1 - Spirax Sarco EL2600 pressure transmitter, range 0 - 232 psig, with low pressure 'U' syphon and isolating valve.



## MTI10 Insertion and MTL10 In-line Thermal Mass Flowmeter and Temperature Transmitter

### Description

The MTI10 insertion thermal mass flowmeter and the MTL10 in-line thermal mass flowmeter provide accurate mass flow measurement of clean, dry gases using constant temperature differential sensing for fast response and low flow accuracy. Constant temperature differential is achieved by changing the power to the sensor. The amount of power applied to the sensor is proportional to the mass flow rate of the gas being measured. The MTI10/MTL10 is virtually immune to changes in temperature and pressure over a wide range of flow.

The unique Cal-V feature allows for in-situ testing of the meter's accuracy by testing the functionality of the sensor and the processing circuitry.

MTI10\_MTL10 View software allows the user to adjust the meter configuration, monitor alarm conditions, log data and view data from your PC. The MTI10\_MTL10 View software connects the flowmeter to a PC using an USB mini connection.

The MTI10/MTL10 electronics are ideal in environments where high vibration or dirty power may affect meter performance. The transmitter provides a wide range of user outputs including two 4-20mA, pulse or alarm, and Modbus RTU.



Feature	Benefit
Calibrated in actual gas	Better accuracy, surrogate gases are not always linear across entire flow range
Higher power than competitor sensors	Faster response time, wider turndown
Temperature differential sensing	Better low flow accuracy
Cal-V	In-situ validation of sensor and circuitry, no need to return meter to factory
MTI10_MTL10 View	Ability to log data, adjust meter configuration and monitor alarm conditions from a PC
Immune to changes in temperature and pressure	Delivers repeatable, accurate flow measurement under varying flows

### Performance Specifications

Specification	Product	Performance
Accuracy	MTL10 In-line	$\pm 1.0\%$ of rate $\pm 0.2\%$ full scale
	MTI10 Insertion	$\pm 1.0\%$ of rate $\pm 0.4\%$ full scale
Repeatability	MTI10/MTL10	$\pm 0.2\%$ full scale
Straight run requirements	MTL10 In-line	8 diameters upstream, 4 diameters down
	MTI10 Insertion	15 diameters upstream, 10 diameters down
Flow response time	MTI10/MTL10	0.9 seconds
Temperature accuracy	Standard sensor	$\pm 1.0^\circ\text{C}$ ( $\pm 1.8^\circ\text{F}$ )
	High temp sensor	$\pm 2.0^\circ\text{C}$ ( $\pm 3.6^\circ\text{F}$ )
Calibration	MTI10/MTL10	NIST standards using actual application gas

Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only.  
In the interests of development and improvement of the product, we reserve the right to change the specification.

TI-8-632-US 1.16

# MTI10 Insertion and MTL10 In-line Thermal Mass Flowmeter and Temperature Transmitter

## Operating Specifications

### Fluid Type

Dry and clean gas or air

### Line Size

MTL10 in-line: 8mm to 150mm (0.25" to 6")

MTI10 insertion: 40mm (1.5") and larger

### Process Temperature Limit

Standard sensor: -40 to 121°C (-40 to 250°F)

High temperature sensor: 0 to 343°C (32 to 650°F)

### Process Pressure

#### MTI10 insertion

Compression fitting: 34.5 bar (500 psig)

Retractor assembly : 8.6 bar (125 psig)

High pressure retractor (with crank)

NPT: 41.4 bar (600 psig)

ANSI Class 150 and 300; No valve supplied

#### MTL10 in-line

NPT: 34.5 bar (500 psig)

ANSI Class 150: 16 bar (230 psig)

**Note:** Pressure ratings stated for temperatures of 38°C (100°F)

### Input Power

DC: 22-26VDC, 24VDC nominal, 0.75 amp. standard

AC: 85 to 264VAC, 47-63Hz, 20 watts optional

### Ambient Relative Humidity

0 to 90% RH, non-condensing

### Ambient Temperature Limit

DC power: -40 to 70°C (-40 to 158°F)

AC power: -20 to 70°C (-4 to 158°F)

Remote sensor box: -40 to 100°C (-40 to 212°F)

### Cable Conduit connection

ANSI 3/4" NPT

M20 x 1.5mm (optional)

### Signal cable

5 conductor, 18 AWG, twisted, shielded. Maximum length 100 feet.

### Flow range

15 to 60,000 SFPM (0.07 to 280 NMPS)

Turndown: up to 1,000:1; typical 100:1

## Typical Flow Range for MTI10 Insertion

Nominal Size	SCFM	NM <sup>3</sup> /hr
40mm (1.5")	0 - 840	0 - 1,320
50mm (2.0")	0 - 1,400	0 - 2,200
80mm (3.0")	0 - 3,080	0 - 4,860
100mm (4.0")	0 - 5,300	0 - 8,360
150mm (6.0")	0 - 12,000	0 - 18,900
200mm (8.0")	0 - 20,800	0 - 32,800
300mm (12.0")	0 - 46,600	0 - 73,500

## Full Scale Range for MTL10 In-line

Nominal Size	SCFM	NM <sup>3</sup> /hr
8 (0.25)	0 - 20	0 - 32
15 (0.50)	0 - 90	0 - 140
20 (0.75)	0 - 180	0 - 280
25 (1.00)	0 - 320	0 - 500
32 (1.25)	0 - 580	0 - 910
40 (1.50)	0 - 840	0 - 1,320
50 (2.00)	0 - 1,400	0 - 2,200
65 (2.50)	0 - 2,000	0 - 3,150
80 (3.00)	0 - 3,080	0 - 4,860
100 (4.00)	0 - 5,300	0 - 8,360
150 (6.00)	0 - 12,000	0 - 18,900

**Note:** Standard conditions of air at 70°F and one atmosphere. Consult Spirax Sarco for other gases and flow ranges.

## Outputs

### Analog

Two isolated 4-20mA output (one for flow rate, second programmable for flow rate or temperature); fault indication per NAMUR NE43

### Pulse

Isolated pulse output 0 - 100HZ, 5 - 24 volts p/p for flow.

10 amps max.

### Communications

USB - Connect to PC using MTI10\_MTL10 View software provides configuration capability, remote process monitoring, and data logging.

Modbus RTU - RS 485

## Physical Specifications

### Sensor Material

316 stainless steel, Hastelloy C276 (optional)

### Probe

316 stainless steel

### Compression Fitting

316 stainless steel

### Enclosure

NEMA 4X (IP68), aluminum

## Agency Approvals

CE Approved - MTI10, 24 VDC power only

FM and FMC: Approved

Class I, Div. 1, Groups B, C, D; Class II, Div.1, Groups E, F, G; Class III, Div. 1; T3C

# MTI10 Insertion and MTL10 In-line Thermal Mass Flowmeter and Temperature Transmitter

## Dimensions

MTI10 Insertion with retractor, local and remote

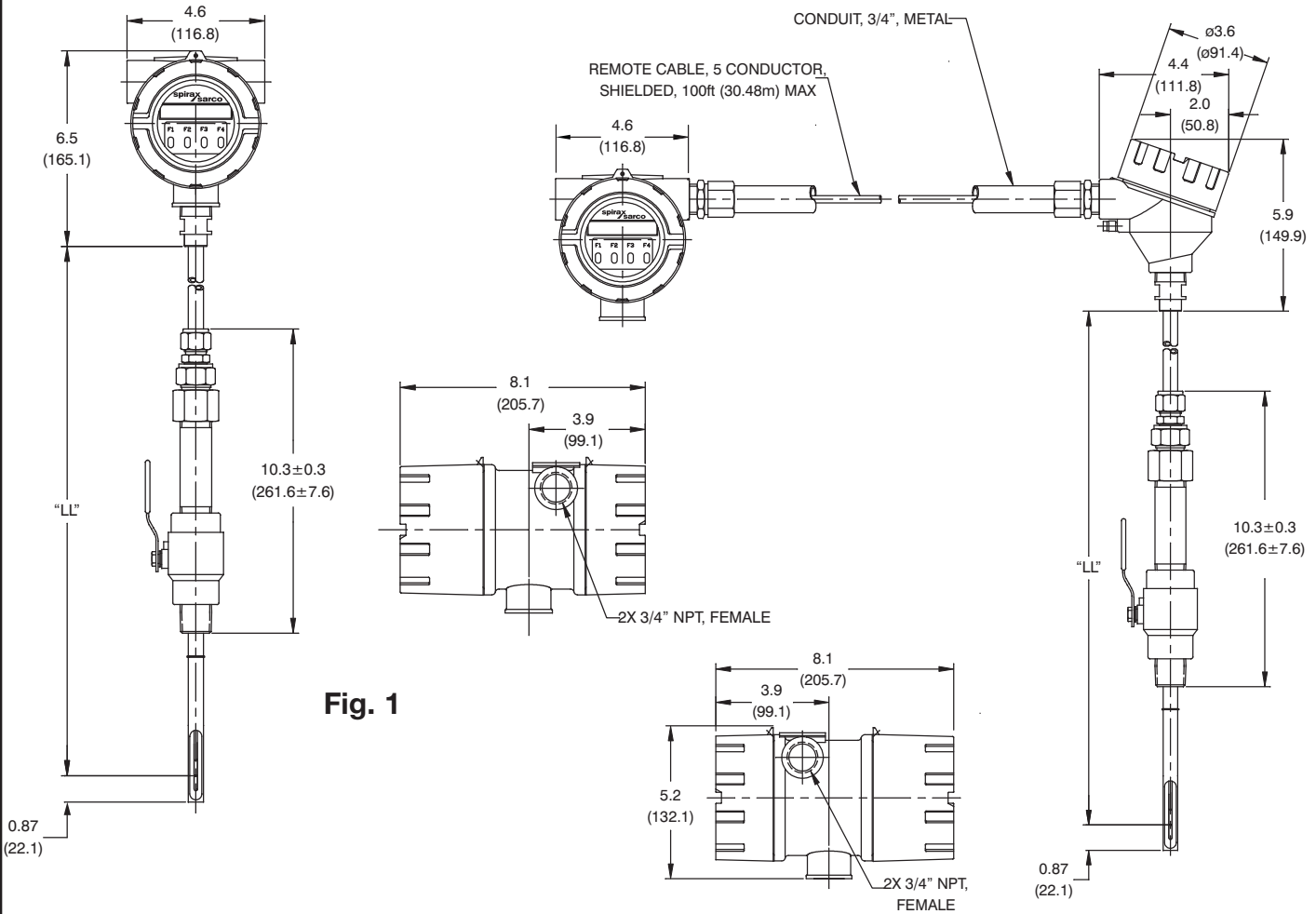


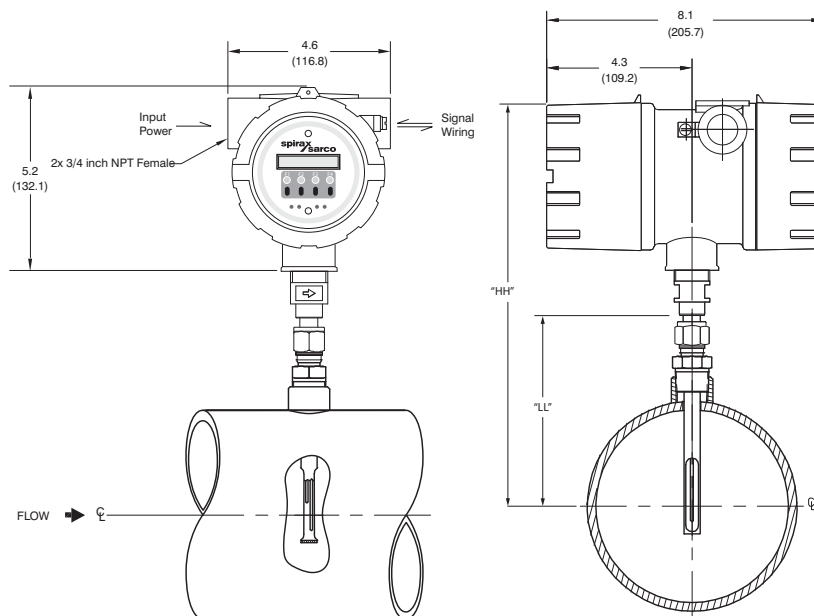
Fig. 1

Fig. 2

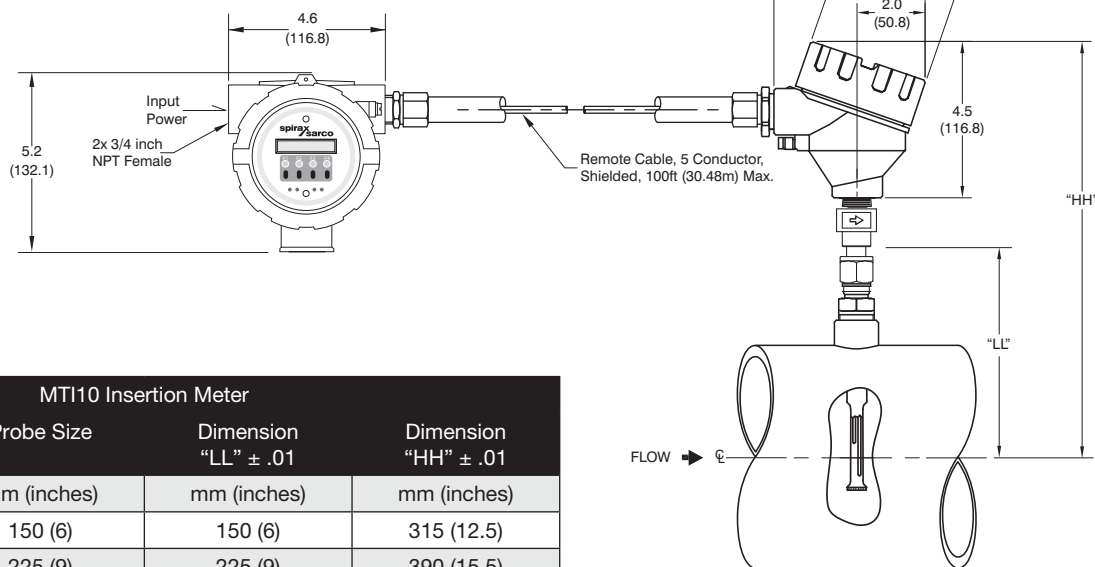
MTI10 Insertion Meter With Retractor		
Probe Size	Probe Size	Dimension "LL" ± .01
Model Code	mm (inches)	mm (inches)
375R	375 (15)	375 (15)
450R	450 (18)	450 (18)
600R	600 (24)	600 (24)
750R	750 (30)	750 (30)
900R	900 (36)	900 (36)

# MTI10 Insertion and MTL10 In-line Thermal Mass Flowmeter and Temperature Transmitter

## MTI10 Insertion with stainless steel probe, local and remote



**Fig. 3**



**Fig. 4**

MTI10 Insertion Meter			
Probe Size	Probe Size	Dimension "LL" ± .01	Dimension "HH" ± .01
Model Code	mm (inches)	mm (inches)	mm (inches)
150I	150 (6)	150 (6)	315 (12.5)
225I	225 (9)	225 (9)	390 (15.5)
300I	300 (12)	300 (12)	470 (18.5)
375I	375 (15)	375 (15)	550 (21.5)
450I	450 (18)	450 (18)	620 (24.5)
600I	600 (24)	600 (24)	770 (30.5)
750I	750 (30)	750 (30)	930 (36.5)
900I	900 (36)	900 (36)	1080 (42.5)

# MTI10 Insertion and MTL10 In-line Thermal Mass Flowmeter and Temperature Transmitter

MTL10 In-line with NPT connections, local and remote

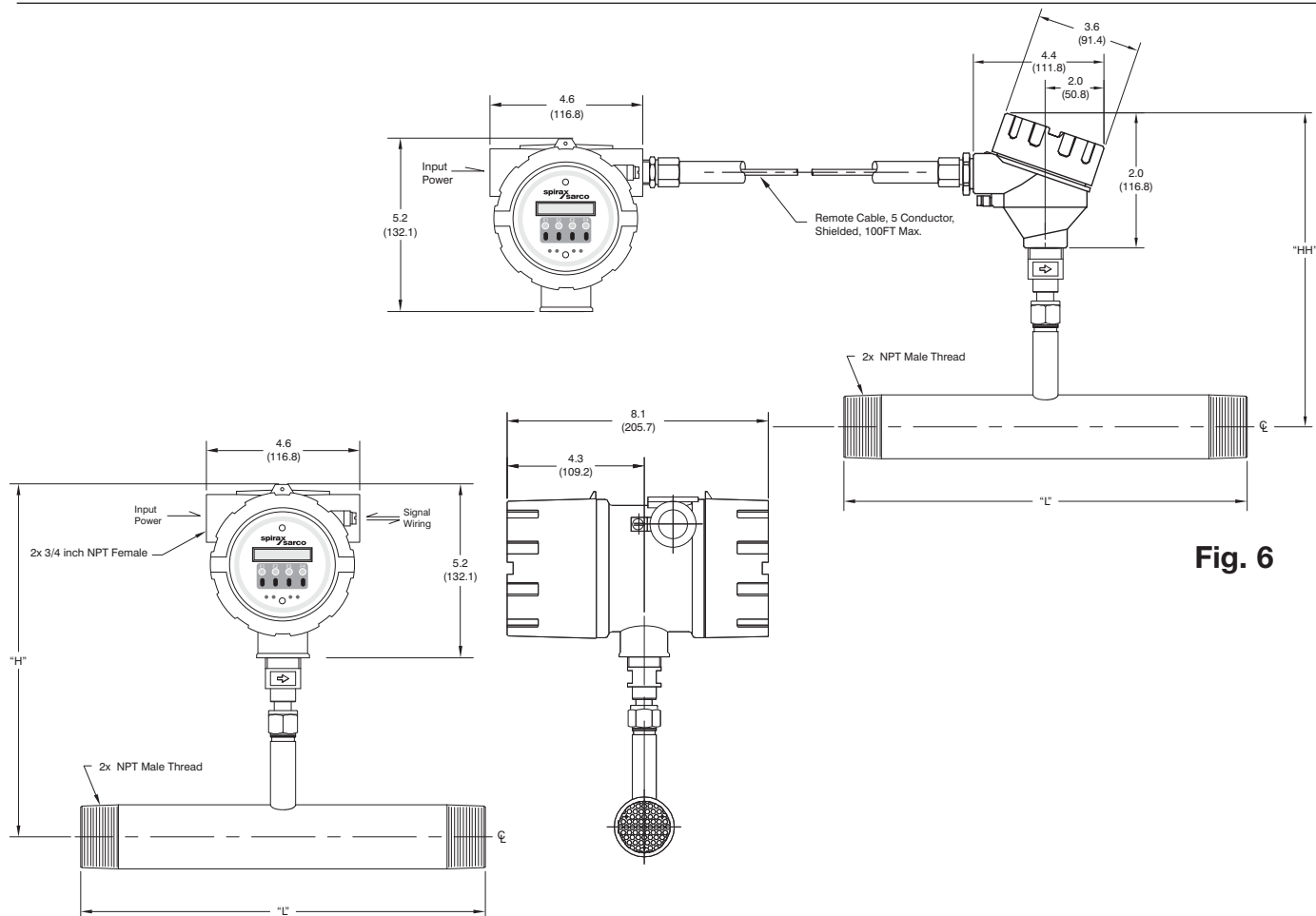


Fig. 5

Fig. 6

In-line Meter With NPT Connections			
Body Size	Body Size	Dimension "L"	Dimension "H"
Model Code	mm (inches)	mm (inches)	mm (inches)
8	8 (0.25)	145 (5.8)	265 (10.5)
15	15 (0.50)	300 (12)	265 (10.5)
20	20 (0.75)	300 (12)	265 (10.5)
25	25 (1.00)	300 (12)	265 (10.5)
32	32 (1.25)	300 (12)	265 (10.5)
40	40 (1.50)	300 (12)	265 (10.5)
50	50 (2.00)	300 (12)	265 (10.5)
65	65 (2.50)	450 (18)	270 (10.6)
80	80 (3.00)	450 (18)	270 (10.6)
100	100 (4.00)	450 (18)	280 (11.1)



# MTI10 Insertion and MTL10 In-line Thermal Mass Flowmeter and Temperature Transmitter

MTL10 In-line with ANSI 150# RF flange connections, local and remote

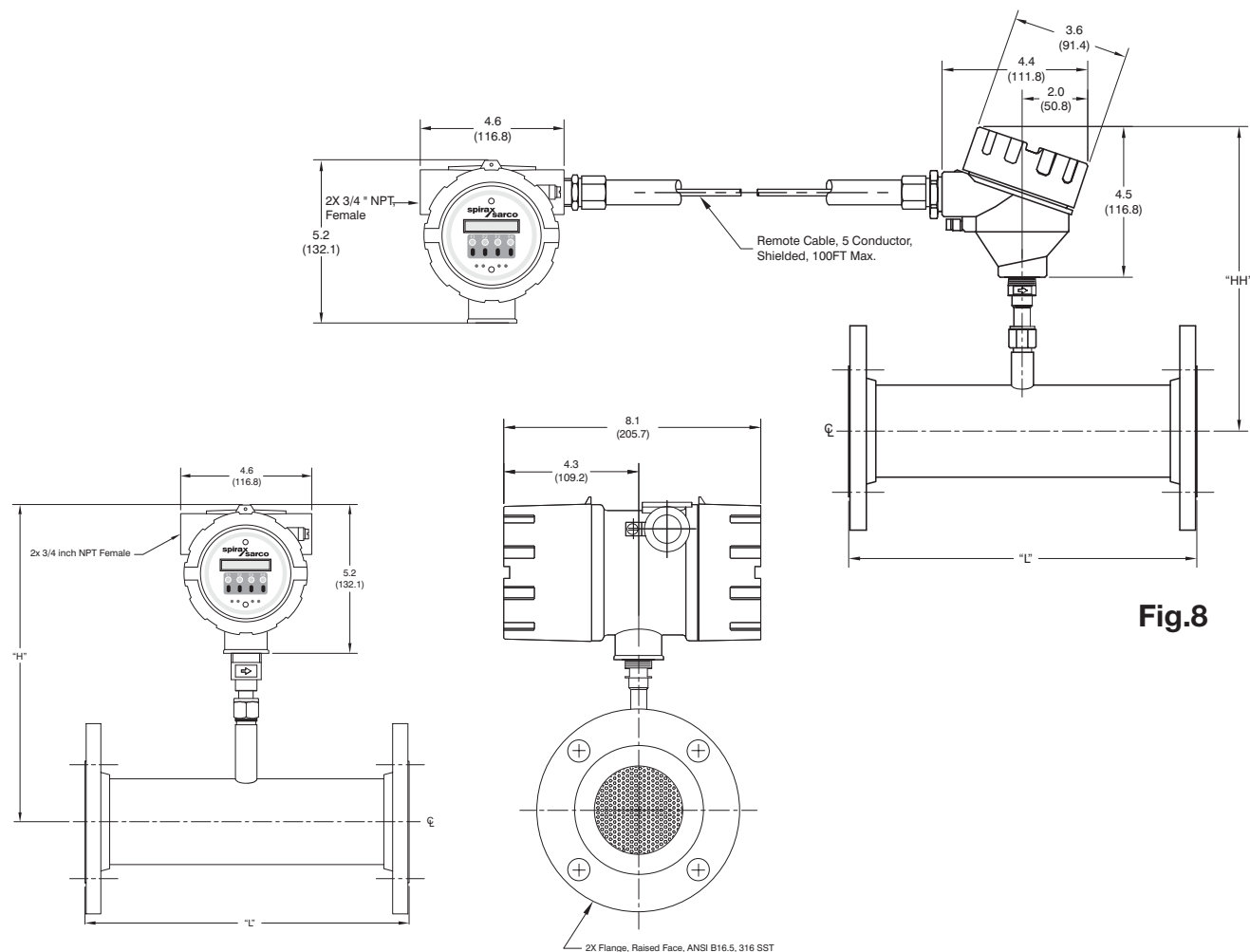


Fig.8

Fig. 7

In-line Meter With Flange Connections			
Body Size	Body Size	Dimension "L"	Dimension "H"
Model Code	mm (inches)	mm (inches)	mm (inches)
15	15 (0.50)	300 (12)	265 (10.5)
20	20 (0.75)	300 (12)	265 (10.5)
25	25 (1.00)	300 (12)	265 (10.5)
32	32 (1.25)	300 (12)	265 (10.5)
40	40 (1.50)	300 (12)	265 (10.5)
50	50 (2.00)	300 (12)	265 (10.5)
65	65 (2.50)	450 (18)	270 (10.6)
80	80 (3.00)	450 (18)	270 (10.6)
100	100 (4.00)	450 (18)	280 (11.1)
150	150 (6.00)	600 (24)	310 (12.2)

# MTI10 Insertion and MTL10 In-line Thermal Mass Flowmeter and Temperature Transmitter

## Ordering Information

### MTI10 Insertion

Category	Description	Suffix Code							
Model	Mass Thermal Insertion & Temperature Transmitter	MTI10							
Probe	150mm (6") Sensor		150I						
	300mm (12") Sensor		300I						
	375mm (15") Sensor		375I						
	450mm (18") Sensor		450I						
	600mm (24") Sensor		600I						
	750mm (30") Sensor		750I						
	900mm (36") Sensor		900I						
	375mm (15") Sensor, 125 psig retractor with 3/4" NPT full port valve		375R						
	450mm (18") Sensor, 125 psig retractor with 3/4" NPT full port valve		450R						
	600mm (24") Sensor, 125 psig retractor with 3/4" NPT full port valve		600R						
	750mm (30") Sensor, 125 psig retractor with 3/4" NPT full port valve		750R						
	900mm (36") Sensor, 125 psig retractor with 3/4" NPT full port valve		900R						
Sensor Material	316 SS wetted parts: temperature sensor, probe, compression fitting			SS					
	Hastelloy C-276 sensor & probe, 316 SS compression fitting			SH					
	Hastelloy C-276 sensor & probe, Monel compression fitting			SJ					
	Hastelloy C-276 sensor & probe, Hastelloy C-276 compression fitting			SL					
Temperature Transmitter Type	Standard -40 to 120°C (-40 to 250°F)			ST					
	High Temperature 0 to 343°C (32 to 650°F) <sup>1</sup>			HT					
Enclosure	Local Enclosure, NEMA 4X, 24 VDC					E1			
	Local Enclosure, NEMA 4X, 85 to 250 VAC					E2			
	Remote sensor J-box, 24 VDC, 100 ft max cable, order separately, requires option board <sup>2</sup>					E3			
	Remote sensor J-box, 85 to 250 VAC, 100 ft max cable, order separately, requires option board <sup>2</sup>					E4			
Display <sup>7</sup>	Rate/Total Display & Configuration Panel						DD		
Option Boards	Blank Option Board <sup>3</sup>							B0	
	Isolated 24VDC power & terminal block for remote sensor <sup>4</sup>							B1	
	Modbus RS485, Isolated 24VDC power & terminal block for remote sensor <sup>4</sup>							B2	

# MTI10 Insertion and MTL10 In-line Thermal Mass Flowmeter and Temperature Transmitter

Calibration <sup>5, 6</sup>	Air, Nitrogen, mass flow < than 2040 NM3M (1200 SCFM)								G1
	Air, Nitrogen, mass flow > than 2040 NM3M (1200 SCFM)								G2
	Argon, Carbon Dioxide, Hydrogen, Natural Gas, Oxygen mass flow < 1700 NM3M (1000 SCFM)								G3
	Argon, Carbon Dioxide, Hydrogen, Natural Gas, Oxygen mass flow > 1700 NM3M (1000 SCFM)								G4
	Carbon Monoxide, Helium, Ammonia, Propane <1190 NM3M (700 SCFM)								G5
	Carbon Monoxide, Helium, Ammonia, Propane >1190 NM3M (700 SCFM)								G6
	Biogas, Digester Gas, Flare Gas, Flash Gas, Vent Gas, and all other gases								G7
Example		MTI10	100I	SS	ST	E1	DD	B2	G3

<sup>1</sup> Remote electronics recommended for all high temperature applications.

<sup>2</sup> Cable not included, it must be ordered separately.

<sup>3</sup> Do not select when ordering remote sensor

<sup>4</sup> Option boards needed for power, communications, and remote display options.

<sup>5</sup> Calibration prices are for new flowmeters only. Contact SSI for recalibration prices.

<sup>6</sup> Above 4,250 NM3M (2,500 SCFM) contact SSI for calibration charge.

<sup>7</sup> Use Display Configuration Code to specify the display orientation based on the flow direction.

Note: Insertion meters can be installed on pipes 40mm (1.5") and larger. Use the inline meters for pipes smaller than 40mm (1.5").

Calculating probe length (probe needs to be installed in the middle of the pipe):

Insertion length = 1/2 the pipe diameter + 80mm (3") + insulation + retractor (codes 15R through 36R use 250mm (10")). Round up to the next largest probe.

# MTI10 Insertion and MTL10 In-line Thermal Mass Flowmeter and Temperature Transmitter

## MTL10 In-line

Line size, pipe material/connection matrix

Line size	Standard Rating Material	NPT		ASME 150	
		SST	CS	SST	CS
8mm (0.25")		Avail			
15mm (0.5")		Avail		Avail	
20mm (0.75")		Avail		Avail	
25mm (1.0")		Avail		Avail	
32mm (1.25")		Avail		Avail	
40mm (1.5")		Avail		Avail	
50mm (2.0")		Avail	Avail	Avail	Avail
65mm (2.5")		Avail	Avail	Avail	Avail
80mm (3.0")		Avail	Avail	Avail	Avail
100mm (4.0")				Avail	Avail
150mm (6.0")				Avail	

## MTL10 In-line Model Code

Category	Description	Suffix Code									
Model <sup>7</sup>	Mass Thermal Inline & Temperature Transmitter	MTL10									
Line Size	8mm (0.25")		008								
	15mm (0.5")		015								
	20mm (0.75")		020								
	25mm (1.0")		025								
	32mm (1.25")		032								
	40mm (1.5")		040								
	50mm (2.0")		050								
	65mm (2.5")		065								
	80mm (3.0")		080								
	100mm (4.0")		100								
	150mm (6.0")		150								
Connection	NPT Male			1NB							
	ASME 150			3AB							
Flow Tube	316 SS				6C						
	A106B Grade B Carbon steel				4D						
Sensor Material	316 SS wetted parts: temperature sensor, probe, compression fitting					SS					
	Hastelloy C-276 sensor & probe, 316 SS compression fitting					SH					
Temperature Transmitter Type	Standard -40 to 120°C (-40 to 250°F)					ST					
	High Temperature 0 to 343°C (32 to 650°F) <sup>1</sup>					HT					
Enclosure	Local Enclosure, NEMA 4X, 24 VDC						E1				
	Local Enclosure, NEMA 4X, 85 to 250 VAC						E2				
	Remote sensor J-box, 24 VDC, 100 ft max cable, order separately, requires option board <sup>2</sup>						E3				
	Remote sensor J-box, 85 to 250 VAC, 100 ft max cable, order separately, requires option board <sup>2</sup>						E4				

# MTI10 Insertion and MTL10 In-line Thermal Mass Flowmeter and Temperature Transmitter

Display <sup>8</sup>	Rate/Total Display & Configuration Panel								DD		
Option Boards	Blank Option Board <sup>3</sup>									B0	
	Isolated 24VDC power & terminal block for remote sensor <sup>4</sup>									B1	
	Modbus RS485, Isolated 24VDC power & terminal block for remote sensor <sup>4</sup>									B2	
Calibration <sup>5, 6</sup>	Air, Nitrogen, mass flow < than 2040 NM3M (1200 SCFM)										G1
	Air, Nitrogen, mass flow > than 2040 NM3M (1200 SCFM)										G2
	Argon, Carbon Dioxide, Hydrogen, Natural Gas, Oxygen mass flow < 1700 NM3M (1000 SCFM)										G3
	Argon, Carbon Dioxide, Hydrogen, Natural Gas, Oxygen mass flow > 1700 NM3M (1000 SCFM)										G4
	Carbon Monoxide, Helium, Ammonia, Propane <1190 NM3M (700 SCFM)										G5
	Carbon Monoxide, Helium, Ammonia, Propane >1190 NM3M (700 SCFM)										G6
	Biogas, Digester Gas, Flare Gas, Flash Gas, Vent Gas, and all other gases										G7
Example		MTL10	008	1NB	6C	SS	ST	E1	DD	B1	G1

<sup>1</sup> Remote electronics recommended for all high temperature applications.

<sup>2</sup> Cable not included, it must be ordered separately.

<sup>3</sup> Do not select when ordering remote sensor

<sup>4</sup> Option boards needed for power, communications, and remote display options.

<sup>5</sup> Calibration prices are for new flowmeters only. Contact SSI for recalibration prices.

<sup>6</sup> Above 4,250 NM3M (2,500 SCFM) contact SSI for calibration charge.

<sup>7</sup> MTL10 does not have CE approval

<sup>8</sup> Use Display Configuration Code to specify the display orientation based on the flow direction.

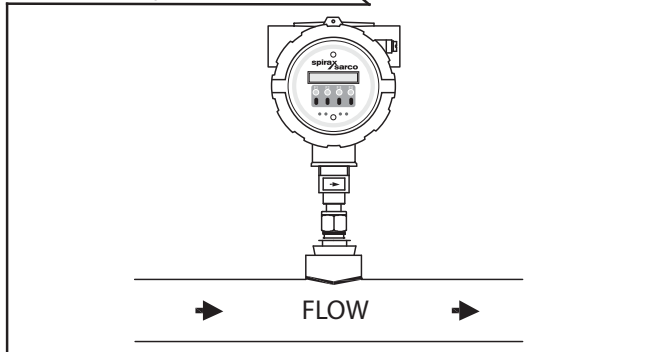
## Accessories

Part Number	Description
100657	Stainless Steel Tags
EM000677	Chamber of Commerce Certificate of Origin
101570	5 conductor, 18 AWG PVC shielded cable for remote, specify feet (100' maximum)
SCA00010	Remoted Enclosure Mounting Kit
890000	Flowmeter cleaned and bagged for Oxygen service
102878	Teflon Ferrule Kit (MTI10 only)

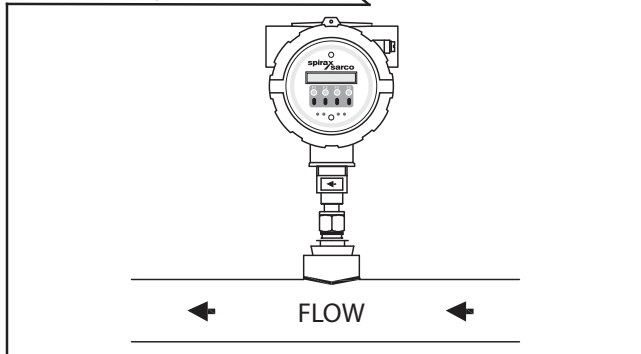
# MTI10 Insertion and MTL10 In-line Thermal Mass Flowmeter and Temperature Transmitter

## Display Configuration Codes

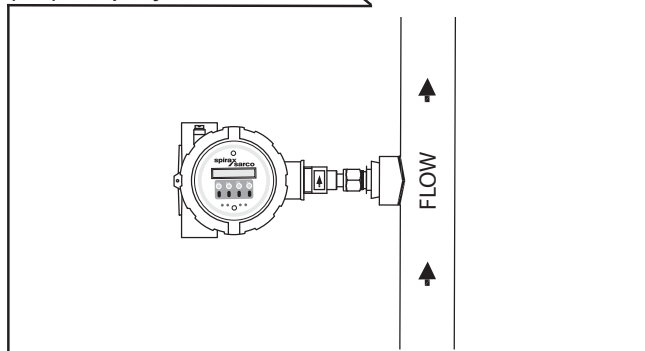
(D1) Display Position



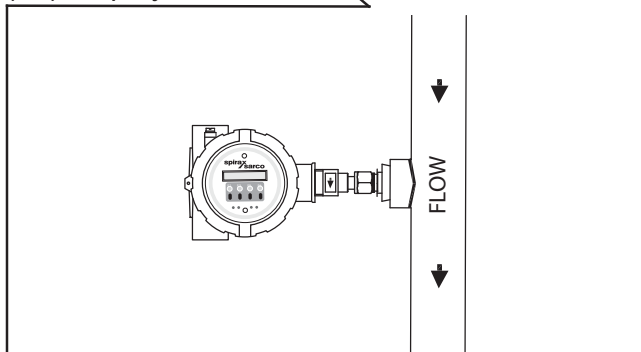
(D2) Display Position



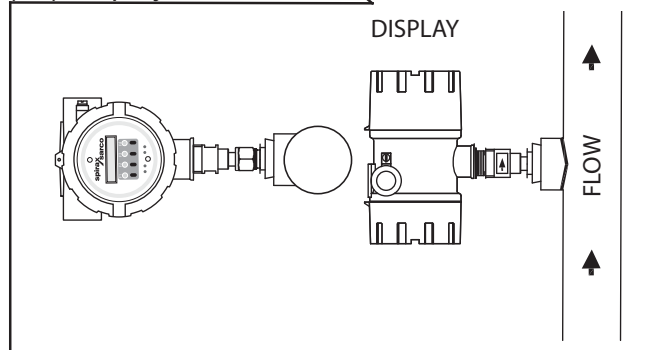
(D3) Display Position



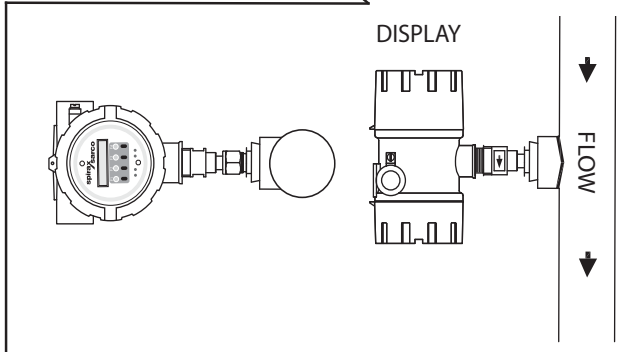
(D4) Display Position



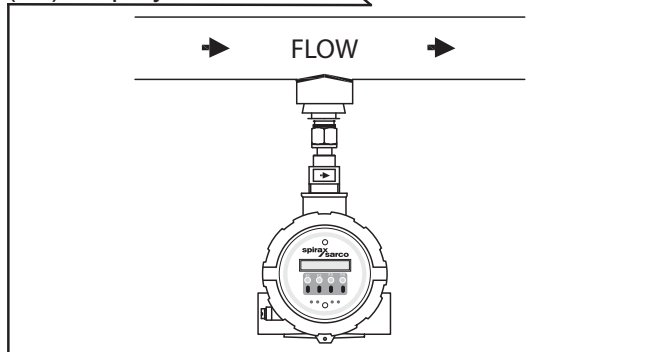
(D5) Display Position



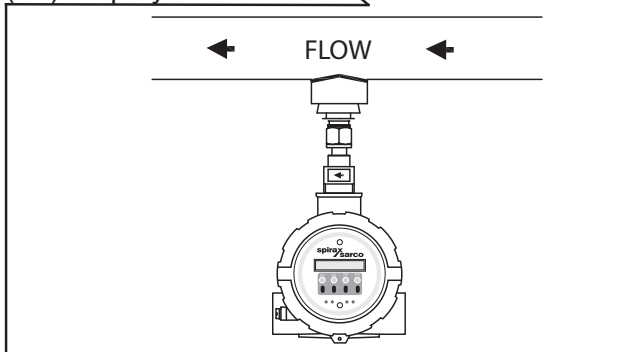
(D6) Display Position



(D7) Display Position



(D8) Display Position







## FP 93B Flow Processor

### Description

The FP-93B Flow Processor satisfies the instrument needs for a variety of flowmeter types in steam, liquid, gas, and heat metering applications.

### Features

- “EZ Setup”- Guided Setup for First Time Users
- Liquid, Gas, Steam and Heat Flow Equations
- Utility Metering - Steam, Heating/Cooling, Chilled Water, Natural Gas, Compressed Air
- Menu Selectable Hardware & Software Features
- Internal Data Logging Standard
- Isolated Pulse, Analog and Relay Outputs Standard
- RS-232 Port Standard, Provides Power for Modem
- RS-485 Optional
- Windows™ Setup Software
- NX19 Gas Equations
- DDE, OPC Server & HMI Software Available
- Remote Metering by Wireless or Modem

### Specifications:

#### Environmental

Operating Temperature: 32 to 120 °F  
Storage Temperature: -40 to 185°F  
Humidity 0-95% Non-condensing  
Materials UL, CSA, VDE approved

#### Display

Type: 2 lines of 20 characters  
Types: Backlit LCD and VFD ordering options  
Character Size: 0.3” nominal  
User selectable label descriptors and units of measure

#### Keypad

Keypad Type: Membrane Keypad  
Keypad Rating: Sealed to NEMA 4  
Number of keys: 16

#### Enclosure

Enclosure Options: Panel, Wall, Explosion Proof  
Size: See Dimensions  
Depth behind panel: 6.5” including mating connector  
Type: DIN  
Materials: Plastic, UL94V-0, Flame retardant  
Bezel: Textured per matt finish

#### Power Input

The factory equipped power option is internally fused. An internal line to line filter capacitor is provided for added transient suppression. MOV protection for surge transient is also supported  
Universal AC Power: 85 to 276 VAC, 50/60 Hz  
DC Power Option: 24 VDC (16 to 48 VDC)  
Power Consumption  
AC Power: 6.5 V/A  
DC Power: 300 mA max.



### Flow Meter Types

Linear: Vortex, Turbine, Gilflo, Gilflo 16 point, ILVA 16 Point Mass Flow and others

Square Law: Orifice, Target and others

Multi-Point Linearization: May be used with all flowmeter types. Including 16 point, UVC and dynamic compensation.

### Flow Inputs

#### Analog Input:

Accuracy: 0.02% FS at 68 °F  
Ranges  
Voltage: 0-10 VDC, 0-5 VDC, 1-5 VDC  
Current: 4-20 mA, 0-20 mA,  
4-20 mA stacked, 0-20 mA stacked  
Basic Measurement Resolution: 16 bit  
Update Rate: 4 updates/sec  
Automatic Fault detection: Signal over/under-range,  
Current Loop Broken  
Calibration: Operator assisted learn mode  
Extended calibration: Learns Zero and Full Scale of each range  
Fault Protection:  
Fast Transient: 500 V Protection (capacitive clamp)  
Reverse Polarity: No ill effects  
Over-Voltage Limit: 50 VDC Over voltage protection  
Over-Current Protection: Internally current limited protected to 24VDC

#### Pulse Inputs:

Number of Flow Inputs: one  
Input Impedance: 10 k  $\Omega$  nominal  
Trigger Level: (menu selectable)  
High Level Input  
Logic On: 2.5 to 30 VDC  
Logic Off: 0 to 2 VDC  
Low Level Input (mag pickup)  
Selectable sensitivity: 10 mV and 100 mV  
Minimum Count Speed: 0.25 Hz (to maintain rate display)  
Maximum Count Speed: Selectable: 0 to 50 kHz  
Overvoltage Protection: 50 VDC



# FP 93B

## Flow Processor

### Temperature, Pressure, Density Inputs

The compensation inputs usage are menu selectable for temperature, temperature 2, pressure, density or not used.

Calibration: Operator assisted learn mode  
Operation: Ratiometric  
Accuracy: 0.02% FS at 68 °F  
Basic Measurement Resolution: 16 bit  
Update Rate: 2 updates/sec minimum  
Automatic Fault detection:  
Signal Over-range/under-range  
Current Loop Broken  
RTD short  
RTD open  
Reverse Polarity: No ill effects  
Over-Current Limit  
(current input) Internally limited to protect input to 24 VDC  
Available Input Ranges  
Current: 4-20 mA, 0-20 mA  
Resistance: 100 Ohms DIN RTD

100 Ohm DIN RTD (DIN 43-760, BS 1904):  
Three Wire Lead Compensation  
Internal RTD linearization learns ice point resistance  
1 mA Excitation current with reverse polarity protection  
Temperature Resolution: 0.02 °F  
Temperature Accuracy: 1.0 °F

### Stored Information (ROM)

Steam Tables (saturated & superheated),  
Fluid Properties: Water, Air, Natural Gas or Generic

### User Entered Stored Information (EEPROM / Nonvolatile RAM)

Transmitter Ranges, Signal Types  
Fluid Properties  
(specific gravity, expansion factor, specific heat, viscosity, isentropic exponent, combustion heating value, Z factor)  
Units Selections (English/Metric)  
Language Translations (optional)

### Excitation Voltage

24 VDC @ 100 mA (fault protected)

### Relay Outputs

The relay outputs usage is menu assignable to (Individually for each relay) Hi/Lo Rate Alarm, Hi/Lo Temperature Alarm, Hi/Lo Pressure Alarm, Pulse Output (pulse options), Wet Steam or General purpose warning (security).

Number of relays: 2 (3 optional)  
Contact Style: Form C contacts  
Contact Ratings: 240 V, 5 amp

### Analog Outputs

The analog outputs are menu assignable to correspond to the Uncompensated Volume Rate, Corrected Volume Rate, Mass Rate, Heat Rate, Temperature, Density, or Pressure.

### Number of Outputs: 2

Type: Isolated Current Sourcing (shared common)  
Available Ranges: 0-20 mA, 4-20 mA (menu selectable)  
Resolution: 16 bit  
Accuracy: 0.05% FS at 68 °F  
Update Rate: 5 updates/sec  
Temperature Drift: Less than 200 ppm/C  
Maximum Load: 1000 ohms  
Compliance Effect: Less than .05% Span  
60 Hz rejection: 40 dB minimum  
EMI: No effect at 3 V/M  
Calibration: Operator assisted Learn Mode  
Averaging: User entry of DSP Averaging constant to cause a smooth control action

**Listing:** CE Approved, UL/CSA Pending

### Serial Communication

The serial port can be used for printing, datalog retrieval, modem connection and communication with a computer.

RS-232:  
Device ID: 01-99  
Baud Rates: 300, 1200, 2400, 9600  
Parity: None, Odd, Even  
Handshaking: None, Software, Hardware  
Print Setup: Configurable print list and formatting  
RS-485: (optional 2nd COM port)  
Device ID: 01-247  
Baud Rates: 300, 600, 1200, 2400, 4800, 9600, 19200  
Parity: None, Odd, Even  
Protocol: Modbus RTU (Half Duplex)

### Data Logging

The data logger captures print list information to internal storage for approximately 1000 transactions. This information can be used for later uploading or printing. Storage format is selectable for Comma-Carriage Return or Printer formats.

### Isolated Pulse output

The isolated pulse output is menu assignable to Uncompensated Volume Total, Compensated Volume Total, Heat Total or Mass Total.

Pulse Output Form (menu selectable): Open Collector NPN or 24 VDC voltage pulse  
Nominal On Voltage: 24 VDC  
Maximum Sink Current: 25 mA  
Maximum Source Current: 25 mA  
Maximum Off Voltage: 30 VDC  
Saturation Voltage: 0.4 VDC  
Pulse Duration: User selectable  
Pulse output buffer: 8 bit  
Fault Protection  
Reverse polarity:  
Shunt Diodes  
Over-current Protected  
Over-voltage Protected

# FP 93B

## Flow Processor

### Real Time Clock

The Flow Processor is equipped with a non-volatile real time clock with display of time and date.

Format:

24 hour format for time

Day, Month, Year for date

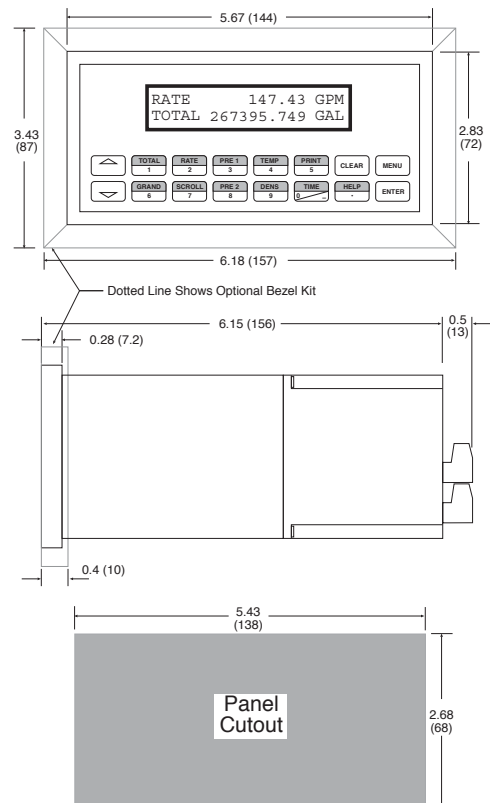
Optional Daylight Savings Time

### Terminal Designations

1	DC OUTPUT	FLOW
2	PULSE IN	Vin (+)
3	-----	lin (+)
4	COMMON	
5	RTD EXCIT (+)	TEMPERATURE
6	RTD SENS (+)	IN
7	RTD SENS (-)	lin (+)
8	DC OUTPUT	
9	RTD EXCIT (+)	PRESSURE
10	RTD SENS (+)	(TEMP 2)
11	RTD SENS (-)	IN
12	PULSE OUTPUT (+)	
13	PULSE OUTPUT (-)	
14	ANALOG OUTPUT 1 (+)	
15	ANALOG OUTPUT 2 (+)	
16	ANALOG OUTPUT COMMON (-)	
17	NO	
18	COM RLY1	
19	NC	
20	NC	
21	COM RLY2	
22	NO	
23	AC LINE	POWER IN
24	AC LINE	DC (+)

### Dimensions

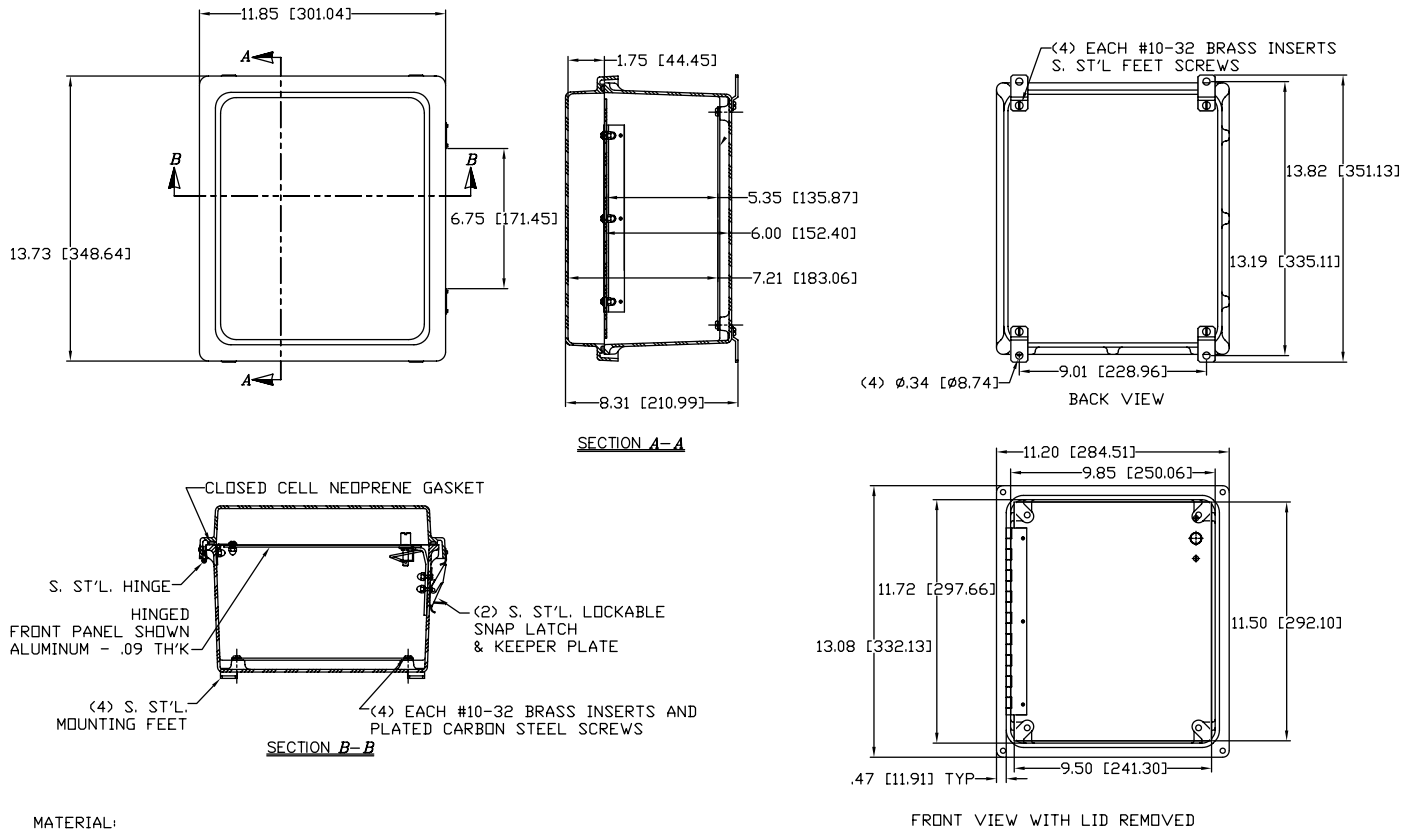
Panel Mount (option P)



Dimensions are in inches (mm)

# FP 93B Flow Processor

## Wall Mount (option N)



## Model Code

Category	Description	Suffix Codes					
Model	Microprocessor-based flow processor	FP-93B					
Display	LCD		L				
Power Supply	85 to 276 VAC 24 VDC			1 3			
Network Card	None RS485/Modbus				0 1		
Mounting	NEMA 4 Wall Mount Panel Mount					N P	
Options	RS485 Terminal Block Connector None						TB N

The standard unit includes: Peak Demand, AGA NX-19 calculation for natural gas, Stacked DP, Datalogger, Stack Emissions Controller and Manifold Flowmeter Controller,

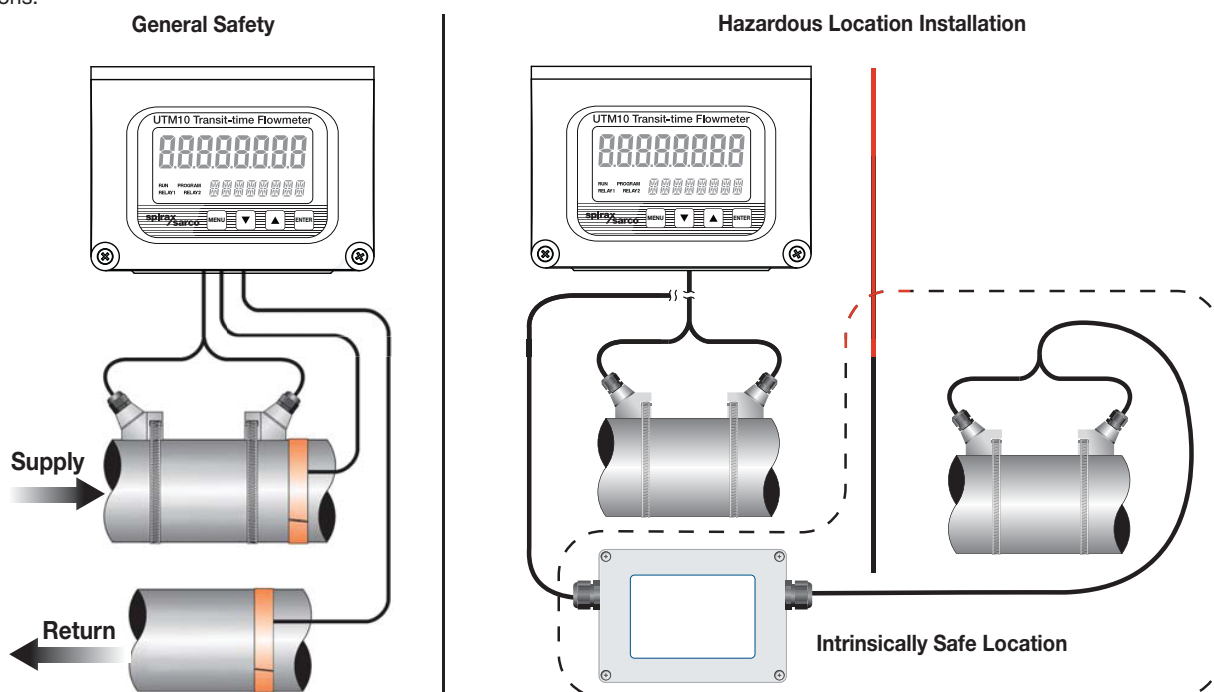


## UTM10 Series Ultrasonic Transit-time Flowmeters

### Description

UTM10 ultrasonic flow and energy meters clamp onto the outside of pipes and do not make contact with the internal liquid. The technology has inherent advantages over alternate devices including: low-cost installation, no pressure head loss, no moving parts to maintain or replace, no fluid compatibility issue, and a large, bi-directional measuring range that ensures reliable readings even at very low and high flowrates. UTM10 is available in a variety of configurations that permit the user to select a meter with features suitable to meet particular application requirements.

The UTM10 is available in two versions: a stand-alone flowmeter, and an energy flowmeter used in conjunction with dual clamp-on, or dual insertion RTDs. The energy flowmeter measures energy usage in kJ, Wh, BTU and Tons and is ideal for retrofit, chilled water and other HVAC applications.



### Features

- May be used to measure clean liquids as well as those with small amounts of suspended solids or aeration (e.g.: surface water, sewage).
- Bi-directional flow measurement system. Totalizer options include forward, reverse and net total.
- Modbus RTU, BACNet® MS/TP over RS485 communications.; Ethernet connection includes BACNet®/IP, EtherNet/IP™ and Modbus TCP/IP protocols.
- Large, easy-to-read digital display.
- Rugged, aluminium enclosure ensures a long service life in harsh environments.
- Certified for hazardous area installation in Europe and North America.

### Benefits

- **Reduced material costs:** The clamp-on sensor eliminates the need for in-line flanges, pipe fittings, strainers, and filters.
- **Reduced installation time:** The UTM10 can be installed and fully operational within minutes.
- **Reduced maintenance costs:** The UTM10 has a non-mechanical operation it will not be subject to wear and tear – Consequently there are no repair kits or replacement parts available or required.
- The UTM10 is a clamp on design unit - Consequently there is **No need to shut down the process for installation or maintenance.**

*Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only.  
In the interests of development and improvement of the product, we reserve the right to change the specification.*

TI-P197-01-US 10.14

# UTM10 Series

## Ultrasonic Transit-time Flowmeters

### Specifications

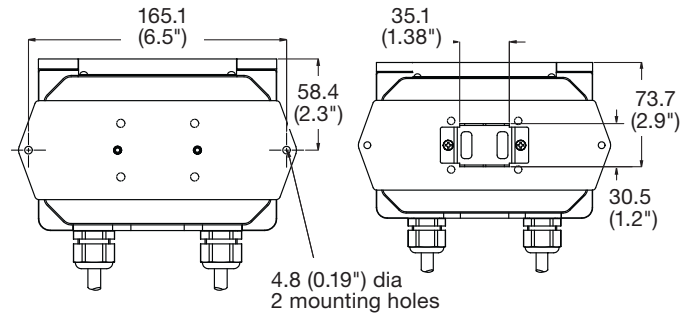
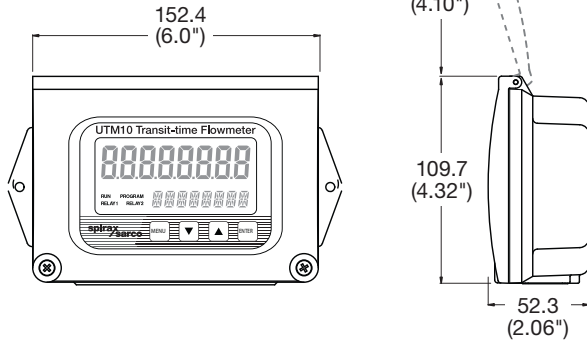
System	
Liquid types	Most clean liquids or liquids containing small amounts of suspended solids or gas bubbles
Velocity range	Bi-directional to 12 m/s (40 ft/s)
Flow accuracy	<b>UTT10-050S, UTT10-050L and UTT10-050H:</b> ±1% of rate at flows >0.3 m/s (1 ft/s); ±0.003 m/s (0.01 ft/s) at flows <1 ft/s (0.3 m/s) <b>UTT10-025S and UTT10-040S:</b> 25 mm (1") and larger ±1% of rate from 1.2 to 12 m/s (4 to 40 ft/s); ±0.012 m/s (0.04 ft/s) at rates <1.2 m/s (4 ft/s) <b>UTT10-015S and UTT10-020S:</b> ±1% Full-scale (reference the 'Measuring range' under 'Dimensions' on page 3)
Temperature accuracy (Energy meters only)	<b>Option 1:</b> 0-50°C (32-122°F); Absolute: 0.12°C (0.22°F) Difference: 0.05°C (0.09°F) <b>Option 2:</b> 0-100°C (32-212°F); Absolute: 0.25°C (0.45°F) Difference: 0.10°C (0.18°F) <b>Option 3:</b> -40-177°C (-40-350°F); Absolute: 0.60°C (1.10°F) Difference: 0.25°C (0.45°F)
Sensitivity	<b>Flow:</b> 0.0003 m/s (0.001 ft/s) <b>Temperature:</b> <b>Option 1:</b> 0.012°C (0.03°F); <b>Option 2:</b> 0.025°C (0.05°F); <b>Option 3:</b> 0.06°C (0.1°F)
Repeatability	0.5% of reading
Installation compliance	<b>General safety:</b> <b>All models</b> EN 61010, UL 61010-1 and CSA C22.2 No. 61010-1 <b>Power supply options A and D only</b> EN 61010-1
	<b>Hazardous location</b> (power supply options A and D only): Class 1 Div. 2 Groups C,D,T4; Class II, Division 2, Groups F,G,T4; Class III Division 2 for US/CAN; ATEX II 2 g EX nAT4; UL 1604, CSA 22.2 No. 213, EN 60079-0 and EN 60079-15. Compliant with directives 2004/108/EC, 2006/95/EC, and 94/9/EC on flowmeter systems with transducers constructed with twinaxial cable (all transducers with cables 30 m (100 ft) and shorter) or remote transducers with conduit.
Transmitter	
Power requirements	<b>ac:</b> 95-264 Vac 47-63 Hz @ 17 VA maximum <b>dc:</b> 10-28 Vdc @ 5 VA maximum <b>or</b> 20-28 Vac 47-63 Hz @ 0.35 A maximum <b>Protection:</b> auto resettable fuse, reverse polarity and transient suppression
Display	<b>Two line LCD, LED backlit:</b> <b>Top row</b> 18 mm (0.7") height, 7-segment; <b>Bottom row</b> 9 mm (0.35") height, 14-segment <b>Icons:</b> RUN, PROGRAM, RELAY1, RELAY2 <b>Flowrate indication:</b> 8-digit positive, 7-digit negative maximum; auto decimal, lead zero blanking <b>Flow accumulator (totalizer):</b> 8-digit positive, 7-digit negative maximum (reset via keypad press, USP, network command or momentary contact closure)
Enclosure	<b>IP65 (Type 4) construction:</b> powder-coated aluminium, polycarbonate, stainless steel, polyurethane, nickel-plated steel mounting brackets <b>Size (electronic enclosure only):</b> W x H x D in mm (inches) 152 x 112 x 56 mm (6.0" x 4.4" x 2.2") <b>Conduit holes: (2 x holes)</b> 12.7 mm (½") NPT female; <b>(1 x hole)</b> 19 mm (¾") NPT female
Temperature	-40°C to +85°C (-40°F to +185°F)
Configuration	Via optional keypad or PC running USP software (Note: not all configuration parameters are available from the keypad – i.e. flow and temperature calibration and advanced filter settings)
Engineering units	<b>Flowmeter:</b> Metres, cubic metres, litres, million litres, kg, Feet, gallons, cubic feet, million gallons, barrels (liquor and oil), acre-feet, lbs. <b>Energy meter:</b> kJ, kWh, MWh, BTU, MBTU, Tons and the flowmeter list from above
Inputs/outputs	<b>USB 2.0:</b> for connection of a PC running USP configuration utility <b>RS485:</b> Modbus RTU command set. <b>Optional</b> BACnet MS/TP (Baud rate field selectable 9600 to 76800) <b>10/100 Base-T:</b> RJ45, communication via Modbus TCP/IP, EtherNet/IP™ and BACnet®/IP <b>4-20 mA:</b> 12-bit, internal power, can span negative to positive flow/energy rates <b>Flowmeter model only:</b> 0-1,000 Hz: open-collector, 12-bit, can span negative to positive rates; square-wave or turbine meter simulation outputs. <b>Energy flowmeter model only:</b> Total pulse option: Opto isolated open collector transistor. <b>Two alarm outputs:</b> open-collector, configure as rate alarm, signal strength alarm or totalizer pulse
Transducers	
Type	Compression mode propagation, clamp-on
Construction	<b>UTT10-050S and 050L:</b> IP67 (NEMA 6), CPVC, Ultem®, Nylon cord grip, PVC cable jacket; -40 to 121°C (-40 to 250°F) <b>UTT10-015S to UTT10-040S:</b> IP67 (NEMA 6), CPVC, Ultem®, Nylon cord grip, PVC cable jacket; -40 to 121°C (-40 to 50°F) <b>UTT10-050S and 050L:</b> IP68 (NEMA 6P), CPVC, Ultem®, Nylon cord grip, Polyethylene cable jacket; -40 to 121°C (-40 to 250°F) <b>NEMA 6:</b> Submersible to a depth of 1 m (3 ft) for 30 days max. <b>NEMA 6P:</b> Submersible to a depth of 30 m (100 ft) indefinitely <b>UTT10-050H:</b> IP67 (NEMA 6), PTFE, Vespel, Nickel-plated brass cord grip, PFA cable jacket; -40 to 176°C (-40 to 250°F) <b>UTT10-015S to UTT10-040S:</b> 2 MHz <b>UTT10-050S and UTT10-050H:</b> 1 MHz <b>UTT10-050L:</b> 500 KHz
Frequency	
Cables	RG59 Coaxial, 75 ohm or Twinaxial, 78 ohm (optional Flex armored conduit)
Cable length	300 m (990 ft) maximum in 3 m (10 ft) increments
RTDs	<b>Energy meters only:</b> RTD platinum 385, 1000 ohm, 3-wire; PVC jacket cable
Installation	<b>UTT10-050S, UTT10-050L and UTT10-050H:</b> General and Hazardous Location (see 'Installation compliance' above) <b>UTT10-050S and IS Barrier (F option):</b> "Class I Div 1, Groups C&D T5 Intrinsically Safe Exia;" "CSA C22.2 No.'s 142 & 157, UL 913 & 916"
Software utilities	
USP	Utilized to configure, calibrate and troubleshoot Flow and Energy Meters. Connection via USB A/B cable; software is compatible with Windows 95, Windows 98, Windows 2000, Windows XP, Windows Vista® and Windows® 7 32-bit O.S. only

# UTM10 Series

## Ultrasonic Transit-time Flowmeters

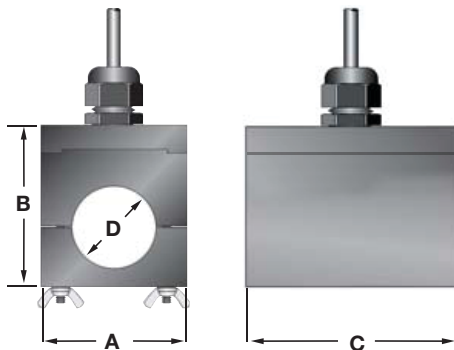
**Dimensions**  
approximate in mm (inches)

### UTM10 electronics

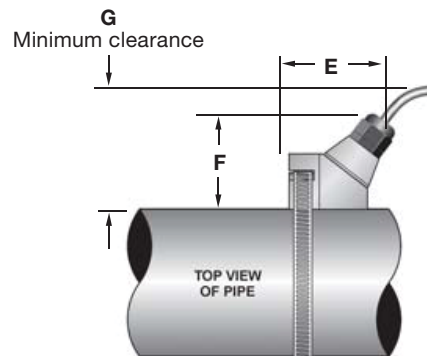


### UTT10 transducer

**UTT10-015S to UTT10-040S**  
Pipes 12 mm to 40 mm (½" to 1½")



**UTT10-050S, UTT10-050L and UTT10-050H**  
Pipes 50 mm (2") and larger



Model	E	F	G
UTT10-050S	74.9 (2.95")	69.8 (2.75")	76.2 (3.00")
UTT10-050H	74.9 (2.95")	69.8 (2.75")	76.2 (3.00")
UTT10-050L	86.4 (3.40")	74.7 (2.94")	81.3 (3.20")

Pipe size	Pipe material	A	B	C	D	Measuring range
DN15 (½")	ASME	62.5 (2.46")	59.9 (2.36")	67.6 (2.66")	21.3 (0.84")	8 - 144 litres/min (2 - 38 US gallons/min)
	Copper	62.5 (2.46")	59.9 (2.36")	84.6 (3.33")	15.9 (0.63")	7 - 102 litres/min (1.8 - 27 US gallons/min)
	Tubing	62.5 (2.46")	57.9 (2.28")	94.5 (3.72")	12.7 (0.50")	6 - 68 litres/min (1.5 - 18 US gallons/min)
DN20 (¾")	ASME	62.5 (2.46")	65.3 (2.57")	67.6 (2.66")	26.7 (1.05")	10 - 250 litres/min (2.75 - 66 US gallons/min)
	Copper	62.5 (2.46")	63.5 (2.50")	90.4 (3.56")	22.2 (0.88")	10 - 204 litres/min (2.5 - 54 US gallons/min)
	Tubing	62.5 (2.46")	63.5 (2.50")	90.4 (3.56")	19.0 (0.75")	10 - 170 litres/min (2.5 - 45 US gallons/min)
DN25 (1")	ASME	62.5 (2.46")	74.2 (2.92")	72.6 (2.86")	33.4 (1.32")	13 - 409 litres/min (3.5 - 108 US gallons/min)
	Copper	62.5 (2.46")	72.9 (2.87")	96.5 (3.80")	28.6 (1.13")	13 - 360 litres/min (3.5 - 95 US gallons/min)
	Tubing	62.5 (2.46")	2.75 (0.99")	96.5 (3.80")	25.4 (1.00")	13 - 320 litres/min (3.5 - 85 US gallons/min)
DN32 (1¼")	ASME	71.0 (2.80")	80.8 (3.18")	79.8 (3.14")	42.2 (1.66")	19 - 704 litres/min (5 - 186 US gallons/min)
	Copper	62.5 (2.46")	76.2 (3.00")	102.6 (4.04")	34.9 (1.38")	17 - 575 litres/min (4.5 - 152 US gallons/min)
	Tubing	62.5 (2.46")	76.2 (3.00")	102.6 (4.04")	31.8 (1.25")	15 - 514 litres/min (4 - 136 US gallons/min)
DN40 (1½")	ASME	76.7 (3.02")	86.9 (3.42")	84.6 (3.33")	48.3 (1.90")	23 - 946 litres/min (6 - 250 US gallons/min)
	Copper	68.8 (2.71")	72.6 (2.86")	108.7 (4.28")	41.3 (1.63")	19 - 814 litres/min (5 - 215 US gallons/min)
	Tubing	68.8 (2.71")	84.1 (3.31")	108.7 (4.28")	38.1 (1.50")	19 - 757 litres/min (5 - 200 US gallons/min)

# UTM10 Series

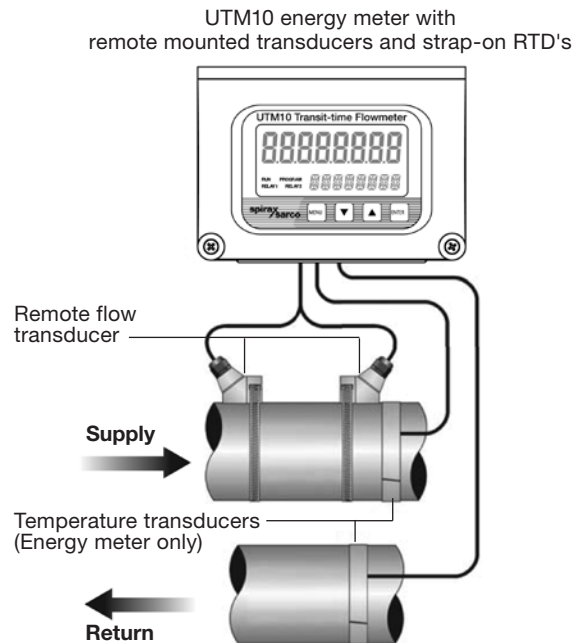
## Ultrasonic Transit-time Flowmeters

### Meter with remote flow transducer

The UTM10 is available with remote mounted transducers that permit separation of up to 300 m (990 ft) using coaxial or twinaxial cable. This design is utilized when pipes are located in areas that are not convenient for viewing, or on piping systems with severe vibration. CPVC are rated to 121°C (250°F) and PTFE are rated to 176°C (350°F).

### Common features:

- Rate-Total backlit display
- 4 - 20 mA output
- 0 - 1000 Hz rate pulse and dual alarm outputs (Flowmeter model only)
- USB programming port
- RS485 Modbus network connection
- Remote totalizer reset



### How to order the Ultrasonic Transit-time Flowmeter

Category	Description	Suffix codes
Model - see Note 1	Velocity meter	UTM10-S
	Energy meter - see Notes 2 and 3	UTM10-E-
Electrical power	dc 10 - 28 Vdc @ 5 watts maximum	D
	ac 95 - 264 Vac, 47 to 63 Hz @ 17 VA maximum	A
	20 - 28 Vac, 47 to 63 Hz @ 17 VA maximum	C
Digital communications	STD - Modbus RTU - see Note 1	N
	BACnet MS/TP	B
	10/100 Base-T (Ethernet/IP, BACnet/IP, Modbus TCP/IP), BACnet MS/TP	C
	10/100 Base-T (Ethernet/IP, BACnet/IP, Modbus TCP/IP), Modbus RTU	E
	Totalizing pulse (Isolated open collector) - see Note 3	P
Energy temperature range	None, if selected Electronics Model UTM10-S only	0
	Model 0 to 50°C (32 to 122°F)	1
	UTM10-E 0 to 100°C (32 to 212°F)	2
	only -40 to 176°C (-40 to 350°F)	3
Approvals	General Safety	N
	General Safety, Hazardous Location and CE	F
Example		UTM10-E-A-N-3-N

### Notes:

1. All electronics have a 4 button keypad, remote mounted transducers, General Safety Approvals, 4-20 mA output, Modbus RTU output, USB connection, 1000 Hz output UTM10-S only.
2. Energy, 4-20 mA output, Dual 1000 Ohm RTD connection, Modbus RTU output, USB connection. **RTD's ordered separately.**
3. Totalizing pulse is for the Energy Option only. The pulse is an optically-isolated open-collector, 30 Vdc max., 100 mA max., at 15 Hz max. rate with 50% duty cycle.



# UTM10 Series

## Ultrasonic Transit-time Flowmeters

### How to order the UTT ultrasonic transit-time transducers

Category	Description	Suffix codes
<b>Model</b>	Transducers, all rated to 121°C (250°F) (CPVC, Ultem®)	UTT10-
<b>Line size (nominal)</b>	15 mm (½")	015S
	20 mm (¾")	020S
	25 mm (1")	025S
	32 mm (1¼")	032S
	40 mm (1½")	040S
	Standard, 50 mm (2") and larger, 1.0 MHz transducers, max. temperature 121°C (250°F)	050S
	Large pipe, 610 mm (24") and larger, 0.5 MHz transducers, max. temperature 121°C (250°F)	050L
	High temperature, 50 mm (2") and larger, 1.0 MHz transducers, max. temperature 177°C (350°F)	050H
<b>Pipe material</b>	050S, 050L, 050H transducers only	X
	ASME pipe (015S to 040S only)	M
	Copper pipe (015S to 040S only)	C
	Standard tubing (015S to 040S only)	P
<b>Cable length - see Note 2</b>	6 m (20 ft)	020
	15 m (50 ft)	050
	30 m (100 ft)	100
	>30 m (100 ft) in 3 m (10 ft) increments <b>Suffix code = Total length of cable in ft e.g.: 190 ft = 190</b>	Cutomer to specify
<b>Conduit and submersible option</b>	None	N
	Armored flex conduit - see Note 1	A
	Submersible NEMA 6P (050S without conduit)	S
	Submersible NEMA 6P (050L without conduit)	T
<b>Conduit length</b>	Submersible NEMA 6P (050S and 050L with armored flex conduit) - see Note 1	V
	None	000
	6 m (20 ft)	020
	15 m (50 ft)	050
	30 m (100 ft)	100
<b>Approvals</b>	>30 m (100 ft) in 3 m (10 ft) increments <b>Suffix code = Total length of cable in ft e.g.: 190 ft = 190</b>	Cutomer to specify
	Standard, General Safety, Hazardous Locations - See 'Installation Compliance', Page 2	S
<b>Example</b>	Class 1 Division 1 Groups C and D, 050S transducers only (Includes IS Barriers)	F
		<b>UTT10-050S-X-020-N-000-S</b>

#### Notes:

<sup>1</sup> Armored Flex conduit can be ordered with conduit option A and V only.

<sup>2</sup> Twinaxial Cable, 78 Ω up to 30 m (100 ft), Greater than 30 m (100 ft) RG59 Coaxial Cable, 75 Ω



# UTM10 Series

## Ultrasonic Transit-time Flowmeters

Accessories	P/N	Description
<b>Strap-on RTD kit</b>	URTD-C-20	6 m (20 ft) cable
	URTD-C-50	15 m (50 ft) cable
	URTD-C-100	30 m (100 ft) cable

**Please note:**  
When ordering the UTM10-E  
you must also order the RTD kit.

**Note:** That the strap-on RTD kit includes 2 RTDs, heat sink compound, and installation tape. RTDs are 1000  $\Omega$  Pt., Insert 205°C (400°F).

<b>Insertion RTD kit</b>	INS-RTD-C-20	6 m (20 ft) cable
	INS-RTD-C-50	15 m (50 ft) cable
	INS-RTD-C-100	30 m (100 ft) cable

**Note:** That the insertion RTD kit includes 2 RTDs, 76 mm (3") insertion depth. 6.35 mm (¼") O.D.. RTDs are 1000  $\Omega$  Pt, 260°C (500°F).

Mounting tracks	UTMT-10	254 mm (10")	Scaled transducer mounting track assembly
	UTMT-16	406 mm (16")	

**Note:** For UTT10-050S transducers only

### How to order example:

1 off Spirax Sarco UTM10-E-A-N-3-N ultrasonic transit-time flowmeter plus  
1 off URTD-C-20 clamp-on RTD with 6 m cables.  
and  
1 off Spirax Sarco UTT10-050SX020N000S ultrasonic transit-time transducer.

ULTEM is a registered trademark of General Electric Company.  
WINDOWS, EXCEL and VISTA are registered trademarks of Microsoft Corp.  
CSA is a registered trademark of the Canadian Standards Association.  
BACNET is a registered trademark of American Society of Heating,  
Refrigerating and Air-Conditioning Engineers (ASHRAE)

# spirax sarco

## Model MAGFLO®

### Sensor Model Mag 1100, MAG 1100 Food and MAG 3100 Signal Converter Model MAG 6000 and MAG 5000 MAG 5100 W

#### Description

MAGFLO® electromagnetic flowmeters employ Faraday's law to measure the volumetric flow rate of conductive liquids. Spirax Sarco offers a wide variety of electromagnetic flowmeters. In addition to standard meters for typical applications, we have specialized meters, like our sanitary MAG 1100 FOOD—for application-specific flow measurement.

#### Features

##### 6000 signal converter (electronics)

- 0.25% accuracy
- Compact and practical design
- User-friendly design
- SENSORPROM™ Technology
- Bidirectional measurement
- Self-diagnostic
- Backlit display
- HART protocol available
- Empty Pipe Cut-Off
- Batch Control Function
- Electrode Cleaning available

##### 5000 same features as 6000 except

- 0.5% accuracy
- Less Batch Control Function

##### 1100 sensor

- Universal sensor
- High liquid temperature
- Withstands rigorous cleaning
- Food version
  - 3A and FDA approved
  - Steam CIP cleanable
  - Withstands rigorous cleaning
  - Sanitary Design
  - Tri-clamp connections
- Line sizes
  - Standard: 1/4" to 4"
  - High temperature: 1/2" to 4"
  - Food: 3/8" to 4"
  - Wafer connection

##### 3100 sensor

- Line Sizes: 1/2" to 80"
- Several Liner and Electrode Materials Available
- NEMA 6 (Accidental Submersible)
- Flange Connection

##### 5100 W

- DN 25 to DN 1200 (1" to 48")
- Connection flanges EN 1092-1 (DIN 2501), ANSI, AWWA and AS.
- Ebonite Hard Rubber liner for all water applications
- Drinking water EPDM liner with approvals
- Hastelloy integrated grounding and measuring electrodes
- Increased low flow accuracy for water leak detection, due to coned liner design.
- Drinking water approvals
- Suitable for direct burial and constant flooding
- Build-in length according to ISO 13359
- Easy commissioning, SENSORPROM unit automatically uploads calibration values and settings.
- Designed that patented in-situ verification can be conducted. Using SENSORPROM fingerprint.



#### Applications

MAGFLO® electromagnetic flowmeters offer important advantages such as no pressure drop, no moving parts, high accuracy, and a wide variety of materials of construction. They have been successfully used in many industries including food, beverage, pharmaceutical, chemical, power, heat, pulp & paper, steel and water treatment. No maintenance, low cost of ownership, and high reliability make MAGFLO® the flowmeter of choice for many flow measurement applications.

# Model MAGFLO®

## Sensor Model Mag 1100, MAG 1100 Food and MAG 3100

## Signal Converter Model MAG 6000 and MAG 5000 MAG 5100 W

### Performance Specifications

#### Mag 6000 signal converter

##### Accuracy

- Better than  $\pm 0.25\%$  of rate

##### Compact and practical design

The NEMA 6 signal converter can be installed either integrally on the sensor or remote on a wall or pipe. Front and back panel NEMA 4x converters are also available as an option.

##### User-friendly design

Alphanumeric display

Electronic unit and display can be rotated for easy viewing.

##### Sensorprom™ technology

Easy to start up—sensor data is downloaded from the SENSORPROM™ located in the terminal box to the signal converter. After power failure or converter replacement, all settings are automatically downloaded from the SENSORPROM™ to the MAG 5000—no need for reprogramming.

##### Self-diagnostic

Operating malfunctions are indicated in the display and error relays are activated. The last 10 errors are stored in Error Pending and Error Log.

##### Backlit display

##### Hart protocol available

##### Electrode cleaning

Converter can control an optional external electrode cleaning unit—output and display values are maintained during cleaning.

##### Bidirectional

Flow can be measured in both forward and reverse directions using a relay output to indicate direction changes.

##### Empty-pipe cut-off

If the sensor is drained, the converter automatically suppresses the input and indicates zero flow.

##### Batch function

#### Mag 5000 signal converter

##### Accuracy

$\pm 0.5\%$  of rate

##### Compact and practical design

The NEMA 6 signal converter can be installed either integrally on the sensor or remote on a wall or pipe. Front and back panel NEMA 4x converters are also available as an option.

##### User-friendly design

Alphanumeric display

Electronic unit and display can be rotated for easy viewing.

##### Sensorprom™ technology

Easy to start up—sensor data is downloaded from the SENSORPROM™ located in the terminal box to the signal converter. After power failure or converter replacement, all settings are automatically downloaded from the SENSORPROM™ to the MAG 5000—no need for reprogramming.

##### Bidirectional

Flow can be measured in both directions with two internal totalizers.

##### Self-diagnostic

Operating malfunctions are indicated in the display and error relays are activated. The last 10 errors are stored in Error Pending and Error Log.

##### Backlit display

##### Hart protocol available

## Model MAGFLO®

# Sensor Model Mag 1100, MAG 1100 Food and MAG 3100 Signal Converter Model MAG 6000 and MAG 5000 MAG 5100 W

### Mag 1100 sensor

(standard, high temp and food)

*Universal sensor*

Ceramic Liner with platinum electrodes

*High liquid temperature*

Standard 302° F, optional 390° F

*Withstands rigorous cleaning*

External construction in stainless steel, and enclosure meets NEMA 6 (accidental submersible), and can be steam cleaned.

*Food version*

- 3A and FDA approved
- Steam CIP cleanable
- Withstands Rigorous Cleaning:
  - External construction in stainless steel.
  - Enclosure meets NEMA 6 (accidental submersible).
- Sanitary Design:
  - The electrodes are fused into the ceramic liner
  - no crevices where bacteria can grow
- Tri-clamp connections

*Line sizes*

- Standard: 1/4" to 4"
- High temperature: 1/2" to 4"
- Food: 3/8" to 4"

### Mag 3100 sensor

*Line sizes:*

1/2" to 80"

*Several liner and electrode materials available*

See following pages for selection

*Nema 6 (accidental submersible)*

Can easily be upgraded to NEMA 6P (continuously submersible to 30 ft of water)

*Fully welded sensor construction*

*Flange version*

ANSI Class 150, 300 or AWWA class D



### Mag 5100W

- DN 25 to DN 1200 (1" to 48")
- Connection flanges EN 1092-1 (DIN 2501), ANSI, AWWA and AS.
- Ebonite Hard Rubber liner for all water applications
- Drinking water EPDM liner with approvals
- Hastelloy integrated grounding and measuring electrodes
- Increased low flow accuracy for water leak detection, due to coned liner design.
- Drinking water approvals
- Suitable for direct burial and constant flooding
- Build-in length according to ISO 13359
- Easy commissioning, SENSORPROM unit automatically uploads calibration values and settings.
- Designed that patented in-situ verification can be conducted. Using SENSORPROM fingerprint.

# Model MAGFLO®

## Sensor Model Mag 1100, MAG 1100 Food and MAG 3100 Signal Converter Model MAG 6000 and MAG 5000 MAG 5100 W



### Specifications - Sensor Mag 1100

	MAG 1100 Ceramic	MAG 1100 PFA
		
<b>Type</b>	Flangeless sensor (Wafer)	
<b>Nominal size</b>	1/4", 3/8", 1/2", 1", 1 1/2", 2", 3", 4"	3/8", 1/2", 1", 1 1/2", 2", 3", 4"
<b>Operating pressure</b>	1/4"-2 1/2": 600 psi, 3": 560 psi, 4": 450 psi	300 psi
<b>Vacuum</b>	1.5 × 10 <sup>-5</sup> psi	0.3 psi
<b>Temperature of medium</b>	PFA Ceramic High temperature version	-20°F to +265°F
<b>Temperature shock</b> (Ceramic liner)	(Duration > 1 min.): 1/4", 3/8", 1/2", 1": Max. ΔT ≤ 60°F/min. 1 1/2", 2", 2 1/2": Max. ΔT ≤ 50°F/min. 3", 4" : Max. ΔT ≤ 40°F/min. (Duration ≤ 1 min., followed by 10 min. rest): 1/4", 3/8", 1/2", 1": Max. ΔT ≤ 175°F 1 1/2", 2", 2 1/2": Max. ΔT ≤ 160°F 3", 4": Max. ΔT ≤ 140°F	Max. ±210°F momentarily
<b>Ambient temperature</b>	Remote mount signal converter: -40°F to +210°F Integral mount signal converter: -5°F to +120°F	
<b>Liner</b>	Aluminum oxide Al <sub>2</sub> O <sub>3</sub> (ceramics)	Reinforced PFA (Teflon)
<b>Electrodes</b>	Platinum with gold/titanium brazing alloy	Hastelloy C-276
<b>Enclosure</b>	Stainless steel AISI 316L (1.4404)	Stainless steel AISI 316 (1.4436)
<b>Terminal box</b>	Standard (Remote installation only) High temp.	Fiberglass-reinforced polyamide Fiberglass-reinforced polyamide
<b>Studs &amp; nuts</b>	Stainless steel AISI 304 (1.4301) Number and size to DIN 2501	
<b>Mating flanges</b>	DIN 2501 (150-600 psi), ANSI B16.5, class 150 and 300 or equivalent	
<b>Gaskets</b>	Option Standard Option Option	1/4" & 3/8": 1/2" NPT threaded adaptor EPDM (max. 300°F, 600 psi) Graphite (max. 390°F, 600 psi) PTFE (max. 210°F, 300 psi)
<b>Cable entries</b>	4 pcs. PG 13.5	
<b>Enclosure rating</b>	Standard Option	NEMA 4X / 6 (3 ft. submersion for 30 min) NEMA 6P (30 ft. continuous submersion)
<b>Mechanical load (vibration)</b>	18-1000 Hz random, 3.17 G rms in all directions to EN 60068-2-36	
<b>Test pressure</b>	1200 psi (2 × nominal)	600 psi (2 × nominal)
<b>Ex approvals</b>		
<b>Excitation frequency programmable</b>	1/4" - 2 1/2": 15 Hz 3", 4": 7.5 Hz	3/8" - 2 1/2": 15 Hz 3", 4": 7.5 Hz

# Model MAGFLO®

## Sensor Model Mag 1100, MAG 1100 Food and MAG 3100 Signal Converter Model MAG 6000 and MAG 5000 MAG 5100 W

### Specifications - Sensor Mag 1100 FOOD

	MAG 1100 FOOD	MAG 1100 FOOD PFA
		
Type	Hygienic sensor	
Nominal size	3/8", 1/2", 1", 1 1/2", 2", 3", 4"	
Process connection	Hygienic adapters available for: ♦ Direct welding in ♦ Clamp fitting ♦ Threaded fitting	
Operating pressure	3/8"-2 1/2": 600 psi, 3": 560 psi, 4": 450 psi	300 psi
Vacuum	1.5 × 10 <sup>-5</sup> psi	0.3 psi
Temperature of medium	0°F to +300°F Suitable for steam sterilization	-20°F to +270°F Suitable for steam sterilization at 300°F
Temperature shock	(Duration > 1 min.): 3/8", 1/2", 1" Max. ΔT ≤ 60°F/min. 1 1/2", 2", 2 1/2" Max. ΔT ≤ 50°F/min. 3", 4" Max. ΔT ≤ 40°F/min. (Duration ≤ 1 min., followed by 10 min. rest): 3/8", 1/2", 1" Max. ΔT ≤ 175°F 1 1/2", 2", 2 1/2" Max. ΔT ≤ 160°F 3", 4" Max. ΔT ≤ 140°F	Max. ±212°F momentarily
Ambient temperature	Remote mount signal converter: -40°F to +210°F Integral mount signal converter: -5°F to +120°F	Remote mount signal converter: -40°F to +210°F Integral mount signal converter: -5°F to +120°F
Liner	Aluminum oxide Al <sub>2</sub> O <sub>3</sub> (ceramic)	Reinforced PFA (Teflon)
Electrodes	Platinum with gold/titanium brazing alloy	Hastelloy C-276
Enclosure	Stainless steel AISI 316L (1.4404)	Stainless steel AISI 316L (1.4404)
Terminal box	Standard: Fiberglass-reinforced polyamide Option (Remote installation only): Stainless steel AISI 316 (1.4436)	Fiberglass-reinforced polyamide Stainless steel AISI 316 (1.4436)
Cable entries	4 pcs. PG 13.5	4 pcs. PG 13.5
Enclosure rating	Standard: NEMA 4X / 6 (3 ft. submersion for 30 min) Option: NEMA 6P (30 ft. continuous submersion)	NEMA 4X / 6 (3 ft. submersion for 30 min) NEMA 6P (30 ft. continuous submersion)
Mechanical load (vibration)	18-1000 Hz random, 3.17 G rms in all directions, to EN 60068-2-36	18-1000 Hz random, 3.17 G rms in all directions, to EN 60068-2-36
Test pressure	1200 psi (2 × nominal)	600 psi (2 × nominal)
Approvals	3A, EHEDG	3A
Excitation frequency	3/8" - 2 1/2": 15 Hz	3/8" - 2 1/2": 15 Hz
programmable	3", 4": 7.5 Hz	3", 4": 7.5 Hz

#### Accessories MAG 1100 FOOD

Adapters	Stainless steel AISI 316	Pressure
Pipe connection/ Operating pressure	Adapter for direct welding into pipe: <b>Tri-Clover</b> ISO 2037, DIN 11850, SMS 3008, BS 4825-1 3/8", 1/2", 1", 1 1/2", 2", 3" 4"	600 psi 350 psi
	Clamp adapter: <b>Tri-Clamp</b> ISO 2852, DIN 32676, SMS 3016, BS 4825-3 3/8", 1/2", 1", 1 1/2", 2" 2 1/2", 3", 4"	200 psi 150 psi
	Thread adapter: DIN 11851: 3/8", 1/2", 1", 1 1/2" 2", 2 1/2", 3", 4" ISO 2853, SS 3351, BS 4825-4: 3/8", 1/2", 1", 1 1/2", 2", 3", 4" 1", 1 1/2", 2", 2 1/2", 3" SMS 1145:	600 psi 350 psi 200 psi 80 psi
Gasket	Standard: EPDM (ethylene, propylene rubber) (-5 °F to 300 °F) Option: NBR (nitrile butadiene rubber) (-5 °F to 210 °F)	
Material	Stainless steel AISI 304, ISO 2852	

#### Note

It is always a system so please state system max. pressure and **not** MAG 1100 or adapter.

# Model MAGFLO®

## Sensor Model Mag 1100, MAG 1100 Food and MAG 3100

## Signal Converter Model MAG 6000 and MAG 5000 MAG 5100 W



	<b>MAG 3100</b>																											
Type	Sensor with flanges																											
Nominal Size	1/2" to 80"																											
Measuring Range	Adjustable from 0-0.8 ft/s to 0-33 ft/s																											
Coil Current	Pulsating DC with one of the following frequencies: 6 1/4 Hz or 12 1/2 Hz depending on sensor size																											
Process Temperature (Pressure ≤ 580 psi)	Neoprene: 32° to 158° F	Linatex Rubber: -40° to 160° F																										
	PTFE®: -5° to 266° F "	Ebonite: 32° to 200° F																										
	High Temp PTFE 0 to 355° F	EPDM: -15 to 158° F																										
Ambient Temperature	Remote Signal Converter	-40° F to 210° F																										
	Integral Signal Converter	-40° F to 120° F																										
Pipe Connection																												
Standard	1/2" to 24" ANSI B 16.5 Class 150 28" to 80" AWWA C-207 Class D (150 psi)																											
Option	1/2" to 24" ANSI B 16.5 Class 300 Others on request																											
Process Vacuum	Maximum process vacuum depends on liner material:																											
	Neoprene, Ebonite, EPDM, Natural rubber: 7.25 psia																											
Liner																												
Standard	Neoprene																											
Option	Teflon®, Natural rubber, EPDM, Ebonite																											
Electrodes																												
Standard	Stainless steel 316 Ti																											
Option	Hastelloy C276, Platinum, Titanium, Monel, Tantalum, AISI 316Ti coated																											
Enclosure																												
Standard	Carbon steel, corrosion-resistant two-component coating																											
Option	Stainless steel AISI 316																											
Measuring Pipe	Stainless steel AISI 304																											
Enclosure Rating																												
Standard	NEMA 6 accidental submersible (tested to 10 ft of water 72h)																											
Option	NEMA 6 submersible, tested to 30 ft of water (no time limit if NEMA 6P submersible kit is being used)																											
Cable Entries	2 Pg 13.5–2 others available																											
Mechanical Load Design Pressure	3 G, 1-800 Hz sinusoidal in all directions																											
	1.5 x flange rating																											
Conductivity																												
Compact installation	Liquids with an electric conductivity ≥ 5 µs/cm																											
	For a conductivity between 1 and 5 µs/cm, the accuracy may degrade to ±0.5% of actual flow.																											
Remote installation	<div><div><p><b>Standard Cable</b></p><table><caption>Standard Cable Data</caption><thead><tr><th>Cable length [ft]</th><th>Conductivity [µS/cm]</th></tr></thead><tbody><tr><td>0</td><td>5</td></tr><tr><td>300</td><td>100</td></tr><tr><td>600</td><td>200</td></tr><tr><td>950</td><td>300</td></tr></tbody></table><p>Cable length</p></div><div><p><b>Special Cable</b></p><table><caption>Special Cable Data</caption><thead><tr><th>Cable length [ft]</th><th>Conductivity [µS/cm]</th></tr></thead><tbody><tr><td>0</td><td>5</td></tr><tr><td>150</td><td>10</td></tr><tr><td>300</td><td>20</td></tr><tr><td>600</td><td>30</td></tr><tr><td>900</td><td>40</td></tr><tr><td>1200</td><td>45</td></tr><tr><td>1500</td><td>50</td></tr></tbody></table><p>Cable length</p></div></div>		Cable length [ft]	Conductivity [µS/cm]	0	5	300	100	600	200	950	300	Cable length [ft]	Conductivity [µS/cm]	0	5	150	10	300	20	600	30	900	40	1200	45	1500	50
	Cable length [ft]	Conductivity [µS/cm]																										
	0	5																										
300	100																											
600	200																											
950	300																											
Cable length [ft]	Conductivity [µS/cm]																											
0	5																											
150	10																											
300	20																											
600	30																											
900	40																											
1200	45																											
1500	50																											
	<p><b>Note:</b></p> <p>For detection of empty sensor the min. conductivity must always be ≥ 20 µs/cm and the max. length of electrode cable when remote mounted is 150 ft. Special cable must be used.</p>																											

\* -5 to 120° F with signal converter mounted on sensor

\*\* Each temperature class assumes a maximum ambient temperature of 105° F.

**Model MAGFLO®****Sensor Model Mag 1100, MAG 1100 Food and MAG 3100  
Signal Converter Model MAG 6000 and MAG 5000 MAG 5100 W****MAG 3100 Liner Selection Guide**

<b>Liner</b>	<b>Applications</b>
<b>Neoprene</b>	General purpose, sewage, drinking water and district heating
<b>EPDM</b>	Drinking water, sea water
<b>PTFE</b>	Aggressive chemicals, paper and pulp, high temperature applications
<b>Linatex®</b>	Abrasive media and mining slurries
<b>Ebonite</b>	Drinking water, high pressure applications and district heating

**Electrode Selection Guide**

<b>Electrodes</b>	<b>Applications</b>
<b>AISI 316 Ti</b>	General purpose, water, sewage and district heating
<b>AISI 316 Ti Ceramic coated</b>	High content of fibres, paper pulp
<b>Hastelloy C-276</b>	Good chemical properties, sea water
<b>Monel</b>	Salt, brine and alkaline solutions
<b>Titanium</b>	Chlorine, chlorite, nitric and chromic acids.
	Textile bleaching industry
<b>Tantalum</b>	Almost any acid solution
<b>Platinum and platinum/irridium</b>	The ultimate electrode material.
	Unaffected by most liquids



# Model MAGFLO®

## Sensor Model Mag 1100, MAG 1100 Food and MAG 3100 Signal Converter Model MAG 6000 and MAG 5000 MAG 5100 W

### Specifications - MAG 5100 W





Technical specifications			
Design	Full bore sensor	Coned bore sensor	Full bore sensor
Nominal size	DN 25 ... 40 (1" ... 1½")	DN 50 ... 300 (2" ... 12")	DN 350 ... 1200 (14" ... 48")
Measuring principle	Electromagnetic induction		
Excitation frequency	12.5 Hz	• 50 ... 65 mm (2" ... 2½"): 12.5 Hz • 80 ... 150 mm (3" ... 6"): 6.25 Hz • 200 ... 300 mm (8" ... 12"): 3.125 Hz	DN 350 ... 450 (14" ... 18"): 3.125 Hz DN 500 ... 1200 (20" ... 48"): 1.5625 Hz
Process connection			
Flanges		Flat face flanges	
• EN 1092-1	PN 40 (580 psi)	• 50 ... 300 mm: PN 16 (2" ... 12": 230 psi) • 200 ... 300 mm: PN 10 (8" ... 12": 145 psi)	• PN 10 (145 psi) • PN 16 (230 psi)
• ANSI B16.5	Class 150 lb	Class 150 lb ~20 bar (290 psi)	--
• AWWA C-207	--	--	28" ... 48": Class D
• AS4087	PN 16 (230 psi) DN 50 ... 1200 (2" ... 48"), 14 bar (232 psi)		
Rated Operation conditions			
Ambient temperature			
• Sensor	-40 ... +70 °C (-40 ... +158 °F)		
• With compact transmitter MAG 5000/6000	-20 ... +50 °C (-4 ... +122 °F)		
• With compact transmitter MAG 6000 I	-20 ... +60 °C (-4 ... +140 °F)		
Operating pressure	0.01 ... 40 bar (0.15 ... 580 psi)	0.03 ... 20 bar (0.44 ... 290 psi)	0.01 ... 16 bar (0.15 ... 232 psi)
Enclosure rating			
• Standard	IP67 to EN 60529 / NEMA 4X/6 (1 mH2O for 30 minutes)		
• Option	IP68 to EN 60529 / NEMA 6P (10 mH2O continuously)		
Pressure drop at 3 m/s (10 ft/s)	As straight pipe	Max. 25 mbar (0.36 psi)	As straight pipe
Medium conditions			
Temperature of medium			
• NBR	-10 ... +70 °C (14 ... +158 °F)		
• EPDM	-10 ... +70 °C (14 ... +158 °F)		
EMC	89/336 EEC		
Design			
Weight	See dimensional drawings		
Material			
• Housing and flanges	Carbon steel, St 37.2		
• Terminal box	Standard Fibre glass reinforced polyamide		
• Measuring pipe	AISI 304 (1.4301)		
• Liner	Ebonite Hard Rubber (hydro carbon resistant)		
• Electrodes	Hastelloy C276		
• Grounding electrodes standard	Hastelloy C276		
Certificates and approvals			
Custody Transfer (only together with MAG 5000/6000 CT), order as special Approvals	OIML R 49 pattern approval cold water (Denmark and Germany): DN 50 ... 300 (2" ... 12") MI 001 cold water (EU): DN 50 ... 300 (2" ... 12") FM Class 1, Div 2		
Approvals	PED – 97/23 EC1), CRN		

1) For sizes larger than 600 mm (24") in PN 16 PED conformity is available as a cost added option. The basic unit will carry the LVD (Low Voltage Directive) and EMC approval.

# Model MAGFLO®

## Sensor Model Mag 1100, MAG 1100 Food and MAG 3100







## Signal Converter Model MAG 6000 and MAG 5000 MAG 5100 W

	 			 		
	<b>MAG 6000 Signal Converter: 0.25%</b>			<b>MAG 5000 Signal Converter: 0.5% accuracy</b>		
<b>Functions</b>	Display flowrate, 2 totalizers, low flow cut-off, empty pipe cut-off, flow direction, error system, operating time uni/bidirectional flow, limit switches, pulse output, control for cleaning unit and batch			Display flowrate, 2 totalizers, low flow cut-off, empty pipe cut-off, flow direction, error system, operating time, uni/bidirectional flow, limit switches, pulse output, control for cleaning unit		
<b>Current Output</b>						
Current	0-20 mA or 4-20 mA			0-20 mA or 4-20 mA		
Load	< 800 ohm			< 800 ohm		
Time Constant	0.1-30 s adjustable			0.1-30 s adjustable		
<b>Frequency/Pulse Output</b>	Short-circuit-protected			Short-circuit-protected		
Frequency	0-10 kHz, 50% duty cycle			0-10 kHz, 50% duty cycle		
Pulse Width	50 ms, 500 ms, 5 ms, 50 ms, 100 ms, 500 ms, 1 s, 5 s			50 ms, 500 ms, 5 ms, 50 ms, 100 ms, 500 ms, 1 s, 5 s		
Time Constant	0.1-30 s adjustable			0.1-30 s adjustable		
<b>Active</b>	24 V DC			24 V DC supplied by the signal converter		
		≤ 1 Hz	≤ 10 kHz	0-2 Hz: load: 125 ohm to 100 kohm		
	Min. R <sub>load</sub>	150 Ω	1 KΩ	0-10 kHz: load: 125 ohm to 100 kohm		
<b>Passive</b>	Max. R <sub>load</sub>	≤ 10 KΩ	≤ 10 KΩ			
	3-30 V DC			External supply of 5-50 V DC (max. current: 200 mA)		
		U = 3 V	U = 30 V	0-10 kHz: load: 125 ohm to 10 kohm		
	Min. R <sub>load</sub>	10 Ω	225 Ω			
	Max. R <sub>load</sub>	≤ 10 KΩ	≤ 10 KΩ			
<b>Relay</b>	Switch relay to indicate flow direction or fault			Switch relay to indicate fault		
Load	Max.: 42 V/ 2 A, 24 Vd.c./1 A			Max.: 42 V/2A, 24 Vd.c./1A		
Time Constant	Flow direction: 5 s; Fault : 1 s			1 s		
<b>Digital input</b>	11-30 V d.c., R <sub>i</sub> = 4.4 KΩ (reset Totalizer, Force Output and Batch Control)			11-30 V d.c., R <sub>i</sub> = 4.4 KΩ (reset Totalizer, Force Output)		
Activation time	50 msec.			50 msec		
Current	I <sub>11 V d.c.</sub> = 2.5 mA, I <sub>30 V d.c.</sub> = 7 mA			I <sub>11 V d.c.</sub> = 2.5 mA, I <sub>30 V d.c.</sub> = 7 mA		
<b>Galvanic Isolation</b>	All inputs and outputs are galvanically isolated			All inputs and outputs are galvanically isolated		
<b>Cut-off</b>						
Low-flow	0-9.9% of maximum flow			0-9.9% of maximum flow		
Empty Pipe	Detection of empty pipe. (special cable required)			detection of empty pipe. (special cable required)		
<b>Counter</b>	Two internal eight-digit counters for forward, net or reverse flow source					

# Model MAGFLO®

## Sensor Model Mag 1100, MAG 1100 Food and MAG 3100

## Signal Converter Model MAG 6000 and MAG 5000 MAG 5100 W

					
<b>MAG 6000 Signal Converter: 0.25%</b>				<b>MAG 5000 Signal Converter: 0.5% accuracy</b>	
<b>Electrode Cleaning</b>		For process liquids which can leave insulating deposits on the sensor's electrodes, or leave conductive deposits on the inside of the sensor.		N/A	
		Electrode cleaning requires a special 19" rack cleaning unit.			
<b>Display</b>		Backlit alphanumeric text, 3 x 20 characters to indicate flow, volume, settings and faults. Reverse flow indicated by negative sign.		Backlit alphanumeric text, 3 x 20 characters to indicate flow, volume, settings and faults. Reverse flow indicated by negative sign.	
<b>Zero Point Adjustment</b>		Automatic		Automatic	
<b>Input Impedance</b>		$> 1 \times 10^{14} \Omega$		$> 1 \times 10^{14} \Omega$	
<b>Excitation Frequency</b>		Pulsating DC current with one of the following frequencies: 1 9/16 Hz, 3 1/8 Hz, 6 1/4 Hz or 12 1/2 Hz, 25 Hz		Pulsating DC current at a frequency of 3 1/8 Hz	
<b>Ambient Temperature</b>		During operation -5° to 120° F		During operation -5° to 120° F	
		During storage -40° to 160° F (RH max. 95%)		During storage -40° to 160° F (RH max. 95%)	
<b>Supply Voltage</b>					
AC		115/230 V AC. +10% to -15%, 50-60 Hz, 9 VA		115/230 V AC +10% to -15%, 50-60 Hz, 9 VA	
DC		11-30 V DC/11-24 V AC, 9 W		11-30 V DC/11-24 V AC 9 W	
<b>Integral/Remote</b>		Can be mounted integrally on sensor, or remote on pipe or wall		Can be mounted integrally on sensor, or remote on pipe or wall	
	Material	Fiberglass-reinforced polyamide or optional stainless steel		Fiberglass-reinforced polyamide or optional stainless steel	
	Rating	NEMA 6, accidental submersible (3ft of water for 30 min.)		NEMA 6, accidental submersible (3 ft of water for 30 min.)	
	Mechanical Load	3.17 G, 18-1000 Hz random in all directions		3.17 G, 18–1000 Hz random in all directions	
<b>19" insert</b>		Insert fits in a 19" rack or wall, front, back panel unit		Insert can be fitted in a 19" rack or wall, front, back panel unit	
	Material	Standard 19" insert of Aluminum/steel		Standard 19" insert of Aluminum/steel	
	Rating	19" Insert and back panel mount: NEMA 1		19" Insert and back panel mount: NEMA 1	
		Front panel and wall mount unit: NEMA 4X		Front panel and wall mount unit: NEMA 4X	
	Mechanical Load	115/230 V AC version: 1 G, 1-800 Hz sinusoidal in all directions		115/230 V AC version: 1 G, 1-800 Hz sinusoidal in all directions	
		24 V DC version: 1 G, 1-800 Hz sinusoidal in all directions			
<b>Communication</b>					
Standard		Prepared for client mounted add-on modules		Without serial communication	
Optional		HART® as add on module		HART®	

# Model MAGFLO®

## Sensor Model Mag 1100, MAG 1100 Food and MAG 3100 Signal Converter Model MAG 6000 and MAG 5000 MAG 5100 W



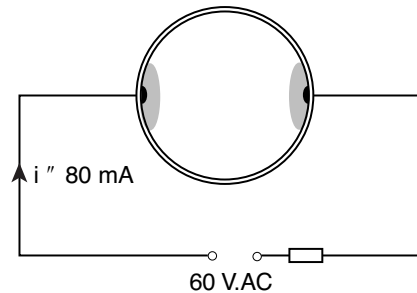
**MAGFLO® Cleaning Unit**

**Application** For use with MAG 6000 and MAG 5000 19" insert to clean the electrodes on MAG 1100 and MAG 3100.

### Cleaning Voltage

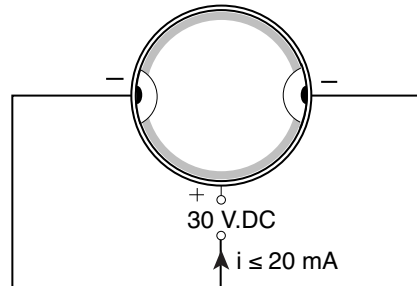
AC	cleaning: 60 V a.c.
DC	cleaning: 30 V d.c.
<b>Cleaning Period</b>	60 sec + 60 sec. pause period
<b>Relay</b>	Switch relay indicating cleaning in progress
Load:	42 V/2A
<b>Indicator Lamps</b>	LEDs: "ON" and "CLEANING"
<b>Supply Voltage</b>	
AC	115/230 V AC +10% to -15%, 50-60 Hz, 7 VA cleaning, 5 VA stand by
DC	18-30 V DC, 17 W cleaning, 3 W stand by
<b>Ambient Temperature</b>	During operation: -5 to 120° F
	During storage: -5 to 160° F
<b>19" insert</b>	19" insert for MAG 6000 and MAG 5000 in either a front, back or wall mount unit
	Enclosure material: Standard 19" insert in Aluminum/steel
	Enclosure rating: NEMA 1; if front or wall mount kit is used: NEMA 4X
	Mechanical load: 1 G, 1-800 Hz sinusoidal in all directions

MAG 6000 can be MAG 5000 can be mounted with the Cleaning Unit. The electronic package can be mounted in either a wall, front, or back panel unit.



### AC Cleaning

AC Cleaning is used to remove greasy deposits on the electrodes caused from measurement of waste water flows from abattoirs or water containing oil residues. During cleaning, heat is generated on the electrode surface, softening the greasy particles. This causes gas bubbles which remove the deposits from the electrode surface.



### DC Cleaning

DC cleaning is used to remove conductive deposits from the meter pipe. When measuring district heating water flows, conductive magnetite deposits can accumulate. If the water's conductivity is below approx. 250µS/cm, these deposits can short the electrode signal and cause measuring error. This cleaning method involves electrolysis in which the electron flow leads the deposited particles away from the area around the electrodes.

# Model MAGFLO®

## Sensor Model Mag 1100, MAG 1100 Food and MAG 3100

## Signal Converter Model MAG 6000 and MAG 5000 MAG 5100 W

### Sensor size selection guide

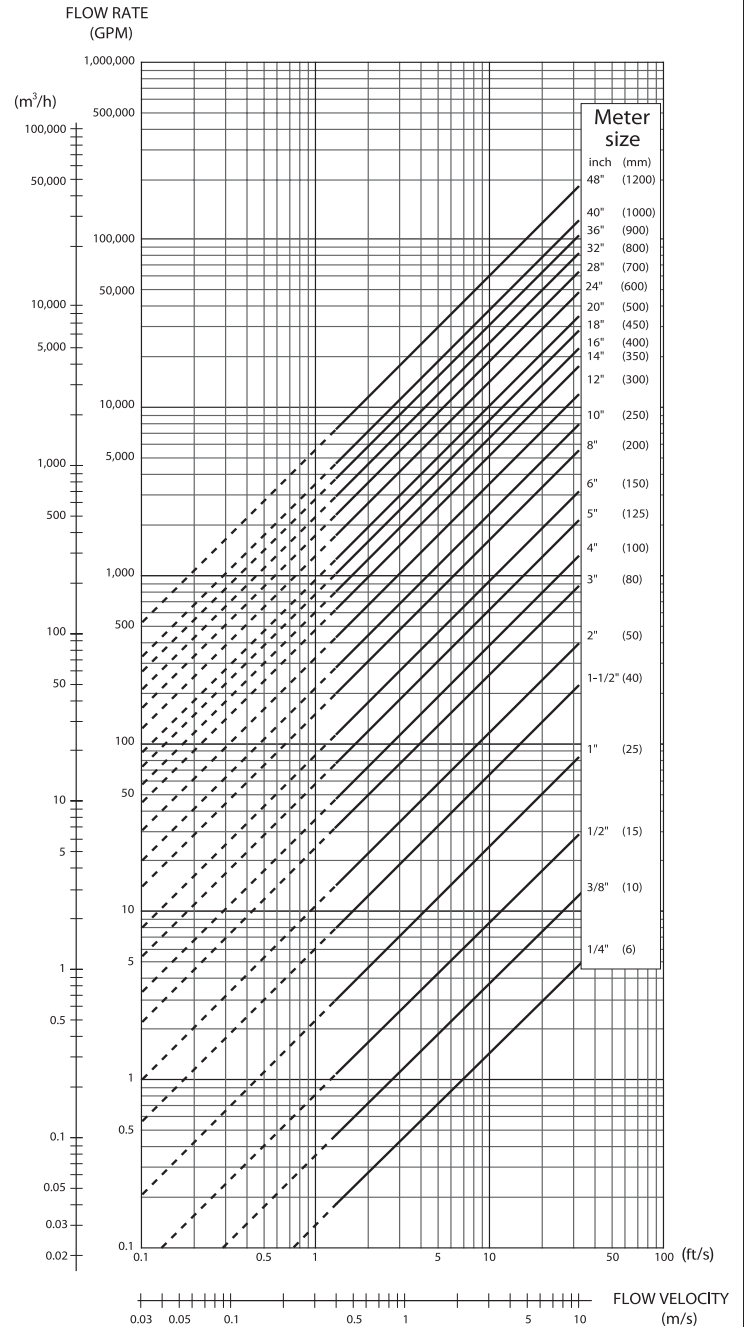
The table shows the relationship between flow velocity V, flow quantity Q, and sensor size.

### Guidelines for selection of sensor

Min. measuring range: 0-0.8 ft/s

Max. measuring range: 0-33 ft/s

Normally the sensor is selected with a nominal flow in the measuring range of 3-5 ft/s.

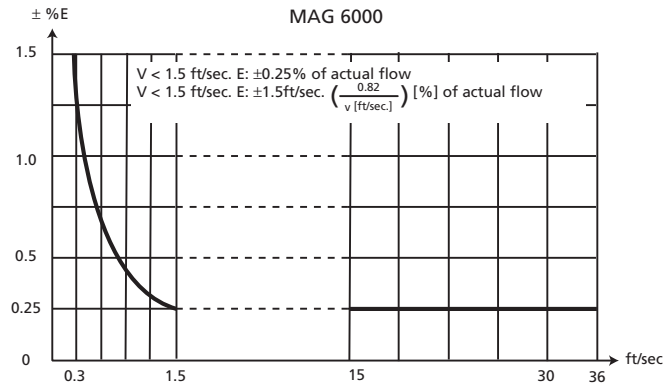


# Model MAGFLO®

## Sensor Model Mag 1100, MAG 1100 Food and MAG 3100 Signal Converter Model MAG 6000 and MAG 5000 MAG 5100 W

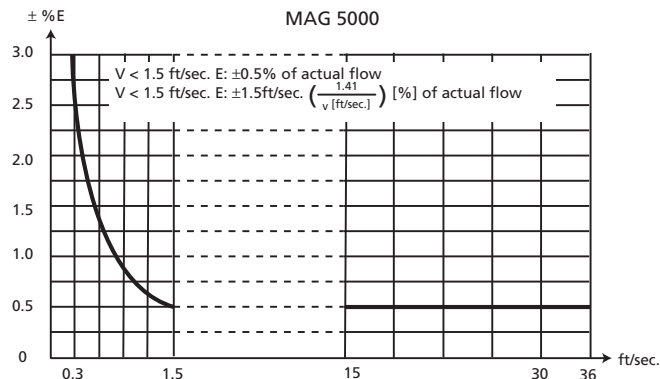
### Accuracy

Meter uncertainty under reference conditions (display/frequency/pulse output)



V: Actual flow velocity [ft/sec]

E: Meter uncertainty as a percentage of actual flow



V: Actual flow velocity [ft/sec]

E: Meter uncertainty as a percentage of actual flow

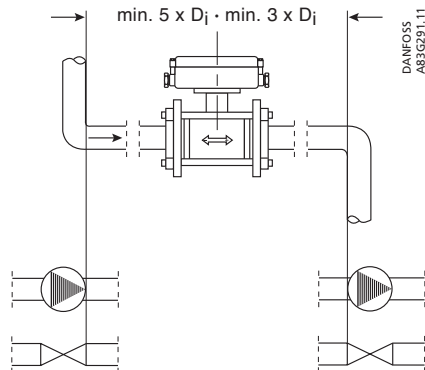
### Other Accuracy Statements

<b>Current output</b>	Pulse output: $\pm(0.1\% \text{ of actual flow} + 0.05\% \text{ FSO})$
<b>Effect of ambient temperature</b>	Display/frequency/pulse output: $< \pm 0.003\% / \text{Kelvin}$
	Current output: $< \pm 0.005\% / \text{Kelvin}$
<b>Effect of supply voltage</b>	$< 0.005\%$ of measuring value on 1% change
<b>Repeatability</b>	$\pm 0.1\%$ of actual flow for $V \geq 1.5 \text{ ft/s}$

### Inlet and outlet conditions

For accurate flow measurement, it is essential to have sufficient straight run of inlet and outlet pipes, and a certain distance between pumps and valves.

It is also important to center the flowmeter in relation to the pipe flanges and gaskets.



Reference Conditions (ISO/DP9104)	
<b>Temperature of medium</b>	68° F $\pm 4$ °F
<b>Ambient temperature</b>	68° F $\pm 4$ °F
<b>Supply voltage</b>	Un $\pm 1\%$
<b>Warm-up time</b>	30 min
<b>Incorporation in pipe section in accordance with reference conditions (ISO)</b>	Inlet section 10 x DN
	Outlet section 5 x DN
	Sensor optimally grounded and centered
	For further information contact Spirax Sarco
<b>Flow conditions</b>	Fully developed flow profile

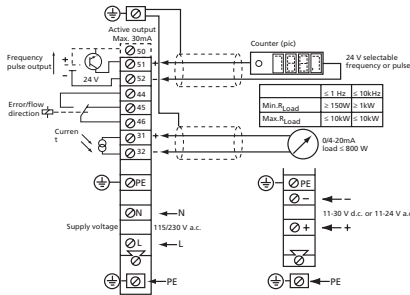
# Model MAGFLO®

## Sensor Model Mag 1100, MAG 1100 Food and MAG 3100

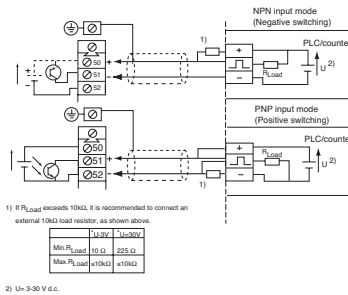
## Signal Converter Model MAG 6000 and MAG 5000 MAG 5100 W

### Electrical connection mag 6000 and mag 5000

Signal converter MAG 6000 and MAG 5000 integrally mounted on sensor

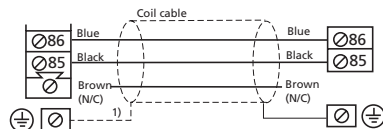
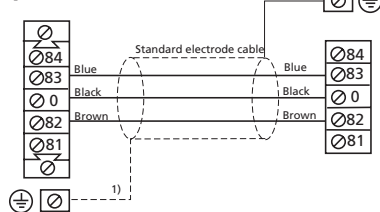


Connection of electromechanical counter (active output), current output, power supply.

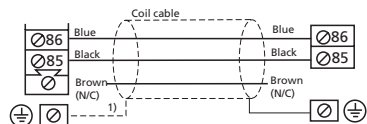
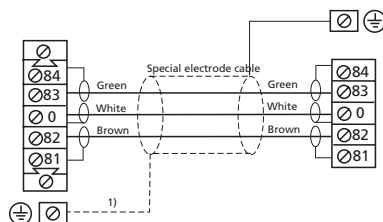


Other pulse-frequency output connection options using passive mode.

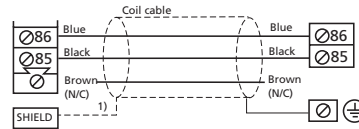
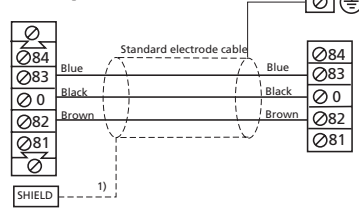
### Signal converter mag 6000 and mag 5000 remote mounted on sensor (other connections as shown above)



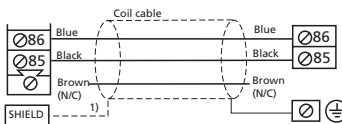
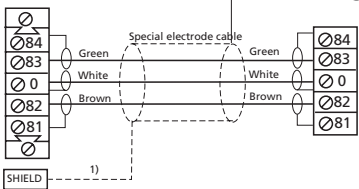
Signal converter remote mounted using a standard electrode cable.



MAG 6000 NEMA 6 version with special electrode cable for empty pipe detection.



MAG 6000 NEMA 6 version with special electrode cable for empty pipe detection.



19 insert remote mounted using special electrode cable. empty pipe detection.

1) EMC immunity: In areas with severe electrical interference, the shield on the electrode and coil cables must be grounded at both ends.

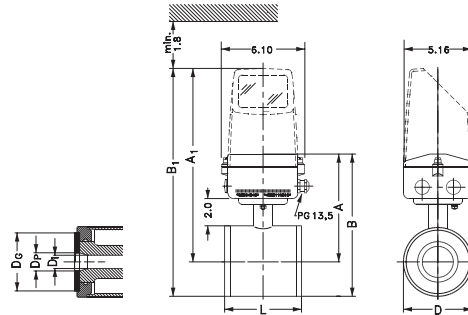
# Model MAGFLO®

## Sensor Model Mag 1100, MAG 1100 Food and MAG 3100 Signal Converter Model MAG 6000 and MAG 5000 MAG 5100 W

### Dimensions

Sensor MAG 1100 Standard and high temperature

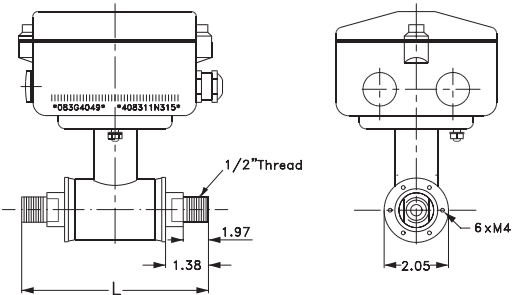
MAG 1100, integral/remote



Size	A <sup>1</sup>	B <sup>1</sup>	A <sub>1</sub>	B <sub>1</sub>	D	D <sub>i</sub> (Al <sub>2</sub> O <sub>3</sub> )	D <sub>p</sub>	D <sub>g</sub>	Weight <sup>2</sup>	The total built-in length "L", depends on the gasket selected.				
										EPDM	Graphite	PTFE (Teflon)	Without gasket	Earthing Ring
.25"	6.14"	7.13"	12.16"	13.15"	1.90"	0.24"	0.68"	1.34"	4.8"	2.52	2.60	2.75	2.52	3.03
.375"	6.14"	7.13"	12.16"	13.15"	1.90"	0.39"	0.68"	1.34"	4.8"	2.52	2.60	2.75	2.52	3.03
.5"	6.14"	7.13"	12.16"	13.15"	1.90"	0.59"	0.68"	1.57"	4.8"	2.56	2.60	2.75	2.52	3.03
1"	6.46"	7.72"	12.48"	13.74"	2.50"	0.98"	1.12"	2.20"	4.9"	3.15	3.19	3.35	3.10	3.62
1.5"	6.93"	8.58"	12.95"	14.61"	3.31"	1.57"	1.71"	2.95"	7.5"	3.74	3.78	3.94	3.70	4.21
2"	7.24"	9.25"	13.27"	15.27"	4.00"	1.97"	2.15"	3.54"	9.2"	4.13	4.17	4.33	4.05	4.61
2.5"	7.64"	10.00"	13.66"	16.02"	4.72"	2.56"	2.68"	4.41"	12.0"	5.12	5.15	5.31	5.05	5.59
3"	7.87"	10.47"	13.90"	16.50"	5.24"	3.15"	3.25"	4.88"	15.0"	6.10	6.14	6.30	6.00	6.57
4"	8.39"	11.50"	14.41"	17.52"	6.26"	3.94"	4.22"	5.91"	22.0"	7.28	7.31	7.48	7.20	7.76

1 0.5" shorter when the AISI terminal box is used. (High temperature version 390°F).

2 With signal converter MAG 5000 or MAG 6000 installed, weight is increased by approx. 1.8 lbs.



The MAG 1100 1/4" and 3/8" can be assembled with a 1/2" NPT SS fitting instead of wafer mount.

	Without gasket	EPDM	Graphite	Teflon
L	5.9"	5.9"	6.0"	6.1"

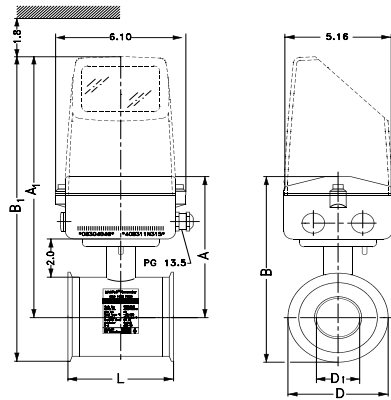


# Model MAGFLO®

## Sensor Model Mag 1100, MAG 1100 Food and MAG 3100 Signal Converter Model MAG 6000 and MAG 5000 MAG 5100 W

### Dimensions

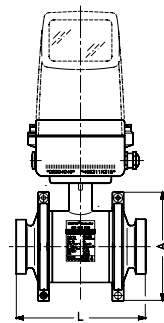
Sensor mag 1100 food



Sensor Size	L	A	B	A <sub>1</sub>	B <sub>1</sub>	D	Weight *
.375"	2.60"	5.63"	6.89"	11.8"	13.1"	2.52"	4.8"
.5"	2.60"	5.63"	6.89"	11.8"	13.1"	2.52"	4.8"
1	3.19"	5.94"	7.48"	12.1"	13.6"	3.05"	4.9"
1.5"	3.78"	6.34"	8.15"	12.5"	14.3"	3.58"	7.5"
2	4.17"	6.69"	9.06"	12.8"	15.2"	4.69"	9.2"
2.5"	5.24"	7.01"	9.57"	13.2"	15.7"	5.12"	12"
3	6.22"	7.32"	10.40"	13.5"	16.6"	6.10"	15"
4	7.40"	8.43"	12.04"	14.6"	18.2"	7.20"	22"

\* With signal converter MAG 5000 or MAG 6000 installed weight is increased by approx. 4.4 lbs.

### Built-in length



Sensor Size	A	L **
.375	3.90"	5.75"
.5	3.90"	5.75"
1	4.45"	6.34"
1.5	4.96"	6.93"
2	6.06"	7.32"
2.5	6.50"	8.78"
3	7.87"	10.5"
4	8.86"	11.34"

\*\* The total built-in length "L" is independent of the adapter type selected.

### Accessories

Mag 1100 food

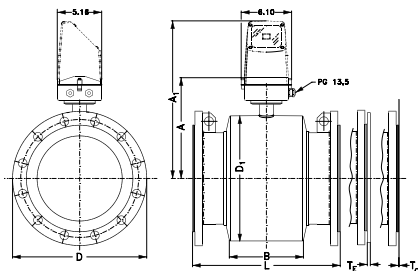
Sensor Size	Tri-Clover®		Tri-Clamp®	
	Di	Do	Di	Do
.5	0.53	0.63		
1			0.89	2
1.5	1.40	1.52	1.4	2
2	1.91	2.03	1.91	2.52
2.5	2.37	2.52	2.37	3.05
3	2.87	3.02	2.87	3.58
4	3.85	4.04	3.85	4.69

# Model MAGFLO®

## Sensor Model Mag 1100, MAG 1100 Food and MAG 3100 Signal Converter Model MAG 6000 and MAG 5000 MAG 5100 W

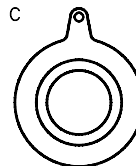
### Dimensions

Sensor mag 3100



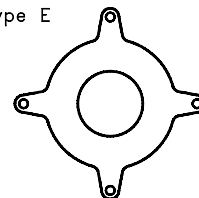
Earthing/protection flange

Type C



Size	t <sub>1</sub>	t <sub>2</sub>	Weight (lbs)
1" to 10"	0.05"	0.6"	0.07-0.9
12" to 24"	0.06"	0.8"	1.3-5.7
28" to 48"	0.08"	1.0"	6.6-11.0
56" to 80"	0.12"	1.6"	20.0-35.0

Type E



Size	t <sub>1</sub>	Weight
.5"	0.2	0.15
1" to 6"	0.2	0.7-3.0
8" to 14"	0.3	3.7-9.0
16" to 24"	0.4	14.0-28.0

Type C flanges for liners of neoprene, EPDM, linatex® and ebonite.

Type E flanges for liners of PTFE.

MAG 3100 high temperature (PTFE) is always equipped with 2 pcs. type E earthing flanges.

Size	A <sup>1</sup>	A <sub>1</sub>	B	D <sub>1</sub>	L <sup>2</sup>			T <sub>C</sub> <sup>3</sup>	T <sub>E</sub> <sup>3</sup>	Weight <sup>4</sup>
					ANSI 16.5 Class 150	Class 300	AWWA C-207 Class D			
.5"	7.36"	13.31"	2.32"	4.09"	7.87"	7.87"		-	0.24"	11"
1"	7.36"	13.31"	2.32"	4.09"	7.87"	7.87"		0.05"	0.24"	13"
1.5"	7.76"	13.70"	3.23"	4.88"	7.87"	7.87"		0.05"	0.24"	17"
2"	8.07"	14.01"	2.83"	5.47"	7.87"	7.87"		0.05"	0.24"	28"
2.5"	8.35"	14.29"	2.83"	6.06"	7.87"	10.71"		0.05"	0.24"	30"
3"	8.74"	14.69"	2.83"	6.85"	10.71"	10.71"		0.05"	0.24"	33"
4"	9.53"	15.47"	3.35"	8.43"	9.84"	12.20"		0.05"	0.24"	44"
5"	10.04"	15.98"	3.35"	9.41"	9.84"	13.10"		0.05"	0.24"	55"
6"	10.87"	16.81"	5.39"	11.10"	11.81"	11.81"		0.05"	0.24"	66"
8"	11.97"	17.91"	5.39"	13.31"	13.78"	13.78"		0.05"	0.31"	110"
10"	13.07"	19.02"	5.39"	15.47"	17.72"	17.72"		0.05"	0.31"	155"
12"	14.05"	20.00"	5.39"	17.48"	19.69"	19.69"		0.06"	0.31"	176"
14"	14.25"	20.20"	10.63"	17.76"	21.65"	21.65"	-	0.06"	0.31"	242"
16"	15.24"	21.18"	10.63"	19.76"	23.62"	23.62"	-	0.06"	0.39"	275"
18"	16.45"	22.40"	12.20"	22.16"	23.62"	25.20"	-	0.06"	0.39"	385"
20"	17.44"	23.39"	13.78"	24.17"	26.77"	28.70"	-	0.06"	0.39"	440"
24"	19.45"	25.39"	16.93"	28.15"	32.28"	33.80"	-	0.06"	0.39"	660"
28"	21.42"	27.36"	19.69"	32.13"	-	-	34.5"	0.08"	-	770"
30"	22.48"	28.43"	21.89"	34.21"	-	-	36.9"	0.08"	-	880"
32"	23.86"	29.80"	22.05"	36.50"	-	-	39.4"	0.08"	-	1045"
36"	25.71"	31.65"	24.80"	40.63"	-	-	44.3"	0.08"	-	1233"
40"	27.72"	35.67"	26.38"	44.72"	-	-	49.2"	0.08"	-	1541"
44"	29.72"	35.67"	30.31"	48.74"	-	-	-	0.08"	-	
48"	31.89"	37.83"	31.18"	53.07"	-	-	59.1"	0.08"	-	2751"
56"	36.42"	42.36"	39.37"	65.94"	-	-	68.9"	0.12"	-	3211"
60"	38.27"	44.21"	40.15"	65.83"	-	-	73.8"	0.12"	-	3731"
64"	40.35"	46.30"	44.49"	75.39"	-	-	78.7"	0.12"	-	4257"
72"	44.21"	50.16"	49.21"	77.72"	-	-	88.5"	0.12"	-	5291"
80"	48.15"	54.09"	54.13"	85.59"	-	-	98.4"	0.12"	-	7492"

1 0.5" shorter with AISI terminal box (Ex and high temperature)

2 When earthing flanges are used the thickness of the earthing flange must be added to the built-in length

3 T<sub>C</sub> = Type C grounding ring, T<sub>E</sub> = Type E grounding ring

4 Weights are approx and for ANSI 150 without signal converter.

D = Outside diameter of flange, see flange tables

# Model MAGFLO®

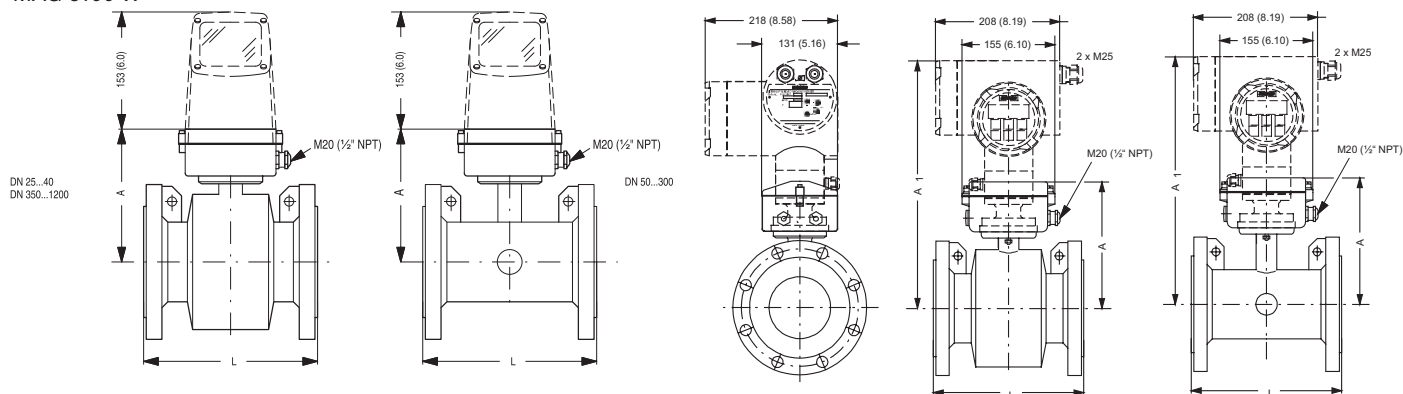
## Sensor Model Mag 1100, MAG 1100 Food and MAG 3100

## Signal Converter Model MAG 6000 and MAG 5000 MAG 5100 W

### Dimensions

MAG 5100 W

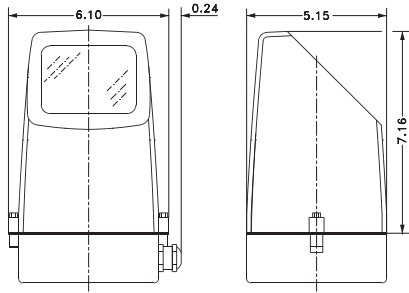
MAG 5100 W / 6000 I Compact



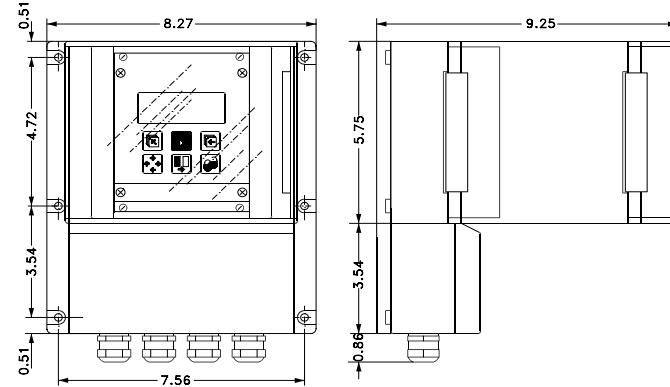
Nominal size		A		A <sub>1</sub>		L		PN 10		PN 16		PN 40		Class 150/AWWA		AS	
[mm]	[inch]	[mm]	[inch]	[mm]	[inch]	[mm]	[inch]	[mm]	[inch]	[mm]	[inch]	[mm]	[inch]	[mm]	[inch]	[mm]	[inch]
25	1	187	7.4	340	13.4	-	-	-	-	-	-	200	7.9	200	7.9	200	7.87
40	1½	197	7.8	350	13.8	-	-	-	-	-	-	200	7.9	200	7.9	200	7.87
50	2	188	7.4	341	13.4	-	-	200	7.9	-	-	-	-	200	7.9	200	7.87
65	2½	194	7.6	347	13.7	-	-	200	7.9	-	-	-	-	200	7.9	200	7.87
80	3	200	7.9	353	13.9	-	-	200	7.9	-	-	-	-	200	7.9	200	7.87
100	4	207	8.1	360	14.2	-	-	250	9.8	-	-	-	-	250	9.8	250	9.84
125	5	217	8.5	370	14.6	-	-	250	9.8	-	-	-	-	250	9.8	250	9.84
150	6	232	9.1	385	15.2	-	-	300	11.8	-	-	-	-	300	11.8	300	11.81
200	8	257	10.1	410	16.1	350	13.8	350	13.8	-	-	-	-	350	13.8	350	13.78
250	10	284	11.2	437	17.2	450	17.7	450	17.7	-	-	-	-	450	17.7	450	17.72
300	12	310	12.2	463	18.2	500	19.7	500	19.7	-	-	-	-	500	19.7	500	19.69
350	14	382	15.0	535	21.1	550	21.7	550	21.7	-	-	-	-	550	21.7	550	21.65
400	16	407	16.0	560	22.1	600	23.6	600	23.6	-	-	-	-	600	23.6	600	23.62
450	18	438	17.2	591	23.3	600	23.6	600	23.6	-	-	-	-	600	23.6	600	23.62
500	20	463	18.2	616	24.3	600	23.6	600	23.6	-	-	-	-	600	23.6	600	23.6
600	24	514	20.2	667	26.3	600	23.6	600	23.6	-	-	-	-	600	23.6	600	23.6
700	28	564	22.2	717	28.2	700	27.6	700	27.6	-	-	-	-	700	27.6	700	27.6
750	30	591	23.3	744	29.3	-	-	-	-	-	-	-	-	750	29.5	750	-
800	32	616	24.3	779	30.7	800	31.5	800	31.5	-	-	-	-	800	31.5	800	31.5
900	36	663	26.1	826	32.5	900	35.4	900	35.4	-	-	-	-	900	35.4	900	35.4
1000	40	714	28.1	877	34.5	1000	39.4	1000	39.4	-	-	-	-	1000	39.4	1000	39.4
	42	714	28.1	877	34.5	-	-	-	-	-	-	-	-	1000	39.4	-	-
	44	765	30.1	928	36.5	-	-	-	-	-	-	-	-	1100	43.3	-	-
1200	48	820	32.3	983	38.7	1200	47.2	1200	47.2	-	-	-	-	1200	47.2	1200	47.2

- not available

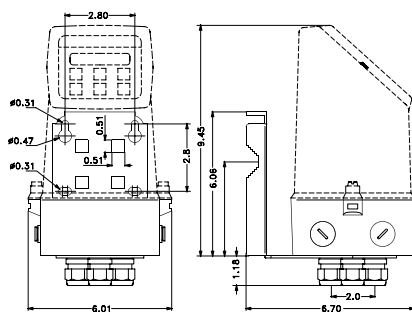
Flow Measurement

**Model MAGFLO®****Sensor Model Mag 1100, MAG 1100 Food and MAG 3100  
Signal Converter Model MAG 6000 and MAG 5000 MAG 5100 W****Signal converter compact  
polyamid—standard***Signal converter installed in compact  
mode*

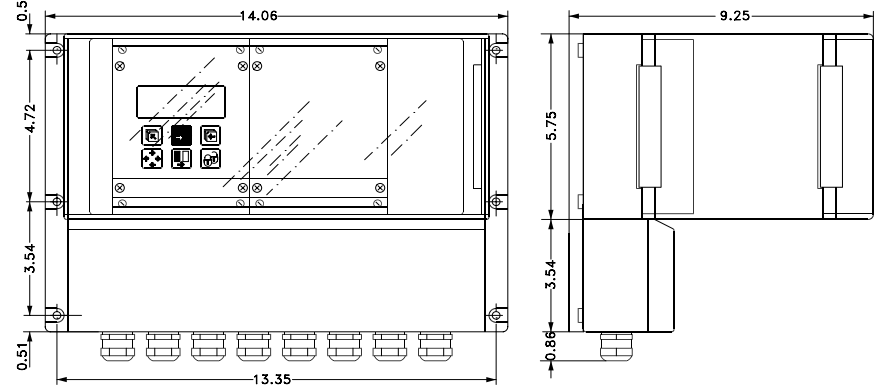
weight: mag 6000  
and mag 5000: 1.65 lbs

**Wall mounting box 21 TE (for optional 19" insert  
signal converter)**

Weight excl. signal converter: 7.56 lbs

*Signal converter installed remote*

weight: wall bracket: 2.0 lbs

**Wall mounting box 42 TE  
(for optional 19" insert signal converter and  
electrode cleaning unit)**

Weight excl. signal converter: 6.4 lbs



## MAGFLO MAG 5100 W

### Benefits

- DN 25 to DN 1200 (1" to 48")
- Connection flanges EN 1092-1 (DIN 2501), ANSI, AWWA and AS.
- Ebonite Hard Rubber liner for all water applications
- Hastelloy Integrated grounding and measuring electrodes
- Increased low flow accuracy for water leak detection, due to coned liner design.
- Drinking water approvals
- Suitable for direct burial and constant flooding
- Build-in length according to ISO 13359
- Easy commissioning, SENSORPROM unit automatically up-loads calibration values and settings
- Designed that patented in-situ verification can be conducted. Using SENSORPROM fingerprint.

### Application

The main applications of the MAGFLO electromagnetic flow sensors can be found in the following fields:

- Water abstraction
- Water treatment
- Water distribution network (leak detection management)
- Custody transfer water meters
- Irrigation
- Waste water treatment
- Filtration plant (e.g. reverse osmosis and ultra filtration)
- Industrial Water applications

### Mode of operation

The flow measuring principle is based on Faradays law of electromagnetic Induction where the sensor converts the flow into an electrical voltage proportional to the velocity of the flow.

### Function

- Highly resistant to a wide range of chemicals
  - OIML R49 and PTB approved
  - Conforms to ISO 4064 and EN 14154
  - MI-0001 Custody Transfer approval for billing
- Meets EEC directives: PED, 97/23/EC pressure directive for #N 1092-1 flanges
- Simple onsite of factory upgrade to IP68/NEMA 6P of standard sensor.

### Integration

The complete flow meter consists of a flow sensor and an associated transmitter MAGFLO MAG 5000 or MAG 6000

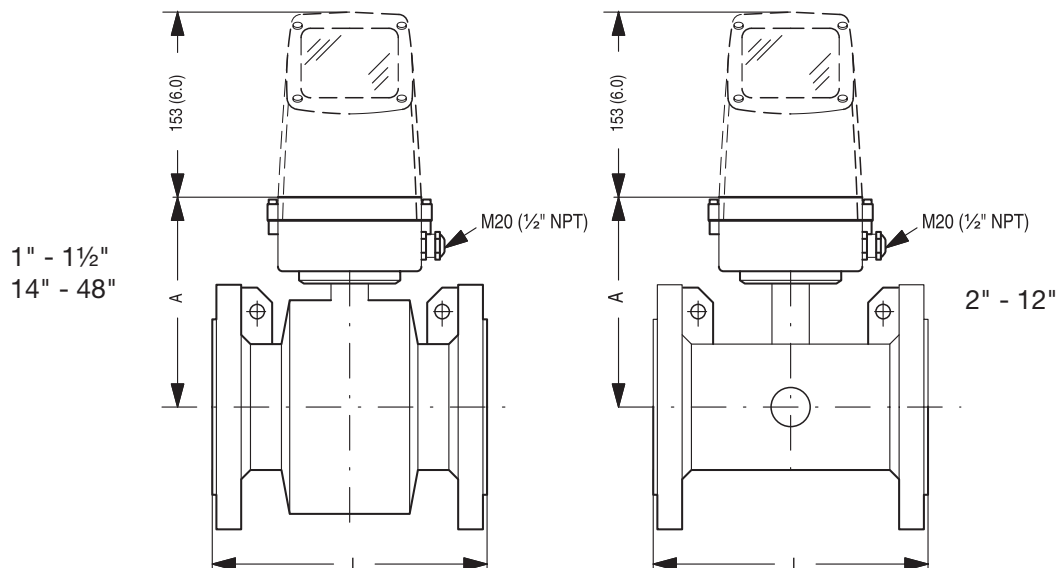


# MAGFLO MAG 5100 W

## Technical Specifications

Design	Full bore sensor	Coned bore sensor	Full bore sensor
Nominal size	DN 25 ...40 (1" ...1 ½")	DN 50 ...300 (2" ...12")	DN 350 ...1200 (14"...48")
Measuring principle	Electromagnetic induction		
Excitation frequency	12.5 Hz	<ul style="list-style-type: none"><li>• 50... 65mm (2" ...2 ½"): 12.5 Hz</li><li>• 80 ...150mm (3" ...6"): 6.25 Hz</li><li>• 200 ... 300mm (8" ...12"): 3.125 Hz</li></ul>	DN 350 ... 450 (14" ...18"): 3.125Hz DN 500... 1200 (20" ...48"): 1.5625 Hz
Process connection			
Flanges			
• ANSI B 16.5	Class 150 lb	Class 150 lb ~20 bar (290 psi)	
• AWWA C-207	-	-	28" ...48": Class D
Rated Operation Conditions			
Ambient temperature <ul style="list-style-type: none"><li>• Sensor</li><li>• With Compact transmitter</li></ul> MAG 5000/6000	-40... +70 °C (-40... +158 °F) -20... +50 °C (-4 ... +122 °F)		
Operating pressure	0.01 ...40bar (0.15 ...580 psi)	0.03 ...20 bar (0.44...290psi)	0.01...16 bar (0.15 ...232psi)
Enclosure rating <ul style="list-style-type: none"><li>• Standard</li><li>• Optiion</li></ul>	IP67 to EN 60529 / NEMA 4x/6 (1 mH <sub>2</sub> O for 30 minutes) IP68 to EN 60529 / NEMA 6P (40 mH <sub>2</sub> O continously)		
Pressure drop at 3 m/s (10 ft/s)	As straight pipe	Max. 25 mbar (0.36 psi)	As straight pipe
Medium conditions			
Temperature of medium			
• Ebonite	-10 ... +70 °C {14 ... +158°F)		
EMC	89/336 EEC		
Design			
Weight	See dimensional drawings		
Material <ul style="list-style-type: none"><li>• Housing and flanges</li><li>• Terminal box</li><li>• Measuring pipe</li><li>• Liner</li><li>• Electrodes</li><li>• Grounding electrodes standard</li></ul>	Carbon steel, St 37.2 Standard Fibre glass reinforced polyamide AISI 304 (1.4301) Ebonite Hard Rubber (hydro carbon resistant) Hastelloy C276 Hastelloy C276		
Certificates and approvals			
Custody Transfer (only together with MAG 5000/6000 CT)	OIML R 49 cold water (2" ...12") MI 001 cold water (2" ...12")		
Approvals	FM Class 1, Div 2 CSA Class 1, Div 2		
Approvals	CRN		

# MAGFLO MAG 5100 W



Nominal Size		A	L	Weight
			Class 150 / AWWA	Class 150 / AWWA
[mm]	[inch]	[inch]	[inch]	[lbs]
25	1	7.4	7.9	9
40	1 1/2	7.8	7.9	13
50	2	7.4	7.9	20
65	2 1/2	7.6	7.9	24
80	3	7.9	7.9	28
100	4	8.1	9.8	41
125	5	8.5	9.8	52
150	6	9.1	11.8	64
200	8	10.1	13.8	124
250	10	11.2	17.7	174
300	12	12.2	19.7	243
350	14	15.0	21.7	307
400	16	16.0	23.6	351
450	18	17.2	23.6	400
500	20	18.2	23.6	495
600	24	20.2	23.6	704
700	28	22.2	27.6	602
750	30	23.3	29.5	725
800	32	24.3	31.5	804
900	36	26.1	35.4	1089
1000	40	28.1	39.4	1282
	42	28.1	39.4	1512
	44	30.1	43.3	1680
1200	48	32.3	47.2	1896



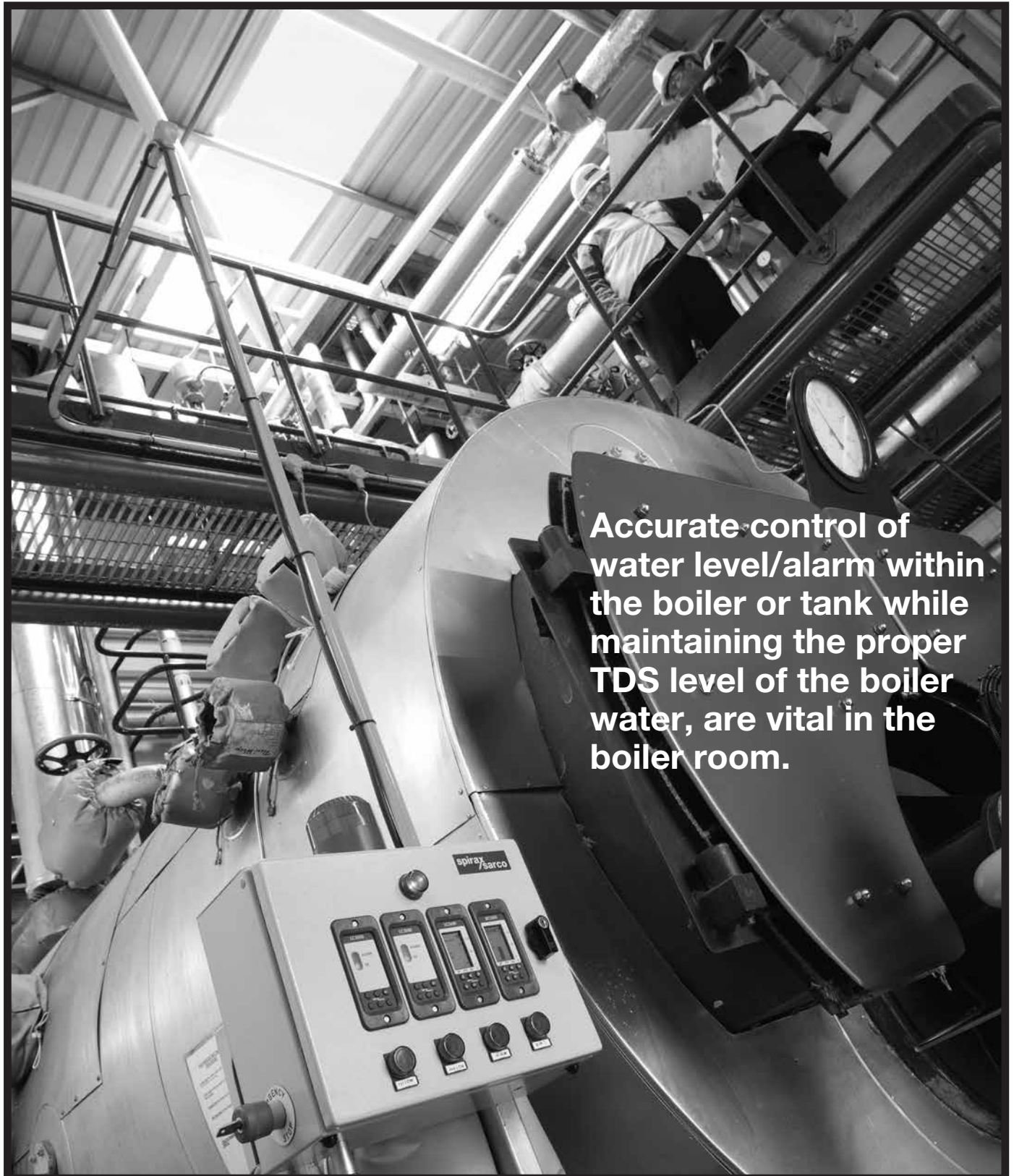
# MAGFLO MAG 5100 W

## Model Code MAG 5100 W

DESCRIPTION	SIZE (IN.)	CODE No	FLANGE
Sensor MAG 5100 W - Hard Rubber Liner (ebonite)			
Liner: Ebonite	1"	7ME6580-2DJ14-2AA2	150# ANSI
Accuracy: 0.5% of rate	1 ½ "	7ME6580-2RJ14-2AA2	150# ANSI
Electrodes:Hastelloy C	2"	7ME6580-2YJ14-2AA2	150# ANSI
Enclosure: NEMA 4X, NEMA 6*	2 ½ "	7ME6580-2FJ14-2AA2	150# ANSI
(3-ft. submersible up to 72 hours)	3"	7ME6580-3MJ14-2AA2	150# ANSI
Flange Material: Carbon Steel	4"	7ME6580-3TJ14-2AA2	150# ANSI
Sizes 1" to 24" : ANSI 16.5B, Class 150	5"	7ME6580-4BJ14-2AA2	150# ANSI
Sizes 28" to 48" : AWWA C-207, Class D	6"	7ME6580-4HJ14-2AA2	150# ANSI
Max Temp: 158° F (70°C)	8"	7ME6580-4PJ14-2AA2	150# ANSI
*NEMA 6P when applying submersible kit part # 085U0220	10"	7ME6580-4VJ14-2AA2	150# ANSI
	12"	7ME6580-5DJ14-2AA2	150# ANSI
Code numbers in Bold Type indicate items ordinarily in stock.	14"	7ME6580-5KJ14-2AA2	150# ANSI
Consult factory for confirmation.	16"	7ME6580-5RJ14-2AA2	150# ANSI
	18"	7ME6580-5YJ14-2AA2	150# ANSI
	20"	7ME6580-6FJ14-2AA2	150# ANSI
Coned Design	24"	7ME6580-6PJ14-2AA2	150# ANSI
	28"	7ME6580-6YL14-2AA2	AWWA
	30"	7ME6580-7DL14-2AA2	AWWA
	32"	7ME6580-7HL14-2AA2	AWWA
	36"	7ME6580-7ML14-2AA2	AWWA
	40"	7ME6580-7RL14-2AA2	AWWA
	42"	7ME6580-7UL14-2AA2	AWWA
	44"	7ME6580-7VL14-2AA2	AWWA
	48"	7ME6580-8BL14-2AA2	AWWA

# Boiler Controls

for level control/alarm and TDS control.



Accurate control of water level/alarm within the boiler or tank while maintaining the proper TDS level of the boiler water, are vital in the boiler room.

## Boiler Controls Table of Contents

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## LP 10-4 Level Probe

### Description

The Spirax Sarco LP10-4 level probe is used with Spirax Sarco LC1300 series level controllers to provide on / off level control and alarm functions in steam boilers, tanks or other vessels.

The four tip probe is particularly suitable where 3-lamp 'electric gauge glass' alarm/ level indicators are fitted. The probe body is grounded through its screwed connection and the boiler or tank normally forms the ground return path. The probe may also be used in concrete or plastic tanks by using one of the tips as a ground return, or by providing a separate ground rod or plate. The LP10-4 probe has four detachable level sensing tips which are cut to length on installation to give the required switching levels. Note: Tips are ordered separately, and are 39" long. Two sets of tips may be connected for a maximum probe length of 82". When a tip is immersed in conductive liquid it completes an electrical circuit to ground. When the level drops below the tip, the resistance to ground becomes high, indicating to the controller that the tip is out of the liquid.

- Single probe provides all the controls needed on a tank
- Suitable for use with steam boilers up to 464 psig (32 barg)
- For level control and simple alarm duties
- Stainless steel and PFA wetted parts

### Approvals

The LP10-4 is also available with a 1" NPT screwed connection.

### Caution

**The probe is not suitable for outside installation without additional environmental protection.**

### Available tip lengths inches (mm)

Tips are 39.4" (1000 mm) long. Two sets of tips may be connected for a maximum probe length of 82.5" (2095 mm)

### Pressure / temperature limits

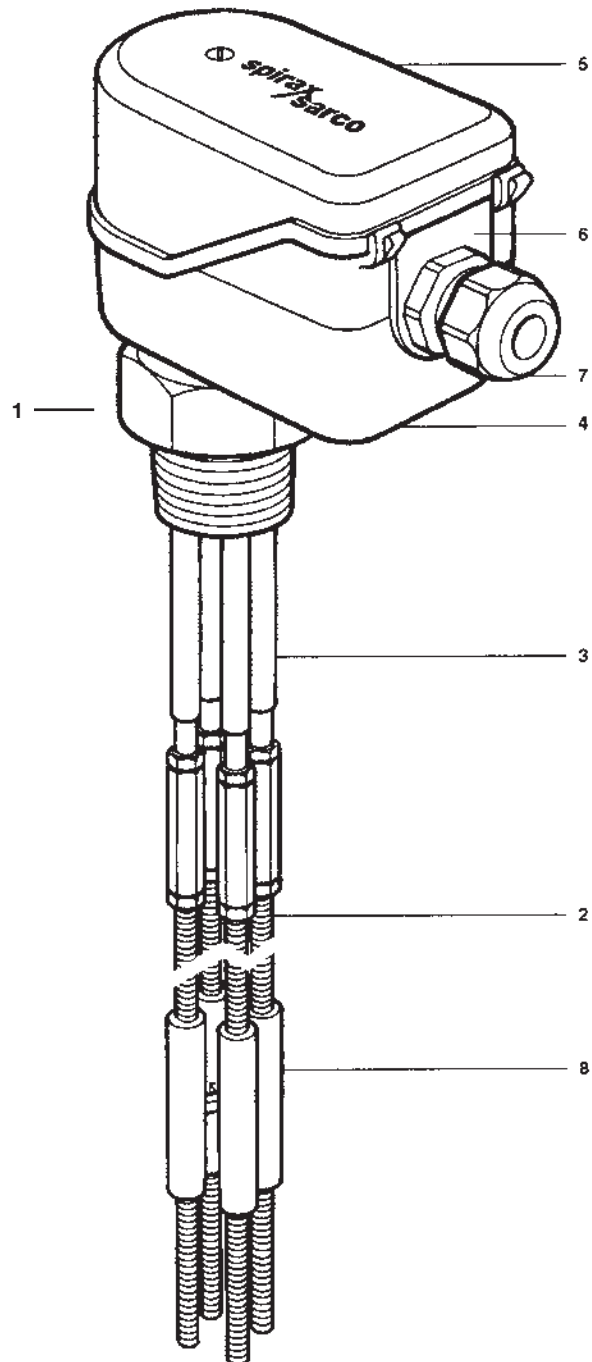
Nominal pressure rating	PN40
Maximum pressure	464 psig (32 barg)
Maximum temperature	462°F (239°C)
Maximum ambient temperature	158°F (70°C)
Minimum ambient temperature	-4°F ( -20°C)

### Technical data

Protection rating	IP54
Maximum cable length (probe to controller)	98ft (30 m)
Maximum sensing depth	82.5" (2 095 mm)
Minimum sensing depth	3" (75 mm)
Minimum conductivity (when used with an LC1300 level controller)	1µS/cm @ 77°F (25°C)

### Materials

No.	Part	Material
1	Probe body	Austenitic stainless steel Type 304L/ 1.4306
2	Probe tips	Austenitic stainless steel Type 316/ 316L
3	Tip insulation sleeving	PFA (Per Fluor Alkoxy)
4	Lower housing	PPS (Polyphenylene sulphide)
5	Upper housing	PPS (Polyphenylene sulphide)
6	Gland support pad	Thermoplastic elastomer
7	Cable gland	PA (Polyamide)
8	Tip steady	PEEK (Polyaryletherketone) Grade 450G



# LP 10-4 Level Probe

## Safety information

### WARNING

Your attention is drawn to Safety Information Leaflet IM-GCM-10, as well as to any National or Regional regulations.

This product is designed and constructed to withstand the forces encountered during normal use.

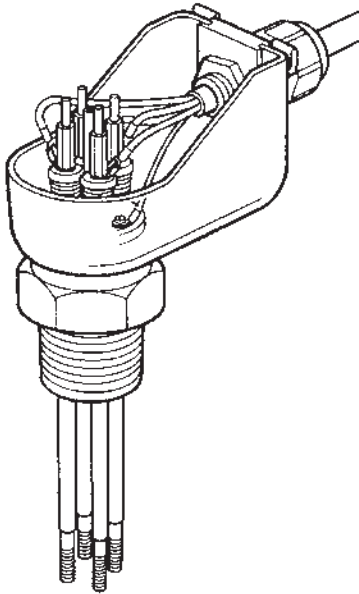
Use of the product for any purpose other than as a level probe could cause damage to the product and may cause injury or fatality to personnel.

This product contains materials including plastics which can give off toxic fumes if exposed to excessive heat. Additional environmental protection is needed for installation outdoors.

## Installation

This document does not contain sufficient information to install the product safely. See the Installation and Maintenance Instructions provided with every unit.

The LP10-4 is designed for installation in a 1" NPT threaded flange or cover. The probe tips are screwed to the probe body using the extension connectors and lock-nuts provided, then cut to length before installation to give the required switching levels. Tip steadies provide lateral support as well as insulation between the tips. For deep tanks/ boilers, the switching level may be extended to a maximum of 82" by fitting a second probe tip. A minimum 3" (80 mm) nominal bore protection tube is recommended if installing the probe in a boiler, or in a tank which is subject to very turbulent conditions.



## Wiring

Wiring is straightforward on the LP10-4, as crimp connectors are used. Extra connectors are available as a spares kit. Terminal posts are colour coded for easy identification.

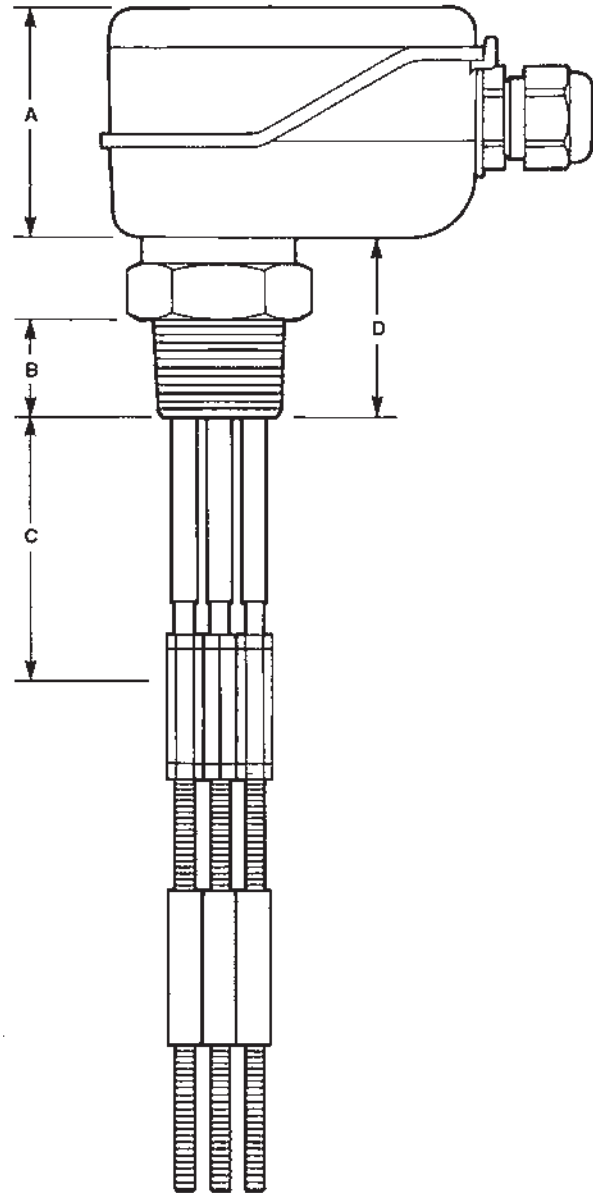
The wiring loom may be disconnected and removed without disturbing the cable gland by lifting the gland carrier out of the lower housing.

## Maintenance

No special maintenance is required, though boiler water level controls do require periodic testing and inspection which is described in separate literature.

## Dimensions / weight (approximate) in inches and lbs.

A	B	C	D	Weight
2.4	1.0	3.0	2.0	2.5



## How to specify

Conductivity probe with austenitic stainless steel body and probe tips, PFA tip insulation, suitable for steam boiler operation up to 464 psig (462°F)

## How to order

Example: 1 of Spirax Sarco LP10-4 probe with 39" tip assembly.

## Available spares

### LP10-4 connector set (electrical)

Comprising: 6 flat crimp connectors and 2 ring crimps

### LP10-4 tip mounting kit

Comprising: 1 set of 4 tip connectors, 8 lock-nuts and 2-tip supports



## LP 20 Capacitance Level Probe

### Description

The Spirax Sarco LP20 is a capacitance probe designed for modulating level control in conductive liquids, in conjunction with a PA20 preamplifier, which is supplied separately. It can also be used for adjustable on/off control.

The LP20 may be used with one or more controllers or transmitters to provide level control, level alarms, and/or outputs to a building management system. The probe is normally installed in a steam boiler or metal tank where it is earthed through the ½" NPT screwed connection, the boiler or tank forming the earth return path.

It may be used in a non-conductive tank (e.g. plastic or concrete) if an earth rod is provided.

The PA20 preamplifier (described in separate literature), is screwed to the top of the probe and hand tightened, enabling easy removal without the need to disturb the probe.

### Approvals:

The LP20 is available with a ½" NPT screwed connection.

**Caution: The probe is not suitable for outside installation without additional environmental protection.**

### Available probe lengths (approximate) in inches

14.6, 18.5, 21.6, 23.6, 25.6, 29.5, 31.5, 35.4, 37.4, 41.3, 47.2, 53.1, or 59.1

**Note:** Probe length includes the 1" (25 mm) 'dead' length at its tip. **The probe must not be cut to length.**

### Pressure / temperature limits

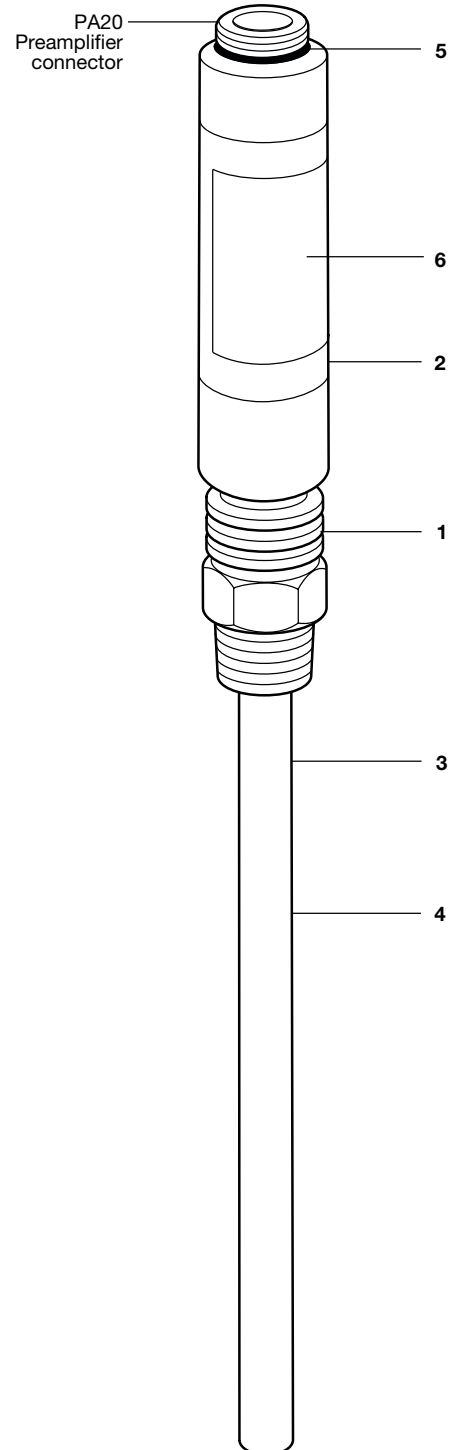
Nominal pressure rating	(PN40)
Maximum pressure	464 psig (32 bar g)
Maximum temperature	462°F (239°C)
Ambient temperature	Maximum 158°F (70°C) Minimum 41°F (5°C)
Designed for a maximum cold hydraulic test pressure of 870 psig (60 bar g)	

### Technical data

Sensing depth	Probe length minus 1" (25 mm)
Minimum conductivity	5 µS/cm or 5 ppm

### Materials

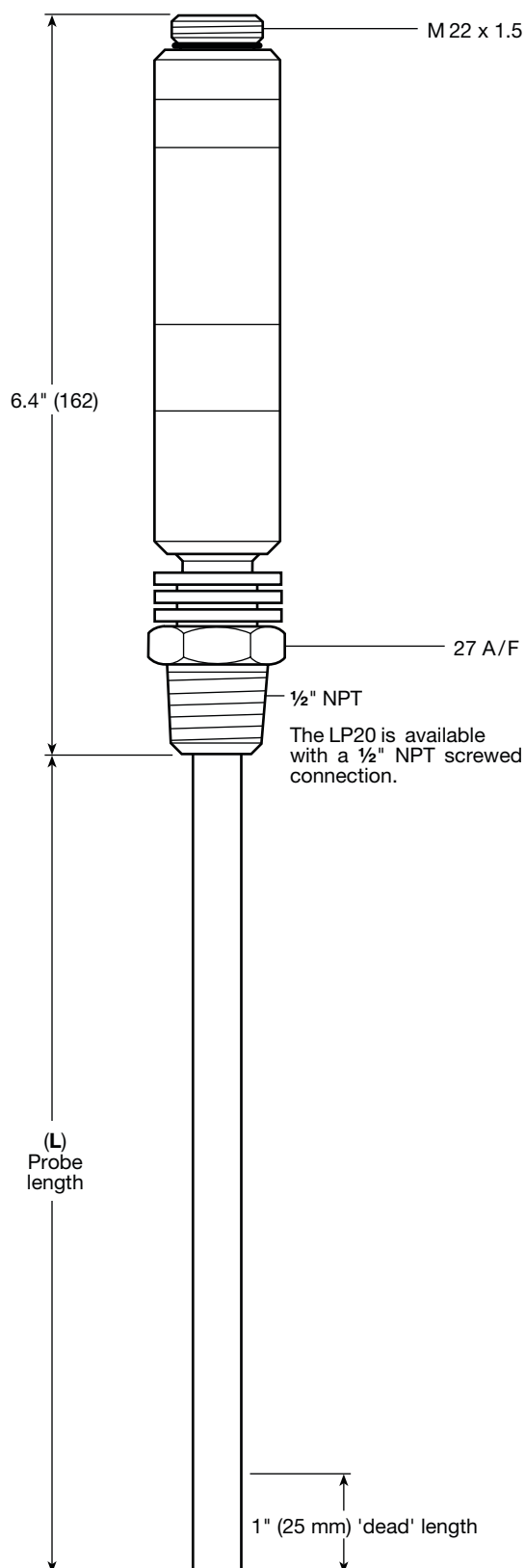
No.	Description	Material
1	Probe body	Austenitic stainless steel BS EN 10088-3 (1.4306)
2	Cover assembly	Austenitic stainless steel Type 316L
3	Probe (sheathed)	Stainless steel tube ASTM A269 Gr. 316L
4	Probe sheathing	PTFE BS 6564 Grade UA Type 1
5	'O' ring	Nitrile rubber
6	Name-plate	Polycarbonate



# LP 20 Capacitance Level Probe

**Dimensions** (approximate) in inches **Weights** (approximate) in pounds including immediate packaging

Probe length	14.6	18.5	21.6	23.6	25.6	29.5	31.5	35.4	37.4	41.3	47.2	53.1	59.1
Weight	1.8	1.8	2.0	2.1	2.2	2.3	2.5	2.7	2.9	3.1	3.3	3.6	3.7



## Safety information, installation and maintenance

This document does not contain sufficient information to install the system safely. See the Installation and Maintenance Instructions supplied with the probe for full details.

**Installation note:** Do not install the probe outdoors without additional weather protection.

The probe is installed in a 1/2" NPT female connection. If the probe is to be installed in a boiler shell or a turbulent tank, fit a protection tube. This should be as long as possible, and at least long enough to cope with expansion of the probe at higher operating temperatures. The Table below shows the maximum probe expansion possible 0 - 239°C.

Probe length in inches (mm)	Maximum expansion in inches (mm) (inc. 'dead' length)
14.6 (370)	0.4 (10)
18.5 (470)	0.5 (13)
21.6 (550)	0.5 (15)
23.6 (600)	0.6 (16)
25.6 (650)	0.7 (17)
29.5 (750)	0.8 (20)
31.5 (800)	0.8 (21)
35.4 (900)	0.9 (23)
37.4 (950)	1.0 (25)
41.3 (1050)	1.1 (27)
47.2 (1200)	1.2 (30)
53.1 (1350)	1.3 (34)
59.1 (1500)	1.5 (38)

**Do not cover the vent and drain holes on the body.**

## Maintenance note:

No special maintenance is required. Boiler water level controls and alarms do, however require periodic testing and inspection, which is described in separate literature.

## How to specify

Capacitance level probes shall be Spirax Sarco type LP20 with stainless steel body, cover assembly and probe, and PTFE probe insulation. They shall be suitable for modulating and on/off level control and be fitted with a screwed connection for attaching a Spirax Sarco PA20 preamplifier.

## How to order

**Example:** 1 off Spirax Sarco LP20 capacitance level probe with NPT connection. Probe length 18.5".

## PA 20 Pre-Amplifier

### Description

The PA20 preamplifier is used with a Spirax Sarco capacitance probe to amplify the capacitance measured and convert it to a voltage output proportional to the liquid level. It is compatible with all Spirax Sarco voltage input controllers/transmitters.

The preamplifier consists of a tubular austenitic stainless steel body which screws onto the top of the probe, and has a DIN 43650 connector. The connector includes a 1/2" NPT adaptor for connection to flexible conduit and four 18AWG flying leads. The PA20 has three sensitivity settings, selected to suit different probe lengths by wiring variations. These are fully described in the Installation and Maintenance Instructions supplied with the unit.

#### Principal features:

- Compact, rigidly mounted.
- Can be removed/replaced without disturbing the probe.
- No maintenance needed.
- Suitable for all probe lengths.

#### Approvals:

The PA20 is with a 1/2" NPT screwed connection.

**Please note that this version will not be marked and is not suitable for Europe.**

**Caution: The probe is not suitable for outside installation without additional environmental protection.**

### Limiting conditions

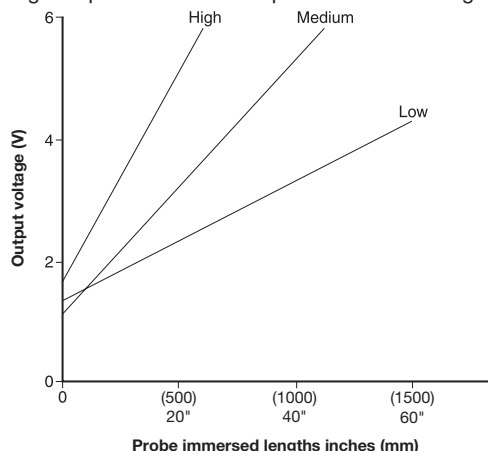
Maximum ambient temperature	158°F (70°C)
Maximum cable length	300 ft (100 m)

### Technical data

Supply voltage	15 - 36 Vdc
Maximum power requirement	10 mA
Output volts range	1 - 6 Vdc
Output impedance	100 Ω

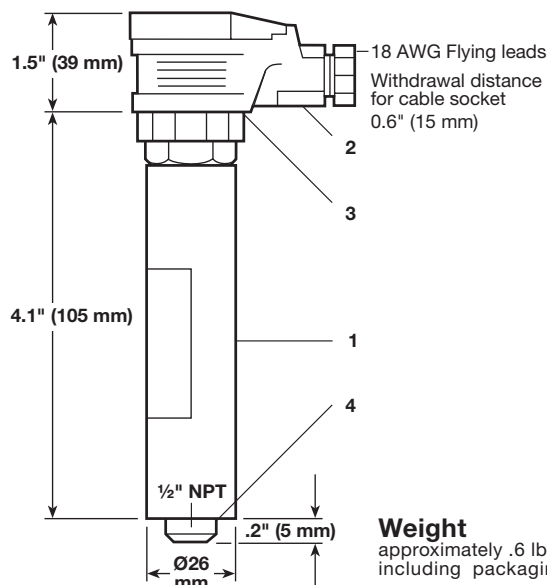
### Voltage check graph

Voltage output characteristics/probe immersed lengths.



Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only. In the interests of development and improvement of the product, we reserve the right to change the specification.

### Dimensions (approximate) in inches (mm)



#### Weight

approximately .6 lbs (0.25 kg) including packaging.

### Materials

No	Part	Material
1	Body	Austenitic stainless steel ASTM A582 303
2	Cable connector	Polyamide (Glass filled)
3	Connector gasket	Silicone rubber
4	'O' ring	Nitrile rubber

### Safety information, installation and maintenance

**This document does not contain sufficient information to install the product safely. See the Installation and Maintenance Instructions provided with each unit.**

#### Installation note:

The PA20 is screwed into the top of the capacitance probe and hand tightened. An 'O' ring is supplied to provide a seal. An 'O' ring is also supplied with the probe. Use only one 'O' ring. Note: Do not install the probe outdoors without additional weather protection.

#### Maintenance note:

No special maintenance is required. Boiler water level controls do, however, require periodic testing and inspection, which is described in separate literature.

#### Spare parts

There are no available spare parts for this unit.

### How to specify

Preamplifiers shall be Spirax Sarco type PA20 for use with Spirax Sarco capacitance probes. Preamplifiers shall have austenitic stainless steel bodies and a screwed connection, with a DIN 43650 connector.

### How to order

**Example:** 1 off Spirax Sarco PA20 preamplifier.



## LC1350 Level Controller

### Description

The Spirax Sarco LC1350 has two alarm channels that can be independently configured high or low to control the water level of a boiler, tank or vessel by operating a pump, valve or solenoid. It has been designed as an on/off level controller for use with the LP10-4 four-tip conductivity probe operating on supply voltages from 110 to 240 Vac.

The controller is suitable for use with virtually all qualities of conductive liquids from salt solutions or boiler water to condensate having an electrical conductivity as low as 1  $\mu\text{S}/\text{cm}$  at 25°C. (0.64ppm @ 77°F)

The LC1350 gives accurate and reliable control under the very different conditions found in vessels, tanks or high output boilers operating up to 32 bar @ 239°C. (464psig @ 462°F)

The front panel has a 3-digit LCD screen and moving segments that display the liquid level rising or falling along with a five-button keypad.

The unit can be panel, DIN rail or chassis mounted.

### Principal features:

- Level controller with two configurable alarms.
- Universal power supply – 110 Vac to 240 Vac @ 50/60 Hz.
- TÜV approved.
- LCD shows level change direction.
- Interactive safety feature.
- Infrared comms.

### Approvals

This product complies with the Electromagnetic Compatibility Directive 2004 / 108 / EC and all its requirements.

The LC1350 is suitable for Class A Environments (e.g. industrial). A fully detailed EMC assessment has been made and has the reference number UK Supply BH LC1350 2008.

The LC1350 complies with the Low Voltage Directive by meeting the standards of:

- EN 61010-1:2010 safety requirements for electrical equipment for measurement, control, and laboratory use.

The LC1350 has been type-tested as a level control by meeting the standard:

- Vd TÜV requirements for water level control and limiting devices, Water Level 100 (07.2010).

### Application

Typical application example – on/off control of a feedtank:

- Pump on
- Pump off
- High alarm
- Low alarm

**Note:** probes can be mounted in external chambers if boiler mounting is not possible.

### Function

#### Inputs

The LC1350 input options are:

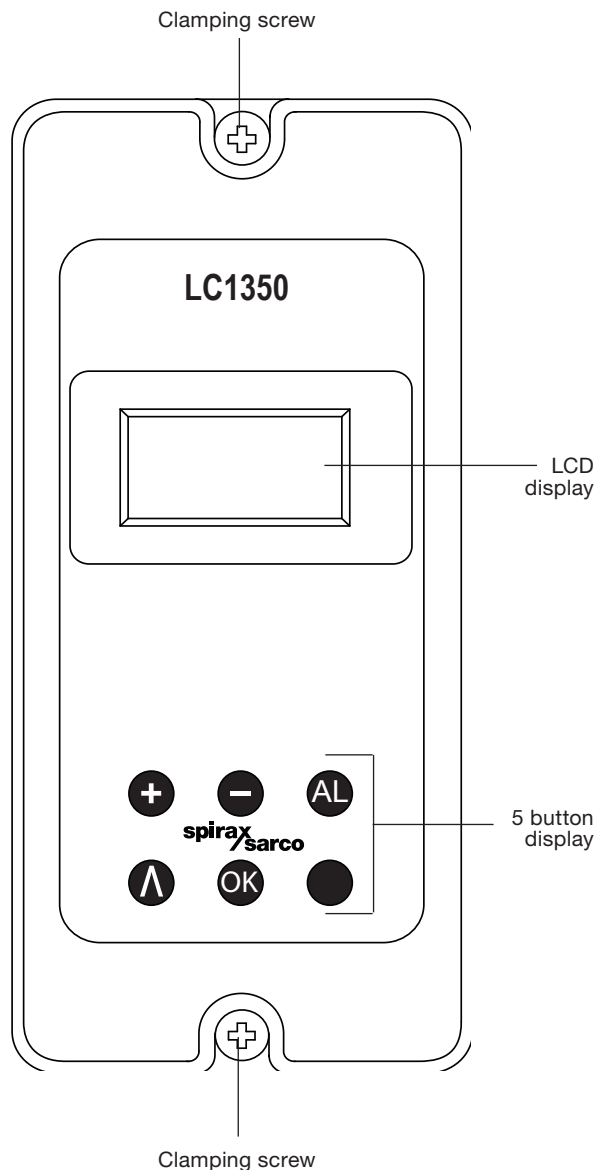
- High alarm or low alarm from a conductivity probe.
- Pump on/off control from two conductivity probes.

#### Function / outputs

The controller reacts to a change in probe conductivity (open/closed circuit) and energizes / de-energizes a relay. This action switches a pump or sounds an alarm.

#### Other features:

- Additional filters can be selected to increase the damping effect for turbulent conditions.
- To prevent unwanted or inadvertent changes being made, all commissioning parameters are protected with a fixed pass code.
- The product can communicate via an infrared link between adjacent boiler house controllers. It is designated as a slave unit.
- A panel mounted external test switch may be fitted if required.



# LC1350

## Level Controller

### Technical data LC1350

<b>Power supply</b>	Mains voltage range	110 Vac to 240 Vac at 50/60 Hz	
	Power consumption	7.5 W (maximum)	
<b>Environmental</b>	General	Indoor use only	
	Maximum altitude	2 000 m (6 562 ft) above sea level	
	Ambient temperature limits	0 - 55°C (32-131°F)	
	Maximum relative humidity	80% up to 31°C (88°F) decreasing linearly to 50% at 40°C (104°F)	
	Overvoltage category	III	
	Pollution degree	2 (as supplied)	
		3 (when installed in an enclosure) - Minimum of IP54.	
	Enclosure rating (front panel only)	IP65 (verified by TRAC Global)	
	LVD (safety)	Electrical safety EN 61010-1	
	EMC	Immunity/Emissions	Suitable for heavy industrial locations
	Enclosure	Material	Polycarbonate
	Front panel	Material	Silicone rubber, 60 shore.
	Solder	Tin/lead (60/40%)	
<b>Mains and signal connector</b>	Termination	Rising clamp plug-in terminal blocks with screw connectors. <b>Caution:</b> Use only the connectors supplied by Spirax Sarco Ltd. Safety and Approvals may be compromised otherwise.	
	Cable size	0.2 mm <sup>2</sup> (24 AWG) to 2.5 mm <sup>2</sup> (12 AWG).	
	Stripping length	5 - 6 mm (0.2")	
<b>Level probe cable/wire</b>	Type	High temperature	
	Shield type	Screened	
	Number of cores	5	
	Gauge	1 - 1.5 mm <sup>2</sup> (18 - 16 AWG)	
	Maximum length	100 m (328 ft)	
<b>Input - Level probe (conductivity)</b>	Switching conductivity	Minimum conductivity 1 µS/cm @ 25°C (K = 0.22 (220 KΩ) ) when used with a Spirax Sarco LP10-4 probe.	
	Drive	ac – pulsed	
<b>Output relays</b>	Contacts	2 x single pole changeover relays (SPCO)	
	Voltage ratings (maximum)	250 Vac	
	Resistive load	3 amp @ 250 Vac	
	Inductive load	1 amp @ 250 Vac	
	ac motor load	¼ HP (2.9 amp) @ 250 Vac	
		1/10 HP (3 amp) @ 120 Vac	
	Pilot duty load	C300 (2.5 amp) - control circuit/coils	
	Electrical life (operations)	3 x 10 <sup>5</sup> or greater depending on load	
	Mechanical life (operations)	30 x 10 <sup>6</sup>	
<b>Output infrared</b>	Physical layer	IrDA	
	Baud	38 400	
	Range	10 cm (4")	
	Working angle	15°	
	Eye safety information	Exempt from EN 60825-12: 2007 Safety of laser products - does not exceed the accessible emission limits (AEL) of Class 1	

# LC1350

## Level Controller

### Safety information, installation and maintenance

**Warning:** This document does not contain sufficient information to install the unit safely. The unit operates at a potentially fatal mains voltage. Before attempting to install the unit read the Installation and Maintenance Instructions supplied with it.

In most countries, steam boilers operating with limited supervision require two self-monitoring level probes and controllers to provide two independent low level alarms. A high level alarm is also advised, and is compulsory in some countries. The LC1350 is not self-monitoring.

**Do not** install the product outdoors without additional weather protection.

**Do not** attempt to open the product - it is sealed and has no replaceable parts or internal switches.

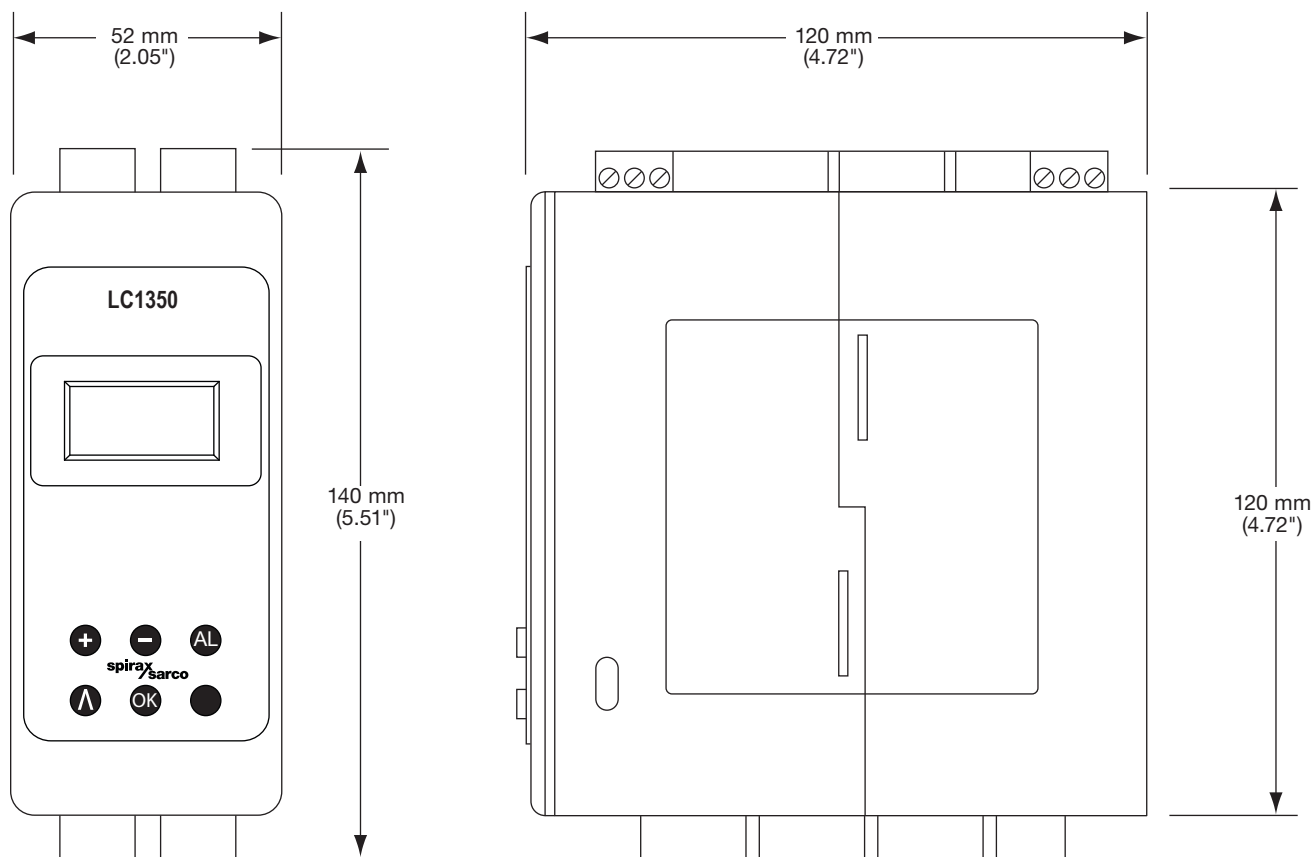
**Do not** cover or obstruct the infrared beam between products.

No special servicing, preventative maintenance or inspection of the product is required.

Boiler water level controls and level alarms do, however, require testing and inspection.

### Dimensions / weight (approximate) in mm and g.

Weight 430 g. (0.95 lb)



### How to specify

Conductivity level controller to provide on/off control of a pump plus two configurable alarms, and to have infrared communications.

### How to order

**Example:** 1 off Spirax Sarco LC1350 level controller.

## LC2250 Level Controller

### Description

The Spirax Sarco LC2250 is a level controller for on/off or modulating control of conductive liquid levels.

The LC2250 has two alarm outputs that can be configured high or low.

The controller is suitable for use with liquids having an electrical conductivity of 5  $\mu\text{S}/\text{cm}$  or 5 ppm, when used with an LP20, PA20, or PA420 capacitance probe.

The LC2250 may be used on boilers, tanks, or vessels operating at up to 32 bar g at 239°C (464 psig@462°F).

The front panel has a 3 digit LCD display and a five-button keypad.

The unit can be panel, DIN rail, or chassis mounted.

#### Principal features:

- Level controller for modulating or on/off control of boilers.
- Universal power supply – 110 Vac to 240 Vac @ 50/60 Hz.
- TÜV approvals.
- Alarm – high or low.
- Input filter for turbulent conditions.
- 0/4-20 mA retransmit.
- Infrared communications.

#### Approvals

This product complies with the Electromagnetic Compatibility Directive 2004 / 108 / EC and all its requirements.

The LC2250 is suitable for Class A Environments (e.g. industrial). A fully detailed EMC assessment has been made and has the reference number UK Supply BH LC2250 2008.

The LC2250 complies with the Low Voltage Directive by meeting the standards of:

- EN 61010-1:2010 safety requirements for electrical equipment for measurement, control, and laboratory use.

The LC2250 has been type-tested as a level control by meeting the standard:

- Vd TÜV requirements for water level control and limiting devices, Water Level 100 (07.2010).

### Typical applications

#### On/off control:

- Pump control.
- Two alarm output.
- 4 - 20 mA level output.

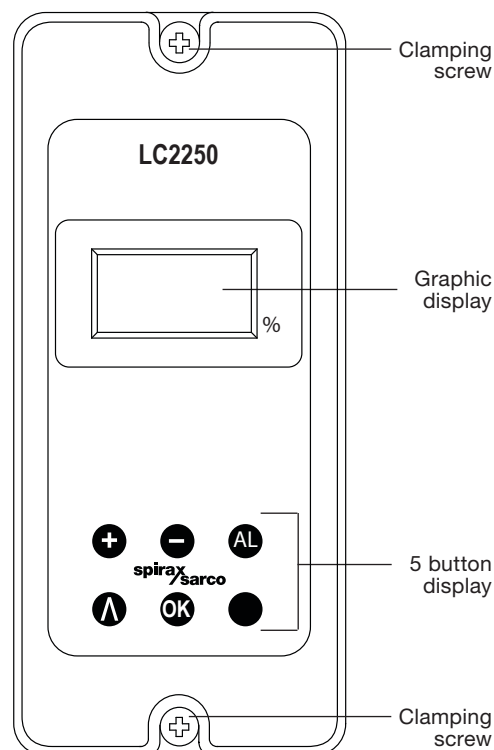
**Note: A solenoid valve may be used instead of a pump.**

#### Modulating control:

Modulating valve control using valve motor drive or 4 - 20 mA control signals.

- Two alarm output.
- 4 - 20 mA level output.

**Note: The 4 - 20 mA level output is only available when the product is configured for valve motor drive systems.**



### Function

The product compares the input signals with the Set Point selected by the user. It then changes its output signal to control the water level in the boiler or tank.

#### Inputs

The product has two inputs to accept the following signals:

- Level probe or transmitter 1 - 6 V or 4 - 20 mA.
- A 1 K potentiometer input ~ for Valve Motor Drive (VMD).

#### Outputs

The output control signal can be configured / wired to work with a pump or a modulating control valve. It also provides a relay output for high or low level alarms and can provide an isolated 4 - 20 mA retransmission output.

#### Other features:

- An additional filter can be selected to increase the damping effect for turbulent conditions.
- Commissioning parameters are protected with a pass code.
- The LC2250 can communicate via an infrared link between adjacent controllers. It enables the parameters to be passed to a product fitted with RS485 (User). The LC2250 is designated as a slave unit – no set-up or adjustment is needed.  
Important: Do not cover or obstruct the infrared beam between products.

# LC2250

## Level Controller

### Technical data LC2250

Power supply		Mains voltage range	110 Vac to 240 Vac at 50/60 Hz		
		Power consumption	7.5 W (maximum)		
Environmental		General	Indoor use only		
		Maximum altitude	2 000 m (6 562 ft) above sea level		
		Ambient temperature limits	0 - 55°C (32-131°F)		
		Maximum relative humidity	80% up to 31°C (88°F) decreasing linearly to 50% at 40°C (104°F)		
		Overvoltage category	III		
		Pollution degree	2 (as supplied)		
			3 (when installed in an enclosure) - Minimum of IP54		
		Enclosure rating (front panel only)	IP65 (verified by TRAC Global)		
		LVD (safety)	Electrical safety EN 61010-1		
		EMC	Immunity/Emissions	Suitable for heavy industrial locations	
		Enclosure	Material	Polycarbonate	
Front panel	Material	Silicone rubber, 60 shore.			
Solder	Tin/lead (60/40%)				
Cable / wire and connector data	Mains and signal connector	Termination	Rising clamp plug-in terminal blocks with screw connectors. <b>Caution:</b> Use only the connectors supplied by Spirax Sarco Ltd. Safety and Approvals may be compromised otherwise.		
		Cable size	0.2 mm² (24 AWG) to 2.5 mm² (12 AWG).		
		Stripping length	5 - 6 mm (0.2")		
	Level probe cable / wire	Type	High temperature		
		Shield type	Screened		
		Number of cores	3 LP20/PA20, 2 (LP20/PA420 4-20mA Transducer)		
		Gauge	1 – 1.5 mm² (18 - 16 AWG)		
		Maximum length	100 m (328 ft)		
	4 - 20 mA output cable / wires	Type	Twisted pair		
		Shield type	Screened		
		Number of pairs	1		
		Gauge	0.23 - 1 mm² (24 - 18 AWG)		
		Maximum length	100 m (328 ft)		
	Input technical data	Level voltage	Minimum voltage	0 Vdc or 1 V (with OUTRANGE function selected)	
			Maximum voltage	6 Vdc (absolute maximum = 7 Vdc)	
Input impedance			28 KΩ		
Accuracy			5% FSD over operating range		
Repeatability			2.5% FSD over operating range		
Resolution			14 bit (0.15 mV approximately)		
Sample time			260 Hz		
4 - 20 mA		Minimum current	0 mA		
		Maximum current	22 mA		
		Input impedance	11 KΩ		
		Accuracy	5% FSD over operating range		
		Repeatability	2.5% FSD over operating range		
		Resolution	14 bit (1 µA - approximately)		
		Sample time	260 Hz		

# LC2250

## Level Controller

### Technical data LC2250 (continued)

Output technical data	24 Vdc supply	Maximum voltage	32 Vdc (no load, open circuit)
		Maximum current	25 mA
		Ripple voltage	10 mV @ 264 V, full load
	4 - 20 mA	Minimum current	0 mA
		Maximum current	20 mA
		Open circuit voltage (maximum)	19 Vdc
		Resolution	0.1% FSD
		Maximum output load	500 ohm
		Isolation	100 V
		Output rate	10 / second
	Relays	Contacts	2 x single pole changeover relays (SPCO)
		Voltage ratings (maximum)	250 Vac
		Resistive load	3 amp @ 250 Vac
		Inductive load	1 amp @ 250 Vac
		ac motor load	1/4 HP (2.9 amp) @ 250 Vac
			1/10 HP (3 amp) @ 120 Vac
		Pilot duty load	C300 (2.5 amp) - control circuit/coils
		Electrical life (operations)	3 x 10 <sup>5</sup> or greater depending on load
		Mechanical life (operations)	30 x 10 <sup>6</sup>
		Physical layer	IrDA
Infrared		Baud	38 400
		Range	10 cm (4")
		Working angle	15°
		Eye safety information	Exempt from EN 60825-12: 2007 Safety of laser products - does not exceed the accessible emission limits (AEL) of Class

### Safety information, installation and maintenance

This document does not contain sufficient information to install the unit safely. The unit operates at a potentially fatal mains voltage. Before attempting to install the unit read the Installation and Maintenance Instructions supplied with it.

The product must be installed in a suitable industrial control panel or fireproof enclosure to provide impact and environmental protection. A minimum of IP54 (EN 60529) is required.

The product may be installed on a DIN rail, a chassis plate, or in a panel cut-out. A bezel is supplied.

Install the product in an environment that minimizes the effects of heat, vibration, shock and electrical interference.

**Do not** install the product outdoors without additional weather protection.

**Do not** attempt to open the product - it is sealed and has no replaceable parts or internal switches.

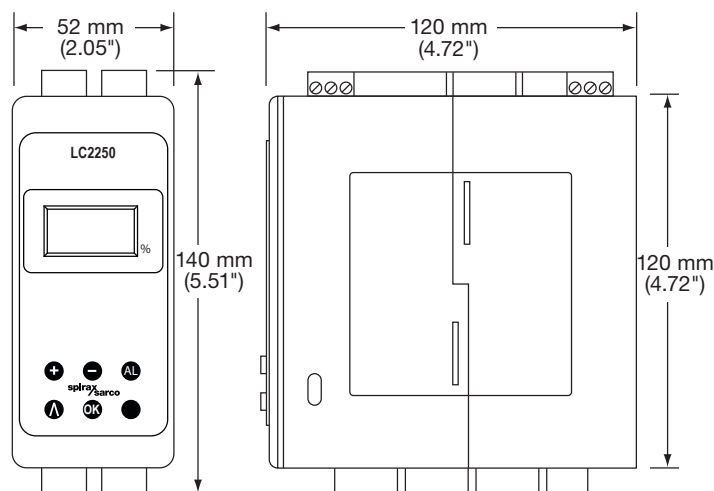
**Do not** cover or obstruct the infrared beam between products.

No special servicing, preventative maintenance or inspection of the product is required.

Boiler water level controls and level alarms do, however, require testing and inspection.

### Dimensions/weight (approximate) in mm and g.

Weight 430 g. (0.95lb)



### How to specify

Level controller with auto voltage sensing, alarm that can be configured high or low, and infrared communications.

### How to order

**Example:** 1 off Spirax Sarco LC2250 level controller.



## LC2650 Level Controller

### Description

The Spirax Sarco LC2650 is a level controller for conductive liquids.

It provides on/off or modulating control of liquid levels in boilers, tanks, and vessels operating up to 32 bar at 239°C (464 psi@462°F).

It has two alarm channels that can be independently configured either high or low.

The controller is suitable for use with liquids having an electrical conductivity as low as 5 µS/cm or 5 ppm (when used with an LP20 or PA20 capacitance probe).

The front panel has an LCD screen and a five-button keypad. The LCD display screen can show either operating information (in run mode), or a trend graph that displays a record of the variation in level over a set time.

In run mode the general data is shown on several consecutive screen displays.

A test function provides the operator with a diagnostic feature. Inputs can be measured and outputs can be set from the front panel.

To prevent unwanted or inadvertent changes being made, all commissioning parameters are protected with a pass code. The LC2650 can communicate via an infrared link between adjacent controllers.

It can be designated as either a master unit or a slave unit. The LC2650 can be panel, DIN rail or chassis mounted.

### Principal features:

- Modulating or on/off control of boiler water level using a capacitance probe.
- Switchable integral action.
- Single, two or three-element control.
- LCD graphics display and five-button keypad.
- Graphic display of status, PV percentage, and alarm, plus a trend graph.
- Infrared communication.
- EIA 485/Modbus communications.

### Approvals

This product complies with the Electro magnetic Compatibility Directive 2004 / 108 / EC and all its requirements.

The LC2650 is suitable for Heavy Industrial environments. A fully detailed EMC assessment has been made and has the reference number UK Supply BH LC2650 2008.

The LC2650 complies with the Low Voltage Directive by meeting the standards of:

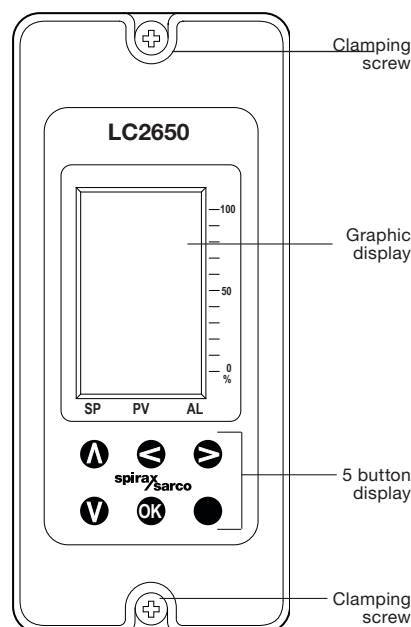
- EN 61010-1:2010 safety requirements for electrical equipment for measurement, control, and laboratory use.

The LC2650 has been type-tested as a level control by meeting the standard:

- Vd TÜV requirements for water level control and limiting devices, Water Level 100 (07.2010).

### Applications

The product can be configured to control the level of a boiler, tank or vessel, by operating a pump, valve or solenoid. Typical applications:



### On/off control:

- Pump control.
- Two alarm outputs.
- 4 - 20 mA level output (isolated).

**Note: A solenoid valve may be used instead of a pump.**

### Modulating control:

Modulating valve control using valve motor drive or 4 - 20 mA control signals.

- Two alarm outputs.
- 4 - 20 mA level output (isolated).

### Two or three element modulating control:

Modulating valve control using a valve motor drive or 4 - 20 mA control signal.

- Two alarm outputs.
- 4 - 20 mA level output (isolated).
- Feedback from steam flowmeter.
- Feed forward from water flowmeter.

### Inputs / Function

The product compares the input signals with the set point selected by the user. It then changes its output signal to control the water level in the boiler or tank.

### Outputs

The product control signal can be configured / wired to work with a pump or a modulating control valve. It also provides relay outputs for high and low level alarms and can provide an isolated 0 - 20 mA or 4 - 20 mA retransmission output.

Parameters can be remotely accessed via the RS485 / MODBUS communications.

### Other features

An additional filter can be selected to increase the damping effect for turbulent conditions.



# LC2650

## Level Controller

### Technical data LC2650

Power supply	Mains voltage range	110 Vac to 240 Vac at 50/60 Hz	
	Power consumption	7.5 W (maximum)	
Environmental	General	Indoor use only	
	Maximum altitude	2 000 m (6 562 ft) above sea level	
	Ambient temperature limits	0 - 55°C (32-131°F)	
	Maximum relative humidity	80% up to 31°C (88°F) decreasing linearly to 50% at 40°C(104°F)	
	Overvoltage category	III	
	Pollution degree	2 (as supplied)	
		3 (when installed in an enclosure) - Minimum of IP54	
	Enclosure rating (front panel only)	IP65 (verified by TRAC Global)	
	LVD (safety)	Electrical safety EN 61010-1	
	EMC	Immunity/Emissions	Suitable for heavy industrial locations
	Enclosure	Material	Polycarbonate
	Front panel	Colour	Pantone 294 (blue)
Material		Silicone rubber, 60 shore.	
Solder	Tin/lead (60/40%)		
Mains and signal connector	Termination	Rising clamp plug-in terminal blocks with screw connectors. <b>Caution:</b> Use only the connectors supplied by Spirax Sarco Ltd. Safety and Approvals may be compromised otherwise.	
	Cable size	0.2 mm² (24 AWG) to 2.5 mm² (12 AWG).	
	Stripping length	5 - 6 mm (0.2")	
Level probe, feedback, steam meter and water cable/wire	Type	High temperature	
	Shield type	Screened	
	Number of cores	3 (LP20/PA20), 2 (LP20 4-20 mA Transducer)	
	Gauge	1 – 1.5 mm² (18 - 16 AWG)	
	Maximum length	100 m (328 ft)	
	Recommended type	Prysmian (Pirelli) FP200, Delta Crompton Firetuf OHLS	
0/4-20 mA output(s) cable/wire	Type	Twisted pair	
	Shield type	Screened	
	Number of pairs	1	
	Gauge	0.23 - 1 mm² (24 - 18 AWG)	
	Maximum length	100 m (328 ft)	
RS485 communication cable/wire	Type	EIA RS485 twisted pair	
	Shield type	Screened	
	Number of pairs	2 or 3	
	Gauge	0.23 mm² (24 AWG)	
	Maximum length	1200 m (4000 ft)	
	Recommended type	Alpha Wire 6413 or 6414	
LAN Cat 5 or Cat 5E ScTP (screened), FTP (foil) or STP (shielded) cable can be used, but limited to 600 m.			

# LC2650

## Level Controller

### Technical data LC2650 (continued)

Input technical data	Level voltage	Minimum voltage	0 Vdc or 1 V (with OUTRANGE function selected)
		Maximum voltage	6 Vdc (absolute maximum = 7 Vdc)
		Input impedance	28 kΩ
		Accuracy	5% FSD over operating range
		Repeatability	2.5% FSD over operating range
		Resolution	14 bit (0.15 mV approx)
		Sample time	260 Hz
	4 - 20 mA	Minimum current	0 mA
		Maximum current	20 mA
		Input impedance	110 Ω
		Accuracy	5% FSD over operating range
		Repeatability	2.5% FSD over operating range
		Resolution	14 bit (1 μA approximately)
		Sample time	260 Hz
	Level 'out of range' alarm-voltage	Minimum alarm level	< 0.2 Vdc
		Minimum recovery level	> 1 Vdc
		Maximum alarm level	> 6.5 Vdc
		Maximum recovery level	< 6 Vdc
	Level 'out of range' alarm-current	Minimum alarm level	< 2.5 mA
		Minimum recovery level	> 4 mA
		Maximum alarm level	> 21 mA
		Maximum recovery level	< 20 mA
Output technical data	24 Vdc supply	Maximum voltage	24 Vdc (nominal)
		Maximum current	25 mA
		Ripple voltage	10 mV, full load
	4 - 20 mA	Minimum current	0 mA
		Maximum current	22 mA
		Open circuit voltage (maximum)	19 Vdc
		Resolution	1% FSD
		Maximum output load	500 ohm
		Isolation	100 V
		Output rate	10 / second
	Relays	Contacts	2 x single pole changeover relays (SPCO)
		Voltage ratings (maximum)	250 Vac
		Resistive load	3 amp @ 250 Vac
		Inductive load	1 amp @ 250 Vac
		ac motor load	¼ HP (2.9 amp) @ 250 Vac
			1/10 HP (3 amp) @ 120 Vac
		Pilot duty load	C300 (2.5 amp) - control circuit/coils
		Electrical life (operations)	3 x 10 <sup>6</sup> or greater depending on load
		Mechanical life (operations)	30 x 10 <sup>6</sup>
	RS485	Physical layer	RS485 4-wire full or 2-wire half duplex
		Protocol	Modbus RTU format
		Isolation	60 Vac/dc
		Receiver unit load	1/8 (256 devices - maximum)
		Output rate	Up to 10 frames / second
	Infrared	Physical layer	IrDA
		Baud	38 400
		Range	10 cm (4")
		Working angle	15°
		Eye safety information	Exempt from EN 60825-12: 2007 Safety of laser products - does not exceed the accessible emission limits (AEL) of Class 1

# LC2650

## Level Controller

### Safety information, installation and maintenance

**Warning:** This document does not contain sufficient information to install the unit safely. The unit operates at a potentially fatal mains voltage. Before attempting to install the unit read the Installation and Maintenance Instructions supplied with it.

Caution: before installing and connecting the power ensure there is no condensation within the unit. The product may be installed on a DIN rail, on a chassis plate, or in a panel cutout. A bezel is supplied.

The product must be installed in a suitable industrial control panel or fireproof enclosure to provide impact and environmental protection. A minimum of IP54 (EN 60529) is required. Spirax Sarco can provide suitable plastic or metal enclosures

**Do not** install the product outdoors without additional weather protection.

**Do not** attempt to open the product - it is sealed and has no replaceable parts or internal switches.

**Do not** cover or obstruct the infrared beam between products.

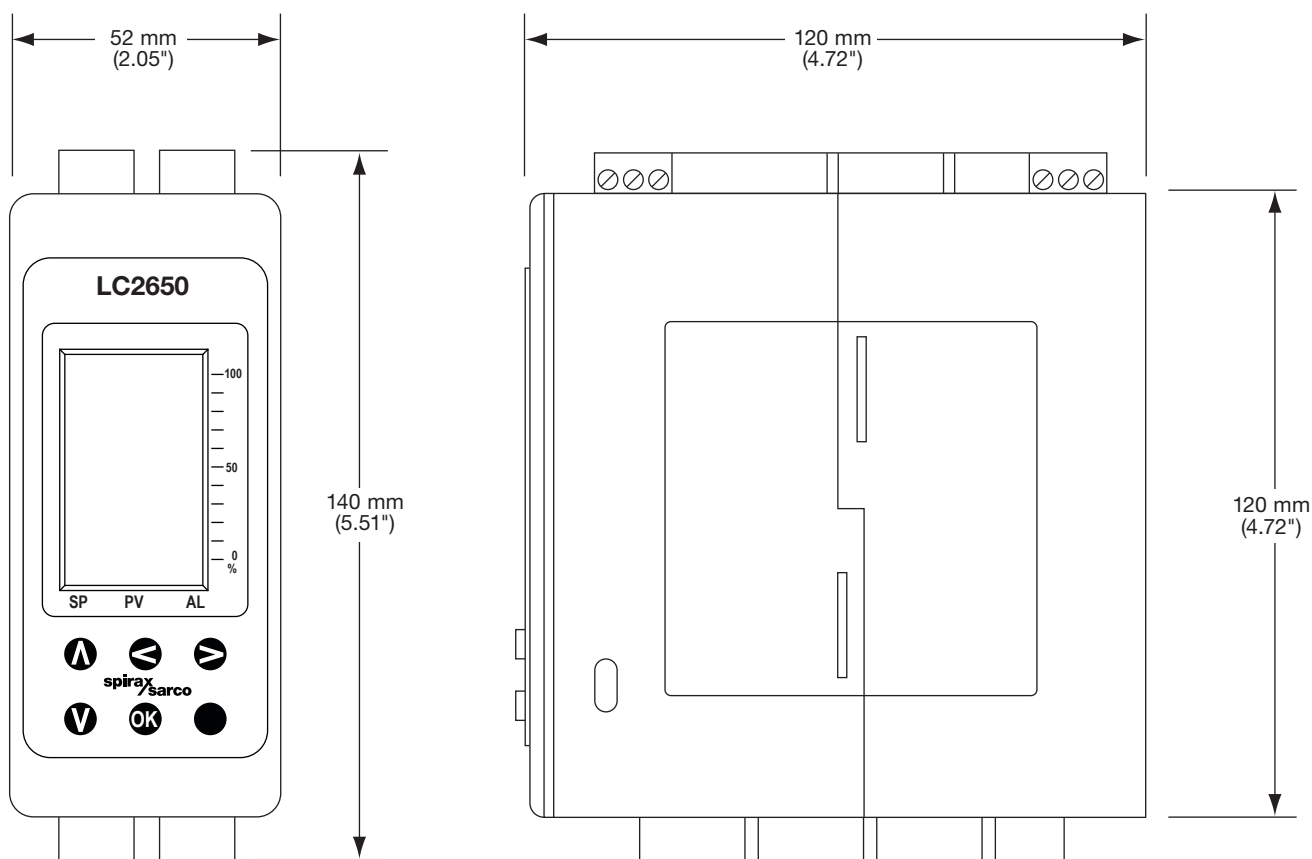
All wiring materials and methods shall comply with relevant standards where applicable.

No special servicing, preventative maintenance or inspection of the product is required.

Boiler water level controls and level alarms do, however, require testing and inspection.

### Dimensions/weight (approximate) in mm and g.

Weight 550 g. (1.21 lb)



### How to specify

Multi-voltage level controller having two alarms, configurable high or low, infrared communication as a master or slave unit.

### How to order

**Example:** 1 off Spirax Sarco LC2650 level controller.

## APS 1 Probe Simulator

- A valuable diagnostic aid for Spirax Sarco boiler control installations
- Compatible with all TDS/level probes and controllers
- No need to fire boiler or alter water levels
- No battery or power supply needed
- Easy to operate

### Description

The APS 1 probe simulator is used in place of a level or conductivity probe to verify the correct operation of Spirax Sarco controllers. It can also be used to diagnose wiring/probe faults. It is connected to the level probe or conductivity probe wiring, avoiding the need to fire the boiler or alter water levels, and is quick and easy to use.

The APS 1 has switch settings covering all Spirax Sarco probe types and ranges.

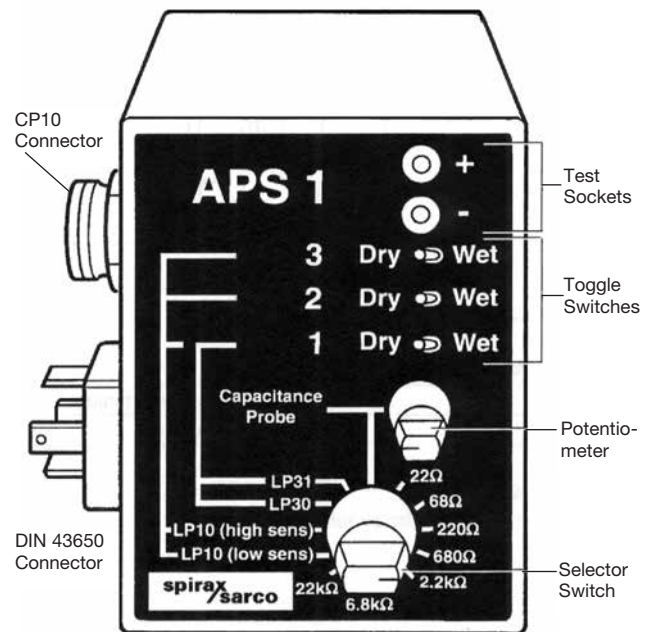
A potentiometer provides the variable input to a capacitance controller, and 4mm test sockets are provided for connection of a multimeter, which is used to check the voltage when simulating capacitance probes.

Switches simulate wet or dry (high or low resistance) conductivity level probe conditions, and resistors are built in to represent various conductivity probe ranges.

The APS 1 is powered by the controller under test, so needs no batteries or external power supply.

The unit is fitted with two inputs, connected in parallel. One is for connection of a PT 1, 2, or 3 plug tail, and the other is a DIN 43650 connector as used on conductivity and capacitance probes.

Full operating instructions are supplied with each unit.



### Limiting conditions

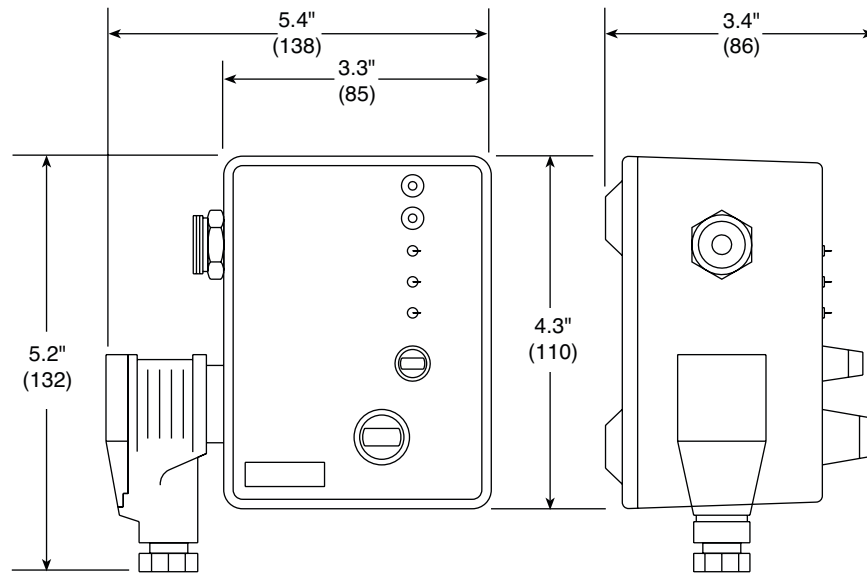
Maximum ambient temperature	130°F (55°C)
Protection rating	IP 40

### Technical data

Conductivity probe settings	22Ω, 68Ω, 220Ω, 680Ω, 2.2kΩ, 6.8kΩ, 22kΩ
Level probe settings	
LP 31	6.8kΩ/15kΩ
LP 30	6.8kΩ/15kΩ
LP 10/EL 9 (High sensitivity)	68kΩ/150kΩ
LP 10/EL 9 (Low sensitivity)	6.8kΩ/15kΩ
Capacitance probe range	0-10 Volts output

# APS 1 Probe Simulator

Dimensions (approximate) in inches and millimeters



Weight 1lb (450g)

## Materials

Case	Die-cast aluminium
Coating	Nylon (grey)

## How to order

Spirax Sarco APS 1 probe simulator.





## DS1000 Digital Display

### Description

The Spirax Sarco DS1000 is connected in series with a 4 - 20 mA current loop to provide an LCD display, in engineering units, of the process variable represented by the current flow.

It has many uses for level, conductivity, temperature, or pressure indication. A specific application example is to provide a remote display of TDS for Spirax Sarco TDS blowdown controllers. It is supplied calibrated in percentage units to display 00.0 at 4 mA, and 100.0 at 20 mA. Jumper links and potentiometers on the back of the instrument allow it to be scaled in any engineering units if required. An aperture below the display shows the unit of measurement, and the special legend sheet supplied with the instrument enables alternative units of measurement to be selected if required.

The DS1000 is housed in a 3.78" x 1.89" (96 x 48 mm) DIN standard panel mounted case and has a .5" (12.7 mm) high 3½ digit LCD, with a selectable decimal point.

Because the instrument is loop powered it needs no external power supply. It requires less than 3 volts from the loop for operation.

#### Principal features:

- Loop powered 4-20 mA input.
- Pre-calibrated for percentage indication.
- Can be scaled for any engineering units.
- IP65 front panel seal.

#### Pressure / temperature limits

Maximum ambient temperature	122° F (50°C)
Minimum ambient temperature	32° F (0°C)

### Safety information, installation and maintenance

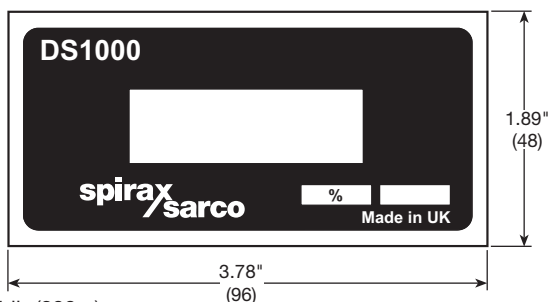
For full details see the installation and maintenance instructions supplied with the product.

#### Installation note:

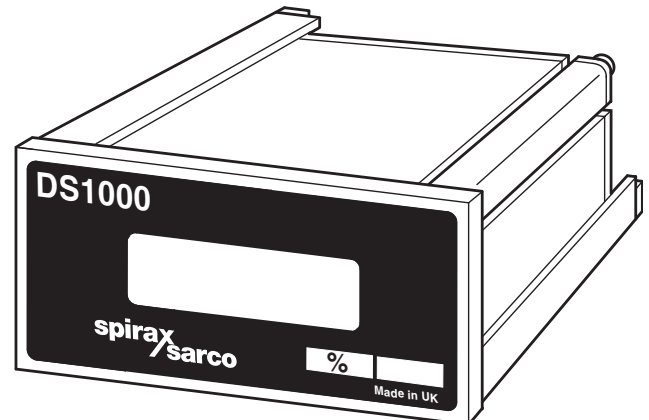
The DS1000 is fitted in a 3.62" x 1.73" (92 x 44 mm) aperture in the boiler panel. It should not be installed adjacent to switch gear, electro-magnetic starters, contactors, thyristor power units, or motors.

#### Dimensions approximate in inches (millimeters)

Panel cutout 3.62" x 1.73" (92x44)



Weight 0.4 lb (200 g)



### Materials

Front bezel / back panel	Nylon 6-glass filled
Case	Aluminium

### Technical data

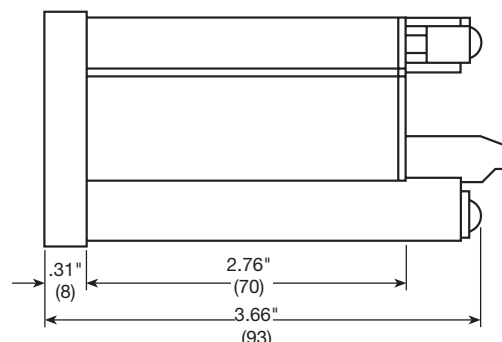
	68°F (20°C)
Input	4-20mA 2 wire
Display	0.5" (12.7mm) high LCD 3-1/2 digit
Volt drop	<3 Volt
	Zero ± 1000 counts
	Span 200/2000 counts
Rangeability	Decimal point Any position
	Accuracy ± 1 count
	Sample rate 3 readings/second
	Fuse rating 63mA (PCB mounted)
Protection rating	IP65 (Front panel only)

### How to specify

4-20mA loop powered digital display with legend sheet.

### How to order

1 off Spirax Sarco DS1000 digital display.



Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only. In the interests of development and improvement of the product, we reserve the right to change the specification.

TI-P403-41-US 1.14

## LP30 High Integrity, Self-monitoring Low Level Alarm Probe

### Description

The Spirax Sarco LP30 level probe is used with a Spirax Sarco LC3050 level controller to provide a high integrity, self-monitoring low level alarm signal, usually in a steam boiler. It consists of a probe body with a removable cable socket, and a separate screw-on probe tip which is retained by a lock-nut and pin.

The probe has a level sensing tip (probe tip), and a comparator tip. The earth return path is via the body connection.

Under normal operating conditions the probe tip is partially immersed, and the resistance to earth is low. When the water level drops below the probe tip the resistance to earth becomes high, causing the controller to give a low level alarm signal.

The comparator tip compensates for any leakage to earth caused by scale, dirt, or internal moisture, ensuring a low water alarm signal even under adverse conditions.

### Principal features:

- High integrity, self-monitoring low level alarm probe.
- Suitable for pressures up to 0° psig @ 462°F (32 bar g at 239°C).
- No maintenance required.
- Positively retained probe tip.

### Approvals:

The LP30 is available with a ½" NPT screwed connection.

**Caution: The probe is not suitable for outside installation without additional environmental protection.**

### Available tip lengths inches (mm)

19.7" (500 mm), 39.4" (1000 mm), 59" (1500 mm).

### Pressure / temperature limits

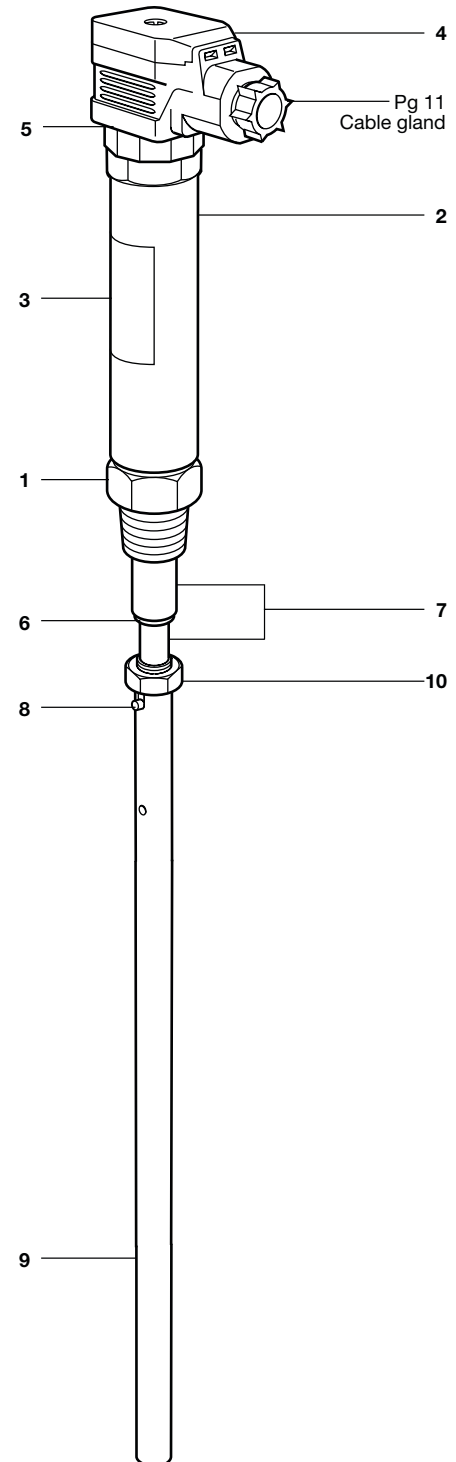
Nominal pressure rating	PN40
Maximum boiler pressure	464 psig (32 barg)
Maximum temperature	462°F (239°C)
Maximum ambient temperature	158°F (70°C)
Designed for a maximum cold hydraulic pressure test of: 870 psig (60 barg)	

### Technical data

Maximum probe cable length	164 ft (50m)
Cable socket protection rating	IP65

### Materials

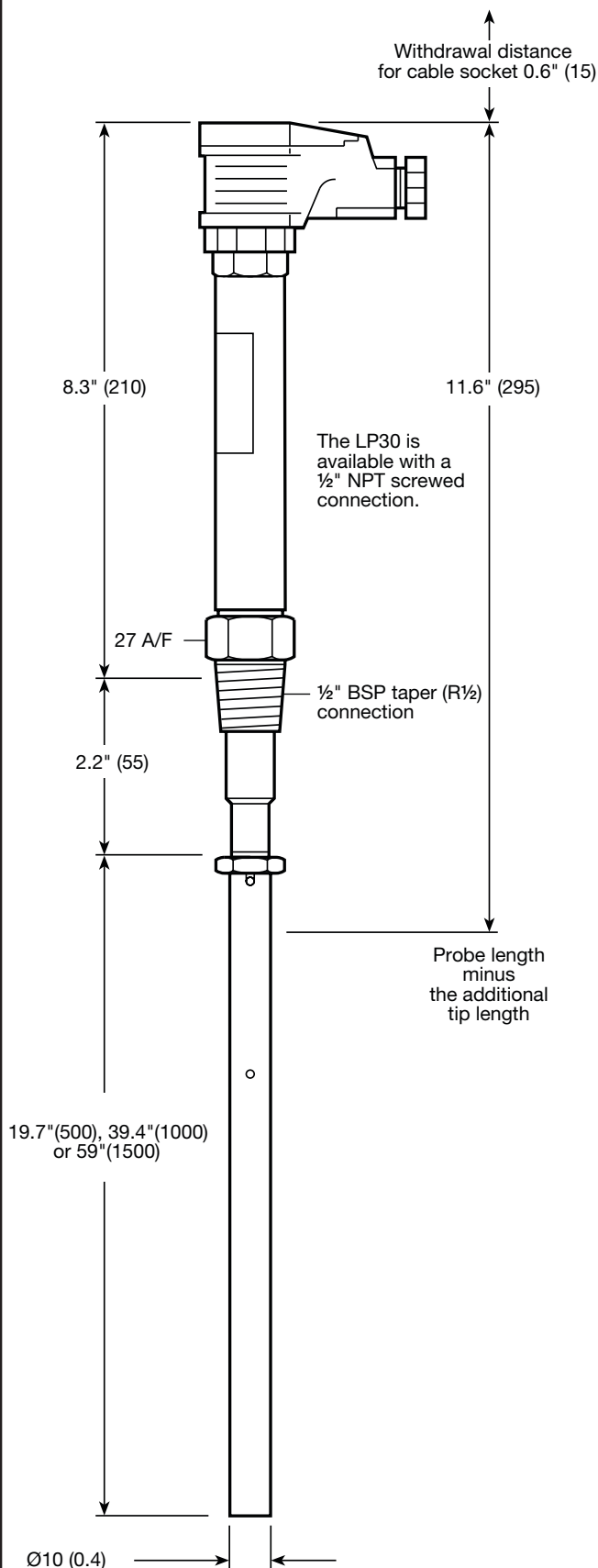
No.	Description	Material
1	Probe body	Austenitic stainless steel BS EN 10088-3 (1.4306)
2	Cover assembly	Austenitic stainless steel Type 316L
3	Name-plate	Polycarbonate
4	Cable socket and probe connector	Polyamide, glass filled
5	Connector gasket	Silicone elastomer
6	Comparator tip	Austenitic stainless steel Type 316L
7	Primary insulator and secondary insulator	PTFE BS 6564 Grade UA Type 1
8	Retaining pin	Austenitic stainless steel Type 302 / 304
9	Probe tip	Austenitic stainless steel Type 316L
10	Lock-nut	Austenitic stainless steel BS 6105 A4 80





# LP30 High Integrity, Self-monitoring Low Level Alarm Probe

**Dimensions** (approximate) in inches and (millimeters)



**Weight (approximate) in lb (kg) including immediate packaging**

Tip length	Probe	19.7" (500 mm)	39.4" (1000 mm)	59" (1500 mm)
Weight	1.11 lb (.52 kg)	.61 lb (.28 kg)	1.21 lb (.55 kg)	3.6 lb (.8 kg)

## Safety information, installation and maintenance

This document does not contain sufficient information to install the product safely. See the Installation and Maintenance Instructions provided with each unit.

### Installation note:

The probe is designed to work with a Spirax Sarco LC3050 controller. Two probes and controllers are normally fitted in steam boilers, giving first and second low alarms.

A protection tube is required for boiler shell or turbulent tank fitting.

Install the probe in a 1/2" NPT (1/2" BSP) female connection.

**Note: Do not install the probe outdoors without additional weather protection.**

**Warning: It is essential that the probe tip of the LP30 low level alarm probe does not touch any part of the boiler. Standards require that the tip is at least 14 mm from the protection tube, and this must be checked when the probe is installed.**

The product is supplied with a spring clearance checking set. Refer to separate literature for details. Spare sets are available - see Spare Parts.

### Maintenance note:

No special maintenance is required.

Boiler water level controls do, however, require periodic testing and inspection, which is described in separate literature.

## How to specify

High integrity self-monitoring low level alarm probes shall be Spirax Sarco type LP30 with austenitic stainless steel bodies and probe tips, PTFE probe sleeving, and cable socket with Pg 11 cable gland. They must have a comparator tip to compensate for scaling, and a positively located probe tip. They must be used with an appropriate Spirax Sarco controller.

## How to order

**Example:** 1 off Spirax Sarco LP30 high integrity, self-monitoring, low level alarm probe with 39.4" (1000 mm) tip.

## Spare parts

The spare parts available are detailed below. No other parts are supplied as spares.

### Available spares

<b>LP30 tip retaining pins</b>	Stock No. 4024780	Pack of 10
<b>Spring clearance checking set</b>	Stock No. 4024781	1 set (2 springs)

### How to order spares

Always order spares by using the description given in the column headed 'Available spares' and state which product they are for.

**Example:** 1 off Spring clearance checking set for a Spirax Sarco LP30 high integrity, self-monitoring low level alarm probe.

## LP 31 High Integrity, Self-Monitoring High Water Level Alarm Probe

### Description

The Spirax Sarco LP31 is used in conjunction with an LC3050 controller to provide a high integrity, self-monitoring alarm for detection of high water levels in steam boilers and other vessels.

The probe is normally installed direct in the boiler shell in a protection tube, but can be mounted in an external chamber if regulations permit.

The LP31 is supplied in three nominal tip lengths, and is cut to the exact length required prior to installation.

In normal operation, the tip is above the water level, and has a high resistance path to earth. If the water level rises to touch the probe tip, the resistance to earth drops, causing the alarm relays in the controller to be de-energised and the alarm to sound.

The LP31 is designed so that its tip and wiring connection integrity is monitored by the controller, causing an alarm signal in the event of a fault occurring.

The LP31 can also be used as a simple (non self-monitoring) high or low level probe with an LC1350 level controller.

A DIN 43650 cable socket with Pg 11 cable gland is supplied with the unit.

### Approvals:

The LP31 is available with a 1/2" NPT screwed connection.

**Caution: The probe is not suitable for outside installation without additional environmental protection.**

### Available tip lengths inches (mm)

19.7" (500), 39.4" (1000) and 59" (1500).

### Limiting conditions

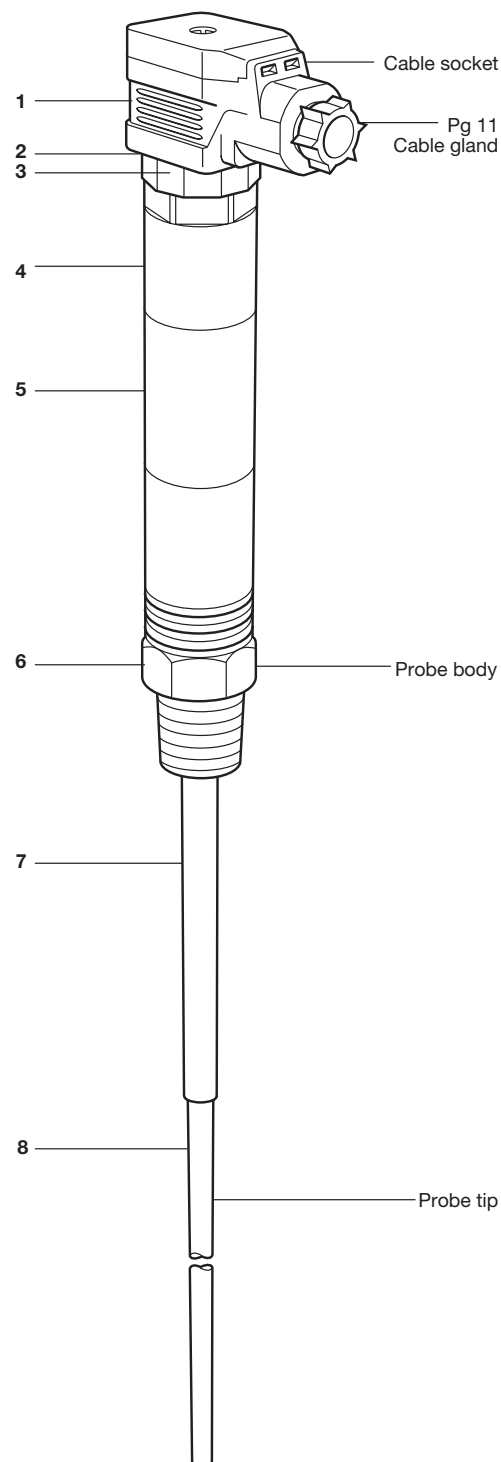
Nominal pressure rating	PN40
Maximum boiler pressure	464 psi g (32 bar g)
Maximum temperature	462°F (239°C)
Maximum ambient temperature	158°F (70°C)

### Technical data

Maximum probe cable length	164 ft (50 metres)
Cable socket protection rating	IP65
Minimum conductivity	LC1350 1 mS/cm or 1 ppm
	LC3050 30 mS/cm or 30 ppm

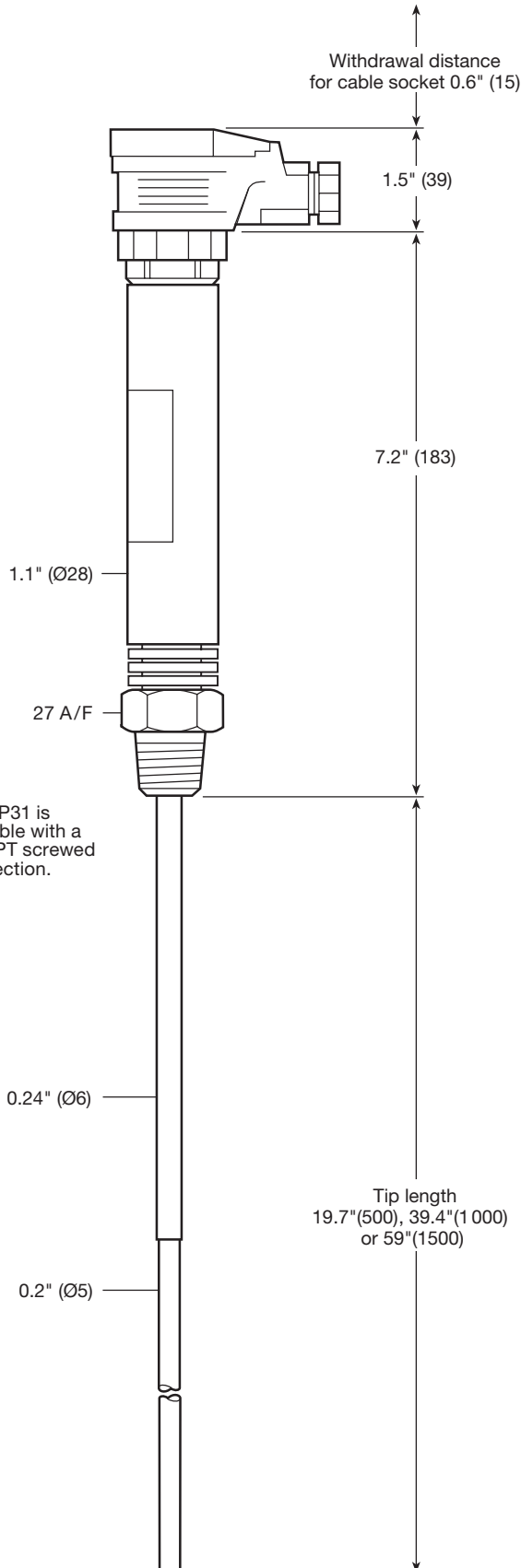
### Materials

No.	Description	Material
1	Cable socket	Polyamide, glass filled
2	Flat gasket	Silicone rubber
3	Probe connector	Polyamide, glass filled
4	Cover assembly	Austenitic stainless steel
5	Name-plate	Polycarbonate
6	Body	Austenitic stainless steel BS EN 10088-3 (1.4306)
7	Probe tip sleeving	PTFE
8	Probe tip	Austenitic stainless steel ASTM A276 316L



# LP 31 High Integrity, Self-Monitoring High Water Level Alarm Probe

**Dimensions** (approximate) in inches and millimeters



**Weights** (approximate) in lb (kg)

Tip length	19.7"(500 mm)	39.4" (1000 mm)	59.1" (1500 mm)
Weight	1.1 (0.51)	1.3 (0.59)	1.5 (0.67)

## Safety information, installation and maintenance

This document does not contain sufficient information to install the product safely. See the Installation and Maintenance Instructions provided with each unit.

### Installation note:

The LP31 tip is cut to length and de-burred prior to installation.

The LP31 has been designed to work with a Spirax Sarco LC3050 controller.

A protection tube is required for boiler shell or turbulent tank fitting.

Install the probe in a 1/2" NPT parallel (1/2" BSP) female connection using PTFE tape.

**Note: Do not install the probe outdoors without additional weather protection.**

### Maintenance note:

No special maintenance is required.

Boiler water level controls do, however, require periodic testing and inspection, which is described in separate literature.

### Spare parts

There are no available spare parts for this unit.

## How to specify

High integrity high level alarm probes shall be Spirax Sarco self-monitoring type LP31 with an austenitic stainless steel body and probe tip, PTFE probe sleeving, and DIN 43650 cable socket with Pg 11 cable gland. They shall be cut to length on installation and be used with an appropriate Spirax Sarco controller.

## How to order

**Example:** 1 off Spirax Sarco LP31 high integrity, self-monitoring, high water level alarm probe with 39.4" (1000 mm) tip.

## LC3050 Level Controller

### Description

The Spirax Sarco LC3050 is a level limiting alarm for use in conductive liquids as a high or a low alarm, and is defined as a 'special design water level limiter' in the context of EN 12952-11. It is suitable for use with steam or hot water boilers operating up to 32 bar at 239°C (464psig@462°F).

The LC3050 is a dual voltage unit, 230 Vac or 115 Vac for use with Spirax Sarco high or low level, self-monitoring high integrity probes.

The LC3050 has two LED's, indicating normal and alarm conditions, and a test button (AL). The other buttons on the keypad are non-functional.

The unit can be panel, DIN rail or chassis mounted.

An automatic cyclic test of the probe, probe cable and controller is carried out every few seconds by internally simulating a fault in the probe.

A test button is fitted so that a full test of the probe, controller, and associated circuits can be carried out. Provision is made for the wiring of a remote test button if required.

**WARNING; In most countries, steam boilers operating with limited supervision require two self-monitoring level probes and controllers to provide two independent low level alarms. A high level alarm is also advised, and is compulsory in some countries.**

### Principal features:

- High integrity, self-monitoring low or high level alarm.
- TUV approved.
- Dual mains supply, 230/115 Vac.
- LED indication of status.
- Infrared communications.

### Approvals

This product complies with the Electromagnetic Compatibility Directive 2004 / 108 / EC and all its requirements.

This product meets all the Requirements of the Directive and is suitable for Class A Environments (eg Industrial). The LC3050 meets the requirements of the Directive by meeting the Controlling standard:

- EN 61326-1: 2006 - Electrical equipment for measurement control and laboratory use - EMC requirements Part 1: General requirements.

In addition the LC3050 meets the EMC requirements of the following standards:

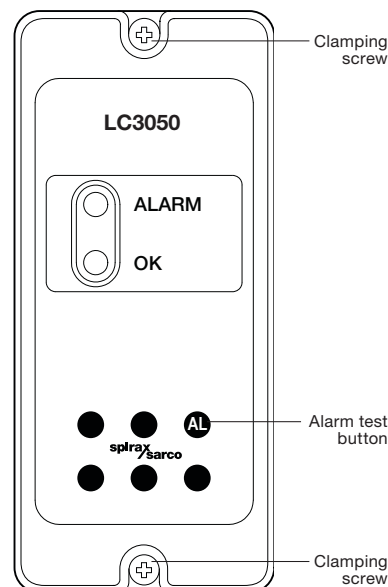
- EN 12953-9: 2007 - Shell boilers Part 9: Requirements for limiting devices of the boiler and accessories.
- EN 12952-11: 2007 - Water-tube boilers and auxiliary installations Part 11: Requirements for limiting devices of the boiler and accessories.

The LC3050 has been type-tested as a Special Design Water Level Limiter by meeting the Standard:

- Vd TÜV requirements for water level control and limiting devices, Water Level 100 (07.2010).

The product complies with Low Voltage Directive (2006 / 95 / EC) by meeting the standards of:

- EN 61010-1:2001 Safety requirements for electrical equipment for measurement, control and laboratory use.



### Function / Inputs / Outputs

#### Function

The LC3050 is normally configured to warn of a change in level outside normal limits for steam or hot water boilers, tanks or vessels, by engaging an alarm relay. Spirax Sarco high-integrity, self-monitoring probes can indicate internal faults or water ingress.

The LC3050 compares the resistance to earth from the probe, through the water, to the boiler or vessel shell. If a change in water level causes this resistance to change beyond a set limit, a timer is engaged which alters the state of internal relays after a pre-set delay. This signal is normally used to trigger an alarm, and cut the supply to the burner.

#### Input / output

The product accepts inputs from the LP30 low level probe or the LP31 high level probe.

With the water level normal the green LED will be lit, and the boiler panel will indicate a normal water level. The green LED briefly extinguishes every few seconds showing that the automatic cyclic test is being carried out.

A compensation tip on the probe signals an alarm if the probe should become faulty through water ingress or an internal wiring fault.

Outputs can be remotely accessed via the RS485 / MODBUS communications.

#### Other features

The LC3050 can communicate via an infrared link between adjacent controllers. It enables the alarm status of the LC3050 to be passed to a product fitted with RS485 (user). User products are those fitted with a graphics display. The LC3050 is defined as a slave unit. No set-up or adjustment is needed.

# LC3050

## Level Controller

### Technical data LC3050

Power supply		Mains voltage range	220/240 Vac setting (198 V to 264 V) 110/120 Vac setting (99 V to 132 V)	
		Frequency	50 - 60 Hz	
		Power consumption	230 V/30 mA or 115 V/60 mA	
Environmental		General	Indoor use only	
		Maximum altitude	2 000 m (6 562 ft) above sea level	
		Ambient temperature limits	0 - 55°C (32-131°F)	
		Maximum relative humidity	80% up to 31°C (88°F)decreasing linearly to 50% at 40°C (104°F)	
		Overvoltage category	III	
		Pollution degree	2 (as supplied)	
			3 (when installed in an enclosure) - Minimum of IP54.	
		Enclosure rating (front panel only)	IP65 (verified by TRAC Global)	
		LVD (safety)	Electrical safety EN 61010-1	
		EMC	Immunity/Emissions	Suitable for heavy industrial locations
		Enclosure	Material	Polycarbonate
		Front panel	Material	Silicone rubber, 60 shore.
Solder	Tin/lead (60/40%)			
Cable / wire and connector data	Mains and signal connector	Termination	Rising clamp plug-in terminal blocks with screw connectors. <b>Caution:</b> Use only the connectors supplied by Spirax Sarco Ltd. - Safety and Approvals may be compromised otherwise.	
		Cable size	0.2 mm² (24 AWG) to 2.5 mm² (12 AWG).	
		Stripping length	5 - 6 mm (0.2")	
	Level probe cable/wire	Type	High temperature	
		Shield type	Screened	
		Number of cores	4	
		Gauge	1 – 1.5 mm² (18 - 16 AWG)	
		Maximum length	50 m (164 ft)	
		Recommended type	Prysmian (Pirelli) FP200, Delta Crompton Firetuf OHLS	
Input technical data		Minimum conductivity	30 µS/cm or 30 ppm at 25°C (77°F)	
Output technical data	Relays	Contacts	2 x single pole changeover relays (SPCO)	
		Voltage ratings (maximum)	250 Vac	
		Resistive load	3 amp @ 250 Vac	
		Inductive load	1 amp @ 250 Vac	
		ac motor load	¼ HP (2.9 amp) @ 250 Vac	
			1/10 HP (3 amp) @ 120 Vac	
		Pilot duty load	C300 (2.5 amp) - control circuit/coils	
		Electrical life (operations)	3 x 10 <sup>5</sup> or greater depending on load	
		Mechanical life (operations)	30 x 10 <sup>6</sup>	
	Infrared	Physical layer	IrDA	
		Baud	38 400	
		Range	10 cm (4")	
		Working angle	15°	
		Eye safety information	Exempt from EN 60825-12: 2007 Safety of laser products - does not exceed the accessible emission limits (AEL) of Class 1	

# LC3050

## Level Controller

### Safety information, installation and maintenance

**Warning:** This document does not contain sufficient information to install the unit safely. The unit operates at a potentially fatal mains voltage. Before attempting to install the unit read the Installation and Maintenance Instructions supplied with it.

**Caution:** before installing and connecting the power ensure there is no condensation within the unit. The product may be installed on a DIN rail, on a chassis plate, or in a panel cutout. A bezel is supplied.

The product must be installed in a suitable industrial control panel or fireproof enclosure to provide impact and environmental protection. A minimum of IP54 (EN 60529) is required. Spirax Sarco can provide suitable plastic or metal enclosures

**Do not** install the product outdoors without additional weather protection.

**Do not** attempt to open the product - it is sealed and has no replaceable parts or internal switches.

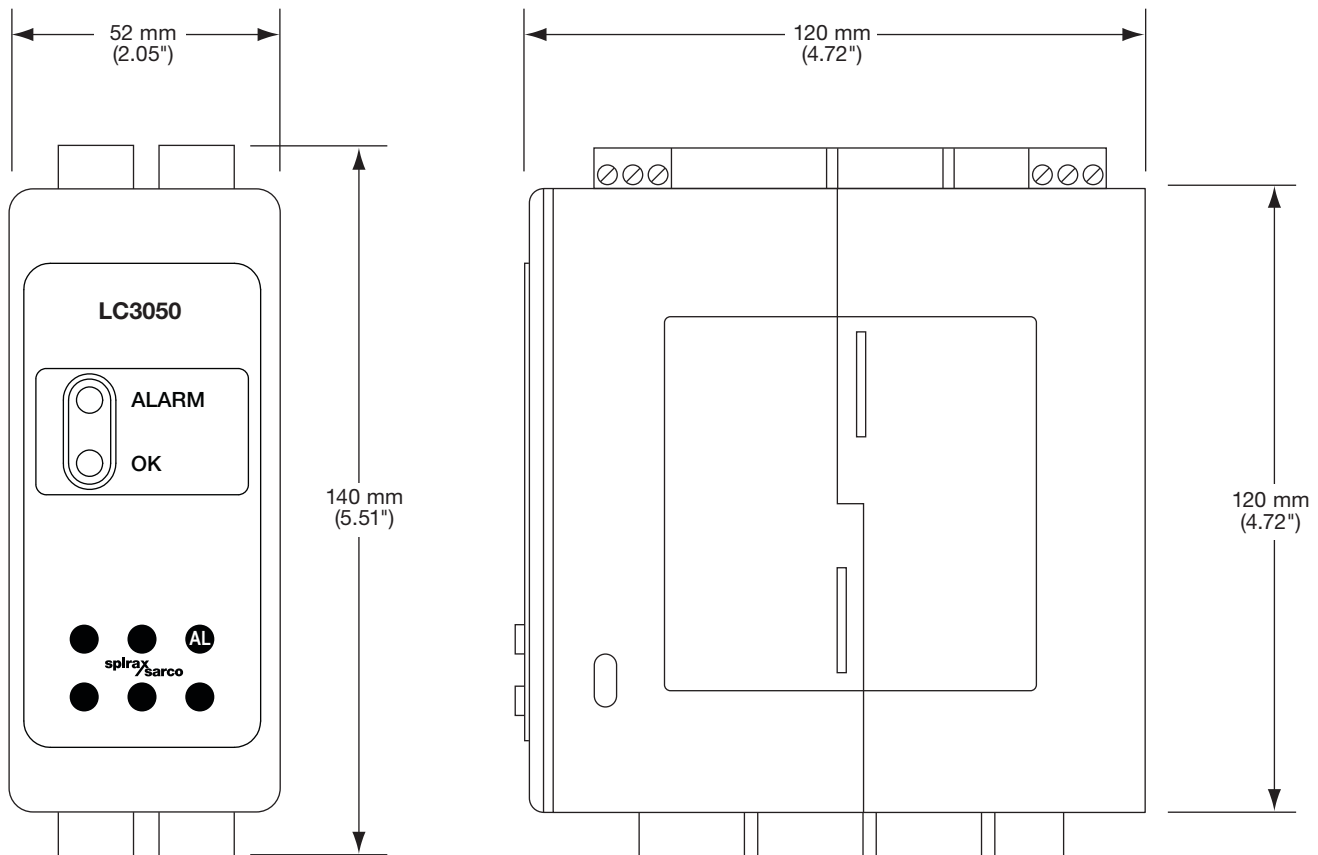
**Do not** cover or obstruct the infrared beam between products.

No special servicing, preventative maintenance or inspection of the product is required.

Boiler water level controls and level alarms do, however, require testing and inspection.

### Dimensions/weight (approximate) in mm and g.

Weight 430 g. (0.95 lb)



### How to specify

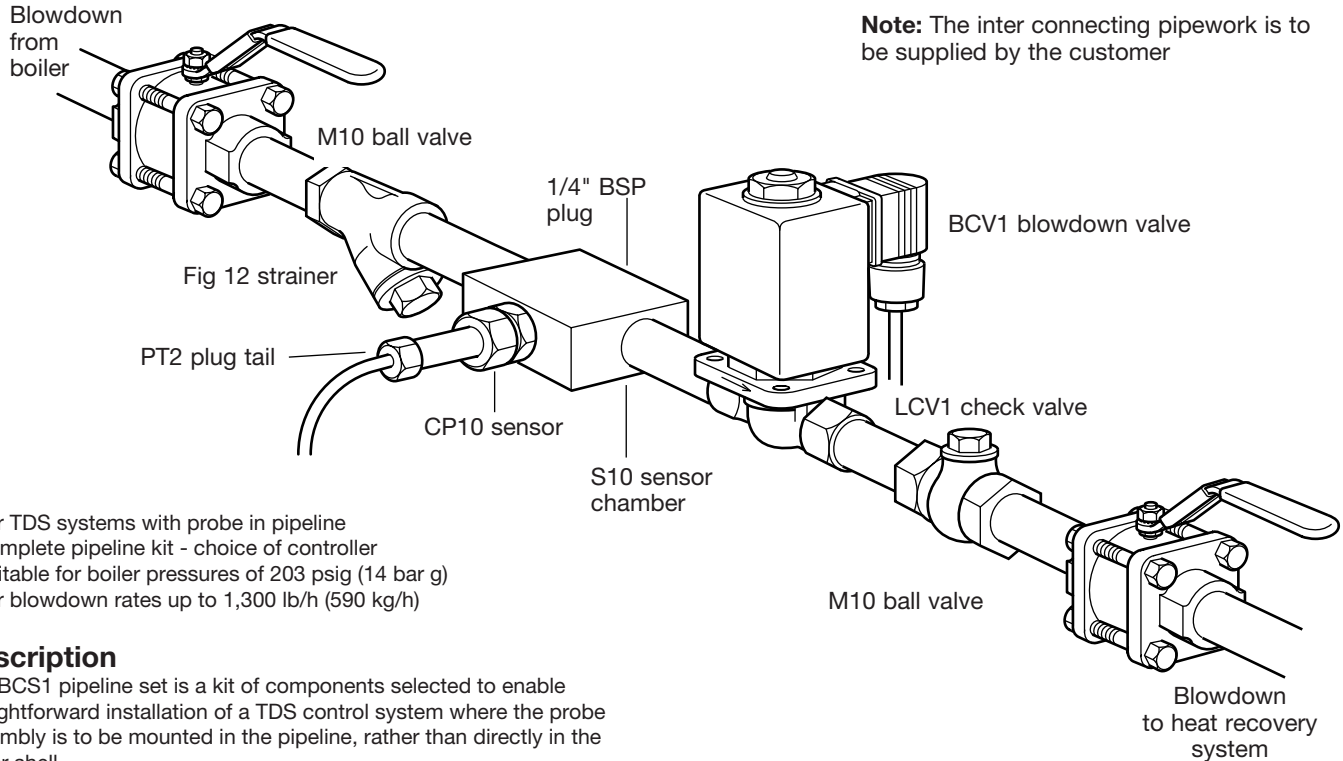
High-integrity self-monitoring level controller with fail-safe operation and self-testing facilities. LED indication of alarm and safe status. Infrared communications facility. A test button facility shall be provided on the front panel.

### How to order

**Example:** 1 off Spirax Sarco LC3050 level high-integrity, self-monitoring level controller.



## BCS1 Blowdown System Pipeline Set



**Note:** The inter connecting pipework is to be supplied by the customer

- For TDS systems with probe in pipeline
- Complete pipeline kit - choice of controller
- Suitable for boiler pressures of 203 psig (14 bar g)
- For blowdown rates up to 1,300 lb/h (590 kg/h)

### Description

The BCS1 pipeline set is a kit of components selected to enable straightforward installation of a TDS control system where the probe assembly is to be mounted in the pipeline, rather than directly in the boiler shell.

The BCS1 pipeline set consists of the following items:

- 1 x S10 sensor chamber 1/2" NPT.
- 1 x CP10 sensor and gasket.
- 1 x PT2 plug tail. (3/8" BSP)
- 1 x Sensor chamber plug 1/4" BSP.
- 1 x BCV1 solenoid valve 120 V.
- 1 x LCV1 check valve 1/2" NPT.
- 1 x y type cast iron strainer (1/2" NPT, 20 Mesh).
- 2 x M10 ball valves 1/2" NPT.

Alternative products are available, but not as part of a kit.

A controller is also required, and should be selected from the Spirax Sarco range.

The BC3150 and BC3250 are all suitable, and offer a choice of features. Full details are available in separate literature.

Main features are listed opposite.

### Materials

S10 sensor chamber	Stainless steel	BS 970 303 S31
CP10 sensor body and pin	Stainless steel	BS 970 303 S31
PT2 plug tail	Brass body	
Sensor chamber plug	Carbon steel	
BCV1 solenoid valve	Brass body, stainless steel seat, PTFE seal.	
LCV1 check valve	Bronze	
Strainer	Cast iron	
M10 ball valve	Zinc plated forged carbon steel	

See individual product literature for further information.

### BC3200

- Wall mounting.
- Two button commissioning, calibration, and operation.
- Selectable ranges (ppm or  $\mu\text{S}/\text{cm}$ ).
- Four digit LED display of TDS and system status.
- High TDS alarm relay output.
- 0 -20 or 4 - 20 mA output.
- Patented automatic probe cleaning circuit.
- Temperature compensation facility.
- Selectable security feature.
- Optional front cover lock available.

### BC3210

- As BC3200, but boiler panel mounting.
- Optional lockable cover available.



# BCS1 Blowdown System Pipeline Set

## Limiting conditions

Maximum boiler pressure 203 psig (14 bar g).

## Capacities

The capacity of the system is limited by the blowdown valve capacity at various boiler pressures.

Boiler pressure psig (bar g)	Low to medium flowrates (Standard setting*)	Medium to high flowrates (High setting*)
14.5 (1)	60	175
29.0 (2)	85	250
58.0 (4)	115	350
87.0 (6)	130	385
116.0 (8)	150	445
145.0 (10)	165	495
203.0 (14)	200	590

\*At 'Standard setting' the controller is set to open the valve for 10 seconds every 30 seconds.

When blowing down at 'High setting' the controller opens the valve continuously.

## Weight

Boxed kit approximately 8.2 lbs (3.7 kg).

## Electrical data

### BCV1 solenoid (blowdown) valve

Voltage range	209 V to 264 V
Frequency range	50 to 60 Hz
Power consumption	40 VA (inrush) 16 VA/10 W (hold)
Protection rating	IP65

## Safety information

**WARNING:** Your attention is drawn to Safety Information Leaflet IM-GCM-10, as well as to any National or Regional regulations.

The products contained in the BCS1 pipeline set are designed and constructed to withstand the forces encountered during normal use. Use of the BCS1 pipeline set other than for the control of TDS could cause damage to the products and may cause injury or fatality to personnel.

The BCV1 valve and CP10 sensor contain PTFE which can give off toxic fumes if exposed to excessive heat.

## Installation

This document does not contain sufficient information to install the product safely. See the Installation and Maintenance Instructions provided with each kit.

## Available spares

Armature and spring set for BCV1 blowdown valve (kit).  
Stock No. 4034080

## How to order

Example: 1 off Spirax Sarco BCS1 pipeline set.



## S20 Sensor Chamber, TP20 Temperature Sensor, CP10 Sensor and PT2 Plug-tail Cast Iron Valves

- Purpose designed sensor chamber for in-line mounting
- Simple removal of sensors for cleaning
- Allows continuous temperature compensated measurement

### Description

The Spirax Sarco S20 sensor chamber is fitted with conductivity and temperature sensors used to determine the conductivity of liquids. The use of a temperature sensor enables an accurate measurement to be made when the temperature varies, as in the case of condensate return monitoring systems.

The hexagonal in-line sensor chamber is screwed 1" NPT.

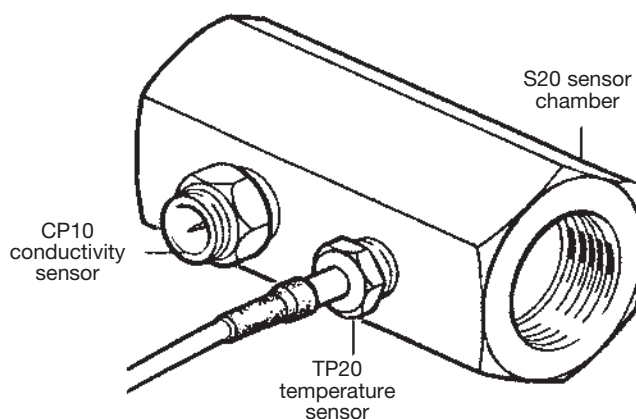
Adjacent radial female screwed connections are provided for:-

CP10 conductivity sensor (3/8" BSP).

TP20 temperature sensor (1/4" BSP).

An additional 1/4 " BSP (1/4" NPT) connection is provided on the other side of the chamber for taking a sample if required.

Spirax Sarco can supply a sample cooler for cooling hot samples, or a blanking plug if the connection is not required.



### Limiting Conditions

#### S20 sensor chamber and TP20 Temperature sensor

Maximum pressure	160 psig (11 barg)
Maximum media temperature	302°F (150°C)

#### CP10 conductivity sensor

Maximum pressure	464 psig (32 barg)
Maximum media temperature	462°F (239°C)
Torque rating	44 lb./f (60 Nm)

#### PT2 Plug-tail

Cable temperature range	-67 to 248°F (-55 to 120°C)
Supplied cable length	50" (1.25m)
Maximum voltage	20Vdc, 14Vac
Maximum current	10mA

### Installation

**Caution: Do not install the sensor outdoors without additional weather protection.**

Fit the sensor chamber in a vertical or horizontal pipeline with suitable isolation valves to allow inspection/cleaning of the sensors. Reducers may be fitted if required. Flow can be in either direction.

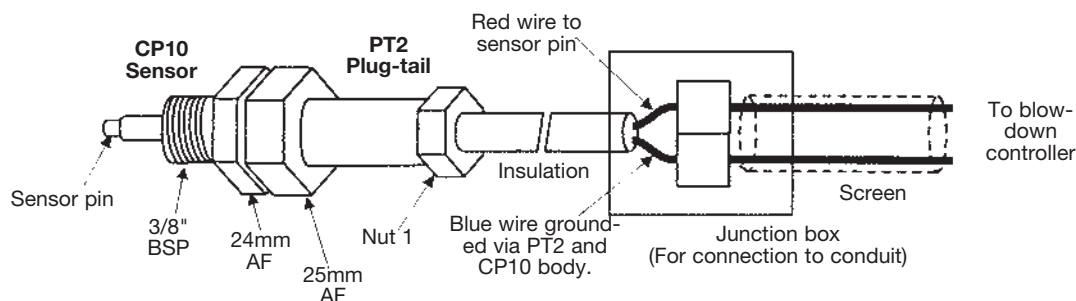
The sensors themselves must be horizontal.

The TP20 has a taper thread, and may be installed using PTFE sealing tape if required.

The CP10 sensor is provided with an S-type stainless steel gasket for sealing and does not require sealing tape.

Fit the sensors to the chamber and tighten.

Fit PT2 plug tail (or other Spirax Sarco plug tail) to the CP10 sensor and tighten.



The supply to the Sensor and Plug-tail must be provided by a low voltage limited power source.

Spirax Sarco Blowdown controllers provide this type of supply.

Flexible metal conduit (M16) can be connected to the PT12 by removing the nut (1)

*Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only. In the interests of development and improvement of the product, we reserve the right to change the specification.*

TI-9-403-US 08.11

# S20 Sensor Chamber, TP20 Temperature Sensor, CP10 Sensor and PT2 Plug-tail

## Maintenance

The equipment requires no specific maintenance other than periodic inspection and cleaning.

## How to Specify

In line sensor chamber with conductivity and temperature sensors. CP10 Conductivity Sensor and PT2 Plug-tail.

## Materials

### S20 sensor chamber

Stainless steel	ASTM 8582303	BS 970 303 S31
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### PT2 Plug-tail

Body	Brass
Nuts	Brass (2off)
Insulator	Polyphenylene Sulphide Resin (glass filled)

### CP10 conductivity sensor

Body	Stainless steel	BS 970 303 S31
Insulator	PEEK plastic	
Pin	Stainless steel	BS 970 303 S31

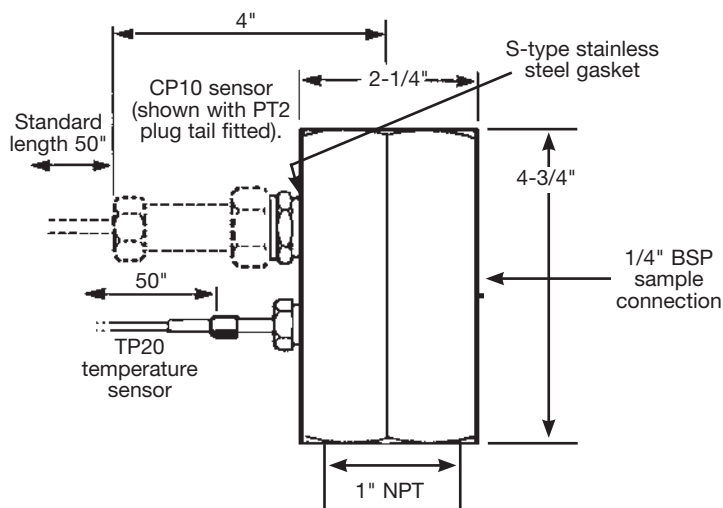
### TP20 temperature sensor

Body and probe	Stainless steel 316	ASTM A269 Gr. 316
Cable insulation	PFA	

## How to Order

Spirax Sarco's S20 sensor chamber complete with CP10 sensor, PT2 plug tail, 1/4" BSP blanking plug, and TP 20 temperature sensor.

## Dimensions (approximately) in inches



## CP 30 Conductivity Probe

- Conductivity probe for use with blowdown controllers
- Suitable for use in steam boilers up to 464 psig.  
462°F - (32 barg, 239°C)
- Easily cut to length
- All wetted parts in austenitic stainless steel/PTFE

### Description

The Spirax Sarco CP30 conductivity probe is used in conjunction with a controller to measure the conductivity or TDS of water, usually in a steam boiler for the purpose of monitoring and controlling blowdown. The probe may be installed in a Spirax Sarco probe elbow, a screwed flange, or directly in a boiler connection. The CP30 is supplied in four nominal tip lengths, and is cut to the exact length required prior to installation.

A DIN 43650 cable socket with 1/2" NPT conduit thread and four 18AWG wires are supplied with the unit.

### Limiting conditions

Maximum boiler pressure	464 psig (32 barg)
Maximum temperature	462°F (239°C)
Hydraulic ambient temperature	158°F (70°C)
Minimum distance from boiler tubes	.8" (20mm)
Minimum emersion depth (vertical installed probes)	4.0" (100mm)
Cable socket protection rating	IP65

**\*Additional environmental protection is needed for outdoor installations.**

### Installation

Probes with tip lengths up to 19.7" (500mm) can be installed vertically or horizontally. Vertical installation only is recommended for longer lengths. The probe must be installed in a position where it can sense the conductivity of the boiler water, away from the feed water inlet if possible. Full instructions on cutting the probe tip to length, wiring, and maintenance are given in the Installation and Maintenance Instructions supplied with each unit.

### Available Tip Lengths Inches and millimeters

11.8", 19.7", 39.4", 59.1" 300mm, 500mm, 1000mm, 1500mm

### Weights (approximate) in lb (kg)

11.8" (300mm) tip version	1lb (0.47kg)
19.7" (500mm)	1lb (0.49kg)
39.4" (1000mm)	1.3lb (0.59kg)
59.1" (1500mm) tip version	1.5lb (0.68kg)

### Available Spares

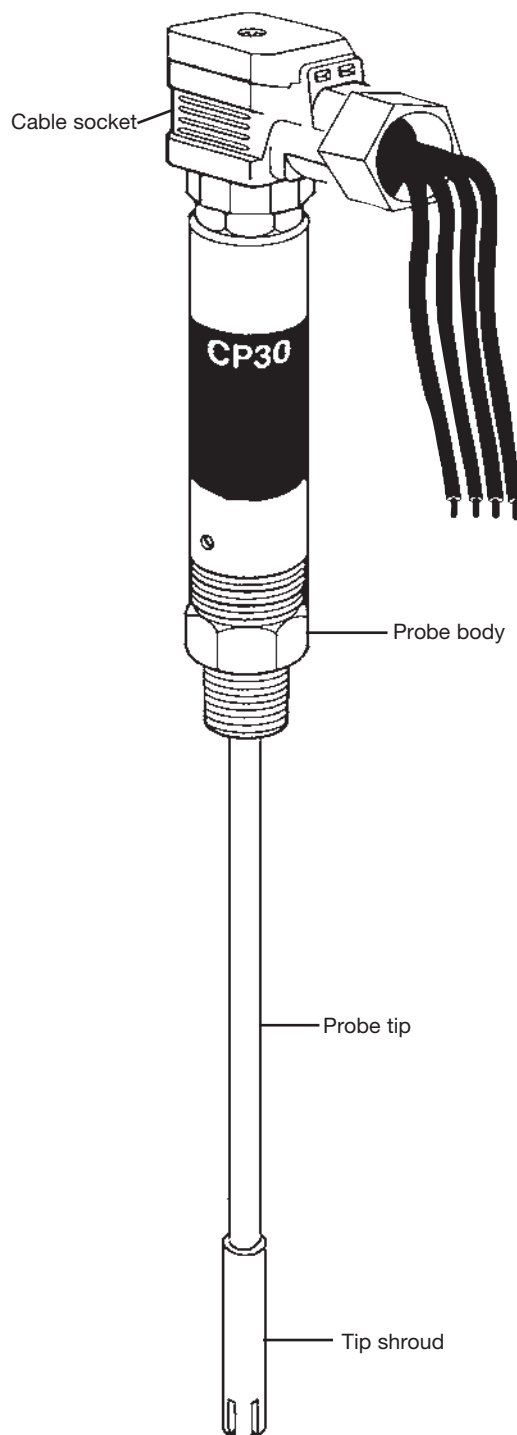
Tip shroud and spring assembly, stock No. 4031280.

### How to Specify

Conductivity probe with all wetted parts in austenitic stainless steel and PTFE, 1/2" NPT, tip length 19.7" (500mm).

### How to Order

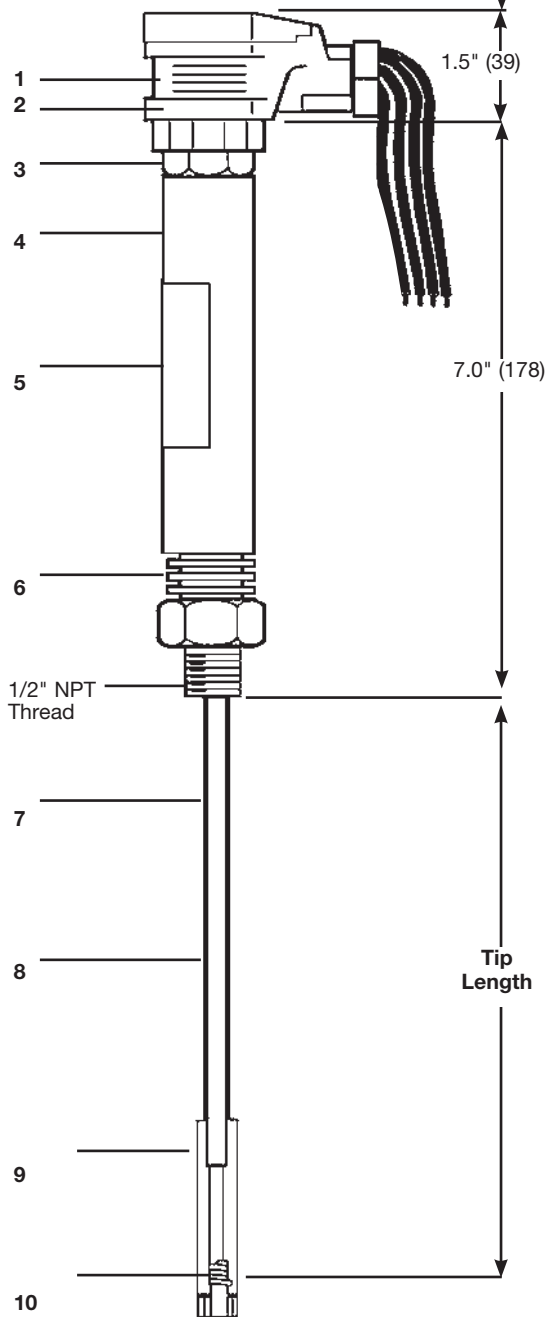
Spirax Sarco UL CP30 (1/2" NPT) probe with 19.7" (500mm) tip.



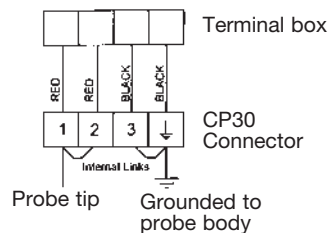
# CP 30 Conductivity Probe

**Dimensions** (approximate) in inches and millimeters

Withdrawal distance for cable socket 0.6" (15)



## Wiring



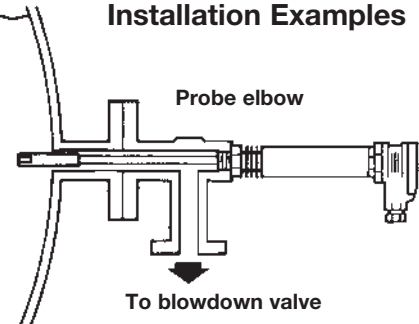
## Approvals

UL  
United States

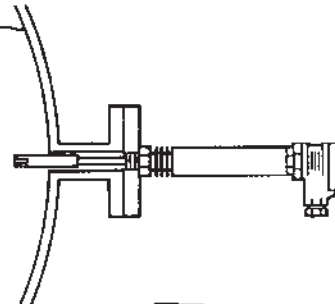
UL61010

## Installation Examples

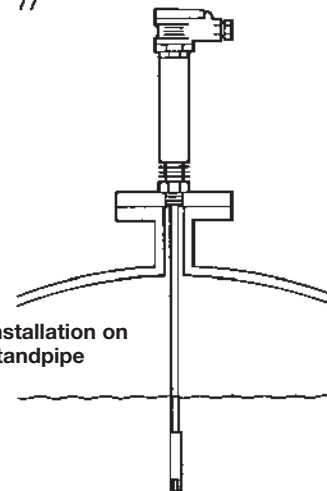
Installation on a probe elbow, ideally on the horizontal center line of the boiler.



Installation on a boiler (screwed or flanged)



Vertical installation on a boiler standpipe



## Materials

No	Description	Material
1	Cable socket	Polyamide, glass filled
2	Flat gasket	Silicone rubber
3	Probe connector	Polyamide, glass filled
4	Cover assembly	Austenitic stainless steel
5	Nameplate	Aluminum foil
6	Body	Austenitic stainless steel Type 316Ti W/S No. 1.4571
7	Probe tip	Austenitic stainless steel ASTM A276 316L
8	Probe tip sleeving	PTFE
9	Tip shroud	PTFE
10	Spring	Austenitic stainless steel BS 2056 316 S42
11	Flying leads	Copper conductor, PVC insulation 18AWG CSA TEW 105oC, UL1015 105oC, 600V

## CP 32 Twin Tip Conductivity Probe

### Description

The Spirax Sarco CP32 conductivity probe is used in conjunction with a controller to measure the conductivity (or TDS) of water, usually in a steam boiler, for the purpose of monitoring and controlling blowdown.

The CP32 has a built-in temperature sensor, and when used with an appropriate controller, is able to detect scaling (UK Patent No. 2297843). It also automatically initiates a probe conditioning cycle (UK Patent No. 2276943). This causes any scale on the probe to become porous or fall off, allowing the probe to continue to sense at its original calibration level.

**WARNING: This feature is not a substitute for adequate boiler water treatment. If scale is occurring on a probe, it is also occurring inside the boiler, and a competent water treatment specialist must be consulted to avoid a potentially dangerous situation.**

The CP32 is supplied in three nominal tip lengths, and has a ½" NPT male thread for connection to a Spirax Sarco probe elbow, a screwed flange, or directly into a boiler connection.

### Principal features :

- Twin tip conductivity probe for use in TDS control systems.
- Built-in temperature sensor - only one boiler connection needed.
- Suitable for use in steam boilers up to 462°F @ 464 psi g
- Patented scale detection and compensation.

### Available tip lengths inches

11.8", 19.7" and 39.4"

**Note:** 39.4" probes can only be installed vertically.

### Pressure / temperature limits

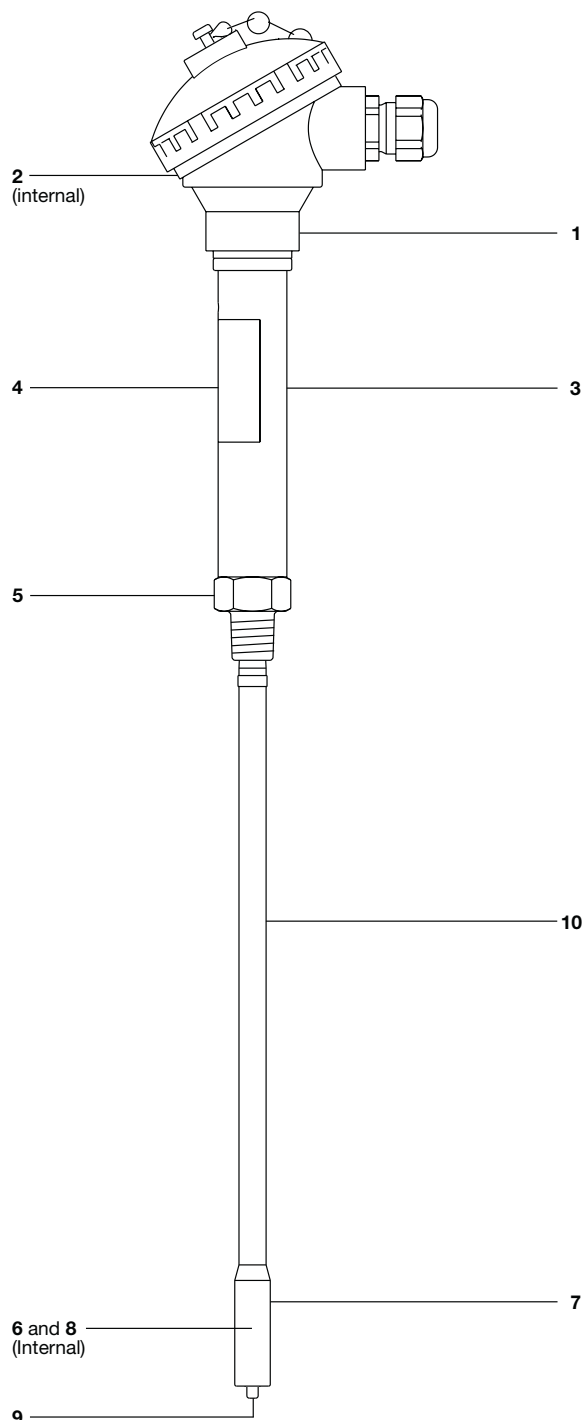
Maximum boiler pressure	464 psi g
Maximum operating temperature	462°F
Maximum ambient temperature	131°F

### Technical data

Protection rating (terminal head / cable gland only)	IP65
Minimum tip distance from boiler tubes	0.4"
Minimum immersion depth (vertically installed probes)	4.0"
Maximum cable length (probe to controller)	328 ft
Minimum conductivity	10 ppm

### Materials

No.	Part	Material
1	Terminal head	Aluminium
2	'O' ring	Nitrile rubber
3	Cover tube	Austenitic stainless steel Type 316L
4	Name-plate	Polycarbonate
5	Body	Austenitic stainless steel Type 304L 1.4306
6	Spring	Austenitic stainless steel 302 S26
7	Insulator	PEEK
8	Driver tip	Austenitic stainless steel Type 316
9	Sensor tip	Austenitic stainless steel UGINE 4632
10	Rod	Austenitic stainless steel Type 316 / 316L

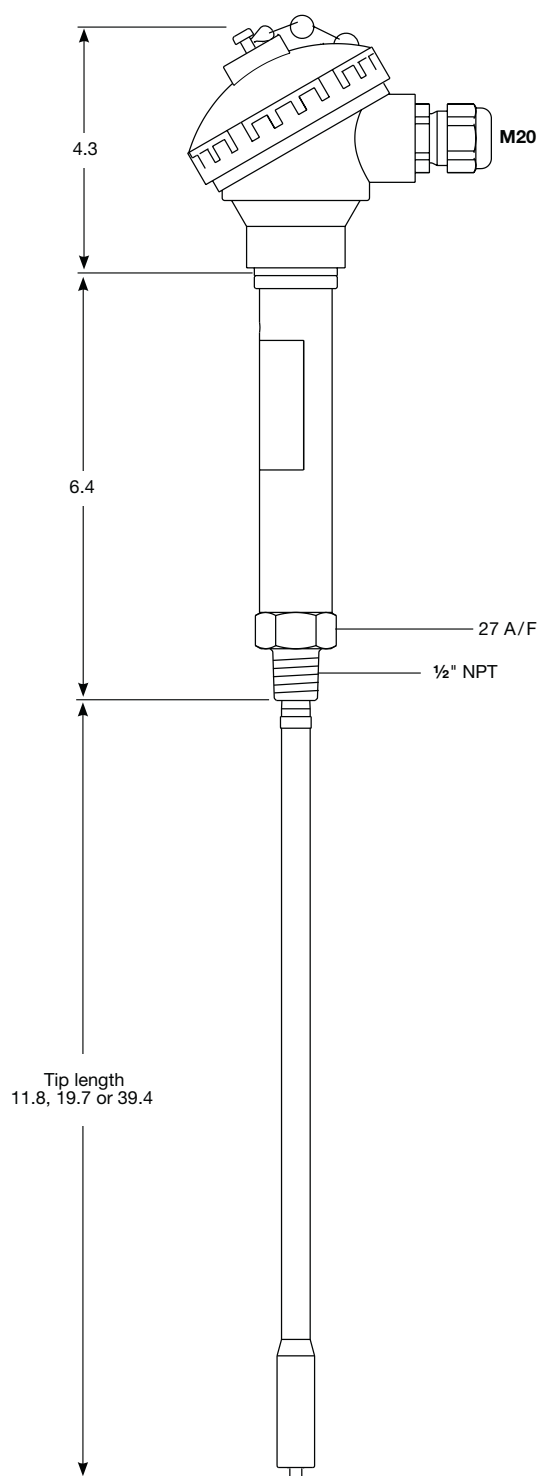


Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only.  
In the interests of development and improvement of the product, we reserve the right to change the specification.

TI-P403-59-US 08.08

# CP 32 Twin Tip Conductivity Probe

**Dimensions** (approximate) in inches



## Safety information

For full details see the Installation and Maintenance Instructions supplied with the product, which gives full wiring, commissioning and operating instructions.

### Warning:

**This product contains materials including PTFE which can give off toxic fumes if exposed to excessive heat.**

### Installation Note:

**Do not** install the probe outdoors without additional weather protection. 11.8" and 19.7" probes can be installed vertically or horizontally.

**CAUTION: 39.4" probes must be installed vertically only.** The probe must be installed in a position where it can sense the conductivity of the boiler water, away from the feedwater inlet if possible.

The CP32 contains no user serviceable components, and periodic cleaning is all that is required. Any attempt to dismantle the probe will result in permanent damage.

## Spare parts

The spare parts available are detailed below. No other parts are supplied as spares.

### Available spares

Enclosure 'O' ring	2
--------------------	---

### How to order spares

Always order spares by using the description given in the column headed 'Available spares' and state which product they are for.

**Example:** 1 off Enclosure 'O' ring for a Spirax Sarco CP32 twin tip conductivity probe.

## How to specify

TDS conductivity probes shall be Spirax Sarco type CP32 with nickel alloy sensor tips and built-in temperature sensor. They must incorporate a patented facility to check the sensor tips for scaling. When used in conjunction with an appropriate Spirax Sarco controller, they must also be able to automatically initiate a patented probe cleaning feature, which, if unable to clean the probe, will activate a warning on the controller's display panel and / or a remote alarm. The system must also be able to automatically compensate for any polarisation effects at the sensors. They must be suitable for boiler pressures up to 464 psig and a maximum working temperature of 462°F. They must be available in 11.8", 19.7" and 39.4" lengths, and have a 1/2" NPT boiler connection.

## How to order

**Example:** 1 of Spirax Sarco CP32, twin tip conductivity probe having a 1/2" NPT connection and 11.8" tip length.

## Weights (approximate) in lb

Tip length	11.8"	19.7"	39.4"
Weight	2.2	2.6	3.5

## BC3150 Blowdown Controller

### Description

The BC3150 is a blowdown controller for steam boilers. It controls TDS (total dissolved solids – salts in solution) by opening and closing a blowdown valve. It works in conjunction with a Spirax Sarco conductivity sensor, a boiler blowdown valve or condensate dump valve.

The product can be panel, DIN rail or chassis mounted and powered by a 110 to 240 Vac mains supply.

The front panel has a 3 digit LCD and a five-button keypad.

The product has no battery. The programmed settings are held in non-volatile memory (Flash) and are written to after changing a parameter and pressing the OK key.

### Principal features:

- Blowdown controller with temperature compensation.
- Type approved as a TDS limiter and controller.
- Works with CP10, CP30 or CP32 conductivity probes.
- Wide range: 1-9990  $\mu\text{S}/\text{cm}$  or ppm – (x1, x 10, x 100 x 1000).
- LCD display with direct probe condition indicator.
- Infrared communications.

### Approvals

This product complies with the Electromagnetic Compatibility Directive 2004 / 108 / EC and all its requirements.

The BC3150 is suitable for Class A Environments (e.g. industrial). A fully detailed EMC assessment has been made and has the reference number UK Supply BH BC3150 2008.

The BC3150 complies with the Low Voltage Directive by meeting the standards of:

- EN 61010-1:2010 safety requirements for electrical equipment for measurement, control, and laboratory use.

The BC3150 has been type-tested as a TDS controller and limiter by meeting the standard:

- Vd TÜV Equipment for Water Control 100 (07.2010).

### Function

All ranges and operating parameters are selected using the software menu.

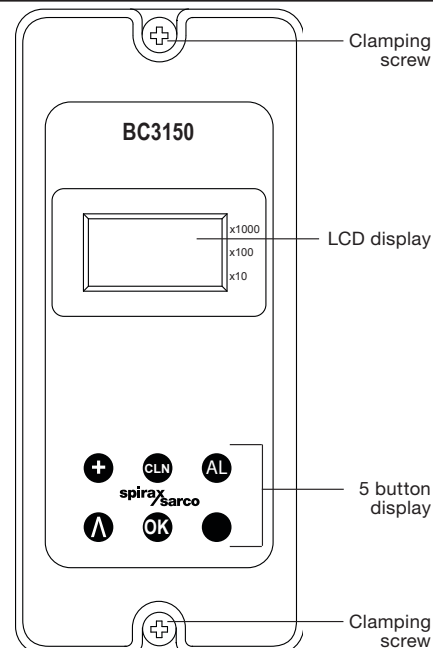
Commissioning is carried out using the two lower buttons.

Once fully commissioned, the TDS value is displayed in  $\mu\text{S}/\text{cm}$  (or ppm if selected).

If the water conductivity exceeds the Set Point level, the TDS value shown on the display will alternate with 'bld', and the valve relay will be energised until the conductivity drops below 5% of full scale (FS) below the set point.

If the water conductivity exceeds the alarm level, the TDS value will alternate with 'AL', and the valve relay will be energised until the conductivity drops 3% (FS) below the alarm level.

If the system is carrying out a purge, The TDS value will alternate with 'Pur', and the valve relay will be energised until the conductivity drops 5% (FS) below the set point.



### Inputs

The BC3150 can accept a signal from a Spirax Sarco conductivity probe (CP10, CP30, or CP32).

A Pt100 temperature sensor may be connected to provide temperature compensation (2% / °F). This is recommended if the boiler is working at varying pressures, or for other applications, such as condensate monitoring or coil boilers, where the temperature may vary. If a Pt100 is not fitted, the product uses a default temperature of 363°F (145 psig).

### Outputs

Pulsed output - For smaller boilers where the capacity of the blowdown valve is relatively high compared to the boiler size, the blowdown may be set to pulsed, rather than continuous output, opening for 10 seconds, and closing for 20 seconds. This slows the rate at which the boiler water is removed so that the level is not unduly affected, avoiding the risk of triggering a low water alarm.

### Other features

To prevent unwanted or inadvertent changes being made, all commissioning parameters are protected with a pass code.

The BC3150 can communicate via an infrared link between adjacent controllers.

This feature enables the parameters of this product (OEM) to be passed to a product fitted with RS485 (user).

The BC3150 is always an IR slave – No set-up or adjustment is needed.

An isolated 4 - 20 mA output is provided as standard, and may be used for remote display of the TDS level or as an output to a computerised management system.



# BC3150

## Blowdown Controller

### Technical data BC3150

Power supply		Mains voltage range	110 Vac to 240 Vac at 50/60 Hz		
		Power consumption	7.5 W (maximum)		
Environmental		General	Indoor use only		
		Maximum altitude	2 000 m (6 562 ft) above sea level		
		Ambient temperature limits	0 - 55°C (32-131°F)		
		Maximum relative humidity	80% up to 31°C (88°F) decreasing linearly to 50% at 40°C(104°F)		
		Overvoltage category	III		
		Pollution degree	2 (as supplied)		
			3 (when installed in an enclosure) - Minimum of IP54		
		Enclosure rating (front panel only)	IP65 (verified by TRAC Global)		
		LVD (safety)	Electrical safety EN 61010-1		
		EMC	Immunity/Emissions	Suitable for heavy industrial locations	
		Enclosure	Material	Polycarbonate	
		Front panel	Material	Silicone rubber, 60 shore.	
		Solder	Tin/lead (60/40%)		
Cable/wire and connector data		Mains and signal connector	Termination	Rising clamp plug-in terminal blocks with screw connectors. <b>Caution:</b> Use only the connectors supplied by Spirax Sarco Ltd. - Safety and Approvals may be compromised otherwise.	
			Cable size	0.2 mm² (24 AWG) to 2.5 mm² (12 AWG).	
			Stripping length	5 - 6 mm (0.2")	
		TDS probe	Type	High temperature	
			Shield type	Screened	
			Gauge	1 – 1.5 mm² (18 - 16 AWG)	
			Maximum length	0 - 9.99 range - 10 metres (33ft)	
				0 - 99.90 range - 30 metres (100ft)	
				0-999.0 range and 0-9990 ranges - 100 metres (328ft)	
			Recommended type	Prysmian (Pirelli) FP200, Delta Crompton Firetuf OHLS	
		Pt100 probe cable / wire	Type	High temperature, twisted	
			Shield type	Screened	
			Number of cores	3	
			Gauge	1 - 1.5 mm² (18 - 16 AWG)	
			Maximum length	100 m (328 ft)	
			Recommended type	Various	
		4 - 20 mA output cable / wires	Type	Twisted pair	
			Shield type	Screened	
			Number of pairs	1	
			Gauge	0.23 - 1 mm² (24 - 18 AWG)	
			Maximum length	100 m (328 ft)	
Recommended type	Various				

# BC3150

## Blowdown Controller

### Technical data BC3150 (continued)

<b>Input technical data</b>	<b>Water conductivity</b>	Probe types	CP10, CP30 and CP32
			0 – 9.99 ppm or $\mu\text{S/cm}$
			0 – 99.9 ppm or $\mu\text{S/cm}$
		Ranges	0 – 999 ppm or $\mu\text{S/cm}$
			0 – 9990 ppm or $\mu\text{S/cm}$
		Accuracy	$\pm 2.5\%$ FSD (possibly > in high EM locations)
		$\mu\text{S/cm}$ to ppm conversion	0.7
		Neutralising factor	0.7
		Resolution	0.1% FSD
		Drive:	ac – 4 wires
	<b>Temperature compensation (TC)</b>	Sensor type	Pt100 – Class B or better
		Range	0 - 250°C (With Pt100 not fitted – user programmed temperature 100 - 250°C, 1°C steps)
		Accuracy	$\pm 2.5\%$ FSD – system accuracy $\pm 5\%$
		Resolution	0.1% FSD
		Drive:	dc – 3 wires
<b>Output technical data</b>	<b>Probe cleaning</b>	Maximum voltage	32 Vdc
		Drive	Pulsed (1 second on, 1 second off)
		Time	20 seconds
	<b>4 - 20 mA</b>	Minimum current	0 mA
		Maximum current	20 mA
		Open circuit voltage (maximum)	19 Vdc
		Resolution	0.1% FSD
		Maximum output load	500 ohm
		Isolation	100 V
		Output rate	10 / second
	<b>Relays</b>	Contacts	2 x single pole changeover relays (SPCO)
		Voltage ratings (maximum)	250 Vac
		Resistive load	3 amp @ 250 Vac
		Inductive load	1 amp @ 250 Vac
		ac motor load	1/4 HP (2.9 amp) @ 250 Vac 1/10 HP (3 amp) @ 120 Vac
		Pilot duty load	C300 (2.5 amp) - control circuit/coils
		Electrical life (operations)	3 x 10 <sup>5</sup> or greater depending on load
		Mechanical life (operations)	30 x 10 <sup>6</sup>

# BC3150

## Blowdown Controller

### Safety information, installation and maintenance

**Warning:** This document does not contain sufficient information to install the unit safely. The unit operates at a potentially fatal mains voltage. Before attempting to install the unit read the Installation and Maintenance Instructions supplied with it.

**Caution:** before installing and connecting the power ensure there is no condensation within the unit. The product may be installed on a DIN rail, on a chassis plate, or in a panel cutout. A bezel is supplied.

The product must be installed in a suitable industrial control panel or fireproof enclosure to provide impact and environmental protection. A minimum of IP54 (EN 60529) is required. Spirax Sarco can provide suitable plastic or metal enclosures

**Do not** install the product outdoors without additional weather protection.

**Do not** attempt to open the product - it is sealed and has no replaceable parts or internal switches.

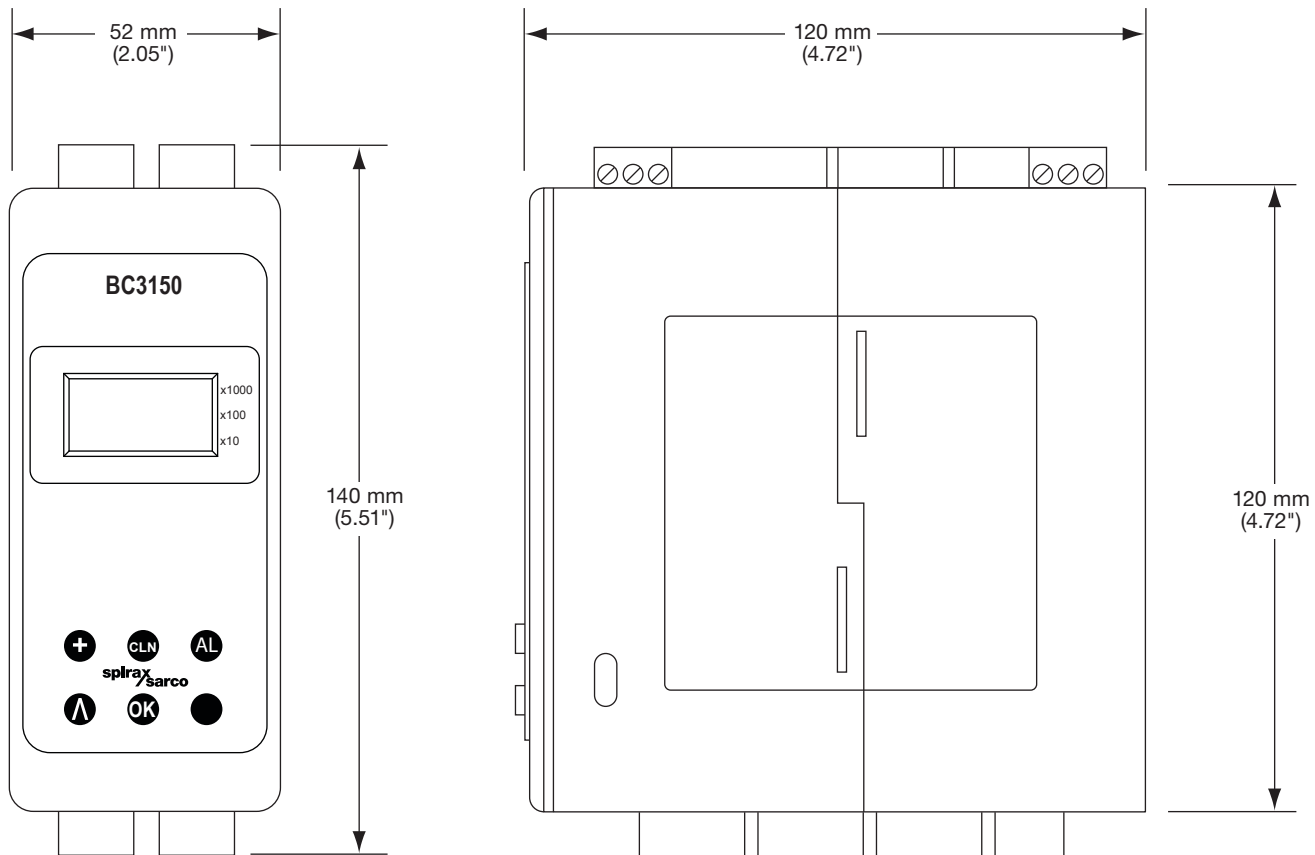
**Do not** cover or obstruct the infrared beam between products.

No special servicing, preventative maintenance or inspection of the product is required.

Boiler water level controls and level alarms do, however, require testing and inspection.

### Dimensions / weight (approximate)

Weight 1 lb



### How to specify

Blowdown controller with LCD display and five-button keypad, and infrared communications.

### How to order

**Example:** 1 off Spirax Sarco BC3150 blowdown controller.

## BC3250 Blowdown Controller

### Description

The BC3250 is a blowdown controller for steam boilers. It controls TDS (total dissolved solids - salts in solution) by opening and closing a blowdown valve.

It also has a timer that controls a bottom blowdown valve, to remove precipitated solids from the bottom of the boiler.

The product works in conjunction with a Spirax Sarco conductivity sensor, a boiler blowdown valve and, for condensate contamination detection, a dump valve.

It can operate on a supply voltage of between 110 to 240 Vac @ 50/60 Hz.

The front panel has an LCD graphics display and five-button keypad to select, view, and change functions.

In run mode (standard setting) the display is divided into three sections:

- i) Process variable and control parameters.
- ii) Information line, displays the various control states and process units.
- iii) Three bar graphs, which show a percentage of full scale of:
  - PV Process Variable highest and lowest recorded value.
  - SP Set Point and hysteresis point.
  - AL High Alarm and hysteresis point.

An additional filter can be selected to increase the damping effect where the probe is fitted directly in the boiler. This avoids over-frequent valve operation.

A Trend graph screen display appears if the right or left button is pressed in run mode - This displays a record of the variation in TDS over a set time.

The BC3250 can be used on a condensate contamination system. Please note that it will not detect contaminants that do not change the conductivity, e.g. oils, fats, or sugars.

The blowdown may be set to pulsed, rather than continuous output, opening for 10 seconds, and closing for 20 seconds. This avoids the risk of triggering a low water alarm in smaller boilers.

An isolated 0 - 20 or 4 - 20 mA output is provided for remote display of the TDS level or as an output to a management system.

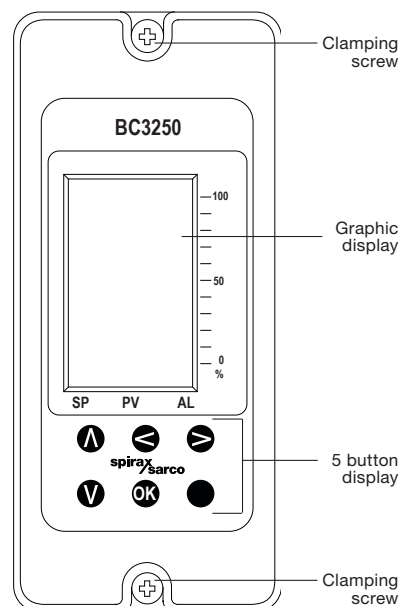
If a switch box is fitted to the bottom blowdown valve actuator, an alarm can be configured to indicate if the bottom blowdown valve fails to close or to lift off its seat.

The BC3250 can communicate via an infrared link between adjacent controllers. It can be designated as either a master unit or a slave unit.

The unit can be panel, DIN rail or chassis mounted.

#### Principal features:

- Blowdown controller with bottom blowdown timer.
- Multi-voltage 110 Vac to 240 Vac.
- Display in  $\mu\text{S}/\text{cm}$  or ppm.
- LCD graphics display of PV and sequential trend graph.
- Filter for turbulent conditions.
- Infrared communications.
- Diagnostic / test facility.
- 0/4 - 20 mA output.
- EIA 485/Modbus communications.
- TÜV approved.



### Approvals

This product complies with the Electromagnetic Compatibility Directive 2004 / 108 / EC and all its requirements.

The BC3250 is suitable for Class A Environments (e.g. industrial). A fully detailed EMC assessment has been made and has the reference number UK Supply BH BC3250 2008.

The BC3250 complies with the Low Voltage Directive by meeting the standards of:

- EN 61010-1:2010 safety requirements for electrical equipment for measurement, control, and laboratory use.

The BC3250 has been type-tested as a TDS controller and limiter by meeting the standard:

- Vd TÜV requirements for TDS control and limiting devices, Water Level 100 (07.2006).

### Function

#### Inputs

The BC3250 can accept a signal from a Spirax Sarco CP10, CP30 or CP32 conductivity probe, and a Pt100 temperature sensor.

#### Function / outputs

If the water conductivity exceeds the Set Point, the valve relay will be energised until the conductivity drops below the Set Point. If the water conductivity exceeds the alarm level, the alarm relay will be de-energised until the conductivity drops below the alarm level.

#### Other features:

- Test function.
- Direct display of probe factor.
- Commissioning parameters protected with a pass code.

# BC3250

## Blowdown Controller

### Technical data BC3250

Power supply	Mains voltage range	110 Vac to 240 Vac at 50/60 Hz	
	Power consumption	7.5 W (maximum)	
Environmental	General	Indoor use only	
	Maximum altitude	2 000 m (6 562 ft) above sea level	
	Ambient temperature limits	0 - 55°C (32-131°F)	
	Maximum relative humidity	80% up to 31°C (88°F) decreasing linearly to 50% at 40°C (104°F)	
	Overvoltage category	III	
	Pollution degree	2 (as supplied)	
		3 (when installed in an enclosure) - Minimum of IP54	
	Enclosure rating (front panel only)	IP65 (verified by TRAC Global)	
	LVD (safety)	Electrical safety EN 61010-1	
	EMC	Immunity/Emissions	Suitable for heavy industrial locations
	Enclosure	Material	Polycarbonate
	Front panel	Color	Pantone 294 (blue)
		Material	Silicone rubber, 60 shore.
Solder	Tin/lead (60/40%)		
Mains and signal connector	Termination	Rising clamp plug-in terminal blocks with screw connectors. <b>Caution:</b> Use only the connectors supplied by Spirax Sarco Ltd. Safety and Approvals may be compromised otherwise.	
	Cable size	0.2 mm² (24 AWG) to 2.5 mm² (12 AWG).	
	Stripping length	5 - 6 mm (0.2")	
TDS cable/wire	Type	High temperature	
	Shield type	Screened	
	Number of cores	4	
	Gauge	1 – 1.5 mm² (18 - 16 AWG)	
	Maximum length	0 - 9.99 range - 10 metres (33ft)	
		0 - 99.90 range - 30 metres (100ft)	
		0-999.0 range and 0-9990 ranges - 100 metres (328ft)	
Recommended type	Prysmian (Pirelli) FP200, Delta Crompton Firetuf OHLS		
Pt100 probe cable / wires	Type	High temperature, twisted	
	Shield type	Screened	
	Number of cores	3	
	Gauge	1 – 1.5 mm² (18 - 16 AWG)	
	Maximum length	100 m (328 ft)	
0/4-20 mA output(s) cable/wire	Type	Twisted pair	
	Shield type	Screened	
	Number of pairs	1	
	Gauge	0.23 - 1 mm² (24 - 18 AWG)	
	Maximum length	100 m (328 ft)	
	Recommended type	various	
RS485 communication cable / wire	Type	EIA RS485 twisted pair	
	Shield type	Screened	
	Number of pairs	2 or 3	
	Gauge	0.23 mm² (24 AWG)	
	Maximum length	1200 m (4000 ft)	
	Recommended type	Alpha Wire 6413 or 6414	
LAN Cat 5 or Cat 5E ScTP (screened), FTP (foil) or STP (shielded) cable can be used, but limited to 600 m.			

# BC3250

## Blowdown Controller

### Technical data BC3250 (continued)

Input technical data	Water conductivity	Probes type:	CP10, CP30 and CP32
			Minimum $\geq 1 \mu\text{S} @ 25^\circ\text{C} (77^\circ\text{F})$
			0 – 9.99 ppm or $\mu\text{S}/\text{cm}$
			0 – 99.9 ppm or $\mu\text{S}/\text{cm}$
		Ranges	0 – 999 ppm or $\mu\text{S}/\text{cm}$
			0 – 9990 ppm or $\mu\text{S}/\text{cm}$
		Accuracy	$\pm 2.5\%$ FSD (Poss > if high EMC)
		pH factor	0.50 – 1.00 (0.7 default)
	Temperature compensation (TC)	Neutralising factor	0.7
		Resolution	0.1% FSD
		Drive:	ac – 4 wires
		Sensor type	Pt100 – Class B or better
	Burner input	Range	0 - 250°C (32-482°F) (With Pt100 not fitted – user programmed temperature 100 - 250°C {212-482°F}, 1°C steps)
		Accuracy	$\pm 2.5\%$ FSD – system accuracy $\pm 5\%$
		Resolution	1% FSD
		Drive:	dc – 3 wires
Output technical data	Probe cleaning	Input voltage range	110 – 240 Vac
		Maximum current input	2 mA maximum
	4 - 20 mA	Maximum voltage	32 Vdc
		Drive	ac/dc/pulsed
		Minimum current	0 mA
		Maximum current	20 mA
		Open circuit voltage (maximum)	19 Vdc
		Resolution	1% FSD
		Maximum output load	500 ohm
	Relays	Isolation	100 V
		Output rate	10 / second
		Contacts	2 x single pole changeover relays (SPCO)
		Voltage ratings (maximum)	250 Vac
		Resistive load	3 amp @ 250 Vac
		Inductive load	1 amp @ 250 Vac
		ac motor load	1/4 HP (2.9 amp) @ 250 Vac 1/10 HP (3 amp) @ 120 Vac
		Pilot duty load	C300 (2.5 amp) - control circuit/coils
		Electrical life (operations)	3 x 10 <sup>5</sup> or greater depending on load
		Mechanical life (operations)	30 x 10 <sup>6</sup>
	RS485	Physical layer	RS485 4-wire full or 2-wire half duplex
		Protocol	Modbus RTU format
		Isolation	60 Vac/dc
		Receiver unit load	1/8 (256 devices - maximum)
		Output rate	Up to 10 frames / second
	Infrared	Physical layer	IrDA
		Baud	38 400
		Range	10 cm (4")
		Working angle	15°
		Eye safety information	Exempt from EN 60825-12: 2007 Safety of laser products - does not exceed the accessible emission limits (AEL) of Class 1

# BC3250

## Blowdown Controller

### Safety information, installation and maintenance

**Warning:** This document does not contain sufficient information to install the unit safely. The unit operates at a potentially fatal mains voltage. Before attempting to install the unit read the Installation and Maintenance Instructions supplied with it.

The product must be installed in a suitable industrial control panel or fireproof enclosure to provide impact and environmental protection. A minimum of IP54 (EN 60529) is required.

The product may be installed on a DIN rail, a chassis plate, or in a panel cut-out. A bezel is supplied.

Install the product in an environment that minimizes the effects of heat, vibration, shock and electrical interference.

**Do not** install the product outdoors without additional weather protection.

**Do not** attempt to open the product - it is sealed and has no replaceable parts or internal switches.

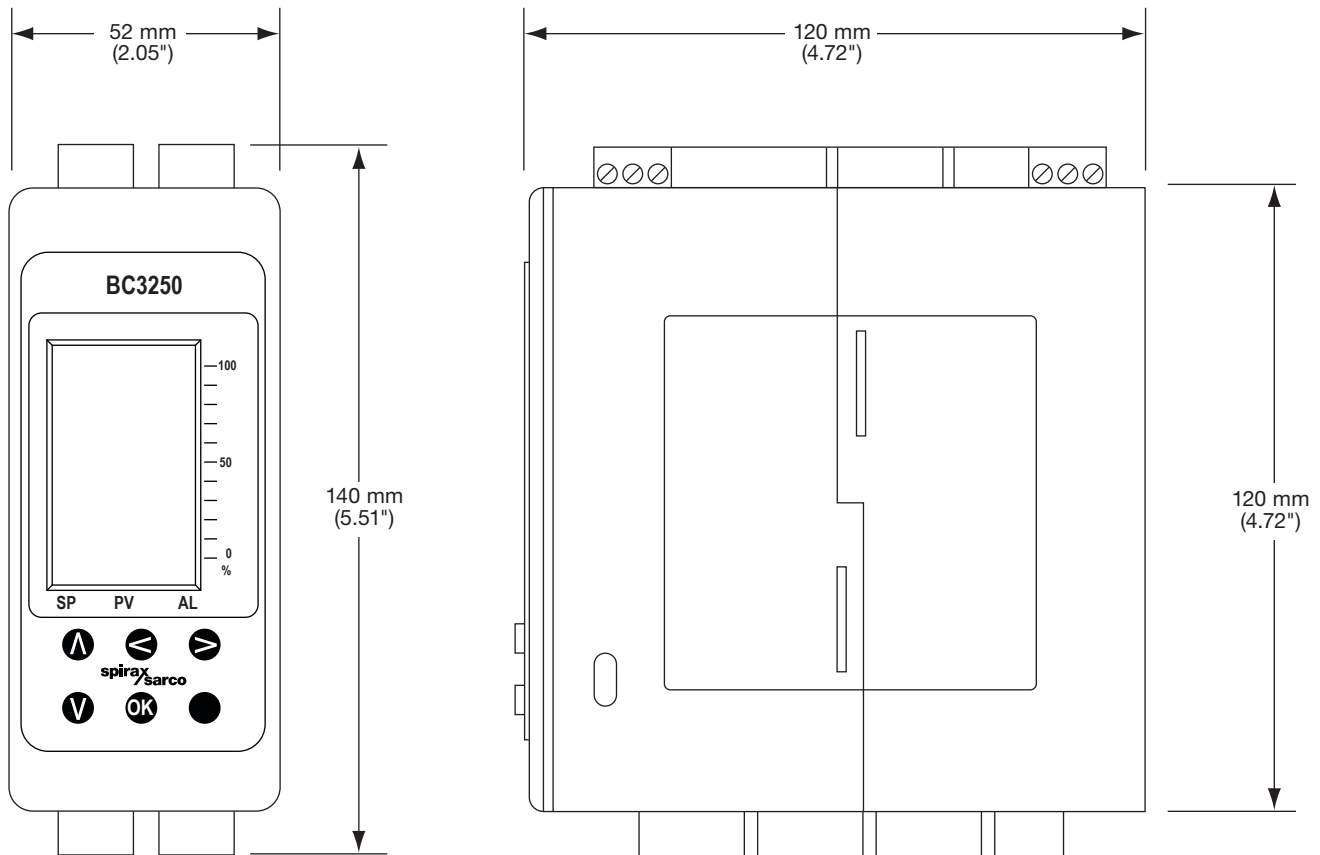
**Do not** cover or obstruct the infrared beam between products.

No special servicing, preventative maintenance or inspection of the product is required.

Boiler water level controls and level alarms do, however, require testing and inspection.

### Dimensions / weight (approximate)

Weight 1.21 lb



### How to specify

Blowdown controller with integral bottom blowdown timer and infrared comms.

### How to order

**Example:** 1 off Spirax Sarco BC3250 blowdown controller.

## BCV1 and BCV20 Blowdown Valves

### Description

The BCV1 and BCV20 valves are small bore, normally closed valves with a brass body and corrosion resistant internal components. They are primarily intended for low and medium pressure boiler blowdown applications.

BCV1 and BCV20 valves are identical apart from the orifice size, the BCV1 having a 3 mm ( $\frac{1}{8}$ ") orifice and the BCV20 a 6 mm ( $\frac{1}{4}$ ") orifice. Valves are supplied complete with a mains connector, which is protected to IP65 and is suitable for 3 x 1 mm<sup>2</sup> (18 AWG) cable.

### Available sizes and pipe connections

$\frac{1}{2}$ " screwed BSP - 230 V version  
 $\frac{1}{2}$ " screwed BSP - 110 V version  
 $\frac{1}{2}$ " screwed NPT - 120 V version  
 $\frac{1}{2}$ " screwed NPT - 120 V version (UL/CSA Listed)

### Limiting conditions

#### BCV1

Maximum boiler or steam pressure	14 bar g (203 psi g) (Intermittent operation)
Medium temperature range	-40 to +200°C (-40 to +392°F)
Medium	Water and steam
Maximum ambient temperature	55°C (130°F)

#### BCV1 (UL/CSA)

Maximum boiler or steam pressure	9 bar g (130 psi g)
Medium temperature range	-40 to +180°C (-40 to +356°F)
Medium	Water and steam
Maximum ambient temperature	55°C (130°F)

#### BCV20

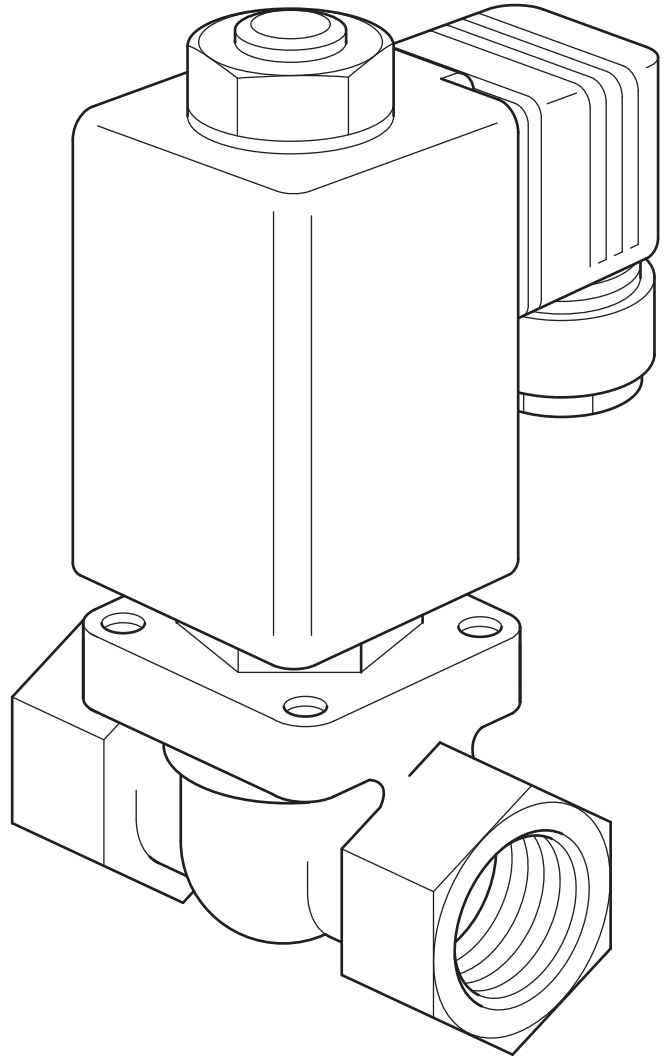
Maximum boiler or steam pressure	4 bar g (58 psi g)
Medium temperature range	-40 to +180°C (-40 to +356°F)
Medium	Water and steam
Maximum ambient temperature	55°C (130°F)

### Electrical data

230 V version	207 V to 253 V
110 V version	99 V to 121 V
120 V version	108 V to 132 V
Frequency	50 - 60 Hz
Maximum power consumption	40 VA (inrush) 16 VA/12 W (hold)
Protection rating	IP65 (Nema 4)

### Materials

Body	Brass
Soft seal	PTFE
Internal components	Stainless steel

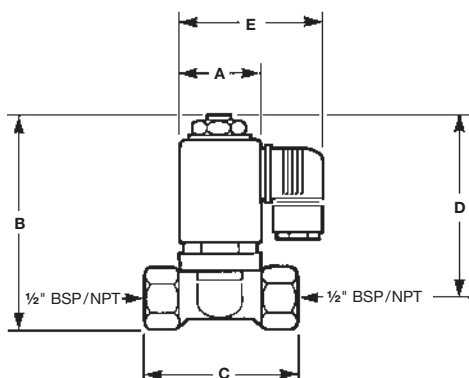




# BCV1 and BCV20 Blowdown Valves

## Dimensions/weight (approximate) in mm (ins) and kg (lbs)

A	B	C	D	E	Weight
40 (1.57)	110 (4.33)	74.5 (2.93)	94.5 (3.72)	73 (2.87)	0.75 (1.65)



## Capacities

Model	BCV1	BCV20
Orifice size	3 mm (1/8")	6 mm (1/4")
C <sub>v</sub> value	0.3	0.9

For conversion: C<sub>v</sub> (UK) = K<sub>v</sub> x 0.963 C<sub>v</sub> (US) = K<sub>v</sub> x 1.156

When used for boiler blowdown purposes, the valve will be controlling a mixture of water and flash steam, so the following capacity table applies:-

Boiler pressure bar g (psi g)	Capacity kg/h (lb/h) BCV1	Capacity kg/h (lb/h) BCV20
1 (14.5)	175 (385)	560 (1232)
2 (290)	250 (550)	790 (1738)
4 (580)	350 (770)	1120 (2464)
6 (870)	385 (847)	-
8 (1160)	445 (979)	-
10 (1450)	495 (1089)	-
14 (2030)	590 (1298)	-

When the BCV20 valve is used as part of the BCS2 blowdown control system, downstream of a steam trap, the following capacity table applies:-

Head across valve m (ft)	Cold water capacity kg/h (lb/h)	Hot water capacity with flash steam kg/h (lb/h)
1 (3)	253 (557)	63 (138)
2 (6)	358 (787)	90 (198)
3 (9)	438 (963)	110 (242)
5 (15)	566 (1245)	142 (312)
10 (30)	800 (1760)	200 (440)

## How to specify

### BCV1

Solenoid valves shall be Spirax Sarco normally closed blowdown valve type BCV1 or BCV1 (UL/CSA) with brass bodies and stainless steel valve seat with a PTFE seal.

### BCV20

Solenoid valves shall be Spirax Sarco normally closed, low pressure blowdown valve type BCV20 with brass bodies and stainless steel valve seat with a PTFE seal.

## How to order

**Example:** 1 off Spirax Sarco BCV1 or BCV20 blowdown valve having screwed NPT connections, 120 V.

## Spare parts

The spare parts available are detailed below. No other parts are supplied as spares.

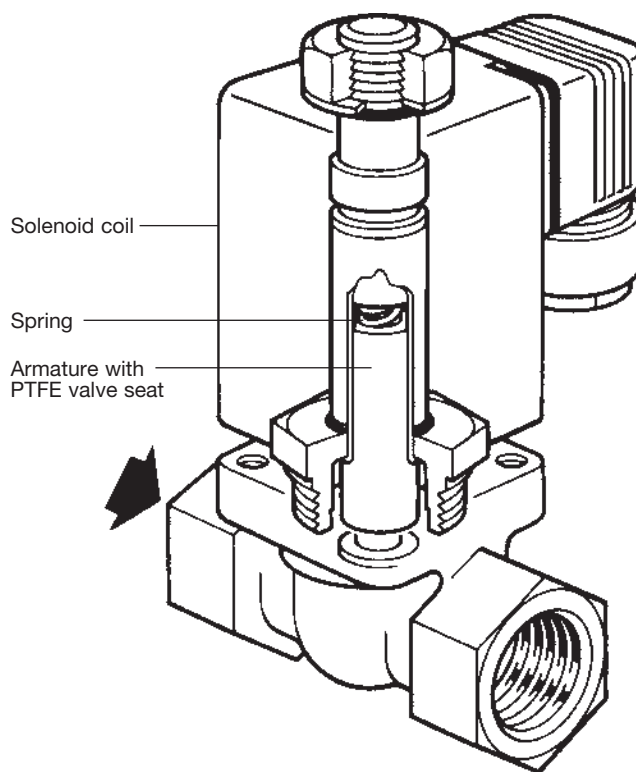
### Available spares

Armature and spring set (kit).	Stock No. 4034080
Solenoid coil 230 V	Stock No. 4034081
Solenoid coil 110/120 V	Stock No. 4034082

### How to order spares

Always order spares by using the description given in the column headed 'Available spares' and state the valve type.

**Example:** 1 off Armature and spring set (Stock No. 4034080) for a Spirax Spirax BCV20 blowdown valve.





# BCV43

## Blowdown Control Valves

### 3/4" and 1 1/2"

#### Description

Spirax Sarco's BCV blowdown control valves are manufactured using the market proven SPIRA-TROL body. These valves have been specifically designed for the blowdown of steam boilers or for other high pressure drop, low flow applications, and are generally used with a blowdown controller as part of an automatic TDS control system.

The flowrate is adjusted by setting the stroke of the valve spindle. These valves have been specially designed to minimize seat erosion and ensure consistent shut-off.

A 1/4" BSP plug at the base of the valve may be removed to allow a sample cooler to be fitted.

#### Two versions are available:

- Electrically actuated TDS blowdown control valve. (Non-UL Listed)
- Pneumatically actuated TDS blowdown control valve.

Available model	Material	Connection
BCV43	Carbon Steel	Flanged

#### SPIRA-TROL valve body options

Stem sealing	Graphite packing	High temperature applications
Seating	Hard facing	316L stainless steel with Stellite 6 facing

BCV blowdown control valves are compatible with the following actuators and positioners:

Version	Actuator	Positioners
Electric	AHL1 series	
Pneumatic	PN9___ series	PP5 (pneumatic)
		EP5 (electropneumatic)
		ISP5 (intrinsically safe electropneumatic)
		SP400 and SP500 (microprocessor based electropneumatic)

#### Standards

These products fully comply with the requirements of the European Pressure Equipment Directive 97 / 23 / EC.

#### Certification

These products are available with material certification to EN 10204 3.1. Note: All certification / inspection requirements must be stated at the time of order placement.

#### Operation

BCV blowdown control valves are supplied in the normally closed position.

**Electrical version:** When the power is connected to the actuator the valve opens to the position set by the internal limit switch.

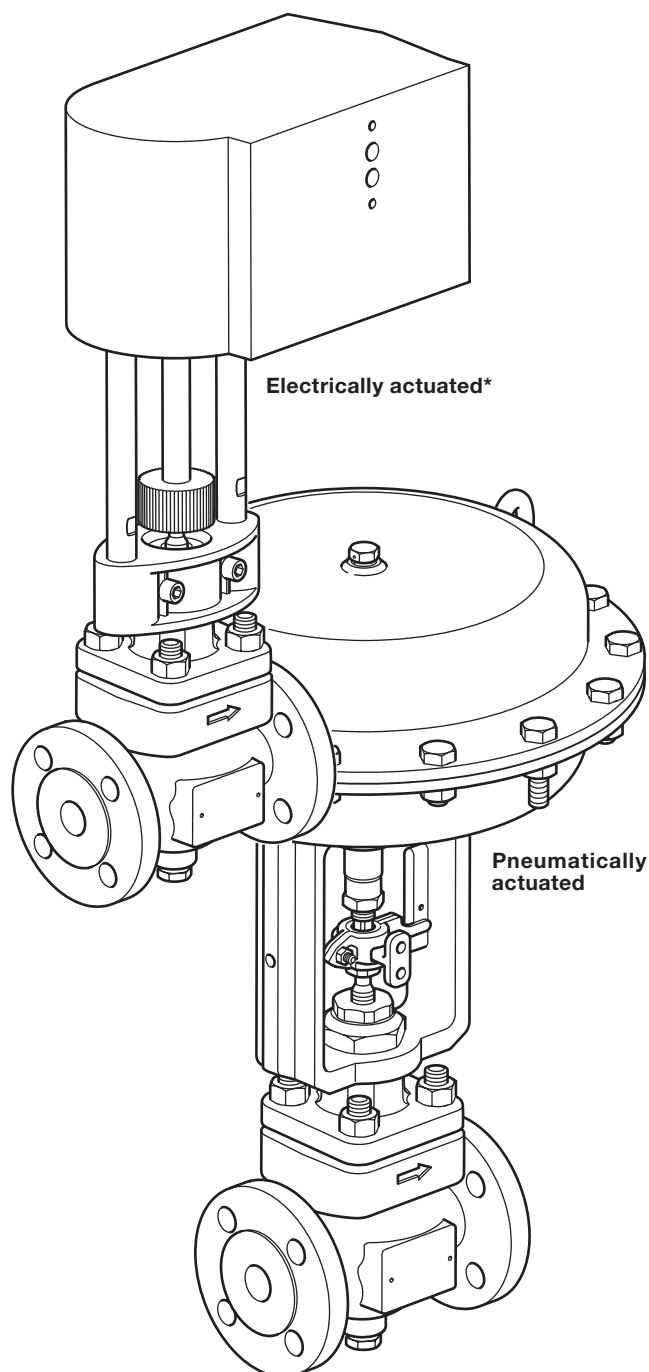
**Pneumatic version:** When the solenoid valve opens, air is admitted to the actuator activating the valve to open to the selected stroke.

\*AHL1 series electric actuator is not UL Listed

#### Size and pipe connections

3/4" and 1 1/2" Flanged

ASME class 300



# BCV43

## Blowdown Control Valves

### 3/4" and 1 1/2"

#### Materials

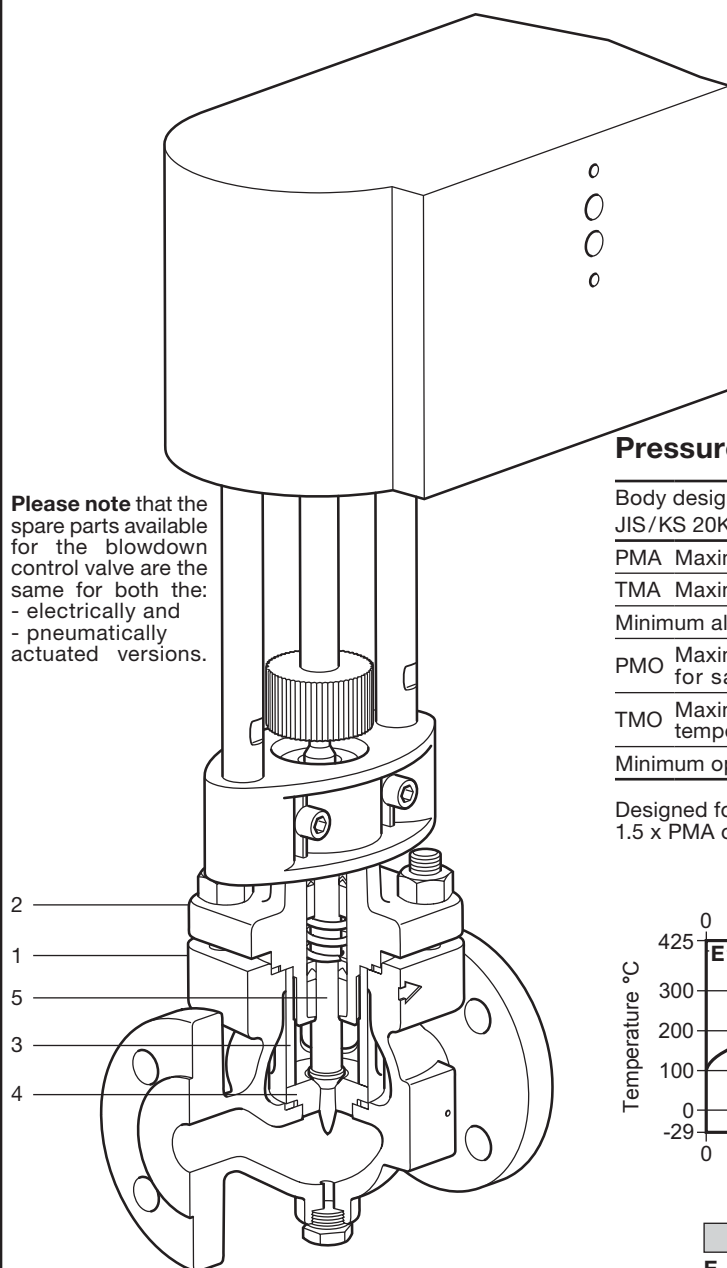
Please note that the spare parts available for the blowdown control valve are the same for both the electrically and pneumatically actuated versions.

No.	Part	Material
1.	Body	Carbon steel 1.0619+N / WCB
2.	Bonnet	Forged steel 1.0460 / A105N or 1.0619 / WCB
3.	Seat retainer	Stainless steel 316L
4.	Seat	Stainless steel 316L with Stellite
5.	Plug	Stainless steel 316L with Stellite

#### Electrical data

Actuator	AHL1 series
Supply voltage	Standard 24 Vdc and 110 Vac
Supply frequency	50 to 60 Hz
Power consumption	10 to 18 watts
Actuator speed	2 mm/s, 4 mm/s or 6 mm/s
Actuators thrust maximum	450 lbf (2kN)
Maximum shut-off value	600 psig (42 bar g)

Size	Actuator	Maximum shut-off value
1/2"	AHL1 series / PN9123E	600 psig (42 bar g)
1 1/2"	AHL1 series / PN9223E	600 psig (42 bar g)

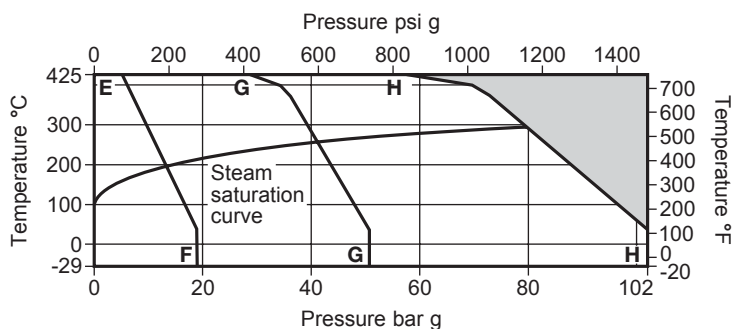


#### Pressure/temperature limits – BCV43

Body design conditions: PN40, PN63, or PN100  
JIS/KS 20K, 30K, or 40K, ASME class 300

PMA	Maximum allowable pressure	51.1 bar g @ 38°C	741 psi g @ 100°F
TMA	Maximum allowable temperature	425°C @ 28.8 bar g	797°F @ 418 psi g
	Minimum allowable temperature	-29°C	-20°F
PMO	Maximum operating pressure for saturated steam service	41.7 bar g @ 254°C	605 psi g @ 489°F
TMO	Maximum operating temperature	425°C @ 28.8 bar g	797°F @ 418 psi g
	Minimum operating temperature	-29°C	-20°F

Designed for a maximum cold hydraulic test pressure of:  
1.5 x PMA of the relative end connection of choice



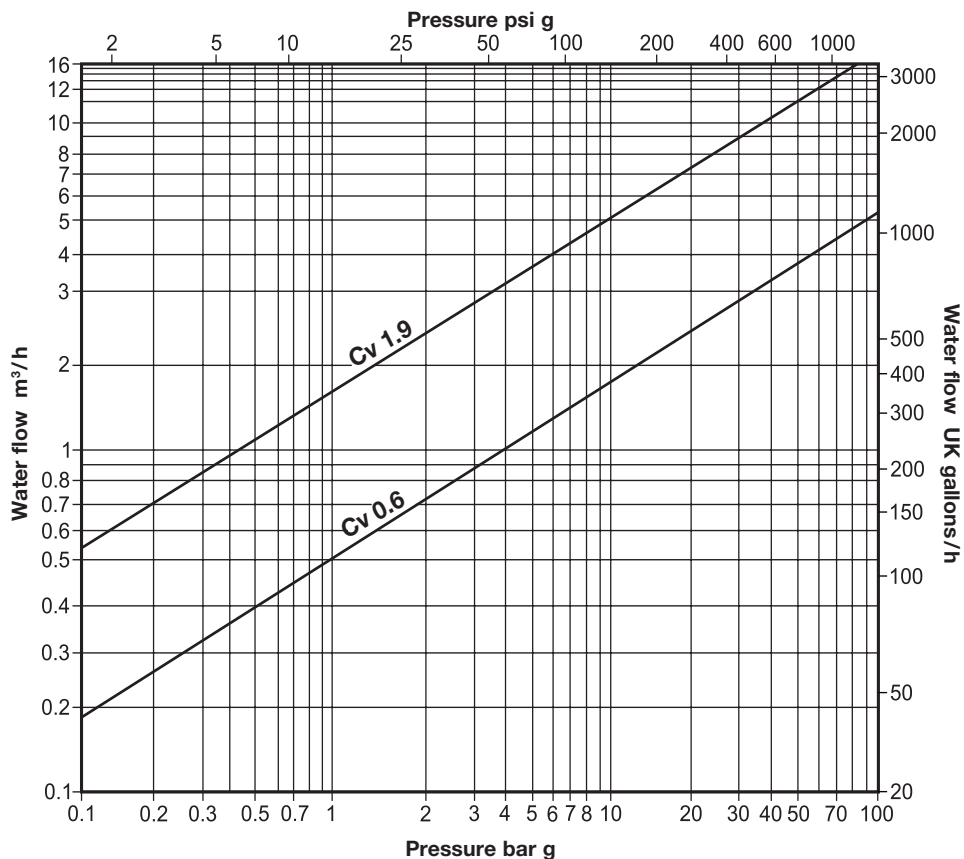
The product **must not** be used in this region.  
E - G Flanged ASME class 300

# BCV43 Blowdown Control Valves $\frac{3}{4}$ " and $1\frac{1}{2}$ "

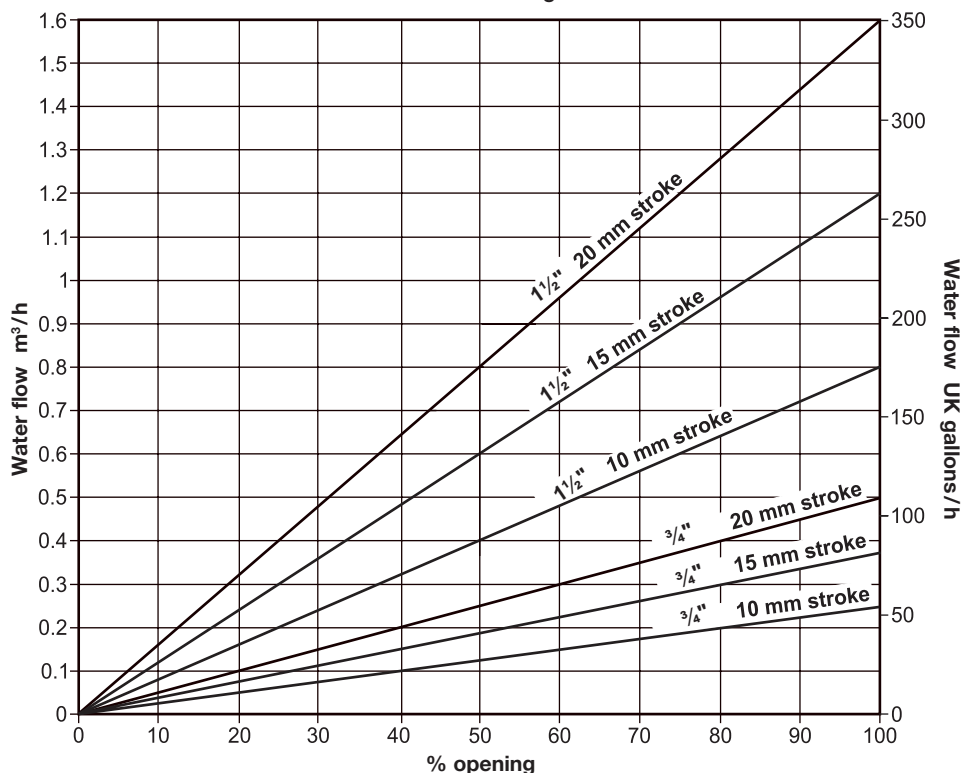
## Cvs values

Valve size	$\frac{3}{4}$ "	$1\frac{1}{2}$ "
Cvs value	0.6	1.9

## Cvs chart



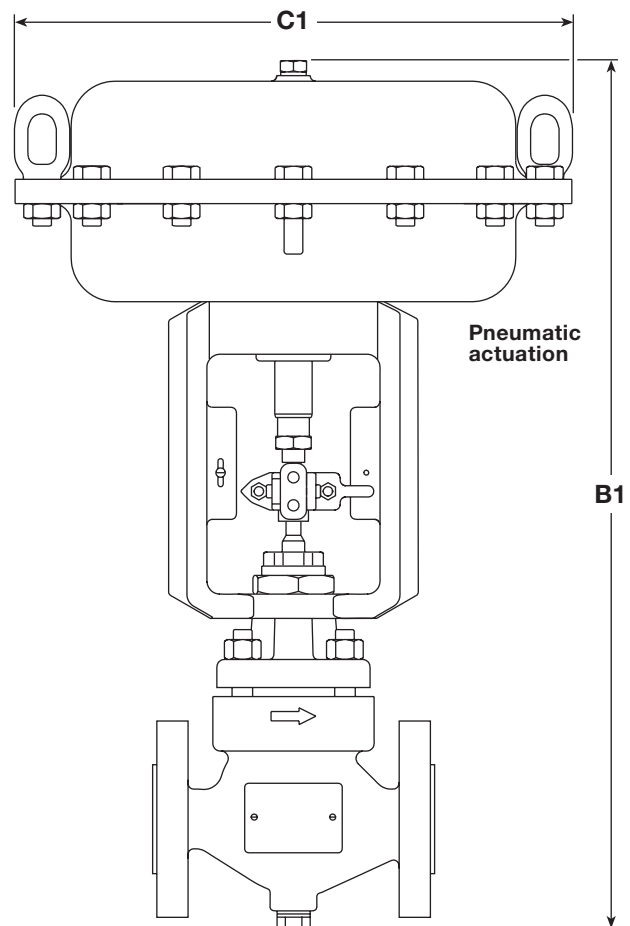
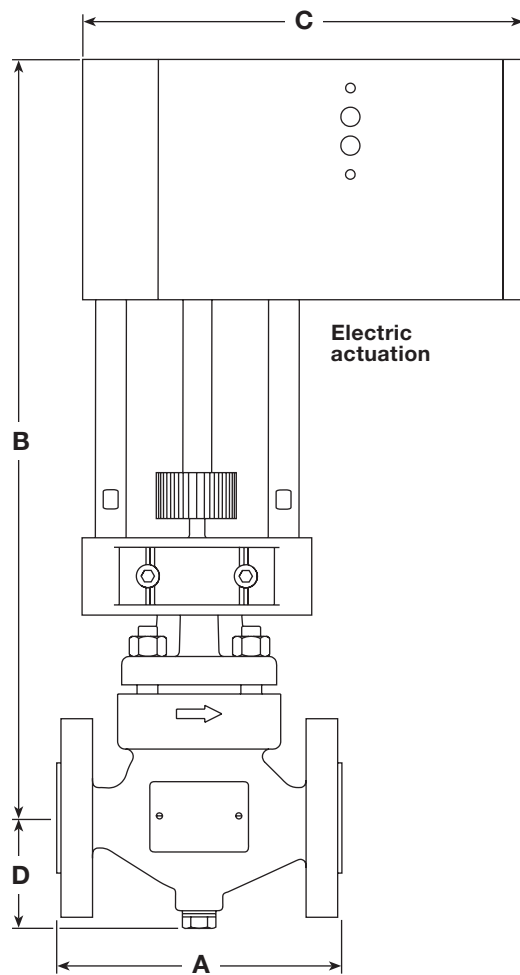
## Capacities



# BCV43 Blowdown Control Valves $\frac{3}{4}$ " and $1\frac{1}{2}$ "

Dimensions / weights (approximate) in inches and lbs

Size	A	B	B1	C	C1	D	Weight	
							Electric version	Pneumatic version
							ASME 300	ASME 300
$\frac{3}{4}$ "	7.5	15.4	14.9	9.0	6.7	2.25	28.2	28.2
$1\frac{1}{2}$ "	9.25	16.6	17.0	9.0	11.8	3.0	44.0	68.3



# BCV43 Blowdown Control Valves 3/4" and 1 1/2"

## BCV selection guide

Valve size	¾" and 1½"		
Valve series	BCV		
Body material	4	Carbon steel	
Connections	3	Flanged	
Stem sealing	H	=	Graphite
Seating	W	=	Stainless Steel 316L with Stellite
Type of trim	S	=	Standard trim
Trim-balancing	U	=	Unbalanced
Bonnet type	S	=	Standard
Bolting	S	=	Standard
Flow coefficient	To be specified		
Connection type	To be specified		
Actuation	PN	=	Pneumatic
	EL	=	Electrical
			110 Vac or 24 Vac/Vdc

## Available Models

Pipe Size		Cv	Pipe Connection	Actuation
3/4"	BCV43HWSUSS	0.6	Flanged ASME300	EL110VAC
3/4"	BCV43HWSUSS	0.6	Flanged ASME300	EL24VDC
3/4"	BCV43HWSUSS	0.6	Flanged ASME300	PN
1 1/2"	BCV43HWSUSS	1.9	Flanged ASME300	EL110VAC
1 1/2"	BCV43HWSUSS	1.9	Flanged ASME300	EL24VDC
1 1/2"	BCV43HWSUSS	1.9	Flanged ASME300	PN

## Safety information, installation and maintenance

For full details see the Installation and Maintenance Instructions (IM-P403-103) supplied with the product.

**Installation note:** The blowdown control valve should preferably be installed with the actuator vertically above the pipework and the flow direction as indicated on the valve body. It can be fitted in other positions, but not upside down.

**Disposal:** This product is recyclable. No ecological hazard is anticipated with the disposal of the product, providing due care is taken.

## Spare parts

The spare parts available are detailed below. No other parts are supplied as spares.

**Please note** that the spare parts available for the BCV blowdown control valve are the same for both the electrically and pneumatically actuated versions.

### Available spares

Actuator clamping nut	<b>A</b>
Gasket set	<b>B, G</b>
Stem seal kits	Graphite packing <b>C1</b>
Plug stem and seat kit	Linear trim (No gaskets supplied) <b>D2, E</b>

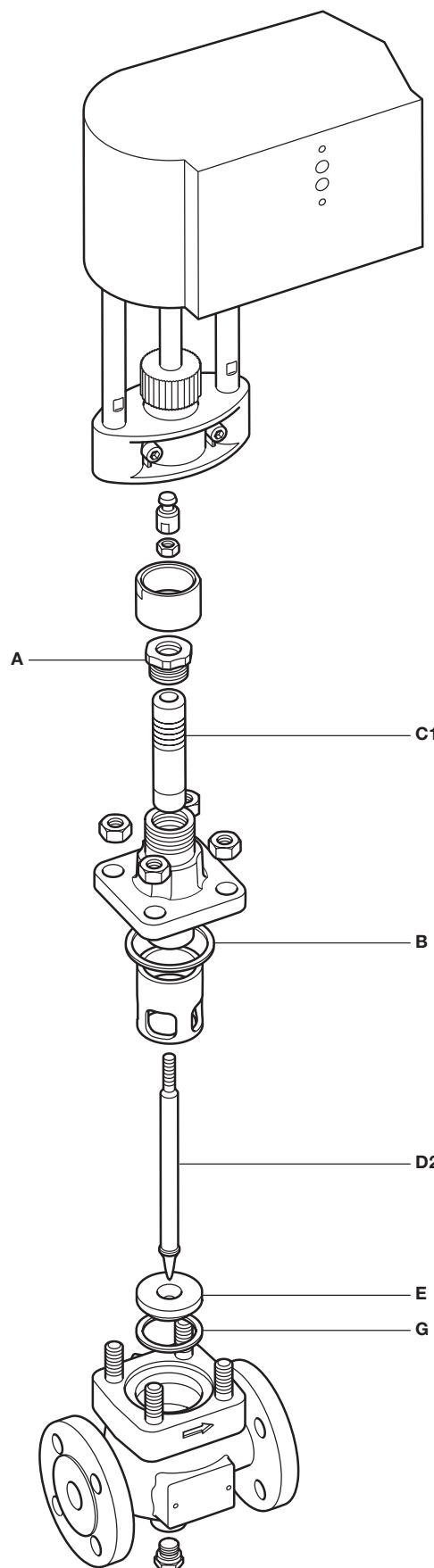
### How to order spares

Always order spares by using the description given in the column headed 'Available spares', and state the size and type of valve and specify clearly the full product description as found on the label of the blowdown control valve body, as this will ensure that the correct spare parts are supplied.

**Example:** 1 off Actuator clamping nut for a Spirax Sarco 3/4" BCV43 blowdown control valve.

Spirax Sarco, Inc., 1150 Northpoint Blvd., Blythewood, SC 29016 • Phone: (803) 714-2000 • Fax: (803) 714-2222

TI-P403-102-US 8.14









## MS1 Conductivity Meter

- Automatic temperature compensation
- Wide selectable range
- Automatic switch-off

### General description

The Spirax Sarco MS 1 is a battery powered conductivity meter designed for use with liquids. It is particularly suitable for measuring the conductivity of boiler water, feed water, or condensate samples in order to estimate the level of Total Dissolved Solids, or TDS.

The instrument is fitted with a permanently wired carbon electrode sensor with integral temperature sensor.

A plug-in extension lead is also provided to allow ac resistance measurements to be made on installed conductivity probes in order to check their condition. Calibration to a master instrument or standard solution is possible using the adjustment screw on the side of the case. The instrument is supplied in a protective wallet.

### Limiting conditions

Maximum recommended sensor operating temperature 113°F (45°C).

### Specification

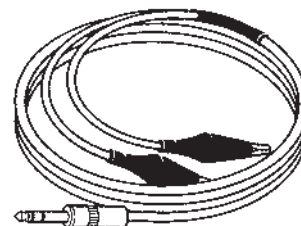
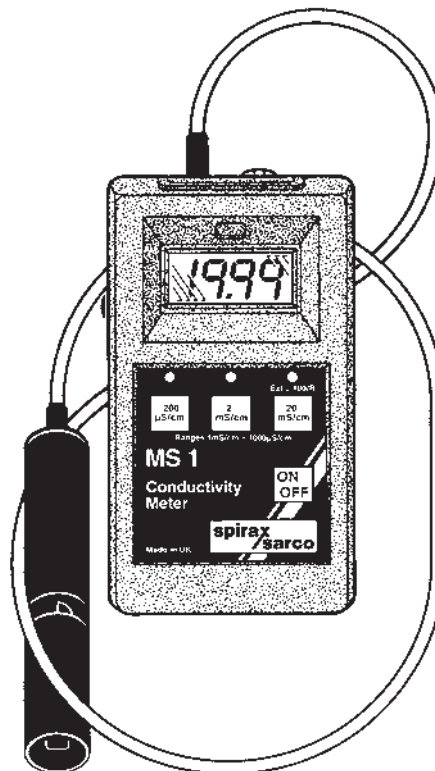
Ranges	0 to 199.9 $\mu$ S/cm, 0 to 1.999mS/cm, 0 to 19.99mS/cm.
Range indication	Decimal Point and LED above selection key.
Temperature compensation	Automatic, 2%/°C.
Resolution	Reference temperature 77°F (25°C). 0.1 $\mu$ S/cm.
Accuracy	+/-1.5% or +/-3 digits (whichever is greatest) at 77°F (25°C).
Calibration range	+/-20%. 20 turns (approx).
On/off	Auto-off timer.
Sensor	PVC cell with carbon electrodes.
Extension cable	Twin core, jack plug and crocodile clips.
Battery	PP3 or equivalent. A low battery warning indicator is fitted.

### Dimensions (approx in inches and millimeters)

Instrument	3.2" x 5.8" x 1.5" (80 x 147 x 39)
Sensor cable	36" (1000)
Extension cable	36" (1000)
Weight	1lb (430g) with case

### How to specify

1 - Spirax Sarco MS 1 Conductivity Meter.



## SC20 Sample Coolers

### Description

The Spirax Sarco SC20 sample cooler is used to cool samples of boiler water or steam. The cooler consists of a stainless steel coil, through which the sample flows, and a stainless steel body, through which cooling water flows in the opposite direction. A pre-drilled mounting bracket is incorporated into both end caps. The SC20 is also available with a clamp adaptor for connecting to an industry standard ½" sanitary clamp fitting.

### Principal features:

- For boiler water, steam, or condensate sampling.
- Stainless steel body and coil to minimise corrosion.
- Counter current flow for efficient cooling.

### Available types:

NPT connections (6 mm O/D tube). A ¼" NPT male x 6 mm O/D stud coupling is supplied loose for connecting the sample inlet tube to an NPT inlet valve or fitting.

A kit (SCS20), as above, but with stainless steel fittings.

A sample cooler NPT with a clamp adaptor suitable for connection to an industry standard ½" sanitary clamp fitting (clamp not supplied).

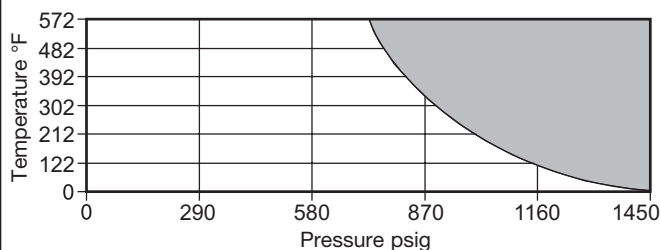
Special sanitary sample coolers (SSC20) are also available in NPT. They have a stated coil internal finish. See separate literature for further details.

**Note: The SC20 sample cooler is not polished or specially treated internally, and the internal finish of the coil is not specified.**

**Stainless steel couplings are also available separately:-**  
¼" NPT male x 6 mm O/D tube.

### Pressure / temperature limits

#### Coil



The product **must not** be used in this region.

#### Body

Maximum design pressure	145 psig @ 212°F
Maximum design temperature	212°F @ 145 psig
Designed for a maximum cold hydraulic test pressure of	282 psig

**Note:** The pressure/temperature limits for the clamp adaptor are dependant on the manufacturer's recommendations

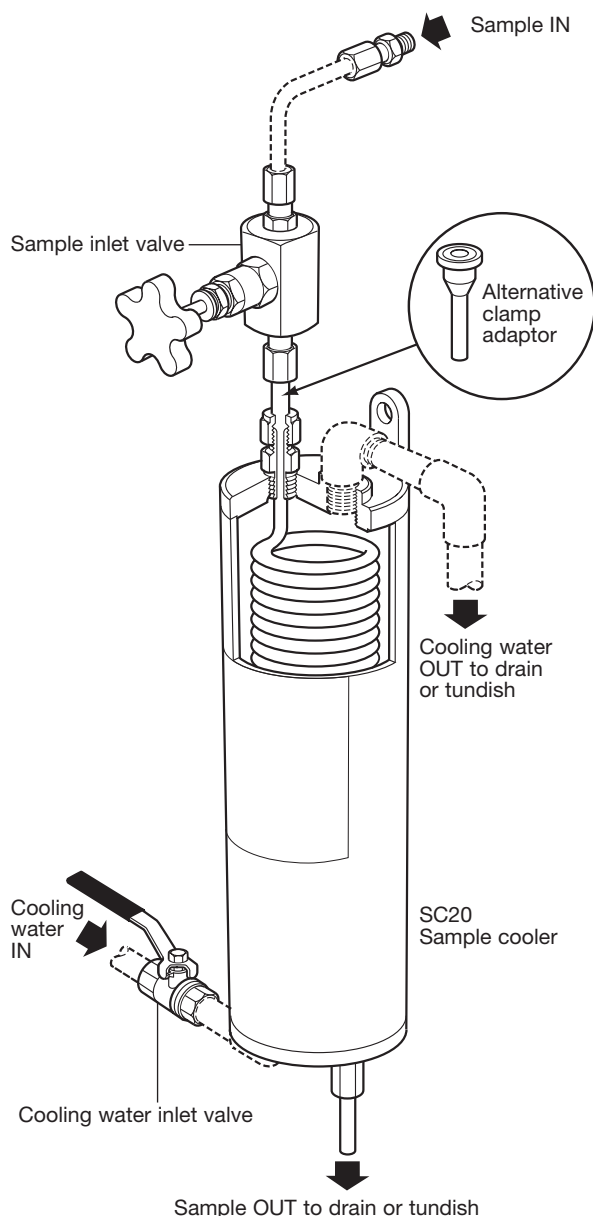
### Materials

<b>Coil</b>	Austenitic stainless steel	Grade 316L
<b>Body</b>	Austenitic stainless steel	

### Sizes and pipe connections

<b>Cooling water inlet and outlet connections</b>	NPT version	½" NPT
	Clamp adaptor versions	½" NPP
<b>Sample tube inlet and outlet connections</b>	NPT version	6 mm O/D*
	Clamp adaptor versions	6 mm O/D with ½" adaptor for clamp fitting

\* A ¼" NPT male x 6 mm O/D stud coupling is provided.



# SC20 Sample Coolers

## Performance

The tables below show typical sample outlet temperatures above cooling water inlet temperatures for several pressures and cooling water flowrates.

## Example

A sample flowrate of 0.13 GPM is required from a boiler operating at 145 psig. For a cooling water flowrate of 4.8 GPM from Table 1 the sample outlet temperature would be 7°F above the cooling water inlet temperature. If the cooling water is at 60°F, the sample temperature would be 67°F.

Table 2 is used in the same way for steam.

Samples may not be taken where marked '-' as the flow is limited by the sample inlet valve capacity.

**Table 1 Saturated water (e.g. boiler water)**

Sample Flow-rate GPM	Cooling Water Flowrate 1.6 GPM					Cooling Water Flowrate 4.8 GPM					Cooling Water Flowrate 9.5 GPM				
						Boiler Pressure PSIG									
	15	43	101	145	290	15	43	101	145	290	15	43	101	145	200
0.04	2°F	2°F	5.5°F	11°F	11°F	0°F	0°F	2°F	2°F	7°F	0°F	0°F	0°F	0°F	3.5°F
0.09	3.5°F	3.5°F	11°F	14.5°F	14.5°F	2°F	2°F	3.5°F	3.5°F	11°F	0°F	0°F	0°F	2°F	7°F
0.13	9°F	9°F	14.5°F	20°F	20°F	5.5°F	5.5°F	7°F	7°F	14.5°F	0°F	0°F	3.5°F	5.5°F	11°F
0.18	12.5°F	12.5°F	20°F	23.5°F	23.5°F	9°F	9°F	11°F	11°F	18°F	2°F	2°F	3.5°F	5.5°F	14.5°F
0.22	18°F	18°F	23.5°F	27°F	27°F	11°F	11°F	14.5°F	14.5°F	21.5°	5.5°F	5.5°F	7°F	9°F	16°F
0.26	25°F	25°F	29°F	32.5°F	32.5°F	16°F	16°F	18°F	18°F	25°F	7°F	9°F	9°F	11°F	20°F
0.35	29°F	32.5°F	36°F	39.5°F	39.5°F	20°F	21.5°F	23.5°F	25°F	32.5°F	11°F	12.5°F	14.5°F	16°F	27°F
0.44	32.5°F	36°F	43°F	47°F	48.5°F	27°F	29°F	29°F	32.5°F	39.5°F	18°F	20°F	21.5°F	23.5°F	32.5°F
0.53	39.5°F	41.5°F	52°F	54°F	56°F	30.5°F	32.5°F	36°F	41.5°F	47°F	20°F	23.5°F	27°F	30.5°F	39.5°F

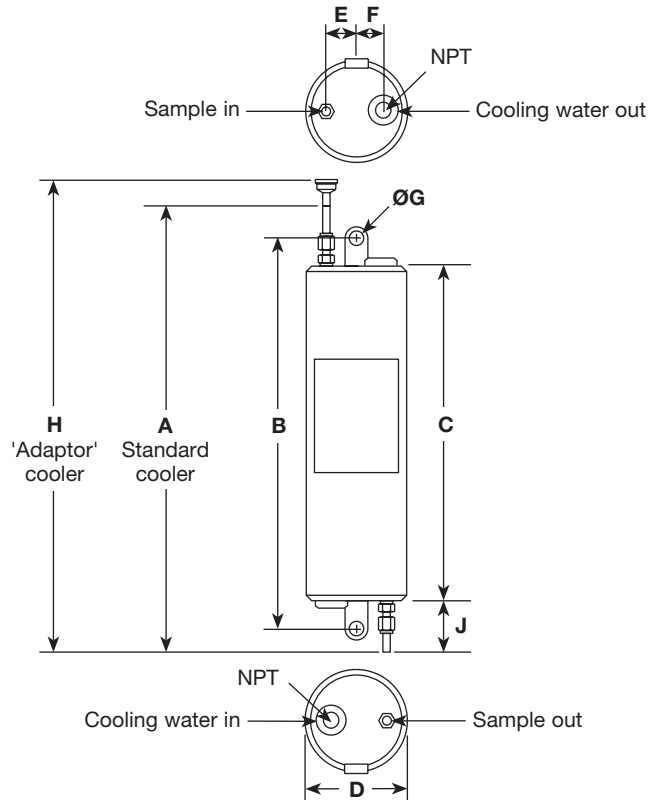
**Table 2 Saturated steam**

Sample Flow-rate lb/h	Cooling Water Flowrate 1.6 GPM						Cooling Water Flowrate 4.8 GPM						Cooling Water Flowrate 9.5 GPM					
							Boiler Pressure PSIG											
	7.5	15	43	101	145	290	7.5	15	43	101	145	290	7.5	15	43	101	145	200
11	5.5°F	5.5°F	7°F	9°F	11°F	11°F	3.5°F	3.5°F	5.5°F	5.5°F	7°F	7°F	2°F	2°F	2°F	3.5°F	3.5°F	3.5°F
22	-	12.5°F	14.5°F	14.5°F	14.5°F	16°F	-	7°F	7°F	7°F	7°F	9°F	-	2°F	3.5°F	3.5°F	3.5°F	3.5°F
33	-	-	16°F	18°F	18°F	20°F	-	-	9°F	7°F	11°F	12.5°F	-	-	3.5°F	3.5°F	5.5°F	7°F
44	-	-	-	21.5°F	23.5°F	25°F	-	-	-	11°F	16°F	16°F	-	-	-	7°F	9°F	11°F
66	-	-	-	-	38°F	38°F	-	-	-	14.5°F	25°F	25°	-	-	-	-	16°F	18°F
88	-	-	-	-	-	50.5°F	-	-	-	-	-	36°F	-	-	-	-	-	23.5°F
110	-	-	-	-	-	63°F	-	-	-	-	-	45°F	-	-	-	-	-	30.5°F
132	-	-	-	-	-	75.5°F	-	-	-	-	-	54°F	-	-	-	-	-	38°F
155	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

# SC20 Sample Coolers

## Dimensions (approximate) in inches

A	B	C	D	E	F	G	H	J
16.1	13.8	11.8	3.5	1.0	0.9	0.5	17.7	2.2



## Weights (approximate) in pounds

Cooler	6.8 lbs
SCS20 system	9.3 lbs

## Accessories and Spare Parts

The spare parts available are listed below. No other parts are supplied as spares.

### Available spares:

Component	Stock number
Sample inlet valve NPT	4037990
Stud coupling 1/4" NPT male x 6 mm stainless steel (for connecting SC20 to an NPT valve or fitting)	0963209

## Safety information, installation and maintenance

For full details see the Installation and Maintenance Instructions supplied with the product.

### WARNING:

- To avoid the risk of scalding, it is essential that a full flow of cooling water is present before opening the sample inlet valve.
- Always close the sample inlet valve before turning off the cooling water.
- Sample pipework becomes very hot under normal working conditions, and will cause burns if touched.

### Installation note:

The sample inlet to the cooler can be taken direct from a boiler or steam line isolating valve, or if a Spirax Sarco TDS control system is fitted, from the take-off point provided on the blowdown valve. We recommend that a tundish piped to drain is located under the outlet, with sufficient space below it for a beaker or similar sample container. Installation & Maintenance Instructions, IM-P403-66.

### Maintenance note:

No routine maintenance is required.

## How to order

**Example:** 1 off Spirax Sarco SC20 sample cooler having NPT connections.



## BT1050 Boiler Blowdown Timer

### Description

The BT1050 is a timer for the control of a bottom blowdown valve. It allows the bottom blowdown valve to open, removing precipitated solids that could otherwise build up and eventually cause damage.

The BT1050 has three timers. These allow different blowdown cycle times and durations to be set, for example, MON - FRI. Up to three blowdown cycles can be selected in one day. The timers can also be used to prioritise boiler blowdown cycles.

The product can be panel, DIN rail or chassis mounted and is powered by a 110 to 240 Vac at 50/60 Hz mains supply.

The front panel has an LCD graphic display and five-button keypad.

A test function provides the operator with a diagnostic tool.

The BT1050 can communicate via an infrared link between adjacent units. It can be designated as either a slave or a master unit, and connected to a two or four wire EIA/TIA-485 multi-drop network.

Up to nine BT1050 (or BT1000) units can be installed and linked for multi-boiler installations.

### Approvals

The BT1050 complies with Electromagnetic Compatibility Directive 2004/108/EC and all its requirements.

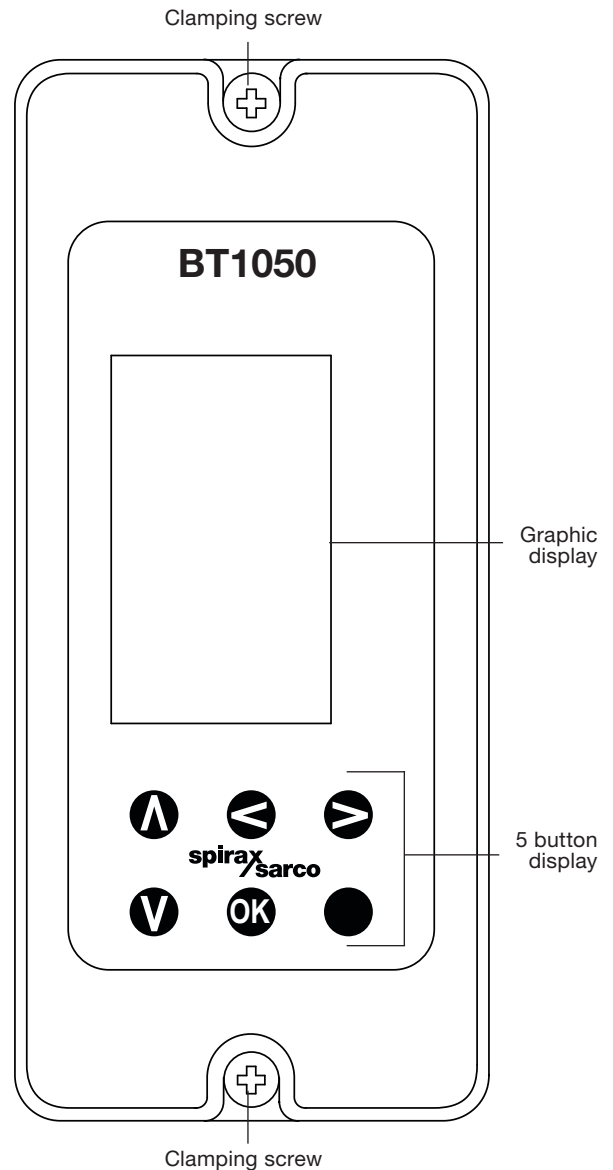
This product is suitable for Class A environments (e.g. industrial). A fully detailed EMC assessment has been made and has the reference number UK Supply BH BT1050 2008.

The BT1050 complies with the Low Voltage Directive (2006/95/EC) by meeting the standards of:

- EN 61010-1:2010 safety requirements for electrical equipment for measurement, control, and laboratory use.

### Principal features:

- Purpose designed for bottom blowdown duties.
- Three separately adjustable timers.
- Straightforward to commission – quick set-up option.
- Universal power supply - 110 Vac to 240 Vac.
- Timers prevent boilers from blowing down in rapid succession.
- Warns if valve fails to open or close.



# BT1050

## Boiler Blowdown Timer

### Technical data BT1050

<b>Power supply</b>	Mains voltage range	110 Vac to 240 Vac at 50/60 Hz	
	Power consumption	7.5 W (maximum)	
<b>Environmental</b>	General	Indoor use only	
	Maximum altitude	2 000 m (6 562 ft) above sea level	
	Ambient temperature limits	0 - 55°C (32-131°F)	
	Maximum relative humidity	80% up to 31°C (88°F) decreasing linearly to 50% at 40°C (104°F)	
	Overvoltage category	III	
	Pollution degree	2 (as supplied) 3 (when installed in an enclosure) - Minimum of IP54	
	Enclosure rating (front panel only)	IP65 (verified by TRAC Global)	
	LVD (safety)	Electrical safety EN 61010-1	
	EMC	Immunity	EN 61326: A1 + A2 Annex A Table 1 for industrial locations
		Emissions	EN 61326: A1 + A2 Class A Table 4
	Enclosure	Material	Polycarbonate
	Front panel	Material	Silicone rubber, 60 shore.
	Solder	Tin/lead (60/40%)	
<b>Mains and signal connector</b>	Termination	Rising clamp plug-in terminal blocks with screw connectors. <b>Caution:</b> Use only the connectors supplied by Spirax Sarco Ltd. Safety and Approvals may be compromised otherwise.	
	Cable size	0.2 mm² (24 AWG) to 2.5 mm² (12 AWG).	
	Stripping length	5 - 6 mm (0.2")	
<b>Cable / wire and connector data</b>	<b>Switch box and Lockout (link) circuit</b>	Type	High temperature
		Shield type	Screened
		Number of cores	2
		Gauge	1 – 1.5 mm² (18 - 16 AWG)
		Maximum length	100 m (328 ft)
		Recommended type	Prysmian (Pirelli) FP200, Delta Crompton Firetuf OHLS
	<b>RS485 communication</b>	Type	EIA RS485 twisted pair
		Shield type	Screened
		Number of pairs	2 or 3
		Gauge	0.23 mm² (24 AWG)
		Maximum length	1200 m (4000 ft)
		Recommended type	Alpha wire 6413 or 6414
		Please note that LAN Cat 5 or Cat 5E ScTP (screened), FTP (foil) or STP (shielded) cable can be used, but limited to 600 m.	

# BT1050

## Boiler Blowdown Timer

### Technical data BT1050 (continued)

<b>Input</b>	<b>Switch box</b>	Maximum voltage	32 Vdc (no load, open circuit)	
		Maximum current	3 mAdc (short circuit)	
	<b>Lockout (link)</b>	Maximum voltage	32 Vdc (no load, open circuit)	
		Maximum pulldown voltage	0.25 Vdc	
		Maximum current	1.5 mAdc	
<b>RS485</b>		Physical layer	RS485 4-wire full or 2-wire half duplex	
		Protocol	Modbus RTU format	
		Isolation	60 Vac/dc	
		Receiver unit load	1/8 (256 devices - maximum)	
		Output rate	Up to 10 frames / second	
<b>Clock calendar battery</b>		Type	AA (PCB tagged) Lithium Thionyl Chloride (Lithium content 0.65g)	
		Shelf life	10 year – with battery switch off @ TAMB: 25°C (77°F)	
		Working life	10 year – Mains power on 35 hours/week @ TAMB: 55°C (131°F)	
<b>Infrared</b>		Physical layer	IrDA	
		Baud	38400	
		Range	10 cm (4")	
		Working angle	15°	
		Eye safety information	Exempt from EN 60825-12: 2007 Safety of laser products ~ does not exceed the accessible emission limits (AEL) of class 1	
<b>Output</b>	<b>Relays</b>	Contacts	2 x single pole changeover relays (SPCO)	
		Voltage ratings (maximum)	250 Vac	
		Load	Resistive	3 amp @ 250 Vac
			Inductive	1 amp @ 250 Vac
		ac motor load	1/4 HP (2.9 amp) @ 250 Vac	
			1/10 HP (3 amp) @ 120 Vac	
		Pilot duty load	C300 (2.5 amp) - control circuit/coils	
		Electrical life (operations)	3 x 10 <sup>5</sup> or greater depending on load	
		Mechanical life (operations)	30 x 10 <sup>6</sup>	

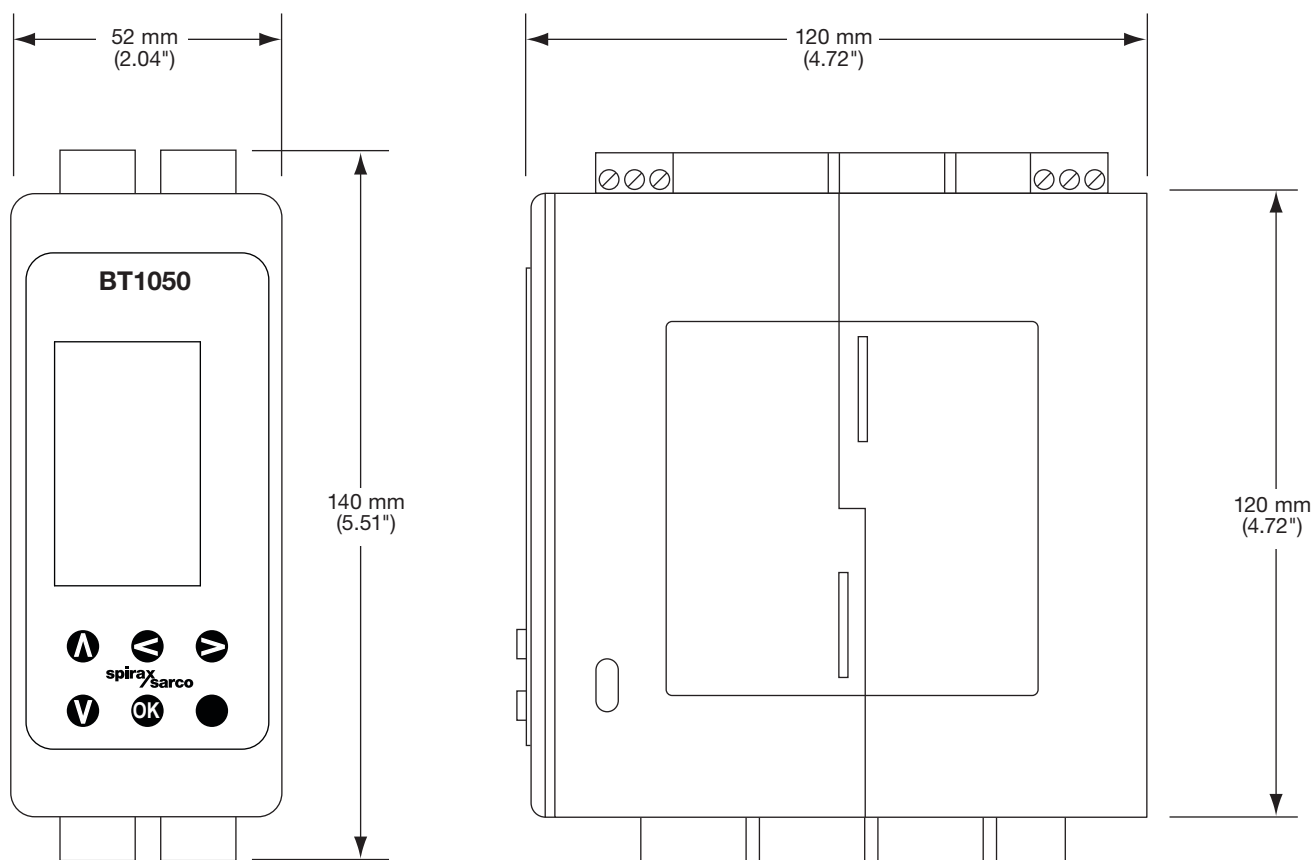


# BT1050

## Boiler Blowdown Timer

### Dimensions/weight (approximate)

Weight (0.9 lb)



### Safety information, installation and maintenance

This document does not contain sufficient information to install the product safely. See the Installation and Maintenance Instructions supplied with the product, which gives full wiring, commissioning and operating instructions.

Attention is drawn to Safety Information Leaflet IM-GCM-10, as well as to any national regulations concerning blowdown. In particular, your attention is drawn to the danger of working on a shut down boiler whilst other boilers are operating.

#### Warnings:

- Isolate the mains supply before installing the controller as live terminals at mains voltage are exposed.
- Only use the screws provided with the product.
- Do not install the product outdoors without additional weather protection.
- Do not drill the product case or use self-tapping screws.

#### Caution:

- A 15 mm (0.6") gap is required between multiple controllers for cooling.

#### Installation / environmental conditions:

Install the product in an environment that minimises the effects of heat, vibration, shock and electrical interference.

The product must be installed in a suitable industrial control panel or fireproof enclosure to provide impact and environmental protection. A minimum of IP54 (EN 60529) is required.

The product may be installed on a DIN rail, chassis plate, or in a panel cutout. A bezel is provided.

### How to specify

Blowdown timer with; three integral timers, LCD display, valve malfunction alarm and infrared communications.

### How to order

**Example:** 1 off Spirax Sarco BT1050 blowdown timer.

## KBV40i Key Operated Boiler Blowdown Valve

### Description

The key operated boiler blowdown valve consists of a carbon steel reduced bore ball valve with carbon reinforced PTFE seats and a key operated mechanism in stainless steel. Two types of key are sold as optional extras and are available as follows:

- **Standard length key.**
- **Extended length 'T' bar type key** for use where access to the valve is limited.

**To ensure compliance with boiler regulations** the key cannot be removed when the valve is open.

**Note:** The standard length key and extended length 'T' bar type key are sold separately. It is recommended that an extended length 'T' bar type key is purchased for valve sizes 2" and 2-½".

### Standards

These products comply with the requirements of the European Pressure Equipment Directive 97/23/EC and carries the mark when so required.

ISO mounting in accordance with ISO 5211.

Antistatic device complying with ISO 7121 and BS 5351.

### Certification

These products are available with certification to EN 10204 3.1.

**Note:** All certification/inspection requirements must be stated at the time of order placement.

### Sizes and pipe connections

1", 1-¼", 1-½", 2", and 2-½" Flanged ASME (ANSI) B 16.5 Class 300.

#### Available flange options:

Flange	Face-to-face	Flange thickness
ASME (ANSI) 300	ASME B 16.10	ASME B 16.5

### Materials

<b>Body and insert</b>	Zinc plated carbon steel	ASTM A216 WCB
<b>Stem seals</b>	Antistatic R-PTFE	
<b>Vented ball</b>	Austenitic stainless steel	AISI 316
<b>Stem</b>	2-½"	Austenitic stainless steel
	1" - 2"	Martensitic stainless steel
<b>Seats</b>	Carbon and graphite reinforced PTFE	PDR 0.8

### Valve coefficients

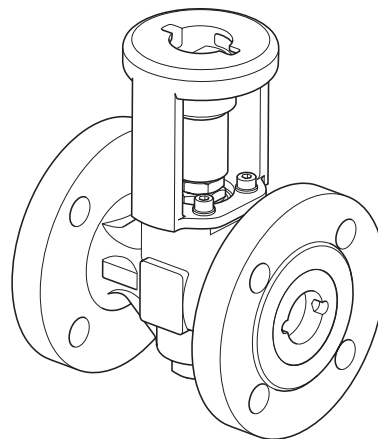
Size	1"	1-¼"	1-½"	2"	2-½"
<b>Cv value</b>	34.6	46.2	93.6	119.1	227.8

### How to specify

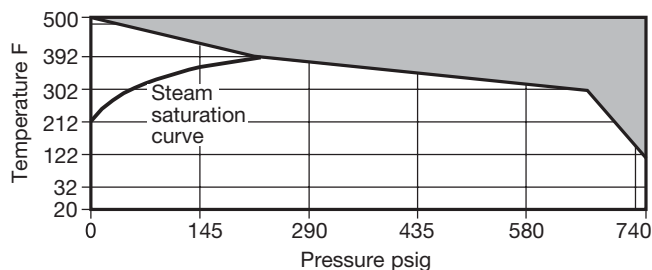
1-½" key operated boiler blowdown valve, flanged ANSI300 with carbon reinforced seats and stainless steel key.

### How to order

**Example:** 1 off Spirax Sarco 1-½" KBV40i key operated boiler blowdown valve having ANSI300 flanged connections.



### Pressure / temperature limits



The product **must not** be used in this region.

Body design conditions		ASME 300
PMA	Maximum allowable pressure	740 psig @ 100°F
TMA	Maximum allowable temperature	500°F @ 0 psig
Minimum allowable temperature		20°F
PMO	Maximum operating pressure for saturated steam service	250.1 psig
TMO	Maximum operating temperature	500°F @ 0 psig
Minimum operating temperature		20°F
<b>Note:</b> For lower operating temperatures consult Spirax Sarco		
ΔPMX Maximum differential pressure is limited to the PMO		
Designed for a maximum cold hydraulic test pressure of 1109 psig		

# KBV40i Key Operated Boiler Blowdown Valve

## Dimensions/weights (approximate) in mm and kg

Valve size	Flange	A	B	C	D	E	F	Weight
1"	A300	6.5	4.7	1.4			0.7	9.4
1-¼"	A300	7.0	5.2	1.4			1.0	12.1
1-½"	A300	7.5	5.2	1.4			1.2	17.6
2"	A300	8.5	5.5	1.4			1.5	22.22
2-½"	A300	9.5	5.5	1.4			2.0	33.0
Standard length key					1.3	10.2		0.9
Extended length 'T' bar key					19.7	14.8		2.0

## Spare parts - 1" to 2" and 2-½"

The spare parts available are shown in solid outline. Parts drawn in broken line are not supplied as spares. To ensure correct operation and maintain the warranty, use only Spirax Sarco original parts. Before actioning any maintenance programme observe the 'Safety Information' in Section 1 of the Information and Maintenance Instructions IM-P405-48 supplied with the unit.

### Available spares 1" to 2"

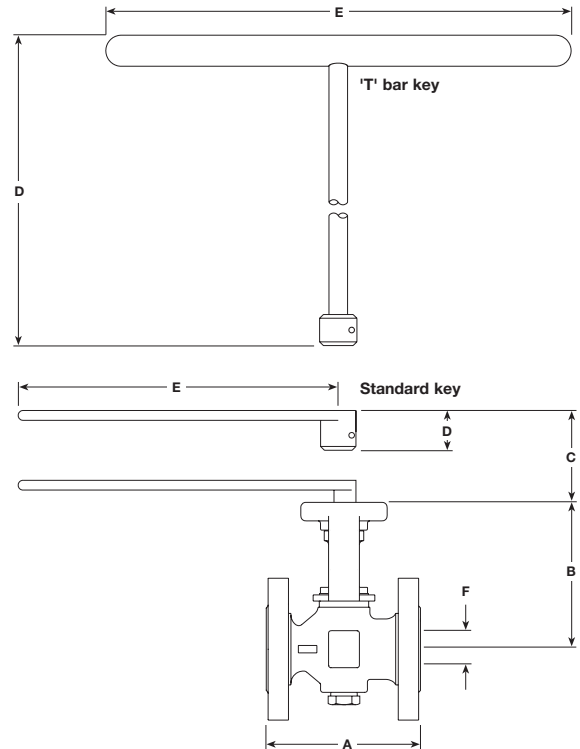
Seats, insert 'O' ring and stem seals	5, 6, 9, 10
Insert tool - Required to aid the removal of the ball valve insert (2)	Not shown

**Caution** - The ball must be installed with the vent hole on the upstream side of the valve.

## How to order spares 1" to 2"

Always order spares by using the description given in the column headed 'Available spares' and state the size and type of ball valve.

**Example:** 1 set of seats, insert 'O' ring and stem seals for a Spirax Sarco 2" KBV40i boiler blowdown valve.



### Available spares 2-½"

Seats, insert 'O' ring, seat 'O' ring, stem 'O' ring, lower stem seals and upper stem packing **5, 6, 7, 8, 11, 12**

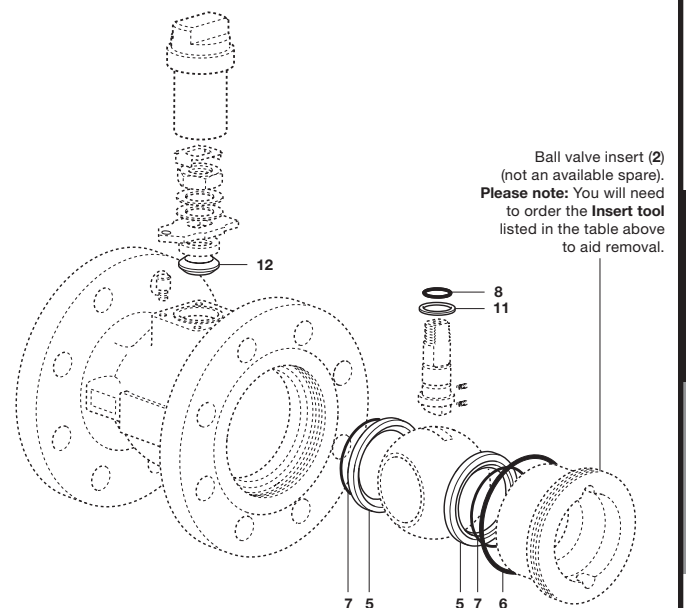
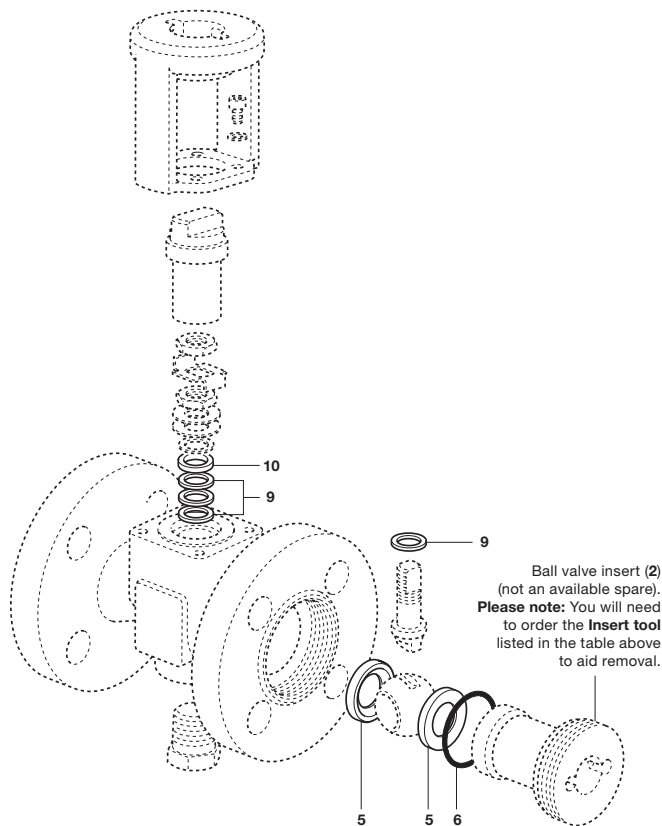
Insert tool - Required to aid the removal of the ball valve insert (2) **Not shown**

**Caution** - The ball must be installed with the vent hole on the upstream side of the valve.

## How to order spares 2-½"

Always order spares by using the description given in the column headed 'Available spares' and state the size and type of ball valve.

**Example:** 1 set of seats, insert 'O' ring, seat 'O' ring, stem 'O' ring, lower stem seals and upper stem packing for a Spirax Sarco DN65 KBV40i boiler blowdown valve



## ABV40i Air Actuated Boiler Blowdown Valves

### Description

The Spirax Sarco ABV40i one piece end entry, reduced bore ball valves is fitted with 90° rotary spring return pneumatic actuator, for boiler blowdown duties. It is used in conjunction with a Spirax Sarco blowdown timer to provide timed control of bottom blowdown, ensuring that the recommended boiler blowdown cycles occur with minimum heat loss, avoiding duplication or omission. The pneumatic actuator, (which can also be operated with other non-corrosive gases), moves through 90° to open the valve, and has a spring return fail-close operation. A switch box is mounted on the actuator, and either or both microswitches may be wired to a Building Management System if required.

**Note:** The BT1050 blowdown timer uses one switch only to indicate 'valve fully closed' or 'valve not fully closed' positions, and does not indicate that the valve has opened fully. A solenoid valve is required, which may be directly mounted to the NAMUR (VDI/VDE 3845) interface on the actuator. A suitable solenoid valve may be selected from the Spirax Sarco MV range. Alternatively, an air supply may be connected directly to the actuator port 'A' (1/4" BSP), where it is necessary to install the solenoid valve remote from the actuator. A standard 1/4" BSP 3-way solenoid valve may also be used.

### 3-port/2-way NAMUR mounting solenoid types:

**MV11** - 230 Vac, **MV12** - 110 Vac, **MV13** - 24 Vac, **MV14** - 24 Vdc

The ABV40i must be installed with the flow in the direction of the arrow on the body.

### Principal features:

- Automatic timed blowdown minimises wasted heat.
- Suitable for boiler pressures up to 250.1 psig.
- Spring return for fail-safe operation.
- Pneumatic actuator for fast response.

### Standards

These products comply with the requirements of the European Pressure Equipment Directive 97/23/EC and carries the  $\text{CE}$  mark when so required.

ISO mounting in accordance with ISO 5211.

Antistatic device complying with ISO 7121 and BS 5351.

### Certification

These products are available with certification to EN 10204 3.1.

**Note:** All certification/inspection requirements must be stated at the time of order placement.

### Sizes and pipe connections

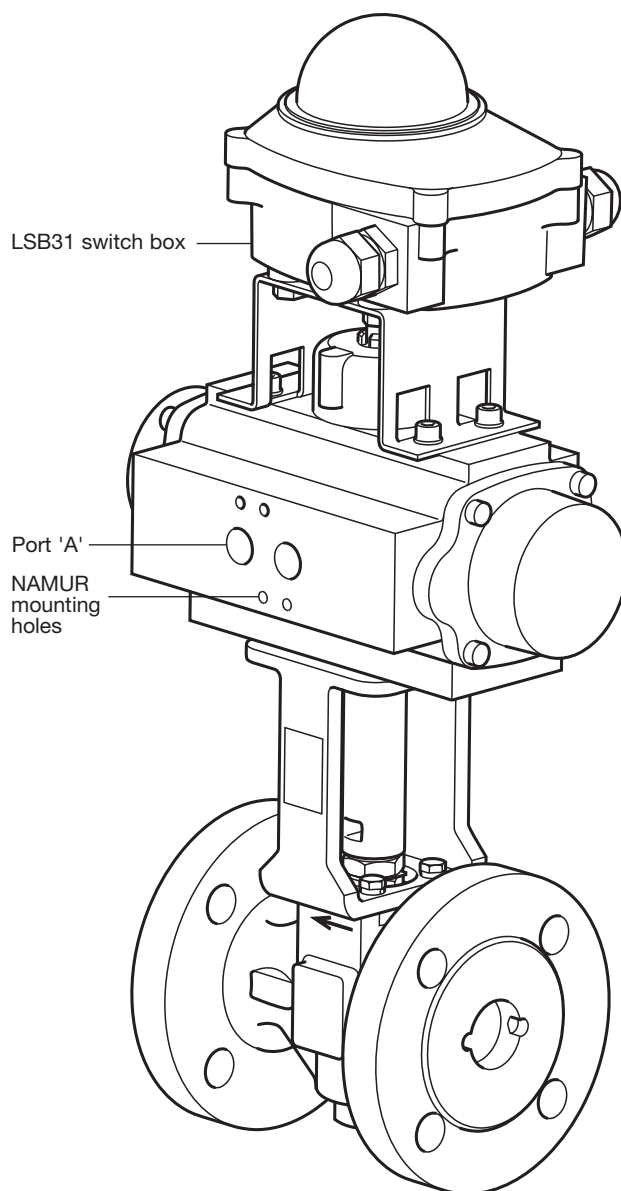
1", 1-1/4", 1-1/2", 2", and 2-1/2" Flanged ASME B 16.5 Class 300.

### Available flange options:

Flange	Face-to-face	Flange thickness
ASME 300	ASME B 16.10	ASME B 16.5

### Technical data

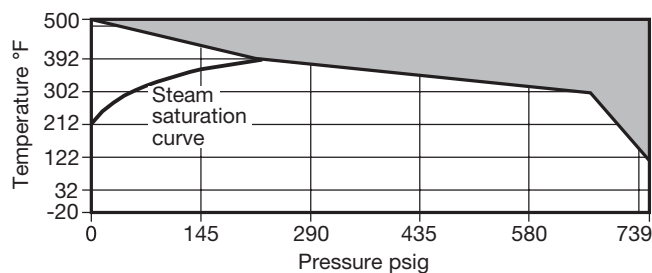
Operating time (full stroke)			0.25 - 0.6 seconds
Operating media			Clean compressed air Non-corrosive gas
Compressed air consumption @ 6 bar g	1"	BVA315S/14	0.0002 (N)m³/stroke
	1-¼"	BVA320S/14	0.0006 (N)m³/stroke
	1-½"	BVA325S/14	0.0008 (N)m³/stroke
	2"	actuator	
	2-½"	BVA330S/14 actuator	0.0011 (N)m³/stroke
LSB31 switch rating			10 A 250 Vac
Protection rating			IP67
Switch sensor			Mechanical 2 - SPDT



# ABV40i Air Actuated Boiler Blowdown Valves

## Pressure / temperature limits

### ABV40i



The product **must not** be used in this region.

### Valve

Body design conditions	<b>ABV40i</b>	ASME 300
PMA Maximum allowable pressure	<b>ABV40i</b>	740 psig @ 100°F
TMA Maximum allowable temperature		500°F @ 0 psig
Minimum allowable temperature		-20°F
PMO Maximum operating pressure for saturated steam service		250.1 psig
TMO Maximum operating temperature		500°F @ 0 bar g
Minimum operating temperature		-20°F
<b>Note:</b> For lower operating temperatures consult Spirax Sarco		
ΔPMX Maximum differential pressure is limited to the PMO		
Designed for a maximum cold hydraulic test pressure of:	<b>ABV40i</b>	1109 psig

### Actuator

Maximum ambient temperature	176°F
Minimum ambient temperature	32°F
Maximum air supply pressure	116 psig
Minimum air supply pressure	Depends on operating conditions

### MV series solenoid

Maximum ambient temperature	122°F
Minimum ambient temperature	32°F

### Valve coefficients

Size	1"	1-¼"	1-½"	2"	2-½"
Cv value	34.6	46.2	93.6	119.1	227.8

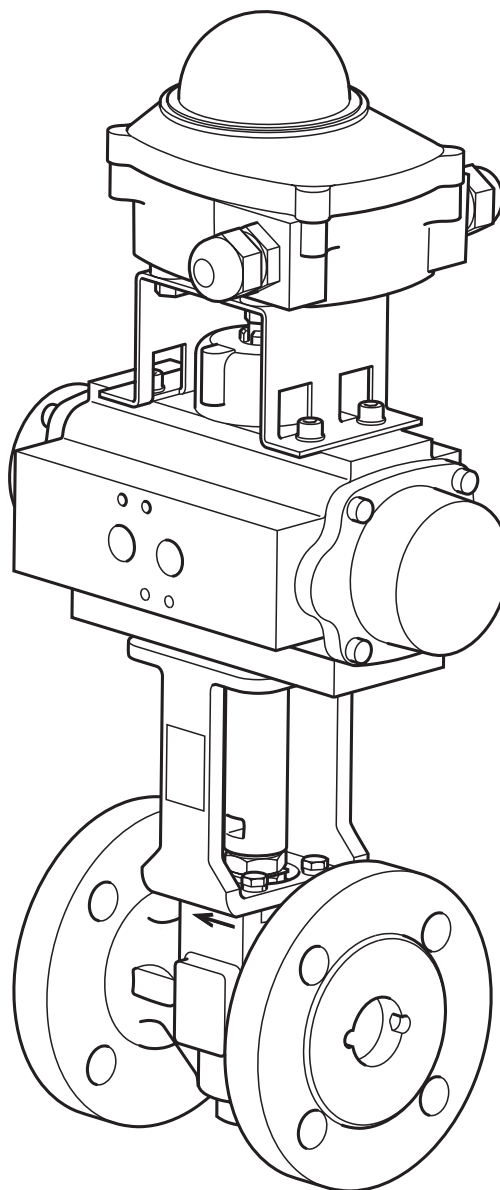
## Materials

### Valve

<b>Body and insert</b>		Zinc plated carbon steel	ASTM A216 WCB
<b>Stem seals</b>		Antistatic R-PTFE	
<b>Vented ball</b>		Austenitic stainless steel	AISI 316
<b>Stem</b>	2-½"	Austenitic stainless steel	AISI 316
	1" - 2"	Martensitic stainless steel	AISI 420
<b>Seats</b>		Carbon and graphite reinforced PTFE	PDR 0.8

### Actuator

Body, piston and end caps	Aluminium - anodised
Pinion	Carbon steel - nickel plated
'O' ring seals	Nitrile rubber



## How to specify

Air actuated ball valve, 1-¼", ANSI 300 with carbon reinforced seats, 90 degree rotary pneumatic actuator and switch box. NAMUR compatible solenoid valve 220 / 240 Vac.

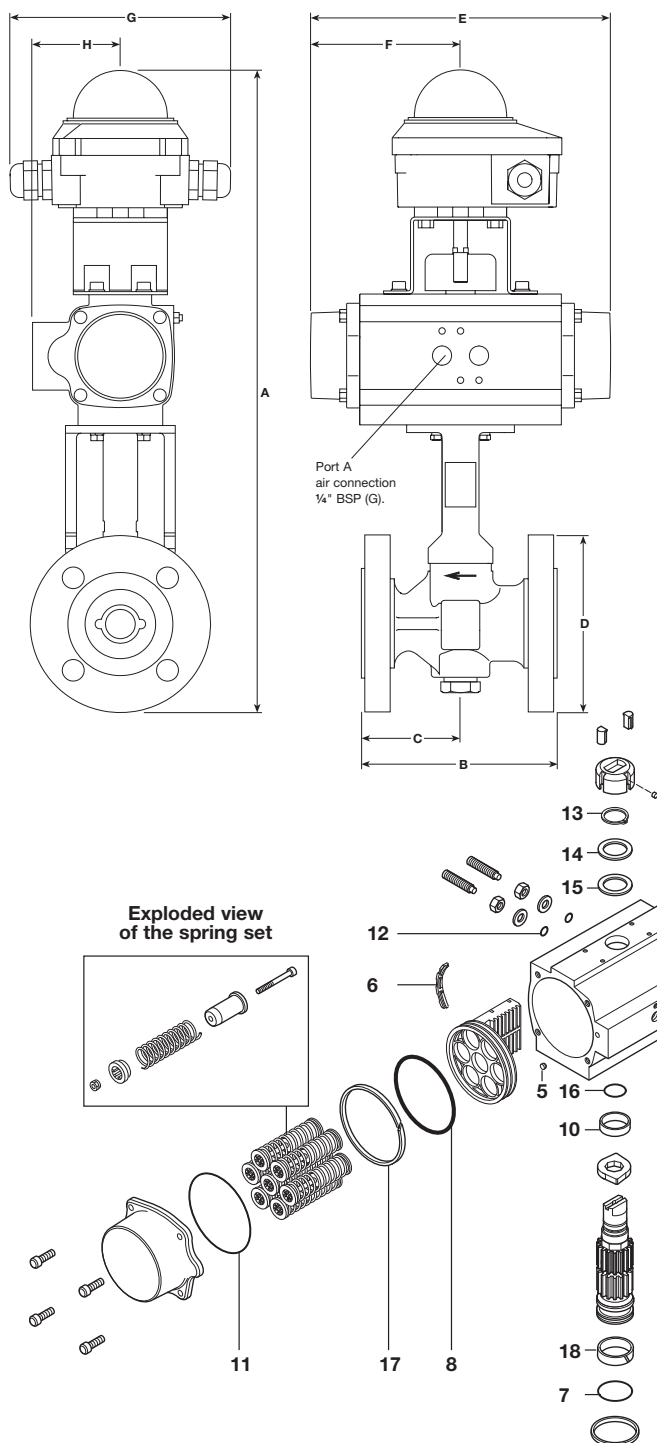
## How to order

**Example:** 1 off Spirax Sarco 1-¼", ABV40i air actuated boiler blowdown valve having ANSI 150 flanged connections plus 1 off MV11 solenoid valve 220 / 240 Vac.

# ABV40i Air Actuated Boiler Blowdown Valves

Dimensions/weights (approximate) in inches and pounds

Valve size	Actuator type	Flange	A	B	C	D	E	F	G	H	Weight
1"	BVA315S/14	Class 300	16.6	6.5	4.1	4.9	7.7	3.9	5.5	2.2	14.9
1-1/4"	BVA320S/14	Class 300	17.7	7.0	2.6	5.3	8.5	4.3	5.5	2.3	20.7
1-1/2"	BVA325S/14	Class 300	18.8	7.5	4.7	6.1	10.2	5.1	5.5	2.8	28.6
2"	BVA325S/14	Class 300	19.2	8.5	5.6	6.5	10.2	5.1	5.5	2.8	33.3
2-1/2"	BVA330S/14	Class 300	21.0	9.5	6.4	7.5	11.8	5.9	5.5	3.1	51.4



## Spare parts

The spare parts available are detailed below. No other parts are available as spares.

**Please note:** There are no spares available for the switch box.

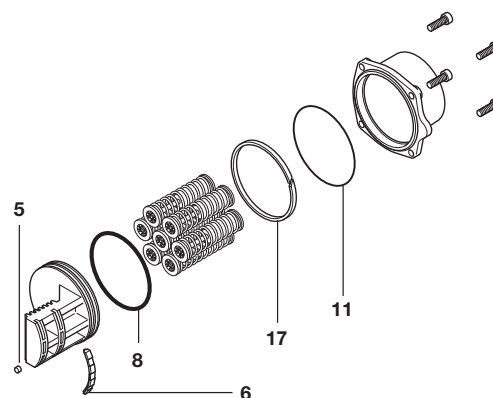
To ensure correct operation and maintain the warranty, use only Spirax Sarco original parts.

Before actioning any maintenance programme observe the 'Safety Information' in Section 1 of IM-P405-46 supplied with the unit.

## Actuator

### Spare parts for the BVA300S/14

The available spare parts for the BVA300S/14 are listed opposite. No other parts are available as spares.



## Spare parts

The spare parts available are detailed below. No other parts are supplied as spares.

### Available spares

BVA300 series maintenance kit	'O' rings set (NBR)	7, 8, 11, 12, 16
	Pinion washers	13, 14, 15
	Others	5, 6, 10, 17, 18

## How to order spares

Always order spares by using the description given in the column headed 'Available spares' and state the nomenclature of the pneumatic actuator that they are intended for.

**Note:** all the spares mentioned above are sold together in one spare part kit.

**Example:** 1 - BVA300 series maintenance kit with 'O' rings in NBR for a Spirax Sarco BVA320S/14 pneumatic actuator.



# ABV40i Air Actuated Boiler Blowdown Valves

## Valve

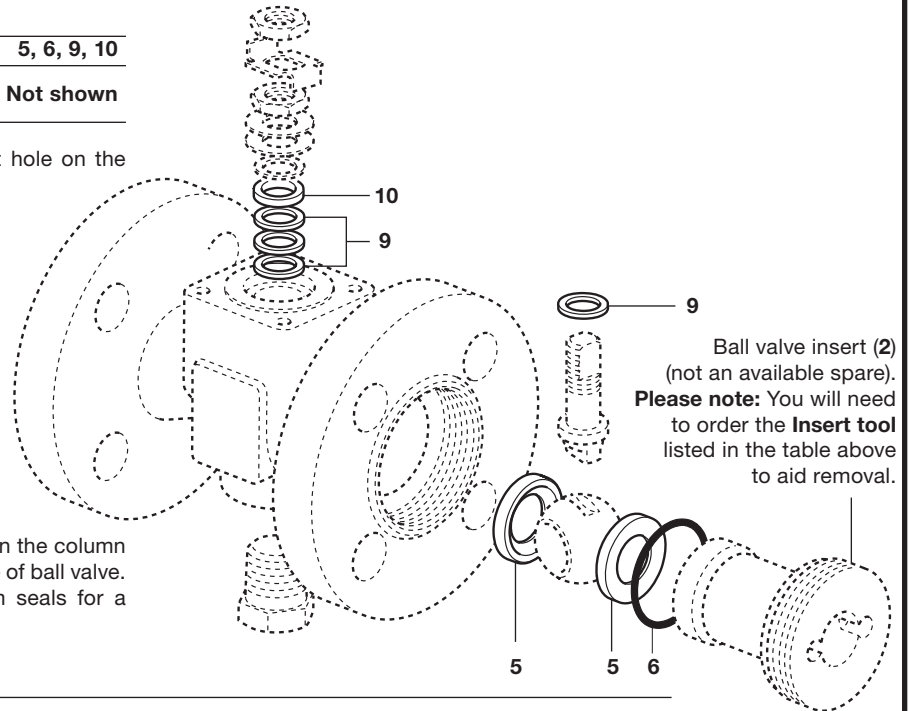
### 1" to 2" Spare parts

The spare parts available are shown in solid outline. Parts drawn in broken line are not supplied as spares.

#### Available spares

Seats, insert 'O' ring and stem seals	5, 6, 9, 10
Insert tool - Required to aid the removal of the ball valve insert (2)	Not shown

**Caution** - The ball must be installed with the vent hole on the upstream side of the valve.



### How to order spares

Always order spares by using the description given in the column headed 'Available spares' and state the size and type of ball valve.

**Example:** 1 set of seats, insert 'O' ring and stem seals for a Spirax Sarco 2" ABV40i boiler blowdown valve.

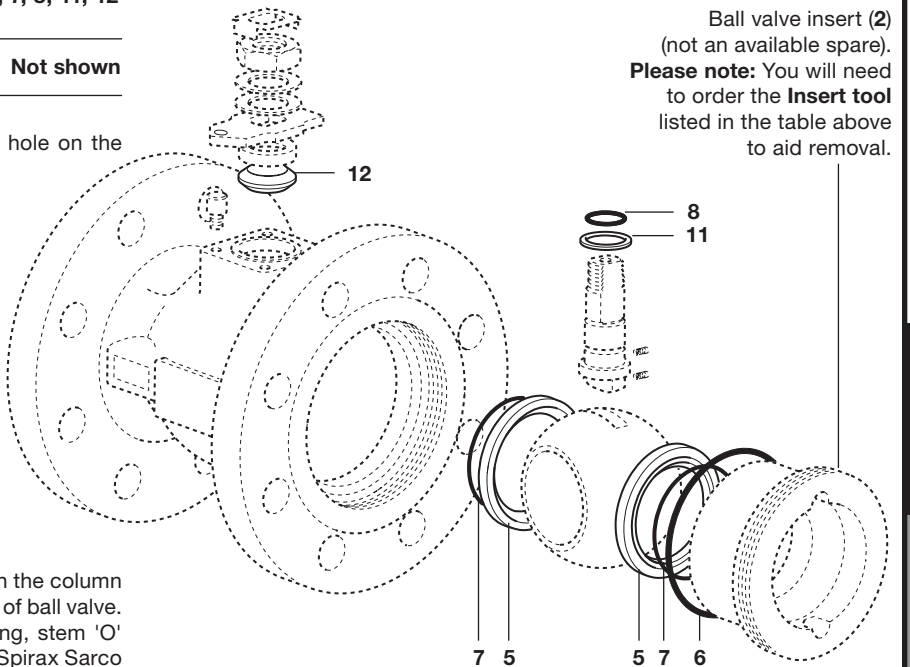
### DN65 Spare parts

The spare parts available are shown in solid outline. Parts drawn in broken line are not supplied as spares.

#### Available spares

Seats, insert 'O' ring, seat 'O' ring, stem 'O' ring, lower stem seals and upper stem packing	5, 6, 7, 8, 11, 12
Insert tool - Required to aid the removal of the ball valve insert (2)	Not shown

**Caution** - The ball must be installed with the vent hole on the upstream side of the valve.



### How to order spares

Always order spares by using the description given in the column headed 'Available spares' and state the size and type of ball valve.

**Example:** 1 set of seats, insert 'O' ring, seat 'O' ring, stem 'O' ring, lower stem seals and upper stem packing for a Spirax Sarco 2" ABV40i boiler blowdown valve.

# Pressure/Temperature Regulators and Safety Valve Solutions







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## Safeguard Overheat Protection For 2 & 3 Port Temperature Control Valves

The Safeguard Overheat Protection system consists of the HL10 high limit cutout with a 130 control system and one of the valves listed below. The valve is installed upstream of a heating control valve or in parallel with a cooling control valve to provide secondary overheat protection. If the temperature at the sensor exceeds the setting, the HL10 cutout is activated to close a normally open valve or open a normally closed valve. The cutout must be reset manually. Failure of the 130 control system will activate the HL10 cutout. The HL10 is available with a microswitch which may be linked to an alarm system.

### Control Valves

Any of the following valves can be used by attaching the valve bonnet to the coupling nut of the HL10 high limit cutout.

	Normally Open (to close w/ rise in temp)	Normally Closed* (to open w/ rise in temp)
Two Port Valves	SB, KA, KB & KC valves	SBRA, KX, KY, NSRA valves
Three Port Valves	1", 1-1/2", 2" TW Valves	

\* Normally closed valves must be installed in a separate bypass pipe line unimpeded by any other control valve.

### 130 Control System

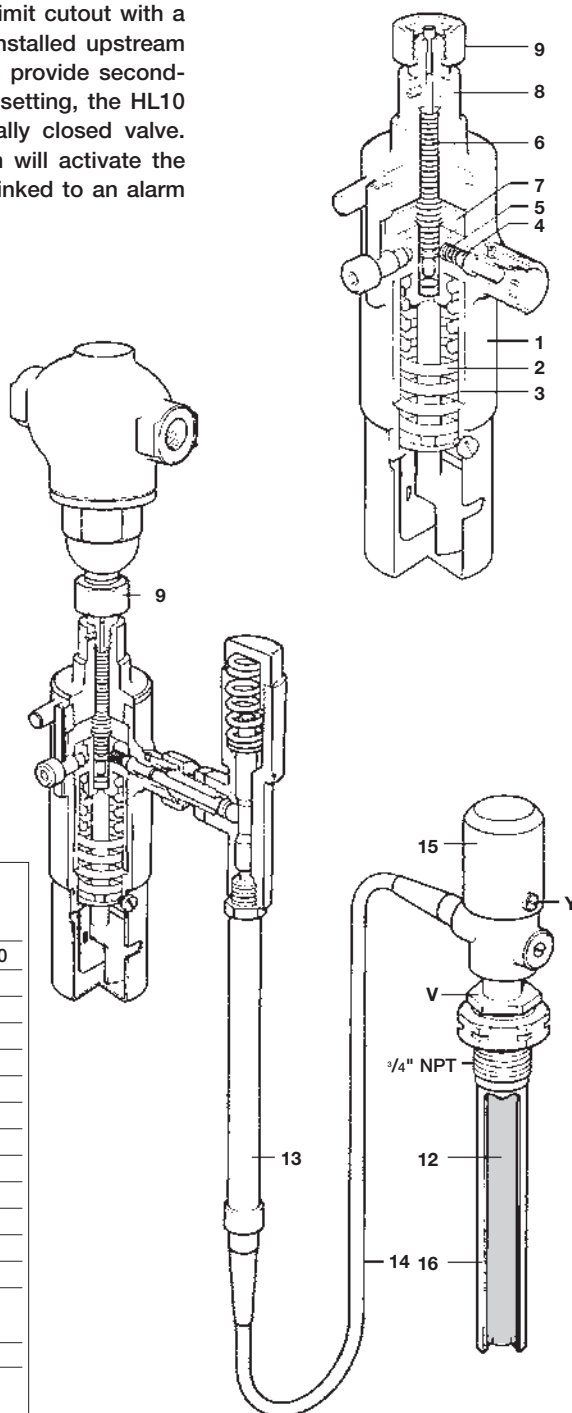
Standard capillary tube length is 6.5 ft 2 m. Other lengths are available up to a maximum of 32 ft 10 m. in multiples of 6.5 ft 2 m. The length of capillary tubing should be kept to a minimum to avoid the system's being affected by ambient temperature.

### Separable Well

For correct installation, a separable well with 3/4" NPT connection is required. The sensor is held in the separable well by means of a gland nut (V) and compression ring. Wells are available in copper, mild steel and stainless steel construction.

### Construction Materials

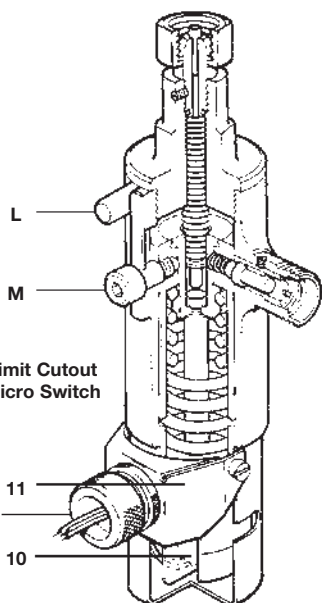
No.	Part	Material	Material Spec.	Closest Equivalent
1	Body	Bronze	BS 1400 LG2	ASTM B62 UNS C37700
2	Main Spring	Stainless Steel		
3	Piston	Stainless Steel		
4	Ball	Stainless Steel		
5	Ball Return Spring	Stainless Steel		
6	Bellows	Stainless Steel		
7	Piston Insert	Stainless Steel		
8	Bonnet	Brass		
9	Valve Coupling Nut	Brass		
10	Micro Switch (see overleaf)			
11	Cover (see overleaf)	Aluminum		
12	Sensor	Brass		
13	Actuator	Brass		
14	Capillary Tube	Copper PVC Covered		
15	Adjustment Head Cover	Polypropylene Plastic		
16	Separable Well	Stainless Steel Mild Steel Copper		



# Safeguard Overheat Protection

## Dimensions (nominal) in inches and millimeters

HL 10							
A	B	C	D	Weight			
9.3	2.4	2.4	3.0	4.8 lb			
235	60	61	75	2.2 kg			
130 Control System							
E	F	G	H	J	K	K1	Weight
2.5	3.3	9.3	10	5.9	0.69	0.87	3.8 lb
64	83	235	25	150	17.5	21	1.7 kg



HL10  
High Limit Cutout  
with Micro Switch

Conduit Entry  
Bracket

## Optional Extras

A micro switch (10) is available, which can be connected into an alarm system, and can be arranged to either make or break the electrical circuit on firing of the cutout.

It is suitable for the following ratings:

	Voltage	Resistive Load Amps	Inductive Load Amps
AC	125	5	5
	250	5	5
	up to 15	10	10
DC	30	5	3
	50	1	1
	75	0.75	0.25
	125	0.5	0.06
	250	0.25	0.03

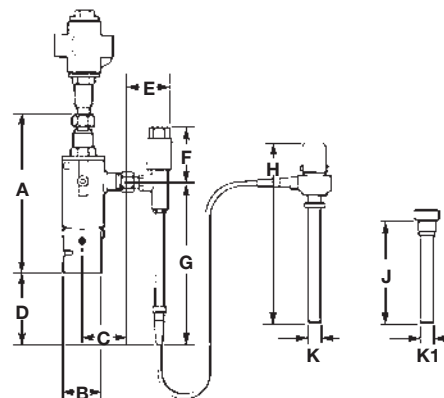
## Installation

Full details are given in the Installation & Maintenance Instructions, supplied with each unit.

## Testing

As an emergency device, it is advisable to test this unit occasionally. This should be done either by temporarily raising the temperature of the equipment being controlled or by adjusting down the temperature at which the cutout is normally set to operate.

Warning: The cutout device is spring loaded and should not be opened up by unskilled persons, nor should it be 'fired' other than when attached to the valve.



## Sample Specification

Spirax Sarco Safeguard (with microswitch), a spring loaded mechanism incorporating a cutout device and requiring hand reset. A brass hydraulically operated secondary overheat protection control system mounted in a separable well with PVC covered copper capillary tubing. The unit is coupled to a 2 port or 3 port valve.

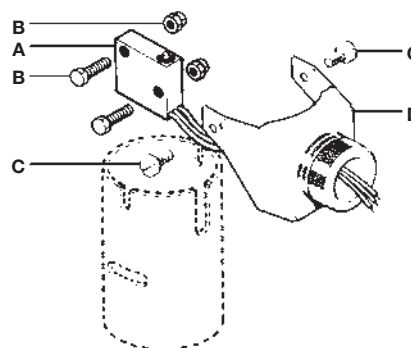
## Temperature Setting

The system is set to operate at 140°F (60°C). The setting can be adjusted between 32°F (0°C) and 212°F (100°C). Full setting details are given in the Installation & Maintenance Instructions supplied with each control system and these should always be referred to. One turn of the setting screw changes the temperature by 11°F (6°C). On completion always replace the adjustment head cover.

## Resetting

Resetting can be swiftly carried out by using a lever between the two lugs L & M. Before resetting, it is most important to allow the equipment to cool and to remedy the cause of overheating.

## Spare Parts



Micro Switch Assembly A, B (2 each)

Conversion Kit A, B (2 each), C (2 each), D

Available spare parts are shown in heavy outline. Parts drawn in broken line are not supplied as spares.



## Direct Acting Temperature Regulator 25 MT

The 25 MT is a self-actuated temperature control valve with a calibrated dial for accurate temperature setting. A variety of solid-fill sensing bulbs are available (see TI-1-1123-US). The standard capillary tubing length is 8 feet, with an optional standard length of 15 feet.

Model	25MT
Sizes	½"
Connections	NPT
Construction	Cast Iron
Options	BSP Connections Non-standard capillary tubing lengths (see TI-1-1123-US)

### Typical Applications

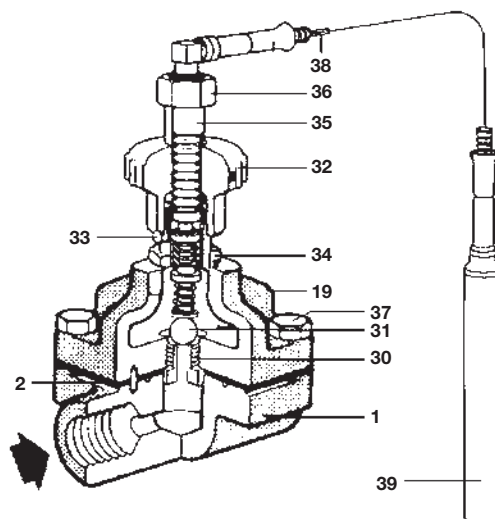
Small storage steam water heaters, instantaneous heat exchangers and converters, air handling coils, tank heating coils, steam jacketed vessels, steam chests, molds and platens.

### Sample Specification

The temperature control valves shall be self-actuated. The temperature setting shall be adjustable without the use of tools, and the set point shall be indicated on a calibrated dial. Thermostatic system shall be solid fill, and shall incorporate overheat protection.

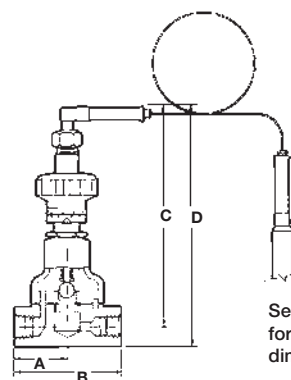
### Construction Materials

No.	Part	Material	
1	"M" Body	Cast Iron	ASTM A 126 CL B
2	Gasket	Graphite	
19	"T" Body	Cast Iron	ASTM A 126 CL B
30	Pilot Valve Seat	Stainless Steel	
31	Pilot Valve Head	Stainless Steel	
32	Adjustment Knob	Phenolic	
33	Pointer	Stainless Steel	
34	Extension Nut	Brass	
35	Case Tube	Brass	
36	Retaining Nut	Brass	
37	Pilot Mounting Screws	Steel	ASTM A449
38	Capillary Tube	Varies with style selected	
39	Bulb	Varies with style selected	



### 25 MT Capacity Pounds of Saturated Steam per Hour

Inlet Press Psig	Outlet Press Psig	Capacity (Lb/Hr) Vs P-Band (°F)	5 Cv > .134	10 .25	20 .47
10	0	5.3	9.7	18.5	
10	3	4.8	8.8	16.6	
10	5	4.3	7.8	14.8	
25	0-5	8.5	15.6	29.7	
25	15	7.4	13.6	25.8	
25	20	5.6	10.4	19.7	
50	0-18	13.9	25.5	48.3	
50	35	11.7	21.5	40.8	
50	42	9.1	16.8	31.8	
75	0-30	19.2	35.3	67.0	
75	55	16.0	29.4	55.8	
75	65	12.1	22.2	42.2	
100	0-43	24.6	45.1	85.7	
100	75	20.3	37.3	70.7	
100	85	16.6	30.4	57.8	
150	0-68	35.3	64.8	123.1	
150	105	31.5	57.8	109.7	
150	130	23.1	42.3	80.4	
200	0-93	46.0	84.5	160.4	
200	140	41.3	75.8	144.0	
200	170	31.9	58.6	111.2	
250	0-118	56.8	104.2	197.8	
250	175	51.1	93.9	178.3	
250	210	40.7	74.6	141.7	



### Dimensions (nominal) in inches and millimeters

Size	A	B	C	D	Weight
½"	1.75 44	3.5 89	7.38 187	8.06 205	5.25 lb 2.4 kg

Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only.  
In the interests of development and improvement of the product, we reserve the right to change the specification.

TI-1-1125-US 4.12

# Direct Acting Temperature Regulator 25 MT

## Limiting Operating Conditions

**Max. Operating Pressure (PMO)** 250 psig (17 barg)

**Max. Operating Temperature\*** 450°F (232°C)

\*The temperature of the sensing bulb must not exceed 350°F (177°C)

## Standard Temperature Ranges

30°F to 90°F	0°C to 32°C		
60°F to 120°F	15°C to 50°C	160°F to 220°F	70°C to 105°C
100°F to 160°F	40°C to 70°C	200°F to 260°F	95°C to 125°C
120°F to 180°F	50°C to 80°C	260°F to 320°F	125°C to 160°C

## Pressure Shell Design Conditions

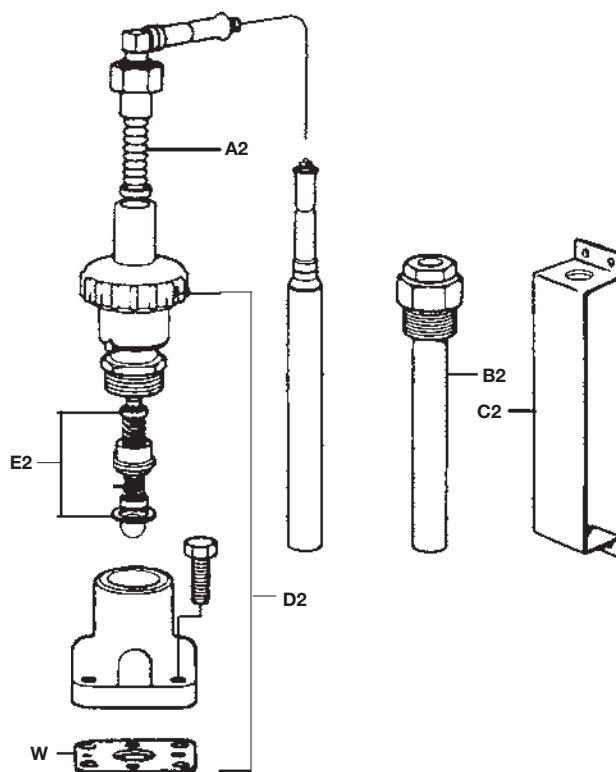
**PMA** 250 psig/0-450°F 17 barg/0-232°C  
Max. allowable pressure

**TMA** 450°F/0-250 psig 232°C/0-17 barg  
Max. allowable temperature

## Installation and Maintenance

The regulator should be installed in a horizontal pipe with suitable by-pass and isolating valves. A steam trap must be installed upstream to prevent condensate from reaching the regulator. The trap and regulator should both be protected with a strainer. The thermostatic bulb must be carefully located in the medium being heated. Complete installation & maintenance instruction are given in IM-1-1125-US, which accompanies the product.

## Spare Parts



## Temperature Pilot (see TIS 1.1123)

Thermal System (T1, T2, T3, T10, T11, T12)	A2
State bulb style, capillary tube length and temperature range	
Well (T5, T6, T7, T8)	B2
(Specify bulb style)	
Wall Mounting Bracket (T9)	C2
(State bulb size)	
Complete Pilot Adjustment Assembly	D2, W
Head & Seat Assembly	E2, W
(Specify 15 psig or below Assembly or Standard)	



## BX and BXRA Bronze Self-Acting Control Valves

### Description

The BX range of two port valves are used in conjunction with Spirax Sarco SA control systems to provide a self-acting temperature control unit. Alternatively, they can be used as electrically actuated temperature control valves by fitting an EL3500 Series electric actuator with a suitable temperature transmitter and controller.

### Available Types

**BX** Normally open single seat with four different orifice sizes: BX2, BX3, BX4 and BX6.

**BXRA** Normally closed, single seat.

### Sizes and Pipe Connections

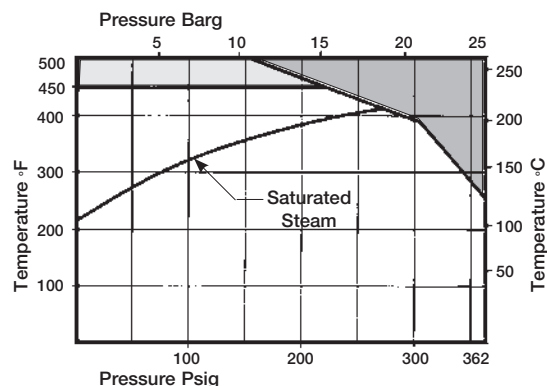
½" screwed NPT. (Option: BSP)

### Limiting Operating Conditions

#### Maximum Differential Pressure

<b>BX</b>	<b>250 psi*</b>	<b>17 bar</b>
<b>BXRA</b>	<b>150 psi</b>	<b>10 bar</b>

\* On liquid applications, the permissible maximum differential pressure may be affected by high static pressure. Please consult the factory if the application requires a large differential pressure with a high inlet pressure.



If the valve is to be used in this region, a spacer (stock #0467000) must be fitted between the valve and the control system to protect the control system from overheating.

The valves must not be used in this region

The valves may be used in this region provided that the above maximum differential pressures are not exceeded. Valves with ANSI flanges must not be used above flange limits.

SHUTOFF: ANSI CLASS IV

### Pressure Shell Design Conditions

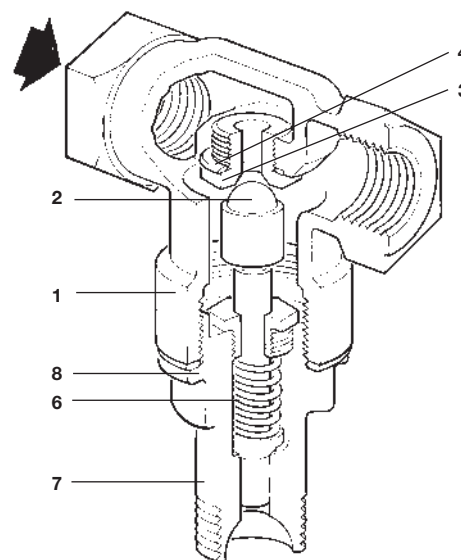
<b>PMA</b>	362 psig/248°F	25 barg/120°C
Max. allowable pressure	253 psig/428°F	17.5 barg/220°C
	152 psig/500°F	10.5 barg/260°C

<b>TMA</b>	500°F/0-152 psig	260°C/0-10.5 barg
Max. allowable temperature		

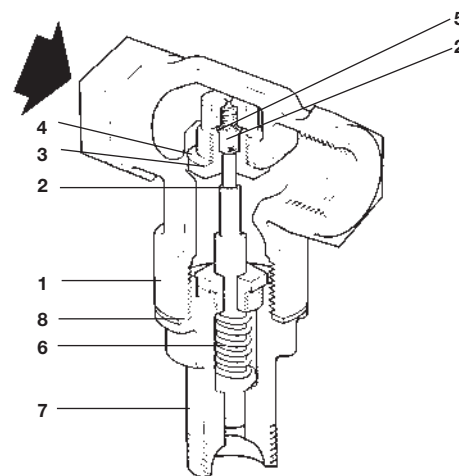
### Typical Applications

Industrial or commercial applications using steam or hot water as a heating medium, or water for cooling.

### BX Valve



### BXRA Valve



### Construction Materials

No.	Part	Material	Material Spec.	Closest Equivalent
1	Body	Bronze	BS 1400 LG2	ASTM B62
2	Valve	Stainless Steel		
3	Valve Seat	Stainless Steel		
4	Valve Seat Gasket	Copper		
5	Ball Return Spring	Stainless Steel		
6	Main Return Spring	Stainless Steel		
7	Bonnet	Brass		
8	Bonnet Gasket	Nickle Reinforced Exfoliated Graphite		

Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only. In the interests of development and improvement of the product, we reserve the right to change the specification.

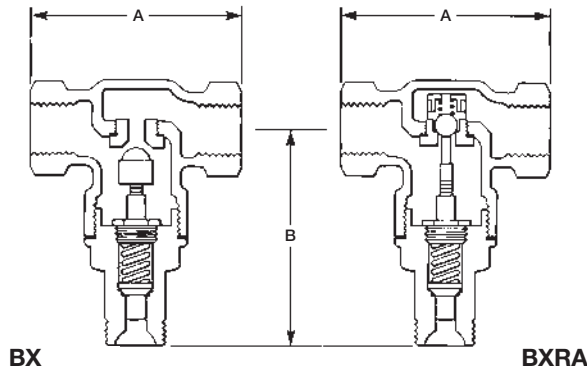
TI-1-800 US 10.13



# BX and BXRA Bronze Self-Acting Control Valves

## Dimensions (nominal) in inches and millimeters

Size	A	B	Weight
1/2"	3.2	3.3	1.5 lb
(DN15)	80	83	0.7 kg



## C<sub>v</sub> at P Band\*

Valve	BX2	BX3	BX4	BX6	BXRA
C <sub>v</sub>	0.44	0.74	1.20	1.92	0.66
P Band (°F)*	5.4°	8°	8°	8°	8°

\* The proportional band (P Band) is the difference required between the desired set temperature and the actual controlled temperature to open the valve fully. The above figures apply to valves fitted with 121 or 123 control systems. For 122 or 128 systems, the P Band will be twice the amount shown.

Example: For a BX3 valve with a 122 control system, the valve will not fully open until the controlled temperature drops to 16°F below the set point.

## Capacities

For saturated steam sizing capacities, see TI-1-011-US. For water sizing capacities, see TI-1-012-US.

## Sample Specification

Control valve shall be bronze body with stainless steel trim. Valve is coupled to the appropriate temperature control system. This combined unit is self acting and provides proportional control action. The temperature control system shall be brass with PVC covered capillary or stainless steel sensor and capillary, oil filled, hydraulically operated; and shall incorporate packless glands and a gas filled overheat protection device. Temperature setting shall be adjustable while control is in service, include °F adjustment scale and shall incorporate a tamper proof device. When required, sensor bulb shall be mounted in a separable well for removal from the equipment. Refer to TI-1-900-US or TI-1-901-US for temperature control system details.

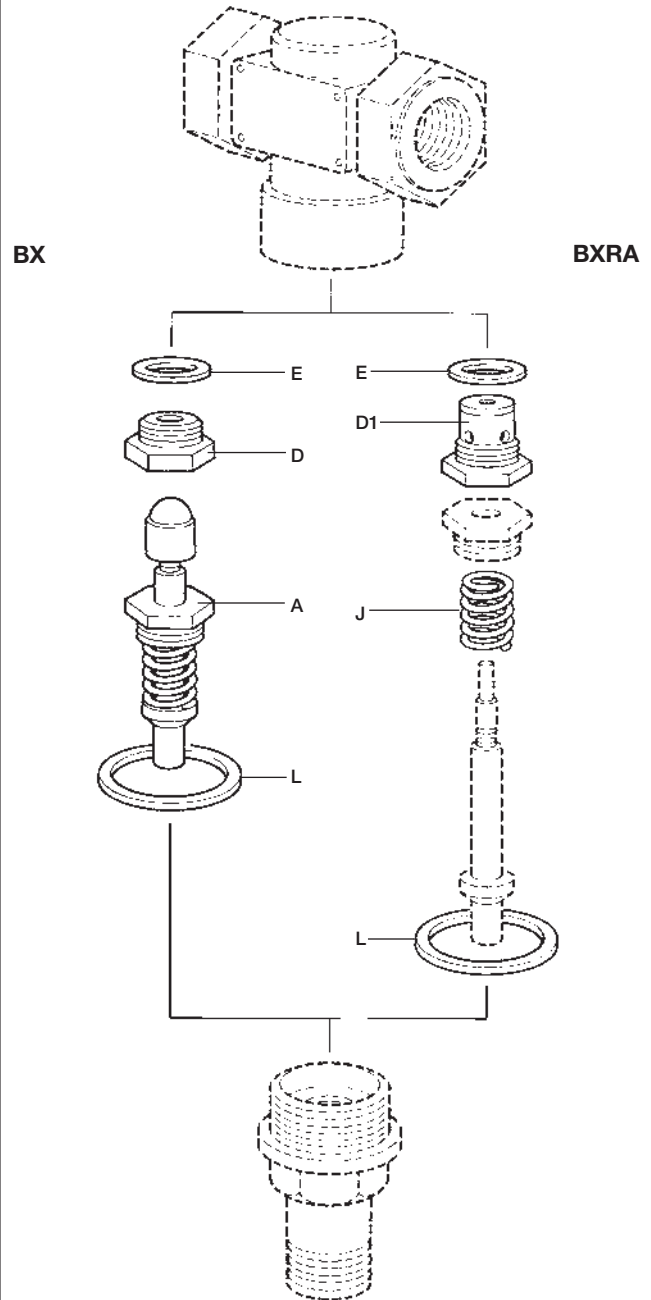
## Installation

The valve should be installed in a horizontal section of the heating or cooling medium inlet piping. The control system connection must point vertically downward. A bypass with suitable stop valves should be provided to permit servicing, and a Y-pattern strainer should be installed upstream of the valve. If the valve is smaller than the pipeline, eccentric reducers should be used. In a steam system, a steam trap should be installed upstream of the valve to ensure that the steam entering the valve is as dry as possible.

## Maintenance

Except for periodic cleaning of the upstream strainer, maintenance or servicing is normally required only if a malfunction is detected. Complete installation and maintenance instructions are given in the IM-S21-01 sheet, which accompanies the product.

## Spare Parts



Valve & Seat Assembly (BX valve)	L, A, D, E
Valve & Seat Assembly (BXRA valve)	L, D1, E
Gasket Set (pkt of 3 each)	L, E



## SB and SBRA Bronze Valves

### SB

Normally open, closes with temperature rise for heating, single seat.

### SBRA

Normally closed, opens with rising temperature for cooling. Single seat with optional 1/8" (C<sub>v</sub>.44) bleed bypass and optional fusible device.

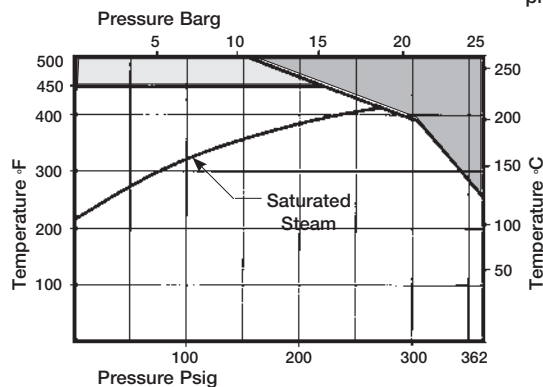
Model	SB, SBRA
Sizes	1/2", 3/4", 1"
Connections	NPT
Construction	Bronze Body Stainless Steel Trim
Options	BSP Connections ANSI 300 flanges (SB only)

### Limiting Operating Conditions

#### Maximum Differential Pressure

Size/DN	SB	SBRA
1/2 15	250 psi* 17 bar	174 psi 12 bar
3/4 20	150 psi* 10 bar	101 psi 7 bar
1 25	100 psi* 6.8 bar	70 psi 4.7 bar

\* On liquid applications, the permissible maximum differential pressure may be affected by high static pressure. Please consult the factory if the application requires a large differential pressure with a high inlet pressure.



If the valve is to be used in this region, a spacer (stock #0467000) must be fitted between the valve and the control system to protect the control system from overheating.

The valves must not be used in this region

The valves may be used in this region provided that the above maximum differential pressures are not exceeded. Valves with ANSI flanges must not be used above flange limits.

SHUTOFF: ANSI CLASS IV

### Pressure Shell Design Conditions

<b>PMA</b>	362 psig/248°F	25 barg/120°C
Max. allowable pressure	253 psig/428°F	17.5 barg/220°C
	152 psig/500°F	10.5 barg/260°C

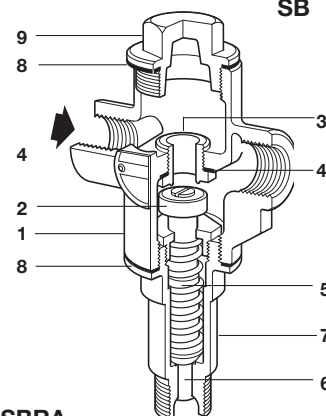
<b>TMA</b>	500°F/0-152 psig	260°C/0-10.5 barg
Max. allowable temperature		

### Typical Applications

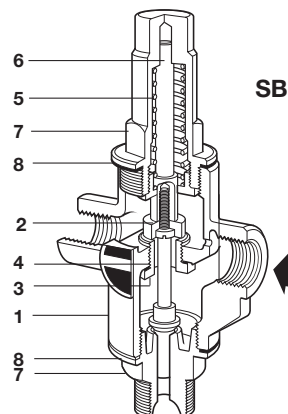
Industrial or commercial applications using steam or hot water as a heating medium, or water for cooling.

Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only. In the interests of development and improvement of the product, we reserve the right to change the specification.

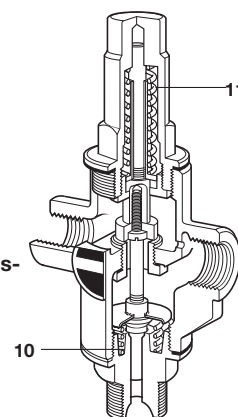
### SB



### SBRA



### SBRA with fusible device and bleed



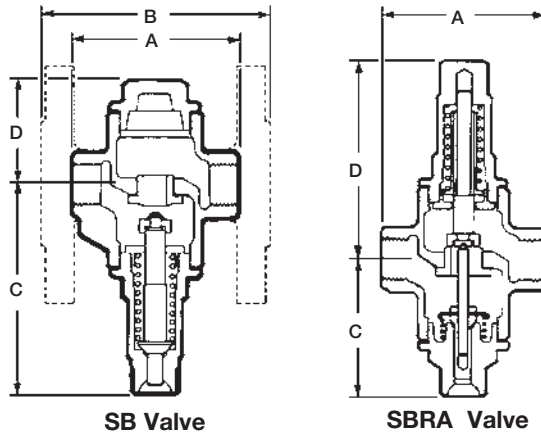
### Construction Materials

No.	Part	Material	Material Spec.	Closest Equivalent
1	Body	Bronze	BS 1400 LG2	B62 UNS 83600
2	Valve	Stainless Steel		
3	Valve Seat	Stainless Steel		
4	Valve Seat Gasket	Copper		
5	Return Spring	Stainless Steel		
6	Push Rod	Brass		
7	Bonnet	Brass		
8	Bonnet Cap Gasket	Nickle Reinforced Exfoliated Graphite		
9	Cap	Brass	BS 2872 CZ 122	B283 UNS No. 37700
10	Fail Safe Spring	Stainless Steel		
11	Fusible Device	Brass		

# SB and SBRA Bronze Valves

## Dimensions (nominal) in inches and millimeters

SB VALVES						
SIZE DN	ANSI 300			WEIGHT		
	A	B	C	D	Scr.	Flg.
1/2 15	3.1 79	3.9 98	3.9 101	2.0 50	2.3 lb 1.0 kg	7.7 lb 3.5 kg
3/4 20	3.7 95	4.4 113	3.9 101	2.0 50	3.0 lb 1.3 kg	8.0 lb 3.6 kg
1 25	4.7 108	5.0 128	3.9 101	2.0 50	3.5 lb 1.5 kg	8.5 lb 3.8 kg
SBRA						
1/2 15	3.1 79	-	2.6 66	3.7 95	2.3 lb 1.0 kg	-
3/4 20	3.7 95	-	2.6 66	3.7 95	3.0 lb 1.3 kg	-
1 25	4.7 108	-	2.6 66	3.7 95	3.5 lb 1.5 kg	-



## Cv at P Band\*

Size	1/2"	3/4"	1"
Cv	3.0	4.5	7.9
P Band (°F)*	8°	8°	10°

\* The proportional band (P Band) is the difference required between the desired set temperature and the actual controlled temperature to open the valve fully. The above figures apply to valves fitted with 121 or 123 control systems. For 122 or 128 systems, the P Band will be twice the amount shown. Example: For a 3/4" SB valve with a 122 control system, the valve will not fully open until the controlled temperature drops to 16°F below the set point. For complete sizing information, see TIS 1.011 (steam) or TIS 1.012 (water).

## Sample Specification

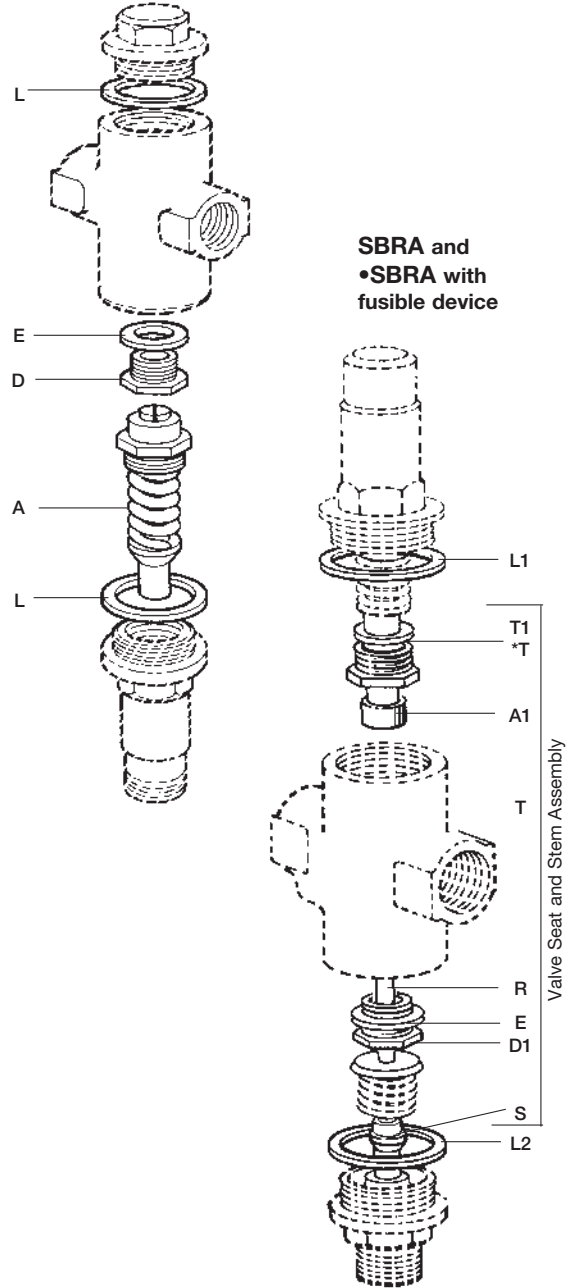
Control valve shall be bronze body with stainless steel trim. Valve will achieve ANSI Class IV Shutoff. Valve is coupled to the appropriate temperature control system. This combined unit is self acting and provides proportional control action. The temperature control system shall be brass with PVC covered capillary or stainless steel sensor and capillary, oil filled, hydraulically operated; and shall incorporate packless glands and a gas filled overheat protection device. Temperature setting shall be adjustable while control is in service, include °F adjustment scale and shall incorporate a tamper proof device. When required, sensor bulb shall be mounted in a separable well for removal from the equipment. Refer to TIS 1.900 or 1.901 for temperature control system details.

## Installation

The valve should be installed in a horizontal section of the heating or cooling medium inlet piping. The control system connection must point vertically downward. A bypass with suitable stop valves should be provided to permit servicing, and a Y-pattern strainer should be installed upstream of the valve. If the valve is smaller than the pipeline, eccentric reducers should be used. In a steam system, a steam trap should be installed upstream of the valve to ensure that the steam entering the valve is as dry as possible.

## SB

## Spare Parts



The spare parts available are shown in heavy outline. Parts drawn in broken line are not supplied as spares.

Valve Seat and Stem Assembly (SB valve)	A, D, E, L
Valve Seat and Stem Assembly (SBRA valve with or without fusible device)	A1, D1, E, T1, R, S
Fusible Device	T
Set of all Gaskets (SB valve)	E, L
Set of all Gaskets (SBRA valve with or without fusible device)	L1, L2, E,

## Maintenance

Except for periodic cleaning of the upstream strainer, maintenance or servicing is normally required only if a malfunction is detected. Complete installation and maintenance instructions are given in the IMI sheet, which accompanies the product.

TI-1-801-US 4.12



## NS and NSRA Bronze Self-Acting Control Valves

**NS**  
Normally open, closes with temperature rise for heating, double seat.

**NSRA**  
Normally closed, opens with rising temperature for cooling, double seat.

Model	NS, NSRA
<b>Sizes</b>	2½", 3"
<b>Connections</b>	NPT
<b>Construction</b>	Bronze Body and Trim
<b>Options</b>	BSP Connections ANSI 150 or 300 flanges

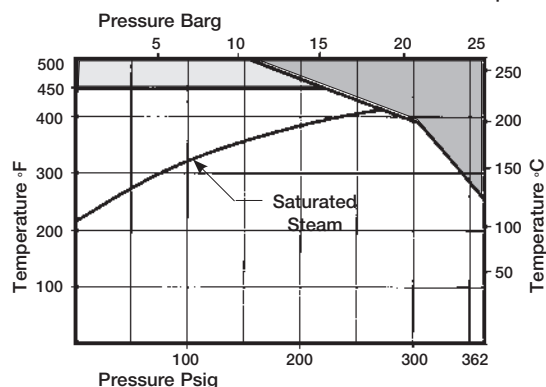
**NOTE:** NS & NSRA are not to be used with HL10/130 safeguard overheat protection.


### Limiting Operating Conditions

#### Maximum Differential Pressure


Size/DN	NS	NSRA
2½"	150 psi*	40 psi
65	10 bar	2.7 bar
3"	150 psi*	30 psi
80	10 bar	2 bar

\*On liquid applications, the permissible maximum differential pressure may be affected by high static pressure. Please consult the factory if the application requires a large differential pressure with a high inlet pressure. Not to be used in compressed air applications.



 If the valve is to be used in this region, a spacer (stock #0467000) must be fitted between the valve and the control system to protect the control system from overheating.

 The valves must not be used in this region

 The valves may be used in this region provided that the above maximum differential pressures are not exceeded. Valves with ANSI flanges must not be used above flange limits.

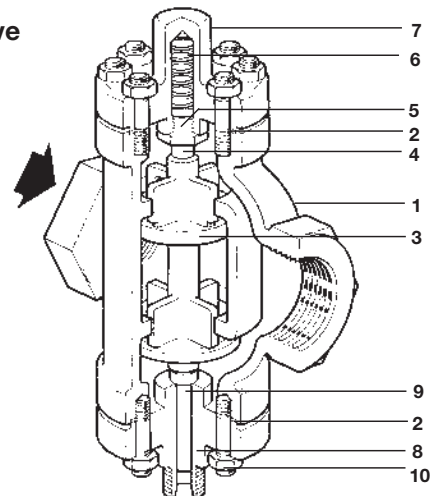
SHUTOFF: ANSI CLASS II

### Pressure Shell Design Conditions

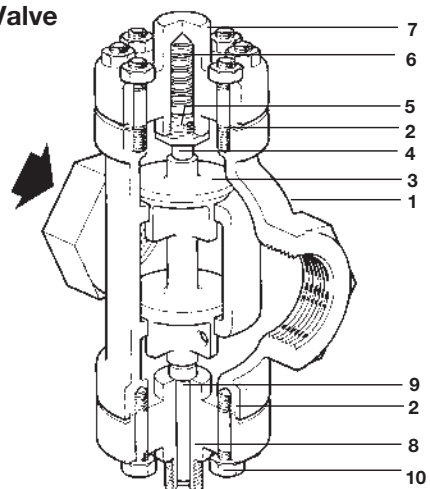
**PMA** 362 psig/248°F 25 barg/120°C  
Max. allowable pressure 253 psig/428°F 17.5 barg/220°C  
152 psig/500°F 10.5 barg/260°C

**TMA** 500°F/0-152 psig 260°C/0-10.5 barg  
Max. allowable temperature

NS Valve



NSRA Valve



### Construction Materials

No.	Part	Material	Material Spec.
1	Body	Gun-metal	BS 1400 LG2
2	Body Gasket	Semi-ridged graphite	BS 2815 Gr A
3	Valve Closure Member	Gun-metal	BS 1400 LG 2
4	Plunger	Brass	BS 2874 CZ 121
5	Plunger Guide	Brass	BS 2874 CZ 121
6	Return Spring	Stainless Steel	BS 2056 302 S 26
7	Spring Housing	Gun-metal	BS 1400 LG 2
8	Bonnet	Gun-metal	BS 1400 LG 2
9	Stem	Brass	BS 2874 CZ 121
10	Body Studs	Steel	BS 4439 Gr 8.8
	Body Nuts	Steel	BS 3692 Gr 8
	2½"	M12	
	3½"	M16	

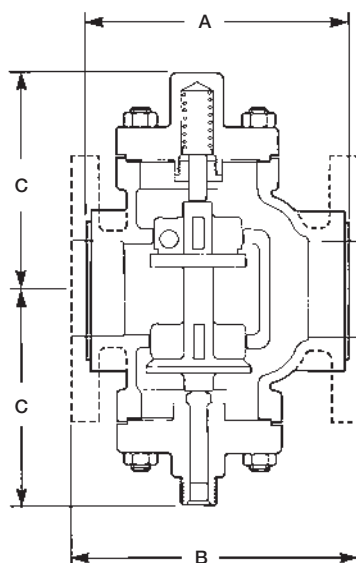
Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only.  
In the interests of development and improvement of the product, we reserve the right to change the specification.

TI-1-802-US 5.09

# NS and NSRA Bronze Self-Acting Control Valves

**Dimensions (nominal) in inches and millimeters**

Size DN	A	ANSI 300/150 B	C	Weight NPT	Flg.
2½" 65	6.7 171	8.0 203	5.9 150	18.0 lb 8.1 kg	38.0 lb 17.2 kg
3" 80	7.6 194	9.2 236	6.3 160	30.0 lb 13.6 kg	50.0 lb 22.7 kg



## C<sub>v</sub> at P Band\*

Size	2½"	3
C <sub>v</sub>	75.6	109.2
P Band (°F)*	24°	24°

\*The proportional band (P Band) is the difference required between the desired set temperature and the actual controlled temperature to open the valve fully. The above figures apply to valves fitted with 121 or 123 control systems.

For complete sizing information, see TIS 1.011 (steam) or TIS 1.012 (water).

## Typical Applications

Industrial or commercial applications using steam or hot water as a heating medium, or water for cooling.

## Spare Parts

Body Gasket (pkt of 6) See item #2 in Construction Materials

## Sample Specification

Control valve shall be bronze body with bronze trim. Valve shall achieve ANSI Class II Shutoff. Valve is coupled to the appropriate temperature control system. This combined unit is self acting and provides proportional control action. The temperature control system shall be brass with PVC covered capillary or stainless steel sensor and capillary, oil filled, hydraulically operated; and shall incorporate packless glands and a gas filled overheat protection device. Temperature setting shall be adjustable while control is in service, include °F adjustment scale and shall incorporate a tamper proof device. When required, sensor bulb shall be mounted in a separable well for removal from the equipment. Refer to TI-1-900-US or TI-1-901-US for temperature control system details.

## Installation

The valve should be installed in a horizontal section of the heating or cooling medium inlet piping. The control system connection must point vertically downward. A bypass with suitable stop valves should be provided to permit servicing, and a Y-pattern strainer should be installed upstream of the valve. If the valve is smaller than the pipeline, eccentric reducers should be used. In a steam system, a steam trap should be installed upstream of the valve to ensure that the steam entering the valve is as dry as possible.

## Maintenance

Except for periodic cleaning of the upstream strainer, maintenance or servicing is normally required only if a malfunction is detected. Complete installation and maintenance instructions are given in the IMI sheet (IM-S21-01), which accompanies the product.

# spirax sarco

## KA 51, KB 51, KC 51 Bronze Valves

### Description

The KA, KB and KC range of two-port valves are used in conjunction with Spirax Sarco SA control systems to provide a self-acting temperature control unit. Alternatively, they can be used as electrically actuated temperature control valves by fitting an EL3500 Series electric actuator with a suitable temperature transmitter and controller.

#### KA 51

Normally open single seat with screwed connections.

#### KB 51

Normally open, single seat, with a bronzepressure balancing bellows.

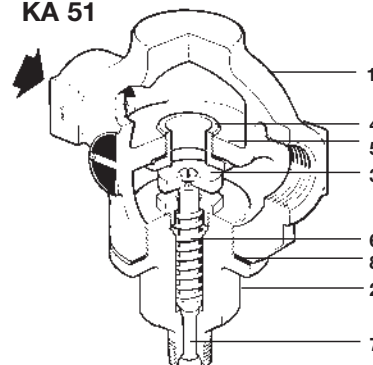
#### KC 51

Normally open, single seat with stainless steel pressure balancing bellows with screwed connections. The pressure balancing bellows enables the valve to operate against higher differential pressures.

Model	KA 51, KB 51, KC 51
Sizes*	1", 1-1/4", 1-1/2", 2"
Connections	NPT
Construction	Bronze Body Stainless Steel Trim
Options	BSP Connections

\* KC 51 available in sizes 1-1/2" and 2".

KA 51

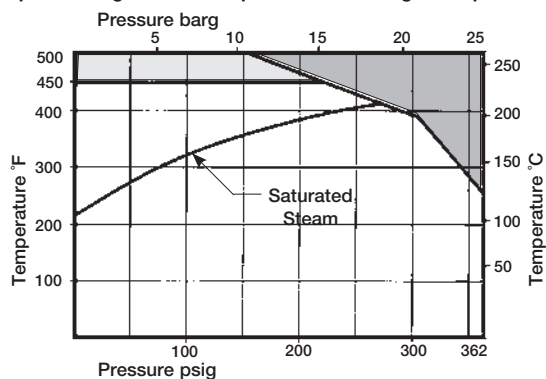


### Limiting Operating Conditions

#### Maximum Differential Pressure

Size	KA 51*		KB 51		KC 51	
1	65psi	4.5 bar	150 psi	10 bar	—	—
1-1/4	43 psi	3 bar	130 psi	9 bar	—	—
1-1/2	29 psi	2 bar	118 psi	8.2 bar	232 psi	16 bar
2	22 psi	1.5 bar	100 psi	6.9 bar	200 psi	13.8 bar

\* On liquid applications, the permissible maximum differential pressure may be affected by high static pressure. Please consult the factory if the application requires a large differential pressure with a high inlet pressure.



☐ If a KA 51 valve is to be used in this region, a spacer (stock #0467000) must be fitted between the valve and the control system to protect the control system from overheating. The KB & KC 51 valves cannot be used with a spacer, and are limited to 450°F

☐ The valves must not be used in this region

☐ The valves may be used in this region provided that the above maximum differential pressures are not exceeded.

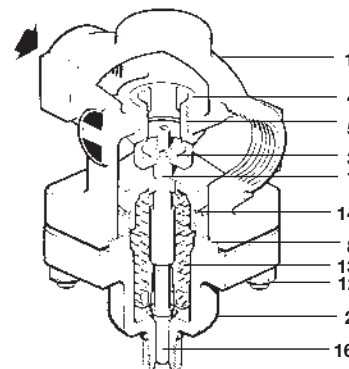
SHUTOFF: ANSI CLASS IV

### Pressure Shell Design Conditions

<b>PMA</b>	<b>362 psig/248°F</b>	<b>25 barg/120°C</b>
Max. allowable pressure	253 psig/428°F	17.5 barg/220°C
	152 psig/500°F	10.5 barg/260°C

<b>TMA</b>	<b>500°F/0-152 psig</b>	<b>260°C/0-10.5 barg</b>
Max. allowable temperature		

KB & KC 51



### Construction Materials

No. Part	Material	Material Spec.	Closest Equivalent
1 Body	Bronze	BS 1400 LG2	B62 UNS 83600
2 KA51,KB51 Bonnet*	Bronze	BS 1400 LG2	B62 UNS 83600
KC51 Bonnet	Steel	DIN 17245 GSC25	A216 Gr. WCB
3 Valve	Stainless Steel	BS 970 431 S29	A276 Type 431
4 Valve Seat	Stainless Steel	BS 970 431 S29	A276 Type 431
5 Valve Seat Gasket			
1	Mild Steel	BS 1449 CS 4	A366
1-1/4 to 2	Nickle Reinforced Exfoliated Graphite		
6 Return Spring (KA)	Stainless Steel	BS 970 302 S 25	
7 KA 51,KB51 Push Rod	Brass	BS 2874 CZ 121	B16M
KC 51 Push Rod	Stainless Steel	BS 970 321 S20	
8 Bonnet Gasket	Nickle Reinforced Exfoliated Graphite		
12 Bonnet Studs	Steel	BS 4439 Gr. 8.8	A354
Bonnet Nuts		BS 3692 Gr. 8	ANSI B18.2.4.1 M
1-1/4 & 1-1/2	M10 x 35 mm		
2	M12 x 35 mm		
13 Bellows (KB 51)	Phosphor Bronze		
Bellows (KC 51)	Stainless Steel	AISI 316L	
14 Bellows Gasket (KB)	Nickle Reinforced Exfoliated Graphite		
16 Plunger(KB)	Brass	BS 2874 CZ 121	B16M

\* 1-1/4", 1-1/2" & 2" sizes have a bolted bonnet

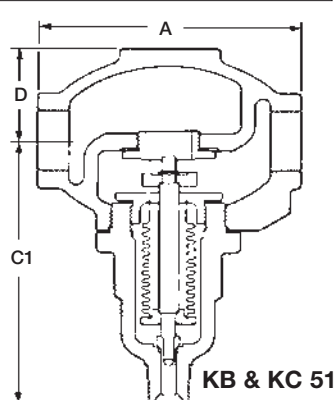
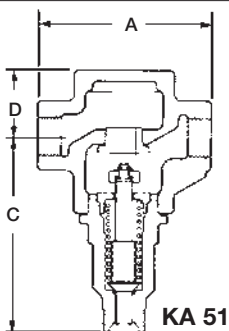
Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only.  
In the interests of development and improvement of the product, we reserve the right to change the specification.



# KA 51, KB 51, KC 51 Bronze Valves

**Dimensions (nominal) in inches and millimeters**

SIZE	A	C	C1	D	WEIGHT	
					KA	KB/KC
1	5.3 136	4.2 107	5.4 138	2.0 51	8.7 lb 3.96 kg	9.1 lb 4.17 kg
1-1/4	5.6 144	4.3 110	6.0 152	2.0 51	13.7 lb 6.20 kg	15.4 lb 7.00 kg
1-1/2	5.9 150	4.3 110	6.0 152	2.4 62	16.6 lb 7.52 kg	18.3 lb 8.32 kg
2	7.1 180	4.3 110	6.0 152	2.8 71	20.6 lb 9.35 kg	22.7 lb 10.30 kg



## Typical Applications

Industrial or commercial applications using steam or hot water as a heating medium.

## Sample Specification (KB)

Control valve shall be bronze body with stainless steel trim and single seated. Valve shall achieve ANSI Class IV Shutoff. For operation against high differential pressures, valve shall be supplied with bronze pressure balancing bellows. Provide with screwed pipe connections. Valve is coupled to the appropriate temperature control system. This combined unit is self acting and provides proportional control action. The temperature control system shall be brass with PVC covered capillary or stainless steel sensor and capillary, oil filled, hydraulically operated; and shall incorporate packless glands and a gas filled overheat protection device. Temperature setting shall be adjustable while control is in service, include °F adjustment scale and shall incorporate a tamper proof device. When required, sensor bulb shall be mounted in a separable well for removal from the equipment. Refer to TIS 1.900 or 1.901 for temperature control system details.

## Installation

The valve should be installed in a horizontal section of the heating medium inlet piping. The control system connection must point vertically downward. A bypass with suitable stop valves should be provided to permit servicing, and a Y-pattern strainer should be installed upstream of the valve. If the valve is smaller than the pipeline, eccentric reducers should be used. In a steam system, a steam trap should be installed upstream of the valve to ensure that the steam entering the valve is as dry as possible.

## Maintenance

Except for periodic cleaning of the upstream strainer, maintenance or servicing is normally required only if a malfunction is detected. Complete installation and maintenance instructions are given in the IMI sheet (IM-S21-01), which is available upon request.

## C<sub>v</sub> AT P BAND\*

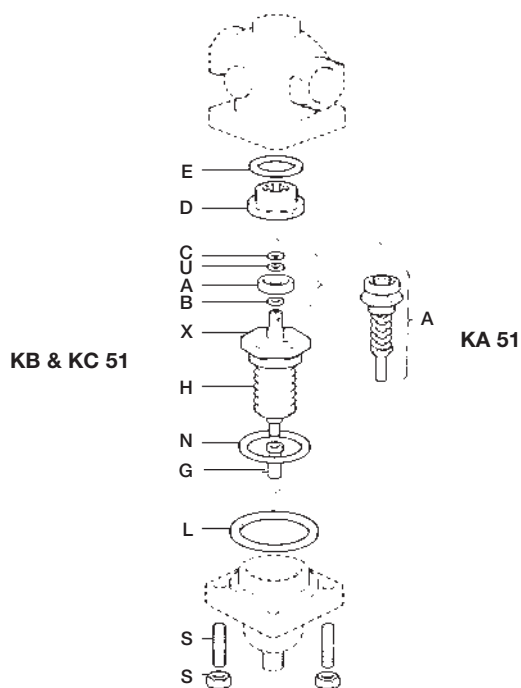
Size	1	1-1/4	1-1/2	2
KA & KB	11.4	19.2	27.6	39.6
P Band (°F)*	12.4°	20°	22.5°	23.8°
KC	—	—	19.2	39.6
P Band (°F)*	—	—	20°	23.8°

\* The proportional band (P Band) is the difference required between the desired set temperature and the actual controlled temperature to open the valve fully. The above figures apply to valves fitted with 121 or 123 control systems. For 122 or 128 systems, (which cannot be used on valves larger than 1") the P Band will be twice the amount shown.

Example: For a 1" KA 51 valve with a 122 control system, the valve will not fully open until the controlled temperature drops to 24.8°F below the set point.

For complete sizing information, see TIS 1.011 (steam) or TIS 1.012 (water).

## Spare Parts



### KA 51

Valve & Seat Assembly A, D, E, L

Set of Gaskets E, L

Set of Bonnet Studs & Nuts (set of 4)\* S

### KB 51 & KC 51

Valve & Seat Assembly A, B, C, D, E, G,  
(excluding bellows & Push Rod Assembly) L, U

Bellows & Push Rod Assembly L, N, H, G

Set of all Gaskets B, C, E, L, U, G

Set of Bonnet Studs & Nuts (set of 4) S

\* 1" valves have a screwed bonnet

TI-1-803-US 06.10

# spirax sarco

## KX 51 and KY 51 Bronze Valves

### KX 51

Normally closed, opens with temperature rise for cooling, single seat. Adjustable bleed 1/8" (Cv .44) provides bypass. (1" KX 51 only)

### KY 51

Normally closed, opens with rising temperature, single seat. The valve incorporates a pressure balancing bellows, which enables the valve to operate against higher differential pressures.

Model	KX 51	KY 51
<b>Sizes</b>	1", 1-1/4", 1-1/2", 2"	1-1/4", 1-1/2", 2"
<b>Connections</b>	NPT	
<b>Construction</b>	Bronze Body Stainless Steel Trim	
<b>Options</b>	BSP Connections	

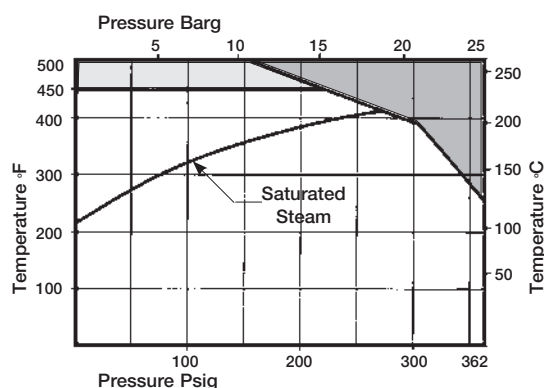
[ All KY Valves have fixed bleeds ]

## Limiting Operating Conditions

### Maximum Differential Pressure

Size	KX 51*		KY 51	
1	50 psi	3.5 bar	—	—
1-1/4	33 psi	2.3 bar	130 psi	9 bar
1-1/2	24 psi	1.9 bar	119 psi	8.2 bar
2	16 psi	1.1 bar	100 psi	6.9 bar

\* On liquid applications, the permissible maximum differential pressure may be affected by high static pressure. Please consult the factory if the application requires a large differential pressure with a high inlet pressure.



If a KA 51 valve is to be used in this region, a spacer (stock #0467000) must be fitted between the valve and the control system to protect the control system from overheating. The KB 51 valve cannot be used with a spacer, and is limited to 450°F

The valves must not be used in this region

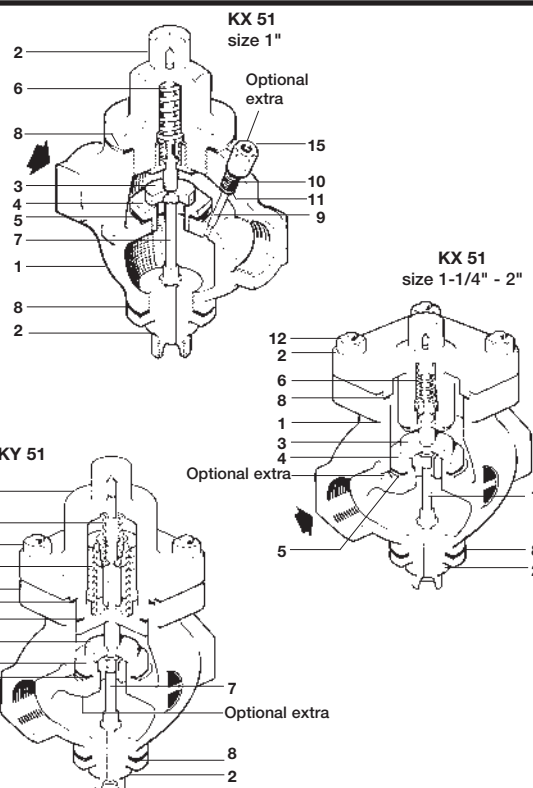
The valves may be used in this region provided that the above maximum differential pressures are not exceeded. Valves with ANSI flanges must not be used above flange limits.

SHUTOFF: ANSI CLASS IV

## Pressure Shell Design Conditions

<b>PMA</b>	362 psig/248°F	25 barg/120°C
Max. allowable pressure	253 psig/428°F	17.5 barg/220°C
	152 psig/500°F	10.5 barg/260°C

<b>TMA</b>	500°F/0-152 psig	260°C/0-10.5 barg
Max. allowable temperature		



## Construction Materials

No.	Part	Material	Material Spec.	Closest Equivalent
1	Body	Bronze	BS 1400 LG2	B62 UNS 83600
2	Bonnet	Bronze	BS 1400 LG2	B62 UNS 83600
3	Valve	Stainless Steel	BS 970 431 S29	A276 Type 431
4	Valve Seat	Stainless Steel	BS 970 431 S29	A276 Type 431
5	Valve Seat Gasket			
1		Mild Steel	BS 1449 CS 4	A366
1-1/4 to 2		Nickle Reinforced Exfoliated Graphite		
6	Return Spring (KA)	Stainless Steel	BS 970 302 S 25	
7	Push Rod	Brass	BS 2874 CZ 121	B16M
8	Bonnet Gasket	Nickle Reinforced Exfoliated Graphite		
9	Bleed Valve 1/8"	Stainless Steel	BS 970 431 S29	A276 Type 431
10	Bleed Valve Gasket	Brass	BS 2874 CZ 121	B16M
11	Bleed Valve 'O' Ring	Rubber		
12	Bonnet Studs	Steel	BS 4439 Gr. 8.8	A354
	Bonnet Nuts		BS 3692	ANSI B18.2.4.1 M
1-1/4 & 1-1/2		M10 x 35 mm		
2		M12 x 35 mm		
13	Bellows (KB)	Phosphor Bronze		
14	Bellows Gasket (KB)	Nickle Reinforced Exfoliated Graphite		

Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only. In the interests of development and improvement of the product, we reserve the right to change the specification.

TI-1-804-US 05.10

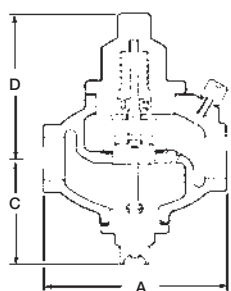


# KX 51 and KY 51 Bronze Valves

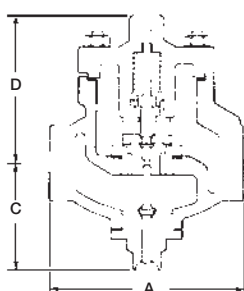
## Dimensions (NOMINAL) IN INCHES AND MILLIMETERS

Size	A	C	C1	D	WEIGHT	
					KX	KY
1	5.3 136	3.2 80	4.3 108	-	9.0 lb 4.10 kg	-
1-1/4	5.6 144	3.2 80	4.4 112	6.0 154	13.9 lb 6.23 kg	15.9 lb 7.25 kg
1-1/2	5.9 150	3.5 90	4.4 112	6.0 154	16.8 lb 7.62 kg	19.0 lb 8.57 kg
2	7.1 180	4.0 100	4.4 112	6.0 154	20.9 lb 9.50 kg	23.2 lb 10.60 kg

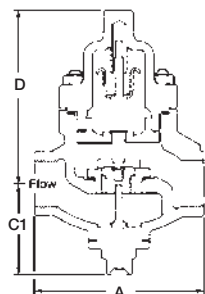
KX 51 size 1"



KX 51 size 1-1/4"-2"



KY 51 size 1-1/4"-2"



## Typical Applications

Industrial or commercial applications using water as a cooling medium.

## Sample Specification (KY)

Control valve shall be bronze body with stainless steel trim and single seated. Valve shall achieve ANSI Class IV Shutoff. For operation against high differential pressures, valve shall be supplied with pressure balancing bellows. Provide with screwed pipe connections. For continuous minimum flow requirements, valve to be fitted with bleed bypass. Valve is coupled to the appropriate temperature control system. This combined unit is self acting and provides proportional control action. The temperature control system shall be brass with PVC covered capillary or stainless steel sensor and capillary, oil filled, hydraulically operated; and shall incorporate packless glands and a gas filled overheat protection device. Temperature setting shall be adjustable while control is in service, include °F adjustment scale and shall incorporate a tamper proof device. When required, sensor bulb shall be mounted in a separable well for removal from the equipment. Refer to TIS 1.900 or 1.901 for temperature control system details.

## Installation

The valve should be installed in a horizontal section of the cooling medium inlet piping. The control system connection must point vertically downward. A bypass with suitable stop valves should be provided to permit servicing, and a Y-pattern strainer should be installed upstream of the valve.

## Maintenance

Except for periodic cleaning of the upstream strainer, maintenance or servicing is normally required only if a malfunction is detected. Complete installation and maintenance instructions are given in the IMI sheet, which accompanies the product.

## Cv at P Band\*

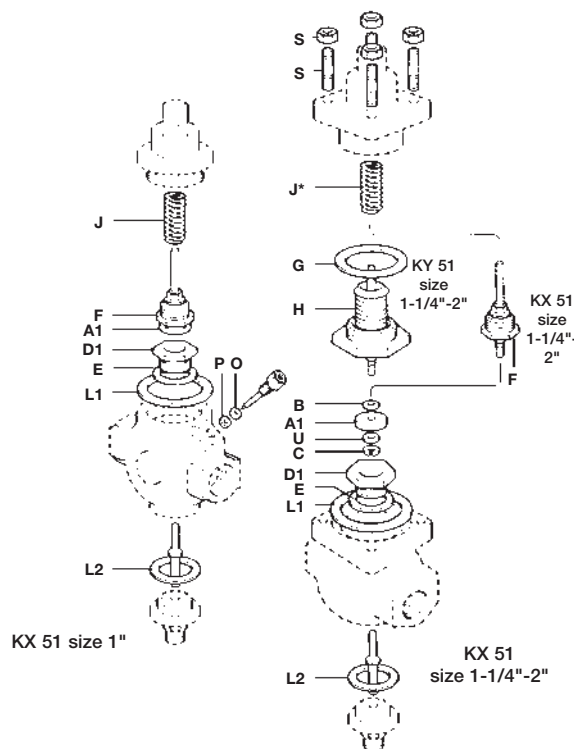
Size	1	1-1/4	1-1/2	2
C <sub>v</sub>	11.4	19.2	27.6	39.6
P Band (°F)*	12.4°	20°	22.5°	23.8°

\* The proportional band (P Band) is the difference required between the desired set temperature and the actual controlled temperature to open the valve fully. The above figures apply to valves fitted with 121 or 123 control systems. For 122 or 128 systems, (which cannot be used on valves larger than 1") the P Band will be twice the amount shown.

Example: For a 1" KX 51 valve with a 122 control system, the valve will not fully open until the controlled temperature rises to 24.8°F above the set point.

For complete sizing information, see TIS 1.011 (steam) or TIS 1.012 (water).

## Spare Parts



### KX 51

Valve & Seat Assembly	A1, D1, E, J, F, L1
Set of all Gaskets (1)	L1, L2, E, P, O
Set of all Gaskets (1-1/4 to 2)	E, L1, L2, B, U, C
Set of Bonnet Studs & Nuts (set of 4)	S

### KY 51

Valve & Seat Assembly	A1, B, C, D1, E, L1, U
Bellows & Push Rod Assembly	H, G, L1, B, C, U
Set of all Gaskets	B, C, U, E, G, L1, L2
Set of Bonnet Studs & Nuts (set of 4)	S

\* Part "J" available in KX Valve only.

TI-1-804-US 05.10



## BM and BMRA Cast Steel Valves

### BM

Normally open, closes with rising temperature for heating. Single seat with four different orifice sizes - BM 2, BM 3, BM 4 & BM 6.

### BMRA

Reverse acting (normally closed), opens with rising temperature for cooling. Single seat.

Model	BM, BMRA
Sizes	1/2"
Connections	ANSI 300 flanged
Construction	Carbon Steel Body Stainless Steel Trim
Options	ANSI 150 flanges

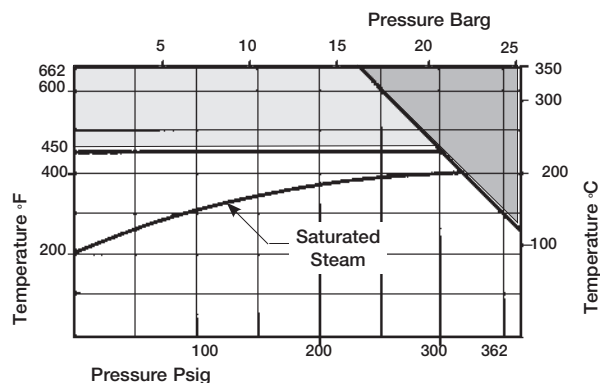
### Limiting Operating Conditions

#### Maximum Differential Pressure

1/2" / 15 mm

<b>BM</b>	<b>250 psi*</b>	<b>17 bar</b>
<b>BMRA</b>	<b>150 psi</b>	<b>10 bar</b>

\* On liquid applications, the permissible maximum differential pressure may be affected by high static pressure. Please consult the factory if the application requires a large differential pressure with a high inlet pressure.



☐ If the valve is to be used in this region, a spacer (stock #0467000) must be fitted between the valve and the control system to protect the control system from overheating.

☐ The valves must not be used in this region

☐ The valves may be used in this region provided that the above maximum differential pressures are not exceeded. Valves with ANSI flanges must not be used above flange limits.

SHUTOFF: ANSI CLASS IV

### Pressure Shell Design Conditions

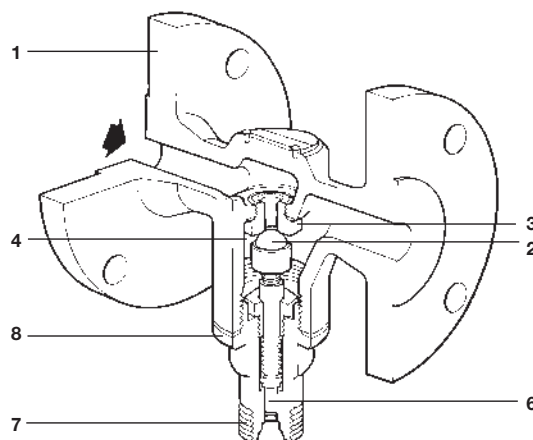
<b>PMA</b>	<b>362 psig/248°F</b>	<b>25 barg/120°C</b>
Max. allowable pressure	<b>290 psig/482°F</b>	<b>20 barg/250°C</b>
	<b>188 psig/750°F</b>	<b>13 barg/400°C</b>

<b>TMA</b>	<b>750°F/0-188 psig</b>	<b>400°C/0-13 barg</b>
Max. allowable temperature		

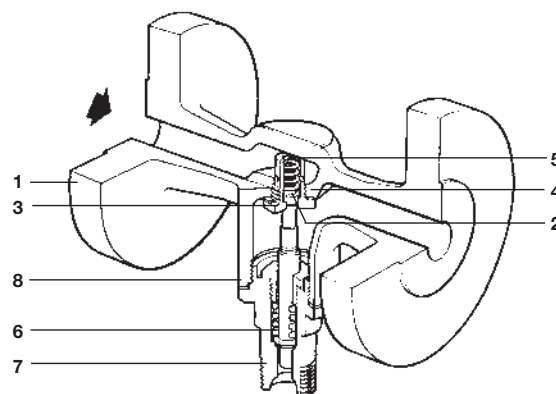
### Typical Applications

Industrial or commercial applications using steam or hot water as a heating medium, or water for cooling.

### BM



### BMRA



### Construction Materials

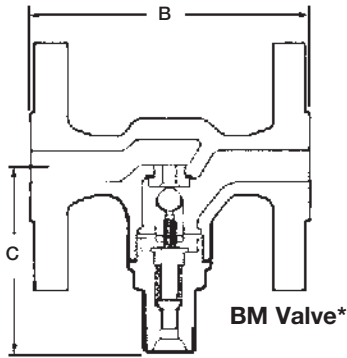
No.	Part	Material	Material Spec.	Closest Equivalent
1	Body	Steel	DIN 17245 GS C25	A216 Gr WCB
2	Valve	Stainless Steel	AISI 440C	
3	Valve Seat	Stainless Steel	BS 970 431 S29	A276 Gr. 431
4	Valve Seat Gasket	Mild Steel		
5	Ball Return Spring	Stainless Steel		
6	Main Return Spring	Stainless Steel		
7	Bonnet	Brass	BS 970 070 M20	A108 Grade 1022
8	Bonnet Gasket	Nickle Reinforced Exfoliated Graphite		

Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only.  
In the interests of development and improvement of the product, we reserve the right to change the specification.

# BM and BMRA Cast Steel Valves

## DIMENSIONS (NOMINAL) IN INCHES AND MILLIMETERS

SIZE DN	ANSI 300 B	C	WEIGHT
1/2 15	5.0 127	3.4 87	8.0 lb 3.6 kg



## C<sub>v</sub> at P Band\*

Valve	BM2	BM3	BM4	BM6	BMRA
C <sub>v</sub>	0.44	0.74	1.20	1.92	0.66
P Band (°F)*	5.4°	8°	8°	8°	8°

\* The proportional band (P Band) is the difference required between the desired set temperature and the actual controlled temperature to open the valve fully. The above figures apply to valves fitted with 121 or 123 control systems. For 122 or 128 systems, the P Band will be twice the amount shown. Example: For a BM3 valve with a 122 control system, the valve will not fully open until the controlled temperature drops to 16°F below the set point. For complete sizing information, see TIS 1.011 (steam) or TIS 1.012 (water).

## Sample Specification

Control valve shall be steel body with stainless steel trim, single seated with flanged pipe connections. Valve shall achieve ANSI Class IV Shutoff. Valve is coupled to the appropriate temperature control system. This combined unit is self acting and provides proportional control action. The temperature control system shall be brass with PVC covered capillary or stainless steel sensor and capillary, oil filled, hydraulically operated; and shall incorporate packless glands and a gas filled overheat protection device. Temperature setting shall be adjustable while control is in service, include °F adjustment scale and shall incorporate a tamper proof device. When required, sensor bulb shall be mounted in a separable well for removal from the equipment. Refer to TIS 1.900 or 1.901 for temperature control system details.

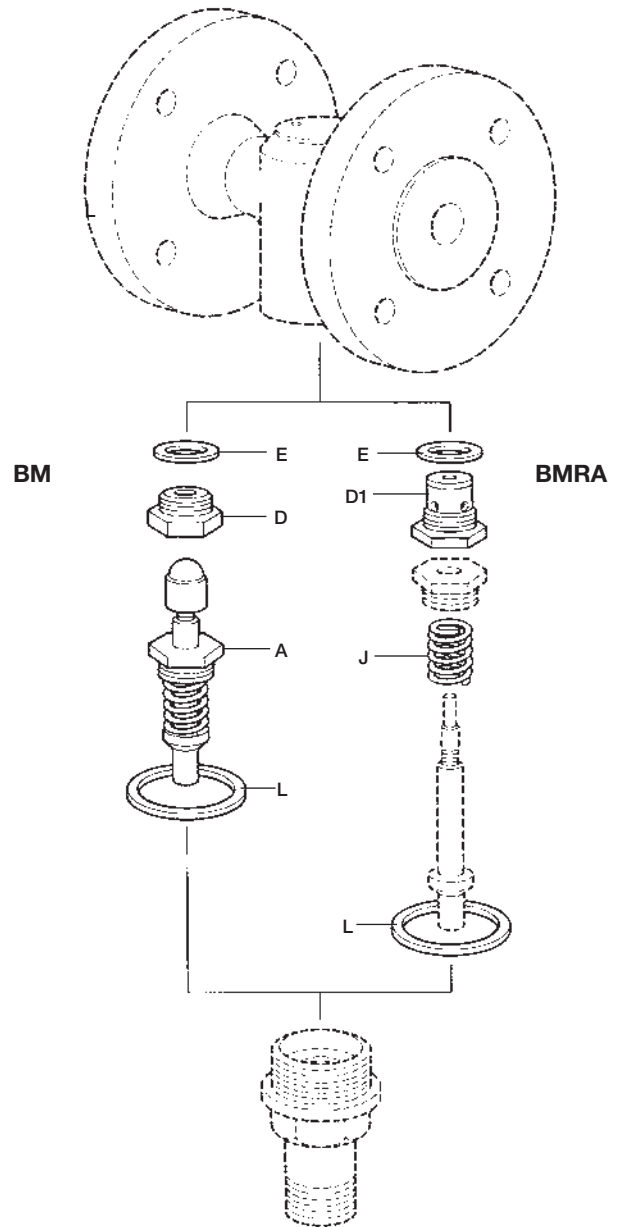
## Installation

The valve should be installed in a horizontal section of the heating or cooling medium inlet piping. The control system connection must point vertically downward. A bypass with suitable stop valves should be provided to permit servicing, and a Y-pattern strainer should be installed upstream of the valve. If the valve is smaller than the pipeline, eccentric reducers should be used. In a steam system, a steam trap should be installed upstream of the valve to ensure that the steam entering the valve is as dry as possible.

## Maintenance

Except for periodic cleaning of the upstream strainer, maintenance or servicing is normally required only if a malfunction is detected. Complete installation and maintenance instructions are given in the IMI sheet, which accompanies the product.

## Spare Parts



Valve Seat Assembly	BM	A, D, E, L
Valve Seat Assembly	BMRA	J, D1, E, L
Gasket Set	(pkt of 3 each)	L, E

# spirax sarco

## KA 43, KB 43 and KC 43 Cast Steel Valves

**KA 43** - Normally open, closes with rising temperature for heating. Single seat.

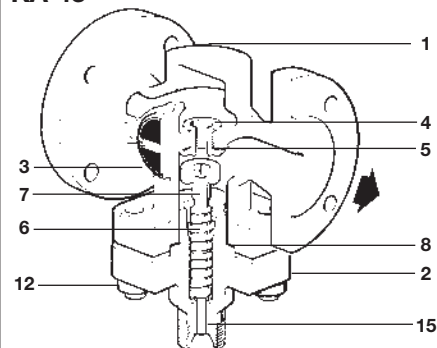
**KB 43** - Normally open, closes with rising temperature for heating. Single seat with phosphor bronze pressure balancing bellows.

**KC 43** - Normally open, closes with rising temperature for heating. Single seat with stainless steel pressure balancing bellows.

The pressure balancing bellows enables the valve to operate against higher differential pressure.

Model	KA 43	KB 43	KC 43
Sizes	1/2" to 2"	1", 1-1/4", 1-1/2", 2"	1-1/4", 1-1/2", 2"
Connections	ANSI 300 flanged		
Construction	Carbon Steel Body Stainless Steel Trim		
Options	ANSI 150 flanges		

KA 43



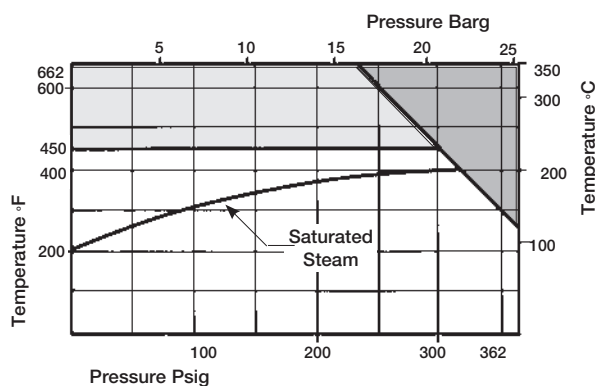
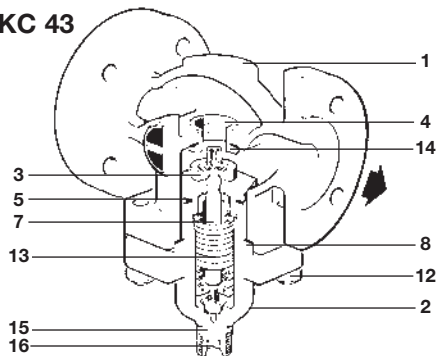
### Limiting Operating Conditions

#### Maximum Differential Pressure

Size-DN	KA 43	KB 43	KC 43
1/2 15 mm	250 psi 17 bar		
3/4 20 mm	145 psi 10 bar		
1 25 mm	65 psi 4.5 bar	145 psi 10 bar	
1-1/4 32 mm	43 psi 3 bar	130 psi 9 bar	232 psi 16 bar
1-1/2 40 mm	29 psi 2 bar	119 psi 8.2 bar	232 psi 16 bar
2 50 mm	21 psi 1.5 bar	100 psi 6.9 bar	200 psi 13.8 bar

\* On liquid applications, the permissible maximum differential pressure may be affected by high static pressure. Please consult the factory if the application requires a large differential pressure with a high inlet pressure.

KB 43, KC 43



If a KA 43 or KC 43 valve is to be used in this region, a spacer (stock #0467000) must be fitted between the valve and the control system to protect the control system from overheating. The KB 43 valve cannot be used with a spacer, and is limited to 450°F.

The valves must not be used in this region

The valves may be used in this region provided that the above maximum differential pressures are not exceeded. Valves with ANSI flanges must not be used above flange limits.

SHUTOFF: ANSI CLASS IV

### Construction Materials

No.	Part	Material	Material Spec.	Closest Equivalent
1	Body	Steel	DIN 17245 GSC 25	A216 Gr WCB
2	Bonnet	Steel	DIN 17245 GSC 25	A216 Gr WCB
3	Valve	Stainless Steel	BS 970 431 S29	A276 Type 431
4	Valve Seat	Stainless Steel	BS 970 431 S29	A276 Type 431
5	Valve Seat Gasket			
	1/2 to 1	Mild Steel	BS 1449 CS 4	A366
	1-1/4 to 2	Nickle Reinforced Exfoliated Graphite		
6	Return Spring	Stainless Steel	BS 970 302 S25	
7	Push Rod KA & KB	Brass	BS 2872 CZ 121 4 Pb	
	KC	Stainless Steel	BS 970 321 S20	
8	Bonnet Gasket	Nickle Reinforced Exfoliated Graphite		
12	Bonnet Studs	Steel	BS 4439 Gr. 8.8	A354
	Bonnet Nuts	Steel	BS 3692 Gr 8	ANSI B18.2.4.1 W
	1/2 to 1-1/2	M10 x 35		
	2	M12 x 35		
13	Bellows KB	Phosphor Bronze		
	KC	Stainless Steel	AISI 316 L	
14	Bellows Gasket	Nickle Reinforced Exfoliated Graphite		
15	Bonnet Bush	Brass	BS 2874 CZ 121	B16M
16	Plunger	Brass	BS 2874 CZ 121	B16M

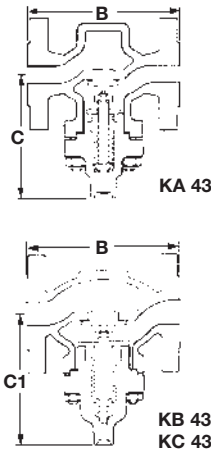
Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only.  
In the interests of development and improvement of the product, we reserve the right to change the specification.

TI-1-808-US 06.10

# KA 43, KB 43 and KC 43 Cast Steel Valves

Dimensions (nominal) in inches and millimeters						
Size	ANSI 300		Weight			
	B	C	C1	KA	KB/KC	
1/2	5.1 130	4.1 105	—	9.5 lb 4.3 kg	—	
3/4	5.9 150	4.1 105	—	13.9 lb 6.3 kg	—	
1	6.3 160	4.1 105	5.4* 138	17.6 lb 8.0 kg	18.1 lb 8.2 kg	
1-1/4	7.1 180	4.3 110	6.0 152	19.2 lb 8.7 kg	20.0 lb 9.1 kg	
1-1/2	8.0 202	4.3 110	6.0 152	24.4 lb 9.7 kg	22.3 lb 10.1 kg	
2	9.2 232	4.3 110	7.3 187	32.2 lb 14.6 kg	33.1 lb 15.0 kg	

\* KC 43 is not available in 1" size



## Pressure Shell Design Conditions

**PMA** 362 psig/248°F 25 barg/120°C  
 Max. allowable pressure 290 psig/482°F 20 barg/250°C  
 188 psig/750°F 13 barg/400°C

**TMA** 750°F/0-188 psig 400°C/0-13 barg  
 Max. allowable temperature

## Typical Applications

Small process applications using steam or hot water as a heating medium.

## C<sub>v</sub> at P Band\*

Size	1/2	3/4	1	1-1/4	1-1/2	2
KA & KB	3.36	5.4	11.4	19.2	27.6	39.6
KC				19.2	19.2	39.6
P Band (°F)*	8°	10°	12.4°	20°	22.5°	23.8°

\* The proportional band (P Band) is the difference required between the desired set temperature and the actual controlled temperature to open the valve fully. The above figures apply to valves fitted with 121 or 123 control systems. For 122 or 128 systems, (which cannot be used on valves larger than 1") the P Band will be twice the amount shown.

Example: For a 1" KA 43 valve with a 122 control system, the valve will not fully open until the controlled temperature drops to 24.8°F below the set point. For complete sizing information, see TIS 1.011 (steam) or TIS 1.012 (water).

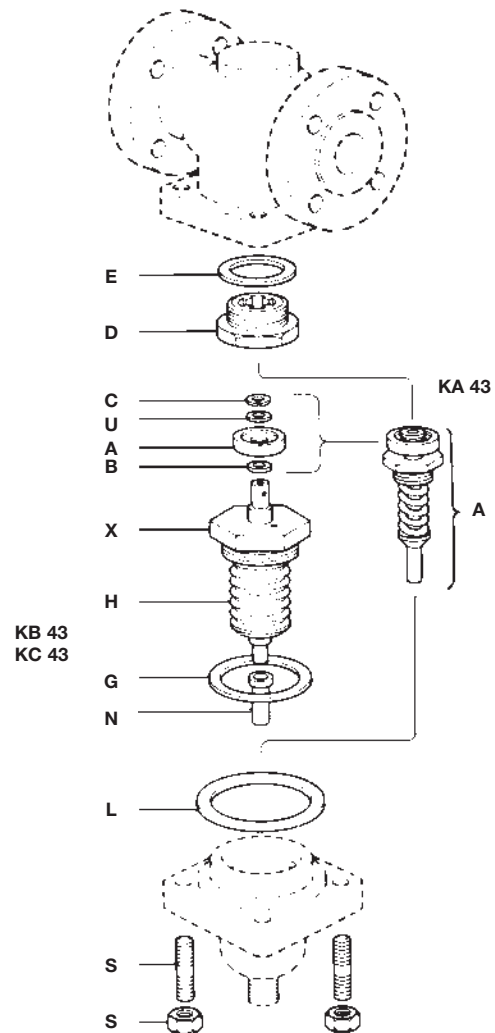
## Sample Specification

Control valve shall be steel body with stainless steel trim, single seated with flanged pipe connections. Valve shall achieve ANSI Class IV Shutoff. Valve is coupled to the appropriate temperature control system. This combined unit is self acting and provides proportional control action. The temperature control system shall be brass with PVC covered capillary or stainless steel sensor and capillary, oil filled, hydraulically operated; and shall incorporate packless glands and a gas filled overheat protection device. Temperature setting shall be adjustable while control is in service, include °F adjustment scale and shall incorporate a tamper proof device. When required, sensor bulb shall be mounted in a separable well for removal from the equipment. Refer to TIS 1.900 or 1.901 for temperature control system details.

## Installation

The valve should be installed in a horizontal section of the heating medium inlet piping. The control system connection must point vertically downward. A bypass with suitable stop valves should be provided to permit servicing, and a Y-pattern strainer should be installed upstream of the valve. If the valve is smaller than the pipeline, eccentric reducers should be used. In a steam system, a steam trap should be installed upstream of the valve to ensure that the steam entering the valve is as dry as possible.

## Spare Parts



### KA 43

Valve & Seat Assembly	A, D, E, L
Set of all Gaskets	E, L
Set of Bonnet Studs & Nuts (set of 4)	S

### KB & KC 43

Valve & Seat Assembly	A, B, C, D, E, L, U, G excluding Bellows & Push Rod)
Bellows & Push Rod Assembly	G, L, H, N
Set of all Gaskets	B, C, E, L, U, G
Set of Bonnet Studs & Nuts (set of 4)	S

Available spare parts are shown in heavy outline. Parts drawn in broken line are not supplied as spares.

## Maintenance

Except for periodic cleaning of the upstream strainer, maintenance or servicing is normally required only if a malfunction is detected. Complete installation and maintenance instructions are given in the IMI sheet, which accompanies the product.

TI-1-808-US 06.10



## TW 3 Port Valve for Liquid Systems

The TW is a 3-way self actuated temperature control valve which may be used on liquid systems as either a diversion valve for heating or cooling, or a mixing valve for blending hot and cold water.

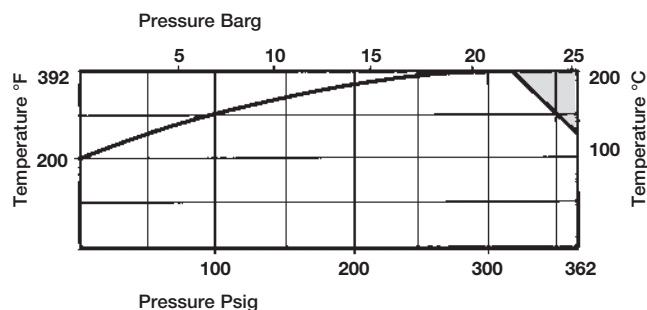
<b>Model</b>	<b>TW</b>
<b>Sizes</b>	3/4", 1", 1-1/2"
<b>Connections</b>	NPT
<b>Construction</b>	Bronze

### Limiting Operating Conditions

#### Maximum Differential Pressure

3/4" to 1-1/2" 50 psi 3.4 bar

### Operating Range



The valves must not be used in this region

The valves may be used in this region provided that the above maximum differential pressures are not exceeded. Valves with ANSI flanges must not be used above flange limits.

SHUTOFF: ANSI CLASS III

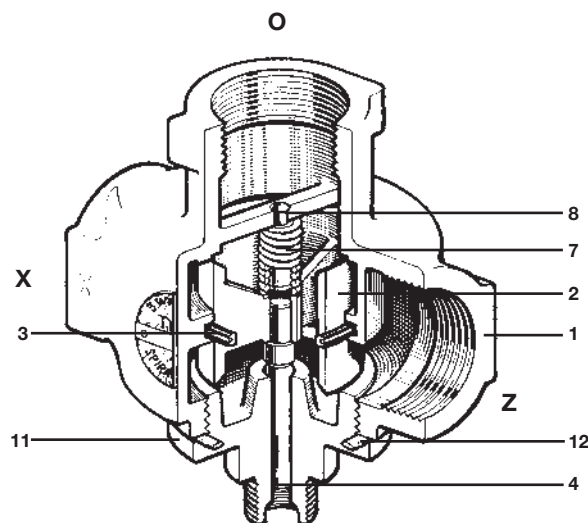
### Pressure Shell Design Conditions

**PMA** 362 psig/0-248°F 25 barg/120°C  
Max. allowable pressure 319 psig/0-392°F 22 barg/0-200°C

**TMA** 392°F/0-319 psig 200°C/0-22 barg  
Max. allowable temperature

### Typical Applications

Industrial or commercial applications using water as a heating or cooling medium.



### Construction Materials

No.	Part	Material	Material Spec.	Closest Equivalent
1	Body	Bronze	BS 1400 LG2	B62 UNS 83600
2	Piston	Bronze	BS 1400 LG2	B62 UNS 83600
3	Piston Sealing Ring	Carbon Impregnated PTFE		
4	Stem	Brass	BS 2874 CZ 121	B16M
7	Return Spring	Stainless Steel	BS 2056 302 S26	A313 Type 302
8	Return Spring Plate	Brass	BS 2874 CZ 121	B16M
11	Bonnet	Brass	BS 2874 CZ 121	B16M
12	Bonnet Gasket	Nickle Reinforced Exfoliated Graphite		

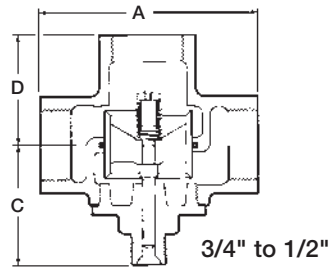
Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only. In the interests of development and improvement of the product, we reserve the right to change the specification.



# TW 3 Port Valve for Liquid Systems

## Dimensions (nominal) in inches and millimeters Screwed

SIZE	A	C	D	WEIGHT
3/4"	3.8 97	2.3 58	2.1 54	2.7 lb 1.2 kg
1"	4.5 114	2.4 61	2.2 57	4.3 lb 1.9 kg
1-1/2"	5.9 151	3.0 76	2.8 70	8.5 lb 3.8 kg



## Sample Specification

Control valve shall be bronze body, bronze trim, piston balanced 3 port with screwed connections. Valve shall achieve ANSI Class III Shutoff. Valve is coupled to the appropriate temperature control system. This combined unit is self acting and provides proportional control action. The temperature control system shall be brass with PVC covered capillary or stainless steel sensor and capillary, oil filled, hydraulically operated; and shall incorporate packless glands and a gas filled overheat protection device. Temperature setting shall be adjustable while control is in service include, °F adjustment scale and shall incorporate a tamper proof device. When required, sensor bulb shall be mounted in a separable well for removal from the equipment. Refer to TIS 1.900 or 1.901 for temperature control system details.

## Piping Arrangements

Application	Port 'O'	Port 'X'	Port 'Z'
Diversion Valve - Heating	Flow in	to heating surface	to recirculation
Diversion Valve - Cooling	Flow in	to recirculation	to cooling surface
Mixing Valve	Blended Outlet	Hot flow in	Cold flow in

Note: Port 'X' closes on high temperature; port 'Z' closes on low temperature; Port 'O' is always open

## Cv Values

3/4"	1"	1-1/2"
5.4	10.5	24

For complete sizing information, see TIS 1.012

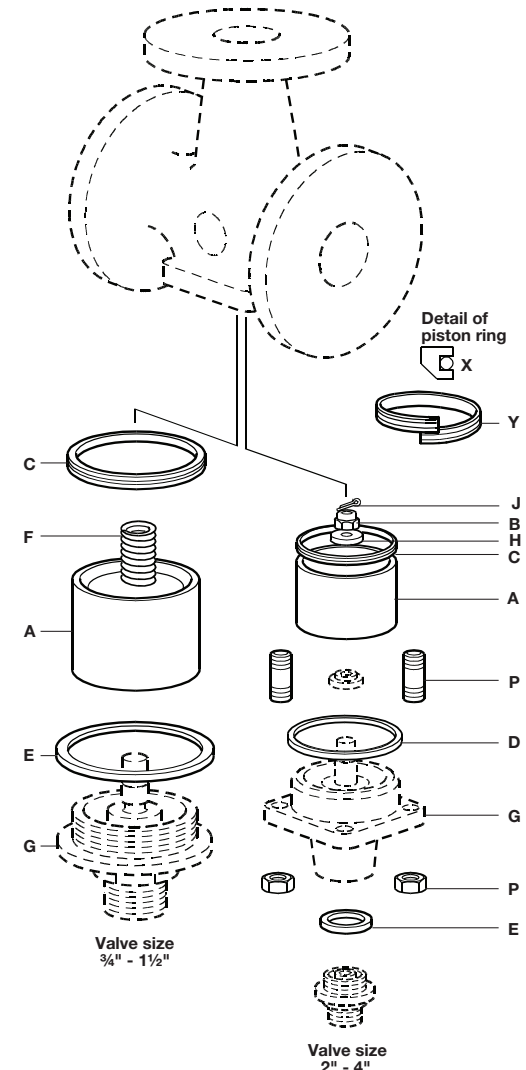
## Installation

The valve should be installed in a horizontal section of pipe with the control system connection pointing vertically downward. Suitable stop valves should be provided to permit servicing, and Y-pattern strainers should be installed in the inlet piping. The valve ports are marked 'O', 'X' and 'Z', and piping instructions are supplied with each valve.

## Maintenance

Except for periodic cleaning of the upstream strainer, maintenance or servicing is normally required only if a malfunction is detected. **Complete installation and maintenance instructions are given in the IMI sheet, which accompanies the product.**

## Spare Parts



Piston Sealing Ring 2", 3"	C, D, E
Piston Sealing Ring 3/4", 1 1/2"	C, E, F
Piston Set 3/4", 1 1/2"	A, C, E, F
Piston Set 2", 3"	A, B, C, D, E, J, H
Set of Cover Studs & Nuts	P

Available spare parts are shown in heavy outline. Parts drawn in broken line are not supplied as spares.

TI-1-809-US 2.14



## Self Acting Temperature Control Systems

### Description

A range of self-powered control systems that incorporate sensor, actuator, set point adjustment/indicator for use with the following valve types:

2-port	KA, KB, KC, KX, KY, SB, SBRA, BX, BXRA, BM, BMRA, BMF, BMFRA, NS, NSRA,
3-port	TW

### Available Types

#### Set point adjustment at sensor

SA121	For use on	2-port valves	1/2" to 3"
		3-port valves	3/4" to 1-1/2"
SA128	For use on	2-port valves	1/2" to 1"
		3-port valves	3/4" and 1"

#### Set point adjustment at valve

SA122	For use on	2-port valves	1/2" to 1"
		3-port valves	3/4" and 1"

#### Remote set point adjustment

SA123	For use on	2-port valves	1/2" to 3"
		3-port valves	3/4" to 1-1/2"

Connection - NPT

### Optional Extras

**Union Kit (SA122)** Direct immersion

**Pocket** Indirect immersion

Material options include mild steel, copper, brass, stainless steel  
Glass option also available for SA122 and SA123 only

**Wall bracket**

**Duct adaptor** Duct mounting

**Coiled Sensor** Fast response

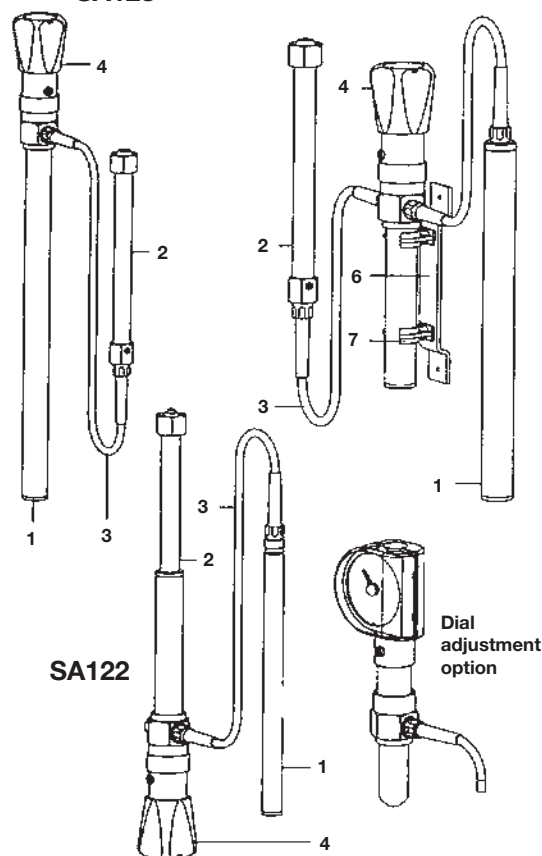
**Nickel plating**

**Dial Type Set Point Adjuster**

**Pt100 Temperature Sensor** SA122TP and SA123TP incorporate an internal pocket to accept a Pt100 sensor.

SA121 and  
SA128

SA123



SA122

Dial  
adjustment  
option

### Temperature Ranges

#### Set point adjustment at sensor

SA121	Range 1	5° to 125°F (-15°C to 50°C)
	Range 2	105° to 225°F (40° to 105°C)
SA123	Range 3	205° to 320°F (95°C to 160°C)

Over temperature protection 100°F (55°C) over set value to 375°F (190°C) maximum

SA122	Range 1	0° to 250°F (-20°C to 120°C)
	Range 2	105° to 340°F (40°C to 170°C)

Over temperature protection 100°F (55°C) over set value to 375°F (190°C) maximum

SA128	Range 1	0° to 230°F (-20°C to 110°C)
	Range 2	105° to 340°F (40°C to 170°C)

Over temperature protection 100°F (55°C) over set value to 375°F (190°C) maximum

### Capillary Tube

Standard length 2 m, 4m, 8m, and 20 m.

### Construction Materials

No	Part	Material
1	Sensor	Brass
2	Actuator	Brass
3	Capillary tube	Copper with a PVC coated armoured covering
4	Adjustment head	Polypropylene
*5	Union kit	Brass
6	Mounting bracket	Steel
7	Clip	Polypropylene
*8	Adaptor plate (Duct fixing adaptor)	Steel
*9	Pocket Brass	Mild steel BS 980 CEW2
		Copper BS 2871 C106
		Stainless steel BS 2817 CZ126
10	Liquid fill	Kerosene BS 3605 CFS 316S 18

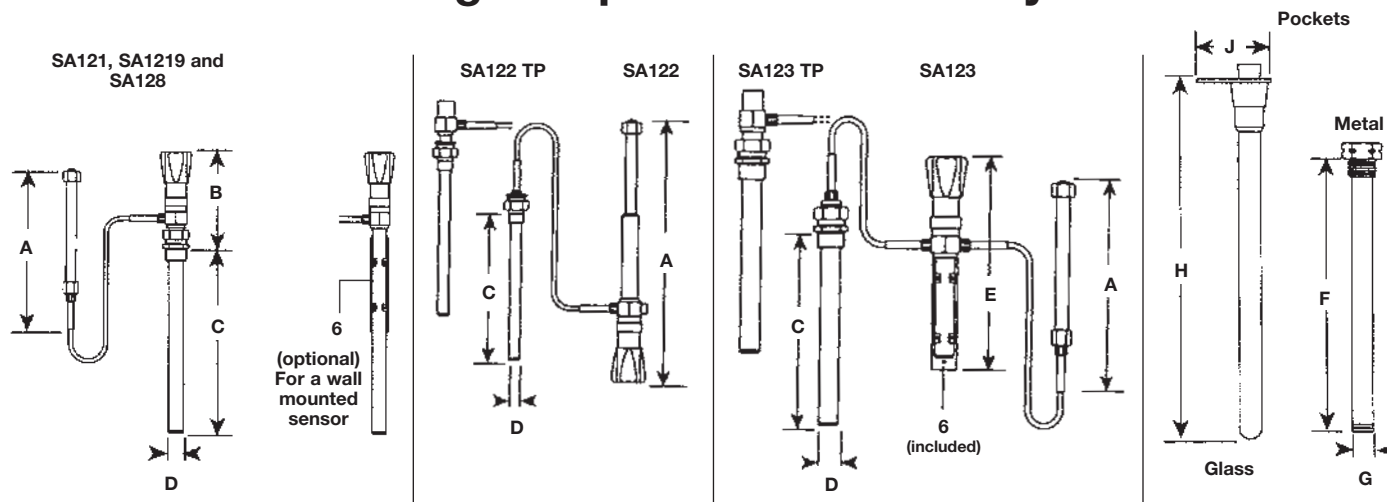
\*Items 5,8, and 9 are shown overleaf

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# Self Acting Temperature Control Systems



**Dimensions / Weight (approximate) in inches & millimeters**

Model	A	B	Control System			Metal Pockets		Glass Pockets		Weight excluding
			C	D	E	F	G	H	J	
SA121	11.0 (275)	7.2 (185)	12.2 (310)	1.0 (25)	-	12.5 (315)	1.1 (28)	-	-	4.5lb (2.0)
SA122	16.3 (415)	-	9.4 (240)	.67 (17)	-	10.1 (258)	.8 (20)	255 (575)	4.5 (117)	4.0lb (1.8)
SA122TP	16.3 (415)	-	10.4 (225)	.67 (17)	-	10.1 (258)	.8 (20)	-	-	4.5lb (2.0)
SA123	11.0 (275)	-	9.7 (248)	1.0 (25)	10.6 (270)	10.1 (258)	1.1 (28)	225 (575)	4.5 (117)	5.8lb (2.5)
SA123TP	11.0 (275)	-	10.4 (225)	1.0 (25)	10.6 (270)	10.1 (258)	1.1 (28)	-	-	5.8lb (2.7)
SA128	11.0 (275)	7.2 (185)	6.7 (178)	1.0 (25)	-	7.0 (180)	1.1 (28)	-	-	4.0lb (1.8)

## Union Kit (for sensor immersion without pocket)

Includes gland nut, compression ring and union nipple.

SA121, SA123 and SA128	Items Z, Y and X included with controller
SA122	Items W, V and U optional - not included

## Pockets (for indirect immersion)

Includes pocket, gland nut, and compression ring.

SA121, SA123 and SA128	Items T, Z, and Y
SA122	Items S, W, and V
Available materials	Mild steel, copper, brass and stainless steel

## Long Pockets (SA122 and SA123 only)

To special order only.

Having a minimum length 0.5m, maximum length to order.

Includes pocket, bracket and rubber bung.

SA121 and SA123	Items S, V, W and T, Z, Y
Available Materials	Mild steel, copper, brass and stainless steel

## Glass Pockets (SA122 and SA123 only)

To special order only.

Includes pocket, bracket and rubber bung.

SA122 and SA123	Items R, O, and P
-----------------	-------------------

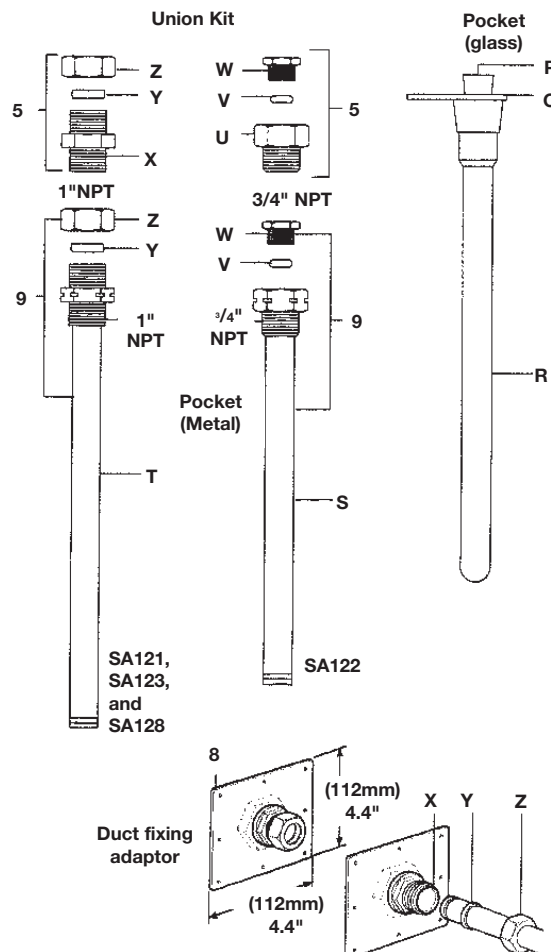
## Wall Mounting Bracket (Item 6)

SA121, SA122, SA123 and SA128	Optional
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## Duct Fixing Adaptor (for air sensing within ducts)

Includes adaptor plate, union nipple, compression ring and gland nut.

SA121, SA123 and SA128	Items 8, X, Y, and Z
SA122	Not available



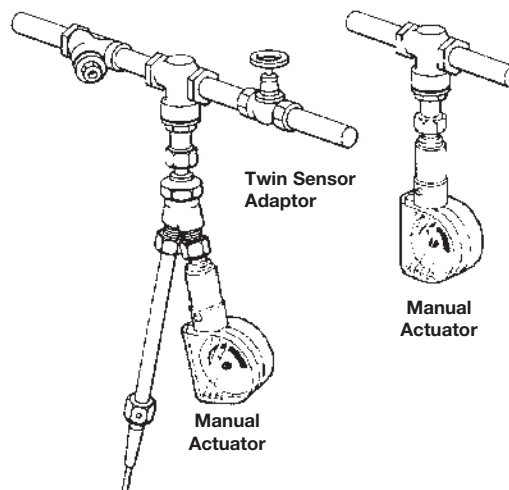
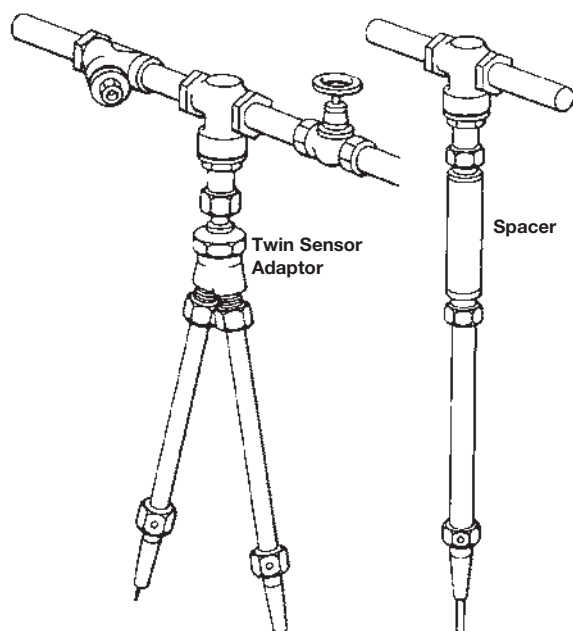
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# spirax/sarco

## Temperature Control Ancillaries

### Twin Sensor Adaptor

When coupled to a 2 port or 3 port valve allows the valve to be operated by either actuator.

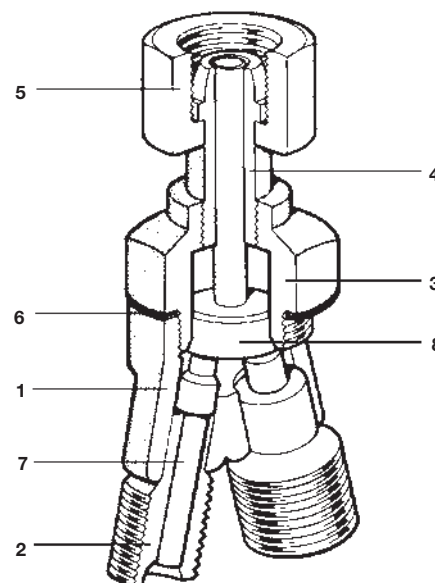
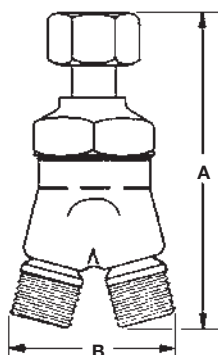


### Construction Materials

No.	Part	Material	
1	Body	Brass	BS 2872 CZ 122
2	Connector	Brass	BS 2872 CZ 121
3	Lower Body	Brass	BS 2872 CZ 121
4	Nipple	Brass	BS 2872 CZ 121
5	Valve Coupling Nut	Brass	BS 2872 CZ 121
6	Body Gasket	Compressed Asbestos Fiber	BS 2815 Gr. A
7	Push Rod	Brass	BS 2872 CZ 121
8	Plunger	Brass	BS 2872 CZ 121

### Dimensions (nominal) in inches & millimeters

A	B	Weight
4.2	2.3	1.6 lb
108	60	0.72 kg



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# Temperature Control Ancillaries

## Spacer

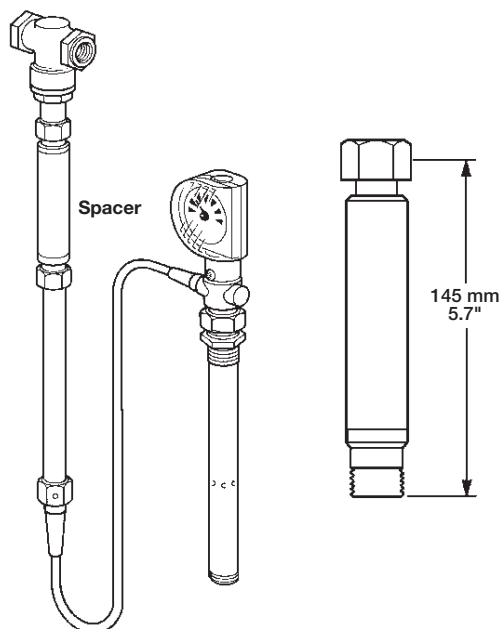
When coupled between a 2 port or 3 port valve and the actuator, it enables the system to operate at a higher temperature. Each Valve has its individual limiting conditions, but when coupled to a Control System, these are governed by the brass actuator which is limited to 450°F (232°C). Installing the spacer between the valve and the control system enables the system to operate at a maximum temperature of 662°F (350°C).

## Limiting Conditions

Maximum pressure 362 psi 25 bar  
Maximum temperature 662°F 350 °C

## CONSTRUCTION MATERIALS

Part	Material
Case	Brass BS 2871 part 2 CZ 162
(1972) Bellows	Stainless Steel AISI 321



## Manual Actuator

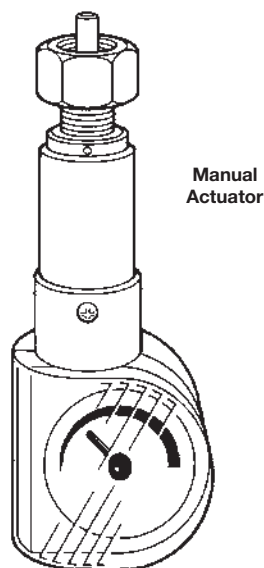
When coupled to a 2 port or a 3 port valve, it enables the valve to be manually operated.

## Tamper Proof

The Unit is provided with a lockable head to prevent unauthorized tampering with the setting.

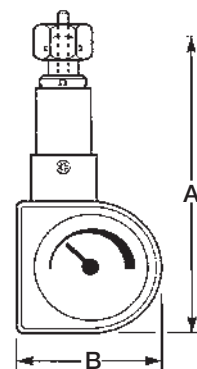
## Materials

Brass with plastic adjustment head



## Dimensions (nominal) in inches & millimeters

A	B	Weight
6.3	2.2	0.5 lb
160	55	0.2 kg



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## Steam Capacities 2 Port Valves

### Steam Capacities - Pounds of saturated steam per hour

Steam Pressure		1/2" BX & BM				SB			KA			KB				KC		NS	
Inlet	Outlet	2	3	4	6	1/2	3/4	1	1/2	3/4	1	1	1-1/4	1-1/2	2	1-1/2	2	2-1/2	3
2	0	8	13	21	33	52	78	137	58	94	198	198	333	479	687	333	687	1,310	1,890
3	0	9	16	26	41	64	96	168	71	115	242	242	408	587	842	408	842	1,610	2,320
5	3	8	14	23	37	57	86	150	64	103	217	217	366	525	754	366	754	1440	2080
5	1	11	19	30	49	76	114	200	85	137	289	289	487	700	1000	487	1000	1920	2720
7	5	9	15	24	39	60	90	159	67	108	229	229	386	554	795	386	795	1520	2190
7	2	13	22	35	56	88	132	231	98	158	333	333	561	807	1160	561	1160	2210	3190
10	7	11	19	31	50	77	116	204	87	139	294	294	496	713	1020	496	1020	1950	2820
10	5	14	24	38	61	95	143	250	107	171	362	362	610	876	1260	610	1260	2400	3470
12	9	12	20	32	52	81	121	213	91	146	308	308	518	745	1070	518	1070	2040	2950
12	7	15	25	40	64	100	150	263	112	180	380	380	640	920	1320	640	1320	2520	3640
12	0	19	31	51	82	128	191	336	143	230	485	485	816	1170	1680	816	1680	3210	4640
15	12	13	21	34	55	86	129	226	96	155	326	326	550	790	1130	550	1130	2170	3130
15	9	17	28	46	73	114	172	301	128	206	435	435	733	1050	1510	733	1510	2880	4170
15	0/3	21	35	57	91	142	214	375	160	257	542	542	912	1310	1880	912	1880	3590	5190
20	17	14	23	37	60	94	140	247	105	169	356	356	599	861	1240	599	1240	2360	3410
20	13	20	33	53	86	134	201	352	150	241	508	508	856	1230	1760	856	1760	3370	4870
20	0/5	24	41	67	107	167	250	439	187	300	633	633	1070	1530	2200	1070	2200	4200	6060
30	26	18	30	49	78	122	184	323	137	220	465	465	784	1130	1620	784	1620	3090	4460
30	22	24	41	66	105	164	247	433	184	296	625	625	1050	1510	2170	1050	2170	4150	5990
30	0/12	31	53	86	137	215	322	565	240	386	815	815	1370	1970	2830	1370	2830	5410	7810
40	34	24	40	66	105	164	246	432	184	295	624	624	1050	1510	2170	1050	2170	4140	5970
40	30	30	50	81	130	203	304	534	227	365	771	771	1300	1870	2680	1300	2680	5110	7390
40	0/17	39	65	105	168	263	394	691	294	473	998	998	1680	2420	3470	1680	3470	6620	9560
50	43	28	48	77	123	193	289	508	216	347	733	733	1230	1770	2550	1230	2550	4860	7020
50	37	37	61	100	159	249	373	655	279	448	946	946	1590	2290	3290	1590	3290	6270	9060
50	0/22	46	77	124	199	311	466	818	348	559	1180	1180	1990	2860	4100	1990	4100	7830	11300
60	52	33	55	89	142	222	333	584	248	399	843	843	1420	2040	2930	1420	2930	5590	8070
60	46	41	69	112	179	280	420	737	313	504	1060	1060	1790	2570	3690	1790	3690	7050	10190
60	0/30	53	88	143	229	359	538	944	402	645	1360	1360	2290	3300	4730	2290	4730	9040	13050
75	65	40	67	108	173	271	407	714	304	488		1030	1735	2490	3575	1735	3575	6830	9870
75	57	51	85	138	221	345	517	908	386	620		1310	2210	3170	4550	2210	4650	8690	12550
75	0/37	63	106	172	275	430	645	1130	482	775		1640	2760	3960	5680	2760	5680	10850	15670
100	90	46	77	124	199	310	465	820	348	560		1180	1990	2860	4100	1990	4100	7830	11310
100	78	64	107	173	277	435	650	1140	485	780		1650	2770	3990	5720	2770	5720	10930	15780
100	0/52	81	136	220	352	550	825	1450	615	990		2090	3520	5070	7270	3520	7270	13870	20040
125	112	57	96	156	250	390	585		435	700		1480	2490			2490	5140	9820	14180
125	98	78	131	212	339	530	795		590	950		2010	3390			3390	6990	13340	19280
125	0/66	98	165	268	430	670	1010		750	1210		2550	4290			4290	8850	16900	24410
150	133	71	119	192	308	480	720		540							3080	6350	12120	17510
150	117	93	156	253	405	630	950		710							4050	8350	15950	23040
150	0/80	116	195	315	505	790	1185		885							5060	10440	19920	28780
175	157	78	132	213	340	535			600							3420	7040		
175	138	106	178	290	460	720			810							4620	9530		
175	0/95	133	225	365	580	910			1020							5830	12020		
200	180	88	148	240	385	600			670							3830	7910		
200	158	120	202	325	525	820			915							5230	10790		
200	0/109	150	255	410	660	1030			1150							6600	13600		
250	225	110	185	300	475	745			830										
250	196	150	250	410	655	1020			1150										
250	0/138	185	315	510	815	1270			1420										

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# Steam Capacities 2 Port Valves

Unless a control valve is correctly sized, the most sensitive and accurate thermostat cannot give satisfactory control. If the valve is too big, it can cause a "hunting" and rapid wear on the valve head and seat due to wire drawing. Valves too small increase heat-up time and may be incapable of maintaining temperature on heavy load.

The capacity of any valve depends on the difference in pressure between the inlet and outlet (the pressure drop.)

In the case of steam valves, it also depends on the inlet pressure.

## Using the Steam Chart

Proper valve selection requires the following information:

- 1) Required flow in pounds of steam per hour.
- 2) Inlet steam pressure immediately ahead of the valve.
- 3) Allowable pressure drop across the valve. On steam applications where it is impossible to calculate the allowable pressure drop, 10% to 20% of the absolute inlet pressure should be used on most applications. Higher pressure drops imply low pressures within the heat exchanger and maximum heater rating may not be achieved.
- 4) Select valve which meets the above requirements and has suitable end connections and body materials.

## Valve Capacity Factors

Type	C <sub>v</sub>
1/2 BX2, BM2	0.44
1/2 BX3, BM4	0.74
1/2 BX4, BM4	1.20
1/2 BX6, BM6	1.92
1/2 SB	3.0
3/4 SB	4.5
1 SB	7.9
1/2 KA	3.36
3/4 KA	5.4
1 KA, KB	11.4
1-1/4 KB, KC	19.2
1-1/2 KB	27.6
1-1/2 KC	19.2
2 KB, KC	39.6
2-1/2 NS	75.6
3 NS	109.2

### 1. For Liquids

$$C_v = \text{GPM} \sqrt{\frac{\text{Sp. Gr.}}{\text{Pressure Drop, psi}}}$$

Where Sp. Gr. Water = 1  
GPM = Gallons per minute

### 2. For Steam (Saturated)

#### a. Critical Flow

When  $\Delta P$  is greater than

$$F_L^2 (P_1/2)$$

$$C_v = \frac{W}{1.83 F_L P_1}$$

#### b. Noncritical Flow

When  $\Delta P$  is less than

$$F_L^2 (P_1/2)$$

$$C_v = \frac{W}{2.1 \sqrt{\Delta P (P_1 + P_2)}}$$

Where:

P<sub>1</sub> = Inlet Pressure psia

P<sub>2</sub> = Outlet Pressure psia

W = Capacity lb/hr

F<sub>L</sub> = Pressure Recovery Factor  
(.9 on globe pattern valves for flow to open)  
(.85 on globe pattern valves for flow to close)

### 3. For Air and Other Gases

#### a. When P<sub>2</sub> is 0.53 P<sub>1</sub> or less,

$$C_v = \frac{\text{SCFH} \sqrt{\text{Sp. Gr.}}}{30.5 P_1}$$

Where Sp. Gr. of air is 1.  
SCFH is Cu. ft. Free Air per Hour at 14.7 psia, and 60°F.

#### b. When P<sub>2</sub> is greater than 0.53 P<sub>1</sub>,

$$C_v = \frac{\text{SCFH} \sqrt{\text{Sp. Gr.}}}{61 \sqrt{(P_1 - P_2) P_2}}$$

Where Sp. Gr. of air is 1.  
SCFH is Cu. Ft. Free Air per Hour at 14.7 psia, and 60°F.

### 4. Correction for Superheated Steam

The required Valve C<sub>v</sub> is the C<sub>v</sub> from the formula multiplied by the correction factor.

Correction Factor =

$$1 + (.00065 \times \text{degrees F. superheat above saturation})$$

Example: With 25°F of Superheat, Correction Factor = 1 + (.00065 x 25) = 1.01625

### 5. Correction for Moisture Content

Correction Factor =

$$\sqrt{\text{Dryness Fraction}}$$

Example: With 4% moisture, Correction Factor =  $\sqrt{1 - 0.04} = 0.98$

### 6. Gas—Correction for Temperature

Correction Factor =

$$\sqrt{\frac{460 + ^\circ\text{F}}{520}}$$

Example: If gas temperature is 150°F, Correction Factor =

$$\sqrt{\frac{460 + 150}{520}} = 1.083$$

## Spira-trol Valve Capacities for Proportional Band Range of 2°F to 14°F

### Cv Table based on sensors 121,123, 422 and 423

Valve Type	Size	Proportional Band								Max C <sub>v</sub>	Max. Proportional Band @
		2°F (± 1°)	3°F (± 1-1/2°)	4°F (± 2°)	6°F (± 3°)	8°F (± 4°)	10°F (± 5°)	12°F (± 6°)	14°F (± 7°)		
BX BM	1/2" BX2/BM2	.23	.32	.39	.44	—	—	—	—	—	—
	1/2" BX3/BM3	.24	.36	.48	.68	.74	—	—	—	0.74	7.9°F
	1/2" BX4/BM4	.43	.61	.75	.98	1.2	—	—	—	1.2	7.9°F
	1/2" BX6/BM6	.56	.80	1.1	1.5	1.9	—	—	—	1.9	7.9°F
BXRA/BMRA	1/2"	.18	.26	.35	.52	.66	—	—	—	0.66	7.9°F
SB SBRA	1/2"	1.1	1.6	2.1	2.7	3.0	—	—	—	3.0	7.9°F
	3/4"	1.8	2.5	3.2	4.0	4.5	—	—	—	4.5	7.9°F
	1"	2.6	3.6	4.6	6.3	7.5	7.9	—	—	7.9	10°F
K Series KC 1-1/2" has same rating as KC 1-1/4"	1/2"	1.5	2.1	2.6	3.2	3.4	—	—	—	3.4	7.9°F
	3/4"	1.6	2.2	2.7	3.7	4.6	5.4	—	—	5.4	10°F
	1"	3.1	4.6	6.0	8.4	10.0	10.6	11.0	11.4	11.4	14°F
	1-1/4"	3.5	5.3	7.0	10.0	12.3	14.3	16.0	17.0	19.2	20°F
	1-1/2"	3.7	5.5	7.3	10.6	13.6	16.3	19.0	22.0	27.6	22.5°F
NS NSRA	2"	3.8	5.8	7.6	11.5	15.0	19.0	23.0	27.0	39.6	23.8°F
	2-1/2"	8.8	13.0	17.4	26.0	35.0	43.0	51.0	60.0	75.6	23.8°F
TW*	3"	17.0	25.0	33.0	48.0	65.0	80.0	92.0	98.0	109	23.8°F
	3/4"	—	—	—	—	5.4	—	—	—	—	—
	1"	—	—	—	—	—	10.1	—	—	—	—
* size 3-port valves on Max. C <sub>v</sub>	1-1.2"	—	—	—	—	—	—	—	27	—	—

For Sensor Types 122 & 128, double proportional bands given above.

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## Water Capacities 2 and 3 Port Valves

### Using the Water Chart

From the chart, select a valve that passes the required flow at the maximum allowable differential pressure. Follow the vertical pressure line and choose a suitable normally open or normally closed valve with the required capacity.

### Valve Capacity Factors

#### 2 Port Normally Open Valves (for heating) $C_v$

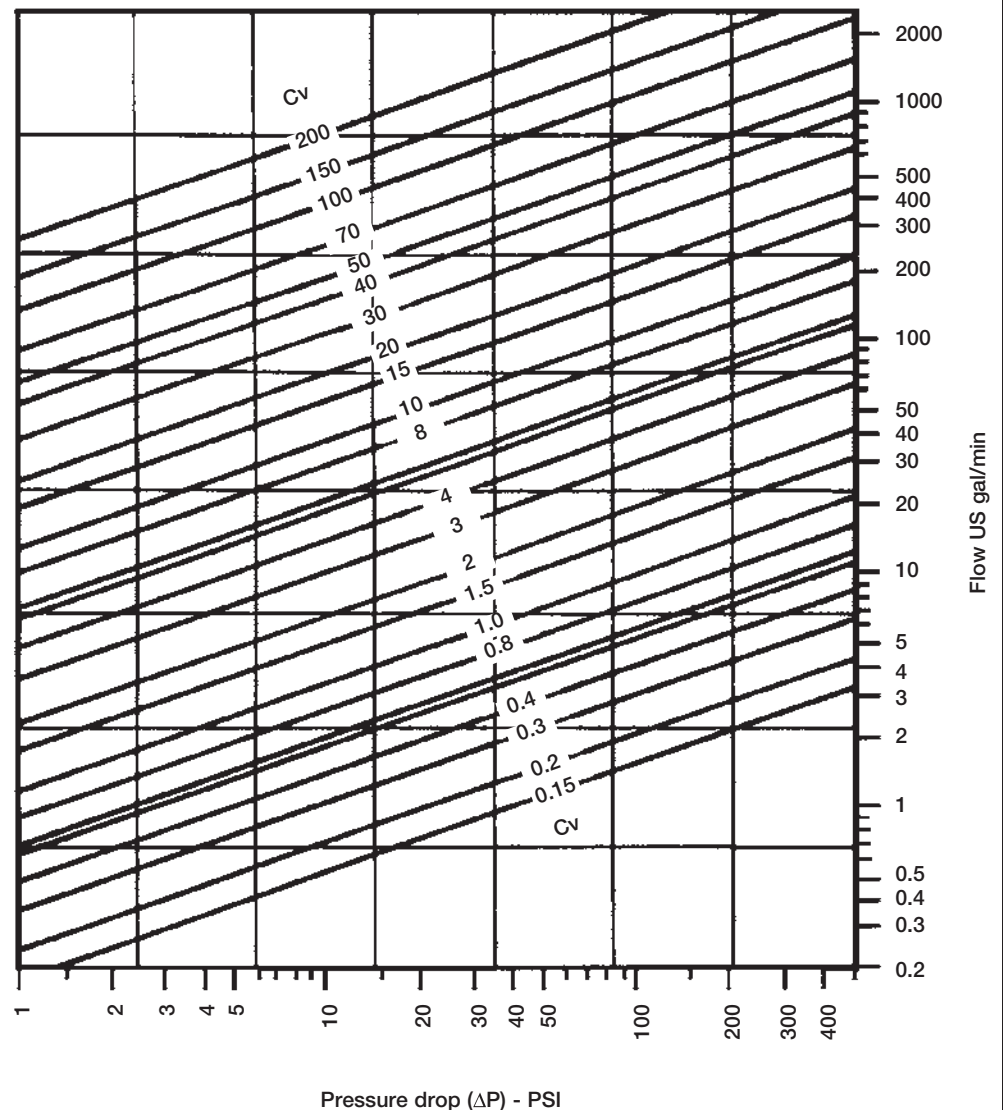
1/2	BX2, BM2	0.44
1/2	BX3, BM3	0.74
1/2	BX4, BM4	1.20
1/2	BX6, BM6	1.92
1/2	SB	3.0
3/4	SB	4.5
1	SB	7.9
1/2	KA	3.36
3/4	KA	5.4
1	KA, KB	11.4
1-1/4	KB, KC	19.2
1-1/2	KC	19.2
1-1/2	KB	27.6
2	KB, KC	39.6
2-1/2	NS	75.6
3	NS	109.2

#### 2 Port Normally Closed Valves (for cooling) $C_v$

1/2	BXRA, BMRA	0.66
1/2	SBRA	3.0
3/4	SBRA	4.5
1	SBRA	7.9
1	KX	11.4
1-1/4	KY	19.2
1-1/2	KY	27.6
2	KY	39.6
2-1/2	NSRA	75.6
3	NSRA	109.2

#### 3 Port Valves $C_v$

3/4	TW	5.4
1	TW	10.5
1-1/2	TW	24





## Direct Operated Pressure Regulator 25MP

The 25MP is a direct acting steam pressure reducing valve. Downstream pressure is fed back through an external sensing line.

<b>Model</b>	<b>25MP</b>
<b>Sizes</b>	½"
<b>Connections</b>	NPT
<b>Construction</b>	Cast Iron

### Construction Materials

No.	Part	Material	
1	Body	Cast Iron	ASTM A 126 CL B
2	Lower Diaphragm Housing	Cast Iron	ASTM A 126 CL B
3	Diaphragm Bolts	Steel	ASTM A449
4	Upper Case Diaphragm	Cast Iron	ASTM A 126 CL B
5	Adjustment Screw	Stainless Steel	AISI 300 series
6	Jam Nut	Brass	ASTM B16
7	Adjustment Spring	Carbon Steel	AISI 1060
8	Spring Plate	Steel	ASTM A 569
9	Diaphragm Plate	Brass	ASTM 36(260)
10	Diaphragm	Phosphor Bronze	ASTM B 103 Alloy A
11	Stem	Stainless Steel	AISI 303
12	Valve Head	Stainless Steel	AISI 440A
13	Valve Seat	Stainless Steel	400 Series STN Steel
14	Stem Guide	Stainless Steel	AISI 303
15	Stem Guide Gasket	Stainless Steel	AISI 302
16	Pilot Valve Spring	Stainless Steel	AISI 302
17	Pilot Valve Assy. Gasket	Graphite	AISI 302
18	Cover Plate	Stainless Steel	AISI 300 Series
19	Retaining Ring	Brass	ASTM B 36

### Limiting Operating Conditions

**Max. Operating Pressure (PMO)** 250 psig (17 barg)

**Max. Operating Temperature** 450°F (232°C)

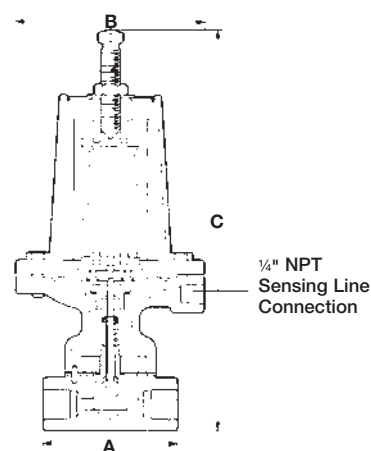
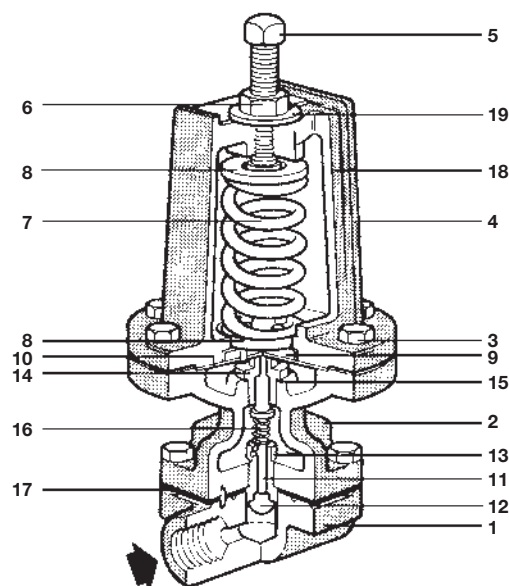
### Downstream Pressure Ranges

For the following downstream pressures, three color-coded pilot valve springs are available:

**Yellow:** 3 to 30 psi    **Blue:** 20 to 100 psi    **Red:** 80 to 250 psi  
    0.2 to 2.8 bar                      2.8 to 10.3 bar                      10.3 to 13.8 bar

### Typical Applications

Small steam pressure reducing applications where an 80% to 90% accuracy of regulation is acceptable.



### Dimensions (nominal) in inches and millimeters

Size	A	B	C	Weight
½"	3.5 89	4.9 125	9.75 248	9.75 lb 4.45 kg



# Direct Operated Pressure Regulator 25MP

**Capacity** – Pounds of saturated steam per hour at 80% accuracy of regulation

Inlet Steam Pressure		Reduced Steam Pressure														
psig		2	5	10	15	20	30	40	50	60	75	100	125	150	175	200
	bar	.14	.34	.69	1.03	1.38	2.07	2.76	3.45	4.14	5.17	6.89	8.62	10.3	12.1	13.8
15	1.03	8	10	15												
30	2.07	12	18	27	31	33										
50	3.45	15	20	30	37	46	50	57								
75	5.17	17	23	48	59	73	74	78	73	72						
100	6.89	19	39	56	70	85	93	110	92	98	94					
125	8.62			68	85	102	118	122	116	125	128	119				
150	10.3			85	105	124	139	139	139	142	145	143	139			
175	12.1			97	123	140	159	163	150	159	162	164	162	157		
200	13.8			114	137	160	182	188	173	187	191	194	197	190	167	
250	17.2			137	164	192	218	226	224	228	230	233	232	234	222	210
300	20.6				185	210	245	270	260	265	272	275	216	280	280	275

for kg/hr, multiply by .454

## Capacity & Accuracy of Regulation

Capacity of the type MP regulator is based upon the accuracy of regulation of the reduced pressure, and chart values are given for an accuracy of regulation of 80%. This means that, for example, at a reduction of 100 psi to 20 psi, the capacity will be 85 lbs/hr when the reduced pressure drops to 80% of the 20 psi initial setting or 16 psi.

The following multipliers can be used to determine the capacity for other percent of accuracy of regulation values.

Accuracy of Regulation	Capacity Chart Multiplier
75%	1.25
80%	1.0
85%	0.75
90%	0.5

## Sample Specification

The pressure regulator shall be direct-acting with an external pressure sensing line. The valve trim shall be hardened stainless steel, and the body shall be cast iron.

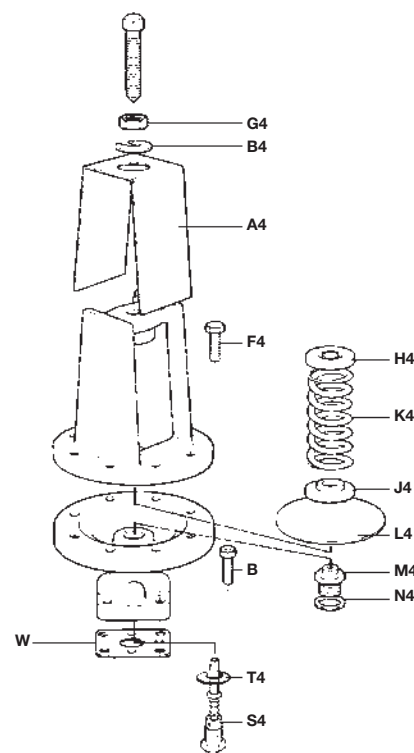
## Installation

The regulator should be installed in a horizontal line with suitable bypass and isolating valves. A steam trap should be installed upstream to prevent condensate from reaching the regulator. The trap and regulator should both be protected with a strainer. The pressure sensing line should be located in a straight section of the downstream piping at least 10 pipe diameters from the nearest fitting, or in the steam space.

## Maintenance

Complete installation and maintenance instructions are given in IM-3-104-US, a copy of which is supplied with each valve.

## Spare Parts



Cover Plate w/ Retaining Ring	A4, B4
Pilot Screws w/ Gasket	B, W
Adjustment Screw w/ Nut, and Upper and Lower Spring Support Disc	G4, H4
Adjustment Spring	J4
Specify controlled pressure and spring color	K4
Yellow	3 to 30 psi
Blue	20 to 100 psi
Red	80 to 250 psi
Diaphragm Assembly	L4
Stem Guide w/ Gasket	M4, N4
Head & Seat Assembly w/ Gasket	S4, T4
Square Gasket for all Pilots (set of 3)	W



## Direct Operated Pressure Regulator LRV2

The LRV2 is a direct operated pressure regulator suitable for liquid applications.

Model	LRV2S (Stainless Steel Bellows)
Sizes	1/2", 3/4", 1"
Connections	NPT
Construction	Bronze
Options	LRV2B with phosphor bronze/brass bellows.

### Construction Materials

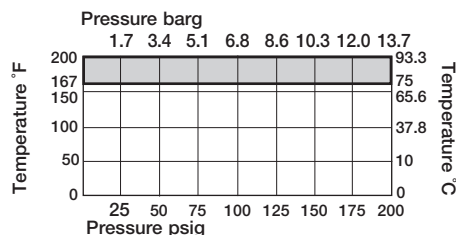
No.	Part	Material Spec.	
1	Spring Housing	Aluminum - Epoxy coated	LM 24
2	Adjustment Hand Wheel	Plastic - Polypropylene	
3	Top Spring Plate	Cast Iron	DIN 1691 GG 20
4	Pressure Adjustment Spring	Silicone Chrome Spring Steel	BS 2803 685 A55 Range 2
5	Bellows Assembly	Stainless Steel	316Ti/316L
6	Bellows Assembly Gasket	Reinforced Exfoliated Graphite	
7	Cap Screws	Steel - Zinc plated M8 x 25 mm	BS 3692 Gr 8.8
8	Body	Bronze	BS1400 LG2
9	Guide Bush	Graphite filled PTFE	
10	Pushrod	Stainless Steel	ASTM A276 316L
11	Valve Seat	Stainless Steel	BS 970 431 S29
12	Valve Seat Gasket	Stainless Steel	BS 1449 316 S11
13	Piston	Stainless Steel	BS970 431 S29
14	Valve Head	Nitrile Rubber	
15	Piston Return Spring	Stainless Steel	BS2056 Gr302 S26
16	Strainer Screen	Stainless Steel	BS 1449 304 S16
17	Cap	Brass	BS 2872 CZ 122
18	Cap Gasket	Reinforced Exfoliated Graphite	
19	Spring Range ID Plate	Polypropylene	
20	Bulkhead Plate	Stainless Steel	316L
21	Tamperproof Pin	Mild Steel - Copper Plated	

### Limiting Operating Conditions - Liquid

**Max. Upstream Pressure** 200 psig (14 barg)

**Max. Downstream Pressure** 115 psig (8.6 barg)

**Max. Cold Hydraulic Test** 550 psig (38 barg)



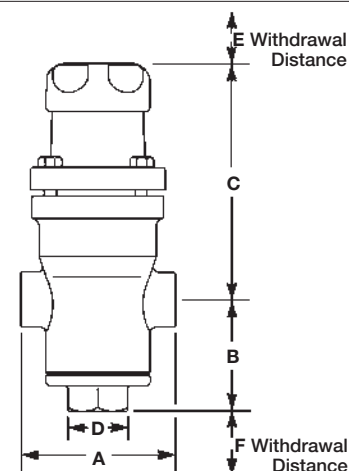
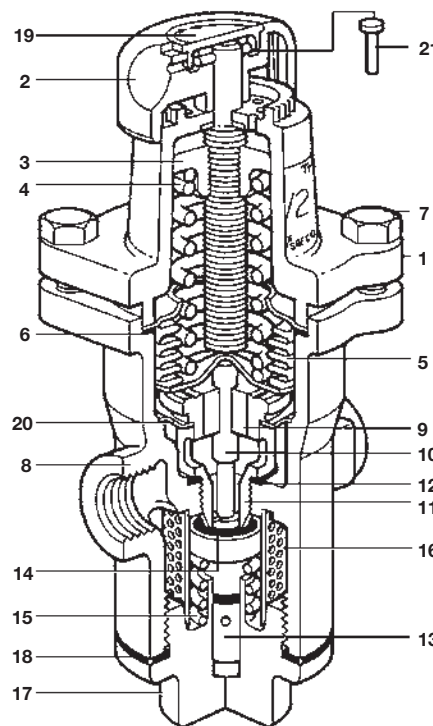
### Downstream Pressure Ranges

For the following downstream pressures, three color-coded springs are available. Where the pressures overlap, use the lowest pressure spring to give the downstream pressure required:

**Grey:** 5 to 25 psi  
0.14 to 1.7 barg

**Green:** 20 to 60 psi  
1.4 to 4.0 barg

**Orange:** 51 to 125 psi  
3.5 to 8.6 barg



### Dimensions (nominal) in inches and millimeters

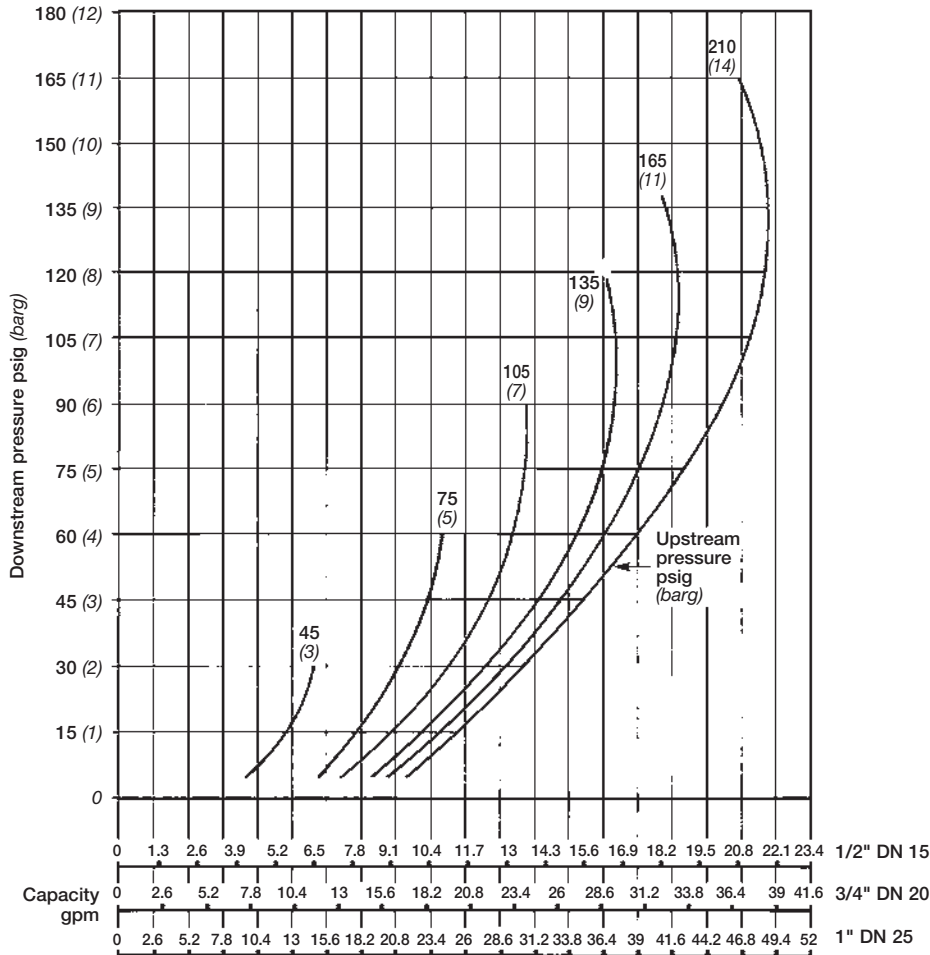
Size	A	B	C	D	E	F	Weight
1/2"	3.26 83	2.44 62	5.11 130	1.26 32	.98 25	1.57 40	4.41 lb 2.0 kg
3/4"	3.78 96	2.44 62	5.11 130	1.26 32	.98 25	1.57 40	4.41 lb 2.0 kg
1"	4.25 108	2.44 62	5.11 130	1.26 32	.98 25	1.57 40	4.41 lb 2.0 kg

# Direct Operated Pressure Regulator LRV2

## Capacities – Water capacities in gpm

Full lift capacities for safety valve sizing are shown below:

	1/2" (DN15)	3/4" (DN20)	1" (DN25)
$Cv_s (Kv_s)$	2.4 (2.1)	4.2 (3.6)	5.0 (4.3)



## How to use the chart

The curved lines labelled 45, 70, 105, etc., represent upstream pressures. Downstream pressure is read along the vertical line on the left hand side of the chart.

### Example:

Required, a reducing valve to pass water at the rate of 11.7 gpm reducing from 105 to 60 psi. From the downstream pressure of 60 psi on the left hand side of the chart extend out horizontally until the line meets the curved 105 upstream line. At the point read vertically downwards where it will be seen that a 1/2" valve (with a 50-125 psi spring) will be required.

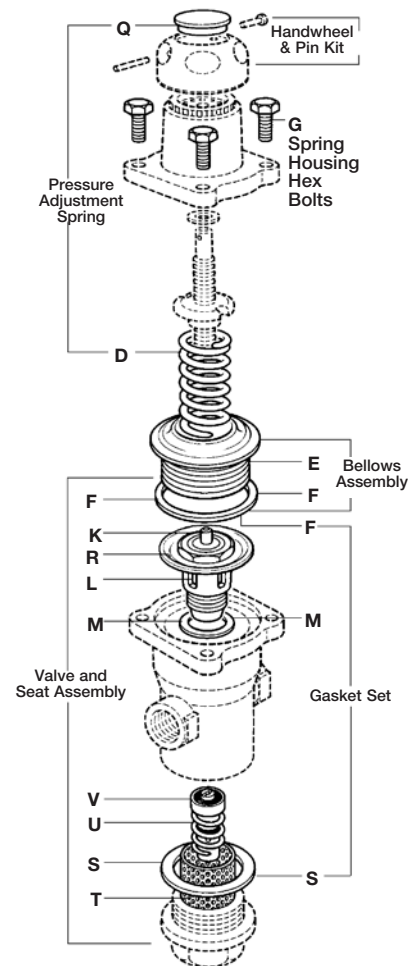
## How to order

1-1/2" Spirax Sarco LRV2 Pressure Reducing Valve with Bronze body and fitted with orange spring (50 to 125 psi).

## Installation

The valve should be installed in a horizontal pipeline with the direction of flow as indicated by the arrow on the valve body. Full installation and maintenance instructions are supplied with the product. (IM-P001-08)

## Spare Parts



## Spare Parts

The spare parts available are shown in heavy outline. Parts drawn in broken line are not supplied as spares.

### AVAILABLE SPARE

* Pressure Adjustment Spring	
Grey 0.35/1.7 bar g	D, Q
Green 1.4/4.0 bar g	D, Q
Orange 3.5/8.6 bar g	D, Q
* Bellows Assembly - Stainless Steel	E, F
* Spring Housing Hex Bolts (set of 4)	G
* Piston and Seat Assembly	F, R, L, M, V, U, T, S
* Gasket Set	F, M, S
* Screen	T

\* Common to all sizes

### How to order

Always order spares by using the description given in the column headed Available Spare and stating the size, type and pressure range of the reducing valve.  
Example: Pressure Adjustment Spring, pressure range 50-125 psi (orange) for 1/2" Spirax Sarco Type LRV2S Reducing Valve.

TIS 3.103 US 03.10

# spirax sarco

## Direct Operated Pressure Regulator BRV2S

<b>Model</b>	BRV2S (Stainless Steel Bellows)
<b>Sizes</b>	1/2", 3/4", 1"
<b>Connections</b>	NPT
<b>Construction</b>	Ductile Iron

The BRV2 is a direct acting pressure reducing valve suitable for steam or gases, such as compressed air.

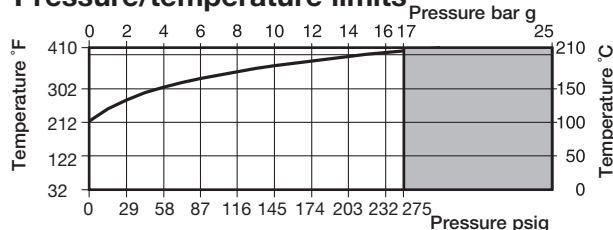
### Construction Materials

No.	Part	Material	Material Spec.
1	Spring Housing	Aluminum Epoxy Coated	LM 24
2	Adjustment Hand Wheel	Mineral Reinforced Nylon	
3	Top Spring Plate	Cast Iron	DIN 1691 GG 20
4	Pressure Adjustment Spring	Silicone Chrome Spring Steel	BS 2803 685 A55 Range 2
5	Bellows Assembly Option:	Stainless Steel Phosphor Bronze/Brass	316Ti/316L BS 2872 C2122
6	Bellows Assembly Gasket	Stainless Steel Reinforced Exfoliated Graphite	
7	Spring Housing Bolts	Steel-Zinc plated M8 x 25 mm	BS 3692 Gr 8.8
8	Body - Screwed & Flanged	SG Iron	DIN 1693 GGG40.3
9	Guide Bush	Graphite Filled PTFE	
10	Pushrod	Stainless Steel	ASTM A276 Gr 316L
11	Valve Seat	Stainless Steel	BS 970 431 S29
12	Valve Seat Gasket	Stainless Steel	BS 1449 316 S11
13	Valve	Stainless Steel	AISI 420
14	Valve Return Spring	Stainless Steel	BS 20056 316 S42
15	Strainer Screen	Stainless Steel	BS 1449 316 SH
16	Spring Range Identification Disc	Polypropylene	
17	Bulkhead Plate	Stainless Steel	316L
18	Tamperproof Pin	Mild Steel - Copper Plated	
19	Blanking Plug	Stainless Steel	BS970 431 S29
20	Compression Fitting	Brass	

### Limiting Operating Conditions - steam or gas

<b>Max. Upstream Pressure</b>	275 psig (19 barg)
<b>Max. Downstream Pressure</b>	125 psig (8.0 barg)
<b>Max. Operating Temperature</b>	410°F (210°C)
<b>Max. Cold Hydraulic Test</b>	550 psig (38 barg)
<b>Max. Recommended Turndown Ratio</b>	10:1 psig at Maximum Flow
<b>Shutoff ANSI Class</b>	Class IV

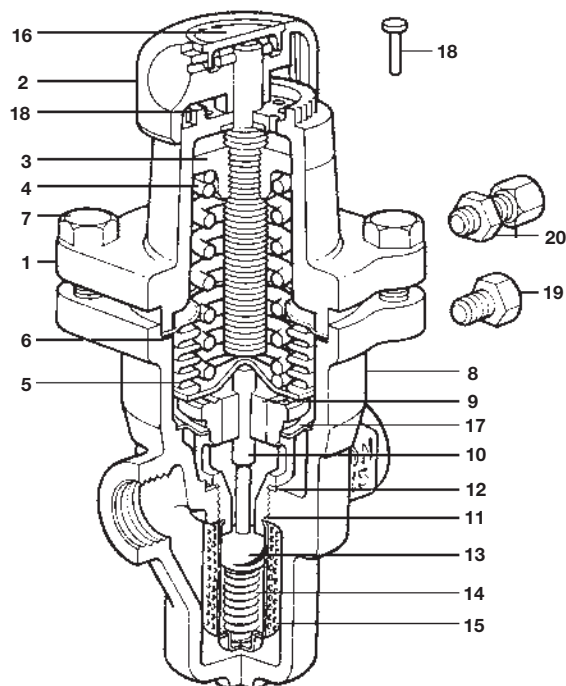
### Pressure/temperature limits



### Downstream Pressure Ranges

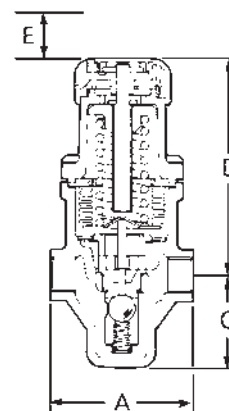
For the following downstream pressures, three color-coded springs are available. Where the pressures overlap, use the lowest pressure spring to give the downstream pressure required:

<b>Grey:</b> 2 to 25 psig 0.14 to 1.7 barg	<b>Green:</b> 20 to 60 psig 1.4 to 4.0 barg	<b>Orange:</b> 50 to 125 psig 3.5 to 8.6 barg
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### Typical Applications

Small steam or gas pressure reducing applications.



### Dimensions (nominal) in inches and millimeters

Size	A	C	D	E	Weight
				Withdrawal Distance	
1/2" DN15	3.3 83	2.2 55	5.0 126.5	1.0 25	3.4 lb 1.55 kg
3/4" DN20	3.8 96	2.2 55	5.0 126.5	1.0 25	3.6 lb 1.65 kg
1" DN25	4.25 108	2.2 55	5.0 126.5	1.0 25	4.2 lb 1.90 kg

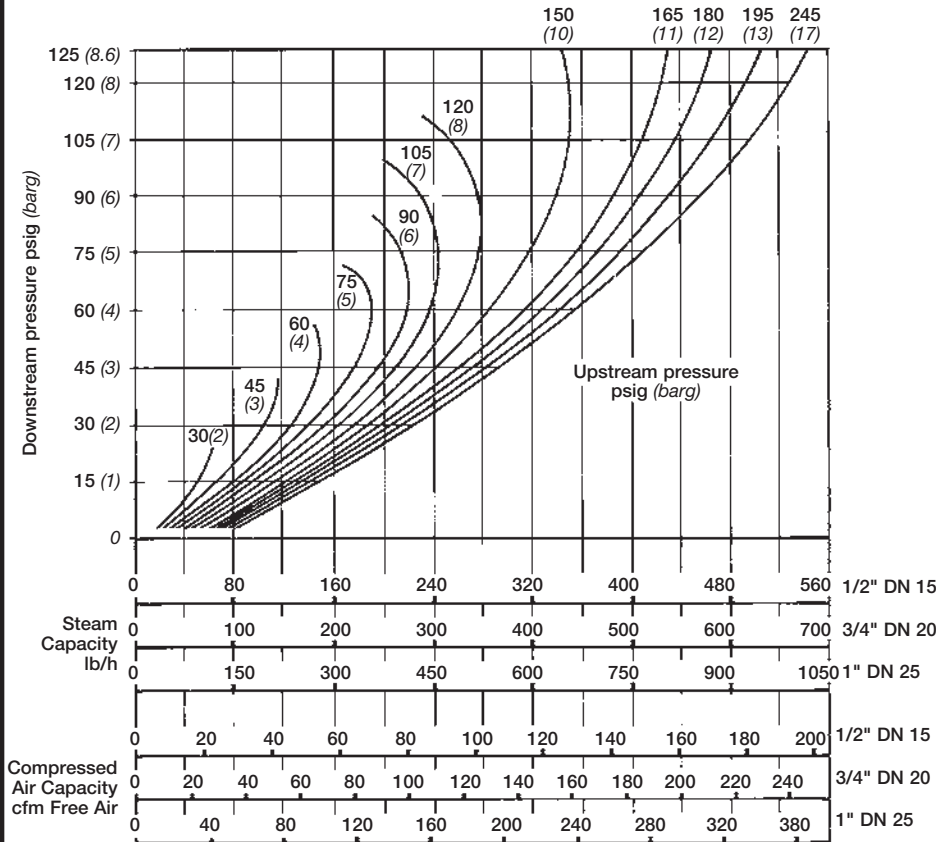
Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only.  
In the interests of development and improvement of the product, we reserve the right to change the specification.

# Direct Operated Pressure Regulator BRV2S

## Capacities – Saturated steam capacities in lb/h

Full lift capacities for safety valve sizing are shown below:

	1/2" (DN15)	3/4" (DN20)	1" (DN25)
$C_v$ ( $K_v$ )	1.8 (1.5)	2.9 (2.5)	3.5 (3.0)



## How to use the chart

The curved lines labelled 30, 45, 60, etc., represent upstream pressures. Downstream pressures are read along the vertical line on the left hand side of the chart.

### Example:

Required, a reducing valve to pass 160 lb/h reducing from 150 to 60 psi. From the downstream pressure of 60 on the left hand side of the chart extend out horizontally until the line meets the curved 150 psi upstream line. At this point, read vertically downward where it will be seen that 1/2" BRV2S will be required.

## Installation and Maintenance

The valve should be installed in a horizontal pipeline with the direction of flow as indicated by the arrow on the valve body.

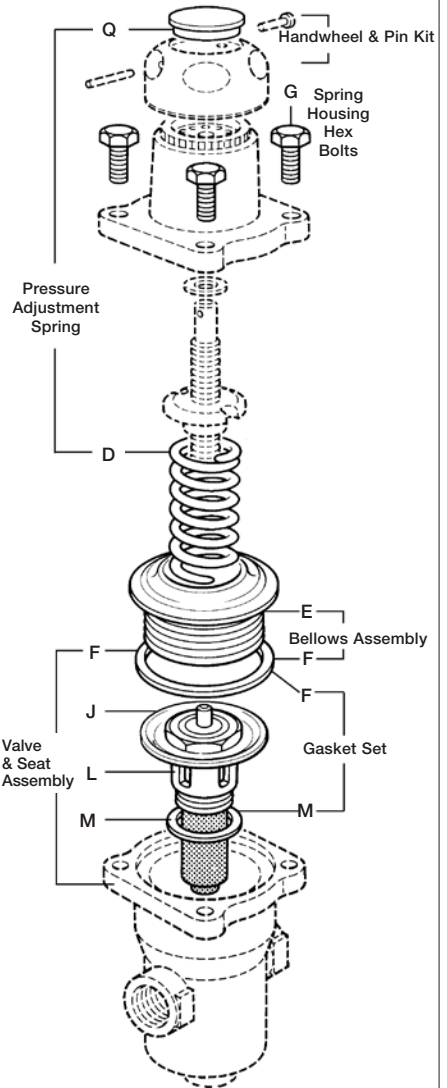
When the required set pressure has been achieved, the tamper proof pin may be used to prevent further pressure adjustments.

Any strainer fitted upstream of the BRV2S, and the strainer screen fitted inside the valve should be cleaned regularly so that the flow to the valve is not restricted. Full Installation and Maintenance Instructions are supplied with each product. (IM-P045-10)

### BRV2SP/BRV2BP

When external pressure sensing is used, remove the blanking plug (19) and fit the 1/8"/6mm O/D compressing fitting (20-supplied). The other end of the 6mm sensing pipe should be connected into the downstream pipework at least 1m downstream from the valve. For more detail, see Installation and Maintenance Instructions.

## Spare Parts



### Spare Parts

The spare parts available are shown in heavy outline. Parts drawn in broken line are not supplied as spares.

#### AVAILABLE SPARES

Valve and seat assembly	F,M,L,J
* Bellows Assembly (Stainless Steel)	E,F
Option Phosphor Bronze/Brass	
* Spring Housing Hex bolts (set of 4)	G
* Pressure Adjustment Spring	D,Q
Grey 2-25 psig • Green 20-60 psig	
Orange 50-125 psig	
* Gasket set	F,M
* Common to all sizes.	

#### How to order

Always order spares by using the description given in the column headed Available Spare and stating the size, type and pressure range of the reducing valve.

Example: Pressure Adjustment Spring, pressure range 50-125 psig (orange) for 1/2" Spirax Sarco Type BRV2S Reducing Valve.

TI-3-107-US 04.14





## Stainless Steel Direct Operated Pressure Regulator SRV2S

The SRV2S is a compact, stainless steel, direct acting pressure reducing valve for steam or gases such as compressed air. All wetted parts are constructed in 316L stainless steel.

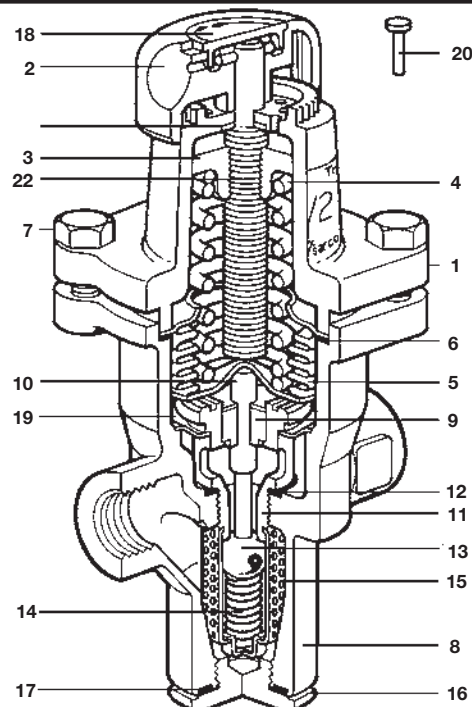
<b>Model</b>	SRV2S
<b>Sizes</b>	1/2", 3/4", 1"
<b>Connections</b>	NPT
<b>Construction</b>	Stainless Steel
<b>Options</b>	Flanged ANSI 150. Ductile Iron Body Material see BRV2 TIS 3.107

### Typical Applications

Sterilizers, autoclaves, humidifiers, culinary steam supplies, and other equipment requiring reduced pressure to operate.

### Construction Materials

No.	Part	Material	Material Spec.
1	Spring Housing	Aluminum	LM6-Electroless Nickel Finish
2	Adjustment Hand Wheel	Plastic	Mineral Reinforced Nylon
3	Top Spring Plate	Cast Iron	DIN 1691 GG 20 Electroless Nickel Finish
4	Pressure Adjustment Spring	Silicone Chrome Spring Steel	BS 2803 685 A5 Range 2-Electroless Nickel Finish
5	Bellows Assembly	Stainless Steel	316Ti/316L
6	Bellows Assembly Gasket	Reinforced Exfoliated Graphite	
7	Hexagon Bolt	Stainless Steel	BS 6105 A 270
8	Body	Stainless Steel (Electropolish Finish)	ASTM A 351 CF 3M
9	Guide Bush	Graphite Filled PTFE	
10	Pushrod	Stainless Steel	ASTM A 276 316L
11	Valve Seat	Stainless Steel	ASTM A 351 CF 3M
12	Valve Seat Gasket	Stainless Steel	BS 1449 316 S11
13	Valve	Stainless Steel	316L
14	Valve Return Spring	Stainless Steel	BS 20056 316 S42
15	Strainer Screen	Stainless Steel	BS 1449 316 SH
16	Bottom Cap	Stainless Steel	ASTM A 276 316L
17	Bottom Cap Gasket	PTFE	
18	Spring Range Identification Plate	Plastic	Polypropylene
19	Bulkhead Plate	Stainless Steel	AISI 316L
20	Tamperproof Pin	Mild Steel-Copper Plated	
21	Washer	Stainless Steel	316L
22	Drive Spindle	Carbon Steel	BS 970 230 M07-Electroless Nickel Finish



### Limiting Operating Conditions

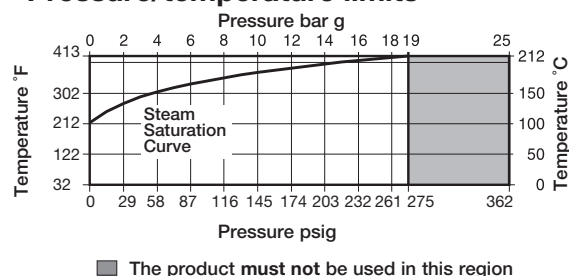
Body design conditions	PN25
Maximum design pressure	362 psig@248°F (25barg @ 120°C)
Maximum design temperature	413°F@275 psig (212°C @19barg)
Minimum allowable temperature	32°F (0°C)
Maximum operating pressure for saturated steam service	275 psig (19 barg)
Maximum operating temperature	413°F@275 psig (212°C @19barg)
Minimum operating temperature	32°F (0°C)
<b>Note:</b> For lower operating temperatures consult Spirax Sarco	
Maximum downstream reduced pressure	125 psig (19 barg)
Maximum differential pressure	275 psig (19 barg)
Maximum recommended turndown ratio 10:1 at maximum flow	
Designed for a maximum cold hydraulic test pressure of 551 psig (38 barg)	
<b>Note:</b> With internals fitted, test pressure must not exceed 275 psig (19 barg)	

### Downstream Pressure Ranges

For the following downstream pressures, three color-coded springs are available. Where the pressures overlap, use the lowest pressure spring to give the downstream pressure required:

<b>Grey:</b> 2 to 25 psig 0.14 to 1.7 barg	<b>Green:</b> 20 to 60 psig 1.4 to 4.0 barg	<b>Orange:</b> 50 to 125 psig 3.5 to 8.6 barg
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### Pressure/temperature limits



### Dimensions (nominal) in inches and millimeters

Size	A	C	D	E Withdrawal Distance	Weight
1/2"	3.3 83	2.4 62	5.1 130	1.0 25	3.3 lb 1.5 kg
3/4"	3.8 96	2.4 62	5.1 130	1.0 25	3.5 lb 1.6 kg
1"	4.3 108	2.4 62	5.1 130	1.0 25	3.8 lb 1.7 kg

Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only.  
In the interests of development and improvement of the product, we reserve the right to change the specification.

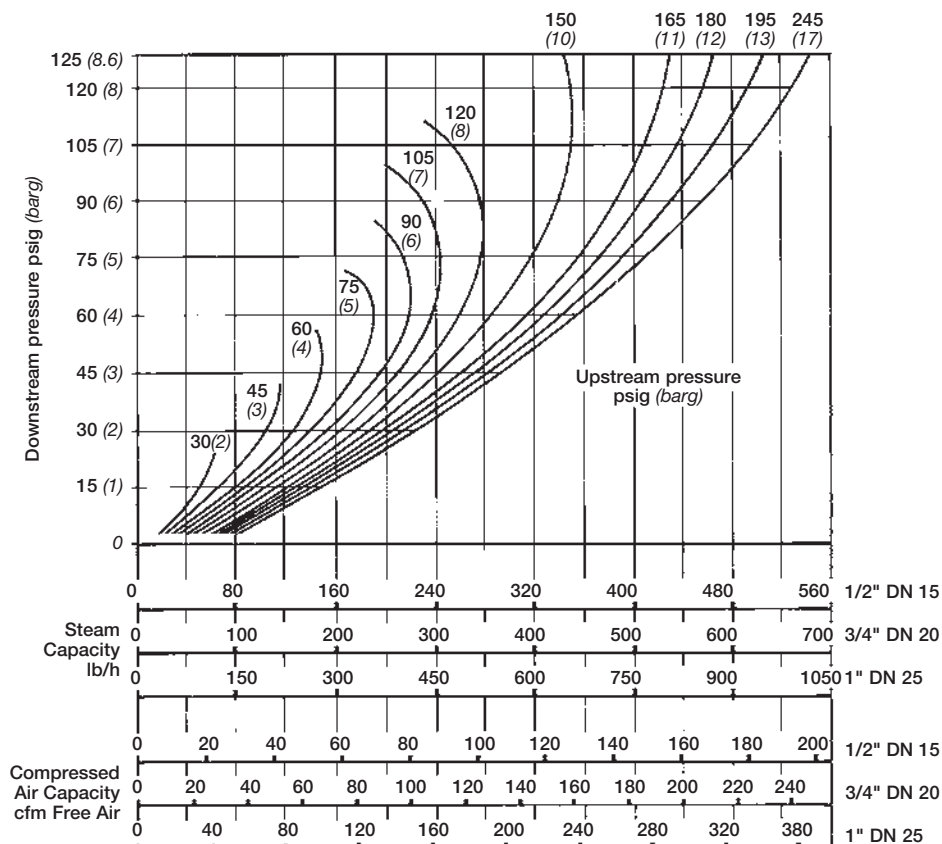
TI-3-108-US 03.14

# Stainless Steel Direct Operated Pressure Regulator SRV2S

## Capacities – Saturated steam capacities in lb/h

Full lift capacities for safety valve sizing are shown below:

	1/2" (DN15)	3/4" (DN20)	1" (DN25)
$C_v$ ( $K_v$ )	1.8 (1.5)	2.9 (2.5)	3.5 (3.0)



## How to use the chart

The curved lines labelled 30, 45, 60, etc., represent upstream pressures. Downstream pressures are read along the vertical line on the left hand side of the chart.

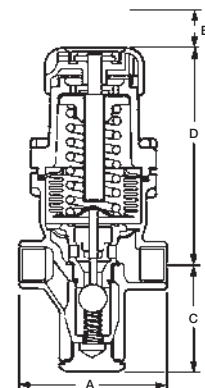
**Example:** Required, a reducing valve to pass 160 lb/h reducing from 150 to 60 psi. From the downstream pressure of 60 on the left hand side of the chart extend out horizontally until the line meets the curved 150 psi upstream line. At this point, read vertically downward where it will be seen that 1/2" SRV2S will be required

## Installation and Maintenance

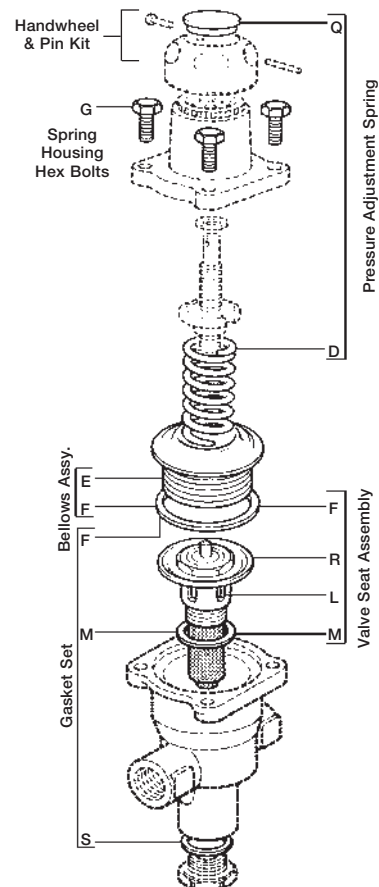
The valve should be installed in a horizontal pipeline with the direction of flow as indicated by the arrow on the valve body. When the required set pressure has been achieved, the tamper proof pin may be used to prevent further pressure adjustments. Any strainer fitted upstream of the SRV2S, and the strainer screen fitted inside the valve should be cleaned regularly so that the flow to the valve is not restricted. Full Installation and Maintenance Instructions are supplied with each product. (IM-P186-03)

## Sample Specifications

Pressure reducing valve shall be direct operated type with all 316L wetted parts. Reduced pressure shall be adjustable, by hand, and a tamper proof device included to prevent further adjustment.



## Spare Parts



## Spare Parts

Valve and seat assembly	F, R, L, M
* Bellows (Stainless Steel)	E, F
* Spring Housing Hex Bolts (set of 4)	G
* Pressure Adjustment Spring	D, Q
Grey 2/25 psig	
Green 20/60 psig	
Orange 50/125 psig	
* Set of all gaskets	F, M, S
* Common to all sizes.	

Only parts listed are available as spares. Always state valve size when ordering spare parts.

TI-3-108-US 03.14



## Direct Operated Pressure Regulator BRV71 & BRV73

The BRV71 ductile iron screwed, and the BRV73 ductile iron flanged body is a direct operated pressure regulator for steam applications.

<b>Model</b>	BRV71 & BRV73
<b>Sizes</b>	1", 1-1/4", 1-1/2", 2"
<b>Connections</b>	NPT/ANSI150
<b>Construction</b>	Ductile Iron
<b>Options</b>	BSP, PN16, JIS10

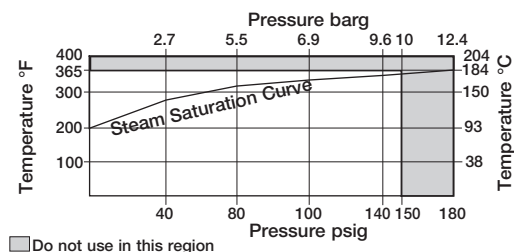
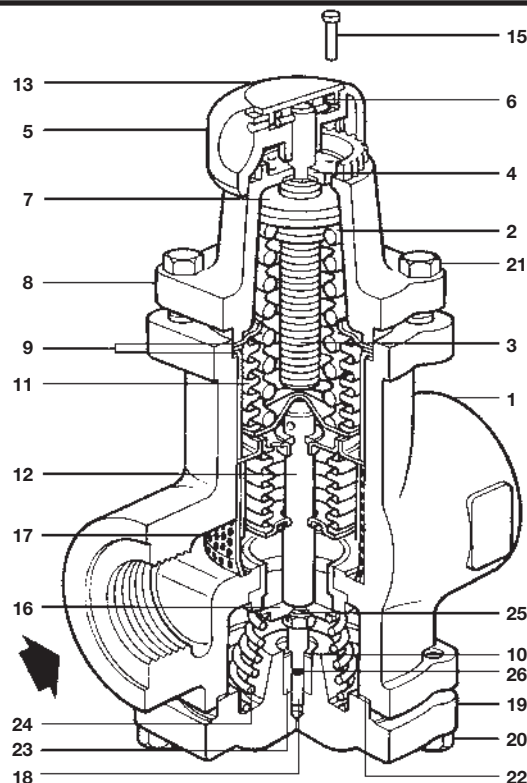
### Construction Materials

No.	Part	Material	Material Spec.
1	Body Assembly	SG Iron	DIN 1693 GGG40.3 ELNP coated
2	Pressure Adjustment Control Spring	Silicone Chrome	BS 2803 685 A55
3	Adjustment Screw	Carbon Steel	BS970 230 M07
4	Plain Washer	Stainless Steel	Gr. 18/10/3-4A
5	Adjustment Knob	Mineral filled nylon 66	10B 140
6	Spirol Pin	Stainless Steel	AISI420 Chrome plated
7	Spring Plate	Cast Iron	DIN 1691 GG20
8	Spring Housing	Aluminium	2ELNP coated
9	Upper Gasket	Semi-rigid graphite laminated	
10	Lower Gasket	Semi-rigid graphite laminated	
11	Bellows Assembly	Stainless Steel 316L	
12	Bellows/push rod assy.	Stainless Steel 316L	PTFE 15% graphite fill
13	Printed Cap	Polypropylene	
14	Locking Pin	Copper	
16*	Head (incorporating seal Pt No.27)	Stainless Steel	BS970 431S29
17	Screen	Stainless Steel 316L	
18	Lower Push Rod	Stainless Steel	BS970 431S29
19	End Cap	SG iron	DIN 1693 GGG40.3 ELNP coated
20	Screw	Steel, zinc plated	BS3692 Gr.8.8
21	Screw	Steel, zinc plated	BS3692 Gr.8.8
22	Washer	Stainless Steel	BS1449 304 515
23	Guide Bush	PTFE 15% Graphite Filled	
24	Return Spring	Stainless Steel	BS2056 316 S42
25	PTFE Washer	Virgin PTFE	BS6564 Type 2Gr.B
26	"O" Ring Seal	EPDM	E0962-90
27*	Head "O" Ring Seal	EDPM	E0962-90

\*Not Shown

### Limiting Operating Conditions

Body design conditions	PN16
Maximum allowable pressure	232 psig@248°F (16barg @ 120°C)
Maximum allowable temperature	363°F@ 232 psig (184°C @10barg)
Minimum allowable temperature	14°F (-10°C)
Maximum operating pressure for saturated steam service	150 psig (10 barg)
Maximum operating temperature	363°F@150 psig (184°C @10barg)
Minimum operating temperature	32°F (0°C)
<b>Note:</b> For lower operating temperatures consult Spirax Sarco	
Maximum downstream reduced pressure	130 psig (9 barg)
Maximum differential pressure	150 psig (10 barg)
Maximum recommended turndown ratio 10:1 at maximum flow	
Designed for a maximum cold hydraulic test pressure of 340 psig (24 barg)	
<b>Note:</b> With internals fitted, test pressure must not exceed 252 psig (16 barg)	

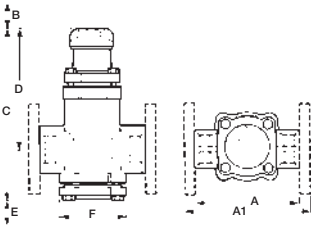


### Downstream Pressure Ranges

For the following downstream pressures, three color-coded springs are available. Where the pressures overlap, use the lowest pressure spring to give the downstream pressure required:

**Grey:** 2 to 25 psig 0.14 to 1.7 barg  
**Green:** 20 to 60 psig 1.4 to 4.0 barg  
**Orange:** 50 to 125 psig 3.5 to 8.6 barg





# Direct Operated Pressure Regulator BRV71 & BRV73

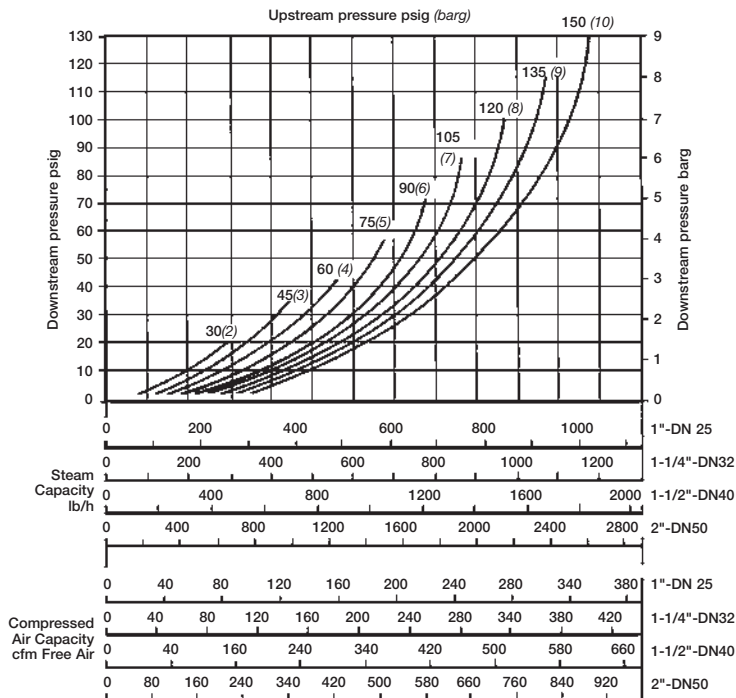
## Dimensions (nominal) in inches and millimeters

Size	BSP/NPT PN Scr.		ANSI 150		JIS 10		Weight							
	A	A1	A	A1	B	C	D	E	F	Scr	Flg			
1"	5.3 134	6.8 174	6.7 170	6.7 170	3.5 90	8.6 220	6.0 153	1.0 25	3.3 84	10 lb 4.4 kg	13 lb 5.9 kg			
1-1/4"	5.3 134	7.0 179	6.8 174	6.8 175	3.5 90	8.6 220	6.0 153	1.0 25	3.3 84	9.8 lb 4.2 kg	16 lb 7.65 kg			
1-1/2"	5.3 134	7.2 186	7.1 183	7.1 180	3.5 90	8.6 220	6.0 153	1.0 25	3.3 84	11.0 lb 4.95 kg	18 lb 8.55 kg			
2"	5.3 134	7.2 186	7.2 186	7.1 180	3.5 90	8.6 220	6.0 153	1.0 25	3.3 84	11.0 lb 4.75 kg	20 lb 9.4 kg			

## Capacities – Steam & compressed air capacity chart

Full lift capacities for safety valve sizing are shown below:

	1" (DN25)	1-1/4" (DN32)	1-1/2" (DN40)	2" (DN50)
$C_v (K_v)$	10.7 (9.3)	12.8 (11.1)	18.1 (15.7)	18.7 (16.2)



## How to use the chart

The curved lines labelled 30, 45, 60, etc., represent upstream pressures. Downstream pressures are read along the vertical line on the left hand side of the chart.

### Example:

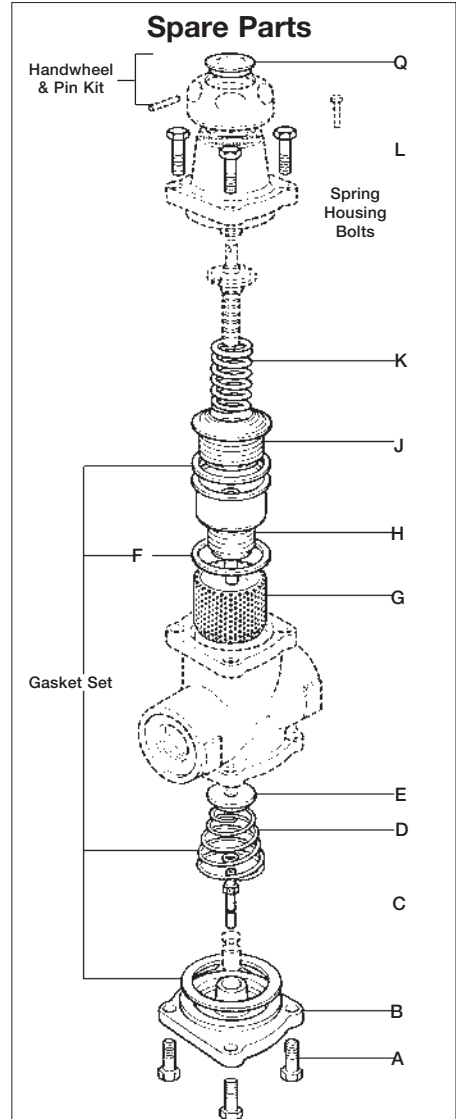
Required, a reducing valve to pass 400 lb/h reducing from 105 to 60 psi. From the downstream pressure of 60 psi on the left hand side of the chart extend out horizontally until the line meets the curved 105 psi upstream line. At this point, read vertically downward where it will be seen that a 1" BRV71/73 will be required.

## Installation and Maintenance

The valve should be installed in a horizontal pipeline with the direction of flow as indicated by the arrow on the valve body. Full Installation and Maintenance Instructions are supplied with this product. (IM-P210-04)

### How to order

Example: 1" Spirax Sarco BRV71 pressure reducing valve with ductile iron body, stainless steel bellows and fitted with Orange spring (50-130 psig)



## Spare Parts

The spare parts available are shown in heavy outline. Parts drawn in broken line are not supplied as spares.

### AVAILABLE SPARE

* Pressure Adjustment Spring	K, Q
Grey 2-25 psig • Green 20-60 psig	
Orange 50-125 psig	
* Bellows Assembly (Stainless Steel)	J
Bellows pushrod assembly, (Sub Assembly, Head, "O" rings, Lower push rod and balancing bellows)	E, C, H
* Bottom cap	B
* Strainer screen	G
* Return spring and gasket set	F
* Hex. Head Screws - Spring housing (set of 4)	L
- Bottom cap (set of 4)	A
* Return spring	D
* Common to all sizes.	

### How to order

Always order spares by using the description given in the column headed Available Spare and stating the size, type and pressure range of the reducing valve.  
Example: Pressure Adjustment Spring, pressure range 50-130 psig (orange) for 1" Spirax Sarco BRV71 Reducing Valve.



# Stainless Steel Direct Operated Pressure Regulator SRV461/463

Types SRV461/463 Direct Acting Pressure Reducing Valve with non-rising adjustment screw, O-ring soft seal on valve plug for tight ANSI Class VI shutoff, and 316 Ti stainless steel construction for wetted parts.

Model	SRV461	SRV463
Sizes	1/2", 3/4", 1", 1-1/4", 1-1/2", 2"	
Plug Connections	NPT	ANSI 150
Construction	316 Ti Stainless Steel, EPDM Diaphragm, TFE O-ring Seal	
Options	BSP Connections	DIN PN16 or BS4504 flanges
	SRV461S and SRV463S for Hydrocarbon Service - Consult Factory	
	Non-Standard Pressure Ranges	

\* flanged only

## Construction Materials

No.	Part	Material	Werkstoff No.	AISI Equivalent*
1	Body	Stainless Steel	1.4571	316 Ti
2	Spring Housing	Stainless Steel	1.4404	316L
3	Cap	Stainless Steel	1.4571	316 Ti
4	Valve Seat	Stainless Steel	1.4571	316 Ti
5	Valve Plug	Stainless Steel	1.4571	316 Ti
6	O-Ring Seal	TFE		
7	Diaphragm	EPDM		
8	Piston	Stainless Steel	1.4571	316 Ti
9	O-Ring	EPDM		
10	Top Spring Plate	Stainless Steel	1.4571	316 Ti
11	Spring	Stainless Steel	1.4310	301
12	Adjustment Screw	Stainless Steel	1.4571	316 Ti

\* not direct equivalents, nearest AISI specification is given.

## Limiting Operating Conditions

Max. Operating Pressure (PMO) 174 psig (12 barg)

Max. Operating Temperature Steam service: 374°F (190°C)  
Liquid and gas service: 266°F (130°C) at all operating pressures

## Pressure Shell Design Conditions

**PMA** 220 psig/0-122°F 15 barg/0-50°C  
Max. allowable pressure 187 psig/302°F 13 barg/150°C  
174 psig/374°F 12 barg/190°C

**TMA** 374°F/0-174 psig 190°C/0-12 barg  
Max. allowable temperature

## PRESSURE RANGES

4 – 16 psi 0.3 – 1.1 bar  
12 – 36 psi 0.8 – 2.5 bar  
30 – 75 psi 2.0 – 5.0 bar

## Capacities

Capacities can be calculated from the fully open capacity indices.

Size	Cv	Kv
1/2" DN15	4.7	4
3/4" DN20	5.9	5
1" DN25	7.0	6
1-1/4" DN32	14.0	12
1-1/2" DN40	18.7	16
2" DN50	21.1	18

## Sizing Notes

- Maximum capacities can be obtained only at the upper end of each pressure range. Therefore, to ensure quoted capacities always select lowest pressure range option compatible with required downstream pressure.
- Because of valve droop characteristics, it is recommended that only 80% of the "fully open capacity indices" be used for sizing.
- Required C<sub>v</sub>'s can be calculated from the following formulae:

### For Steam:

Establish whether the flow is critical or non-critical, and calculate the required C<sub>v</sub> using one of the following formula:

### For Liquids

$$C_v = \text{GPM} \sqrt{\frac{\text{Sp. Gr.}}{\text{Pressure Drop, psi}}}$$

Where Sp. Gr. Water = 1  
GPM = Gallons per minute

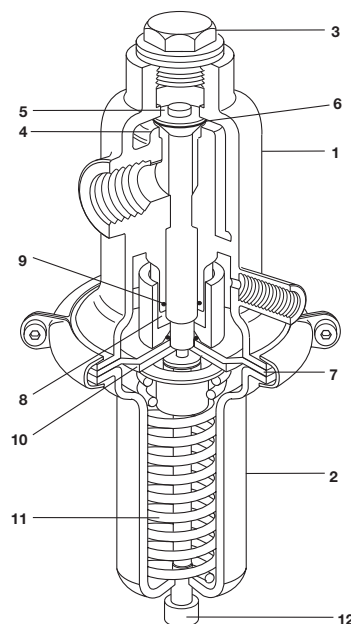
### For Steam (Saturated)

**a. Critical Flow**  
When  $\Delta P$  is greater than  $F_L^2 (P_1/2)$   
$$C_v = \frac{W}{1.83 F_L P_1}$$

**b. Noncritical Flow**  
When  $\Delta P$  is less than  $FL^2 (P_1/2)$   
$$C_v = \frac{W}{2.1 \sqrt{\Delta P (P_1 + P_2)}}$$

### Where:

P<sub>1</sub> = Inlet Pressure psia  
P<sub>2</sub> = Outlet Pressure psia  
W = Capacity lb/hr  
F<sub>L</sub> = Pressure Recovery Factor  
(.9 on globe pattern valves for flow to open)  
(.85 on globe pattern valves for flow to close)



## Typical Applications

Clean steam, gas, and liquid supplies to bio-reactors, centrifuges, freeze dryers (lyophilizers), sterilizers, autoclaves, process tanks, production suites, humidifiers, and culinary equipment.

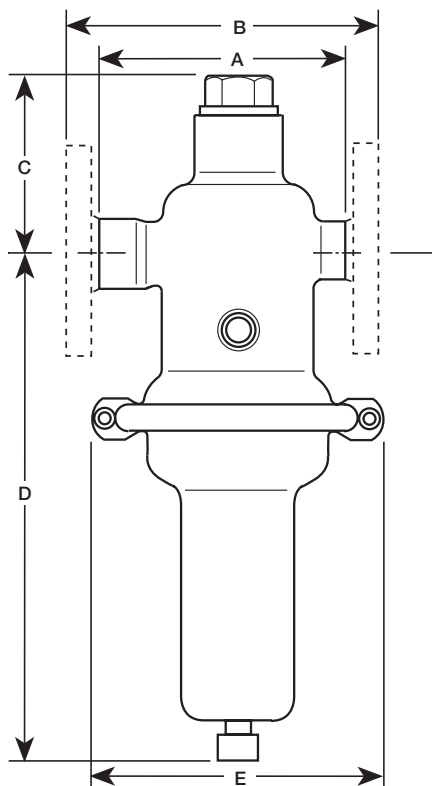
## Sample Specification

Stainless steel direct acting pressure reducing valves shall be diaphragm actuated with all 316Ti grade body and a soft O-ring seal for ANSI Class VI shutoff. Pressure setting on valves shall be adjustable while in service with maximum capacities rated for droop not to exceed 20%. Valve body shall be of packless design. Spirax Sarco SRV461 (screwed) SRV463 (flanged).

# Stainless Steel Direct Operated Pressure Regulator SRV461/463

**Dimensions** (nominal) in inches and millimeters

Size	A	B	C	D	D	E	E
				4-16	12-36	4-16	12-36
					30-75		30-75
1/2"	3.4	5.1	3.0	11.8	9.3	7.9	5.4
	85	130	76	300	235	200	138
3/4"	—	5.9	3.0	11.8	9.3	7.9	5.4
	—	150	76	300	235	200	138
1"	3.4	6.3	3.0	11.8	9.3	7.9	5.4
	85	160	76	300	235	200	138
1-1/4"	5.1	7.1	3.5	11.8	9.3	7.9	5.4
	130	180	90	300	235	200	138
1-1/2"	5.7	7.9	3.5	11.8	9.3	7.9	5.4
	145	200	90	300	235	200	138
2"	7.3	9.1	3.5	11.8	9.3	7.9	5.4
	185	230	90	300	235	200	138



See Installation & Maintenance Instructions IMI 3.110 supplied with each valve.

## Maintenance

This product can be maintained without disturbing the piping connections. Complete isolation of the valve from supply is required before any servicing is performed.

The valve should be disassembled periodically for inspection and cleaning of the valve head and seat.

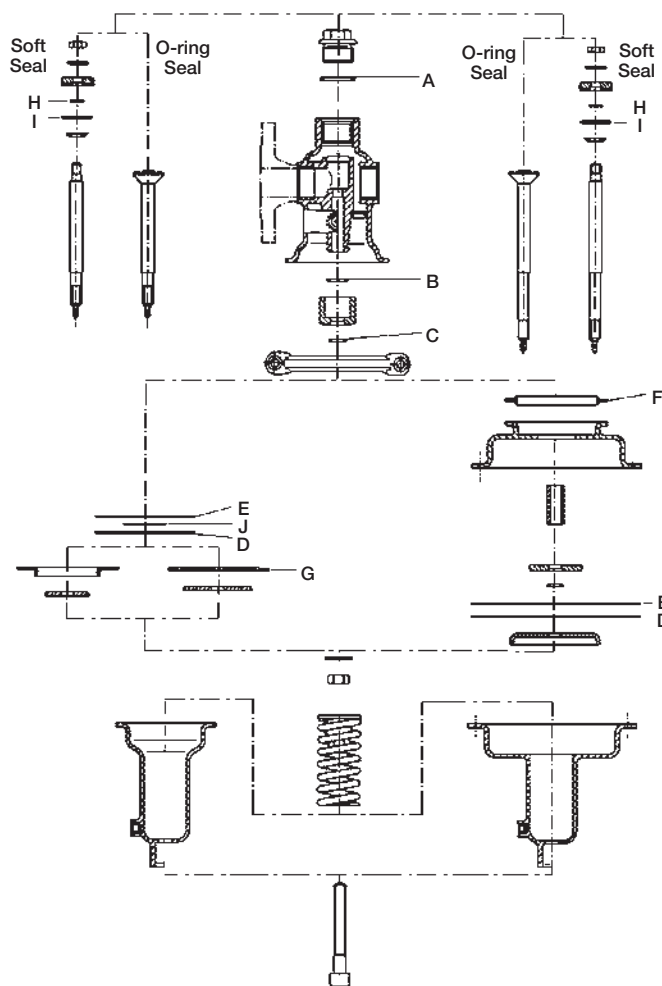
Worn or damaged parts should be replaced. Please refer to Spare Parts list for replacement parts. Complete installation and maintenance instructions are given in IMI 3.110 which accompanies the product.

**Weight lb/kg**

setting ranges	screwed	flanged
psi	bar	
4-16	0.3-1.1	13.5 6.1 15.4 7 17.4 7.9 24.2 11.0
12-36	0.8-2.5	6.5 3.1 8.8 4.0 10.8 4.9 13.2 6.0
30-75	2.0-5.0	6.5 3.1 8.8 4.0 10.8 4.9 13.2 6.0

Valves with pressure ranges  
12-36 psi and 30-75 psi

Valves with pressure range  
4-16 psi



Repair Kit – SRV461/463	1/2"-1" DN 15-25	A, B, C, D, E, F, G
Repair Kit – SRV461S/463S	1/2"-1" DN 15-25	A, B, C, D, E, F, G, H, I
Repair Kit – SRV461/463	1-1/4"-2" DN 32-50	A, B, C, D, E, F, G, J
Repair Kit – SRV461S/463S	1-1/4"-2" DN 32-50	A, B, C, D, E, F, G, H, I, J
Item J—Sizes	1-1/4" and larger only	

Standard spare parts are those shown numbered in the diagram. Additional spares may be available upon request. Always order spares by using the description in the first column, and by stating size, type, pressure range and valve seal type for the reducing valve.

TI-3-110-US 10.15

# spirax sarco

## Pilot Operated Pressure Regulator 1/2" to 4" 25P

The 25P is a self-actuated pilot-operated pressure regulator. Downstream pressure is fed back through an external sensing line to the pressure pilot, which adjusts the opening of the main valve so as to maintain the set pressure. The main valve can close tight for ANSI/FCI 70-2 Class IV shut off when steam is not required.

Model	25P			
Sizes	1/2" to 2"	2 1/2", 3", 4"	1/2" to 2"	2", 2 1/2", 3", 4"
Connections	NPT	ANSI 125 flgd.	NPT	ANSI 300 flgd.
Construction	Cast Iron		Cast Steel	
Options		ANSI 250 flgd.		ANSI 150 flgd. (excludes 2")

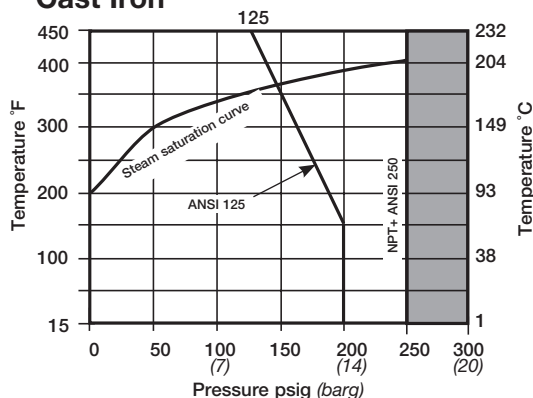
### Typical Applications

The 25P is a reliable, accurate regulator to reduce steam from a high supply pressure to the most efficient operating pressure of the equipment, and to protect the equipment from dangerously high pressures.

### Capacities

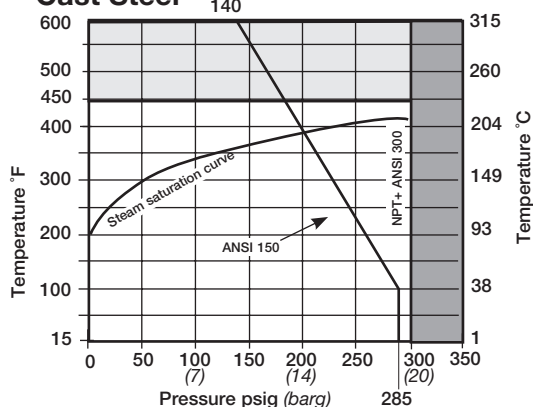
For selection and sizing data, see TIS 3.030.

### Cast Iron



The product should not be used in shaded area.

### Cast Steel



The product should not be used in shaded area.

For operation in this region, stainless steel transmission tubing need be fitted.

Note: Maximum temperature for Stainless Steel tubing is 600°F

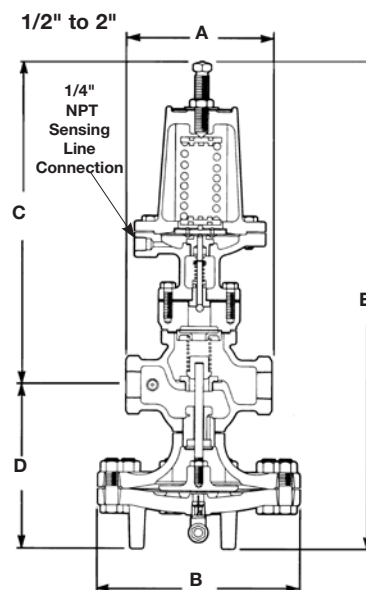
### Downstream Pressure Ranges

For the following downstream pressures, three color-coded pilot valve springs are available:

**Yellow:** 3 to 30 psi

**Blue:** 20 to 100 psi

**Red:** 80 to 250 psi



Dimensions (nominal) in inches and millimeters

Size	ANSI 125		ANSI 250		B	C	D	E	Weight	
	ANSI 125	ANSI 150	ANSI 250	ANSI 300					Cast Iron	Cast Steel
1/2", 3/4"	5.5 140	-	-	-	7.6 194	12.2 310	6.2 157	18.4 467	32 lb 14.5 kg	35 lb 15.9 kg
1"	6.0 152	-	-	-	8.6 219	12.1 308	6.75 171	18.9 479	39 lb 17.7 kg	43 lb 19.5 kg
1 1/4", 1 1/2"	7.25 184	-	-	-	8.6 219	12.7 322	7.1 179	19.75 502	44 lb 20 kg	48 lb 21.8 kg
2"	8.5 216	-	9.0 228	-	10.6 270	13.3 338	8.2 208	21.5 546	69 lb 31.3 kg	75 lb 34 kg
2 1/2"	-	10.9 276	11.5 292	-	13.6 346	14.0 356	13.9 354	27.9 710	157 lb 71.2 kg	171 lb 77.6 kg
3"	-	11.75 298	12.5 318	-	13.6 346	13.9 354	14.4 367	28.4 721	188 lb 85.3 kg	205 lb 93 kg
4"	-	13.9 352	14.5 368	-	15.6 397	15.25 387	16.1 410	31.4 797	284 lb 129 kg	309 lb 140 kg

Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only.  
In the interests of development and improvement of the product, we reserve the right to change the specification.

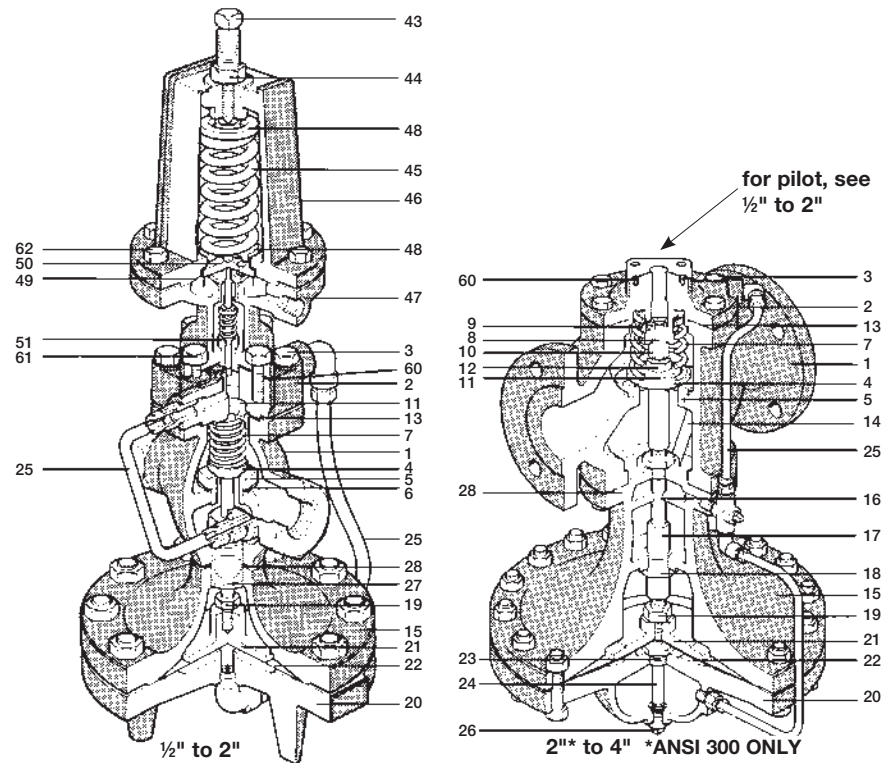
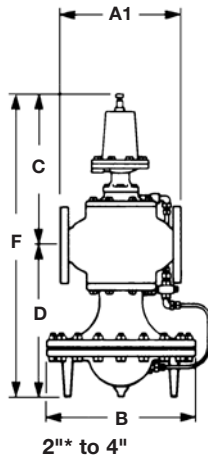
TI-3-015-US 4.12

# Pilot Operated Pressure Regulator

## 1/2" to 4" 25P

### Sample Specification

The pressure regulator shall be of the pilot-actuated diaphragm operated type. The main valve shall be single-seated with hardened stainless steel trim; the regulator body shall be cast iron (cast steel). The pilot shall be bolted directly to the regulator body. The regulator shall be capable of dead-end shut-off.



### Construction Materials

No.	Part	Material	
1	Valve Body	Cast Iron	ASTM A 126 CL B
		Cast Steel	ASTM A216 Gr WCB
2	Cover	Cast Iron	ASTM A 126 CL B
		Cast Steel	ASTM A216 Gr WCB
3	Cover Bolts	Steel	ASTM A449
4	Main Valve Head	Stainless Steel	
5	Main Valve Seat	Stainless Steel	
6	Main Valve Seat Gasket	Copper	
7	Valve Return Spring	Stainless Steel	
8	Valve Stem	Stainless Steel	
9	Strainer Screen	Stainless Steel	
10	Valve Stem Sleeve	Stainless Steel	
11	Spring Guide	Cast Iron 1/2"-2"	
		CRS 2"-4"	
12	Nut	Steel	
13	Cover Gasket	Graphite	
14	Pressure Equalizer Pipe	Stainless Steel	
15	Upper Diaphragm Case	Cast Iron	ASTM A 126 CL B
		Cast Steel	ASTM A216 Gr WCB
16	Stem Bushing (2 1/2" - 4" Cast Steel only)	Stainless Steel	
17	Diaphragm Plate Stem	Stainless Steel	
18	Diaphragm Stem Guide	Stainless Steel	
19	Nut	Brass 1/2" - 2"	
		Steel 2"-4"	
20	Lower Diaphragm Case	Cast Iron	ASTM A 126 CL B
		Cast Steel	ASTM A216 Gr WCB
21	Diaphragm Plate	Brass 1/2" - 2"	
		C.I. 2"-4"	
22	Main Diaphragm (2 ply)	Stainless Steel	
23	Bushing	CRS	
24	Tube & Orifice	Stainless Steel	
25	Tubing Assembly	Copper	
		Brass	
	(optional for cast steel)	Stainless Steel	

No.	Part	Material	
26	Plug (Cast Iron)	Brass	
		(Cast Steel)	Steel
27	Connector Stud	Stainless Steel	
28	Body Gasket	1/2" - 2" Copper Clad	
		2"-4" Graphite	
43	Adjustment Screw	Stainless Steel	
44	Jam Nut	Brass	
45	Pilot Valve Spring	Steel	
46	Upper Diaphragm Case	Cast Iron	ASTM A 126 CL B
		Cast Steel	ASTM A216 Gr WCB
47	Lower Diaphragm Case	Cast Iron	ASTM A 126 CL B
		Cast Steel	ASTM A216 Gr WCB
48	Spring Plate	Steel	
49	Diaphragm	Stainless Steel	
50	Diaphragm Plate	Brass	
51	Pilot Head Spring	Stainless Steel	
60	Pilot Gasket	Graphite	
61	Pilot Mounting Screws	Steel	
62	Diaphragm Case Screws	Steel	ASTM A449

### Installation

The regulator should be installed in a horizontal line with suitable bypass and isolating valves. A steam trap should be installed upstream to prevent condensate from reaching the regulator. The trap and regulator should both be protected with a strainer. The pressure sensing line should be located in a straight section of the downstream piping at least 10 pipe diameters from the nearest fitting. Complete installation instructions are given in IM-3-000-US.

### Maintenance

Complete installation and maintenance instructions are given in IM-3-000-US, a copy of which is supplied with each regulator. Available spare parts are shown on TI-1-1120-US & TI-3-0271-US.

TI-3-015-US 4.12



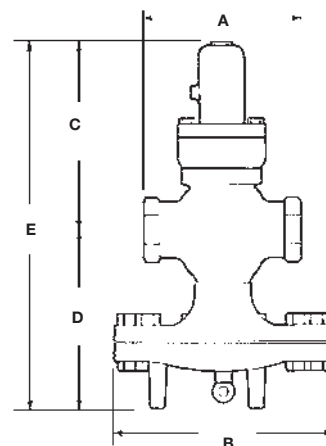


## Pressure Regulator with Air Loaded Pilot 1/2" to 4" 25PA

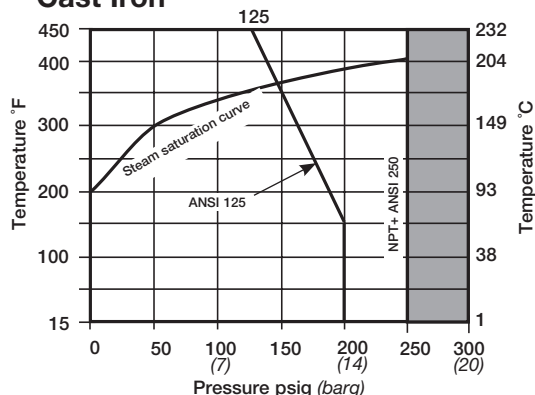
The Pressure Pilot is loaded by an external compressed air supply rather than by a spring. The downstream pressure can be set remotely by adjusting the loading air pressure.

Model	25PA			
<b>Sizes</b>	1/2" to 2"	2-1/2", 3", 4"	1/2" to 2"	2", 2-1/2", 3", 4"
<b>Connections</b>	NPT	ANSI 125 flgd.	NPT	ANSI 300 flgd.
<b>Construction</b>	Cast Iron		Cast Steel Body	
<b>Options</b>		ANSI 250 flgd.		ANSI 150 flgd (excludes 2")

25PA 1/2" to 2"



### Cast Iron



### Air Pilots

PA direct air load maximum 120 psig air

### Downstream Pressure Ranges

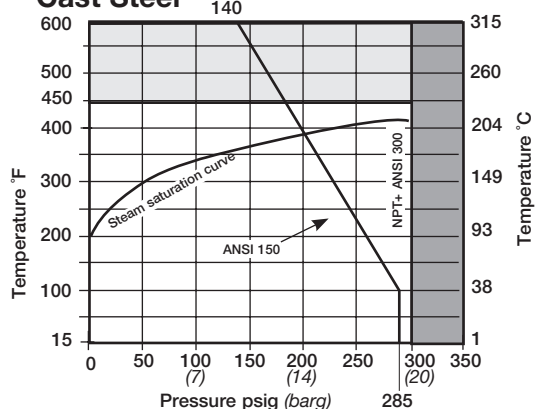
For proper selection, see TI-3-030-US

PA 3 to 100 psig (approximate ratio 1:1), see table

### Capacities

For selection and sizing data, see TI-3-030-US

### Cast Steel

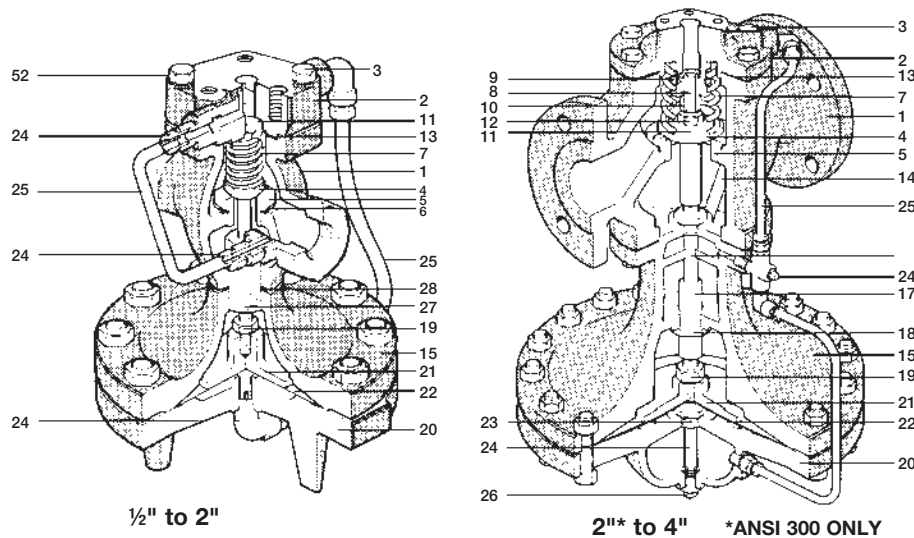


### Dimensions (nominal) in inches\*

	Ansi 125				Ansi 250				Ansi 300				Weight	
Size	A	A1	A1	B	C	C1	D	E	E1	Cast Iron	Cast Steel			
1/2", 3/4"	5.5	–	–	7.6	10.1	8.0	6.2	16.3	14.2	32	35			
1"	6.0	–	–	8.6	10.1	8.0	6.75	16.9	14.8	39	43			
1-1/4", 1-1/2"	7.25	–	–	8.6	10.1	8.0	7.1	17.7	15.6	44	48			
2"	8.5	–	9.0	10.6	11.3	9.2	8.2	19.5	17.4	69	75			
2-1/2"	–	10.9	11.5	13.6	11.9	9.9	13.9	25.8	23.8	157	171			
3"	–	11.75	12.5	13.6	11.9	9.8	14.4	26.3	24.3	188	205			
4"	–	13.9	14.5	15.6	13.2	11.1	16.1	29.3	27.3	284	309			

\* All pilots are interchangeable. Drawings are for dimensional purposes only.

# Pressure Reducing Valve with Air Loaded Pilot 1/2" to 4" 25PA



## Construction Materials

No.	Part	Material	
1	Valve Body	Cast Iron Cast Steel	ASTM A 126 CL B ASTM A216 Gr WCB
2	Cover	Cast Iron Cast Steel	ASTM A 126 CL B ASTM A216 Gr WCB
3	Cover Bolts	Steel	ASTM A449
4	Main Valve Head	Stainless Steel	
5	Main Valve Seat	Stainless Steel	
6	Main Valve Seat Gasket	Copper	
7	Valve Return Spring	Stainless Steel	
8	Valve Stem	Stainless Steel	
9	Strainer Screen	Stainless Steel	
10	Valve Stem Sleeve	Stainless Steel	
11	Spring Guide	Cast Iron 1/2"-2" CRS 2" - 4"	
12	Nut	Steel	
13	Cover Gasket	Graphite	
14	Pressure Equalizer Pipe	Stainless Steel	
15	Upper Diaphragm Case	Cast Iron Cast Steel	ASTM A 126 CL B ASTM A216 Gr WCB
16	Stem Bushing (2-1/2" - 4" Cast Steel only)	Stainless Steel	
17	Diaphragm Plate Stem	Stainless Steel	
18	Diaphragm Stem Guide	Stainless Steel	
19	Nut	Brass 1/2" - 2" Steel 2" - 4"	
20	Lower Diaphragm Case	Cast Iron Cast Steel	ASTM A 126 CL B ASTM A216 Gr WCB
21	Diaphragm Plate	Brass 1/2" - 2" C.I. 2" - 4"	
22	Main Diaphragm (2 ply)	Stainless Steel	
23	Bushing	CRS	
24	Tube & Orifice	Stainless Steel	
25	Tubing Assembly	Copper Brass	
26	Plug (Cast Iron) (Cast Steel)	Brass Steel	
27	Connector Stud	Stainless Steel	
28	Body Gasket	1/2" - 2" Copper Clad 2" - 4" Graphite	

## Installation

The valve should be installed in a horizontal line with suitable bypass and isolating valves. A steam trap should be installed upstream to prevent condensate from reaching the valve. The trap and regulator should both be protected with a strainer. The pressure sensing line should be located either in the downstream piping, or in the steam space. Complete installation instructions are given in IM-3-000-US.

## Air Loading Pilot PA Requires Air Loading as indicated in the following table

Desired Outlet Steam Pressure P2 psig	5	10	25	50	75	100
Inlet Pressure P1 psig	10 psig to 100 psig					
Approximate Air Set Pressure psig	11 to 13.5	16 to 16.8	31 to 33.5	56 to 58	80 to 81	102 to 103

## Maintenance

Complete installation and maintenance instructions are given in IM-3-000-US, a copy of which is supplied with each valve. Available spare parts are shown on TI-1-1120-US and TI-3-0271-US.

TI-3-019-US 04.12



## Pilot Operated Pressure Regulator w/ Electric Override 1/2" to 4" 25PE

The 25PE has all of the features of the 25P, with the addition of an electric pilot. An electrical signal can override the pressure pilot to provide a remote shut-off capability.

\*Note: For pressures below 15 psig, the E pilot is not recommended for use with valves 2½" and larger.

Model	25PE			
Sizes	½" to 2"	2½", 3", 4"	½" to 2"	2", 2½", 3", 4"
Connections	NPT	ANSI 125 flgd.	NPT	ANSI 300 flgd.
Construction	Cast Iron		Cast Steel	
Options		ANSI 250 flgd.		ANSI 150 flgd. (excludes 2")
Electric Pilot Specifications	Enclosure: NEMA 4 & 7 (C&D) 115v (230v)/60Hz Inrush: 45 VA Normally closed 200 psig Max. operating pressure			
Electric Pilot Options	For regulators 2½" and larger at pressures below 125 psig, use the following electric pilot: Enclosure: NEMA 4 & 7 (C&D) 115v (230v)/60Hz Inrush: 45 VA Normally closed 140 psig Max. operating pressure (for faster response time) 230 Volt Coil			

### Typical Applications

Steam pressure reducing applications where the PRV must also respond to an electrical program timer, safety or limit switch, or remote manual switch.

### Sample Specification

The pressure regulator shall be of the pilot-actuated diaphragm operated type. The main valve shall be single-seated with hardened stainless steel trim; the regulator body shall be cast iron (cast steel). The pilot shall be bolted directly to the regulator body. The main valve shall be capable of dead-end shut-off. The electric pilot shall have a NEMA 4 & 7 (C & D) enclosure with 115v (230v) 60 Hz coil.

### Limiting Operating Conditions

**Max. Operating Pressure(PMO)** NPT: 200 psig (14 barg) @ 392°F (200°C)  
ANSI 125: 125 psig (8 barg) @ 392°F (200°C)  
ANSI 250: 200 psig (14 barg) @ 392°F (200°C)  
ANSI 150: 185 psig (12 barg) @ 392°F (200°C)  
ANSI 300: 200 psig (14 barg) @ 392°F (200°C)

**Max. Operating Temperature** 392°F (200°C)

### Downstream Pressure Ranges

For the following downstream pressures, three color-coded pilot valve springs are available:

Yellow: 3 to 30 psi Blue: 20 to 100 psi Red: 80 to 250 psi

### Pressure Shell Design Conditions

**PMA** Cast Iron: 250 psig/0-450°F 17 barg/0-232°C  
Max. allowable pressure Cast Steel: 300 psig/0-600°F 21 barg/0-316°C

**TMA** Cast Iron: 450°F/0-250 psig 232°C/0-17 barg  
Max. allowable temperature Cast Steel: 600°F/0-300 psig 316°C/0-21 barg

### Capacities

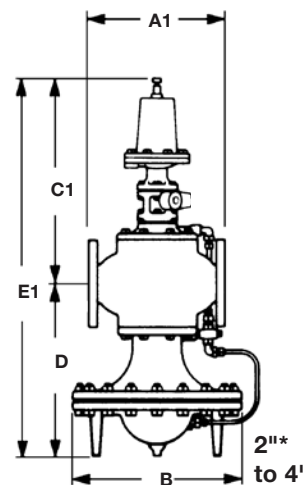
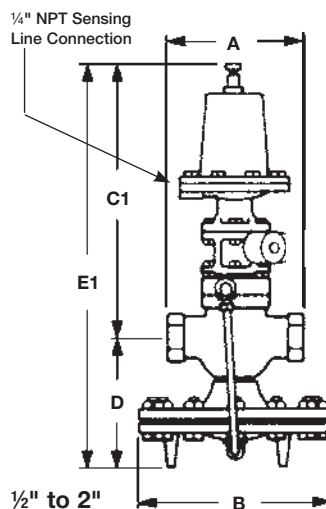
For selection & sizing data, see TI-3-030-US.

### Installation

The regulator should be installed in a horizontal line with suitable bypass and isolating valves. A steam trap should be installed upstream to prevent condensate from reaching the regulator. The trap and regulator should both be protected with a strainer. The pressure sensing line should be located in a straight section of the downstream piping at least 10 pipe diameters from the nearest fitting. Complete installation instructions are given in IM-3-000-US.

### Maintenance

Complete installation and maintenance instructions are given in IM-3-000-US, a copy of which is supplied with each regulator. Available spare parts are shown on TI-3-0271-US and TI-1-1120-US.



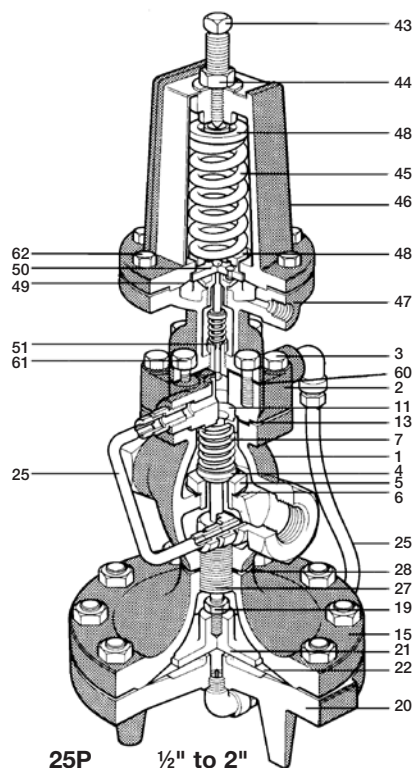
### Dimensions (nominal) in inches and millimeters

	Ansi 125		Ansi 250 Ansi 300		Weight				
Size	A	A1	A1	B	C1	D	E1	Cast Iron	CastSteel
½", ¾"	5.5 140	– –	– –	7.6 194	14.1 367	6.2 157	20.6 524	36 lb 16.3 kg	39 lb 17.7 kg
1"	6.0 152	– –	– –	8.6 219	14.4 365	6.75 171	21.1 537	43 lb 19.5 kg	47 lb 21.3 kg
1¼", 1½"	7.25 184	– –	– –	8.6 219	14.9 379	7.1 179	22.0 559	48 lb 21.8	52 lb 23.6 kg
2"	8.5 216	– –	9.0 228	10.6 270	15.6 395	8.2 208	23.75 603	73 lb 33.1 kg	80 lb 36.3 kg
2½"	– –	10.9 276	11.5 292	13.6 346	16.25 413	13.9 354	30.2 767	160 lb 72.6 kg	175 lb 79.4 kg
3"	– –	11.75 298	12.5 318	13.6 346	16.2 411	14.4 367	30.6 778	191 lb 86.6 kg	208 lb 94.4 kg
4"	– –	13.9 352	14.5 368	15.6 397	17.5 445	16.1 410	33.6 854	287 lb 130 kg	313 lb 142 kg

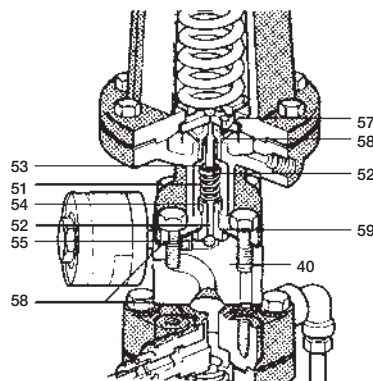
Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only.  
In the interests of development and improvement of the product, we reserve the right to change the specification.



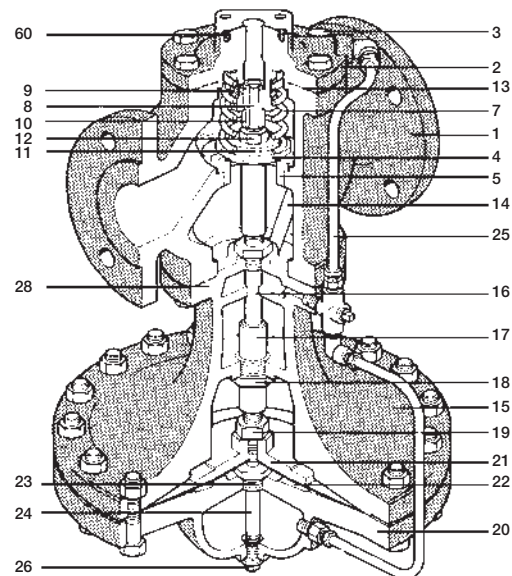
# Pilot Operated Pressure Regulator w/ Electric Override 1/2" to 4" 25PE



**25P** 1/2" to 2"



**PE Pilot**  
1/2" to 4"



**25PE** 2" to 4"

## Construction Materials

No.	Part	Material
1	Valve Body	Cast Iron ASTM A 126 CL B Cast Steel ASTM A216 Gr WCB
2	Cover	Cast Iron ASTM A 126 CL B Cast Steel ASTM A216 Gr WCB
3	Cover Bolts	Steel ASTM A449
4	Main Valve Head	Stainless Steel
5	Main Valve Seat	Stainless Steel
6	Main Valve Seat Gasket	Copper
7	Valve Return Spring	Stainless Steel
8	Valve Stem	Stainless Steel
9	Strainer Screen	Stainless Steel
10	Valve Stem Sleeve	Stainless Steel
11	Spring Guide	Cast Iron 1/2"-2" CRS 2" - 4"
12	Nut	Steel
13	Cover Gasket	Graphite
14	Pressure Equalizer Pipe	Stainless Steel
15	Upper Diaphragm Case	Cast Iron ASTM A 126 CL B Cast Steel ASTM A216 Gr WCB
16	Stem Bushing (2 1/2" - 4" Cast Steel only)	Stainless Steel
17	Diaphragm Plate Stem	Stainless Steel AISI 304
18	Diaphragm Stem Guide	Stainless Steel AISI 303
19	Nut	Brass 1/2" - 2" Steel 2" - 4"
20	Lower Diaphragm Case	Cast Iron ASTM A 126 CL B Cast Steel ASTM A216 Gr WCB
21	Diaphragm Plate	Brass 1/2" - 2" C.I. 2" - 4"
22	Main Diaphragm (2 ply)	Stainless Steel
23	Bushing	CRS

\*ANSI 300 ONLY

No.	Part	Material
24	Tube & Orifice	Stainless Steel
25	Tubing Assembly	Copper Brass
26	Plug (Cast Iron) (Cast Steel)	Brass Steel
27	Connector Stud	Stainless Steel
28	Body Gasket	1/2" - 2" Copper Clad 2" - 4" Graphite
40	Electric Pilot Adapter	Cast Iron ASTM A 126 CL B Bronze ASTM B62
43	Adjustment Screw	Stainless Steel
44	Jam Nut	Brass
45	Pilot Valve Spring	Steel
46	Upper Diaphragm Case	Cast Iron Cast Steel
47	Lower Diaphragm Case	Cast Iron Cast Steel
48	Spring Plate	Steel ASTM A569
49	Diaphragm	Stainless Steel
50	Diaphragm Plate	Brass
51	Pilot Head Spring	Stainless Steel
52	Spring Retainer Cup	Stainless Steel
53	Retaining Ring	Brass
54	Pilot Seat	Stainless Steel
55	Pilot Head	Stainless Steel
56	Head Stem	Stainless Steel
57	Stem Guide	Stainless Steel
58	Stem Guide Gasket	Stainless Steel
59	Seat Gasket	Stainless Steel
60	Pilot Gasket	Graphite
61	Pilot Mounting Screws	Steel ASTM A449
62	Diaphragm Case Screws	Steel

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TI-3-0151-US 4.12



## Sizing and Selection Chart

### 25P, 25PE, 25PA, and all Combinations

#### Capacities (pounds of saturated steam per hour for standard port valve sizes for lower steam pressure)

Inlet Steam Pressure psig	Outlet Steam Pressure psig	NOMINAL VALVE SIZE								
		1/2"	3/4"	1"	1-1/4"	1-1/2"	2"	2-1/2"	3"	4"
	C.V. Factors $\bar{I}$	3.48	6.5	10.5	14	20	35	56	74	115
15	10	95	175	285	380	540	950	1,500	2,000	3,100
	5	135	250	405	545	780	1,365	2,185	2,890	4,480
	3	155	285	465	620	880	1,550	2,470	3,260	5,080
20	12	120	230	365	490	700	1,225	1,960	2,590	4,025
	8	155	290	470	630	900	1,575	2,520	3,330	5,175
	0-5	180	335	540	720	1,025	1,795	2,870	3,790	5,895
25	15	145	270	435	580	830	1,450	2,325	3,070	4,770
	10	195	360	580	775	1,110	1,950	3,110	4,110	6,385
	0-7	205	385	620	825	1,180	2,065	3,305	4,360	6,785
30	20	155	290	470	630	900	1,575	2,520	3,330	5,175
	15	220	410	665	890	1,270	2,220	3,555	4,700	7,300
	0-12	230	430	695	925	1,320	2,310	3,695	4,885	7,590
40	30	155	290	470	630	900	1,575	2,520	3,330	5,175
	25	250	470	755	1,010	1,440	2,520	4,030	5,330	8,280
	0-18	280	525	850	1,135	1,620	2,835	4,535	5,995	9,315
50	40	190	355	575	770	1,100	1,925	3,080	4,070	6,325
	30	315	585	955	1,275	1,820	3,185	5,095	6,735	10,465
	0-21	350	650	1,050	1,400	2,000	3,500	5,600	7,400	11,500
60	45	280	520	840	1,120	1,600	2,800	4,480	5,920	9,200
	35	360	670	1,080	1,440	2,060	3,605	5,770	7,620	11,845
	0-27	385	720	1,165	1,555	2,220	3,885	6,215	8,215	12,765
75	60	280	525	850	1,135	1,620	2,835	4,535	5,995	9,315
	50	415	775	1,250	1,665	2,380	4,165	6,665	8,800	13,685
	0-35	470	875	1,415	1,890	2,700	4,725	7,560	9,990	15,525
85	70	290	540	870	1,160	1,660	2,905	4,650	6,140	9,545
	50	490	915	1,480	1,965	2,820	4,935	7,895	10,435	16,215
	0-43	515	960	1,555	2,070	2,960	5,180	8,290	10,950	17,020
100	80	370	690	1,115	1,485	2,120	3,710	5,935	7,845	12,190
	60	580	1,080	1,740	2,325	3,320	5,810	9,295	12,285	19,090
	0-48	600	1,120	1,815	2,420	3,460	6,055	9,690	12,800	19,895
125	100	440	825	1,335	1,780	2,540	4,445	7,110	9,400	14,600
	80	680	1,275	2,060	2,745	3,920	6,860	10,975	14,500	22,540
	0-62	730	1,365	2,200	2,940	4,200	7,350	11,760	15,540	24,150
150	125	490	910	1,470	1,960	2,800	4,900	7,840	10,360	16,100
	100	800	1,490	2,400	3,205	4,580	8,015	12,825	16,945	26,335
	0-76	860	1,600	2,590	3,460	4,940	8,645	13,830	18,280	28,400
175	150	490	915	1,480	1,975	2,820	4,935	7,895	10,435	16,125
	125	870	1,630	2,635	3,515	5,020	8,785	14,055	18,570	28,865
	0-87	985	1,840	2,970	3,960	5,660	9,900	15,850	20,950	32,545
200	150	840	1,600	2,540	3,390	4,840	8,470	13,550	17,900	27,830
	125	1,075	2,000	3,240	4,330	6,180	10,815	17,300	22,870	35,530
	0-103	1,125	2,100	3,390	4,520	6,460	11,300	18,000	23,900	37,145
225	175	840	1,650	2,670	3,560	5,080	8,890	14,225	18,800	29,210
	150	1,160	2,180	3,500	4,660	6,660	11,655	18,650	24,640	38,300
	0-117	1,250	2,340	3,780	5,000	7,200	12,600	20,160	26,640	41,400
250	200	925	1,730	2,790	3,720	5,320	9,300	14,900	19,680	30,600
	150	1,340	2,500	4,050	5,400	7,720	13,500	21,600	28,600	44,400
	0-131	1,385	2,590	4,180	5,570	7,960	13,930	22,300	29,450	45,800
*273	225	880	1,640	2,650	3,530	5,050	8,830	14,130	18,670	29,000
	200	1,240	2,320	3,750	4,990	7,130	12,480	19,960	26,400	41,000
	0-145	1,510	2,830	4,570	6,090	8,700	15,230	24,360	32,200	50,000
*300	250	920	1,720	2,780	3,700	5,290	9,250	14,800	19,600	30,400
	225	1,250	2,330	3,770	5,020	7,170	12,550	20,100	26,500	41,300
	0-160	1,640	3,070	4,960	6,600	9,440	16,520	26,400	34,900	54,300

Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only.  
In the interests of development and improvement of the product, we reserve the right to change the specification.

# Sizing and Selection Chart

## 25P, 25PE, 25PA, and all Combinations

### Capacities (pounds of saturated steam per hour for reduced port valve sizes for lower steam pressure)

Inlet Steam Pressure psig	Outlet Steam Pressure psig	NOMINAL VALVE SIZE								
		1/2"S	3/4"S	1"S	1-1/4"S	1-1/2"S	2"S	2-1/2"S	3"S	4"S
	C.V. Factors $\bar{I}$	1.16	2.4	4.6	6.5	11.6	18.5	26	37	64
15	10	30	65	125	175	315	505	695	1,000	1,730
	5	45	95	175	250	450	720	1,015	1,440	2,500
	3	50	110	205	285	510	820	1,150	1,630	2,795
20	12	40	85	160	230	405	650	920	1,300	2,225
	8	50	110	210	290	520	825	1,170	1,655	2,825
	0-5	60	125	235	335	600	955	1,330	1,915	3,265
25	15	50	100	190	270	485	770	1,085	1,540	2,630
	10	65	135	255	360	640	1,025	1,435	2,040	3,550
	0-7	70	145	270	385	685	1,090	1,555	2,210	3,775
30	20	50	110	210	290	520	825	1,170	1,655	2,825
	15	75	150	290	410	735	1,175	1,660	2,350	4,000
	0-12	80	160	305	430	760	1,220	1,715	2,435	4,225
40	30	50	110	210	290	520	825	1,170	1,655	2,825
	25	85	175	335	470	835	1,360	1,870	2,665	4,640
	0-18	95	200	370	525	935	1,500	2,100	2,985	5,185
50	40	65	130	250	355	640	1,105	1,430	2,085	3,565
	30	105	220	420	585	1,045	1,670	2,350	3,330	5,825
	0-21	115	240	460	650	1,130	1,850	2,600	3,700	6,400
60	45	95	200	370	520	940	1,500	2,110	3,000	5,125
	35	125	250	475	670	1,195	1,900	2,760	3,810	6,590
	0-27	130	270	510	720	1,290	2,065	2,885	4,125	7,105
75	60	95	200	370	525	935	1,500	2,100	2,985	5,185
	50	140	290	545	775	1,380	2,210	3,155	4,475	7,655
	0-35	155	330	620	875	1,565	2,500	3,495	4,950	8,640
85	70	100	210	395	540	960	1,590	2,160	3,070	5,415
	50	165	350	655	915	1,660	2,650	3,735	5,295	9,045
	0-43	170	360	680	960	1,710	2,735	3,850	5,460	9,475
100	80	120	255	490	690	1,230	1,960	2,735	3,880	6,780
	60	190	400	755	1,080	1,900	3,050	4,315	6,140	10,600
	0-48	200	420	800	1,120	2,000	3,200	4,480	6,350	11,000
125	100	145	300	585	825	1,470	2,350	3,365	4,765	8,140
	80	230	480	905	1,275	2,280	3,645	5,115	7,250	12,500
	0-62	245	510	965	1,365	2,435	3,900	5,535	7,850	13,420
150	125	160	335	645	910	1,625	2,590	3,640	5,270	9,000
	100	265	555	1,050	1,490	2,645	4,230	5,930	8,415	14,650
	0-76	285	580	1,140	1,600	2,870	4,590	6,420	9,140	15,800
175	150	165	350	655	915	1,660	2,650	3,775	5,295	9,045
	125	290	600	1,160	1,630	2,915	4,665	6,550	9,285	15,900
	0-87	330	680	1,310	1,840	3,300	5,270	7,410	10,500	18,000
200	150	285	580	1,125	1,600	2,850	4,480	6,290	9,060	15,450
	125	360	740	1,420	2,000	3,570	5,725	8,015	11,350	19,700
	0-103	375	780	1,485	2,100	3,740	5,990	8,390	11,875	20,670
225	175	290	605	1,170	1,625	2,945	4,700	6,600	9,400	16,200
	150	390	810	1,540	2,180	3,885	6,200	8,715	12,350	21,300
	0-117	420	875	1,655	2,340	4,175	6,680	9,375	13,300	23,000
250	200	310	640	1,250	1,730	3,100	4,920	6,920	9,840	17,000
	150	450	935	1,775	2,500	4,465	7,155	10,000	14,200	24,700
	0-131	460	970	1,830	2,590	4,615	7,395	10,300	14,725	25,450
*275	225	290	610	1,160	1,640	2,930	4,670	6,560	9,335	16,150
	200	415	855	1,640	2,320	4,140	6,600	9,275	13,200	22,830
	0-145	505	1,040	2,000	2,830	5,050	8,050	11,310	16,100	27,840
*300	250	310	635	1,220	1,720	3,070	4,890	6,870	9,780	18,900
	225	415	860	1,650	2,330	4,160	6,640	9,330	13,270	22,900
	0-160	550	1,130	2,170	3,070	5,475	8,730	12,270	17,460	30,200

Capacities are based on an accuracy regulation of 1 PSI and with pipe sizes to insure reasonable velocities. Refer to pipe sizing chart.

\* Cast steel construction required for service above 250 psig



## Pilot Operated Back Pressure Regulator 1/2" to 4" 25BP

The 25BP Back Pressure Regulator maintains a constant upstream pressure in a piping system. The reverse-acting pressure pilot opens the main valve when the sensed upstream pressure increases. The 25BP is NOT a safety valve, and should NEVER be used as such.

Model	25BP			
Sizes	1/2" to 2"	2 1/2", 3", 4"	1/2" to 2"	2", 2 1/2", 3", 4"
Connections	NPT	ANSI 125 flgd.	NPT	ANSI 300 flgd.
Construction	Cast Iron		Cast Steel	
Options		ANSI 250 flgd.		ANSI 150 flgd. (excludes 2")

### Typical Applications

The modulated release of surplus steam ensures that the set maximum pressure in the steam space or upstream piping will not be exceeded. Flash steam recovery systems to release excess flash steam limits the flash tank pressure. For elimination of non-critical loads, see TI-3-031-US.

### Limiting Operating Conditions

**Max. Operating Pressure(PMO)** NPT: 250 psig (17 barg) @ 450°F (232°C)  
 ANSI 125: 125 psig (8 barg) @ 450°F (232°C)  
 ANSI 250: 250 psig (17 barg) @ 450°F (232°C)  
 ANSI 150: 185 psig (12 barg) @ 450°F (232°C)  
 ANSI 300: 300 psig (20 barg) @ 450°F (232°C)

**Max. Operating Temperature** 450°F (232°C)

### Upstream Pressure Ranges

For the following upstream pressures, three color-coded pilot valve springs are available:

**Yellow:** 3 to 30 psi    **Blue:** 20 to 100 psi    **Red:** 80 to 250 psi

### Pressure Shell Design Conditions

**PMA** Cast Iron: 250 psig/0-450°F 17 barg/0-232°C  
 Max. allowable pressure Cast Steel: 300 psig/0-600°F 21 barg/0-316°C

**TMA** Cast Iron: 450°F/0-250 psig 232°C/0-17 barg  
 Max. allowable temperature Cast Steel: 600°F/0-300 psig 316°C/0-21 barg

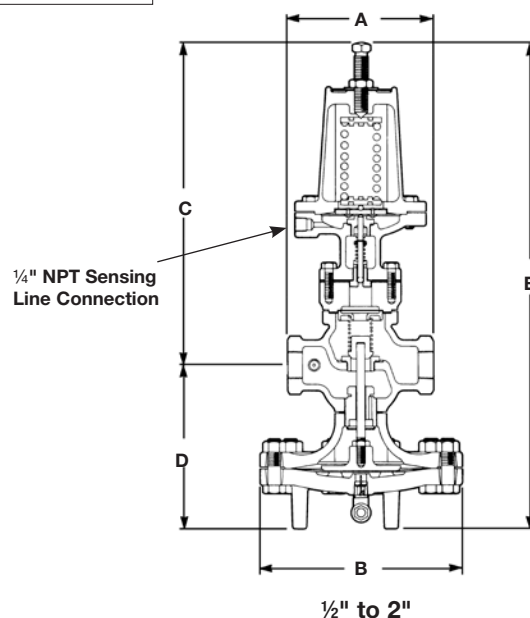
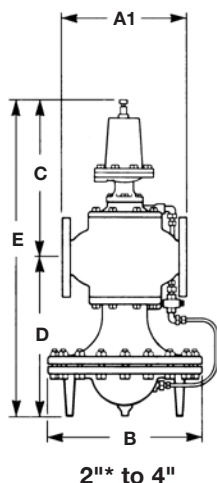
### Sample

#### Specification

The back pressure regulator shall be of the pilot-actuated, diaphragm-operated type. The main valve shall be single seated with hardened stainless steel trim; the valve body shall be cast iron (cast steel). The pilot shall be bolted directly to the valve body.

#### Capacities:

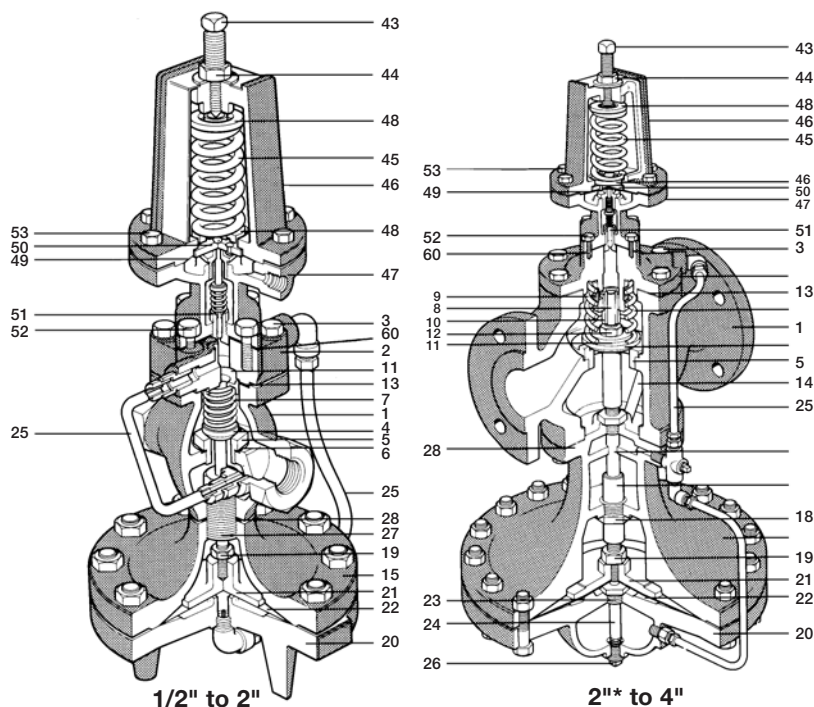
For selection and sizing data, see TI-3-031-US.



### Dimensions (nominal) in inches and millimeters

Size	Ansi 125		Ansi 250 Ansi 300		C	D	E	Weight	
	A	A1	A1	B				Cast Iron	Cast Steel
1/2", 3/4"	5.5 140	-	-	7.6 194	12.2 310	6.2 157	18.4 467	32 lb 14.5 kg	35 lb 15.9 kg
1"	6.0 152	-	-	8.6 219	12.1 308	6.75 171	18.9 479	39 lb 17.7 kg	43 lb 19.5 kg
1 1/4", 1 1/2"	7.25 184	-	-	8.6 219	12.7 322	7.1 179	19.75 502	44 lb 20 kg	48 lb 21.8 kg
2"	8.5 216	-	9.0 228	10.6 270	13.3 338	8.2 208	21.5 546	69 lb 31.3 kg	75 lb 34 kg
2 1/2"	-	10.9 276	11.5 292	13.6 346	14.0 356	13.9 354	27.9 710	157 lb 71.2 kg	171 lb 77.6 kg
3"	-	11.75 298	12.5 318	13.6 346	13.9 354	14.4 367	28.4 721	188 lb 85.3 kg	205 lb 93 kg
4"	-	13.9 352	14.5 368	15.6 397	15.25 387	16.1 410	31.4 797	284 lb 129 kg	309 lb 140 kg

# Pilot Operated Back Pressure Regulator 1/2" to 4" 25BP



\*ANSI 300 ONLY

## Construction Materials

No.	Part	Material
1	Valve Body	Cast Iron ASTM A 126 CL B Cast Steel ASTM A216 Gr WCB
2	Cover	Cast Iron ASTM A 126 CL B Cast Steel ASTM A216 Gr WCB
3	Cover Bolts	Steel ASTM A449
4	Main Valve Head	Stainless Steel 400 Series Stn Stl
5	Main Valve Seat	Stainless Steel
6	Main Valve Seat Gasket	Copper
7	Valve Return Spring	Stainless Steel
8	Valve Stem	Stainless Steel
9	Strainer Screen	Stainless Steel
10	Valve Stem Sleeve	Stainless Steel
11	Spring Guide	Cast Iron 1/2"-2" CRS 2" - 4"
12	Nut	Steel
13	Cover Gasket	Graphite
14	Pressure Equalizer Pipe	Stainless Steel
15	Upper Diaphragm Case	Cast Iron ASTM A 126 CL B Cast Steel ASTM A216 Gr WCB
16	Stem Bushing (2 1/2" - 4" Cast Steel only)	Stainless Steel
17	Diaphragm Plate Stem	Stainless Steel
18	Diaphragm Stem Guide	Stainless Steel
19	Nut	Brass 1/2" - 2" Steel 2" - 4"
20	Lower Diaphragm Case	Cast Iron ASTM A 126 CL B Cast Steel ASTM A216 Gr WCB
21	Diaphragm Plate	Brass 1/2" - 2" C.I. 2" - 4"
22	Main Diaphragm (2 ply)	Stainless Steel
23	Bushing	CRS
24	Tube & Orifice	Brass
25	Tubing Assembly	Copper
26	Plug (Cast Iron) (Cast Steel)	Brass Steel

No.	Part	Material
27	Connector Stud	Stainless Steel
28	Body Gasket	1/2" - 2" Copper Clad 2" - 4" Graphite
43	Adjustment Screw	Stainless Steel
44	Jam Nut	Brass
45	Pilot Valve Spring	Steel
46	Upper Diaphragm Case	Cast Iron Cast Steel
47	Lower Diaphragm Case	Cast Iron Cast Steel
48	Spring Plate	Steel ASTM A569
49	Diaphragm	Stainless Steel
50	Diaphragm Plate	Brass
51	Head & Seat Assy.	Stainless Steel Stainless Steel
52	Pilot Mounting Screws	Steel ASTM A449
53	Diaphragm Case Screws	Steel
60	Pilot Gasket	Graphite

## Installation

The regulator should be installed in a horizontal line with suitable bypass and isolating valves. A steam trap should be installed upstream to prevent condensate from reaching the regulator. The trap and regulator should both be protected with a strainer. The pressure sensing line should be located either in the upstream piping, or in the steam space. Complete installation instructions are given in IM-3-023-US.

## Maintenance

Complete installation and maintenance instructions are given in IM-3-023-US, a copy of which is supplied with each regulator. Available spare parts are shown on TI-1-1120-US and TI-3-0271-US.

TI-3-023-US 4.12





## Sizing and Selection Chart 25BP

The data required to size the valve are identical to those required for a pressure reducing valve, i.e. upstream pressure, downstream pressure and capacity. Valve sizing depends upon the application.

### As a flash steam surplussing valve

1. To size a Spirax Sarco 25BP Back Pressure Regulator properly, determine the maximum probable pounds of flash steam that will be generated within the flash tank.

The amount of flash can be calculated from the table overleaf. To this add approximately 20% as a safety factor for errors in calculating the load and/or possible future growth.

2. Determine the minimum amount of low pressure steam that will be used. If at times there is no demand for low pressure steam, then the back pressure regulator must be sized for the total amount of flash steam generated in the tank plus 20% safety factor. Where there is a definite minimum amount of low pressure steam used at all times, this amount of flash steam should be subtracted from the total flash steam generated and the regulator sized for the surplus amount.

**Example:** Suppose the high pressure system is operating at 125 psi, the amount of steam used at this pressure is 10,000#/hr and it is desired to keep the flash tank at 5 psi. Under these conditions, 13.4% of the 10,000#/hr (1340#/hr of flash steam) will be generated in the flash tank. If there is no demand for the low pressure steam at times, then the regulator must be sized for the 1340#/hr plus 20% or approximately 1600#/hr. If there is a constant demand for 500#/hr of low pressure steam at 5 psi, then the regulator should be sized to vent the difference between 1600 and 500 or 1100#/hr.

### Eliminating non-critical loads

For this application, a 25BP valve must be sized for the minimum allowable pressure drop to insure that the valve is normally fully open. Select valve size with load capacity at the minimum pressure drop on the 25P capacity table given in TIS 3.030.

A combination P-BP regulator must be sized using the inlet and reduced pressure the same as for a 25P pressure reducing valve. For a combination T-BP regulator size the same as a 25T temperature control.

### Surplussing Valve Capacities pounds of saturated steam per hour to atmosphere

Inlet Steam Pressure psig	NOMINAL VALVE SIZE								
	1/2"	3/4"	1"	1-1/4"	1-1/2"	2"	2-1/2"	3"	4"
C.V. Factors →	3.48	6.5	10.5	14	20	35	56	74	115
2	45	85	140	180	260	455	725	960	1,490
3	55	105	170	225	320	560	900	1,185	1,840
5	75	135	215	290	415	725	1,160	1,530	2,380
10	110	210	335	445	640	1,120	1,790	2,360	3,675
15	150	275	445	590	845	1,480	2,365	3,130	4,860
20	180	335	540	720	1,025	1,795	2,870	3,790	5,895
25	205	385	620	825	1,180	2,065	3,305	4,360	6,785
30	230	430	695	925	1,320	2,310	3,695	4,885	7,590
40	280	525	850	1,135	1,620	2,835	4,535	5,995	9,315
50	350	650	1,050	1,400	2,000	3,500	5,600	7,400	11,500
60	385	720	1,165	1,555	2,220	3,885	6,215	8,215	12,765
75	460	875	1,415	1,890	2,700	4,725	7,560	9,990	15,525
100	600	1,120	1,815	2,420	3,460	6,055	9,690	12,800	19,895
125	730	1,365	2,200	2,940	4,200	7,350	11,760	15,540	24,150
150	860	1,600	2,590	3,460	4,940	8,645	13,830	18,280	28,400
175	985	1,840	2,970	3,960	5,660	9,900	15,850	20,950	32,545
200	1,125	2,100	3,390	4,520	6,460	11,300	18,000	23,900	37,145
250	1,385	2,590	4,180	5,570	7,960	13,930	22,300	29,450	45,800
*300	1,640	3,070	4,960	6,600	9,440	16,400	26,400	34,900	53,300

\* Cast steel construction required for service above 250 psig

Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only.  
In the interests of development and improvement of the product, we reserve the right to change the specification.

TI-3-031-US 4.15

# Sizing and Selection Chart

## 25BP

### Percent Flash

Percent flash for various initial steam pressures and flash tank pressures

Steam Pressure psig	FLASH TANK PRESSURE, psig										
	0	2	5	10	15	20	30	40	60	80	100
5	1.7	1.0	0								
10	2.9	2.2	1.4	0							
15	4.0	3.2	2.4	1.1	0						
30	6.5	5.8	5.0	3.8	2.6	1.7	0				
40	7.8	7.1	6.4	5.1	4.0	3.1	1.3	0			
60	10.0	9.3	8.6	7.3	6.3	5.4	3.6	2.2	0		
80	11.7	11.1	10.3	9.0	8.1	7.1	5.5	4.0	1.9	0	
100	13.3	12.6	11.8	10.6	9.7	8.8	7.0	5.7	3.5	1.7	0
125	14.8	14.2	13.4	12.2	11.3	10.3	8.6	7.4	5.2	3.4	1.8
160	16.8	16.2	15.4	14.1	13.2	12.4	10.6	9.5	7.4	5.6	4.0
200	18.6	18.0	17.3	16.1	15.2	14.3	12.8	11.5	9.3	7.5	5.9
250	20.6	20.0	19.3	18.1	17.2	16.3	14.7	13.6	11.2	9.8	8.2
300	22.7	21.8	21.1	19.9	19.0	18.2	16.7	15.4	13.4	11.8	10.1
350	24.0	23.3	22.6	21.6	20.5	19.8	18.3	17.2	15.1	13.5	11.9
400	25.3	24.7	24.0	22.9	22.0	21.1	19.7	18.5	16.5	15.0	13.4

*Note: Table is for trap discharge at saturated steam temperature. Subcooled discharge traps release less flash. Load should be increased by 20% to allow for trap leakage, future growth, etc.*



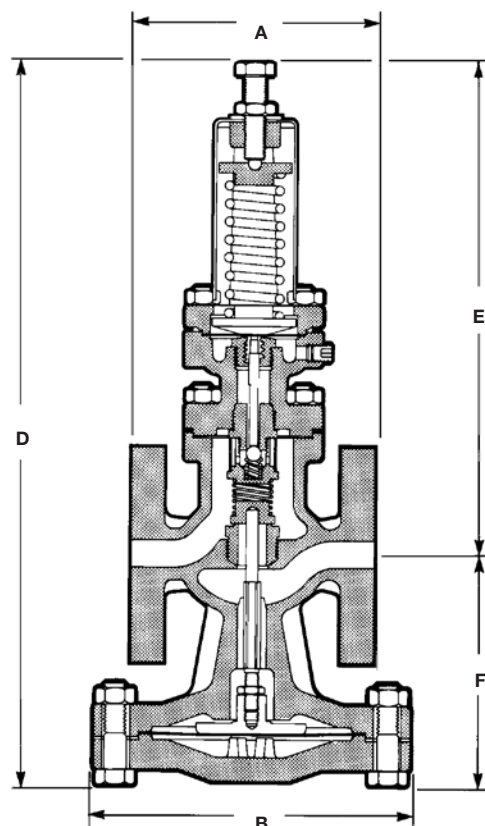
## Stainless Steel Pilot Operated Pressure Regulator DP 163

The DP163 is a self-powered, pilot-operated pressure reducing valve constructed entirely of stainless steel with 316L SS body. Downstream pressure is sensed either internally or through an external sensing pipe.

<b>Model</b>	<b>DP163</b>
<b>Sizes</b>	1/2" to 3"
<b>Connections</b>	ANSI 300
<b>Construction</b>	316 Stainless Steel Body Stainless Steel Internals
<b>Options</b>	BS or DIN Flanges, ANSI 150 flanges

### Typical Applications

Sterilizers, autoclaves, humidifiers, large and small scale bioprocessing equipment, culinary steam supplies and production suites, and other steam equipment which requires a reduced steam pressure to operate.



### Limiting Operating Conditions

**Max. Operating Pressure (PMO)** 304 psig (21 barg)

**Max. Operating Temperature** 432°F (250°C)

### Downstream Pressure Ranges

For the following downstream pressures, two color-coded pilot valve springs are available:

**Red:** 3 to 250 psi  
0.2 to 17 bar

**Grey:** 230 to 304 psi  
16 to 21 bar

### Pressure Shell Design Conditions

**PMA** 580 psig/0-248°F 40 barg/0-120°C  
Max. allowable pressure 472 psig/464°F 32 barg/240°C  
304 psig/752°F 21 barg/400°C

**TMA** 752°F/0-304 psig 400°C/0-21 barg  
Max. allowable temperature

### Capacities

See TIS 3.081

### Sample Specification

Self-contained reducing valves shall be pilot-actuated diaphragm operated type DP163. Valve shall be packless design, single-seated globe type suitable for dead-end shut off. Valve stem shall be top and bottom guided. Pilot to be top mounted with set pressure adjustment via a spring. Main valve body to be constructed of 316L stainless steel. All internal components to be made of stainless steel.

**Dimensions** (nominal) in inches and millimeters

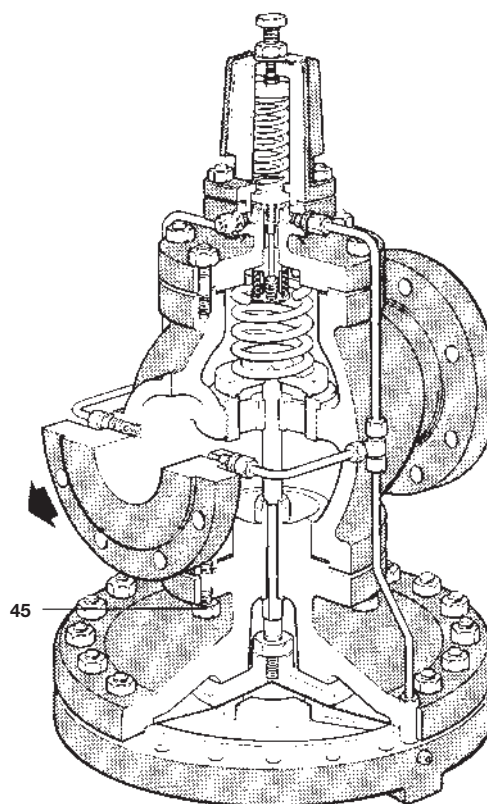
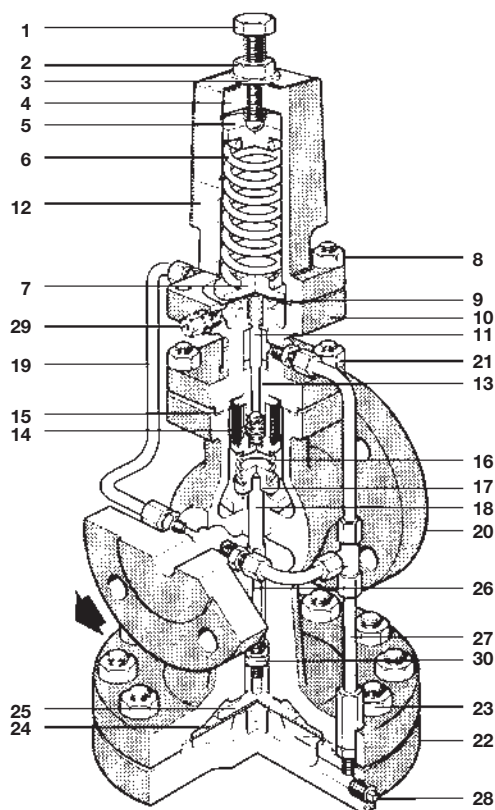
Size	BS 4504 PN 40 A	ANSI 300 A	ANSI 150 A	BS 10 J A	B	D	E	F	Weight
1/2" & 1/2" LC 15 & 15 LC	5.1 130	5.1 130	4.7 122	5.1 130	6.9 175	15.9 405	10.9 277	5.0 128	33 lb 15 kg
3/4" 20	5.9 150	5.9 150	5.6 142	5.9 150	6.9 175	15.9 405	10.9 277	5.0 128	35.3 lb 16 kg
1" 25	6.3 160	6.3 160	6.1 156	6.4 164	8.5 216	17.3 440	11.3 288	6.0 152	50.7 lb 23 kg
1-1/4" 32	7.1 180	7.2 183	6.9 176	7.2 184	8.5 216	17.3 440	11.3 288	6.0 152	55.1 lb 25 kg
1-1/2" 40	7.9 200	8.2 209	7.9 200	8.2 209	11.0 280	19.3 490	12.0 305	7.3 185	88.1 lb 40 kg
2" 50	9.1 230	9.3 236	9.1 230	9.6 243	11.9 280	19.3 490	12.0 305	7.3 185	95.2 lb 42 kg
3" 80	12.2 310	12.5 319	12.2 310	12.8 325	13.8 350	22.8 580	12.7 322	10.1 258	226 lb 103 kg

Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only.  
In the interests of development and improvement of the product, we reserve the right to change the specification.

TI-3-080-US 8-04



# Stainless Steel Pilot Operated Pressure Regulator DP 163



## Construction Materials

No.	Part	Material	
1	Adjustment Screw	Stainless Steel	BS 6105 A4/80
2	Adjustment Locknut	Stainless Steel	BS 6105 A4/80
3	Washer	Stainless Steel	BS 1449 304 S16
4	Spring Housing	Stainless Steel	BS 3100 316 C12
5	Top Spring Plate	Stainless Steel	BS 970 431 S29
6	Pressure Adjustment Spring	Stainless Steel	BS 2056 302 S25
7	Bottom Spring Plate	Stainless Steel	BS 970 431 S29
8	Spring Housing Securing Studs & Nuts	Stainless Steel	BS 6105 A4/80
9	Pilot Diaphragm	Stainless Steel	BS 1449 316 S31
10	Pilot Valve Housing	Stainless Steel	BS 3100 316 C12
11	Pilot Valve Plunger	Stainless Steel	BS 970 431 S29
12	Spring Housing Cover	Stainless Steel	BS 1449 304 S12
13	Pilot Valve & Seat Unit	Stainless Steel	BS 970 431 S29
14	Internal Strainer	Stainless Steel	BS 1449 304 S16
15	Body Gasket	Compressed Synthetic Fiber	P1141 A BS 2815 B
16	Main Valve Return Spring	Stainless Steel	BS 2056 302 S25
17	Main Valve	Stainless Steel	BS 970 431 S29
18	Main Valve Seat	Stainless Steel	BS 970 431 S29
19	Pressure Sensing Pipe	Stainless Steel	BS 3605 304 S14
20	Main Valve Body	Stainless Steel	BS 3100 316 C12
21	Pilot Valve Housing Securing Studs & Nuts	Stainless Steel	BS 6105 A4/80
	DN 15 & 20	M10 x 25 mm	
	DN 25 & 32	M12 x 30 mm	
	DN 40 & 50	M16 x 35 mm	
	DN 80	M12 x 35 mm	
22	Main Diaphragm Chamber	Cast Stainless Steel	BS 3100 316 C12
23	Main Diaphragm	Stainless Steel	BS 6105 A4/80
	Securing Bolts & Nuts	Stainless Steel	BS 3692 Gr 8
	DN 15 & 20	M12 x 50 mm	
	DN 25 & 32	M12 x 55 mm	
	DN 40 & 50	M12 x 65 mm	
	DN 80	M12 x 75 mm	

24	Main Diaphragms	Stainless Steel	BS 1449 316 S31
25	Main Diaphragm Plate	Stainless Steel	BS 970 431 S29
26	Push Rod	Stainless Steel	BS 970 431 S29
27	Pipe Assembly	Stainless Steel	BS 3605 304 S14
28	Plug 1/8" BSP	Stainless Steel	BS 970 431 S29
29	Pressure Pipe Union	Stainless Steel	BS 970 316 S31
30	Locknut	Stainless Steel	BS 6105 A4/80
45	Body Stud & Nuts	Stainless Steel	BS 6105 A4/80
	M12 x 40 mm		BS 3692 Gr 8

## Installation

The DP163 controls by sensing the downstream pressure through a pressure sensing pipe taken from the union (29) or through the internal pressure sensing pipe (19) provided. Complete installation instructions are given in IM-P006-07, which accompanies the product. Note: Capacity will be reduced if an external sensing pipe is not fitted.

## Maintenance

This product can be maintained without disturbing the piping connections. Complete isolation of the valve is required before any servicing is performed. The valve should be disassembled periodically for cleaning of the strainer screen and inspection and cleaning of both the valve head and seat, and the pilot head and seat. Worn or damaged parts should be replaced. Please refer to Spare Parts list (TIS 3.082) for replacement parts. Complete installation and maintenance instructions are available upon request.

TI-3-080-US 08.04



## Capacities for the Stainless Steel Pilot Operated Pressure Regulator DP 163

### Capacities Pounds of saturated steam per hour for standard valves

Inlet Steam Pressure psig	Outlet Steam Pressure psig	NOMINAL VALVE SIZE							
		1/2" LC	1/2"	3/4"	1"	1-1/4"	1-1/2"	2"	3"
Max C <sub>v</sub> Factors		1.1	3.2	6.4	9.4	14.0	19.8	32.7	74.8
25	15	42	94	198	340	510	790	1270	2350
	10	48	100	205	365	530	840	1345	2510
	7	51	110	225	390	575	895	1420	2630
50	40	60	130	240	475	640	995	1525	2300
	30	95	205	420	730	1080	1590	2570	5300
	0-21	110	225	450	790	1190	1660	2775	5950
75	60	100	210	445	775	1050	1600	2650	5300
	50	135	295	610	990	1500	2175	3600	7900
	0-35	160	340	720	1160	1780	2665	4230	9100
100	80	140	305	620	1075	1570	2300	3800	8100
	60	210	440	915	1490	2250	3300	5300	12000
	0-48	220	470	980	1560	2400	3550	5650	12450
125	100	165	360	680	1200	1825	2775	4420	9500
	80	245	520	1090	1750	2650	3970	6300	14100
	0-62	270	580	1225	1960	2970	4325	7050	15400
150	125	190	405	825	1330	2050	3060	4940	10700
	100	290	660	1300	2090	3150	4450	7500	16600
	0-76	330	700	1480	2360	3605	5320	8500	18700
175	150	205	430	890	1470	2200	3250	5150	11200
	125	310	680	1400	2225	3375	5000	8025	17750
	0-87	380	820	1750	2710	4160	6230	9970	21900
200	150	305	660	1380	2250	3290	4970	7980	11500
	125	405	870	1800	2810	4275	6500	10400	23100
	0-103	440	925	1970	3100	4750	7100	11350	25070
225	175	315	680	1405	2300	3390	5115	8200	17800
	150	425	900	1880	2990	4600	6800	10960	24000
	0-117	495	1050	2195	3485	5360	7980	12800	28200
250	200	320	685	1440	2320	3440	5200	8300	18600
	150	530	1130	2350	3750	5800	8600	13700	30300
	0-131	555	1180	2420	3800	5970	8990	14280	31900
275	225	340	720	1530	2430	3600	5405	8700	19000
	200	450	955	2030	3200	4840	7220	11600	25900
	0-145	610	1305	2700	4300	6650	9800	15820	34800
300	250	350	740	1580	2490	3720	5600	8970	19300
	225	465	980	2050	3275	4990	7380	11850	26500
	0-160	665	1420	2940	4700	7180	10760	17200	37900

Capacities are based on an accuracy of regulation of 1-1/2 psi and with pipe sizes to ensure reasonable steam velocities. Refer to pipe sizing chart.

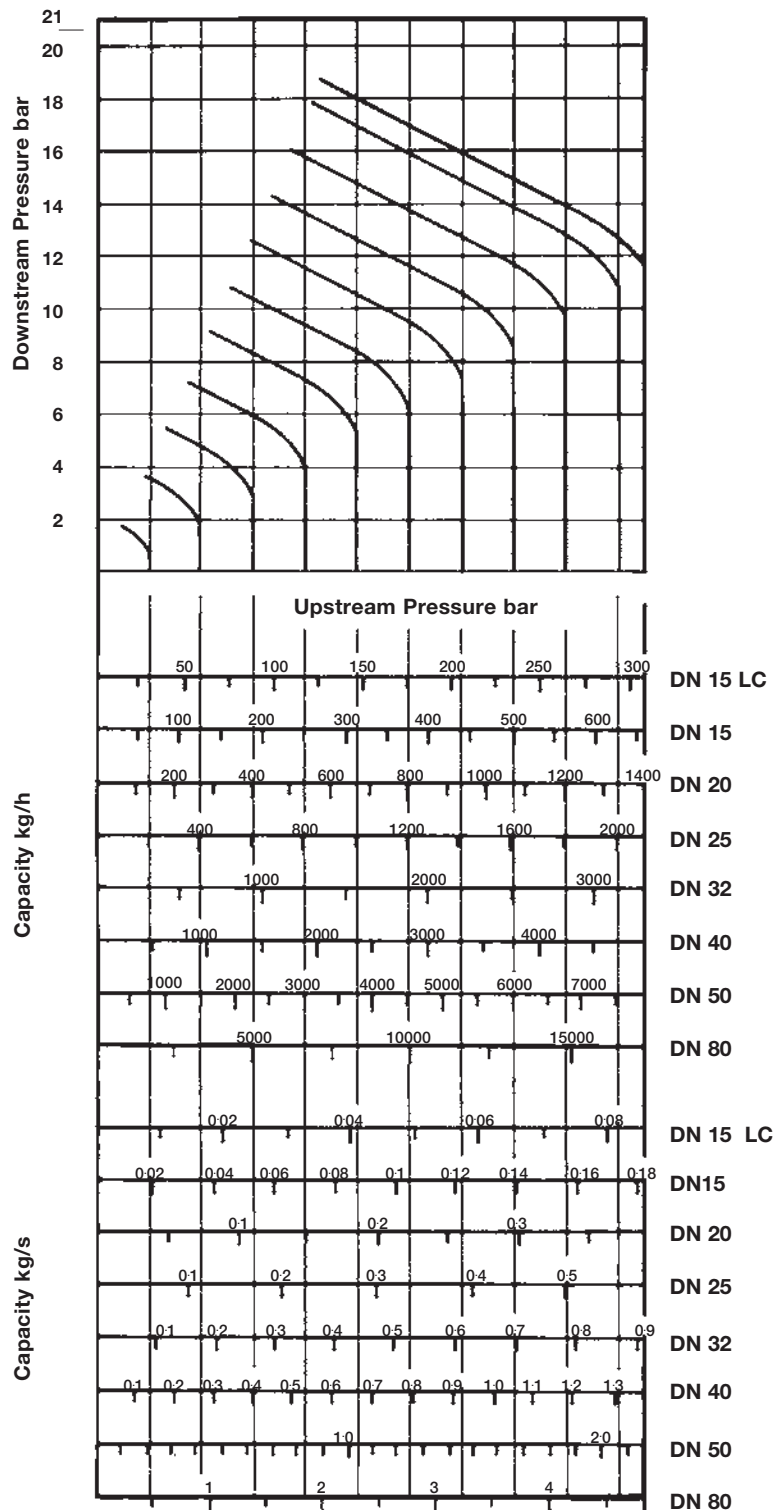
**Note: The capacities quoted on the chart are based on valves fitted with external pressure sensing pipes. Reliance on the internal pressure sensing pipe will mean that capacities may be reduced. In the case of low downstream pressure, this reduction could be up to 30% of the valve capacity**

Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only.  
In the interests of development and improvement of the product, we reserve the right to change the specification.

TI-3-081-US 03.94

# Capacities for the Stainless Steel Pilot Operated Pressure Regulator DP 163

## Steam Capacities (metric Units)



### How to use the chart

#### Saturated Steam

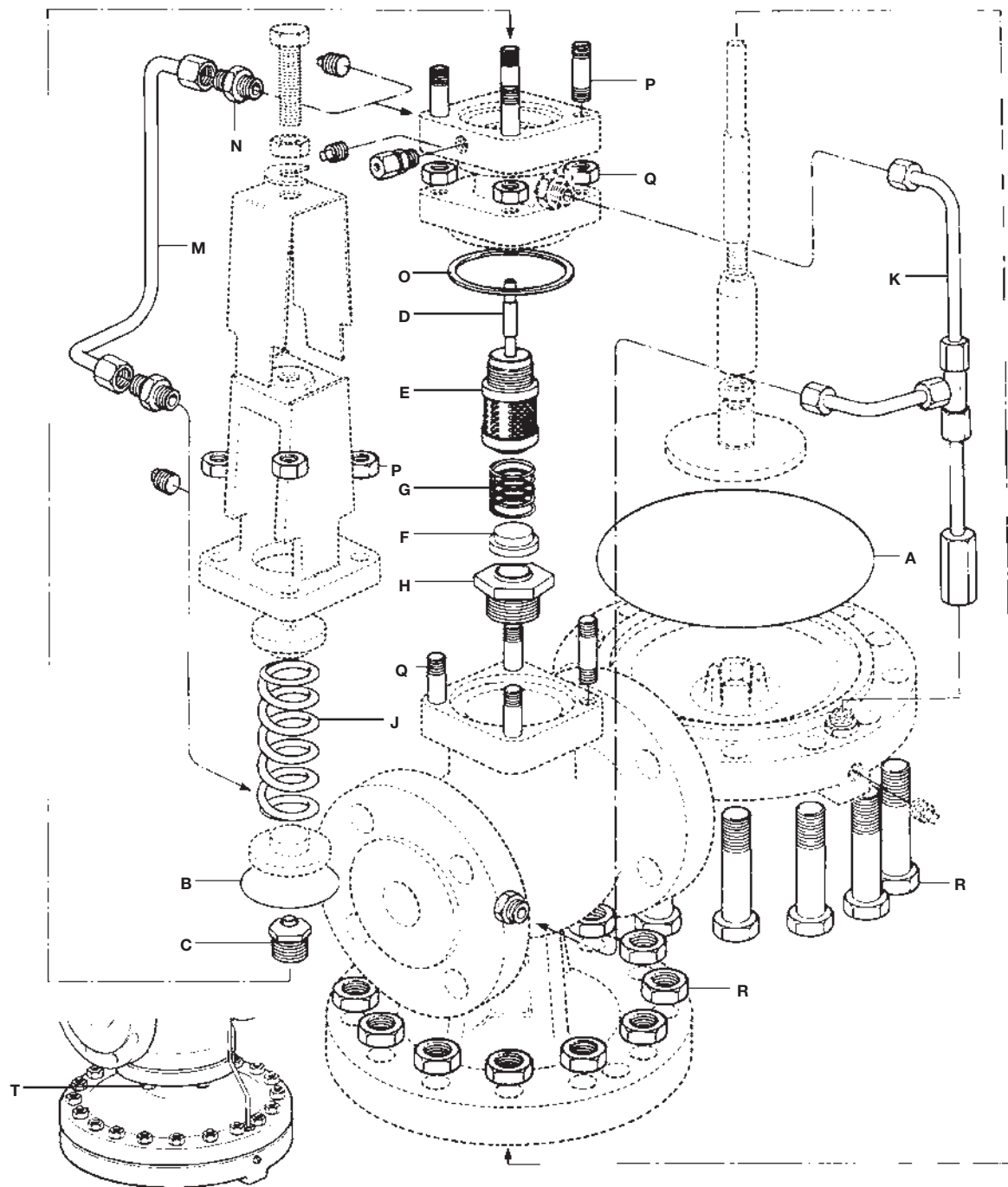
Required a valve to pass 600 kg/h reducing from 6 bar to 4 bar. Find point at which curved 6 bar upstream pressure line crosses horizontal 4 bar downstream pressure line. A perpendicular dropped from this point gives the capacities of all DP sizes under these conditions. A DN 32 valve is the smallest size which will carry the required load.

#### Superheated Steam

Because of the higher specific volume of superheated steam, a correction factor must be applied to the figure obtained from this chart. For 55°C of superheat, the factor is 0.95, and for 100°C of superheat, it is 0.9. Using the example given for saturated steam, the DN 32 valve would pass  $740 \times 0.95 = 703$  kg/h if the steam had 55°C of superheat. It is still big enough to pass the required load of 600 kg/h.



## Spare Parts for the Stainless Steel Pilot Operated Pressure Regulator DP 163



Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only.  
In the interests of development and improvement of the product, we reserve the right to change the specification.

TI-3-082-US 05.10

# Spare Parts for the Stainless Steel Pilot Operated Pressure Regulator DP 163

## Spare Parts

Maintenance Kit		
A standby set of spares for general maintenance purposes covering all spares marked*		
* Main Diaphragm	(2 off) A	
* Pilot Diaphragm	(2 off) B	
Pilot Valve Seal Assembly	C	
* Pilot Valve & Plunger Assembly	D,E	
Main Valve Assembly	F,H	
* Main Valve Return Spring	G	
Pressure Adjustment Spring		
Choice of spring to suit reduced pressure		
Yellow	3 psi to 45 psi	0.2 bar to 3 bar
Red	3 psi to 250 psi	0.2 bar to 17 bar
Grey	230 psi to 304 psi	16 bar to 21 bar
* Control Pipe Assembly	K	
Balance Pipe Assembly	M,N	
* Body Gasket	(packet of 3) O	
Set of Spring Housing	P	
Securing Studs & Nuts	(set of 4)	
Set of Pilot Valve Housing	Q	
Securing Studs & Nuts	(set of 4)	
Set of Diaphragm Chamber	R	
Securing Bolts & Nuts		
1/2" & 3/4" - DN 15 & 20	set of 10	
1" & 1-1/4" - DN 25 & 30	set of 12	
1-1/2" & 2" - DN 40 & 50	set of 16	
3" - DN 80	set of 20	
Set of Main Body Studs & Nuts 3" DN 80	(set of 6) T	

## Interchangeability of Spares

The following table shows how some parts are interchangeable. For example, the line headed main diaphragm indicates that the diaphragm used in sizes 1/2" LC, 1/2" & 3/4" DN 15 LC, DN 15 and DN 20, is common to those sizes by the letter 'a'. The letter 'b' indicates that sizes 1" and 1-1/4" DN 25 and DN 32, use a common diaphragm.

	Valve Size DN						
	1/2" LC 1/2"	3/4"	1"	1-1/4"	1-1/2" 2"	3"	
	15	15	20	25	32	40	50 80
* Main Diaphragm	a	a	a	b	b	c	c d
* Pilot Diaphragm	a	a	a	a	a	a	a a
Pilot Valve Seal Assembly	a	a	a	a	a	a	a a
* Pilot Valve & Plunger Assembly	a	a	a	a	a	a	a a
Main Valve Assembly	a	b	c	d	e	f	g h
* Main Valve Return Spring	a	a	a	b	b	c	c d
Pressure Adjustment Spring	a	a	a	a	a	a	a a
* Control Pipe Assembly	a	a	b	c	d	e	f g
Balance Pipe Assembly	a	a	b	c	d	e	f g
* Body Gasket	a	a	a	b	b	c	c d
Set of Spring Housing	a	a	a	a	a	a	a a
Securing Studs & Nuts							
Set of Pilot Valve Housing	a	a	a	b	b	c	c d
Securing Studs & Nuts							
Set of Diaphragm Chamber	a	a	a	b	b	c	c d
Securing Bolts & Nuts							
Set of Main Body Studs & Nuts	-	-	-	-	-	-	- a



## Pilot Operated Temperature Regulators

### 1/2" to 4" 25T

The 25T is a self actuated pilot-operated temperature regulating valve. The temperature pilot has a calibrated dial for accurate temperature setting, and is available with a variety of solid-fill sensing bulbs (see TI-1-1123-US). The standard capillary tubing length is 8 feet, with an optional standard length of 15 feet.

Model	25T			
Sizes	1/2" to 2"	2 1/2", 3", 4"	1/2" to 2"	2", 2 1/2", 3", 4"
Connections	NPT	ANSI 125 flgd.	NPT	ANSI 300 flgd.
Construction	Cast Iron		Cast Steel	
Options		ANSI 250 flgd.		ANSI 150 flgd. (excludes 2")
Non-Standard capillary tubing length (see TIS 1.1123) in 5 ft. intervals to a maximum of 50 ft.				

### Typical Applications

Storage steam water heaters, instantaneous heat exchangers and converters, air handling coils, tank heating coils, steam jacketed vessels, steam chests, molds and platens.

### Capacities

For selection and sizing data, see TI-1-1124-US.

### Limiting Operating Conditions

<b>Max. Operating Pressure</b> (PMO)	NPT: 250 psig (17 barg) @ 450°F (232°C)
	ANSI 125: 125 psig (8 barg) @ 450°F (232°C)
	ANSI 250: 250 psig (17 barg) @ 450°F (232°C)
	ANSI 150: 185 psig (12 barg) @ 450°F (232°C)
	ANSI 300: 300 psig (20 barg) @ 450°F (232°C)
<b>Max. Operating Temperature*</b>	450°F (232°C)
	*The temperature of the sensing bulb must not exceed 350°F (177°C)

### Standard Temperature Ranges

30°F to 90°F (0°C to 32°C)	
60°F to 120°F (15°C to 50°C)	100°F to 160°F (40°C to 70°C)
120°F to 180°F (50°C to 80°C)	160°F to 220°F (70°C to 105°C)
200°F to 260°F (95°C to 125°C)	260°F to 320°F (125°C to 160°C)

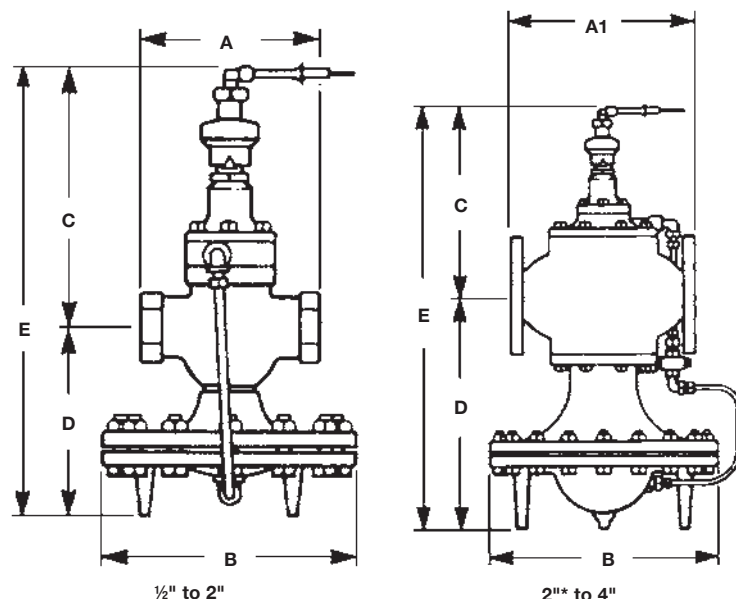
### Pressure Shell Design Conditions

<b>PMA</b>	Cast Iron: 250 psig/0-450°F 17 barg/0-232°C
<b>Max. allowable pressure</b>	Cast Steel: 300 psig/0-450°F 20 barg/0-232°C

<b>TMA</b>	Cast Iron: 450°F/0-250 psig 232°C/0-17 barg
<b>Max. allowable temperature</b>	Cast Steel: 450°F/0-300 psig 232°C/0-17 barg

### Sample Specification

Temperature Regulators shall be of the pilot-actuated, diaphragm-operated type. The main valve shall be single-seated, with hardened stainless steel trim; the valve body shall be cast iron (cast steel). The pilot shall be bolted directly to the valve body and shall be removable without disturbing the control connections. The temperature setting shall be adjustable without the use of tools, and the set point shall be indicated on a calibrated dial. The thermostatic system shall be solid fill, and shall incorporate overheat protection.



**Dimensions (nominal) in inches and millimeters**

Size	Ansi 125		Ansi 250 Ansi 300						Weight	
	A	A1	A1	B	C	D	E		Cast Iron	Cast Steel
1/2", 3/4"	5.5 140	-	-	7.6 194	9.8 249	6.2 157	16.0 406		27 lb 12.2 kg	30 lb 13.6 kg
1"	6.0 152	-	-	8.6 219	9.75 248	6.75 171	16.5 419		34 lb 15.4 kg	37 lb 16.8 kg
1 1/4", 1 1/2"	7.25 184	-	-	8.6 219	10.3 262	7.1 179	17.4 441		39.5 lb 17.9 kg	43 lb 19.5 kg
2"	8.5 216	-	9.0 228	10.6 270	10.9 278	8.2 208	19.1 486		64 lb 29 kg	70 lb 31.8 kg
2 1/2"	-	10.9 276	11.5 292	13.6 346	11.7 297	13.9 354	25.6 651		152.5 lb 69.2 kg	166 lb 75.3 kg
3"	-	11.75 298	12.5 318	13.6 346	11.6 294	14.4 367	26.0 660		183.5 lb 83.2 kg	200 lb 90.7 kg
4"	-	13.9 352	14.5 368	15.6 397	12.8 325	16.1 410	28.9 735		279.5 lb 127 kg	305 lb 138 kg

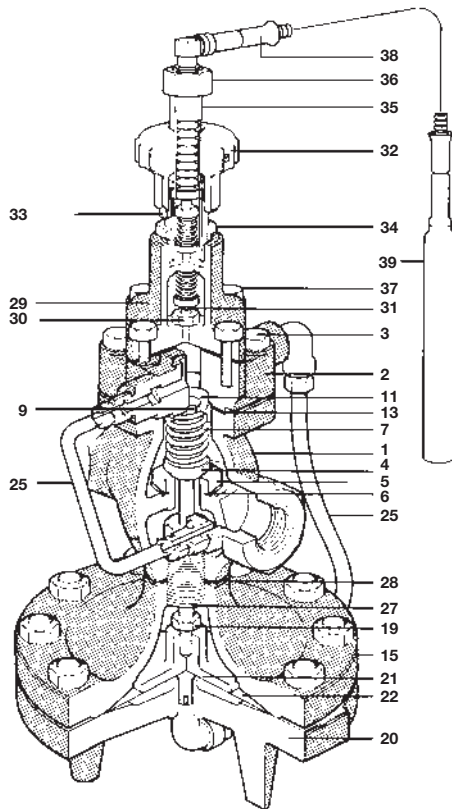
Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only. In the interests of development and improvement of the product, we reserve the right to change the specification.

TI-1-1116-US 4.12

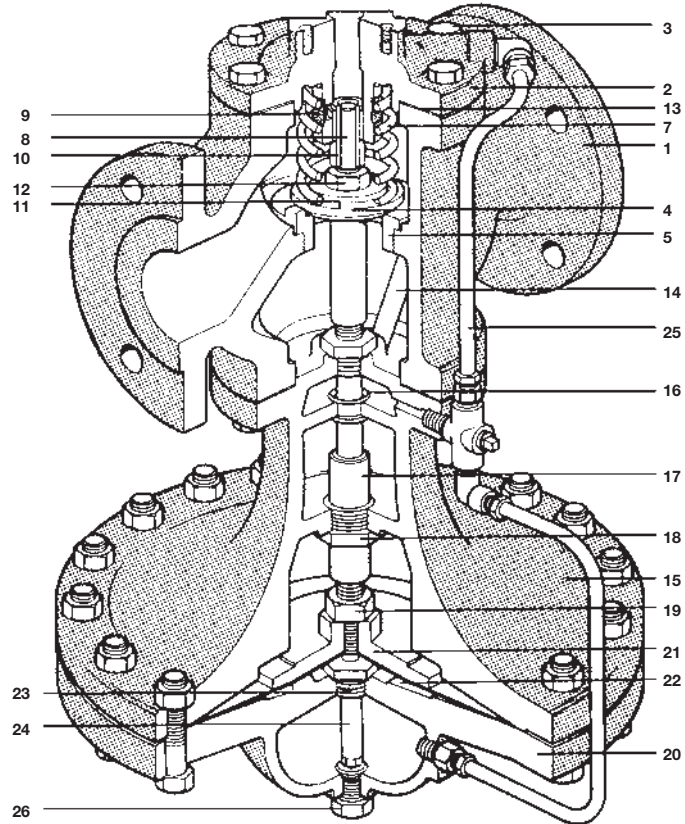


# Pilot Operated Temperature Regulators

## 1/2" to 4" 25T



1/2" to 2"



2" to 4" \*ANSI 300 ONLY

### Construction Materials

No.	Part	Material
1	Valve Body	Cast Iron ASTM A 126 CL B Cast Steel ASTM A216 Gr WCB
2	Cover	Cast Iron ASTM A 126 CL B Cast Steel ASTM A216 Gr WCB
3	Cover Bolts	Steel ASTM A449
4	Main Valve Head	Stainless Steel,
5	Main Valve Seat	Stainless Steel
6	Main Valve Seat Gasket	Copper
7	Valve Return Spring	Stainless Steel
8	Valve Stem	Stainless Steel
9	Strainer Screen	Stainless Steel
10	Valve Stem Sleeve	Stainless Steel
11	Spring Guide	Cast Iron 1/2"-2" CRS 2" - 4"
12	Nut	Steel
13	Cover Gasket	Graphite
14	Pressure Equalizer Pipe	Stainless Steel
15	Upper Diaphragm Case	Cast Iron ASTM A 126 CL B Cast Steel ASTM A216 Gr WCB
16	Stem Bushing (2 1/2" - 4" Cast Steel only)	Stainless Steel
17	Diaphragm Plate Stem	Stainless Steel
18	Diaphragm Stem Guide	Stainless Steel
19	Nut	Brass 1/2" - 2" Steel 2" - 4"
20	Lower Diaphragm Case	Cast Iron Cast Steel
21	Diaphragm Plate	Brass 1/2" - 2" C.I. 2" - 4"
22	Main Diaphragm (2 ply)	Stainless Steel
23	Bushing	CRS
24	Tube & Orifice	Stainless Steel

25	Tubing Assembly	Copper Brass
26	Plug (Cast Iron) (Cast Steel)	Brass Steel
27	Connector Stud	Stainless Steel
28	Body Gasket	1/2" - 2" Copper Clad 2" - 4" Graphite
29	Pilot Valve Body	Cast Iron ASTM A 126 CL B Cast Steel ASTM A216 Gr WCB
30	Pilot Valve Seat	Stainless Steel
31	Pilot Valve Head	Stainless Steel
32	Adjustment Knob	Phenolic
33	Pointer	Stainless Steel
34	Extension Nut	Brass
35	Case Tube	Brass
36	Retaining Nut	Brass
37	Pilot Mounting Screws	Steel
38	Capillary Tube	Varies with style selected
39	Bulb	Varies with style selected
60	Pilot Gasket	Stainless Steel

### Installation

The regulator should be installed in a horizontal line with suitable bypass and isolating valves. A steam trap should be installed upstream to prevent condensate from reaching the valve. The trap and regulator should both be protected with a strainer. The thermostatic bulb must be carefully located in the medium being heated. Complete installation instructions are given in IM-1-1116-US.

### Maintenance

Complete installation and maintenance instructions are given in IM-1-1116-US, a copy of which is supplied with each valve. Available spare parts are shown on TI-1-1120-US and TI-3-0271-US.

TI-1-1116-US 4.12



# Pilot Operated Temperature Regulator w/ Electric Override 1/2" to 4" 25TE

The 25TE has all of the features of the 25T, with the addition of an electric pilot. An electrical signal can override the temperature pilot to provide a remote shut-off capability.

Note: For pressures below 15 psig, the E pilot is not recommended for use with valves 2-1/2" and larger.

Model	25TE			
Sizes	1/2" to 2"	2-1/2", 3", 4"	1/2" to 2"	2", 2-1/2", 3", 4"
Connections	NPT	ANSI 125	NPT	ANSI 300
Construction	Cast Iron		Cast Steel	
Options		ANSI 250		ANSI 150 (excludes 2")
	Non-Standard Capillary tubing length in 5 ft. increments to a maximum of 50 ft. (see TIS 1.1123)			
Electric Pilot Specifications	Enclosure: NEMA 4 & 7 (C&D) 115v/60Hz; Holding: 23 VA Inrush: 45VA; Normally closed 200 psig Max. operating pressure			
Electric Pilot Options	140 psig Max. operating pressure (for faster response time) 230 volt coil			

## Capacities

The valve is sized according to the temperature control requirements.

For selection & sizing data, see TIS 1.1114

## Sample Specification

The pressure reducing valves shall be of the pilot-actuated diaphragm operated type with electric override. The main valve shall be single-seated with hardened stainless steel trim; the valve body shall be cast iron (cast steel). The pilots shall be bolted directly to the valve body and shall be removable without disturbing the control connections. The temperature setting shall be adjustable without the use of tools, and the set point shall be indicated on a calibrated dial. The thermostatic system shall be solid-fill, and shall incorporate over heat protection. The electric pilot shall have a NEMA 4 & 7 (C & D) enclosure with 115v (230v) 60 Hz coil.

## Limiting Operating Conditions

Max. Operating  
(200°C)

NPT: 200 psig (14 barg) @ 392°F

Pressure (PMO)

ANSI 125: 125 psig (8 barg) @ 392°F (200°C)  
ANSI 250: 200 psig (14 barg) @ 392°F (200°C)  
ANSI 150: 185 psig (12 barg) @ 392°F (200°C)  
ANSI 300: 200 psig (14 barg) @ 392°F (200°C)

Max. Operating  
Temperature\*

392°F (200°C)

\*The temperature of the sensing bulb must not exceed 350°F (177°C)

## Standard Temperature Ranges

30°F to 90°F	0°C to 32°C		
60°F to 120°F	15°C to 50°C	100°F to 160°F	40°C to 70°C
120°F to 180°F	50°C to 80°C	160°F to 220°F	70°C to 105°C
200°F to 260°F	95°C to 125°C	260°F to 320°F	125°C to 160°C

## Pressure Shell Design Conditions

PMA Cast Iron: 250 psig/0-450°F 17 barg/0-232°C  
Max. allowable pressure Cast Steel: 300 psig/0-450°F 20 barg/0-232°C

TMA Cast Iron: 450°F/0-250 psig 232°C/0-17 barg  
Max. allowable temperature Cast Steel: 450°F/0-300 psig 232°C/0-20 barg

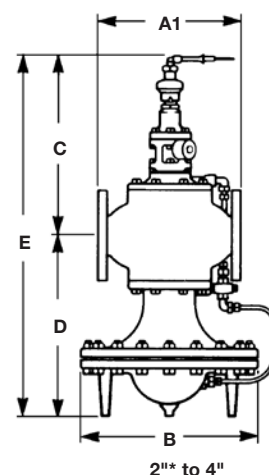
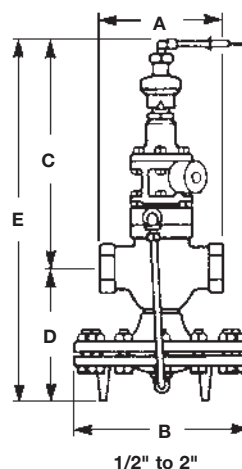
## Typical Applications

Temperature control applications where the valve must also respond to an electrical program timer, safety or limit switch, or remote manual switch.

## Installation

The regulator should be installed in a horizontal line with suitable bypass and isolating valves. A steam trap should be installed upstream to prevent condensate from reaching the valve. The trap and regulator should both be protected with a strainer. The thermostatic bulb must be carefully located in the medium being heated. Complete installation instructions are given in IMI 650-D76.

**Maintenance** Complete installation and maintenance instructions are given in IMI 650-D76, a copy of which is supplied with each valve. Available spare parts are shown on TI-1-1120-US and TI-3-0271-US.



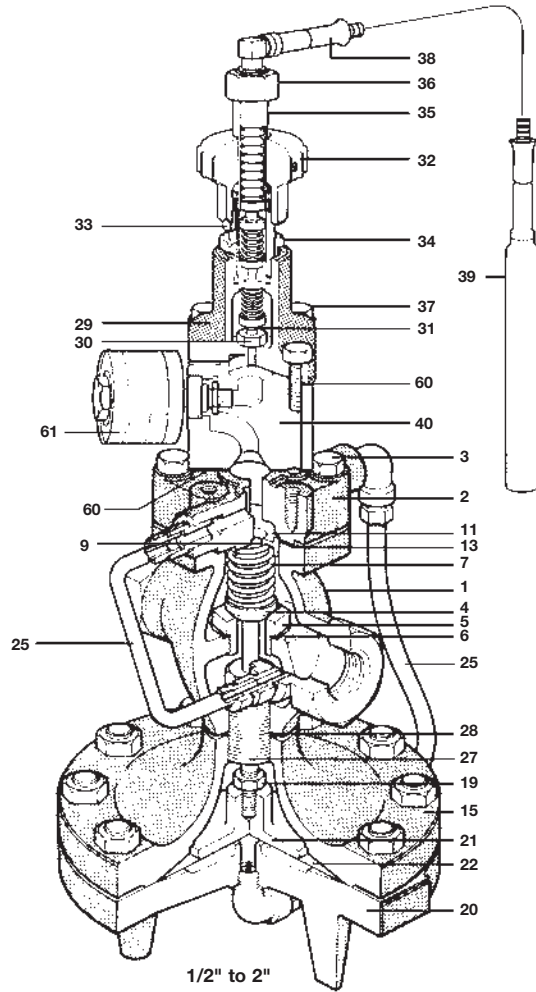
## Dimensions (nominal) in inches and millimeters

Size	ANSI 125 ANSI 150		ANSI 250 ANSI 300		B	C	D	E	Weight	
	A	A1	A1	A1					Cast Iron	Cast Steel
1/2", 3/4"	5.5 140	-	-	-	7.6 194	12.1 306	6.2 157	18.25 464	30.5 lb 13.8 kg	33 lb 15 kg
1"	6.0 152	-	-	-	8.6 219	12.0 305	6.75 171	18.75 476	37.5 lb 17 kg	41 lb 15 kg
1-1/4", 1-1/2"	7.25 184	-	-	-	8.6 219	12.6 319	7.1 179	19.6 498	43 lb 19.5 kg	47 lb 21.3 kg
2"	8.5 216	-	9.0 228	-	10.6 270	13.2 335	8.2 208	21.4 543	67.5 lb 30.6 kg	74 lb 33.6 kg
2-1/2"	-	10.9 276	11.5 292	-	13.6 346	13.9 354	13.9 354	27.9 708	156 lb 70.8 kg	170 lb 77.1 kg
3"	-	11.75 298	12.5 318	-	13.6 346	13.9 351	14.4 367	28.4 721	187 lb 84.8 kg	204 lb 92.5 kg
4"	-	13.9 352	14.5 368	-	15.6 397	15.1 383	16.1 410	31.2 792	283 lb 128 kg	308 lb 140 kg

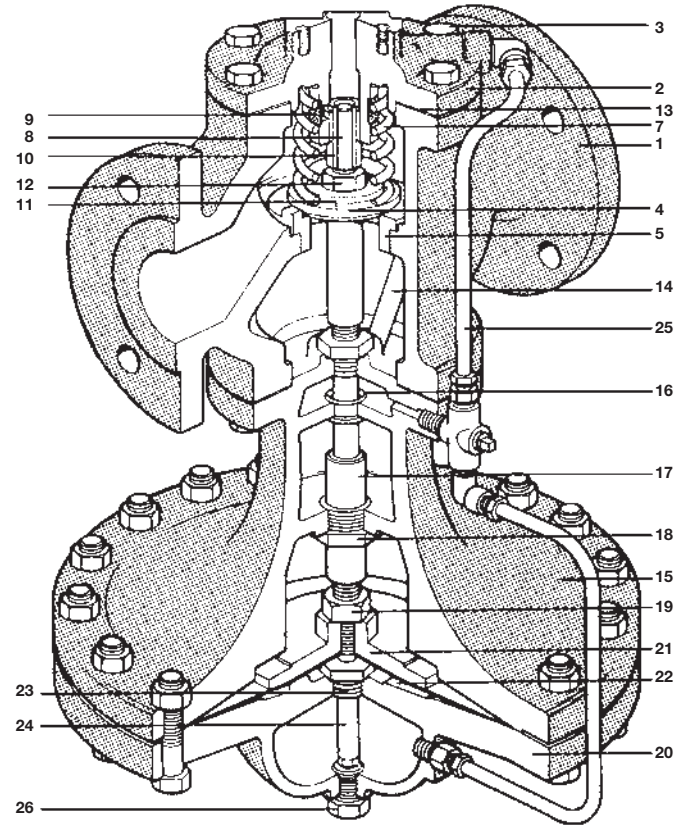
Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only.  
In the interests of development and improvement of the product, we reserve the right to change the specification.



# Pilot Operated Temperature Regulator w/ Electric Override 1/2" to 4" 25TE



1/2" to 2"



2" to 4" \*ANSI 300 ONLY

## Construction Materials

No.	Part	Material
1	Valve Body	Cast Iron ASTM A 126 CL B
2	Cover	Cast Iron ASTM A 126 CL B
3	Cover Bolts	Steel ASTM A449
4	Main Valve Head	Stainless Steel
5	Main Valve Seat	Stainless Steel
7	Valve Return Spring	Stainless Steel
8	Valve Stem	Stainless Steel
9	Strainer Screen	Stainless Steel
10	Valve Stem Sleeve	Stainless Steel
11	Spring Guide	Cast Iron 1/2" - 2" CRS 2" - 4"
12	Nut	Steel
13	Cover Gasket	Graphite
14	Pressure Equalizer Pipe	Stainless Steel
15	Upper Diaphragm Case	Cast Iron ASTM A 126 CL B Cast Steel ASTM A216 Gr WCB
16	Stem Bushing (2-1/2" - 4" Cast Steel only)	Stainless Steel
17	Diaphragm Plate Stem	Stainless Steel
18	Diaphragm Stem Guide	Stainless Steel
19	Nut	Brass 1/2" - 2" Steel 2" - 4"
20	Lower Diaphragm Case	Cast Iron ASTM A126CL B Cast Steel ASTM A216 Gr WCB
21	Diaphragm Plate	Brass 1/2" - 2" C.I. 2" - 4"
22	Main Diaphragm (2 ply)	Stainless Steel ASTM A240
23	Bushing	CRS
24	Tube & Orifice	Stainless Steel
25	Tubing Assembly	Copper Brass

No.	Part	Material
26	Plug (Cast Iron) (Cast Steel)	Brass Steel
27	Connector Stud	Stainless Steel
28	Body Gasket	1/2" - 2" Copper Clad 2" - 4" Graphite
29	Pilot Valve Body	Cast Iron ASTM A 126 CL B Cast Steel ASTM A216 Gr WCB
30	Pilot Valve Seat	Stainless Steel
31	Pilot Valve Head	Stainless Steel
32	Adjustment Knob	Phenolic
33	Pointer	Stainless Steel
34	Extension Nut	Brass
35	Case Tube	Brass
36	Retaining Nut	Brass
37	Pilot Mounting Screws	Steel
38	Capillary Tube	Varies with style selected
39	Bulb	Varies with style selected
40	Electric Pilot Body	Cast Iron Cast Bronze
60	Pilot Gasket	Graphite
61	Electric Solenoid Valve	

TI-1-11161-US 4.12



## Electric Pilot Operated On/Off Regulator 1/2" to 4" 25E

The 25E is controlled by an electric pilot valve. The main valve opens wide when the pilot is energized; it closes tight when the pilot is de-energized. The 25E does not modulate or throttle steam at part load.

**Note:** For pressures below 15 psig, the E pilot is not recommended for use with valves 2-1/2" and larger.

Model	25E			
Sizes	1/2" to 2"	2-1/2", 3", 4"	1/2" to 2"	2", 2-1/2", 3", 4"
Connections	NPT	ANSI 125 flgd.	NPT	ANSI 300 flgd.
Construction	Cast Iron		Cast Steel	
Options		ANSI 250 flgd.		ANSI 150 flgd. (excludes 2")
Electric Pilot Specifications	Enclosure: NEMA 4 & 7 (C&D) 115v/60Hz Holding: 23 VA Inrush: 45 VA Normally closed 200 psig Max. operating pressure			
Electric Pilot Options	140 psig Max. operating pressure (for faster response time) 230 volt coil			

### Typical Applications

On/Off control of steam flow in response to remote manual or automatic electrical signals which may originate at safety switches, timers, manual switches, etc.

### Sample Specification

The On/Off operation of the main valve shall be controlled by an electrical solenoid pilot which is bolted directly to the main valve and may be removed without disturbing the control tubing connections. The main valve shall be single seated with hardened stainless steel trim. The valve body shall be cast iron (cast steel). The electric pilot shall have a NEMA 4&7 (C&D) enclosure with 115v (230v) 60 Hz coil.

### Limiting Operating Conditions

**Max. Operating Pressure (PMO)** NPT: 200 psig (14 barg) @ 392°F (200°C)  
ANSI 125: 125 psig (8 barg) @ 392°F (200°C)  
ANSI 250: 200 psig (14 barg) @ 392°F (200°C)  
ANSI 150: 185 psig (12 barg) @ 392°F (200°C)  
ANSI 300: 200 psig (14 barg) @ 392°F (200°C)

**Max. Operating Temperature (TMO)** 392°F (200°C)

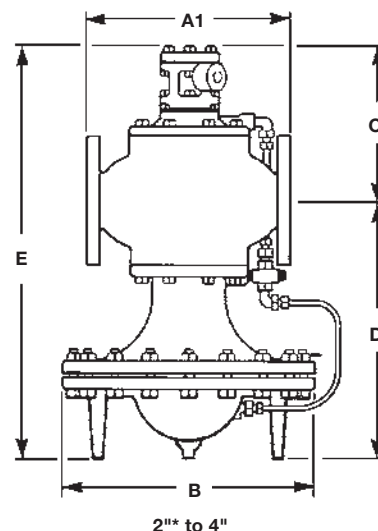
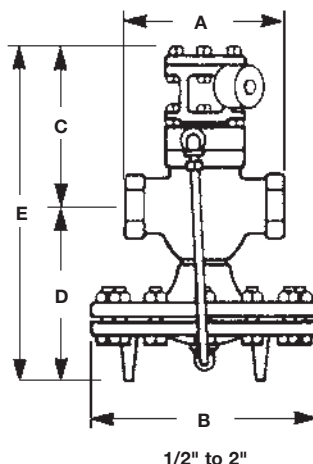
### Pressure Shell Design Conditions

**PMA** Cast Iron: 250 psig/0-450°F 17 barg/0-232°C  
**Max. allowable pressure** Cast Steel: 300 psig/0-450°F 20 barg/0-232°C

**TMA** Cast Iron: 450°F/0-250 psig 232°C/0-17 barg  
**Max. allowable temperature** Cast Steel: 450°F/0-300 psig 232°C/0- barg

### Capacities

For selection and sizing data, see TI-1-1114-US.



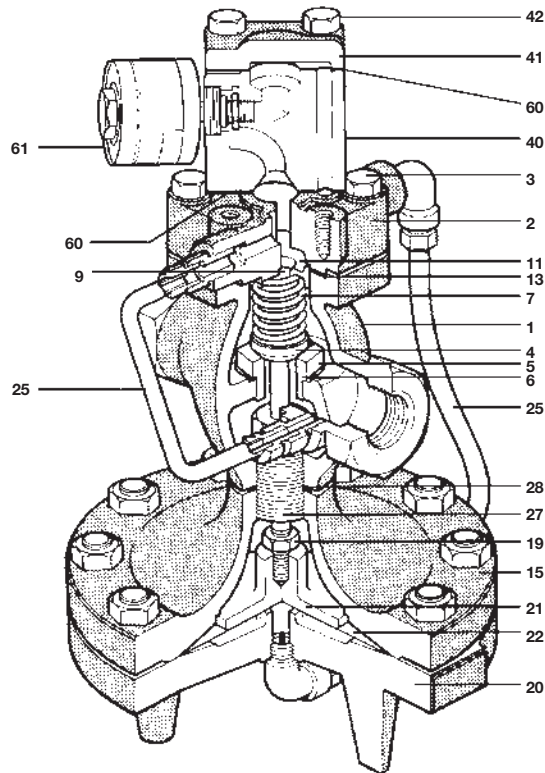
### Dimensions (nominal) in inches and millimeters

Size	ANSI 125		ANSI 250		ANSI 150		ANSI 300		WEIGHT	
	A	A1	A1	B	C	D	E		Cast Iron	Cast Steel
1/2", 3/4"	5.5 140	-	-	7.6 194	6.1 154	6.2 157	12.25 311		28 lb 12.7 kg	31 lb 14.1 kg
1"	6.0 152	-	-	8.6 219	6.0 152	6.75 171	12.75 324		35 lb 15.9 kg	38 lb 17.2 kg
1-1/4", 1-1/2"	7.25 184	-	-	8.6 219	6.6 167	7.1 179	13.6 346		40.5 lb 18.4 kg	44 lb 20 kg
2"	8.5 216	-	9.0 228	10.6 270	7.2 183	8.2 208	15.4 391		65 lb 29.5 kg	71 lb 32.2 kg
2-1/2"	-	10.9 276	11.5 292	13.6 346	7.9 200	13.9 354	21.8 554		153.5 lb 69.6 kg	167 lb 75.8 kg
3"	-	11.75 298	12.5 318	13.6 346	7.9 198	14.4 367	22.25 565		184 lb 83.7 kg	201 lb 91.2 kg
4"	-	13.9 352	14.5 368	15.6 397	9.1 232	16.1 410	25.25 641		280.5 lb 127 kg	305 lb 138 kg

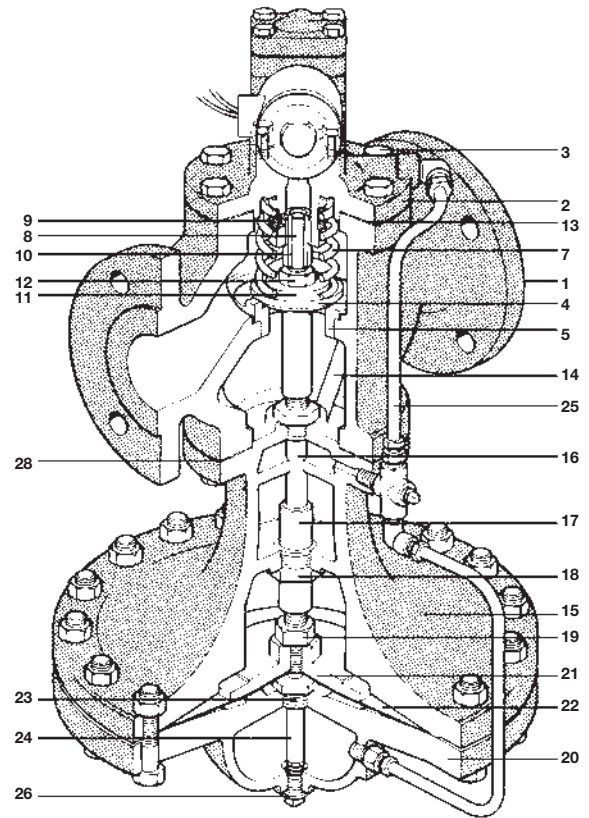
Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only.  
In the interests of development and improvement of the product, we reserve the right to change the specification.

TI-1-1118-US 04.12

# Electric Pilot Operated On/Off Regulator 1/2" to 4" 25E



1/2" to 2"



2" to 4" \*ANSI 300 ONLY

## Construction Materials

No.	Part	Material
1	Valve Body	Cast Iron Cast Steel
2	Cover	Cast Iron Cast Steel
3	Cover Bolts	Steel
4	Main Valve Head	Stainless Steel
5	Main Valve Seat	Stainless Steel
6	Main Valve Seat Gasket	Copper
7	Valve Return Spring	Stainless Steel
8	Valve Stem	Stainless Steel
9	Strainer Screen	Stainless Steel
10	Valve Stem Sleeve	Stainless Steel
11	Spring Guide	Cast Iron 1/2"-2" CRS 2" - 4"
12	Nut	Steel
13	Cover Gasket	Graphite
14	Pressure Equalizer Pipe	Stainless Steel
15	Upper Diaphragm Case	Cast Iron Cast Steel
16	Stem Bushing (2-1/2" - 4" Cast Steel only)	Stainless Steel
17	Diaphragm Plate Stem	Stainless Steel
18	Diaphragm Stem Guide	Stainless Steel
19	Nut	Brass 1/2" - 2" Steel 2" - 4"
20	Lower Diaphragm Case	Cast Iron Cast Steel
21	Diaphragm Plate	Brass 1/2" - 2" C.I. 2" - 4"
22	Main Diaphragm (2 ply)	Stainless Steel
23	Bushing	CRS
24	Tube & Orifice	Stainless Steel

25	Tubing Assembly	Copper Brass
26	Plug (Cast Iron) (Cast Steel)	Brass Steel
27	Connector Stud	Stainless Steel
28	Body Gasket	1/2" - 2" Copper Clad 2" - 4" Graphite
40	Electric Pilot Body	Cast Iron Cast Bronze
41	Electric Pilot Cover	Cast Iron
42	Cap Screws	Steel
60	Pilot Gasket	Stainless Steel
61	Electric Solenoid Valve	

## Installation

The valve should be installed in a horizontal pipe with suitable bypass and isolating valves. A steam trap should be installed upstream to prevent condensate from reaching the valve. The trap and valve should both be protected with a strainer.

## Maintenance

Complete installation and maintenance instructions are given in IM-3-000-US, a copy of which is supplied with each valve. Available spare parts are shown on TI-1-1120-US and TI-3-0271-US.

TI-1-1118-US 04.12



## Pilot Operated Temperature Regulators

### 25 Series Thermostat Bulb Types

The Thermostat Bulb styles are for temperature pilots used on the following:  
25T & 25TE Temperature Controls  
25PT & 25 PTE Pressure Temperature Controls.

#### Thermostat Bulb Types

- T1 Bulb in copper with brass capillary tubing.
- T2 Bulb in copper with union connection 3/4" NPT, with brass capillary tubing.
- T4 T1 flanged temperature pilot well.
- T5 Brass, 5 3/4" extension well for T2 thermostat bulb.
- T6 Stainless steel, 5 3/4" extension well for T2 thermostat bulb.
- T7 Brass, 18" extension well for T1 thermostat bulb.
- T8 Stainless steel, 18" extension well for T1 thermostat bulb.
- T9 Wall mounting bracket for T1 thermostat bulb.
- T10 Bulb in stainless steel, with stainless steel capillary tubing.
- T11 Bulb in stainless steel with union connection 3/4" NPT, with stainless steel capillary tubing.

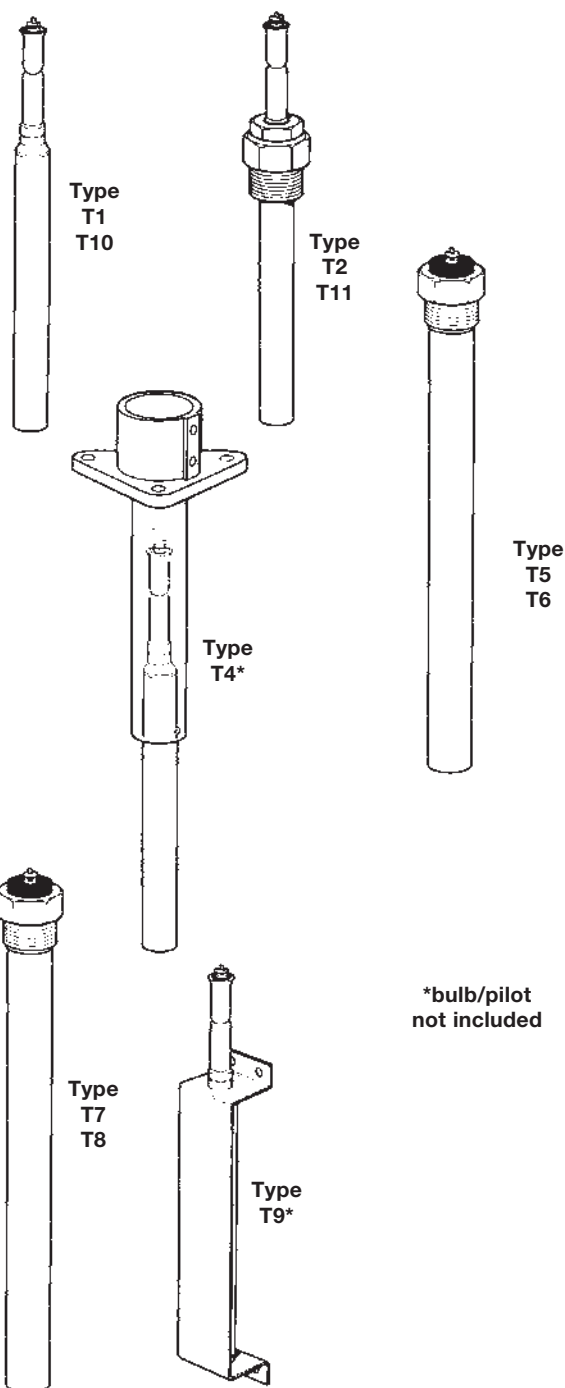
#### Limiting Operating Conditions

Up to 200°F / 93°C above the control set point  
provided temperatures at the bulb do not exceed  
350°F 176°C.

#### Options:

##### Capillary Tube Length

Standard 8 ft. and 15 ft. available. Intervals of 5 ft. up to a maximum of 50 ft.



# Pilot Operated Temperature Regulators

## 25 Series Thermostat Bulb Types

Dimensions (nominal) in inches & millimeters

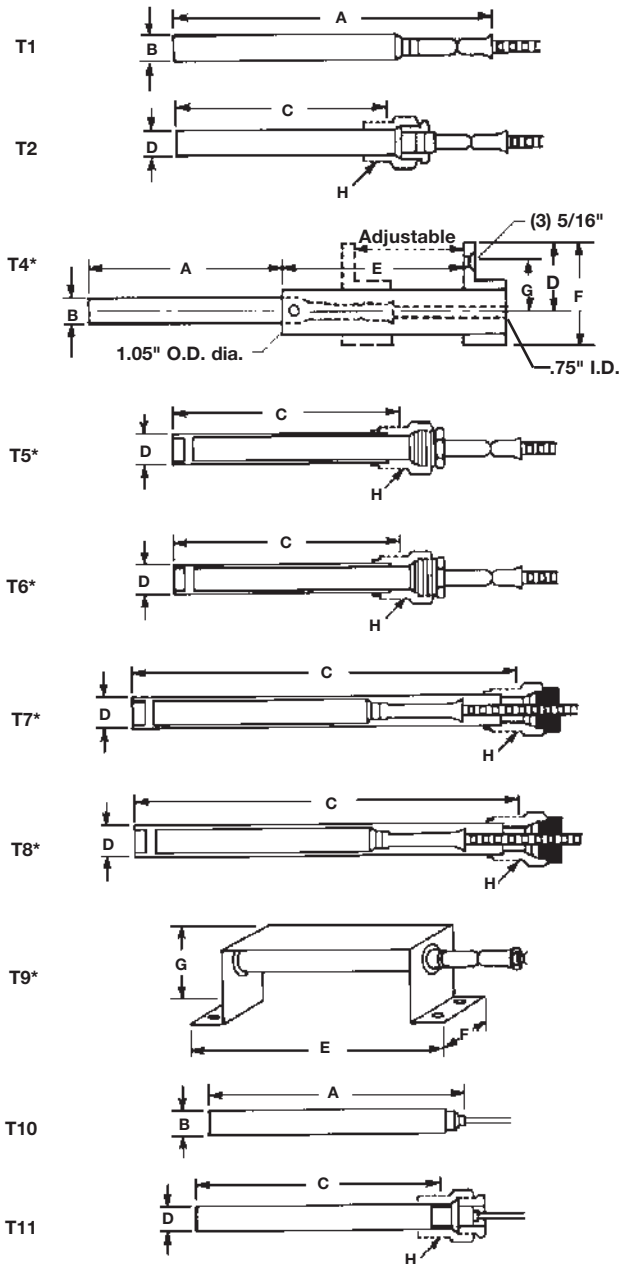
Style	A	B	C	D	E	F	G	NPT H	J
T1	8 203	0.62 15.7	-	-	-	-	-	-	-
T2	-	-	5.21 132	0.62 15.7	-	-	-	3/4"	-
T4	5 127	0.62 15.7	-	1.4 36	7.0 178	2.25 57.2	1.0 25.5	-	5/16"
T5	-	-	5.75 146	0.75 19	-	-	-	3/4"	-
T6	-	-	5.75 146	0.75 19	-	-	-	3/4"	-
T7	-	-	18 457	0.75 19	-	-	-	3/4"	-
T8	-	-	18 457	0.75 19	-	-	-	3/4"	-
T9	-	-	-	-	6.7 170	1.5 38	2.1 53	-	-
T10	6.4 162	0.62 15.7	-	-	-	-	-	-	-
T11	-	-	6.12 155	0.62 15.7	-	-	-	3/4"	-

### Installation

The thermostatic bulb should be carefully located in the medium being heated. Make sure that the entire length of the thermostatic bulb is immersed in the heated medium with a good circulation left over it. Locate the thermometer being used to monitor temperature close to the thermostatic bulb. When the bulb is contained in a well, use a heat conducting compound to improve response time.

### How to Specify

1 - 1/2" Spirax Sarco 25T Temperature Control with Thermostat Bulb Style T2.



\*bulb/pilot not included.



# spirax sarco

## Combination Pressure/Temperature Regulator 1/2" to 4" 25PT

The 25PT eliminates the need for a separate pressure regulator and a temperature regulator. Normal operation is controlled by the temperature pilot, and the pressure pilot sets an upper limit on the downstream steam pressure. The temperature pilot has a calibrated dial for accurate temperature setting, and is available with a variety of solid-fill sensing bulbs (See TIS 1.1123). The standard capillary tubing length is 8 feet, with an optional standard length of 15 feet.

Model	25PT			
Sizes	1/2" to 2"	2-1/2", 3", 4"	1/2" to 2"	2", 2-1/2", 3", 4"
Connections	NPT	ANSI 125 flgd.	NPT	ANSI 300 flgd.
Construction	Cast Iron		Cast Steel	
Options		ANSI 250 flgd.		ANSI150flgd. (excludes 2")
	Non-Standard capillary tubing length (see TIS 1.1123)			

### Typical Applications

Storage steam water heaters, instantaneous heat exchangers and converters, air handling coils, tank heating coils, steam jacketed vessels, steam chests, molds and platens, and other temperature control applications where it is necessary or desirable to set an upper limit on the delivered steam pressure.

### Capacities

The regulator is sized according to the temperature control requirements. For selection and sizing, see TI-1-1124-US.

### Limiting Operating Conditions

<b>Max. Operating Pressure (PMO)</b>	NPT:	250 psig (17 barg) @ 450°F (232°C)
	ANSI 125:	125 psig (8 barg) @ 450°F (232°C)
	ANSI 250:	250 psig (17 barg) @ 450°F (232°C)
	ANSI 150:	185 psig (12 barg) @ 450°F (232°C)
	ANSI 300:	300 psig (20 barg) @ 450°F (232°C)

**Max. Operating Temperature** 450°F (232°C)

\*The temperature of the sensing bulb must not exceed 350°F (177°C)

### Standard Temperature Ranges

30°F to 90°F	0°C to 32°C		
60°F to 120°F	15°C to 50°C	160°F to 220°F	70°C to 105°C
100°F to 160°F	40°C to 70°C	200°F to 260°F	95°C to 125°C
120°F to 180°F	50°C to 80°C	260°F to 320°F	125°C to 160°C

### Downstream Pressure Ranges

For the following downstream pressures, three color-coded pilot valve springs are available:

Yellow: 3 to 30 psi    Blue: 20 to 100 psi    Red: 80 to 290 psi

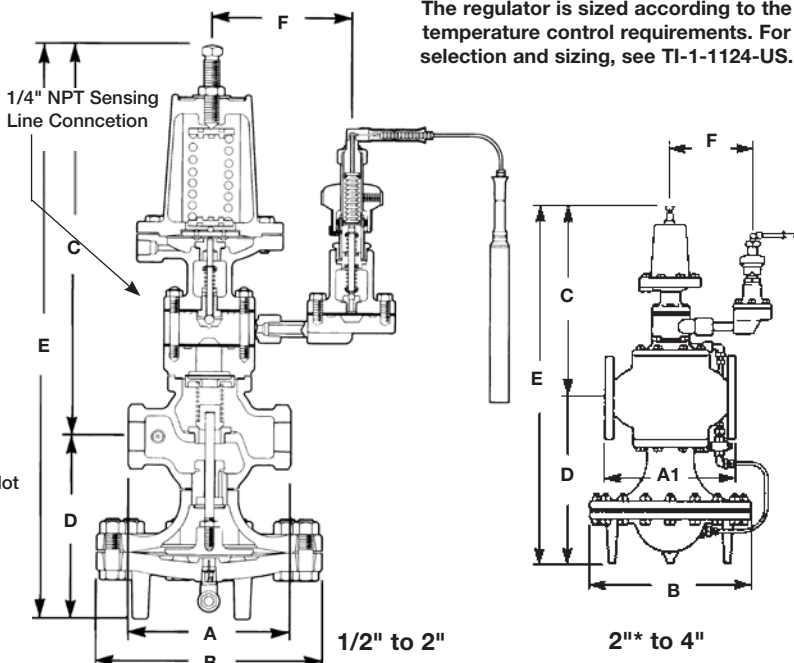
### Pressure Shell Design Conditions

<b>PMA</b>	Cast Iron:	250 psig/0-450°F	17 barg/0-232°C
Max. allowable pressure	Cast Steel:	600°F/0-300 psig	316°C/0-21 barg

<b>TMA</b>	Cast Iron:	450°F/0-250 psig	232°C/0-17 barg
Max. allowable temperature			

### Sample Specification

Pressure/Temperature Regulators shall be of the pilot-actuated, diaphragm-operated type with separate pressure and temperature pilots. The main valve shall be single-seated, with hardened stainless steel trim; the regulator shall be cast iron (cast steel). The pilots shall be removable without disturbing the control connections. The temperature setting shall be adjustable without the use of tools, and the set point shall be indicated on a calibrated dial. The thermostatic system shall be solid fill, and shall incorporate overheat protection. The regulator shall be capable of dead-end shut-off.



### Dimensions (nominal) in inches and millimeters

Size	ANSI 125		ANSI 250		ANSI 300				WEIGHT	
	A	A1	A1	B	C	D	E	F	Cast Iron	Cast Steel
1/2", 3/4"	5.5 140	-	-	7.6 194	13.25 337	6.2 157	19.4 494	5.0 127	38 lb 17.2 kg	41 lb 18.6 kg
1"	6.0 152	-	-	8.6 219	13.2 335	6.75 171	19.9 506	5.0 127	45 lb 20.4 kg	49 lb 22.2 kg
1-1/4", 1-1/2"	7.25 184	-	-	8.6 219	13.75 349	7.1 179	20.8 529	5.0 127	50.5 lb 22.9 kg	55 lb 25.0 kg
2"	8.5 216	-	9.0 228	10.6 270	14.4 365	8.2 208	22.6 573	5.0 127	75 lb 34 kg	82 lb 37.2 kg
2-1/2"	-	10.9 276	11.5 292	13.6 346	15.1 383	13.9 354	29.0 737	5.0 127	163.5 lb 74.2 kg	178 lb 80.7 kg
3"	-	11.75 298	12.5 318	13.6 346	15.0 381	14.4 367	29.4 748	5.0 127	194.5 lb 88.2 kg	212 lb 96.2 kg
4"	-	13.9 352	14.5 368	15.6 397	16.3 414	16.1 410	32.4 824	5.0 127	290.5 lb 132 kg	316 lb 143 kg

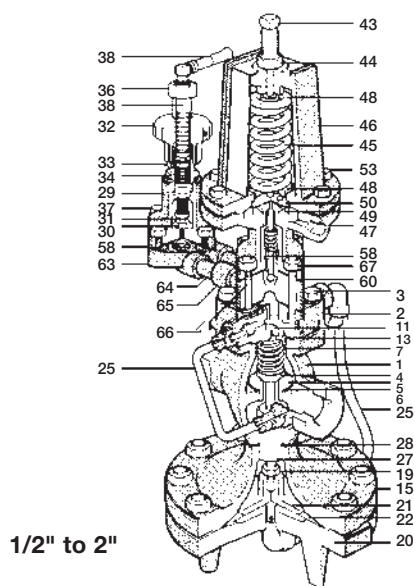
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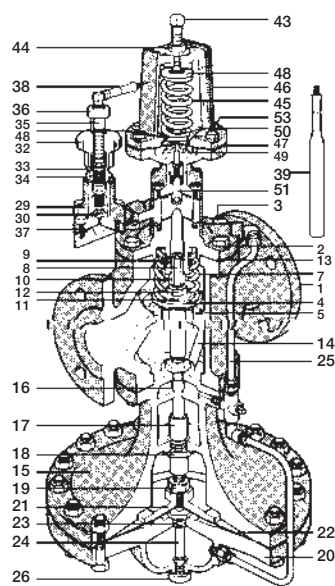
TI-3-017-US 4.12

# Combination Pressure/Temperature Regulator

## 1/2" to 4" 25PT



1/2" to 2"



2" to 4"

\*ANSI 300 ONLY

### Construction Materials

No.	Part	Material	
1	Valve Body	Cast Iron	ASTM A 126 CL B
		Cast Steel	ASTM A216 Gr WCB
2	Cover	Cast Iron	ASTM A 126 CL B
		Cast Steel	ASTM A216 Gr WCB
3	Cover Bolts	Steel	ASTM A449
4	Main Valve Head	Stainless Steel	
5	Main Valve Seat	Stainless Steel	
6	Main Valve Seat Gasket	Copper	
7	Valve Return Spring	Stainless Steel	
8	Valve Stem	Stainless Steel	
9	Strainer Screen	Stainless Steel	
10	Valve Stem Sleeve	Stainless Steel	
11	Spring Guide	Cast Iron 1/2"-2"	
		CRS 2" - 4"	
12	Nut	Steel	
13	Cover Gasket	Graphite	
14	Pressure Equalizer Pipe	Stainless Steel	
15	Upper Diaphragm Case	Cast Iron	
		Cast Steel	
16	Stem Bushing (2-1/2" - 4" Cast Steel only)	Stainless Steel	AISI 303
17	Diaphragm Plate Stem	Stainless Steel	
18	Diaphragm Stem Guide	Stainless Steel	
19	Nut	Brass 1/2" - 2"	
		Steel 2" - 4"	
20	Lower Diaphragm Case	Cast Iron	ASTM A 126 CL B
		Cast Steel	ASTM A216 Gr WCB
21	Diaphragm Plate	Brass 1/2" - 2"	
		C.I. 2" - 4"	
22	Main Diaphragm (2 ply)	Stainless Steel	
23	Bushing	CRS	
24	Tube & Orifice	Stainless Steel	
25	Tubing Assembly	Copper	
		Brass	
26	Plug (Cast Iron) (Cast Steel)	Brass	
		Steel	
27	Connector Stud	Stainless Steel	
28	Body Gasket	1/2" - 2" Copper Clad	
		2" - 4" Graphite	
29	Pilot Valve Body	Cast Iron	ASTM A 126 CL B
		Cast Steel	ASTM A216 Gr WCB
30	Pilot Valve Seat	Stainless Steel	
31	Pilot Valve Head	Stainless Steel	
32	Adjustment Knob	Phenolic	

33	Pointer	Stainless Steel	
34	Extension Nut	Brass	
35	Case Tube	Brass	
36	Retaining Nut	Brass	
37	Pilot Mounting Screws	Steel	
38	Capillary Tube	Varies with style selected	
39	Bulb	Varies with style selected	
43	Adjustment Screw	Stainless Steel	
44	Jam Nut	Brass	
45	Pilot Valve Spring	Steel	
46	Upper Diaphragm Case	Cast Iron	
		Cast Steel	
47	Lower Diaphragm Case	Cast Iron	
		Cast Steel	
48	Spring Plate	Steel	ASTM A569
49	Diaphragm	Stainless Steel	
50	Diaphragm PLate	Brass	
51	Pilot Head Spring	Stainless Steel	
52	Spring Retainer Cup	Stainless Steel	
53	Retaining Ring	Brass	
54	Pilot Seat	Stainless Steel	
55	Pilot Head	Stainless Steel	
56	Head Stem	Stainless Steel	
57	Stem Guide	Stainless Steel	
58	Stem Guide Gasket	Stainless Steel	
59	Seat Gasket	Stainless Steel	
60	Pilot Gasket	Graphite	
61	Pilot Mounting Screws	Steel	ASTM A449
62	Diaphragm Case Screws	Steel	
63	"T" Pilot Adapter	Brass	
64	Adapter Pipe	Steel	
65	"P" Pilot Adapter	Ductile Iron	
		Cast Steel	
66	Adapter Stud	Steel	
67	Adapter Nut	Steel	

### Installation

The regulator should be installed in a horizontal line with suitable bypass and isolating valves. A steam trap should be installed upstream to prevent condensate from reaching the regulator. The trap and regulator should both be protected with a strainer. The thermostatic bulb must be carefully located in the medium being heated. The pressure sensing line may be located either in the downstream piping or in the steam space. Complete installation instructions are given in IM-3-000-US.

### Maintenance

Complete installation and maintenance instructions are given in IM-3-000-US, a copy of which is supplied with each regulator. Available spare parts are shown on TI-1-1120-US and TI-3-0271-US.

TI-3-017-US 4.12



# Combination Pressure/Temperature Regulator w/ Electric Override 1/2" to 4" 25PTE

The 25PTE has all of the features of the 25PT pressure/temperature regulator, with the addition of an electric pilot which permits an electrical signal to override the temperature and pressure pilots to provide a remote shut-off capability.

\*Note: For pressures below 15 psig, the E pilot is not recommended for use with valves 2-1/2" and larger.

Model	25PTE			
Sizes	1/2" to 2"	2-1/2", 3", 4"	1/2" to 2"	2", 2-1/2", 3", 4"
Connections	NPT	ANSI 125 flgd.	NPT	ANSI 300 flgd.
Construction	Cast Iron		Cast Steel	
Options		ANSI 250 flgd.		ANSI 150 flgd. (excludes 2")
Electric Pilot Specifications	Non-Standard capillary tubing length (see TIS 1.1123)			
	Enclosure: NEMA 4 & 7 (C&D) 115v (230v)/60Hz Inrush: 45 VA Normally closed 200 psig Max. operating pressure			
Electric Pilot Options	For regulators 2-1/2" and larger at pressures below 125 psig, use the following electric pilot: Enclosure: NEMA 4 & 7 (C&D) 115v (230v)/60Hz Inrush: 45 VA Normally closed 140 psig Max Operating Pressure			

## Typical Applications

Pressure/Temperature control applications where the regulator must also respond to an electrical program timer, safety or limit switch, or remote manual switch.

## Sample Specification

Pressure/Temperature Regulators shall be of the pilot-actuated, diaphragm-operated type with separate pressure and temperature pilots and electrical override. The main valve shall be single-seated, with hardened stainless steel trim; the regulator body shall be cast iron (cast steel). The pilots shall be removable without disturbing the control connections. The temperature setting shall be adjustable without the use of tools, and the set point shall be indicated on a calibrated dial. The thermostatic system shall be solid fill, and shall incorporate overheat protection. The regulator shall be capable of dead-end shut-off. The electric pilot shall have a NEMA 4 & 7 (C&D) enclosure with 115v (230v) 60 Hz coil.

## Limiting Operating Conditions

<b>Max. Operating Pressure (PMO)</b>	NPT:	200 psig (14 barg) @ 392°F (200°C)
	ANSI 125:	125 psig (8 barg) @ 392°F (200°C)
	ANSI 250:	200 psig (17 barg) @ 392°F (200°C)
	ANSI 150:	185 psig (12 barg) @ 392°F (200°C)
	ANSI 300:	200 psig (14 barg) @ 392°F (200°C)

**Max. Operating Temperature** 392°F (200°C)

\*The temperature of the sensing bulb must not exceed 350°F (177°C)

## Standard Temperature Ranges

30°F to 90°F	0°C to 32°C		
60°F to 120°F	15°C to 50°C	160°F to 220°F	70°C to 105°C
100°F to 160°F	40°C to 70°C	200°F to 260°F	95°C to 125°C
120°F to 180°F	50°C to 80°C	260°F to 320°F	125°C to 160°C

## Downstream Pressure Ranges

For the following downstream pressures, three color-coded pilot valve springs are available:

**Yellow:** 3 to 30 psi **Blue:** 20 to 100 psi **Red:** 80 to 190 psi

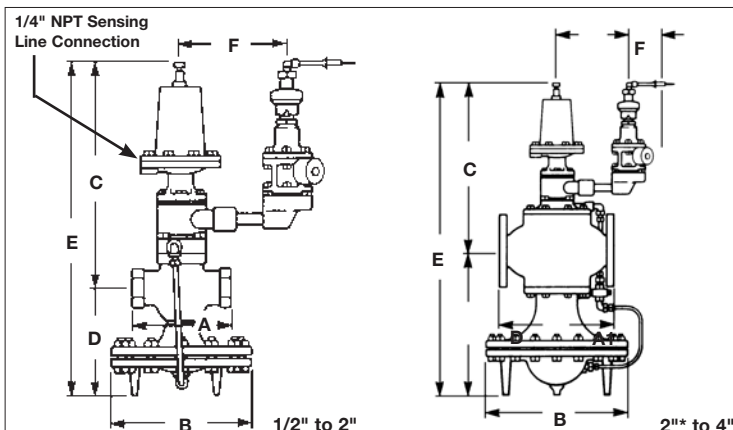
## Pressure Shell Design Conditions

**PMA** Cast Iron: 250 psig/0-450°F 17 barg/0-232°C  
Max. allowable pressure Cast Steel: 300 psig/0-600°F 21 barg/0-316°C

**TMA** Cast Iron: 450°F/0-250 psig 232°C/0-17 barg  
Max. allowable temperature Cast Steel: 600°F/0-300 psig 316°C/0-21 barg

## Capacities

The regulator is sized according to the temperature control requirements. For selection and sizing, see TIS 1.1114 and 3.030.

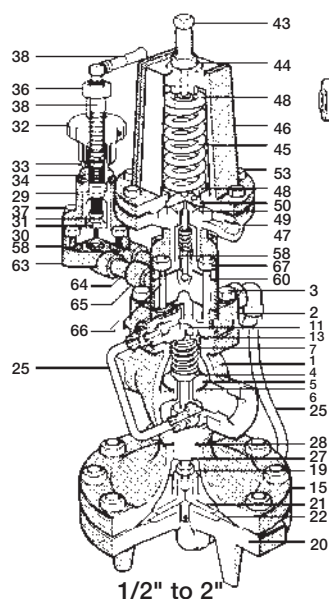


Dimensions (nominal) in inches and millimeters										
	ANSI 125 ANSI 150		ANSI 250 ANSI 300		WEIGHT					
Size	A	A1	A1	B	C	D	E	F	Cast Iron	Cast Steel
1/2", 3/4"	5.5 140	–	–	7.6 194	13.25 337	6.2 157	19.4 494	5.0 127	41 lb 18.6 kg	45 lb 20.4 kg
1"	6.0 152	–	–	8.6 219	13.2 335	6.75 171	19.9 506	5.0 127	48 lb 21.8 kg	52 lb 23.6kg
1-1/4", 1-1/2"	7.25 184	–	–	8.6 219	13.75 349	7.1 179	20.8 529	5.0 127	53.5 lb 24.3 kg	60 lb 26.3kg
2"	8.5 216	–	9.0 228	10.6 270	14.4 365	8.2 208	22.6 573	5.0 127	78 lb 35.4 kg	85 lb 38.6 kg
2-1/2"	– –	10.9 276	11.5 292	13.6 346	15.1 383	13.9 354	29.0 737	5.0 127	166 lb 75.6 kg	181 lb 82.1 kg
3"	– –	11.75 298	12.5 318	13.6 346	15.0 381	14.4 367	29.4 748	5.0 127	197.5 lb 89.6 kg	215 lb 97.5 kg
4"	– –	13.9 352	14.5 368	15.6 397	16.3 414	16.1 410	32.4 824	5.0 127	293.5 lb 133 kg	320 lb 145 kg

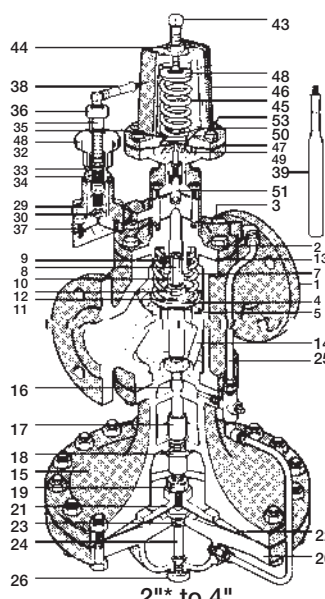
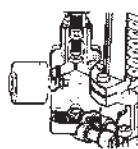
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In the interests of development and improvement of the product, we reserve the right to change the specification.



# Combination Pressure/Temperature Regulator w/ Electric Override 1/2" to 4" 25PTE



1/2" to 2"



2" to 4"

\*ANSI 300 ONLY

## Construction Materials

No.	Part	Material	
1	Valve Body	Cast Iron	ASTM A 126 CL B
		Cast Steel	ASTM A216 Gr WCB
	Cover	Cast Iron	ASTM A 126 CL B
		Cast Steel	ASTM A216 Gr WCB
3	Cover Bolts	Steel	ASTM A449
4	Main Valve Head	Stainless Steel	
5	Main Valve Seat	Stainless Steel	
6	Main Valve Seat Gasket	Copper	
7	Valve Return Spring	Stainless Steel	
8	Valve Stem	Stainless Steel	
9	Strainer Screen	Stainless Steel	
10	Valve Stem Sleeve	Stainless Steel	
11	Spring Guide	Cast Iron 1/2"-2"	
12	Nut	CRS 2" - 4"	
13	Cover Gasket	Graphite	
14	Pressure Equalizer Pipe	Stainless Steel	
15	Upper Diaphragm Case	Cast Iron	ASTM A 126 CL B
		Cast Steel	ASTM A216 Gr WCB
16	Stem Bushing (2-1/2" - 4" Cast Steel only)	Stainless Steel	
17	Diaphragm Plate Stem	Stainless Steel	
18	Diaphragm Stem Guide	Stainless Steel	
19	Nut	Brass 1/2" - 2"	
		Steel 2" - 4"	
20	Lower Diaphragm Case	Cast Iron	ASTM A 126 CL B
		Cast Steel	ASTM A216 Gr WCB
21	Diaphragm Plate	Brass 1/2" - 2" C.I. 2" - 4"	
22	Main Diaphragm (2 ply)	Stainless Steel	
23	Bushing	CRS	
24	Tube & Orifice	Stainless Steel	
25	Tubing Assembly	Copper Brass	
26	Plug (Cast Iron) (Cast Steel)	Brass Steel	
27	Connector Stud	Stainless Steel	
28	Body Gasket	1/2" - 2" Copper Clad 2" - 4" Graphite	
29	Pilot Valve Body	Cast Iron	ASTM A 126 CL B
		Cast Steel	ASTM A216 Gr WCB
30	Pilot Valve Seat	Stainless Steel	
31	Pilot Valve Head	Stainless Steel	
32	Adjustment Knob	Phenolic	

33	Pointer	Stainless Steel	
34	Extension Nut	Brass	
35	Case Tube	Brass	
36	Retaining Nut	Brass	
37	Pilot Mounting Screws	Steel	
38	Capillary Tube	Varies with style selected	
39	Bulb	Varies with style selected	
43	Adjustment Screw	Stainless Steel	
44	Jam Nut	Brass	
45	Pilot Valve Spring	Steel	
46	Upper Diaphragm Case	Cast Iron	
		Cast Steel	
47	Lower Diaphragm Case	Cast Iron	
		Cast Steel	
48	Spring Plate	Steel	ASTM A569
49	Diaphragm	Stainless Steel	
50	Diaphragm PLate	Brass	
51	Pilot Head Spring	Stainless Steel	
52	Spring Retainer Cup	Stainless Steel	
53	Retaining Ring	Brass	
54	Pilot Seat	Stainless Steel	
55	Pilot Head	Stainless Steel	
56	Head Stem	Stainless Steel	
57	Stem Guide	Stainless Steel	
58	Stem Guide Gasket	Stainless Steel	
59	Seat Gasket	Stainless Steel	
60	Pilot Gasket	Graphite	
61	Pilot Mounting Screws	Steel	ASTM A449
62	Diaphragm Case Screws	Steel	
63	"T" Pilot Adapter	Brass	
64	Adapter Pipe	Steel	
65	"P" Pilot Adapter	Ductile Iron	
		Cast Steel	
66	Adapter Stud	Steel	
67	Adapter Nut	Steel	

## Installation

The regulator should be installed in a horizontal line with suitable bypass and isolating valves. A steam trap should be installed upstream to prevent condensate from reaching the regulator. The trap and regulator should both be protected with a strainer. The thermo-static bulb must be carefully located in the medium being heated. The pressure sensing line may be located either in the downstream piping or in the steam space. Complete installation instructions are given in IM-3-000-US.

## Maintenance

Complete installation and maintenance instructions are given in IM-3-000-US, a copy of which is supplied with each regulator. Available spare parts are shown on TI-1-1120-US and TI-3-0271-US. TI-3-0171-US 4.12



## Sizing and Selection Chart

### 25T, 25TE, 25E, 25PT, 25PTE

#### How to Select and Size

##### 25T and 25TE Temperature Controls

##### 25E Electric On/Off Valve

##### 25PT and 25PTE Pressure/Temperature Controls

Select the pilot or pilots best suited to the application, then determine the regulator size required to meet the steam capacity load. Satisfactory temperature control and low control maintenance depend on sizing each regulator correctly for its intended application.

Too large a regulator may tend to hunt or it may operate for long periods with the main valve just barely cracked open. Wire drawing – the erosive scouring of high-velocity steam – can subject an oversized valve seat to premature wear.

Too small a regulator will not meet peak heating load requirements. It will increase the time a system requires for coming up to temperature during start-up.

Size of the regulator should be determined by actual steam capacity requirements, not by pipe sizes in the system. For most applications, regulator size will be smaller than the sizes of connected piping.

#### Determining Steam Capacity

##### For heating water with steam:

$$\text{lbs. of steam/h} = \frac{\text{GPM}}{2} \times \text{temp rise } ^\circ\text{F} \times 1.1$$

##### For heating fuel oil with steam:

$$\text{lbs. of steam/h} = \frac{\text{GPM}}{4} \times \text{temp rise } ^\circ\text{F} \times 1.1$$

##### For heating air with steam coils:

$$\text{lbs. of steam/h} = \frac{\text{CFM}}{800} \times \text{temp rise } ^\circ\text{F}$$

##### For radiation:

$$\text{lbs. of steam/h} = \frac{\text{sq. ft. EDR}}{4}$$

#### How to Size Valve

Proper regulator sizing requires the following information:

- 1) The steam capacity required for the application in pounds per hour.
- 2) Inlet supply pressure of the steam taken immediately ahead of the regulator.
- 3) Outlet steam pressure from the allowable pressure drop across the regulator.

**Where it is impossible to calculate the pressure drop, 35% to 40% of the gage supply pressure can be used as a reasonable approximation. Noise level increases with the pressure drop. Install regulator with properly sized piping.**

#### Example

Determine what size Spirax Sarco 25T Temperature Regulator will be required for an instantaneous water heater heating 20 GPM of water from 60° to 160°F. Steam supply pressure at the heater is 75 psig. Permissible drop across the regulator is 20 psi.

Solution: Using formula for heating water:

$$\begin{aligned} \text{lbs. of steam/hr.} &= \frac{\text{GPM}}{2} \times \text{temp rise } ^\circ\text{F} \times 1.1 \\ &= \frac{20}{2} \times 100 \times 1.1 \\ &= 1,100 \text{ lbs/h} \end{aligned}$$

From the capacity chart overleaf, look in the first column for 75 psig inlet pressure. In second column, find 55 psig downstream pressure (75 psig inlet less 20 psi permissible drop). Follow a horizontal line to the sixth column where we find that a 1" regulator is required to supply no less than 1,100 pounds per hour.

# Sizing and Selection Chart

## 25T, 25TE, 25E, 25PT, 25PTE

### Capacities Pounds of saturated steam per hour

Inlet Steam Pressure psig	Outlet Steam Pressure psig	Nominal Valve Size									
		1/2"S	1/2"	3/4"	1"	1-1/4"	1-1/2"	2"	2-1/2"	3"	4"
	C <sub>v</sub> Factor →	1.16	3.48	6.5	10.5	14	20	35	56	74	115
† 2	0	15	45	85	140	180	260	455	725	960	1,490
† 3	0	19	55	105	170	225	320	560	900	1,185	1,840
† 5	2	20	57	106	171	228	326	572	915	1,200	1,875
	1	23	70	131	211	282	405	705	1,125	1,490	2,310
† 7	4	21	63	117	189	252	360	630	1,010	1,330	2,070
	2	27	81	151	245	326	466	815	1,300	1,725	2,680
† 10	5	29	86	160	260	345	495	865	1,385	1,830	2,840
	3	37	110	205	332	442	632	1,105	1,770	2,340	3,635
† 12	7	29	90	167	270	360	515	990	1,445	1,910	2,965
	4	43	128	238	386	515	735	1,285	2,060	2,720	4,220
† 15	10	30	95	175	285	380	540	950	1,500	2,000	3,100
	8	37	110	210	335	450	640	1,120	1,795	2,370	3,680
	5	45	135	250	405	545	780	1,365	2,185	2,890	4,480
20	15	34	101	190	310	410	585	1,025	1,640	2,165	3,365
	10	47	140	265	425	570	810	1,420	2,270	3,000	4,660
	0-5	60	180	335	540	720	1,025	1,795	2,870	3,790	5,895
25	20	36	107	200	325	430	650	1,080	1,725	2,280	3,545
	15	50	145	270	435	580	830	1,450	2,325	3,070	4,770
	0-7	70	205	385	620	825	1,180	2,065	3,305	4,360	6,785
30	24	41	125	230	374	500	715	1,250	1,995	2,640	4,100
	18	65	195	365	590	785	1,120	1,960	3,135	4,245	6,440
	0-12	75	230	430	695	925	1,320	2,310	3,695	4,885	7,590
40	34	45	97	255	410	545	780	1,365	2,180	2,885	4,480
	24	86	256	478	772	1,030	1,470	2,570	4,115	5,440	8,450
	0-18	95	280	525	850	1,135	1,620	2,835	4,535	5,995	9,315
50	42	57	170	320	515	690	985	1,720	2,755	3,640	5,660
	35	95	275	515	830	1,105	1,580	2,765	4,425	5,850	9,085
	0-21	115	350	650	1,050	1,400	2,000	3,500	5,600	7,400	11,500
60	50	69	210	385	625	835	1,190	2,085	3,330	4,400	6,845
	40	110	235	610	990	1,315	1,880	3,290	5,265	6,955	10,810
	0-27	130	385	720	1,165	1,555	2,220	3,885	6,215	8,215	12,765
75	65	75	225	420	675	900	1,285	2,250	3,600	4,760	7,400
	55	122	365	685	1,110	1,475	2,110	3,695	5,910	7,810	12,135
	0-35	155	470	875	1,415	1,890	2,700	4,725	7,560	9,990	12,525
100	85	102	305	575	925	1,235	1,765	3,085	4,940	6,525	10,140
	75	155	460	865	1,395	1,860	2,660	4,655	7,450	9,840	15,295
	0-48	200	600	1,120	1,815	2,420	3,460	6,055	9,690	12,800	19,895
125	110	110	335	625	1,000	1,345	1,920	3,360	5,375	7,100	11,040
	90	205	615	1,150	1,860	2,480	3,540	6,195	9,910	13,100	20,355
	0-62	245	730	1,365	2,220	2,940	4,200	7,350	11,760	15,540	24,150
150	130	140	425	790	1,280	1,700	2,440	4,265	6,825	9,000	14,000
	105	255	760	1,410	2,290	3,050	4,360	7,630	12,210	16,130	25,100
	0-76	285	860	1,600	2,590	3,460	4,940	8,645	13,830	18,280	28,400
175	155	150	450	840	1,360	1,810	2,585	4,525	7,240	9,570	14,870
	120	300	910	1,700	2,740	3,655	5,220	9,135	14,620	19,310	30,000
	0-87	330	985	1,840	2,970	3,960	5,660	9,900	15,850	20,950	32,545
200	170	215	645	1,200	1,950	2,600	3,700	6,490	10,380	13,700	21,300
	140	330	980	1,830	2,960	3,950	5,640	9,870	15,800	20,870	32,430
	0-103	375	1,125	2,100	3,390	4,520	6,460	11,300	18,000	23,900	37,145
250	210	285	850	1,590	2,450	3,430	4,900	8,575	13,700	18,130	28,200
	175	410	1,220	2,280	3,685	4,920	7,020	12,280	19,660	25,980	40,365
	0-131	460	1,385	2,590	4,180	5,570	7,960	13,930	22,300	29,450	45,800
*275	225	290	880	1,640	2,650	3,530	5,050	8,830	14,130	18,670	29,000
	200	415	1,240	2,320	3,750	4,990	7,130	12,480	19,980	26,400	41,000
	0-145	505	1,510	2,830	4,570	6,090	8,700	15,230	24,360	32,200	50,000
*300	250	310	920	1,720	2,780	3,700	5,290	9,250	14,800	19,600	30,400
	225	415	1,250	2,330	3,770	5,020	7,170	12,550	20,100	26,500	41,300
	0-160	550	1,640	3,070	4,960	6,600	9,440	16,320	26,400	34,900	54,300

† Specify low pressure main valve and low pressure "T" pilot for 2-1/2", 3" & 4" at inlet pressures of 15 psig and below. Not available in cast steel.

6" size not recommended below 15 psig. "E" pilot is not recommended for use with 2-1/2", 3" & 4" valves at pressures below 15 psig.

\* Cast steel construction required for service above 250 psig.

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## Spare Parts Guide 1/2" to 2" Main Valves

### Spare Parts – Main Valve

Cap Assembly w/ Cap Screws & Gasket	A,B,C
Diaphragm Case Bolts & Nuts	G,H
Screen, Spring Support Disc	M,N,O,C
Valve Spring and Cap Gasket	
Cap Gasket, Valve Head, Seat & Seat Gasket	C,P,Q,R
(specify regular or reduced port "S" valve)	
Valve Stem Guide & Gasket	J,S,T
Diaphragm (2 per set)	L
Transmission Tubing w/ Fittings	U,V
Gasket Kit	C,R,S,W
Diaphragm Plate	K
Rebuild Kit	BCLMOPQRUVW

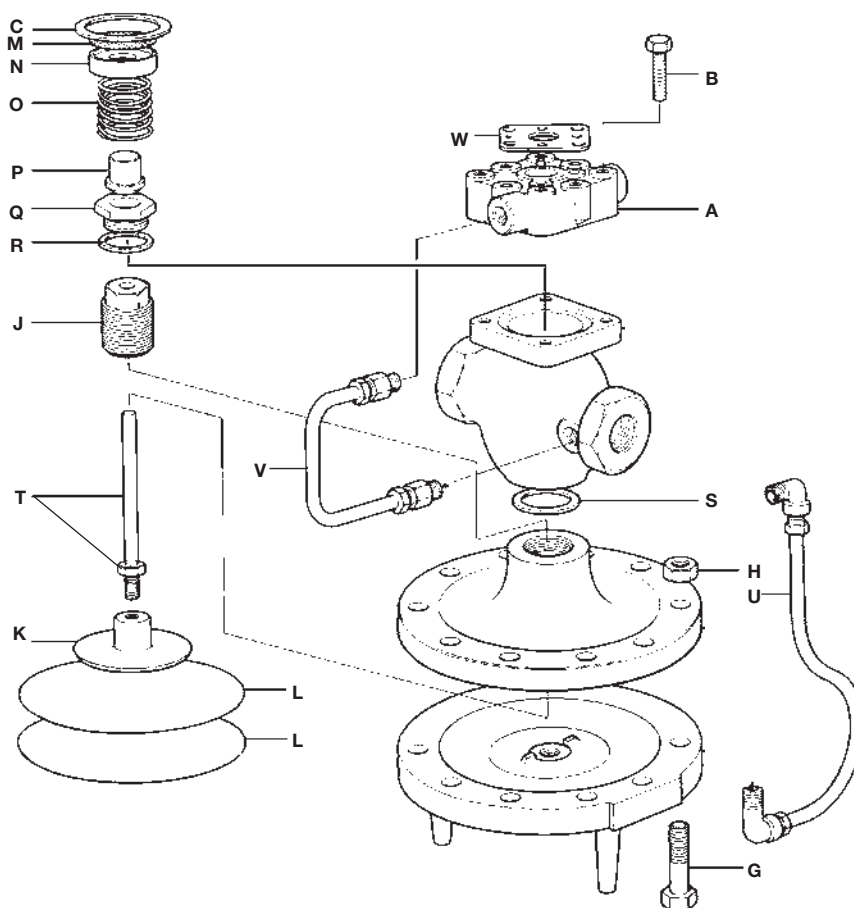
### How to Order

Always order spares by using the description given in the column headed Spare Parts, stating the valve size and material.

Example 1 – Cap Assembly for 1/2" Spirax Sarco 25T Cast Iron Temperature Regulator.

### Maintenance

For complete installation & maintenance instructions, see the IMI sheet, which accompanies the product.







## Spare Parts Guide 6" Main Valves

### SPARE PARTS – MAIN VALVE

Main Valve Spring	O, S
& Lower Diaphragm Cover Gaskets	
Diaphragm Plate & Set Screws	K, D
Transmission Tubing with Fittings	U
Diaphragms (2 per set)	L
Gasket Kit	C, S, W
Head, Stem & Seat Assembly	P, Q, C
(specify regular or reduced part "S" valve)	
Screen Assembly	I, J
Cover Bolt Kit	B
Diaphragm Case Bolt Kit	G, H
Rebuild Kit	BCLOPQSUW
Pilot Platform:	X

### HOW TO ORDER

Always order spares by using the description given in the first column under Spare Parts, stating the valve size and material.

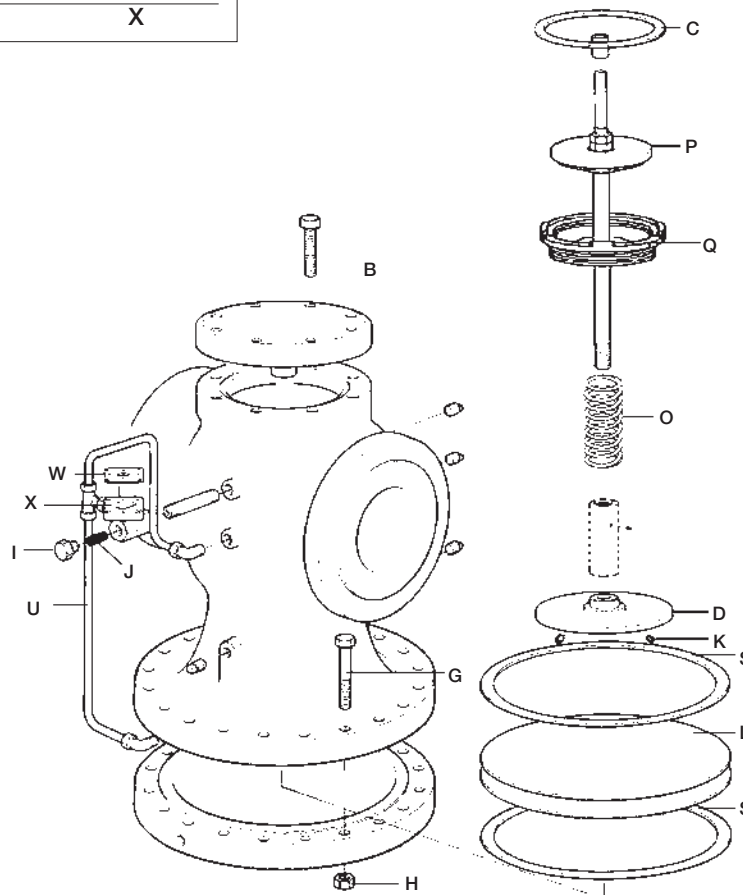
Example: 1 – Diaphragm Plate & Set Screws for 6" Spirax Sarco 25T Cast Iron Reducing Valve

### MAINTENANCE

See installation and maintenance instructions supplied with each valve, copies are available on request.

Main valve seat in 6" regulator is field replaceable.

Please consult factory for seat removal tool. To retain tight shut off, minor wear can be corrected by lapping with suitable grinding compound.



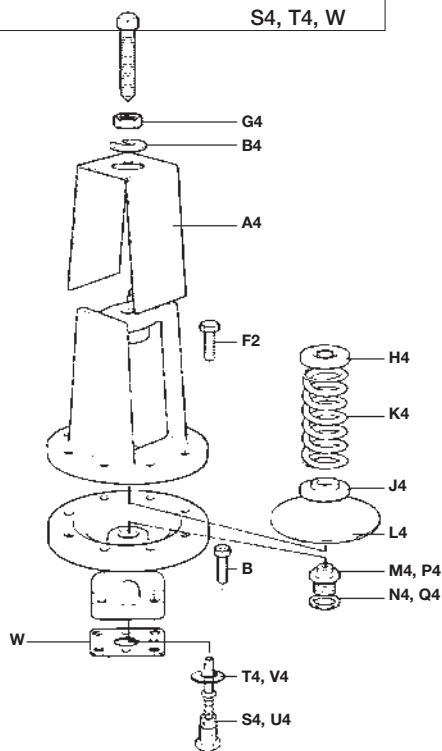


## 25 Series Spare Parts Guide

### 1/2" to 6" Pilots

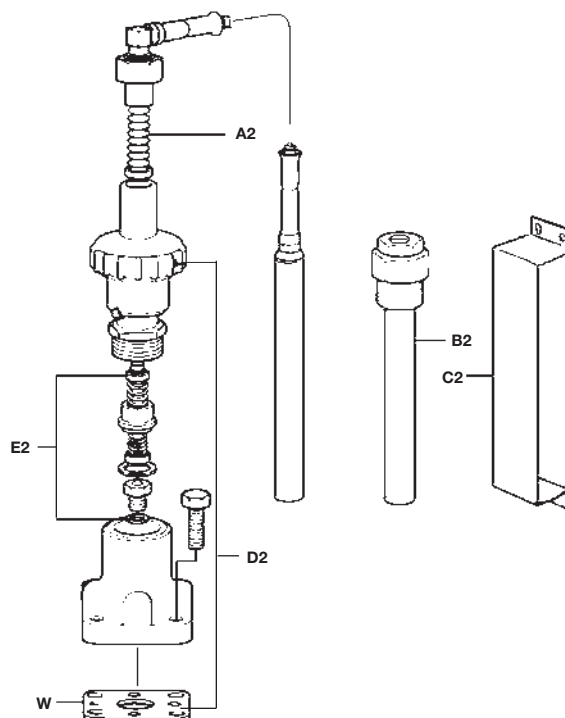
#### Spare Parts – Pressure Pilot, P & BP

Cover Plate w/ Retaining Ring	A4, B4
Pilot Screws w/ Gasket	B, W
Adjustment Screw w/ Nut, and Upper and Lower Spring Support Discs	G4, H4 J4
Adjustment Spring	K4
Specify controlled pressure and spring color	
Yellow	3 to 30 psi
Blue	20 to 100 psi
Red	80 to 250 psi
Diaphragm (2)	L4
Stem Guide w/ Gasket (25P, 25PA)	M4, N4
Stem Guide and Seal Gasket (25BP)	P4, Q4
Head & Seat Assembly w/ Gasket (25P, 25PA & 25MP)	S4, T4
Head & Seat Assembly (25BP)	U4, V4
Square Gasket for all Pilots (set of 3)	W
Pilot Kit	L4, M4, N4, S4, T4, W



#### Spare Parts – Temperature Pilot see TI-1-1123-US

Thermal System (T1, T2, T3, T10, T11)	A2
State bulb style, capillary tube length & temperature range	
Well (T5, T6, T7, T8, T4)	B2
State bulb style	
Wall Mounting Bracket (T9)	
State bulb style	C2
Complete Pilot Body Assembly	D2, W
Head & Seat Assembly	E2, W
(Specify 15 psig or below Assembly or Standard)	



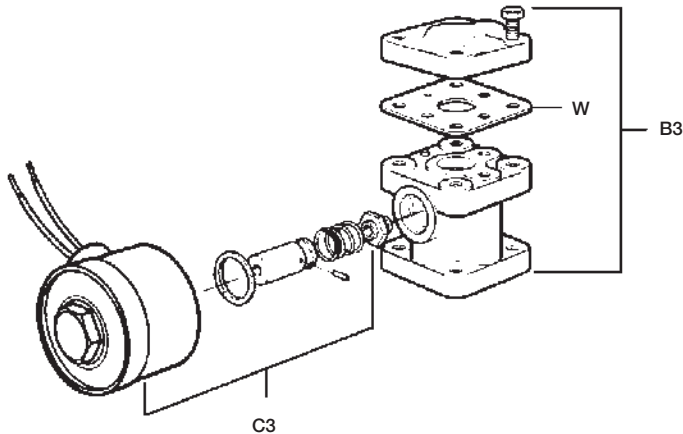


# 25 Series Spare Parts Guide

## 1/2" to 6" Pilots

### Spare Parts – Electric Pilot

NEMA 4 & 7 Solenoid	C3
specify voltage and steam pressure	
Complete "E" Pilot Body Assembly	B3, W



### How to Order

Always order spares by using the description given in the first column under Spare Parts, stating the valve size and material. When ordering temperature pilots, specify the bulb style, capillary length and temperature range. When ordering electric pilots, specify electrical characteristics, pressures and size of main valve.

Example: 1 – Thermal System style T1 for 2" Spirax Sarco 25PT Pressure Temperature control with 8-ft capillary tubing and temperature range 120°F to 180°F.

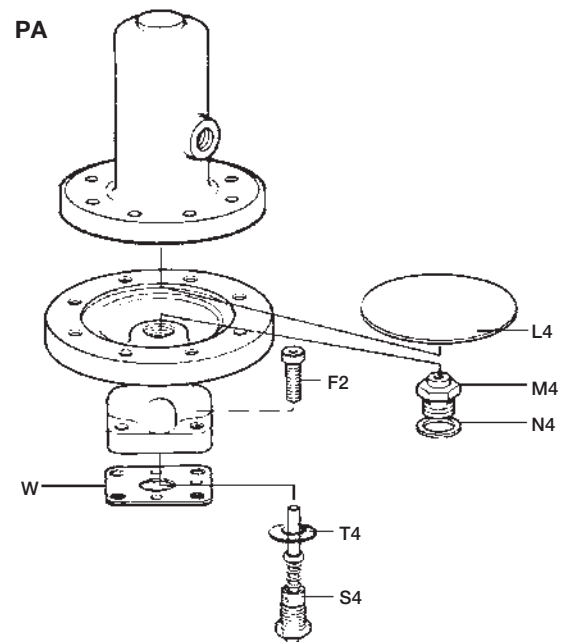
1 – NEMA 4 Solenoid for 1½" Spirax Sarco 25PE Reducing Valve with 115 volt, 60 Hz AC coil steam pressure 200 psi.

### Maintenance

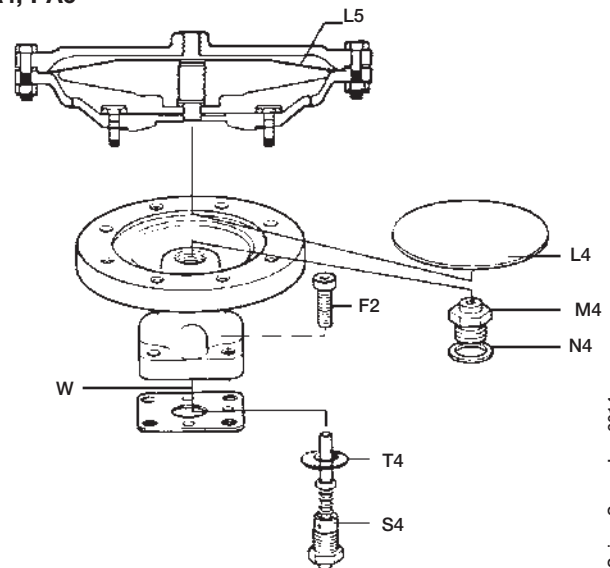
See installation and maintenance instructions supplied with each valve, copies are available on request.

### Spare Parts – PA (air loaded) Pilot

Pilot Mounting Screws	F2
Lower Diaphragm (2)	L4
Upper Diaphragm for PA4	L5
Upper Diaphragm for PA6	L5
Stem Guide w/ Gasket	M4, N4
Head & Seat Assembly w/ Gasket	S4, T4
Square Gasket for all Pilots	W



### PA4, PA6





## Acoustic Blankets

### Description

The Spirax Sarco removable Acoustic Blanket is an easy to install, reusable, one-piece asbestos free encapsulation designed specifically to fit and be used on Spirax Sarco 25 series main valves and L and K series control valves. In addition to providing reductions in harmful noise levels by 5 dBA, these blankets also provide insulation to limit heat energy losses. The Acoustic Blanket comes complete with inner and outer chemical resistant teflon fiberglass cloth with 1" thick high density fiberglass mat. Simple, but effective Velcro® fasteners make the blankets easy to install.

### Limiting Operating Conditions

**Max. Operating Temperature** 600°F (315°C) continuous

**Available Range**

1/2" to 6" AB Acoustic Blankets

### Construction Materials

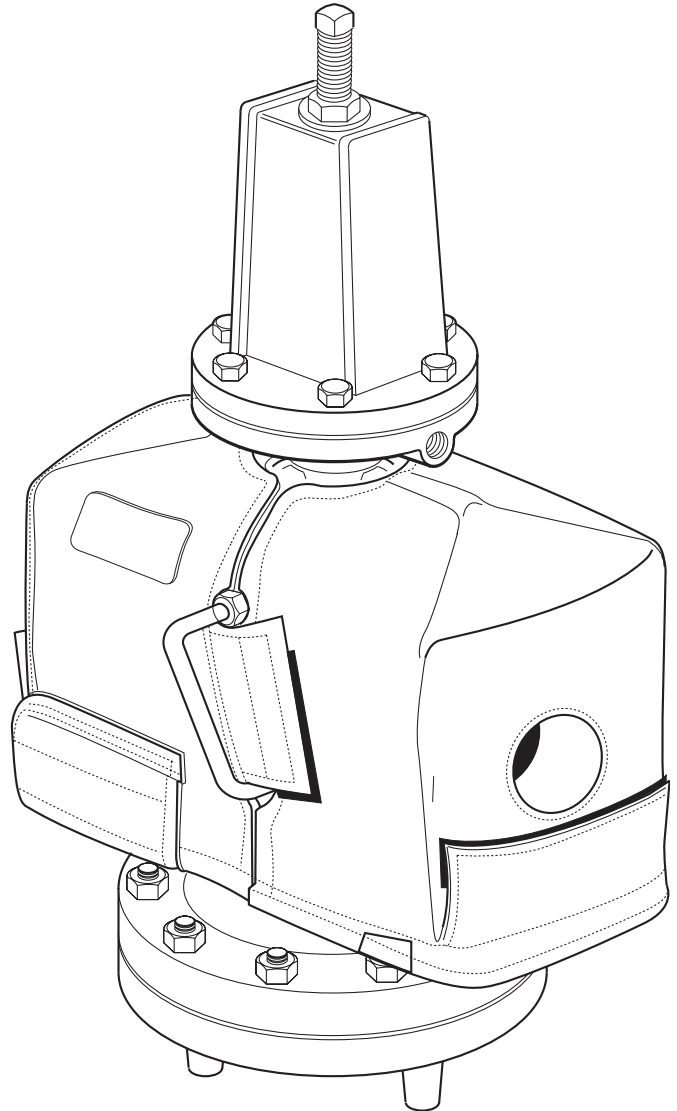
Part	Material
Jacket	Teflon Coated Fiberglass
Insulation Mat	Fiberglass

### Sizing and Selection

Match Acoustic Blanket size to pilot operated regulator or control valve size regardless of end connection. For example: Select 1/2" AB for 1/2" 25P cast iron, NPT pilot operated regulator.

### Installation

Check the nameplate on the Acoustic Blanket to be sure you have the correct blanket for your valve. Slip the blanket around the valve making sure the drawstrings are located at the inlet and outlet connections of the valve. Cut-outs for piloted operated regulators are provided to slip around external transmission tubing and pilot assemblies. Attached Velcro® fastening system making sure blanket fits snug to valve.





## Acoustic Plates

The Spirax Sarco model AP Acoustic Plate is designed to graduate the expansion across a valve, and therefore reduce valve noise. The acoustic plate absorbs the impact of the vent pressure at the downstream side of the valve. It distributes the steam flow and provides a noise frequency shift to reduce the perceived noise using a multiple hole orifice pattern in the plate inserted on the downstream side of the valve. Noise level reductions of up to 10 dBA can be achieved.

### Limiting Operating Conditions

**Max. Operating Pressure** 250 psig (17 barg)

**Max. Operating Temperature** 650°F

**Pressure Drop** Less than 1%

#### Standard Connections

AP plates are installed between standard flanges:

ANSI 150 RF flange designated "A"

ANSI 300 RF flange designated "B"

### Construction Materials

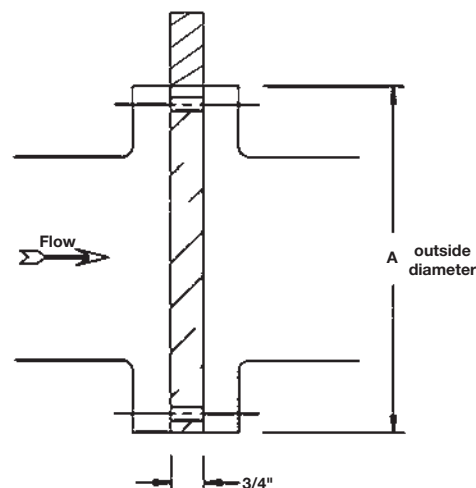
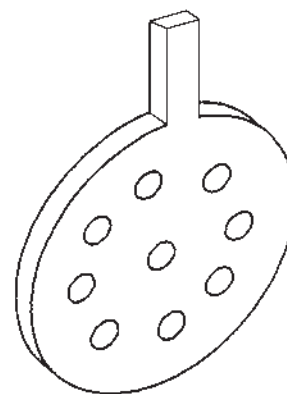
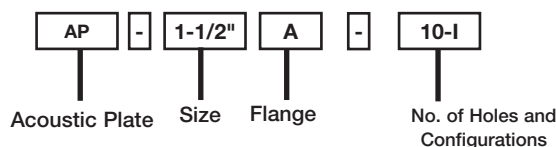
Part	Material
Plate	Cast Steel

### Installation

The Series AP Acoustic Plate is designed to reduce control valve and/or regulator noise. The plate is installed between standard ANSI 125/150 flanges or ANSI 250/300 downstream of a valve and reorients the normal exit turbulence of the steam flow. Noise reduction of up to 10 dBA can be achieved. The plates can be used in conjunction with D series noise diffusers and acoustic silencers for additional noise attenuation. See below for dimensions.

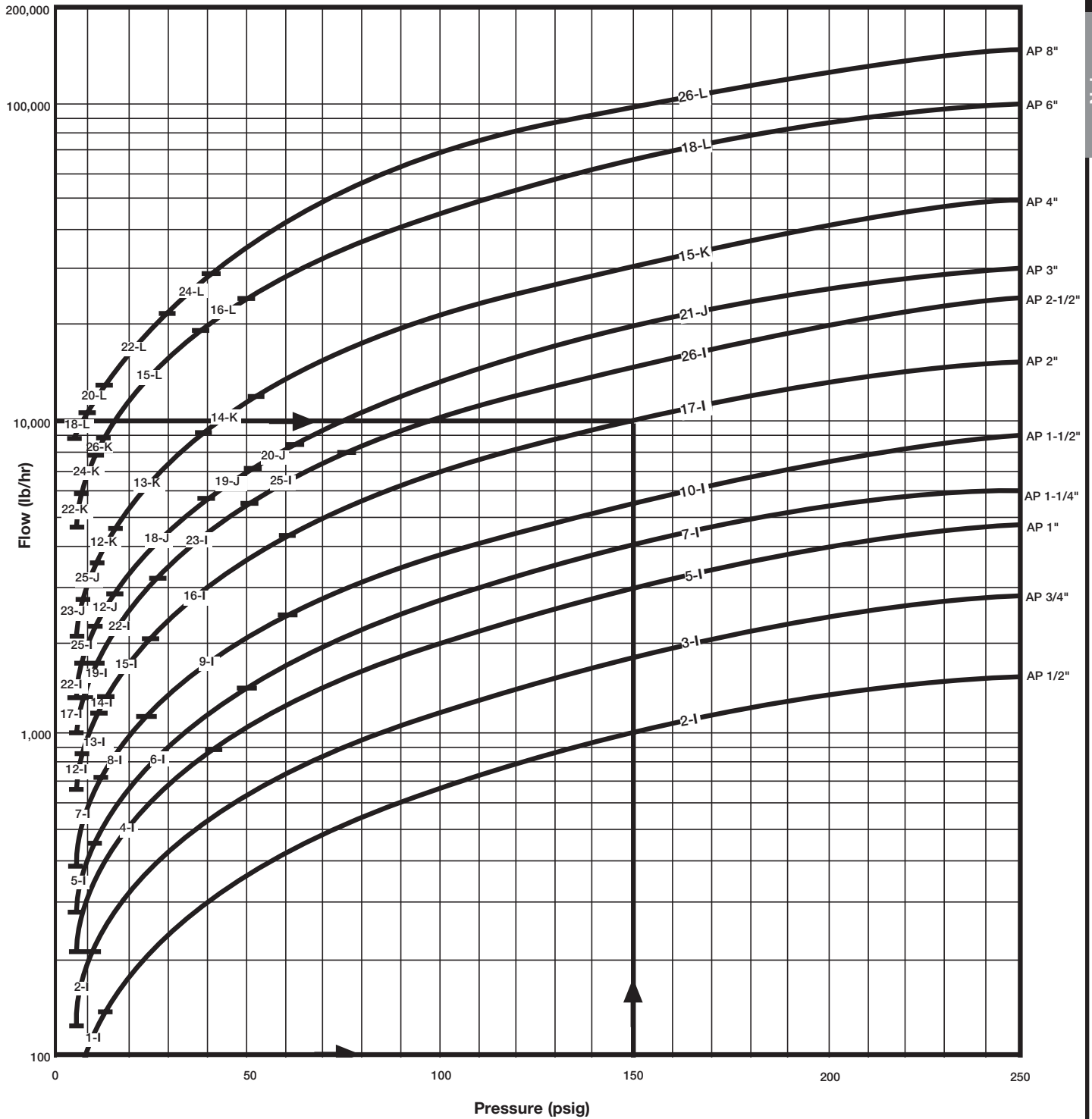
Dimensions (nominal) in inches and millimeters			
Nominal Pipe Size	Dimension A of ANSI 150 Flange	Dimension A of ANSI 300 Flange	Avg. Weight (lbs.)
1/2"	1.75	2.00	1.0
3/4"	2.12	2.50	3.4
1"	2.50	2.75	3.6
1-1/4"	2.88	3.12	3.8
1-1/2"	3.25	3.62	4.3
2"	4.0	4.25	6.0
2-1/2"	4.75	5.00	6.5
3"	5.25	5.75	10
4"	6.75	7.00	11.5
6"	8.62	9.75	12.4
8"	10.88	12.00	14.0

### How To Order Quantity One Of:



# Acoustic Plates

## Sizing and Selection Chart for AP Plates



### How To Use Sizing Chart

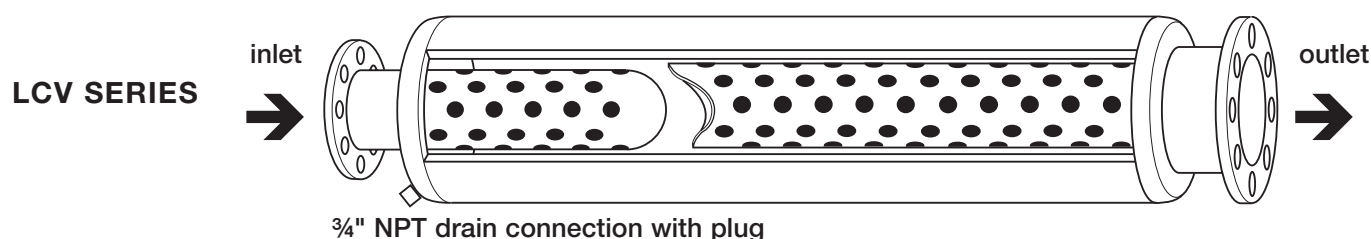
Select correct acoustic plate by known flow rates (lb/hr.) and inlet pressure of control valve or regulator.

Example: Inlet pressure of control valve 150 psig @ 10,000 lb./hr. Move horizontal to intersect with 150 psig. Follow 150 psig line vertically to intersect with 10,000 lb./hr. horizontal line. Select AP 2" - 17 - I.

TI-3-035-US 07.10

# spirax sarco

## Acoustic Silencers



### Description

The Spirax Sarco acoustic silencer is designed to attenuate noise generated by control valves and/or pilot operated regulators. The silencers are particularly effective in limiting the propagation of valve generated noise into the downstream piping. Upon flow and piping configuration, noise attenuation of up to 35 dBA can be expected.

### Limiting Operating Conditions

Max. Operating Pressure	300 psig (20 barg)
Max. Operating Temperature	650°F (343°C)
Standard Range	1/2" to 24" LCV Acoustic Silencers.
Connections:	Standard connections ANSI 300 lb. raised face flange. 3/4" - 3000 lb. drain with plug. Options of ANSI 150 lb. raised face flange available.

### Construction Materials

Part	Material
Silencer	All welded steel. ASME Section VIII Div I
Insulation Mat	Fiberglass

### Dimensions (nominal) in inches

Model	A	B	C	D	Weight (lb.)
LCV-2	1/2" to 2"	5"	35"	2"	120
LCV-3	1/2" to 3"	6-1/2"	46"	3"	150
LCV-4	1/2" to 4"	10"	52"	4"	200
LCV-5	3/4" to 4"	12"	60"	5"	250
LCV-6	2" to 6"	12"	66"	6"	400
LCV-8	2" to 6"	14"	72"	8"	550
LCV-10	1-1/4" to 6"	16"	78"	10"	650
LCV-12	2" to 6"	18"	90"	12"	800
LCV-14	2-1/2" to 6"	20"	104"	14"	1200
LCV-16	2-1/2" to 6"	22"	116"	16"	1500
LCV-18	3" to 6"	24"	132"	18"	1750
LCV-20	4" to 6"	26"	146"	20"	2200
LCV-22	6"	30"	158"	22"	2800
LCV-24	6"	30"	174"	24"	3100
LCV-26	6"	32"	186"	26"	3500
LCV-28	6"	36"	202"	28"	4850
LCV-30	6"	36"	216"	30"	5000

### Installation

Connect the inlet of the silencer directly to the outlet connection of the valve. The required pipeline expansion takes place within the silencer. This expanded outlet feature eliminates the expense associated with separate expansion fittings. A suitable float and thermostatic steam trap is recommended for removing condensate from the silencer. The drain connection must always point vertically down.



# Acoustic Silencers

## Sizing Acoustic Silencers

Select correct silencer by known flow rates (lb/hr), inlet, outlet pressure (psig) and size of regulator or control valve. Example: Inlet pressure to IN 25P regulator is 100 psig, outlet pressure is 60 psig @ 2400 lb/hr. Move horizontal across the 100 psig inlet line to 60 psig outlet to vertically intersect with a 1" regulator to meet or exceed capacity of 2400 lb/hr. Selection 1" LCV-2.

Inlet Pressure (psig)	Outlet Pressure (psig)	Valve Size												Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max lb/hr	Model	Max
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## Noise Diffuser D Series

The D Series Noise Diffuser is designed to reduce Pressure Reducing Valve noise generation. The diffuser breaks up the normal exit turbulence of the steam flow using an engineered orifice pattern in a pipe nozzle inserted on the downstream side of a pressure reducing valve.

The amount of noise level reduction produced by the diffuser will be approximately 15 dBA. Pressure drop through the diffuser will not exceed 1% of line pressure upstream of the pressure reducing valve.

Model	D-1 to D-24
PMO	320 psig
Sizes	1/2"x 2" to 6"x20" (see over)
Connections	Male NPT/ANSI Flgd. (see over)
Construction	Carbon Steel Body
Options	Buttweld outlet connection

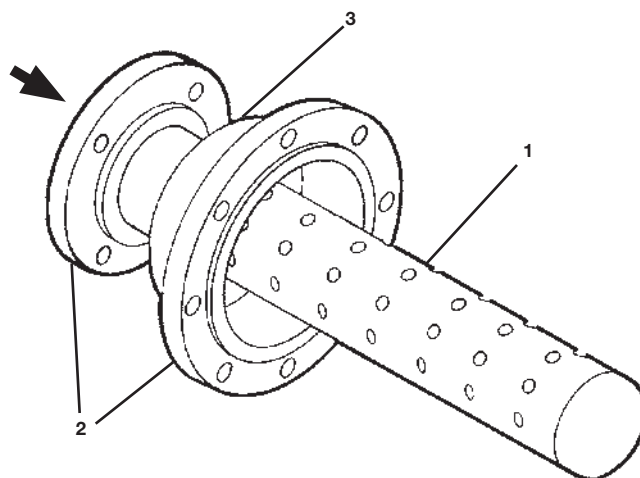
### Limiting Operating Conditions

**Max. Operating Pressure (PMO)** 320 psig (22 barg)

**Max. Operating Temperature** 600°F (260°C) at all operating pressures

### Construction Materials

No.	Part	Material
1	Pipe	Steel ASTM A106 GrB ASTM A-53-GrB ASTM A516 Gr70
2	Flanges	Steel ASTM A105
3	Head	Steel ASTM A-516 Gr70



### Sample Specification

An in-line noise diffuser shall be installed directly attached to the downstream connection of a pressure reducing valve to reduce noise output by approximately 15 dBA when measured by a sound level meter meeting ANSI standards. Noise Diffuser shall be manufactured of rolled and welded steel components that have been welded in accordance with ASME Section IX weld procedures. Pressure drop through the diffuser shall not exceed 1% of line pressure upstream of the pressure reducing valve. No additional pipe expansion shall be necessary downstream of the diffuser.

### Capacities:

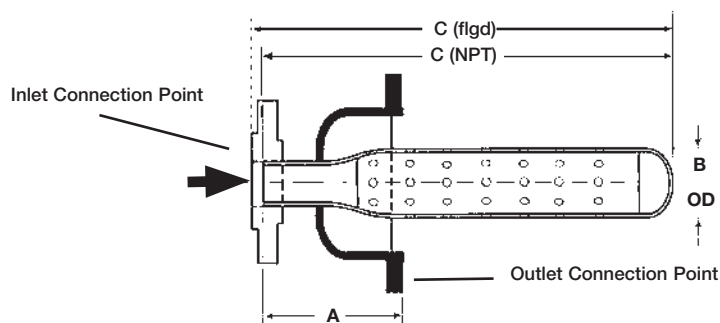
For sizing and selection data, see overleaf.

### Installation

The Noise Diffuser inlet should be directly attached to the outlet of the Pressure Reducing Valve. This type of installation is recommended to avoid the generation of flanking noise normally found when separately installing the Pressure Reducing Valve and Diffuser with a section of pipe between them.



# Noise Diffuser D Series



Dimensions nominal in inches

Model	Inlet <sup>1</sup>	Outlet <sup>2</sup>	A	B	C	Maximum Weight <sup>3</sup>		Model
						NPT/150# 150#/150#	NPT/300# 300#/300#	
D1	1/2 to 1	2	5.5	1.32	10.5	6.8	8.8	D1
D3					13.5	7.1	9.1	D3
D4	3/4 to 2	4	6.5	2.38	16.5	18.6	27.6	D4
D5	3/4 to 2-1/2			2.88		25.8	34.8	D5
D6	1-1/4 to 3	6	8	3.5	17	39	64	D6
D8	1-1/2 to 4	8	10	4.5	17	72.9	109.9	D8
D10	2 to 6	12	12	6.625	21	131.2	202.2	D10
D12	2-1/2 to 6				21	131.6	202.6	D12
D14	3 to 6				28	132.6	203.6	D14
D16	4 & 6	16	12	8.625	24	196.2	308.2	D16
D18					31	196.4	308.4	D18
D20	6	20	12	10.75	26	297.1	467.1	D20
D24					32	298.4	468.4	D24

<sup>1</sup> Available inlet sizes: Male NPT – 1/2", 3/4", 1", 1-1/4", 1-1/2", 2"; ANSI 150 or 300 flanged – 2-1/2", 3", 4", 6".

<sup>2</sup> All outlets are ANSI 150 or 300 flanged.

<sup>3</sup> The weight shown is for the largest inlet size. If precise weights are required, please contact the factory.

## Capacities – Pounds of Saturated Steam per Hour

Inlet Steam Press. to PRV psig	Model No												
	D1	D3	D4	D5	D6	D8	D10	D12	D14	D16	D18	D20	D24
15	1000	1500	3000	4000	6000	10,000							
20	1000	1500	3000	4000	6000	12,000	15,000						
25	1000	1500	3000	4000	6000	12,000	16,500						
30	1000	1500	3000	4000	6000	12,000	18,000						
40	1000	1500	3000	4000	6000	12,000	18,000						
50	1000	1500	2000	4000	6000	12,000	18,000	25,000					
60	1000	1500	2000	4000	6000	12,000	18,000	25,000	35,000				
75	1000	1500	2000	4000	6000	12,000	18,000	25,000	35,000	40,000	50,000		
85	1000	1500	2000	4000	6000	12,000	16,800	25,000	35,000	40,000	50,000		
100	1000	1500	2000	4000	6000	12,000	15,000	25,000	35,000	40,000	50,000		
125	1000	1500	2000	4000	6000	10,000	15,000	25,000	35,000	40,000	50,000		
150	1000	1500	2000	4000	6000	10,000	15,000	25,000	35,000	40,000	50,000	75,000	
175	1000	1500	2000	4000	6000	10,000	15,000	25,000	35,000	40,000	50,000	75,000	
200	1000	1500	2000	4000	6000	10,000	15,000	25,000	35,000	40,000	50,000	75,000	100,000
225	1000	1500	2000	4000	6000	10,000	15,000	25,000	35,000	40,000	50,000	75,000	100,000
250	1000	1500	2000	4000	6000	10,000	15,000	25,000	35,000	40,000	50,000	75,000	103,000
275	1000	1500	2000	4000	6000	10,000	15,000	25,000	35,000	40,000	50,000		
300	1000	1650	2000	5000	6600	10,000	16,500	27,000	35,000	40,000	55,000		

Diffuser capacity depends on the inlet steam pressure to the PRV. Choose a diffuser with a capacity equal to or greater than that of the PRV, and check to confirm that the connections are compatible. If not, select the next diffuser that offers the same inlet connection as the PRV outlet.

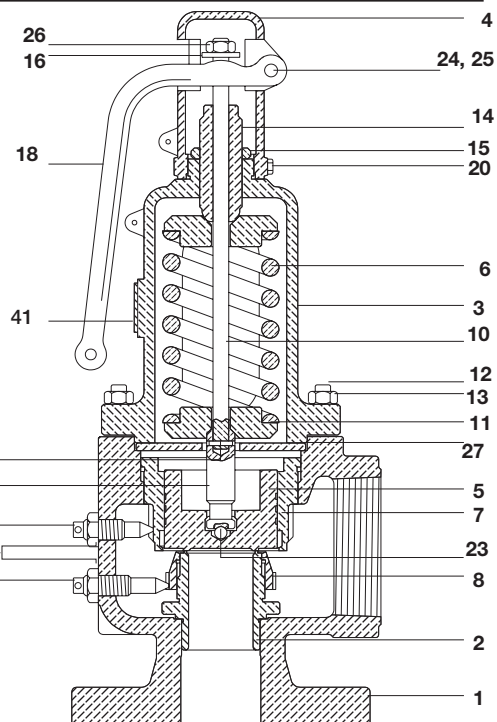
TI-3-025-US 5.13

# spirax sarco

## Safety Valves SV73 Series

The **SV73** Series valves are built in conformance to Section I and VIII of the ASME boiler and pressure vessel code. They are primarily intended for use on power boilers and unfired pressure vessels where ASME Section I or VIII stamped valves are required. The orifice areas listed are actual orifice areas and should not be confused with the API effective orifice areas shown in most safety valve catalogs.

Model	SV73	
<b>Sizes</b>	1-1/2" x 2-1/2" to 3" x 4"	3" x 4" to 6" x 8"
<b>Connections</b>	Inlet - Female NPT Outlet - Female - NPT	Inlet - ANSI 250 Fig. Outlet - ANSI 125 Fig.
<b>Construction</b>	Cast Iron body with Stainless Steel Trim	
<b>Options</b>	Drip pan elbow See TI-3-2141-US	



### Limiting Operating Conditions (Steam)

Max. Operating Pressure (PMO)	250 psig (17 barg)
Max. Operating Temperature	406°F (208°C)

See TI-3-2121-US for sizing data.

### Construction Materials

No.	Part	Material
1	Body	ASTM A126 Class B
2	Seat	ASTM A351 Grade CF8
3	Bonnet	ASTM A126 Class B
4	Cap	ASTM A126 Class B
5	Disc	ASTM A217 CA15
6	Spring	Chrome-vanadium alloy steel
7	Upper adjusting ring	ASTM A351 Grade CF8
8	Lower adjusting ring	ASTM A351 Grade CF8
9	Stem (lower)	ASTM A479 Type 410
10	Stem (upper)	ASTM A479 Type 410
11	Spring washers (2 off)	ASTM A105
12	Bonnet stud	ASTM A193 Grade B7
13	Bonnet nut	ASTM A194 Grade 2H
14	Adjusting screw	ASTM A479 Type 410
15	Adjusting screw nut	Carbon steel
16	Release ring	Carbon steel
17	Lock-nut (2 off)	Carbon steel
18	Lever	Grey iron
20	Cap set screw	Carbon steel
21	Upper adjusting ring pin	Stainless steel
22	Lower adjusting ring pin	Stainless steel
23	Disc ball	Stainless steel
24	Pin washer	Carbon steel
25	Lever pin	Carbon steel
26	Lock-nut	Carbon steel
27	Guide plate	Carbon steel
40	Stem pin	Carbon steel
41	Name plate	Stainless steel

### Typical Applications

Protection of steam system downstream of pressure regulating stations, on inlet to such equipment as air coils, heat exchangers and process vessels. Also for use on flash recovery vessels on condensate return systems to protect vessels. Air systems to protect accumulation vessels and air equipment from over-pressurization. Steam boilers and generators.

### Installation

Safety valves must be installed in a vertical upright position and drained via connection 19.

Avoid having the operating pressure too near the safety valve set pressure. A very minimum differential of 5 psig or 10% (whichever is greater) is recommended. An even greater differential is desirable, when possible, to assure better seat tightness and valve longevity.

Avoid discharge piping where its weight is carried by the safety valve. Even though supported separately, changes in temperature alone can cause piping strain. We recommend that drip pan elbows or flexible connections be used where possible. If required, remove protective plug (19) and route to drain.

For full details on proper installation, please refer to the installation, operating and maintenance instructions, IM-S13-33.

### Maintenance

Develop a regular program of visual inspection. Inspection should include checking for clogged drains, discharge pipe, and dirt build-up around the valve seat.

Test the safety valve every 6 months (depending on plant's age and condition) either by raising the system pressure to the valve's set pressure or operating the hand lever.

When safety valves require repair, service adjustments or set pressure changes, work shall be accomplished by the manufacturer, or holders of "VR" stamps.

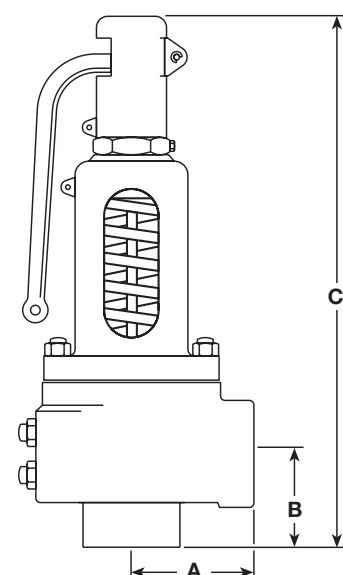
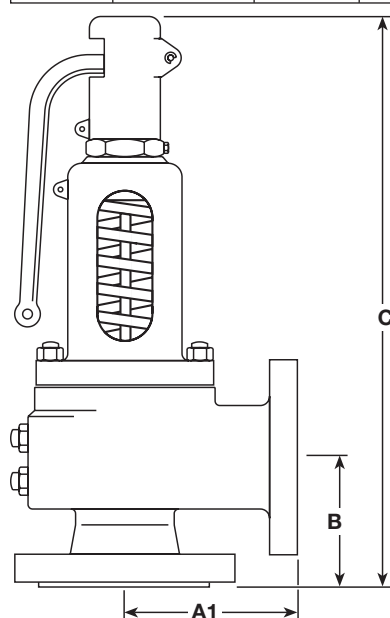
Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only.  
In the interests of development and improvement of the product, we reserve the right to change the specification.

TI-3-212-US 11.15

# Safety Valves SV73 Series

Dimensions, weights and orifice sizes (approximate) in inches and lbs

Valve inlet		Valve outlet		Orifice	A	A1	B	C	Weight
Size	Connection	Size	Connection	letter	ins	ins	ins	ins	lbs
1½"	NPT	2½"	NPT	J	3.5	-	4.3	15.8	33
2"	NPT	3"	NPT	K	4.0	-	4.6	17.1	46
2½"	NPT	4"	NPT	L	4.6	-	5.5	18.5	66
3"	NPT	4"	NPT	M	5.1	-	5.6	24.3	93
1½"	ANSI 250	2½"	NPT	J	3.5	-	4.3	15.8	38
2"	ANSI 250	2½"	NPT	J	3.5	-	4.3	15.8	40
2"	ANSI 250	3"	NPT	K	4.0	-	4.6	17.1	49
2½"	ANSI 250	3"	NPT	K	4.0	-	4.6	17.1	51
2½"	ANSI 250	4"	NPT	L	4.6	-	5.5	19.5	71
3"	ANSI 250	4"	NPT	L	4.6	-	5.5	19.5	73
3"	ANSI 250	4"	NPT	M	5.1	-	5.4	24.3	101
3"	ANSI 250	4"	ANSI 125	L	-	5.5	5.5	19.5	82
3"	ANSI 250	4"	ANSI 125	M	-	5.5	5.4	24.3	110
4"	ANSI 250	6"	ANSI 125	N	-	7.1	6.8	26.5	187
4"	ANSI 250	6"	ANSI 125	P	-	7.1	6.8	28.5	196
6"	ANSI 250	8"	ANSI 125	Q	-	9.3	9.3	34.5	355
6"	ANSI 250	8"	ANSI 125	R	-	10.0	10.9	43.9	595



## How to Specify

To simplify selection and specifying of Spirax Sarco safety valves, use the following type numbering system. The type numbering system is ideal as the digit which comprises a specific type number has a distinct significance. The digits describe the basic valve series, materials of construction, connection type, boiler code conformance, inlet and outlet connections, orifice size and set pressure.

## SV7 safety valve selection guide

Series number	SV7	SV7
Construction	3 = Cast iron	3
ASME section	V = ASME Code Section I U = ASME Code Section VIII Blank = Valve without code stamp	V
Size and connection	A = 1½" NPT x 2½" NPT B = 2" NPT x 3" NPT C = 2½" NPT x 4" NPT D = 3" NPT x 4" NPT E = 1½" ANSI 250 x 2½" NPT F = 2" ANSI 250 x 2½" NPT G = 2" ANSI 250 x 3" NPT H = 2½" ANSI 250 x 3" NPT I = 2½" ANSI 250 x 4" NPT J = 3" ANSI 250 x 4" NPT L = 3" ANSI 250 x 4" ANSI 125 N = 4" ANSI 250 x 6" ANSI 125 Q = 6" ANSI 250 x 8" ANSI 125	A
Actual orifice area Sq. In.	J = 1.374 K = 1.968 L = 3.054 M = 3.846 N = 4.633 P = 6.830 Q = 11.811 R = 17.123	J
Set pressure	Specify set pressure from *5 psi g to 250 psi g	180
SV7 3 - V - A J - 180		

## How to order

Example: 1 off Spirax Sarco SV73-V-AJ-180 safety valve having a set pressure of 180 psi g.

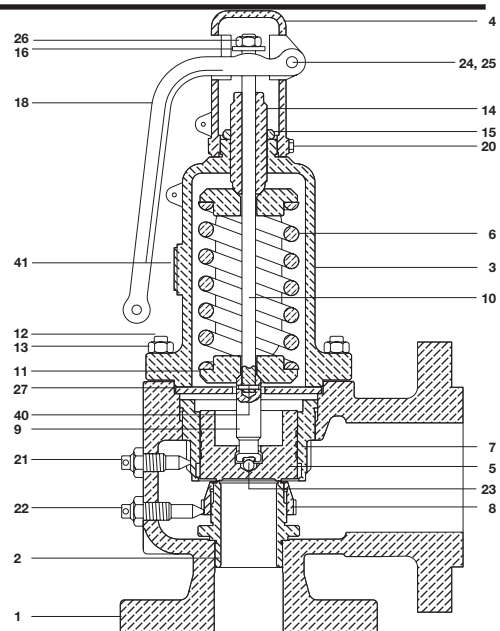
\*Note: Set pressures below 15 psi are not ASME coded and are not certified.

# spirax sarco

## Safety Valves SV74 Series

The **SV74 Series** valves are built in conformance to Section I and VIII of the ASME boiler and pressure vessel code. They are primarily intended for use on power boilers and unfired pressure vessels where ASME Section I or VIII stamped valves are required. The orifice areas listed are actual orifice areas and should not be confused with the API effective orifice areas shown in most safety valve catalogs.

Model	SV74	
Sizes	1-1/2" x 2" to 6"x 8"	
Connections	Inlet: ANSI 300 RF	Outlet: ANSI 150 RF
Construction	Cast Steel body with Stainless Steel Trim	
Options	Tungsten Spring Drip pan elbow-See TI-3-2141-US	



### Construction Materials

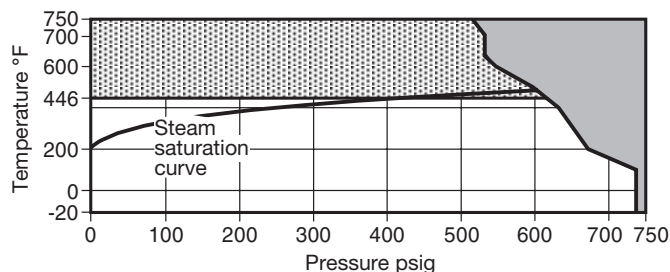
No.	Part	Material
1	Body	ASME SA 216 Gr. WCB
2	Seat	F to H orifice ASTM A479 304
		J to R orifice ASTM A351 Grade CF8
3	Bonnet	ASME SA 216 Gr. WCB
4	Cap	ASTM A126 Class B
5	Disc	F to H orifice ASTM A479 304
		J to R orifice ASTM A217 CA15
6	Spring	Chrome-vanadium alloy steel or tungsten alloy steel
7	Upper adjusting ring	ASTM A351 Grade CF8
8	Lower adjusting ring	ASTM A351 Grade CF8
9	Stem (lower)	ASTM A479 Type 410
10	Stem (upper)	ASTM A479 Type 410
11	Spring washers (2 off)	ASTM A105
12	Bonnet stud	ASTM A193 Grade B7
13	Bonnet nut	ASTM A194 Grade 2H
14	Adjusting screw	ASTM A479 Type 410
15	Adjusting screw nut	Carbon steel
16	Release ring	Carbon steel
17	Lock-nuts (2 off)	Carbon steel
18	Lever	Grey iron
20	Cap set screw	Carbon steel
21	Upper adjusting ring pin	Stainless steel
22	Lower adjusting ring pin	Stainless steel
23	Disc ball	Stainless steel
24	Pin washer	Carbon steel
25	Lever pin	Carbon steel
26	Lock-nut	Carbon steel
27	Guide plate	Carbon steel
40	Stem pin	Carbon steel
41	Name plate	Stainless steel

### Limiting Operating Conditions (Steam)


Max. Operating Pressure (PMO) 300 psig (20.7 barg)  
 Max. Operating Temperature 446°F (217°C)  
 750°F (399°C) with Tungsten Spring

See TI-3-2121-US for sizing data.

### Pressure/Temperature Limits



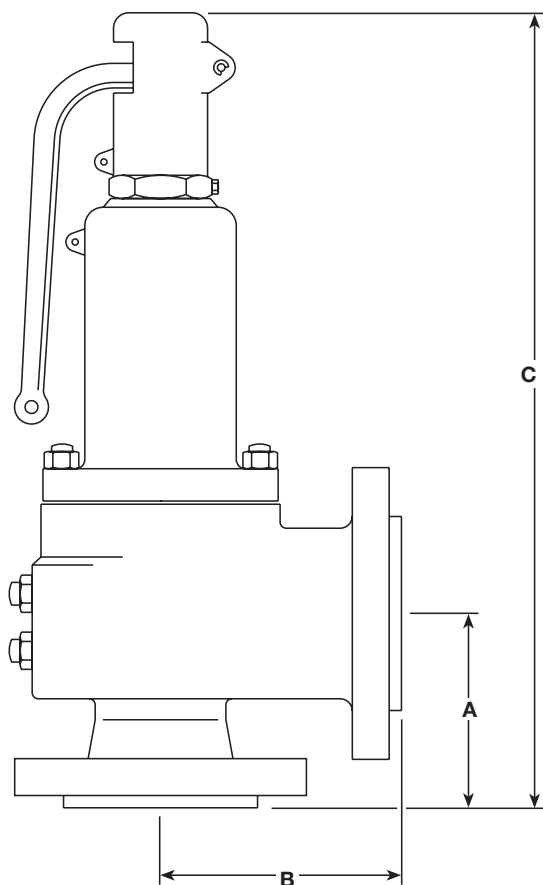
 The product **must not** be used in this region.

 A tungsten alloy spring must be used in this region.  
 Consult Spirax Sarco for further information

### Typical Applications

Protection of steam system downstream of pressure regulating stations, on inlet to such equipment as air coils, heat exchangers and process vessels. Also for use on flash recovery vessels on condensate return systems to protect vessels. Air systems to protect accumulation vessels and air equipment from over-pressurization. Steam boilers and generators.

# Safety Valves SV74 Series



**Dimensions, weights and orifice sizes (approximate) in inches and lbs**

Valve inlet Size	Valve inlet Connection	Valve outlet Size	Valve outlet Connection	Orifice letter	A ins	B ins	C ins	Weight lbs
1½"	ANSI 300	2"	ANSI 150	F	4.25	4.5	15.7	31
1½"	ANSI 300	2"	ANSI 150	G	4.25	4.5	15.7	31
1½"	ANSI 300	2½"	ANSI 150	H	4.90	4.8	16.2	46
1½"	ANSI 300	2½"	ANSI 150	J	4.90	4.8	16.2	46
2"	ANSI 300	3"	ANSI 150	K	5.60	5.1	18.5	62
2½"	ANSI 300	4"	ANSI 150	L	6.40	6.1	20.1	90
3"	ANSI 300	4"	ANSI 150	M	6.50	6.5	25.0	117
4"	ANSI 300	6"	ANSI 150	N	7.50	7.2	26.7	198
4"	ANSI 300	6"	ANSI 150	P	8.30	7.1	28.7	212
6"	ANSI 300	8"	ANSI 150	Q	9.40	9.9	34.8	384
6"	ANSI 300	8"	ANSI 150	R	10.00	10.9	43.9	633

## SV7 safety valve selection guide

Series number	SV7	SV7
Construction	4 = Cast steel	4
ASME section	V = ASME Code Section I U = ASME Code Section VIII Blank = Valve without code stamp	V
Size and connection	S = 1½" ANSI 300 x 2" ANSI 150 T = 1½" ANSI 300 x 2½" ANSI 150 U = 2" ANSI 300 x 3" ANSI 150 V = 2½" ANSI 300 x 4" ANSI 150 W = 3" ANSI 300 x 4" ANSI 150 X = 4" ANSI 300 x 6" ANSI 150 Y = 6" ANSI 300 x 8" ANSI 150	X
Actual orifice area Sq. In.	F = 0.328 G = 0.537 H = 0.841 J = 1.374 K = 1.968 L = 3.054 M = 3.846 N = 4.633 P = 6.830 Q = 11.811 R = 17.123	P
Set pressure	Specify set pressure from 5 psig to 300 psig*	180

For tungsten alloy spring add 'T' after set pressure eg: 180 'T'.

SV7	4	-	V	-	X	P	-	180
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## How to order

**Example 1:** 1 off Spirax Sarco SV74-V-XP-180 safety valve having a set pressure of 180 psig.

If a tungsten alloy spring was required the order would read as follows:

**Example 2:** 1 off Spirax Sarco SV74-V-XP-180T safety valve having a set pressure of 180 psig.

**\*NOTE:** R orifice, Section 1, pressure limit is 250 psig

**\*NOTE:** Set pressures below 15 psi are not ASME coded and are not certified.

## Installation

Safety valves must be installed in a vertical upright position and drained via connection 19.

Avoid having the operating pressure too near the safety valve set pressure. A very minimum differential of 5 psig or 10% (whichever is greater) is recommended. An even greater differential is desirable, when possible, to assure better seat tightness and valve longevity.

Avoid discharge piping where its weight is carried by the safety valve. Even though supported separately, changes in temperature alone can cause piping strain. We recommend that drip pan elbows or flexible connections be used where possible. If required, remove protective plug (19) and route to drain.

For full details on proper installation, please refer to the installation, operating and maintenance instructions, IM-S13-33.

## Maintenance

Develop a regular program of visual inspection. Inspection should include checking for clogged drains, discharge pipe, and dirt build-up around the valve seat.

Test the safety valve every 6 months (depending on plant's age and condition) either by raising the system pressure to the valve's set pressure or operating the hand lever.

## How to Specify

To simplify selection and specifying of Spirax Sarco safety valves, use the following type numbering system. The type numbering system is ideal as the digit which comprises a specific type number has a distinct significance. The digits describe the basic valve series, materials of construction, connection type, boiler code conformance, inlet and outlet connections, orifice size and set pressure.





## Sizing Safety Valves

## Capacities

1. lb/h steam, 90% of actual capacity at 3% accumulation in accordance with ASME Code, Section I.
2. lb/h steam, 90% of actual capacity at 10% accumulation in accordance with ASME Code, Section VIII.

Steam saturation tempera- ture °F	Set pressure psi g	F		G		H		J		K		L		M		N		P		Q		R	
		0.328		0.537		0.841		1.374		1.968		3.054		3.846		4.633		6.830		11.811		17.123	
		lb/h	10%	lb/h	10%	lb/h	10%	lb/h	10%	lb/h	10%	lb/h	10%	lb/h	10%	lb/h	10%	lb/h	10%	lb/h	10%	lb/h	10%
250	15	438	453	716	741	1122	1161	1833	1897	2625	2717	4074	4216	5131	5308	6181	6395	9111	9427	15756	16302	22842	23634
259	20	512	533	839	872	1314	1366	2146	2231	3074	3196	4770	4959	6007	6244	7236	7522	10668	11089	18447	19176	26744	27800
267	25	587	612	961	1003	1505	1570	2459	2566	3522	3675	5466	5702	6883	7180	8292	8649	12224	12521	21139	22050	30646	31966
274	30	662	692	1083	1133	1697	1775	2772	2900	3971	4153	6126	6446	7760	8116	9348	9776	13780	14413	23830	24923	34548	36133
281	35	737	772	1206	1264	1888	1980	3085	3234	4419	4632	6858	7189	8636	9052	10403	10904	15337	16074	26521	27797	38449	40299
287	40	811	852	1328	1395	2080	2184	3398	3569	4868	5111	7554	7932	9513	9987	11459	12031	16893	17398	26251	27521	39071	41485
292	45	886	932	1451	1525	2272	2389	3711	3903	5316	5590	8275	8675	10392	10923	12515	13158	18449	19398	31904	33545	46253	48631
298	50	961	1012	1573	1656	2463	2594	4025	4237	5764	6069	8945	9451	11265	11859	13570	14286	20006	21060	34595	36418	50155	52964
303	55	1035	1091	1695	1787	2655	2798	4338	4572	6213	6548	9641	10162	12142	12795	14626	15413	21562	22722	37287	39292	54057	56987
307	60	1110	1171	1818	1917	2847	3003	4651	4906	6661	7027	10337	10905	13018	13730	15682	16540	23118	24383	39978	42166	57958	61130
312	65	1185	1251	1940	2048	3038	3208	4846	5240	7110	7506	11033	11648	13894	14666	16738	17687	24675	26045	42070	45040	61860	65206
316	70	1260	1331	2062	2179	3230	3412	5277	5575	7558	7985	11729	12391	14771	15602	17793	18795	26231	27707	45361	47913	65762	69462
320	75	1334	1411	2185	2309	3422	3613	5590	5909	8007	8464	12421	13178	15647	16538	18849	19922	27567	29369	48561	50787	69664	73629
324	80	1409	1490	2307	2440	3613	3822	5903	6244	8455	8943	13245	13978	16524	17474	19905	20949	29344	31301	50744	53661	73795	77985
328	85	1484	1570	2429	2571	3805	4026	6176	6578	8904	9422	13817	14561	17261	18296	21337	22610	30900	32693	53635	56535	77467	81961
331	90	1559	1650	2552	2702	3996	4231	6529	6912	9352	9901	14513	15364	18276	19345	22016	23304	32456	34354	56126	59408	81369	86127
335	95	1633	1730	2674	2832	4188	4436	6842	7247	9800	10379	15209	16107	19153	20281	23072	24431	34013	36016	58818	62282	85271	90294
338	100	1708	1810	2797	2963	4380	4640	7165	7581	10249	10858	16550	17500	20029	21217	24128	25558	35569	37678	60159	65156	89173	94460
341	105	1783	1890	2919	3094	4571	4845	7469	7915	10697	11337	16600	17594	20095	22152	25183	26685	37125	39340	64200	68830	93074	98262
344	110	1858	1969	3041	3224	4763	5050	7782	8250	11146	11816	17296	18337	21382	23088	26239	27813	38682	41002	66982	70903	96776	102958
347	115	1932	2049	3164	3355	4955	5254	8293	8594	11564	12295	17992	19080	22658	24024	27295	29440	40238	42663	68593	73777	100878	106958
350	120	2007	2129	3286	3486	5146	5459	8408	8918	12043	12774	18688	19823	23535	24960	28350	30067	41001	44325	72274	76651	104780	111125
353	125	2082	2209	3408	3616	5338	5663	8731	9253	12491	13232	19384	20586	24411	25896	29462	31194	43351	45967	74666	79525	108681	115291
356	130	2157	2289	3531	3747	5530	5868	9024	9587	12940	13732	20080	21310	25287	26831	30466	32322	44907	47649	77657	82398	112583	119457
358	135	2231	2368	3652	3878	5721	6037	9322	9822	13388	14211	20776	22053	26164	27767	31518	33476	46463	49311	80348	85272	116485	123623
361	140	2306	2448	3775	4008	5913	6277	9660	10256	13836	14690	21272	22726	27040	28703	32573	34548	48060	50793	83408	88146	120387	127790
363	145	2381	2528	3898	4139	6104	6482	9973	10590	14285	15169	22168	23539	27916	29639	33629	35704	49576	52634	85731	91020	124288	131956
366	150	2456	2608	4020	4270	6296	6687	10286	10925	14733	15648	22884	24382	28932	30574	34865	36831	51132	54296	88422	93893	128190	136122
368	155	2530	2688	4143	4400	6488	6891	10599	11259	15182	16127	23259	25026	29669	31510	35740	37958	52689	55958	91114	96767	132092	140288
371	160	2605	2768	4265	4531	6679	7096	11023	11593	15630	16605	24255	25769	30546	32446	36796	39051	54245	57620	93805	99541	135994	144554
373	165	2680	2847	4387	4662	6871	7301	11226	11928	16079	17084	25152	26812	31422	33382	37652	40121	55801	59282	96492	102515	139896	148621
375	170	2755	2927	4510	4792	7063	7505	11539	12262	16527	17563	25647	27555	32298	34317	38907	41340	57358	60943	99188	105388	143797	152787
377	175	2829	3007	4632	4923	7254	7701	11852	12597	16976	18042	26343	27998	33175	35253	39963	42487	58914	62605	101879	108262	147699	156953
380	180	2904	3087	4754	5054	7446	7915	12165	12931	17424	18521	27039	28742	34051	36189	41019	43584	60470	64267	104570	111136	151601	161191
382	185	2979	3167	4875	5184	7638	8119	12478	13265	17872	19000	27735	29485	34927	37125	42075	44722	62627	66529	107953	114002	155503	165286
384	190	3053	3246	4999	5315	7829	8324	12791	13600	18321	19473	28423	30228	35804	38061	43130	45849	63583	67591	109561	116883	159404	169452
386	195	3128	3326	5122	5446	8021	8529	13104	13934	18769	19958	29127	30971	36680	38966	44186	46976	65139	69670	112644	119757	163306	173618
388	200	3203	3405	5244	5577	8212	8731	13417	14268	19718	20920	30437	32314	37557	39932	45242	48103	66696	70914	115336	122603	167208	177784
388	200	3203	3405	5244	5577	8212	8731	13417	14268	19718	20920	30437	32314	37557	39932	45242	48103	66696	70914	115336	122603	167208	177784
392	210	3352	3566	5489	5838	8816	9143	14043	14937	20115	21395	31214	33201	39309	41804	47353	50358	69008	74238	120718	128378	175012	186117
396	220	3502	3725	5733	6099	8979	9352	14676	15606	20416	22332	32616	34687	41062	43675	49465	52612	72921	77862	126101	134126	182815	194449
399	230	3651	3885	5978	6361	9362	9691	15296	16275	21908	23310	33998	36174	42815	45547	51576	54684	76034	80885	131404	139874	190619	202782
403	240	3801	4045	6223	6622	9746	10071	16542	16943	22805	24268	35670	37660	44568	47418	53687	57122	79146	83860	136866	145621	198422	211144
406	250	3950	4204	6468	6883	10129	10370	17598	17948	23702	25226	36782	39146	46320	49200	55769	59276	82559	87533	142499	151606	206226	219447
409	260	4100	4364	6712	7145	10512	11189	17714	18281	24599	26184	38174	40633	48073	51161	57910	61631	85372	90856	147632	157116	214029	227779
413	270	4249	4524	6957	7406	10995	11598	17801	18950	25496	27142	39965	42431	49826	53033	60022	63885	88494	94180	153014	162864	221833	236111
416	280	4399	4683	7202	7667	11279	12008	18427	19618	26393	28100	40957	43606	51579	54905	62133	66140	91597	97503	158397	168631	229636	244444
417	290	4548	4843	7496	7929	11622	12427	19053	20287	27280	29057	42											

# Sizing Safety Valves

## Superheated Steam Correction Factors for Safety Valves

For capacities of superheated steam, multiply saturated steam capacity by correction factor below.

Gauge Pressure PSI	Saturated Temp. °F	TOTAL STEAM TEMPERATURE IN DEGREES FAHRENHEIT																							
		340	360	380	400	420	440	460	480	500	520	540	560	580	600	620	640	660	680	700	720	740	760		
15	250	.99	.99	.98	.98	.97	.96	.95	.94	.93	.92	.91	.90	.89	.88	.87	.86	.86	.85	.84	.83	.83	.82		
20	259	.99	.99	.98	.98	.97	.96	.95	.94	.93	.92	.91	.90	.89	.88	.87	.86	.86	.85	.84	.83	.83	.82		
40	287	1.00	.99	.99	.98	.97	.96	.95	.94	.93	.92	.91	.90	.89	.88	.87	.86	.86	.85	.84	.84	.83	.82		
60	308	1.00	.99	.99	.98	.97	.96	.95	.94	.93	.92	.91	.90	.89	.88	.87	.86	.86	.85	.84	.84	.83	.82		
80	324	1.00	1.00	.99	.99	.98	.97	.96	.94	.93	.92	.91	.90	.89	.88	.87	.86	.86	.85	.84	.84	.83	.82		
100	338	—	1.00	1.00	.99	.98	.97	.96	.95	.94	.93	.92	.91	.90	.89	.88	.87	.86	.85	.85	.84	.83	.82		
120	350	—	1.00	1.00	.99	.98	.97	.96	.95	.94	.93	.92	.91	.90	.89	.88	.87	.86	.85	.85	.84	.83	.82		
140	361	—	—	1.00	1.00	.99	.97	.96	.95	.94	.93	.92	.91	.90	.89	.88	.87	.86	.85	.85	.84	.83	.82		
160	371	—	—	—	1.00	.99	.98	.97	.96	.95	.94	.93	.92	.91	.90	.89	.88	.87	.86	.85	.84	.83	.82		
180	380	—	—	—	1.00	.99	.98	.97	.96	.95	.94	.93	.92	.91	.90	.89	.88	.87	.86	.85	.84	.83	.83		
200	388	—	—	—	1.00	.99	.99	.97	.96	.95	.94	.93	.92	.91	.90	.89	.88	.87	.86	.85	.84	.83	.83		
220	395	—	—	—	1.00	1.00	.99	.98	.96	.95	.94	.93	.92	.91	.90	.89	.88	.87	.86	.85	.84	.84	.83		
240	403	—	—	—	—	1.00	.99	.98	.97	.95	.94	.93	.92	.91	.90	.89	.88	.87	.86	.85	.84	.84	.83		
260	409	—	—	—	—	1.00	.99	.98	.97	.96	.94	.93	.92	.91	.90	.89	.88	.87	.86	.85	.85	.84	.83		
280	416	—	—	—	—	1.00	1.00	.99	.97	.96	.95	.93	.92	.91	.90	.89	.88	.87	.86	.85	.85	.84	.83		
300	422	—	—	—	—	—	1.00	.99	.98	.96	.95	.93	.92	.91	.90	.89	.88	.87	.86	.86	.85	.84	.83		
350	436	—	—	—	—	—	1.00	1.00	.99	.97	.96	.94	.93	.92	.91	.90	.89	.88	.87	.86	.85	.84	.83		
400	448	—	—	—	—	—	—	1.00	.99	.98	.96	.95	.93	.92	.91	.90	.89	.88	.87	.86	.85	.84	.84		
450	460	—	—	—	—	—	—	—	1.00	.99	.97	.96	.94	.93	.92	.91	.89	.88	.87	.86	.86	.84	.84		
500	470	—	—	—	—	—	—	—	—	1.00	.99	.98	.96	.94	.93	.92	.91	.90	.89	.88	.87	.86	.85		
550	480	—	—	—	—	—	—	—	—	—	1.00	.99	.97	.95	.94	.92	.91	.90	.89	.88	.87	.86	.85		
600	489	—	—	—	—	—	—	—	—	—	—	1.00	.99	.98	.96	.94	.93	.92	.90	.89	.88	.87	.86		
650	497	—	—	—	—	—	—	—	—	—	—	—	1.00	.99	.97	.95	.94	.92	.91	.90	.89	.87	.86		
700	506	—	—	—	—	—	—	—	—	—	—	—	—	1.00	.99	.97	.96	.94	.93	.91	.90	.89	.88		
750	513	—	—	—	—	—	—	—	—	—	—	—	—	—	1.00	1.00	.98	.96	.95	.93	.92	.90	.89		
800	520	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1.00	.99	.97	.95	.94	.92	.91	.90		
850	527	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1.00	.99	.98	.96	.94	.93	.92		
900	533	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1.00	.99	.97	.95	.93	.92		
950	540	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1.00	.99	.97	.95	.94		
1000	546	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1.00	.99	.98	.96		

## Sizing Formulas

### STEAM – LBS./HR. – SEC. I

$$A = \frac{W_p}{51.45 K_d P F_{sh} F_p}$$

### STEAM – LBS./HR. – SEC. VIII

$$A = \frac{W_p}{51.5 K_d P F_{sh} F_p}$$

### AIR – SCFM

$$A = \frac{W_c}{18.33 K_d P F_t F_p} \text{ or } A = \frac{W_c \sqrt{T}}{418 K_d P F_p}$$

A = AREA, SQ. IN.

W<sub>p</sub> = FLOW, LBS./HR.

W<sub>c</sub> = FLOW, SCFM

K<sub>d</sub> = Effective coefficient of discharge for use in these formulas. (.859 for SV73 & SV74)

P = Set pressure + Overpressure + 14.7

F<sub>p</sub> = Constant back pressure correction factor.

F<sub>sh</sub> = Superheat correction factor.

T = Absolute temperature, °F + 460.

F<sub>t</sub> =  $\sqrt{\frac{520}{T}}$

TI-3-2121-US 10.15

# Sizing Safety Valves

## Sizing Safety Valves – SV73 & SV74 Air Capacities (SCFM)

Orifice	F	G	H	J	K	L	M	N	P	Q	R
Area Sq. In.	0.328	0.537	0.841	1.374	1.968	3.054	3.846	4.633	6.83	11.811	17.123
Set pressure, psig	Airflow, SCFM @ 10% accumulation psig										
15	169	277	434	709	1 015	1 575	1 983	2 389	3 522	6 091	8 830
20	195	319	500	817	1 170	1 816	2 287	2 754	4 061	7 022	10 180
25	221	362	566	925	1 325	2 056	2 590	3 120	4 599	7 953	11 530
30	247	404	633	1 034	1 480	2 297	2 893	3 485	5 138	8 885	12 880
35	275	451	706	1 153	1 651	2 562	3 227	3 887	5 730	9 909	14 366
40	304	497	779	1 272	1 822	2 827	3 560	4 289	6 323	10 933	15 851
45	332	544	851	1 391	1 993	3 092	3 894	4 691	6 915	11 958	17 336
50	361	590	924	1 510	2 163	3 357	4 227	5 092	7 507	12 982	18 821
55	389	637	997	1 629	2 334	3 622	4 561	5 495	8 100	14 007	20 307
60	417	683	1 070	1 749	2 505	3 887	4 895	5 896	8 692	15 032	21 792
65	446	730	1 143	1 868	2 675	4 152	5 228	6 298	9 284	16 055	23 726
70	474	777	1 216	1 987	2 846	4 417	5 562	6 700	9 877	17 080	24 762
75	503	823	1 289	2 106	3 017	4 681	5 895	7 102	10 470	18 105	26 247
80	531	870	1 362	2 225	3 187	4 946	6 229	7 504	11 062	19 129	27 732
85	560	916	1 435	2 345	3 358	5 211	6 563	7 906	11 655	20 154	29 218
90	588	963	1 508	2 464	3 529	5 476	6 896	8 307	12 247	21 178	30 703
95	617	1 009	1 581	2 583	3 699	5 741	7 230	8 709	12 839	22 202	32 188
100	645	1 056	1 654	2 702	3 870	6 006	7 563	9 111	13 431	23 227	33 673
105	673	1 103	1 727	2 821	4 041	6 271	7 897	9 513	14 024	24 251	35 157
110	702	1 149	1 800	2 940	4 212	6 536	8 231	9 915	14 617	25 276	36 644
115	730	1 196	1 873	3 060	4 382	6 801	8 564	10 317	15 209	26 301	38 129
120	759	1 242	1 946	3 179	4 553	7 065	8 898	10 719	15 801	27 325	39 614
125	787	1 289	2 019	3 298	4 724	7 330	9 231	11 120	16 394	28 350	41 100
130	816	1 336	2 092	3 417	4 894	7 595	9 565	11 522	16 986	29 374	42 585
135	844	1 382	2 165	3 536	5 065	7 860	9 899	11 924	17 579	30 398	44 070
140	873	1 429	2 237	3 655	5 236	8 125	10 232	12 326	18 171	31 422	45 555
145	901	1 475	2 310	3 775	5 407	8 390	10 566	12 728	18 764	32 448	47 041
150	930	1 522	2 383	3 894	5 577	8 655	10 899	13 130	19 356	33 472	48 526
155	958	1 568	2 456	4 013	5 748	8 920	11 233	13 531	19 948	34 495	50 010
160	986	1 615	2 529	4 132	5 919	9 185	11 566	13 933	20 541	35 520	51 496
165	1 015	1 662	2 602	4 251	6 089	9 450	11 900	14 335	21 133	36 545	52 981
170	1 043	1 708	2 675	4 371	6 260	9 714	12 234	14 737	21 726	37 570	54 466
175	1 072	1 755	2 748	4 490	6 430	9 979	12 567	15 138	22 317	38 592	55 949
180	1 100	1 801	2 821	4 609	6 601	10 244	12 900	15 540	22 910	39 617	57 435
185	1 129	1 848	2 894	4 728	6 772	10 509	13 234	15 943	23 503	40 643	58 922
190	1 157	1 894	2 967	4 847	6 943	10 774	13 568	16 344	24 095	41 667	60 407
195	1 186	1 941	3 040	4 966	7 114	11 039	13 902	16 746	24 688	42 692	61 893
200	1 214	1 988	3 113	5 086	7 284	11 304	14 235	17 148	25 280	43 716	63 377
210	1 271	2 081	3 259	5 324	7 626	11 834	14 903	17 952	26 465	45 766	66 349
220	1 328	2 174	3 404	5 562	7 967	12 363	15 569	18 755	27 649	47 813	69 316
230	1 385	2 267	3 550	5 801	8 308	12 983	16 237	19 559	28 834	49 862	72 288
240	1 442	2 360	3 696	6 039	8 650	13 423	16 904	20 363	30 019	51 912	75 259
250	1 499	2 453	3 842	6 277	8 991	13 953	17 571	21 166	31 204	53 960	78 229
260	1 555	2 546	3 988	6 516	9 332	14 482	18 238	21 970	32 388	56 008	81 198
270	1 612	2 640	4 134	6 754	9 674	15 012	18 906	22 775	33 574	58 060	84 172
280	1 669	2 733	4 280	6 992	10 015	15 542	19 572	23 577	34 758	60 106	87 139
290	1 726	2 826	4 426	7 231	10 357	16 072	20 240	24 382	35 944	62 157	90 112
300	1 783	2 919	4 572	7 469	10 698	16 601	20 907	25 185	37 128	64 204	93 080

TI-3-2121-US 10.15



## Drip Pan Elbow

The Drip Pan Elbow, when used in conjunction with a safety relief valve, provides a suitable unrestricted, self-draining outlet. This improves the performance and longevity of the safety valve by alleviating axial loads on the valve, which could impair its operation and shut off.

Model	DPE	
Sizes	3/4" to 4"	6" & 8"
Connections	Female NPT	Flanged ANSI 125
Construction	Cast Iron (ASTM A126 CL B)	

### Typical Applications

Specifically for use on the outlet connection of safety/relief valves to assure unrestricted discharge.

### Dimensions (nominal) in inches and millimeters

SIZE INLET	A in (mm)	B in (mm)	C in (mm)	D in (mm)	E in (mm)	F in (mm)	G. NPT in (mm)	Weight Lb. (kg.)
3/4"	2.00	3.75	1.88	2.00	1.00	1.50	3/8	2
(20)	(51)	(95)	(48)	(51)	(25)	(38)	(10)	(1)
1"	2.00	3.75	1.88	2.00	1.00	1.50	3/8	2
(25)	(51)	(95)	(48)	(51)	(25)	(38)	(10)	(1)
1-1/4"	2.00	5.50	2.47	4.13	1.44	2.13	3/8	7.5
(32)	(51)	(140)	(63)	(105)	(37)	(54)	(10)	(3)
1-1/2"	2.00	5.50	2.47	4.13	1.44	2.13	3/8	7.5
(40)	(51)	(140)	(63)	(105)	(37)	(54)	(10)	(3)
2"	3.00	6.25	2.31	3.63	1.63	2.25	1/2	8.5
(50)	(76)	(159)	(59)	(92)	(41)	(57)	(15)	(4)
2-1/2"	4.00	7.38	3.00	4.31	1.94	2.69	3/4	12
(65)	(102)	(187)	(76)	(109)	(49)	(68)	(20)	(5)
3"	4.00	8.00	3.05	4.88	2.31	3.13	3/4	19
(80)	(102)	(203)	(78)	(124)	(59)	(80)	(20)	(9)
4"	6.00	9.63	4.50	5.75	2.88	3.75	3/4	25
(100)	(152)	(245)	(114)	(146)	(73)	(95)	(20)	(11)
6"	8.00	12.75	6.63	7.44	4.19	8.00	3/4	105
(150)	(203)	(324)	(168)	(189)	(106)	(203)	(20)	(48)
8"	10.00	16.50	7.50	9.44	5.38	10.75	1	202
(200)	(254)	(419)	(191)	(240)	(137)	(273)	(25)	(92)

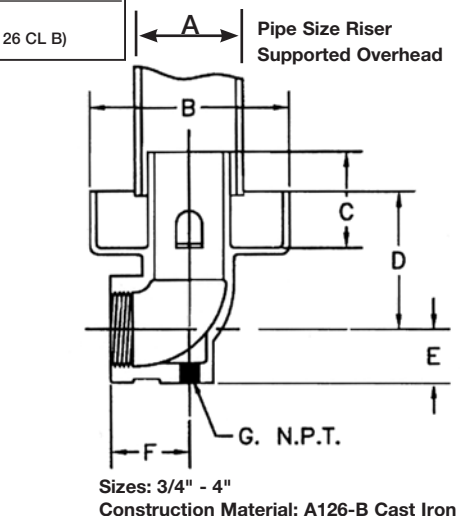
### Limiting Operating Conditions

Max. Operating Pressure (PMO) 250 psig (17 barg)  
Max. Operating Temperature (TMO) 450°F (232°C) at all operating pressures

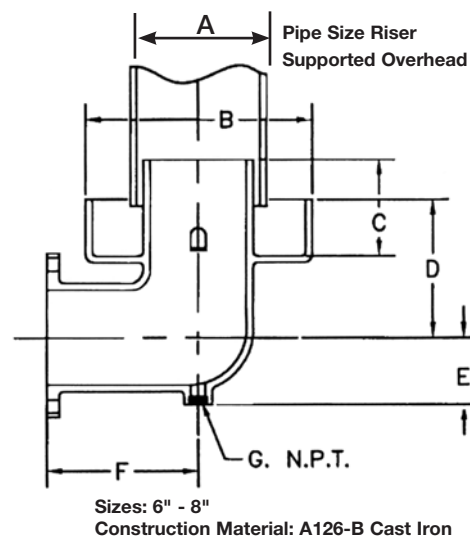
### Installation

The Drip Pan Elbow is to be connected to the discharge connection of the safety/relief valve by a short pipe nipple. Flanged valves 4" and smaller will require a companion flange and short nipple the same size as the valve outlet. The drain connection on the bottom of the elbow should be piped to waste.

Please refer to ASME code for additional installation details.



Sizes: 3/4" - 4"  
Construction Material: A126-B Cast Iron



Sizes: 6" - 8"  
Construction Material: A126-B Cast Iron

### Sample Specification

Drip Pan Elbows for use with safety/relief valves shall be ASTM A126 CL B Cast Iron, and be of the same size as the valve outlet or larger. Pipe as shown on the drawings.



## SV5601 & 5708 Series Bronze Safety Valves

### ASME Section I & VIII - NB Certified for Air, Gas and Steam

#### Description

Spirax Sarco Bronze valve line is a high capacity safety valve used for boilers, piping lines and vessel protection. Designed and engineered for heavy-duty industrial use. ASME approved and National Board flow-rated for capacity.

Sizes from 1/2" to 2-1/2"; NB rated to 250#; Temperatures to 406°F.

#### Usages

SV5601 Series is used for ASME Section I applications to pressure ratings of 250 psig. V and NB stamped for fired vessels. Boilers, or most areas where steam safety valves are required.

SV5708 Series is used for ASME Section VIII applications to pressure ratings of 250 psig. UV and NB stamped for unfired vessel protection. Used for many applications to protect or relieve pressure for Air, Gas and Steam.

#### Features

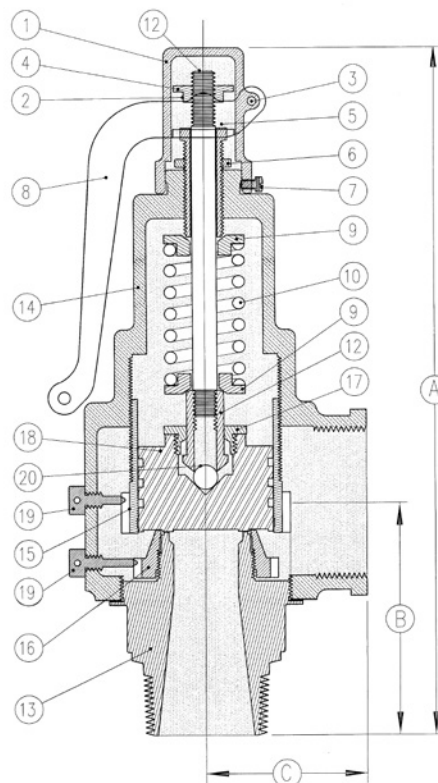
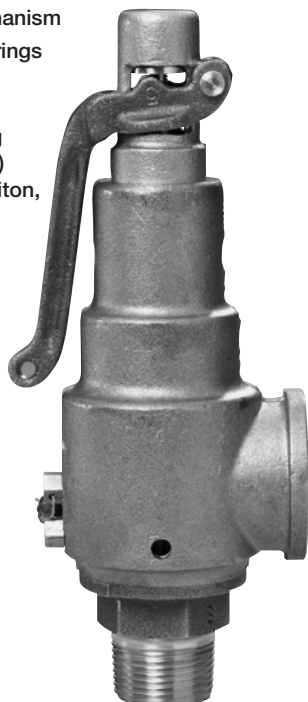
- Designed for durability
- 6 orifices – 12 sizes of piping options
- Top guided seating and discharge
- Full nozzle; high capacity levels
- Excellent re-seating characteristics with pivoting ball-post design
- Short, tuned blow-down and can be adjusted with double ring to meet specific requirements
- Heavy duty hood and lever mechanism
- Standard 17-7 stainless steel springs

#### Options

- Stainless steel whetted trimming package (seat, disk and interiors)
- O-ring seating. (Teflon, EDPM, Viton, or as specified)
- Bubble tight seating options
- Anti vibrating spring for lift lever
- Packed lift lever
- BPT pipe threading

#### Ordering

Specify Section I or VIII valves, set pressure psig, capacity requirements when ordering. See opposite page for details.



#### Parts Identification and Materials

Item	Part Name	Material	ASTM
1	Hood	Cast Brass	
2	Cotter Pin		
3	Lift Lever Pin	Brass	
4	Lifter Nut	Brass	B-16
5	Pressure Screw	Brass	B-16
6	Lock Nut	Brass	B-16
7	Hood Screw	Brass	
8	Lift Lever	Cast Brass	
9	Spring Plate	Brass	B-16
10	Spring	Stainless Steel	
11	Nameplate	Aluminum	
12	Spring Post	Brass	B-16
13	Body	Brass/Cast Brass	B-16/B-61,62
14	Bonnet	Cast Brass	B-61,62
15	Upper Ring	Cast Brass	
16	Lower Ring	Cast Brass	
17	Disc Nut	Brass	B-16
18	Disc	Brass	B-16
19	Regulator Screw	Brass	B-16
20	Ball Bearing	Stainless Steel	

# SV5601 & 5708 Series Bronze Safety Valves

## ASME Section I & VIII - NB Certified for Air, Gas and Steam

### Sample Specification

3/4" x E x 1" Spirax Sarco Bronze Series Safety Valve shall be fitted with enclosed spring and external lifting lever. Furnish with manufacturer's standard connections and valve body of cast brass with bronze internals. When ordering Safety Valves for use on power boilers, specify (V) code stamp as required by ASME Code Section I.

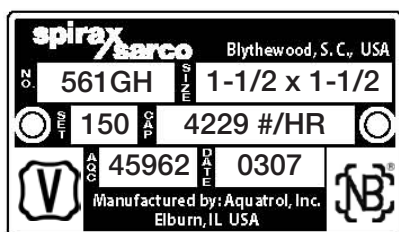
### Installation

Valve should be installed in vertical upright position as close as possible to the connection provided with no unnecessary intervening pipe or fitting. Under no circumstances should there be a shut off valve or restriction of any kind between the safety valve and the connection provided. For full details on proper installation, please refer to the installation, operating and maintenance instructions, IM-3-215-US.

ORIFICE I.D.	ORIFICE SIZE	INLET (in)	OUTLET (in)	SIZE I.D.	DIMENSIONS			WEIGHT (lbs)
					A	B	C	
D	0.125	1/2"	3/4"	A	7.312"	2.468"	1.5"	1.9
D	0.125	3/4"	3/4"	B	7.312"	2.468"	1.5"	2.2
E	0.221	3/4"	1"	C	7.625"	2.5"	1.625"	2.8
E	0.221	1"	1"	D	7.625"	2.5"	1.625"	3.0
F	0.352	1"	1-1/4"	E	8.625"	2.75"	1.75"	4.0
F	0.352	1-1/4"	1-1/4"	F	8.625"	2.75"	1.75"	4.2
G	0.567	1-1/4"	1-1/2"	G	9.25"	3.218"	2.25"	6.7
G	0.567	1-1/2"	1-1/2"	H	9.25"	3.218"	2.25"	6.9
H	0.899	1-1/2"	2"	J	10.875"	3.625"	2.5"	11.4
H	0.899	2"	2"	K	10.875"	3.625"	2.5"	11.6
J	1.463	2"	2-1/2"	L	12.062"	3.937"	3.125"	15.6
J	1.463	2-1/2"	2-1/2"	M	12.062"	3.937"	3.125"	16.3

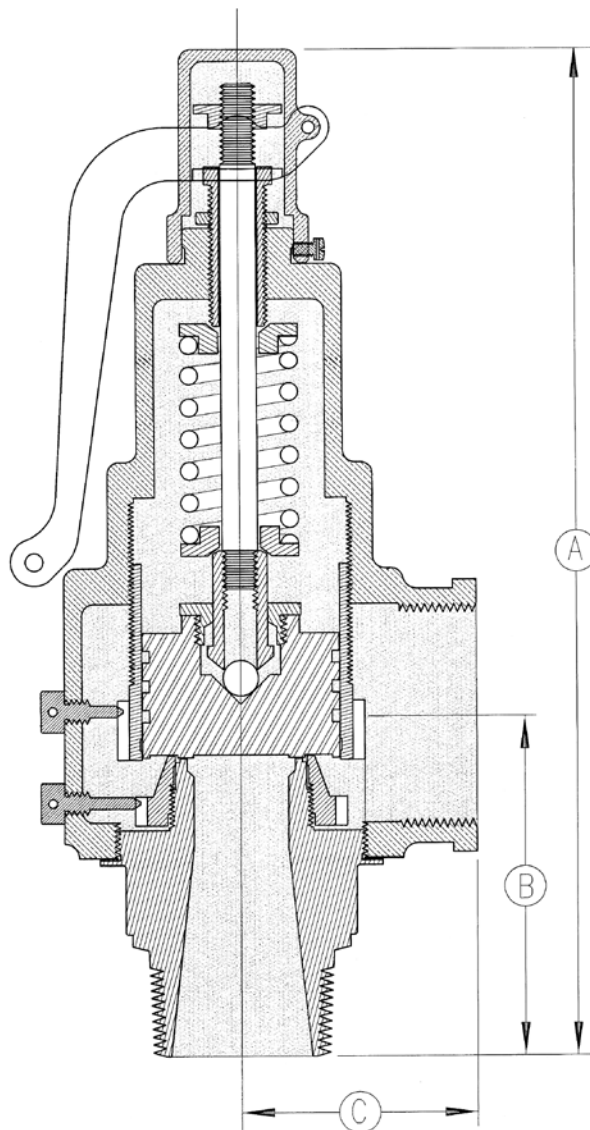
### Nameplate Identification

NO =	Model Identification
G =	Orifice
H =	Piping Size
SIZE =	M x F Piping Size
SET =	Set Pressure (psig)
CAP =	SCFM Air/Gas
AQC =	Internal Tracking (QA)
DATE =	Month/Year
V =	Fired Vessel (Sec. I)
UV =	Unfired Vessel (Sec. VIII)
NB =	National Board Certified



### Maintenance

This product is factory sealed for tamper-proof operation, and no repair parts are available. Test the safety valve every 6 months (depending on plant age and condition), preferably by raising the system pressure to the safety valve's set pressure or operating the hand lever. For full details on proper maintenance, please refer to the installation, operating and maintenance instructions, IM-3-215-US.



# SV5601 & 5708 Series Bronze Safety Valves

## ASME Section I & VIII - NB Certified for Air, Gas and Steam

### Capacities - Steam - ASME Section I - Series 5601



Capacity ratings based on pounds per hour of saturated steam at 3% over pressure. NB certified at 90% of accumulated flow.

SET PRESSURE PSIG	ORIFICE D .125	ORIFICE E .221	ORIFICE F .352	ORIFICE G .567	ORIFICE H .899	ORIFICE J 1.463
5*	120	211	337	542	860	1400
10*	147	260	414	667	1058	1722
15	175	309	492	792	1256	2044
20	213	377	601	967	1534	2496
25	230	406	647	1042	1653	2689
30	257	455	725	1167	1851	3012
35	285	504	802	1292	2049	3334
40	312	552	880	1417	2247	3657
45	340	601	957	1542	2445	3979
50	368	650	1035	1667	2643	4302
55	395	699	1113	1792	2842	4624
60	423	747	1190	1917	3040	4947
65	450	796	1268	2042	3238	5269
70	478	846	1347	2170	3440	5598
75	506	895	1426	2297	3642	5927
80	535	946	1507	2427	3848	6262
85	563	996	1586	2555	4050	6591
90	592	1046	1667	2685	4256	6927
95	620	1096	1746	2812	4459	7256
100	649	1147	1826	2942	4665	7591
110	705	1247	1986	3199	5073	8255
120	762	1347	2146	3457	5481	8920
130	819	1448	2306	3714	5889	9584
140	876	1548	2466	3972	6297	10248
150	932	1648	2626	4229	6706	10913
160	989	1749	2785	4487	7114	11577
170	1046	1849	2945	4744	7522	12241
180	1103	1949	3105	5002	7930	12905
190	1159	2050	3265	5259	8338	13570
200	1216	2150	3425	5517	8747	14234
210	1273	2251	3585	5774	9155	14898
220	1330	2351	3744	6031	9563	15563
230	1386	2451	3904	6289	9971	16227
240	1443	2552	4064	6546	10379	16891
250	1500	2652	4224	6804	10788	17556

**\*NOTE: Set pressures below 15 psi are not ASME coded and are not certified.**

# SV5601 & 5708 Series Bronze Safety Valves

## ASME Section I & VIII - NB Certified for Air, Gas and Steam

### Capacities - Steam - ASME Section VIII - Series SV 5708

Capacity ratings based on pounds per hour of saturated steam at 10% over pressure. NB certified at 90% of accumulated flow.

SET PRESSURE PSIG	ORIFICE D .125	ORIFICE E .221	ORIFICE F .352	ORIFICE G .567	ORIFICE H .899	ORIFICE J 1.463
5*	125	221	352	567	900	1464
10*	153	270	430	692	1098	1787
15	180	319	507	817	1296	2109
20	208	367	585	942	1494	2431
25	235	416	663	1067	1692	2754
30	263	465	740	1192	1890	3076
35	293	518	826	1330	2108	3431
40	323	572	911	1467	2326	3786
45	354	625	996	1605	2544	4141
50	384	679	1082	1742	2762	4495
55	414	733	1167	1880	2980	4850
60	445	786	1252	2017	3198	5205
65	475	840	1338	2155	3416	5559
70	505	893	1423	2292	3634	5914
75	536	947	1508	2430	3852	6269
80	566	1001	1594	2567	4070	6624
85	596	1054	1679	2705	4288	6978
90	627	1108	1764	2842	4506	7333
95	657	1161	1850	2979	4724	7688
100	687	1215	1935	3117	4942	8043
110	748	1322	2106	3392	5378	8752
120	808	1429	2276	3667	5814	9461
130	869	1536	2447	3942	6250	10171
140	930	1644	2618	4217	6686	10880
150	990	1751	2789	4492	7122	11590
160	1051	1858	2959	4767	7558	12299
170	1111	1965	3130	5042	7994	13009
180	1172	2072	3301	5317	8430	13718
190	1233	2179	3471	5592	8866	14428
200	1293	2287	3642	5866	9302	15137
210	1354	2394	3813	6141	9737	15846
220	1415	2501	3983	6416	10173	16556
230	1475	2608	4154	6691	10609	17265
240	1536	2715	4325	6966	11045	17975
250	1596	2822	4495	7241	11481	18684

**\*NOTE:** Set pressures below 15 psi are not ASME coded and are not certified.

# SV5601 & 5708 Series Bronze Safety Valves

## ASME Section I & VIII - NB Certified for Air, Gas and Steam

### Capacities - Air/Gas - ASME Section VIII - Series 5708



Capacity ratings based SCFM (standard cubic feet per minute) of air at 10% over pressure. NB certified at 90% of accumulated flow.

SET PRESSURE PSIG	ORIFICE D .125	ORIFICE E .221	ORIFICE F .352	ORIFICE G .567	ORIFICE H .899	ORIFICE J 1.463
5*	45	79	125	202	320	521
10*	54	96	153	246	391	636
15	64	113	181	291	461	751
20	74	131	208	335	532	865
25	84	148	236	380	602	980
30	94	165	263	424	673	1095
35	104	184	294	473	750	1221
40	115	204	324	522	828	1348
45	126	223	355	571	906	1474
50	137	242	385	620	983	1600
55	147	261	415	669	1061	1726
60	158	280	446	718	1138	1853
65	169	299	476	767	1216	1979
70	180	318	506	816	1294	2105
75	191	337	537	865	1371	2231
80	201	356	567	914	1449	2358
85	212	375	598	963	1526	2484
90	223	394	628	1012	1604	2610
95	234	413	658	1061	1681	2736
100	245	432	689	1109	1759	2863
110	266	471	750	1207	1914	3115
120	288	509	810	1305	2069	3368
130	309	547	871	1403	2225	3620
140	331	585	932	1501	2380	3873
150	352	623	993	1599	2535	4125
160	374	661	1053	1697	2690	4378
170	396	699	1114	1795	2845	4630
180	417	738	1175	1892	3000	4883
190	439	776	1236	1990	3156	5135
200	460	814	1296	2088	3311	5388
210	482	852	1357	2186	3466	5640
220	503	890	1418	2284	3621	5893
230	525	928	1479	2382	3776	6145
240	547	966	1539	2480	3931	6398
250	568	1005	1600	2577	4087	6650

**\*NOTE:** Set pressures below 15 psi are not ASME coded and are not certified.







## SV418 Series Bronze Safety Valves ASME Section VIII - NB Certified for Air, Gas, Steam, and Liquid

### Description

Spirax Sarco's SV418 safety and relief valve is designed for accuracy and reliability. Engineered for heavy-duty industrial usage. Multiple purpose safety and relief for Liquid, Steam, Air, and Gas services. ASME and National Board Certified for Section VIII service. ASME Section VIII to 750 psi for Liquid, Air, and Gas. 300 PSI for Steam.

Sizes from ½" to 3"; NB rated to 750#; Temperatures from -320°F to 425°F.

### Features

- Full nozzle – top guided design
- Short, precise blow-down
- Wide choice of inlet/outlet sizes
- Excellent reseating characteristics
- Designed long term heavy industrial use
- Closed hex cap
- Back pressure tight
- Drainhole with threaded plug

### Options

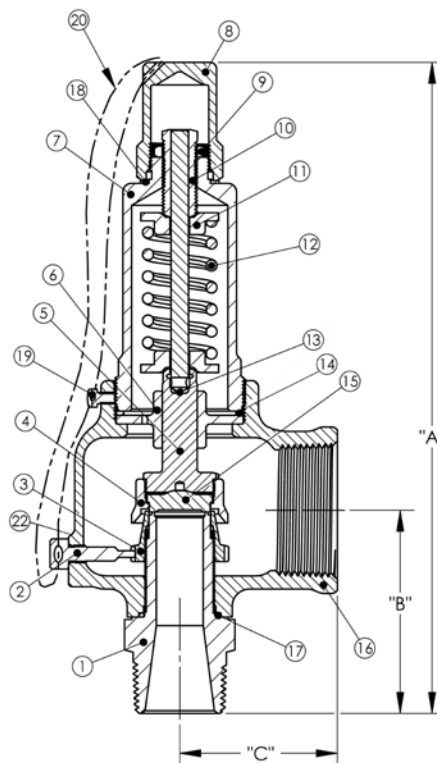
- BSPT piping
- O2 Cleaning and cryogenic services

### Usages

Pressure Vessels, Pumps, Hydraulics, Tanks, Steam Systems, Chemical, Cryogenic, Air and Gas Compressors, Separators, by-pass and over pressure protection. Choose for most industrial applications requiring a safety relief valve.

### Parts Identification and Materials

Item	Description	Series 418
1	Nozzle	SS
2	Lock screw	Brass
3	Lift	SS 316
4	Disk holder	SS 316
5	Disk holder shaft	SS 316
6	Disc guide	Brass
7	Bonnet	Bronze
8	Hood	Brass
9	Lock nut	Brass
10	Pressure screw	Brass
11	Spring plate	Brass
12	Spring	SS 717
13	Spring post	Brass
14	Disc Guide Washer	PTFE
15	Disc	SS 316
16	Body	Bronze
17	Nozzle washer	PTFE
18	Gasket	PTFE
19	Lock screw	Brass
20	Seal wire	Steel
21	Nameplate	SS
22	Drain Plug	SS





# SV418 Series Bronze Safety Valves

## ASME Section VIII - NB Certified for Air, Gas, Steam, and Liquid

### Sample Specification

Spirax Sarco SV418: As required for equipment according to ASME Boiler and Pressure Vessel Code. Stainless steel full nozzle, top guided design. Stainless steel ring and disk. Stainless steel spring with adjustable pressure range and positive shutoff, factory set and sealed. Back pressure tight, includes drainhole with threaded plug.

### Installation

Valve should be installed in vertical upright position as close as possible to the connection provided with no unnecessary intervening pipe or fitting. Under no circumstances should there be a shut off valve or restriction of any kind between the safety valve and the connection provided. For full details on proper installation, please refer to the installation, operating and maintenance instructions, IM-3-215-US.

### Maintenance

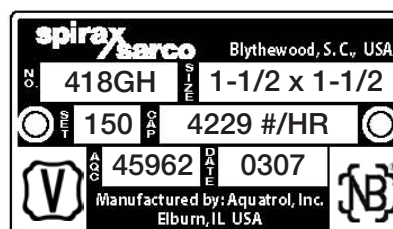
This product is factory sealed for tamper-proof operation, and no repair parts are available. Test the safety valve every 6 months (depending on plant age and condition), preferably by raising the system pressure to the safety valve's set pressure or operating the hand lever. For full details on proper maintenance, please refer to the installation, operating and maintenance instructions, IM-3-215-US.

### Series 418 - Dimensions

DIMENSIONS									
ORIFICE	INLET	OUTLET	FLOW AREA	SIZE ID	A - Closed Cap	A - Lift Lever	B	C	WEIGHT LB
D	1/2"	3/4"	0.125	DC	7 3/8"	8 1/8"	2 3/8"	1 5/8"	2
D	1/2"	1"	0.125	DD	7 3/8"	8 1/8"	2 3/8"	1 5/8"	2
D	3/4"	3/4"	0.125	DE	7 3/8"	8 1/8"	2 3/8"	1 5/8"	2
D	3/4"	1"	0.125	DF	7 3/8"	8 1/8"	2 3/8"	1 5/8"	2
D	1"	1"	0.125	DG	7 1/2"	8 1/4"	2 3/8"	1 5/8"	2
E	3/4"	1"	0.221	EC	7 5/8"	8 3/8"	2 5/8"	1 5/8"	3
E	3/4"	1-1/4"	0.221	ED	8 1/8"	8 7/8"	2 5/8"	2"	3
E	1"	1-1/4"	0.221	EF	8 1/8"	9 1/4"	2 5/8"	2"	3
F	1"	1-1/2"	0.353	FF	9 5/8"	9 5/8"	2 7/8"	2 1/4"	5
F	1-1/2"	1-1/2"	0.353	FG	9 5/8"	9 5/8"	3 1/8"	2 1/4"	5
G	1-1/4"	2"	0.554	GG	10"	10 3/4"	3 3/8"	2 5/8"	9
G	2"	2"	0.554	GF	10 1/4"	11"	3 3/8"	2 5/8"	9
H	1-1/2"	2-1/2"	0.923	HH	11 3/4"	12 1/8"	3 1/2"	2 3/4"	16
J	2"	3"	1.421	JJ	13 1/2"	14"	4"	3 1/4"	24

### Nameplate Identification

NO =	Model Identification
G =	Orifice
H =	Piping Size
SIZE =	M x F Piping Size
SET =	Set Pressure (psig)
CAP =	SCFM Air/Gas
AQC =	Internal Tracking (QA)
DATE =	Month/Year
V =	Fired Vessel (Sec. I)
UV =	Unfired Vessel (Sec. VIII)
NB =	National Board Certified



# SV418 Series Bronze Safety Valves

## ASME Section VIII - NB Certified for Air, Gas, Steam, and Liquid



Capacity ratings based on 10% over pressure of water (liquid) NB certified at 90% of measured flow in GPM.

### Series 418 Capacities - Liquid • GPM

SET PRESSURE PSI	ORIFICE D 0.1257	ORIFICE E 0.2173	ORIFICE F 0.3526	ORIFICE G 0.5542	ORIFICE H 0.9229	ORIFICE J 1.418
5	11	18	30	47	78	120
10	14	24	38	60	100	154
15	16	28	45	71	118	181
20	18	31	51	80	133	204
25	20	35	56	88	147	225
30	22	37	61	96	159	245
35	23	40	66	103	172	264
40	25	43	70	110	184	283
45	27	46	75	117	195	300
50	28	48	79	123	206	316
55	29	51	82	129	216	331
60	31	53	86	135	225	346
65	32	55	90	141	234	360
70	33	57	93	146	243	374
75	34	59	96	151	252	387
80	35	61	99	156	260	400
85	37	63	102	161	268	412
90	38	65	105	166	276	424
95	39	67	108	170	283	435
100	40	68	111	175	291	447
125	44	77	124	195	325	499
150	48	84	136	214	356	547
175	52	91	147	231	385	591
200	56	97	157	247	411	632
225	59	103	167	262	436	670
250	63	108	176	276	460	706
275	66	114	184	290	482	741
300	69	119	192	302	504	774
325	71	123	200	315	524	805
350	74	128	208	327	544	836
375	77	133	215	338	563	865
400	79	137	222	349	581	893
425	82	141	229	360	599	921
450	84	145	236	370	617	948
475	86	149	242	380	634	974
500	89	153	248	390	650	999
525	91	157	254			
550	93	161	260			
575	95	164	266			
600	97	168	272			
625	99	171				
650	101	175				
675	103	178				
700	105	181				
725	107	184				
750	108	187				

# SV418 Series Bronze Safety Valves

## ASME Section VIII - NB Certified for Air, Gas, Steam, and Liquid



Capacity ratings based on SCFM (standard cubic feet per minute) of Air at 10% over pressure. NB certified at 90% of measured flow.

### Series 418 Capacities - Air • SCFM

SET PRESSURE PSI	ORIFICE D 0.1257	ORIFICE E 0.2173	ORIFICE F 0.3526	ORIFICE G 0.5542	ORIFICE H 0.9229	ORIFICE J 1.418
5	46	79	129	202	337	518
10	56	97	157	247	411	632
15	66	114	186	292	486	746
20	76	132	214	336	560	860
25	86	149	242	381	634	975
30	97	167	271	425	709	1089
35	108	186	302	475	790	1214
40	119	205	333	524	872	1340
45	130	225	364	573	954	1465
50	141	244	396	622	1035	1591
55	152	263	427	671	1117	1716
60	163	282	458	720	1199	1842
65	174	301	489	769	1280	1967
70	186	321	520	818	1362	2093
75	197	340	552	867	1444	2218
80	208	359	583	916	1525	2344
85	219	378	614	965	1607	2469
90	230	398	645	1014	1689	2595
95	241	417	676	1063	1771	2720
100	252	436	708	1112	1852	2846
125	308	532	864	1358	2261	3474
150	364	628	1020	1603	2669	4101
175	419	725	1176	1848	3078	4729
200	475	821	1332	2093	3486	5356
225	530	917	1488	2339	3895	5984
250	586	1013	1644	2584	4303	6612
275	642	1109	1800	2829	4712	7239
300	697	1206	1956	3075	5120	7867
325	753	1302	2112	3320	5529	8494
350	809	1398	2268	3565	5937	9122
375	864	1494	2424	3810	6346	9750
400	920	1590	2580	4056	6754	10377
425	976	1686	2736	4301	7162	11005
450	1031	1783	2893	4546	7571	11632
475	1087	1879	3049	4792	7979	12260
500	1142	1975	3205	5037	8388	12888
525	1198	2071	3361			
550	1254	2167	3517			
575	1309	2263	3673			
600	1365	2360	3829			
625	1421	2456				
650	1476	2552				
675	1532	2648				
700	1588	2744				
725	1643	2841				
750	1699	2937				

# SV418 Series Bronze Safety Valves

## ASME Section VIII - NB Certified for Air, Gas, Steam, and Liquid



Capacity ratings based on pounds per hour of saturated steam at 10% over pressure. NB certified at 90% of accumulated flow.

### Series 418 Capacities - Steam • Lbs/Hr

SET PRESSURE PSI	ORIFICE D 0.13	ORIFICE E 0.22	ORIFICE F 0.35	ORIFICE G 0.55	ORIFICE H 0.92	ORIFICE J 1.42
5	129	223	362	569	947	1455
10	157	272	442	694	1156	1776
15	186	321	521	819	1365	2097
20	214	370	601	945	1573	2417
25	243	420	681	1070	1782	2738
30	271	469	761	1195	1991	3058
35	302	523	848	1333	2220	3411
40	334	577	936	1471	2450	3764
45	365	631	1024	1609	2679	4116
50	396	685	1111	1747	2909	4469
55	427	739	1199	1884	3138	4822
60	459	793	1287	2022	3368	5174
65	490	847	1374	2160	3597	5527
70	521	901	1462	2298	3827	5880
75	552	955	1550	2436	4056	6232
80	584	1009	1637	2574	4286	6585
85	615	1063	1725	2711	4515	6938
90	646	1117	1813	2849	4745	7290
95	678	1171	1900	2987	4974	7643
100	709	1225	1988	3125	5204	7995
110	771	1333	2164	3401	5663	8701
120	834	1441	2339	3676	6122	9406
130	896	1550	2514	3952	6581	10111
140	959	1658	2690	4227	7040	10817
150	1021	1766	2865	4503	7499	11522
160	1084	1874	3040	4779	7958	12227
170	1146	1982	3216	5054	8417	12933
180	1209	2090	3391	5330	8876	13638
190	1271	2198	3567	5606	9335	14343
200	1334	2306	3742	5881	9794	15048
210	1397	2414	3917	6157	10253	15754
220	1459	2522	4093	6433	10712	16459
230	1522	2630	4268	6708	11171	17164
240	1584	2738	4443	6984	11630	17870
250	1647	2846	4619	7260	12089	18575
260	1709	2955	4794	7535	12548	19280
270	1772	3063	4970	7811	13007	19985
280	1834	3171	5145	8087	13467	20691
290	1897	3279	5320	8362	13926	21396
300	1959	3387	5496	8638	14385	22101

## SV69L Bronze Liquid Relief Valves Non-ASME Coded

### Description

Spirax Sarco SV69L Series Liquid Relief valves are an industry standard relief valve used for liquid applications. Engineered and designed for heavy-duty industrial usages.

Sizes from 1/4" to 3", pressure to 600#, temperatures to 450°F.

### Usages

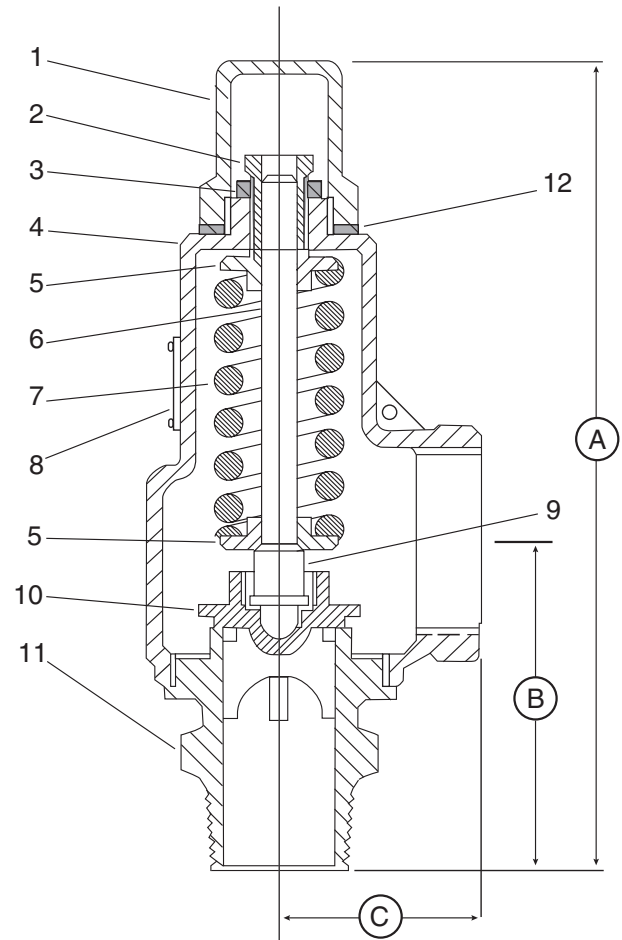
- Pressure relief, liquid relief, by-pass and over-protection
- Continuous relief
- Pressure regulation
- Pumping stations, tanks, hydraulics, fluid lines, oil fields, piping lines.

### Features

- Field adjustable (Set pressure needs to be provided)
- Metal-to-metal precision lapped seating
- Sealed hex cap with O-ring teflon seal
- One piece enclosed bonnet to minimize leakage
- Back pressure tested against leakage (now standard)
- Easy to clean and maintain by simple removal of the bonnet
- 302 Stainless steel springs (STD)

### Options

- Wheel handle
- Stainless steel inserts for corrosive or higher pressure protection
- Polishing and chrome plating



### Parts Identification and Materials

Item	Part Name	Material
1	Hood	Brass
2	Pressure Screw	Brass
3	Lock Nut	Brass
4	Bonnet	Bronze
5	Spring Plate	Brass/Steel*
6	Spring Post	Brass/Steel*
7	Spring	Stainless Steel
8	Name Plate	Aluminum
9	Spring Plate Support	Brass/Steel*
10	Disc	Bronze
11	Body	Brass/Bronze
12	Sealing Disk	Teflon

\* Steel Plated

# SV69L Bronze Liquid Relief Valves

## Non-ASME Coded

### Dimensions - Liquid - Series 69L

SERIES	VALVE SIZE	OUTLET SIZE	SEAT SIZE	A	B	C	MAX. SET PRESSURE LIQUID	WEIGHT (lbs)
69	1/2"	1/2"	1/2" - A	5-7/8"	2-1/8"	1-3/8"	600	1.5
69	1/2"	3/4"	1/2" - A	5-7/8"	2-1/8"	1-3/8"	600	1.5
69	3/4"	3/4"	3/4" - B	6"	2-3/8"	1-3/8"	600	2
69	3/4"	1"	3/4" - B	6"	2-3/8"	1-3/8"	600	2
69	1"	1"	1" - C	7-1/2"	2-5/8"	1-7/8"	600	3
69	1"	1-1/4"	1" - C	7-1/2"	2-5/8"	1-7/8"	600	3
69	1-1/4"	1-1/4"	1-1/4" - D	8-1/2"	3-1/4"	2"	600	4.5
69	1-1/4"	1-1/2"	1-1/4" - D	8-1/2"	3-1/2"	2"	600	4.5
69	1-1/2"	1-1/2"	1-1/2" - E	9-3/4"	3-1/2"	2-1/2"	600	6.5
69	1-1/2"	2"	1-1/2"	9-3/4"	3-1/2"	2-1/2"	600	6.5
69	2"	2"	2" - F	11-1/8"	4"	2-5/8"	600	9.25
69	2"	2-1/2"	2" - F	11-1/8"	4"	2-5/8"	600	9.25
69	2-1/2"	2-1/2"	2-1/2" - G	12"	4-3/4"	3-1/8"	600	21
69	2-1/2"	3"	2-1/2" - G	12"	4-3/4"	3-1/8"	600	22
69	3"	3"	3" - H	13-1/2"	5-1/8"	4-3/8"	600	24

#### Important Notes:

1. Please specify series, size, service and set pressure
2. Standard valve for liquid relief is "same sized outlet" (unless otherwise specified)
3. Stainless Steel trimming recommended for pressure settings over 400 psig (or for chemical reactive purposes)
4. 2-1/2" & 3" Max set pressure 350 psig

# SV69L Bronze Liquid Relief Valves

## Non-ASME Coded

### Capacities - Liquid - Series 69L - Sizes 1/2" to 3"

Liquid capacity in gallons per minute (GPM) at 25% over pressure.

SET PRESSURE	A	B	C	D	E	F	G	H
	1/2"	3/4"	1"	1-1/4"	1-1/2"	2"	2-1/2"	3"
5	3.9	7.7	12	17	22	33	44	55
10	5.6	8.1	17	24	31	46	62	78
15	6.8	13	21	29	38	56	76	95
20	7.9	15	24	34	44	65	88	111
25	8.8	17	27	38	49	73	98	124
30	9.7	19	29	41	53	80	107	136
40	11	22	34	48	62	92	124	157
50	12	24	38	53	69	103	139	175
60	13	26	42	58	75	112	151	190
75	15	30	47	65	85	126	170	21
100	18	34	54	76	98	146	196	248
125	20	38	60	85	109	163	219	277
150	22	42	66	93	120	178	240	303
175	23	45	71	100	129	193	259	328
200	25	48	76	107	138	206	277	350
225	26	51	80	113	146	218	293	371
250	28	54	85	120	154	230	310	392
275	29	56	89	125	161	240	325	410
300	31	59	93	131	169	252	340	429
325	32	61	97	136	176	262		
350	33	64	101	141	183	272		
375	34	66	104	146	189	281		
400	35	68	108	151	195	291		
425	36	70	112	156	201	302		
450	37	72	115	162	208	314		
475	38	75	119	167	215	326		
500	39	77	1123	171	221	337		
525	40	79	126	176	227	348		
550	41	81	130	180	234	359		
575	42	83	134	185	240	371		
600	43	86	138	189	247	383		

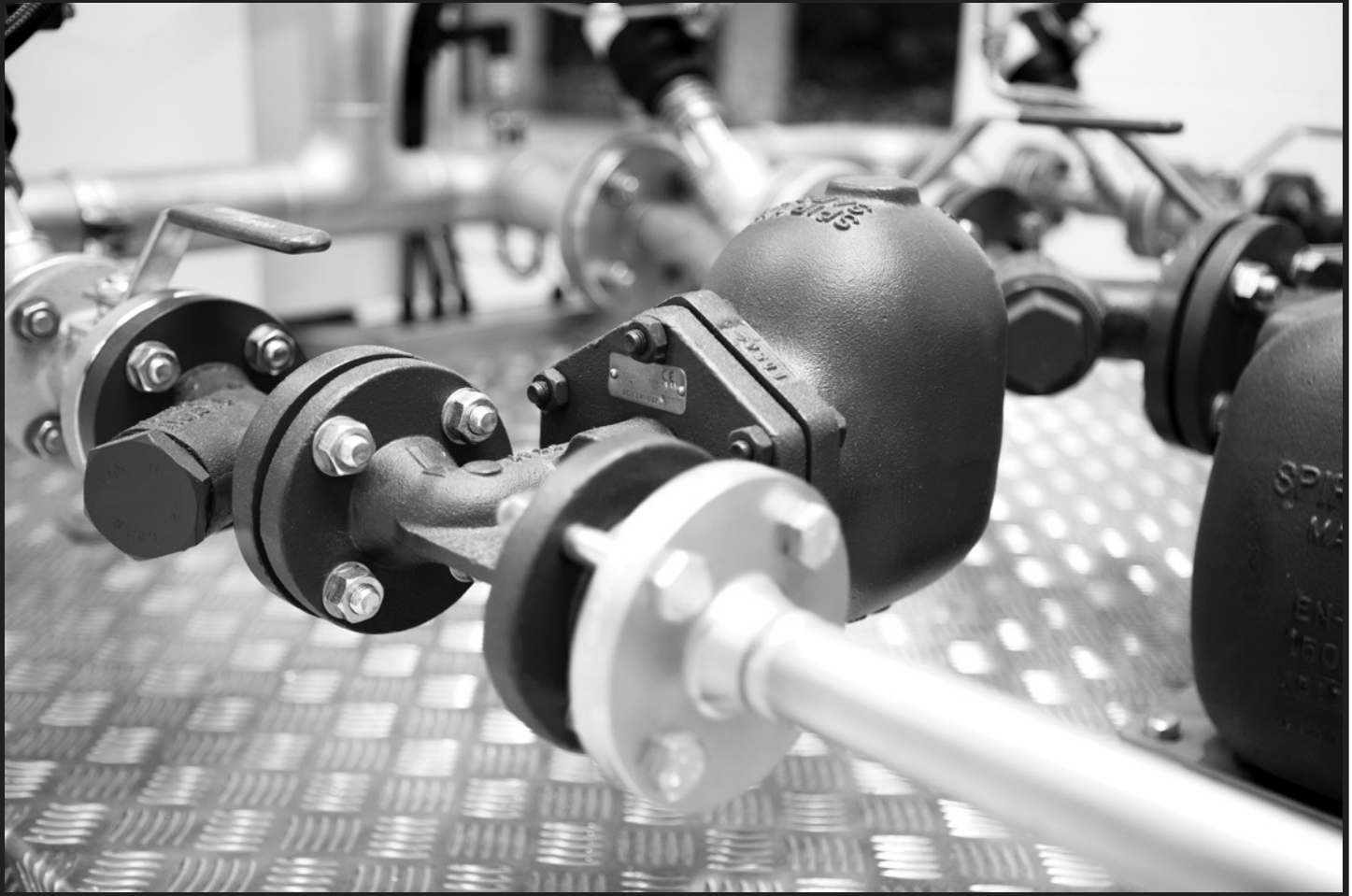
#### Notes:

1. Stainless steel trim package recommended for pressure settings over 400 psig (disk and seat insert)
2. Liters per minute = GPM x 3.785
3. Bar = psig x .06895



# Steam Trapping Solutions

Steam Traps





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Balanced  
Pressure

Inverted  
Buckets



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See the High Purity section for Thermodynamic and Thermostatic steam traps for High Purity, Biotechnology, Pharmaceutical, and Food & Beverage applications.



## USTS II Universal Steam Trap Station

(Requires Universal Trap of Choice)

The USTS-II Universal steam trap station is designed to have inlet and outlet isolation valves, a integral strainer with blow-down and test valve. Designed as a complete steam main drip or tracer steam trap station. The station will support all of the Spirax Sarco universal connection steam traps.

### Limiting Operating Conditions

Max. Operating Pressure (PMO) 650 psig (45 barg)

Max. Operating Temperature (TMO) 750°F (399°C)

Pressure Shell Design Conditions

PMA 650 psig (45 barg)

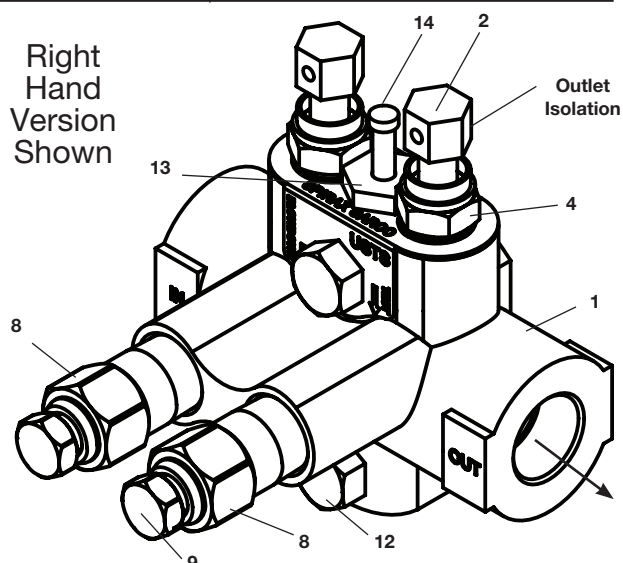
### Construction Materials

No.	Part	Material
1	Body casting	Stainless Steel ASTM A351 CF8
2	Valve spindle	Stainless Steel
3	Valve head (internal)	Stainless Steel
4	Valve packing unit	Stainless Steel
5	Valve packing (internal)	Graphite
6	Washers (internal)	Stainless Steel
7	Strainer screen (internal)	Stainless Steel
8	Blowdown valve body	Stainless Steel
9	Blowdown valve stem	Stainless Steel
10	Blowdown ball head (Internal)	Stainless Steel
11	Blowdown retaining clip (internal)	Stainless Steel
12	Connector screws	Alloy Steel (Plated) ASTM A193 Gr.B7
13	Locking Nut	Stainless Steel
14	Locking Nut Pin	Stainless Steel
15	Handle	Stainless Steel
16	Handle Pin	Stainless Steel

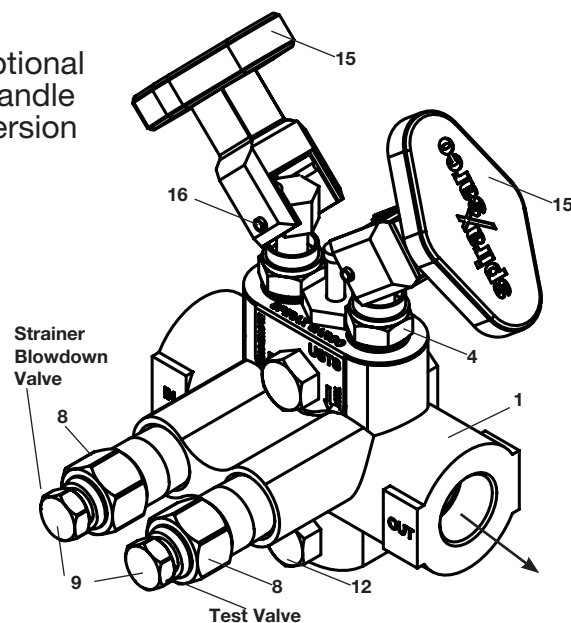
### Compatible Spirax Sarco Universal Steam Traps

Trap type	Model	Model	Model	Model
Thermdynamic	UTD52L	UTD52H	UTD52-HP	UTDS52L
Balanced pressure	UBP32			
Inverted Bucket	UIB30/4	UIB30/5	UIB30/6	UIB30H/8
Inverted Bucket	UIB30H/10			
Float & Thermostatic	UFT32-4.5	UFT32-10	UFT32-14	UFT32-21
Float & Thermostatic	UFT32-32			
Bimetallic	USM21			

Model	USTS II
PMO	650 psig
Sizes	1/2", 3/4"
Standard Flow Direction	Left to Right (Right Hand)
Connections	NPT, SW
Construction	Stainless Steel
Optional Flow Direction	Right to Left (Left hand), handle option



Optional  
Handle  
Version



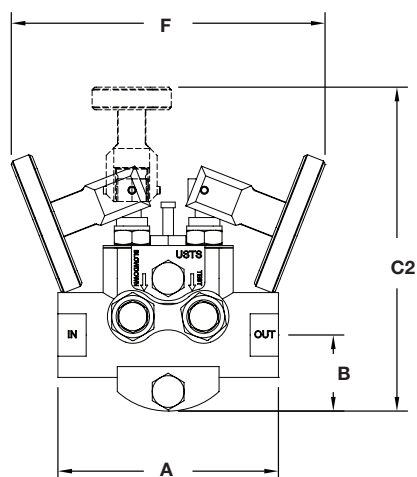
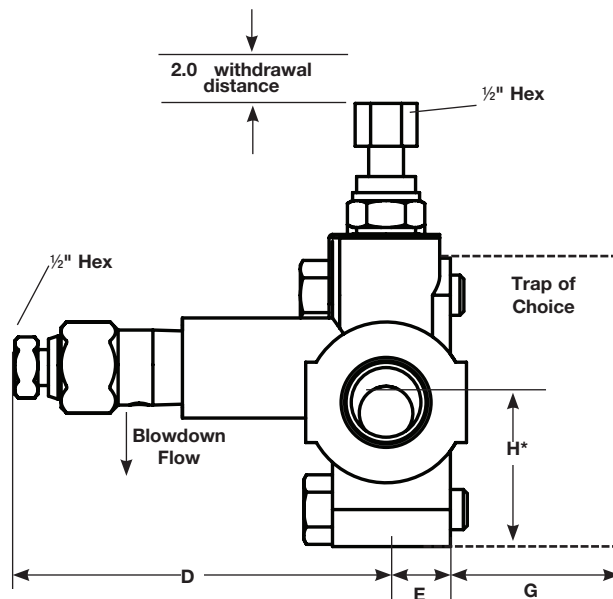
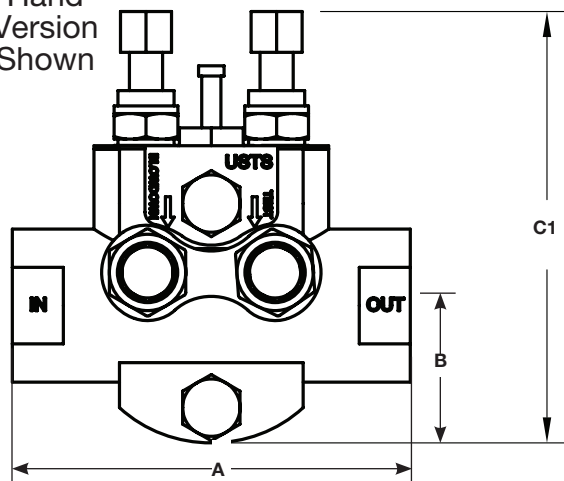
Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only.

In the interests of development and improvement of the product, we reserve the right to change the specification.

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# USTS II Universal Steam Trap Station

Right Hand Version Shown



Station Weight (no trap) 3.0 lbs No handles  
3.7 lbs With handles

A	B	C1	C2	D	E	F
3.9"	1.4"	3.7"	5.7"	3.5"	.6"	5.5"

G	G	G	G	G	G
UTD52L	UTD52H	UFT	UIB30	UIB30H	UBP32
4.3"	4.8"	9.0"	6.2"	9.6"	3.2"

H	H	H	H	H	H
UTD52L	UTD52H	UFT	UIB30	UIB30H	UBP32
1.3"	1.3"	2.2"	4.9"	6.3"	1.3"

\*H = Centerline of trap station connector to bottom of trap

## USTS II Sample Specification

The USTS steam trap station to be manufactured of all stainless steel construction. The station will have two isolation valves, one trap test valve and one strainer blowdown valve. The test valve is on the discharge side of the trap to test trap function: to depressurize that area, or to check the condensate return lines for plugging. The inlet isolation valve blocks the trap inlet while the outlet valves blocks the outlet to the condensate return line downstream of the test valve. The station is supplied with an integral inlet strainer with a blowdown valve for clean out and depressurized mode so the trap or strainer can be repaired or replaced. The station will accept all Spirax Sarco universal traps or any competitors traps who use the standard universal connector design. To be supplied with either left to right flow or right to left flow. Handle option available on all models.

## Installation

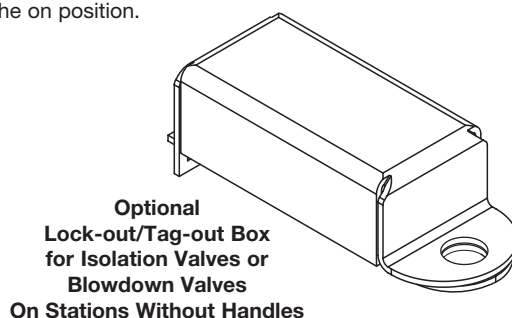
Valve handles to be in upward position, with the strainer pointing straight down and trap connection on the side. Mount selected trap to the connector and torque to proper torque level. On initial start-up turn inlet and outlet valves to test to blow any installation dirt and debris from the system, (be careful to stay away from flow). Turn both valves to the on position.

## How to order

Model number / pipe size / connection type  
Example: USTS II 3/4" NPT (L/R right hand)

## SPARES

Blowdown Valve Assembly	2 required for complete station
Strainer Screen	1 required
Valve Assembly (isolation)	2 required for complete station
With or Without Handles	
Mounting bolts	2 required



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## Universal Pipeline Connector (Requires Universal Trap of Choice)

### Description

The universal straight connector and the universal strainer connectors for use with UTD52L, UTD52H, UTD52SL, UTD52SH, UTD52L-HP, UFT14, UFT32, UIB30H, UBP32 steam traps. Two bolt quick disconnect design for horizontal and vertical piping installations.

Model	Universal straight and strainer connectors
PMO	Dependant on trap type
Sizes	1/2", 3/4", 1"
Connections	NPT, SW to ANSI 16.11
Construction	Stainless steel (standard)
Options	Left hand, Cast Steel SW only, with Spiratec sensor see TI-P128-17-US

### Limiting Operating Conditions

**Max. Operating Pressure (PMO):** 600 psig (42 Bar). Trap may dictate actual PMO if lower when assembled (See trap TIS sheet)

**Max. Operating Temperature (TMO):** 750 deg F (400 deg C). Trap may dictate actual TMO if lower when assembled (See trap TIS sheet)

### Pressure Shell Design Conditions

**Max Allowable pressure (PMA):**

720 psig to 100 deg F 50barg/up to 38 deg C

600 psig to 750 deg F 42 barg/400 deg C

**Max allowable temperature (TMA):**

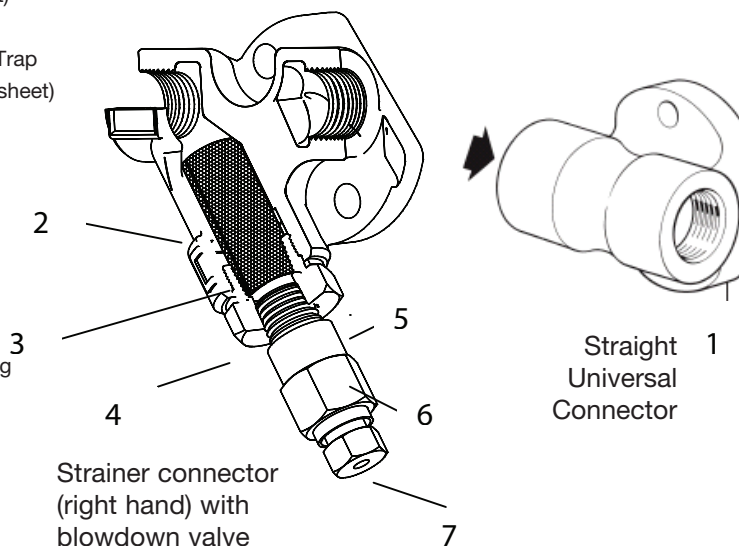
750 deg F /600 psig 400 deg C / 42barg

Designed for a maximum cold hydraulic test pressure of 900 psig

**Note:** selected trap may dictate max allowable pressures and temperatures

### Materials

Trap of choice required. Connectors cannot be used alone.



No	Part	Material	MATERIAL SPEC.
1	Standard Straight connector body	Austenitic Stainless steel	ASTM A351 CF8
1	CS straight SW connector body	Cast Steel	ASTM A216 Gr. WCB
2	Standard strainer connector body	Austenitic Stainless steel	ASTM A351 CF8
2	CS strainer connector body	Cast Steel	ASTM A216 Gr. WCB
3	Strainer screen	Austenitic Stainless steel (.8 mm perforations)	316L
4	Cap gasket	Austenitic Stainless steel	BS 1449 304 S16
5	Strainer cap	Austenitic Stainless steel	AISI 303
6	Blowdown valve body	Stainless steel	AISI 303
7	Blowdown valve stem	Stainless steel	AISI 303
8	Blowdown ball head (not shown internal)	Stainless steel	AISI440

### Spare parts

Blowdown valve retro fit kit 4,5,6,7,8

Strainer screen 3

Strainer cap gasket 4 (package of 3)

### Installation

The connector will be installed in a horizontal or vertical pipeline. Full ported isolation valves should be installed up stream and downstream of the connector /trap. The trap shall be fitted as shown on IMI accompanied with the trap.

Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only.  
In the interests of development and improvement of the product, we reserve the right to change the specification.

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## Determining whether you need right hand or left hand connector

Because of the location or space constraints you may need a right or left hand strainer connector. When straddling the piping in the direction of flow the standard right hand connector will have the trap body facing the left side with the mounting bold to the right. The left hand strainer connector will have the trap body on the right and the mounting bolts on the left.

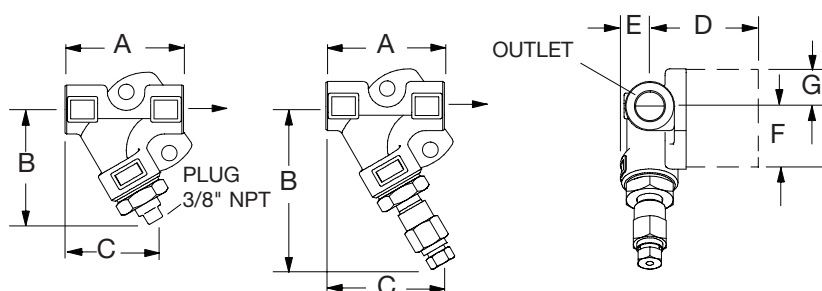
## Operation and Maintenance

Only the strainer connector with blow down can be operated. Turning blowdown valve counter clockwise  $\frac{1}{2}$ " to 1" turn. Clock wise to close. Do not use excessive force to close as damage to seating surface could occur.

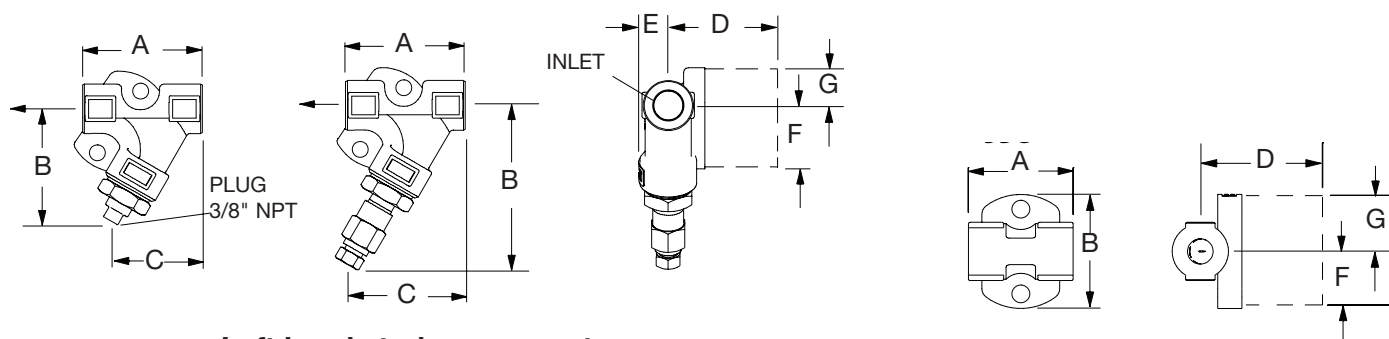
Before performing any maintenance make sure the unit is isolated and all pressure has been relieved. Replacing strainer screen remove strainer cap and gasket and remove screen. Replace with new screen and gasket and tighten to 125-140 ft-lbs. If blow down valve is replaced tighten to 55 ft-lbs. See trap IMI for all other maintenance.

## Sample Specification

Steam trap shall be purchased with the pipeline connector, which once installed remains permanently in the pipeline. Trap shall be attached to the connector by two bolts to enable simple quick rapid installation and replacement. The connection is designed to allow installation on pipe work that is vertical, horizontal, or any angle in between. When specified, the connector shall be provided with integral "Y" pattern strainer with or with integral blowdown valve right hand or left hand pattern.



Right hand strainer connector



Left hand strainer connector

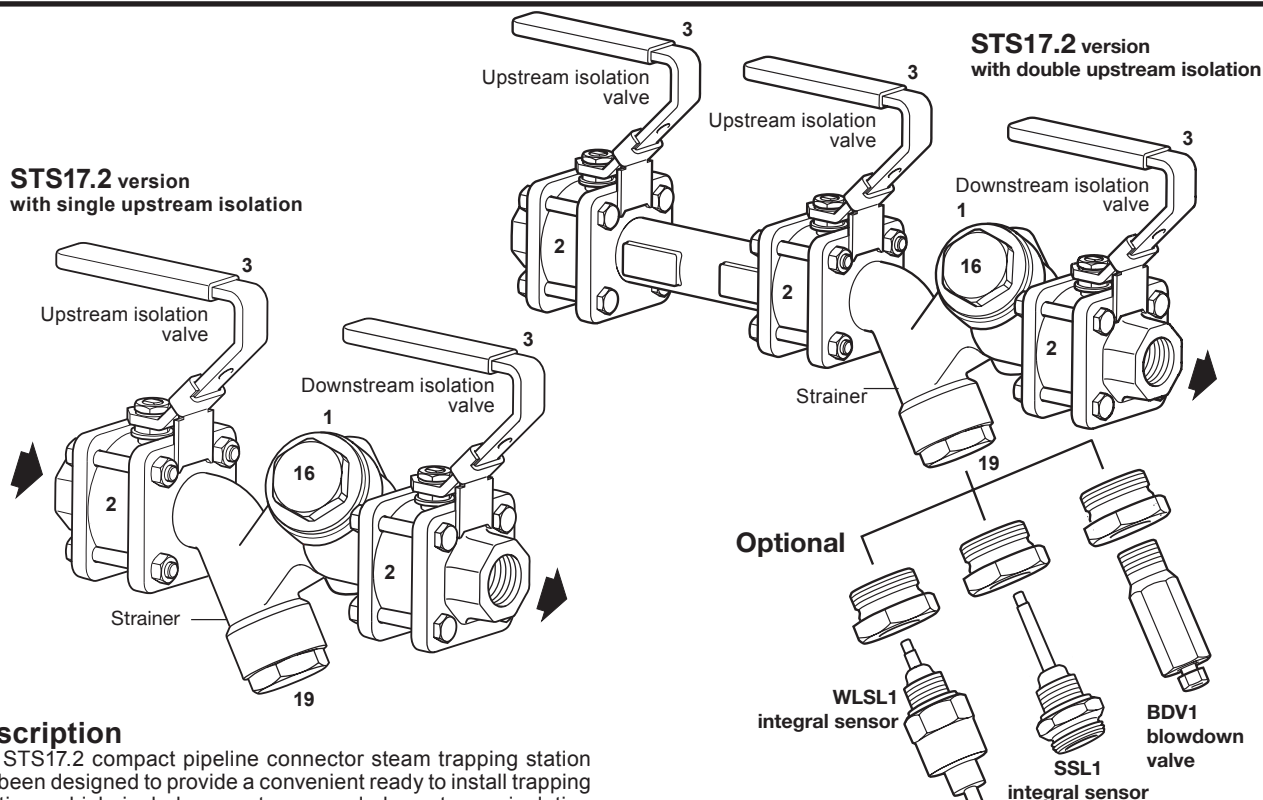
Strainer Connector Dimensions (inches)							
Model >	Right hand and left hand standard with 3/8" NPT plug			Right hand and left hand with blowdown valve			All strainer connectors
Size	A	B	C	A	B	C	E
$\frac{1}{2}$ "	3.2	3.1	2.6	3.2	4.4	3.1	.8
$\frac{3}{4}$ "	3.5	3.2	2.8	3.5	4.5	3.3	.8
1"	3.9	3.4	3.0	3.9	4.6	3.5	.8

Straight Connector Dimensions		
Size	A	B
$\frac{1}{2}$ "	2.4	2.7
$\frac{3}{4}$ "	2.8	2.7
1"	3.5	2.7

Trap dimensions from centerline of connector piping all type connectors (inches) and trap TI reference																
Model >	UTD52L		UTD52H		UTD52SL		UTD52SH		UFT32		UBP32		UIB30		UIB30H	
Size	D	G	D	G	D	G	D	G	D	F	D	F	D	F	D	F
$\frac{1}{2}$ "	3.3	2.0	3.8	2.1	5.1	2.0	5.4	2.1	7.3	2.6	2.2	1.3	5.0	4.9	6.0	6.3
$\frac{3}{4}$ "	3.3	1.8	3.8	1.9	5.1	1.8	5.4	1.9	7.3	2.4	2.6	1.3	4.9	4.9	6.0	6.3
1"	3.4	1.6	3.8	1.7	5.1	1.6	5.4	1.7	7.3	2.2	3.3	1.3	5.0	4.9	6.3	6.3
TI ref.	2.5161 US		2.5161 US		2.5161 US		2.5161 US		P146-02US		2.0008 US		2.412 US		2.412 US	
IM ref.	2.5161 US		2.5161 US		2.5161 US		2.5161 US		P146-01		P127-02		P113-02		P113-02	

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## STS17.2 Stainless Steel Compact Pipeline Connector Steam Trapping Station



### Description

The STS17.2 compact pipeline connector steam trapping station has been designed to provide a convenient ready to install trapping solution, which includes: upstream and downstream isolation valves (2), body incorporating universal connector + strainer (1) and check valve blanking plug (16).

### Available types

The STS17.2 is available with either single or double upstream isolation.

The STS17.2 trapping solution incorporates Spirax Sarco universal connector, which allows speedy trap maintenance. The following swivel connector steam traps (sold separately) can be used with this pipeline connector enabling it to be tailored to suit any application:

- UTD52 thermodynamic steam traps.
- UFT32 ball float steam trap.
- UIB30 and UIB30H inverted bucket steam traps.
- UBP32 balanced pressure steam trap.
- USM bimetallic steam trap.

### Standards

These products fully comply with the requirements of the European Pressure Equipment Directive 97/23/EC.

### Certification

These products are available with certification to EN 10204 3.1. **Note:** All certification/inspection requirements must be stated at the time of order placement. For other certification contact Spirax Sarco.

### Sizes and pipe connections

1/2", 3/4" and 1" screwed NPT or socket weld. (BSP optional)  
1/2", 3/4" and 1" ASME 150 and ASME 300.  
(DN15, DN20 and DN25 flanged EN 1092 PN40 optional)

### Optional extras

**Integral sensor type SSL1** (steam only) or **WLSL1** (for waterlogging) for use with R1C or **WLSL1 with DIODE** for use with RI6C are available as optional extras, to enable operational monitoring of the steam trap. **Please note** that the optional Spirax **SSL1** and **WLSL1** sensors **must not be fitted when the STS17.2 is installed in a vertical application.**

**BDV1 blowdown valve** is also available for cleaning the strainer during operation. Care should be taken when using the BDV1 blowdown valve as the discharge may be hot. Please note that a BDV1 cannot be used when a Spirax sensor has been chosen to be part of the unit.

**Retrofit double isolation valve and spool piece** to convert a single upstream isolation version to double isolation.

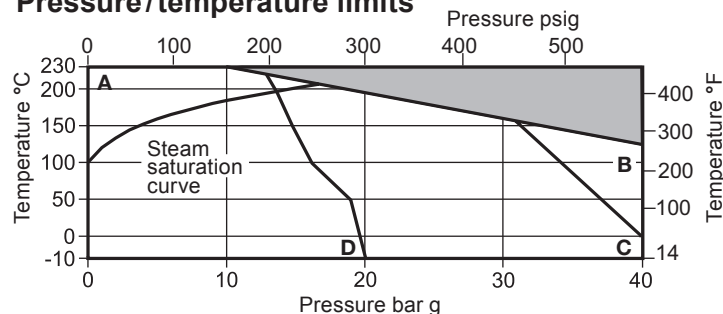
**Insulation jacket** is available to reduce heat loss and energy wastage. See separate literature.

### Materials

No.	Part	Material
1	Body	Stainless steel ASTM A351 Gr. CF8
2	Isolation ball valves	Stainless steel ASTM A182 F316L
3	Handle	Mild steel ENP coated
16	Check valve blanking plug	Stainless steel ASTM A276 431
19	Strainer cap	Stainless steel ASTM A582 416

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## Pressure/temperature limits



The product **must not** be used in this region.

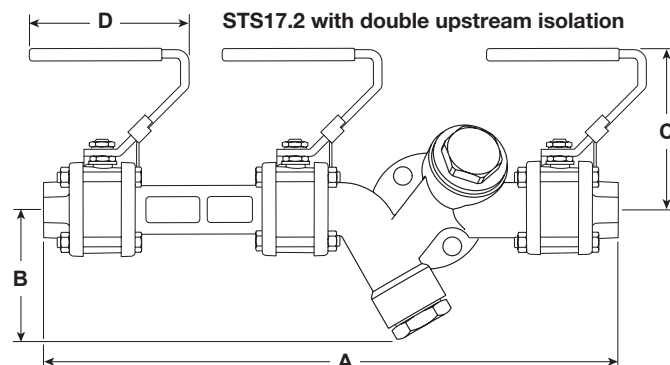
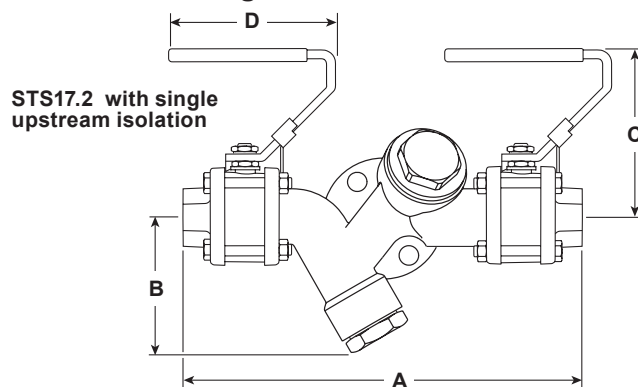
**A - B** Flanged ASME Class 300, screwed and socket weld.

**A - C** Flanged EN 1092 PN40.

**A - D** Flanged ASME Class 150.

System design conditions				PN40
PMA	Maximum allowable pressure	580 psi g @ 248°F (40 bar g @ 120°C)		
TMA	Maximum allowable temperature	446°F @ 145 psi g (230°C @ 10 bar g)		
	Minimum allowable temperature	14°F (-10°C)		
PMO	Maximum operating pressure for saturated steam service	ASME 150	200 psi g (13.6 bar g)	
		All other connections	254 psi g (17.5 bar g)	
TMO	Maximum operating temperature	446°F @ 145 psi g (230°C @ 10 bar g)		
	Minimum operating temperature	14°F (-10°C)		
Designed for a maximum cold hydraulic test pressure of:		870 psi g (60 bar g)		

## Dimensions/weights (approximate) in mm and kg



## Dimensions/weights (approximate) in inches and pounds

Isolation	Size and connection	Dimensions in inches (mm)				Weight lb (kg)
		A	B	C	D	
Single	1/2" NPT and 1/2" SW	8.7 (222)	3.0 (76)	3.7 (93)	3.5 (90)	7.9 (3.60)
Single	3/4" NPT	8.7 (222)	3.0 (76)	3.7 (93)	3.5 (90)	7.8 (3.53)
Single	3/4" SW	8.4 (213)	3.0 (76)	3.7 (93)	3.5 (90)	7.8 (8.54)
Single	1" NPT	9.0 (229)	3.0 (76)	3.7 (93)	3.5 (90)	8.2 (3.71)
Single	1" SW	10.6 (269)	3.0 (76)	3.7 (93)	3.5 (90)	8.5 (3.86)
Single	1/2" ANSI 150	10.6 (268)	3.0 (76)	3.7 (93)	3.5 (90)	9.8 (4.45)
Single	1/2" ANSI 300	11.6 (294)	3.0 (76)	3.7 (93)	3.5 (90)	11.0 (4.98)
Single	3/4" ANSI 150	10.7 (272)	3.0 (76)	3.7 (93)	3.5 (90)	10.3 (4.67)
Single	3/4" ANSI 300	12.1 (306)	3.0 (76)	3.7 (93)	3.5 (90)	13.2 (5.98)
Single	1" ANSI 150	10.7 (274)	3.0 (76)	3.7 (93)	3.5 (90)	10.9 (4.96)
Single	1" ANSI 300	12.2 (309)	3.0 (76)	3.7 (93)	3.5 (90)	14.6 (6.64)
Double	1/2" NPT and 1/2" SW	13.8 (350)	3.0 (76)	3.7 (93)	3.5 (90)	11.7 (5.32)
Double	3/4" NPT	13.8 (350)	3.0 (76)	3.7 (93)	3.5 (90)	11.6 (5.25)
Double	3/4" SW	13.4 (341)	3.0 (76)	3.7 (93)	3.5 (90)	11.6 (5.26)
Double	1" NPT	14.1 (357)	3.0 (76)	3.7 (93)	3.5 (90)	12.0 (5.43)
Double	1" SW	15.6 (397)	3.0 (76)	3.7 (93)	3.5 (90)	12.3 (5.58)
Double	1/2" ANSI 150	15.6 (396)	3.0 (76)	3.7 (93)	3.5 (90)	13.6 (6.17)
Double	1/2" ANSI 300	16.1 (422)	3.0 (76)	3.7 (93)	3.5 (90)	14.8 (6.70)
Double	3/4" ANSI 150	15.7 (400)	3.0 (76)	3.7 (93)	3.5 (90)	14.1 (6.39)
Double	3/4" ANSI 300	17.1 (434)	3.0 (76)	3.7 (93)	3.5 (90)	17.0 (7.70)
Double	1" ANSI 150	15.7 (399)	3.0 (76)	3.7 (93)	3.5 (90)	14.7 (6.68)
Double	1" ANSI 300	17.2 (437)	3.0 (76)	3.7 (93)	3.5 (90)	18.4 (8.36)

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## Spare parts

The spare parts are available as indicated below. No other parts are supplied as spares.

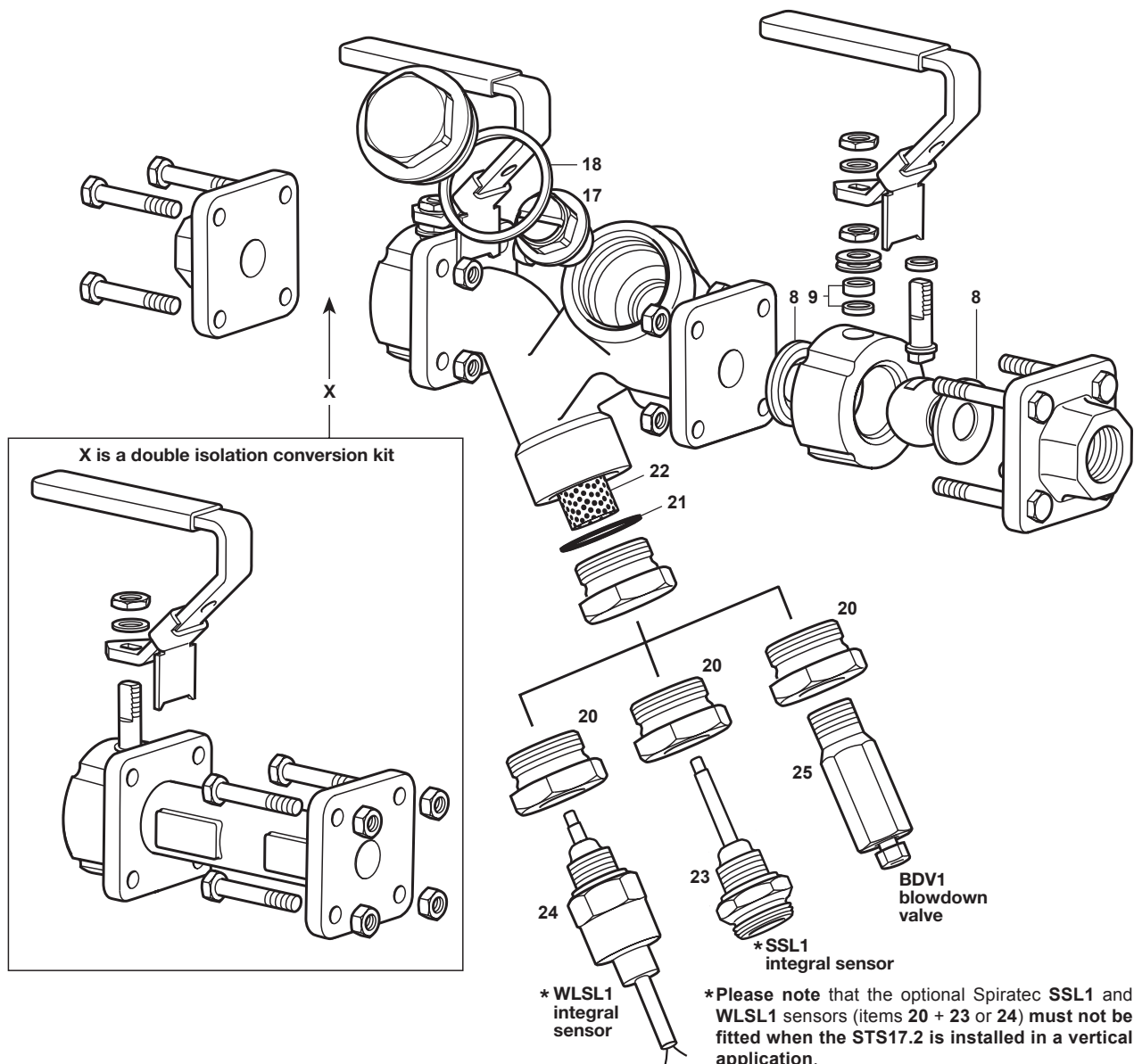
### Available spares

Isolation ball valve seat and stem seals		8, 9
Strainer screen and gasket		21, 22
Spare sensor and sensor gasket	SSL1 Spiratec sensor	23
	WLSL1 diode waterlogging sensor	24
Spiratec retrofit kit	<b>Note:</b> State whether an SSL1 or WLSL1 sensor is required.	20, 21 + 23 or 24
Check valve assembly		17, 18
Double isolation conversion kit (includes spool piece and additional isolation valve)		X
BDV1 blowdown valve retrofit kit		20, 21 + 25

### How to order spares

Always order spares using the description given in the column headed 'Available spares' and state the size and model number.

**Example:** 1 off Spare Spiratec sensor and sensor gasket with WLSL1 diode waterlogging sensor for a ½" STS17.2 compact pipeline connector steam trapping station.



## Safety information, installation and maintenance

For full details see the Installation and Maintenance Instructions (IM-P128-23) supplied with the product.

### How to order

**Example:** 1 off Spirax Sarco ½" screwed BSP STS17.2 stainless steel pipeline compact connector steam trapping station, having a Spiratec SSL1 sensor.

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## IPC20 and IPC21 Pipeline Connectors with Integral Spiratec Sensors (Requires Universal Trap of choice)

### Description

The **IPC20** is a pipeline connector with integral strainer and Spiratec sensor for use with UTD52L, UTD52H, UTD30L, UTD30H and UBP32 steam traps. The **IPC21** is a pipeline connector with an integral strainer and Spiratec sensor for use with UIB30, UIB30H, UFT14 and UFT32 steam traps. Both the **IPC20** and **IPC21** can be fitted with the following sensor options:

**SSL1 Sensor** - for detection of steam leakage.

**WLS1 sensor with diode** - for use with R16C monitor to detect steam wastage and waterlogging.

**WLS1 sensor without diode** - for use with R1C to detect steam wastage and waterlogging.

### Limiting Operating Conditions

**Max. Operating Pressure (PMO)** 464 psig 32 barg connector only  
Trap may dictate actual PMO if lower when assembled  
(See trap TIS sheet)

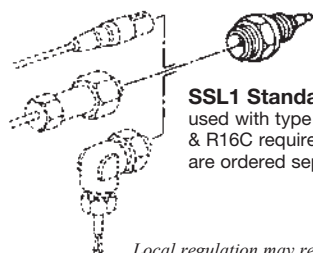
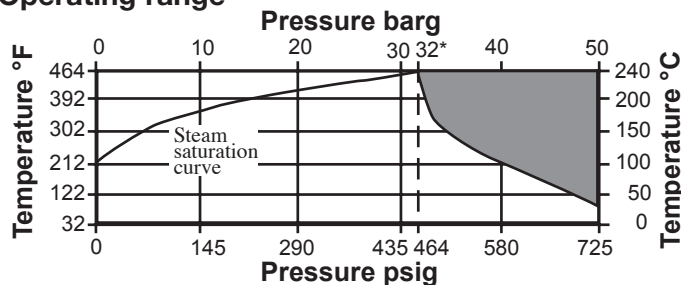
**Max. Operating Temperature (TMO)** 464°F (240°C)

### Pressure Shell Design Conditions

**Max. Allowable Pressure (PMA)** 725 psig 50 barg connector only  
Trap when mounted to connector may dictate PMA if lower  
(See Trap TIS sheet)

**Max. Allowable Temperature (TMA)** 464°F (240°C)  
Selected trap may lower these values.

### Operating range

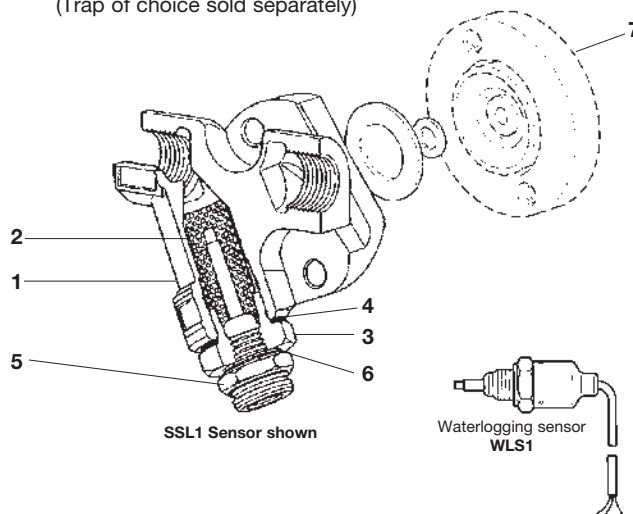


#### SSL1 Standard sensor

used with type 30 meter, R1C and R16C R1C & R16C required a PT1, PT2, or PT3 Plug tails are ordered separately

<b>Model</b>	IPC20 & IPC21 Series
<b>PMO</b>	Dependent on Trap Type
<b>Sizes</b>	1/2", 3/4", 1"
<b>Connections</b>	NPT Standard
<b>Construction</b>	Stainless Steel
<b>Options</b>	SW connections to ANSI B16.11 BSP

(Trap of choice sold separately)



### Materials

No.	Part	Material
1	Body	Austenitic stainless steel ASTM A 351 CF8
2	Strainer	Austenitic stainless steel 316L
	Screen	(0.8 mm perforations)
3	Strainer Cap	Austenitic stainless steel AISI 303
4	Cap gasket	Stainless steel BS 1449 304 S16
5	Sensor	Stainless steel ASTM A582 416
6	Sensor gasket	Stainless steel
7	Selected trap (see trap TIS)	
	UTD52L, H, HP	TIS 2.5161
	UTD30L & H	TIS 2.517
	UFT32	TI-P146-02 US
	UIB30, 30H	TIS 2.412
	UBP32	TIS 2.0008



**WLS1 Waterlogging sensor assembly**  
used with R1C and R16C  
WLS1 requires diode pack

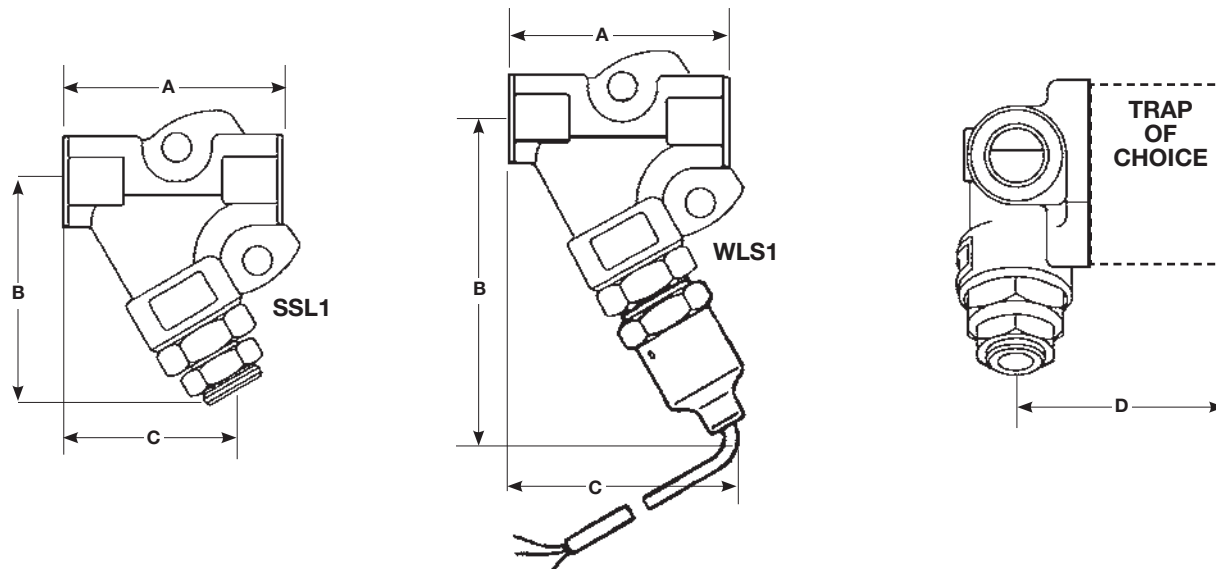
Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only.

In the interests of development and improvement of the product, we reserve the right to change the specification.

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# IPC20 and IPC21 Pipeline Connectors with Integral Spiratec Sensors (Requires Universal Trap of choice)



## SSL1 SENSOR IN PC 20 OR 21 CONNECTOR

Size	A	B	C	Sensor	Withdraw	PT1/Type 30 plug tail withdraw	PT1/Type 30 plug tail withdraw	PT2 plug tail withdraw	PT2 plug tail withdraw	PT3 plug tail withdraw	PT3 plug tail withdraw	Weight Connector only
1/2"	3.2	3.1	2.6	B	C	B	B	B	C	B	C	2.7
	81	79	66	124	91	142	89	147	105	122	89	1.2
3/4"	3.5	3.2	2.7	5	3.7	5.7	4.1	5.9	4.3	4.9	3.7	2.9
	89	81	69	127	94	145	104	150	109	124	94	1.3
1"	3.9	3.4	2.9	5.1	3.9	5.9	4.3	6.1	4.5	5.1	3.9	3.3
	99	86	74	130	99	150	109	155	114	130	99	1.5

## WLS1 SENSOR IN PC 20 OR 21 CONNECTOR

Size	A	B	C	Sensor	Withdraw	Weight
				B	C	Connector only
1/2"	3.2	5	3.6	6.7	4.6	2.7
	81	127	91	170	117	1.2
3/4"	3.5	5.1	3.8	6.8	4.8	2.9
	89	130	97	173	122	1.3
1"	3.9	5.2	4.0	7.0	5.0	3.3
	99	132	102	178	127	1.5

## WLS1 SENSOR IN PC 20 OR 21 CONNECTOR

Size	UTD52L	UTD52H	UFT14	UBP32	UIB30	UIB30H
	D	D	D	D	D	D
1/2"	3.3	3.8	7.3	2.2	5.0	6.0
	84	97	185	56	127	152
3/4"	3.3	3.8	7.3	2.6	4.9	6.0
	84	97	185	66	124	152
1"	3.4	3.8	7.3	3.3	5.0	6.3
	86	97	185	84	127	160

## Spare Parts

The spare parts available are detailed below. No other parts are supplied as spares.

### Available spares

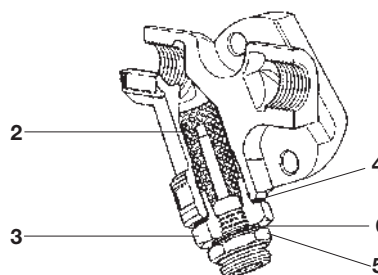
Strainer screen and gasket	2, 4
Sensor and sensor gasket	5, 6
Sensor gasket package of 10	

## How to order spares

Always order spares using the description given in the column headed 'Available spares' state the size and model number. Example: 1 - Strainer screen and gasket for the 1/2" IPC20 connector.

## Installation

The connector will be installed in a horizontal pipeline. The connector face must be in a vertical plane with the Sensor in a downward position. Full ported isolation valves should be installed up stream and down stream of the connector. The trap should be fitted to the connector with its cap uppermost or as shown in the related trap IMI. Note each trap type will have its own IMI.



## Recommended tightening torques

Item	or MM	Ft/Lbs
3	32 A/F	125 - 140
5	24 A/F	37 - 41

## Maintenance

The sensor should be removed periodically to inspect and clean the tip and insulator.

## Sample Specification

Connector shall be supplied with either a SSL1 steam loss only or WLS1 steam loss and water logging sensor. The connector with integral sensor will be made in sizes 1/2" to 1" in stainless steel with NPT, BSP or SW connections. The connector shall be capable of working with any of the Spirax Sarco universal connector steam traps. The SSL1 Sensor will work with TYPE 30, R1C, R16C. The WLS1 will work with the R1C and the R16C. The connector is designed to remain in line with the trap and sensor easily removable without disturbing the piping.

TI-P128-17-US 4.15

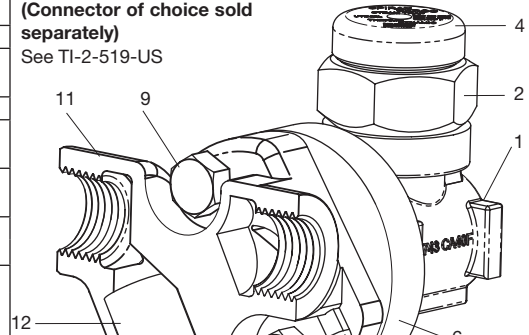


## UTD52 Series Universal Thermo-Dynamic® Steam Trap (for use with Universal Connector)

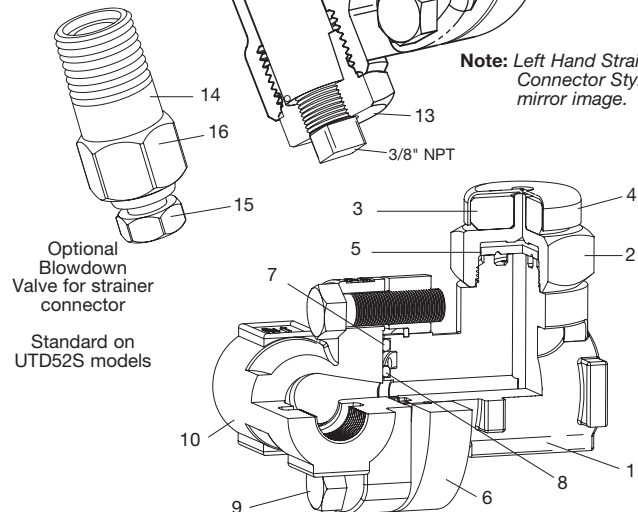
The **Thermo-Dynamic®** steam trap cycles periodically to discharge condensate very near to steam temperature. It is unaffected by waterhammer or superheat. The UTD is a unique solution to maintain the disc in the horizontal plane by means of a universal connector. The trap is easily replaced or removed for servicing without disturbing the pipe connections.

<b>Model</b>	UTD52L, UTD52H, UTD52L-HP UTD52SL, and UTD52SH
<b>PMO</b>	450 psig / 600 psig HP model
<b>Trap Construction</b>	Stainless Steel
<b>Trap Options</b>	Slotted disc
<b>Connector Sizes</b>	1/2", 3/4", 1"
<b>Connector Connections</b>	NPT, SW
<b>Connector Construction</b>	Straight or strainer type (left or right hand)
<b>Connector Options</b>	SW connections to ANSI B16.11 Carbon steel USTSII trap station

**Standard Strainer Connector shown**  
(Connector of choice sold separately)  
See TI-2-519-US



**Note:** Left Hand Strainer Connector Style is mirror image.



### Limiting Operating Conditions

**Max. Operating Pressure** 450 psig (31 barg) Standard  
600 psig (42 barg) UTD52L-HP

**Max. Operating Temperature** 750°F (400°C)

**Pressure Range** 3.5 to 450 psig UTD52L, UTD52H,  
UTD52SL, UTD52SH  
300 to 600 psig UTD52L-HP

Maximum back pressure should not exceed 80% of the upstream pressure

### Pressure Shell Design Conditions

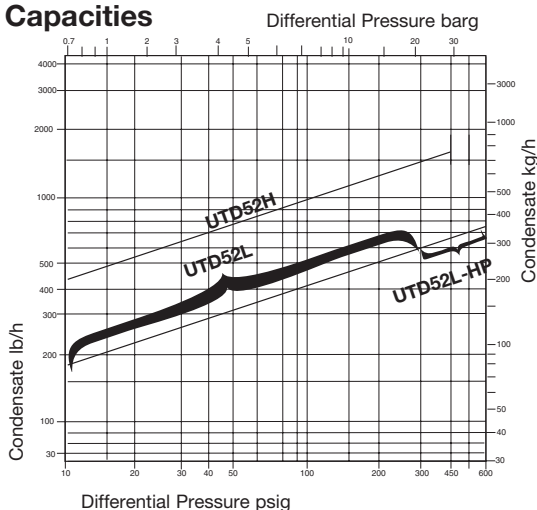
**PMA** 720 psig/up to 100°F 50 barg/up to 38°C - ALL  
Max. allowable pressure 450 psig/750°F 31 barg/238-400°C - Standard  
600 psig/750°F 42 barg/400°C - UTD52L-HP

**TMA** 750°F/0-450 psig 400°C/0-31 barg - Standard  
Max. allowable temperature 750°F/600 psig 400°C/42 barg - UTD52L-HP

Designed for a maximum cold hydraulic test pressure of 1080 psig.

**Typical Applications** Steam main drainage, and steam tracing and constant pressure/constant load applications.

### Capacities



### Construction Materials

No.	Part	Material	
1	Body	Stainless Steel	ASTM A743 Gr.CA40F
2	Cap	Stainless Steel	ASTM A743 Gr.CA40F
3	Insulator	Ceramic	
4	Cover/Nameplate		
5	Disc	Stainless Steel	
6	Flange	Stainless Steel	
7	Inner Gasket	Stainless Steel & Exfoliated Graphite Filler	
8	Outer Gasket	Stainless Steel & Exfoliated Graphite Filler	
9	Connector Screws	Alloy Steel (Plated)	ASTM A193 Gr.B7
<b>Standard Connector</b>			
10	Connector	Stainless Steel	ASTM A351Gr.CF8
<b>Strainer Connector</b>			
11	Connector	Stainless Steel	ASTM A351 Gr.CF8
12	Strainer Screen	Strainer Screen (.031 perf)	
13	Strainer Cap	Stainless Steel	AISI 303
<b>Strainer Connector or UTD52S</b>			
14	Blowdown Ball Head (Internal)	Stainless Steel	AISI 440
15	Blowdown Valve Stem	Stainless Steel	AISI 431
16	Blowdown Valve Body	Stainless Steel	AISI 303

\* Consult factory for material specifications in carbon steel connectors.

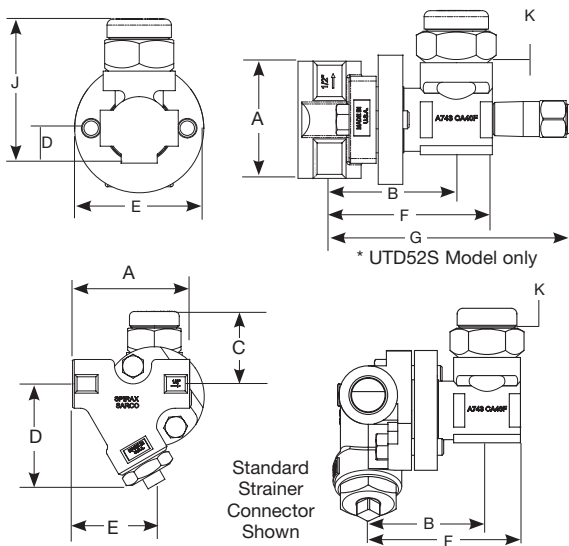
Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only.  
In the interests of development and improvement of the product, we reserve the right to change the specification.

TI-2-5161-US 10.15

# UTD52 Series

## Universal Thermo-Dynamic® Steam Trap

(for use with Universal Connector)



### Dimensions (nominal) in inches and millimeters

Size	Standard Straight Connector UTD52 or UTD52S Models												Weight	
	A	B (L)	B (H)	C (L)	C (H)	D	E	F (L)	F (H)	G (L)*	G (H)*	K (L)		K (H)
1/2"	2.4	2.7	3.0	2.4	2.5	0.7	2.6	3.3	3.8	5.1	5.4	0.4	0.4	3.3 lb
	61	69	76.2	61	63.3	17.8	66	84	97			10.2	10.2	1.5 kg
3/4"	2.9	2.7	3.0	2.4	2.5	0.7	2.6	3.3	3.8	5.1	5.4	0.4	0.5	3.3 lb
	74	69	76.2	61	63.3	17.8	66	84	97			12.7		1.5 kg
1"	3.5	2.7	3.0	2.4	2.5	0.7	2.6	3.3	3.8	5.1	5.4	0.4	0.5	3.7 lb
	90.4	69	76.2	61	63.3	17.8	66	84	97			10.2	12.7	1.7 kg

\* UTD52S Model only

### Dimensions (nominal) in inches and millimeters

Size	Standard and Left Hand Connector											Weight
	A	B (L)	B (H)	C (L)	C (H)	D	E	F (L)	F (H)	K (L)	K (H)	
1/2"	3.2	2.7	3.0	2	2.1	2.9	2.3	3.3	3.8	0.4	0.4	3.8 lb
	81.3	69	76.2	50.8	53.3	73.7	58.4	84	97	10.2	12.7	1.7 kg
3/4"	3.5	2.7	3.0	1.8	1.9	3	2.5	3.3	3.8	0.4	0.5	4.2 lb
	88.9	69	76.2	45.7	38.1	76.2	63.5	84	97	10.2	12.7	1.9 kg
1"	3.9	2.7	3.0	1.6	1.7	3.1	2.7	3.4	3.8	0.4	0.5	4.5 lb
	99.1	69	76.2	40.6	43.2	78.7	68.6	84	97	10.2	12.7	2.0 kg

### Sample Specification

Steam trap shall be supplied with a pipeline connector which, once installed, remains in the line permanently. Trap shall be attached to the connector by two bolts to enable simple and rapid installation and replacement. The connection is designed to allow installation on pipework that is vertical, horizontal, or any angle in between. Operation shall be on/off discharge with tight shut off and no bleed or "controlled" leak, with back pressures up to 80% of inlet pressure. When specified, the connector shall be provided with integral "Y" pattern strainer with or without integral blowdown valve, standard or left hand pattern. The trap itself shall be Thermo-Dynamic® disc type of stainless steel construction and integral seat design with hardened disc and seating surface. Cap to have integral ceramic insulator with stainless steel cover.

**Determining whether you need Standard Strainer Connector or Left Hand** — Because of location or space constraints, when straddling the pipe facing in the direction of flow the standard strainer connector with the trap body facing the left side with bolt on the right. The left hand connector will have the trap body on right with the bolts on the left.

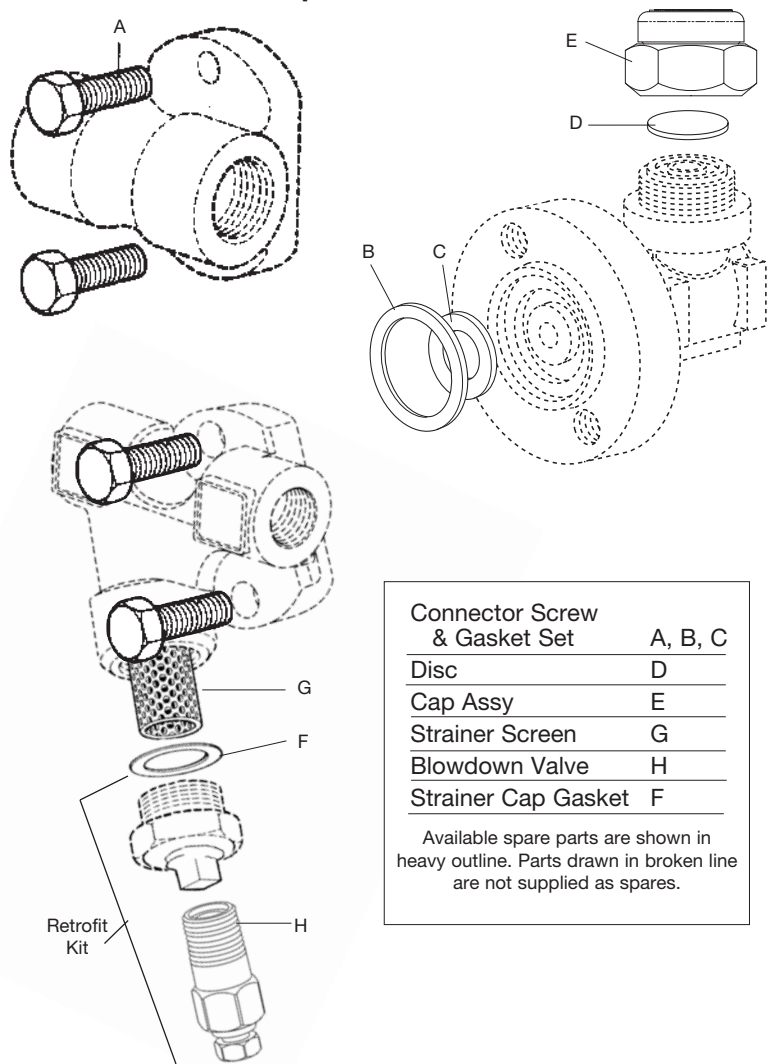
### Installation

The connector can be installed in horizontal or vertical lines. The connector face must be in a vertical plane. The trap should be fitted to the connector with its cap uppermost. Full-port isolating valves should be installed upstream and downstream of the connector.

### Maintenance

The trap can be removed for repair or replacement without disturbing the connector piping connections. Complete isolation of the connector from both supply and return line is required before the trap is removed. The trap should be removed from the connector and disassembled periodically for inspection and cleaning of the disc and seat. **Complete installation and maintenance instructions are given in the IM-2-5161-US, which accompanies the product.**

### Spare Parts



Connector Screw & Gasket Set	A, B, C
Disc	D
Cap Assy	E
Strainer Screen	G
Blowdown Valve	H
Strainer Cap Gasket	F

Available spare parts are shown in heavy outline. Parts drawn in broken line are not supplied as spares.

## UFT32 Series

### Sealed Stainless Steel Float & Thermostatic Steam Trap (for use with Universal Connectors)

Model	UFT32-4.5, UFT32-10, UFT32-14, UFT32-21, UFT32-32
Trap Construction	Stainless Steel
Connector Sizes	1/2", 3/4", 1"
Connector Connections	NPT, SW
Connector Construction	Straight or strainer type (left or right hand)
Options	Carbon steel USTSII trap station

#### Description

The UFT Series of Traps is an austenitic stainless steel maintenance free sealed ball float steam trap with an integral automatic air venting capability. The UFT is designed for differential steam pressures up to 465 psig. When installed with a suitable pipeline connector the UFT can easily and simply be removed without breaking into the pipeline, thus speeding up trap replacement with minimal system downtime. Pipeline connectors are available with screwed, socket weld and flanged end connections.

#### Standards

The body to cover welded joint complies with ASME Section IX and BS/EN 288

This product fully complies with the requirements of the Escape Pressure Equipment Directive 97/23/EC.

#### Certification

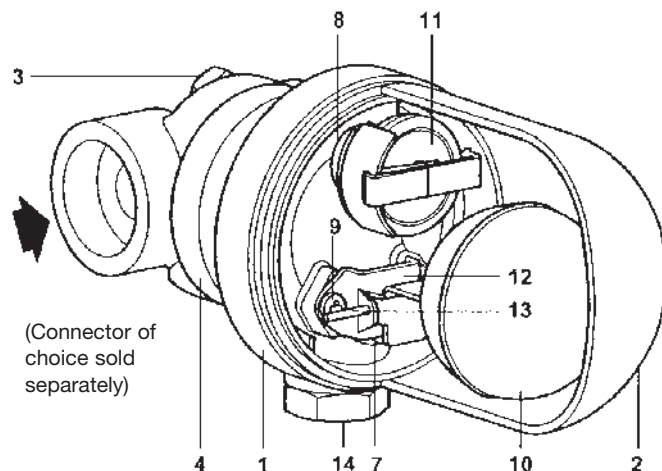
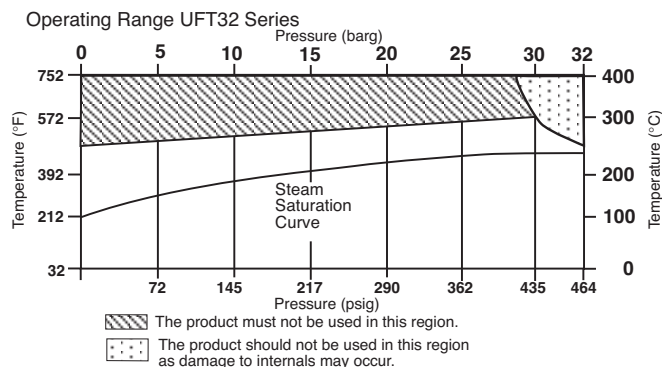
The product is available with material certification to EN 10204 3.1.B as standard and must be specified at the time of order placement.

#### Sizes and pipe connections

The UFT can be fitted to a variety of different pipeline connectors including:  
Universal straight connector 1/2", 3/4", 1"  
Strainer connector 1/2", 3/4", 1"  
Standard or Left Hand with Blowdown Valve

#### Limiting conditions (ISO6552)

Maximum body design conditions	ANSI/ASME 300	
PMA - Maximum allowable pressure	725 psig	50 barg
TMA - Maximum allowable temperature	752°F	400°C
Designed for a maximum cold hydraulic test pressure of	948 psig	64.5 barg



#### Materials

No.	Part	Material	
1	Body	Austenitic stainless steel 304	EN 10213-4 1.4308; ASTM A351 CF8
2	Cover	Austenitic stainless steel 304	EN 10213-4 1.4308; ASTM A351 CF8
3	Connector screws	Steel	ASTM A193 B7
4	Flange	Alloy steel	A322 Gr.4130
5	Inner gasket	Stainless steel/graphite filler	Spirally wound AISI 304 strip
6	Outer gasket	Stainless steel/graphite filler	Spirally wound AISI 304 strip
7	Main valve seat	Stainless steel	BS 970 431 S29
8	Main valve/air vent seat gasket	Stainless steel	BS 1449 304 S11
9	Main valve assembly screws	Stainless steel	BS 6105 CI A2-70
10	Ball float and lever	Stainless steel	BS 1449 304 S16
11	Air vent assembly	Stainless steel	
12	Pivot frame	Stainless steel	BS 1449 304 S16
13	Pivot pin	Stainless steel	
14	Plug	Austenitic stainless steel 304	EN 10088-3 1.4301 ASTM A479 304

#### Options:

Consult factory  
Bimetal Air Vent (for temperature outside operation range)  
Fixed Bleed Option (notched seated) for Sulphur recovery pits for continuous bleed where steam locking can occur. Noted by "N" after pressure notation.

#### ΔPMX - Maximum differential pressure

UFT32-4.5	UFT32-10	UFT32-14	UFT32-21	UFT32-32
65 psig	150 psig	203 psig	300 psig	465 psig
4.5 barg	10 barg	14 barg	21 barg	32 barg

Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only.

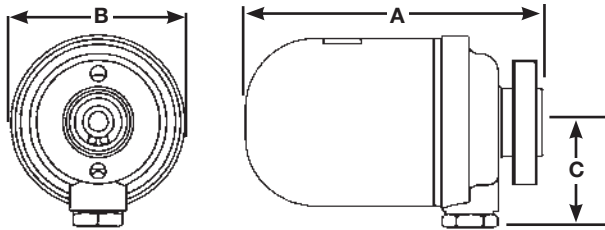
In the interests of development and improvement of the product, we reserve the right to change the specification.

TI-P146-02-US 4.15

# UFT32 Series

## Dimensions/weight *approximate in mm and kg*

Size	A	B	C	Weight
UFT32	6.3" 161	3.7" 94	2.2" 57	4.5 lbs 2.02



## Safety information, installation and maintenance

For full details see the Installation and Maintenance Instructions (IM-P146-01) supplied with the product.

The UFT can be installed on any pipeline connector, but must be installed in a horizontal plane with the plug (14) downwards.

## How to specify

Steam traps shall be sealed ball float traps UFT type suitable for a differential operating pressure of either 65, 150, 203,300 or 465 psig. Traps to be zero maintenance and be connected to a separate pipeline connector by two screws to allow for quick and simple installation/replacement. For example Spirax Sarco UFT32-10 ball float steam trap.

## How to order

When ordering a UFT and connector they must be ordered individually as they are supplied as separate components to ease installation. Each UFT is supplied in a protective box complete with inner and outer gasket (securely crimped in place) and two connector screws.

Example: 1 of Spirax Sarco UFT sealed stainless steel ball float steam trap (for use with pipeline connectors).

## How to order spares

Always order spare parts by using the description given in the column headed 'Available spares' and state the size, model no. and pressure rating of the trap.

Example: 2 x Connector screws for a Spirax Sarco UFT sealed stainless steel ball float steam trap (for use with pipeline connectors).

## Capacities (in accordance with ISO 7842)

**Note:** Capacities shown are based on discharge at saturation temperature. When discharging sub-cooled condensate the air vent provides extra capacity. Under start-up conditions the thermostatic air vent will be open, and will provide additional condensate capacity to the main valve assembly. This will provide a minimum of 100% increased capacity above the hot condensate figures shown.

## UFT32 Series Hot Condensate Capacity #/hr.

Pressure (psig)	UFT 32-4.5	UFT 32-10	UFT 32-14	UFT 32-21	UFT 32-32
10	380	263	183	160	98
25	562	383	275	241	153
50	753	508	374	330	213
65	842	566	420	371	242
100		674	509	451	298
150		796	609	542	362
200			692	617	416
300				741	505
400					624
464					704

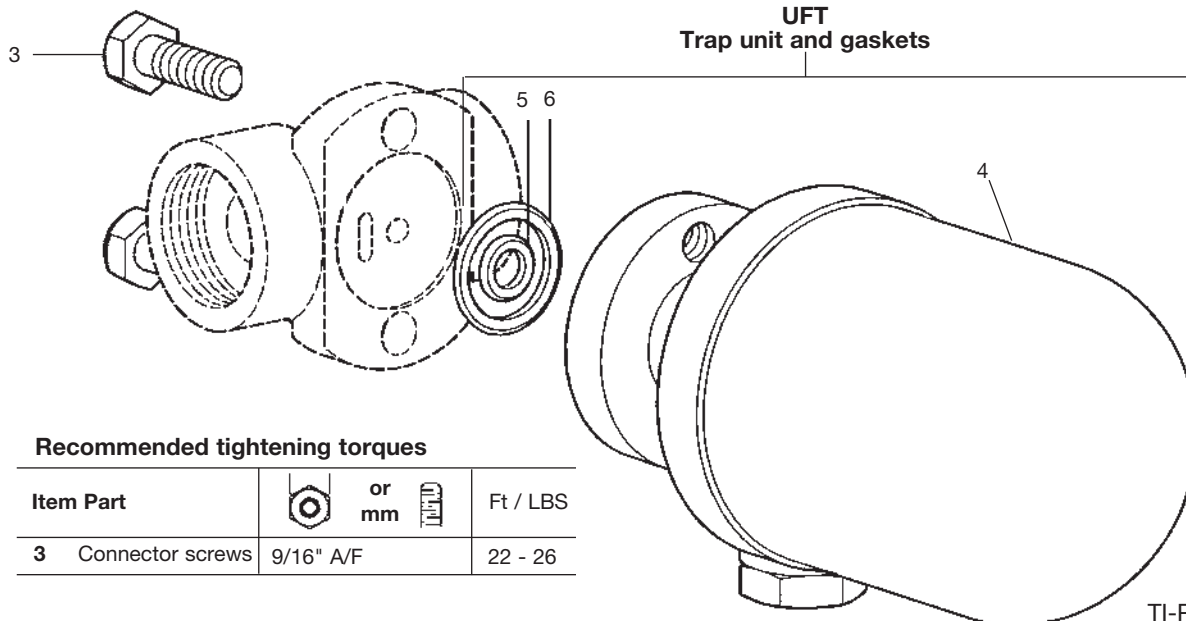
## Spare parts

The UFT is a sealed non-maintainable trap unit. No internal spares are available.



The spares that are available are shown in heavy outline. Parts shown in broken lines are not available as spares.

### Available spares

Connector screws (x2)	<b>3</b>
Complete UFT trap unit inclusive of gaskets and connector screws	<b>3, 4, 5, 6</b>
Connector Gasket Set	<b>5, 6</b>



## Recommended tightening torques

Item Part	 or 	Ft / LBS
3 Connector screws	9/16" A/F	22 - 26

TI-P146-02-US 4.15

# spirax/sarco

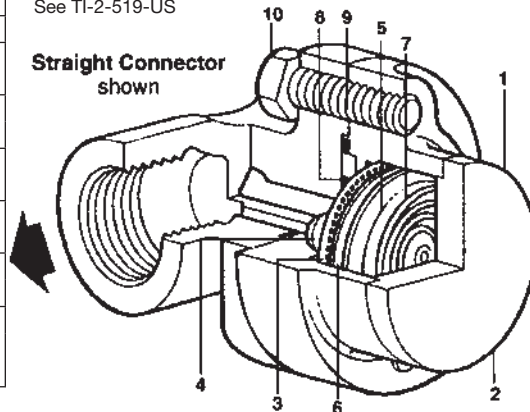
## UBP32 Balanced Pressure Thermostatic Steam Trap (for use with Universal Connectors)

The welded stainless steel element is self-adjusting over the entire operating pressure range and will discharge condensate at approximately 22°F (12°C) below saturated steam temperature. The element is resistant to waterhammer. The connector can be installed in either horizontal or vertical piping, and the trap is easily removed without disturbing the pipework.

<b>Model</b>	<b>UBP32</b>
<b>PMO</b>	464 psig
<b>Trap Construction</b>	Stainless Steel, Tamper proof body
<b>Trap Options</b>	Subcooling capsule filling Near to steam capsule filling
<b>Connector Sizes</b>	1/2", 3/4", 1"
<b>Connector Connections</b>	NPT, SW
<b>Connector Construction</b>	Straight or strainer type (left or right hand) Stainless steel or cast steel
<b>Connector Options</b>	SW connections to ANSI B16.11 Carbon steel USTSII trap station

(Connector of choice sold separately)  
See TI-2-519-US

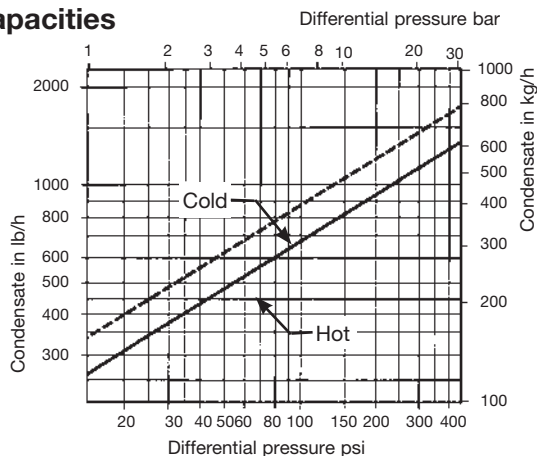
**Straight Connector shown**



### Construction Materials

No.	Part	Material
1	Body	Austenitic stainless steel (304 grade)
2	Cover	Austenitic stainless steel (304 grade)
3	Screen	Stainless Steel
4	Seat	Stainless Steel
5	Capsule	Stainless Steel
6	Spacer plate	Stainless Steel
7	Spring	Stainless Steel
8	Inner gasket	Stainless Steel graphite filler
9	Outer gasket	Stainless Steel graphite filler
10	Connector screws	Steel
		ASTM A183 B7

### Capacities



Orifice Size = .157"

### Typical Applications

Steam tracing systems and steam main drip stations, kitchen and hospital equipment, steam coils, and steam radiators.

### Limiting Operating Conditions

**Max. Operating Pressure (PMO)** 464 psig (32 barg)

**Max. Operating Temperature** 572°F (300°C) at 450 psig (31 barg)

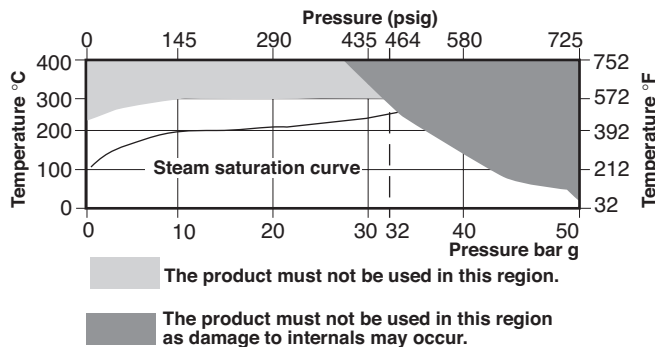
See chart below  
For all other pressures and temperatures

### Pressure Shell Design Conditions

**PMMA** Max. allowable pressure 720 psig/up to 100°F 50 barg/up to 38°C  
450 psig/459°F 31 barg/237°C  
400 psig/752 °F 27 barg/426°C

**TMA** Max. allowable temperature 752°F/0-400 psig 400°C/0-27 barg

### Operating Range



### Capsule Filling

As standard, the trap is supplied with filling for 22°F (12°C) , below saturation.

As an optional alternative, a near to steam fill with a 7°F (4°C) below saturation or a sub cooled 40°F (22°C) below saturation version can be supplied.

Note: If the alternative capsule is required, this must be clearly stated on the order.

Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only.

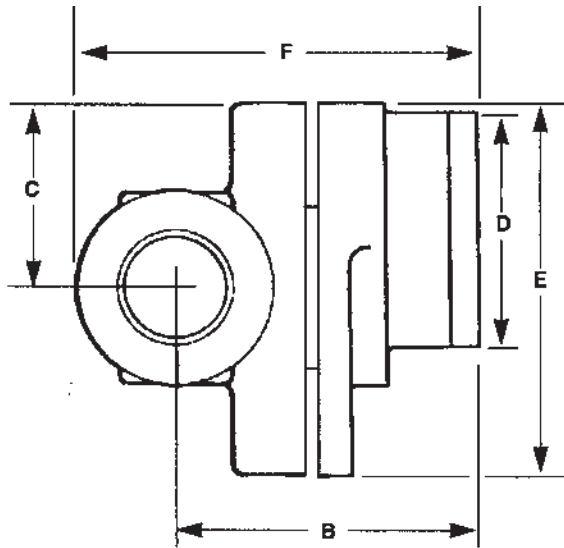
In the interests of development and improvement of the product, we reserve the right to change the specification.

TI-2-008-US 4.15



# UBP32 Balanced Pressure Thermostatic Steam Trap

(for use with Universal Connectors)

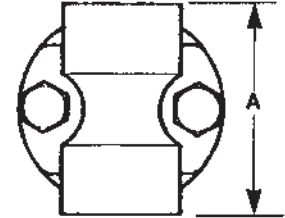
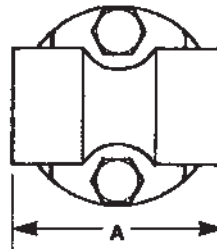


## Dimensions

(nominal) in inches and millimeters

Size	A	B	C	D	E	F	Weight
1/2"	2.4 61.9	2.2 5.6	1.3 33	1.8 46	2.7 69	3.0 76	3.5 lb 1.62 kg
3/4"	2.8 72	2.6 66	1.3 33	1.8 46	2.7 69	3.4 86	3.8 lb 1.7 kg
1"	3.5 89	3.3 84	1.3 33	1.8 46	2.7 69	4.1 104	4.2 lb 9.26 kg

The connector may be rotated to any position.



## Sample Specification

Steam trap shall be supplied with a pipeline connector which, once installed, remains in the line permanently. The trap shall be attached to the connector by two bolts, to enable simple and rapid installation and replacement. The connection is designed to allow installation on pipework that is vertical, horizontal or any angle in between. The trap itself shall be maintenance-free and tamper-proof design of all stainless steel construction with forged body and drawn cover completely sealed against leakage. Operating element to be a solidly liquid-filled thermostatic capsule which self adjusts to all pressures to 435 psig. Trap shall vent air freely and withstand waterhammer, freezing and superheat.

## Installation

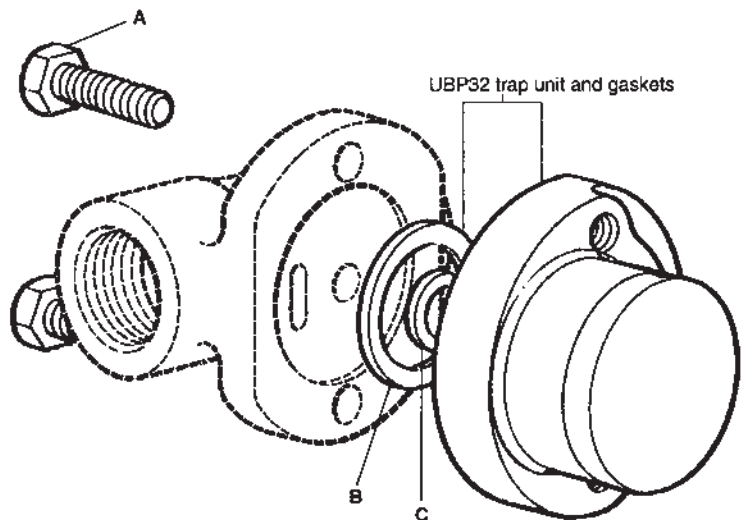
The connector can be installed in either horizontal or vertical pipework. Full port isolation valves should be installed upstream and downstream of the connector. Line the threaded holes in the trap up with the holes in the connector. Insert the bolts supplied through the connector and thread into the trap evenly. Torque bolts evenly to 22- 26 ft-lbs.

## Maintenance

This product is factory sealed for tamper-proof operation. Complete isolation from both supply and return line is required before the trap is removed.

**Complete installation and maintenance instructions are given in the IMI sheet, which accompanies the product.**

## Spare Parts



Connector Screw & Gasket Set

A, B, C

Available spare parts are shown in heavy outline. Parts drawn in broken line are not supplied as spares.

TI-2-008-US 4.15

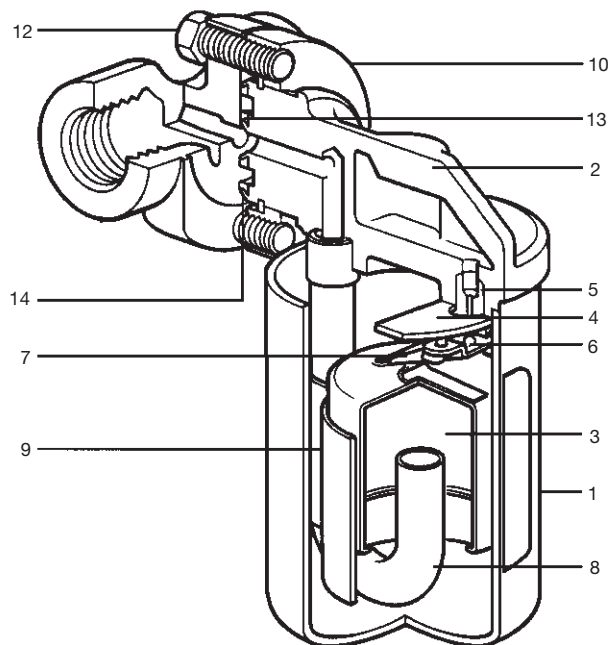
# spirax sarco

## UIB30 and UIB30H Sealed Inverted Bucket Steam Trap (for use with Universal Connectors)

The trap contains an inverted bucket mechanism which responds to the difference in density between steam and condensate. The discharge action is cyclic. Condensate and non-condensibles are discharged close to steam temperature. The UIB is designed to maintain the bucket in the proper plane by means of a swivel connector. The trap is easily replaced without disturbing the piping connections.

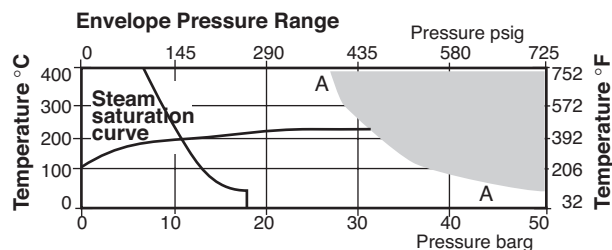
<b>Model</b>	UIB30, UIB30H
<b>Trap Construction</b>	Stainless Steel
<b>Connector Sizes</b>	1/2", 3/4", 1"
<b>Connector Connections</b>	NPT, SW
<b>Connector Construction</b>	Straight or strainer type (left or right hand)
<b>Connector Options</b>	SW connections to ANSI B16.11 USTSII trap station

(Connector of choice sold separately)  
See TI-2-519-US



### Limiting Operating Conditions

<b>Max. Operating Pressure (PMO)</b>	UIB30/8	58 psig (4 barg)
	UIB30H/10	72 psig (5 barg)
	UIB30/7	123 psig (8.5 barg)
	UIB30/6	174 psig (12 barg)
	UIB30/5	290 psig (20 barg)
	UIB30/4	435 psig (30 barg)



The product must not be used in this region.

\*PMO Maximum operating pressure recommended.

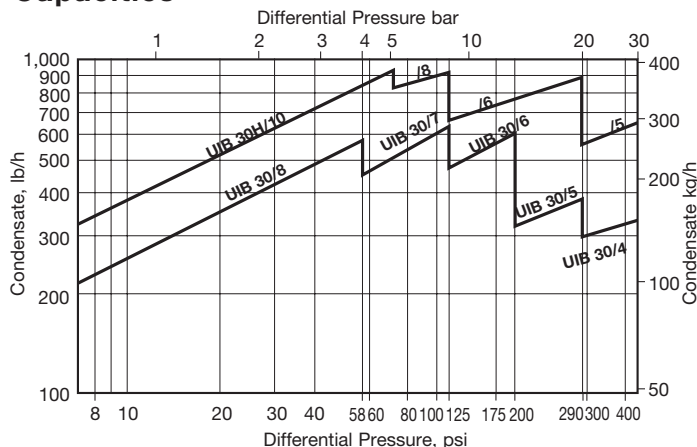
A - A Flanged ANSI 300, screwed and socket weld

C - C Flanged ANSI 150

### Typical Applications

Steam tracing, steam main drip stations, laundry equipment, industrial dryers, and storage tanks.

### Capacities



### Construction Materials

No.	Part	Material
1	Cover	Stainless Steel
2	Body	Stainless Steel
3	Bucket	Stainless Steel
4	Valve Guide Plate	Stainless Steel
5	Valve Seat	Stainless Steel
6	Valve	Stainless Steel
7	Valve Lever	Stainless Steel
8	Internal Tube	Stainless Steel
9	Guide	Stainless Steel
10	Flange	Alloy Steel
12	Connector Screw	Steel
13	Inlet Gasket	Stainless Steel & Filler (Asbestos Free)
14	Outer Gasket	Stainless Steel & Filler (Asbestos Free)

**Note:** The body/cover weld joint is to BS4870 (1981) and complies with ASME section IX.

Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only.

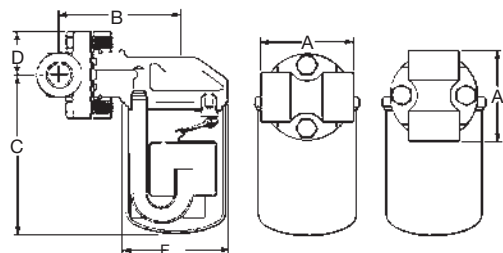
In the interests of development and improvement of the product, we reserve the right to change the specification.

TI-2-412-US 4.15



# UIB30 and UIB30H Sealed Inverted Bucket Steam Trap

(for use with Universal Connectors)



Dimensions (nominal) in inches and millimeters

Size	A	B	C (UIB30)	C (UB30H)	D	E (UIB30)	E (UIB30H)	Weight
1/2"	2.4 61	3.4 86	4.9 125	6.3 160	1.3 34	3.1 80	5.24 2.44	4.8 lb 2.19kg
3/4"	2.9 74	3.3 84	4.9 125	6.3 160	1.3 34	3.1 80	5.5 2.47	5.5 lb 2.22kg
1"	3.5 90	3.4 87	4.9 125	6.3 160	1.3 34	3.1 80	5.7 2.60	5.2 lb 2.38 kg

## Sample Specification

Steam trap shall be supplied with a pipeline connector which, once installed, remains in the pipeline permanently. Trap shall be attached to the connector by two bolts to enable simple and rapid installation and replacement. The connection is designed to allow installation on pipework that is vertical, horizontal, or any angle in between. The trap itself shall be inverted bucket type of all-stainless steel construction which resists distortion due to freeze-up and waterhammer. Trap to have a forged body and drawn cover fully weld-sealed against leakage. Operation shall be self-priming, with orifice size selected for the capacity required by the application, and suitable for working pressures to 435 psig.

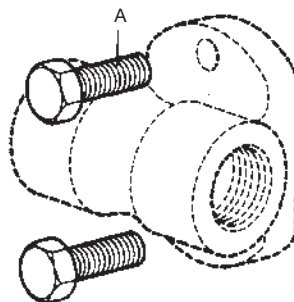
## Installation

The connector can be installed in horizontal or vertical lines. The connector face must be in a vertical plane. The trap should be fitted to the connector with the body pointing downward. Full-port isolating valves should be installed upstream and downstream of the connector.

## Maintenance

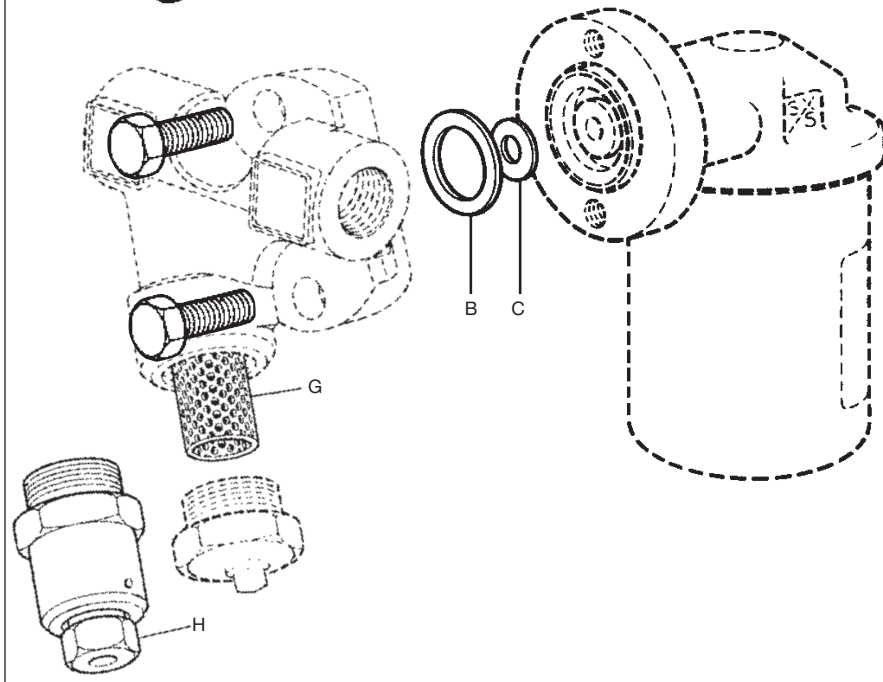
The trap can be removed for repair or replacement without disturbing the connector piping connections. Complete isolation of the connector from both the supply and return lines is required before the trap is removed. **Complete installation and maintenance instructions are given in the IMI sheet, which accompanies the product.**

## Spare Parts



Connector Screw & Gasket Set	A, B, C
Strainer Screen	G
Blowdown Valve	H

Available spare parts are shown in heavy outline. Parts drawn in broken line are not supplied as spares.



## USM21 and USM32

### Sealed Bimetallic Steam Trap (for use with Universal Connectors)

Model	USM21	USM32
PMO	300 psig	464 psig
Trap Construction	Stainless Steel	
Connector Sizes	1/2", 3/4", 1"	
Connector Connections	NPT, SW	
Connector Construction	Straight or strainer type (left or right hand) Stainless steel or cast steel	
Connector Options	SW connections to ANSI B16.11 Carbon steel USTSII trap station	

#### Description

The USM21 and USM32 is a pre-set and maintenance free sealed bimetallic steam trap manufactured in stainless steel. It is designed for applications such as steam tracing and main drips. When installed in any position with a suitable connector the USM21 or USM32 can easily and simply be removed without breaking in the pipeline, thus speeding up trap replacement with minimal system downtime.

#### Materials

No. Part	Material	
1 Body	Stainless steel	ASTM A351 CF8
2 Cover	Stainless steel	
3 Seat	Stainless steel	
4 Stem	Stainless steel	
5 Bimetal	Nickel alloy	
6 Lock-nuts	Stainless steel	
7 Body/seat gasket	Stainless steel	
8 Screen	Stainless steel	
9 Inner gasket	Stainless steel / Graphite filler	Spirally wound AISI 304 strip
10 Outer gasket	Stainless steel / Graphite filler	Spirally wound AISI 304 strip
11 Connector screws	Carbon steel	ASTM A193 B7

#### Capacities #/hr. Flow

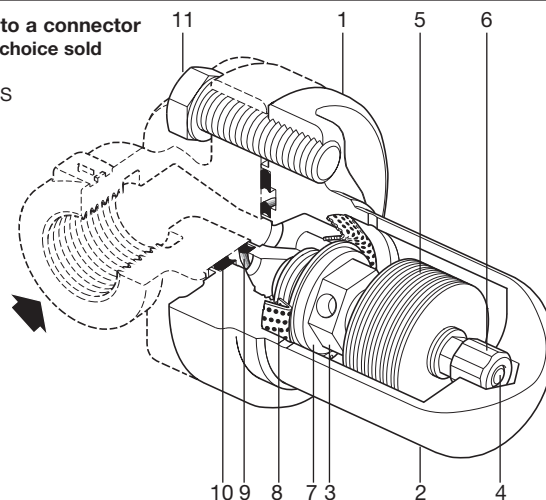
Pressure (psig)	USM21		USM32	
	Cold Condensate	Hot condensate	Cold Condensate	Hot condensate
10	499	177	1966	349
25	995	300	2680	518
50	1677	447	3387	697
65	1954	520	3701	781
100	2507	666	4282	940
150	3027	842	4910	1118
200	3396	898	5412	1266
300	3917	988	6207	1507
400			6841	1705
435			7193	1818

Traps are available in a range of subcooled temperature settings. Except for start-up and shutdown, they must operate above the minimum differential pressure values shown in the table below:

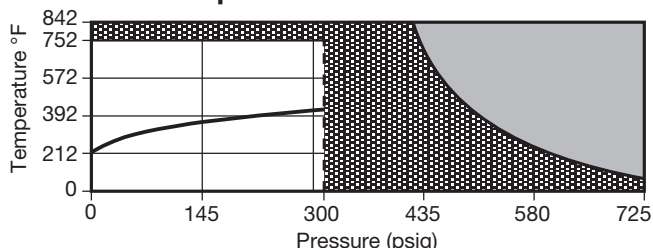
	Nominal subcooled temperature	External identification	Minimum differential pressure
USM21	-18°F (-10°C)	"-1"	73 psig (5 bar g)
USM21	-54°F (-30°C)	"-3"	29 psig (2 bar g)
USM21	-90°F (-50°C)	"-5"	8 psig (0.5 bar g)
USM21	-126°F (-70°C)	"-7"	2 psig (0.1 bar g)
USM32	-30°F (-18°C)	N/A	15 psig (1 bar g)

USM21 fitted to a connector (Connector of choice sold separately)

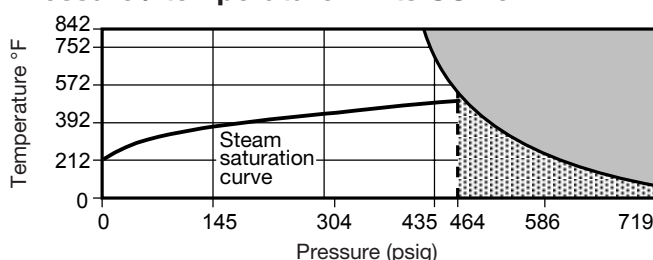
See TI-2-519-US



#### Pressure / temperature limits USM21



#### Pressure / temperature limits USM32



- The product **must not** be used in this region.
- The product should not be used in this region or beyond its operating range as damage to the internals may occur.

#### Limiting Operating Conditions

##### USM21

Max operating pressure (PMO) 300 psig (21 bar g)  
Max operating temperature (TMO) 752°F (400°C)

##### USM32

Max operating pressure (PMO) 464 psig (32 bar g)  
Max operating temperature (TMO) 842°F (400°C)

# USM21 and USM32

## Sealed Bimetallic Steam Trap (for use with Universal Connectors)

### Pressure Shell Design Conditions

#### USM21

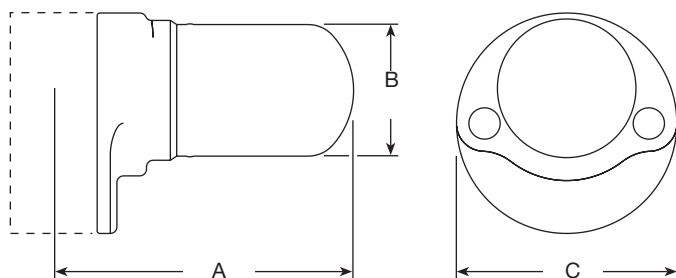
PMA Max allowable pressure 725 psig @ 104°F  
(50 barg @ 40°C)

TMA Max allowable temperature 842°F @ 420 psig  
(400°C @ 29 barg)

#### USM32

PMA Max allowable pressure 719 psig @ 100°F  
(49.6 barg @ 38°C)

TMA Max allowable temperature 842°F @ 418 psig  
(450°C @ 28.8 barg)



### Sample Specification

Steam trap shall be a sealed stainless steel bimetallic thermostatic USM21 or USM32 type manufactured in stainless steel and be suitable for operating pressures up to 300 psig(21 barg). The traps to be zero maintenance and to be connected to separate pipeline connectors or universal trap station, by two screws for quick and simple installation/ replacement. The thermostatic element has 4 operating ranges and will discharge condensate at 18, 54,90 and 126 deg F blow steam temperature depending on you choice of range. Trap can be installed in any plane.

### Installation

The connector can be installed in horizontal or vertical pipeline. The trap station USTS II in horizontal pipeline. The connector face must be in a vertical plane. The trap shall be fitted to the connector or trap station with 2 bolts with a torque of 22-26 FT-LB. Full port isolation valves should be installed upstream and down stream of the trap connector unit.

### Maintenance

Trap must be isolated and cooled before performing any work. There are no internal parts, which can be serviced. Trap module will be completely replaced if it is determined to be failed. 9/16" socket will remove bolts to allow for remove of the trap module. Make sure gasket surface on connector is clean and replace with a new module. Torque to 22-26 FT-LB. Apply steam and check for proper operation and any steam leaks. Complete Installation and maintenance instruction are given on the IM-P625-03, which accompanies the product.

Connector Size	A Straight Connector	A Strainer Connector	A USTS II
1/2"	4.1"	4.1"	3.7"
3/4"	4.1"	4.1"	3.7"
1"	4.5"	4.5"	N/A
all	B	C	WEIGHT TRAP ONLY
all	1.6"	2.7"	1.3 lb

### Spare parts

The USM21 and the USM32 are sealed non-maintainable trap units. No internal spares are available. The spares which are available are shown in heavy outline. Parts shown in a broken line are not available as spares.

#### Available spares: USM21 and USM32

Connector screws (2 off) 11

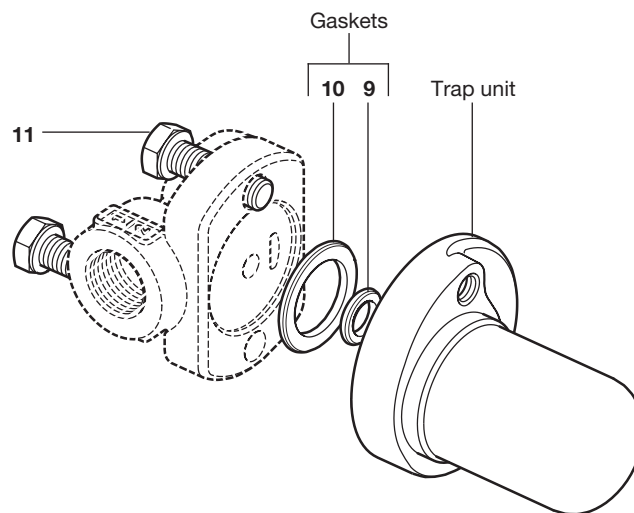
Complete trap unit inclusive of gaskets (9 and 10) and connector screws (11)

**Note:** The gaskets contain sharp metal reinforcement, please handle with care.



#### How to order spares

Always order spares by using the description given in the column headed 'Available spares' and state if ordering a complete trap the nominal operating temperature of the steam trap.

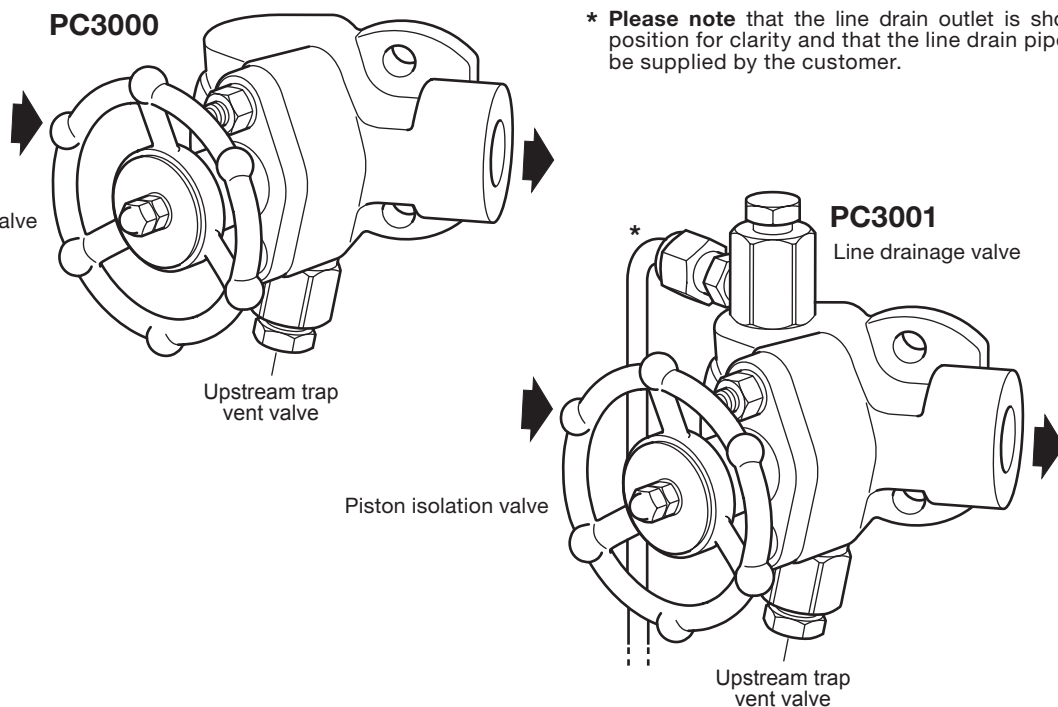
**Example:** Connector screws for a USM21 sealed bimetallic steam trap.



### Recommended tightening torques

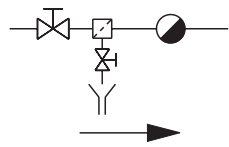
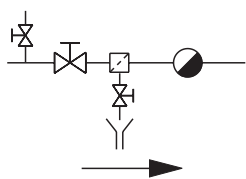
Item No.	Part	 or  mm	22 - 26 ft-lb
11	Connector screws	9/16"	30 - 35 Nm

## PC3000 and PC3001 Pipeline Connectors



### Description

The PC3000 range of pipeline connectors are designed for use with two bolt universal swivel connector steam traps. Incorporating one integral piston stop valve it is possible to isolate upstream of the steam trap and through the use of the fitted depressurization valve, also possible to depressurize it. The trap depressurization port also incorporates a maintainable 40 mesh stainless steel strainer screen to provide trap protection from system dirt and debris. The PC3001 is also fitted with a line drainage valve upstream of the isolation valve.

Available types	left to right (shown) or right to left	<b>PC3000</b>	1 x Piston isolation valves with 1 x Upstream trap vent valve	
		<b>PC3001</b>	1 x Piston isolation valves with 1 x Upstream trap vent valve and 1 x Line drain valve	

**For available options** to the pipeline connections detailed within this Technical Information sheet please reference TI-F01-37.

**Note:** Units are also available without vent/drain ports. These are known as the **PC30** - See Technical Information sheet TI-P128-02.

**Standards** - These products fully comply with the requirements of the European Pressure Equipment Directive 97/23/EC.

**Certification** - These products are available with certification to EN 10204 3.1. **Note:** All certification/inspection requirements must be stated at the time of order placement. For other certification contact Spirax Sarco.

### Sizes and pipe connections

1/2" and 3/4" condensate inlet / outlet connections are available with screwed NPT (or optional BSP) and as a socket weld connection to ASME B16.11 class 3000. Drainage and venting connections have an M18 thread as standard.

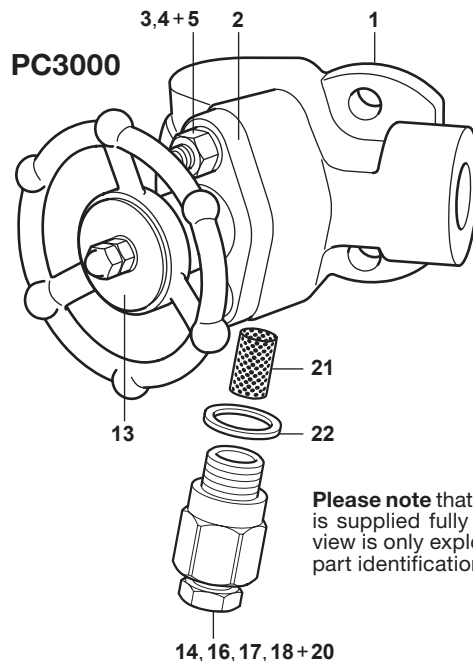
Flanged versions are also available upon request. Please contact Spirax Sarco for further details.

*Local regulation may restrict the use of this product below the conditions quoted.  
Limiting conditions refer to standard connections only.*

# PC3000 and PC3001 Pipeline Connectors

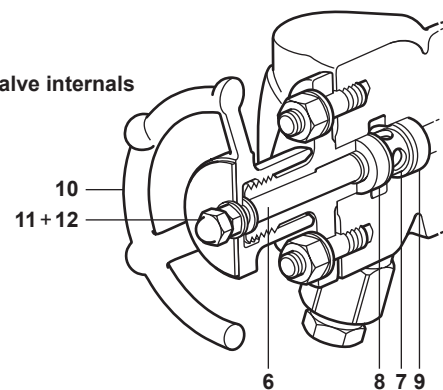
## Materials

No. Part	Material		
1	Pipeline connector body	Austenitic stainless steel	ASTM A182F : 304/304L
2	Bonnet	Carbon steel (Zinc plated)	ASTM A105N/LF2
3	Studs	Steel (plated)	ASTM A193 B7
4	Nuts	Steel (plated)	ASTM A194 2H
5	Washers	Stainless steel	
6	Piston	Stainless steel	AISI 410 : 1.4006
7	Lantern bush	Stainless steel	ASTM A276 : AISI 431
8	Upper ring	Graphite and stainless steel	
9	Lower ring	Graphite and stainless steel	
10	Handwheel	Carbon steel (Zinc plated)	EN 10213 : 1.0619N
11	Handwheel nuts	Stainless steel	
12	Washers	Steel	
13	Name-plate	Stainless steel	
14	Depressurization valve	Stainless steel	ASTM A182 : 304/304L
15	Line drain valve	Stainless steel	ASTM A182 : 304/304L
16	Valve screw	Stainless steel	ASTM A276 : AISI 431
17	Valve cone	Stainless steel	AISI 440 B
18	Retaining ring	Stainless steel	BS 2056 302 S26
19	Compression fitting for the line drain valve only	Carbon steel (Zinc plated)	
20	Valve gasket	Graphite and stainless steel	
21	Strainer screen	Stainless steel	
22	Depressurization valve gasket	Graphite	

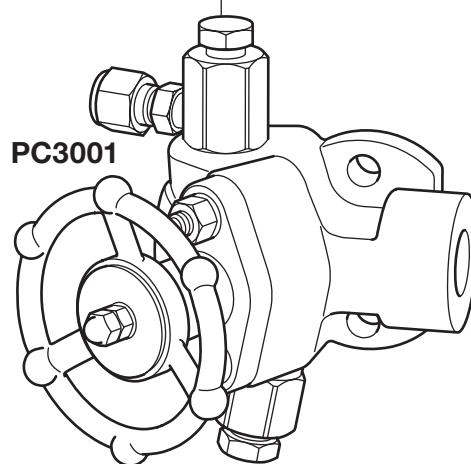


**Please note** that the PC3000 unit is supplied fully assembled; the view is only exploded for ease of part identification.

View showing valve internals



15, 16, 17, 18, 19+20

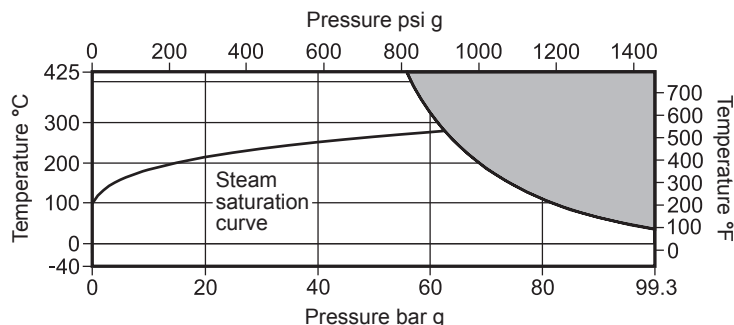


# PC3000 and PC3001 Pipeline Connectors

## Pressure / temperature limits (ISO 6552)

**PC3000**

**PC3001**



The product **must not** be used in this region or beyond the parameter of the PMA or TMA of the relative end connection - See notes below.

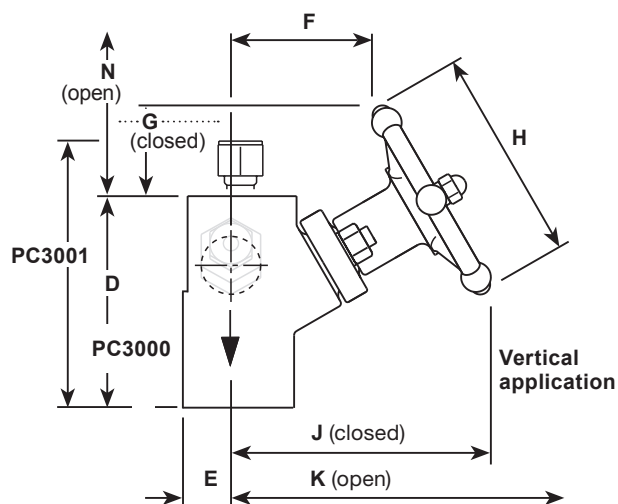
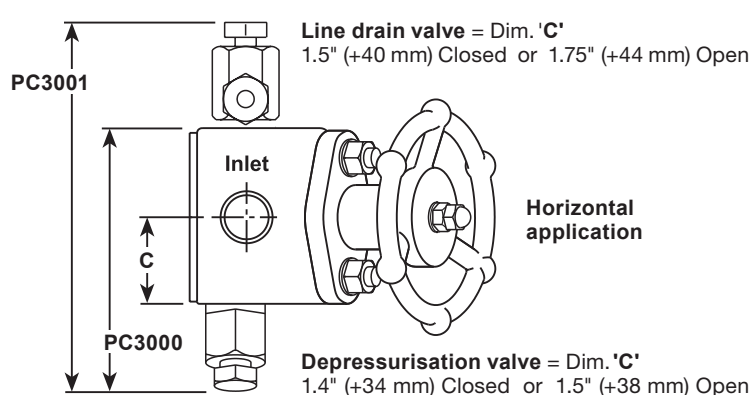
Body design condition			ASME 600
PMA	Maximum allowable pressure	99.3 bar g @ 38°C	1440 psi g @ 100°F
TMA	Maximum allowable temperature	425°C @ 56 bar g	797°F @ 812 psi g
	Minimum allowable temperature	-40°C	-40°F
PMO	Maximum operating pressure for saturated steam service	62 bar g @ 279°C	899 psi g @ 534°F
TMO	Maximum operating temperature	425°C @ 56 bar g	797°F @ 812 psi g
	Minimum operating temperature	-40°C	-40°F
Designed for a maximum cold hydraulic test pressure of: 150 bar g			2 175 psi g

### Notes:

1. If flange connections are fitted then these will limit the maximum and minimum design conditions of the pipeline connector.
2. The maximum operating limits of the complete assembly will be dictated by the steam trap of choice. Reference the specific steam trap technical information sheet for its 'Pressure/temperature limits'.

## Dimensions / weight (approximate)

Units	C	D	E	F	G	H	J	K	N	Weight
Inches (mm)	1.4 (36)	3.5 (90)	1 (25)	2 (50)	1.4 (35)	3.5 (90)	3.9 (99)	4.53 (115)	1.97 (50)	7.9 lbs (3.6 kg)



## How to order

### Example:

1 off ½" Spirax Sarco PC3000 pipeline connector having right to left flow and socket weld end connections to ASME B 16.11 Class 3000.



# PC3000 and PC3001 Pipeline Connectors

## Safety information, installation and maintenance

For full details see the Installation and Maintenance Instructions (IM-P128-35) supplied with the product.

### General information

There are two criteria which must be satisfied to ensure that the swivel connector trap will operate correctly and ensure effective condensate removal:

1. The PC3000 and PC3001 shall be installed with flow in the direction of the arrow. Flow can be horizontal (left to right or right to left), vertical or inclined.
2. The connection face for the swivel connector steam trap must be in the vertical plane unless stated on relevant steam trap Installation and Maintenance Instructions.

After installation it is recommended that the pipeline connector is insulated to minimize radiated heat losses and to protect personnel from burns risk.

### Depressurization and line drainage

The overall assembly is supplied fitted with valve(s) which allow depressurization and line drainage (PC3001 only) of the system to enable safe removal and maintenance of the steam trap. Consideration must be given to the position of the discharge which should be directed or piped to a safe place where it will not injure personnel or damage equipment.

### Disposal

This product is recyclable. No ecological hazard is anticipated with the disposal of this product, providing due care is taken.

## Spare parts

The spare parts available are shown in heavy outline. Parts drawn in broken line are not supplied as spares. For ease of replacement an extractor tool is available for removing the sealing rings.

### Available spares



Piston Valve Sealing Ring	8 and 9
Piston Valve Assembly	2, 4, 5, 6, 7, 8, 9, 10, 11 and 12
Extractor Tool	Not shown
Blowdown Valve and Gasket Kit	14 and 21
Line Drain and Gasket Kit	15
Blowdown Valve, Strainer Screen and Gasket Kit	14, 21 and 22
Blowdown Valve Gasket Kit (set of 10)	22
Strainer Screen and Gasket Kit	21 and 22

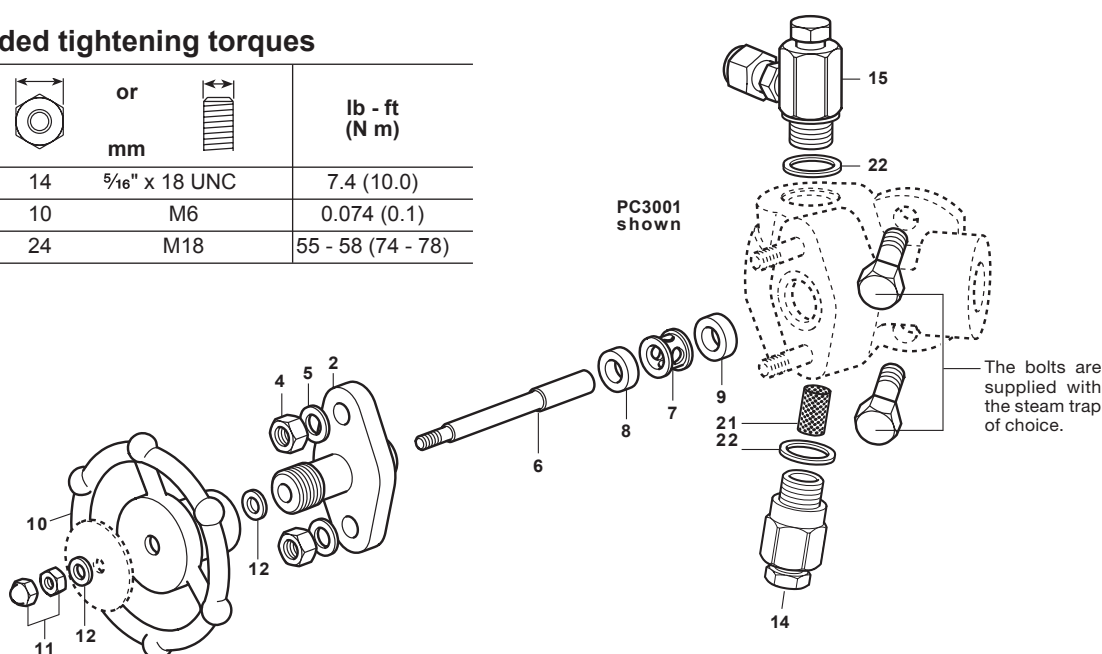
### How to order spares

Always order spares by using the description given in the column headed 'Available spares' and state type and size of equipment.

**Example:** 1 off Sealing ring set for an integral piston valve on a PC3000 pipeline connector having DN15 socket weld connections.

## Recommended tightening torques

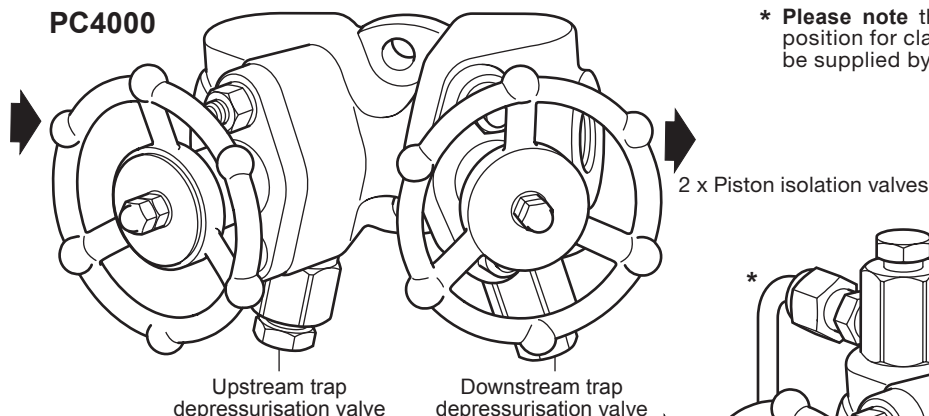
Item	 or 	mm	lb - ft (N m)
4		14 5/16" x 18 UNC	7.4 (10.0)
11		M6	0.074 (0.1)
14 and 15		M18	55 - 58 (74 - 78)





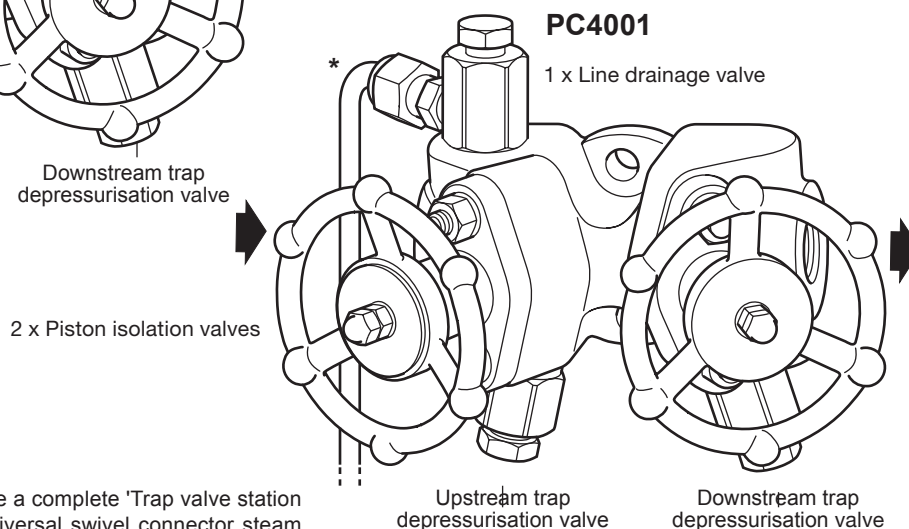
## PC4000 and PC4001 Pipeline Connectors

PC4000



\* Please note that the line drain outlet is shown out of position for clarity and that the line drain pipework is to be supplied by the customer.

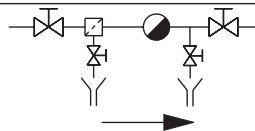
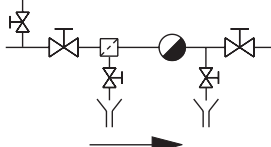
PC4001



### Description

The PC4000 range of pipeline connectors are a complete 'Trap valve station' developed for use with two bolt universal swivel connector steam traps.

As the unit has been designed with two integral piston stop valves, it is possible to isolate both upstream and downstream of the universal trap connection and through the use of the fitted depressurization valves, possible to depressurize, test and drain the pipeline. The trap depressurization port also incorporates a maintainable 40 mesh stainless steel strainer screen to provide trap protection from system dirt and debris, which can be cleared through the use of the line pressure.

Available types	left to right (shown)	PC4000	2 x Piston isolation valves with 1 x Upstream trap depressurization valve and 1 x Downstream trap depressurization valve	
	or right to left	PC4001	2 x Piston isolation valves with 1 x Upstream trap depressurization valve and 1 x Downstream trap depressurization valve and 1 x Line drain valve	

**For available options** to the pipeline connections detailed within this Technical Information sheet please reference TI-F01-37.

**Note:** Units are also available without vent/drain ports. These are known as the **PC40** - See Technical Information sheet TI-P128-03.

**Standards** - These products fully comply with the requirements of the European Pressure Equipment Directive 97/23/EC.

**Certification** - These products are available with certification to EN 10204 3.1. **Note:** All certification/inspection requirements must be stated at the time of order placement. For other certification contact Spirax Sarco.

### Sizes and pipe connections

1/2" and 3/4" condensate inlet / outlet connections are available with screwed NPT (or optional BSP) and as a socket weld connection to ASME B16.11 class 3000. Drainage and venting connections have an M18 thread as standard.

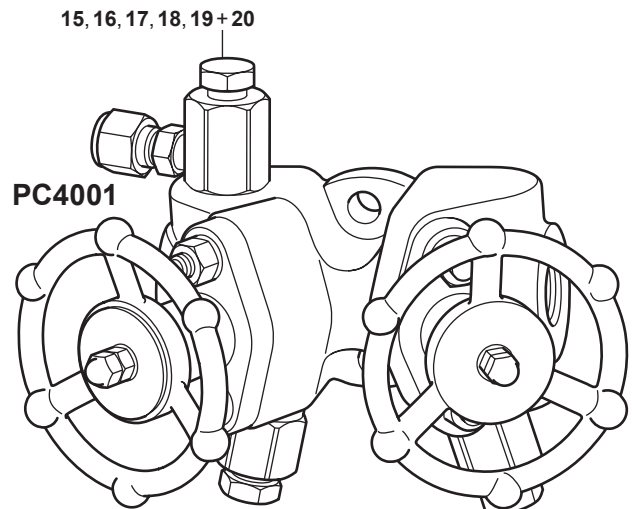
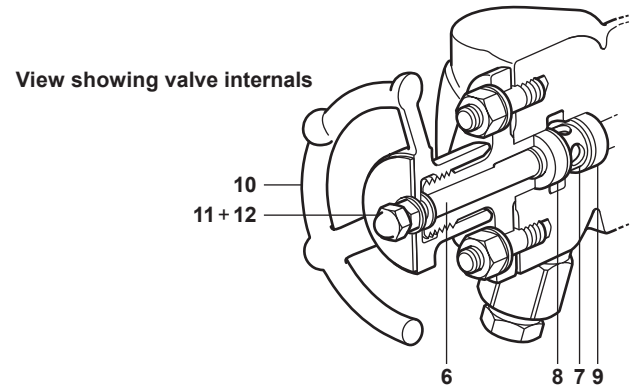
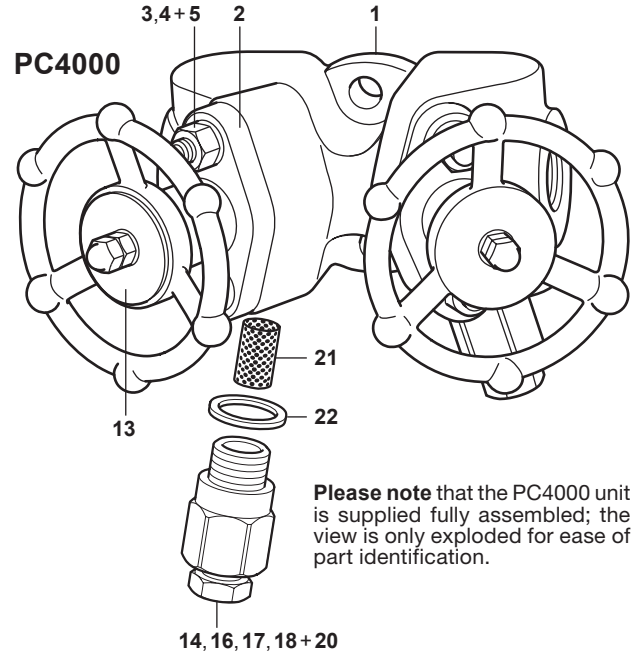
Flanged versions are also available upon request. Please contact Spirax Sarco for further details.

*Local regulation may restrict the use of this product below the conditions quoted.  
Limiting conditions refer to standard connections only.*

# PC4000 and PC4001 Pipeline Connectors

## Materials

No.	Part	Material	
1	Pipeline connector body	Austenitic stainless steel	ASTM A182F : 304/304L
2	Bonnet	Carbon steel (Zinc plated)	ASTM A105N/LF2
3	Studs	Steel (plated)	ASTM A193 B7
4	Nuts	Steel (plated)	ASTM A194 2H
5	Washers	Stainless steel	
6	Piston	Stainless steel	AISI 410 : 1.4006
7	Lantern bush	Stainless steel	ASTM A276 : AISI 431
8	Upper ring	Graphite and stainless steel	
9	Lower ring	Graphite and stainless steel	
10	Handwheel	Carbon steel (Zinc plated)	EN 10213 : 1.0619N
11	Handwheel nuts	Stainless steel	
12	Washers	Steel	
13	Name-plate	Stainless steel	
14	Depressurization valve	Stainless steel	ASTM A182 : 304/304L
15	Line drain valve	Stainless steel	ASTM A182 : 304/304L
16	Valve screw	Stainless steel	ASTM A276 : AISI 431
17	Valve cone	Stainless steel	AISI 440 B
18	Retaining ring	Stainless steel	BS 2056 302 S26
19	Compression fitting for the line drain valve only	Carbon steel (Zinc plated)	
20	Valve gasket	Graphite and stainless steel	
21	Strainer screen	Stainless steel	
22	Depressurization valve gasket	Graphite	

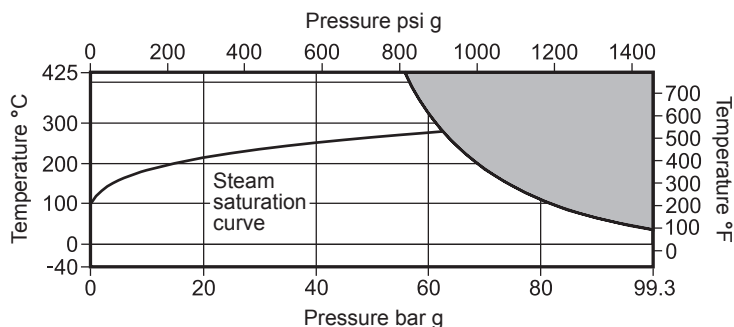


# PC4000 and PC4001 Pipeline Connectors

## Pressure / temperature limits (ISO 6552)

PC4000

PC4001



The product **must not** be used in this region or beyond the parameter of the PMA or TMA of the relative end connection - See notes below.

Body design condition			ASME 600
PMA	Maximum allowable pressure	99.3 bar g @ 38°C	1 440 psi g @ 100°F
TMA	Maximum allowable temperature	425°C @ 56 bar g	797°F @ 812 psi g
	Minimum allowable temperature	-40°C	-40°F
PMO	Maximum operating pressure for saturated steam service	62 bar g @ 279°C	899 psi g @ 534°F
TMO	Maximum operating temperature	425°C @ 56 bar g	797°F @ 812 psi g
	Minimum operating temperature	-40°C	-40°F
Designed for a maximum cold hydraulic test pressure of:			150 bar g / 2 175 psi g

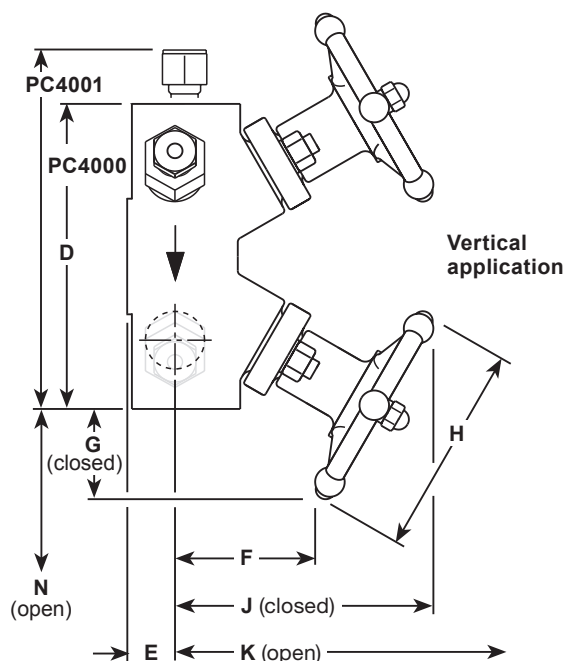
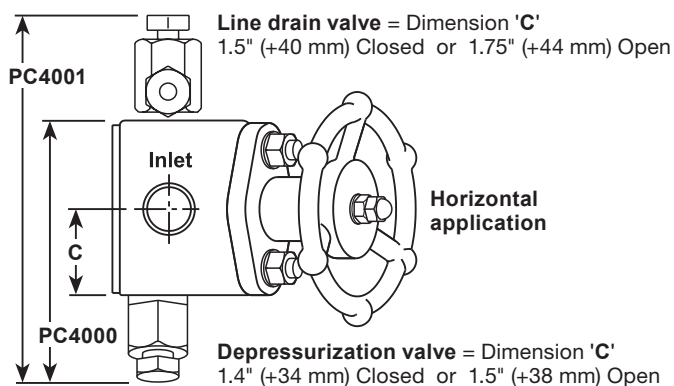
### Notes:

1. If flange connections are fitted then these will limit the maximum and minimum design conditions of the pipeline connector.

2. The maximum operating limits of the complete assembly will be dictated by the steam trap of choice. Reference the specific steam trap technical information sheet for its 'Pressure/temperature limits'.

## Dimensions / weight (approximate)

Units	C	D	E	F	G	H	J	K	N	Weight
Inches (mm)	1.4 (36)	4.9 (125)	1 (25)	2 (50)	1.4 (35)	3.5 (90)	3.9 (99)	4.53 (115)	1.97 (50)	7.9 lbs (3.6 kg)



## How to order

### Example:

1 off ½" Spirax Sarco PC4000 pipeline connector having right to left flow and socket weld end connections to ASME B 16.11 Class 3000.

TI-P128-33-US 10.15

# PC4000 and PC4001 Pipeline Connectors

## Safety information, installation and maintenance

For full details see the Installation and Maintenance Instructions (IM-P128-35) supplied with the product.

### General information

There are two criteria which must be satisfied to ensure that the swivel connector trap will operate correctly and ensure effective condensate removal:

1. The PC4000 and PC4001 shall be installed with flow in the direction of the arrow. Flow can be horizontal (left to right or right to left), vertical or inclined.
2. The connection face for the swivel connector steam trap must be in the vertical plane unless stated on relevant steam trap Installation and Maintenance Instructions.

After installation it is recommended that the pipeline connector is insulated to minimize radiated heat losses and to protect personnel from burns risk.

### Depressurization and line drainage

The overall assembly is supplied fitted with valves which allow depressurization and line drainage (PC4001 only) of the system to enable safe removal and maintenance of the steam trap. Consideration must be given to the position of the discharge which should be directed or piped to a safe place where it will not injure personnel or damage equipment.

### Disposal

This product is recyclable. No ecological hazard is anticipated with the disposal of this product, providing due care is taken.

## Spare parts

The spare parts available are shown in heavy outline. Parts drawn in broken line are not supplied as spares. For ease of replacement an extractor tool is available for removing the sealing rings.

### Available spares



Piston Valve Sealing Ring	8 and 9
Piston Valve Assembly	2, 4, 5, 6, 7, 8, 9, 10, 11 and 12
Extractor Tool	Not shown
Blowdown Valve and Gasket Kit	14 and 21
Line Drain and Gasket Kit	15
Blowdown Valve, Strainer Screen and Gasket Kit	14, 21 and 22
Blowdown Valve Gasket Kit (set of 10)	22
Strainer Screen and Gasket Kit	21 and 22

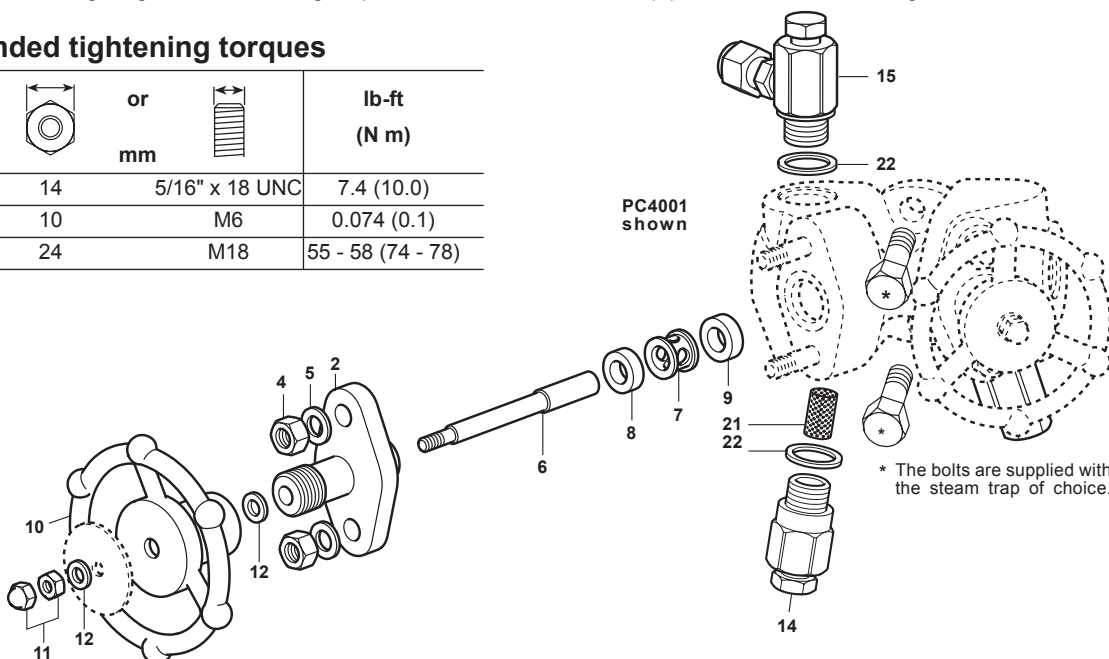
### How to order spares

Always order spares by using the description given in the column headed 'Available spares' and state type and size of equipment.

**Example:** 1 off Sealing ring set for an integral piston valve on a PC4000 pipeline connector having DN15 socket weld connections.

## Recommended tightening torques

Item		or mm		lb-ft (N m)
4	14	5/16" x 18 UNC		7.4 (10.0)
11	10	M6		0.074 (0.1)
14 and 15	24	M18		55 - 58 (74 - 78)

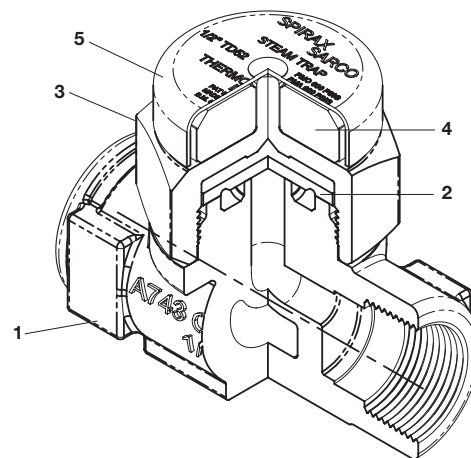


# spirax sarco

## Thermo-Dynamic® Steam Trap TD52

The **Thermo-Dynamic® steam trap** cycles periodically to discharge condensate very near to steam temperature. It is unaffected by waterhammer or superheat.

Model	TD52
<b>PMO</b>	600 psig
<b>Sizes</b>	3/8", 1/2", 3/4", 1"
<b>Connections</b>	NPT
<b>Construction</b>	stainless steel



### Capacities

Pounds of condensate per hour continuous discharge at saturated steam temperature to atmosphere

Inlet Pressure		3/8" TD52	1/2" TD52	TD52	TD52
psig	barg	1/2" TD52L	3/4" TD52L	3/4"	1"
3.5	.24	180	300	405	640
5	.34	185	310	420	670
10	.69	190	345	470	725
20	1.4	200	410	560	865
30	2.1	215	465	640	980
50	3.5	245	575	810	1200
75	5.2	305	700	1000	1470
100	6.9	370	810	1160	1750
150	10.3	500	1000	1450	2200
200	13.8	610	1140	1670	2600
250	17.2	700	1270	1900	2900
300	20.7	790	1410	2100	3250
350	24.1	880	1530	2250	3500
400	27.6	960	1630	2430	3780
450	31.0	1050	1730	2600	4020
500	34.5	1100	1830	2750	4250
550	37.9	1160	1910	2900	4450
600	41.4	1250	2000	3050	4700

### Limiting Operating Conditions

**Max. Operating Pressure (PMO)** 600 psig(42 barg)

**Max. Operating Temperature** 800°F (427°C) at all operating pressures

*Minimum pressure for satisfactory operation is 3.5 psig, (0.24 barg).*

*Maximum back pressure should not exceed 80% of the inlet pressure under any conditions of operation, otherwise the trap may not shut.*

### Pressure Shell Design Conditions

**PMA** 600 psig/up to 800°F 42 barg/up to 427°C  
Max. allowable pressure

**TMA** 800°F/0-600 psig 427°C/0-42 barg  
Max. allowable temperature

### Construction Materials

No.	Part	Material
1	Body	Stainless Steel (with ENP) ASTM A743 GR. CA40F
2	Disc	Stainless Steel AISI 420
3	Cap	Stainless Steel (with ENP) ASTM A743 GR. CA40F
4	Insulator	Ceramic
5	Nameplate Cover	Stainless Steel Type 304

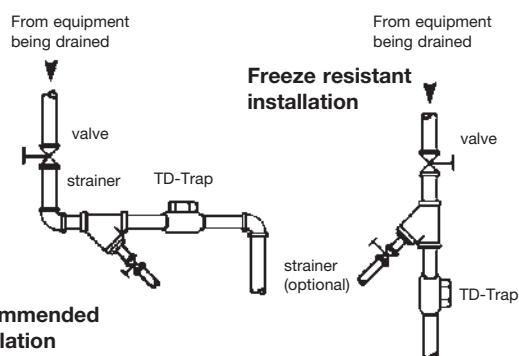
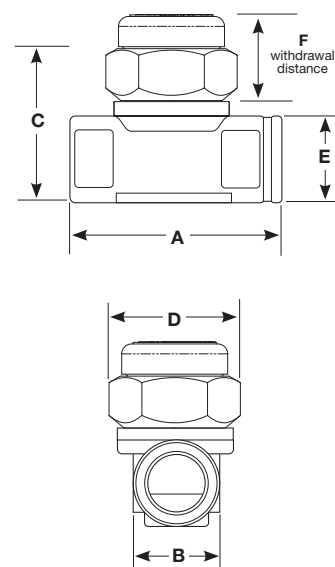
### Typical Applications

Steam main drainage and tracer lines, process equipment, laundry and kitchen equipment, superheated steam applications, outdoor installations subject to freezing.

# Thermo-Dynamic® Steam Trap

## TD52

Dimensions (nominal) in inches and millimeters							
Type	A	B	C	D	E	F	Weight
3/8" TD52	2 50.8	1.03 26.2	2.2 55.9	1.7 43.2	1 25.4	.4 10.2	.84 lbs .38 kg
1/2" TD52L	2.7 68.6	1.24 31.5	2.5 63.5	1.7 43.2	1.2 30.4	.4 10.2	1.2 lbs .54 kg
1/2" TD52	2.7 68.6	1.24 31.5	2.5 63.5	1.8 45.7	1.2 30.4	.4 10.2	1.2 lbs .54 kg
3/4" TD52L	2.8 71.1	1.56 39.6	2.8 71.1	1.8 45.7	1.5 38.1	.4 10.2	1.94 lbs .88 kg
3/4" TD52	2.8 71.1	1.56 39.6	2.9 73.7	2.1 53.3	1.5 38.1	.4 10.2	1.94 lbs .88 kg
1" TD52	3.3 83.8	1.91 46	3.4 86.4	2.5 63.5	1.8 45.7	.6 15.2	3.13 lbs 1.42 kg



### Installation

The preferred installation is in the horizontal position as close as possible to equipment being drained. Install strainer (20 mesh) upstream and full port isolating valves upstream and downstream of trap. Piping to and from the trap should be at least equal to or one size larger than trap connection. Do not weld pipe connection to trap. Body material is not suitable for welding.

For freeze resistant installations, all drains must be pitched toward the trap for gravity flow. Trap must be installed vertically, discharging downward. Discharge piping must be self-draining.

### Sample Specification

Steam trap shall be all stainless steel thermo-Dynamic® disc type with connections on a common center line, which will operate in any position. Integral seat design with hardened disc and seating surfaces. Trap to have integral insulating cap.

### Maintenance

This product can be maintained without disturbing the piping connections. Complete isolation of the trap from both supply and return line is required before any servicing is performed.

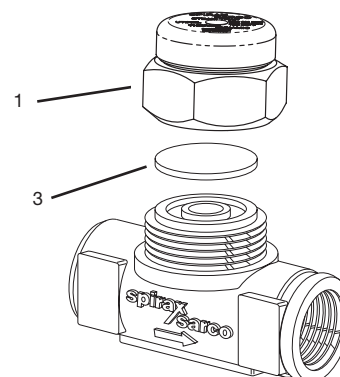
The trap should be disassembled periodically for inspection and cleaning of the disc and seat.

The only wearing parts of the trap are the disc and seat rings, which should be inspected and cleaned periodically. Slight wear can often be corrected by resurfacing on a lapping plate.

**Caution: Only perform maintenance after trap has been isolated.**

Complete installation and maintenance instructions are given in IM-2-516-US, which accompanies the product.

### Spare Parts



Disc	3
Cap Assembly	1

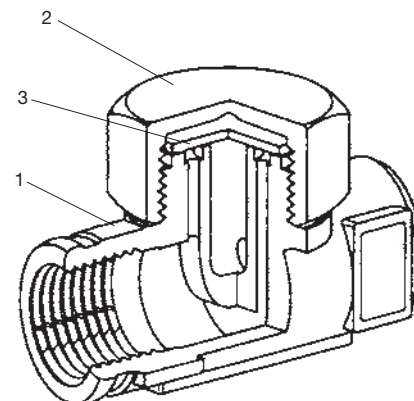




## Thermo-Dynamic® Steam Trap TDC

The **Thermo-Dynamic® steam trap** cycles periodically to discharge condensate very near to steam temperature. It is unaffected by waterhammer or superheat.

Model	TDC
<b>PMO</b>	600 psig
<b>Sizes</b>	3/8", 1/2", 3/4", & 1"
<b>Connections</b>	NPT
<b>Construction</b>	Stainless Steel



### Capacities

Pounds of condensate per hour  
continuous discharge at saturated steam temperature to atmosphere

Inlet Pressure		3/8" TDC	1/2" TDC	TDC 3/4"	TDC 1"
psig	barg				
3.5	.24	180	300	405	640
5	.34	185	310	420	670
10	.69	190	345	470	725
20	1.4	200	410	560	865
30	2.1	215	465	640	980
50	3.5	245	575	810	1200
75	5.2	305	700	1000	1470
100	6.9	370	810	1160	1750
150	10.3	500	1000	1450	2200
200	13.8	610	1140	1670	2600
250	17.2	700	1270	1900	2900
300	20.7	790	1410	2100	3250
350	24.1	880	1530	2250	3500
400	27.6	960	1630	2430	3780
450	31.0	1050	1730	2600	4020
500	34.5	1100	1830	2750	4250
550	37.9	1160	1910	2900	4450
600	41.4	1250	2000	3050	4700

### Limiting Operating Conditions

**Max. Operating Pressure (PMO)** 600 psig (42 barg)

**Max. Operating Temperature** 800°F (427°C) at all operating pressures

*Minimum pressure for satisfactory operation is 3.5 psig, (0.24 barg)*

*Maximum back pressure should not exceed 80% of the inlet pressure under any conditions of operation, otherwise the trap may not shut.*

### Pressure Shell Design Conditions

**PMA** 600 psig/up to 800°F

*Max. allowable pressure* 42 barg/up to 427°C

**TMA** 800°F/0-600 psig

*Max. allowable temperature* 427°C/0-42 barg

### Construction Materials

No.	Part	Material
1	Body	Stainless Steel
2	Cap	Stainless Steel
3	Disc.	Stainless Steel

ASTM A743 GR. CA40F
ASTM A743 GR. CA40F
AISI 420

### Typical Applications

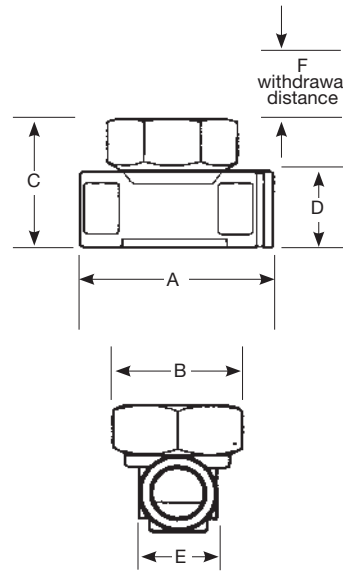
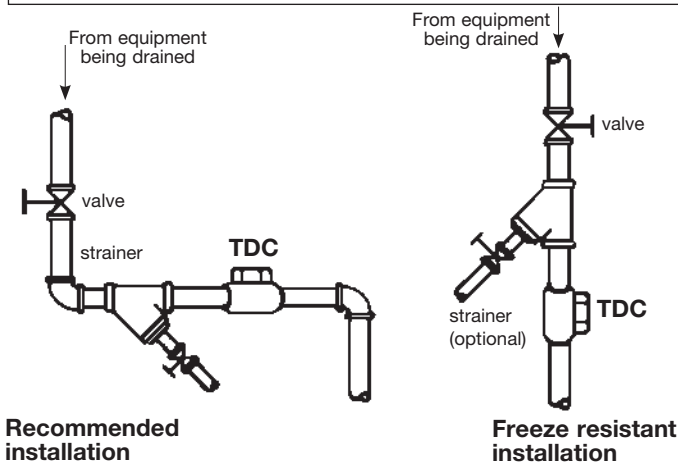
Steam main drainage and tracer lines, process equipment, laundry and kitchen equipment, superheated steam applications, outdoor installations subject to freezing.



# Thermo-Dynamic® Steam Trap

## TDC

Dimensions (nominal) in inches and millimeters							
Size	A	B	C	D	E	F	Weight
3/8" TDC	2 50.8	1.7 43.2	1.7 43.2	1 25.4	1.03 26.2	0.4 10.2	.7 lb .24 kg
1/2" TDC	2.7 68.6	1.7 43.2	2 50.8	1.2 30.5	1.24 31.5	0.4 10.2	0.9 lb .41 kg
3/4" TDC	2.8 71.1	2.1 53.3	2.4 61.0	1.5 38.1	1.56 39.6	0.4 10.2	1.8 lb .82 kg
1" TDC	3.3 83.8	2.5 65.5	2.8 71.1	1.8 45.7	1.87 47.5	0.6 15.2	2.7 lb 1.22 kg



### Installation

The preferred installation is in the horizontal position as close as possible to equipment being drained. Install strainer (20 mesh) upstream and full port isolating valves upstream and downstream of trap. Piping to and from the trap should be at least equal to or one size larger than trap connection. Do not weld pipe connection to trap. Body material is not suitable for welding.

For freeze resistant installations, all drains must be pitched toward the trap for gravity flow. Trap must be installed vertically, discharging downward. Discharge piping must be self-draining.

### Sample Specification

Steam trap shall be all stainless steel Thermo-Dynamic® disc type with connections on a common center line, which will operate in any position. Integral seat design with hardened disc and seating surfaces. Trap to have three hole balanced discharge.

### Maintenance

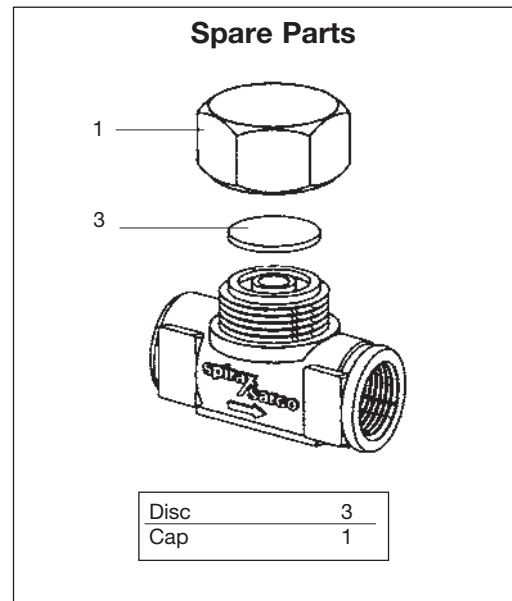
This product can be maintained without disturbing the piping connections. Complete isolation of the trap from both supply and return line is required before any servicing is performed.

The trap should be disassembled periodically for inspection and cleaning of the disc and seat.

The only wearing parts of the trap are the disc and seat rings, which should be inspected and cleaned periodically. Slight wear can often be corrected by resurfacing on a lapping plate.

**Caution: Only perform maintenance after trap has been isolated.**

Complete installation and maintenance instructions are given in IMI 2.5162, which accompanies the product.

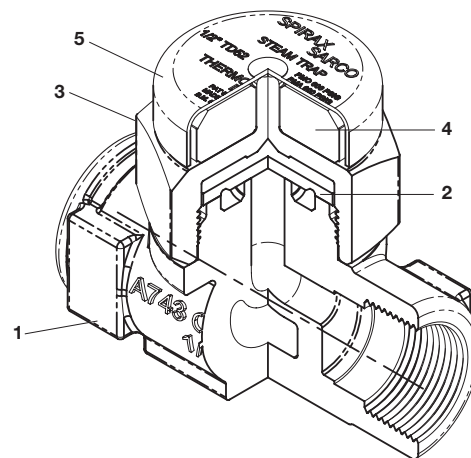




## Thermo-Dynamic® Steam Trap TDT Tracer Trap

The **Thermo-Dynamic® steam trap** cycles periodically to discharge condensate at a sub-cooled temperature. It is unaffected by waterhammer or superheat. Specifically designed as a tracing trap.

Model	TDT
<b>PMO</b>	150 psig
<b>Sizes</b>	1/2"
<b>Connections</b>	NPT
<b>Construction</b>	stainless steel



### Capacities

Pressure psig	Pressure barg	Cold Water lb/hr.	Hot Condensate lb/hr.
10	0.69	440	75
20	1.4	550	100
30	2.1	630	100
50	3.5	830	100
75	5.2	1000	100
100	6.9	1190	100
125	8.6	1340	100
150	10.3	1445	100

### Limiting Operating Conditions

**Max. Operating Pressure (PMO)** 150 psig (10 barg)

**Max. Operating Temperature** 800°F (427°C) at all operating pressures

*Minimum pressure for satisfactory operation is 5 psig, (0.35 barg).*

*Maximum back pressure should not exceed 80% of the inlet pressure under any conditions of operation, otherwise the trap may not shut.*

### Condensate Flow

### Average Operating Subcool Below Saturation

< 50 lb/hr	34°F
< 100 lb/hr.	50°F

### Pressure Shell Design Conditions

**PMA** 600 psig/up to 800°F 42 barg/up to 427°C  
Max. allowable pressure

**TMA** 800°F/0-600 psig 427°C/0-42 barg  
Max. allowable temperature

### Typical Tracer Output for 100ft @ 40°F Product Temperature

Pressure psig barg	3/8" nom. .50 OD	1/2" nom. .625 OD	3/4" nom. .875 OD	1" nom. 1.125 OD
15	15	18	25	33
25	16	20	28	36
50	19	23	32	42
100	22	28	39	50
150	25	31	44	56

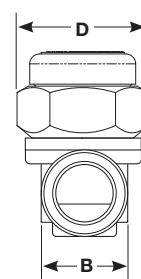
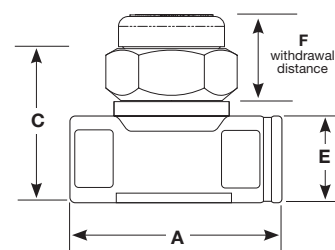
### Typical Applications

Tracer lines and application where subcooling condensate is desired.

# Thermo-Dynamic® Steam Trap

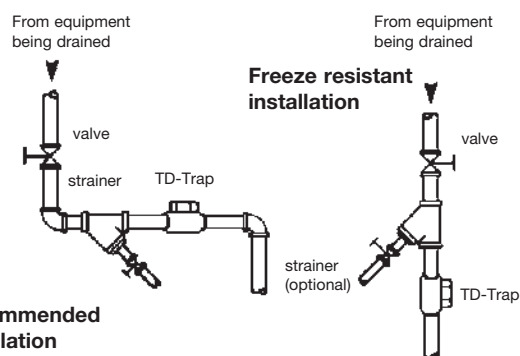
## TDT Tracer Trap

Dimensions (nominal) in inches and millimeters							
Type	A	B	C	D	E	F	Weight
1/2" TD52L	2.7 68.6	1.24 31.5	2.5 63.5	1.7 43.2	1.2 30.4	.4 10.2	1.2 lbs .54 kg



### Construction Materials

No.	Part	Material
1	Body	Stainless Steel (with ENP) ASTM A743 GR. CA40F
2	Disc	Stainless Steel AISI 420
3	Cap	Stainless Steel (with ENP) ASTM A743 GR. CA40F
4	Insulator	Ceramic
5	Nameplate Cover	Stainless Steel Type 304



### Installation

The preferred installation is in the horizontal position as close as possible to equipment being drained. Install strainer (20 mesh) upstream and full port isolating valves upstream and downstream of trap. Piping to and from the trap should be at least equal to or one size larger than trap connection. Do not weld pipe connection to trap. Body material is not suitable for welding.

For freeze resistant installations, all drains must be pitched toward the trap for gravity flow. Trap must be installed vertically, discharging downward. Discharge piping must be self-draining.

### Sample Specification

Steam trap shall be all stainless steel thermo-Dynamic® disc type with connections on a common center line, which will operate in any position. Integral seat design with hardened disc and seating surfaces. Trap to have integral insulating cap.

### Maintenance

This product can be maintained without disturbing the piping connections. Complete isolation of the trap from both supply and return line is required before any servicing is performed.

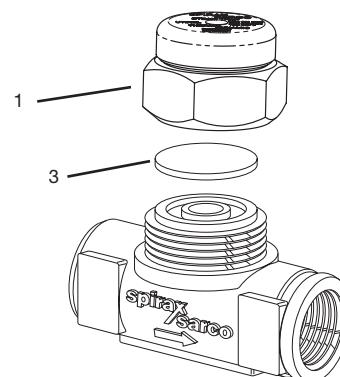
The trap should be disassembled periodically for inspection and cleaning of the disc and seat.

The only wearing parts of the trap are the disc and seat rings, which should be inspected and cleaned periodically. Slight wear can often be corrected by resurfacing on a lapping plate.

**Caution: Only perform maintenance after trap has been isolated.**

Complete installation and maintenance instructions are given in IMI 2.516, which accompanies the product.

### Spare Parts



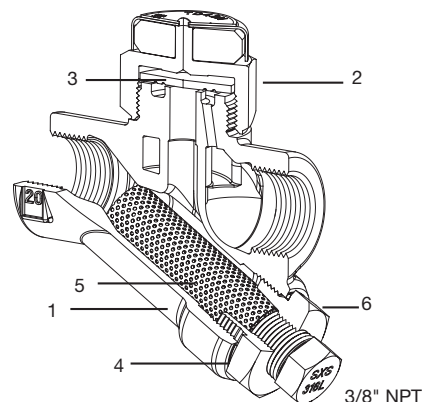
Disc	3
Cap Assembly	1

# spirax sarco

## Thermo-Dynamic® Steam Trap TD42

The **Thermo-Dynamic®** steam trap cycles periodically to discharge condensate very near to steam temperature. It is unaffected by water-hammer or superheat.

Model	TD42 L	TD42 H
PMO	600 psig	
Sizes	1/2", 3/4", 1"	1/2", 3/4"
Connections	NPT	
Construction	Stainless Steel	
Options	Blowdown valve	



### Limiting Operating Conditions

**Max. Operating Pressure (PMO)**

600 psig (42 barg)

**Max. Operating Temperature**

752°F (400°C)  
at all operating pressures

*Minimum pressure for satisfactory operation is 3.5 psi, 0.25 bar.*

*Maximum back pressure should not exceed 80% of the inlet pressure under any conditions of operation, otherwise the trap may not shut.*

### Pressure Shell Design Conditions

**PMA**

Max. allowable pressure

914 psig/up to 248°F 63 barg/up to 120°C

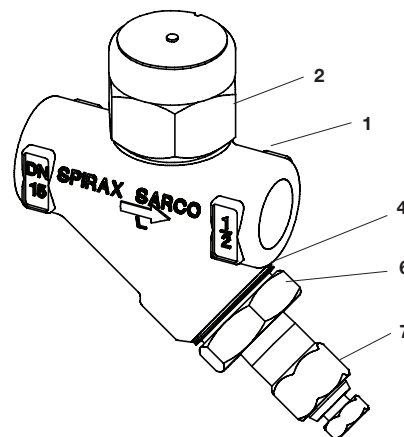
853 psig/528°F 59 barg/276°C

609 psig/752°F 42 barg/400°C

**TMA**

Max. allowable temperature

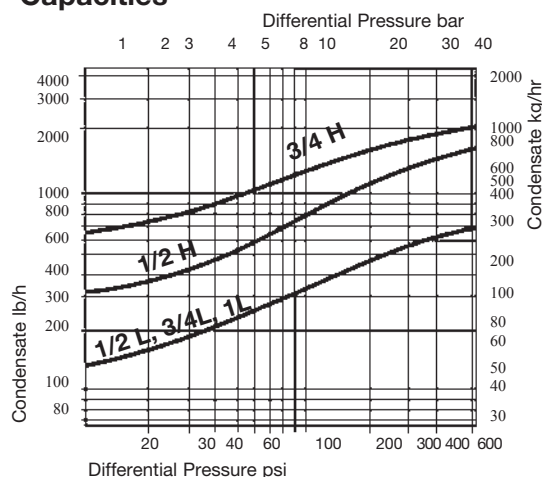
752°F/0-609 psig 400°C/0-42 barg



### Typical Applications

Steam main drainage, tracer lines, process equipment, outdoor installations subject to freezing.

### Capacities



### Construction Materials

No.	Part	Material
1	Body	Stainless Steel (w/ENP) ASTM A743 GrCA40F
2	Cap Assembly	Stainless Steel / Ceramic AISI 416
3	Disc	Stainless Steel AISI 420
4	Cap Gasket	Stainless Steel
5	Strainer Screen	Stainless Steel (.031 Perf) AISI 304
6	Strainer Cap	Stainless Steel AISI 416
7	Blowdown Valve (optional)	Stainless Steel

*Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only.  
In the interests of development and improvement of the product, we reserve the right to change the specification.*

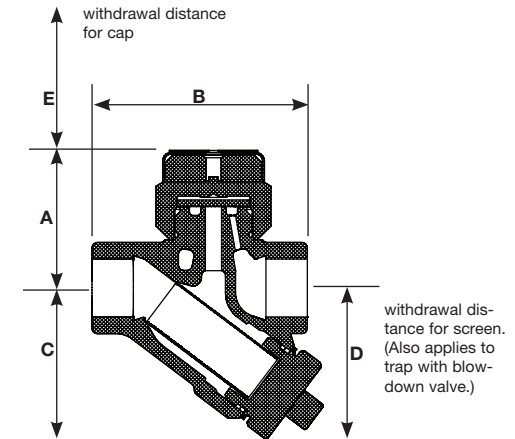
TI-2-502-US 05.08

# Thermo-Dynamic® Steam Trap

## TD42

### Dimensions (nominal) in inches and millimeters

TD42L, TD42H							
Size	A	B	C	D	E	Weight lb/kg	
						TD42L	TD42H
1/2"	2.0 51.5	3.1 78	2.2 55.5	3.7 93	.79 20	1.6 0.78	1.7 0.8
3/4"	2.1 54.5	3.4 84.4	2.4 61.5	4.1 105	.79 20	1.9 0.93	2.2 1
1"	2.3 58	3.8 96	2.5 64.5	4.3 109	.79 20	2.4 1.1	— —
with Blowdown Valve							
1/2"	2.0 51.5	3.1 78	2.8 71	4.3 109	.79 20	2.2 1.0	2.3 1.1
3/4"	2.1 54.5	3.4 84.4	3.1 80	4.8 122	.79 20	2.65 1.2	2.75 1.25
1"	2.3 58	3.8 96	3.3 85	5.1 130	.79 20	3.85 1.75	— —



### Options

**Blowdown Valve** – When the blowdown valve is opened, loose material collected by the strainer is blown to atmosphere. Because a wrench is used to open the valve, the operator is clear of the blowdown stream.

### Sample Specification

Steam trap shall be stainless steel thermodynamic type, integral seat design with hardened disc and seating surfaces, and oxidation resistant (ENP) finish. Trap to contain inlet Y strainer, and when required, shall be provided with integral blowdown valve and insulating cover.

### Installation

The trap will operate in any position, but the preferred installation is in a horizontal pipe. Full-port isolating valves should be installed upstream and downstream of the trap.

### Maintenance

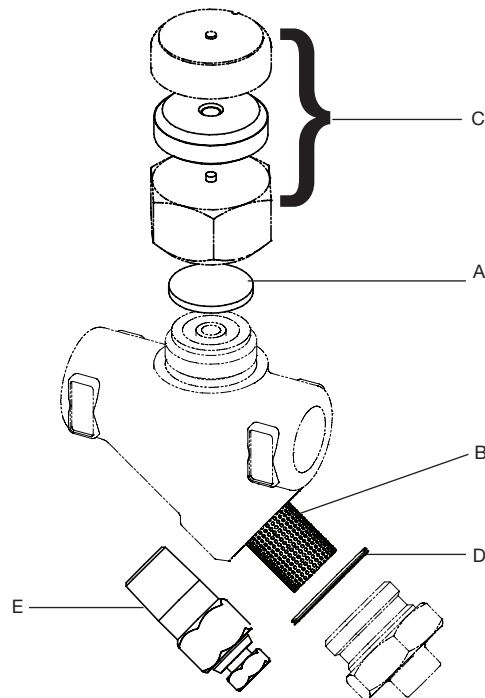
This product can be maintained without disturbing the piping connections. Complete isolation of the trap from both supply and return line is required before any servicing is performed.

Although occasional operation of the optional blowdown valve will remove most of the accumulated debris, the trap should be disassembled periodically for cleaning of the strainer screen and inspection and cleaning of the disc and seat.

The only wearing parts of the trap are the disc and seat ring. A worn disc can be replaced, and slight seat ring wear can often be corrected by resurfacing on a lapping plate.

**Complete installation and maintenance instructions are given in an IMI Sheet, available upon request.**

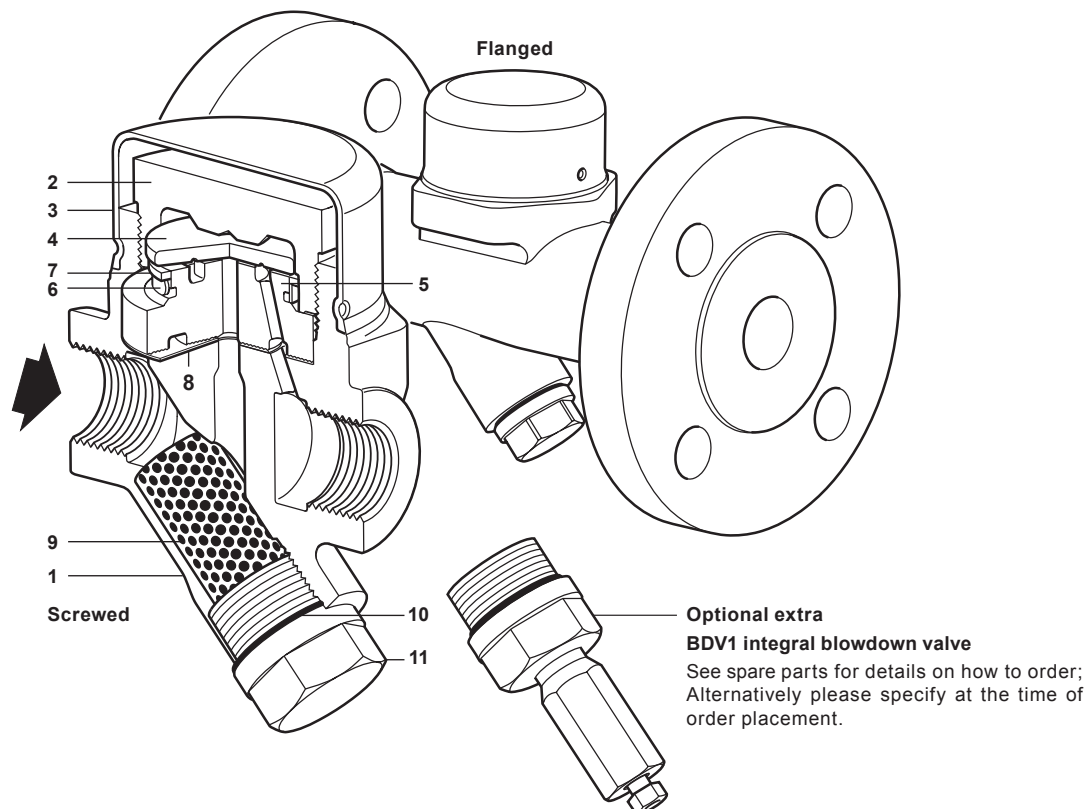
### Spare Parts



Disc (pkt of 3)	A
Strainer Screen & Gasket	B, D
Insulcap Assembly	C
Gasket (Set of 3)	D
Blowdown Valve	E

Available spare parts are shown in heavy line.  
Parts drawn in broken line are not supplied as spares.

## TDC46M Carbon Steel Thermodynamic Steam Trap with Maintainable Seat



### Description

The TDC46M is a carbon steel, thermodynamic steam trap that has been specifically designed for low capacity applications up to 667 psig (46 barg) (where pipe connections permit). As standard the unit is available with either screwed, socket weld or flanged connections.

#### TDC46M benefits:

- Integral strainer.
- Integral air vent.
- Insulation cap.
- Replaceable seat for ease of maintenance.

#### Optional extras

At extra cost a **BDV1** integral blowdown valve can be pre-fitted to the strainer cap, please specify at the time of order placement.

#### Standards

This product fully complies with the requirements of the European Pressure Equipment Directive 97/23/EC.

#### Certification

These products are available with certification to EN 10204 3.1.

**Note:** All certification / inspection requirements must be specified at the time of order placement.

### Sizes and pipe connections

½", ¾" and 1" screwed BSP or NPT.

½", ¾" and 1" socket weld ends to BS 3799 Class 3000 lb.

½", ¾" and 1" integrally flanged EN 1092 PN40, PN100 and ASME class 150, ASME class 300 or ASME class 600 optional EN1092 PN40 and PN100).

### Materials

No.	Part	Material	
1	Body	Carbon steel	1.0619+N/ASTM A216 WCB
2	Top cap	Stainless steel	1.4301/ASTM 479 304
3	Insulating cover	Stainless steel	EN 10088-1 1.4301
4	Disc	Hardened steel	1.2379
5	Seat	Hardened steel	1.2379
6	Bimetal ring	Bimetal	
7	Support	Stainless steel	AISI 304
8	Seat gasket	Graphite foil	
9	Strainer screen	Stainless steel	ASTM A748 316L
10	Strainer cap gasket	Stainless steel	AISI 304
11	Strainer cap	Stainless steel	1.4308/ASTM A351 CF8

Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only.  
In the interests of development and improvement of the product, we reserve the right to change the specification.

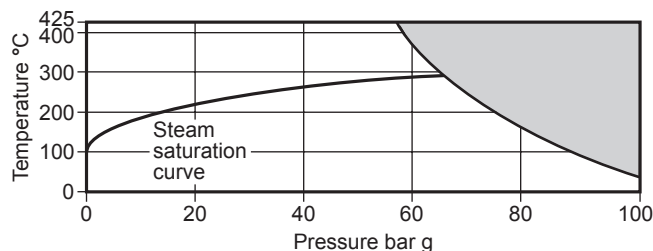
TI-P187-04-US 01.16

# TDC46M Carbon Steel

## Thermodynamic Steam Trap with Maintainable Seat

Pressure / temperature limits (ISO 6552) - Screwed and Socket weld

**Screwed  
Socket weld**



The product **must not** be used in this region or beyond the parameter of the PMA or TMA of the relative end connection.

**Screwed  
Socket weld**

Body design condition	ASME Class 600 (and PN100)
PMA Maximum allowable pressure	1450 psig @ 122°F (100 bar g @ 50°C)
TMA Maximum allowable temperature	797°F @ 834 psig (425°C @ 57.5 bar g)
Minimum allowable temperature	-20°F (-29°C)
PMO Maximum operating pressure	667 psig @ 797°F (46 bar g @ 425°C)
TMO Maximum operating temperature	797°F @ 667 psig (425°C @ 46 bar g)
Minimum operating temperature	32°F (0°C)
Minimum operating pressure	22 psig (1.5 bar g)
Maximum operating backpressure	80% of upstream pressure
Designed for a maximum cold hydraulic test pressure of:	2175 psig (150 bar g)



# TDC46M Carbon Steel

## Thermodynamic Steam Trap with Maintainable Seat

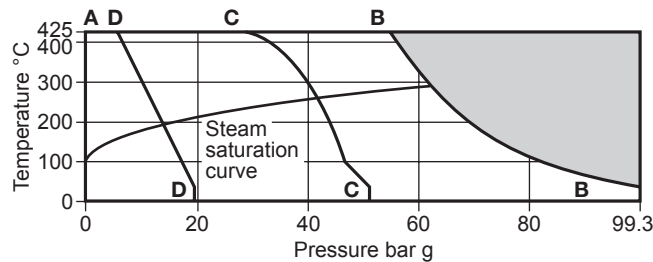
### Pressure / temperature limits (ISO 6552) - Flanged ASME

#### Flanged:

**ASME Class 150**

**ASME Class 300**

**ASME Class 600**



The product **must not** be used in this region or beyond the parameter of the PMA or TMA of the relative end connection.

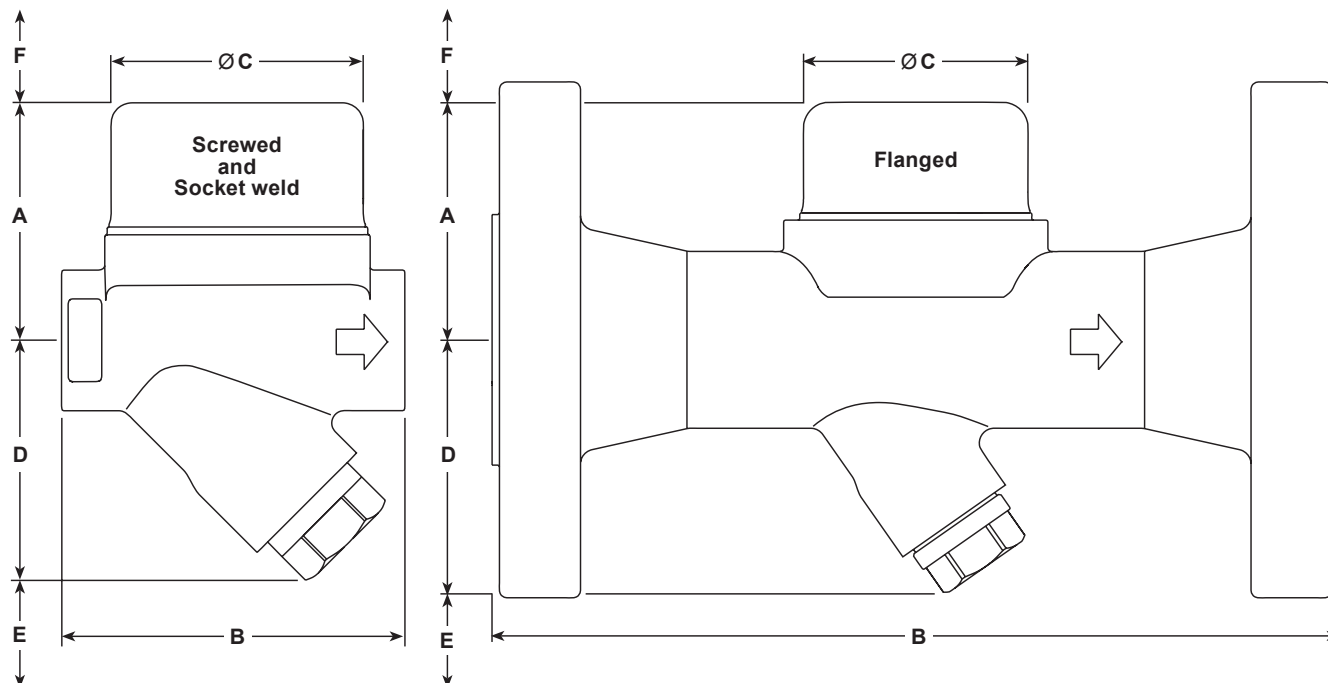
<b>A - B - B ASME 600</b>	Body design condition	ASME Class 600
	PMA Maximum allowable pressure	1440 psig @ 100°F (99.3 bar g @ 38°C)
	TMA Maximum allowable temperature	797°F @ 812 psig (425°C @ 56 bar g)
	Minimum allowable temperature	-20°F (-29°C)
	PMO Maximum operating pressure	667 psig (46 bar g)
	TMO Maximum operating temperature	797°F @ 667 psig (425°C @ 46 bar g)
	Minimum operating temperature	32°F (0°C)
	Minimum operating temperature	22 psig (1.5 bar g)
	Maximum operating backpressure	80% of upstream pressure
	Designed for a maximum cold hydraulic test pressure of:	2161 psig (149 bar g)
<b>A - C - C ASME 300</b>	Body design condition	ASME Class 300
	PMA Maximum allowable pressure	741 psig @ 100°F (51.1 bar g @ 38°C)
	TMA Maximum allowable temperature	797°F @ 418 psig (425°C @ 28.8 g)
	Minimum allowable temperature	-20°F (-29°C)
	PMO Maximum operating pressure for saturated steam service	624 psig (43 bar g)
	TMO Maximum operating temperature	425°C @ 28.8 bar g
	Minimum operating temperature	32°F (0°C)
	Minimum operating temperature	22 psig (1.5 bar g)
	Maximum operating backpressure	80% of upstream pressure
	Designed for a maximum cold hydraulic test pressure of:	1111 psig (76.6 bar g)
<b>A - D - D ASME 150</b>	Body design condition	ASME Class 150
	PMA Maximum allowable pressure	284 psig @ 100°F (19.6 bar g @ 38°C)
	TMA Maximum allowable temperature	797°F @ 80 psig (425°C @ 5.5 bar g)
	Minimum allowable temperature	-20°F (-29°C)
	PMO Maximum operating pressure for saturated steam service	203 psig (14 bar g)
	TMO Maximum operating temperature	797°F @ 80 psig (425°C @ 5.5 bar g)
	Minimum operating temperature	32°F (0°C)
	Minimum operating temperature	22 psig (1.5 bar g)
	Maximum operating backpressure	80% of upstream pressure
	Designed for a maximum cold hydraulic test pressure of:	426 psig (29.4 bar g)

# TDC46M Carbon Steel

## Thermodynamic Steam Trap with Maintainable Seat

Dimensions (approximate) in inches (mm)

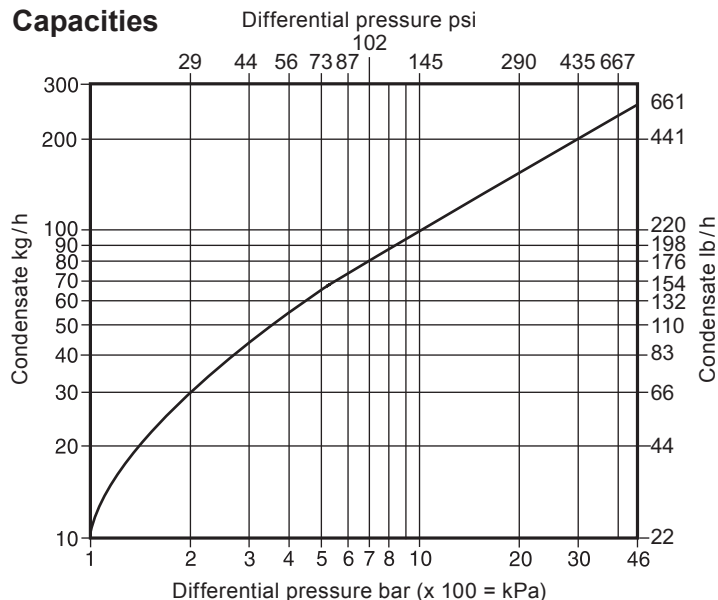
Size	A	Screwed NPT	Socket weld	B	C	D	E	F
				Flanged ASME 150, 300, 600			Withdrawal distance	Withdrawal distance
1/2"	2.3 (58)	78	3.1 (92)	6.0 (150)	2.4 (61)	2.3 (59)	1.6 (40)	1.2 (30)
3/4"	2.4 (61)	95	3.1 (92)	6.0 (150)	2.4 (61)	2.5 (63)	1.6 (40)	1.2 (30)
1"	2.6 (65)	95	3.1 (92)	6.0 (150)	2.4 (61)	2.6 (67)	1.6 (40)	1.2 (30)



Weights (approximate) in pounds (kg)

Size	Screwed	Socket weld	ASME 150	Flanged ASME 300	ASME 600
1/2"	3.0 (1.38)	3.3 (1.49)	5.4 (2.46)	6.5 (2.96)	6.7 (3.06)
3/4"	3.6 (1.64)	3.6 (1.64)	7.0 (3.16)	9.0 (4.06)	9.4 (4.26)
1"	4.2 (1.90)	4.2 (1.90)	9.2 (4.16)	11.4 (5.16)	12.0 (5.46)

### Capacities



### Safety information, installation and maintenance

For full details see the Installation and Maintenance Instructions (IM-P187-05) supplied with the product.

#### Installation note:

The TDC46M is designed for installation with the disc in a horizontal plane with the insulating cover at the top.

It is recommended that a check valve is fitted when discharging condensate into return lines where backpressure is experienced.

It is recommended to install isolation valves upstream and downstream of the steam trap.

#### How to order

**Example:** 1 off Spirax Sarco 1/2" TDC46M thermodynamic steam trap having flanged ANSI 300 connections.

## Steam Traps


Thermo-  
Dynamic®

### Available spares

## How to order spares

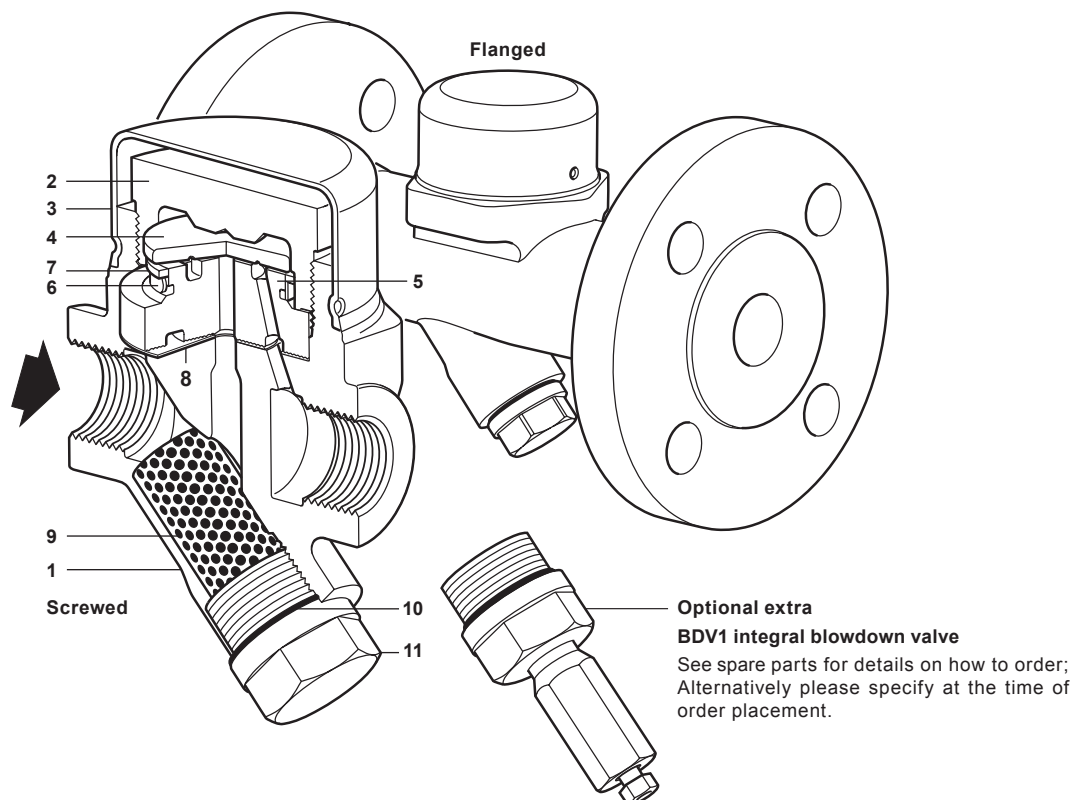
**Example:** 1 off Top cap, seat and disc assembly for a Spirax Sarco ½" TDC46M thermodynamic steam trap.



Item	Part	 in (mm)	ft - lb (N m)
2	Top cap	2.0 (50 A/F)	184 - 203 (250 - 275)
11	Strainer cap	0.94 (24 A/F)	77 - 81 (105 - 110)



## TDS46M Stainless Steel Thermodynamic Steam Trap with Maintainable Seat



**Optional extra  
BDV1 integral blowdown valve**  
See spare parts for details on how to order;  
Alternatively please specify at the time of  
order placement.

### Description

The TDS46M is a stainless steel, thermodynamic steam trap that has been specifically designed for low capacity applications up to 667 psig (46 bar g) (where pipe connections permit). As standard the unit is available with either screwed, socket weld or flanged connections.

#### TDS46M benefits:

- Integral strainer.
- Integral air vent.
- Insulation cap.
- Replaceable seat for ease of maintenance.

#### Optional extras

At extra cost a **BDV1** integral blowdown valve can be pre-fitted to the strainer cap, please specify at the time of order placement.

#### Standards

This product fully complies with the requirements of the European Pressure Equipment Directive 97/23/EC.

#### Certification

These products are available with certification to EN 10204 3.1.  
Note: All certification / inspection requirements must be specified at the time of order placement.

### Sizes and pipe connections

½", ¾" and 1" screwed NPT (optional BSP).

½", ¾" and 1" socket weld ends to BS 3799 Class 3000 lb.

½", ¾" and 1" integrally flanged ASME class 150, ASME class 300 or ASME class 600 (optional EN 1092 PN40, PN100).

### Materials

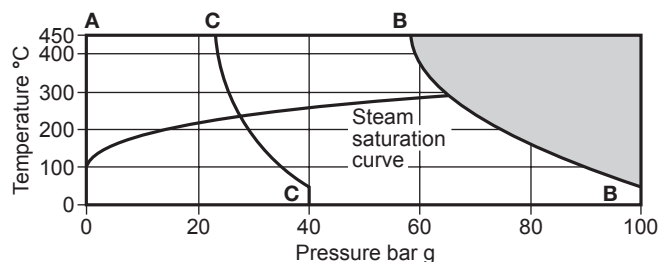
No.	Part	Material	
1	Body	Stainless steel	1.4308/ASTM A351 CF8
2	Top cap	Stainless steel	1.4301/ASTM A479 304
3	Insulating cover	Stainless steel	EN 10088-1 1.4301
4	Disc	Hardened steel	1.2379
5	Seat	Hardened steel	1.2379
6	Bimetal ring	Bimetal	
7	Support	Stainless steel	AISI 304
8	Seat gasket	Graphite foil	
9	Strainer screen	Stainless steel	ASTM A748 316L
10	Strainer cap gasket	Stainless steel	AISI 304
11	Strainer cap	Stainless steel	1.4308/ASTM A351 CF8

# TDS46M Stainless Steel

## Thermodynamic Steam Trap with Maintainable Seat

Pressure/temperature limits (ISO 6552) - Screwed, Socket weld and Flanged EN 1092

Screwed  
Socket weld  
Flanged



The product **must not** be used in this region or beyond the parameter of the PMA or TMA of the relative end connection.

A - B - B	Screwed Socket weld	Body design conditions		PN100
		PMA	Maximum allowable pressure	1450 psig @ 122°F (100 bar g @ 50°C)
		TMA	Maximum allowable temperature	°F @ psig (450°C @ 58.3 bar g)
		Minimum allowable temperature		°F (-50°C)
		PMO	Maximum operating pressure	667 psig @ °F (46 bar g @ 450°C )
		TMO	Maximum operating temperature	°F @ 667 psig (450°C @ 46 bar g)
		Minimum operating temperature		32°F (0°C)
		Minimum operating pressure		22 psig (1.5 bar g)
		Maximum operating backpressure		80% of upstream pressure
		Designed for a maximum cold hydraulic pressure of:		2175 psig (150 bar g)

# TDS46M Stainless Steel

## Thermodynamic Steam Trap with Maintainable Seat

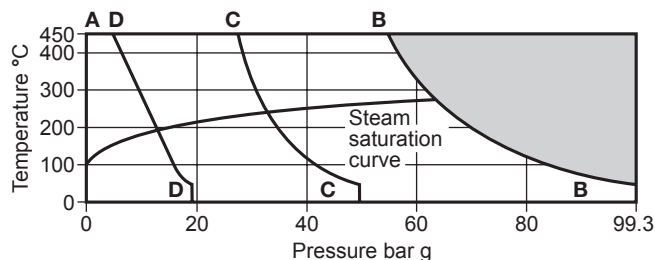
Pressure / temperature limits (ISO 6552) - Flanged ASME

Flanged:

ASME Class 150

ASME Class 300

ASME Class 600



The product **must not** be used in this region or beyond the parameter of the PMA or TMA of the relative end connection.

A - B - B	ASME 600	Body design conditions		ASME Class 600
		PMA	Maximum allowable pressure	1440 psig @ 100°F (99.3 bar g @ 38°C)
		TMA	Maximum allowable temperature	°F @ psig (450°C @ 54.8 bar g)
		Minimum allowable temperature		°F (-50°C)
		PMO	Maximum operating pressure	667 psig (46 bar g )
		TMO	Maximum operating temperature	°F @ 667 psig (450°C @ 46 bar g)
		Minimum operating temperature		32°F (0°C)
		Minimum operating pressure		22 psig (1.5 bar g)
		Maximum operating backpressure		80% of the upstream pressure
		Designed for a maximum cold hydraulic pressure of:		2161 psig (149 bar g)
A - C - C	ASME 300	Body design conditions		ASME Class 300
		PMA	Maximum allowable pressure	psig @ 100°F (49.6 bar g @ 38°C)
		TMA	Maximum allowable temperature	°F @ psig (450°C @ 27.4 bar g)
		Minimum allowable temperature		(-50°C)
		PMO	Maximum operating pressure for saturated steam service	(33 bar g )
		TMO	Maximum operating temperature	°F @ psig (450°C @ 27.4 bar g)
		Minimum operating temperature		32°F (0°C)
		Minimum operating pressure		22 psig (1.5 bar g)
		Maximum operating backpressure		80% of the upstream pressure
		Designed for a maximum cold hydraulic pressure of:		(74.4 bar g)
A - D - D	ASME 150	Body design conditions		ASME Class 150
		PMA	Maximum allowable pressure	psig @ 100°F (19 bar g @ 38°C)
		TMA	Maximum allowable temperature	°F @ psig (450°C @ 4.6 bar g)
		Minimum allowable temperature		(-50°C)
		PMO	Maximum operating pressure for saturated steam service	203 psig (14 bar g )
		TMO	Maximum operating temperature	°F @ psig (450°C @ 4.6 bar g)
		Minimum operating temperature		32°F (0°C)
		Minimum operating pressure		22 psig (1.5 bar g)
		Maximum operating backpressure		80% of the upstream pressure
		Designed for a maximum cold hydraulic pressure of:		(28.5 bar g)

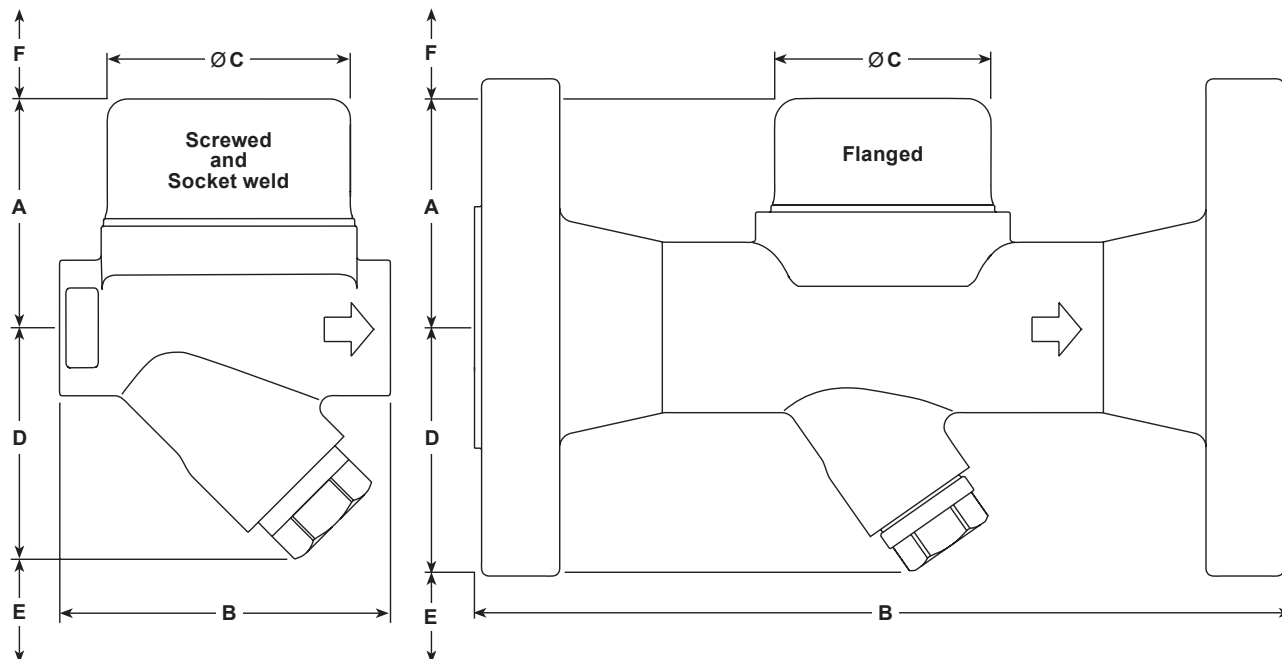


# TDS46M Stainless Steel

## Thermodynamic Steam Trap with Maintainable Seat

Dimensions (approximate) in inches (mm)

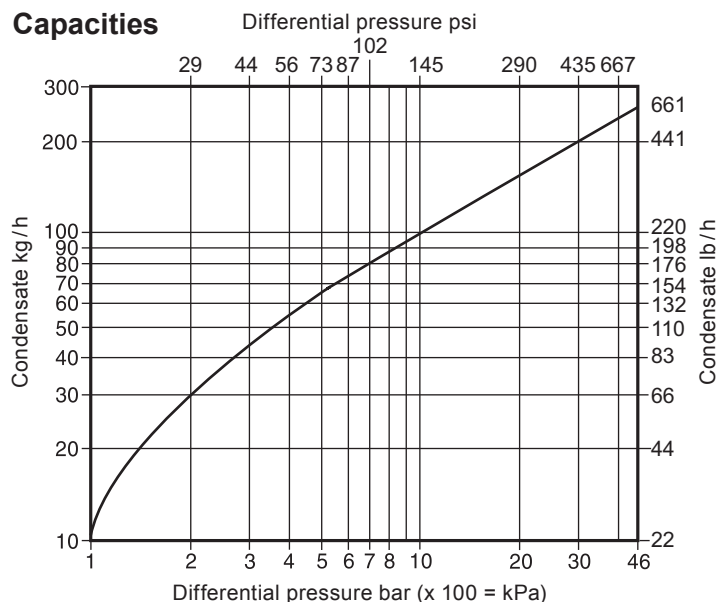
Size	A	Screwed NPT	Socket weld	B	C	D	E	F
				Flanged ASME 150, 300, 600			Withdrawal distance	Withdrawal distance
½"	2.3 (58)	78	3.1 (92)	6.0 (150)	2.4 (61)	2.3 (59)	1.6 (40)	1.2 (30)
¾"	2.4 (61)	95	3.1 (92)	6.0 (150)	2.4 (61)	2.5 (63)	1.6 (40)	1.2 (30)
1"	2.6 (65)	95	3.1 (92)	6.0 (150)	2.4 (61)	2.6 (67)	1.6 (40)	1.2 (30)



Weights (approximate) in pounds (kg)

Size	Screwed	Socket weld	ASME 150	Flanged ASME 300	ASME 600
½"	3.0 (1.38)	3.3 (1.49)	5.4 (2.46)	6.5 (2.96)	6.7 (3.06)
¾"	3.6 (1.64)	3.6 (1.64)	7.0 (3.16)	9.0 (4.06)	9.4 (4.26)
1"	4.2 (1.90)	4.2 (1.90)	9.2 (4.16)	11.4 (5.16)	12.0 (5.46)

Capacities



### Safety information, installation and maintenance

For full details see the Installation and Maintenance Instructions (IM-P187-05) supplied with the product.

#### Installation note:

The TDS46M is designed for installation with the disc in a horizontal plane with the insulating cover at the top.

It is recommended that a check valve is fitted when discharging condensate into return lines where backpressure is experienced.

It is recommended to install isolation valves upstream and downstream of the steam trap.

#### How to order

**Example:** 1 off Spirax Sarco ½" TDS46M thermodynamic steam trap having flanged ANSI 300 connections.

## Steam Traps


Thermo-  
Dynamic®

### Available spares

## How to order spares

**Example:** 1 off Top cap, seat and disc assembly for a Spirax Sarco ½" TDS46M thermodynamic steam trap.



Item	Part	 in (mm)	ft - lb (N m)
2	Top cap	2.0 (50 A/F)	184 - 203 (250 - 275)
11	Strainer cap	0.94 (24 A/F)	77 - 81 (105 - 110)



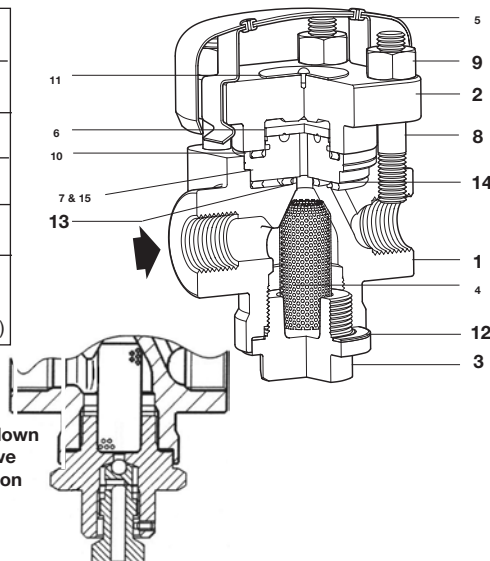
# spirax sarco

## TD62LM and TD62M Thermodynamic Steam Trap with replaceable seats

### Description

The TD62LM and TD62M are maintainable high pressure thermodynamic steam traps with integral strainer and a replaceable seat to ease maintenance. They have been specifically designed for mains drainage applications up to 62 barg. The TD62LM is specifically designed for relatively small condensate loads on superheat and mains drainage applications. An insulating cover is fitted as standard to prevent the trap being unduly influenced by excessive heat loss when subjected to low outside temperatures, wind, rain etc.

Model	TD62LM and TD62M
PMO	900 psig
Sizes	1/2", 3/4", 1"
Connections	SW to ANSI B16.11 Class 3000
Construction	Alloy Steel
Options	NPT Connections ANSI 600 Flanged Blowdown Valve (SW and NPT only)



### Capacities

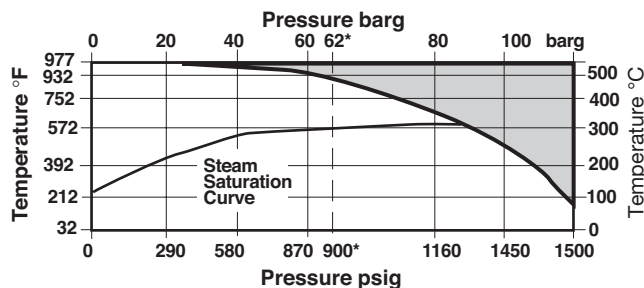
		Hot Condensate Flow			
Pressure		TD62LM		TD62M	
psig	barg	#/hr.	kg.hr.	#/hr.	kg.hr.
25	2			293	133
50	3			422	192
100	7			552	250
120	8	167	76	586	266
150	10	185	84	628	285
200	14	212	96	682	309
250	17	235	107	724	328
300	21	256	116	758	344
350	24	274	124	786	357
400	28	292	132	811	368
500	34	324	147	853	387
550	38	338	153	871	395
600	41	352	160	887	402
650	45	366	166	902	409
700	48	378	172	916	415
750	52	391	177	929	421
800	55	402	183	941	427
850	59	414	188	952	432
900	62	425	193	963	437

### Materials

No.	Part	Material
1	Body	Steel
2	Cover	Steel
3	Strainer cap	Steel
4	Strainer screen	Stainless steel 100 mesh 316L
5	Insulating cover	Aluminium
6	Disc	Chromium steel
7	Seat	Chromium steel
8	Cover studs	Steel
9	Cover nuts	Steel
10	Cover gasket	Spirally wound stainless steel with exfoliated graphite filler
11	Name-plate	Stainless steel
12	Strainer cap gasket	Reinforced exfoliated graphite
13	Inner seat gasket	Spirally wound stainless steel with exfoliated graphite filler
14	Outer seat gasket	Spirally wound stainless steel with exfoliated graphite filler
15	Ferrule	Stainless steel

\* Note: Item 15 (ferrule) is pressed into item 7 (seat).

### Operating Range (SW Connection Only)



The product must not be used in this region

\* PMO — Max. operating pressure recommended

PMOB — Max. operating back pressure 80% of upstream pressure

### Limiting Conditions

#### Body design conditions ANSI 600

PMA — Max. allowable pressure	1500 psig 103 barg
TMA — Max. allowable temperature	977°F 525°C
Cold hydraulic test pressure	2250 psig 155 barg

#### TD62LM

Minimum pressure for satisfactory operation is 120 psig, 8 barg. Maximum back pressure should not exceed 50% of the inlet pressure under any conditions of operation, otherwise the trap may not shut.

#### TD62M

Minimum pressure for satisfactory operation is 20 psig, 1.4 barg. Maximum back pressure should not exceed 80% of the inlet pressure under any conditions of operation, otherwise the trap may not shut.

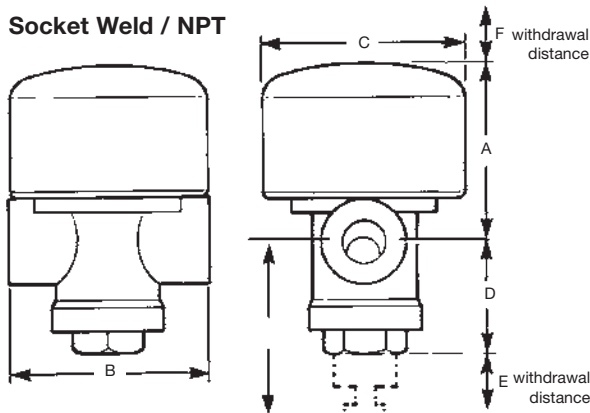
Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only.

In the interests of development and improvement of the product, we reserve the right to change the specification.

TI-2-525-US 3.14

# TD62LM and TD62M Thermodynamic Steam Trap with replaceable seats

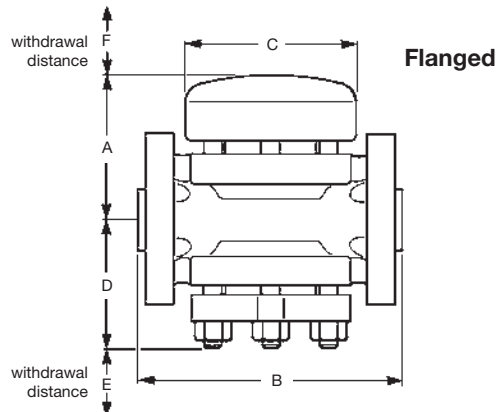
## Socket Weld / NPT



### Dimensions (nominal) in inches and millimeters

Size	A	B	C	D	D*	E	F	Weight
1/2", 3/4"	3.1 79	3.6 92	3.6 92	2.0 51	3.3 84	0.8 20	2.0 51	4.6 lb 2.1 kg
1"	3.3 84	3.9 100	3.6 92	1.8 46	3.1 79	0.8 20	2.0 51	5.3 lb 2.4 kg

\* Traps with blowdown valve



### Dimensions (nominal) in inches and millimeters

Size	A	B1	B2	C	D	E	F	Weight
1/2"	3.2 82	5.9 150	5.3 135	3.6 92	2.8 72	1.6 40	1.2 30	18.7 lb 8.5 kg
3/4"	3.2 82	5.9 150	5.4 138	3.6 92	2.8 72	1.6 40	1.2 30	18.7 lb 8.5 kg
1"	3.2 82	6.3 160	5.8 147	3.6 92	2.8 72	1.6 40	1.2 30	20.0 lb 9.1 kg

## Sample Specification

Spirax Sarco TD62M ThermoDynamic® steam trap, available in sizes 1/2", 3/4", and 1" socket weld connections to ANSI B16.11 Class 3000 (or NPT or ANSI 300 or 600 flanged connections). Alloy steel construction, suitable for operation from 20 to 900 psig at a maximum operating temperature of 842°F. An integral strainer and insulating cover are standard. Traps to have replacement seats and disc.

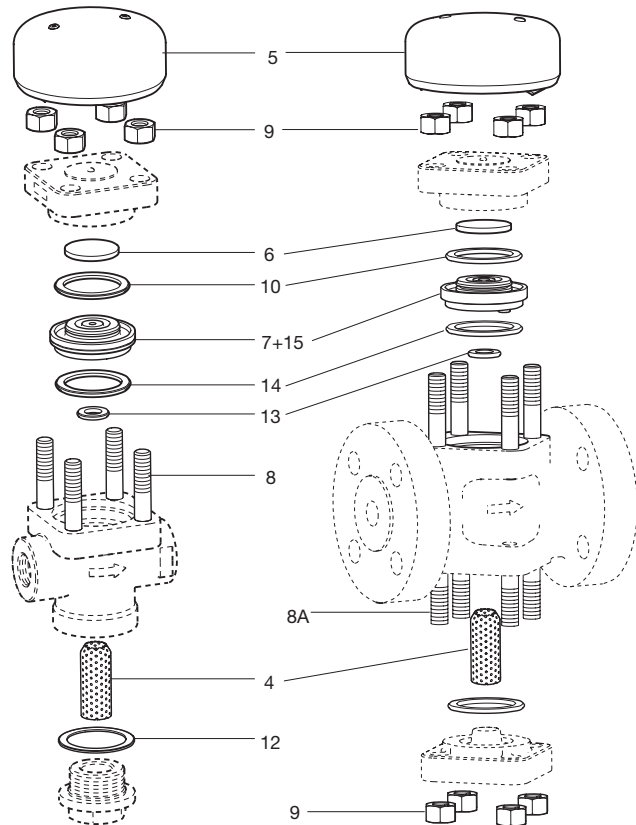
## Installation

The preferred trap installation is in a horizontal pipe with the insulcap up. After 24 hours in service the cover nuts should be checked for tightness and if necessary torqued to 33-37 ft•lb. Full-port isolating valves should be installed upstream and downstream of the trap.

## Spare Parts

### Socket Weld / NPT

### Flanged



## Spare Parts

The spare parts available are shown in solid outline. Parts shown in broken line are not supplied as spares.

## Available spares

Insulating cover	5
Set of cover studs and nuts (set of 8) on FCC	4 on other 8, 8A, 9
Seat and disc assembly	6, 7, 10, 13, 14, 15
Strainer screen 100 mesh	4
Cover gasket (packet of 3 sets) Flanged	10,13,14
Set of gaskets (packet of 3 sets) SW, NPT	10,12,13,14

## How to order spares

Always order spares by using the description given in the column headed "Available spares" and state the size and type of trap.

**Example:** 1- Strainer screen for a Spirax Sarco 1" TD62LM thermodynamic steam trap (ASTM body)

## Maintenance

This product can be maintained without disturbing the piping connections. Complete isolation of the trap from both supply and return line is required before any servicing is performed.

The trap should be disassembled periodically for cleaning of the strainer screen and inspection and cleaning of the disc and seat.

**Complete installation and maintenance instructions are given in the IMI Sheet, which accompanies the product. (IM-P068-58)**

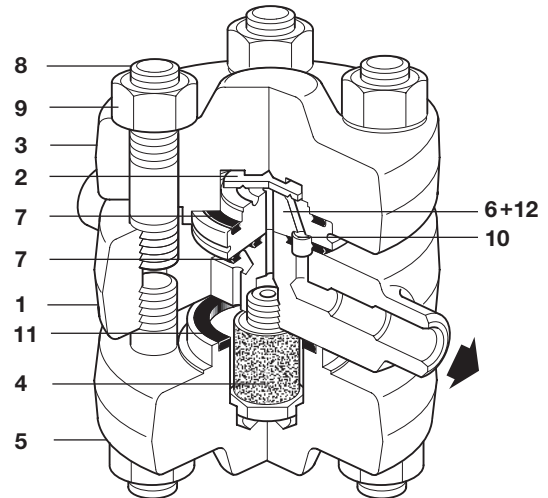
TI-2-525-US 3.14



## TD120M High Pressure Thermo-Dynamic® Steam Trap with Replaceable Seat

The Thermo-Dynamic® steam trap cycles periodically to discharge condensate very near to steam temperature. It is unaffected by waterhammer or superheat.

Model	TD 120M
PMO	3190 psig
Sizes	1/2", 3/4" & 1"
Connections	SW to ANSI B 16.11 Class 6000
Construction	Forged Alloy Steel
Options	Buttweld and ANSI 1500 RF connections



### Limiting Operating Conditions

**Max. Operating Pressure (PMO)** 3190 psig at saturated steam temperature

**Max. Operating Temperature** 572°F (300°C) at 3,190 psig (220 barg)  
1022°F (550°C) at operating pressures below 1160 psig (80 barg)

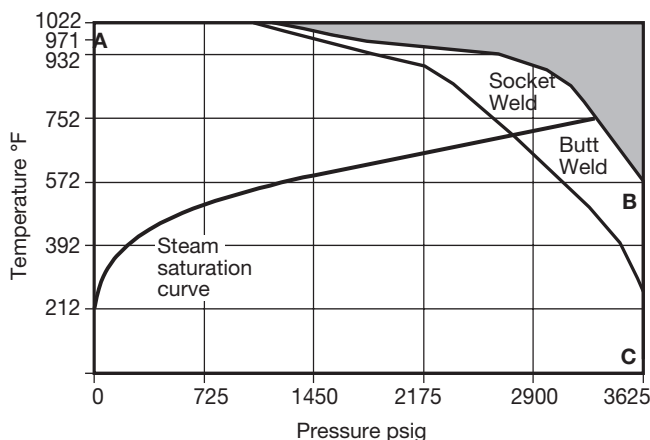
*Minimum pressure for satisfactory operation is 116 psi, 8 bar.  
Maximum back pressure should not exceed 50% of the inlet pressure under any conditions of operation, otherwise the trap may not shut.*

### Pressure Shell Design Conditions

**PMA** 3,190 psig/up to 572°F 220 barg/up to 300°C  
**Max. allowable pressure** 1160 psig/1022°F 80 barg/550°C

**TMA** 1022°F/0-1160 psig 550°C/0-80 barg  
**Max. allowable temperature**  
**Cold Hydraulic Test Pressure** 5437 psig 375 barg

### Pressure / temperature limits (ISO 6552)



### Materials

No.	Part	Material	
1	Body	Alloy steel	ASTM A182 F22
2	Disc	Steel	
3	Top cover	Alloy steel	ASTM A182 F22
4	Strainer screen assembly	Stainless steel	Sintered stainless
5	Bottom cover	Alloy steel	ASTM A182 F22
*6	Seat	Steel	BS 4659 Gr. BD2
7	Cover gasket	Spirally wound stainless steel with exfoliated graphite filler	
8	Cover studs	Steel	ASTM A193 Gr. B16
9	Cover nuts	Steel	ASTM A194 Gr.4
10	Inner seat gasket	Spirally wound stainless steel with exfoliated graphite filler	
11	Cover gasket	Spirally wound stainless steel with exfoliated graphite filler	
*12	Ferrule	Stainless steel	

**\*Note:** Item 12 (ferrule) is pressed into item 6 (seat).

### Capacities

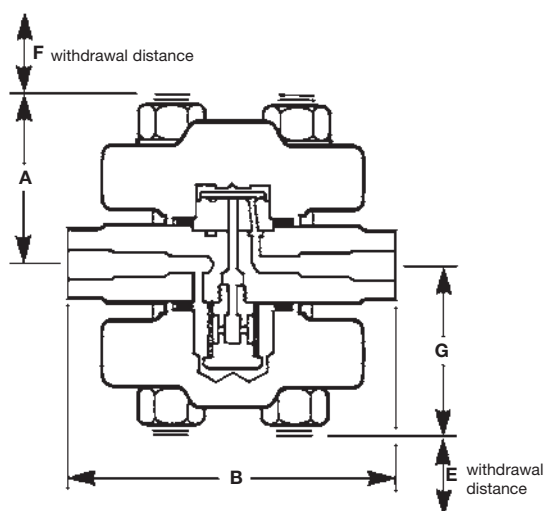
pressure (psig)	cold water (#/hr.)	Hot condensate (#/hr.)	pressure psig	cold water (#/hr.)	Hot condensate (#/hr.)
116	217	156	2000	725	487
250	300	212	2250	762	510
500	403	280	2500	796	532
750	478	329	2750	829	553
1000	540	369	3000	860	572
1250	594	404	3250	890	591
1500	641	434	3500	918	608
1750	685	461	3625	932	617

Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only.

In the interests of development and improvement of the product, we reserve the right to change the specification.

TI-P150-11-US 10.10

# TD120M High Pressure Thermo-Dynamic® Steam Trap with Replaceable Seat



**Dimensions** (nominal) in inches and millimeters

Size DN	A	B	E	F	G	Weight
1/2" 15	3.1 78	6.2 158	2.2 55	2.2 55	3.1 78	23.1 lb 10.5 kg
3/4" 20	3.2 80	6.2 158	2.2 55	2.2 55	3.2 80	23.1 lb 10.5 kg
1" 25	3.2 80	6.2 158	2.2 55	2.2 55	3.2 80	23.1 lb 10.5 kg

## Sample Specification

High pressure Thermo-Dynamic® steam trap with socket weld ends as standard. Trap to be inline maintainable with complete replacement of operating internals. The trap is constructed with alloy steel, suitable for operation from 116 psig to 3,190 psig. Trap comes standard with sinter stainless fine strainer.

## Installation

Install in a horizontal pipeline with the nameplate on top. After 24 hours in service, the cover nuts should be checked for tightness. Full-port isolating valves should be installed upstream and downstream of the trap.

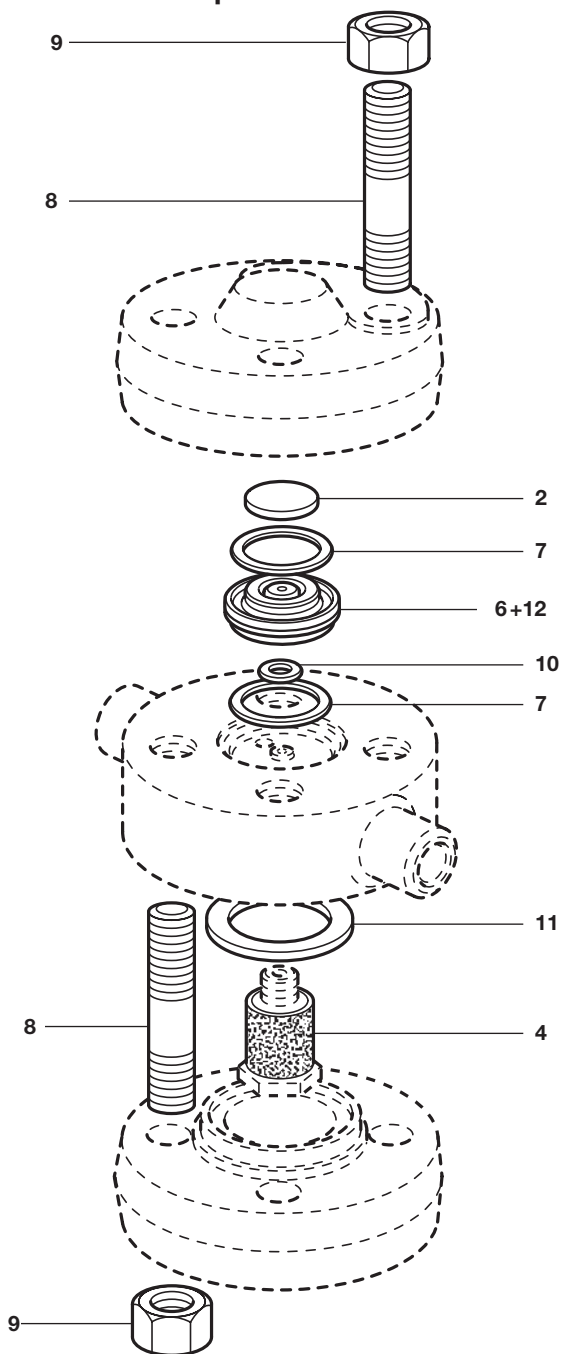
## Maintenance

This product can be maintained without disturbing the piping connections. Complete isolation of the trap from both supply and return line is required before any servicing is performed.

The trap should be disassembled periodically for inspection and cleaning of the disc and seat.

Complete installation and maintenance instructions are given in IM-P150-12.

## Spare Parts



## Spare parts

The spare parts available are shown in solid outline. Parts drawn in broken line are not supplied as spares.

### Available spares

Set of cover studs and nuts	8 (8 off), 9 (8 off)
Strainer screen and gasket	4, 11
Set of gaskets	7 (2 off), 10, 11
Maintenance kit	2, 4, 7 (2 off), 10, 11, 6+12

### How to order spares

Always order spares by using the description given in the column headed 'Available spares' and state the size and type of trap. **Example:** 1 - Seat and disc assembly for a Spirax Sarco 1/2" TD120M high pressure thermodynamic steam trap.



# spirax/sarco

## Cast Iron Float & Thermostatic Steam Traps FT-15, FT-30, FT-75, FT-125

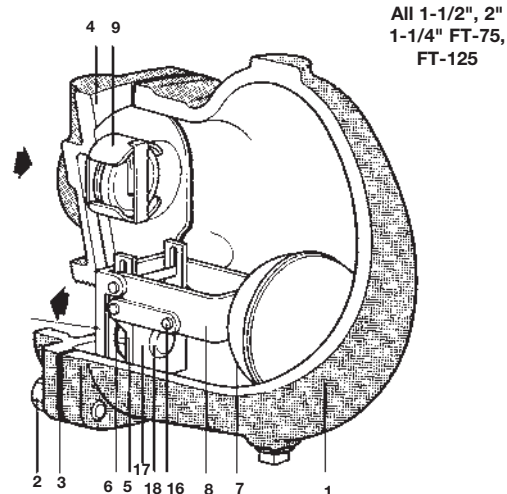
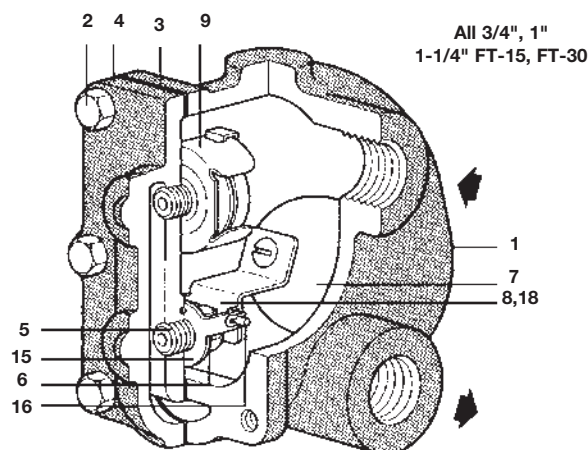
The trap contains a float valve mechanism which modulates to discharge condensate continuously at steam temperature, while non-condensable gases are released by a separate internal balanced pressure thermostatic air vent.

Model	FT-15	FT-30	FT-75	FT-125
<b>PMO</b>	15 psig	30 psig	75 psig	125 psig
<b>Sizes</b>	3/4", 1", 1-1/4", 1-1/2", 2"			
<b>Connections</b>	NPT			
<b>Construction</b>	Cast Iron Body & Cover Stainless Steel Internals			
<b>Options</b>	Gauge Glass, Vacuum Breaker			

### Typical Applications

All process equipment, particularly when controlled by modulating temperature control valves; unit heaters, air heating coils, heat exchangers and steam main drip stations.

For Capacities,  
See TIS 2.317



### Limiting Operating Conditions

<b>Max. Operating Pressure (PMO)</b>	<b>FT-15:</b>	15 psig	(1.0 barg)
	<b>FT-30:</b>	30 psig	(2.1 barg)
	<b>FT-75:</b>	75 psig	(5.2 barg)
	<b>FT-125:</b>	125 psig	(8.6 barg)

**Max. Operating Temperature** 450°F (25°C) at all operating pressures

### Pressure Shell Design Conditions

**PMA** 125 psig/up to 450°F 9 barg/up to 232°C  
Max. allowable pressure

**TMA** 450°F/0-125 psig 232°C/0-9 barg  
Max. allowable temperature

### Construction Materials

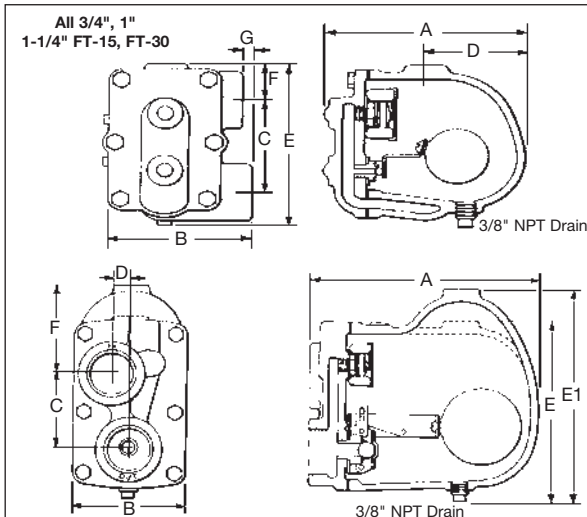
No.	Part	Material
1	Body	Cast Iron ASTM A126 CL B
2	Cover Screws	Carbon Steel ASTM A449
3	Cover Gasket	Graphite
4	Cover	Cast Iron ASTM A126 CL B
5	Valve Seat	Stainless Steel
6	Valve Seat Gasket	Stainless Steel
7	Ball Float	Stainless Steel
8	Float Arm	Stainless Steel
9	Air Vent Assembly	Stainless Steel
	Air Vent Head	Stainless Steel
	Air Vent Seat	Stainless Steel
15	Seat Bracket	Stainless Steel
16	Pivot Pins	Stainless Steel
17	Head Bracket, Stop, Link	Stainless Steel
18	Valve Head	Stainless Steel

Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only.  
In the interests of development and improvement of the product, we reserve the right to change the specification.

TI-2-313-US 2.14

# Cast Iron Float & Thermostatic Steam Traps

## FT-15, FT-30, FT-75, FT-125



Dimensions (nominal) in inches and millimeters									
Size	A	B	C	D	E	E1	F	G	Weight
3/4", 1"	6.2 157	4.6 117	3.3 84	3 77	5.75 146	—	1.3 33	0.3 7.9	9 lb 4.1 kg
1 1/4" * 1 1/2"	8.5 216	4.25 108	3 76	0.7 17	—	8.4 213	3.5 89	—	18 lb 8.2 kg
2"	9.8 249	4.9 124	4.9 124	0.12 3	9.1 230	—	1.9 49	—	26 lb 11.8 kg
*1-1/4" FT-15, FT-30	6.2 157	4.7 119	3 76	2.8 72	5.75 146	—	1.5 38	0.3 7.9	9.3 lb 4.2 kg

All 1-1/2", 2"  
1-1/4" FT-75, FT-125

### Sample Specification

Steam traps shall be of the mechanical ball float type having cast iron bodies, NPT connections, and all stainless steel internals. Incorporated into the trap body shall be a stainless steel balanced pressure thermostatic air vent capable of withstanding up to 450°F(25°C) and resisting waterhammer without sustaining damage. Internals of the trap shall be completely servicable without disturbing the piping.

### Installation

A pipeline strainer should be installed ahead of any steam trap. Full port isolating valves should be placed to permit servicing. The trap should be installed below the drainage point of the equipment with a collecting leg before the trap, in a position so that the float arm is in a horizontal plane so that the float rises and falls vertically, and with the direction of flow as indicated on the body. Refer to IM-2-300 for complete instructions.

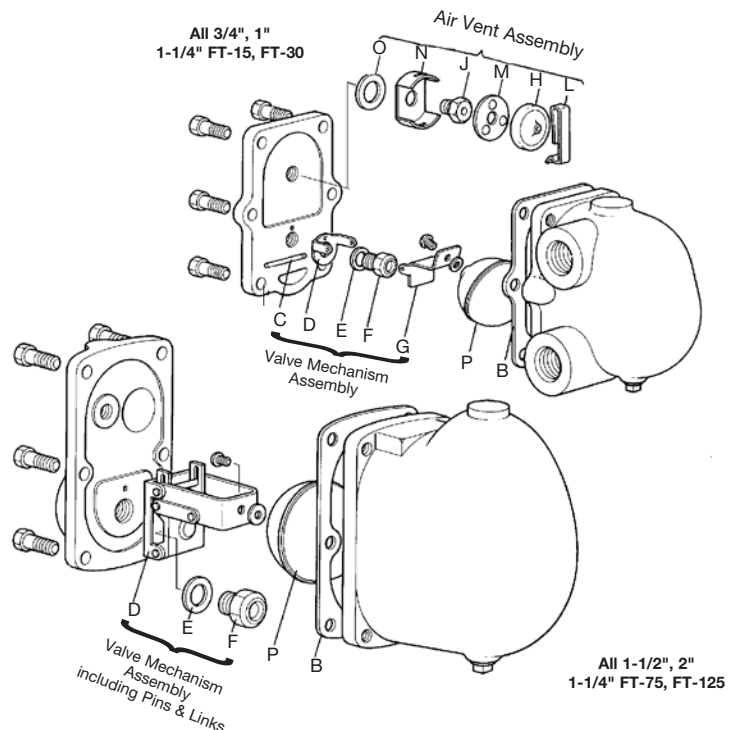
### Maintenance

This product can be maintained without disturbing the piping connections. Complete isolation from both supply and return line is required before any servicing is performed. The trap should be disassembled periodically for inspection and cleaning of the valve head and seat, operating mechanism and air vent.

Worn or damaged parts should be replaced using a complete valve mechanism assembly and/or air vent assembly.

**Complete installation and maintenance instructions are given in IM-2-300, which accompanies the product.**

### Spare Parts



Gasket Kit (3 of each)	B, E
Air Vent Kit	H, J, L, M, N, O
Valve Mechanism Kit (less float)	C, D, E, F, (G)
Float Kit	P
Replacement Module	Consists of: Air Vent Assembly and Valve Mechanism (w/Float) attached to a Cover and supplied with a Cover Gasket, Nameplat and a set of Cover Bolts. (Assembled)
3/4", 1", 1-1/4" FT-15	
3/4", 1", 1-1/4" FT-30	
3/4", 1", FT-15, FT-125	

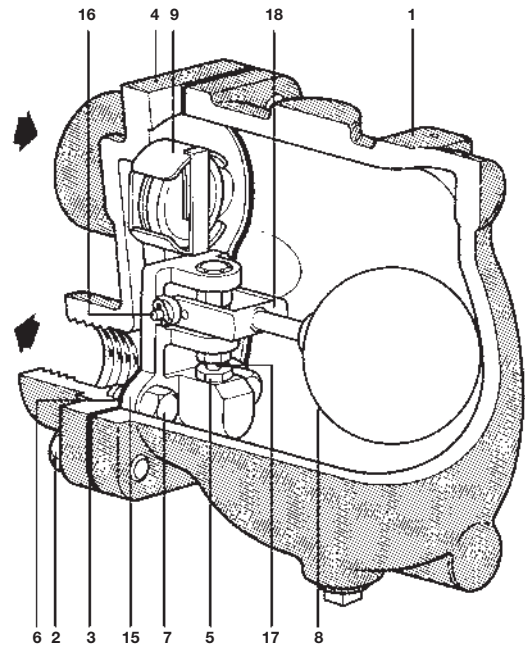
TI-2-313-US 2.14



## Cast Iron Float & Thermostatic Steam Traps FT-150, FT-200

The trap contains a float valve mechanism which modulates to discharge condensate continuously at steam temperature, while non-condensable gases are released by a separate internal balanced pressure thermostatic air vent.

Model	FT-150	FT-200
<b>PMO</b>	150 psig	200 psig
<b>Sizes</b>	3/4", 1", 1-1/4", 1-1/2"	
<b>Connections</b>	NPT	
<b>Construction</b>	Cast Iron Body & Cover Stainless Steel Internals	
<b>Option</b>	Gauge Glass Vacuum Breaker	



### Limiting Operating Conditions

**Max. Operating Pressure (PMO)** FT-150: 150 psig (10.3 barg)  
FT-200: 200 psig (13.8 barg)

**Max. Operating Temperature** 450°F (25°C) at all operating pressures

### Pressure Shell Design Conditions

**PMA** 200 psig/up to 450°F 13.8 barg/up to 232°C  
Max. allowable pressure

**TMA** 450°F/0-200 psig 232°C/0-13.8 barg  
Max. allowable temperature

### Typical Applications

All process equipment, particularly when controlled by modulating temperature control valves, unit heaters, air heating coils, heat exchangers and steam main drip stations

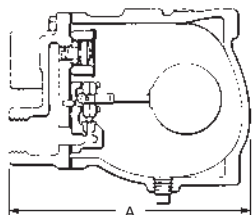
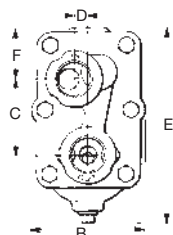
For Capacities, see TIS 2.317.

### Construction Materials

No.	Part	Material	
1	Body	Cast Iron	ASTM A126 CL B
2	Cover Screws	Carbon Steel	ASTM A449
3	Cover Gasket	Graphite	
4	Cover	Cast Iron	ASTM A126 CL B
5	Valve Seat	Stainless Steel	
6	Main Valve Assy Gasket	Graphite	
7	Main Valve Assy Screws	Copper Alloy	
8	Ball Float	Stainless Steel	
9	Air Vent Assembly	Stainless Steel	
	Air Vent Head	Stainless Steel	
	Air Vent Seat	Stainless Steel	
15	Main Valve Assy Housing	Cast Red Brass	
16	Pivot Pin	Stainless Steel	
17	Valve Head	Stainless Steel	
18	Float Arm	Forged Brass (3/4", 1") Cast Red Brass (1-1/4", 1-1/2")	

# Iron Float & Thermostatic Steam Traps

## FT-150, FT-200



**Dimensions**  
(nominal) in inches and millimeters

Size	A	B	C	D	E	F	Weight
3/4", 1"	8.5 216	3.9 100	2.6 65	0.4 9	6.9 175	1.8 46	15 lb 6.8 kg
1-1/4", 1-1/2"	10.75 273	5.75 146	3 76	0.6 14	9.1 232	2.5 64	30 lb 13.6 kg

### Sample Specification

Steam traps shall be of the mechanical ball float type having cast iron bodies, NPT connections, and stainless steel valve heads and seats. Incorporated into the trap body shall be a stainless steel balanced pressure thermostatic air vent capable of withstanding 450°F steam temperature and resisting waterhammer without sustaining damage. Internals of the trap shall be completely servicable without disturbing the piping.

### Installation

A pipeline strainer should be installed ahead of any steam trap. Full port isolating valves should be placed to permit servicing. The trap should be installed below the drainage point of the equipment with a collecting leg before the trap, in a position so that the float arm is in a horizontal plane and the float rises and falls vertically, with the flow direction as indicated on the cover. Refer to IMI 2.300 for complete instructions.

### Maintenance

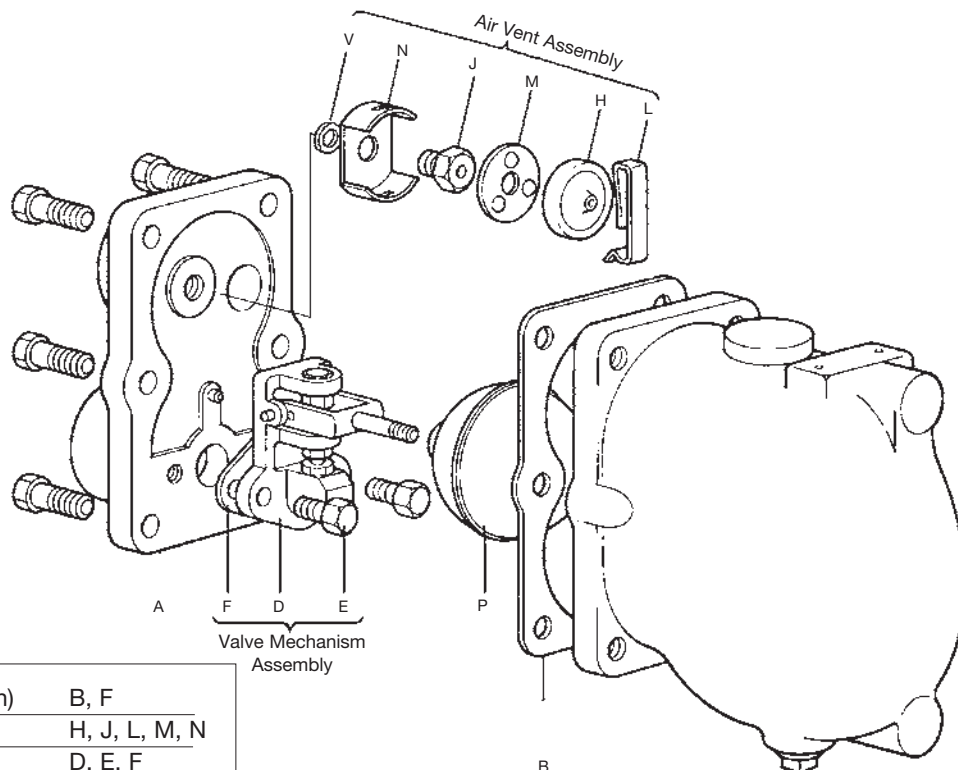
This product can be maintained without disturbing the piping connections. Complete isolation from both supply and return line is required before any servicing is performed.

The trap should be disassembled periodically for inspection and cleaning of the valve head and seat, operating mechanism and air vent.

Worn or damaged parts should be replaced using a complete valve mechanism assembly and/or air vent assembly.

**Complete installation and maintenance instructions are given in IMI 2.300, which accompanies the product.**

### Spare Parts



Gasket Kit (3 of each)	B, F
Air Vent Kit	H, J, L, M, N
Valve Mechanism Kit (less float)	D, E, F
Float Kit	P

TI-2-314-US 2.14



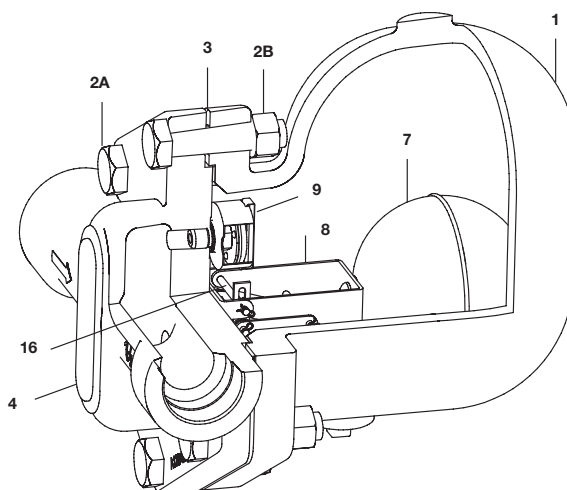
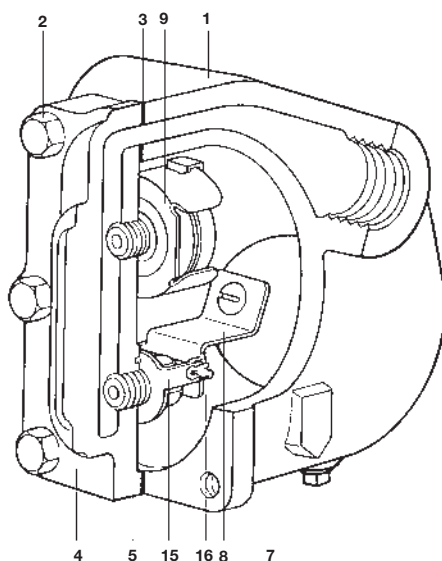
## Cast Iron Float & Thermostatic Steam Traps FTI-15, FTI-30, FTI-75, FTI-125, FTI-200

The Spirax Sarco FTI contains a float valve mechanism which modulates to discharge condensate continuously at steam temperature while non-condensable gases are released by a separate internal balanced pressure thermostatic air vent. The in-line piping connections simplify installation.

Model	FTI-15	FTI-30	FTI-75	FTI-125	FTI-200
<b>PMO</b>	15 psig	30 psig	75 psig	125 psig	200 psig
<b>Sizes</b>	1/2", 3/4", 1", 1-1/2"				
<b>Connections</b>	NPT				
<b>Construction</b>	Cast Iron Body & Cover Stainless Steel Internals				
<b>Options</b>	Gauge Glass, Vacuum Breaker				

### Typical Applications

Air heating coils, heat exchangers, steam main drip stations; small process equipment, particularly when controlled by a modulating temperature control valve; replacement of less efficient inverted bucket traps on unit heating equipment.



### Limiting Operating Conditions

<b>Max. Operating Pressure (PMO)</b>	<b>FTI-15:</b>	15 psig	(1.0 barg)
	<b>FTI-30:</b>	30 psig	(2.1 barg)
	<b>FTI-75:</b>	75 psig	(5.2 barg)
	<b>FTI-125:</b>	125 psig	(8.6 barg)
	<b>FTI-200:</b>	200 psig	(13.8 barg)

<b>Max. Operating Temperature</b>	450°F
	all operating pressures

### Pressure Shell Design Conditions

**PMA** 200 psig/up to 450°F 13.8 barg/up to 232°C  
Max. allowable pressure

**TMA** 450°F/0-200 psig 232°C/0-13.8 barg  
Max. allowable temperature

### Construction Materials

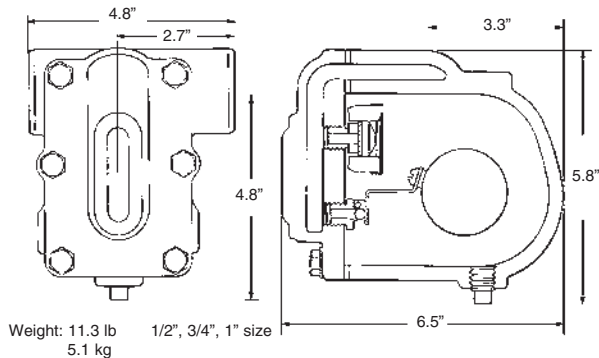
No.	Part	Material	
1	Body	Cast Iron	ASTM A126 CL B
2	Cover Screws	Carbon Steel	ASTM A449
2A	Cover Bolts	Alloy Steel	ASTM A 193 B7
2B	Cover Nuts 3/4" & 1"	7/16 - 14 UNC-2A	ASTM A 194 2H
3	Cover Gasket	Graphite	
4	Cover	Cast Iron	ASTM A126 CL B
5	Valve Seat	Stainless Steel	
7	Ball Float	Stainless Steel	
8	Float Arm	Stainless Steel	
9	Air Vent Assembly	Stainless Steel	
	Air Vent Head	Stainless Steel	
	Air Vent Seat	Stainless Steel	
15	Seat Bracket	Stainless Steel	
16	Pivot Pins	Stainless Steel	
18	Valve Head	Stainless Steel	

Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only.  
In the interests of development and improvement of the product, we reserve the right to change the specification.

TI-2-321-US 2.14

# Cast Iron Float & Thermostatic Steam Traps

## FTI-15, FTI-30, FTI-75, FTI-125, FTI-200



### Sample Specification

Steam traps shall be of the mechanical ball float type having cast iron bodies, NPT horizontal in-line connections, and all stainless steel internals. Incorporated into the trap body shall be a stainless steel balanced pressure thermostatic air vent capable of withstanding 450°F and resisting waterhammer without sustaining damage. Internals of the trap shall be completely servicable without disturbing the piping.

### Installation

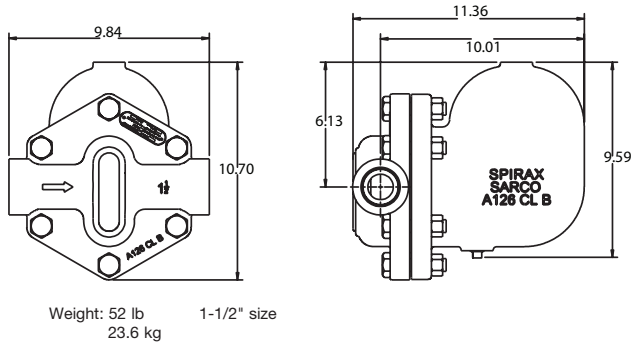
A pipeline strainer should be installed ahead of any steam trap. Full-port isolating valves should be placed to permit servicing. The trap should be installed below the drainage point of the equipment with a collecting leg before the trap, in a position so that the float arm is in a horizontal plane and the float rises and falls vertically with the flow direction as indicated on the body. Refer to the IMI which accompanies the product for complete instructions.

### Maintenance

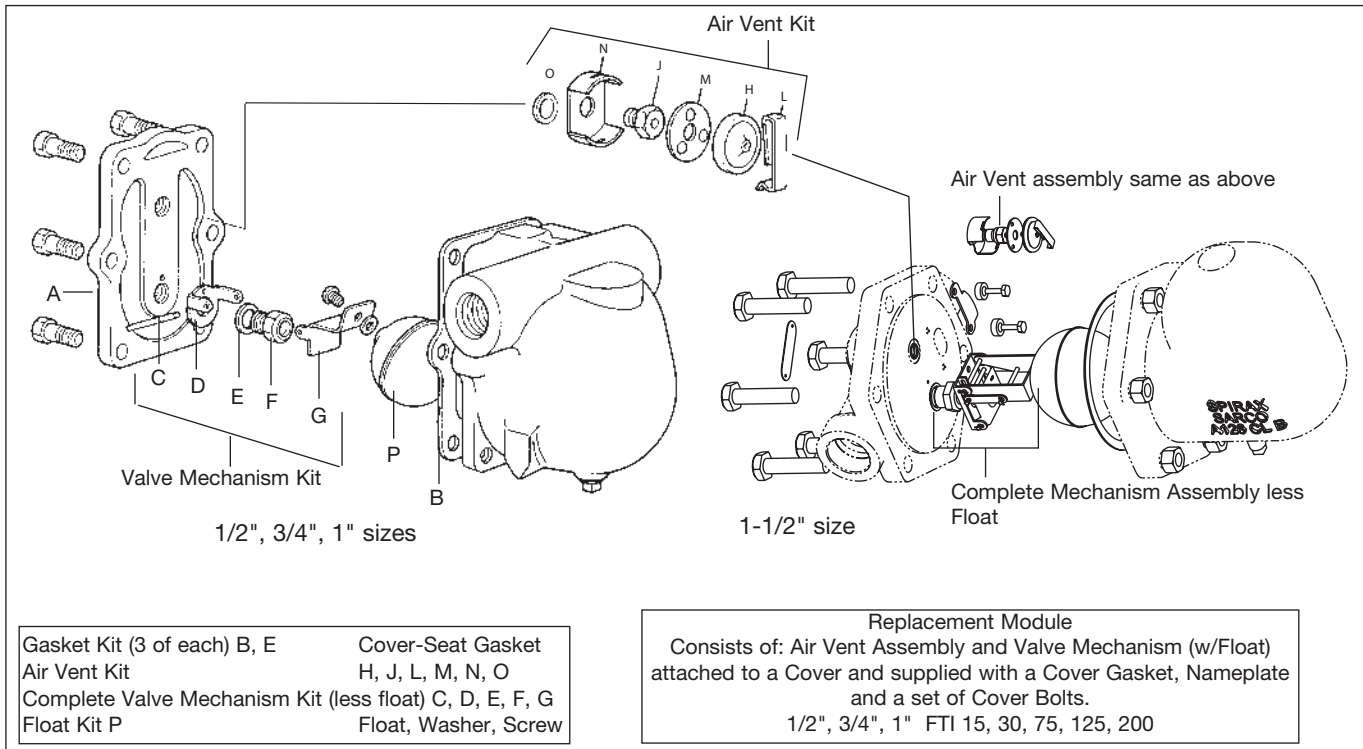
This product can be maintained without disturbing the piping connections. Complete isolation from both supply and return line is required before any servicing is performed.

The trap should be disassembled periodically for inspection and cleaning of the valve head and seat, operating mechanism and air vent. Worn or damaged parts should be replaced using a complete valve mechanism assembly and/or air vent assembly.

**Complete installation and maintenance instructions are given in the IMI, which accompanies the product.**



### Spare Parts



TI-2-321-US 2.14



# spirax sarco

## Cast Iron Float & Thermostatic Steam Traps FTB Super Capacity Series

Steam Traps

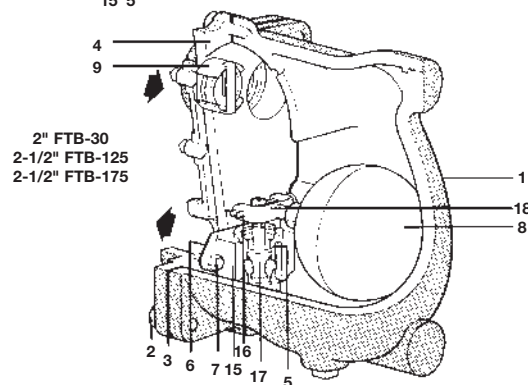
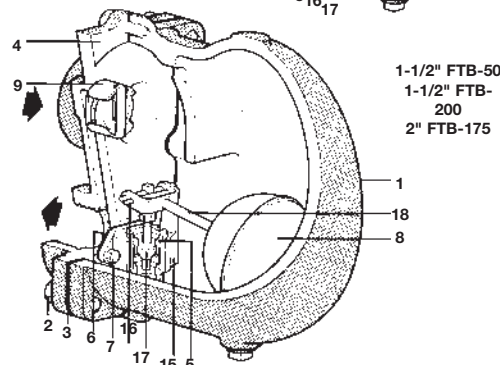
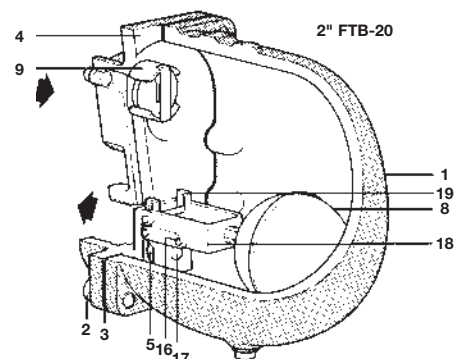
Float & Thermostatic

The trap contains a float valve mechanism which modulates to discharge condensate continuously at steam temperature. Non-condensable gases are released by a separate internal balanced pressure thermostatic air vent.

Model	FTB-20	FTB-30	FTB-50	FTB-125	FTB-175	FTB-200
<b>PMO</b>	20 psig	30 psig	50 psig	125 psig	175 psig	200 psig
<b>Sizes</b>	2"	2"	1-1/2"	2-1/2"	2", 2-1/2"	1-1/2"
<b>Connections</b>	NPT					
<b>Construction</b>	Cast Iron Body					
	Stainless Steel Internals					
<b>Options</b>	Gauge glass, Vacuum Breaker					

### Typical Applications

All process heat exchange equipment, particularly when controlled by modulating temperature control valves; unit heaters and air heating coils.



### Construction Materials

No.	Part	Material
1	Body	Cast Iron ASTM A126 CL B
2	Cover Screws	Carbon Steel ASTM A449 Type 1
3	Cover Gasket	Graphite
4	Cover	Cast Iron ASTM A126 CL B
5	Valve Seat	Stainless Steel
6	Valve Seat Gasket	Stainless Steel (FTB-20)
	Valve Assembly Gasket	Graphite
7	Main Valve Assembly Screws	Stainless Steel ASTM A193 Grade B8
8	Ball Float	Stainless Steel
9	Air Vent Assembly	Stainless Steel
	Air Vent Head	Stainless Steel
	Air Vent Seat	Stainless Steel
15	Main Valve Assy Housing	Stainless Steel
16	Pivot Pin	Stainless Steel
17	Valve Head	Stainless Steel (FTB-20, 175, 200)
		Cast Stainless Steel (FTB-30, 125, 200)
18	Float Arm	Stainless Steel
19	Seat Bracket	Stainless Steel (FTB-20)
	Head Bracket, Stop, Link	Stainless Steel (FTB-20)

For Capacities, see TI-2-317-US

### Limiting Operating Conditions

Max. Operating Pressure (PMO)	FTB-20: 20 psig (1.4 barg)	FTB-30: 30 psig (2.1 barg)	FTB-50: 50 psig (3.4 barg)	FTB-125: 125 psig (8.6 barg)	FTB-175: 175 psig (12.1 barg)	FTB-200: 200 psig (14.0 barg)
Max. Operating Temperature	450°F @ 200 psig					

### Pressure Shell Design Conditions

<b>PMA</b> Max. allowable temp.	FTB-125	175 psig/up to 450°F	12.1 barg/up to 232°C
	FTB-175		
	FTB-200		
	FTB-20	125 psig/up to 450°F	8.6 barg/up to 232°C
	FTB-30		
	FTB-50		
<b>TMA</b> Max. allowable temp.	FTB-125	450° F/0-175 psig	232°C/0-12.1 barg
	FTB-175		
	FTB-20		
	FTB-30	450° F/0-125 psig	232°C/0-8.6 barg
	FTB-50		
	FTB-200		

Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only.

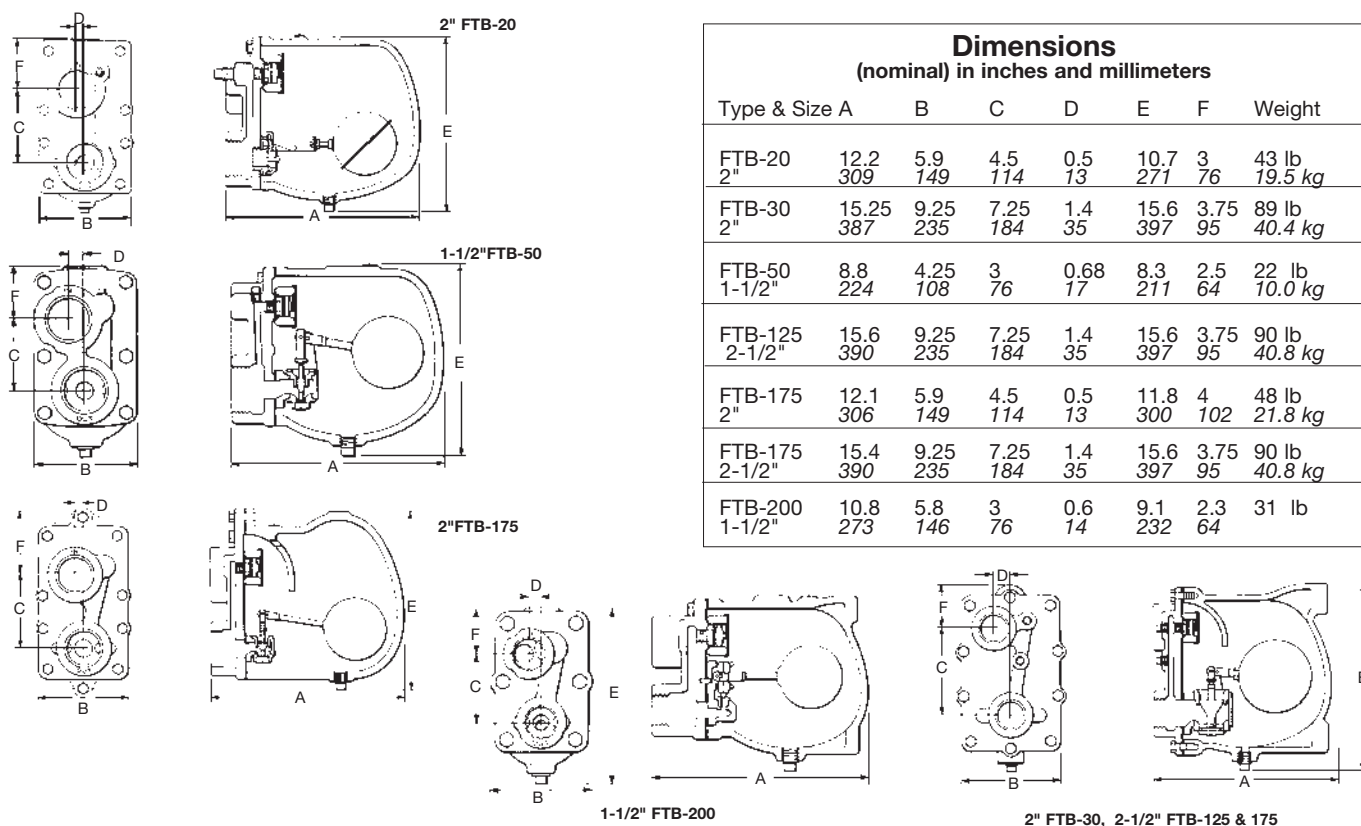
In the interests of development and improvement of the product, we reserve the right to change the specification.

TI-2-315-US 4.16



# Cast Iron Float & Thermostatic Steam Traps

## FTB Super Capacity Series



### Installation

A pipeline strainer should be installed ahead of any steam trap. Full-port isolating valves should be placed to permit servicing. The trap should be installed below the drainage point of the equipment with a collecting leg before the trap, in a position with the float arm in a horizontal plane so that the float rises and falls vertically, and with the direction of flow as indicated on the cover. Refer to IM-2-300-US for complete instructions.

### Maintenance

This product can be maintained without disturbing the piping connections. Complete isolation from both supply and return line is required before any servicing is performed.

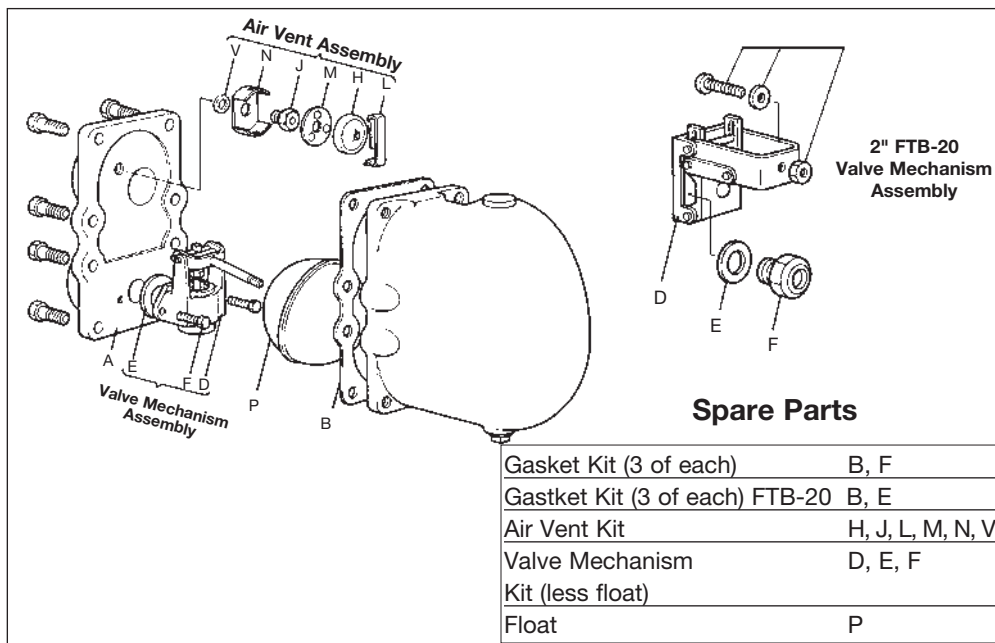
The trap should be disassembled periodically for inspection and cleaning of the valve head and seat, and operating mechanism.

Worn or damaged parts should be replaced using a complete valve mechanism assembly and/or air vent assembly.

Complete installation and maintenance instructions are given in IM-2-300-US, which accompanies the product.

### Sample Specification

Steam traps shall be of the mechanical float type having cast iron bodies, NPT connections, and stainless steel valve heads and seats. Incorporated into the trap body shall be a stainless steel balanced pressure thermostatic air vent capable of withstanding 450°F and resisting waterhammer without sustaining damage. Internals of the trap shall be completely servicable without disturbing the piping.



TI-2-315-US 4.16



## Cast Iron Float & Thermostatic Steam Traps FT, FTI and FTB Capacities

**Capacities** in lb/h hot condensate

Differential Pressure		FT-15				FT-30				FT-75			FT-125		
PSI	BAR	3/4" 1"	1-1/4"	1-1/2"	2"	3/4" 1"	1-1/4"	1-1/2"	2"	3/4" 1"	1-1/4" & 1-1/2"	2"	3/4" 1"	1-1/4" & 1-1/2"	2"
1/4	.017	279	600	1100	2300	279	375	1000	1300	160	550	850	100	400	550
1/2	.035	369	770	1700	2800	369	500	1300	1800	213	725	1100	135	520	675
1	.07	489	980	2400	3600	489	690	1700	2500	280	960	1500	175	680	880
2	.14	650	1240	3300	4650	650	910	2300	3400	365	1300	2000	230	890	1225
5	.35	785	1640	5000	6900	785	1200	3400	5200	520	1900	3100	330	1300	1950
10	.69	1000	2000	6600	9000	1000	1500	4600	6800	700	2650	4150	415	1700	2600
15	1.0	1075	2340	7600	10900	1075	1680	5500	7800	795	3050	4750	500	2050	3000
20	1.4					1210	1800	6000	8600	875	3400	5200	565	2300	3250
30	2.1					1370	2000	7000	10000	970	4000	5800	665	2700	3800
40	2.8									1120	4400	6400	750	3000	4200
50	3.5									1230	4750	6800	830	3200	4600
75	5.2									1450	5400	7700	970	3800	5500
100	6.9												1110	4200	6100
125	8.6												1190	4500	6600

orifice dia.	.218"	.312"	.500"	.625"	.218"	.228"	.390"	.500"	.166"	.312"	.421"	.125"	0.246"	.332"
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Differential Pressure		FTI-15		FTI-30		FTI-75		FTI-125		FTI-200	
PSI	BAR	1/2", 3/4" 1"	1-1/2"	1/2", 3/4" 1"	1-1/2"	1/2", 3/4" 1"	1-1/2"	1/2", 3/4" 1"	1-1/2"	1/2", 3/4" 1"	1-1/2"
1/4	.017	279	1020	279	960	160	850	100	520	50	520
1/2	.035	369	1784	369	1598	213	1450	135	1020	75	1020
1	.07	489	3455	489	2976	280	1880	175	1600	115	1600
2	.14	650	5331	650	4290	365	2683	230	1970	180	1970
5	.35	785	6430	785	5326	520	3335	330	2945	230	2945
10	.69	1000	8163	1000	6413	700	4414	415	3141	305	3141
15	1.0	1075	9673	1075	7850	795	5024	500	3958	365	3958
20	1.4			1210	8242	875	5690	565	4304	415	4304
30	2.1			1370	10200	970	6600	665	5094	495	5094
40	2.8					1120	7111	750	5503	530	5503
50	3.5					1230	7625	830	5655	575	5655
75	5.2					1450	9615	970	6505	680	6505
100	6.9							1110	7666	750	7666
125	8.6							1190	8554	820	8554
150	10.3									895	10026
175	12.0									930	10500
200	13.8									985	11059

orifice dia.	.218"	.625"	.218"	.500"	.166"	.421"	.125"	0.332"	.100"	0.332"
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Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only.  
In the interests of development and improvement of the product, we reserve the right to change the specification.

TI-2-317-US 05.08

# Cast Iron Float & Thermostatic Steam Traps

## FT, FTI and FTB Capacities

**Capacities** in lb/h hot condensate

Differential Pressure		FT-150				FT-200				FTB-20	FTB-30	FTB-50	FTB-125	FTB-175	FTB-200	FTB-175 FTB-200
psi	bar	3/4"	1"	1-1/4"	1-1/2"	3/4"	1"	1-1/4"	1-1/2"	2"	2"	1-1/2"	2-1/2"	2"	1-1/2"	2-1/2"
1/4	.017	170	170	275	275	120	120	250	250	6000	12000	875	19000	2600	920	7000
1/2	.035	235	235	360	360	160	160	335	335	7500	15800	1240	24000	4000	1300	12000
1	.07	315	315	470	470	210	210	450	450	9000	19000	1758	29200	5550	1850	17000
2	.14	425	425	610	610	280	280	600	600	11500	24000	1995	35000	7100	2100	21000
5	.34	650	650	920	920	400	400	870	870	15500	31500	2470	44000	9500	2600	27000
10	.69	810	810	1120	1120	520	520	1100	1100	19000	38000	3040	52000	11500	3200	32000
15	1.0	940	940	1300	1300	600	600	1280	1280	22000	41500	3563	57500	13000	3750	35500
20	1.4	1020	1020	1415	1415	660	660	1410	1410	25000	43500	3990	61500	14000	4200	38500
30	2.1	1175	1175	1600	1600	770	770	1640	1640	—	45500	4750	68500	16000	5000	42500
40	2.8	1310	1310	1770	1770	850	850	1800	1800	—	—	5368	73500	17500	5650	46000
50	3.5	1410	1410	1935	1935	910	910	1910	1910	—	—	5910	78000	18500	6220	48500
75	5.2	1625	1625	2210	2210	1050	1050	2200	2200	—	—	—	86000	21000	7400	54000
100	6.9	1755	1755	2360	2360	1175	1175	2410	2410	—	—	—	93000	22500	8310	58000
125	8.6	1900	1900	2600	2600	1260	1260	2610	2610	—	—	—	100000	24000	9220	61000
150	10.3	2025	2025	2750	2750	1370	1370	2825	2825	—	—	—	—	25500	10150	64000
175	12.1	—	—	—	—	1440	1440	2975	2975	—	—	—	—	27000	10950	68000
200	13.8	—	—	—	—	1512	1512	3130	3130	—	—	—	—	—	11498	69400*

\*2-1/2 FTB-200 ONLY

For kg/h, multiply by .454

### Orifice Diameter

in	.152	.152	.250	.250	.128	.128	.203	.203	.937	2.125*	.375*	2.125*	.750*	.375*	1.500*
mm	3.86	3.86	6.35	6.35	3.25	3.25	5.16	5.16	23.8	54.2*	9.53*	54.0*	19.05*	9.53*	38.1*

\*each orifice of a double seated trap.

# spirax sarco

## Cast/Ductile Iron Float & Thermostatic Steam Trap FT14, IFT14 and FT14C

Steam Traps

Float & Thermostatic

The trap contains a float valve mechanism which modulates to discharge condensate continuously at steam temperature, while non-condensable gases are released by a separate internal balanced pressure thermostatic air vent.

Model	IFT14-4.5 FT14-4.5	IFT14-10 FT14-10	IFT14-14 FT14-14
<b>PMO</b>	65 psig	145 psig	200 psig
<b>Sizes</b>	IFT 1/2", 3/4", only 1/2", 3/4", 1" HC, 1-1/2", 2"		
<b>Connections</b>	NPT		
<b>Construction</b>	1/2", 3/4", 1" HC: Ductile Iron Body 1-1/2", 2": Cast Iron Body All: Stainless Steel Internals		
<b>Options FT14 only</b>	1/2" - 2": Combination (C) Air Vent and SLR (steam lock release)		

### Construction Materials

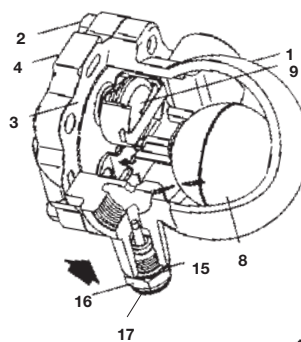
No.	Part	Material
1	Body 1/2", 3/4", 1" 1-1/2", 2"	Ductile (SG) Iron Cast Iron DIN 1693 GGG 40 DIN 1691 GG 25
2	Cover Bolting	Steel BS 3692 Gr. 8.8
3	Cover Gasket	Nickel Reinforced Exfoliated Graphite
4	Cover 1/2", 3/4", 1", 1-1/4" 1-1/2", 2"	Ductile (SG) Iron Cast Iron DIN 1693 GGG 40
5	Valve Seat 1/2", 3/4" Valve Seat 1" Main Valve Assy 1-1/2", 2"	Stainless Steel Stainless Steel Stainless Steel
6	Valve Seat Gasket 1/2", 3/4" 1", 1-1/4" Main Valve Assy Gasket 1-1/2", 2"	Stainless Steel Reinforced Exfoliated Graphite
7	Main Valve Assy Screws 1/2", 3/4" Pivot Frame Assy Set Screws 1", 1-1/4"	Stainless Steel M4 x 6 mm Stainless Steel M5 x 20 mm
	Main Valve Assy Bolts 1-1/2" Studs & Nuts 2"	Stainless Steel M6 x 20 mm M8 x 20 mm
8	Ball Float & Lever	Stainless Steel
9	Air Vent	Stainless Steel
10	Air Vent Seat Gasket	Stainless Steel
11	SLR	Stainless Steel
12	SLR Unit Gasket 1", 1-1/2", 2"	Mild Steel
13	SLR Seal	Stainless Steel
14	Erosion Deflector	Stainless Steel
15	Sensor Gasket	Stainless Steel
16	Sensor SSLI, WLSI optional	Stainless Steel
17	Blanking Plug standard (not shown)	Steel
18	Inlet Baffle 1-1/2", 2" only (baffle not shown)	Stainless Steel

### Typical Applications

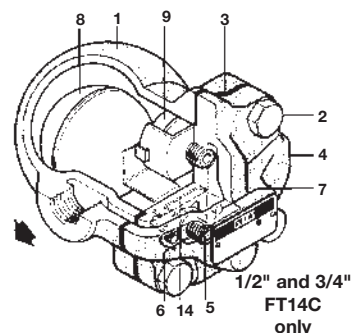
All process equipment, particularly when controlled by modulating temperature control valves; also for unit heaters, air heating coils, heat exchangers and steam main drip stations

### Capacities: see TIS 2.306

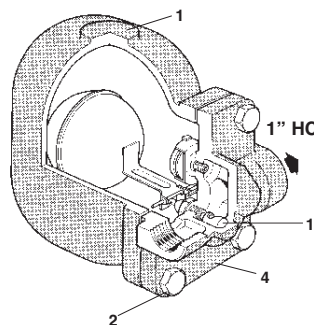
Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only.  
In the interests of development and improvement of the product, we reserve the right to change the specification.



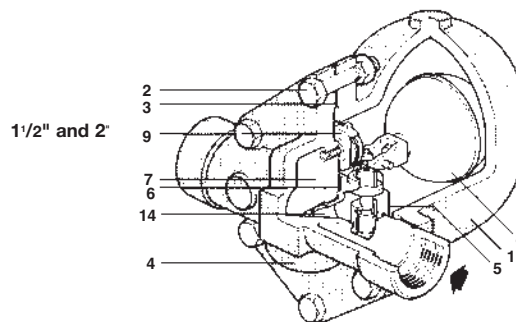
**IFT14**  
1/2" & 3/4"  
Sensor Connection standard with plug sensor added at installation



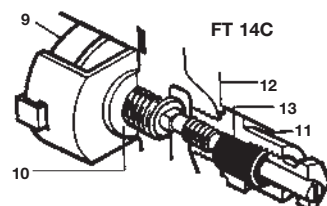
1/2" and 3/4"  
**FT14C**  
only



1" HC



1/2" and 2"



**FT 14C**

Combination  
Air Vent  
SLR unit

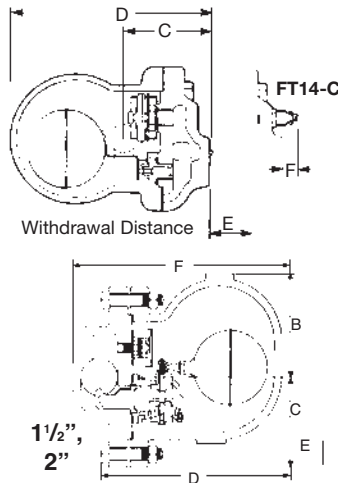
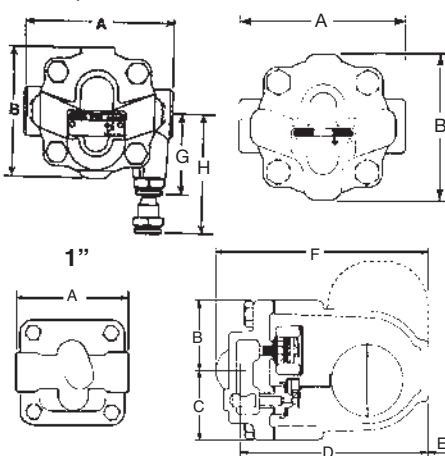
# Cast/Ductile Iron Float & Thermostatic Steam Trap FT14, IFT14 and FT14C

## Limiting Operating Conditions

Max operating pressure (PMO) IFT14-4.5, FT14-4.5, FT14C-4.5	65 psig (4.5 barg)
Max operating pressure (PMO) IFT14-10, FT14-10, FT14C-10	145 psig (10 barg)
Max operating pressure (PMO) IFT14-14, FT14-14, FT14C-14	200 psig (14 barg)

Max operating temperature (TMO) IFT14 1/2", 3/4" FT14C	482°F(250°C) @ 188 psig (13 barg) 392°F (200°C) @ 200 psig (14 barg)
Max operating temperature (TMO) 1" FT14HC	482°F(250°C) @ 200 psig (14 barg)
Max operating temperature (TMO) 1-1/2", 2" FT14	428°F(220°C) @ 195 psig (13.5 barg) 392°F (200°C) @ 200 psig (14 barg)
Minimum allowable temperature All IFT, FT14, FT14C	14°F (-10°C)

1/2", 3/4" FT14 IFT14



## Sample Specification

Steam traps shall be of the mechanical ball float type having iron bodies, horizontal line connections, and all stainless steel internals. Incorporated into the trap body shall be a stainless steel balanced pressure thermostatic air vent capable of withstanding 45°F(25°C) of superheat and resisting waterhammer without sustaining damage. Internals of the trap shall be completely servicable without disturbing the piping. (Optional: The trap shall include an adjustable steam lock release unit.) 14C version.

## Installation

A pipeline strainer should be installed ahead of any steam trap. Full port isolating valves should be placed to permit servicing. The trap should be installed below the drainage point of the equipment with a collecting leg before the trap, in a position so that the float arm is in a horizontal plane and the float rises and falls vertically, with the flow direction as indicated on the body. (The 1/2" and 3/4" FT14 only trap is supplied with right-to-left flow. If left-to-right or vertical flows are required, cover can be rotated as desired.) Refer to IMI 2.300 or IM-FO1-30 for IFT for complete instructions.

## Maintenance

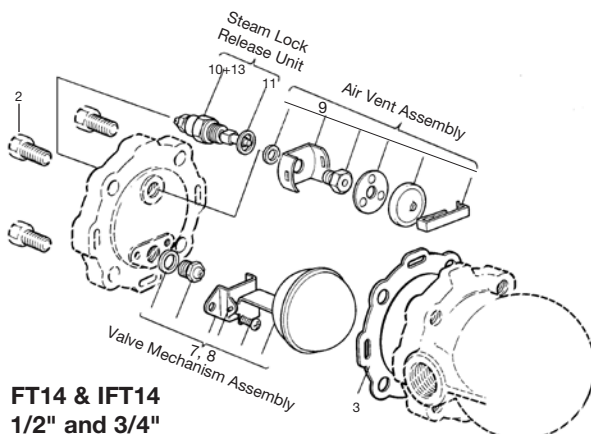
This product can be maintained without disturbing the piping connections. Complete isolation from both supply and return line is required before any servicing is performed. The trap should be disassembled periodically for inspection and cleaning of the valve head and seat, operating mechanism and air vent. Worn or damaged parts should be replaced using a complete valve mechanism assembly and/or air vent assembly. Complete installation and maintenance instructions are given in IMI 2.300, or IM-FO1-30 for IFT which accompanies the product.

**Dimensions**  
(nominal) in inches and millimeters

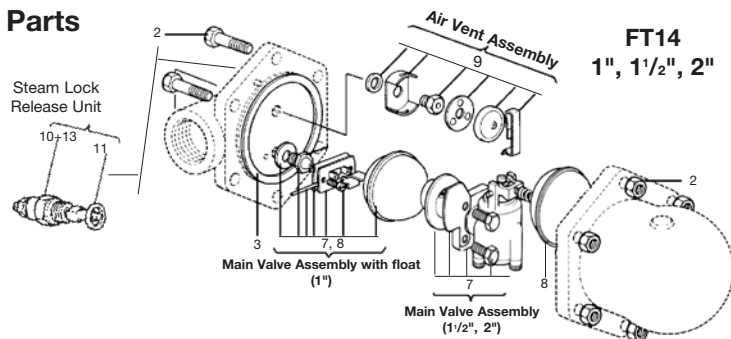
Size	A	B	C	D	E	F	G	H	Weight
1/2", 3/4"	4.8 121	4.2 107	2.6 67	5.8 147	4.1 105	1.2 30	2.6 66	3.9 98	6.4 lb 2.9 kg
1"	4.7 120	4.3 110	3.2 80	7.7 195	6.3 160	8.6 220	-	-	15.0 lb 6.8 kg
1-1/2"	10.6 270	5.1 130	4.3 108	9.4 238	7.9 200	10.6 270	-	-	38.5 lb 17.5 kg
2"	11.9 300	5.4 138	4.9 125	9.8 250	7.8 200	11.3 288	-	-	52 lb 24 kg

## Spare Parts

Main Valve Assembly with float	7, 8
Air Vent Assembly	9
Steam Lock Release Unit	10+13, 11
Cover Gasket (Pkt of 3)	3



FT14 & IFT14  
1/2" and 3/4"



Main Valve Assy w/ Float (1")	7, 8
Main Valve Assy w/ Erosion Deflector (1-1/2", 2")	7
Air Vent Assy (K not used on 1", 1-1/2", 2")	9
Steam Lock Release Unit (state SLR or C unit)	10+13, 11
Three Complete sets of Gaskets	3, 6, 10
Set of Cover Bolts (set of 4) (1")	2
Set of Cover Bolts & Nuts (set of 6) (1-1/2", 2")	2
Ball Float (1-1/2", 2") Float Only	8

The erosion deflector on the 1" is pressed into the body during manufacture and not available as a spare.

TI-2-320-US 4.14



## Mod. 2000 Self Drainage Unit For Float & Thermostatic Trap to prevent freeze up

The drainage device is to be used on the bottom drain connection on F&T steam traps or drain traps in outdoor installations where freezing may occur. When the pressure drops below 3 psig the device opens to completely drain the trap body. The unit will close at pressures above 3 psig.

### Construction Materials

No.	Part	Material
1	Sleeve	Stainless Steel
2	Body with integral seat	
3	Ball valve	
4	Spring	

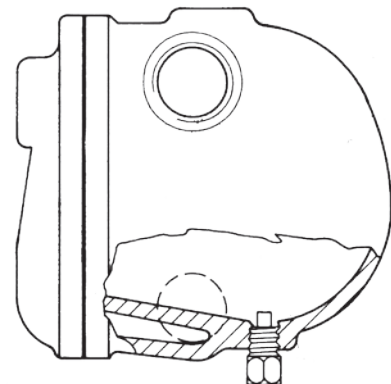
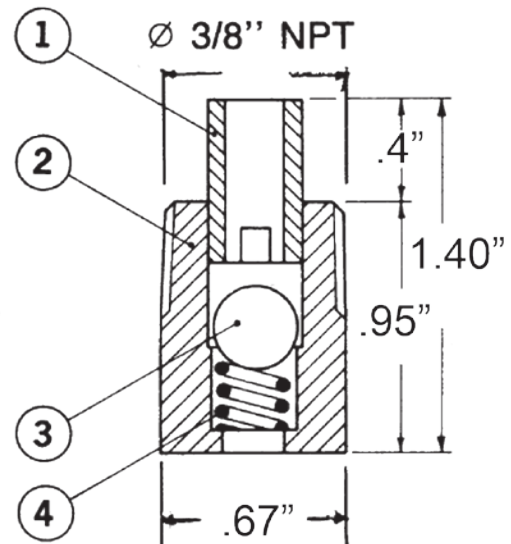
### Pressure Shell Design Conditions

Max Allowable Pressure (PMA)	464 psig (32 barg)
Max Allowable Temperature (TMA)	482°F (250°C)
Max Operating Pressure (PMO)	464 psig (32 barg)
Max Operating Temperature (TMO)	482°F (250°C)
Minimum Closer Pressure	3.6 psig (.25 barg)
Opening pressure	3 psig (0.2 barg)

### Installation

Thread the Mod. 2000 into the drain connection on the bottom of the F&T trap. Most, but not all, have 3/8" connections. Bush down to 3/8" NPT if connection on the trap is larger. This device will automatically open and drain when the steam trap pressure drops below 3 psig; so, it should not drain in an area where it could dump hot condensate onto personnel. If the trap is where drainage may cause a danger, an open funnel drain with a 1" air gap should be placed under the Mod.2000 to drain condensate to a safe place. Reference IM-2-323-US.

Model	Mod.2000
PMO	464 psig (32 barg)
Size	3/8"
Connections	NPT
Construction	Tamperproof stainless steel



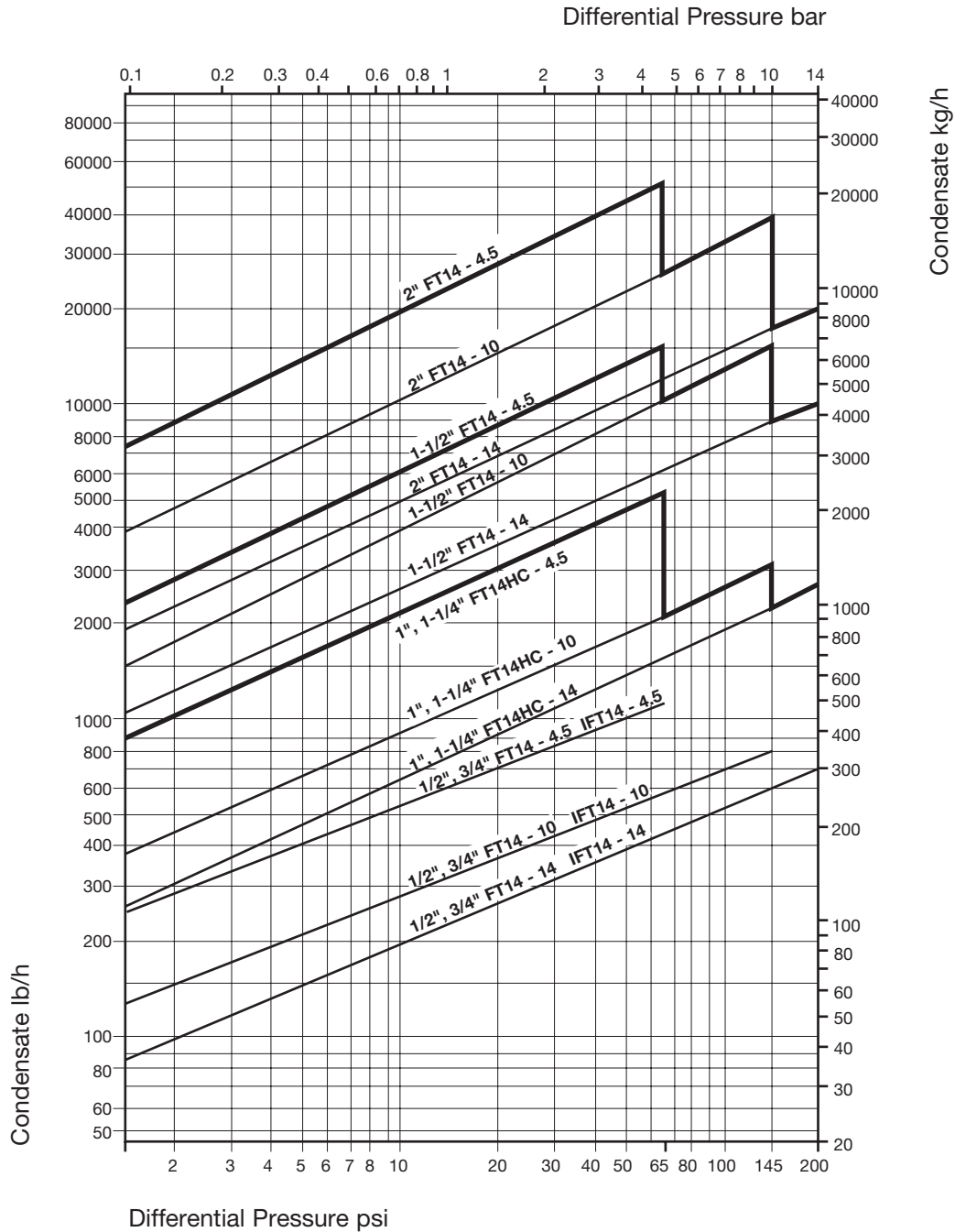
Float & Thermostatic style steam trap with Mod. 2000 drainage device





## Float & Thermostatic Steam Trap FT14, IFT14, 1"FT14HC

Capacities in lb/h hot condensate



Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only.  
In the interests of development and improvement of the product, we reserve the right to change the specification.

TI-2-306-US 6.14





## Cast Steel Float & Thermostatic Steam Traps FTB Super Capacity Series

The trap contains a float valve mechanism which modulates to discharge condensate continuously at steam temperature. Non-condensable gases are released by a separate internal balanced pressure thermostatic air vent.

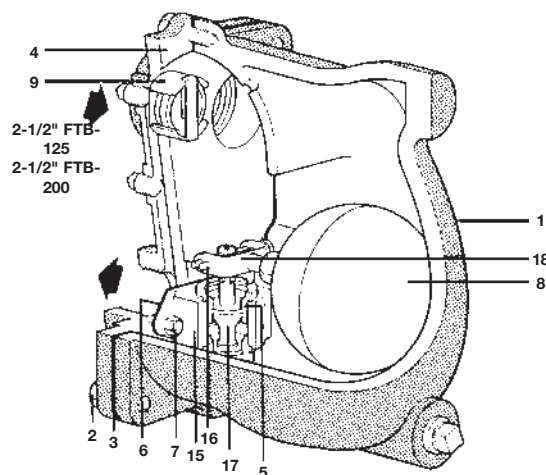
Model	FTB-125	FTB-200
PMO	125 psig	200 psig
Sizes	2-1/2"	
Connections	NPT, SW	
Construction	Cast Steel Body	
	Stainless Steel valve head & seat, Mechanism housing	
Options	Bimetal Air Vent	

### Typical Applications

All process heat exchange equipment, particularly when controlled by modulating temperature control valves; unit heaters and air heating coils.

### Construction Materials

No.	Part	Material
1	Body	Cast Steel ASTM A216 WCB
2	Cover Screws	Carbon Steel ASTM A449 Type 1
3	Cover Gasket	Graphite
4	Cover	Cast Steel ASTM A216 WCB
5	Valve Seat	Stainless Steel
6	Valve Assembly Gasket	Graphite
7	Main Valve Assembly Screws	Stainless Steel
8	Ball Float	Stainless Steel
9	Air Vent Assembly	Stainless Steel
	Air Vent Head	Stainless Steel
	Air Vent Seat	Stainless Steel
15	Main Valve Assy Housing	Stainless Steel
16	Pivot Pin	Stainless Steel
17	Valve Head	Stainless Steel (FTB-175) Cast Stainless Steel (FTB-125)
18	Float Arm	Stainless Steel (FTB-175)



For Capacities, see TI-2-317-US

### Limiting Operating Conditions

Max. Operating Pressure (PMO) FTB-125: 125 psig (8.6 barg)  
FTB-200: 200 psig (13.8 barg)

Thermostatic air vent operating range	
Steam pressure (psig)	Maximum steam temperature °F
200	572
175	558
150	555
100	547
75	542
50	534
25	521
0	464

Note: Use bimetal air vent outside range on chart up to 650°F

### Pressure Shell Design Conditions

PMA Max. allowable pressure	FTB-125 } 200 psig/up to 650°F FTB-200 } 12.1 barg/up to 343°C
TMA Max. allowable temp.	FTB-125 } 650° F/0-200 psig FTB-200 } 343°C/0-12.1 barg

Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only.  
In the interests of development and improvement of the product, we reserve the right to change the specification.

TI-2-322-US 4.12

# Cast Steel Float & Thermostatic Steam Traps

## FTB Super Capacity Series

### Installation

A pipeline strainer should be installed ahead of any steam trap. Full-port isolating valves should be placed to permit servicing. The trap should be installed below the drainage point of the equipment with a collecting leg before the trap, in a position with the float arm in a horizontal plane so that the float rises and falls vertically, and with the direction of flow as indicated on the cover. Refer to IMI 2.300 for complete instructions.

### Maintenance

This product can be maintained without disturbing the piping connections. Complete isolation from both supply and return line is required before any servicing is performed. The trap should be disassembled periodically for inspection and cleaning of the valve head and seat, and operating mechanism.

Worn or damaged parts should be replaced using a complete valve mechanism assembly and/or air vent assembly.

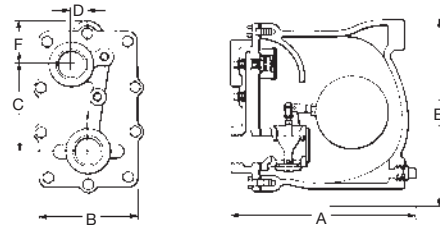
**Complete installation and maintenance instructions are given in IMI 2.300, which accompanies the product.**

### Sample Specification

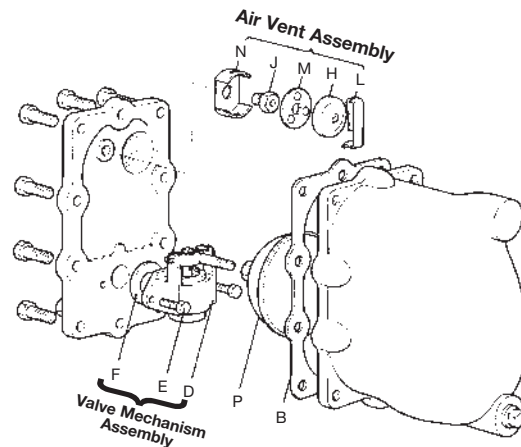
Steam traps shall be of the mechanical float type having cast steel bodies, NPT or SW connections, and stainless steel valve heads and seats. Incorporated into the trap body shall be a stainless steel balanced pressure thermostatic air vent capable of withstanding 572°F operating temperature and resisting waterhammer without sustaining damage. Internals of the trap shall be completely servicable without disturbing the piping. Trap tested in accordance to ANSI / FCI 85-1. Capacity data obtained in accordance to PTC 39.1.

### Dimensions (nominal) in inches and millimeters

Type & Size	A	B	C	D	E	F	Weight
<b>FTB-125</b> 2-1/2"	15.4 390	9.25 235	6.9 184	1.4 35	14.4 397	4.0 95	112 lb 50.8 kg
<b>FTB-200</b> 2-1/2"	15.4 390	9.25 235	6.9 184	1.4 35	14.4 397	4.0 95	112 lb 50.8 kg



2-1/2" FTB-125 & 200



### Spare Parts

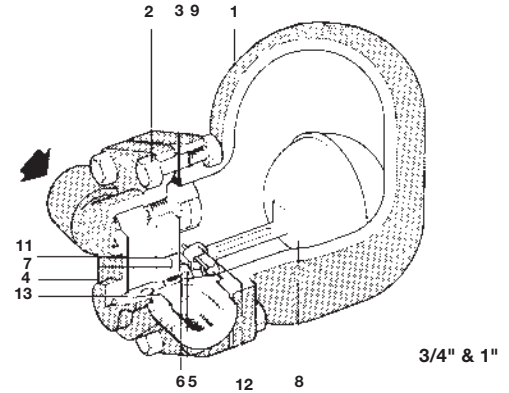
Gasket Kit (3 of each)	B, E (F)
Air Vent Kit	H, J, L, M, N
Valve Mechanism Kit (less float)	D, E, F
Float	P

# spirax sarco

## Cast Steel Float & Thermostatic Steam Trap FT450

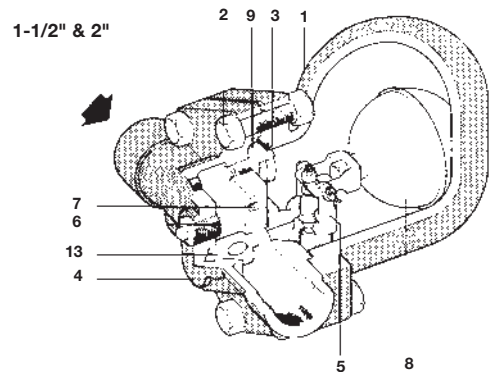
The trap contains a float valve mechanism which modulates to discharge condensate continuously at steam temperature, while non-condensable gases are released by a separate internal balanced pressure thermostatic air vent.

<b>Model</b>	<b>FT 450</b> (Replaces FT 32)
<b>PMO</b>	465 psig (see below)
<b>Sizes</b>	3/4" to 2"
<b>Connections</b>	NPT Carbon Steel Body
<b>Construction</b>	Stainless Steel Internals
<b>Options</b>	ANSI 150, 300 or 600 RF flanged SW Connections to ANSI B16.11 Bimetal Air Vent on 4.5, 10, 14, 21 and 32 Drain plug tapped 1/2" NPT models for superheat operation.



### Construction Materials

No.	Part	Material	
1	Body	Cast Steel	ASTM A216 WCB
2	Cover Bolts	Alloy Steel	ASTM A 193 B7
	Cover Nuts 3/4" & 1"	7/16 - 14 UNC-2A	ASTM A 194 2H
	1-1/2" & 2"	5/8-11UNC-2A	
3	Cover Gasket	Exfoliated Graphite	
4	Cover	Cast Steel	ASTM A216 WCB
5	Valve Seat (3/4" & 1")	Stainless Steel	
	Main Valve Assembly w/ erosion deflector (1-1/2" & 2")	Stainless Steel	
6	Valve Seat Gasket (3/4" & 1")	Stainless Steel	
	Main Valve Assy Gasket 1-1/2" & 2"	Stainless Steel Reinforced Exfoliated Graphite	
7	Pivot Frame Assy	Stainless Steel	
	Set Screws (3/4" & 1")	10-24 Fillister Head	
	Main Valve Assembly Cap Screws (1-1/2")	1/4-20	
	Studs & Nuts (2")	5/16-18	
8	Ball Float & Lever	Stainless Steel	
9	Air Vent Assembly	Standard Stainless Steel	
9A	Optional Bimetal	Corrosion resistant Bimetal and Stainless Steel	
10	Air Vent Seat Gasket	Stainless Steel	
11	Support Frame	Stainless Steel	
12	Pivot Frame	Stainless Steel	
13	Erosion Deflector	Stainless Steel	



### Capacities: See TIS 2.308

### Limiting Operating Conditions\*

<b>Max. Operating Pressure (PMO)</b>	FT450-4.5: 65 psig (4.5 barg)
	FT450-10: 145 psig (10 barg)
	FT450-14: 200 psig (14 barg)
	FT450-21: 300 psig (21 barg)
	FT450-32: 465 psig (32 barg)

<b>Max. Operating Temperature</b>	Bimetal optional air vent
See graph for thermostatic air vent	750°F (400°C) at operating pressures below 505 psig

Pressure Shell Design Conditions For NPT, SW, ANSI300, ANSI600\*

<b>PMA</b>	535 psig/650°F	37 barg/342°C
Max. allowable pressure	505 psig/750°F	35 barg/400°C

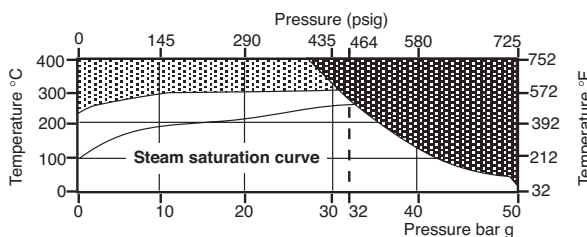
<b>TMA</b>	750°F/0-505 psig	400°C/0-34 barg
Max. allowable temperature		

\* The limiting operating and design conditions for ANSI 150 flanged units will be limited by the Flange Rating.

### Typical Applications

All process equipment, particularly when controlled by modulating temperature control valves; unit heaters, air heating coils, heat exchangers and steam main drip stations.

### Thermostatic Air Vent Operating Range



The product must not be used in this region.

The product must not be used in this region as damage to internals may occur.

Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only.

In the interests of development and improvement of the product, we reserve the right to change the specification.

TI-2-304-US 4.16

# Cast Steel Float & Thermostatic Steam Trap

## FT450

### Sample Specification

Steam traps shall be of the mechanical ball float type having steel bodies, horizontal line connections, and stainless steel valve heads, seats and ball floats. Incorporated into the trap body shall be a stainless steel balanced pressure thermostatic air vent capable of withstanding 45°F(25°C) of superheat and resisting waterhammer without sustaining damage. Internals of the trap shall be completely servicable without disturbing the piping.

### Installation

A pipeline strainer should be installed ahead of any steam trap. Full port isolating valves should be placed to permit servicing. The trap should be installed below the drainage point of the equipment with a collecting leg before the trap, in a position so that the float arm is in a horizontal plane and the float rises and falls vertically, with the flow direction as indicated on the body. Refer to IMI 2.300 for complete instructions.

### Dimensions

(nominal) in inches and millimeters

Size-DN	A	A1	B	C	D	E	F	G	H	NPT/SW	Flg
3/4" 20	6.1 155	10.1 255	3.0 76	3.1 79	6.4 163	4.7 120	7.4 189	4.0 102	—	18.0 lb 8.2 kg	23.8 lb 10.8 kg
1" 25	6.5 165	10.4 264	5.0 127	3.8 97	8.2 208	6.3 160	9.2 234	5.8 147	—	28.0 lb 12.7 kg	33 lb 15 kg
1-1/2" 40	9.8 250	14.0 356	5.6 142	3.6 92	9.8 250	7.7 195	11.1 282	6.4 163	4.7 119	55.1 lb 25.0 kg	64.0 lb 29.0 kg
2" 50	11.8 300	16.0* 406*	6.0 152	4.0 102	10.0 255	7.7 195	11.6 295	6.5 165	6.0 152	68.0 lb 31.0 kg	82.0 lb 37.3 kg

\*ANSI 600 16.5" 419 mm

### Maintenance

This product can be maintained without disturbing the piping connections. Complete isolation from both supply and return line is required before any servicing is performed. The trap should be disassembled periodically for inspection and cleaning of the valve head and seat, operating mechanism and air vent.

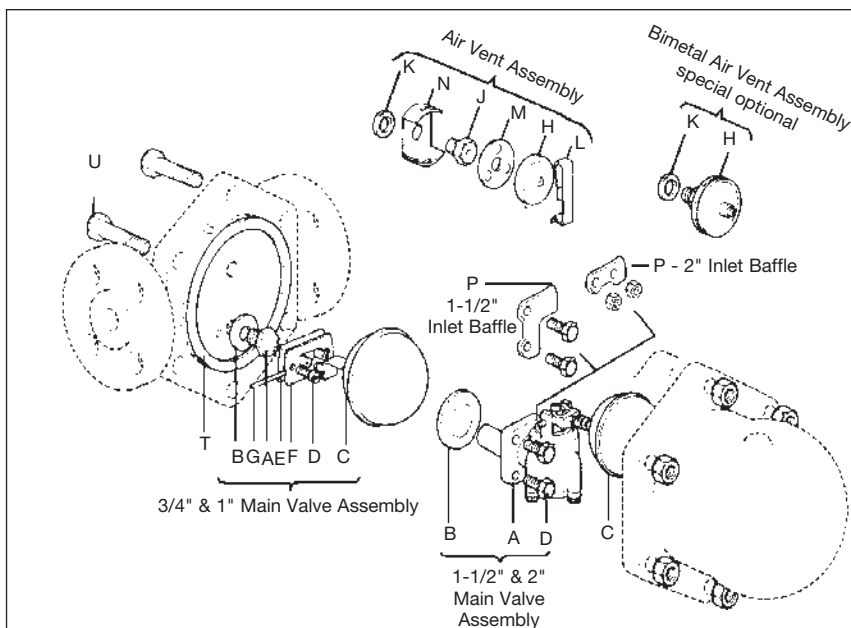
Worn or damaged parts should be replaced using a complete valve mechanism assembly and/or air vent assembly.

Complete installation and maintenance instructions are given in IMI 2.300, which accompanies the product.

### Spare Parts

Valve Mechanism Kit w/ Float (3/4" & 1")	A,B,C,D,E,F,G
Valve Mech. Kit (1-1/2" & 2")	A,B,D,P
Air Vent Kit (PMO up to 21 bar)	H,J,L,M,N
Air Vent Kit (PMO 32 bar)	H,K
Gasket Kit (3 of each)	B,K,T
Ball Float (1-1/2" & 2")	C

The erosion deflector is pressed into the body during manufacture and not available as a spare.

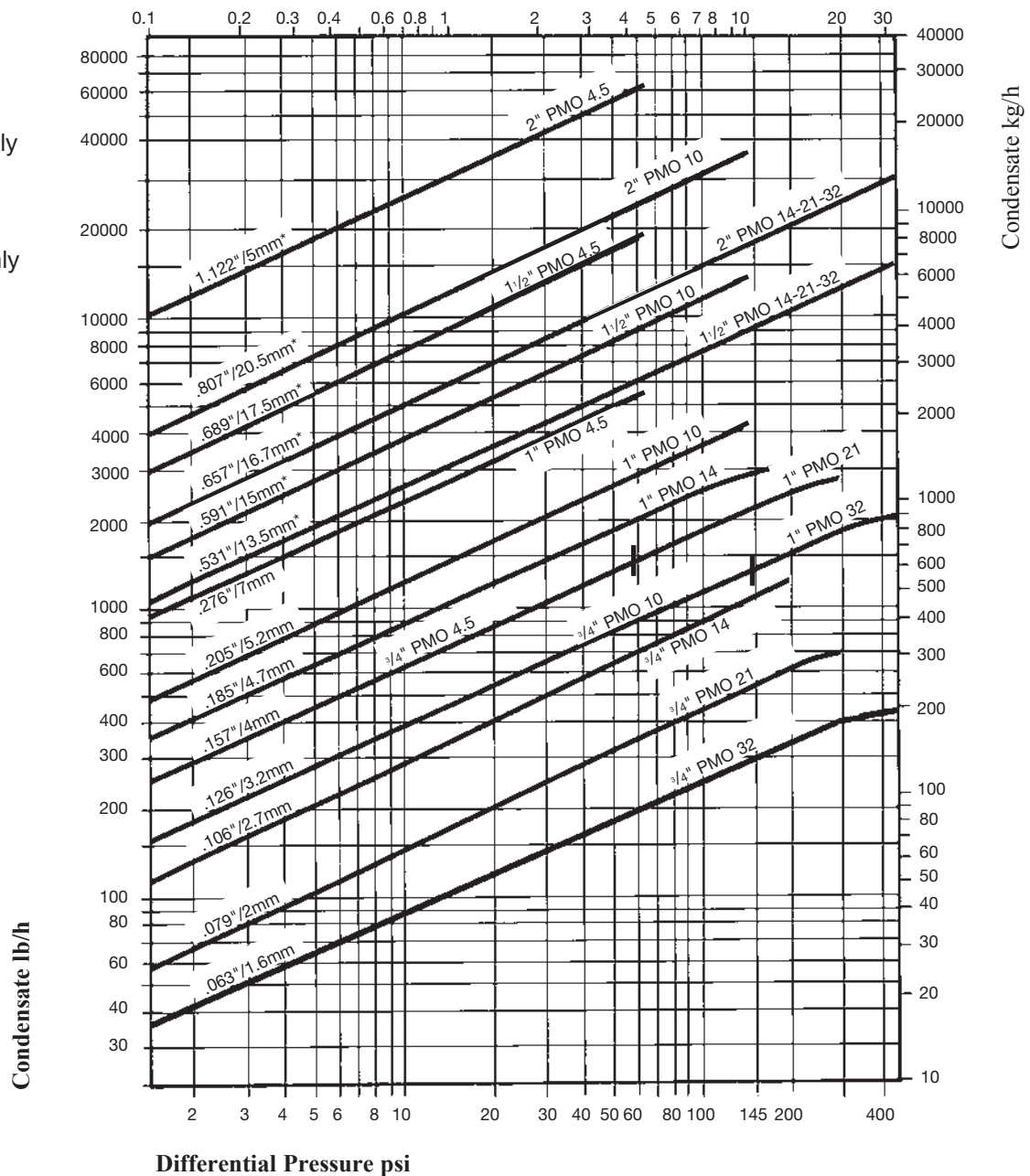




## Float & Thermostatic Steam Trap Capacities FT46, FT450

**Capacities** in lb/h hot condensate

Differential Pressure bar (x 100 = kPa)



\* Each orifice of a double-seated mechanism

Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only.  
In the interests of development and improvement of the product, we reserve the right to change the specification.

TI-2-308-US 10.03

# Float & Thermostatic Steam Trap Capacities

## FT46, FT450

**Capacities** in lb/h hot condensate

Model	Size	Orifice Inches/mm	Differential Pressure, psi				
			1/4	1/2	1	2	5
FT14-4.5	1/2", 3/4"	.157/4	115	155	205	265	390
FT14-10	1/2", 3/4"	.110/2.8	56	76	100	137	200
FT14-14	1/2", 3/4"	.079/2	40	53	71	95	138
FT14-4.5	1"	.276/7	374	529	748	1058	1566
FT14-10	1"	.205/5.2	163	230	325	459	695
FT14-14	1"	.157/4	109	154	218	309	441
FT14-4.5	1-1/2"	.689/17.5*	975	1378	1949	2756	4388
FT14-10	1-1/2"	.591/15*	608	860	1216	1720	2700
FT14-14	1-1/2"	.531/13.5*	394	557	788	1114	1764
FT14-4.5	2"	1.122/28.5*	3196	4520	6392	9040	14332
FT14-10	2"	.807/20.5*	1637	2315	3274	4630	7166
FT14-14	2"	.657/16.7*	780	1102	1559	2205	3418
FT450-4.5	3/4"	.157/4	110	155	219	310	440
FT450-10	3/4"	.126/3.2	65	91	129	183	275
FT450-14	3/4"	.106/2.7	47	66	93	132	203
FT20-21 FT450-21	1/2" 3/4"	.079/2.0	25	35	50	70	110
FT450-32	3/4"	.063/1.6	16	22	31	44	66
FT450-4.5	1"	.276/7	389	550	778	1100	1655
FT450-10	1"	.205/5.2	202	285	403	570	870
FT450-14	1"	.185/4.7	150	212	300	425	640
FT450-21	1"	.157/4	110	155	219	310	440
FT450-32	1"	.126/3.2	65	91	129	183	275
FT450-4.5	1-1/2"	.689/17.5*	1209	1710	2418	3420	5733
FT450-10	1-1/2"	.591/15*	624	882	1247	1764	2734
FT450-14/21/32	1-1/2"	.531/13.5*	407	575	813	1150	1764
FT450-4.5	2"	1.122/28.5*	4289	6065	8577	12130	18522
FT450-10	2"	.807/20.5*	1559	2205	3118	4410	6950
FT450-14/21/32	2"	.657/16.7*	780	1103	1559	2705	3528

\*each orifice of double seated trap

**NOTE:** for FT32 and FT46, use capacities for FT450.



# spirax sarco

## Cast Steel Float & Thermostatic Steam Trap 3" and 4" FT450

The trap contains a float valve mechanism which modulates to discharge condensate continuously at steam temperature, while non-condensable gases are released by a separate internal thermostatic air vent.

Model	FT450	
PMO	450 psig	
Sizes	3"	4"
Connections	NPT, SW, Flanged	Flanged
Construction	Carbon Steel Body Stainless Steel Internals	

### Standards

This product fully complies with the requirements of the European Pressure Equipment Directive 97/23/EC, and carries the CE mark when so required.

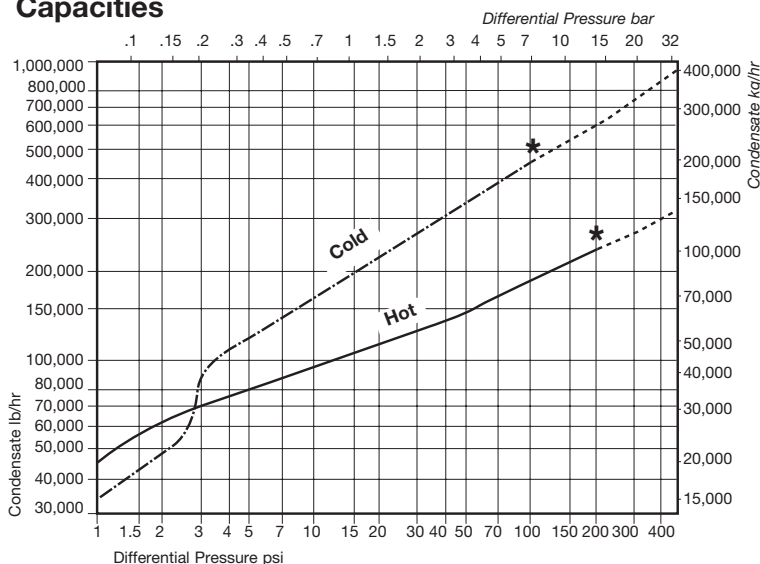
### Certification

This product is available with certification to EN 10204 3.1. Designed in accordance with ASME VIII Div 1. **Note:** All certification/inspection requirements must be stated at the time of order placement.

### Construction Materials

No.	Part	Material
1	Body	Cast Carbon Steel ASTM A216 WCB
2	Cover	Cast Carbon Steel ASTM A216 WCB
3	Cover Gasket	Graphite with SS insert
4	Cover Bolts	Alloy Steel ASTM A193 GR B7
5	Lockwashers	Steel
6	Main Valve Assembly	Stainless Steel
	Valve Mech. Gasket	Graphite
	Valve Mech. Screws	Stainless Steel
7	Float	Stainless Steel ASTM A240 Type 304
8	Cover Plug (3/4" NPT)	Steel
	Drain Plug (3/4" NPT)	Steel
9	Companion Flange	Forged Steel
10	Flange Bolts	Alloy Steel ASTM A193 GR B7
11	Air Vent Assembly	Stainless Steel
	Air Vent Head	Stainless Steel
	Air Vent Seal	Stainless Steel
11A	Air Vent	Stainless Steel & Bimetal RAU Type RR
12	Air Vent Pipe	Stainless Steel

### Capacities



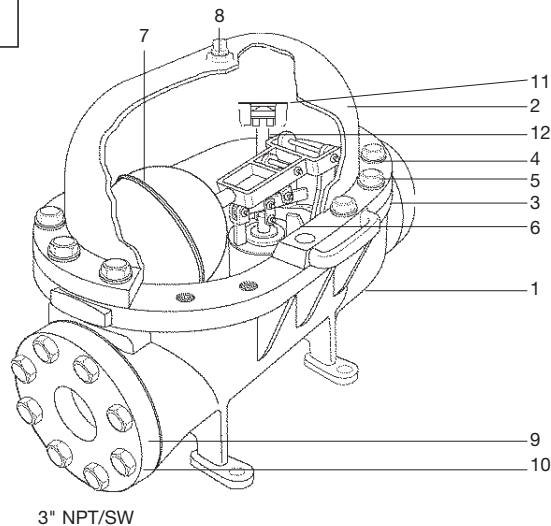
\* In this region the trap capacity may exceed the flow capacity of the connection piping.

Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only.

In the interests of development and improvement of the product, we reserve the right to change the specification.

### Typical Applications

- Reboilers, heat exchangers and other large process equipment
- Large absorption chillers
- In combination with the Spirax Sarco 4" Pressure Powered Pump™



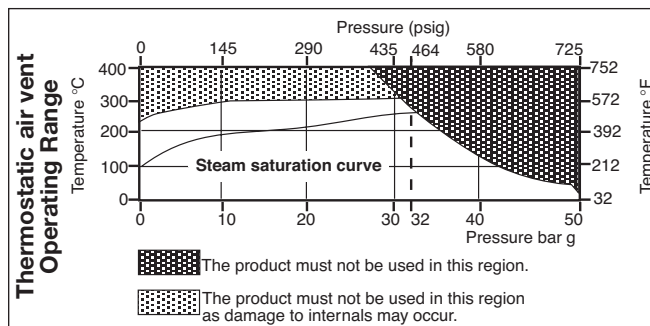
### Limiting Operating Conditions

**Max. Operating Pressure** 450 psig (31 barg)

**Max. Operating Temperature** Optional Bimetal

650°F (343°C) at 450 psig (31 barg)

750°F (400°C) at operating pressures below 375 psig (26 barg)



### Pressure Shell Design Conditions

<b>PMA</b>	450 psig/up to 650°F	31 barg/up to 343°C
Max. allowable pressure	425 psig/700°F	29 barg/371°C
	375 psig/750°F	26 barg/400°C

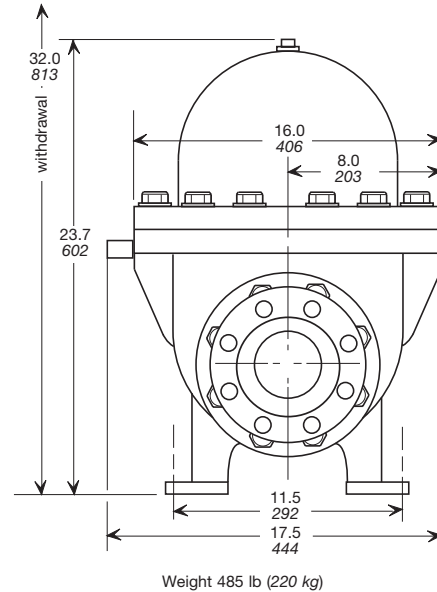
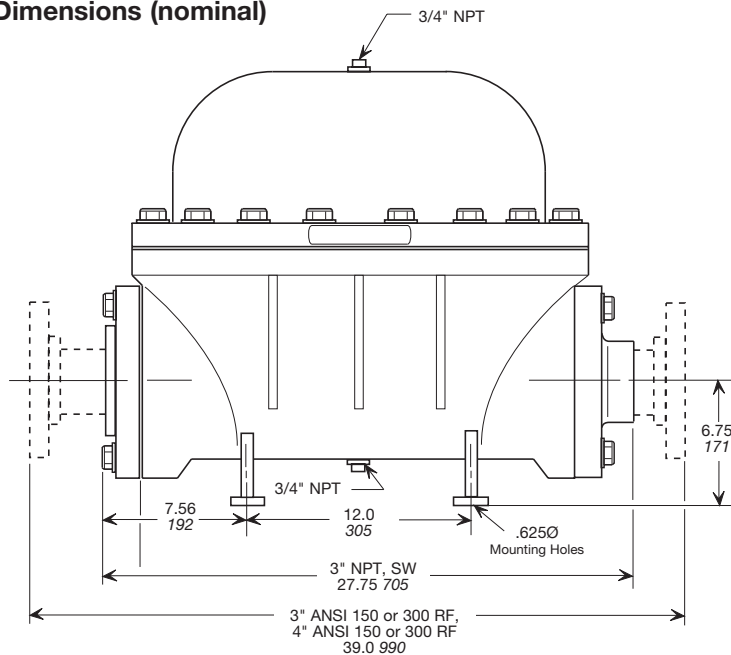
### TMA

Max. allowable temperature 750°F/0-375 psig 400°C/0-26 barg



# Cast Steel Float & Thermostatic Steam Trap 3" and 4" FT450

## Dimensions (nominal)



## Sample Specification

Steam traps shall be of the mechanical ball float type having cast steel bodies with stainless steel internal parts. The piping connections shall be horizontal in-line, and the body shall incorporate mounting legs with drilled pads. The traps shall have an integral thermostatic air vent. The trap body shall be horizontally split and all internal parts shall be completely serviceable without disturbing the inlet and outlet piping.

## Installation

The trap should be located below and close to the equipment drain point. A pipe-line strainer should be installed ahead of the trap, and full port isolating valves should be placed to permit servicing. The mounting legs should be bolted to a firm horizontal support. Access above the trap must be provided for servicing. Complete installation instructions are given in IMI 2.3041.

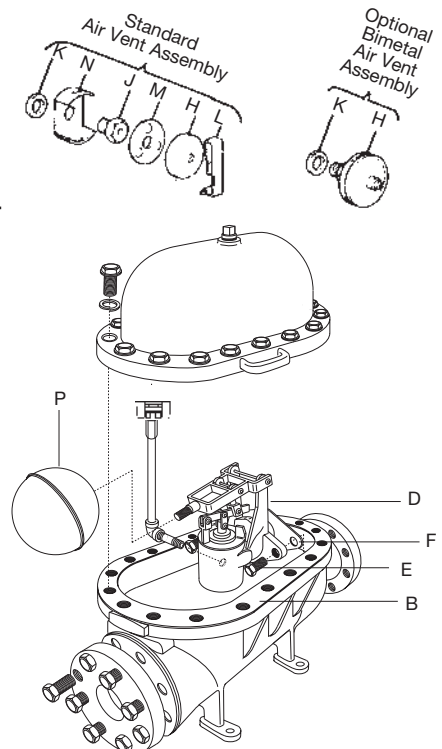
## Maintenance

This product can be maintained without disturbing the piping connections. Complete isolation from both supply and return line is required before any servicing is performed.

The trap should be disassembled periodically for inspection and cleaning of the valve mechanism and air vent.

Complete installation and maintenance instructions are given in IMI 2.3041, which accompanies the product.

## Spare Parts



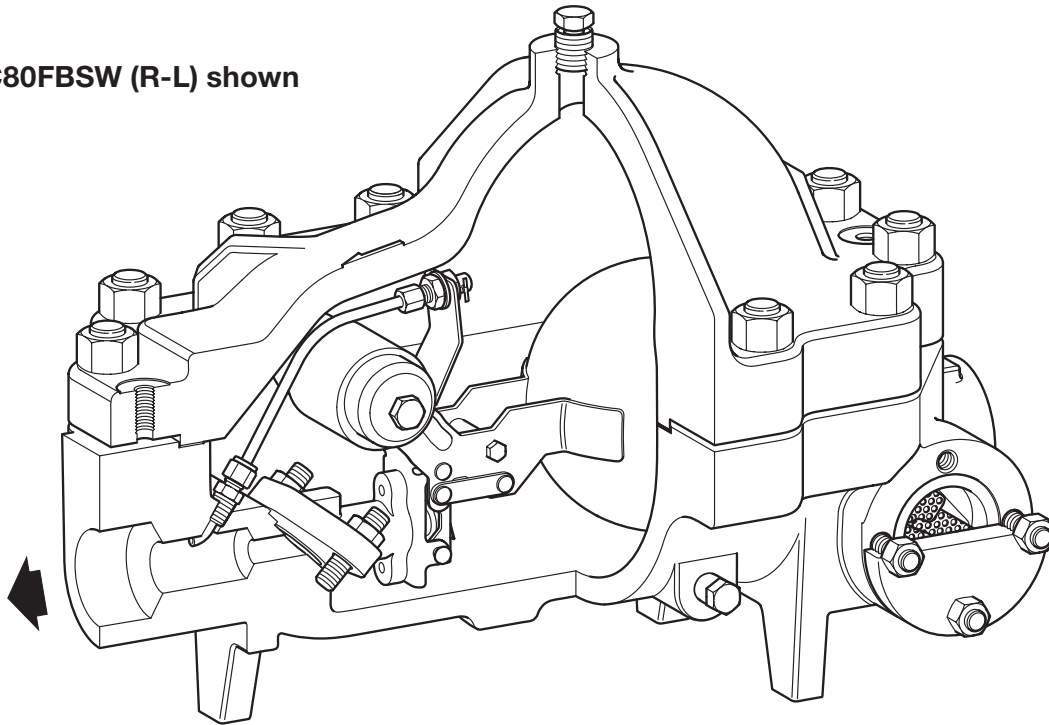
Valve Mechanism Kit	D, E, F
Gasket Kit (pkt of 3 each)	B, K
Air Vent Kit Standard	N, J, M, H, L, K
Air Vent Kit Optional	K, H
Float Kit	P

TI-2-3041-US 2.14

# spirax sarco

## FTC80FB Cast Steel 1½" and 2" Ball Float Steam Trap

2" FTC80FBSW (R-L) shown



### Description

As standard, the FTC80FB ball float steam trap is supplied with a right to left (R-L) flow configuration having horizontal connections and has provision for adding an air venting option; Please note that the unit is supplied with a ¾" socket weld connection in the cover with a plug screwed into the fitting. It has been designed for floor mounting and is suitable for most high-pressure process and drainage applications. Its simple robust ball float mechanism ensures excellent resistance to waterhammer. All internals are easily accessible for in-line maintenance and a drain port allows full body drainage. It has a large maintainable strainer screen that extends service intervals and is located in an accessible flanged chamber.

---

Factory fitted internal fixed bleed for continuous discharge of air and other incondensable gasses

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**Note:** As standard the unit is supplied with a ¾" socket weld connection in the cover with a ¾" BSP screwed plug fitted.

### Standard

This product fully complies with the requirements of the European Pressure Equipment Directive 97/23/EC.

### Certification

This product is available with certification to EN 10204 3.1 for the body, cover, fasteners, and screen flange.

**Note:** All certification / inspection requirements must be stated at the time of order placement.

### Sizes and pipe connections

1½" and 2" ASME (ANSI) B 16.11 Class 6000 socket weld.

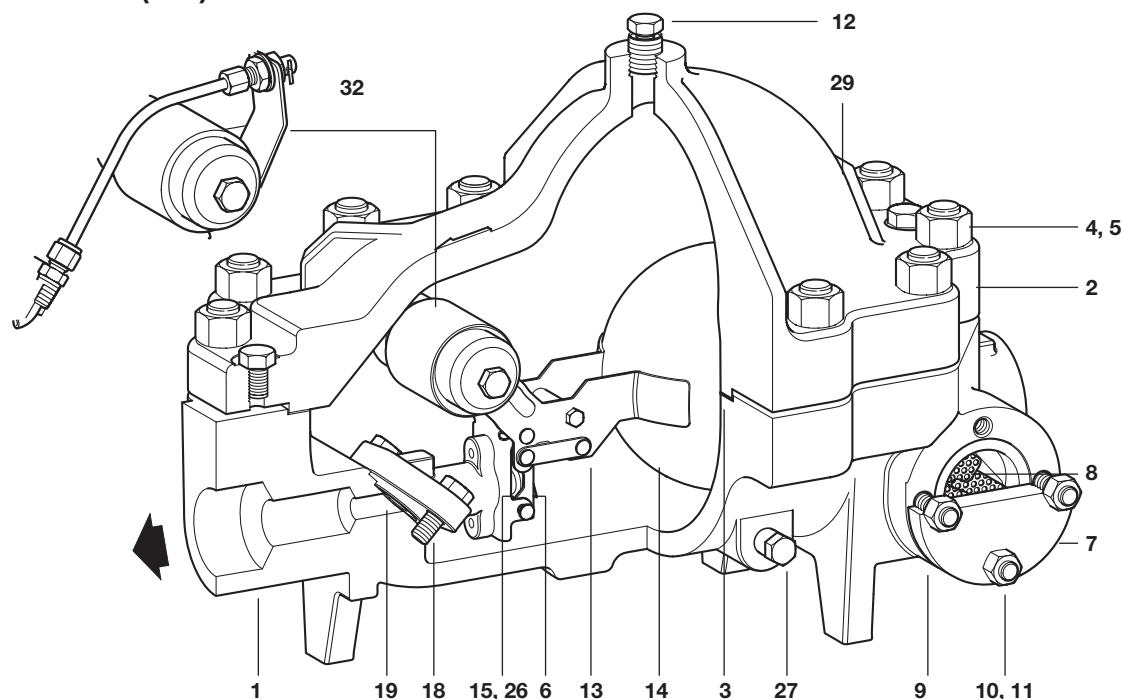
1½" and 2" ASME (ANSI) B 16.5 Class 600 flanges.

**Note:** Other connections are available upon request but may limit the operating range – Please consult Spirax Sarco for further information.

Drain plug connection is ¾" screwed NPT as standard.

# FTC80FB Cast Steel 1½" and 2" Ball Float Steam Trap

2" FTC80 SW (R-L) shown



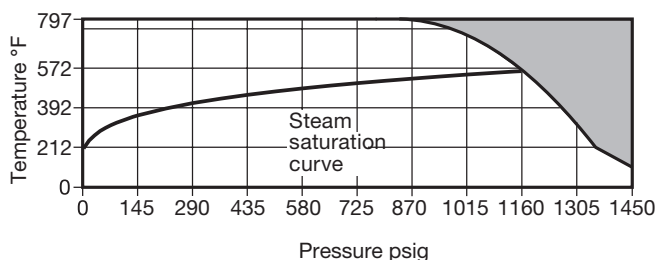
## Materials

No.	Part	Material	
1	Body	Cast steel	ASTM A216 WCB
2	Cover	Cast steel	ASTM A216 WCB
3	Cover gasket	Tanged graphite	
4	Cover stud	Steel	ASTM A193 B16
5	Cover nuts	Steel	ASTM A194 Gr. 4
6	Valve head and retainer	Stainless steel	
7	Strainer flange	Steel	ASTM A182 F11 CL2
8	Strainer screen	Stainless steel	
9	Strainer gasket	Tanged graphite	
10	Strainer studs	Steel	ASTM A193 B16
11	Strainer nuts	Steel	ASTM A194 Gr. 4
12	Plug	Steel	ASTM A182 F11 CL2
13	Mechanism assembly	Stainless steel	
14	Float	Stainless steel	
15	Valve seat	Titanium	
18a	Assembly bolts	Stainless steel	A4-80
18b			
19	Assembly gasket	Reinforced exfoliated graphite	
26	Gasket	Stainless steel	
27	Drain plug 3/8" NPT	Steel	ASTM A182 F11 CL2
29	Name-plate	Stainless steel	
*30	Flange pipe	Steel	ASTM A335 P11
*31	Flange	Steel	ASTM A182 F11 CL2
32	Fixed bleed assembly is made up of Bleed orifice, Pipe support, Washer, Lock-nut, Nut, Ferrule, Bleed pipe, Stud, and Twin ferrule (stainless steel)		

**Note:** Items 30 and 31 the flange and flange pipe are not shown. (Flanged Traps)

# FTC80FB Cast Steel 1½" and 2" Ball Float Steam Trap

## Pressure/temperature limits



The product **must not** be used in this region.

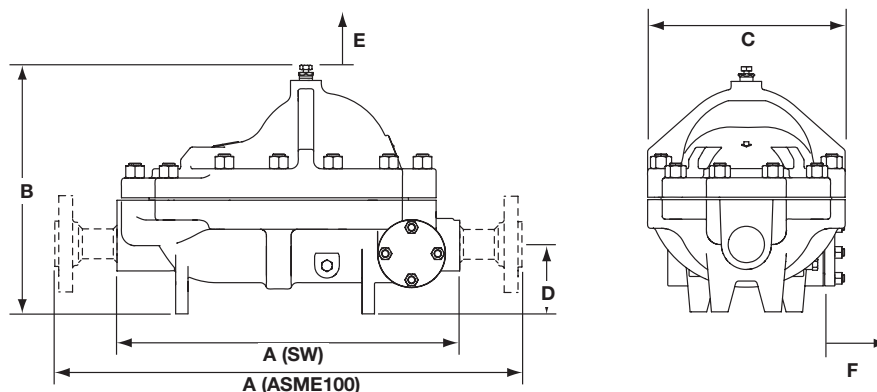
Body design conditions	ASME (ANSI) 600
PMA Maximum allowable pressure	1450 psig @ 125°F
TMA Maximum allowable temperature	797°F @ 126psig
Minimum allowable temperature	-20°F
PMO Maximum operating pressure for saturated steam service	1160 psig
TMO Maximum operating temperature	797°F @ 126psig
Minimum operating temperature	32°F
ΔPMX Maximum differential pressure	<b>FTC80-45</b> 652 psig
	<b>FTC80-62</b> 899 psig
	<b>FTC80-80</b> 1160 psig

Designed for a maximum cold hydraulic test pressure of 2175 psig

Steam Pressure (psig)	Condensate Flow lb/hr		
	FTC80-45	FTC80-62	FTC80-80
50	4330	2761	1925
100	5889	3782	2614
200	8010	5180	3548
300	9589	6227	4243
400	10895	7096	4817
500	12029	7853	5315
600	13043	8530	5761
650	13515	8844	6165
700		9149	6166
800		9721	6540
900		10255	6889
1000			7216
1100			7526
1160			7705

## Dimensions/weights (approximate) in inches and (mm)

Size	A		B	C	D	Withdrawal distance		Weight	
	Socket weld	Flanged ASME 600	Plug			E Cover	F Screen	Socket weld	Flanged ASME 600
DN40 (1½")	21.8 (555)	29.7 (755)	15.4 (390)	12.8 (324)	4.4 (110.5)	2.2 (55)	10.2 (260)	247 (112)	260 (118)
DN50 (2")	21.8 (555)	30.9 (785)	15.4 (390)	12.8 (324)	4.4 (110.5)	2.2 (55)	10.2 (260)	247 (112)	260 (118)



## Safety information, installation and maintenance

For full details see the Installation and Maintenance Instructions (IM-P179-06) supplied with the product.

### Installation note:

The FTC80FB must be installed with the direction of flow as indicated on the body, and with the float arm in a horizontal plain so that it rises and falls vertically. Integral legs assist stable floor mounting. Please note that appropriate high temperature jointing compound must be used on the drain plug and air vent plug threads.

### Disposal

This product is recyclable. No ecological hazard is anticipated with the disposal of this product providing due care is taken.

## How to order

**Example:** 1 off Spirax Sarco 1½" FTC80FB-45 (R-L) ball float steam trap with ASME Class 6000 weld connections complete with 3.1 certification for the FTC80FB.

Spirax Sarco, Inc., 1150 Northpoint Blvd, Blythewood, SC 29016

Telephone: (803) 714-2000 FAX (803) 714-2222

# FTC80FB Cast Steel 1½" and 2" Ball Float Steam Trap

## Spare parts

The spare parts available are shown in heavy outline. Parts drawn in broken line are not supplied as spares.

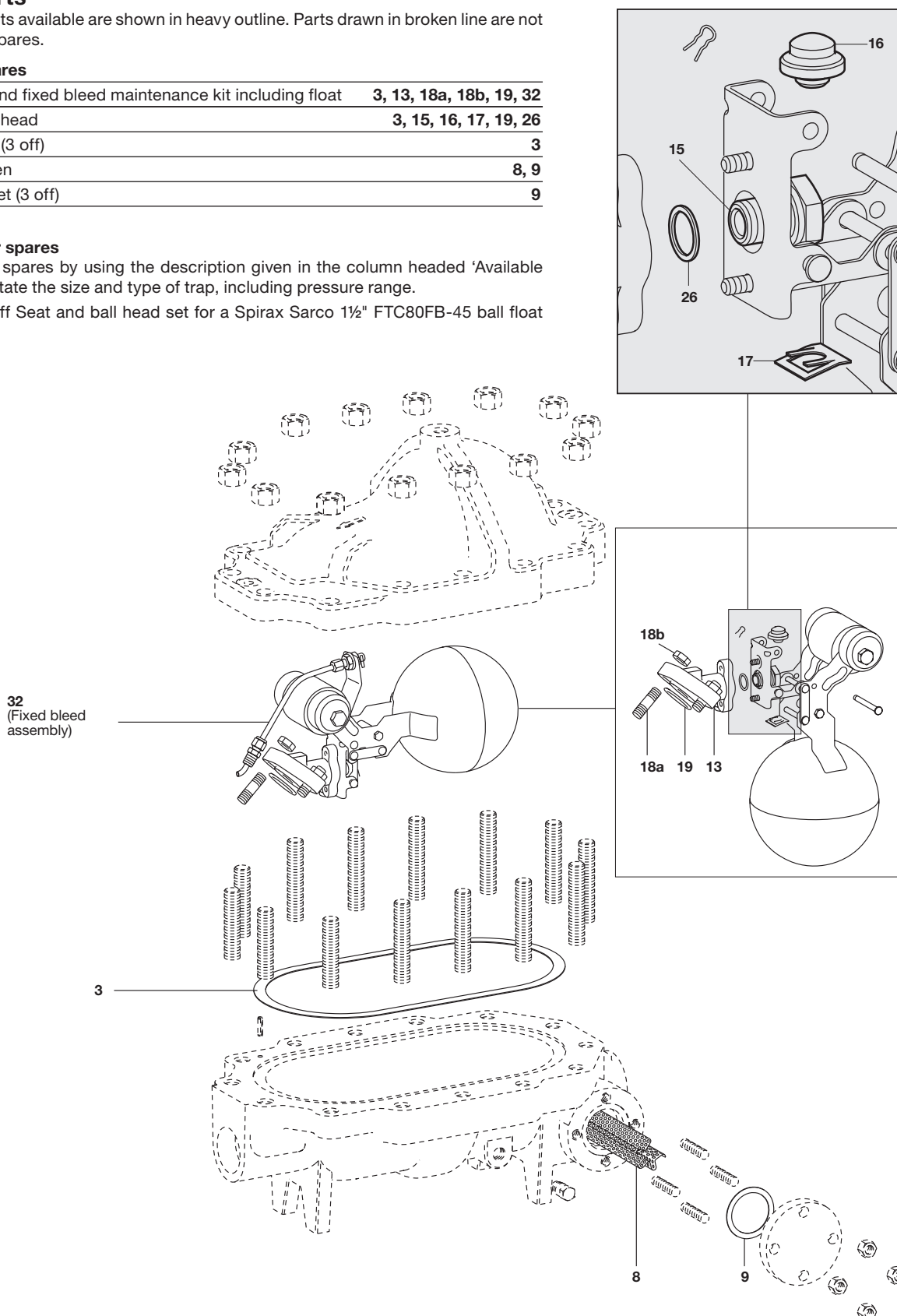
### Available spares

Mechanism and fixed bleed maintenance kit including float	<b>3, 13, 18a, 18b, 19, 32</b>
Seat and ball head	<b>3, 15, 16, 17, 19, 26</b>
Cover gasket (3 off)	<b>3</b>
Strainer screen	<b>8, 9</b>
Strainer gasket (3 off)	<b>9</b>

### How to order spares

Always order spares by using the description given in the column headed 'Available spares' and state the size and type of trap, including pressure range.

**Example:** 1 off Seat and ball head set for a Spirax Sarco 1½" FTC80FB-45 ball float steam trap.





## Stainless Steel Float & Thermostatic Steam Traps FTS150, FTS300

The trap contains a float valve mechanism which modulates to discharge condensate continuously at steam temperature, while non-condensable gases are released by a separate internal balanced pressure thermostatic air vent.

Model	FTS150V	FTS300V	FTS150H	FTS300H
PMO	150 psig	300 psig	150 psig	300 psig
Sizes	1/2" Vertical		1/2" Horizontal	
Connections	NPT			
Construction	Stainless Steel Cover, Body & Internals			
Options	Socket Weld to ANSI B16.11			

### Typical Applications

All process equipment, particularly when controlled by modulating temperature control valves, unit heaters, air heating coils, heat exchangers and steam main drip stations.

### Limiting Operating Conditions

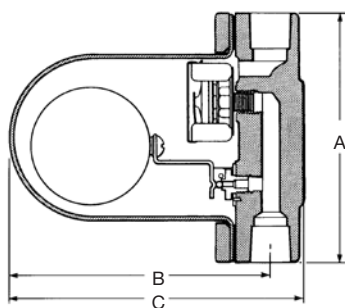
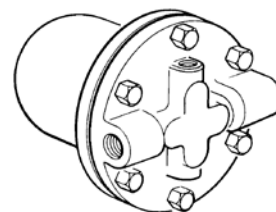
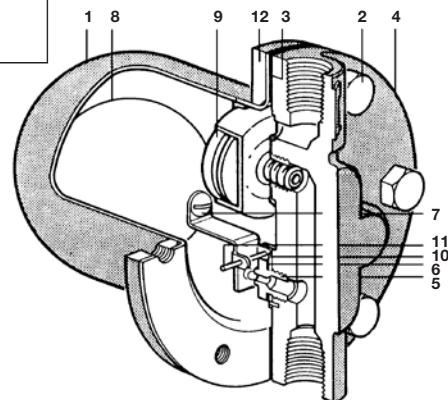
**Max. Operating Pressure (PMO)**    **FTS150:** 150 psig (10 barg)  
     **FTS300:** 300 psig (21 barg)

**Max. Operating Temperature**    572°F (300°C) of superheat at all operating pressures

### Pressure Shell Design Conditions

**PMA**                                    450psig/up to 750°F    31 barg/up to 400°C  
**Max. allowable pressure**

**TMA**                                    750°F/0-450 psig    400°C/0-31 barg  
**Max. allowable temperature**



**Dimensions**  
(nominal) in inches and millimeters

Size	A	B	C	Weight
1/2"	5.3 135	5.4 139	6.1 156	6 lb 2.7 kg

### Construction Materials

No.	Part	Material
1	Body	Stainless Steel    AISI 304
2	Cover Screws	Stainless Steel    AISI 304
3	Cover Gasket	Graphite
4	Cover	Stainless Steel    AISI 304
5	Valve Seat	Stainless Steel
6	Valve Seat Gasket	Stainless Steel
7	Float Screw & Washer	Stainless Steel
8	Ball Float & Lever	Stainless Steel
9	Air Vent Assembly	Stainless Steel
10	Valve Seat Bracket	Stainless Steel
11	Pivot Pin	Stainless Steel
12	Body Retaining Ring	Stainless Steel    AISI 304

*Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only.  
 In the interests of development and improvement of the product, we reserve the right to change the specification.*

TI-2-312-US 2.14

# Stainless Steel Float & Thermostatic Steam Traps

## FTS150, FTS300

### Capacities lb/hr hot condensate

Inlet Pressure																ORIFICE SIZE
psig	10	15	20	25	30	40	50	75	100	125	150	175	200	250	300	
bar	.7	1.0	1.4	1.7	2.1	2.8	3.5	5.2	6.9	8.6	10.3	12.1	13.8	17.2	20.7	
<b>FTS150</b>	300	350	385	420	450	500	540	625	700	760	800	—	—	—	—	.100"/2.54 mm
<b>FTS300</b>	145	170	190	200	220	240	260	310	330	370	400	420	440	470	510	.070"/1.78 mm

For kg/h multiply by .454

### Sample Specification

Steam traps shall be of the mechanical ball float type having stainless steel bodies and forged steel covers, NPT connections, and all stainless steel valve heads and seats. Incorporated into the trap body shall be a stainless steel balanced pressure thermostatic air vent capable of withstanding 572°F temperature and resisting waterhammer without sustaining damage. Internals of the trap shall be completely servicable without disturbing the piping.

### Installation

A pipeline strainer should be installed ahead of any steam trap. Full port isolating valves should be placed to permit servicing. The trap should be installed below the drainage point of the equipment with a collecting leg before the trap, in a position so that the float arm is in a horizontal plane and the float rises and falls vertically, with the flow direction as indicated on the cover. Refer to IMI 2.300 for complete instructions.

### Maintenance

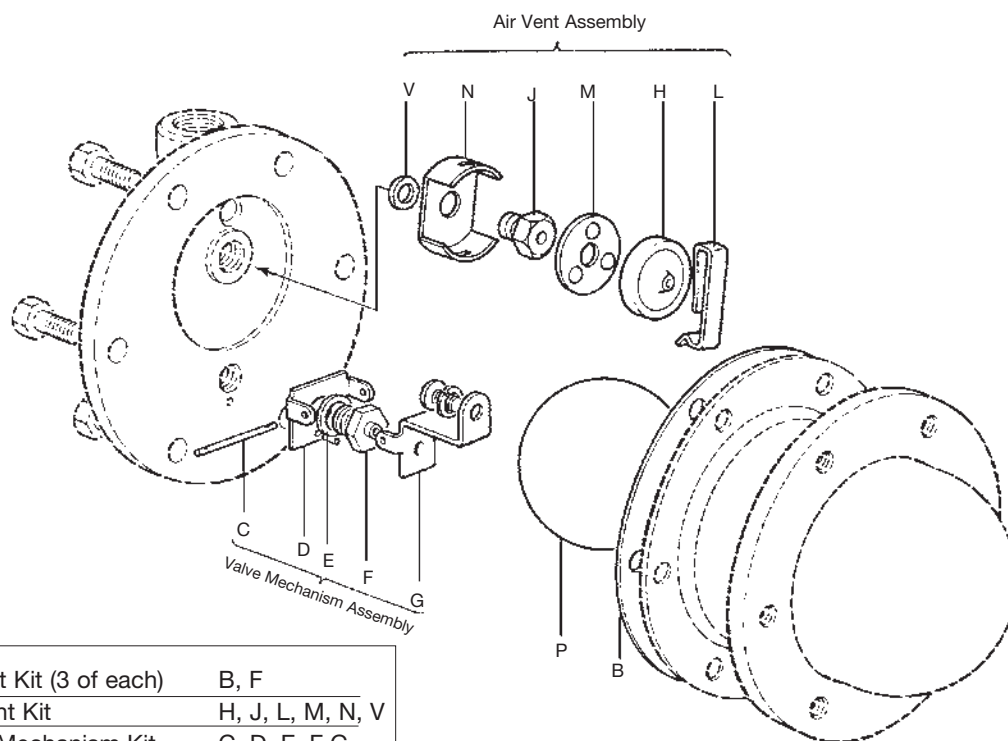
This product can be maintained without disturbing the piping connections. Complete isolation from both supply and return line is required before any servicing is performed.

The trap should be disassembled periodically for inspection and cleaning of the valve head and seat, operating mechanism and air vent.

Worn or damaged parts should be replaced using a complete valve mechanism assembly and/or air vent assembly.

**Complete installation and maintenance instructions are given in IMI 2.300, which accompanies the product.**

### Spare Parts



Gasket Kit (3 of each)	B, F
Air Vent Kit	H, J, L, M, N, V
Valve Mechanism Kit	C, D, E, F, G
Float Kit	P

TI-2-312-US 2.14

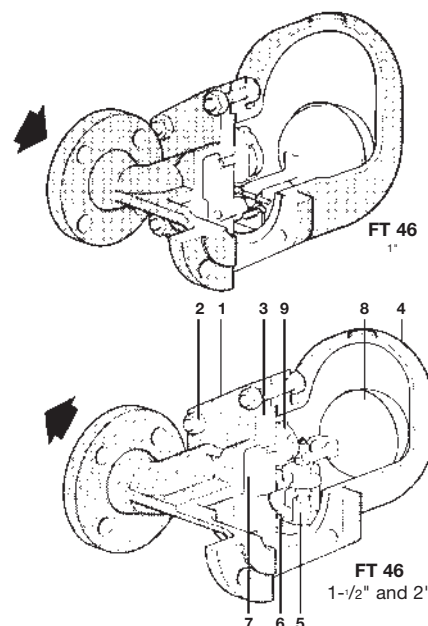




## Stainless Steel Float & Thermostatic Steam Trap FT 46

The FT 46 is a stainless steel float trap designed for applications requiring continuous drainage of high condensate loads in filtered steam applications.

Model	FT 46 - 4.5	FT 46 - 10	FT 46 - 14	FT 46 - 21
<b>PMO</b>	65 psig	145 psig	200 psig	300 psig
<b>Sizes</b>	1", 1-1/2", 2"			
<b>Connections</b>	ANSI 150, 300			
<b>Construction</b>	AISI 316 Stainless Steel Body, Stainless Steel Internals			
<b>Options</b>	3/8" NPT Drain Cock Tapping			



### Construction Materials

No.	Part	Material
1	Body	Stainless Steel AISI 316
2	Cover Bolts	Stainless Steel Class A2 Gr80
	1"	M10 x 60 mm
	1-1/2", 2"	M16 x 85 mm
3	Cover Gasket	Stainless Steel
4	Cover	Stainless Steel AISI 316
5	Valve Seat 1"	Stainless Steel
	Main Valve Assembly w/ Erosion Deflector 1-1/2", 2"	Stainless Steel
6	Valve Seat Gasket 1"	Stainless Steel
	Main Valve Assembly Gasket 1-1/2", 2"	Stainless Steel
7	Pivot Frame Assembly	Stainless Steel
	Set Screws 1"	M5 x 20 mm
	Main Valve Assembly Bolts 1-1/2"	M6 x 20 mm
	Studs & Nuts 2"	M8 x 20 mm
8	Ball Float & Lever	Stainless Steel
9	Air Vent	Stainless Steel
11	Support Frame	Stainless Steel
12	Pivot Frame	Stainless Steel

### Capacities

Refer to TIS 2.308

### Typical Applications

Removal of filtered steam condensate from heating jackets, heat exchangers, large process vessels, steam filters, separators, and humidifiers.

### Limiting Operating Conditions

<b>Max. Operating Pressure (PMO)</b>	<b>FT46-4.5:</b> 65 psig (4.5 barg)
	<b>FT46-10:</b> 145 psig (10 barg)
	<b>FT46-14:</b> 200 psig (14 barg)
	<b>FT46-21:</b> 300 psig (21 barg)
<b>Max. Operating Temperature</b>	45°F (25°C) of Superheat at all operating pressures

### Pressure Shell Design Conditions

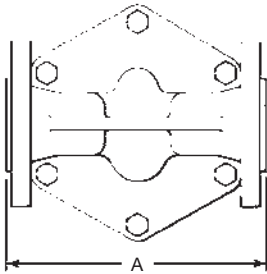
<b>PMA</b> Max. allowable pressure	580 psig/0-248°F	40 barg/0-120°C
	472 psig/464°F	32 barg/240°C
	304 psig/752°F	21 barg/400°C
<b>TMA</b> Max. allowable temperature	752°F/0-304 psig	400°C/0-21 barg

Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only.  
In the interests of development and improvement of the product, we reserve the right to change the specification.

TI-2-318-US 1.14

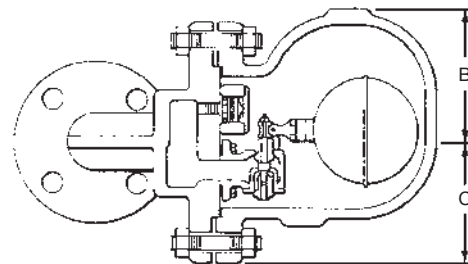
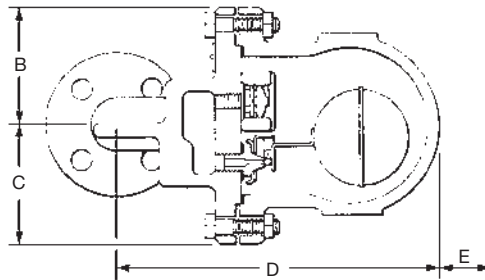
# Stainless Steel Float & Thermostatic Steam Trap

## FT 46



**Dimensions**  
(nominal) in inches and millimeters

Size/DN	A	B	C	D	E	Weight
1" 25	6.2 160	4.5 115	3.4 85	10.8 276	6.7 170	33 lb 15 kg
1-1/2" 40	9.0 230	4.8 130	4.5 115	12.7 326	7.9 200	72.8 lb 33 kg
2" 50	9.0 230	5.5 141	4.8 123	12.9 332	7.9 200	94.8 lb 43 kg



NOTE: Flanges drilled and tapped

### Installation

The trap must be fitted with the direction of flow as indicated on the body, and with the float arm in a horizontal plane so that it rises and falls vertically. Full-flow isolating valves should be installed upstream and downstream of the trap.

### Sample Specification

Float & Thermostatic traps for pharmaceutical sterile areas on plant or clean steam service shall have 316L stainless steel bodies and covers, and all internals, including float, main valve, head/seat, thermostatic air vent and air vent head/seat, shall be stainless steel. Connections shall be in-line horizontal. ANSI flanged Spirax Sarco Model FT 46.

### Maintenance

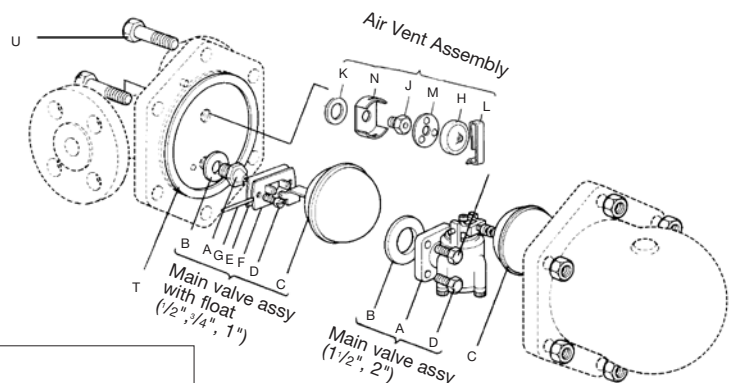
This product can be maintained without disturbing the piping connections. Complete isolation from both supply and return line is required before any servicing is performed.

The trap should be disassembled periodically for inspection and cleaning of the valve head and seat, operating mechanism and air vent.

Worn or damaged parts should be replaced using a complete main valve assembly and/or air vent assembly.

**Complete installation and maintenance instructions are given in the IMI sheet, which accompanies the product.**

### Spare Parts



Main Valve Assembly w/ Float	A,B,C,D,E,F,G
Main Valve Assembly w/ Erosion Deflector (1-1/2", 2")	A,B,D
Ball Float (1")	C
Air Vent Assembly	K, H, J, L, M, N
Three complete sets of Gaskets (Pkt of 3 sets)	B,K,P,R,T
Set of Cover Bolts & Nuts	U

## FTS14

### Austenitic Stainless Steel Float & Thermostatic Steam Trap

#### Description

The FTS14 is an austenitic stainless steel float and thermostatic steam trap with an integral automatic air vent. It provides efficient condensate drainage and prompt air removal to ensure process equipment operates to its maximum potential. As standard the FTS14 has horizontal connections with flow from right to left (R-L). However its unique design allows the cover to be simply rotated to provide horizontal left to right (L-R) and vertical up or vertical down configurations.

#### Sizes and pipe connections

1/2", 3/4" and 1"	NPT (ANSI B 1.20.1)
	Socket weld ends to ANSI B 16.11,
DN15, 20 and 25	Flanged ends to ANSI B 16.5 Class 150 and 300 (Special Order)
1/2", 3/4" and 1"	Hygienic/sanitary clamp ends (Special Order)

**Note:** For alternative connections please consult Spirax Sarco.

#### Optional extras

Internal strainer (**FTS14X**). A manually adjustable needle valve can be added for use as a steam lock release mechanism (**FTS14-C**).

**Note:** All options are available at extra cost and are Special Order.

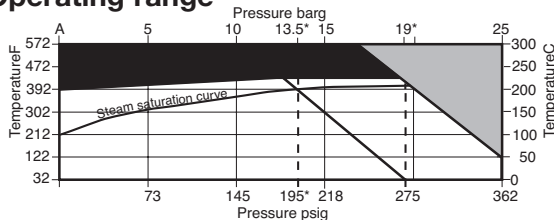
#### Limiting conditions (ISO 6552)

Body design conditions	PN25
PMA - Maximum allowable pressure	362 psig 25 barg
TMA - Maximum allowable temperature	572°F 300°C
TMO - Maximum operating temperature	437°F 225°C
Minimum operating temperature	-4°F -20°C

**Note:** For lower operating temperatures consult Spirax Sarco.

Designed for a maximum cold hydraulic test pressure of 544 psig 37.5 barg

#### Operating range



■ The product must not be used in this region.  
■ The product should not be used in this region as damage to the internals may occur.

\*PMO Maximum operating pressure for steam service,  
A - B Flanged ANSI 300, screwed and socket weld.  
A - C Flanged ANSI 150.

**Note:** For hygienic/sanitary clamp ends the maximum pressure and/or temperature may be restricted by the gasket or clamp used.

#### ΔPMX - Max. Differential Pressure

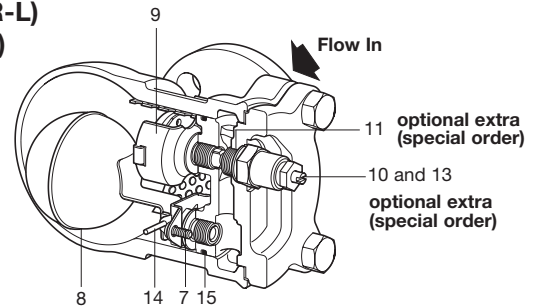
FTS14 - 4.5	FTS14-10	FTS14-14
65 psig	150 psig	200 psig
4.5 bar	10 bar	14 bar

#### Certification

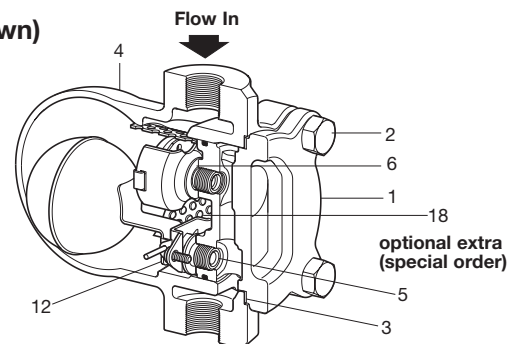
This product is available with certification to EN 10204 3.1.B

**Note:** All certification/inspection requirements must be stated at the time of order placement.

#### FTS14-C (R-L) (Horizontal)



#### FTS14X (Vertical down)



#### Materials

No.	Part	Material
1	Body	Austenitic stainless steel (316) EN 10213-4 (1.4408) ASTM A351 CF8M
2	Cover bolts	Stainless steel BS EN 3506 A2-70
3	Cover gasket	Reinforced exfoliated graphite
4	Cover	Austenitic stainless steel (316) EN 10213-4 (1.4408) ASTM A351 CF8M
5	Main valve seat	Stainless steel BS 970 431 S29
6	Main valve/air vent seat gasket	Stainless steel
7	Main valve assembly screws	Stainless steel
8	Ball float and lever	Stainless steel BS 1449 304 S16
9	Air vent assembly	Stainless steel
10	SLR assembly	Stainless steel
11	SLR gasket	Stainless steel
12	Pivot frame	Stainless steel
13	SLR seal	Graphite
14	Pivot	Stainless steel
15	'O' ring	Grey Viton complies with FDA CFR Title 21, Para 177, Section 2600
*16	Valve spring (1" only)	Stainless steel
*17	Sensor blanking plug	Stainless steel (optional extra)
18	Strainer screen	Stainless steel (optional extra)

**\*Note:** Items 16 and 17 cannot be shown.

Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only.

In the interests of development and improvement of the product, we reserve the right to change the specification.

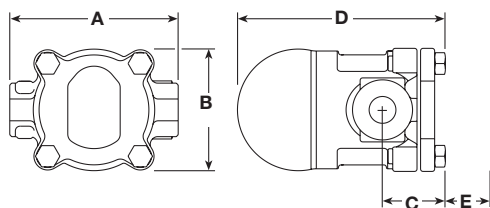
TI-P145-01-US 4.14

# FTS14 Austenitic Stainless Steel Float & Thermostatic Steam Trap

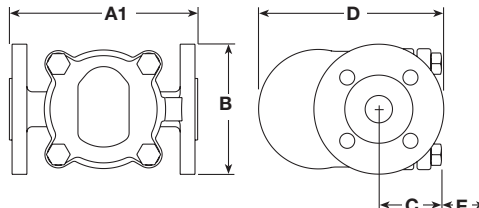
## Dimensions/Weights approximate in inches and (millimeters)

	A	A				E	F	WEIGHT
SIZE	SCREWED/SW	CLAMPENDS	B	C	D	WITHDRAW DISTANCE	FTS14-C	SCREWED /SW
1/2"	5.3" (135)	7.1" (180)	3.8" (97)	1.9" (48)	6.4" (162)	5.3" (135)	.9" (22)	8.3" LBS
3/4"	5.3" (135)	7.1" (180)	3.8" (97)	1.9" (48)	6.4" (162)	5.3" (135)	.9" (22)	8.3" LBS
1"	5.5" (139)	7.9" (200)	4.4" (113)	2.0" (51)	7.0" (179)	5.7" (179)	.9" (22)	9.4" LBS
	A1	A1						WEIGHT FLANGED
	ANSI 150	ANSI 300						
DN15 (1/2")	5.8" (147)	7.9" (200)	3.8" (97)	3.0" (97)	6.4" (162)	5.3" (135)	.9" (22)	11 LBS
DN20 (3/4")	5.8" (147)	7.9" (200)	4.0" (102)	3.0" (77)	6.4" (162)	5.3" (135)	.9" (22)	11 LBS
DN25 (1")	6.3" (160)	8.3" (210)	4.4" (113)	2.4" (62)	7.0" (179)	5.7" (145)	.9" (22)	13.8 LBS

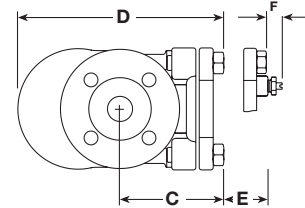
### Screwed, socket welded and clamp ends (all sizes)



### Flanged DN25

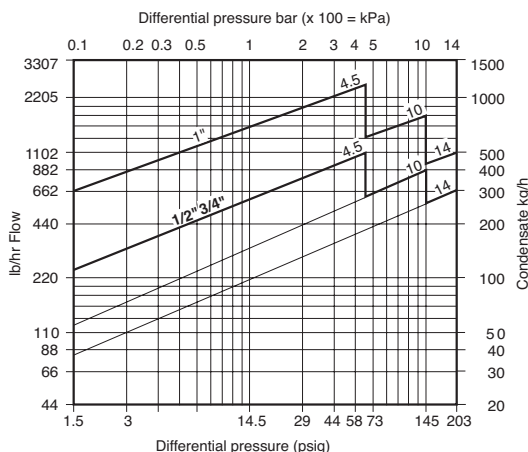


### Flanged DN15, 20 and FTS14-C



## Capacities

Note. Capacities shown are based on discharge at saturation temperature. When discharging sub-cooled condensate the air vent provides extra capacity. Under start-up conditions the thermostatic air vent will be open, and will provide additional condensate capacity to the main valve assembly. On 4.5 bar units this will provide a minimum of 50% increased capacity above the hot condensate figures shown. On 10 and 14 bar units this will be a minimum increase of 100% on the published capacity.



## How to order

Example: 1 off Spirax Sarco 1/2" FT14 - 4.5TV stainless steel float trap fitted with screwed NPT connections. Trap is maintainable in line. Fitted with integral air vent and strainer screen.

## Safety information, installation and maintenance

For full details see the Installation and Maintenance Instructions (IM-P145-02) supplied with the product.

## Spare parts

The spare parts available are shown in heavy outline. Parts drawn in broken line are not supplied as spares.

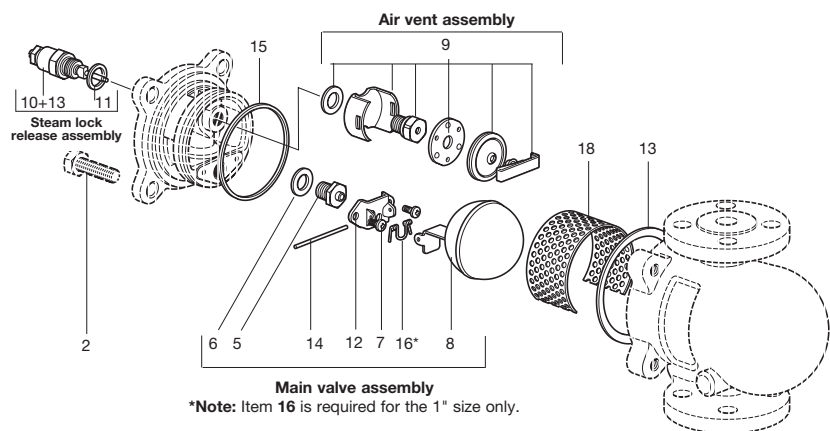
## Available spares

Main Valve ASSY with Float	5, 6, 7, 8, 12, 14, 16
Air Vent ASSY	9
Steam Lock Release Unit	10+13, 11
Gasket set (packet of 3)	13, 15

## How to order spares

Always order spares by using the description given in the column headed 'Available spares' and state the size, type of trap and pressure range i.e. 4.5, 10 or 14 bar.

Example: 1 - Maintenance kit for a Spirax Sarco 1/2" FTS14-4.5 steam trap.



TI-P145-01-US 4.14

# spirax sarco

## Balanced Pressure Thermostatic Steam Traps RTA-125, RTH-125, RTV-125

The balanced pressure steam trap contains a welded stainless steel element which is self-adjusting over the entire operating pressure range and approximately 23°F (13°C) below saturated steam temperature.

Traps in this series are replacements for:

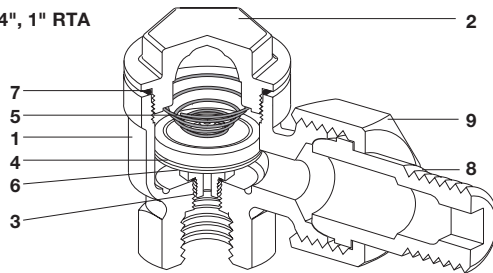
TA-125, TH-125, T-25, TB-25, TS-25, T-65, T-125; 1"H, N-100 angle; H, S-65, N-100 straightway and vertical, TV-125.

Model	RTA-125	RTH-125	RTV-125
	Angle	Straightway	Vertical
PMO	125 psig	125 psig	125 psig
Sizes	1/2", 3/4" & 1"	1/2" & 3/4"	1/2" & 3/4"
Connections	NPT — male union inlet NPT — female outlet		
Construction	Brass body with stainless steel internals		
Option	Extended male inlet spud (1/2", 3/4" RTA-125 only) Near to steam fill 11°F (6°C) All		

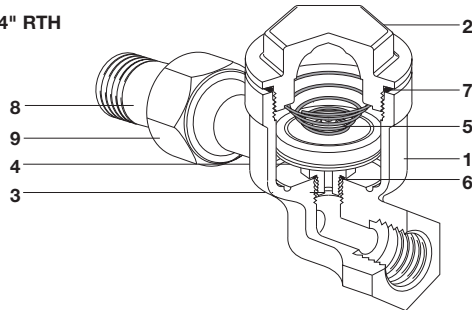
### Typical Applications

Vapor or vacuum two-pipe heating systems, radiators, convectors, fintube, hospital blanket warmers, sterilizers and stills, laundry and kitchen equipment, and small process equipment.

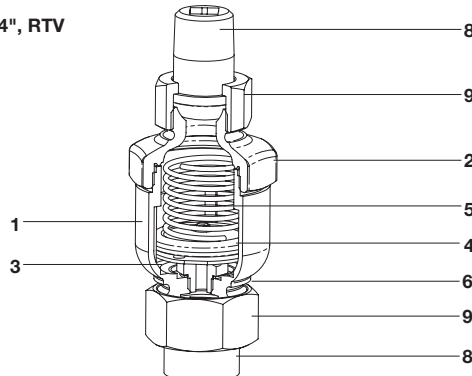
1/2", 3/4", 1" RTA



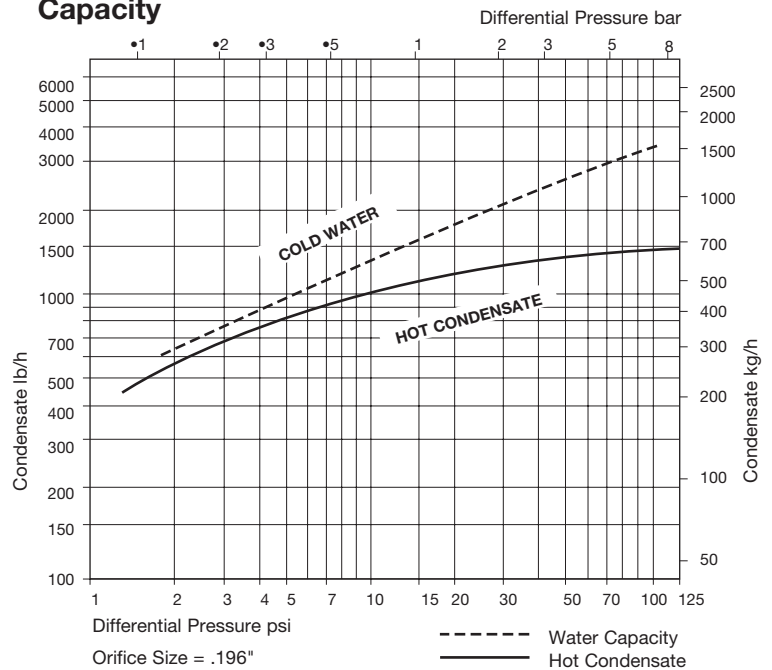
1/2", 3/4" RTH



1/2", 3/4", RTV



### Capacity



### Construction Materials

No.	Part	Material
1	Body	Forged Red Brass ASTM B124 Alloy C3770 TV-125 ASTM B62
2	Cap	Forged Red Brass ASTM B124 Alloy C3770
3	Seat	Stainless Steel
4	Thermostat	Stainless Steel BP99
5	Spring	Stainless Steel
6	Seat Gasket	Brass
7	O-Ring	EPDM
8	Union Nipple	Brass ASTM B16
9	Union Nut	Brass ASTM B16

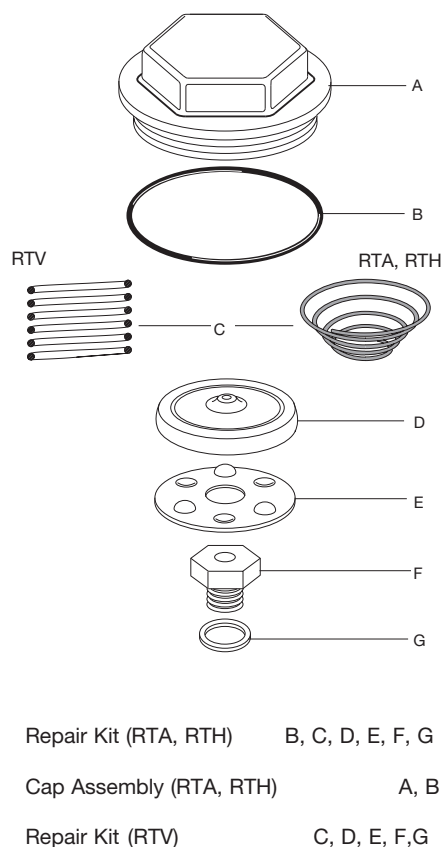
Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only.  
In the interests of development and improvement of the product, we reserve the right to change the specification.

TI-2-0102-US 4.12

# Balanced Pressure Thermostatic Steam Traps

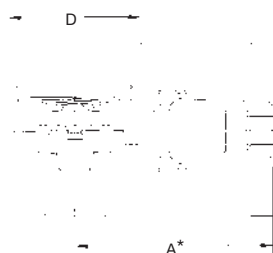
## RTA-125, RTH-125, RTV-125

### Spare Parts

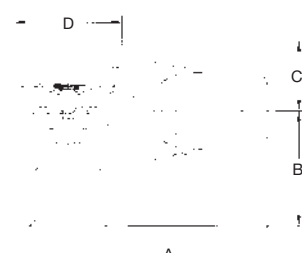


Dimensions (nominal) in inches and millimeters										
Size	Type	Body Pattern	A	B	C	D	E	F	G	Weight
1/2"	RTA-125	Angle	2.8* 71	1.2 30	1.0 25	1.9 48	-	-	-	1 lb 0.5 kg
	RTH-125	Straightway	3.2 83	-	1.2 32	1.9 48	1.4 35	0.7 18	1.1 16	1.4 lb 0.6 kg
	RTV-125	Vertical	5.1 130	-	-	2.0 51	-	-	-	1.6 lb 7 kg
3/4"	RTA-125	Angle	3.0* 78	1.20 32	1.0 25	1.9 48	-	-	-	1.3 lb 0.6 kg
	RTH-125	Straightway	3.2 83	-	1.20 32	1.9 48	1.4 35	0.8 20	1.1 29	1.8 lb 0.6 kg
	RTV-125	Vertical	5.6 141	-	-	2.0 51	-	-	-	2 lb 9 kg
1"	RTA-125	Angle	3.5 89	2.0 51	1.2 44	1.9 48	-	-	-	2.8 lb 1.2 kg

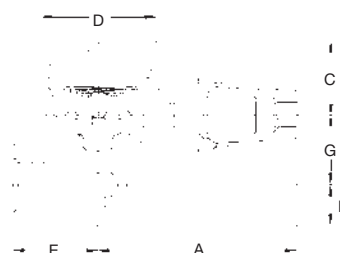
\* with optional extended inlet spud, "A" dimension is 3.2".



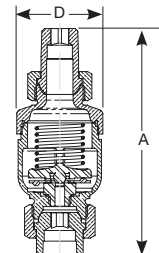
1/2", 3/4" RTA-125



1" RTA-125



1/2", 3/4" RTH-125



1/2", 3/4" RTV-125

### Limiting Operating Conditions

Max. Operating Pressure (PMO)	125 psig (8.6 barg)
Max. Operating Temperature	Saturated Steam Temperature
Minimum Operating Pressure	25" Hg Vacuum

### Pressure Shell Design Conditions

PMA	125 psig/up to 353°F	8.6 barg/up to 179°C
Max. allowable pressure		
TMA	353°F/0-125 psig	179°C/0-8.6 barg
Max. allowable temperature		

### Sample Specification RTA, RTH

Steam traps shall be balanced pressure thermostatic type, self-adjusting to all pressures within their operating range. Bodies to be of forged red brass with male union inlet connection. Thermostatic element shall be of precision welded stainless steel construction, incorporating a hardened stainless steel valve head. Valve seats shall be stainless steel, and all internals, shall be replaceable without disturbing the piping connections.

### Installation

A pipeline strainer should be installed ahead of any steam trap to protect the head and seat from dirt and scale. Full port isolating valves should be placed to permit servicing. Trap should be installed below the drainage point of the equipment with a collecting leg before the trap. For best operation, the element should be in a horizontal position as shown. For a freeze-resistant installation, inlet piping must be pitched toward the trap for gravity flow and the trap outlet must be free of any piping.

### Maintenance

This product can be maintained without disturbing the piping connections. Complete isolation of the trap from both supply and return line is required before any servicing is performed. The trap should be disassembled periodically for inspection and cleaning of the valve head and seat. Worn or damaged parts should be replaced using a complete Repair Kit.

Complete installation and maintenance instructions are given in IM-2-004-US, which accompanies the product. TI-2-0102-US 4.12





## Balanced Pressure Thermostatic Steam Trap T250

The T250 has a welded stainless steel element, which is self-adjusting over the entire operating pressure range and will discharge condensate at approximately 20°F (11°C) below saturated steam temperature.

Model	T250	
	Angle	Straightway
PMO	250 psig	
Sizes	1/2", 3/4" & 1"	1/2" & 3/4"
Connections	NPT	
Construction	Cast Iron Body & Cover Stainless Steel Internals	

### Limiting Operating Conditions

**Max. Operating Pressure (PMO)** 250 psig (17 barg)

**Max. Operating Temperature** Saturated Steam Temperature

### Pressure Shell Design Conditions

**PMA** 250 psig/up to 450°F 17 barg/up to 232°C  
Max. allowable pressure

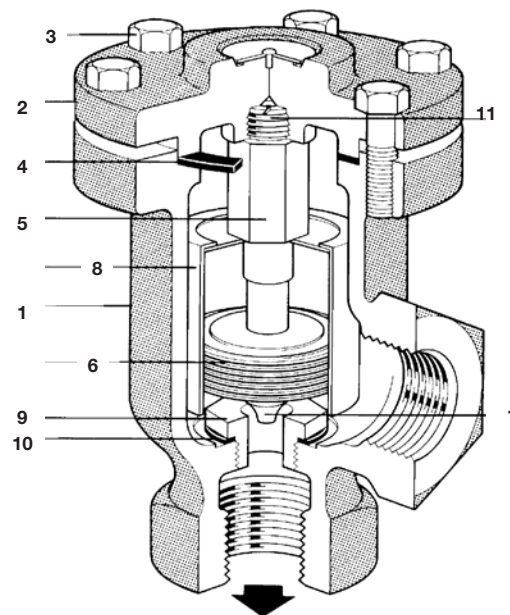
**TMA** 450°F/0-250 psig 232°C/0-17 barg  
Max. allowable temperature

### Construction Materials

No.	Part	Material
1	Body	Cast Iron ASTM A126 CL B
2	Cap	Cast Iron ASTM A126 CL B
3	Cap Screws	Steel ASTM A449
4	Cap Gasket	Stainless Steel Clad Non-Asbestos Fill
5	Element Assembly	Stainless Steel
6	Bellows	Stainless Steel
7	Valve Head	Stainless Steel
8	Bellows Shield (1" only)	Stainless Steel
9	Valve Seat	Stainless Steel
10	Valve Seat Gasket	Stainless Steel Clad Non-Asbestos Fill
11	Lockwasher	Stainless Steel
12	Plug (Stwy. only)	Forged Steel

### Typical Applications

Hospital, laundry and kitchen equipment, high capacity process equipment, outdoor applications subject to freezing, applications requiring high air venting capacity on initial start up.



### Capacities Hot Condensate lb/h

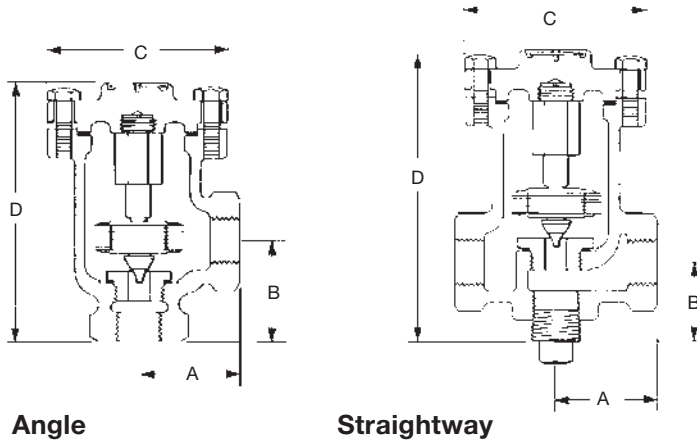
Inlet Pressure		1/2"	3/4"	1"
psig	barg			
1	.07	620	850	1300
2	.14	820	1200	1750
5	.34	1200	1650	2600
10	.70	1580	2225	3500
15	1.0	1800	2650	4200
20	1.4	2100	2950	4600
30	2.1	2450	3500	5500
40	2.8	2750	4000	6200
50	3.5	3100	4400	6850
60	4.1	3300	4700	7250
75	5.2	3650	5050	8000
100	6.9	4200	5750	9000
125	8.6	4400	6150	9650
150	10.3	5000	7000	11000
175	12.1	5275	7450	11750
200	13.8	5600	7800	12100
225	15.6	5900	8200	12500
250	17.2	6000	8500	13500
Orifice Size =		.375"	.438"	.500"

Discharge Capacities shown were obtained from tests using hot condensate approximately 20°F below Saturated Steam temperature. When condensate temperature is below 200°F, discharge capacity is from two to three times greater than shown above.

*Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only.  
In the interests of development and improvement of the product, we reserve the right to change the specification.*



# Balanced Pressure Thermostatic Steam Trap T250



Dimensions (nominal) in inches and millimeters					
Size	A	B	C	D	Weight
<b>Angle</b>					
1/2"	1.75 44	1.75 44	3.12 79	4.56 116	3.5 lb 1.6 kg
3/4"	1.75 44	1.75 44	3.12 79	4.56 116	3.5 lb 1.6 kg
1"	2.12 54	2.25 57	3.9 100	5.37 137	6.0 lb 2.7 kg
<b>Straightway</b>					
1/2"	1.75 44	1.75 44	3.12 79	5.37 137	4.3 lb 1.9 kg
3/4"	1.87 48	1.75 44	3.12 79	5.37 137	4.3 lb 1.9 kg

## Sample Specification

Steam traps shall be balanced pressure thermostatic types, self-adjusting to all pressures within their operating range. Bodies to be of heavy cast iron with NPT connections. Thermostatic elements shall be of precision welded stainless steel construction. All internals to be stainless steel and shall be replaceable without disturbing the piping connections.

## Installation

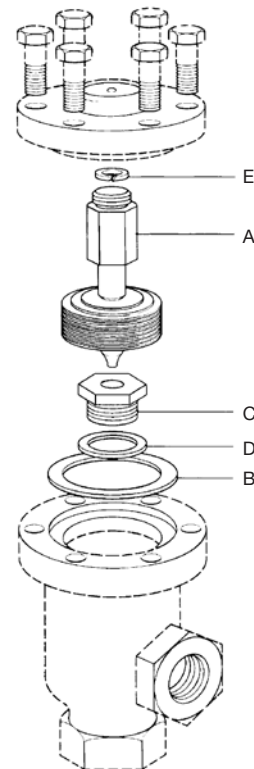
A pipeline strainer should be installed ahead of any steam trap to protect the valve and seat from dirt and scale. Full port isolating valves should be placed to permit servicing. The trap should be installed below the drainage point of the equipment with a collecting leg before the trap. For best operation, the bellows should be in a horizontal position as shown. For a freeze-resistant installation, inlet piping must be pitched toward the trap for gravity flow, and the trap outlet must be free of any piping. See installation instructions #250-D8.

## Maintenance

This product can be maintained without disturbing the piping connections. Complete isolation from both supply and return line is required before any servicing is performed. The trap should be disassembled periodically for inspection and cleaning of the valve head and seat. Worn or damaged parts should be replaced using a complete element set.

**Complete installation and maintenance instructions are given in IMI 2.004, which accompanies the product.**

## Spare Parts



Element Set	A, B, C, D, E
Cap Gasket	B

Available spare parts are shown in heavy outline.  
Angle & straightway traps accept the same spare parts.



## Balanced Pressure Thermo-Matic® Steam Trap TM600, TM600L, TM600N

The trap contains a calibrated element module which is self-adjusting so that condensate is discharged within 10°F of saturated steam temperature over the full operating pressure range. The solid fill bellows can withstand pressure surges and waterhammer, and a patented heat sink protects the bellows from over-expansion should the steam pressure suddenly be reduced. The integral downstream flash chamber reduces discharge velocity to provide smooth discharge of high condensate loads.

Model	TM600	TM600L	TM600N
PMO	600 psig		
Sizes	1/2" & 3/4"		
Connections	NPT		
Construction	Ductile iron body		Carbon Steel body
	stainless steel internals		
Options	BSP Connections		
	SW or flanged to MIL-T-960, Type II		

### Typical Applications

High-pressure steam main drips, high-pressure process equipment, outdoor installations subject to freezing.

### Limiting Operating Conditions

**Max. Operating Pressure (PMO)** 600 psig(41 barg)

**Max. Operating Temperature** Saturated Steam Temperature

### Pressure Shell Design Conditions

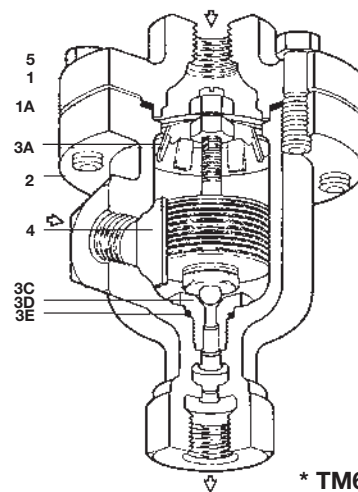
**PMA** 600 psig/up to 650°F 41 barg/up to 343°C  
Max. allowable pressure

**TMA** 650°F/0-600 psig 343°C/0-41 barg  
Max. allowable temperature

### Construction Materials

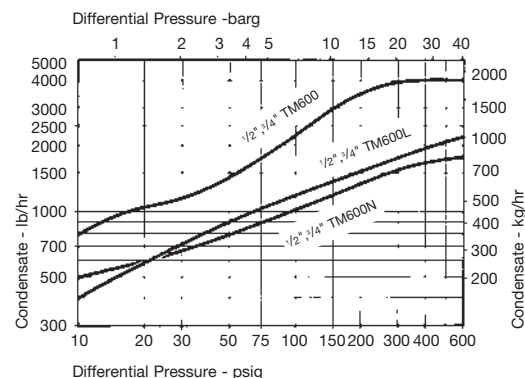
No.	Part	Material	
1	Cover TM600	Ductile Iron	ASTM A395
		TM600N	ASTM A216 G2 WCB
1A	Cover Gasket	Spiral Wound Stainless Steel, Graphite Filled	AISI 304 strip
2	Body TM600	Ductile Iron	ASTM A395
		TM600N	ASTM A216 G2 WCB
3A	Support Plate	Stainless Steel	AISI 304
3C	Valve Head	Hardened Stainless Steel	
		TM 600 (Cone Head)	AISI 420F
		TM 600L (Ball Head)	AISI 440
3D	Valve Seat	Hardened Stainless Steel	AISI 420F
3E	Valve Seat Gasket	Spiral Wound Stainless Steel, Graphite Filled	AISI 304 strip
4	Baffle	Stainless Steel	AISI 302
5	Cover Screws	Steel	ASTM A 449, Type 1

### TM600L\*



\* TM600 has a cone valve head.

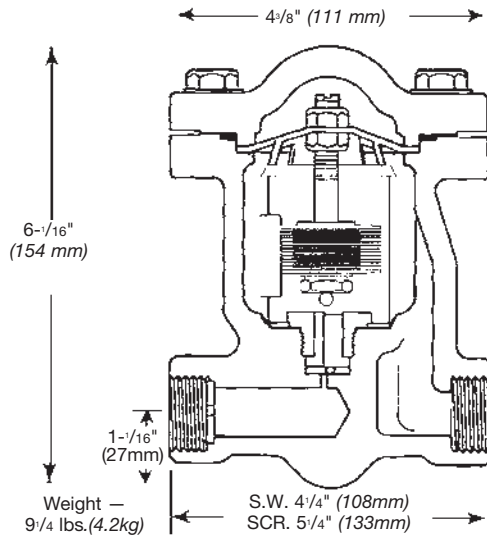
### Capacities



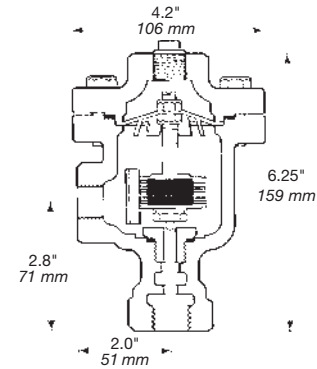
Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only.  
In the interests of development and improvement of the product, we reserve the right to change the specification.

TI-2-003-US 2.14

# Balanced Pressure Thermo-Matic® Steam Trap TM600, TM600L, TM600N



TM600N



TM600  
TM600L

Weight  
7.0 lb  
3.2 kg

## Sample Specification

Steam trap shall be Spirax Sarco type TM600 Thermo-Matic®, self-adjusting for operating pressures to 600 psig. The traps shall incorporate a flash chamber to reduce discharge velocity. Thermostatic elements shall be factory calibrated and shall have a heat sink to prevent over-expansion. Traps shall be non-freezing, and shall have a choice of top or side inlet (TM600 & TM600L) or traps shall have horizontal in-line connections (TM600N). Body and cap shall be ductile iron (TM600 & TM600L) or carbon steel (TM600N).

## Installation

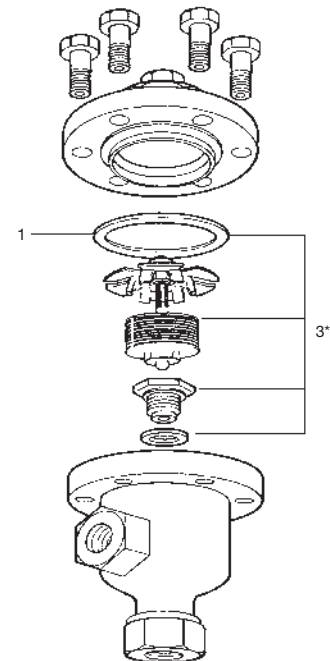
A pipeline strainer should be installed ahead of any steam trap to protect the head and seat from dirt and scale. Full-flow isolating valves should be placed to permit servicing. The trap should be installed below the equipment with a collecting leg before the trap. For best operation, the bellows should be in a horizontal position as shown. For a freeze-resistant installation, the inlet piping must be pitched toward the trap for gravity flow, and the trap must discharge to atmosphere or drain.

## Maintenance

This product can be maintained, unless installed vertically using the alternate inlet, without disturbing the inlet piping connections. Complete isolation of the trap from both supply and return line is required before any servicing is performed. The trap should be disassembled periodically for inspection and cleaning of the valve head and seat, and cleaning of the strainer screen (TM600N only). Worn or damaged parts should be replaced using a complete Element Set.

**Complete installation and maintenance instructions are given in IMI 2.004, which accompanies the product.**

## SPARE PARTS\*



Cover Gasket	1
Element Set	3

\*\* TM600 has a cone head  
Available spare parts are shown in heavy outline.  
Parts drawn in broken line are not supplied as spares.  
\* TM600, TM600L and TM600N parts are not interchangeable. Consult factory for TM600N spare parts.

# spirax/sarco

## BPC32 and BPC32Y Carbon Steel Balanced Pressure Thermostatic Steam Trap

Steam Traps

Balanced Pressure

The standard welded stainless steel element is self-adjusting over the entire operating pressure range and will discharge condensate at approximately 22°F (12°C) below saturated steam temperature. The element is resistant to waterhammer, and up to 572°F (318°C) steam temperature can be tolerated by this trap.

**The BPC32Y has an integral "Y" strainer.**

Model	BPC32	BPC32Y
<b>PMO</b>	465 psig	
<b>Sizes</b>	1/2", 3/4", and 1"	
<b>Connections</b>	NPT, SW, FLG ANSI 150 & 300	
<b>Construction</b>	Forged steel body and cover, stainless steel internals	
<b>Options</b>	Special Capsule fill near to steam and subcool. Blowdown valve for BPC32Y, Check Valve.	

### Typical Applications

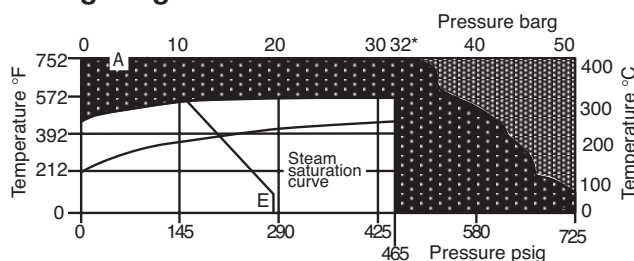
Kitchen and laundry equipment, steam tracers, hospital equipment, steam coils, steam radiators and steam main drip stations.

### Limiting Operating Conditions (ISO 6552)

Body design conditions			PN40
PMA -Maximum allowable pressure	725 psig		50 barg
TMA -Maximum allowable temperature	752°F		400°C
PMO -Maximum operating pressure	465 psig		32 barg
TMO -Maximum operating temperature	572°F		300°C
Designed for a maximum cold hydraulic test pressure of	1088 psig		75 barg

**Note: PMA & TMA are pressure/temperature related - see chart below.**

### Operating range



**The product must not be used in this region.**  
**The product should not be used in this region or beyond its operating range as damage to the internals may occur.**

\*PMO Maximum operating pressure 32 barg.  
 A-B Screwed, socket weld, butt weld and flanged ANSI 300  
 A-E Flanged ANSI 150

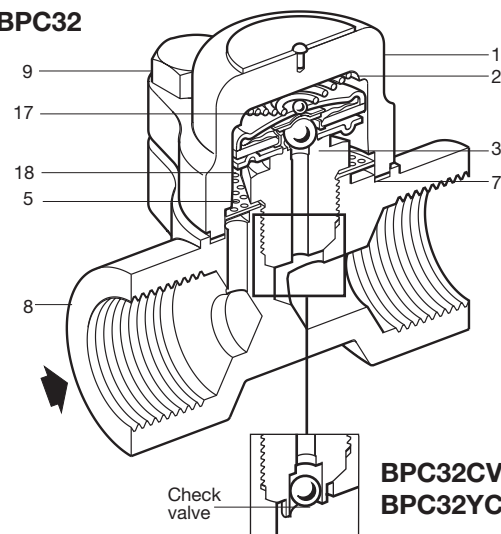
### Materials

No.	Part	Material
1	Cover	Carbon steel DIN 17243 C22.8 (W/S 1.0460) ASTM A105N
2	Capsule	Stainless steel
3	Valve seat	Stainless steel BS 970 431 S29
5	Strainer screen	Stainless steel AISI 304
7	Cover gasket	Stainless steel reinforced exfoliated graphite
8	Body	Carbon steel DIN 17243 C22.8 (W/S 1.0460) ASTM A105N
9	Cover bolts	Stainless steel (M10 x 30) A2-70
10	Strainer cap	Carbon steel DIN 17243 C22.8 (W/S 1.0460) ASTM A105N
11	Strainer cap gasket	Stainless steel BS 1449 304 S16
17	Spring	Stainless steel
18	Spacer plate	Stainless steel

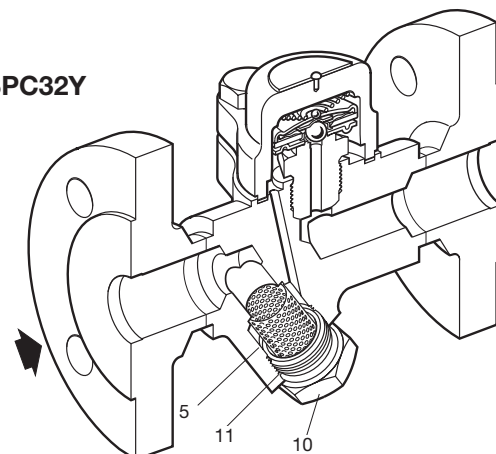
Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only.

In the interests of development and improvement of the product, we reserve the right to change the specification.

### BPC32



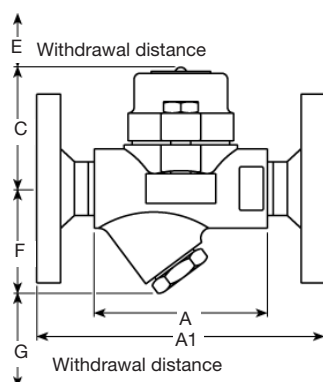
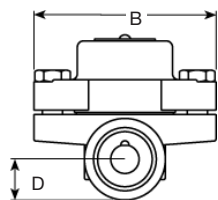
### BPC32Y



### Capsule fill and operation:

**Standard capsule** - is marked with "STD" for operation at approximately 22°F below steam saturation temperature.  
**Optionally** - The capsule can be supplied for sub-cooled "SUB": operation at approximately 43°F below steam saturation or "NTS" at 7°F below steam temperature.

# BPC32 and BPC32Y Carbon Steel Balanced Pressure Thermostatic Steam Trap



Dimensions (NOMINAL) IN INCHES AND MILLIMETERS									WEIGHT SCR/BW	WEIGHT FLGD
Size	A	A1	B	C	D	E	F	G		
BPC32										
1/2" DN15	3.7	5.9	3.7	2.5	0.7	1.5	-	-	3.1 lb	6.4 lb
	95	150	94	64	17	37	-	-	1.4 kg	2.9 kg
3/4" DN20	3.7	5.9	3.7	2.5	0.7	1.5	-	-	3.1 lb	7.7 lb
	95	150	94	64	17	37	-	-	1.4 kg	3.5 kg
1" DN25	3.7	6.3	3.7	2.5	0.7	1.5	-	-	3.3 lb	9.0 lb
	95	160	94	64	23	37	-	-	1.5 kg	4.1 kg
BPC32Y										
1/2" DN15	3.7	5.9	3.7	2.5	-	1.5	2.1	1.1	3.5 lb	6.8 lb
	95	150	94	64	-	37	53	28	1.6 kg	3.1 kg
3/4" DN20	3.7	5.9	3.7	2.5	-	1.5	2.1	1.1	3.5 lb	8.2 lb
	95	150	94	64	-	37	54	28	1.6 kg	3.7 kg
1" DN25	3.7	6.3	3.7	2.5	-	1.5	2.3	1.1	4 lb	9.7 lb
	95	160	94	64	-	37	58	28	1.8 kg	4.4 kg

## Sample Specification

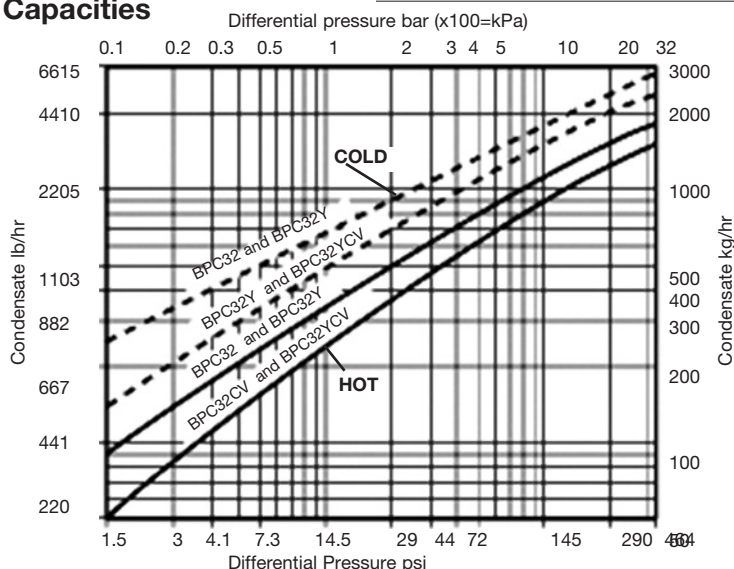
Steam trap shall be Spirax Sarco BPC32/BPC32Y balanced pressure thermostatic-type which self-adjusts to all pressures to 464 psig. Body construction of forged steel with side inlet and outlet threaded (or socket weld) ends containing an integral stainless steel strainer. Shall be provided with blowdown when required, and be maintainable in the field without disturbing the piping. Operating element capsule of design capable of resisting waterhammer and freezing conditions, and can withstand up to 572°F temperatures.

## Spare parts

Capsule and seat assembly seat			
2, 3, 17, 18			
Strainer screen	BPC32	(3 of each)	5
Strainer screen & gasket	BPC32Y	(1 of each)	5, 11

Set of cover gaskets	(packet of 3)	7
Strainer cap gasket	(packet of 3)	11

## Capacities



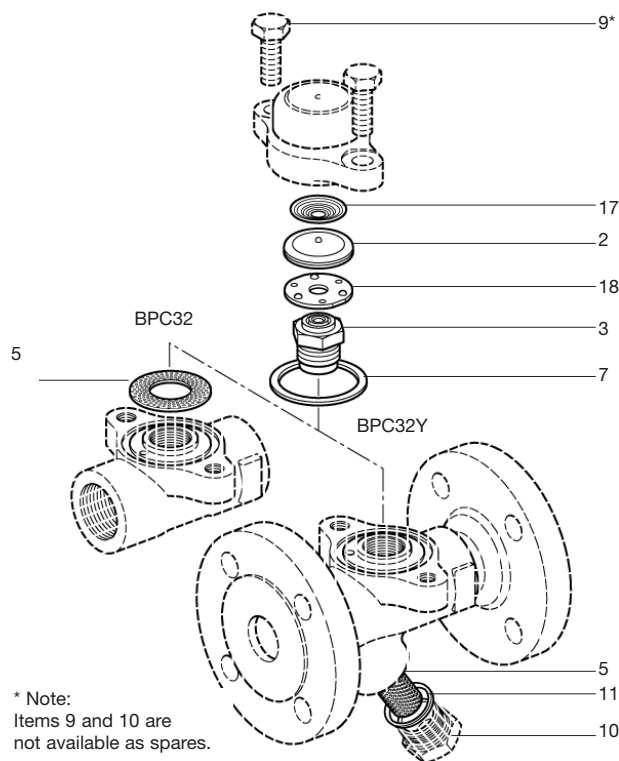
## Installation

The trap is designed for installation with the capsule in a horizontal plane and the cover at the top, preferably with a drop leg immediately preceding the trap. When welding the trap into the pipeline, there is no need to remove the element, providing the welding is done by the electric arc method. Full port isolating valves should be installed upstream and downstream of the trap.

## Maintenance

This product can be maintained without disturbing the piping connections. Complete isolation of the connector from both supply and return line is required before any servicing is performed. The trap should be disassembled periodically for cleaning of the strainer screen and inspection and cleaning of the valve head and seat. Worn or damaged parts should be replaced using a complete Capsule and Seat Assembly Set.

Complete installation and maintenance instructions are given in the IM-P005-02 sheet, which accompanies the product.



\* Note:  
Items 9 and 10 are  
not available as spares.

## Recommended tightening torques

Item	Part	or mm	FT/LB
3	Valve seat	24 A/F	85 - 92
9	Cover bolts	17 A/F M10 x 30	17 - 20
10	Strainer cap	27 A/F	89 - 100

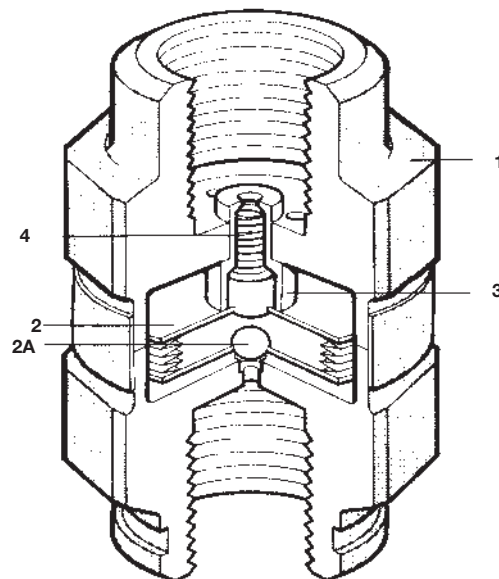




## Sealed Balanced Pressure Thermostatic Steam Trap TSS300

The welded stainless steel element is self-adjusting over the entire operating pressure range and will discharge condensate at approximately 20°F (11°C) below saturated steam temperature. Trap may be installed in horizontal or vertical pipelines.

Model	TSS300
PMO	300 psig
Sizes	3/8" & 1/2"
Connections	NPT
Construction	All Stainless Steel Tamper-proof body
Options	Strainer Screen (For 1/2" size only)



### Limiting Operating Conditions

**Max. Operating Pressure (PMO)** 300 psig (21 barg)

**Max. Operating Temperature** Saturated Steam Temperature

### Pressure Shell Design Conditions ANSI 600

**PMA** 800 psig/up to 725°F 55 barg/up to 385°C  
Max. allowable pressure

**TMA** 725°F/0-800 psig 385°C/0-55 barg  
Max. allowable temperature

### Typical Applications

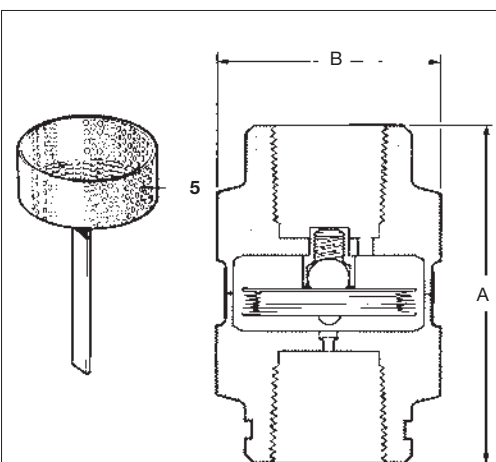
Critical and non-critical steam tracing systems and steam main drips.

### CONSTRUCTION MATERIALS

No.	Part	Material
1	Body*	Stainless Steel AISI 304
2	Element Plates	Stainless Steel
2A	Element Valve	Stainless Steel
3	Element Holder	Stainless Steel
4	Spring	Stainless Steel
5	Strainer Screen (optional)**	Stainless Steel
	Screen Tab	Stainless Steel

\* The body weld joint complies with ASME section IX and BS4870 (1981).

\*\* Optional strainer screen can be inserted into the inlet connection.

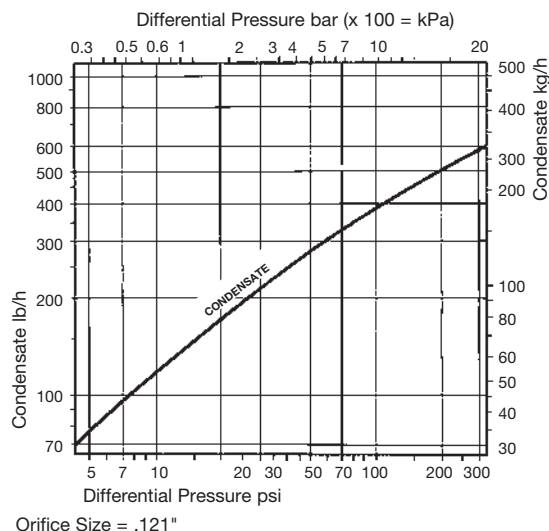


### Dimensions (nominal) in inches and millimeters

Size	A	B	Weight
3/8", 1/2"	2.5 64	1.5 38	0.7 lb 0.3 kg

# Sealed Balanced Pressure Thermostatic Steam Trap TSS300

## Capacities



## Sample Specification

Steam trap shall be encapsulated Spirax Sarco TSS300 balanced pressure thermostatic type, which will operate installed in either horizontal or vertical piping. Construction of all stainless steel with tamper-proof body sealed against leakage. Operating element to be stainless steel welded thermostatic bellows for operation without adjustment at any pressure to 300 psig. Trap to operate close to steam temperature and shall be provided with internal strainer when required.

## Operation

The TSS300 should be used for critical applications (such as draining steam mains or high temperature tracing lines) where it is important to keep the steam space free of condensate. This installation must also be used when the trap discharges into a pressurized condensate return system.

The normal failure mode will be in the open position unless the bellows is distorted by severe operating conditions.

The TSS300 may also be used as a thermostatic air vent. For this use, it should be installed to discharge vertically upward. The discharge should be piped to a drain.

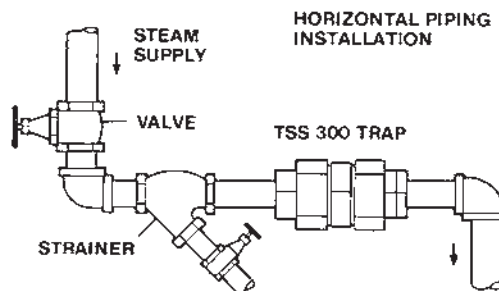
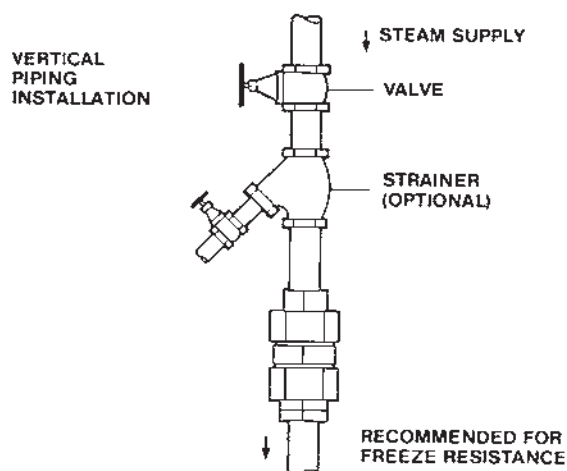
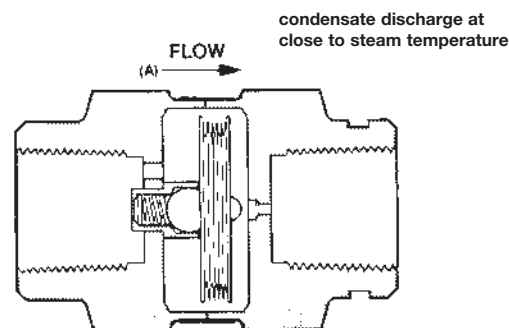
## Installation

The trap nameplate indicates the flow direction. A strainer should be installed upstream of the trap (an optional internal strainer is available). Full port isolating valves should be installed upstream and downstream. To avoid damaging the thermostatic element, the pipe connections should never be welded to the trap. For freeze protection, all drain lines must be pitched toward the trap for gravity flow. The trap must discharge vertically downward and the discharge piping must be self-draining.

## Maintenance

This product is factory sealed for tamper-proof operation, and no repair parts are available. Complete isolation of the trap from both supply and return line is required before the trap is removed.

**Complete installation and maintenance instructions are given in IMI 2.0001, which accompanies the product.**







## Sealed Balanced Pressure Thermostatic Steam Trap DTS300

The welded stainless steel element is self-adjusting over the entire operating pressure range and will discharge condensate at approximately 190°F. Trap may be installed in horizontal or vertical pipelines.

Model	DTS300
PMO	300 psig
Sizes	3/8" & 1/2"
Connections	NPT
Construction	All Stainless Steel Tamper-proof body
Options	Strainer Screen (For 1/2" size only)

### Limiting Operating Conditions

**Max. Operating Pressure (PMO)** 300 psig (21 barg)

**Max. Operating Temperature** Saturated Steam Temperature

### Pressure Shell Design Conditions

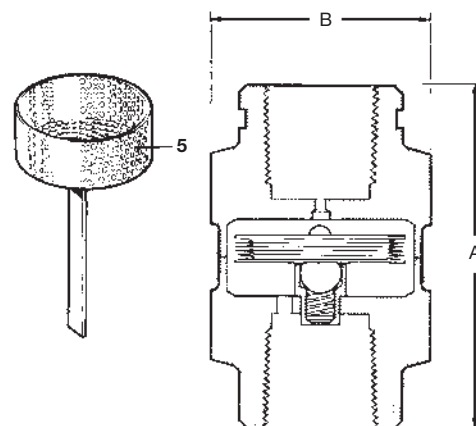
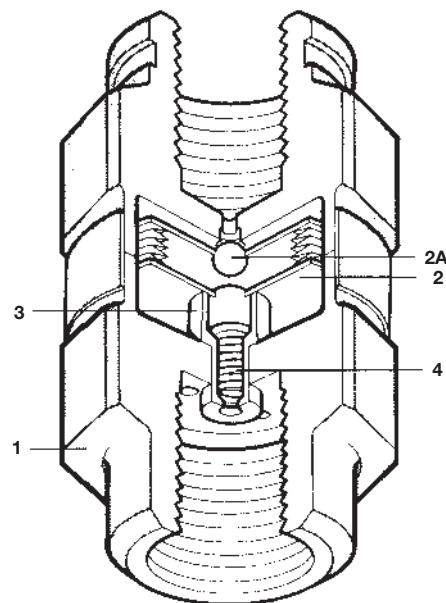
ANSI 600

**PMA** 800 psig/up to 725°F 55 barg/up to 385°C  
Max. allowable pressure

**TMA** 725°F/0-800 psig 385°C/0-55 barg  
Max. allowable temperature

### Typical Applications

Non-critical steam tracing systems.



### Construction Materials

No.	Part	Material
1	Body*	Stainless Steel AISI 304
2	Element Plates	Stainless Steel
2A	Element Valve	Stainless Steel
3	Element Holder	Stainless Steel
4	Spring	Stainless Steel
5	Strainer Screen (optional)**	Stainless Steel
	Screen Tab	Stainless Steel

\* The body weld joint complies with ASME section IX and BS4870 (1981).

\*\* Optional strainer screen can be inserted into the inlet connection.

### Dimensions (nominal) in inches and millimeters

Size	A	B	Weight
3/8", 1/2"	2.5 64	1.5 38	0.7 lb 0.3 kg

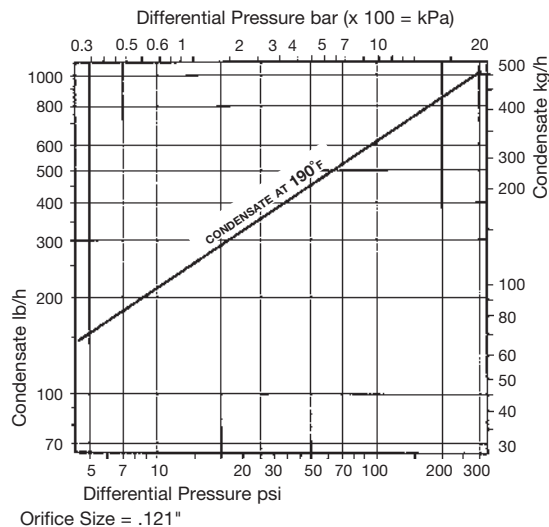
Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only.

In the interests of development and improvement of the product, we reserve the right to change the specification.

TI-2-0011-US 04.12

# Sealed Balanced Pressure Thermostatic Steam Trap DTS300

## Capacities



## Sample Specification

Steam trap shall be encapsulated Spirax Sarco DTS300 balanced pressure thermostatic type, which will operate installed in either horizontal or vertical piping. Construction of all stainless steel with tamper-proof body sealed against leakage. Operating element to be stainless steel welded thermostatic bellows for operation without adjustment at any pressure to 300 psig. Trap to operate close to 190 °F steam temperature and shall be provided with internal strainer when required.

## Operation

The DTS300 should be used for non-critical applications (such as non-critical tracing lines) where it is important to keep the temperature of condensate discharge low.

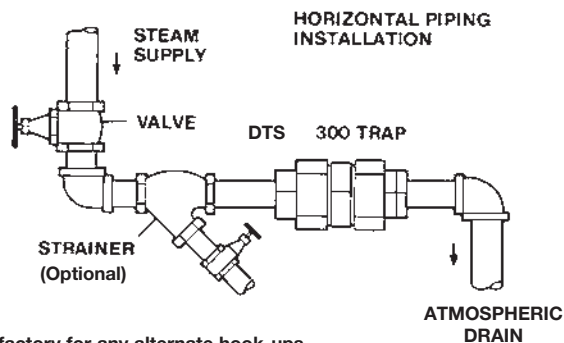
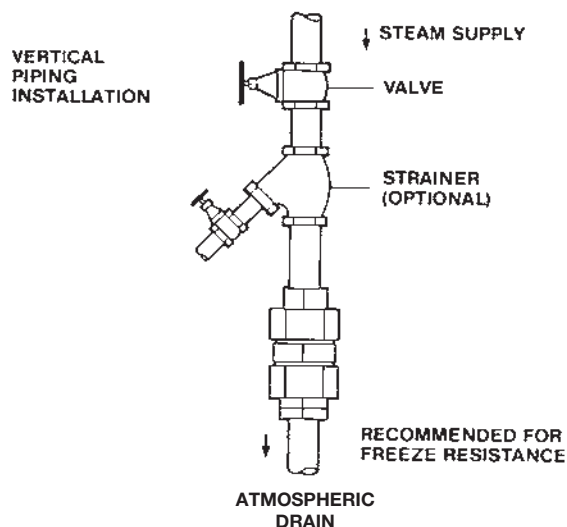
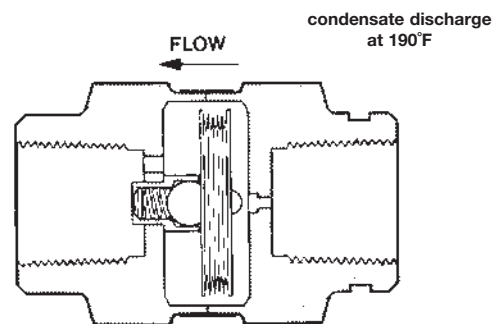
The normal failure mode will be in the open position unless the bellows is distorted by severe operating conditions.

## Installation

The trap nameplate indicates the flow direction. A strainer should be installed upstream of the trap (an optional internal strainer is available). Full port isolating valves should be installed upstream. To avoid damaging the thermostatic element, the pipe connections should never be welded to the trap. For freeze protection, all drain lines must be pitched toward the trap for gravity flow. The trap must discharge vertically downward and the discharge piping must be self-draining.

## Maintenance

This product is factory sealed for tamper-proof operation, and no repair parts are available. Complete isolation of the trap from both supply and return line is required before the trap is removed. Complete installation and maintenance instructions are given in IMI 2.0001A, which accompanies the product.



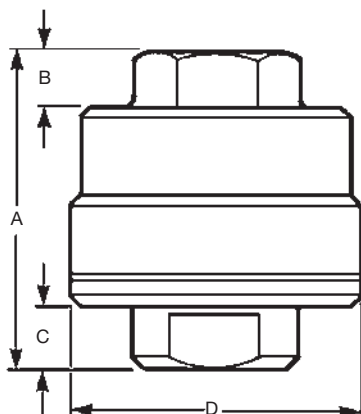
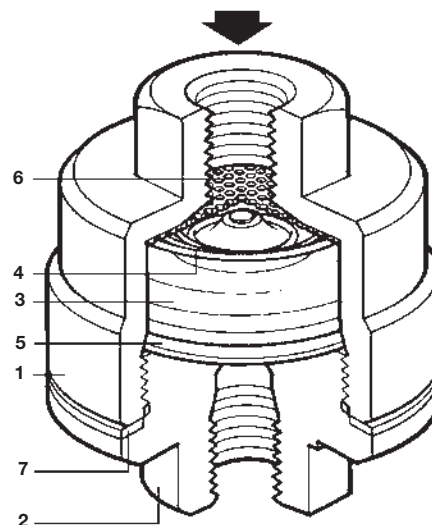
Consult factory for any alternate hook-ups.

# spirax/sarco

## Balanced Pressure Thermostatic Steam Trap MST21 & MST21H

The welded stainless steel element is self-adjusting over the entire operating pressure range and will discharge condensate at approximately 18°F (10°C) below saturated steam temperature on the standard Fill trap. Up to 518°F (270°C) and waterhammer can be tolerated by this trap. The MST21 can be disassembled for servicing. Trap may be installed in horizontal or vertical pipelines. Can be used on tracing, drips, sterilizers and a low capacity air vent.

Model	MST21 / MST21H
PMO	304 psig
Sizes	1/4", 1/2" MST21 1/2", 3/4", 1" MST21H
Connections	NPT
Construction	All Stainless Steel
Options	NTS Fill near to steam 7.2°F SUB Fill sub cooled 40°F



### Dimensions (nominal) in inches and millimeters

Size	A	B	C	D	Weight
1/4"	2.0 50.5	0.3 8.5	0.4 10	1.8 45	.75 lb 0.34 kg
1/2"	2.4 61	0.5 12.5	.06 14	1.8 45	1.06 lb 0.48 kg
3/4"	2.7 68	0.6 14.0	.06 14.0	1.8 45.0	1.06 lb 0.48 kg
1"	3.0 75	0.6 14.0	.06 14.0	1.8 45.0	1.06 lb 0.48 kg

### Typical Applications

Steam main drainage and steam tracing.

### Limiting Operating Conditions

**Max. Operating Pressure (PMO)** 304 psig (21 barg)

**Max. Operating Temperature** 518°F@ 300 psig (270°C @ 21barg)

### Pressure Shell Design Conditions

**PMA** 362 psig/up to 248°F 25 barg/up to 120°C  
Max. allowable pressure 309 psig/424°F 21 barg/218°C  
188 psig/752°F 13 barg/400°C

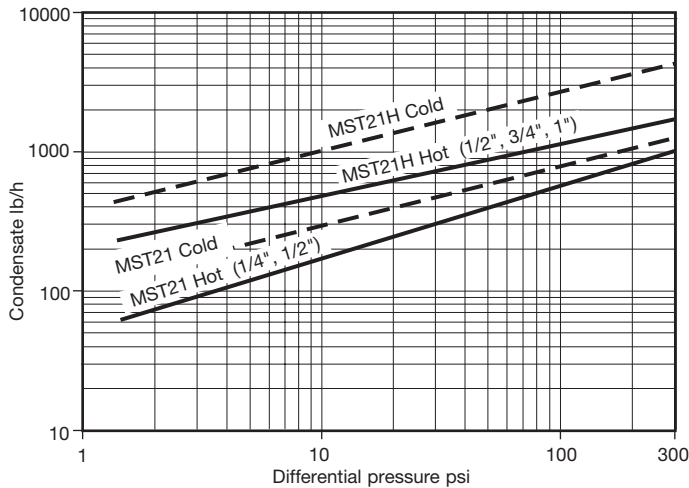
**TMA** 752°F/0-188 psig 400°C/0-13 barg  
Max. allowable temperature

### Construction Materials

No.	Part	Material
1	Body	Stainless Steel ASTM A743 CF16F/ DIN 17440 X 10 CrNiS 18 9
2	Cap	Stainless Steel ASTM A276 Gr 431
3	Capsule	Stainless Steel
4	Spring	Stainless Steel
5	Spacer Plate	Stainless Steel
6	Strainer Screen (0.8mm perf)	Stainless Steel
7	Gasket	Stainless Steel

# Balanced Pressure Thermostatic Steam Trap MST21 & MST21H

## Capacities



Orifice Size:  
MST21 = .079"  
MST21H = .197"

## Sample Specification

Steam trap shall be Spirax Sarco MST21 balanced pressure thermostatic type, which self adjusts to all pressures to 304 psig. Trap to be of all stainless steel maintainable construction. Internal element shall be capable of resisting waterhammer and withstanding up to 518°F (270°C). Offered in standard and high capacity with choice of 3 discharge temperature options.

## Installation

The steam trap is intended for installation in a vertical line with the inlet at the top and the outlet at the bottom. This will ensure that it is self-draining. Full port isolating valves should be installed upstream and downstream of the trap. If fitted in a horizontal line, the trap should be preceded by a short drop leg. Trap will be piped inverted (outlet vertical up) when used as an airvent (NTS-Fill recommended).

## Maintenance

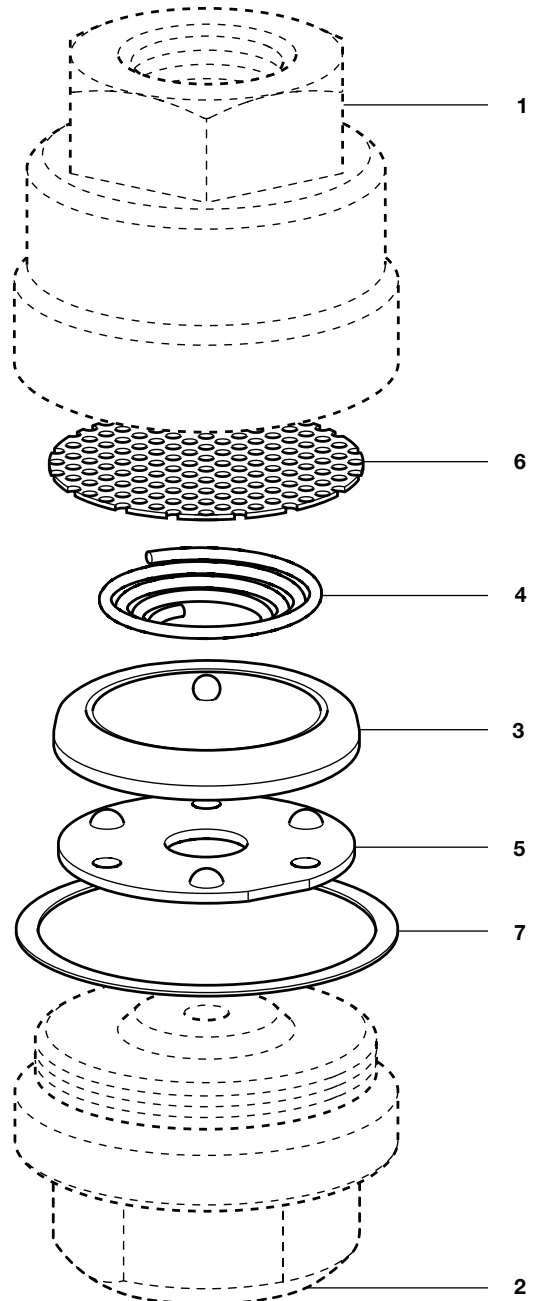
Complete isolation of the trap from both supply and return line is required before any servicing is performed.

The trap should be disassembled periodically for cleaning of the strainer screen and inspection and cleaning of the valve head and seat.

Worn or damaged parts should be replaced using a complete Capsule Assembly Set.

**Complete installation and maintenance instructions are given in the IM-P125-07 sheet, which accompanies the product.**

## Spare Parts



**Capsule Assembly Set** 3, 4, 5, 6, 7  
**Gasket Set (Set of 3)** 7

Available spare parts are shown in heavy outline.  
Parts drawn in broken line are not supplied as spares.

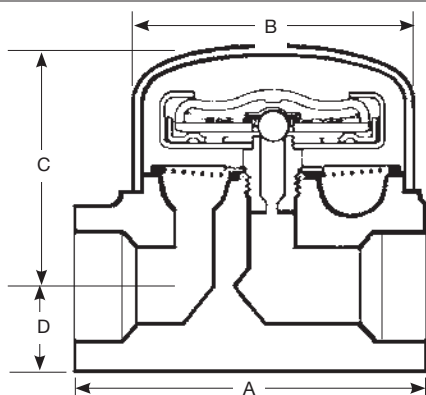
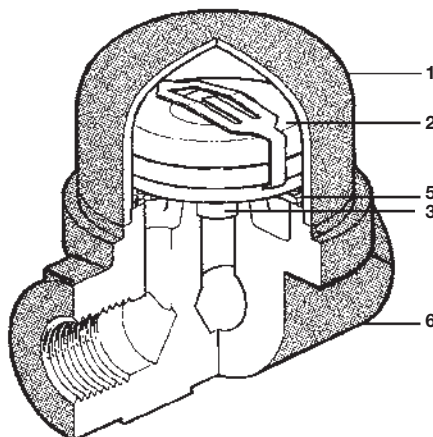
**Please note thermostat fill when ordering spares.**

# spirax/sarco

## Balanced Pressure Thermostatic Steam Trap SBP30LC

The welded stainless steel element is self-adjusting over the entire operating pressure range and will discharge condensate at approximately 22°F (12°C) below saturated steam temperature. The element is resistant to waterhammer, and up to 545°F (285°C) superheat over saturated steam temperature can be tolerated by this trap.

<b>Model</b>	<b>SBP30LC</b>
<b>PMO</b>	435 psig
<b>Sizes</b>	1/2" & 3/4"
<b>Connections</b>	NPT
<b>Construction</b>	All Stainless Steel tamper-proof body
<b>Options</b>	S.W. & BSP connections Subcooling capsule filling



### Dimensions

(nominal) in inches and millimeters

Size	A	B	C	D	Weight
1/2", 3/4"	3.1 80	2.5 63	2.2 56	0.74 19	2.2 lb 1.0 kg

### Typical Applications

Kitchen and hospital equipment, steam tracers, steam coils, steam radiators and steam main drip stations.

### Limiting Operating Conditions

**Max. Operating Pressure (PMO)** 435 psig (30 barg)

**Max. Operating Temperature** 545°F (285°C) at 435 psig(30 barg)

### Pressure Shell Design Conditions

<b>PMA</b>	720 psig/up to 100°F	50 barg/up to 38°C
Max. allowable pressure	450 psig/459°F	31 barg/237°C
	400 psig/752°F	27 barg/426°C

<b>TMA</b>	752°F/0-400 psig	400°C/0-27 barg
Max. allowable temperature		

### Capsule Filling

As standard, the trap is supplied with filling **STD**, which will operate approximately 22°F (12°C) below steam temperature.

As an option, the trap can be supplied with filling **SUB**, which will operate approximately 43°F (24°C) below steam temperature, i.e. sub-cooling.

Note: If the alternative capsule is required, this must be clearly stated on the order, e.g. Capsule to have **SUB** fill.

### Construction Materials

No.	Part	Material
1	Cover*	Stainless Steel ASTM A240 Gr 304
2	Capsule	Stainless Steel AISI 321
2A	Element Valve	Stainless Steel AISI 440
3	Seat Assembly	Stainless Steel AISI 431
4	Valve Seat Gasket	Stainless Steel AISI 304
5	Strainer Screen	Stainless Steel AISI 304
6	Body*	Stainless Steel ASTM A473 Gr 304

\* The body/cover weld joint complies with ASME section IX and BS4870 (1981).

Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only.

In the interests of development and improvement of the product, we reserve the right to change the specification.

TI-2-0061-US 4.14

# Balanced Pressure Thermostatic Steam Trap SBP30LC

## Sample Specification

Steam trap shall be encapsulated Spirax Sarco SBP30LC balanced pressure thermostatic type, which self-adjusts to all pressures to 435 psig and can be installed in either horizontal or vertical piping. Maintenance-free and tamper-proof design of all stainless steel construction with forged body and drawn cover completely sealed against leakage. Operating element to be a solidly liquid-filled thermostatic capsule which vents air freely, operates close to steam temperature, resists waterhammer and freezing conditions, and can withstand up to 90°F superheat.

## Installation

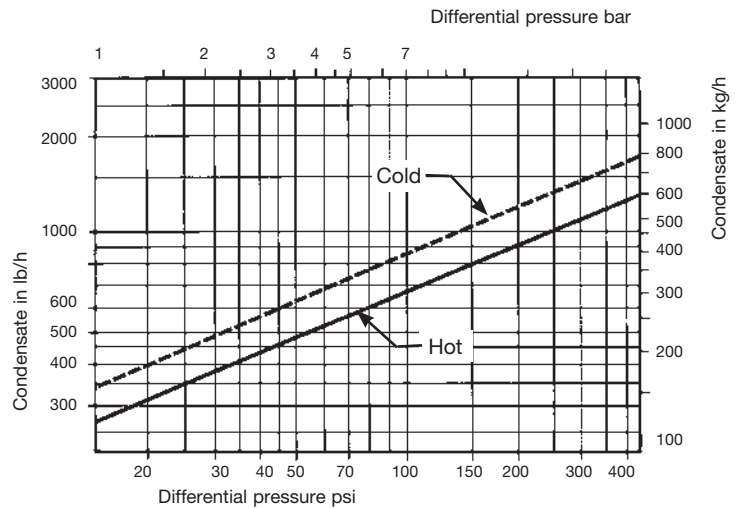
Although the trap will operate in any position, the preferred installation is in a horizontal pipe with a drop leg immediately before the trap. The electric arc process must be used when the SW trap is welded into the pipeline. Full port isolating valves should be installed upstream and downstream of the trap.

## Maintenance

This product is factory sealed for tamper-proof operation, and no repair parts are available. Complete isolation from both supply and return line is required before the trap is removed.

**Complete installation and maintenance instructions are given in the IMI sheet, which accompanies the product.**

## Capacities





## Cast Iron Inverted Bucket Steam Traps B Series

The trap contains an inverted bucket mechanism which responds to the difference in density between steam and condensate. The discharge action is cyclic. Condensate is discharged close to steam temperature.

Model	B1H	B2	B3	B4	B5
<b>PMO</b>	250 psig (see below)				
<b>Sizes</b>	1/2", 3/4"	3/4"	1"	1-1/4"	2"
<b>Connections</b>	NPT				
<b>Construction</b>	Cast Iron Body, Stainless Steel Mechanism				
<b>Options</b>	Bimetal air vent (add '2' to model No. eg. B12HS, B22S, etc.) Integral strainer (add 'S' to model No. eg. B1HS, B2S, etc.) <b>(when bimetal is required, strainer becomes standard)</b>				

### Construction Materials

No.	Part	Material
1	Cover	Cast Iron
2	Cover Screws	Steel
3	Body	Cast Iron
4	Bucket	Stainless Steel
5	Valve Guide Plate (Seat Bracket)	
6	Cover Gasket	Graphite
7	Valve Seat	Stainless Steel (hardened)
8	Valve Head (Ball)	Stainless Steel (hardened)
9	Valve Lever (Bucket Arm)	Stainless Steel
10	Air Vent (optional)	Stainless Steel
11	Strainer Screen (optional)	
	B1HS	Stainless Steel, 20 mesh
	B2S to B5S	Stainless Steel, 1/16" perf.
12 A	Cap on strainer	Brass
	models B1HS etc.	Steel
12 B	Plug in standard	
	model B1H, B2, B3, B4, B5	

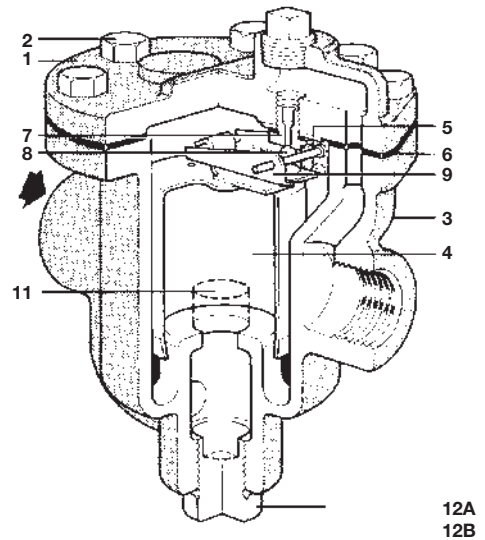
### Typical Applications

Steam main drip stations, laundry equipment, industrial dryers and storage tanks.

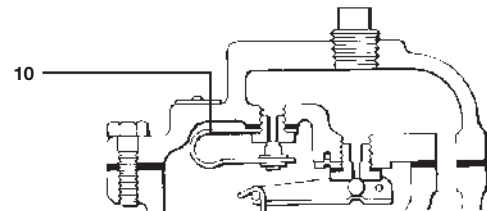
### Optional Bimetal Air Vent

The optional bimetal air vent allows rapid air removal on cold start-up. The vent closes at approximately 200°F, and will remain closed during normal operation of the trap.

**Note: Top plug not provided on B1H-15, 30, 75, 125 B1H, B2, B5**



**FOR CAPACITIES – SEE TIS 2.408**



### Limiting Operating Conditions

<b>Max. Operating Pressure (PMO)</b>	15 psig (1 barg)	125 psig (9 barg)
	30 psig (2 barg)	180 psig (12 barg)
	75 psig (5 barg)	250 psig (17 barg)

(Determined by Orifice selected. See Capacity and Selection Data on TIS 2.408)

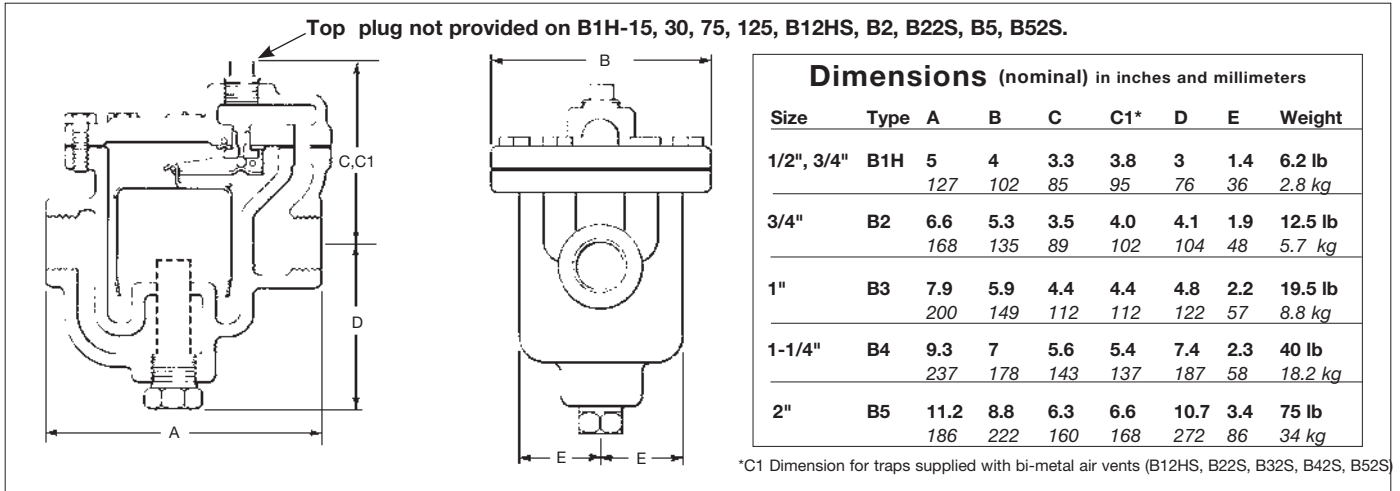
<b>Max. Operating Temperature</b>	450°F (232°C) at all operating pressures
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### Pressure Shell Design Conditions

<b>PMA</b>	250 psig/up to 450°F	17 barg/up to 232°C
Max. allowable pressure		
<b>TMA</b>	450°F/0-250 psig	232°C/0-17 barg
Max. allowable temperature		



# Cast Iron Inverted Bucket Steam Traps B Series



## Sample Specification

Steam traps shall be of the mechanical inverted bucket type with cast iron bodies, screwed NPT horizontal connections and stainless steel valve head, seat and bucket. An internal bi-metal air vent and/or strainer screen shall be available as options.

## Installation

A pipeline strainer should be installed ahead of any trap to protect the head and seat from dirt and scale. Suitable full-port isolation valves should be placed around trap to permit servicing. The trap should be installed below the equipment drainage connection in a horizontal position so that the bucket will rise and fall vertically. For superheated steam applications, a check valve should be installed at the trap inlet.

## Maintenance

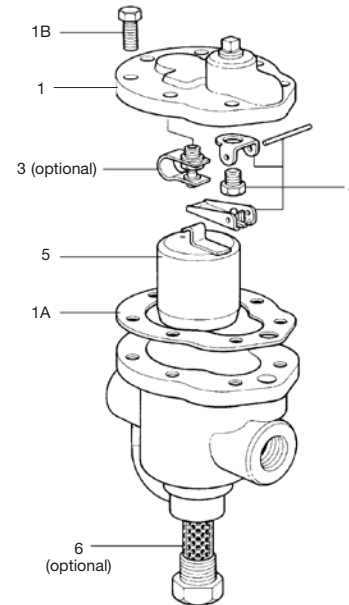
This product can be maintained without disturbing the piping connections. Complete isolation of the trap from both supply and return line is required before any servicing is performed.

The trap should be disassembled periodically for inspection and cleaning of the valve head and seat, and operating mechanism. The bucket vent hole must be clear. The optional strainer screen should be removed and cleaned.

Worn or damaged parts should be replaced using a complete mechanism assembly kit.

**Complete installation and maintenance instructions are given in IMI 2.400, which accompanies the product.**

## Spare Parts



Cover w/ Gasket Specify if standard or w/ bi-metal air vent	1, 1A
Cover Gasket (set of 3)	1A
Cover Cap Screws, Set	1B
Air Vent Assembly	3
Complete Mechanism (specify pressure range)	4
Bucket (Stainless Steel)	5
Strainer (Stainless Steel)	6



## Cast Iron Inverted Bucket Steam Trap B Series Capacities Chart

**Capacities** lb/hr for Kg/Hr, multiply Lb/Hr by .454

Trap Size		1/2" - 3/4"	3/4"	1"	1-1/4"	2"
1 – 15 psi	<b>Model No.</b>	<b>B1H-15</b>	<b>B2-15</b>	<b>B3-15</b>	<b>B4-15</b>	<b>B5-15</b>
	Orifice	1/4"	3/8"	1/2"	5/8"	1-1/16"
	1 psi	665	1700	2140	3940	11,600
	2 psi	715	1920	2330	4090	12,100
	3 psi	755	2110	2600	4350	13,200
	5 psi	835	2370	2920	4980	14,700
	10 psi	960	2810	3590	5990	17,800
5 – 30 psi	15 psi	1040	3220	3900	6560	20,000
	<b>Model No.</b>	<b>B1H-30</b>	<b>B2-30</b>	<b>B3-30</b>	<b>B4-30</b>	<b>B5-30</b>
	Orifice	3/16"	5/16"	3/8"	1/2"	3/4"
	5 psi	615	1920	2340	4150	10,000
	10 psi	715	2260	2840	4930	12,100
	15 psi	810	2580	3230	5680	14,000
	20 psi	895	2870	3630	6200	15,600
10 – 75 psi	25 psi	945	3060	3900	6720	17,100
	30 psi	1000	3220	4120	7140	18,500
	<b>Model No.</b>	<b>B1H-75</b>	<b>B2-75</b>	<b>B3-75</b>	<b>B4-75</b>	<b>B5-75</b>
	Orifice	5/32"	1/4"	9/32"	3/8"	9/16"
	10 psi	500	1250	1970	3840	9,860
	20 psi	610	1600	2500	4720	12,400
	30 psi	705	1850	2860	5470	13,900
20 – 125 psi	40 psi	770	2000	3120	6080	15,200
	60 psi	905	2350	3640	7150	17,900
	75 psi	965	2550	3960	7570	19,200
	<b>Model No.</b>	<b>B1H-125</b>	<b>B2-125</b>	<b>B3-125</b>	<b>B4-125</b>	<b>B5-125</b>
	Orifice	1/8"	13/64"	1/4"	11/32"	1/2"
	20 psi	446	1100	2080	4450	10,800
	40 psi	600	1220	2600	5530	12,500
60 – 180 psi	60 psi	695	1700	3020	6350	15,600
	80 psi	765	1900	3380	7110	17,100
	100 psi	830	2080	3640	7750	18,900
	125 psi	920	2240	4100	8540	20,000
	<b>Model No.</b>	<b>B1H-180</b>	<b>B2-180</b>	<b>B3-180</b>	<b>B4-180</b>	<b>B5-180</b>
	Orifice	3/32"	5/32"	7/32"	9/32"	7/16"
	60 psi	585	1500	2580	4250	13,650
125 – 250 psi	80 psi	642	1700	2830	4730	15,100
	100 psi	703	1800	3070	5080	16,600
	125 psi	765	1940	3380	5680	18,400
	150 psi	816	2100	3580	5980	19,100
	180 psi	867	2220	3780	6300	20,500
	<b>Model No.</b>	<b>B1H-250</b>	<b>B2-250</b>	<b>B3-250</b>	<b>B4-250</b>	<b>B5-250</b>
	Orifice	.070"	9/64"	3/16"	1/4"	3/8"
125 – 250 psi	125 psi	562	1825	2760	4730	15,000
	150 psi	600	1940	2910	4980	16,100
	175 psi	630	2060	3120	5130	16,800
	200 psi	665	2120	3380	5500	17,800
	225 psi	695	2240	3460	5780	18,900
	250 psi	720	2300	3630	6040	19,400

Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only.  
In the interests of development and improvement of the product, we reserve the right to change the specification.

TI-2-408-US 03.94

# Cast Iron Inverted Bucket Steam Trap

## B Series Capacities Chart

### How to Select

The tables overleaf show the maximum capacities on continuous discharge of condensate approximately at steam temperature. Cold water discharge capacities are much higher.

When calculating the capacity requirement for the steam trap, use a safety factor of 2 or 3 times the normal load, depending on the application. Then from the capacity table overleaf, select the trap with the required capacity and pressure range. Caution: Oversizing bucket traps, especially on light load applications such as main drips, can cause the trap to lose its seal and pass steam.

Be careful to select the inverted bucket trap with a seat suitable for the maximum pressure differential and with sufficient capacity to handle the load at the minimum expected pressure differential. The trap will not open if subjected to pressures greater than the maximum differential pressure.

The capacity table also applies to traps with optional air vents (B12H, B22, etc.)

# spirax/sarco

## Cast Iron Inverted Bucket Steam Trap Series 200

Steam Traps

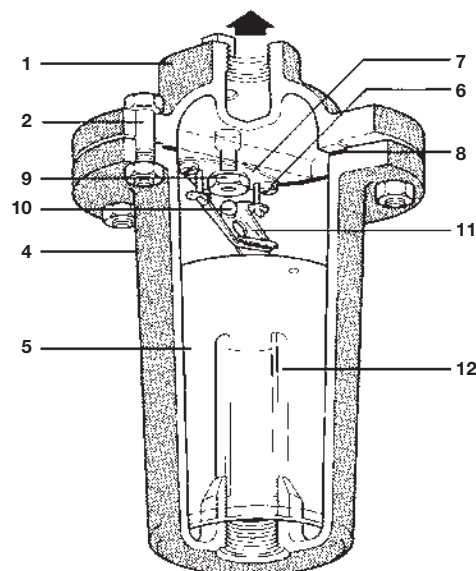
Inverted Buckets

The trap contains an inverted bucket mechanism which responds to the difference in density between steam and condensate. The discharge action is cyclic. Condensate and non-condensibles are discharged close to steam temperature.

Model	211	212	213	215	216
<b>PMO</b>	250 psig (see below)				
<b>Sizes</b>	1/2"	3/4"	1"	1-1/2"	2"
<b>Connections</b>	NPT				
<b>Construction</b>	Cast Iron Body, Stainless Steel Internals				

### Construction Materials

No.	Part	Material
1	Cover	Cast Iron
2	Cover Bolts UNC	Steel
	Cover Nuts	Steel
4	Body	Cast Iron
5	Bucket	Stainless Steel
6	Valve Guide Plate	
	Screws	Stainless Steel
7	Valve Guide Plate	Stainless Steel
8	Cover Gasket	Nickel Reinforced Exfoliated Graphite
9	Valve Seat	Stainless Steel
10	Valve	Stainless Steel
11	Valve Lever	Stainless Steel
12	Internal Tube	Steel



### Typical Applications

Steam main drip stations, laundry equipment, industrial dryers and storage tanks.

**Capacities:** See TIS 2.405

### Limiting Operating Conditions

#### Max. Operating Pressure (PMO) Max. Operating Temperature

Model #	psig	barg
211/6	250	17
211/7	200	13.8
1/2" 211/8	120	8.5
211/10	60	4
211/12	30	2
3/4" 212/7	250	17
212/8	200	13.8
212/10	120	8.5
212/12	60	4
212/16	30	2
213/12	250	17
213/14	180	12.5
1" 213/16	120	8.5
213/20	60	4
213/24	30	2
215/18	250	17
215/20	180	12.5
1-1/2" 215/22	120	8.5
215/28	60	4
215/36	30	2
216/24	250	17
216/32	120	8.5
2" 216/40	60	4
216/48	36	2.5

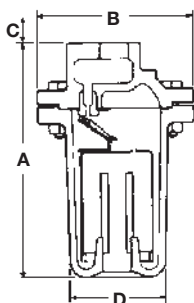
410°F (210°C) at all operating pressures

\* For superheated steam applications, a check valve should be installed at the trap inlet.

#### Pressure Shell Design Conditions

**PMA** 319 psig/up to 410°F  
Max. allowable pressure 22 barg/0-210°C

**TMA** 410°F/up to 319 psig  
Max. allowable temperature 210°C/0-22 barg



### Dimensions (nominal) in inches and millimeters

Size	A	B	C	D	Weight
1/2"	6.4 163	4.3 108	7.0 178	2.6 67	6.25 lb 2.8 kg
3/4"	7.9 200	5.3 135	9.0 229	3.7 93	11.5 lb 5.2 kg
1"	10.6 269	7.4 188	11.0 280	4.5 114	27.0 lb 12.2 kg
1-1/2"	14.4 365	9.4 238	15.0 380	5.5 140	59.0 lb 27.0 kg
2"	17.0 450	11.3 286	18.5 457	7.2 165	96.0 lb 49.4 kg

Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only. In the interests of development and improvement of the product, we reserve the right to change the specification.

TIS 2.401 US 09.00

# Cast Iron Inverted Bucket Steam Trap

## Series 200

### Sample Specification

Steam traps shall be of the mechanical inverted bucket type with cast iron bodies with screwed NPT vertical connections and stainless steel internals.

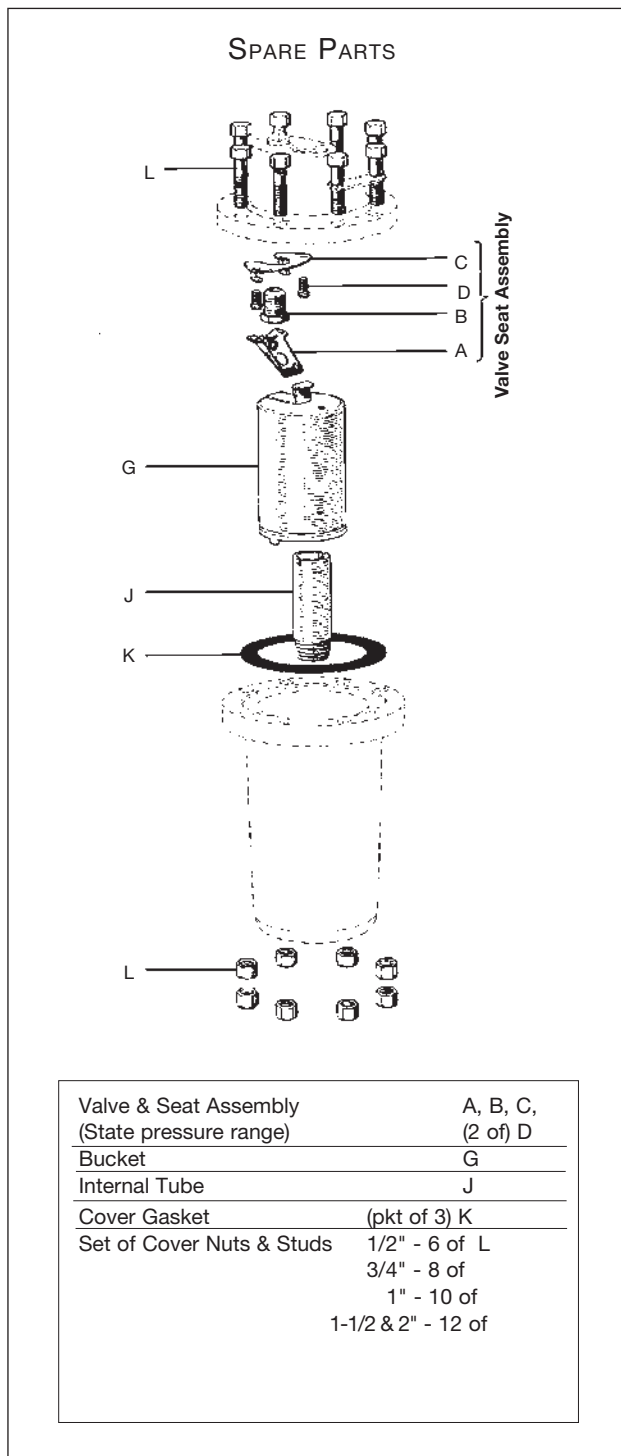
### Installation

A pipeline strainer should be installed ahead of any trap to protect the head and seat from dirt and scale. Suitable full-port isolation valves should be placed around trap to permit servicing. The trap should be installed below the equipment drainage connection in a vertical position with the inlet at the bottom so that the bucket will rise and fall vertically.

### Maintenance

This product must be removed from the line for maintenance. Complete isolation of the trap from both supply and return line is required before any servicing is performed. The trap should be disassembled periodically for inspection and cleaning of the valve head and seat, and operating mechanism. The bucket vent hole must be clear. Worn or damaged parts should be replaced using a complete valve and seat assembly.

**Complete installation and maintenance instructions are given in IMI 2.400, which accompanies the product.**

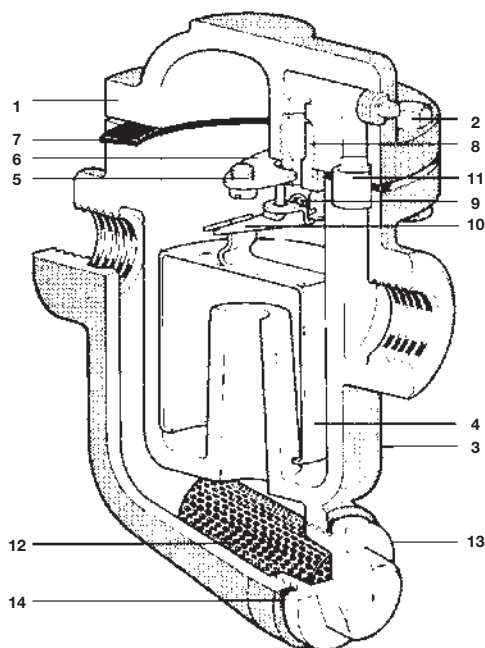




## Steel Inverted Bucket Steam Trap Series HM 34

The trap contains an inverted bucket mechanism which responds to the difference in density between steam and condensate. The discharge action is cyclic. Condensate and non-condensibles are discharged close to steam temperature. The HM 34 has an integral stainless steel strainer.

<b>Model</b>	<b>HM 34</b>
<b>PMO</b>	464 psig
<b>Sizes</b>	1/2", 3/4", 1"
<b>Connections</b>	NPT
<b>Construction</b>	Carbon Steel Body, Stainless Steel Internals
<b>Options</b>	SW Connections



### Limiting Operating Conditions

#### Max. Operating Pressure (PMO)

	<b>Model #</b>	<b>psig</b>	<b>barg</b>
1/2"	HM34/4	464	32
	HM34/5	290	20
	HM34/6	170	12
	HM34/7	120	8.5
	HM34/8	60	4
3/4"	HM34/5	464	32
	HM34/6	290	20
	HM34/7	170	12
	HM34/8	120	8.5
	HM34/10	60	4
1"	HM34/5	464	32
	HM34/6	290	20
	HM34/8	170	12
	HM34/10	120	8.5
	HM34/12	60	4

#### Max. Operating Temperature \*

482°F at 464 psig (250°C at 32 barg)

572°F (300°C) at operating pressures below

406 psig (28 barg)

\* For superheated steam applications, a check valve should be installed at the trap inlet.

### Pressure Shell Design Conditions

<b>PMA</b>	580 psig/up to 248°F	40 barg/up to 120°C
Maximum Allowable Pressure	472 psig/464°F	33 barg/240°C
	406 psig/572°F	28 barg/300°C

<b>TMA</b>	572°F/0-406 psig	300°C/0-28 barg
Maximum Allowable Temperature		

### Capacities: See TIS 2.406

### Construction Materials

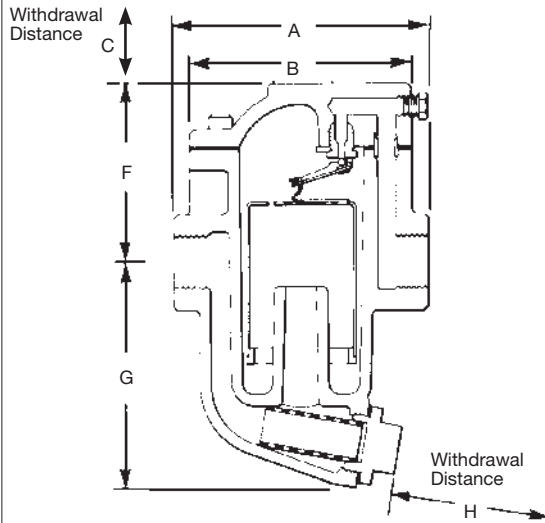
<b>No.</b>	<b>Part</b>	<b>Material</b>	
1	Cover 1/2", 3/4"	Forged Steel	1.0460 (C22.8)
	1"	Cast Steel	DIN 17245 GS C25
2	Cover Bolts	Steel	BS 4168 Gr.8.8
	Cover Nuts	Steel	BS3692 Gr.8
3	Body	Cast Steel	DIN 17245 GS C25
4	Bucket	Stainless Steel	AISI Type 321
5	Valve Guide Plate		
	Screw	Stainless Steel	BS4183 (18/8)
6	Valve Guide Plate	Stainless Steel	AISI Type 321
7	Cover Gasket	Nickel Reinforced Exfoliated Graphite	
8	Valve Seat	Stainless Steel	AISI 440 B
9	Valve	Stainless Steel	AISI 440 B
10	Valve Lever	Stainless Steel	AISI Type 321
11	Ferrule 1/2", 3/4"	Stainless Steel	AISI Type 321H
	1"	Stainless Steel	AISI Type 304
12	Strainer Screen	Stainless Steel	AISI Type 304
13	Strainer Cap	Steel	1.0460 (C22.8)
14	Strainer Gasket	Stainless Steel	AISI Type 304

### Typical Applications

Steam main drip stations, laundry equipment, industrial dryers and storage tanks.

Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only.  
In the interests of development and improvement of the product, we reserve the right to change the specification.

# Steel Inverted Bucket Steam Trap Series HM 34



Dimensions (nominal) in inches and millimeters							
Size	A	B	C	F	G	H	Weight Scr./SW
1/2"	4.7 120	4.1 105	4.0 100	2.6 67	3.5 89	2.6 65	5.8 lb 2.6kg
3/4"	4.7 120	4.1 105	4.0 100	3.5 88	4.2 107	2.6 65	8.9 lb 4.0 kg
1"	7.1 180	6.3 160	6.3 160	5.7 145	4.7 120	3.4 85	22.9lb 10.4 kg

## Sample Specification

Steam traps shall be of the mechanical inverted bucket type with steel bodies with screwed NPT horizontal connections, stainless steel internals, and an integral stainless steel strainer.

## Installation

Suitable full-port isolation valves should be placed around trap to permit servicing. The trap should be installed below the equipment drainage connection in a horizontal position so that the bucket will rise and fall vertically.

## Maintenance

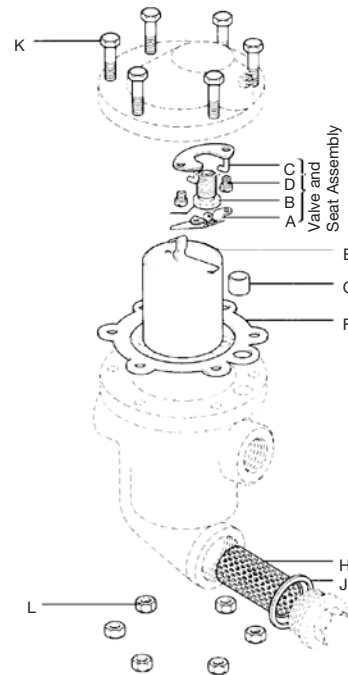
This product can be maintained without disturbing the piping connections. Complete isolation of the trap from both supply and return line is required before any servicing is performed.

The trap should be disassembled periodically for inspection and cleaning of the valve head and seat, and operating mechanism. The bucket vent hole must be clear. The strainer screen should be removed and cleaned.

Worn or damaged parts should be replaced using a complete valve and seat assembly.

**Complete installation and maintenance instructions are given in IMI 2.400, which accompanies the product.**

## Spare Parts



Valve & Seat Assembly	A, B, C, (2 of) D
Bucket	E
Cover Gasket & Ferrule (pkt of 3)	F, G
Strainer Screen	H
Strainer Cap Gasket (pkt of 3)	J
Set of Cover Bolts & Nuts (set of 6)	K, L

TI-2-404-US 2.14

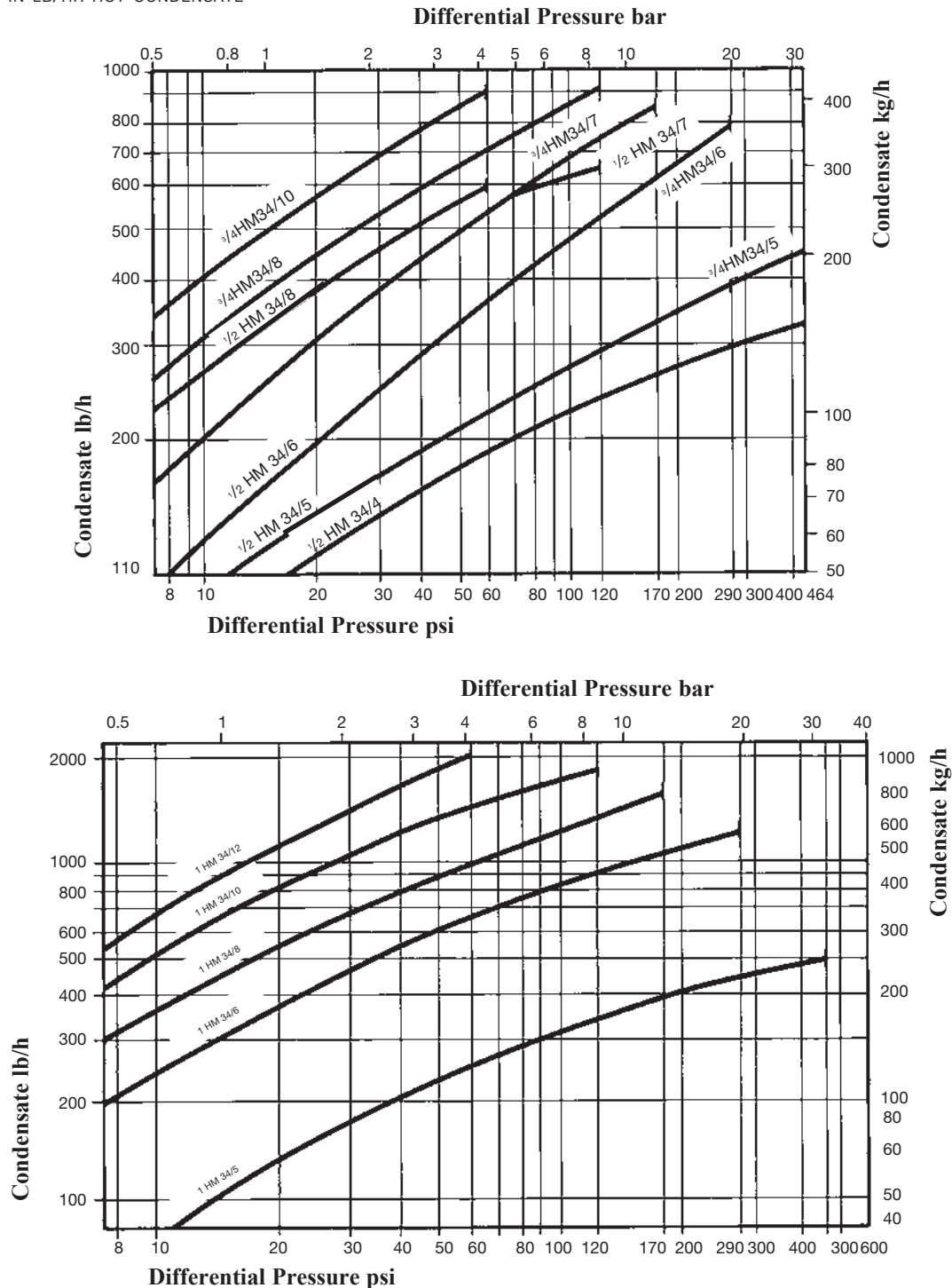






## Steel Inverted Bucket Steam Trap Series HM 34 Capacities Chart

CAPACITIES IN LB/HR HOT CONDENSATE



Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only.  
In the interests of development and improvement of the product, we reserve the right to change the specification.

TI-2-406-US 03.94

# spirax sarco

## Forged Steel Inverted Bucket Steam Trap Series 600

The trap contains an inverted bucket mechanism which responds to the difference in density between steam and condensate. The discharge action is cyclic. Condensate and non-condensibles are discharged close to steam temperature.

Model	621	622	623	625	626
PMO	600 psig (see below)				
Sizes	1/2"	3/4"	1"	1-1/2"	2"
Connections	ANSI 300/600 RF Flanges*				
Construction	Forged Alloy Steel Body, Stainless Steel Internals				

\* The trap will accept either ANSI 300 or 600 connecting flanges

### Limiting Operating Conditions

#### Max. Operating Pressure (PMO)

	Model #	psig	barg
1/2"	621/7	600	41
	621/8	450	31
	621/10	250	17
	621/12	120	8.5
3/4"	622/7	600	41
	622/8	450	31
	622/10	250	17
	622/12	120	8.5
1"	623/8	600	41
	623/10	450	31
	623/12	250	17
	623/16	120	8.5
1-1/2"	625/12	600	41
	625/14	450	31
	625/18	250	17
	625/22	120	8.5
2"	626/18	600	41
	626/20	450	31
	626/24	250	17
	626/32	120	8.5

### Max. Operating Temperature

800°F (427°C) at all pressures

### Pressure Shell Design Conditions

**PMA** 600 psig/up to 800°F 41 barg/up to 427°C

Max. allowable pressure

**TMA** 800°F/0-600 psig 427°C/0-41 barg

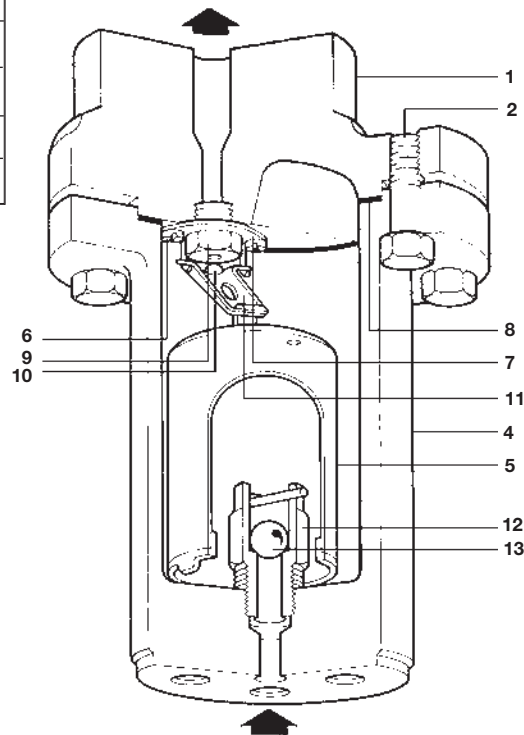
Max. allowable temperature

### Capacities

See TIS 2.405

### Typical Applications

Steam main drip stations, laundry equipment, industrial dryers and storage tanks.



### Construction Materials

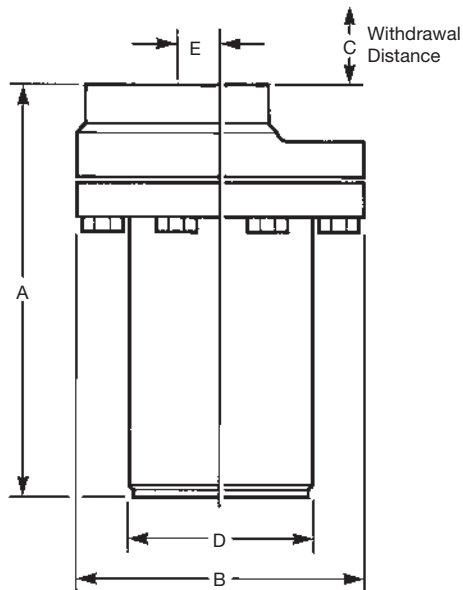
No.	Part	Material	
1	Cover	Forged Steel	ASTM A 182 F11
2	Cover Bolts	Steel	ASTM A 193 GR 37
4	Body	Forged Steel	ASTM A 182 F11
5	Bucket	Stainless Steel	AISI 304
6	Valve Guide Plate		
	Screws	Stainless Steel	BS 4183 (18/8)
7	Valve Guide Plate	Stainless Steel	AISI 304
8	Cover Gasket	Nickel Reinforced Exfoliated Graphite	
9	Valve Seat	Stainless Steel	AISI 440B
10	Valve	Stainless Steel	AISI 440B
11	Valve Lever	Stainless Steel	AISI 321
12	Internal Tube	Mild Steel	BS 1387 Heavy
13	Ball Check Valve	Steel	AISI 440B

Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only.

In the interests of development and improvement of the product, we reserve the right to change the specification.

TI-2-402-US 01.11

# Forged Steel Inverted Bucket Steam Trap Series 600



**Dimensions (nominal) in inches and millimeters**

Size	A	B	C	D	E	Weight
1/2" & 3/4"	10.6 270	7.3 185	8.0 203	4.7 121	1.1 28	40 lb 18.1 kg
1"	12.2 310	8.0 203	9.0 229	5.1 130	1.4 36	65 lb 29.5 kg
1-1/2"	15.8 401	9.8 248	12.0 305	6.6 168	1.8 45	110 lb 49.9 kg
2"	17.8 452	11.9 301	13.0 330	8.4 213	2.1 52	175 lb 79.4 kg

## Installation

A pipeline strainer should be installed ahead of any trap to protect the head and seat from dirt and scale. Suitable full-port isolation valves should be placed around trap to permit servicing. The trap should be installed below the equipment drainage connection in a vertical position with the inlet at the bottom so that the bucket will rise and fall vertically.

## Sample Specification

Steam traps shall be of the mechanical inverted bucket type with forged steel bodies with ANSI flanged vertical connections and stainless steel internals.

## Maintenance

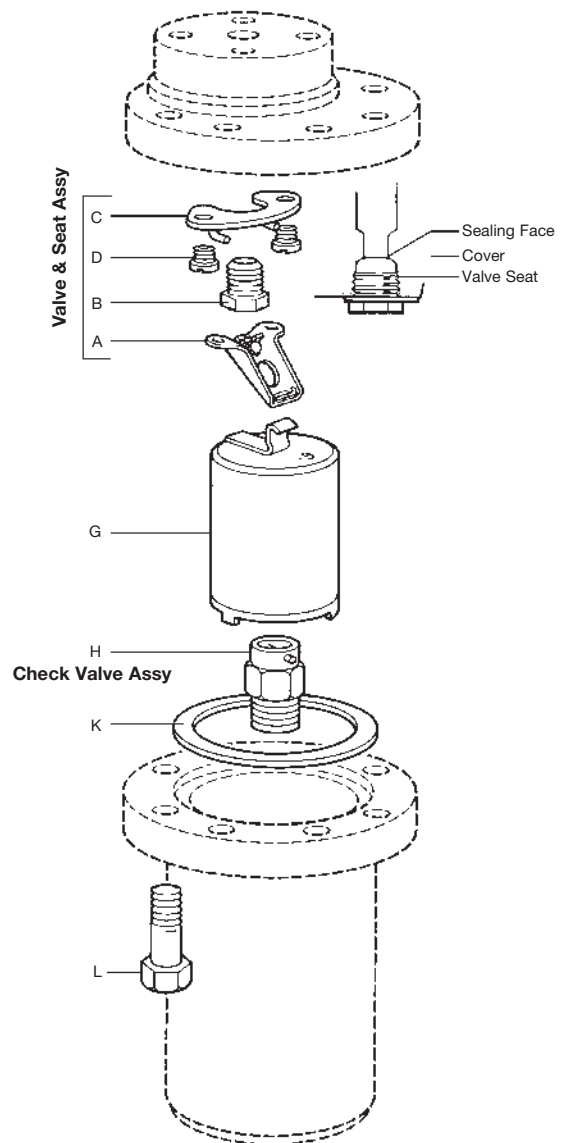
This product must be removed from the line for maintenance. Complete isolation of the trap from both supply and return line is required before any servicing is performed.

The trap should be disassembled periodically for inspection and cleaning of the valve head and seat, and operating mechanism. The bucket vent hole must be clear.

Worn or damaged parts should be replaced using a complete valve and seat assembly.

**Complete installation and maintenance instructions are given in IMI 2.400, which accompanies the product.**

## Spare Parts



Valve & Seat Assembly	A, B, C
(State pressure range)	(2 of) D
Bucket	G
Check Valve Assembly	H
Cover Gasket	(pkt of 3) K
Set of Cover Bolts	L
	621, 622, 623, (8 of)
	625 (10 of)
	626 (12 of)



## Forged Steel Inverted Bucket Steam Trap Series 900

The trap contains an inverted bucket mechanism which responds to the difference in density between steam and condensate. The discharge action is cyclic. Condensate and non-condensibles are discharged close to steam temperature.

Model	921	922	923	925	926
PMO	900 psig (see below)				
Sizes	1/2"	3/4"	1"	1-1/2"	2"
Connections	ANSI 600 Flanged*				
Construction	Forged Alloy Steel Body, Stainless Steel Internals				

### Limiting Operating Conditions

#### Max. Operating Pressure (PMO)

Model #	psig	barg
1/2" 921/8	900	62
3/4" 922/8	900	62
1" 923/10	900	62
923/12	700	48
1-1/2" 925/10	900	62
925/12	700	48
2" 926/16	900	62
926/18	700	48

### Pressure Shell Design Conditions

**PMA** Max. allowable pressure 900 psig/up to 500°F  
62 barg/up to 260°C

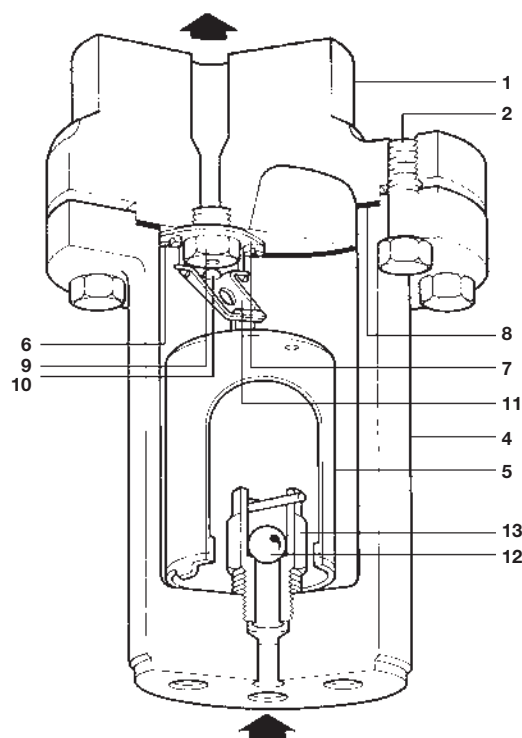
**TMA** Max. allowable temperature 752°F/0-710 psig  
400°C/0-49 barg

Designed for a maximum cold hydraulic pressure of 93 barg

**Capacities:** See TIS 2.405

### Construction Materials

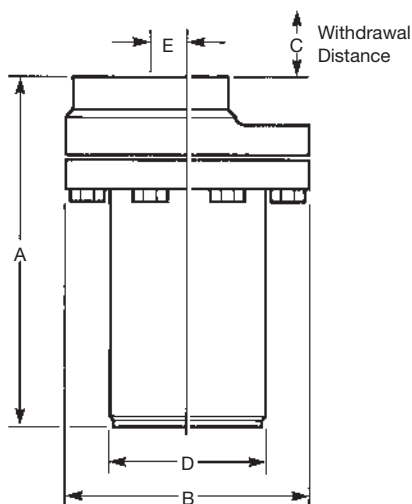
No.	Part	Material
1	Cover	Forged Steel ASTM A 182 F11
2	Cover Bolts	Steel ASTM A193 Gr. B7
4	Body	Forged Steel ASTM A 182 F11
5	Bucket	Stainless Steel
6	Valve Guide Plate	
	Screws	Stainless Steel
7	Valve Guide Plate	Stainless Steel
8	Cover Gasket	Nickel Reinforced Exfoliated Graphite
9	Valve Seat	Stainless Steel
10	Valve	Stainless Steel
11	Valve Lever	Stainless Steel
12	Internal Tube	Mild Steel
13	Ball Check Valve	Steel



### Typical Applications

Steam main drip stations, industrial dryers and storage tanks.

# Forged Steel Inverted Bucket Steam Trap Series 900



**Dimensions (nominal) in inches and millimeters**

Size	A	B	C	D	E	Weight
1/2" & 3/4"	12.2 310	8.0 203	9.0 229	5.1 130	1.4 36	65 lb 29.5kg
1" & 1-1/2"	16.1 410	9.8 248	12.0 305	6.6 168	1.8 45	110 lb 50 kg
2"	17.3 452	11.9 301	13.0 330	8.4 213	2.1 52	175 lb 79.4 kg

## Installation

A pipeline strainer should be installed ahead of any trap to protect the head and seat from dirt and scale. Suitable full-port isolation valves should be placed around trap to permit servicing. The trap should be installed below the equipment drainage connection in a vertical position with the inlet at the bottom so that the bucket will rise and fall vertically.

## Sample Specification

Steam traps shall be of the mechanical inverted bucket type with forged steel bodies with ANSI flanged vertical connections and stainless steel internals.

## Maintenance

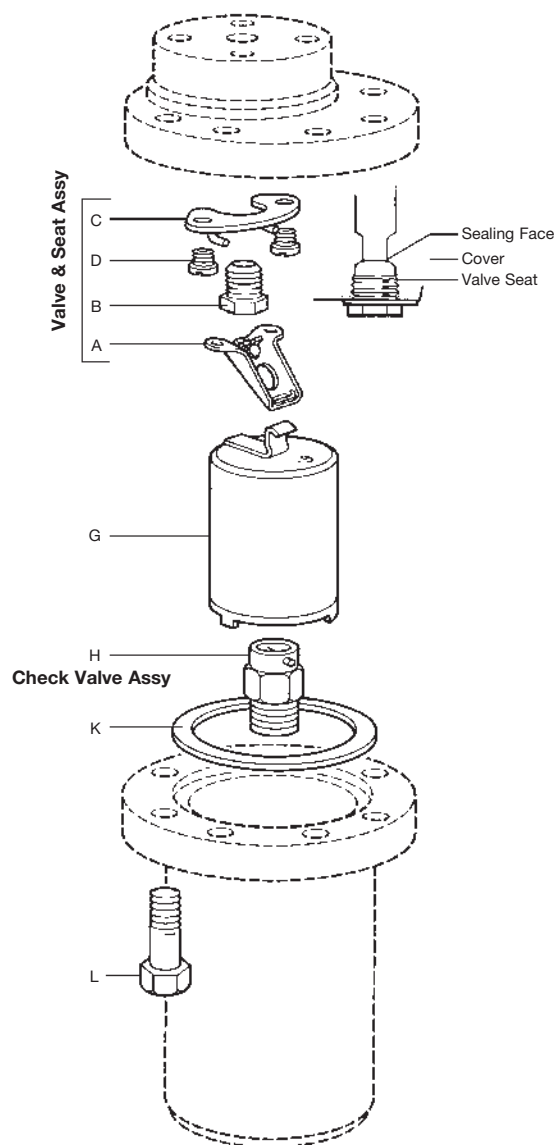
This product must be removed from the line for maintenance. Complete isolation of the trap from both supply and return line is required before any servicing is performed.

The trap should be disassembled periodically for inspection and cleaning of the valve head and seat, and operating mechanism. The bucket vent hole must be clear.

Worn or damaged parts should be replaced using a complete valve and seat assembly.

Complete installation and maintenance instructions are given in IMI 2.400, which accompanies the product.

## Spare Parts



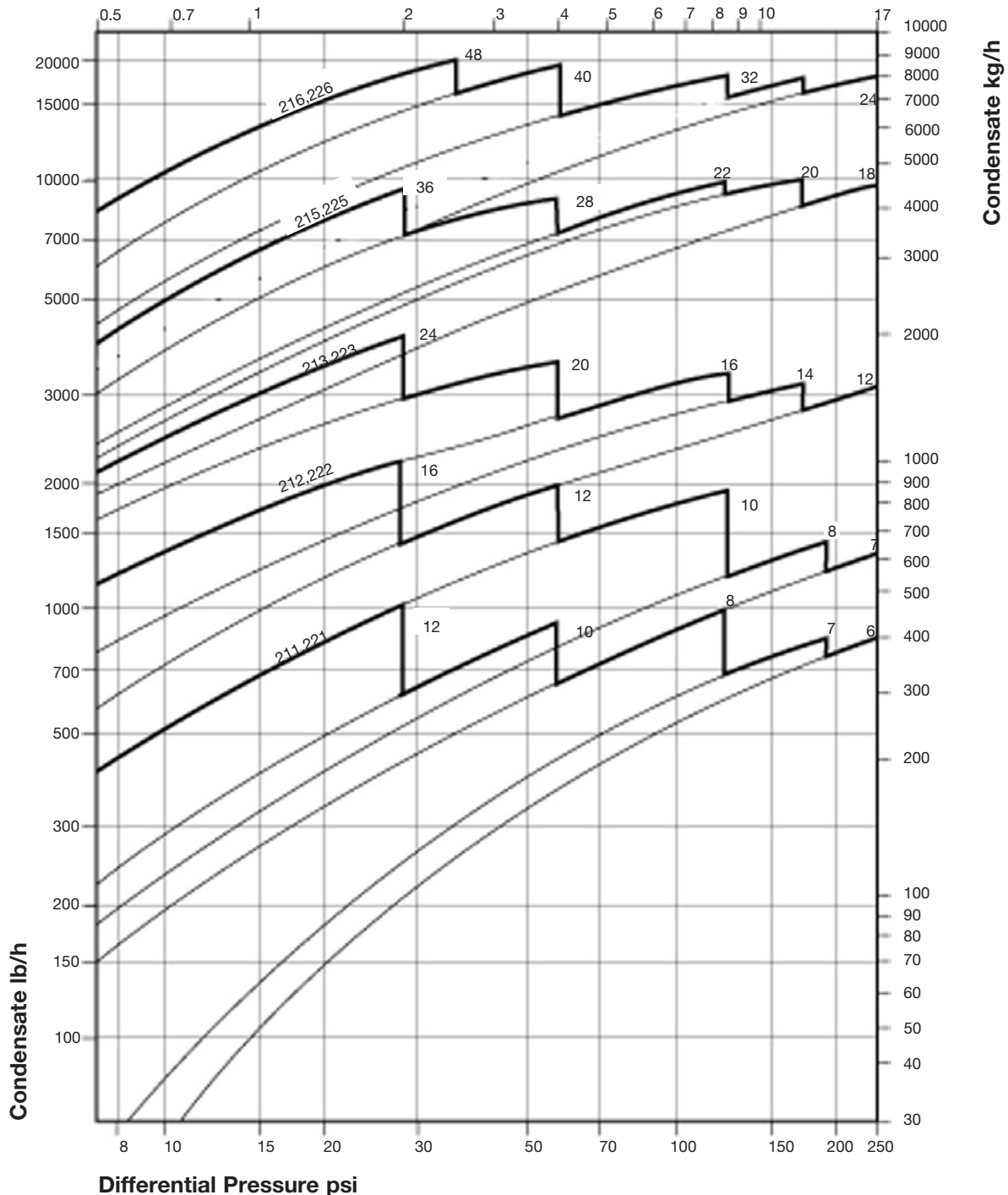
Valve & Seat Assembly (State pressure range)	A, B, C, (2 of) D
Bucket	G
Check Valve Assy.	H
Cover Gasket	(pkt of 3) K
Set of Cover Bolts	L
	921,922 (8 of)
	923, 925 (10 of)
	926 (12 of)



## Cast Iron Inverted Bucket Steam Trap Series 200

**Capacities** in lb/hr hot condensate

**Differential Pressure bar**



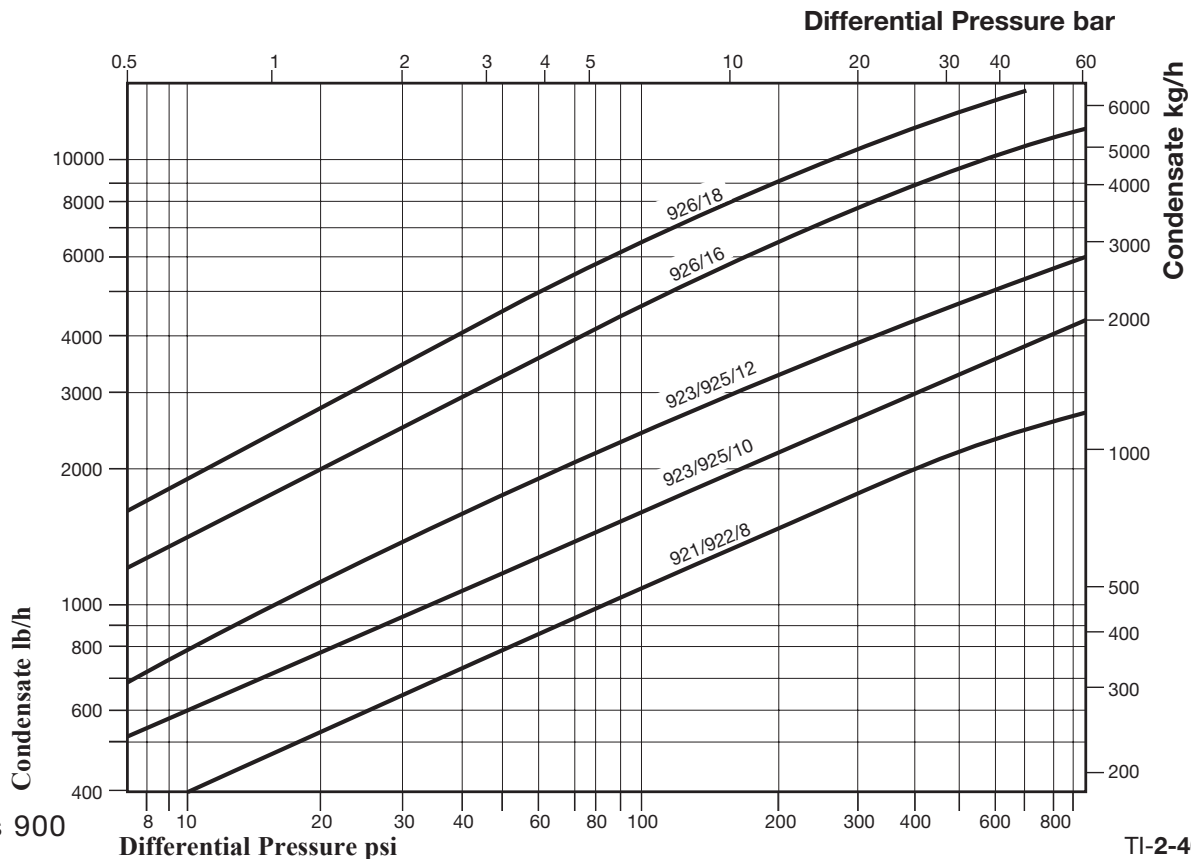
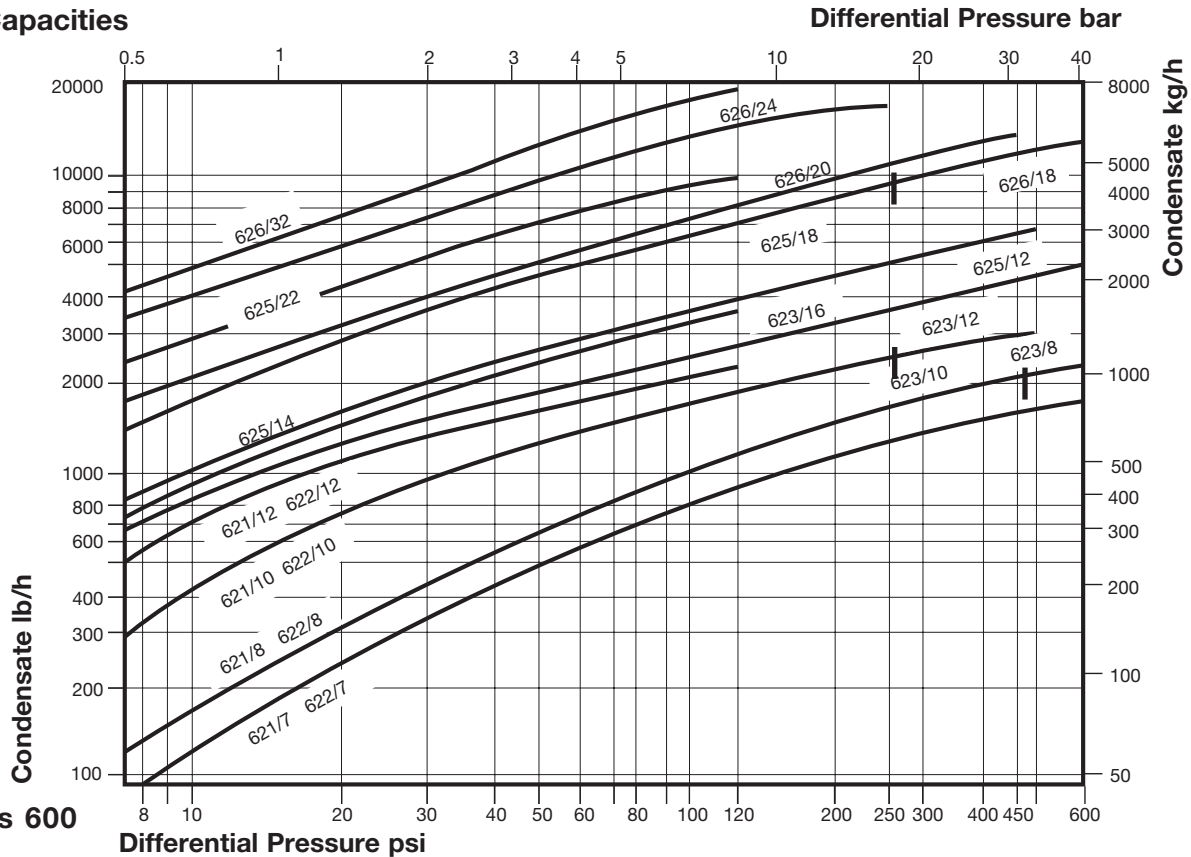
Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only.  
In the interests of development and improvement of the product, we reserve the right to change the specification.

TI-2-405-US 09.00



# Forged Steel Inverted Bucket Steam Trap Series 600 & 900

## Capacities



# spirax sarco

## Stainless Steel Sealed Inverted Bucket Steam Trap SIB30 and SIB30H

Steam Traps

Inverted Buckets

The trap contains an inverted bucket mechanism which responds to the difference in density between steam and condensate. The discharge action is cyclic. Condensate and non-condensibles are discharged close to steam temperature. The SIB30 is sealed for tamper-proof operation.

Model	SIB30
PMO	435 psig (see below)
Sizes	1/2", 3/4"
Connections	NPT
Construction	Tamper-proof, all Stainless Steel
Options	SW Connections

### Construction Materials

No.	Part	Material
1	Cover*	Stainless Steel ASTM A240 Gr 304
2	Body*	Stainless Steel ASTM A314 Gr 304
3	Bucket	Stainless Steel AISI 321
4	Valve Guide Plate	Stainless Steel AISI 321
5	Valve Seat	Stainless Steel AISI 440B
6	Valve	Stainless Steel AISI 440B
7	Valve Lever	Stainless Steel AISI 321
8	Internal Tube	Stainless Steel AISI 304/AISI 321

\*The body/cover weld joint complies with ASME section IX and BS 4870 (1981).

### Limiting Operating Conditions

#### PMO - Maximum operating pressure limitations

$\Delta P$ PSIG BAR	Trap
435 30.0	SIB30/4 SIB30H/5
290 20.0	SIB30/5 SIB30H/6
174 120	SIB30/6 SIB30H/7
123 8.5	SIB30/7 SIB30H/8
73 5.0	SIB30H/10
58 4.0	SIB30/8
36 2.5	SIB30/10
29 2.0	SIB30H/12
22 1.5	SIB30/12

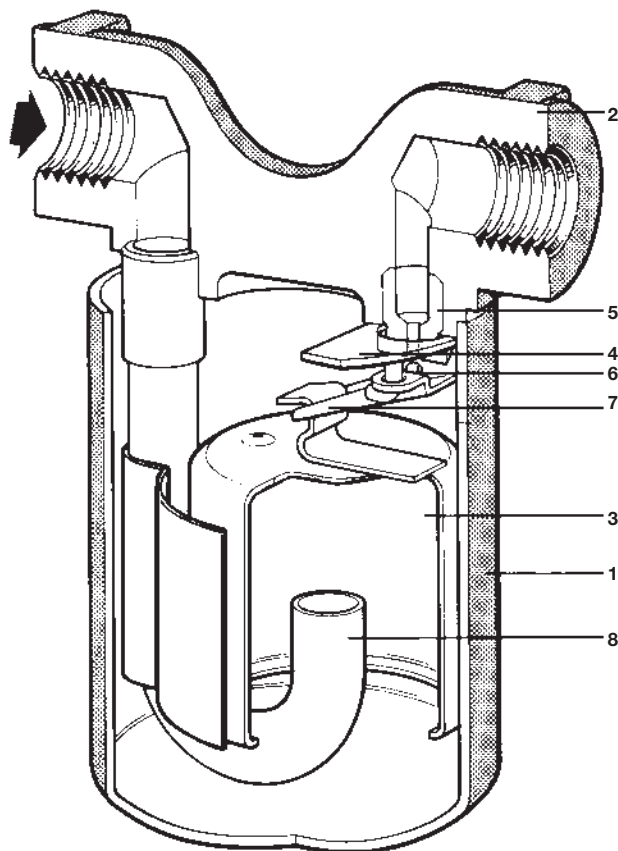
### Pressure Shell Design Conditions

#### Limiting conditions (ISO 6552)

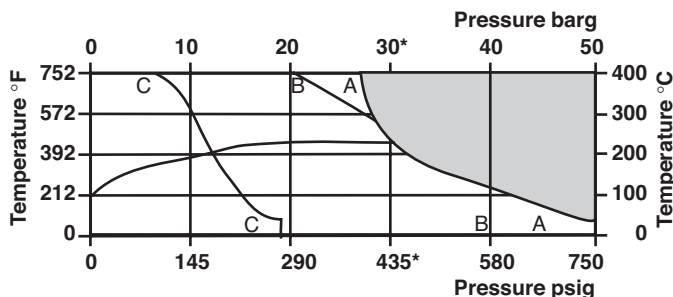
Maximum body design conditions	PN50 (ANSI 300)
PMA - Maximum allowable pressure	50 barg
TMA - Maximum allowable temperature	400°C
Cold hydraulic test pressure	75 barg

### Typical Applications

Steam tracing, steam main drip stations, laundry equipment, industrial dryers and storage tanks.



### Operating Range (SHELL)



■ The product must not be used in this region.

\* PMO Maximum operating pressure recommended with proper mechanism

A - A Flanged ANSI 300, screwed and socket weld

B - B Flanged BS 4504 PN40

C - C Flanged ANSI 150

Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only.

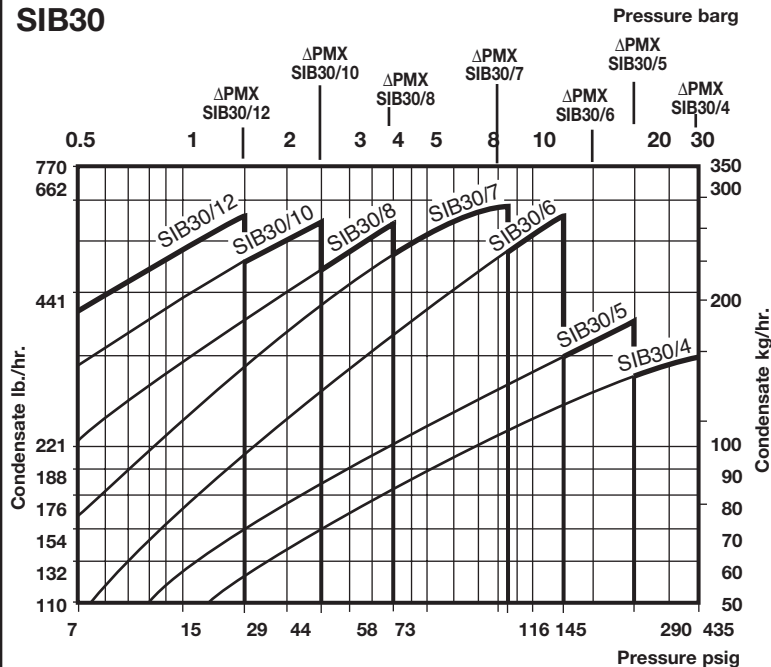
In the interests of development and improvement of the product, we reserve the right to change the specification.

TI-2-410-US 06.04

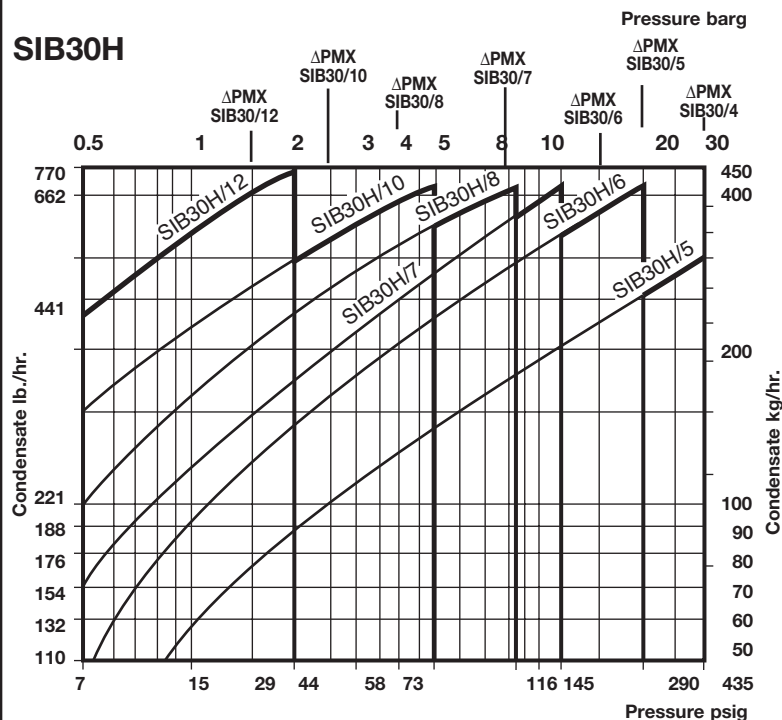
# Stainless Steel Sealed Inverted Bucket Steam Trap

## SIB30 and SIB30H

### SIB30

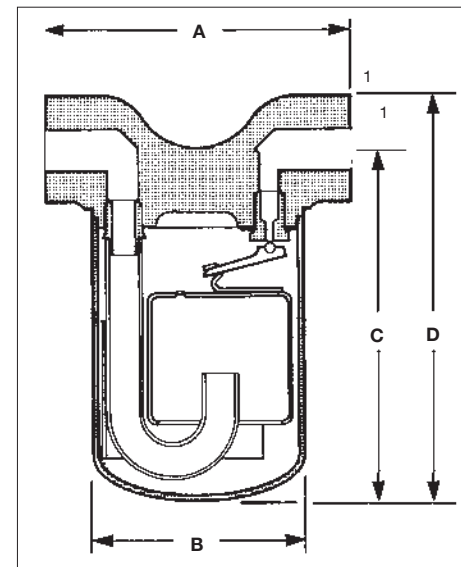


### SIB30H



### Maintenance

This product is factory sealed for tamper-proof operation, and no repair parts are available. Complete isolation of the trap from both supply and return line is required before the trap is removed. Complete installation and maintenance instructions are given in IM-2-400-US, which accompanies the product.



### Installation

A pipeline strainer should be installed ahead of any trap to protect the head and seat from dirt and scale. Suitable full-port isolation valves should be placed around trap to permit servicing. The trap should be installed below the equipment drainage connection in a horizontal position so that the bucket will rise and fall vertically. If installed in exposed locations, consideration should be given to insulating the trap.

### Sample Specification

Steam traps shall be encapsulated inverted bucket type of all-stainless steel construction, which is tamper-proof and maintenance-free, and resists distortion due to freezeup or waterhammer. Trap to have a forged body and drawn cover fully weld-sealed against leakage, with threaded (socket weld) end connections for installation in horizontal piping. Operation shall be self-priming, with orifice size selected for the capacity required by the application, and suitable for working pressure to 435 psig.

### Dimensions (nominal) in inches and millimeters

Size	A	B	C	D	Weight
<b>SIB30</b>					
1/2"	4.3	3.0	4.9	5.6	3.3 lb
15	110	76	124	143	1.5 kg
3/4"	4.3	3.0	4.9	5.6	3.3 lb
20	110	76	124	143	1.5 kg
<b>SIB30H</b>					
1/2"	4.3	3.0	6.3	7.0	3.9 lb
15	110	76	159	177	1.75 kg
3/4"	4.3	3.0	6.3	7.0	3.9 lb
15	110	76	159	177	1.75 kg

TI-2-410-US 06.04



## Stainless Steel Sealed Inverted Bucket Steam Trap SIB 45

The trap contains an inverted bucket mechanism which responds to the difference in density between steam and condensate. The discharge action is cyclic. Condensate and non-condensibles are discharged close to steam temperature. The SIB 45 is sealed for tamper-proof operation. The SIB 45/5 has an integral check valve.

Model	SIB 45
PMO	652 psig (see below)
Sizes	3/4", 1"
Connections	NPT / SW (see below)
Construction	Tamper-proof, all Stainless Steel
Options	SW Connections (standard on SIB 45/5)

### CONSTRUCTION MATERIALS

No.	Part	Material	
1	Cover*	Stainless Steel	ASTM A240 Gr 304
2	Body*	Stainless Steel	ASTM A314 Gr 304
3	Bucket	Stainless Steel	ASTM A240 Gr 304
4	Valve Guide Plate	Stainless Steel	AISI 321
5	Valve Seat	Stainless Steel	AISI 440B
6	Valve	Stainless Steel	AISI 440B
7	Valve Lever	Stainless Steel	AISI 321
8	Internal Tube	Stainless Steel	ASTM A 269-304
9	Check Valve Assy. (SIB 45/5 only)	Stainless Steel	BS 970 431 S29 ASTM A 269 TP 316 AISI 420

\* The cover is welded to the body using the TIG process. Welds are approved in accordance with ASME section IX and BS 4870 (1981.)

### LIMITING OPERATING CONDITIONS

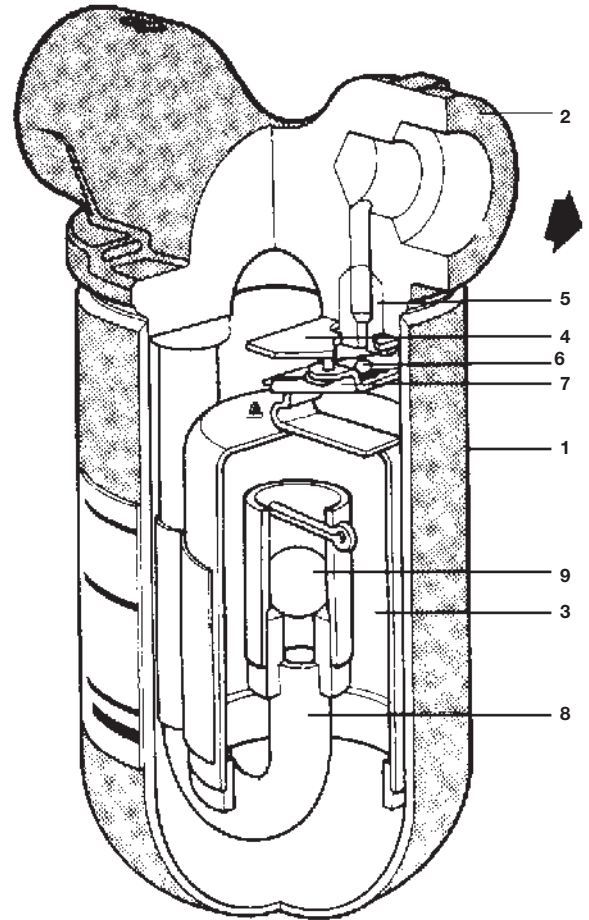
Trap Model	Connections	Operating Pressure Range	
		Min. psig (barg)	Max. psig (barg)
SIB 45/10	NPT	— — to	65 (4.5)
SIB 45/8	NPT	65 (4.5) to	123 (8.5)
SIB 45/6	NPT	123 (8.5) to	290 (20)
SIB 45/5	SW	290 (20) to	652

**Max. Operating Temperature \*** 842°F (450°C) at all operating pressures

\* For superheated steam applications, a check valve should be installed at the trap inlet. (SIB 45/5 has an integral check valve.)

### PRESSURE SHELL DESIGN CONDITIONS

<b>PMA</b>	1440 psig/up to 100°F	100 barg/up to 38°C
Max. allowable pressure	862 psig/529°F	59 barg/276°C
	782 psig/842°F	54 barg/450°C
<b>TMA</b>	842°F/0-782 psig	450°C/0-54 barg
Max. allowable temperature		



### TYPICAL APPLICATIONS

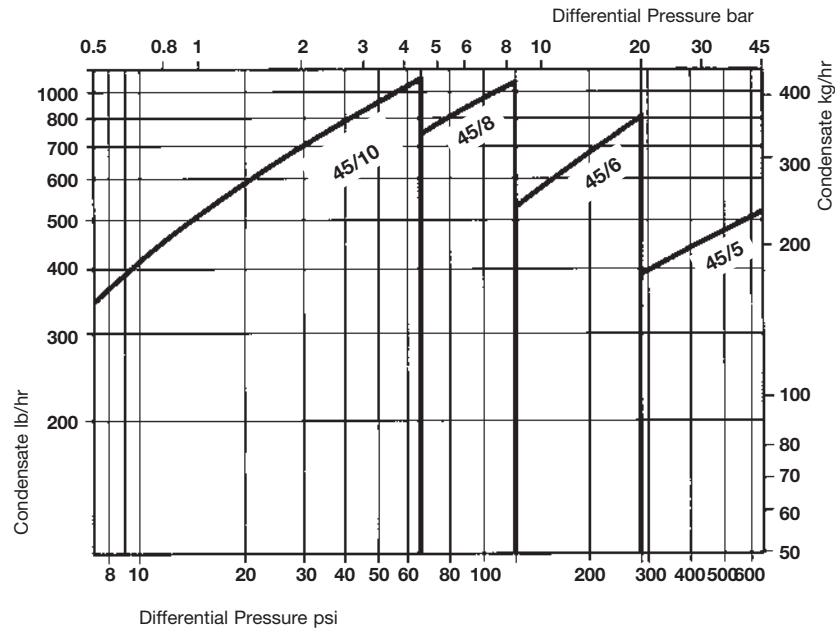
Steam tracing, steam main drip stations, laundry equipment, industrial dryers and storage tanks.

Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only.  
In the interests of development and improvement of the product, we reserve the right to change the specification.

# Stainless Steel Sealed Inverted Bucket Steam Trap

## SIB 45

### CAPACITIES



### SAMPLE SPECIFICATION

Steam traps shall be encapsulated inverted bucket type of all-stainless steel construction, which is tamper-proof and maintenance-free, and resists distortion due to freezeup or waterhammer. Trap to have a forged body and drawn cover fully weld-sealed against leakage, with threaded (socket weld) end connections for installation in horizontal piping. Operation shall be self-priming, with orifice size selected for the capacity required by the application, and suitable for working pressure to 652 psig.

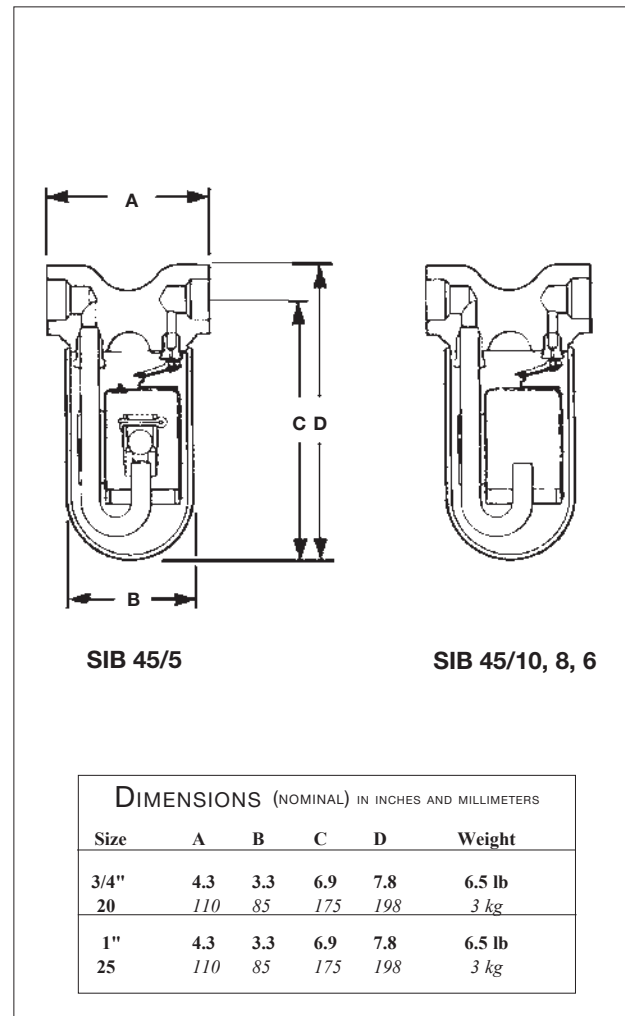
### INSTALLATION

A pipeline strainer should be installed ahead of any trap to protect the head and seat from dirt and scale. Suitable full-port isolation valves should be placed around trap to permit servicing. The trap should be installed below the equipment drainage connection in a horizontal position so that the bucket will rise and fall vertically. If installed in exposed locations, consideration should be given to insulating the trap.

### MAINTENANCE

This product is factory sealed for tamper-proof operation, and no repair parts are available. Complete isolation of the trap from both supply and return line is required before the trap is removed.

**Complete installation and maintenance instructions are given in IMI 2.400, which accompanies the product.**

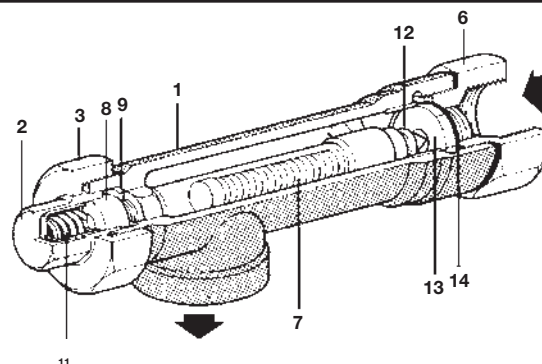




## Thermoton Liquid Expansion Steam Traps

**Types "C" Thermotons** can be field adjusted to hold back condensate until it has cooled to between 75°F and 212°F. (Four 50°F adjustment ranges are available.) Thermotons can therefore function as both steam traps and very simple temperature regulators.

Model	CL-6	CH-6
<b>PMO</b>	125 psig	300 psig
<b>Sizes</b>	3/4"	
<b>Connections</b>	NPT	
<b>Construction</b>	Cast Iron Body Brass & Stainless Steel Internals	
<b>Options</b>	BSP connections	



### Limiting Operating Conditions

**Max. Operating Pressure (PMO)** CL: 125 psig (9 barg)  
CH: 300 psig (21 barg)

**Max. Operating Temperature** Maximum setting: 212°F (100°C)

### Pressure Shell Design Conditions

**PMA** C: 300 psig/up to 450°F 21 barg/up to 232°C  
Max. allowable pressure

**TMA** C: 450°F/0-300 psig 232°C/0-21 barg  
Max. allowable temperature

### Temperature Ranges

Code	Adjustment Range	Types
W	170° to 212°F	CL-6W
	76° to 100°C	CH-6W
B	145° to 195°F	CL-6B
	63° to 91°C	CH-6B
G	110° to 160°F	CL-6G
	43° to 71°C	CH-6G
Y	75° to 125°F	CL-6Y
	24° to 52°C	CH-6Y

### Construction Materials

No.	Part	Material	
1	Body Type C	Cast Iron	ASTM A126 CL B
2	Adjustment Head	Brass	ASTM B124
3	Adjustment Nut	Cast Iron	ASTM A126 CL B
6	Inlet Nut Type C	Steel	AISI 1117
7	Element	Brass & Stainless Steel	
8	Guide Nut	Brass	ASTM B16
9	Guide Washer	Brass	ASTM B36
10	Adjustment End Plug	Brass	ASTM B62
11	Return Spring	Stainless Steel	AISI 302
12	Valve Head	Stainless Steel	AISI 303
13	Valve Seat	Stainless Steel	AISI 303
14	Seat Gasket Type C	Stainless Steel	AISI 302

### Typical Applications

Steam trapping applications, such as outdoor storage tanks and non-critical tracing lines, where extreme sub-cooling is desirable to conserve energy. Automatic drainage of steam traps and process equipment in which residual condensate may freeze if the steam supply is interrupted.

### Capacities

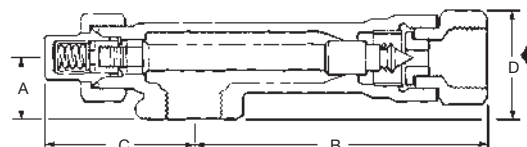
Valve	Orifice	psig	barg	Inlet Pressure psig (barg)											
				5	10	25	40	50	75	100	125	150	200	250	300
				.34	.68	1.72	2.76	3.45	5.17	6.89	8.62	10.3	13.8	17.2	20.7
Type	Orifice	psig	barg	Pounds of condensate per hour*											
CL-6	3/8"	125	8.6	445	630	1000	1260	1400	1730	2000	2240	-	-	-	-
CH-6	5/16"	300	20.7	310	435	690	870	975	1200	1380	1540	1700	1950	2180	2400

\* Capacities for 10°F/5.5°C drop below opening temperature

### Dimensions (nominal) in inches and millimeters

Size & Type	A	B	C	D	E	F	Weight
3/4"	1.5	4.6	3.7	2.7	-	-	4.5 lb
CL-6/CH-6	38	118	94	68	-	-	2.0 kg

### Type CL-6, CH-6



Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only.

In the interests of development and improvement of the product, we reserve the right to change the specification.

TI-2-201-US 12.06



# Thermoton Liquid Expansion Steam Traps

## Sample Specification

Liquid expansion steam traps shall contain a solidly liquid-filled thermostatic element, and shall be field-adjustable to discharge condensate at a fixed temperature below 212°F.

## Installation

Thermotons function both as steam trap and simple temperature regulator. Where over temperature due to element failure will cause risk to people or process a failsafe backup safety control should be fitted. The Type C Thermotons should normally be installed with the outlet above the trap. When used to provide freeze protection, install with outlet downwards (as shown above) to be self draining. Discharge temperature change is approximately 25°F per full turn of the adjustment nut. Allow 1/2 hour between adjustments.

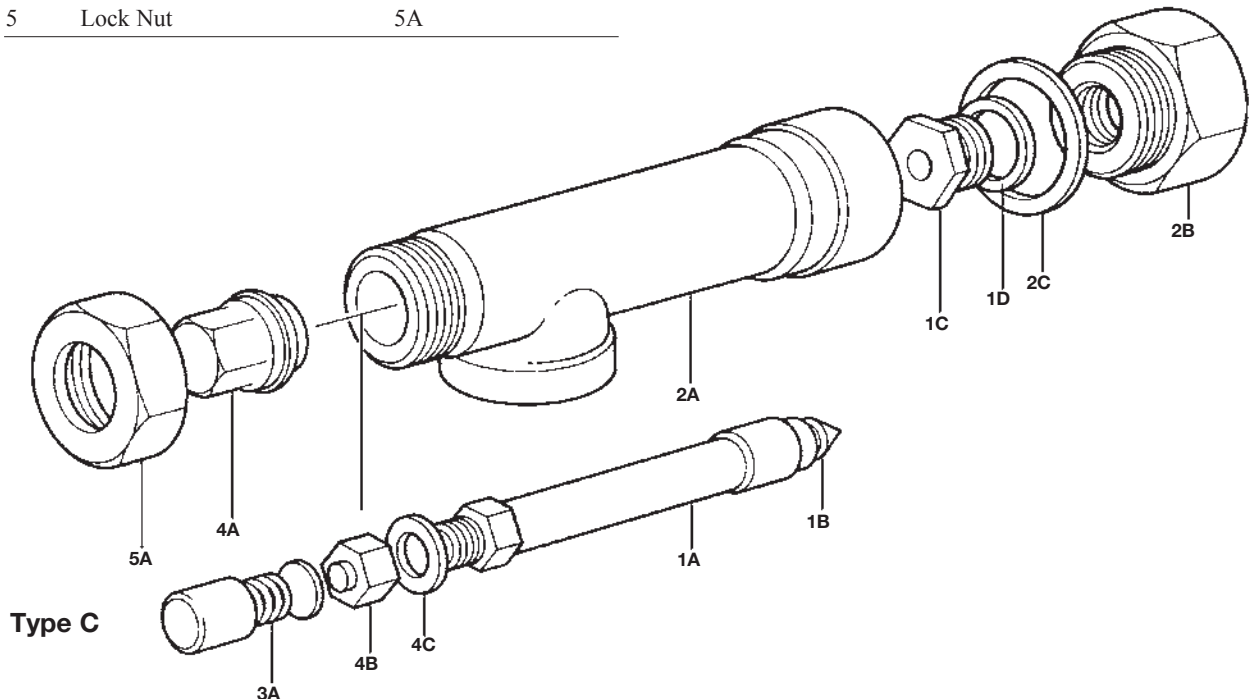
## Maintenance

This product can be maintained without disturbing the piping connections. Complete isolation of the trap from both supply and return line is required before any servicing is performed. The trap should be disassembled periodically for inspection and cleaning of the valve head and seat, and operation of the element set. Worn or damaged parts should be replaced using a complete repair kit. Complete installation and maintenance instructions are given in IMI 2.201, which accompanies the product.

## Spare Parts

### Types C Part No.

1	Element Set (Specify Range)	1A, 1B, 1C, 1D
2	Body Assembly	2A, 2B, 2C
2C	Inlet Nut Gasket	2C
3	Relief Spring	3A
4	Adjustment Head	4A, 4B, 4C
5	Lock Nut	5A





# spirax/sarco

## No. 8 Liquid Expansion Steam Trap

The No. 8 Fixed Temperature Liquid Expansion Thermostatic Steam Trap has an oil-filled element set to operate at a fixed temperature. It is easily adjusted to discharge condensate at any temperature between 140° and 212°F (60° and 100°C).

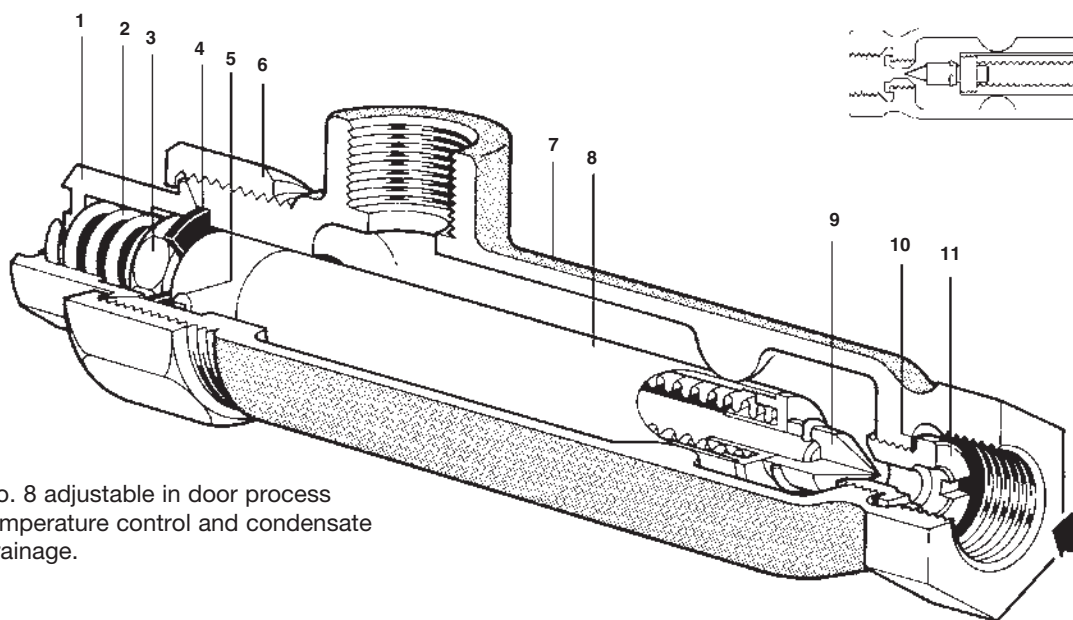
Model	No. 8
PMO	250 psig
Sizes	1/2"
Connections	NPT
Construction	Bronze Body Brass & Stainless Steel Internals
Options	BSP connections

### Typical Applications

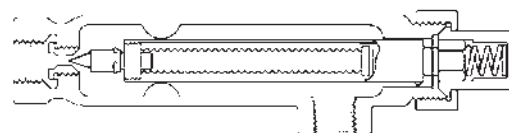
Simple temperature control applications.

**Note: Suitable fail safe precautions must be taken.**

Steam trapping applications where it is desirable to subcool the condensate below 212°F.



No. 8 adjustable in door process temperature control and condensate drainage.



No. 8 set at 140° - 212°F when used outside or in freezing conditions.

### Construction Materials

No.	Part	Material	
1	Adjustment Nut	Brass	BS 2872 CZ 122
2	Overload Spring	Stainless Steel	AISI 302
3	Element Nut	Brass	BS 2872 CZ 122
4	Washer	Brass	BS 2870 CZ 108
5	Adjustment Locknut	Brass	BS 2872 CZ 122
6	Guide Screw	Brass	BS 2872 CZ 108
7	Body	Gunmetal Bronze	Type B62
8	Element	Brass	
9	Valve	Stainless Steel	AISI 431
10	Valve Seat Gasket	Copper	BS 2870 CZ 101
11	Valve Seat	Stainless Steel	AISI431

### Limiting Operating Conditions

**Max. Operating Pressure (PMO)** 250 psig (17 barg)

**Max. Operating Temperature** 450°F (232°C)

### Pressure Shell Design Conditions

**PMA** 362 psig/up to 248°F 25 barg/up to 120°C  
 Max. allowable pressure 282 psig/416°F 19 barg/213°C

152 psig/0-500°F 10.5 barg/0-260°C

**TMA** 500°F/0-152 psig 260°C/0-10.5 barg  
 Max. allowable temperature

Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only.

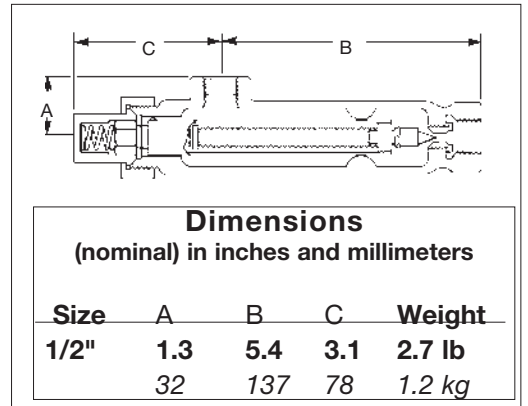
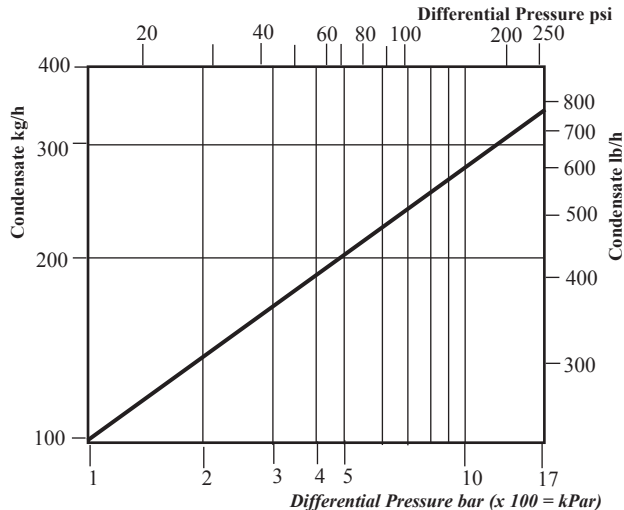
In the interests of development and improvement of the product, we reserve the right to change the specification.

TI-2-200-US 07.02

# No. 8 Liquid Expansion Steam Trap

## Capacities

Capacity shown is based on a trap with the adjustment 3 turns open and handling condensate at 176°F 80°C.



## Installation

The No. 8 functions both as steam trap and simple temperature regulator. Where over temperature due to element failure could cause risk to people or process, a failsafe backup safety control should be fitted. A 'Y' strainer should be installed upstream of the trap. For fixed temperature discharge, the No. 8 trap should be installed with the inlet below the equipment being drained. The outlet should always be above the trap. On indoor process applications outside freezing application outlet should be rotated down for full drainage. Full-port isolating valves should be installed upstream and downstream of the trap.

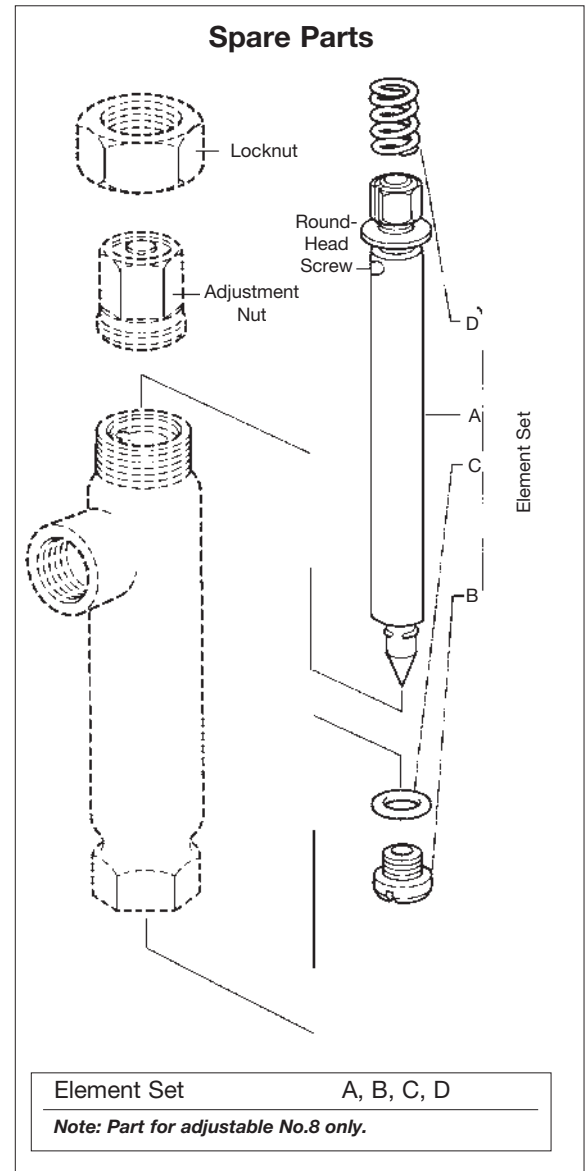
## Sample Specification

Steam traps shall be of the liquid expansion type, having bronze bodies with screwed connections and stainless steel trim. Condensate discharge temperature shall be adjustable within the range specified while traps are in service.

## Maintenance

The No. 8 trap 140°-212°F range is repairable. Complete isolation of the trap from both supply and return line is required before any servicing is performed. The trap should be disassembled periodically for inspection and cleaning of the valve head and seat. Worn or damaged parts should be replaced using a complete element set (range 140° - 212°F only).

If the thermostat becomes inoperative, the cimpet No. 8 must be replaced. **Complete installation and maintenance instructions are given in the IMI sheet, which accompanies the product.**





## Bydrain Freeze Protection Liquid Expansion Trap

### Description

The Spirax Sarco bydrain freeze protection liquid expansion trap is made of stainless steel. It has been specifically designed for protecting condensate systems from frost damage. This fixed temperature discharge trap continuously monitors the temperature in the pipes; the trap is firmly closed at 45°F, but as the temperature of the liquid cools to 36°F the trap opens, discharging any liquid in the pipe.

### Standards

This product fully complies with the requirements of the European Pressure Equipment Directive 97/23/EC.

### Certification

This product is available with certification to EN 10204 3.1.B.

**Note:** All certification /inspection requirements must be stated at the time of order placement.

### Sizes and pipe connections

½" NPT

### Limiting conditions

Body design conditions PN50, Class 300 to ANSI B 16.34

PMA - Maximum allowable pressure 600 psig (41.4 bar g)

TMA - Maximum allowable temperature 842°F (450°C)

PMO - Maximum operating pressure 145 psig (10 bar g)

TMO - Maximum operating temperature 158°F (70°C)

Minimum operating pressure for satisfactory operation is 1psig

No backpressure for correct operation must free drain.

Designed for a maximum cold hydraulic test pressure of 62 bar g

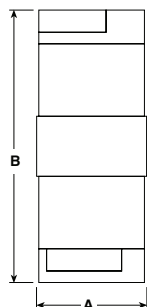
**Note:** The trap seat is completely open at a water circuit temperature of 36°F and closed at 45°F.

### Materials

No.	Part	Material
1	Body	Stainless steel AISI 316L
2	Thermostat	Brass
3	Valve head	PTFE
	Internal parts	Stainless steel

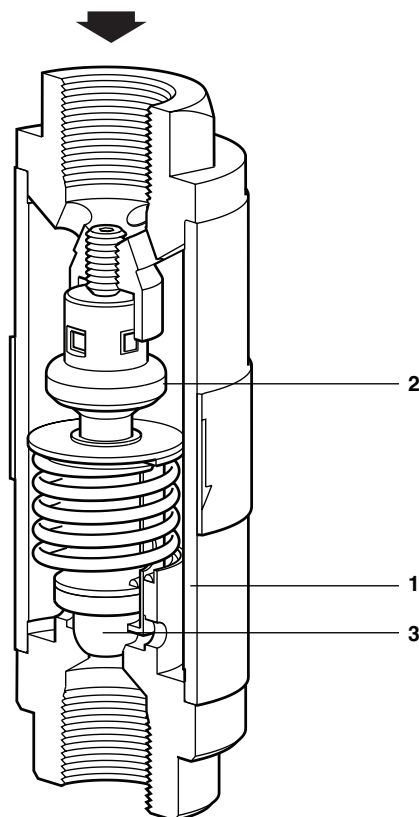
### Dimensions/weights (approximate) in inches and lbs.

Size	Connections	A	B	Weight
½"	NPT	1.7	4.3	1.4



### Typical Applications

Freeze protection for float & thermostatic steam traps, coils, tanks, water lines on docks, eyewash stations, safety showers, tracing condensate manifolds, tracing steam manifolds, condensate return lines, pressure powered pumps, electric pumps, and flash tanks.



### Capacities

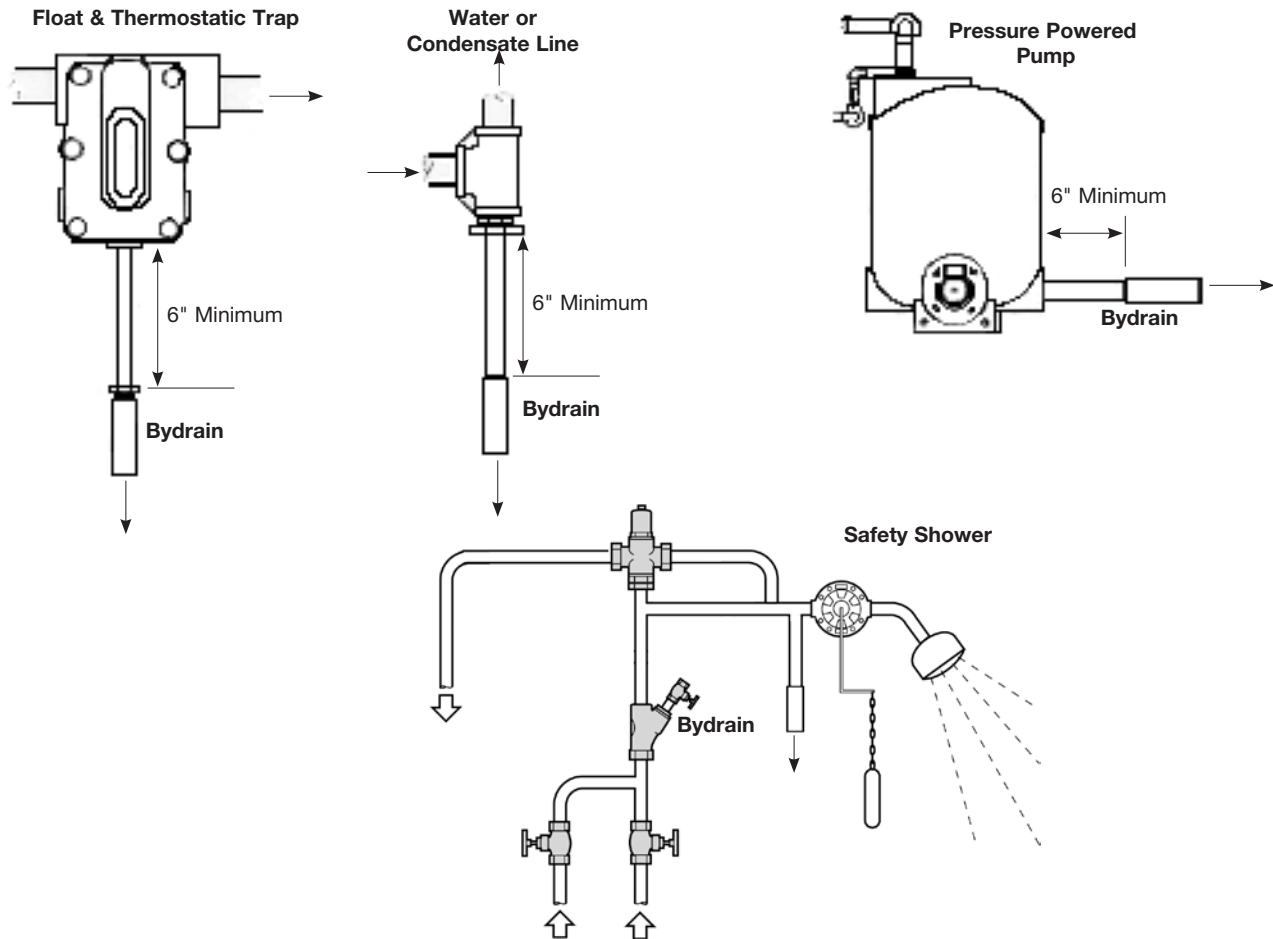
Pressure (psig)	GPM	#/hr
1	1.2	587
2	1.5	766
5	2.2	1090
10	2.8	1423
25	4.0	2024
50	5.3	2643
100	6.9	3451
145	8.0	3981

Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only.

In the interests of development and improvement of the product, we reserve the right to change the specification.

TI-P670-02-US 3.14

# Bydrain Freeze Protection Liquid Expansion Trap



## Safety information, installation and maintenance

For full details see the Installation and Maintenance Instructions (IM-P670-01) supplied with the product.

### How to order

Example: 1 off Spirax Sarco ½" bydrain freeze protection liquid expansion trap with screwed NPT end connections.

### Sample Specification

Temperature actuated drain trap shall have a stainless steel body with brass thermostatic actuator, which will operate in a vertical or horizontal position. Thermostatic actuator to be tamper proof and a sealed encapsulated unit. Thermostatic actuator to crack open at 36°F and be closed tight at 45°F. Drain trap to operate from 0 to 145 psig pressure range.

## Operation

The Bydrain should be used for any application where flow to replenish temperature is required to prevent freezing of water or condensate lines or to drain a vessel which is prone to freezing due to ambient conditions. The normal failure mode is in the open position unless plugged by debris.

## Installation

The marking on the trap indicates the flow direction if placed on water line, condensate line, tank, etc. An isolation valve should be placed ahead of trap to allow for removal of trap without draining the system. When used on steam trap isolation valves should be on the steam itself so no isolation is required ahead of the Bydrain. Discharge must go to zero atmospheric pressure only, to avoid damage to the thermostat. The pipe connections should never be welded. Vertical is the preferred position where space is available. When used in a horizontal position pitch piping toward the trap. When used on steam service or hot condensate the trap must be at least 6" or more from the device. Discharge into large diameter drain or ditch. Never create an "ICE PATCH" hazard by discharging on to slab or walkway.

# spirax/sarco

## SMC32 and SMC32Y Carbon Steel Bimetallic Steam Trap

Steam Traps

Bimetallic

The SMC32 and SMC32Y are carbon steel maintainable bimetallic steam traps with straight connections. The SMC32 has an integral flat strainer screen and the SMC32Y has an integral cylindrical Y-type strainer.

Model	SMC32	SMC32Y
PMO	465 psig	
Sizes	1/2", 3/4", and 1"	
Connections	NPT, SW, FLG ANSI 150 & 300	
Construction	Forged steel body and cover, stainless steel internals	
Options	Blowdown valve for SMC32Y.	

### Typical Applications

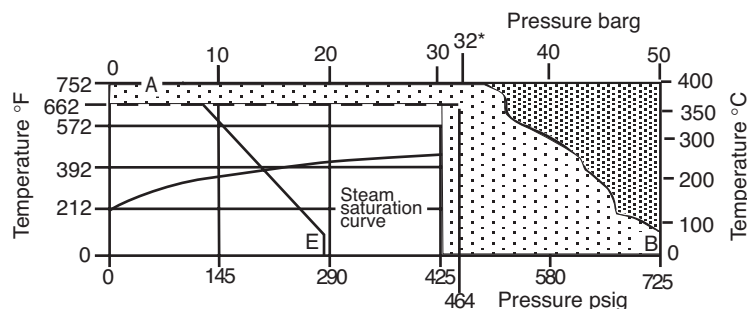
Kitchen and laundry equipment, steam tracers, hospital equipment, steam coils, steam radiators and steam main drip stations.

### Limiting Operating Conditions (ISO 6552)

Body design conditions		PN40
PMA	-Maximum allowable pressure	725 psig (50 barg)
TMA	-Maximum allowable temperature	752°F (400°C)
PMO	-Maximum operating pressure	464 psig (32 barg)
TMO	-Maximum operating temperature	662°F (300°C)
Designed for a maximum cold hydraulic test pressure of		1088 psig (75 barg)

**Note:** PMA & TMA are pressure/temperature related - see chart below.

### Operating range

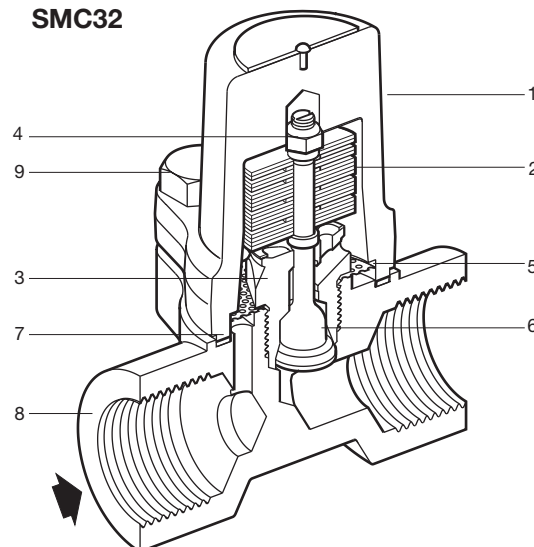


- The product must not be used in this region.
- The product should not be used in this region or beyond its operating range as damage to the internals may occur.

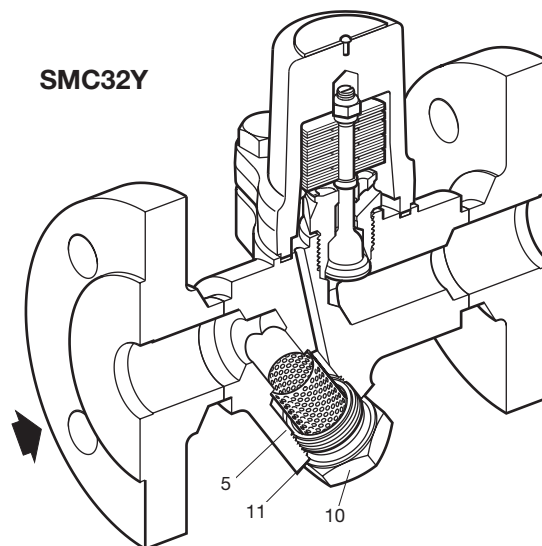
### Materials

No.	Part	Material
1	Cover	Carbon steel DIN 17243 C22.8 (W/S 1.0460) ASTM A105N
2	Bimetallic element	Corrosion resistant bimetal and stainless steel Rau Type H46
3	Valve seat	Stainless steel BS 970 431 S29
4	Locking nut	Stainless steel
5	Strainer screen	Stainless steel AISI 304
6	Valve	Stainless steel
7	Cover gasket	Stainless steel reinforced exfoliated graphite
8	Body	Carbon steel DIN 17243 C22.8 (W/S 1.0460) ASTM A105N
9	Cover bolts	Stainless steel (M10 x 30) A2 - 70
10	Strainer cap	Carbon steel DIN 17243 C22.8 (W/S 1.0460) ASTM A105N
11	Strainer cap gasket	Stainless steel BS 1449 304 S16

SMC32



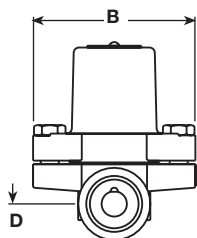
SMC32Y



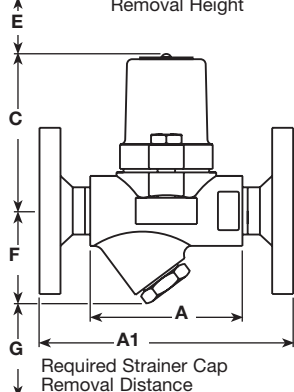
Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only.  
In the interests of development and improvement of the product, we reserve the right to change the specification.

TI-P076-10-US 1.16

# SMC32 and SMC32Y Carbon Steel Bimetallic Steam Trap



Required Cap  
Removal Height



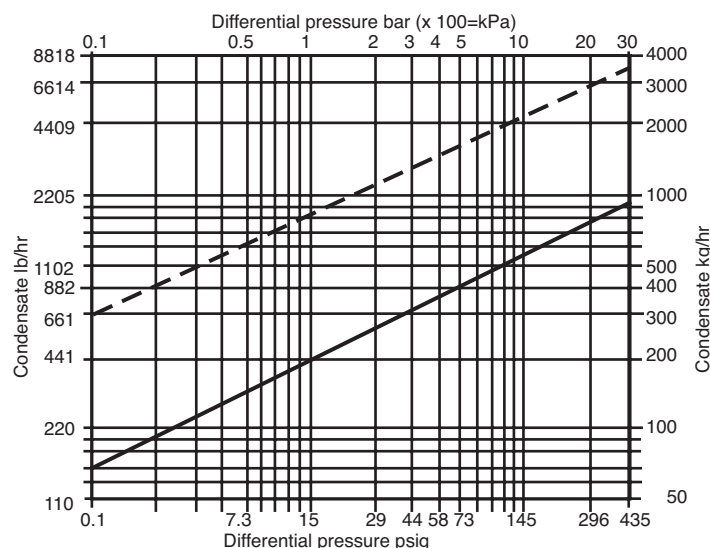
Required Strainer Cap  
Removal Distance

Dimensions (NOMINAL) IN INCHES (MM)									WEIGHT SCR/BW	WEIGHT FLGD
Size	A	A1	B	C	D	E	F	G		
SMC32										
1/2"	3.7	5.9	3.7	3.6	0.7	2.0	-	-	3.8 lb	6.8 lb
	(95)	(150)	(94)	(92)	(17)	(51)	-	-	(1.47kg)	(3.1kg)
3/4"	3.7	5.9	3.7	3.6	0.7	2.0	-	-	3.8 lb	8.2 lb
	(95)	(150)	(94)	(92)	(17)	(51)	-	-	(1.7 kg)	(3.7kg)
1"	3.7	5.9	3.7	3.6	0.7	2.0	-	-	4.0 lb	9.7lb
	(95)	(160)	(94)	(92)	(23)	(51)	-	-	(1.8 kg)	(4.4 kg)
SMC32Y										
1/2"	3.7	5.9	3.7	3.6	-	2.0	2.1	1.1	4.2 lb	7.3 lb
	(95)	(150)	(94)	(92)	-	(51)	(53)	(28)	(1.9kg)	(3.3kg)
3/4"	3.7	5.9	3.7	3.6	-	2.0	2.1	1.1	4.2 lb	8.8 lb
	(95)	(150)	(94)	(92)	-	(51)	(54)	(28)	(1.9kg)	(4.0kg)
1"	3.7	6.3	3.7	3.6	-	2.0	2.3	1.1	4.4 lb	10.4 lb
	(95)	(160)	(94)	(92)	-	(51)	(58)	(28)	(12.0kg)	(4.7kg)

## Sample Specification

Steam trap shall be Spirax Sarco SMC32/SMC32Y bimetallic-type which self-adjusts to all pressures to 464 psig. Body construction of forged steel with side inlet and outlet threaded (or socket weld) ends containing an integral stainless steel strainer. Shall be provided with blowdown when required, and be maintainable in the field without disturbing the piping. Operating bimetal of design capable of resisting waterhammer and freezing conditions, and can withstand up to 662°F temperatures.

## Capacities



## Installation

The trap is designed for installation with the bimetal in a horizontal plane and the cover at the top, preferably with a drop leg immediately preceding the trap. When welding the trap into the pipeline, there is no need to remove the element, providing the welding is done by the electric arc method. Full port isolating valves should be installed upstream and downstream of the trap.

## Maintenance

This product can be maintained without disturbing the piping connections. Complete isolation of the connector from both supply and return line is required before any servicing is performed.

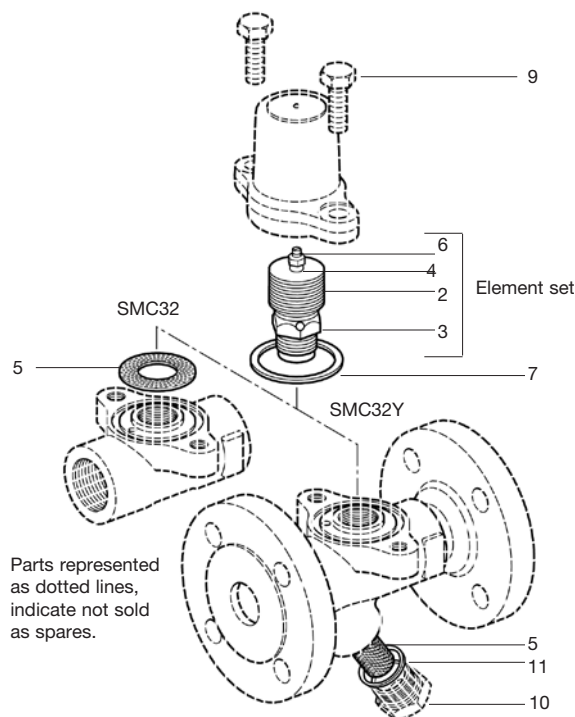
The trap should be disassembled periodically for cleaning of the strainer screen and inspection and cleaning of the valve head and seat.

Worn or damaged parts should be replaced using a complete Bimetal Assembly Set.

**Complete installation and maintenance instructions are given in the IM-P076-09 sheet, which accompanies the product.**

## Spare parts

Element set	2, 3, 4, 6
Strainer screen	SMC32 (3 off) 5
Strainer screen and gasket	SMP32Y (1 off) 5, 11
Set of cover gaskets	(packet of 3) 7
Strainer cap gasket	(packet of 3) 11



Parts represented  
as dotted lines,  
indicate not sold  
as spares.

## Recommended tightening torques

Item	Part	or mm	FT/LB
3	Valve seat	24 A/F	85 - 92
9	Cover bolts	17 A/F M10 x 30	17 - 20
10	Strainer cap	27 A/F	89 - 100



# spirax sarco

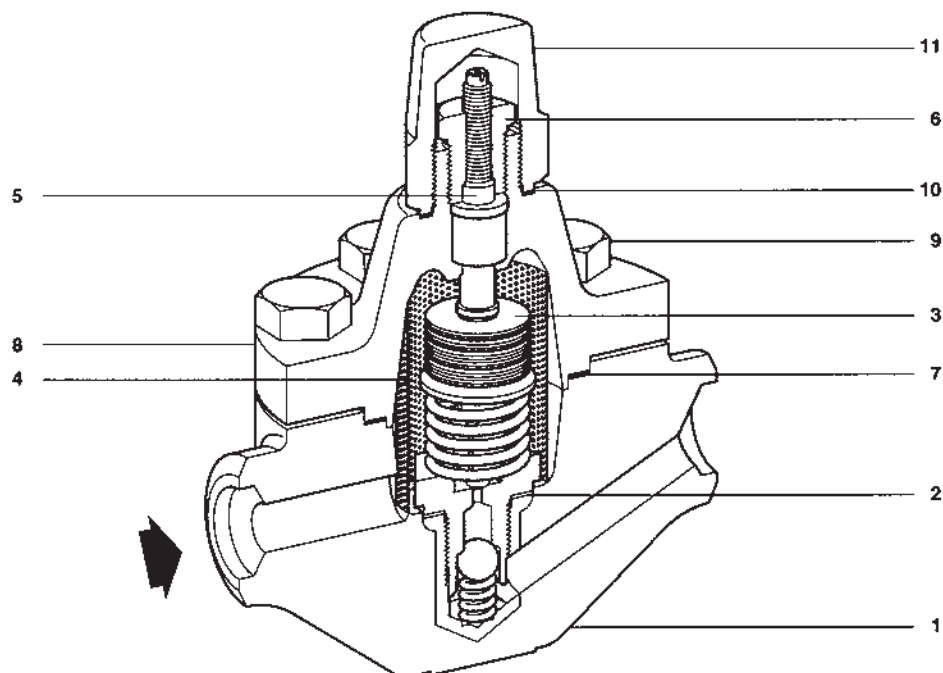
## HP80, HP100, HP150 and HP210 Series Bimetallic Steam Traps

Steam Traps

Bimetallic

### Description

Spirax Sarco's HP80, HP100, HP150 and HP210 bimetallic steam traps are made of forged steel, and designed for draining high pressure, high temperature steam lines and processes. These steam traps, which are specially designed for HP steam, have a reinforced stainless steel insert within the body and can be repaired inline. They operate with no loss of steam, and quickly drain air, non-condensate gases and large quantities of cold water on start-up. Normally open in the event of failure, they have a check valve, a built-in strainer screen and an external device for adjusting the discharge temperature of the condensate.



### Sizes and pipe connections

1/2", 3/4" and 1" socket weld to ANSI B 16.11  
or butt weld to ANSI B 16.25

### Limiting Conditions

Body design conditions	HP80	PN250, Class 1500
	HP100	to ANSI B 16.24
	HP150	PN420, Class 2500
	HP210	to ANSI B 16.34
PMO - Maximum operating pressure	HP80	1160 psig 80 barg
	HP100	1450 psig 100 barg
	HP150	2175 psig 150 barg
	HP210	3045 psig 210 barg
TMO - Maximum operating temperature	HP80	932°F up to 1160 psig
		500°C up to 80 barg
	HP100, HP150, HP210	1058°F up to 3045 psig
		570°C up to 210 barg
Minimum operating pressure	HP80	290 psig 20 barg
	HP100	362 psig 25 barg
	HP150	362 psig 25 barg
	HP210	362 psig 25 barg
△ PMX - The back pressure for correct operation must not exceed 90% of the upstream pressure.		
Designed for a maximum cold hydraulic test pressure of:	HP80 and HP100	5628 psig 388 barg
	HP150 and HP210	9367 psig 646 barg

### Materials

No.	Part	Material	
1	Body	HP80	Alloy steel ASTM A182 F11
		HP100, 150, 210	Alloy steel ASTM A182 F22
2	Valve seat gasket	Stainless steel AISI 304	
3	Bimetallic element	Stainless steel	
4	Strainer screen	Stainless steel AISI 304L	
5	Gland packing	Graphite (asbestos-free)	
6	Locking gland nut	Stainless steel	
7	Cover gasket	Metal, stainless steel/graphite (asbestos-free)	
8	Cover	HP80	Alloy steel ASTM A182 F11
		HP100, 150, 210	Alloy steel ASTM A182 F22
9	Cover bolt	HP80	Steel ASTM A193 B7
		HP100, 150, 210	Steel ASTM A193 B16
10	Blind nut gasket	Metal, stainless steel/graphite	
11	Blind nut	Steel ASTM A105	

### Certification

This product is available with certification to EN 10204 3.1.B  
All certificates must be requested at the time of ordering.

Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only.

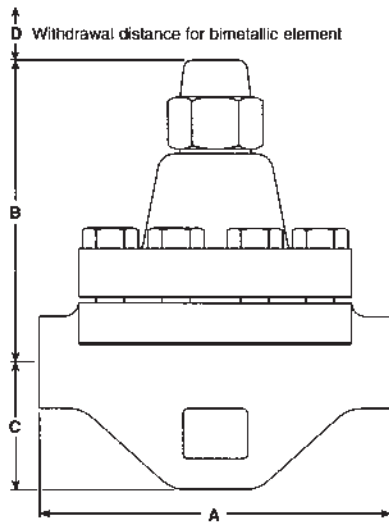
In the interests of development and improvement of the product, we reserve the right to change the specification.

TI-P623-06-US 1.14



# HP80, HP100, HP150 and HP210 Series Bimetallic Steam Traps

**Dimensions/weights** (approximate) in mm and kg



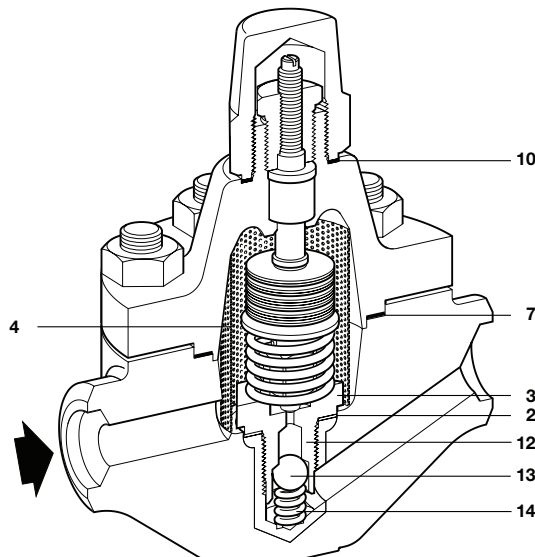
Size		A	B	C	D	Weight
HP80	1/2"	6.3" 160	5.4" 138	2.3" 58	5.9" 150	21 lb. 9.5
	3/4"	6.3" 160	5.4" 138	2.3" 58	5.9" 150	21 lb. 9.5
	1"	6.3" 160	5.4" 138	2.3" 58	5.9" 150	21 lb. 9.5
HP100	1/2"	6.3" 160	5.7" 145	2.3" 58	5.9" 150	23 lb. 10.5
	3/4"	6.3" 160	5.7" 145	2.3" 58	5.9" 150	23 lb. 10.5
	1"	6.3" 160	5.7" 145	2.3" 58	5.9" 150	23 lb. 10.5
HP150 HP210	1/2"	8.3" 210	6.6" 168	2.4" 61	5.9" 150	25.4 lb. 11.5
	3/4"	8.3" 210	6.6" 168	2.4" 61	5.9" 150	25.4 lb. 11.5
	1"	8.3" 210	6.6" 168	2.4" 61	5.9" 150	25.4 lb. 11.5

## Installation and maintenance

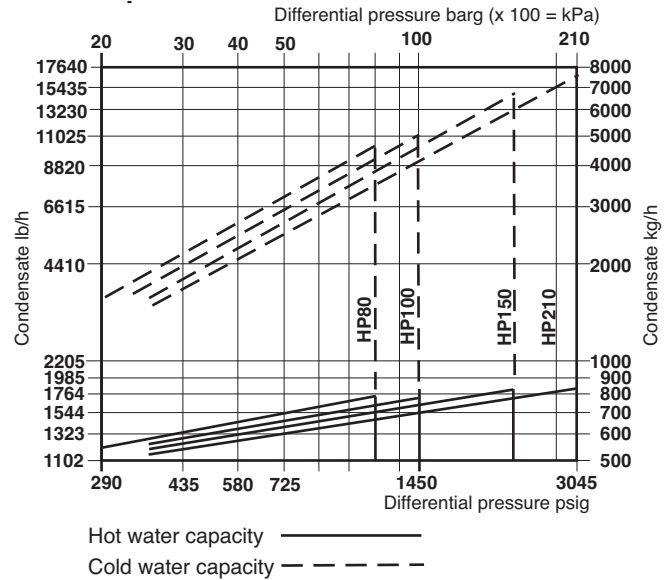
Full Installation and Maintenance Instructions (Inclusive of operation and fault finding) are supplied with the product, see IMI

## How to order

**Example:** 1 off 1/2" Spirax Sarco HP80 bimetallic steam trap with socket weld end connections.



## Capacities



## Spare Parts

The spare parts available are detailed below. No other parts are supplied as spares.

### Available spare


Bimetallic assembly kit	2, 3, 4, 7, 10
Screen	4
Gasket Kit	2, 7, 10
Check Valve Assembly	13, 14

## How to order spares

Always order spares by using the description given in the column headed 'Available spare' and state the size and model of the bimetallic steam trap.

**Example:** 1 — Bimetallic assembly kit for a 1" Spirax Sarco HP80 bimetallic steam trap.

## Recommended tightening torques

Item	 in mm	Ft. / Lbs.
3	36 A/F	88.51
6	21 A/F	
HP80	24 A/F	88.51
HP100	24 A/F	118
HP150, HP210	30 A/F	147.5
HP80, HP100	41 A/F	59
HP150, HP210	55 A/F	103.2

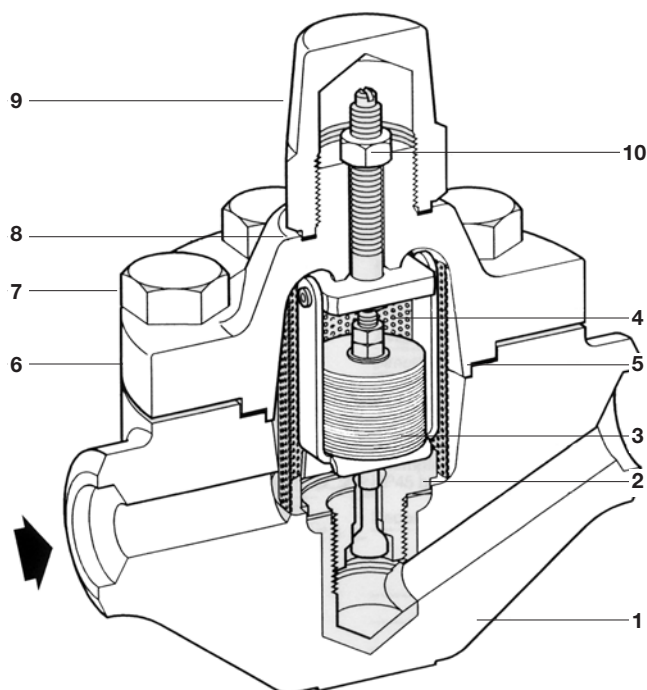
## HP45 Bimetallic Steam Trap

### Description

Spirax Sarco's HP45 bimetallic steam traps are made of forged steel, and designed for draining high pressure, high temperature steam lines and processes.

These steam traps, which are specially designed for HP steam, have a reinforced stainless steel insert within the body and can be repaired inline. They operate with no loss of steam, and quickly drain air, non-condensable gases and large quantities of cold water on start-up.

Normally open in the event of failure, they have a check valve, a built-in strainer screen and an external device for adjusting the discharge temperature of the condensate.



### Sizes and pipe connections

1/2", to 1" screwed BSP/NPT and socket weld ends (ANSI B 16.11)

3/4" and 1" with ANSI 600 flanges

### Limiting Conditions

Body design conditions	PN150, Class 900 to ANSI B 16.34	
PMO - Maximum operating pressure	652 psig	45 barg
TMO - Maximum operating temperature	842°F	450°C
Minimum operating pressure	217 psig	15 barg
ΔPMX - The back pressure for correct operation must not exceed 90% of the upstream pressure.		
Designed for maximum cold hydraulic test pressure of	3320 psig	229 barg

### Materials

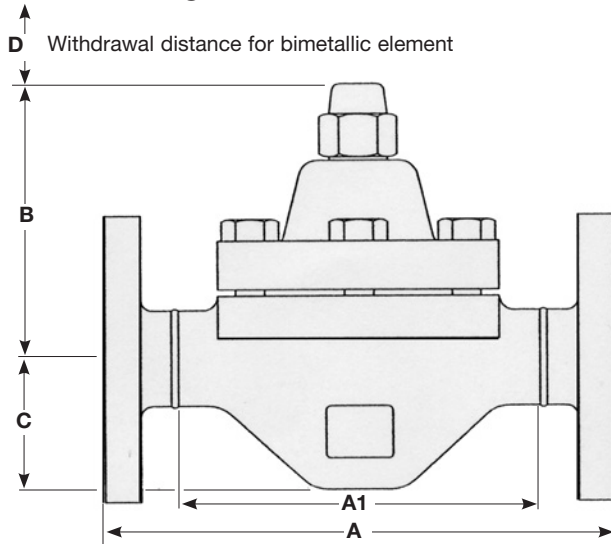
No.	Part	Material
1	Body	Steel ASTM A105 Gr.II or equivalent
2	Valve seat gasket	Stainless steel AISI 304
3	Bimetallic element	Stainless steel
4	Strainer screen	Stainless steel AISI 304L
5	Cover gasket	Metal, copper/graphite (asbestos-free)
6	Cover	Steel ASTM A105 or equivalent
7	Cover bolt	Steel
8	Blind nut gasket	Metal, copper/graphite (asbestos-free)
9	Blind nut	Steel ASTM A105 or equivalent
10	Lock-nut	Steel

### Certification

This product is available with certification to EN 10204 3.1.B  
All certificates must be requested at the time of ordering.

# HP45 Bimetallic Steam Trap

**Dimensions/weights** (approximate) in mm and kg



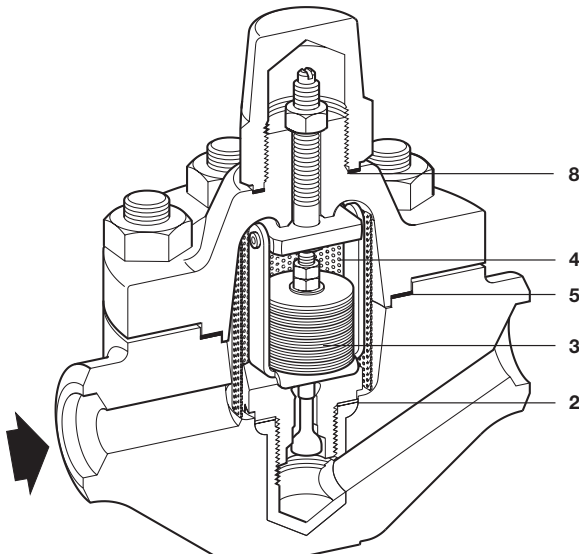
Size	A	A1	B	C	D	Weight
1/2"		6.3" 160	4.9" 124	2.3" 58	5.9" 150	17.6 lb. 8.0
3/4"		6.3" 160	4.9" 124	2.3" 58	5.9" 150	17.6 lb. 8.0
1"	9.25" 235	6.3" 160	4.9" 124	2.3" 58	5.9" 150	17.6 lb. 8.0
3/4" DN20 ANSI 600	9.25" 235	6.3" 160	4.9" 124	2.3" 58	5.9" 150	22.0 lb. 10.0
1" DN25 ANSI 600	9.25" 235	6.3" 160	4.9" 124	2.3" 58	5.9" 150	23.2 lb. 10.5

## Installation and maintenance

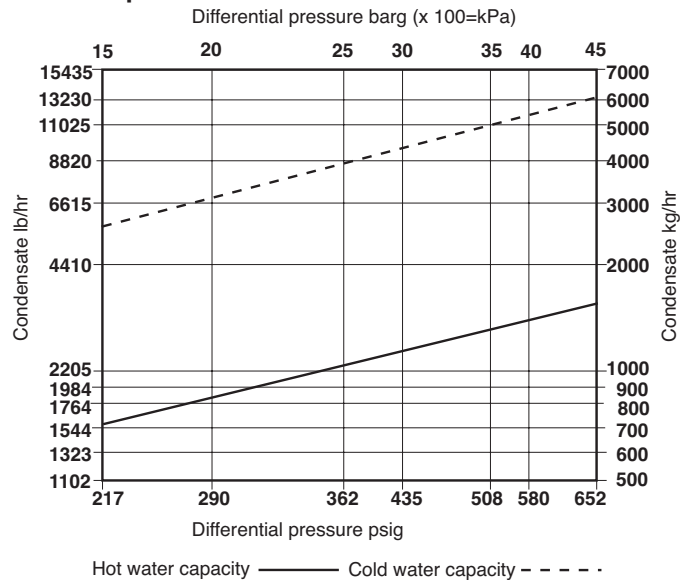
Full Installation and Maintenance Instructions (Inclusive of operation and fault finding) are supplied with the product, see IMI

## How to order

**Example:** 1 of 1/2" Spirax Sarco 'BYVAP' HP45 bimetallic steam trap with socket weld end connections.



## Capacities



## Spare Parts

The spare parts available are detailed below. No other parts are supplied as spares.

### Available spare

Bimetallic assembly kit	2, 3, 4, 5, 8
Strainer Screen	4

## How to order spares

Always order spares by using the description given in the column headed 'Available spare' and state the size and model of the bimetallic steam trap.

**Example: 1** — Bimetallic assembly kit for a 1" Spirax Sarco 'BYVAP' HP45 bimetallic steam trap.

## Recommended tightening torques

Item	mm or	Ft. / Lbs.
3	36 A/F	88.51
7	22 A/F	59.0
9	24 A/F	59.0
10	24 A/F	118

## STAPS Wireless Steam Trap Monitoring System

### Description

The STAPS wireless steam trap monitoring system has been designed to efficiently monitor and evaluate steam trap operation. It surveys the operation of the steam trap at regular intervals and identifies poor performance that can cause reduced plant efficiency and increased energy consumption. It can diagnose both failed-open steam traps that leak live steam and those that have failed-closed or are blocked that result in waterlogging leading to plant damage, product spoilage and health and safety concerns.

Using non-intrusive installation technology combined with a 2.4 GHz wireless network, it is an ideal solution for steam trap monitoring. It is suitable for use with all types of steam trap and can be connected to pipework up to 4", via an adjustable clamp.

### Benefits include:

- Continuously monitoring of all steam traps.
- Reduces energy and emissions loss significantly.
- Immediate identification of failure location for quick response/action.
- Ability to validate losses via integrated software.
- Non-intrusive – no need to break into the steam line to install
- A range of clamps to suit pipework ranging up to 4".
- No need for height access equipment to check trap operation.
- Typically 3 years battery life.

### Certification and Approvals

- |                             |  |
|-----------------------------|--|
| EMC Emissions and immunity: | Emissions class B and Industrial immunity.                     |
| - EN 61326-2-1: 2006        | Complies with FCC rules CFR 47 (1 <sup>st</sup> October 2011). |
| - EN 61326-2-3: 2006        | Safety to IEC/EN 61010-1 2001 (second edition).                |
|                             | CSA 22.2   |

### Associated equipment:

- Repeater.
- Laptop / PC software.
- Receiver.
- Access to the company's LAN network is preferred, giving improved network coverage.
- For stand alone PC systems, it is recommended that a network switch device is used between the PC and receiver.

### PC application:

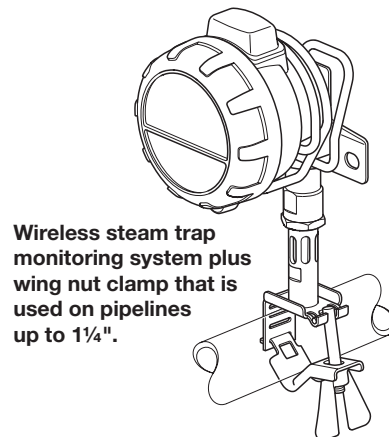
- Allows quick and easy viewing of whole steam trap population.
- Alerts the user to any issues with traps.
- Historical view of data and maintenance on each trap.

### Sizes and pipe connections

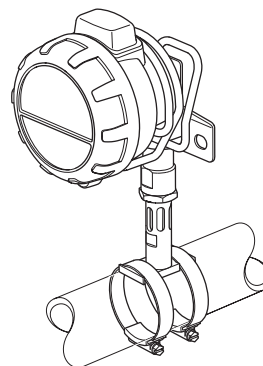
The STAPS wireless monitoring system is suitable for connecting to pipework up to 4", via an adjustable clamp. The head can be directly mounted to the sensor or fitted remotely.

### Materials

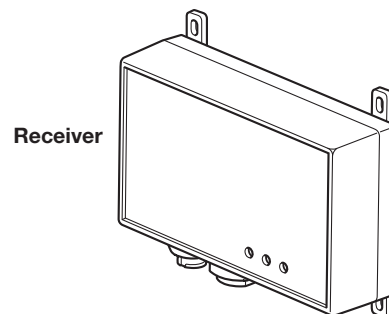
Head unit	Head casing	PA12 glass filled
	Sensor housing	Stainless steel 316/304
	Sensor	PZT
	Clamp	Stainless steel 430/304
	Winged nut	Stainless steel 316
	LED enclosure	PA12
	Sensor cable	FEP/PTFE insulation
	Probe	Stainless steel
	Mounting Bracket	Stainless steel 430
	Sensor guide	Stainless steel 304
Receiver/Repeater	Casing	ABS



Wireless steam trap monitoring system plus wing nut clamp that is used on pipelines up to 1¼".



Wireless steam trap monitoring system plus jubilee clamp that is used on pipelines from 1.5" to 4".



Receiver

Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only.  
In the interests of development and improvement of the product, we reserve the right to change the specification.

# STAPS

## Wireless Steam Trap Monitoring System

### Technical information

#### Head unit:

Available with post or tethered head mountings.

Integral battery	Lithium Thionyl Chloride
Maximum altitude	9842 ft (3 000 m) (0.7 bar atmospheric)
Ambient temperature range	-20 - 158°F (-29 to +70°C)
Maximum pipe temperature	797°F (425°C)
Maximum relative humidity	95%
Enclosure rating	IP65
Output	Wireless 2.4 GHz
Display	LED
Operating modes	Trap monitoring unit - end device or repeater/end device

#### Receiver / Repeater

Power	Mains powered 100 – 250 Vac, 50 – 60 Hz
Current	ac – 0.5 A 100 Vac dc – 1.5 A 12 V
Connector	ac – 2 pin IEC 320-C8 US mains plug dc – 2 pin IP65 connector
Maximum altitude	9842 ft 3 000 m (0.7 bar atmospheric)
Ambient temperature range	-20 - 158°F (-29 to +70°C)
Maximum relative humidity	95%
Enclosure rating	IP65 (Excluding external power supply)
Display	LED
Output	Wireless 2.4 GHz, Ethernet
Operating modes	Receiver or repeater

#### System requirements

PC	Windows XP .NET 3.5 Windows 7 .NET 3.5 Network switch or access to company LAN network
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# STAPS

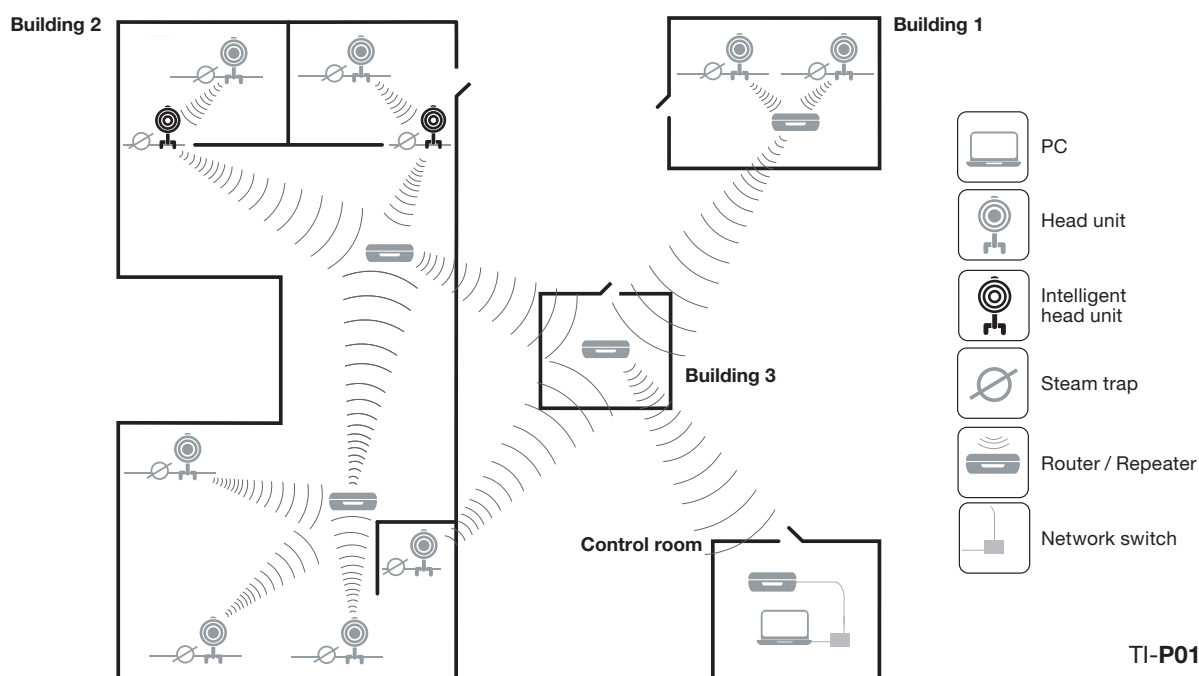
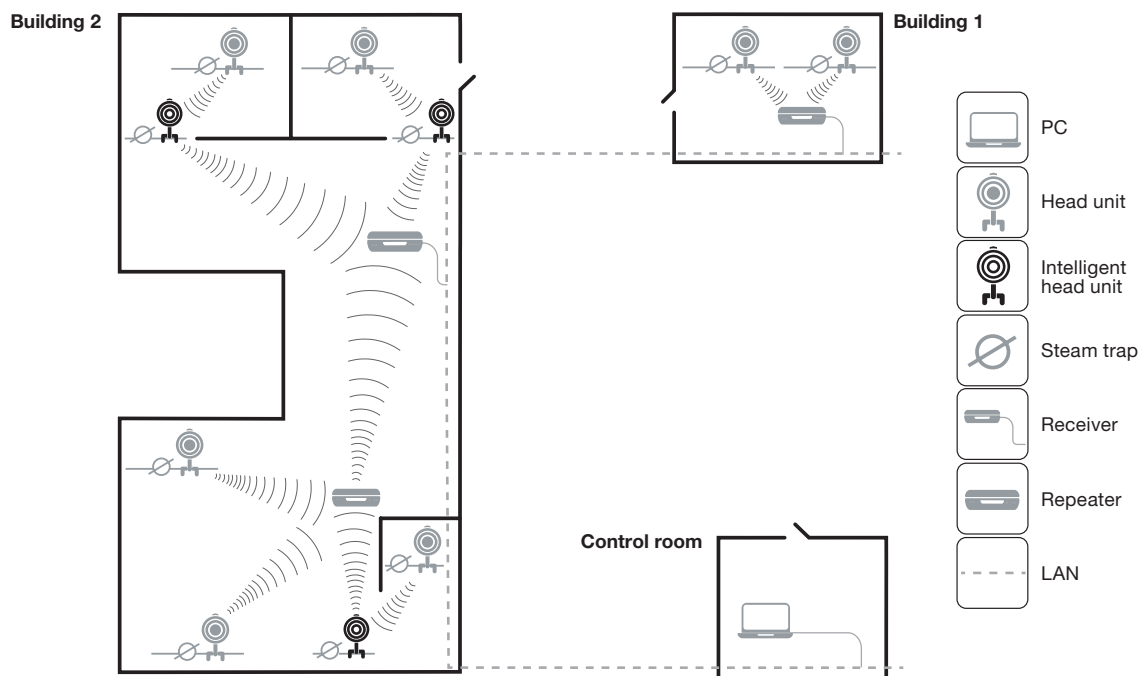
## Wireless Steam Trap Monitoring System

### How does it work?

A head unit assembly mounted on the pipe upstream of the trap to be monitored 'listens' to the sound signature of the trap in operation. This sound signature is categorised and transmitted via 2.4 GHz wireless network to a central PC. The PC determines the trap condition and calculates any steam loss.

Each STAPS head unit assembly is powered by a long life Lithium battery (typical battery life of over 3 years). It can communicate directly to a receiver that is connected to the PC software via a LAN connection or via another intelligent head or repeater. The PC software can be installed onto a PC on the sites internal network, or onto a standalone local PC.

The STAPS head, repeater and receiver create a network and can communicate with each other, passing on the steam trap data to the supervisory PC. The illustration below illustrates a typical network.



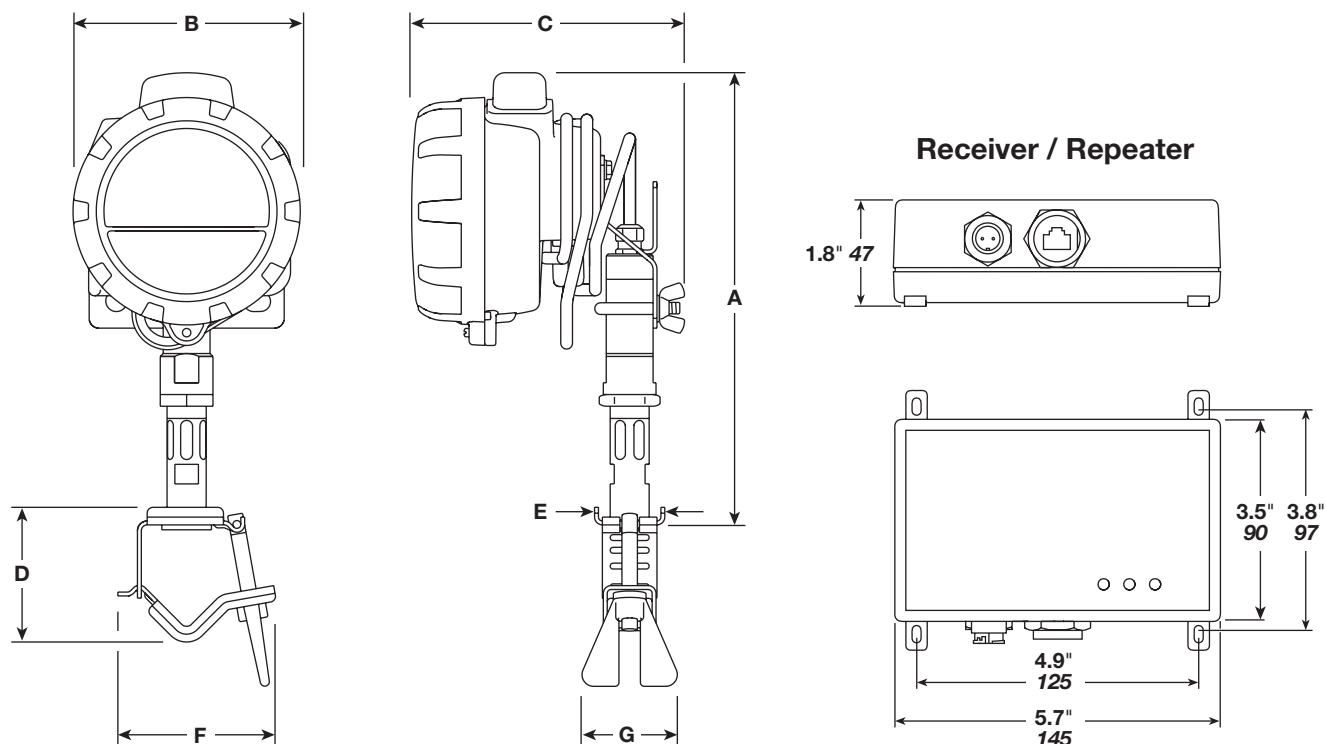
TI-P014-02-US 8.14

# STAPS

## Wireless Steam Trap Monitoring System

Dimensions / weights (approximate) in inches and pounds and *mm and kg*

Wireless steam trap monitoring system + wing-nut clamp



Size	A	B	C	D	E	F	G	Weight
DN15 - 1/2"	9.2" 234	4.6" 117	4.9" 126	1.7"-2.7" 44 - 69	1.4" 36	2.2" 55	2.0" 50	2.2 lb 1 kg
DN20 - 3/4"								
DN25 - 1"								
DN32 - 1 1/4"								
DN40 - 1 1/2"								
DN50 - 2"								
DN65 - 2 1/2"					2.0" 50	1.2" 30		
DN80 - 3"								
DN100 - 4"								

approximate in inches and pounds and *mm and kg*

### Safety information, installation and maintenance

For full details see the Installation and Maintenance Instructions (IM-P014-01) supplied with the product.

#### Disposal:

- The Lithium Thionyl Chloride battery must be disposed of in line with local legislation. It must be remembered that battery hazards remain even when the cells are discharged.
- The Piezo sensor should be disposed of in line with local lead disposal guidelines.

No other ecological hazard is anticipated with the disposal of this product. It should be disposed of within the local recycling procedures.

### How to order

Contact your local Spirax Sarco representative to arrange a site survey and installations.

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# STAPS

## Wireless Steam Trap Monitoring System

### Spare parts

Only the parts listed below are available for the STAPS system. No other parts are supplied as spares.

#### Available spares

Battery (SAFT LS 33600 3.6 V battery)	1
'O' ring spares kit	2
Head mounting bracket, 'U' bolt and wing nuts	8, 9, 10 and 19
Ethernet cable spares kit	15
Clamp, 'T' bolt and wing nut	5, 6 and 7
Power supply (US) spares kit	12 and 14
Front cover spares kit	3 and 4
Spare receiver mounting kit	6, 17 and 18

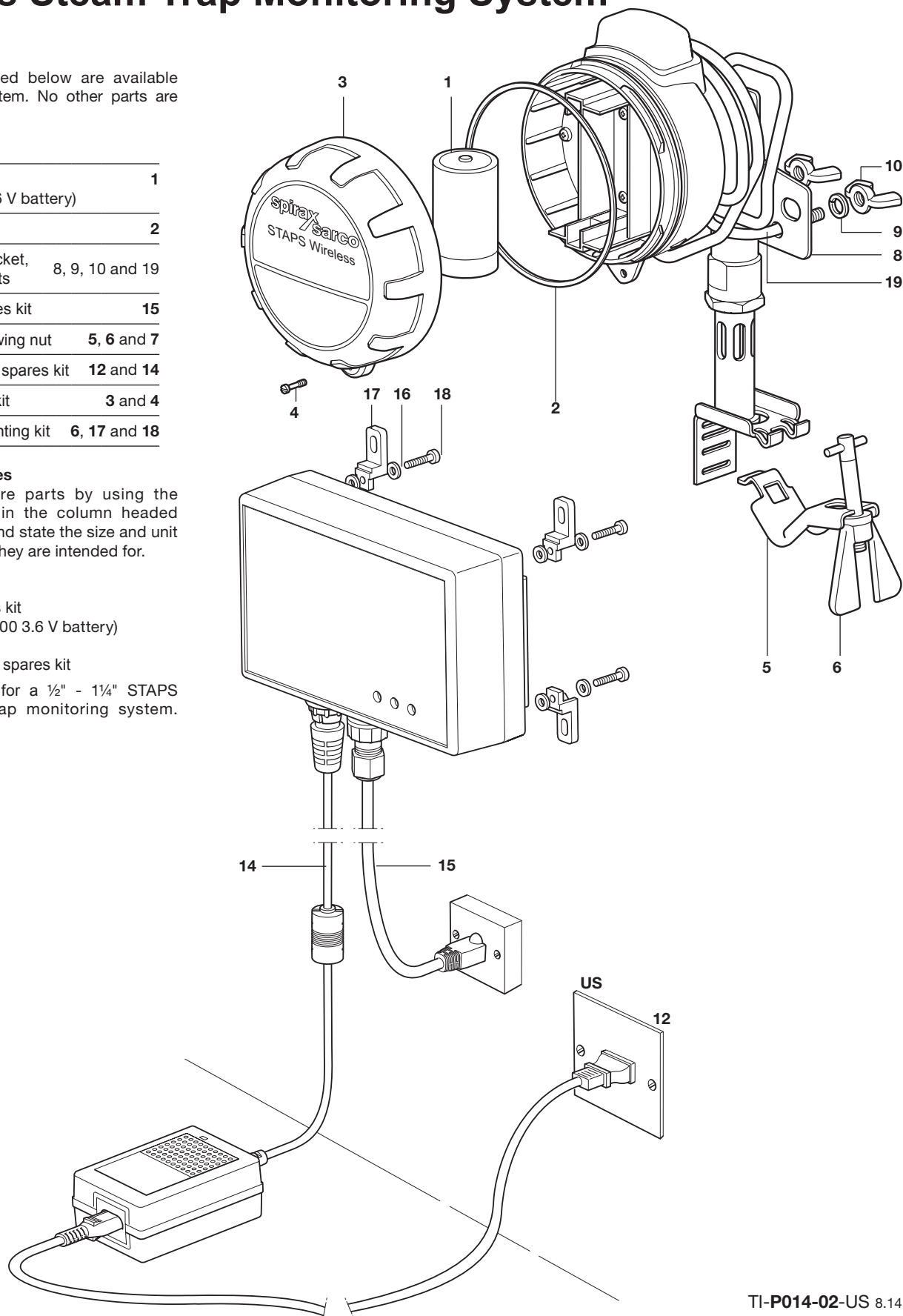
#### How to order spares

Always order spare parts by using the description given in the column headed 'Available spares' and state the size and unit nomenclature that they are intended for.

#### Example:

1 off Battery spares kit  
(SAFT LS 33600 3.6 V battery)  
and  
1 off Wall mounting spares kit

These spares are for a ½" - 1¼" STAPS wireless steam trap monitoring system.



TI-P014-02-US 8.14





## SPIRA-tec® Steam Loss Detector System Type 30 (for use with SSL1 Sensor)

The SPIRA-tec® Type 30 Indicator is a portable, battery-operated instrument designed to detect the presence of a steam leak in a steam trap (when used with a sensor chamber) and to indicate this condition on an LED indicator.

### Limiting Operating Conditions

**Max. Ambient Temperature** 104°F (40°C)

### Construction Materials

The Indicator Box is a polyamide plastic enclosure housing the electronic circuit.

### Operation

Full instructions are included with each indicator. The indicator incorporates a test circuit which will show whether the battery needs renewing or the indicator is faulty. To test for steam loss, plug indicator into sensing chamber ahead of trap. In essence, a green light  $\checkmark$  means a trap which is working correctly, i.e. closing to steam, and a red light  $\times$  indicates a trap which is allowing steam to pass.

### Sample Specification

SPIRA-tec steam leak detection system shall be comprised of an in-line sensor chamber or trap with Integral Sensor and a portable indicator box and cable for test purposes.

Sensor chambers, fitted before each trap, shall have ductile iron or steel bodies with screwed or socket weld connections, and incorporate a level-sensing electrode.

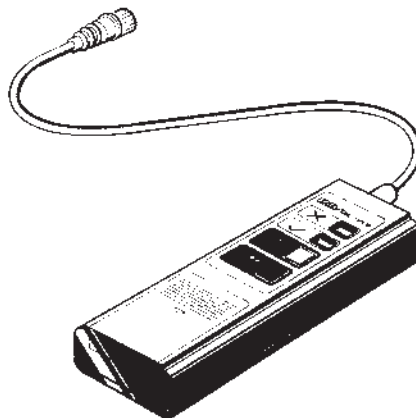
The hand-held indicator box shall have positive colored pass and fail lights, an internal circuit check facility and be UL listed as intrinsically safe for use in hazardous locations. An indicator cable 4 feet shall be provided with each box.

Optional items shall include a hand-operated remote test box for testing either a single trap or up to 12 traps, an automatic remote electronic monitoring system for up to 16 traps, a blanking plug to prevent ingress of dirt and cable plug tails of either of the push fit type or screw-on connection style.

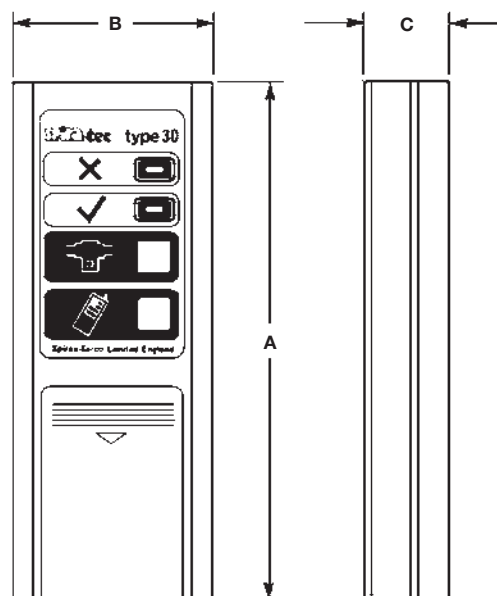
The system shall test for steam loss by detecting the presence or absence of condensate using the difference in conductivities of water and steam. Trap operation shall be indicated by a green (pass) light or a red (fail) light on the indicator box.

### Indicator Cable

A four-foot-long indicator cable of twin core, Teflon insulated, Hytel sheathed cable is provided with the indicator. It has connections on the ends for the Sensor Chamber or trap (if trap has Integral Sensor) and the Type 30 indicator. The Hytel sheathing will withstand 230°F (110°C).



Plug into SSL1 Sensor on sensor chamber, IFT with SSL1, strainer connector with SSL1 (IPC20, IPC21).



### Dimensions (nominal) in inches and millimeters

A	B	C	Weight (without battery)
6.2 157	2.4 62	1 25	4.6 oz 130 g

### Spare Parts

The indicator cable is available as a spare part. To order, specify cable only.

# SPIRA-tec® Steam Loss Detector System

## Type 30

### Purpose

The SPIRA-tec trap failure indicator is designed to indicate whether a steam trap is working correctly. It consists of a permanently installed sensor chamber and an indicator which is plugged into the sensor chamber for testing and removed when the testing is completed.

### Operation

#### Trap Working

Condensate flows to the steam trap, under the weir. A small hole in the top of the weir balances the pressure on either side and ensures that the sensor on the upstream side is submerged in condensate. When the sensor is connected to the indicator, the circuit is complete and gives a green  $\checkmark$  signal.

#### Trap Passing Steam

Steam volume in the sensor chamber increases, raising the pressure difference across the weir. The upstream condensate level drops to expose the sensor, breaking the circuit to give a red  $\times$  signal.

### Installation

The sensor chamber with SSL1 sensor should be fitted immediately upstream of the trap, in a horizontal line with the direction of flow according to the arrow on the body, or a trap with Integral SSL1 Sensor. The cable from the indicator should be disconnected from the sensor chamber or remote test point after checking.

Air and other incondensable gases present at the trap on start-up should be allowed to dissipate to avoid a false red signal.

Blast discharge traps may cause a temporary red flicker, but green over most of the cycle shows the trap to be working properly.

### Batteries

Type 30 Indicator – One 9 volt battery.

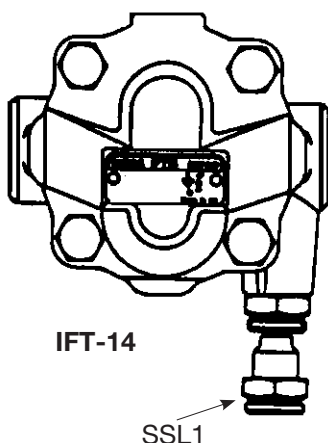
### Component Specifications

TIS 2.701, Sensor Chambers

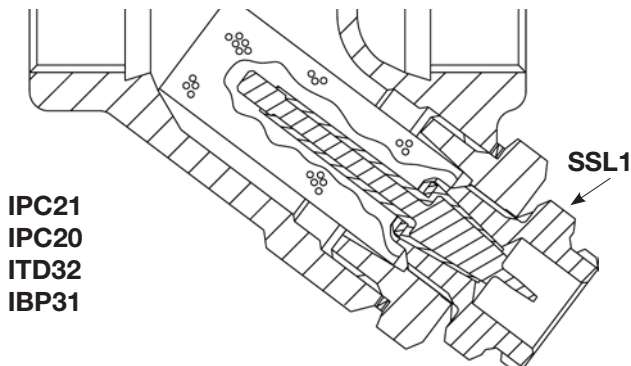
TIS 2.702, Remote Test Points

TIS 2.704, Automatic Monitor

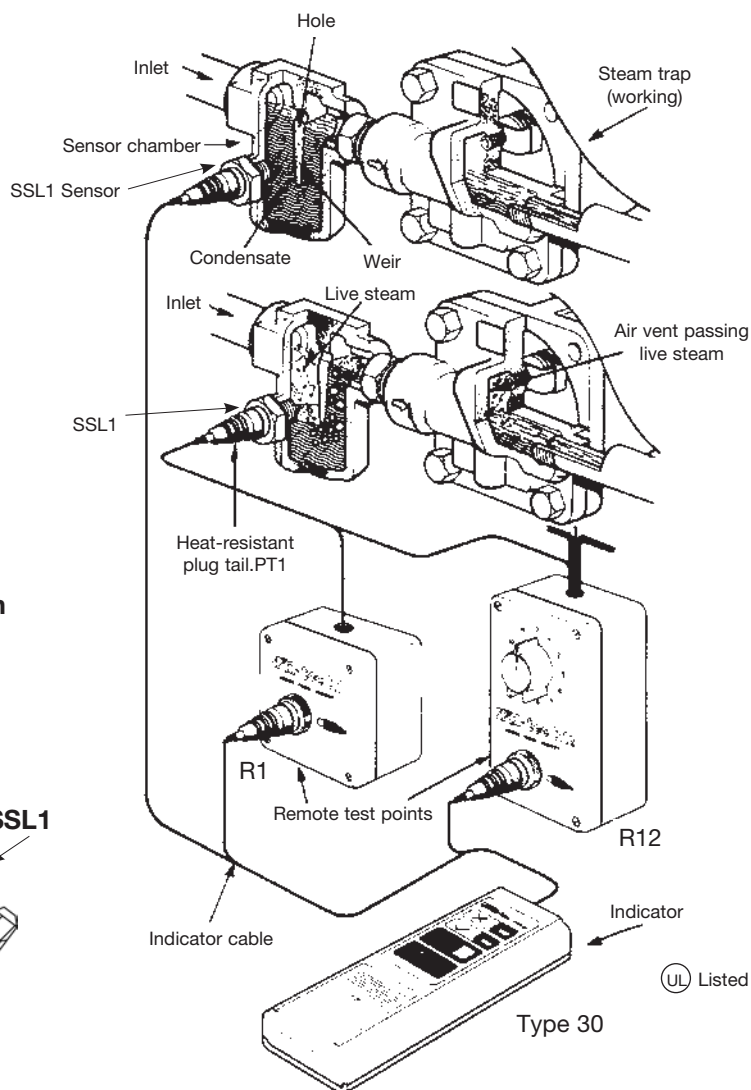
#### Intrap Sensing



IPC20 and IPC21 are strainer connectors with a spiratec SSL1 Sensor



#### Chamber Sensing

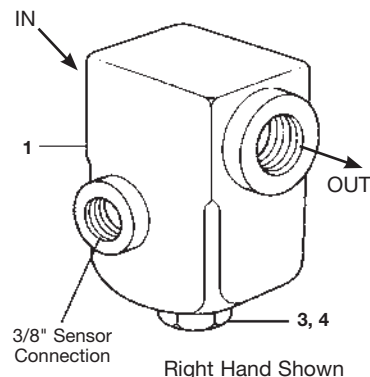




## SPIRA-tec® Sensor Chambers ST14, ST16, ST17

The Sensor Chamber is installed upstream of the steam trap as part of the SPIRA-tec® steam trap fault detection system. The chamber is supplied with a drilled and tapped connection for the SPIRA-tec® sensor (standard or waterlogging) which is supplied separately (see other side). Steam trap status is indicated on a portable indicator (Type 30) or remote monitor (R16C & R16E).

Model	ST14	ST16	ST17
PMO	464 psig		
Sizes	1/2" to 2"	1/2", 3/4", 1"	
Connections	NPT		
Construction	Steel	Stainless Steel	Ductile Iron
Options	SW Connections	SW Connections ANSI 150 & 300 Flanges	



### Limiting Operating Conditions

**Max. Operating Pressure (PMO)** 464 psig (32 barg)  
**Max. Operating Temperature (TMO)** Saturated Steam Temperature

#### Pressure Shell Design Conditions

<b>PMA</b>	580 psig/up to 248°F	40 barg/up to 120°C
Max. allowable pressure	464 psig/482°F	32 barg/250°C
	319 psig/662°F (ST17 only)	22 barg/350°C
	304 psig/752°F (ST14&ST16)	21 barg/400°C

<b>TMA</b>	662°F/0-319 psig (ST17 only)	350°C/0-22 barg
Max. allowable temperature	752°F/0-304 psig (ST16 & ST14)	400°C/0-21 barg

### Sample Specification

SPIRA-tec® steam leak detection system shall consist of an in-line sensor chamber and a portable or remote indicator box and cable for test purposes.

Sensor chambers, fitted before each trap, shall have ductile iron, steel, or stainless steel bodies with screwed, socket weld or flanged connections, and incorporate a sensing element.

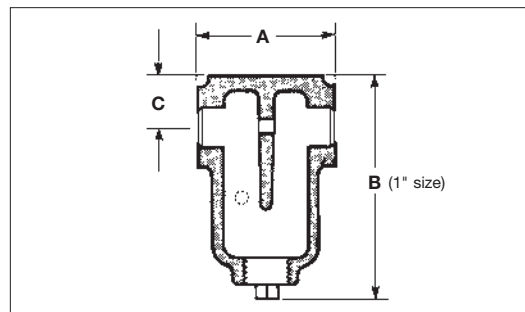
The hand-held indicator box shall have positive colored pass and fail lights, an internal circuit check facility. An indicator cable 4 feet long shall be provided with each box.

Optional items shall include a hand-operated remote test box for testing either a single trap or up to 12 traps, an automatic remote electronic monitoring system for up to 16 traps, a blanking plug to prevent ingress of dirt, and cable plug tails of either the push-fit type or screw-on connection style.

The system shall test for steam loss by detecting the presence or absence of condensate using the difference in conductivities of water and steam. The system shall also test for traps failed, closed or blocked by detecting temperature drops at the steam trap. Trap operation shall be indicated by a green (OK) light or a red (fail open) light, or an amber (fail closed) light on the indicator box.

### Installation

The sensor chamber should be installed immediately upstream of the trap (close coupled) in a horizontal position with the direction of flow according to the arrow on the body.



Dimensions (nominal) in inches and millimeters				
ST14 & ST16	A	B	C	Weight
1/2", 3/4"	3.0	4.0	0.9	1.8 lb
	75	101	23	0.8 kg
1"	4.7	4.7	1.1	4.8 lb
	120	120	28	2.2 kg
1-1/2", 2"	9.9	8.5	1.8	48.4 lb
(ST14 only)	252	215	45	22.0 kg
<b>ST17</b>				
1/2", 3/4"	2.8	3.5	0.9	2.6 lb
	72	89	23	1.2 kg
1"	4.7	4.7	1.1	4.8 lb
	120	120	28	2.2 kg

### Maintenance

The sensor should be removed periodically to inspect and clean the tip and insulator.

### Spare Parts

Sensor and Sensor Gasket  
Blanking Plug  
Sensor gasket package of 10

### Construction Materials

No.	Part	Material - ST14		Material - ST16		Material - ST17	
1	Sensor Chamber	Steel	DIN 17245 GS C25	Stainless Steel	AISI 316L	Ductile Iron	DIN 1693 GGG 40
3	Drain Plug	Stainless Steel	BS 970 431 S 29	Stainless Steel	AISI 316L	Stainless Steel	BS 970 431 S 29
4	Drain Plug	Stainless Steel	BS 1449 304 S 16	Stainless Steel	AISI 316L	Stainless Steel	BS 1449 304 S 16

Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only.  
In the interests of development and improvement of the product, we reserve the right to change the specification.

TI-2-701-US 10.14

# SPIRA-tec® Sensor Chambers

## ST14, ST16, ST17

SPIRA-tec® sensor assemblies are installed into the sensor chamber (see other side) for detection of condensate and temperature drops at the steam trap. This indicates where the steam trap is leaking steam or is failed, closed or blocked.

Model	Standard	Waterlogging
<b>Connections</b>	3/8" BSP	
<b>Construction</b>	Stainless Steel	
<b>Type</b>	Conductivity	Conductivity & Temperature
<b>Options</b>	Plug Tail Assemblies (PT1, PT2, or PT3)	

### Limiting Operating Conditions

Max. Operating Pressure (PMO)	464 psig (32 barg)
Max. Operating Temperature (TMO)	Saturated Steam Temperature

### Sample Specification

#### Standard Sensor:

Sensor shall be of stainless steel construction with suitable insulator. The sensor shall be capable of determining different conductivities associated with steam and condensate.

#### Waterlogging Sensor:

Sensor shall be of stainless steel construction with suitable insulator. The sensor shall be capable of determining different conductivities associated with steam and condensate. The sensor shall also detect temperature drops associated with steam traps that fail closed, are blocked, or not in use. Sensor shall be made with plug tail on right hand or left hand side.

### Installation

The sensor is installed into the side connection on the SPIRA-tec® sensor chamber. Chamber mounted upstream of trap as close as possible.

### Maintenance

The sensor should be removed periodically to inspect and clean the tip and insulator.

#### Determine sensor position:

If you were to straddle the pipe facing in the direction of flow, right hand sensor would be on right side and left hand on your left side.

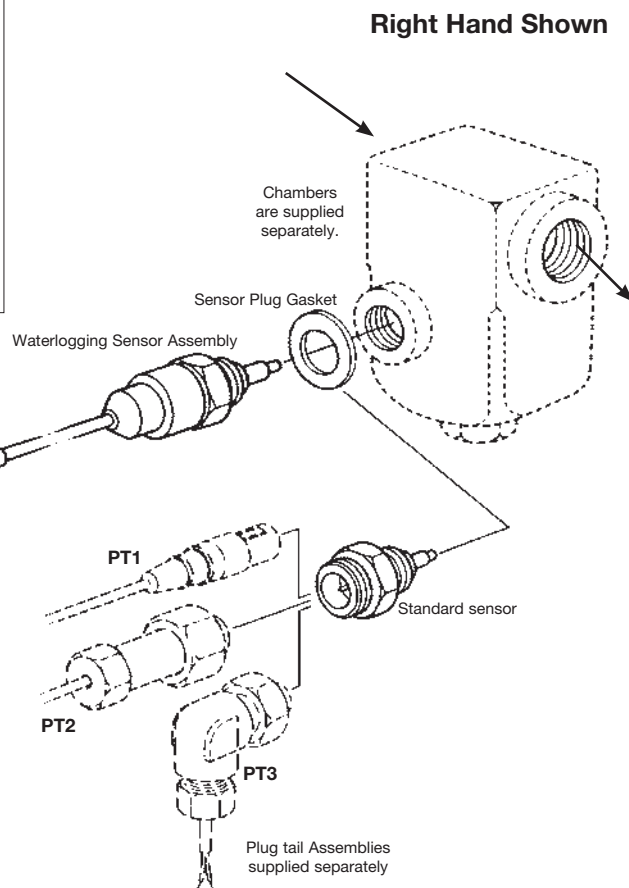
**Note:** You must order sensor separately. Chamber does not have sensor installed when supplied

#### Sensor types:

SSLI Steam leakage for use output only with type 30, R1C and R16C

WLSI Steam leakage and water logging for use with R1C only.

WLSI with diode steam leakage and water logging for use with R16C only.



**Spiratec products  
shall not be used  
in hazardous areas and  
explosive atmospheres.**



## SPIRA-tec® Remote Test Point R1 and R12

The SPIRA-tec® Trap Leak Detection System is designed to indicate whether a steam trap is leaking steam. A Plug Tail is fixed permanently into the sensor chamber, and this is then wired to the remote test point sited at any convenient point. Trap checking is then carried out by plugging into the remote test point rather than into the sensor chamber.

### Available Types

R1 test point, suitable for one sensor chamber.

R12 test point has a selection switch which can be used for checking up to 12 sensor chambers.

The plug tail is supplied with 4 feet (1.25 m) of wire. Any additional wire must be provided by the installer in accordance with the Installation and Operating Instructions.

PT 1 plug tail is available with plug in connection

PT 2 plug tail is available with screw on connection and brass angle pattern housing.

(PT 2 & PT 3 provide protection to IP67.)

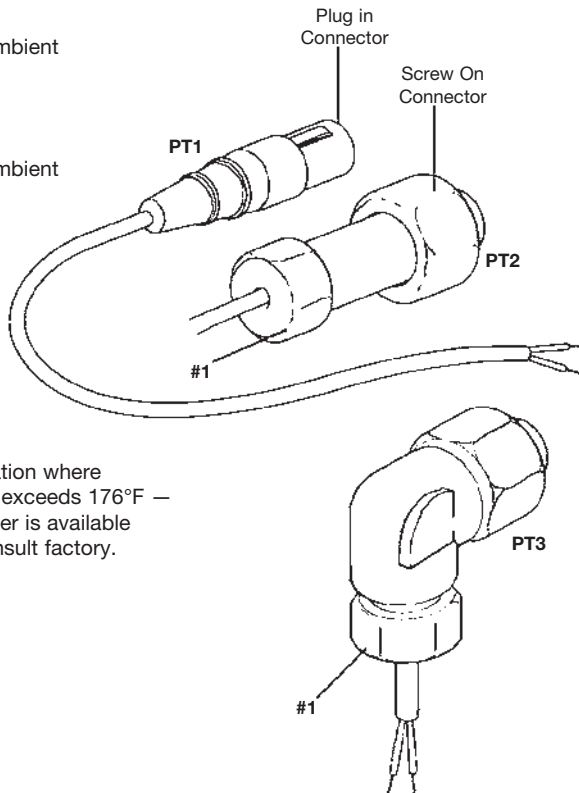
Removing nut #1 allows a conduit adaptor to be connected to the M16 conduit thread on the housing, if cable protection is required.

#### R1 \*

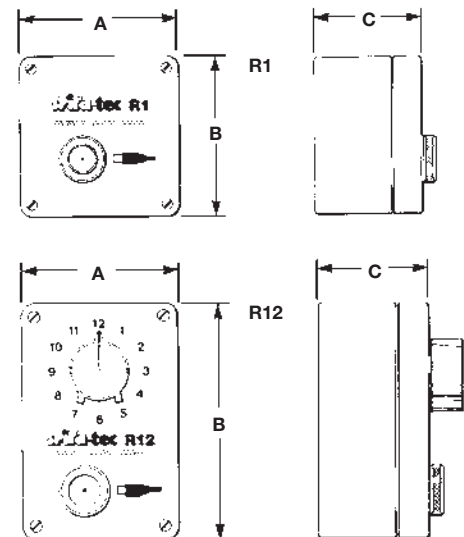
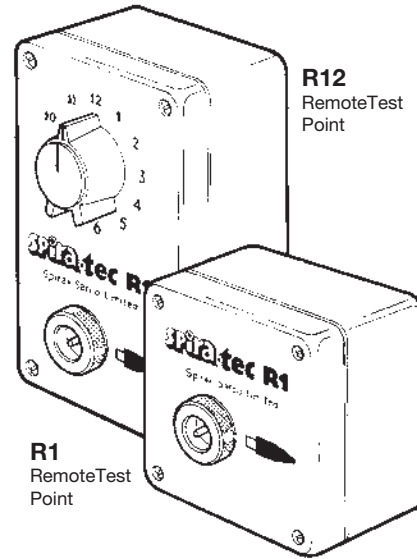
Maximum Ambient  
Temperature  
176°F (80°C)

#### R12

Maximum Ambient  
Temperature  
120°F (49°C)



\* For application where temperature exceeds 176°F — metal encloser is available (R1 only) consult factory.



### Dimensions (nominal) in inches and millimeters

Type	A	B	C	Weight
R1	3.2 82	3.1 80	2.1 55	0.4 lb 0.2 kg
R12	3.1 80	4.7 120	2.1 65	0.7 lb 0.3 kg

Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only.

In the interests of development and improvement of the product, we reserve the right to change the specification.

TI-2-702-US 02.04



# SPIRA-tec® Remote Test Point R1 and R12

## Use in Hazardous Areas

The Type 30 Indicator is listed by Underwriters Laboratories, Inc., as intrinsically safe for use in hazardous locations (Class 1, Division 1 & 2, Groups A, B, C & D, in accordance with U.L. Standard 913) when used with the ST Sensor Chamber, R1 and R12 remote test points.

The R1 and R2 are also approved for use in hazardous locations by BASEEFA under BS 5501, Parts 1 & 7. The enclosure is rated to IP 20 under BS 5490. 1977.

## Permissible Interconnecting Cables

The total Capacitance, Inductance and Inductance to Resistance (L/R) ratio of cables used in hazardous areas, must not exceed the following values:

Group	Capacitance in mF	Inductance in mH	or L/R ratio in mH/ohm
II C	0.3	0.22	19
II B	0.9	0.66	57
II A	2.4	1.76	152

## Installation

1. Decide on the most convenient cable entry. Remove the front cover by taking out the four securing screws and drill the required hole in the side or back of the test point. Fit a suitable waterproof cable entry. (Fig. 1) Note: The R1 cover will only fit one way round.
2. Secure the test point to a flat surface using the four mounting holes outside the sealed enclosure.
3. Connect the Plug Tail PT1, PT2, or PT3 into the pipeline sensor chamber. Extend the 4-ft (1.25 m) of cable provided by connecting on a suitable; length of twin core cable. The type of cable is not critical – lightweight wire with 20 gauge conductors or 7/0.2 multi-strand wire will suffice. Similarly, the type of connection is not critical, but it should be made waterproof if exposed to moisture. The extension cable should be passed through the cable entry (Fig. 2).
- 2). In the case of the R1, connect the extension to the terminals inside the cover.
5. In the case of R12, connect the extension from all red or green wires to the numbered terminals on the edge connector, noting the number of each sensor. The test sheet provided can be used for this purpose. Extensions from all the blue wires should be connected to the square ground bar in the base of the box. With screw heads facing outwards, push the edge connector onto the printed circuit board (Fig. 3).
6. Replace the front cover and the four securing screws.

## To Operate

Plug the indicator cable into the socket provided and use the indicator in accordance with its instructions.

In the case of the R12, the rotary switch should be used to select the sensor to be checked.

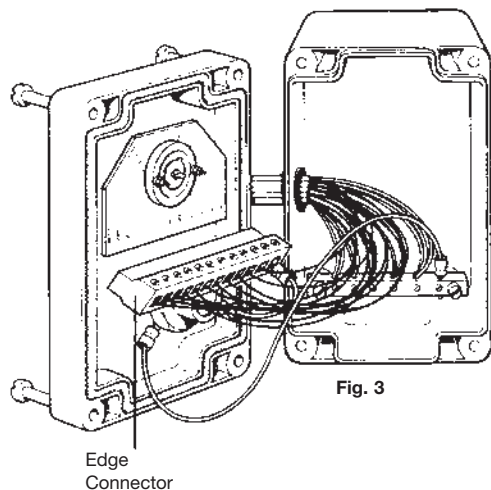


Fig. 3

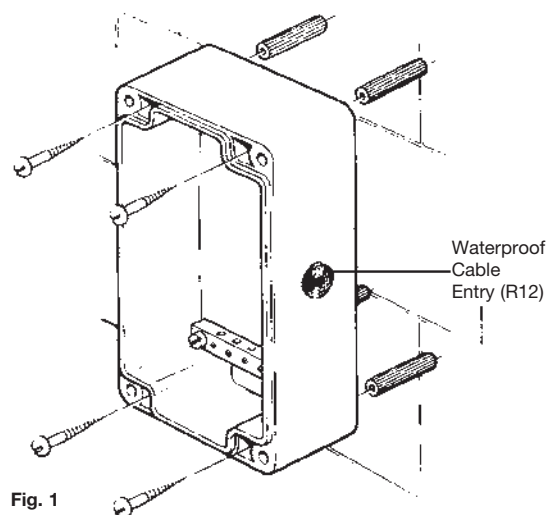


Fig. 1

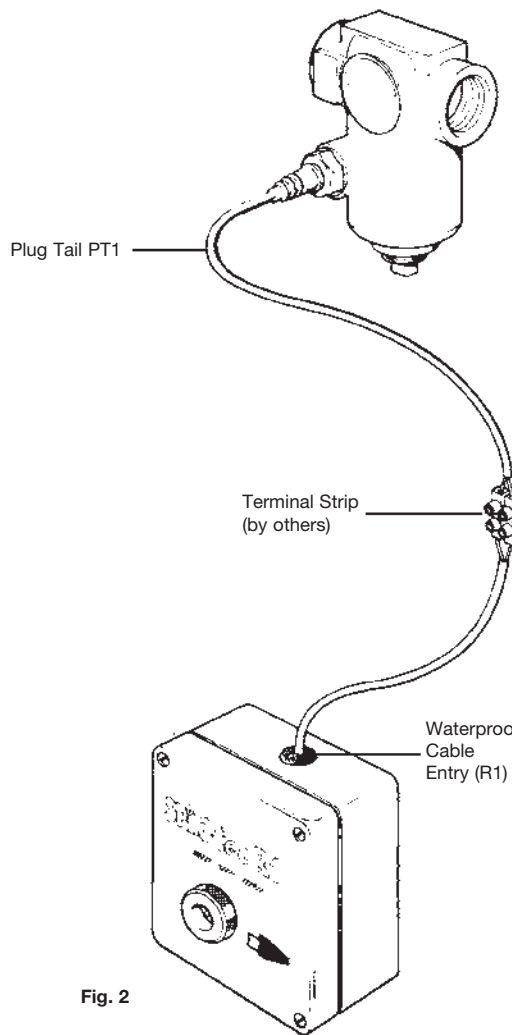


Fig. 2



## R1C Steam Trap Failure Monitor

The R1C steam trap failure monitor will monitor the performance of a single steam trap when used in conjunction with a Spiratec sensor chamber and sensor. It will indicate whether a trap is operating correctly, passing live steam or has failed closed by means of colored trap status lights on the unit. Analog and digital outputs allow it to be connected directly to BEMS/EMS to indicate steam trap status remotely.

### SYSTEM COMPONENTS

To detect a steam trap that is leaking steam, a standard SS1 Spiratec sensor combined with a Spiratec sensor chamber is used. To detect a steam trap that is leaking steam or is waterlogged, a WLS1 Spiratec waterlogging sensor assembly combined with a Spiratec sensor chamber is used.

### CONSTRUCTION MATERIALS

Body Cast malleable iron, black enamel finish.

### TECHNICAL DATA

Enclosure rating IP65 (when fitted with correct cable glands)

Supply voltage: Voltage required:  
4-20 mA output **not used** Separate 9-30 Vdc, <35 mA  
4-20 mA output **used** Separate 22-30 Vdc, <35 mA

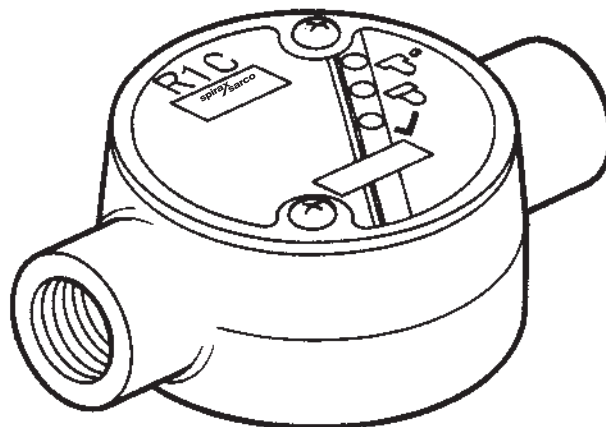
#### R1C operation:

Trap status:	Status lights:
Trap operating correctly	Red and orange lights <b>OFF</b> Green light <b>FLASHING</b>
Trap leaking steam	Red light <b>ON</b> Green light <b>FLASHING</b>
Trap blocked or waterlogged	Orange light <b>ON</b> Green light <b>FLASHING</b>
Trap cold but free of condensate (this is a common state during system start-up or when the system is shut down).	Red and orange lights <b>ON</b> Green light <b>FLASHING</b>

During normal operation, the green light flashes **ON** every second to show that electrical power is connected to the R1C and that it is operating correctly.

### CONNECTIONS

The R1C enclosure is a circular conduit box with M20 threaded entry holes. To maintain resistance to moisture, use a suitable cable gland between the R1C and the Spiratec sensor (Type SS1 or WLS1). If the cable to the BEMS/EMS passes through a conduit, make sure that the threaded connection to the R1C is water-tight to maintain the IP65 enclosure rating. Details of electrical connection are supplied with the product.



### INSTALLATION

The Spiratec sensor chamber is installed immediately upstream of the trap being monitored in a horizontal pipeline. Full details are given in the technical literature supplied with the products.

The R1C should be installed within 30 ft. of the Spiratec sensor chamber. It is designed to form part of a conduit cable protection system but may be fixed to any convenient surface using bulkhead clamps.

### STEAM LEAK DETECTION PERIOD

Internal switches in the R1C allow the steam leak detection period to be set at various intervals. This helps to prevent nuisance alarms which may be caused by intermittent interruptions in condensate flow under normal operating conditions.

### CONDENSATE CONDUCTIVITY LEVELS

Internal switches in the R1C allow the condensate conductivity levels to be adjusted to accommodate local conditions. The purity of the steam is directly related to its conductivity. Therefore, the multiple settings cover a wide range of systems.

### TRAP WATERLOGGING TEMPERATURE LEVELS

Internal switches in the R1C allow the waterlogging temperature levels to be set at one of seven pre-set temperatures. Because of relation between steam pressure and temperature, each steam trap can be monitored as closely as desired.

As supplied, the R1C comes factory set as follows:

Channel	Failure Detection	Notes
Leak detection period	22 minutes	The trap must leak steam for 22 minutes before the R1C signals a fault.
Leak detection	4.8µS	The conductivity of the condensate in the sensor chamber must be greater than 4.8 microsiemens for correct operation.
Waterlogging detection temperature	185°F	The condensate in the sensor chamber must cool below the R1C signals a waterlogging fault.

Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only.

In the interests of development and improvement of the product, we reserve the right to change the specification.

TI-2-707-US 10.10

# R1C Steam Trap Failure Monitor

## OUTPUT SIGNALS FOR REMOTE INDICATION OF TRAP STATUS

### Digital Outputs

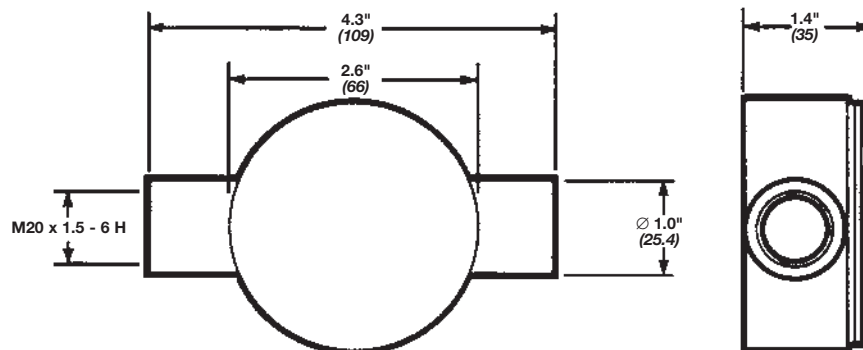
**PNP open collector output** - use this output to connect the R1C to a BEMS/EMS whose digital inputs are pulled down to 0 volts. The pnp outputs act like switches connected to the R1C's power supply. During normal trap operation, the pnp outputs will switch ON and give out a voltage equal to the R1C's power supply minus 0.4 V. Their output resistance in this state is 220 ohms. If the trap fails, one of the pnp digital outputs will switch OFF.

**NPN open collector outputs** - use this output option to connect the R1C to a BEMS/EMS whose digital inputs are pulled up to a positive voltage. The npn outputs act like switches connected to 0 volts. During normal trap operation, the npn outputs will switch ON, giving out 0 volts with an output resistance of 220 ohms. If the trap fails, one of the npn digital outputs will switch OFF.

Trap Status	Nominal Output Current from R1C	Recommended BEMS/EMS Alarm Threshold Settings
Trap operating correctly	20 mA	23.0 mA > setpoint > 17.5 mA
Trap leaking steam	15 mA	17.3 mA > setpoint > 12.5 mA
Trap blocked or waterlogged	10 mA	12.5 mA > setpoint > 7.5 mA
Trap cold, but free of condensate (or R1C failure)	4 mA	7.5 mA > setpoint > 0 mA

The current output from the R1C is derived from an internally powered loop and is capable of driving into an impedance of at least 550 ohms. In practice, this means that the maximum permissible distance between the R1C and the BEMS/EMS will be governed by the type of connecting cable used.

## DIMENSIONS (NOMINAL) IN INCHES (mm)



Trap Status	R1C Digital Outputs	
	Waterlogged	Steam Leak
Trap operating correctly	On	On
Trap leaking steam	On	Off
Trap blocked or waterlogged	Off	On
Trap cold, but free of condensate (or R1C failure)	Off	Off

### Analog Output:

An analog output is available as standard for use with BEMS/EMS's that operate on an analog input signal. Setting details are given below:

### Maintenance

There are no user serviceable parts in the R1C.

### How to Specify

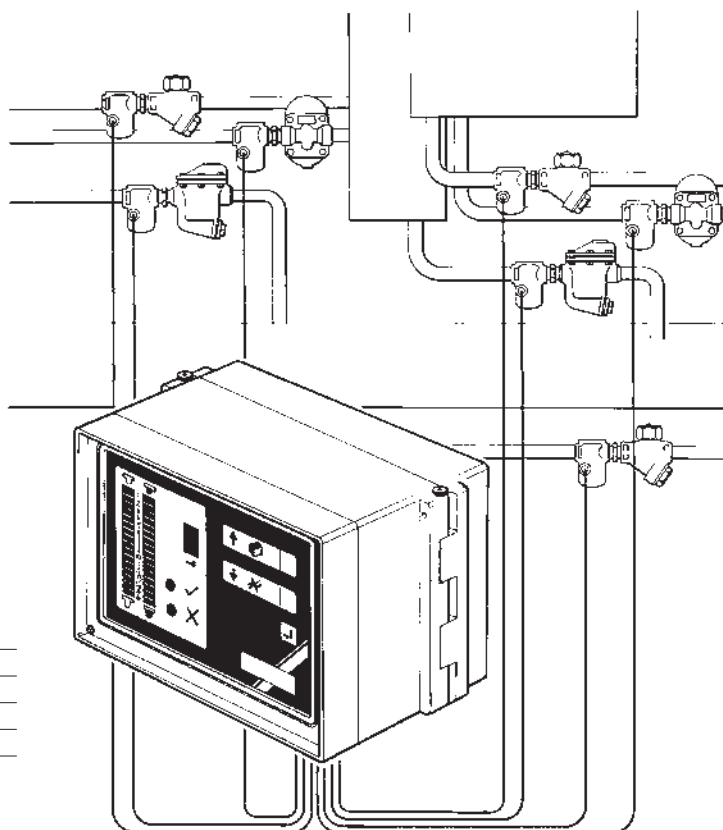
- 1 - Spirax Sarco R1C steam trap failure monitor (pnp digital outputs), or
- 1 - Spirax Sarco R1C steam trap failure monitor (npn digital outputs)

## SPIRA-tec® Automatic Steam Trap Monitor R16C

The SPIRA-tec® R16C is an automatic steam trap monitor for up to 16 steam traps. Remotely mounted, it continuously scans electronically up to 16 Spira-tec® Sensor Chambers and indicates when steam wastage or waterlogging occurs at any of the traps being monitored. A Sensor is screwed into each Sensor Chamber and is connected by wiring to the R16C which is sited at a convenient point.

When all the steam traps being monitored are working correctly, a single green light will be illuminated. If one or more of the steam traps is failing, then the corresponding "fail" lights (of which there are thirty two) are illuminated and the green light is extinguished.

The R16C, which is continuously operating, will indicate at a glance that either all the traps are operating correctly, or that there is a failure of any particular identified trap or traps. The unit can be interfaced with most present day computer controlled Building Management Systems, through a pair of volt free contacts, which will open on trap failure.



### Available Types

R16C steam monitor is available as standard for use with mains supplies at 96-240Vac or 24Vac. The monitor is supplied for wall or panel mounting.

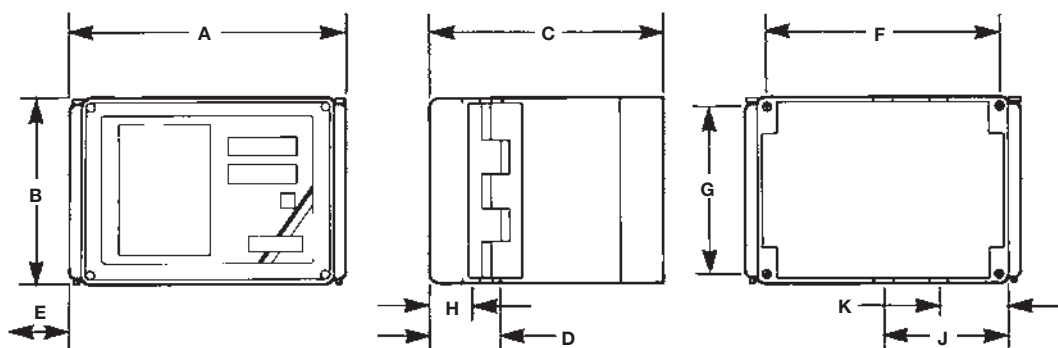
### Technical Data

Supply voltage		96-240Vac ±10% or 24 Vac ±10%
Supply frequency		50 - 60 Hz
Supply current consumption		50 mA
Environmental limits	Operating temperature range	0°C to 50°C
	Maximum operating relative humidity	80% up to 31°C decreasing linearly to 34% at 50°C
	Maximum altitude	2 000 m above sea level
	Maximum voltage	24 Vac/dc
	Maximum current	0.5A
Relay rating	Maximum power	10W
	Enclosure rating	IP65 with correct cable glands (wall mounting unit only)
Electrical connections		Screw terminals

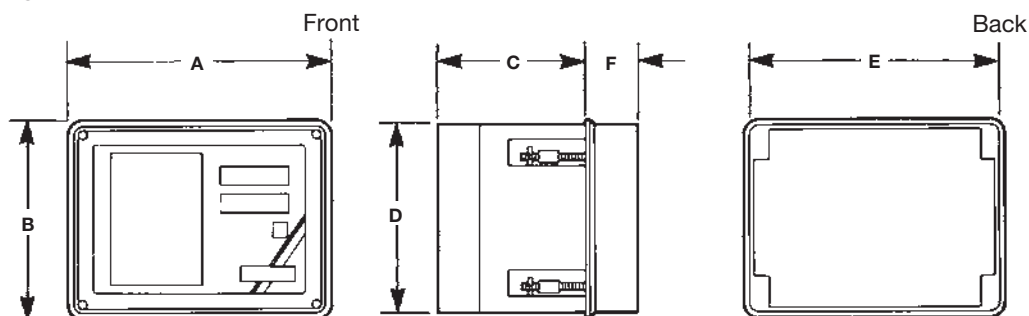
If cable protection is required, a conduit adaptor can be connected to the M16 conduit thread on the housing after removing the nut (1). The plug tail is supplied with 1.25m of cable. Any additional cable must be provided by the installer in accordance with the Installation Instructions.

Note: The type of cable is not critical, but a lightweight cable with 20 gauge conductors of 7/0.2 (0.22mm<sup>2</sup>) multi-strand cable will suffice.

# SPIRA-tec® Automatic Steam Trap Monitor R16C



## Wall Mounting

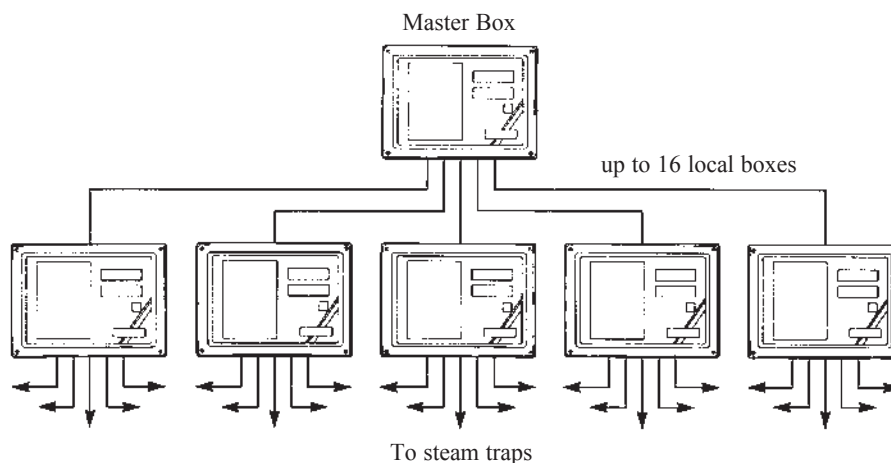


## Dimensions (nominal) in inches and millimeters

Wall Mounting		A	B	C	D	E	F	G	H	J	K	Weight
		7.9	5.4	6.7	2.0	5.1	6.7	3.9	1.2	3.6	2.0	4.0 lb
		201	138	169	50	130	170	100	30	92	52	1.8 kg
Panel Mounting		A	B	C	D	E	F	Weight				
		7.6	5.7	4.1	5.5	7.3	1.6	3.4 lb				
		192	145	105	140	186	40	1.53 kg				

## To Use as Master Box

The R16C can be installed on a cascade basis. One "master" box will monitor up to 16 x R16C "local" boxes. A red light on the master box will indicate which "local" box is registering a leaking trap. Inspection of that local box will then identify the specific trap which is failing.



## Trap Diffuser DF1, DF3 and Three Way Test Valve

### Description

The **DF Series Trap Diffuser** is a compact unit designed to be fitted to the outlet of a steam or liquid drain trap. The DF Diffuser reduces noise and erosion by cushioning high velocity discharge.

<b>Model</b>	DF1 & DF3
<b>Sizes</b>	1/2" & 3/4"
<b>Connections</b>	NPT
<b>Construction</b>	Stainless Steel
<b>Options</b>	BSP Connection DF1 SW Inlet only DF1

### Typical Applications

The DF Series Diffuser can be fitted to any trap where conditions promote blast discharge similar to that associated with balanced pressure, inverted bucket or Thermo-Dynamic® traps.

### Limiting Operating Conditions

**DF1 Max. Operating Pressure (PMO)** 915 psig/63 barg

**DF3 Max. Operating Pressure (PMO)** 300 psig/21 barg

### Construction Materials

No.	Part	Material
1	Case	Stainless Steel
2	End Boss Screwed Socket Weld	Stainless Steel Stainless Steel
3	Internals	Stainless Steel
4	Screen	Stainless Steel

### Installation

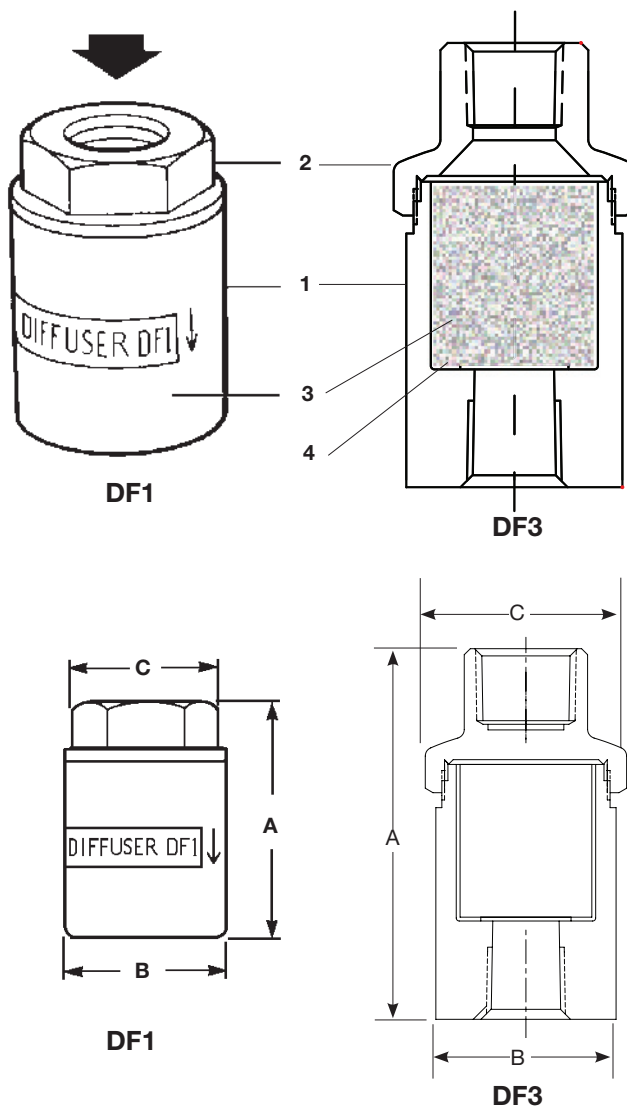
The DF Series Diffuser should be fitted on the outlet side of a steam trap or liquid drainer with a suitable fitting to ensure that the discharge of condensate is towards the ground or some safe enclosure.

### Sample Specification

The trap diffuser shall be all stainless steel with a knitted and compacted wire mesh diffusing element.

### Dimensions (approximate) in inches & millimeters

Size	A	B	C	Weight (DF1)
<b>DF1 1/2"</b>	2.3 59	1.5 40	1.1 27	.51 lb .23 kg
<b>DF1 3/4"</b>	2.3 60	1.5 40	1.3 32	.51 lb .23 kg
<b>DF3 1/2"</b>	3.8 97	1.8 46	2.1 53	1.4 lb .63 kg
<b>DF3 3/4"</b>	3.8 97	1.8 46	2.1 53	1.4 lb .63 kg



# Trap Diffuser DF1, DF3 and Three Way Test Valve

The TWT steam trap test valve is designed to have a combination inlet or outlet isolation/blowdown valve capability. Unit can be used with any small size steam trap typically in drip or tracer service.

## Limiting Operating Conditions

Max. Operating Pressure: (PMO) 300 psig (21 barg)  
Max. Operating Temperature: (TMO) 421°F (198°C)

## Pressure Shell Design Conditions

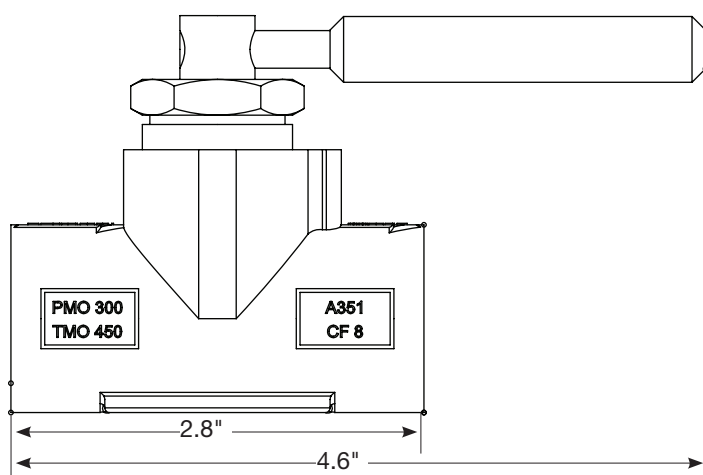
PMA : 300 psig (21 barg)

## Two Valves One Upstream and Downstream of Trap

Function	Direction of Flow Handle Position	
	Inlet Valve	Outlet Valve
Normal operation	→	→
Checking line for blockage	↓	→
Trap Isolation for Maintenance	↑	↓
Visual testing of trap	→	↓
Shutdown Drainage if Steam is Off Stream	↓	↓
Start-up	↓	→
Purging	↓	→

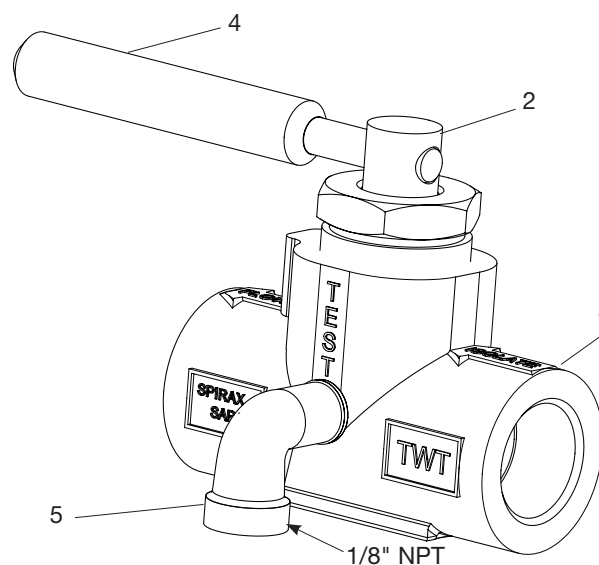
## One Valve Downstream of Trap (trap outlet)

Function	Direction of Flow Handle Position
Normal Operation	→
Visual testing of trap	↓
Shut down drainage steam upstream isolated by other means	↓
Return line isolation	↑

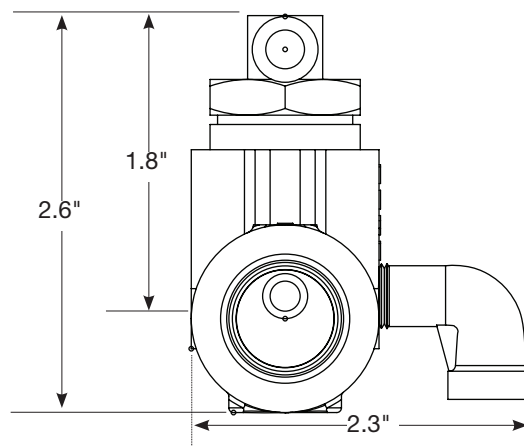


Model	TWT
PMO	300 psig
Sizes	1/2" 3/4"
Connections	NPT
Construction	Stainless Steel

No.	Part	Material
1	Body	Stainless Steel ASTM A351 CR CF8
2	Isolation Plug/Spindle	Stainless Steel 316L AISI 304
3	Liner	R-PTFE (internal not shown)
4	Handle	Stainless Steel
5	Vent Elbow	Stainless Steel 304 AISI 304
6	Packing	Graphite



## SPARE: Valve Internal Assembly



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TI-2-800-US US 02.06





## MSC Manifolds for Steam Distribution and Condensate Collection

### Description

The type MSC forged steel manifolds centralize steam distribution and condensate collection for up to 12 sources.

Both models have integral piston valves with a variety of connections, making them particularly well suited for tracing applications.

The compact design provides easy access for trap maintenance and monitoring, while the mounting arrangement permits quick installation.

The condensate collection manifold includes an internal siphon pipe to promote even temperature distribution and ensure single-phase discharge of condensate.

All units are hydro tested to 1.5 times design pressure, and painted with industrial heat resistant coating (gray) with a maximum temperature of 850°F

### Operation

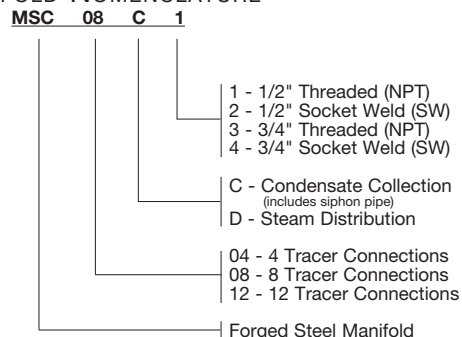
In operation the piston valve should be either fully open or fully closed. **Throttling service is not recommended.**

As the piston valve has such a large sealing area it is not necessary to use a valve key to ensure dead tight shut-off.

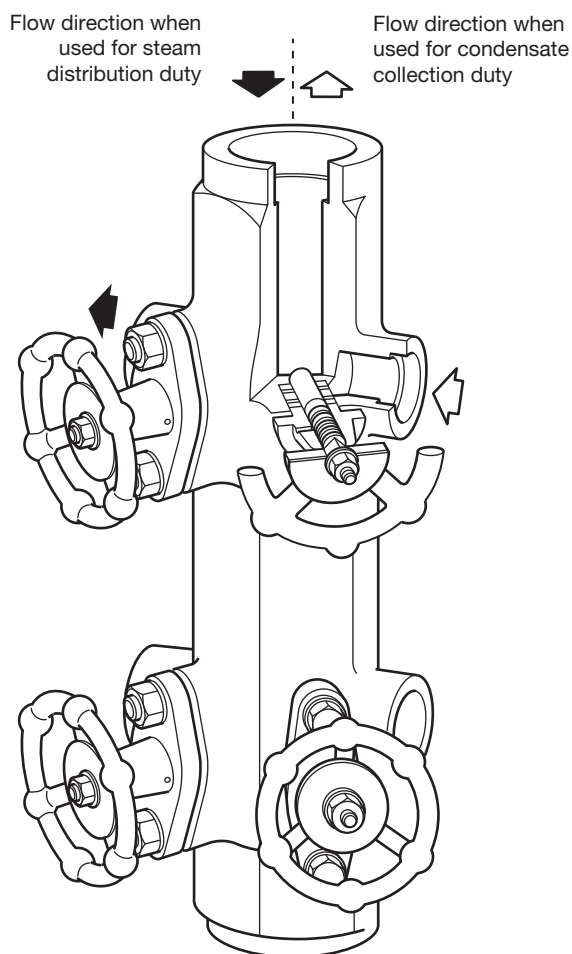
### Technical Data

Body design rating	ANSI Class 300 (PN50)
PMA	740 psig @ 100°F (51 Bar g @ 38°C)
TMA	797°F @ 406 psig (425°C @ 28 bar g)
Min allowable temp	-20°F (-29°C)
PMO (Sat. steam)	600 psig @ 500°F (41 bar g @ 260°C)
Hydrotest pressure	1,110 psig (76 bar g)
N° of connections	4, 8, 12
Connection sizes	1/2", 3/4"
Connection types	NPT, SW to ANSI B16.11 Cl. 3000
Piston valve CV	2.1 (per valve - both sizes)

### MANIFOLD NOMENCLATURE



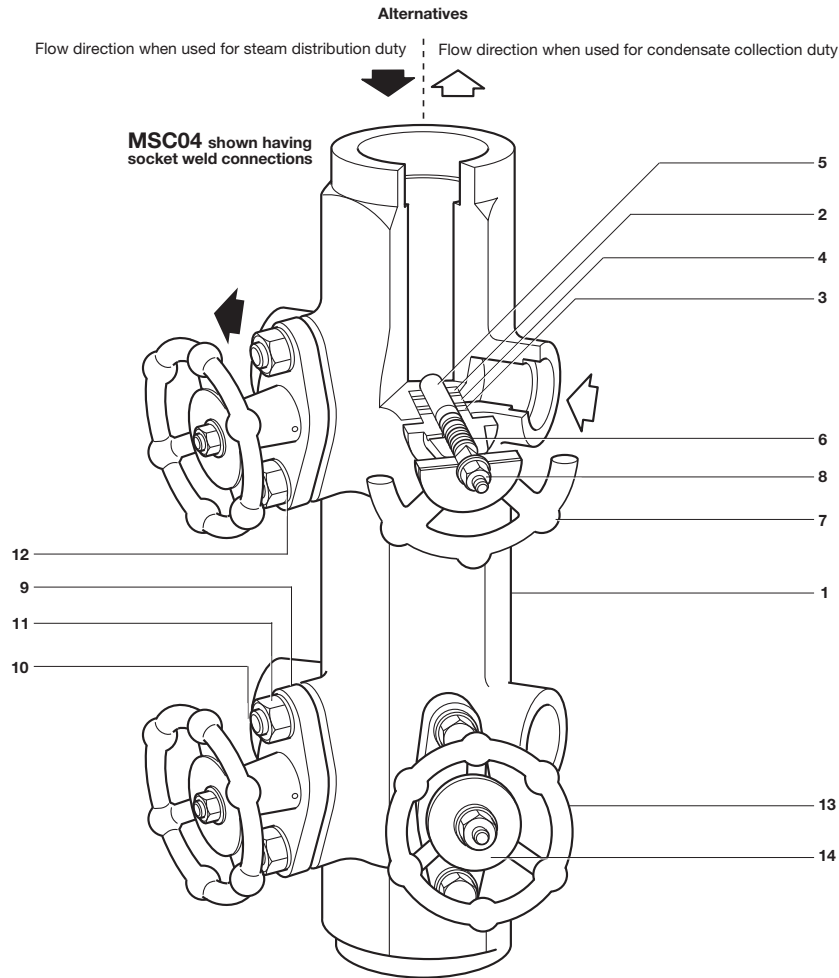
### Alternatives



**MSC04** shown having socket weld connections

Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only.  
In the interests of development and improvement of the product, we reserve the right to change the specification.

TI-6-804-US 3.14



## Materials

No.	Part	Material	
1	Body	Carbon steel	ASTM A105N or ASTM A350 LF2
2	Lower ring	Graphite and stainless steel	
3	Upper ring	Graphite and stainless steel	
4	Lantern bush	Steel	
5	Piston	Stainless steel	ASTM A479 F316
6	Spindle	Stainless steel	ASTM A479 F410
7	Handwheel	Carbon steel	ASTM A105N
8	Handwheel nut	Steel	
9	Bonnet	Carbon steel	ASTM A105N or ASTM A350 LF2
10	Studs	Stainless steel	ASTM A193 Gr. B8
11	Nuts	Stainless steel	ASTM A194 Gr. 8
12	Washers	Stainless steel	
13	Handwheel	Stainless steel	
14	Name-plate	Stainless steel	

## Spare parts

The spare parts available are detailed below. For ease of replacement an extractor tool is available for removing the sealing rings.

### Available spares

Sealing ring set	2, 3
Valve internals set	2, 3, 4, 5, 6, 8, 13
Extractor tool	

### How to order spares

Always order spares by using the description given in the column headed 'Available spares' and state the type and size of manifold.

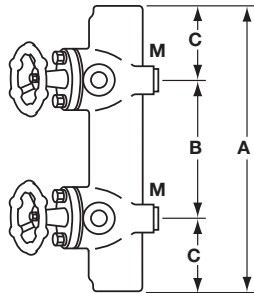
**Example:** 1 off Sealing ring set for an integral piston valve on a carbon steel manifold MSC04 1/2" socket weld.

TI-6-804-US 3.14

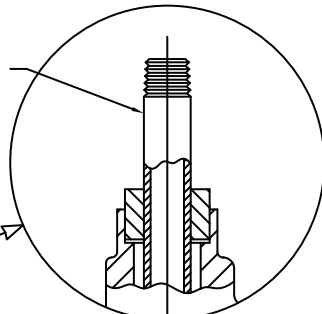
**Dimensions & weights (nominal) in inches/mm and lb/kg**

Type	A	B	C	D	E	F	G	H	J	K	L	M	N	Weight
MSC04	13.0 330	6.3 160	3.3 85	4.3 110	2.8 71	1.9 48	1.5 38	3.0 75	4.3 110	5.1 130	2.0 50	M12	1.8 45	22 lb 10 kg
MSC08	25.6 650	6.3 160	3.3 85	4.3 110	2.8 71	1.9 48	1.5 38	3.0 75	4.3 110	5.1 130	2.0 50	M12	1.8 45	44 lb 20 kg
MSC12	38.2 970	6.3 160	3.3 85	4.3 110	2.8 71	1.9 48	1.5 38	3.0 75	4.3 110	5.1 130	2.0 50	M12	1.8 45	66 lb 30 kg

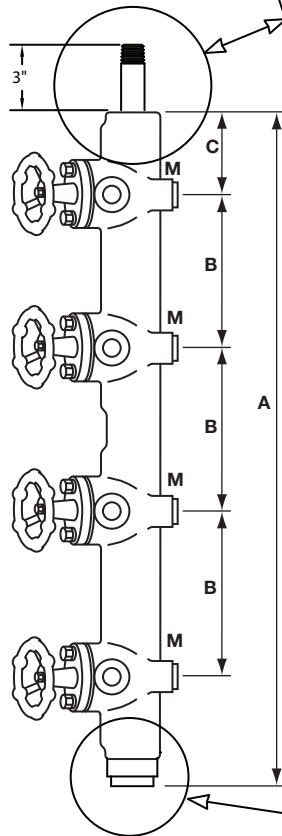
**MSC04**



3/4" A106 PIPE  
SCH. 80 M.N.P.T.  
SIPHON TUBE

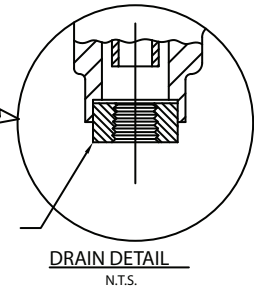


**OUTLET DETAIL**  
N.T.S.



**MSC08**  
Shown as condensate  
collection manifold

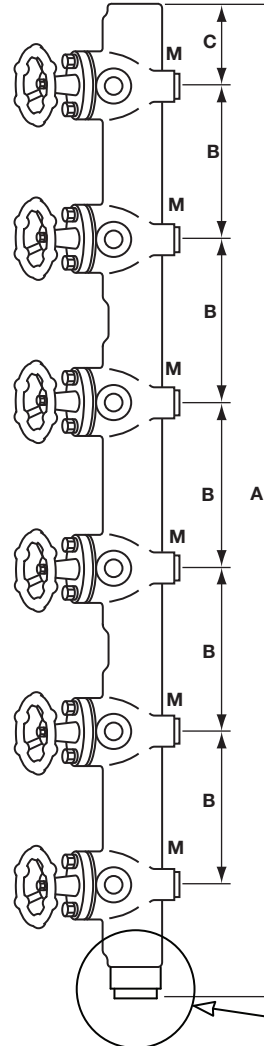
3/4" NPT 6000#  
HALF COUPLING



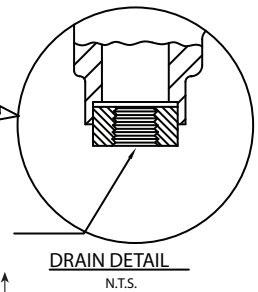
**DRAIN DETAIL**  
N.T.S.

**MSC12**

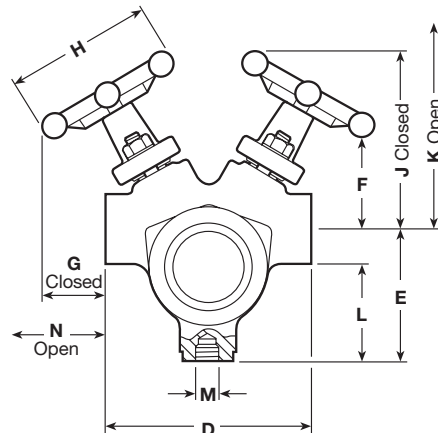
Shown as steam  
distribution  
manifold



3/4" NPT 6000#  
HALF COUPLING



**DRAIN DETAIL**  
N.T.S.



Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only.  
In the interests of development and improvement of the product, we reserve the right to change the specification.

## Safety information, installation and ancillaries

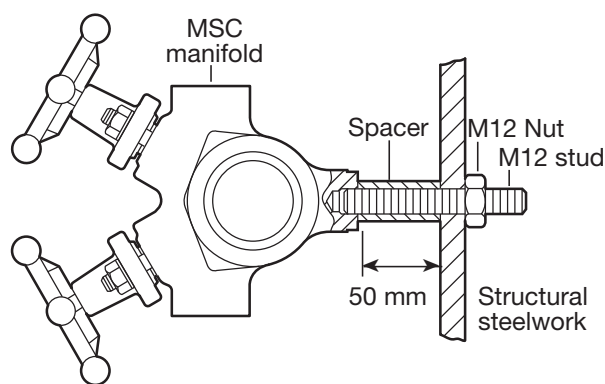
For full details see the Installation and Maintenance Instructions supplied with the product.

### General

These manifolds have been designed for vertical installation. The back is provided with M12 threaded connections for ease of installation by attaching to a supporting structure. For ease of installation it is recommended that spacers are fitted to give the manifold a stand-off of at least 2" (50mm). Following installation it is recommended that the manifold is insulated to minimize radiated heat losses and to protect personnel from burn risks. For convenience the following mounting kits (comprising 50mm spacers and M12 studs and nuts) and thermal insulation blankets are available.

### Ancillaries

Part Numbers	MSC04	MSC08	MSC12
Installation Kit	74287	74288	74289
Thermal Blanket (Steam)	1170063	1170263	1170463
Thermal Blanket (Condensate)	1170062	1170262	1170462



Installation view from above

## Steam distribution duty

The recommended installation is with the steam inlet connection at the top of the manifold. A trap set should be fitted to the bottom of the manifold. The discharge from this trap set should ideally be returned. If it is to be discharged to atmosphere we recommend that a diffuser is fitted.



## Condensate collection duty

The recommended installation is with the condensate outlet at the top. The bottom of the manifold should be fitted with a stop valve for blowdown purposes. Again, we recommend that a diffuser is fitted.

## How to order

**Example:** 1 off Spirax Sarco MSC08 steam distribution and condensate collection manifold in A105N forged carbon steel body with integral piston valves having 8 x 1/2" socket weld connections to ANSI B 16.11 Class 3000.

## Recommended tightening torques

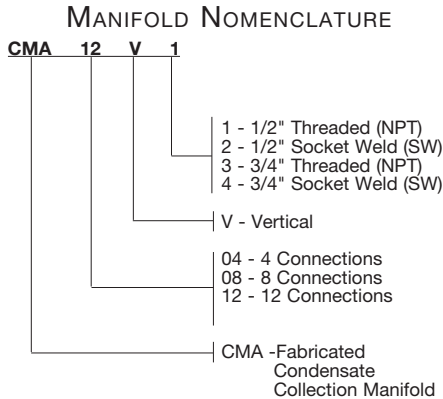
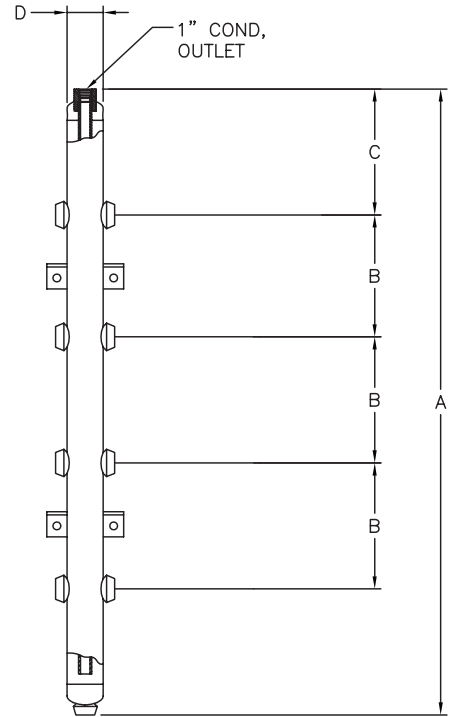
Item	Part	 or mm		N m
8	Handwheel nut	10 A/F	M6	0.1
11	Bonnet nuts	14 A/F		5.0



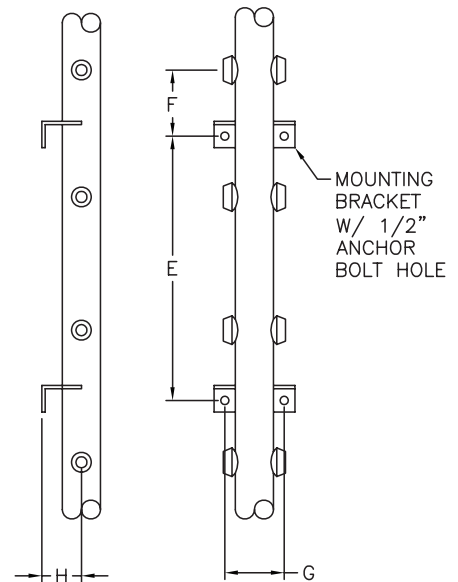
## Vertical Condensate Collection Manifold – Fabricated

The CMAV condensate collection manifold is a fabricated assembly designed for vertical installation to facilitate centralized recovery of condensate from up to 12 sources. Condensate is collected within the shell and discharged through the top via an internal siphon pipe. The water seal created by the siphon tube promotes even temperature distribution and ensures single phase discharge of condensate. The compact design provides easy access for trap maintenance and monitoring, while the mounting and connection arrangement permits fast installation.

Model	CMAV
<b>PMA</b>	720 psig at 508°F (50 barg at 264°C)
<b>Hydrotest Pressure</b>	1,080 psig (74 barg)
<b>Number of Connections</b>	4, 8, 12
<b>Connection Sizes</b>	1/2", 3/4"
<b>Connection Types</b>	NPT, SW to ANSI B16.11 Cl. 3000
<b>Construction</b>	Carbon Steel ASTM A106 Gr.B Sch. 80 Forged Steel A105 Cl.3000 All welding in accordance with Section IX of the ASME Boiler and Pressure Vessel Code
<b>Options</b>	Preassembled with steam trap stations Consult factory



Condensate Collection Manifold dimensions (nominal) in inches & mm											
Model Number	Tracer		A	B	C	D	E	F	G	H	Approx. Weight
	N°	Size									
CMA04V1/V2	4	1/2"	29.6	10	10	2.9	N/A	5.0	4.5	3.0	17 lb
			752	254	254	74	N/A	127	114	76	8 kg
CMA04V3/V4	4	3/4"	29.6	10	10	2.9	N/A	5.0	4.5	3.0	17 lb
			752	254	254	74	N/A	127	114	76	8 kg
CMA08V1/V2	8	1/2"	49.6	10	10	2.9	20	5.0	4.5	3.0	39 lb
			1260	254	254	74	508	127	114	76	18 kg
CMA08V3/V4	8	3/4"	49.6	10	10	2.9	20	5.0	4.5	3.0	39 lb
			1260	254	254	74	508	127	114	76	18 kg
CMA12V1/V2	12	1/2"	69.6	10	10	2.9	20	5.0	4.5	3.0	54 lb
			1768	254	254	74	508	127	114	76	25 kg
CMA12V3/V4	12	3/4"	69.6	10	10	2.9	20	5.0	4.5	3.0	54 lb
			1768	254	254	74	508	127	114	76	25 kg

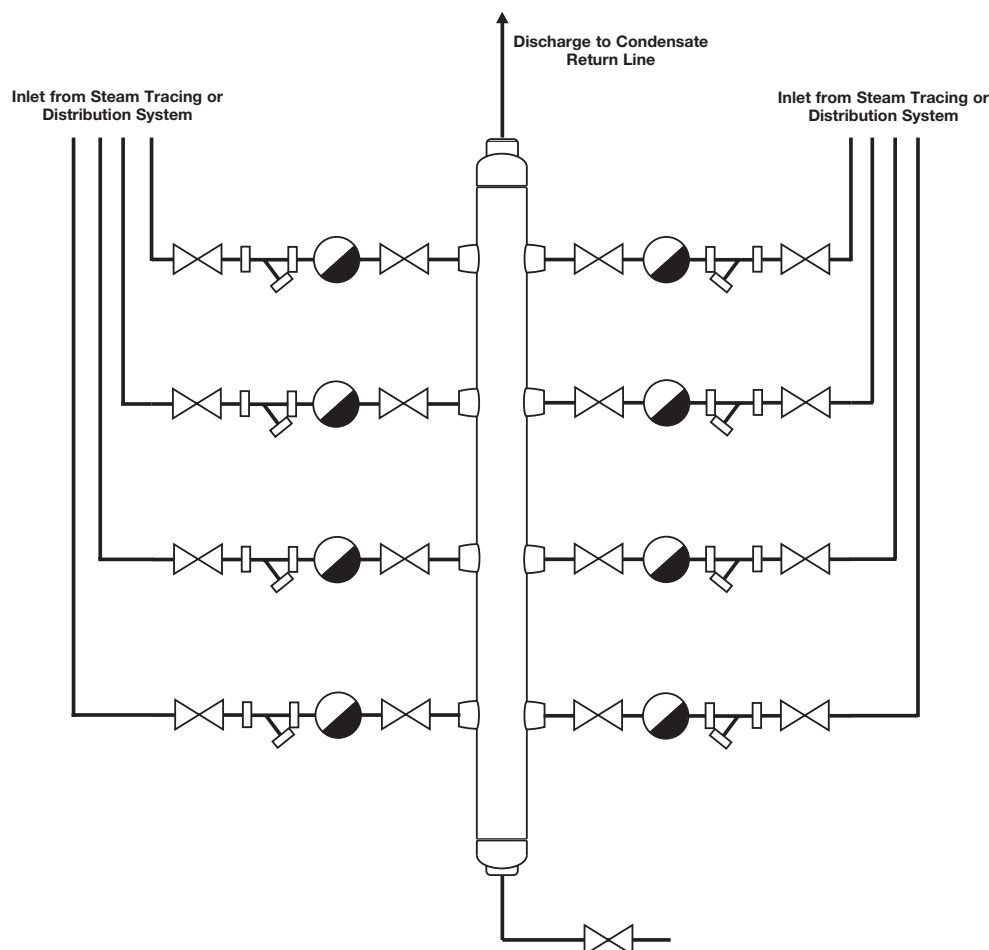


CMA08V

Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only.  
In the interests of development and improvement of the product, we reserve the right to change the specification.

# Vertical Condensate Collection Manifold Fabricated

## TYPICAL HOOK-UP FOR 8 CONNECTION MANIFOLD



### SAMPLE SPECIFICATION

The condensate collection manifold shall be Spirax Sarco model CMA12V designed for vertical orientation to accommodate up to 12 condensate sources.

### CONSTRUCTION FEATURES

The unit shall include an internal siphon pipe designed to provide a water seal at all condensate loads to ensure single phase discharge and even temperature distribution. The assembly shall have a 1" discharge connection at the top and a 3/4" drain connection that permits complete drainage during maintenance. Support brackets are to be provided for fast installation. Connections shall be provided on up to 3 sides and spaced to accommodate any valve orientation without interference from adjoining piping. The design is to be compact enough such that all traps and other connected equipment are within easy reach for servicing. Construction shall consist of ASTM A106 Gr. B carbon steel 2-1/2" Sch. 80 pipe with ANSI Cl. 3000 connections. Welding is to be performed in accordance with Section IX of the ASME Boiler & Pressure Vessel Code. The assembly shall be hydrostatically tested to 1.5 times design pressure, sandblasted, and provided with one coat industrial heat resistant coating (gray) maximum temperature 850°F.

### INSTALLATION

The manifold is to be installed vertically with the condensate discharge connection at the top as shown. Isolation valves, steam traps, strainers, and other required equipment are attached on up to 3 sides at the connections provided. Mounting is accomplished using the brackets supplied on the back side of the unit. For outdoor installations, a freeze protection device fitted to the 3/4" drain connection is recommended.

### OPTIONS

Each manifold can be supplied with a wide selection of valves, traps, and other equipment as a completely fabricated and tested assembly. Consult factory for specific applications.

### TYPICAL APPLICATIONS

The manifold can be utilized wherever multiple sources of condensate from steam traps need to be centrally collected in a vertical orientation. This includes steam tracing, light condensate-producing equipment, separators, and steam main drips.

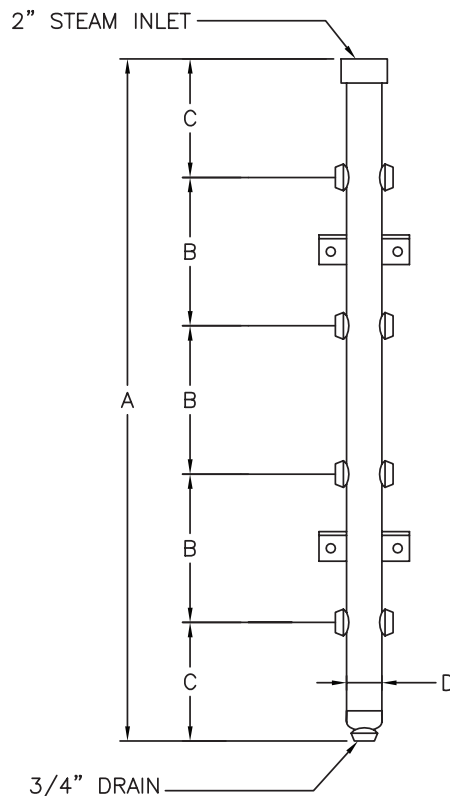
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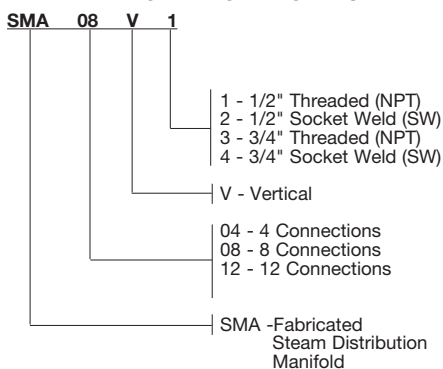
## Vertical Steam Distribution Manifold – Fabricated

The SMAV steam distribution manifold is a fabricated assembly designed for vertical installation to provide up to 12 steam distribution points. The compact design provides easy access for isolation valve operation and maintenance, while the mounting and connection arrangement permits fast flexibility of installation. Used in conjunction with the forged or fabricated condensate collection manifolds.

Model	SMAV
<b>PMA</b>	720 psig at 508°F (50 barg at 264°C)
<b>Hydrotest Pressure</b>	1,080 psig (74 barg)
<b>Number of Connections</b>	4, 8, 12
<b>Connection Sizes</b>	1/2", 3/4"
<b>Connection Types</b>	NPT, SW to ANSI B16.11 Cl. 3000
<b>Construction</b>	Carbon Steel ASTM A106 Gr.B Sch. 80 Forged Steel A105 Cl.3000 All welding in accordance with Section IX of the ASME Boiler and Pressure Vessel Code
<b>Options</b>	Preassembled with isolation valves Consult factory

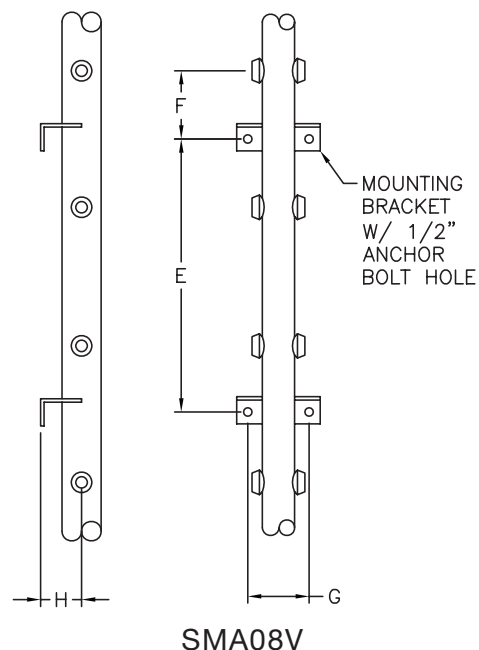


### MANIFOLD NOMENCLATURE



Steam Distribution Manifold dimensions (nominal) in inches & mm

Model Number	Tracer		A	B	C	D	E	F	G	H	Approx Weight
	N°	Size									
SMA04V1/V2	4	1/2"	26	10	8.0	2.4	N/A	5.0	4.5	3.0	10 lb
			660	254	203	61		127	114	76	5 kg
SMA04V3/V4	4	3/4"	26	10	8.0	2.4	N/A	5.0	4.5	3.0	10 lb
			660	254	203	61		127	114	76	5 kg
SMA08V1/V2	8	1/2"	46	10	8.0	2.4	20	5.0	4.5	3.0	22 lb
			1168	254	203	61	508	127	114	76	10 kg
SMA08V3/V4	8	3/4"	46	10	8.0	2.4	20	5.0	4.5	3.0	22 lb
			1168	254	203	61	508	127	114	76	10 kg
SMA12V1/V2	12	1/2"	66	10	8.0	2.4	20	5.0	4.5	3.0	30 lb
			1676	254	203	61	508	127	114	76	14 kg
SMA12V3/V4	12	3/4"	66	10	8.0	2.4	20	5.0	4.5	3.0	30 lb
			1676	254	203	61	508	127	114	76	14 kg

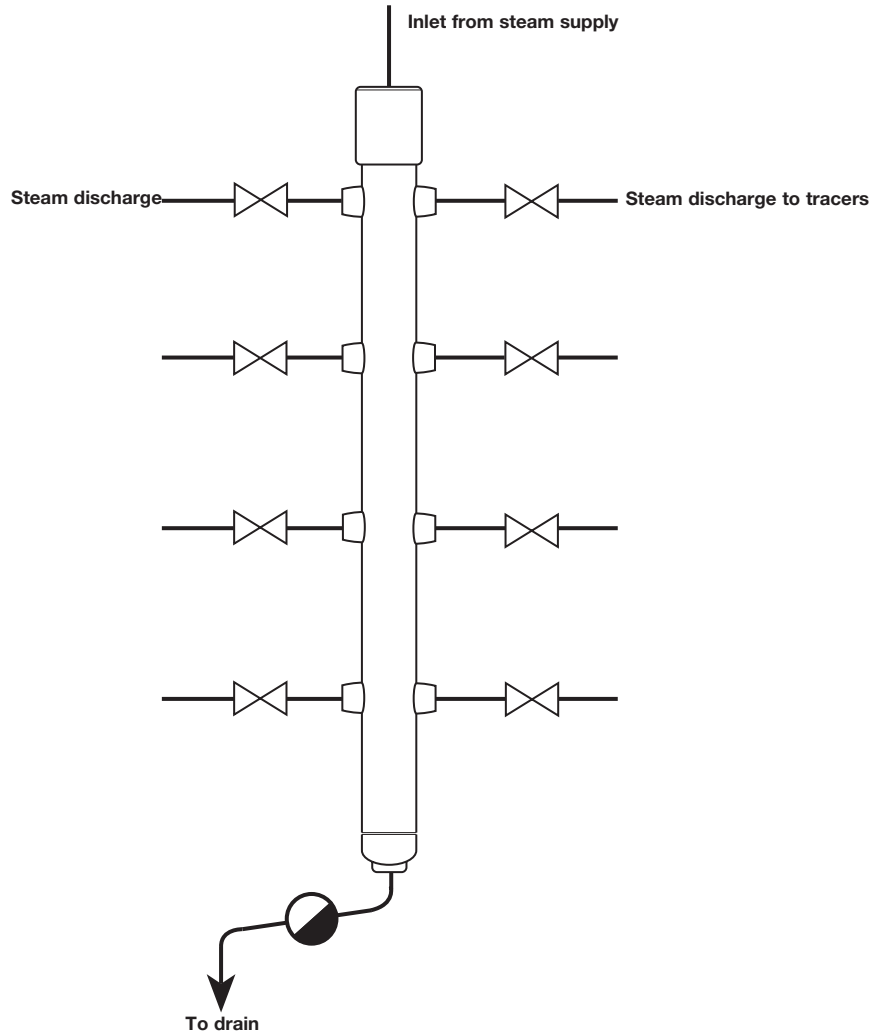


Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only.  
In the interests of development and improvement of the product, we reserve the right to change the specification.



# Vertical Steam Distribution Manifold Fabricated

## TYPICAL HOOK-UP OF 8 CONNECTION MANIFOLD



### SAMPLE SPECIFICATION

The steam distribution manifold shall be Spirax Sarco model SMA12V designed for vertical orientation to provide up to 12 steam distribution points.

### CONSTRUCTION FEATURES

The assembly shall have a 2" inlet connection at the top and a 3/4" drain connection that permits complete drainage during maintenance. Support brackets are to be provided for flexibility of installation. Connections shall be provided on up to 3 sides and spaced to accommodate any valve orientation without interference from adjoining piping. The design is to be compact enough such that all connected equipment are within easy reach for servicing. Construction shall consist of ASTM A106 Gr. B carbon steel 2" Sch. 80 pipe with ANSI Cl. 3000 connections. Welding is to be performed in accordance with Section IX of the ASME Boiler & Pressure Vessel Code. The assembly shall be hydrostatically tested to 1.5 times design pressure and supplied with one coat of industrial heat resistant coating (gray) maximum temperature 850°F

### INSTALLATION

The manifold is to be installed vertically with the steam inlet connection at the top as shown. Isolation valves and piping are attached on up to 3 sides at the connections provided. Mounting is accomplished using the brackets supplied on the back side of the unit. An appropriately sized steam trap fitted to the 3/4" drain connection is recommended.

### OPTIONS

Each manifold can be supplied with a wide selection of isolation valves and drainage trap as a completely fabricated and tested assembly. Consult factory for specific applications.

### TYPICAL APPLICATIONS

The SMAV manifold can be utilized wherever multiple sources of steam need to be centrally distributed in a vertical orientation, such as steam tracing applications.

# Condensate Recovery Solutions





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Non-Electric Pumps

Electric Pumps

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## The Pivotrol® Pump Patented PTC Pressure Powered Pump

### Description

The Spirax Sarco **Pivotrol® Pump** (patented) is a non electric pump which transfers high temperature condensate, or other liquids from a low point, low pressure or vacuum space to an area of higher pressure or elevation. This self-contained unit including **PowerPivot®** technology (patented) uses steam, compressed air or any other suitable pressurized gas as the pumping force. **The standard Pivotrol® Pump (patented) will handle liquids from 0.9 to 1.0 specific gravity.**

Model	PTC	PTC-T-bone
<b>PMO</b>	200 psig (13.8 barg)	
<b>Sizes</b>	2" x 2", 3" x 2"	3" x 3"
<b>Connections</b>	Cover: NPT Liquid: ANSI 150/NPT	
<b>Construction</b>	Ductile Iron	
<b>Warranty</b>	3 Million Cycles or 5 Year Warranty, whichever number is achieved first. Lifetime Warranty on Spring	
<b>Options</b>	Pump modified to handle liquids down to 0.65 specific gravity, 5 Million Cycles or 5 Year Warranty	

### Accessories

- Gauge glass with brass cocks.
- Reflex type gauge glass -Insulation cover.

### Capacities

For sizing and selection data, see TI-5-030-US

### Standards

The product fully complies with the requirements of the European Pressure Equipment Directive 97/23/EC and carries the **CE** mark when so required (must be specified at the time of order).

### Operating Characteristics

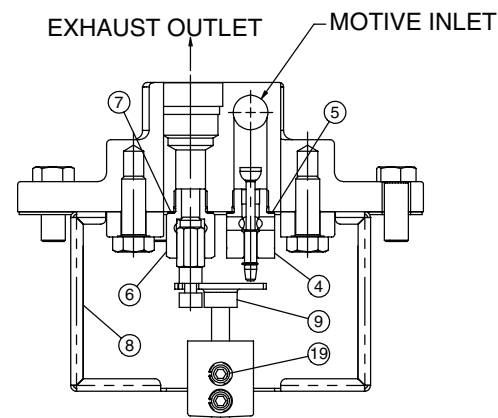
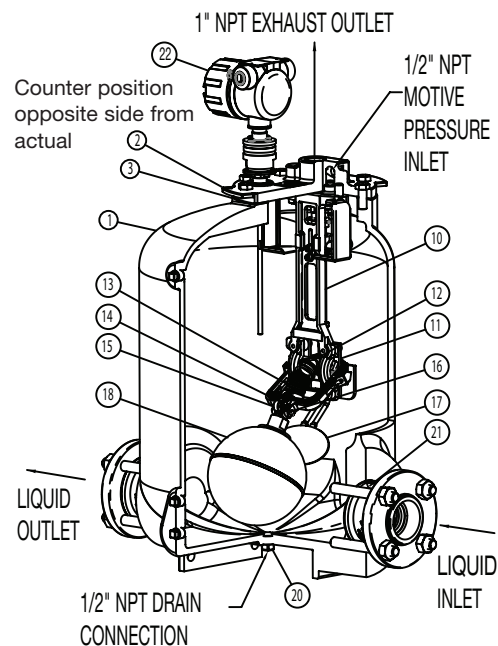
Pump discharge per cycle –	7.1 gal (26.9 l) Nominal
Average instantaneous discharge rate –	See TI-5-030-US
Steam/Air Consumption –	3 lbs. per 1000 lbs. of liquid pumped

#### For increased service life –

Operate pump with motive pressure 15-20 psig above pump back pressure.

### Construction Materials

No.	Part	Material	Spec
1	Body	Ductile Iron	ASTM A395
2	Cover	Ductile Iron	ASTM A395
3	Cover Gasket	Grafoil	
4	Steam Inlet Valve Assembly	Stainless Steel	
5	Steam Inlet Valve Gasket	Stainless Steel	
6	Exhaust Valve Assembly	Stainless Steel	
7	Exhaust Valve Gasket	Stainless Steel	
8	Baffle	Stainless Steel	
9	Push Rod Assembly	Stainless Steel	
10	Mechanism Support	Stainless Steel	
11	Bushing Mounting Plate (Bushings)	Stainless Steel Carbide	
12	Spring Anchor	Carbide	
13	Spring	Inconel	
14	Float Arm Assembly (Pivots)	Stainless Steel Carbide	
15	Float Pivot	Stainless Steel	
16	Pin	Stainless Steel	
17	Paddle	Stainless Steel	
18	Float	Stainless Steel	
19	Screws (typical)	Stainless Steel	
20	Plugs (typical)	Forged Steel	
21	Check Valves (SDCV44)	Stainless Steel (see TI-7-224-US)	
22	Cycle Counter	Various (see TI-5-020-US)	



# The Pivotrol® Pump Patented

## PTC Pressure Powered Pump

### Dimensions (nominal) in inches and millimeters

PTC Size	A	B	C	D	E	F	G	H*	I	J (Ref Only)	Weight Pump
2" PTC w/Stn. Stl. Check Valves	23.3 592	11.3 286	14 354	24.9 630	5.1 129	4.5 114	3.9 99	24.2 612	6.1 155	31.6 803	260 lb 118 kg
3" x 2" PTC w/Stn. Stl. Check Valves	23.9 607	11.3 286	14 354	24.9 630	5.1 129	4.5 114	3.9 99	24.2 612	6.1 155	31.6 803	270 lb 122 kg
PTC w/T-Bone 3" x 3" w/Stn. Stl. Check Valves	19.2 488	13.8 351	14 356	24.9 632	5.1 130	N/A N/A	4.5 114	24.2 615	6.1 155	31.6 803	280 lb 127 kg

\* H Dimension is to the centerline of the motive supply inlet.

### Limiting Operating Conditions

<b>PMO</b>	200 psig (13.8 barg)
<b>Max. Operating Pressure</b>	
Minimum motive differential required:	5 psig

Filling Head Requirements	Filling Head Above Pump Cover	Filling Height From Base of Pump
Standard recommended	12" (305mm)	36.9" (951mm)
Max filling head	48" (1219mm)	72.9" (1852mm)
Min filling head	2x2 -3" (-76mm)	21.9" (556mm)
	3x2 -1" (-25mm)	23.9" (607mm)
T-Bone	3x3 -1" (-25mm)	23.9" (607mm)
Max Number of Cycles per minute = 6		
Specific gravity of pumped liquid options = 0.9 to 1.0; 0.8 to 0.89; 0.65 to 0.79		

**Note:** See TI-5-020-US for cycle counter details

### Pressure Shell Design Conditions

<b>PMA</b>	200 psig@400°F	(13.8 barg@204°C)
Max. allowable pressure		
<b>TMA</b>	400°F@200 psig	(204°C@13.8 barg)
Max. allowable temperature		

### Sample Specification

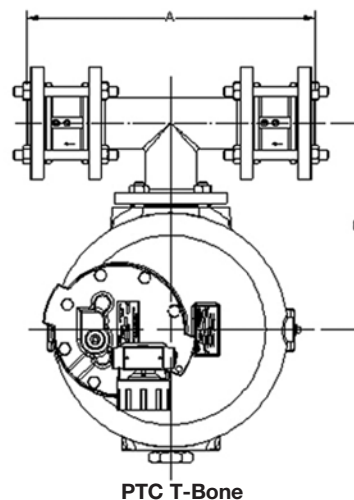
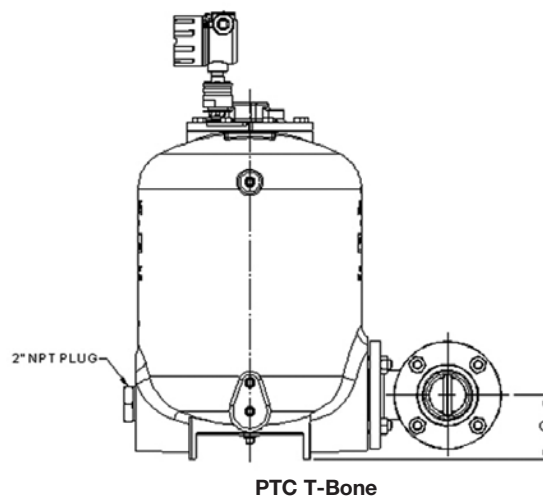
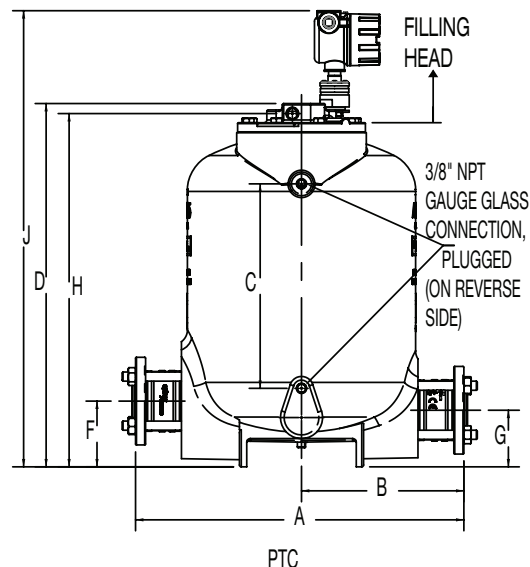
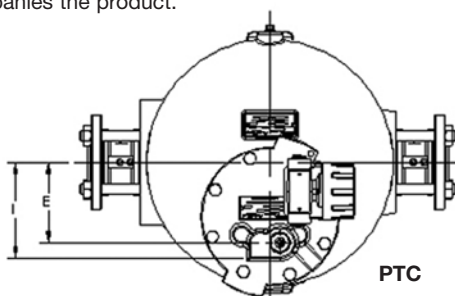
The pump shall be Spirax Sarco Pivotrol® Pump (patented) operated by steam, compressed air or other pressurized gas to 200 psig, which does not require any electrical energy. The pump shall have stainless steel, split disc check valves on the inlet and outlet connections. The pump shall contain Spirax Sarco PowerPivot® (patented) inside to ensure longevity and reliability of the pump. The Pivotrol® Pump (patented) shall include an Inconel spring with a lifetime warranty and be supplied with an integral cycle counter to monitor a 3 million cycle or 5 year warranty, which ever number is achieved first. When required the pump shall be supplied with a gauge glass and custom designed insulation jacket.

### Installation

Full details are given in IM-5-201-US, which accompanies the product.

### Maintenance

Complete installation and maintenance instructions are given in IMI-5-201-US which accompanies the product.







## The Pivotrol® Pump Patented PTF Pressure Powered Pump Series

### Description

The Spirax Sarco **Pivotrol® Pump** (patented) is a non electric pump which transfers high temperature condensate, or other liquids from a low point, low pressure or vacuum space to an area of higher pressure or elevation. This self-contained unit including **PowerPivot®** technology (patented) uses steam, compressed air or any other suitable pressurized gas as the pumping force. **The standard Pivotrol® Pump (patented) will handle liquids from 0.9 to 1.0 specific gravity.** Suitable for use in hazardous environments and volatile fluid pumping applications. See IM-5-201-US for full details.

Model	PTF	PTF - Stainless Steel	PTF - Top Inlet	PTF - T-Bone
PMO	200 psig (13.8 barg)			
Sizes	2" x 2", 3" x 2"		3" x 3"	
Connections	Cover: NPT Liquid: ANSI 150/NPT			
Construction	ASME Coded Steel			
Warranty	3 Million Cycles or 5 Year Warranty, whichever number is achieved first. Lifetime Warranty on Spring			
Options	Pump modified to handle liquids down to 0.65 specific gravity, gauge glass reflex			

### Accessories

- Gauge glass with brass cocks.
- Reflex type gauge glass -Insulation cover.

### Capacities

For sizing and selection data, see TI-5-030-US

### Standards

The product fully complies with the requirements of the European Pressure Equipment Directive 97/23/EC and carries the **CE** mark when so required (must be specified at the time of order). **CE** marked products are not ATEX approved, therefore are not suitable in hazardous environments or volatile fluid pumping applications in the EU.

### Operating Characteristics

Pump discharge per cycle –	8.4 gal (31.8 l) <i>Nominal</i>
Average instantaneous discharge rate –	90 gpm (5.7 l/s)
Average Steam Consumption –	3 lbs. per 1000 lbs. of liquid pumped
Average Air Consumption –	60 SCF per 1000 lbs. of liquid pumped
Filling head recommended above centerline of inlet check valve is 12" (305mm).	

### For increased service life –

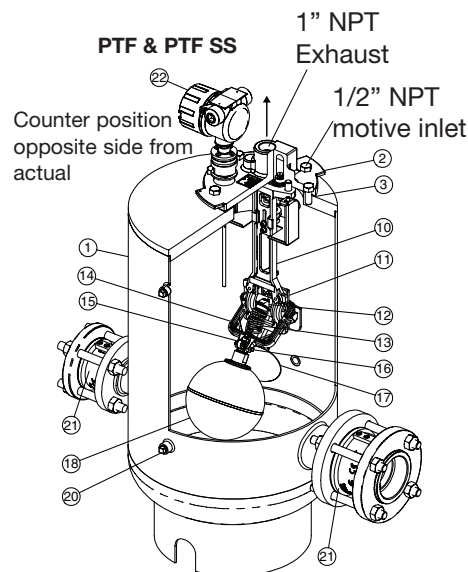
**Operate pump with motive pressure 15-20 psig above pump back pressure.**

### Construction Materials

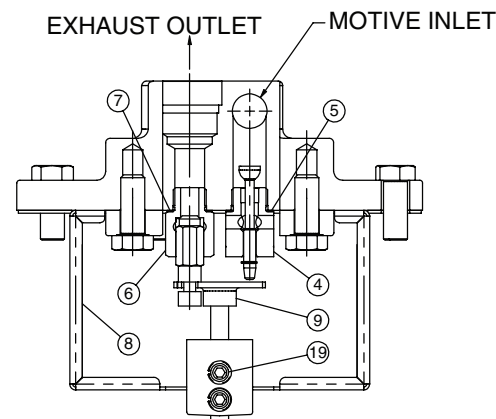
No.	Part	Material	Spec
1	Body	PTF - Fabricated Steel	ASME Coded
		PTF Top: Fabricated Steel	ASME Coded
		PTF SS: Fabricated St. Steel	ASME Coded
2	Cover	PTF - Cast Steel	ASTM SA216WCB
		PTF Top: Cast Steel	ASTM 216WCB
		PTF SS: Cast Stainless Steel	ASTM A351 CF8M
3	Cover Gasket	Grafoil	
4	Steam Inlet Valve Assembly	Stainless Steel	
5	Steam Inlet Valve Gasket	Stainless Steel	
6	Exhaust Valve Assembly	Stainless Steel	
7	Exhaust Valve Gasket	Stainless Steel	
8	Baffle	Stainless Steel	
9	Push Rod Assembly	Stainless Steel	
10	Mechanism Support	Stainless Steel	
11	Bushing Mounting Plate (Bushings)	Stainless Steel Carbide	
12	Spring Anchor	Carbide	
13	Spring	Inconel	
14	Float Arm Assembly (Pivots)	Stainless Steel Carbide	
15	Float Pivot	Stainless Steel	
16	Pin	Stainless Steel	
17	Paddle	Stainless Steel	
18	Float	Stainless Steel	
19	Screws (typical)	Stainless Steel	
20	Plugs (typical)	Forged Steel	
21	Check Valves (SDCV44)	Stainless Steel (see TI-7-224-US)	
22	Cycle Counter	Various (see TI-5-020-US)	

*Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only.*

*In the interests of development and improvement of the product, we reserve the right to change the specification.*



See reverse for Top Inlet and T-Bone views



# The Pivotrol® Pump Patented

## PTF Pressure Powered Pump Series

### Dimensions (nominal) in inches and millimeters

PTF- Stainless Steel Size	A	B	C	D	E	F	G	H*	I	J	K	L	M	N	O	Weight Pump
2" x 2" PTF-SS	29.2	14.4	14	32.1	5.1	11	10.4	31.5	6.3	37.3	0.6	N/A	N/A	N/A	N/A	210 lb
Check Valves	742	364	354	815	129	278	263	800	160	947	15	N/A	N/A	N/A	N/A	95 kg
3" x 2" PTF-SS	30.2	14.4	14	32.1	5.1	11	10.4	31.5	6.3	37.3	0.6	N/A	N/A	N/A	N/A	230 lb
Check Valves	767	364	354	815	129	278	263	800	160	947	15	N/A	N/A	N/A	N/A	104 kg
3" x 3" PTF-Top	19.2	9.6	N/A	32.1	N/A	12	N/A	31.5	N/A	44.7	0.6	12	16	5.8	3	230 lb
Check Valves	488	244	N/A	815	N/A	305	N/A	800	N/A	1135	15	305	406	147	76	104 kg
3" x 3" PTF-T Bone	19.2	9.6	N/A	N/A	N/A	N/A	1.0	N/A	N/A	N/A	N/A	N/A	N/A	17.1	3	230 lb
Check Valves	488	244	N/A	N/A	N/A	N/A	279	N/A	N/A	N/A	N/A	N/A	N/A	434	76	104 kg

\* H Dimension is to the centerline of the motive supply inlet.

### Limiting Operating Conditions

#### PMO

Max. Operating Pressure 200 psig (13.8 barg)

Minimum motive differential required: 5 psig

Filling Head Requirements	Filling Head Above Pump Cover	Filling Height From Base of Pump
Standard recommended	12" (305mm)	42.8" (1087mm)
Max filling head	PTF-SS 48" (1219mm)	78.8" (2002mm)
Min filling head	PTF-SS 2x2 -3" (-76mm)	27.8" (706mm)
	PTF-SS 3x2 -1" (-25mm)	29.8" (757mm)
Max filling head	PTF-Top 39" (199mm)	78.8" (2002mm)
	PTF-Top 12" (305mm)	52.9" (1344mm)

Max Number of Cycles per minute = 6

Specific gravity of pumped liquid options = 0.9 to 1.0; 0.8 to 0.89; 0.65 to 0.79

### Pressure Shell Design Conditions

<b>PMA</b>	200 psig@400°F	(13.8 barg@204°C)
Max. allowable pressure	125 psig@650°F	(8.6 barg@343°C)
<b>TMA</b>	400°F@200 psig	(204°C@13.8 barg)
	650°F@125 psig	(343°C@8.6 barg)

Consult the factory for pressure/temperature rating with reflex gauge glass

### Sample Specification

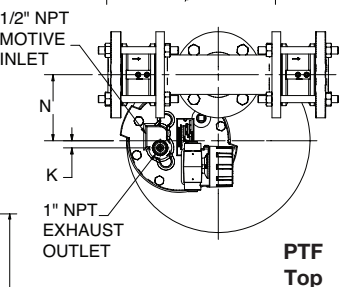
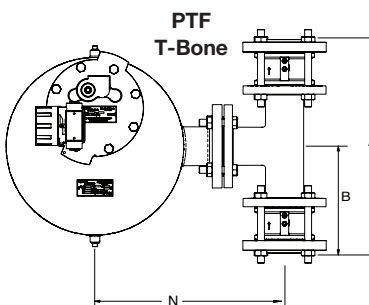
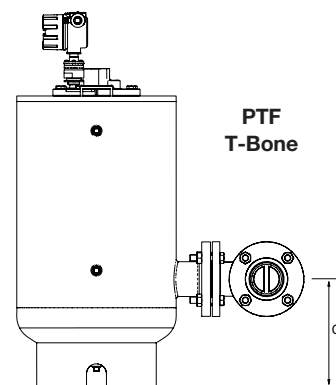
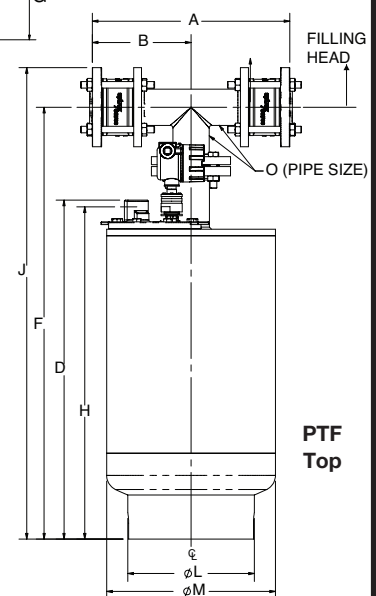
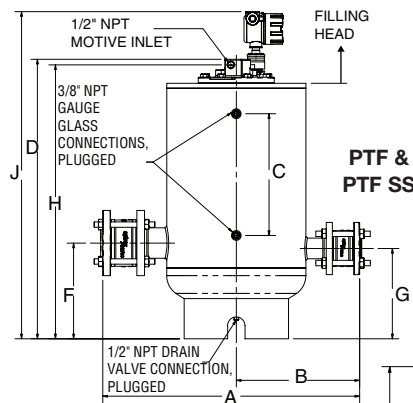
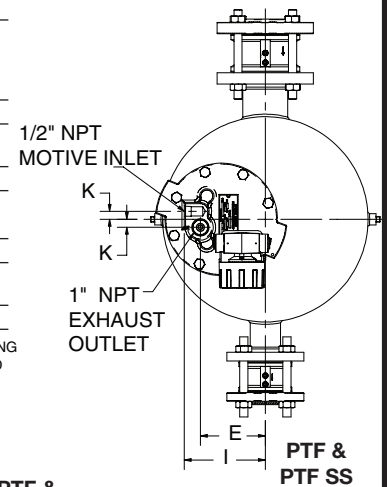
The pump shall be Spirax Sarco Pivotrol® Pump (patented) operated by steam, compressed air or other pressurized gas to 200 psig, which does not require any electrical energy. The pump shall have stainless steel, split disc check valves on the inlet and outlet connections. The pump shall contain Spirax Sarco PowerPivot® (patented) inside to ensure longevity and reliability of the pump. The Pivotrol® Pump (patented) shall include an Inconel spring with a lifetime warranty and be supplied with an integral cycle counter to monitor a 3 million cycle or 5 year warranty, which ever number is achieved first. When required the pump shall be supplied with a gauge glass and custom designed insulation jacket.

### Installation

Full details are given in IM-5-201-US, which accompanies the product.

### Maintenance

Complete installation and maintenance instructions are given in IMI-5-201-US which accompanies the product.







## The Pivotrol® Pump Patented PTF-HP Pressure Powered Pump

### Description

The Spirax Sarco **Pivotrol® Pump** (patented) is a non electric pump which transfers high temperature condensate, or other liquids from a low point, low pressure or vacuum space to an area of higher pressure or elevation. This self-contained unit including **PowerPivot®** technology (patented) uses steam, compressed air or any other suitable pressurized gas as the pumping force. **The standard Pivotrol® PTF-HP Pump (patented) will handle liquids from 0.88 to 1.0 specific gravity.** Suitable for use in hazardous environments and volatile fluid pumping applications. See IM-5-201-US for full details.

Model	PTF-HP
PMO	300 psig (20.7 barg)
Sizes	3" x 2" (DN80 x DN50)
Connections	Inlet & Outlet: ANSI 300 flange NPT/SW Motive & Exhaust: NPT/SW
Construction	Fabricated Steel Body 300 psig ASME Code Stamped Stainless Steel Internals
Warranty	3 Million Cycles or 5 Year Warranty, whichever number is achieved first. Lifetime Warranty on Spring
Options	Gauge glass assembly reflex

### Accessories

- Reflex type gauge glass - Insulation cover.

### Capacities

For sizing and selection data, see TI-5-030-US

### Standards

The product fully complies with the requirements of the European Pressure Equipment Directive 97/23/EC and carries the **CE** mark when so required (must be specified at time of order). **CE** marked products are not ATEX approved, therefore are not suitable in hazardous environments or volatile fluid pumping applications in the EU.

### Operating Characteristics

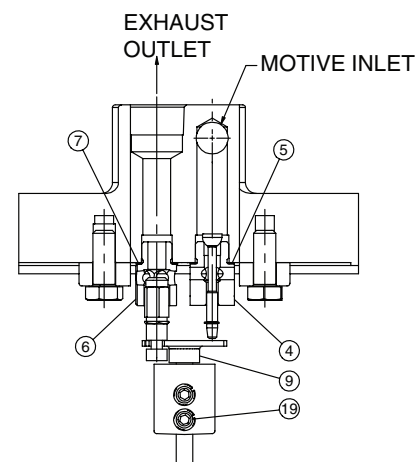
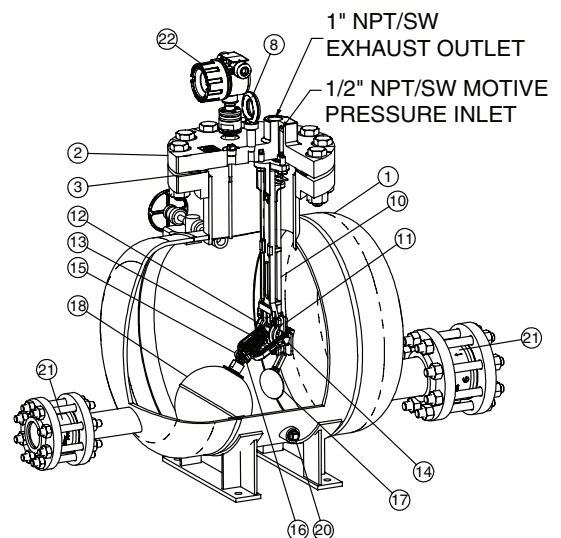
Pump discharge per cycle –	16 gal (60.6 l) Nominal
Maximum instantaneous discharge rate –	192 gpm (12.1 l/s)
Steam/Air Consumption –	See TI-5-030-US

For increased service life –

Operate pump with motive pressure 15-20 psig above pump back pressure.

### Construction Materials

No.	Part	Material	Spec
1	Body	Fabricated Steel	ASME coded
2	Cover	Cast Steel	ASTM A216 WCB
3	Cover Gasket	Spiral Wound	AISI 304/Graphite
4	Steam Inlet Valve Assembly	Stainless Steel	
5	Steam Inlet Valve Gasket	Stainless Steel	
6	Exhaust Valve Assembly	Stainless Steel	
7	Exhaust Valve Gasket	Stainless Steel	
8	Eye Bolt	Stainless Steel	
9	Push Rod Assembly	Stainless Steel	
10	Mechanism Support	Stainless Steel	
11	Bushing Mounting Plate (Bushings)	Stainless Steel Carbide	
12	Spring Anchor	Carbide	
13	Spring	Inconel	
14	Float Arm Assembly (Pivots)	Stainless Steel Carbide	
15	Float Pivot	Stainless Steel	
16	Pin	Stainless Steel	
17	Paddle	Stainless Steel	
18	Float	Stainless Steel	
19	Screws (typical)	Stainless Steel	
20	Plugs (typical)	Forged Steel	
21	Check Valves	Stainless Steel	
22	Cycle Counter	Various (see TI-5-020-US)	



Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only.  
In the interests of development and improvement of the product, we reserve the right to change the specification.

TI-5-209-US 4.15

# The Pivotrol® Pump Patented PTF-HP Pressure Powered Pump

## Dimensions (nominal) in inches and millimeters

A	B*	C	D	E	F	G	H	I	J	K	L	M	N	P	Q	Weight
32.8	32.1	6.0	6.8	0.6	2.8	4.0	45.1	22.1	14.5	18.7	9.0	4.5	5.8	20.0	30.8	472 lb
833	792	153	173	15	71	102	1141	559	368	475	229	114	147	508	782	214 kg

\*B Dimension is to the centerline of the motive supply inlet.

Reflex Gauge Glass weight = 23 lb (10.4 kg)

Cover and Mechanism Assembly weight = 101 lb (46 kg)

## Limiting Operating Conditions

### PMO

**Max. Operating Pressure** 300 psig (20.7 barg)

Minimum motive differential required: 5 psig

### Filling Head Requirements

	Filling Head Above Pump Cover	Filling Height From Base of Pump
Standard recommended	12" (305mm)	42.8" (1087mm)
Max filling head	60" (1524mm)	90.8" (2306mm)
Min filling head	0" (0mm)	30.8" (782mm)

Max Number of Cycles per minute = 6

**Note:** See TI-5-020-US for cycle counter details.

## Pressure Shell Design Conditions

### PMA

**Max. Allowable Pressure** 300 psig @ 650°F (20.7 barg @ 343°C)

### TMA

**Max. Allowable Temperature** 650°F @ 300 psig (343°C @ 20.7 barg)  
with Reflex Gauge Glass:  
600°F @ 300 psig (315°C @ 20.7 barg)

## Sample Specification

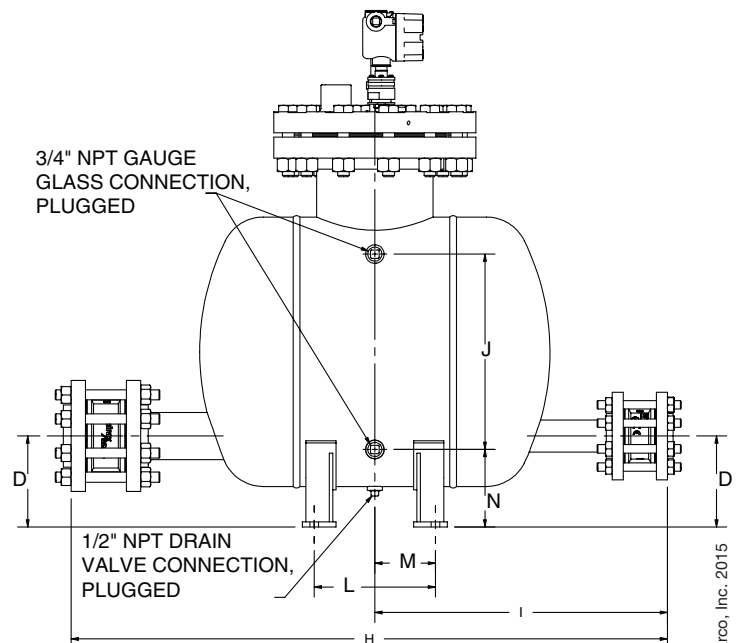
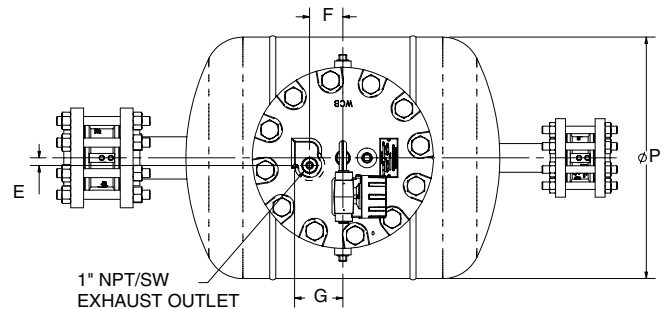
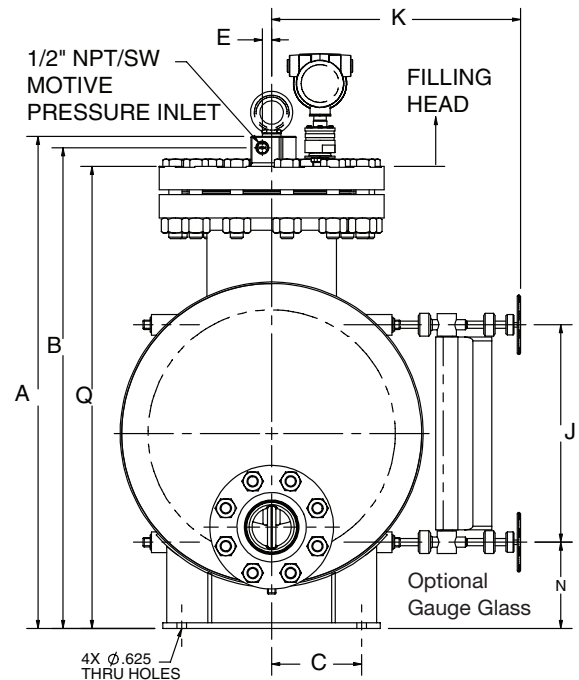
The pump shall be Spirax Sarco Pivotrol® Pump (patented) PTF-HP, operated by steam, compressed air or other pressurized gas to 300 psig, which does not require any electrical energy, and is capable of pumping liquids down to 0.88 specific gravity. The pump shall have stainless steel, split disc check valves on the inlet and outlet connections. The pump shall contain Spirax Sarco PowerPivot® (patented) technology to ensure longevity and reliability of the pump. The Pivotrol® Pump (patented) shall include an Inconel spring with a lifetime warranty and be supplied with an integral cycle counter to monitor a 3 million cycle or 5 year warranty, which ever number is achieved first. When required the pump shall be supplied with a reflex gauge glass.

## Installation

Full details are provided in IM-5-201-US which accompanies the product.

## Maintenance

Complete installation and maintenance instructions are given in IM-5-201-US, which accompanies the product.





## The Pivotrol® Pump Patented PTF-HTF Pressure Powered Pump

### Description

The Spirax Sarco **Pivotrol®** Pump (patented), featuring reliable **PowerPivot®** technology (patented) is specifically designed for use on heat transfer fluids, with specific gravity of .65 - .79, in a closed loop system. This self-contained unit uses the pressurized heat transfer fluid vapor phase as the pumping force to transport condensed heat transfer fluid from a low point, or low pressure space to an area of high pressure or elevation. Suitable for use in hazardous environments and volatile fluid pumping applications. See IM-5-201-US for full details.

Model	PTF-HTF
<b>PMO</b>	200 psig (13.8 barg)
<b>Sizes</b>	3" x 2"
<b>Connections</b>	Inlet & Outlet: ANSI 300 RF with surface finish 125-250 $\mu$ in. serrated concentric or spiral grooves per ANSI B16.5 Motive & Exhaust: SW ANSI B16.11 Drain: (2) ANSI 300 RF with surface finish 125-250 $\mu$ in. serrated concentric or spiral grooves per ANSI B16.5
<b>Construction</b>	ASME Coded Steel
<b>Warranty</b>	Lifetime Warranty on Spring

### Accessories

- Gauge glass with brass cocks.
- Reflex type gauge glass -Insulation cover.

### Capacities

For sizing and selection data, see TIS 5.030

### Operating Characteristics

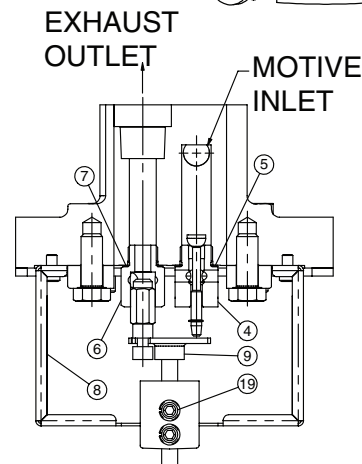
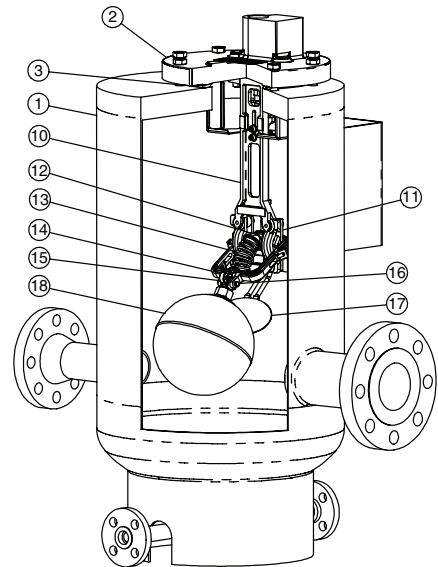
Pump discharge per cycle – 8.4 gal (31.8 l) *Nominal*  
Average instantaneous discharge rate – 90 gpm (5.7 l/s)

### For increased service life –

Operate pump with motive pressure 15-20 psig above pump back pressure.

### Construction Materials

No.	Part	Material	Spec
1	Body	Fabricated Steel	ASME coded
2	Cover	Cast Steel	ASTM SA216 WCB
3	Cover Gasket	Spiral-Wound Flexitallic Type 'LS'	
4	Steam Inlet Valve Assembly	Stainless Steel	
5	Steam Inlet Valve Gasket	Stainless Steel	
6	Exhaust Valve Assembly	Stainless Steel	
7	Exhaust Valve Gasket	Stainless Steel	
8	Baffle	Stainless Steel	
9	Push Rod Assembly	Stainless Steel	
10	Mechanism Support	Stainless Steel	
11	Bushing Mounting Plate (Bushings)	Stainless Steel Carbide	
12	Spring Anchor	Carbide	
13	Spring	Inconel	
14	Float Arm Assembly (Pivots)	Stainless Steel Carbide	
15	Float Pivot	Stainless Steel	
16	Pin	Stainless Steel	
17	Paddle	Stainless Steel	
18	Float	Stainless Steel	
19	Screws (typical)	Stainless Steel	



*Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only.  
In the interests of development and improvement of the product, we reserve the right to change the specification.*

TI-5-208-US 4.15

# The Pivotrol® Pump Patented

## PTF-HTF Pressure Powered Pump

**Dimensions** (nominal) in inches and *millimeters*

A	B*	C	D	E	F	G	H	I	J	K	L	M	Weight
34.6	33.4	12.2	11.6	2.0	16.0	15.0	30.0	19.0	9.5	6.1	4.4	.6	210 lb
879	848	310	295	51	406	381	762	483	241	155	112	15	95.3 kg

\*B Dimensions is to the centerline of the motive supply inlet.

### Limiting Operating Conditions

#### PMO

**Max. Operating Pressure**

200 psig (13.8 barg)

Minimum motive differential required:

5 psig

#### Filling Head Requirements

**Filling Head Above Pump Cover**

**Filling Height From Base of Pump**

Standard recommended

12" (305mm)

42.8" (1087mm)

Max filling head

48" (1219mm)

78.8" (2002mm)

Min filling head

-1" (-25mm)

29.8" (757mm)

Max Number of Cycles per minute = 6

### Pressure Shell Design Conditions

#### PMA

Max. allowable pressure 200 psig @ 750°F (13.8 barg @ 399°C)

#### TMA

Max. allowable temperature 750°F @ 200 psig (399°C @ 13.8 barg)

### Check Valves

Two check valves are required, but not supplied with the pump.

**Recommended check valves are 2" and 3" Velan Model F00-1114C-02AA ANSI 300 RF flanged cast steel swing type valves.** (All capacity data established with Velan check valves as specified.)

### Sample Specifications

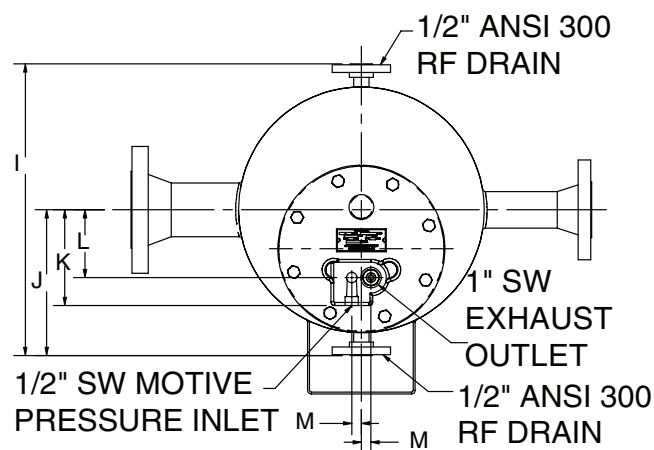
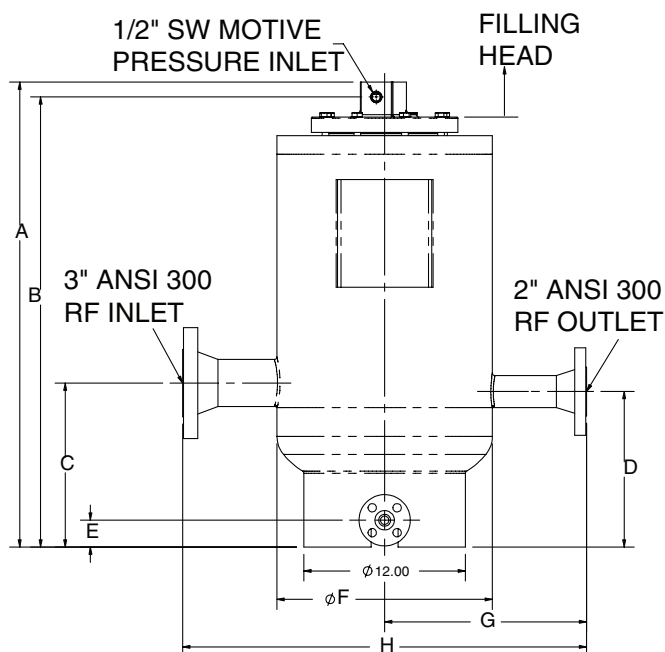
The pump shall be Spirax Sarco PTF-HTF, Pivotrol® Pump (patented) featuring reliable PowerPivot® technology (patented) specifically designed for use on heat transfer fluids in a closed loop system, which does not require any electrical energy (.65 - .79 specific gravity range). The PTF-HTF, Pivotrol® pump (patented) shall include an Inconel spring with a lifetime warranty and 3 year warranty.

### Installation

Full details are given in IM-5-201-US, which accompanies the product.

### Maintenance

Complete installation and maintenance instructions are given in IM-5-201-US, which accompanies the product.



Condensate Recovery

Non-Electric Pumps

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TI-5-208-US 4.15



## The Pivotrol® Pump Patented PTF4 (High Capacity) Pressure Powered Pump

### Description

The Spirax Sarco **Pivotrol® Pump** (patented) is a non electric pump which transfers high temperature condensate, or other liquids from a low point, low pressure or vacuum space to an area of higher pressure or elevation. This self-contained unit including **PowerPivot®** technology (patented) uses steam, compressed air or any other suitable pressurized gas as the pumping force. **The standard Pivotrol® PTF4 Pump (patented) will handle liquids from 0.88 to 1.0 specific gravity.** Suitable for use in hazardous environments and volatile fluid pumping applications. See IM-5-201-US for full details.

Model	PTF4
<b>PMO</b>	200 psig (13.8 barg)
<b>Sizes</b>	4" x 4"
<b>Connections</b>	Inlet & Outlet: ANSI 150 flange NPT/SW Motive & Exhaust: NPT/SW
<b>Construction</b>	Fabricated Steel Body 200 psig ASME Code Stamped Stainless Steel Internals
<b>Warranty</b>	3 Million Cycles or 5 Year Warranty, whichever number is achieved first. Lifetime Warranty on Spring
<b>Options</b>	Gauge Glass Assembly Reflex

**Capacities**  
For sizing and  
selection data,  
see TI-5-030-US

### Standards

The product fully complies with the requirements of the European Pressure Equipment Directive 97/23/EC and carries the **CE** mark when so required (must be specified at time of order). **CE** marked products are not ATEX approved, therefore are not suitable in hazardous environments or volatile fluid pumping applications in the EU.

### Operating Characteristics

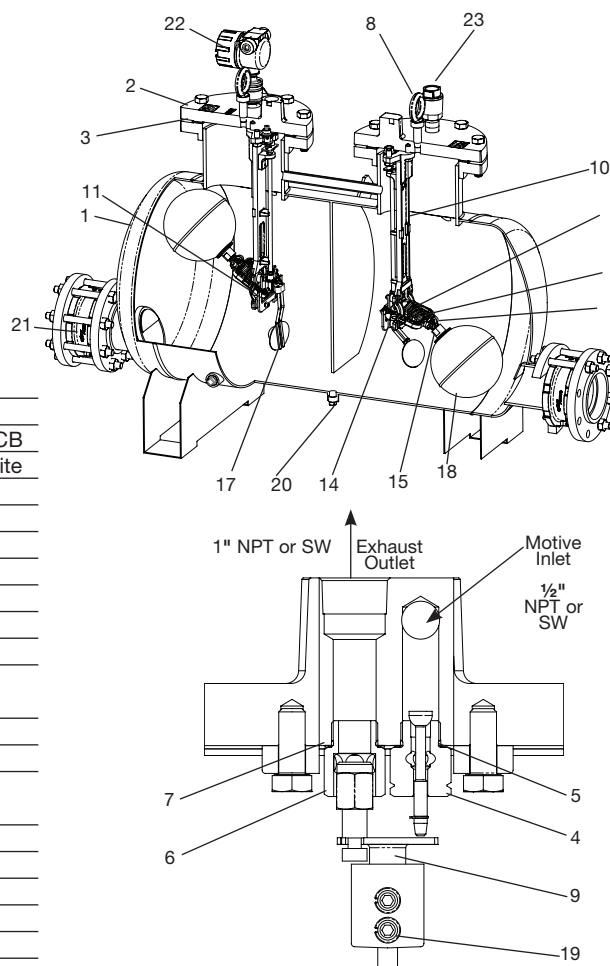
Pump discharge per cycle – 26.9 gal (101.8l) *Nominal*  
Maximum instantaneous discharge rate – 450 gpm (28 l/s)  
Steam/Air Consumption – See TI-5-030-US

**For increased service life –**

**Operate pump with motive pressure 15-20 psig above pump back pressure.**

### Construction Materials

No.	Part	Material	Spec
1	Body	Fabricated Steel	ASME coded
2	Cover	Cast Steel	ASTM A216 WCB
3	Cover Gasket	Spiral Wound	AISI 304/Graphite
4	Steam Inlet Valve Assembly	Stainless Steel	
5	Steam Inlet Valve Gasket	Stainless Steel	
6	Exhaust Valve Assembly	Stainless Steel	
7	Exhaust Valve Gasket	Stainless Steel	
8	Eye Bolt	Stainless Steel	
9	Push Rod Assembly	Stainless Steel	
10	Mechanism Support	Stainless Steel	
11	Bushing Mounting Plate (Bushings)	Stainless Steel Carbide	
12	Spring Anchor	Carbide	
13	Spring	Inconel	
14	Float Arm Assembly (Pivots)	Stainless Steel Carbide	
15	Float Pivot	Stainless Steel	
16	Pin	Stainless Steel	
17	Paddle	Stainless Steel	
18	Float	Stainless Steel	
19	Screws (typical)	Stainless Steel	
20	Plugs (typical)	Forged Stainless Steel	
21	Check Valves (SDCV44)	Stainless Steel (see TI-7-224-US)	
22	Cycle Counter	Various (see TI-5-020-US)	
23	Vent Assist Valve	Stainless Steel	



*Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only.  
In the interests of development and improvement of the product, we reserve the right to change the specification.*

TI-5-211-US 4.15



# The Pivotrol® Pump Patented

## PTF4 (High Capacity) Pressure Powered Pump

### Dimensions (nominal) in inches and millimeters

A (Ref Only)	B*	C	D	E	F	G	H	I	J	K	L	M	N	P	Weight
39.5	33.5	32.0	14.5	16.0	19.8	20.0	10.5	0.6	27.5	31.5	56.2	4.0	8.8	13.0	550 lb
1002	851	813	368	406	503	508	267	15	699	800	1427	102	224	330	249 kg

\*B Dimensions is to the centerline of the motive supply inlet.

Reflex Gauge Glass weight = 23 lb (10.4 kg) (Each)

Cover and Mechanism Assembly weight = 65 lb (29.5 kg) (Each)

### Limiting Operating Conditions

#### PMO

**Max. Operating Pressure**

200 psig (13.8 barg)

Minimum motive differential required:

5 psig (0.5 barg)

Maximum back pressure: 75% of motive pressure.

#### Filling Head Requirements

**Filling Head  
Above Pump Cover**  
36" (914 mm)

**Filling Height  
From Base of Pump**  
69.5" (1765 mm)

Standard recommended

Max filling head

60" (1524 mm)

92" (2337 mm)

Min filling head

-3" (-76 mm)

29.3" (744 mm)

Max Number of Cycles per minute = 6

**Note:** See TI-5-020-US for cycle counter details.

### Pressure Shell Design Conditions

**PMA** 200 psig @ 400°F (13.8 barg @ 204°C)

**Max. Allowable Pressure**

**TMA** 650°F @ 125 psig (343°C @ 8.6 barg)

**Max. Allowable** with Reflex Gauge Glass:

**Temperature** 600°F @ 125 psig (315°C @ 8.6 barg)

### Sample Specification

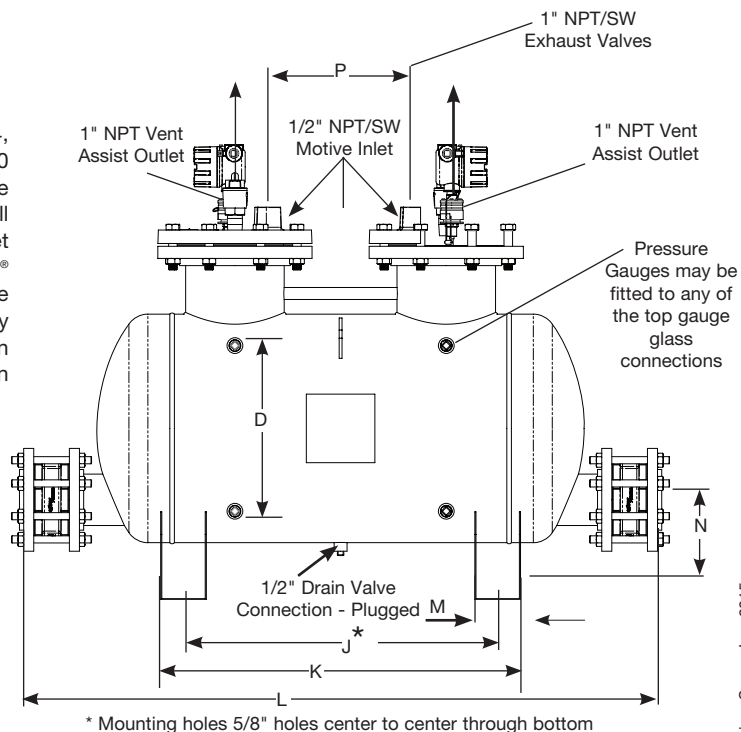
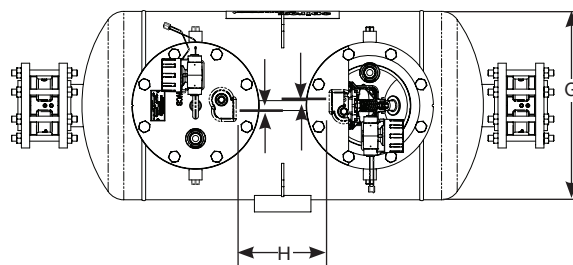
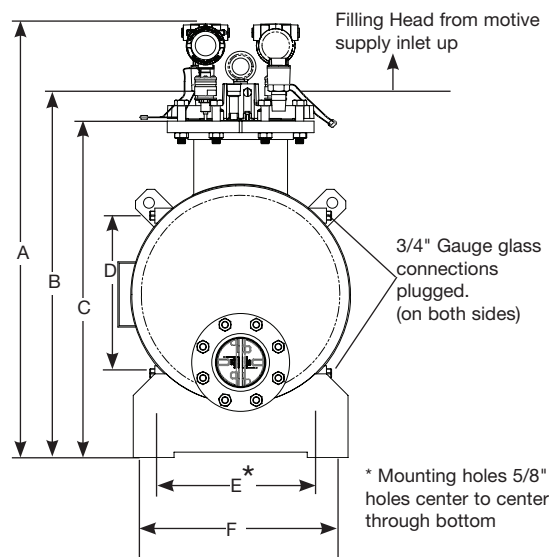
The pump shall be Spirax Sarco Pivotrol® Pump (patented) PTF4, operated by steam, compressed air or other pressurized gas to 200 psig, which does not require any electrical energy, and is capable of pumping liquids down to 0.88 specific gravity. The pump shall have stainless steel, split disc check valves on the inlet and outlet connections. The pump shall contain Spirax Sarco PowerPivot® (patented) technology to ensure longevity and reliability of the pump. The Pivotrol® Pump shall include an Inconel spring with a lifetime warranty and be supplied with an integral cycle counter to monitor a 3 million cycle or 5 year warranty, which ever number is achieved first. When required the pump shall be supplied with a reflex gauge glass.

### Installation

Full details are given in IM-5-201-US, which accompanies the product.

### Maintenance

Complete installation and maintenance instructions are given in IM-5-201-US, which accompanies the product.



\* Mounting holes 5/8" holes center to center through bottom

Condensate Recovery

Non-Electric Pumps

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TI-5-211-US 4.15





# The Pivotrol® Pump Patented

## Selection and Sizing

### Vented Receiver (Open System)

To drain condensate from a single or multiple source an "open" system, a vented receiver should be installed in a horizontal plane above and ahead of the pump. Sufficient receiver volume is needed above the filling head level to accept the condensate reaching the receiver during the pump discharge stroke. More important, the receiver must be sized to allow sufficient area for complete flash steam separation from the condensate. The chart below shows proper vented receiver sizing (per criteria set forth in the A.S.H.R.A.E. Handbook) based on the amount of flash steam present. If the receiver is sized as shown below, there will be sufficient volume for condensate storage and sufficient area for flash steam separation. The receiver can be a length of large diameter pipe or a tank.

#### Pump size - up to 3"x 2"

Flash Steam up to —	Pipe Size		Vent Line Diameter
	Diameter	Length	
75 lb/h	4"	36"	1-1/2"
150 lb/h	6"	36"	2"
300 lb/h	8"	36"	3"
600 lb/h	10"	36"	4"
900 lb/h	12"	36"	6"
1200 lb/h	16"	36"	6"
2000 lb/h	20"	36"	8"

#### Pump Size – PTF4

Flash Steam up to –	Pipe Size		Vent Line Diameter
	Diameter	Length	
1000 lb/h	16"	60"	6"
2000 lb/h	20"	60"	8"
3000 lb/h	24"	60"	8"
4000 lb/h	26"	60"	10"
5000 lb/h	28"	60"	10"
6000 lb/h	30"	72"	12"
7000 lb/h	32"	72"	12"
8000 lb/h	36"	72"	14"

### Inlet Reservoir Piping (Closed System)

To drain condensate from a single piece of equipment in a "closed" system, a reservoir should be installed in a horizontal plane above and ahead of the pump. Sufficient reservoir volume is needed above the filling head level to accept the condensate reaching the reservoir during the pump discharge stroke. The chart below shows minimum reservoir sizing, based on condensate load, needed to prevent equipment flooding during the pump discharge stroke. The reservoir can be a length of large diameter pipe or a tank.

#### Pump size - up to 3"x 2"

Liquid lb/h	Reservoir Pipe Size				
	3"	4"	6"	8"	10"
500 or Less	2'				
1000	2'				
1500	3'	2'			
2000	3.5'	2'	1'		
3000		3'	2'		
4000		4'	2'	1'	
5000		6'	3'	2'	
6000			3'	2'	
7000			3'	2'	
8000			4'	2'	
9000			4.5'	3'	2'
10,000			5'	3'	2'
11,000			5'	3'	2'

#### Pump Size – PTF4

Liquid Load lb/h	Reservoir Pipe Size*			
	12"	16"	20"	24"
10,000	5'	3'	2'	
20,000	10'	7'	4'	
30,000		9'	6'	4'
40,000		12'	7.5'	6'
50,000			9'	6'
60,000			9'	6'

\* When BP/MP is less than 50%, these reservoir lengths can be reduced by 1/2.

### Capacity Multiplying Factors for other Filling Heads

Filling Head		Check valve and piping size, pump type			
Inches	mm	2" x 2" PTC/PTF	3" x 2" PTC/PTF	PTF-HP	PTF4
-3.0	-76	0.47	NA	NA	0.23
-1.0	-25	0.66	0.40	NA	0.41
0.0	0	0.76	0.43	0.6	0.70
6.0	152	0.90	0.69	0.9	0.89
12.0	305	1.00	1.00	1.0	0.95
18.0	457	1.08	1.02	1.1	0.98
24.0	610	1.16	1.04	1.2	1.00
36.0	914	1.38	1.17	1.3	1.00
48.0	1219	1.48	1.25	1.4	1.08
60.0	1524	N/A	N/A	1.5	1.20

### Capacity Multiplying Factors for Motive Gas Supply

(other than steam)									
2" and 3" x 2" PTC / PTF									
10%	20%	30%	40%	50%	60%	70%	80%	90%	% Back Pressure VS. Motive Pressure (bp / MP)
1.04	1.06	1.08	1.10	1.12	1.15	1.18	1.23	1.28	Capacity Multiplying Factors
PTF-HP									
1.19	1.43	1.43	1.53	1.85	2.04	2.14	2.20	2.44	Capacity Multiplying Factors
PTF4									
1.19	1.43	1.43	1.53	1.85	2.04	2.14	2.20	2.44	Capacity Multiplying Factors

Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only.  
In the interests of development and improvement of the product, we reserve the right to change the specification.

TI-5-030-US 7.15

# The Pivotrol® Pump Patented

## Selection and Sizing

Motive Pressure psig	Back Pressure psig	2" x 2" PTC/PTF 12" Filling Head lb/hr	3" x 2" PTC/PTF 3" x 3" PPF Top 12" Filling Head lb/hr	3" x 2" PTF-HTF 12" Filling Head lb/hr	Motive Pressure psig	Back Pressure psig	3" x 2" PTF-HP 12" Filling Head lb/hr
200	180	-	-	-	300	200	12550
200	160	-	5250	3518	300	185	13875
200	140	6375	7375	4941	300	160	14565
200	120	7375	9440	6325	300	140	15750
200	100	8250	11145	7467	300	120	17125
200	80	9000	12565	8419	300	100	19125
200	60	9685	14260	9554	300	80	20315
200	50	10000	14875	9966	300	60	22065
200	40	10310	15690	10512	300	40	24375
200	30	10635	16310	10928	300	20	27500
200	20	10950	17000	11390	300	10	28750
200	10	11195	17640	11819	280	200	11125
180	160	-	3750	2513	280	180	12435
180	140	5425	6335	4244	280	160	13250
180	120	6685	8555	5732	280	140	14435
180	100	7760	10375	6951	280	120	16875
180	80	8600	11980	8027	280	100	17875
180	60	9450	13625	9129	280	80	19125
180	50	9830	14375	9631	280	60	20850
180	40	10230	15150	10151	280	40	23125
180	30	10560	15875	10636	280	20	26125
180	20	10895	16665	11166	280	10	27565
180	10	11195	17505	11728	250	200	9190
160	140	4250	4860	3256	250	180	10185
160	120	5750	7500	5025	250	160	11000
160	100	7040	9375	6281	250	140	12190
160	80	8065	11135	7460	250	120	13935
160	60	9105	12940	8670	250	100	15935
160	50	9565	13750	9213	250	80	17065
160	40	9990	14565	9759	250	60	19000
160	30	10440	15400	10318	250	40	21200
160	20	10870	16270	10901	250	20	24125
160	10	11195	17315	11601	250	10	25700
140	120	4625	6085	4077	200	180	6065
140	100	6120	8145	5457	200	160	7190
140	80	7420	10065	6744	200	140	8315
140	60	8625	12120	8120	200	120	11935
140	50	9190	13000	8710	200	100	12500
140	40	9690	13940	9340	200	80	14065
140	30	10245	14875	9966	200	60	15825
140	20	10760	15840	10613	200	40	18125
140	10	11195	17045	11420	200	20	20815
120	100	4700	6300	4221	200	10	22315
120	80	6475	8625	5779	150	120	7875
120	60	7845	10970	7350	150	100	8875
120	50	8530	12100	8107	150	80	10750
120	40	9240	13160	8817	150	60	12625
120	30	9865	14250	9548	150	40	14935
120	20	10535	15280	10238	150	20	17375
120	10	11065	16655	11159	150	10	19000
100	80	4995	6260	4194	125	100	7065
100	60	6620	9255	6201	125	80	9065
100	50	7500	10680	7156	125	60	10875
100	40	8370	12040	8067	125	40	13250
100	30	9145	13310	8918	125	20	15500
100	20	9900	14460	9688	125	10	16685
100	10	10630	16100	10787	100	80	7245
80	60	5010	6485	4345	100	60	9125
80	50	6000	8435	5651	100	40	11435
80	40	6935	10185	6824	100	20	13810
80	30	7970	11750	7873	100	10	15375
80	20	8870	13250	8878	75	60	7035
80	10	10000	15190	10177	75	40	9435
60	50	4250	5000	3350	75	20	12125
60	40	5315	7485	5015	75	10	13565
60	30	6360	9625	6449	50	40	5085
60	20	7460	11580	7759	50	20	10185
60	10	9190	13750	9213	50	10	11625
50	40	4440	5500	3685	25	20	2750
50	30	5625	8125	5444	25	10	9685
50	20	6730	10315	6911			
50	10	8690	12755	8546			
40	30	4630	5750	3853			
40	20	5850	8700	5829			
40	10	7930	11470	7685			
30	20	4810	5810	3893			
30	15	5475	8000	5360			
30	10	6820	9690	6492			
20	15	4375	5375	3601			
20	10	5210	7450	4925			
15	10	4375	6000	4020			

Condensate Recovery

Non-Electric Pumps

Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only.  
In the interests of development and improvement of the product, we reserve the right to change the specification.

TI-5-030-US 7.15

# The Pivotrol® Pump Patented

## Selection and Sizing

### PTF4

Motive Pressure psig	Back Pressure psig	36" Fill Head (70" Fill Height) lb/hr
200	150	22120
200	140	22970
200	120	24870
200	100	27110
200	80	29860
200	60	33400
200	50	35640
200	40	38390
200	30	41930
200	20	46920
200	15	50460
180	120	23700
180	100	26020
180	60	32500
180	50	34810
180	40	37640
180	30	41300
180	20	46440
180	15	50090
160	120	22530
160	100	24920
160	80	27830
160	60	31590
160	50	33980
160	40	36890
160	30	40660
160	20	45960
160	15	49720
140	100	23410
140	80	26220
140	60	29850
140	50	32150
140	40	34960
140	30	38590
140	20	43710
140	15	47340
120	80	24610
120	60	28110
120	50	30320
120	40	33030
120	30	36530
120	20	41460
120	15	44950
100	60	24730
100	50	27100
100	40	30010
100	30	33750
100	20	39030
100	15	42780
80	60	21350
80	50	23880
80	40	26980
80	30	30970
80	20	36610
80	15	40600
70	50	21850
70	40	24830
70	30	28680
70	25	31120
70	20	34110
70	15	37960
60	40	22940
60	30	26840
60	25	29310
60	20	32330
60	15	36230
50	30	25310
50	25	27970
50	20	30910
50	15	34160
40	30	19480
40	25	22230
40	20	25600
40	15	29940
30	20	20440
30	15	25650

#### To size the PTF4 in a closed system:

Establish available motive pressure.

Establish static back pressure on Pump/Trap combination.

Place established pressures in formula below:

- Pump Motive Pressure (psig) – min. VAV delta P (psig) > Back Pressure (psig)
- Capacity charts to be read as normal, i.e. at pump motive and back pressure.
- If, Pump Motive Pressure (psig) – min. VAV delta P (psig) < Back Pressure (psig), then isolate or remove VAV and multiply capacity by 0.77 to find reduced capacity without VAV.

#### Sizing Example: 1

A closed system has the following conditions:

Motive steam available = 150 psig. Static Back Pressure = 45 psig.

#### Open System.

PTF4

Capacity charts show capacity at 150 psig motive with 45 psig back pressure.

#### Closed System.

The Vent Assist Valve on the PTF4 requires at least 75 psig differential pressure to operate in a closed system.

#### To size the PTF4 pump:

Pump Motive Pressure – min. VAV delta P > Back Pressure.

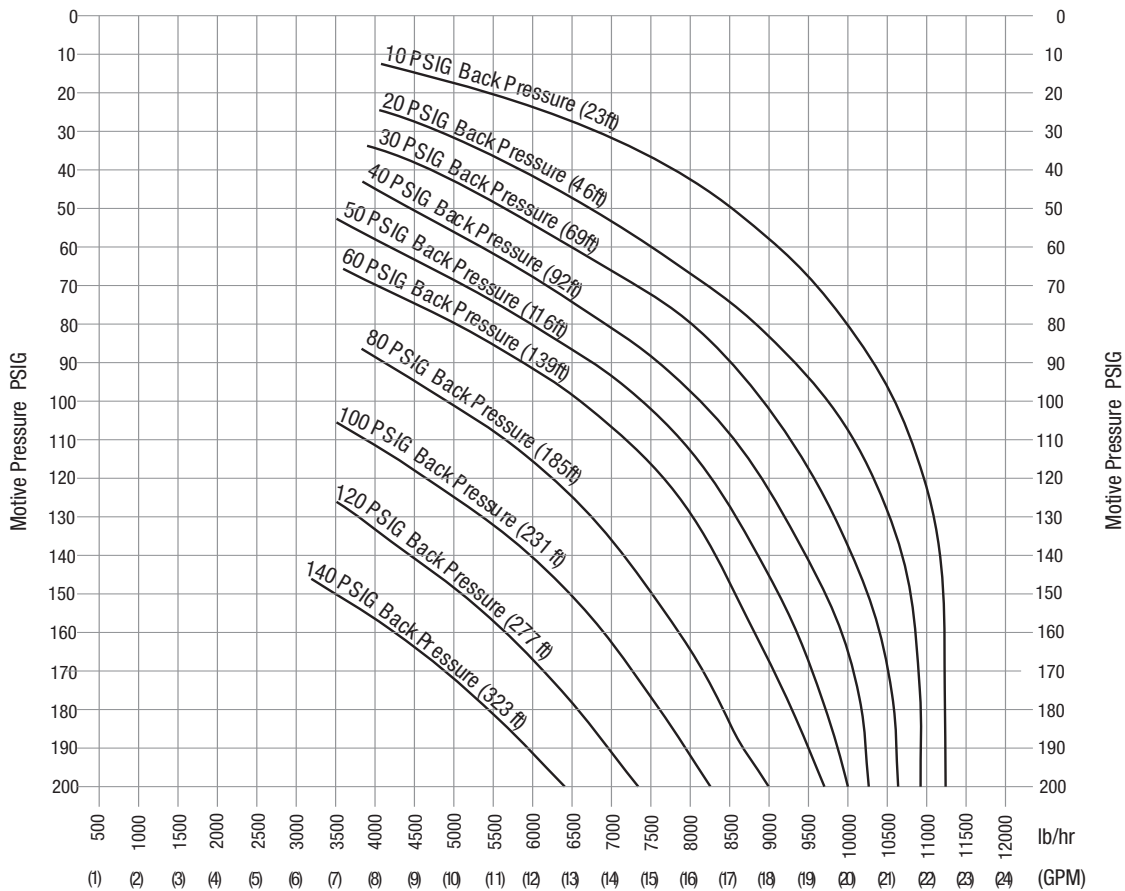
150 psig – 75 psig > 45 psig

As the motive pressure is 150 psig and the VAV requires a minimum 120 psig to operate (75 + 45 = 120), this combination is sized correctly.

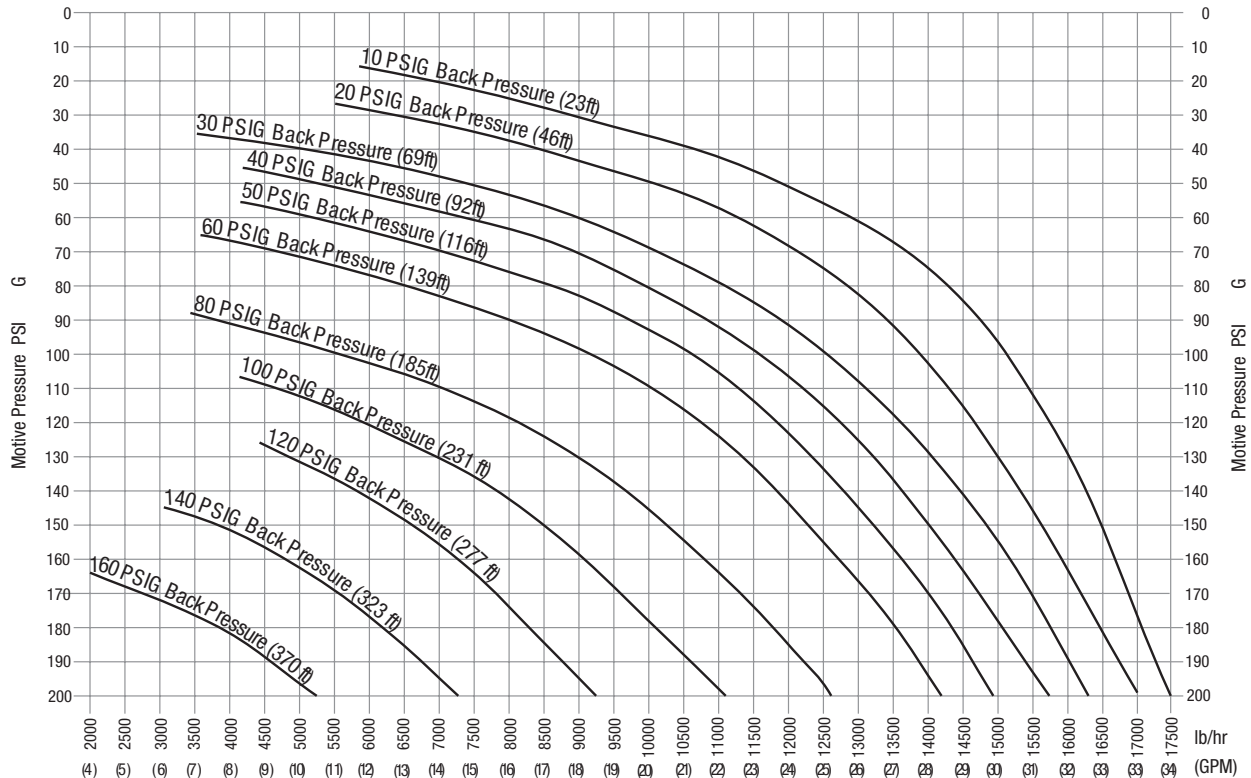
# The Pivotrol® Pump Patented Selection and Sizing

## Capacity Charts

### 2" x 2" Pivotrol® Pump



### 3" x 2" Pivotrol® Pump

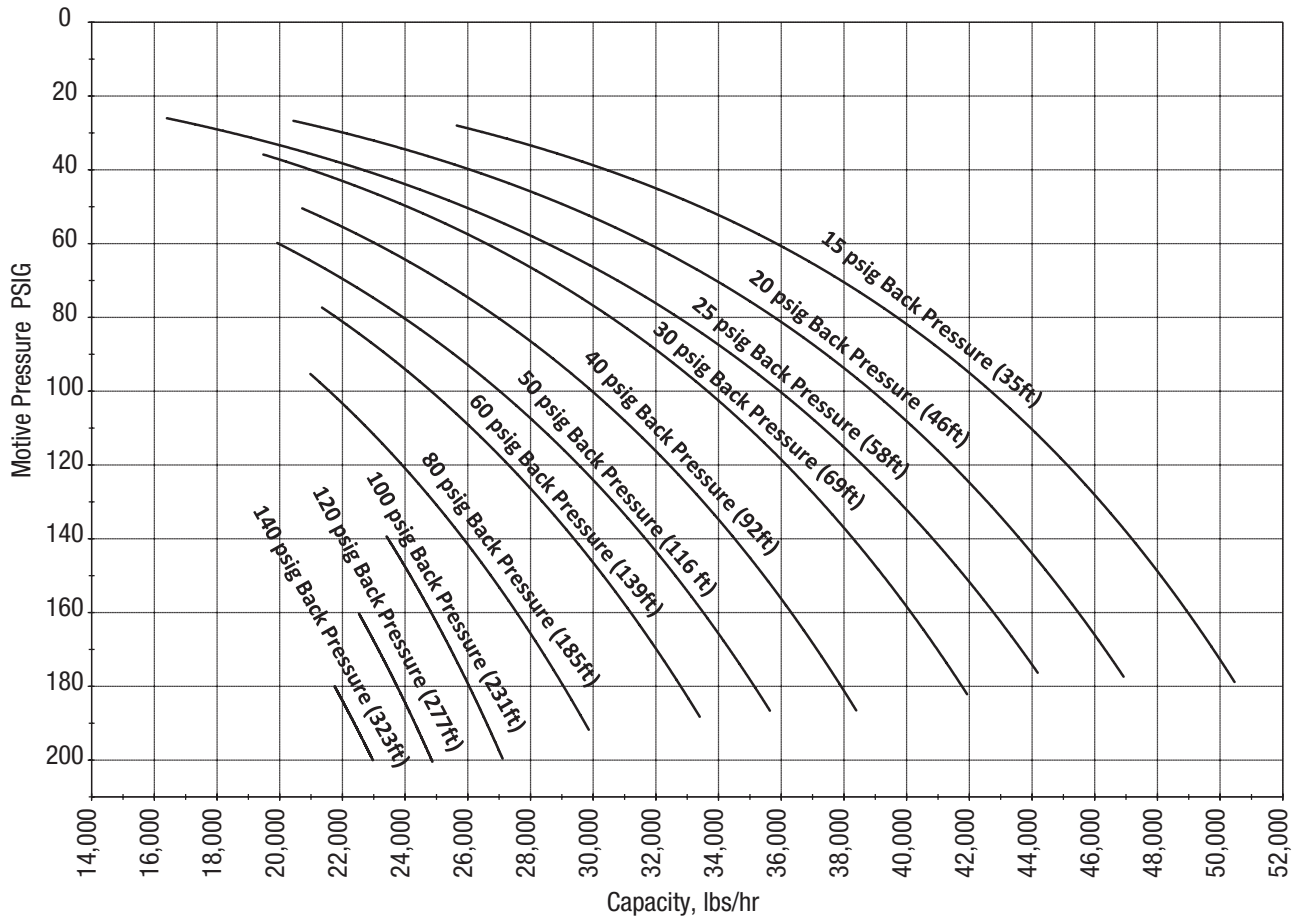


Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only.  
In the interests of development and improvement of the product, we reserve the right to change the specification.

TI-5-030-US 7.15

# The Pivotrol® Pump Patented Selection and Sizing

## PTF4 Capacity Chart



Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only.  
In the interests of development and improvement of the product, we reserve the right to change the specification.

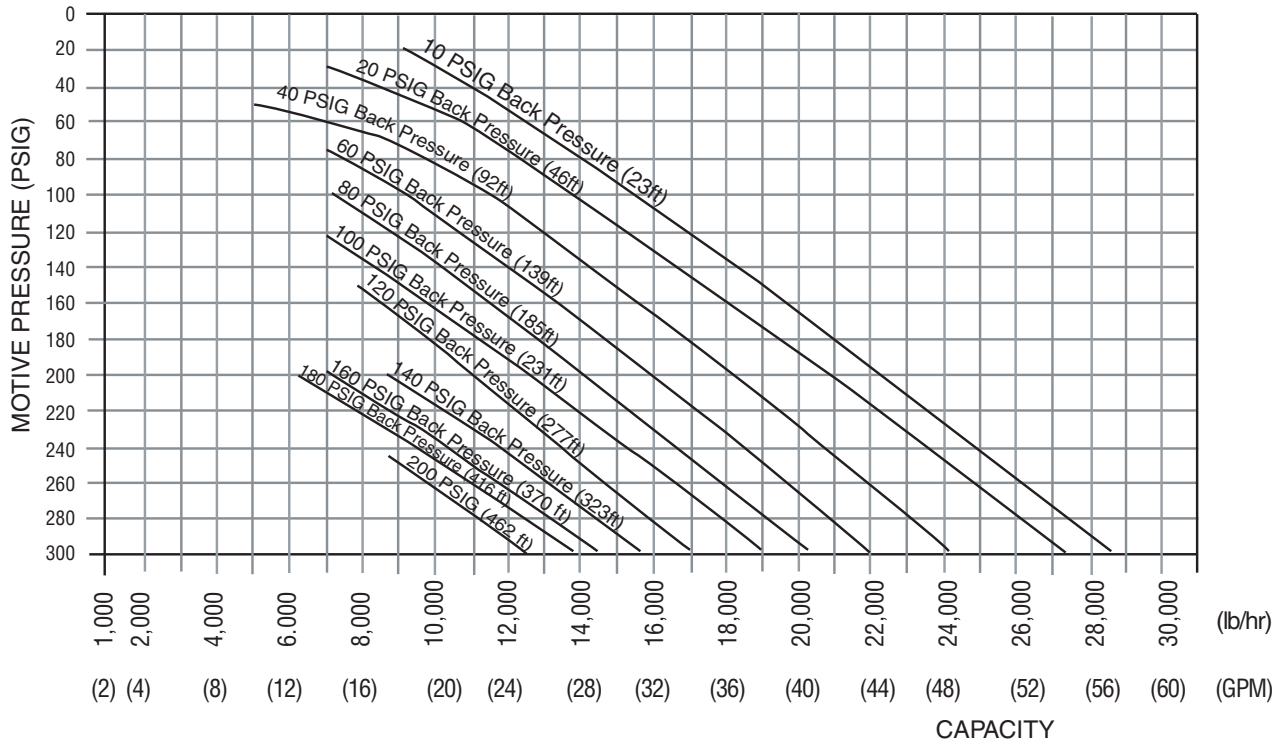
TI-5-030-US 7.15

Condensate  
Recovery

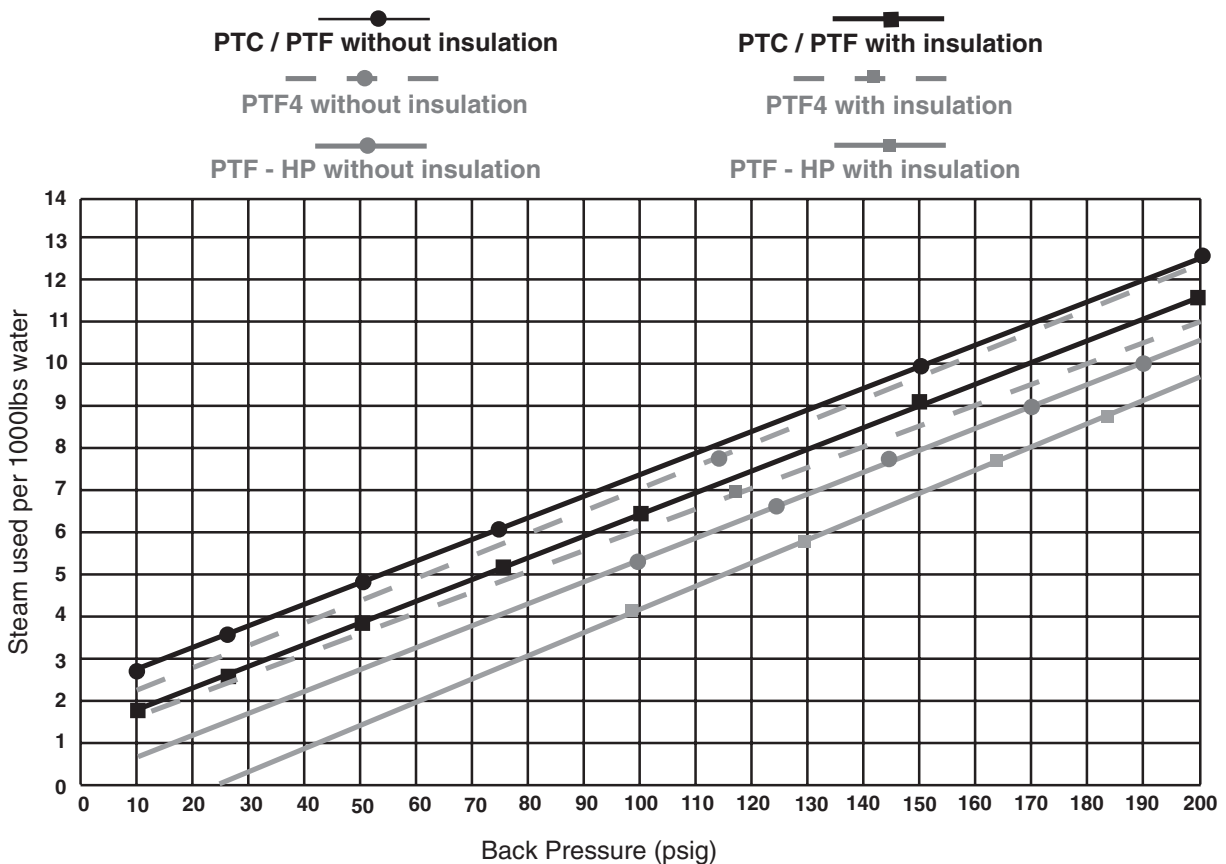
Non-Electric  
Pumps

# The Pivotrol® Pump Patented Selection and Sizing

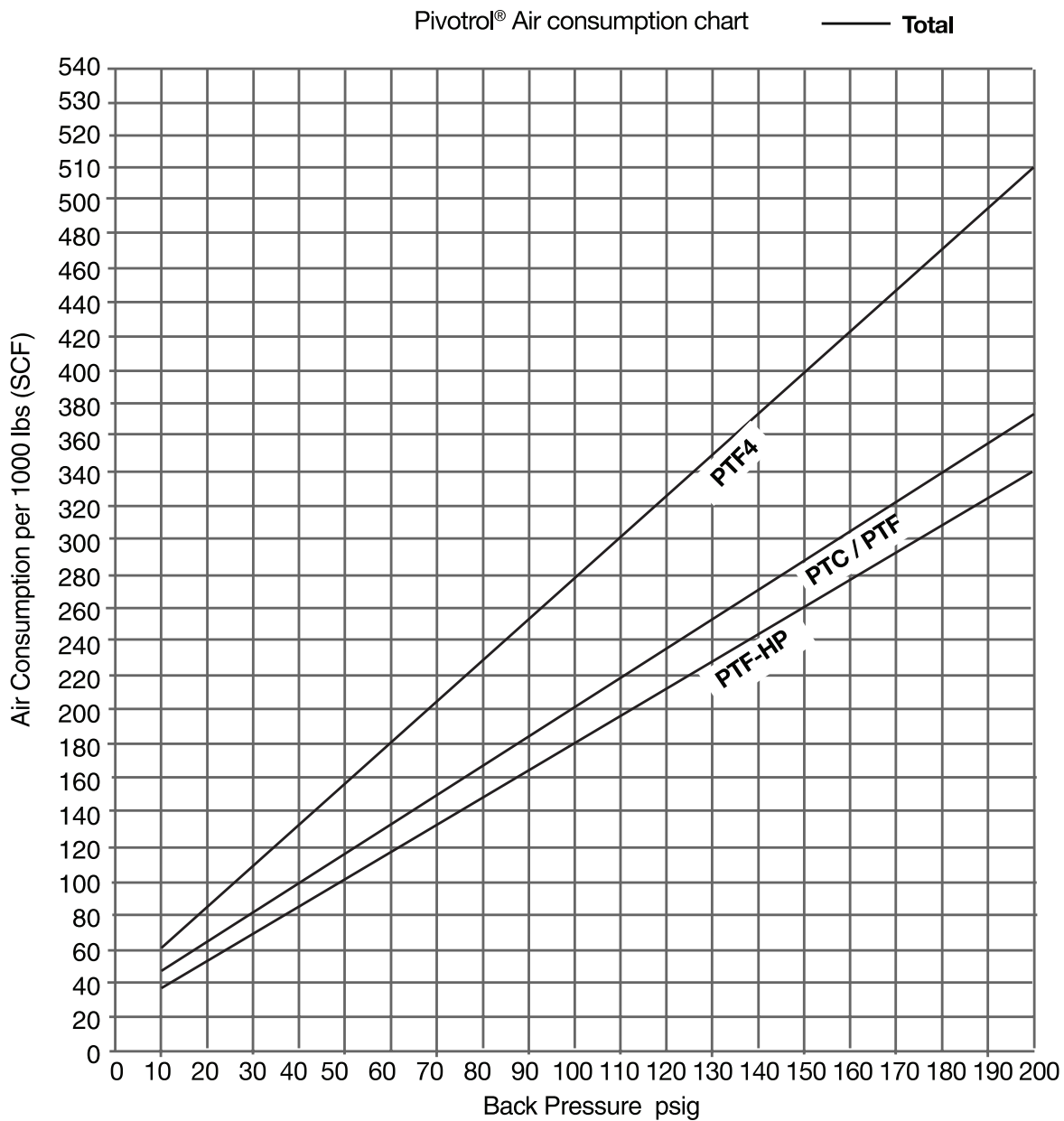
## 3" x 2" PTF-HP Pivotrol® Pump



## Pivotrol® Steam Consumption Chart



# The Pivotrol® Pump Patented Selection and Sizing



TI-5-030-US 7.15





## The Pivotrol® Pump Patented Digital Cycle Counter

### Description

The monitoring of condensate return pump operation is an important activity for plant operations and maintenance personnel. The use of pressure powered pumps equipped with a digital cycle counter provides the ability to monitor pump operation, schedule preventative maintenance and estimate the amount of condensate recovered. The counter may operate in open and some closed loop condensate systems.

### Specifications

Counter	8 Digit LCD display — NEMA 4 X, IP65
Options	BSP Threaded Version (Standard Counter Only)

### Construction Materials

No.	Part	Material
1	Enclosure	Aluminum
2	Gaskets	
3	Housing	Stainless Steel
4	Sealing Nut	Stainless Steel and Teflon®
5	Insulator	
6	Probe	Stainless Steel
7	Plug Receptacle	Stainless Steel
8	Plug	Stainless Steel

### Limiting Operating Conditions

#### External Operating Temperature Range

Counter: 14°F to 122°F (-10°C to 50°C)

#### Maximum Sensor Pressure

PMO: 300 psig / 21 barg

#### Maximum Operating Temperature

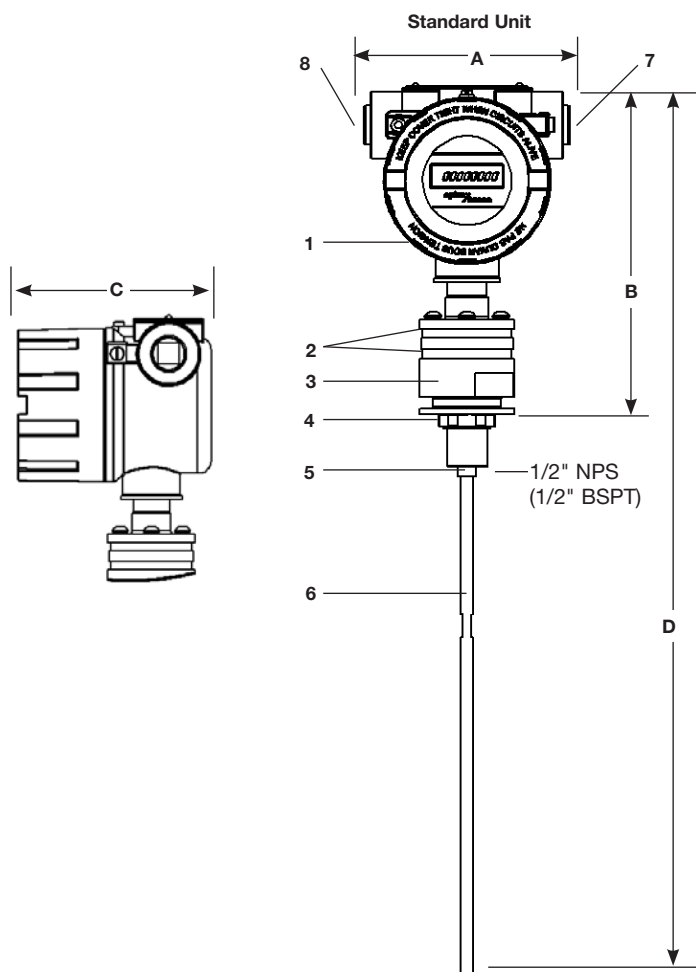
TMO: 500°F / 310°C

### Pump Capacities

Model	Approximate Gallons/Cycle
PTC	7.1 / 26.9L
PTF	8.4 / 31.8L
PTF-HP	16 / 60.6L
PTF4	26.9 / 102L

### Dimensions (approximate) in inches and millimeters

Model	A	A w/Aux	B	C	D	Weight
PTC/PTF	4.4	4.9	7.0	4.4	17.0	5 lb
	112	125	178	112	480	2.3 kg
PTF-HP/	4.4	4.9	7.0	4.4	25.4	5.1 lb
PTF4	112	125	178	112	645	2.3 kg



# The Pivotrol® Pump Patented Digital Cycle Counter

## Enclosure Approvals

For FM approved enclosure:

CL I.

GR. A,B,C,D:

CL. II. GR. E,F,G;

CL. III.;

TYPE 4X

For CSA Class I Group A, conduit seal is required within 18 inches.

For FM approved enclosure:

CL. I, ZONE 1, AEx d IIC, IP66

For IECEX:

IECEX FMG 06.0003U, Ex d II C, IP68

For Ex:

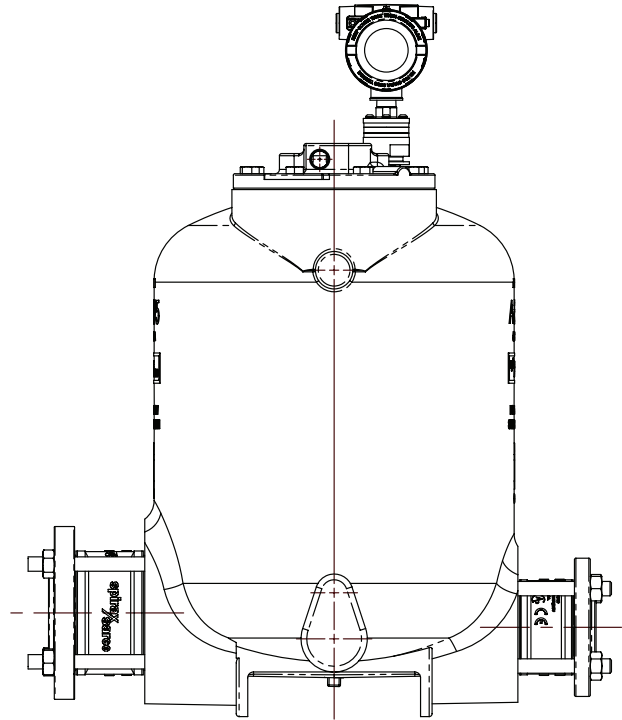
II 2 GD Ex d II C; IP68; FTZU 04 ATEX 0265 U AMBIENT TEMP.: - 40°C TO + 85°C (- 40°F TO 185°F)

**Battery is suitable for up to 10 years of uninterrupted operation.**

## Safety and Regulatory Compliance

Seating nut contains Teflon®.

This product is not intended to be submerged.



## Installation (see IM-5-020-US)

1. Place counter in 1/2" NPS (1/2" BSPT) hole in pump cover (only hole available)
2. Orientate counter in desired direction.
3. Screw sealing nut until wrench tight.

**Caution: Before installation or any maintenance is performed, ensure that all steam, condensate, air or gas lines are closed and internal pressure is relieved to prevent injury.**

**Plugs (7) & (8) should not be unscrewed and will void warranty.**

## Orientation (see IM-5-020-US)

The Digital Cycle Counter orientation may be changed from its original position in the Pivotrol cover and mechanism assembly.

**Caution: Before any maintenance is performed, ensure that all steam, condensate, air or gas has been closed and internal pressure is relieved to prevent injury.**

1. Unscrew sealing nut.
2. Twist cycle counter into desired position, ensuring cable remains in place.
3. Tighten sealing nut.

# spirax sarco

## Low-Profile Pressure Powered Pump™ PPEC

Spirax Sarco Pressure Powered Pump™ is a non-electric pump which transfers high temperature condensate or other liquids from a low point, low pressure or vacuum space to an area of higher pressure or elevation. This self-contained unit uses steam, compressed air or any other suitable pressurized gas as the pumping force. **The standard pressure powered pump will handle liquids from 0.9 to 1.0 specific gravity.**

Body Style	Iron	Steel	316 Stainless Steel
PMO	125 psig		
Sizes	1" & 1-1/2"		
Connections	NPT		
Construction	Cast Iron Body,	Cast Steel Body	Cast Stainless Steel Body
	Stainless Steel Internals, Bronze Check Valves Stainless Steel Ch.valves	Stainless Steel Internals, Stainless Steel Check Valves	
Options	BSP Connections,	S.W. & BSP Connections,	
	Pump modified to handle liquids down to 0.65 specific gravity	Pump modified to handle liquids down to 0.65 specific gravity	

### Operating Characteristics

Pump discharge per cycle – 4.0 gal (15.14 l)  
Maximum instantaneous discharge rate  
– 30 gpm (1.9 l/s)  
Steam Consumption  
– 3 lbs. of steam per 1000 lbs. of liquid pumped.  
Air consumption  
– 100 SCF per 1000 lbs. of liquid pumped.

### Accessories

Gauge glass with brass cocks for iron pumps, steel cocks for steel pumps, and stainless steel cocks for stainless steel pumps; Pump insulation cover.

### Standards

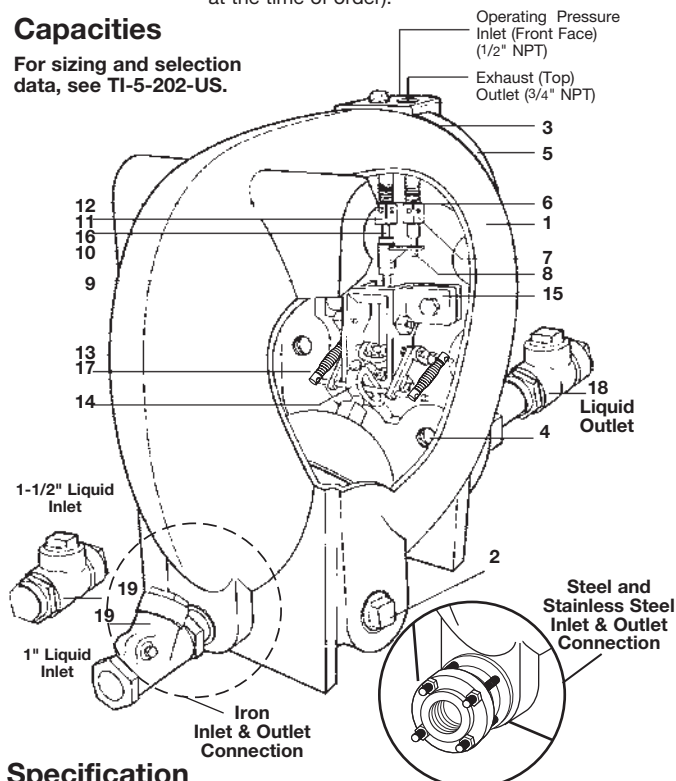
With the exception of cast iron, this product fully complies with the requirements of the European Pressure Equipment Directive 97/23/EC and carries the CE mark when so required (must be specified at the time of order).

### Construction Materials

No.	Body Style	Part	Material
1	Iron	Body	Cast Iron
	Steel		Cast Steel
	316 SS		Cast 316 Stainless Steel
2	Iron	Plug 3/8"	Forged Steel
	Steel	Plug 1/2"	Forged Steel
	316 SS	Plug 1/2"	Forged 316 Stainless Steel
3	All	Cover Gasket	Graphite
4	Iron	Cover Screws	Steel
	Steel		Steel
	316 SS		Stainless Steel
5	Iron	Cover	Iron
	Steel		Steel
	316 SS		Stainless Steel
6	All	Exhaust Valve Seat Gasket	Stainless Steel
7	All	Exhaust Valve Seat	Stainless Steel
8	All	Exhaust Valve Head	Stainless Steel
9	All	Push Rod	Stainless Steel
10	All	Valve Head Actuator	Cast Stainless Steel
11	All	Inlet Valve Seat	Stainless Steel
12	All	Inlet Valve Seat Gasket	Stainless Steel
13	All	Push Rod Actuator	Stainless Steel
14	All	Float & Arm	Stainless Steel
15	All	Mechanism Casting	Cast Stainless Steel
		Screws 1/2" – 13 x 1-1/4	Stainless Steel
16	All	Inlet Valve	Stainless Steel
17	All	Spring	Inconel
18		Lift Check Valve (outlet)	Bronze with bronze disc
		Wafer Check Vlv (outlet)	Austenitic stainless steel
19		1" Swing Check Vlv (inlet)	Bronze with teflon disc
		1-1/2" Lift Check Vlv (inlet)	Bronze with bronze disc
		1" & 1-1/2" Wafer Check Vlv (inlet)	Austenitic stainless steel

### Capacities

For sizing and selection data, see TI-5-202-US.



### Limiting Operating Conditions

Max. Operating Pressure (PMO) 125 psig (9 barg)  
Minimum motive pressure required: 5 psig (0.34 barg)

Specific Gravity of pumped liquid - 0.9 to 1.0  
Specific Gravity of pumped liquid options - 0.89 to 0.8 & 0.79 to 0.65  
Filling head recommended above pump is 6" (152 mm) See TIS 5.202

#### Pressure Shell Design Condition

<b>PMA</b>	Iron	125 psig /0-450°F	9 barg/0-232°C
Max. allowable pressure	Steel	285 psig /0-650°F	19 barg/343°C
	316 SS	220 psig /0-400°F	15 barg/204°C

<b>TMA</b>	Iron	450°F/0-125 psig	232°/0-9 barg
Max. allowable temperature	Steel	750°F/240 psig	399°C/16 barg
	316 SS	850°F/180 psig	454°C/12 barg

**Note:** Consult factory for PMA and TMA when using gauge glass.

**For increased service life, operate pump with motive pressure 15-20 psig above pump back pressure.**

### Sample Specification

The pump shall be Spirax Sarco type PPEC low profile pressure powered pump operated by steam, compressed air or other pressurized gas to 125 psig, which does not require any electrical energy, and is safe for use in explosive atmospheres. Body construction of cast iron, cast steel, or cast 316 stainless steel, for pumping liquids of specific gravity of 0.65 and above. The pump shall contain a float operated snap-acting mechanism with no external seals or packing, stainless steel trim, and hardened stainless steel mechanism bearing components with single piece motive inlet valve. Pump to be provided complete with inlet and outlet check valves attached at the factory for ease of field installation. When required, shall be equipped with a sight glass to monitor operation.

### Installation

For generic hook-up sketch, see TI-5-202-US. Full details are given in IM-5-200-US, which accompanies the product.

Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only.  
In the interests of development and improvement of the product, we reserve the right to change the specification.

TI-5-218-US 10.14

# Low-Profile Pressure Powered Pump™ PPEC

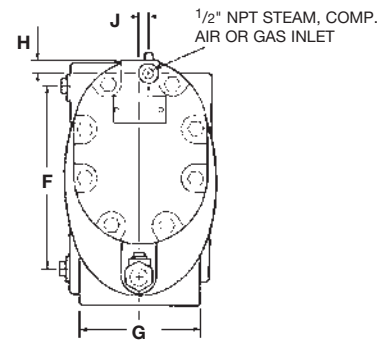
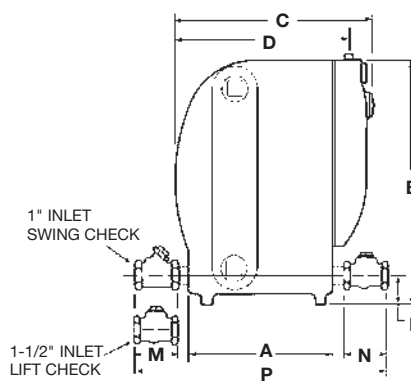
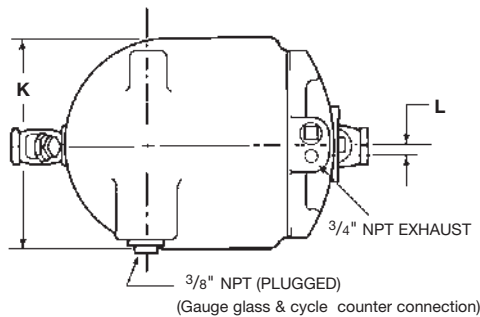
Dimensions (nominal) in inches and millimeters

Size	Style	A	B	C	D	E	F	G	H	J	K	L	M	N	P	Pump with Check Valve Package*
1"	Iron	11.0	18.9	14.6	13.1	2.1	14.0	9.0	1.1	.6	11.5	.6	3.6	3.4	20.3	154 lb
	Brz Ch.valve	279	480	371	333	53	356	229	29	16	292	16	91	86	516	70 kg
1-1/2"	Iron	11.0	18.9	14.6	13.1	2.1	14.0	9.0	1.1	.6	11.5	.6	4.3	4.3	23.1	155 lb
	Brz Ch.valve	279	480	371	333	53	356	229	29	16	292	16	108	108	587	70 kg
1"	Iron	11.0	18.9	14.6	13.1	2.8	14.0	9.0	1.1	.6	11.5	.6	3.3	3.3	19.4	154 lb
	SS Ch.valve	279	480	371	333	71	356	229	29	16	292	16	84	84	493	70 kg
1-1/2"	Iron	11.0	18.9	14.6	13.1	2.8	14.0	9.0	1.1	.6	11.5	.6	4.8	4.8	23.8	155 lb
	SS Ch.valve	279	480	371	333	71	356	229	29	16	292	16	121	121	605	70 kg
1"	Steel	11.7	19.6	14.6	13.1	2.8	14.0	9.0	1.1	.6	11.6	.6	2.1	2.1	15.9	166 lb
		297	498	371	333	70	356	229	29	16	294	16	54	54	405	75 kg
1-1/2"	Steel	11.7	19.6	14.6	13.1	2.8	14.0	9.0	1.1	.6	11.6	.6	2.7	2.7	17.1	171 lb
		297	498	371	333	70	356	229	29	16	294	16	69	69	434	78 kg
1"	316 SS	11.7	19.6	14.6	13.1	2.8	14.0	9.0	1.1	.6	11.6	.6	2.1	2.1	15.9	166 lb
		297	498	371	333	70	356	229	29	16	294	16	54	54	405	75 kg
1-1/2"	316 SS	11.7	19.6	14.6	13.1	2.8	14.0	9.0	1.1	.6	11.6	.6	2.7	2.7	17.1	171 lb
		297	498	371	333	70	356	229	29	16	294	16	69	69	434	78 kg

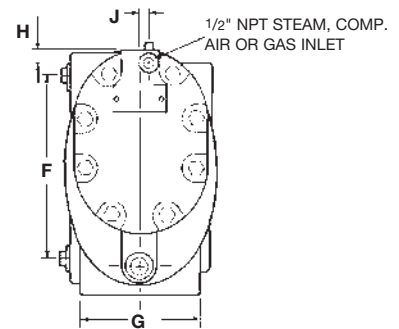
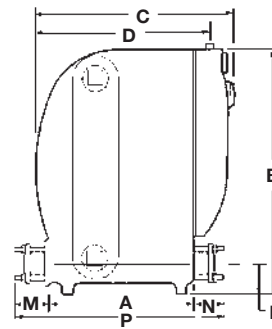
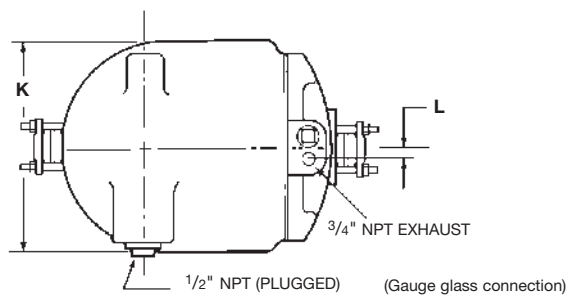
Note: Cover/Mechanism withdrawal distance – 12" - 305 mm  
Iron Cover/Mechanism assembly – 35 lb (16 kg)

\* For gauge glass assembly on cast iron unit, add 5 lbs (2.3 kg).  
For gauge glass assembly on steel or stainless steel unit, add 23 lbs (10.4 kg).

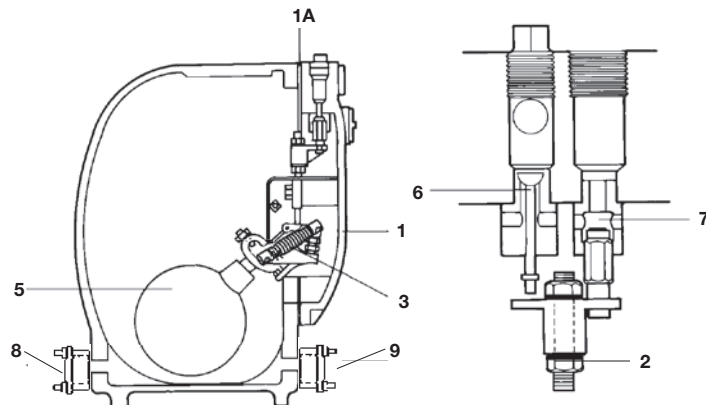
## Cast Iron



## Steel and Stainless Steel



Cover only for PPEC	1
Cover Gasket for PPEC	1A
Push rod repair kit for PPEC	2
Spring Assembly for PPEC	3
Float only for PPEC	5
Inlet Valve Head,	6
Seat & Gasket for PPEC	
Exhaust Valve Head, Seat & Gasket for PPEC	7
Mechanism Rebuild Kit (Not Shown) See IM-5-203/3	
Bronze Inlet Check Valve for PPEC	8
Bronze Outlet Check Valve for PPEC	9
Stainless Steel Water Check Valve	8 / 9
Cover & Complete Mechanism Assembly for PPEC	



TI-5-218-US 10.14



## PPEC Pressure Powered Pump Selection and Sizing

### How to Select & Size

From the inlet pressure, back pressure and filling head conditions given below, select the pump size and check valve package which meets the capacity requirement of the application.

Specify pump body type. Select optional extras as required.

For GPM, multiply the capacities below by 0.002.

For kg/h, multiply the capacities below by 0.454.

For liquid specific gravities from 0.9 to 0.65, consult Spirax Sarco.

\* Back pressure is the lift height (H) in feet x 0.433 plus psig in return line, plus downstream piping friction pressure drop in psig, calculated based on the maximum instantaneous discharge rate of the respective pump selected. (See TIS Sheets)

**Note: To achieve rated capacity, pump must be installed with check valves supplied by Spirax Sarco. Use of a substitute check valve may effect the performance of the pump.**

Condensate load

3000 lb/h

Steam pressure available for operating pump

75 psig

Vertical lift from pump to the return piping

30 feet

Pressure in the return piping (piping friction negligible)

25 psig

Filling head on the pump available

6 inches

### Solution:

1. Calculate "H", the total lift or back pressure, against which the condensate must be pumped. = (30 x 0.433) + 25 = 38 psig
2. From capacity table, with 75 psig inlet pressure and 40 psig back pressure, choose a 1-1/2" pump with stainless steel check valves, which has a capacity of 3300 lb/h.

### Note from capacity multiplying factor charts:

A. Pump capacity if filling head is 24 in: 1.3 x 3,300 = 4290 lb/h

B. Pump capacity using compressed air: 1.12 x 3,300 = 3696 lb/h

(% back pressure is 38 ÷ 75 = 50%)

**Capacity lb/h** When installed with recommended filling head above top of pump.

Operating Inlet Pressure psig	Total Lift Back Pressure psig	Filling head 6"			
		Liquid Specific Gravity 0.9 to 1.0			
		Single pump PPEC			
		Check Valve Size		Check Valve Size	
		1" Bronze	1-1/2" Bronze	1" Stainless Steel	1-1/2" Stainless Steel
300	20				
300	40				
300	60				
300	80				
300	100				
300	120				
300	150				
250	20				
250	40				
250	60				
250	80				
250	100				
250	120				
250	150				
200	15				
200	40				
200	60				
200	80				
200	100				
200	120				
200	150				
150	15				
150	40				
150	60				
150	80				
150	100				
150	120				
125	15	2,100	3,400	2,600	5,100
125	40	1,900	2,900	2,400	4,500
125	60	1,700	2,500	2,200	4,050
125	80	1,500	2,100	1,900	3,100
125	100	1,300	1,600	1,700	2,650
125	115	1,200	1,350	1,350	1,900
100	15	2,100	3,400	2,550	4,950
100	40	1,800	2,800	2,300	4,000
100	60	1,600	2,400	2,200	3,250
100	80	1,400	1,800	1,750	2,500
75	15	2,100	3,300	2,500	4,800
75	40	1,700	2,500	2,200	3,300
75	60	1,300	2,000	2,000	2,450
50	10	2,000	3,300	2,400	4,400
50	25	1,700	2,700	2,150	3,350
50	40	1,400	2,000	1,650	2,100
25	5	2,000	3,400	2,700	5,000
25	10	1,700	3,000	2,350	3,800
25	15	1,400	2,600	1,800	3,300
10	2	1,900	3,000	2,200	3,000
10	5	1,600	2,600	1,900	2,600
5	2	1,500	2,400	1,700	2,400

\* For Capacity Multiplying Factors for Motive Gas Supplies and Other Filling Heads see back side of this page.  
NOTE: Capacity shown when fitted with specified check valves only.

# PPEC Pressure Powered Pump Installation Details

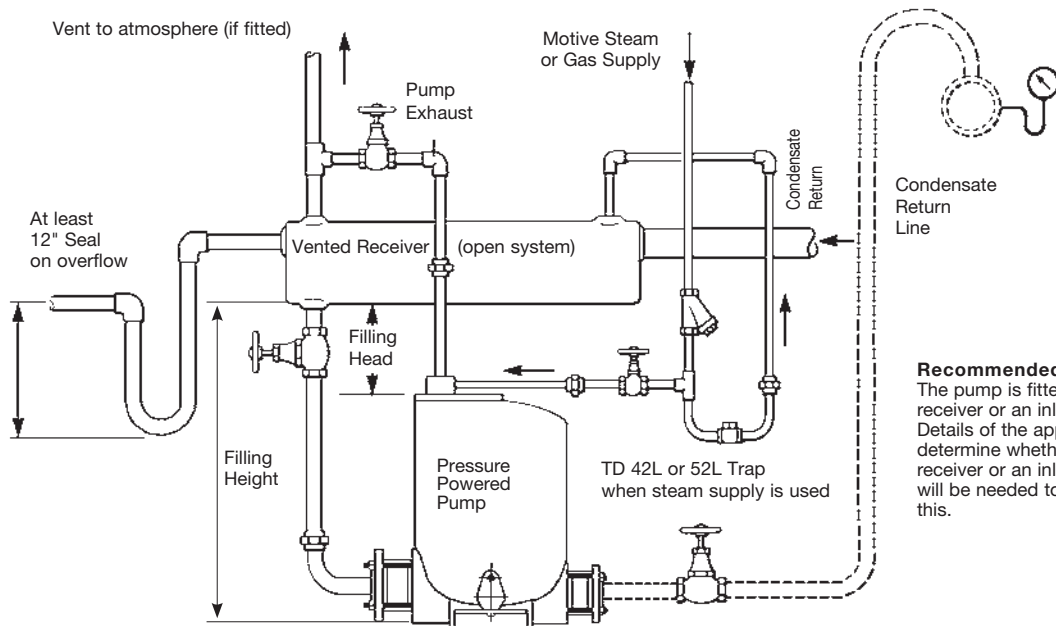
## Capacity Multiplying Factors for Motive Gas Supply (other than steam)

1" PPEC										
10%	20%	30%	40%	50%	60%	70%	80%	90%	% Backpressure Vs. Motive Pressure (BP/MP)	
1.10	1.13	1.16	1.20	1.25	1.30	1.35	1.40	1.45	Capacity Multiplying Factors	
1-1/2" PPEC										
10%	20%	30%	40%	50%	60%	70%	80%	90%	% Backpressure Vs. Motive Pressure (BP/MP)	
1.00	1.00	1.03	1.09	1.18	1.20	1.33	1.45	1.50	Capacity Multiplying Factors	

## Capacity Multiplying Factors for other Filling Heads

Filling Head			Capacity Multiplying Factors	
Inches	mm	1"&1-1/2" PPEC	Check valve and piping size, pump type	
0	0	*0.7		
6	152	1.0		
12	305	1.1		
18	457	1.2		
24	610	1.3		
36	914	1.5		
48	1219			
60	1524			

\* When using a PPEC below 6" filling head, a swing check valve must always be fitted to the inlet.



## Vented Receiver (Open System)

To drain condensate from a single or multiple source an "open" system, a vented receiver should be installed in a horizontal plane above and ahead of the pump. Sufficient receiver volume is needed above the filling head level to accept the condensate reaching the receiver during the pump discharge stroke. More important, the receiver must be sized to allow sufficient area for complete flash steam separation from the condensate. The chart below shows proper vented receiver sizing (per criteria set forth in the A.S.H.R.A.E. Handbook) based on the amount of flash steam present. If the receiver is sized as shown below, there will be sufficient volume for condensate storage and sufficient area for flash steam separation. The receiver can be a length of large diameter pipe or a tank.

## Pump Size - up to 3"x2"

Flash Steam	Pipe Size	Vent Line
up to -	Diameter	Diameter
75 lb/h	4"	1-1/2"
150 lb/h	6"	2"
300 lb/h	8"	3"
600 lb/h	10"	4"
900 lb/h	12"	6"
1200 lb/h	16"	6"
2000 lb/h	20"	8"

## Inlet Reservoir Piping (Closed System)

To drain condensate from a single piece of equipment in a "closed" system, a reservoir should be installed in a horizontal plane above and ahead of the pump. Sufficient reservoir volume is needed above the filling head level to accept the condensate reaching the reservoir during the pump discharge stroke. The chart below shows minimum reservoir sizing, based on condensate load, needed to prevent equipment flooding during the pump discharge stroke. The reservoir can be a length of large diameter pipe or a tank.

## Pump Size - up to 3"x2"

Liquid lb/h	Reservoir Pipe Size				
	3"	4"	6"	8"	10"
500 or Less	2'				
1000	2'				
1500	3'	2'			
2000	3.5'	2'	1'		
3000		3'	2'		
4000		4'	2'	1'	
5000		6'	3'	2'	
6000			3'	2'	
7000			3'	2'	
8000			4'	2'	
9000			4.5'	3'	2'
10,000			5'	3'	2'
11,000			5'	3'	2'





## APT10-4.5 Automatic Pump Trap

The Spirax Sarco Automatic Pump Trap is a non-electric combination pump and trap which transfers high temperature condensate from a low-point, low pressure or vacuum space to an area of higher pressure or elevation. This self contained unit uses steam as the pumping force to remove condensate from process equipment under all operating conditions. Recommended for use with motive steam only.

### Optional Extra

The APT10-4.5 is available with the body and cover coated with electroless nickel plate (ENP). This option, when required, will be denoted as APT10-4.5 ENP.

### Limiting Operating Conditions

<b>Max. Operating Pressure (PMO)</b>	65 psig (4.5 barg)
<b>Max. Back Pressure</b>	58 psig (4 barg)
<b>Max. Operating Temperature (TMO)</b>	311°F (155°C)

### Specific Gravity

0.9 to 1.0

### Filling Head Requirements

(from base) 7.8" (.2m)

### Filling Head Recommended

(from base) 11.8" (.3m)

### Pressure Shell Design Conditions

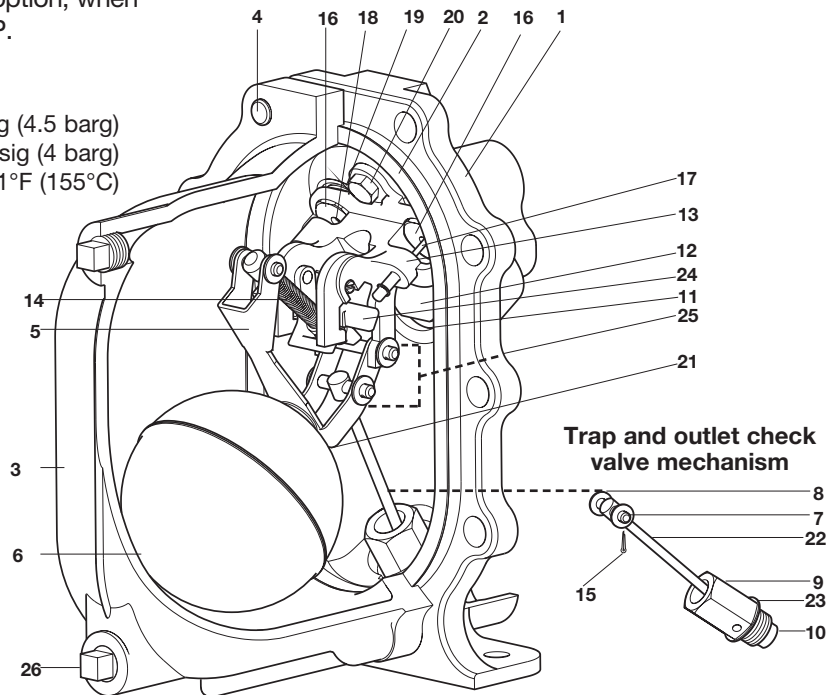
#### PMA

Max. allowable pressure 145 psig (PN10)

#### TMA

Max. allowable temperature 392°F (200°C)

<b>Model</b>	<b>APT10-4.5</b>
<b>PMO</b>	65 psig
<b>Sizes</b>	3/4" x 3/4" Inlet/Outlet 1/2" Motive/Exhaust
<b>Connections</b>	NPT
<b>Construction</b>	Ductile Iron Body Stainless Steel Internals Stainless Steel Check Valves



### Materials

No.	Part	Material	No.	Part	Material
1	Cover	SG Iron ASTM A395/ DIN 1693 GGG 40.3	13	Pump mechanism bracket	Stainless Steel
2	Cover Gasket	Synthetic fiber	14	Spring (pump)	Stainless Steel
3	Body	SG Iron ASTM A395/ DIN 1693 GGG 40.3	15	Split pin	Stainless Steel
4	Cover Bolts	Stainless Steel ISO 3506 Gr. A2-70	16	Inlet and exhaust seat	Stainless Steel
5	Pump trap lever	Stainless Steel	17	Inlet valve	Stainless Steel
6	Float	Stainless Steel	18	Exhaust valve	Stainless Steel
7	Pivot shaft	Stainless Steel	19	Valve seat gasket	Stainless Steel
8	Washer	Stainless Steel	20	Pump mechanism bolt	Stainless Steel
9	Trap housing	Stainless Steel	21	Float bolt	Stainless Steel
10	Ball	Stainless Steel	22	Trap 1st stage valve	Stainless Steel
11	Seat (inlet check valve)	Stainless Steel	23	Trap gasket	Stainless Steel
12	Flap (inlet check valve)	Stainless Steel	24	Actuator arm	Stainless Steel
			25	Name-plate	Stainless Steel
			26	Drain plug	Stainless Steel

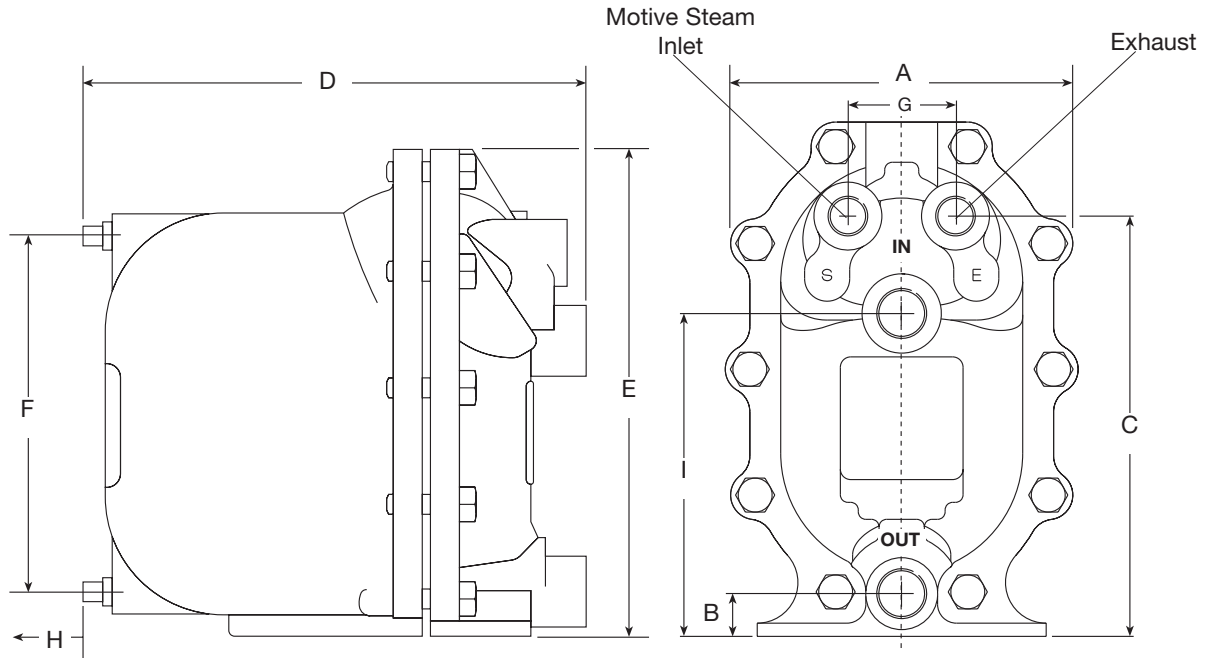
Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only.  
In the interests of development and improvement of the product, we reserve the right to change the specification.

TI-5-2301-US 3.14



# APT10-4.5 Automatic Pump Trap

Approximate Dimensions (nominal) in inches and millimeters											
Size	Connection	A	B	C	D	E	F	G	H	I	Weight
3/4" x 3/4"	NPT	7.4	0.9	8.7	10.5	10.7	7.6	2.2	8.9	6.7	31
		187	23	223	266	273	194	57	225	171	14



## Nominal capacities

For full capacity details for a specific application consult Spirax Sarco.

To accurately size the pump trap, the following data is required.

1. Installation head available, from the base of the pump trap to the center line of the heat exchanger/process condensate outlet (ft). If the outlet is mounted vertically, then this should be from the base of the pump to the face of the outlet.
2. Motive steam pressure available to power the pump trap (psig).
3. Total back pressure in the condensate return system (psig). See note below.
4. Heat exchanger/ plant full load operating pressure (psig).
5. Heat exchanger/ plant maximum steam load (lb/hr).
6. Minimum temperature of process fluid. (°F).
7. Maximum controlled temperature of process fluid (°F).

SIZE	3/4" x 3/4"
Pump discharge/cycle	0.55 gallons
3.3 ft. installation head	Max. trapping capacity 2022 lb/hr
At: 65 psig motive pressure	Max. pumping capacity 1420 lb/hr
21 psig total back pressure	

### NOTE:

Total lift or back pressure BP (static head plus pressure head in the return system) must be below the motive fluid inlet pressure to allow pump capacity to be achieved.

$$BP (\text{back pressure}) = (H \div 2.3) + (P) + (Pf)$$

Height (H) in feet  $\div 2.3$  plus pressure (P) psig in the return line, plus downstream piping friction pressure drop (Pf) in psig.

## Spare Parts

See TIS 5.231

## Installation & Maintenance

Complete installation and maintenance instructions are given in IM-P612-18, supplied with each unit.

## Sample Specification

The pump trap shall be a Spirax Sarco automatic pump trap type APT10-4.5 operated by steam to 65 psig. No electrical energy shall be required.

Body construction from SG iron ASTM A395 dual certified with DIN 1693 GGG 40.3 with a swing type inlet check valve and ball type outlet check valve.

The internal trap mechanism shall contain a stainless steel float connected to an internal trap. The pump trap and check valve mechanisms shall be incorporated into the same body envelope with no external seals or glands and shall be capable of operating with a minimum 7.8 inches installation head from the base of the unit.

## Certification

All pump traps are EN 10204 (3.1.B) certifiable.

## Design Compliance

Shell designed in accordance with ASME VIII / A.D.Merkblatter

**How to order** 1 - Automatic pump trap, type APT10-4.5, 3/4" x 3/4", NPT with NPT motive fluid connections.

## Spare Parts for the APT10-4.5 Automatic Pump Trap

### Spare parts

The spare parts available are shown in heavy outline. Parts drawn in broken line are not supplied as spares.

<b>A</b> Cover gasket	See overleaf
<b>B</b> Inlet check valve	See overleaf
<b>C</b> Spring and actuator arm	See overleaf
<b>D</b> Floats	See overleaf
<b>E</b> Trap and outlet check valve mechanism	See overleaf
<b>F</b> Inlet/exhaust valve and seats	See overleaf

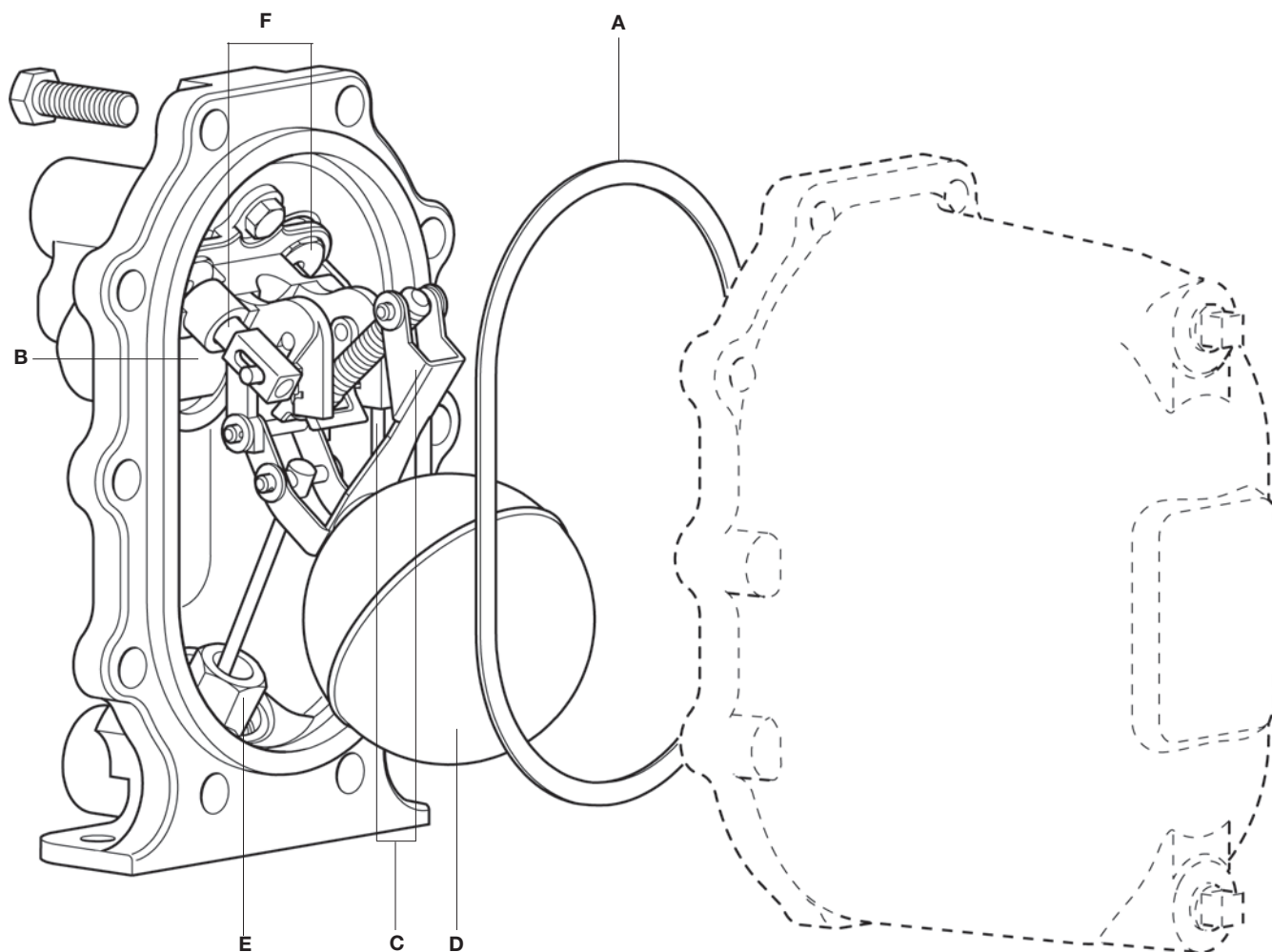
### Please note:

For customer convenience, spares are supplied in kits to ensure all the appropriate replacement parts are available e.g. when an inlet/exhaust valve and seat assembly is ordered, all replacement split pins, washers and gaskets will be provided in addition to the key components listed.

### How to order spares

Always order spares by using the description given.

**Example:** 1 - Inlet/exhaust valve and seat kit for a Spirax Sarco 3/4" x 3/4".



# Spare Parts for the APT10-4.5 Automatic Pump Trap

## Spare parts

The spare parts available are shown in heavy outline. Parts drawn in broken line are not supplied as spares.

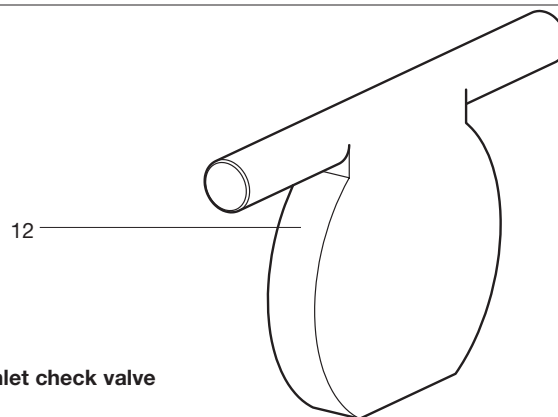
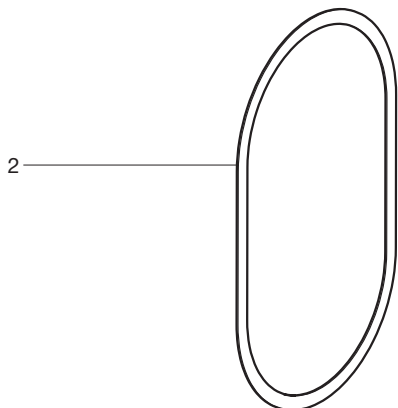
<b>A</b> Cover gasket	2
<b>B</b> Inlet check valve	2, 12
<b>C</b> Spring and actuator arm	2, 14, 24
<b>D</b> Floats	2, 5, 6, 21
<b>E</b> Trap and outlet check valve mechanism	2, 8, 9, 10, 21, 22, 23
<b>F</b> Inlet/exhaust valve and seats	2, 16, 17, 18, 19

Refer to TIS 5.2301 for component number details.

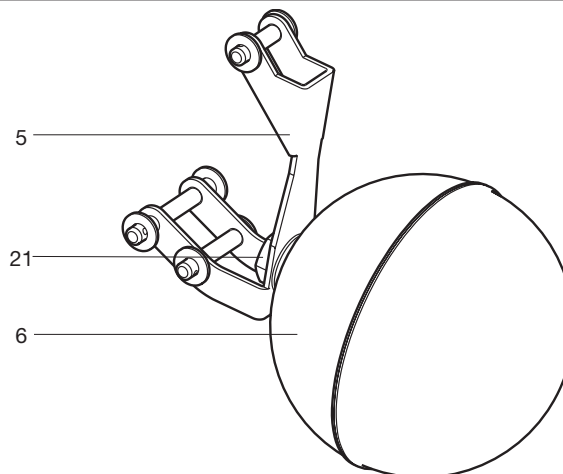
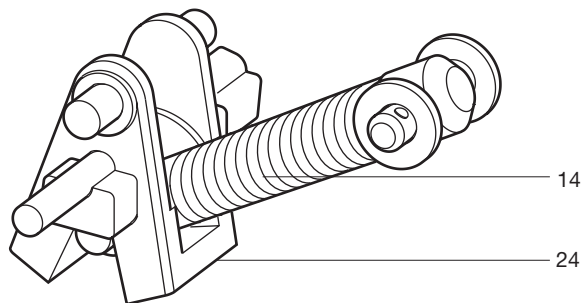
For customer convenience, spares are supplied in kits to ensure all the appropriate replacement parts are available e.g. when an inlet/exhaust valve and seat assembly is ordered, all replacement split pins, washers and gaskets will be provided in addition to the key components listed.

Always order spares by using the description given.

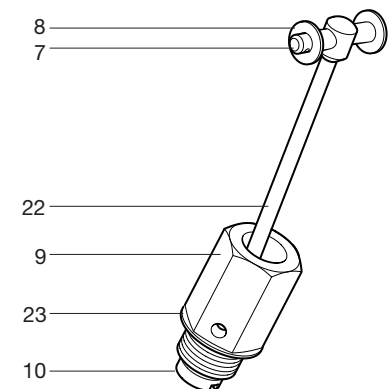
1 - Inlet/exhaust valve and seat kit for a Spirax Sarco 3/4" x 3/4".



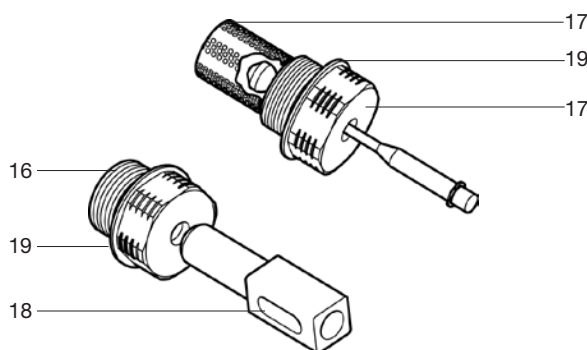
**B Inlet check valve**



**F Inlet / exhaust valve and seats**



**E Trap and outlet check valve mechanism**





## APT14, APT14HC and APT14SHC Automatic Pump Traps

### Description

The Spirax Sarco automatic pump trap is a flanged or screwed displacement receiver pressure rated to PN16. The unit is capable of automatically trapping or pumping, depending on pipeline conditions. The unit is operated by steam and is used to remove condensate from process plant under all operating conditions including vacuum. Recommended for use with motive steam only.

### Design compliance

The shell of the product has been designed in accordance with A.D. Merkblatter/ASME VIII.

### Standards

These products fully comply with the requirements of the European Pressure Equipment Directive 97/23/EC, ATEX Directive 94/9/EC and carry the and marks when so required.

### Certification

These products are available with certification to EN 10204 3.1. **Note:** All certification/inspection requirements must be stated at the time of order placement.

### Sizes and pipe connections

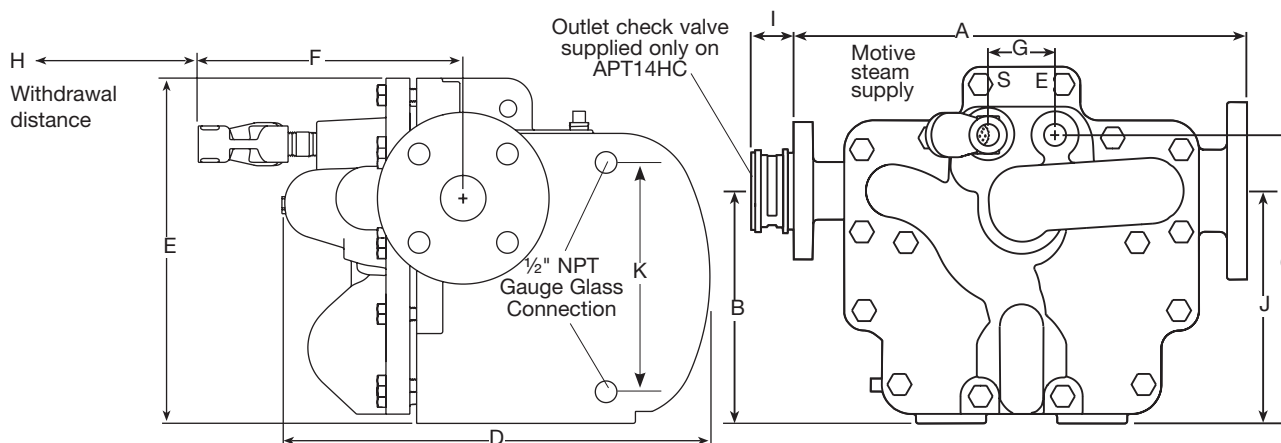
Model and body material	Inlet and outlet sizes and pipe connections		Motive/exhaust		
APT14 SG iron	Flanged	1-1/2" inlet x 1" outlet	ANSI 150 B 16.5	NPT	1/2" (DN15)
			EN 1092 PN16	NPT or BSP	1/2" (DN15)
	Screwed	1-1/2" inlet x 1" outlet	NPT	NPT	1/2" (DN15)
			BSP (BS 21 parallel)	BSP	1/2" (DN15)
APT14HC SG iron	Flanged	2" inlet x 1-1/2" outlet	ANSI 150 B 16.5	NPT	1/2" (DN15)
			EN 1092 PN16	BSP	1/2" (DN15)
APT14SHC Carbon Steel	Flanged	2" inlet x 1-1/2" outlet	ANSI 150 B 16.5	NPT	1/2" (DN15)
			EN 1092 PN16	BSP	1/2" (DN15)

### Optional extra

Both the APT14 and APT14HC are available with the body and cover coated with electroless nickel plate (ENP). This option, when required, will be denoted as APT14 ENP and APT14HC ENP respectively and must be stated at the time of order placement.

Gauge glasses, supplied separately, are available. For further details contact Spirax Sarco.

### Dimensions/weight (approximate) in inches and pounds (mm and kg)



Model	Connection	A	B	C	D	E	F	G	H	I		J	K	Weight
										PN16	ANSI			
APT14	Screwed	13.8 (350)	7.8 (198)	9.7 (246)	15.2 (385)	12.0 (304)	10.2 (258)	2.2 (57)	9.8 (250)	-	-	7.8 (198)	-	99 (45)
	Flanged	15.3 (389)	7.8 (198)	9.7 (246)	15.2 (385)	12.0 (304)	10.2 (258)	2.2 (57)	9.8 (250)	-	-	7.8 (198)	-	99 (45)
APT14HC	Flanged	18.7 (476)	7.8 (198)	10.6 (270)	15.7 (400)	13.2 (335)	9.3 (235)	2.2 (57)	10.8 (275)	1.2 (31.5)	1.8 (45)	7.8 (198)	9.3 (235)	143 (65)
APT14SHC	Flanged	20.0 (508)	8.1 (206)	10.9 (278)	16.0 (407)	13.8 (351)	10.3 (261)	2.2 (57)	10.8 (275)	1.2 (31.5)	1.8 (45)	7.8 (198)	9.3 (235)	232 (105)



Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only.

In the interests of development and improvement of the product, we reserve the right to change the specification.

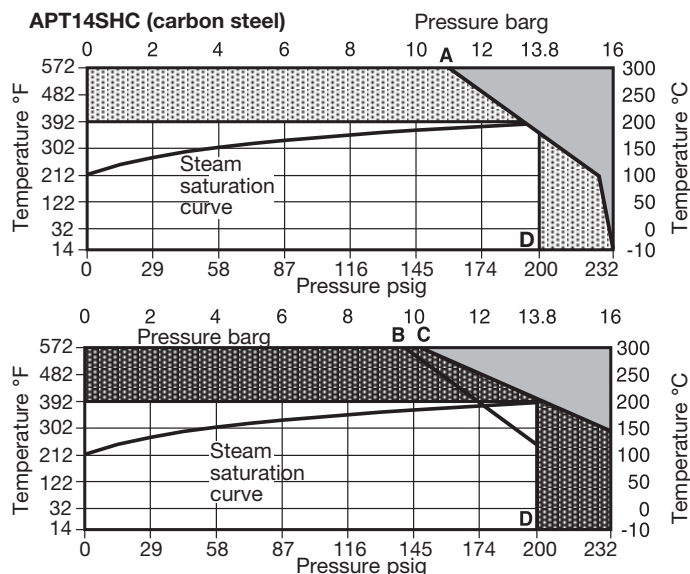
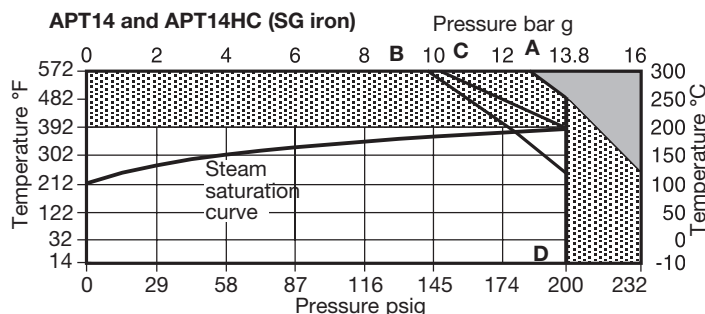
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# APT14 and APT14HC Automatic Pump Trap

## Pressure / temperature limits

-  The product must not be used in this region.  
 The product should not be used in this region or beyond its operating range as damage to the internals may occur.

- A - D Flanged PN16.  
 B - D Flanged JIS/KS 10.  
 C - D Flanged ANSI 150.



Body design conditions		PN16
Maximum motive inlet pressure		200 psig (13.8 bar g)
PMA	Maximum allowable pressure	232 psig @ 248°F (16 bar g @ 120°C)
TMA	Maximum allowable temperature	572°F @ 185 psig (300°C @ 12.8 bar g)
Minimum allowable temperature		14°F (-10°C)
<b>Note:</b> For lower temperatures consult Spirax Sarco.		
PMO	Maximum operating pressure for saturated steam service	200 psig @ 388°F (13.8 bar g @ 198°C)
Maximum backpressure for standard pumps (for higher backpressures contact Spirax Sarco)		72 psig (5 bar g)
TMO	Maximum operating temperature for saturated steam service	388°F @ 200 psig (198°C @ 13.8 bar g)
Minimum operating temperature		14°F (-10°C)
<b>Note:</b> For lower temperatures consult Spirax Sarco.		
Temperature limits (Ambient $\bar{x}$ )		14°F to 392°F (-10°C to 200°C)
Designed for a maximum cold hydraulic test pressure of:		348 psig (24 bar g)
Filling head	Recommended filling head above the pump (from the base of the receiver/process)	12 in (0.3 m)
	Maximum recommended filling head (from the base of the pump) for higher filling heads refer to Spirax Sarco	39 in (1 m)
	Minimum filling head required (from the base of the pump)	8 in (0.2 m)

## Nominal capacities

For full capacity details for a specific application consult Spirax Sarco. To accurately size the pump trap, the following data is required.

1. Installation head available, from the base of the pump trap to the centre line of the heat exchanger / process condensate outlet (m).  
If the outlet is mounted vertically, then this should be from the base of the pump to the face of the outlet.
2. Motive steam pressure available to power the pump trap (psig).
3. Total backpressure in the condensate return system (psig). See note below.
4. Heat exchanger full-load operating pressure (psig).
5. Heat exchanger maximum steam load (lb/hr).
6. Minimum temperature of secondary fluid. (°F).
7. Maximum controlled temperature of secondary fluid (°F).

Model	APT14	APT14HC and APT14SHC
Pump discharge/cycle	1.3 gallons (5 litres)	2.1 gallons (8 litres)
39 inches installation head At: 73 psig motive pressure 15 psig total backpressure	Maximum trapping capacity 8800 lb/hr (4000 kg/h)	Maximum trapping capacity 19800 lb/hr (9000 kg/h)
	Maximum pumping capacity 2420 lb/hr (1100 kg/h)	Maximum pumping capacity 6160 lb/hr (2800 kg/h)

**Note:** The capacities detailed within the above Table are only given as a guide. They are based on the installation parameters shown in the left hand column.

**Achieved capacities will differ if any of the installation parameters change.** For specific capacities and application details, contact Spirax Sarco.

The total lift or backpressure BP (static head plus pressure head in the return system) must be below the motive fluid inlet pressure to allow pump capacity to be achieved.

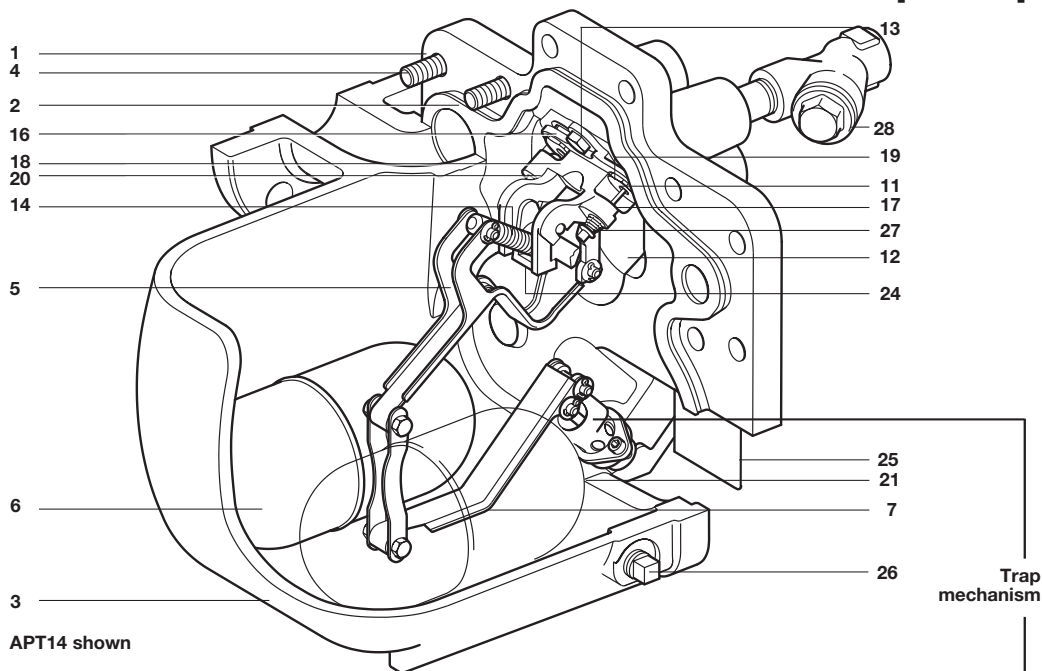
$$BP \text{ (backpressure)} = (H \times 2.31) + (P) + (Pf)$$

Height (H) in feet x 2.31 plus pressure (P) psig in the return line, plus downstream piping friction pressure drop (Pf) in psig.

(Pf can be ignored if the downstream pipework is less than 328 feet to a non-flooded condensate return and has been sized to take into account the effect of flash steam at the heat exchanger's full-load operating conditions.)

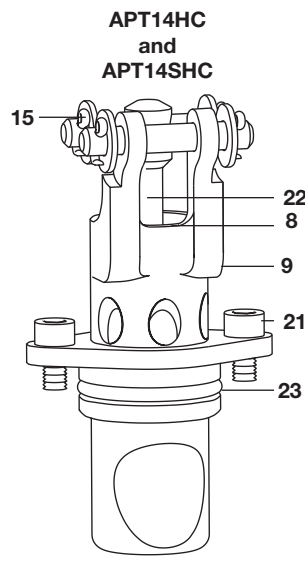
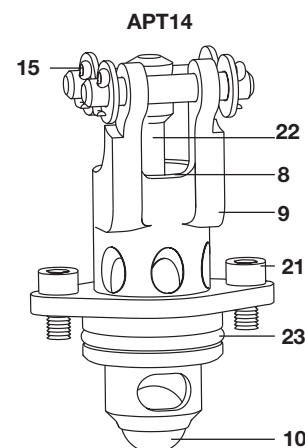
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# APT14 and APT14HC Automatic Pump Trap



## Materials

No.	Part	Material	
1	Cover	APT14	SG iron EN JS 1025 or ASTM A395
		APT14HC	SG iron EN JS 1025 or ASTM A395
		APT14SHC	Carbon steel EN 1.0619+N or ASTM A216 WCB
2	Cover gasket	Graphite laminated with stainless steel insert	
3	Body	APT14	SG iron EN JS 1025 or ASTM A395
		APT14HC	SG iron EN JS 1025 or ASTM A395
		APT14SHC	Carbon steel EN 1.0619+N or ASTM A216 WCB
4	Cover bolts	Stainless steel	ISO 3506 Gr. A2 70
	Location pins	APT14SHC only	Stainless steel 304
5	Pump lever	Stainless steel	BS 1449 304 S15
6	Float	Stainless steel	BS 1449 304 S15
7	Trap lever	Stainless steel	BS 1449 304 S15
8	Trap 2 <sup>nd</sup> stage valve	Stainless steel	ASTM A276 440 B
9	Trap housing	Stainless steel	BS 3146 ANC 2
10	Ball (APT14 only)	Stainless steel	ASTM A276 440 B
11	Seat (inlet check valve)	Stainless steel	AISI 420
12	Flap (inlet check valve)	Stainless steel	BS 3146 ANC 4B
13	Pump mechanism bracket	Stainless steel	BS 3146 ANC 4B
14	Spring (pump)	Stainless steel	BS 2056 302 S26 Gr. 2
15	Split pin	Stainless steel	BS 1574
16	Exhaust seat	Stainless steel	BS 970 431 S29 or ASTM A276 431
17	Inlet valve and seat assembly	Stainless steel	
18	Exhaust valve	Stainless steel	BS 3146 ANC 2
19	Valve seat gasket	Stainless steel	BS 1449 409 S19
20	Pump mechanism bolt	Stainless steel	ISO 3506 Gr. A2 70
21	Trap housing bolt	Stainless steel	BS 6105 A4 80
22	Trap 1 <sup>st</sup> stage valve	Stainless steel	BS 970 431 S29 or ASTM A276 431
23	'O' ring	EPDM	
24	Actuator arm	Stainless steel	BS 3146 ANC 2
25	Name-plate	Stainless steel	BS 1449 304 S16
26	Drain plug	Steel	DIN 17440 1.4571
27	Inlet valve spring	Stainless steel	
28	Motive strainer	APT14	SG iron
		APT14HC	SG iron
		APT14SHC	Carbon steel
29	DCV10 (APT14HC and APT14SHC)	Stainless steel (not shown)	



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# APT14 and APT14HC Automatic Pump Trap

## Safety information, installation and maintenance

For full details see the Installation and Maintenance Instructions (IM-P612-04) supplied with the product.

## How to specify

### APT14 and APT14HC

The pump trap shall be a Spirax Sarco automatic pump trap type APT14 operated by steam to 200 psig. No electrical energy shall be required. Body construction from SG iron (EN JS 1025 dual certified with ASTM A395) with a swing type inlet check valve (APT14 and APT14HC) and ball type outlet check valve (APT14 only). The internal trap mechanism shall contain dual stainless steel floats connected with a two stage trap, while the internal pump mechanism shall be a stainless steel single tension spring snap-action device with no external seals or glands.

### APT14SHC

The pump trap shall be a Spirax Sarco automatic pump trap type APT14SHC operated by steam to 200 psig. No electrical energy shall be required. Body construction from carbon steel (EN 1.0619 dual certified with ASTM A216 WCB) with a swing type inlet check valve. The internal trap mechanism shall contain dual stainless steel floats connected with a two stage trap, while the internal pump mechanism shall be a stainless steel single tension spring snap-action device with no external seals or glands.

## How to order

**Example:** 1 Spirax Sarco automatic pump trap, type APT14, 1½" x 1", ANSI 150 with NPT motive fluid connections.

### Optional extras

Both the APT14 and APT14HC are available with the **body and cover coated with electroless nickel plate (ENP)**. This option, when required, will be denoted as **APT14 ENP** and **APT14HC ENP** respectively and must be stated at the time of order placement.

The APT14, APT14HC and APT14SHC are available with the body drilled, tapped and plugged to accept gauge glasses. **Note:** Gauge glasses can not be fitted retrospectively to the standard APT14, APT14HC or APT14SHC.

**Gauge glasses**, supplied separately, are available for the APT14, APT14HC or APT14SHC. For further details contact Spirax Sarco.

## Spare parts

The spare parts available are shown in solid outline. Parts drawn in broken line are not supplied as spares.

### Available spares

<b>A</b>	Cover assembly (A - G inclusive)	1, 2, 5-25
<b>B</b>	Cover gasket	2
<b>C</b>	Inlet check valve	2, 12
<b>D</b>	Spring and actuator arm	2, 14, 24
<b>E</b>	Floats	2, 5, 6, 7
<b>F</b>	Trap and outlet check valve mechanism	2, 8, 9, 10 (APT14 only), 21, 22, 23
<b>G</b>	Inlet/exhaust valve and seat kit	2, 16, 17, 18, 19, 27
<b>H</b>	See separate literature: For the <b>APT14</b> or <b>APT14HC</b> see TI-P163-01 and for the <b>APT14SHC</b> see TI-P063-02	28

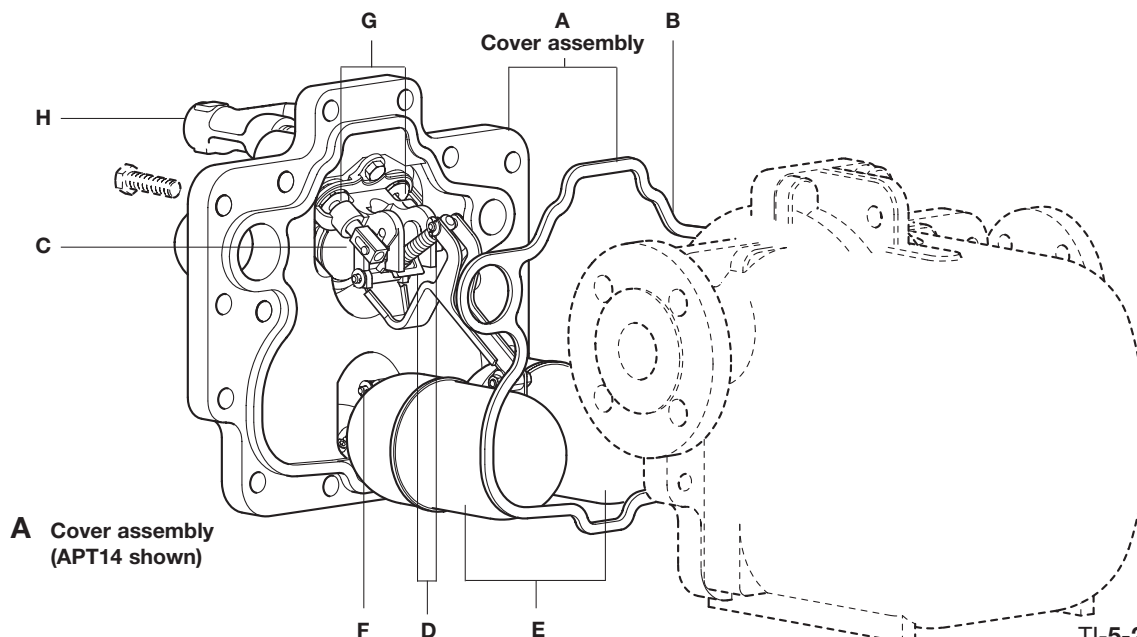
**DCV10 outlet check valve** (APT14HC and APT14SHC only). See separate literature TI-P601-32 **29**

**Please note:** For customer convenience, spares are supplied in kits to ensure all the appropriate replacement parts are available e.g. when an inlet/exhaust valve and seat assembly is ordered, all replacement split pins, washers and gaskets will be provided in addition to the key components listed.

### How to order spares

Always order spares by using the description given in the column headed 'Available spares' and state the size and type of unit.

**Example:** 1 - Inlet/exhaust valve and seat kit for a Spirax Sarco 1½" x 1" APT14 automatic pump trap.



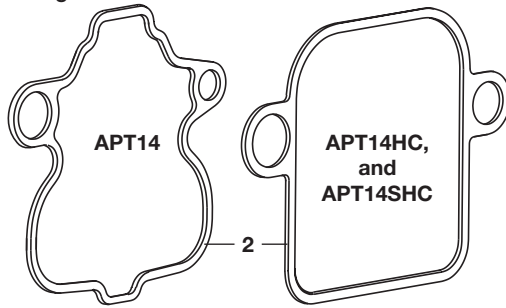
**A** Cover assembly  
(APT14 shown)

TI-5-228-US 10.15

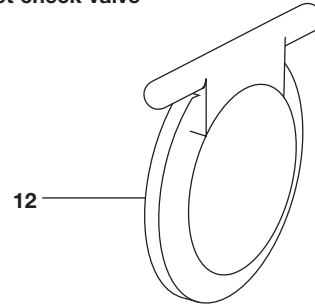


# APT14 and APT14HC Automatic Pump Trap

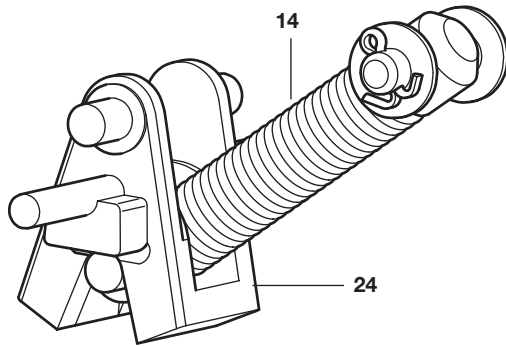
**B Cover gasket**



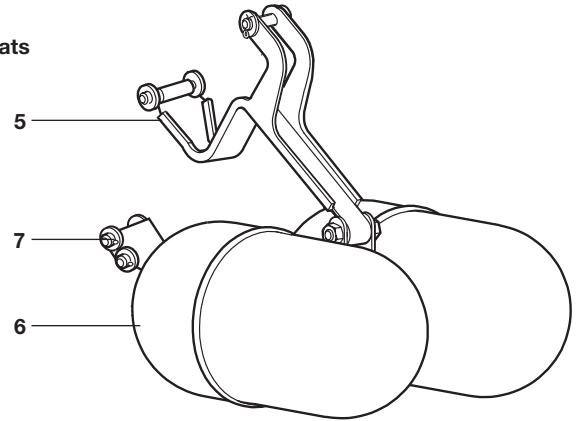
**C Inlet check valve**



**D Spring and actuator arm**



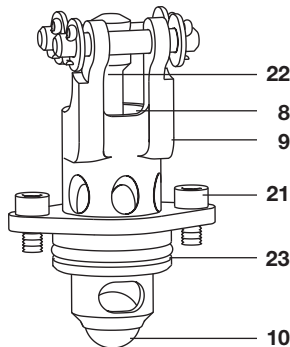
**E Floats**



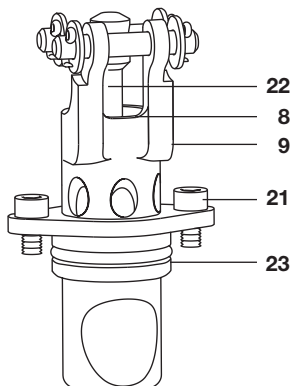
**F Trap and outlet check valve mechanism**

**Note:** Item **10** is not included for the APT14HC and APT14SHC

**APT14**

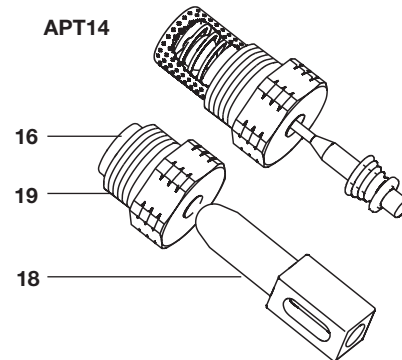


**APT14HC and APT14SHC**

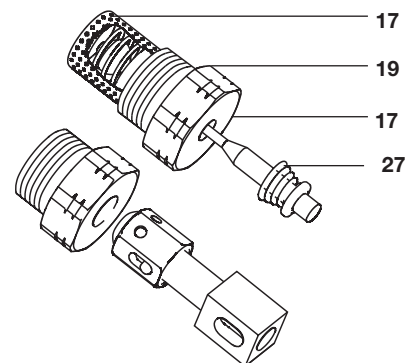


**G Inlet / exhaust valve and seat kit**

**APT14**



**APT14HC and APT14SHC**





# spirax sarco

## APT Selection and Sizing

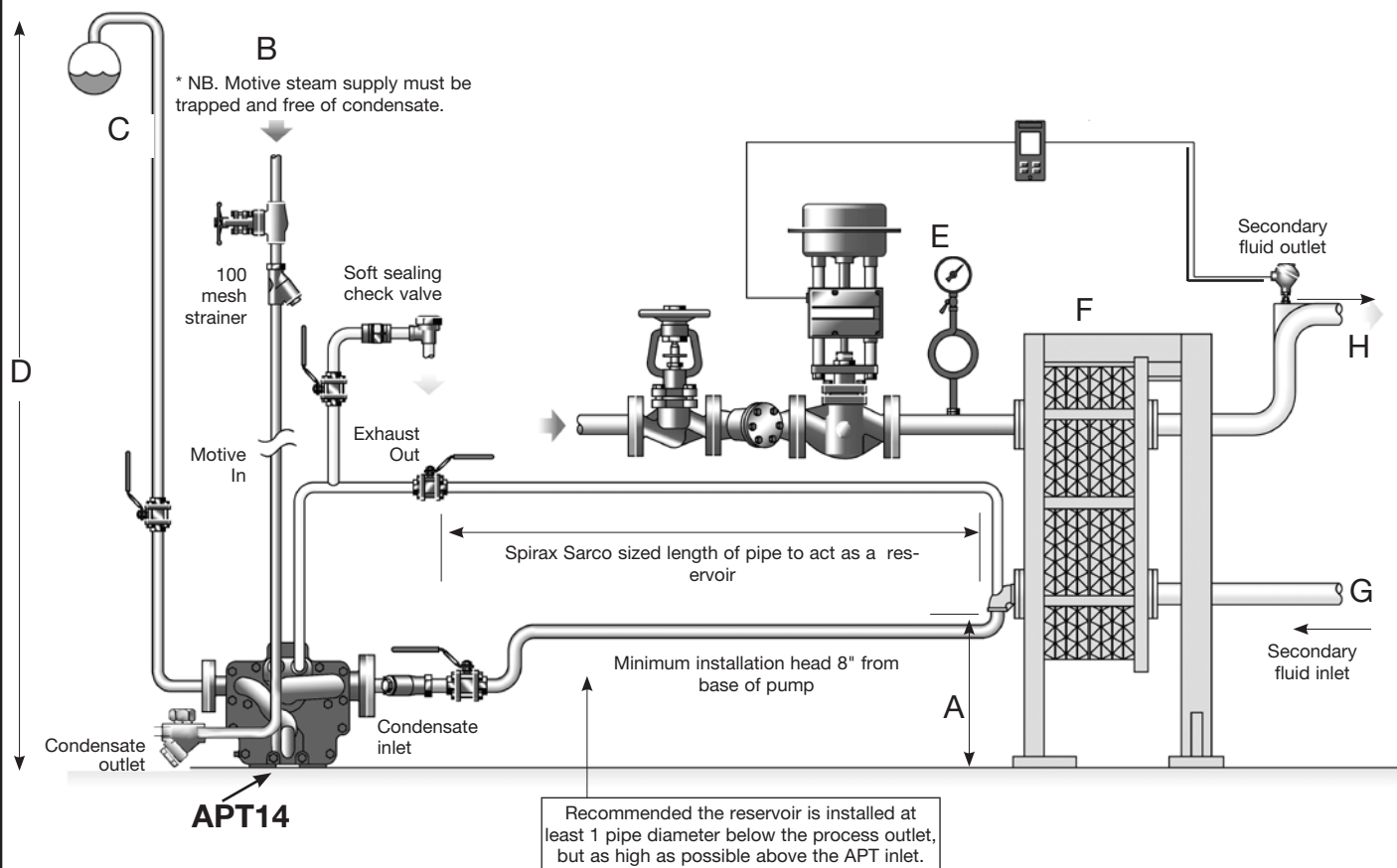
**Spirax Sarco will ensure that the APT is accurately matched to your process and will provide you with a detailed sizing chart, tailored to your specific application.**

Providing the information below is known, we can even provide you with confirmation over the telephone and fax you your specific chart.

Alternatively arrange a visit for your local Spirax Sarco representative who can provide detailed APT sizing information for all your specific needs.

**To help us size the APT for your application simply provide us with the following information: -**

### Recommended Installation



- |   |  |       |
|---|--|-------|
| A | Installation head available from the base of the pump to the centreline of the heat exchanger / process condensate outlet. | ft    |
| B | Motive steam pressure available to power the pump trap.  | psig  |
| C | Pressure in the condensate return system.  | psig  |
| D | Height of condensate return from floor level.  | ft    |
| E | Heat exchanger full load operating pressure.   | psig  |
| F | Maximum steam load on the heat exchanger.  | lb/hr |
| G | Minimum secondary fluid temperature.   | °F    |
| H | Maximum controlled temperature of secondary fluid.   | °F    |

*Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only.  
In the interests of development and improvement of the product, we reserve the right to change the specification.*

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# APT Selection & Sizing

## How to Select & Size

From the inlet pressure, back pressure and filling head conditions given below, select the APT size which meets the capacity requirement of the application.

For GPM, multiply the capacities below by 0.002.

For kg/h, multiply the capacities below by 0.454.

\* Back pressure is the lift height (D) in feet x 0.433 plus psig in return line, (C), plus piping friction in psig.

### Examples:

Steam Condensate load (F) 750 lb/h  
 Steam pressure available for operating APT (B) 100 psig  
 Vertical lift from APT to the return piping (D) 50 feet  
 Pressure in the return piping (piping friction negligible) (C) 50 psig  
 Filling head available from base of APT (A) 8 inches  
 System pressure (E) 150 psig

### Solution:

1. Calculate "C + D", the total lift or back pressure, against which the condensate must be pumped. = (50 x 0.433) + 50 = 72 psig
2. From capacity table, with 100 psig inlet pressure and 72 psig back pressure, choose a APT14 which has a capacity of 1,695 lb/h.

### Note:

The capacity charts shown below are applicable for the specific conditions only. Any variance in system conditions A, B, C, D, or E will alter the capacities shown, and hence these figures can be used as a rough guide only. Your local Spirax Sarco representative will provide detailed APT sizing information for all conditions.

APT10-4.5		65 Psi Motive Steam (B)					
		0 Psi Back Pressure (C+D)		25 Psi Back Pressure (C+D)		58 Psi Back Pressure (C+D)	
		Pumping Capacities lb/h	Trapping Capacity lb/h	Pumping Capacity lb/h	Trapping Capacity lb/h	Pumping Capacity lb/h	Trapping Capacity lb/h
39	65		2231		1974		1306
30			2229		1970		1293
20			1937		1937		1277
16			1620		1620		1271
12			1223		1223		1223
8			607		607		607
39	50		2088		1757	930	
30			2085		1751	901	
20			1937		1745	847	
16			1620		1620	809	
12			1223		1223	744	
8			607		607	542	
39	35		1909		1414	832	
30			1905		1403	806	
20			1900		1390	755	
16			1620		1385	719	
12			1223		1223	658	
8			607		607	471	
39	20		1164	1425		665	
30			1657	1342		643	
20			1649	1197		601	
16			1620	1104		572	
12			1223	957		521	
8			607	592		369	
39	0	1163		971		327	
30		1088		900		316	
20		961		780		297	
16		879		706		282	
12		754		594		258	
8			547	339		183	

APT14		200 Psi Motive Steam (B)						100 Psi Motive Steam (B)						30 Psi Motive Steam (B)			
		Pressure (C+D)		Pressure (C+D)		Pressure (C+D)		0 Psi Back Pressure (C+D)		30 Psi Back Pressure (C+D)		72 Psi Back Pressure (C+D)		0 Psi Back Pressure (C+D)		30 Psi Back Pressure (C+D)	
Installation Head (A) inches	System Pressure (E) psig	Pumping Capacities lb/h	Trapping Capacity lb/h	Pumping Capacity lb/h	Trapping Capacity lb/h	Pumping Capacity lb/h	Trapping Capacity lb/h	Pumping Capacities lb/h	Trapping Capacity lb/h	Pumping Capacity lb/h	Trapping Capacity lb/h	Pumping Capacity lb/h	Trapping Capacity lb/h	Pumping Capacities lb/h	Trapping Capacity lb/h	Pumping Capacity lb/h	Trapping Capacity lb/h
39	200		10021		9561		8592		10021		9561		8592		10021		9561
30			8491		8491		8491		8491		8491		8491		8491		8491
20			6375		6374		6374		6374		6374		6374		6374		6374
16			5296		5296		5296		5296		5296		5296		5296		5296
12			3932		3932		3932		3932		3932		3932		3932		3932
8			1695		1695		1695		1695		1695		1695		1695		1695
39	150		9120		8386		7135		9120		8386		7137		9120		8386
30			8491		8378		7126		8491		8378		7126		8491		8378
20			6375		6374		6374		6374		6374		6374		6374		6374
16			5296		5296		5296		5296		5296		5296		5296		5296
12			3932		3932		3932		3932		3932		3932		3932		3932
8			1695		1695		1695		1695		1695		1695		1695		1695
39	75		7034		5820	3075		7034		5820	2694			7034		5820	
30			7022		5804	2844		7022		5804	2569			7022		5804	
20			6374		5786	2490		6374		5786	2345			6374		5786	
16			5296		5296	2272		5296		5296		2200		5296		5296	
12			3932		3932		2165	3932		3932		2165		3932		3932	
8			1695		1695		1695		1695		1695		1695		1695		1695
39	30		5018	2419		2104		5018	2626		1974			5018		1553	
30			4998	2248		1955		4998	2475		1875			4998		1406	
20			4975	1695		1707		4975	2215		1700			4975		1205	
16			4966	1792		1557		4966	2050		1587			4966		1107	
12			3932	1534		1332		3932	1795		1408			3932		992	
8			1695	941		815		1695	1160		941			1695		850	
39	0		1553	1223		1066		1763		1425		1112		1915			
30			1406	1136		990		1657		1337		1050		1835			
20		1220 1119		994		865		1478		1189		944		1692			
16				908		790		1366		1097		877		1598			
12				780		678		1196		958		773		1445			
8			850	487		423			850	620		513		1026			

# APT Selection & Sizing

## Capacities APT14HC

Installation Head (A) inches	System Pressure (E) psig	200 Psi Motive Steam (B)				100 Psi Motive Steam (B)				72 Psi Back Pressure (C+D)				30 Psi Back Pressure (C+D)				30 Psi Motive Steam (B)			
		0 Psi Back Pressure (C+D)		30 Psi Back Pressure (C+D)		72 Psi Back Pressure (C+D)		0 Psi Back Pressure (C+D)		30 Psi Back Pressure (C+D)		72 Psi Back Pressure (C+D)		0 Psi Back Pressure (C+D)		30 Psi Back Pressure (C+D)		0 Psi Back Pressure (C+D)		30 Psi Back Pressure (C+D)	
		Pumping Capacity lb/h	Trapping Capacity lb/h	Pumping Capacity lb/h	Trapping Capacity lb/h	Pumping Capacity lb/h	Trapping Capacity lb/h	Pumping Capacity lb/h	Trapping Capacity lb/h	Pumping Capacity lb/h	Trapping Capacity lb/h	Pumping Capacity lb/h	Trapping Capacity lb/h	Pumping Capacity lb/h	Trapping Capacity lb/h	Pumping Capacity lb/h	Trapping Capacity lb/h	Pumping Capacity lb/h	Trapping Capacity lb/h	Pumping Capacity lb/h	Trapping Capacity lb/h
39	200	10021	8592	9561	8592	9561	8592	10021	8592	9561	8592	9561	8592	10021	8592	9561	8592	10021	8592	9561	8592
30		8491	8491	8491	8491	8491	8491	8491	8491	8491	8491	8491	8491	8491	8491	8491	8491	8491	8491	8491	8491
20		6375	6374	6374	6374	6374	6374	6374	6374	6374	6374	6374	6374	6374	6374	6374	6374	6374	6374	6374	6374
16		5296	5296	5296	5296	5296	5296	5296	5296	5296	5296	5296	5296	5296	5296	5296	5296	5296	5296	5296	5296
12		3932	3932	3932	3932	3932	3932	3932	3932	3932	3932	3932	3932	3932	3932	3932	3932	3932	3932	3932	3932
8		1695	1695	1695	1695	1695	1695	1695	1695	1695	1695	1695	1695	1695	1695	1695	1695	1695	1695	1695	1695
39	150	9120	7137	8386	7137	8386	7137	9120	7137	8386	7137	8386	7137	9120	7137	8386	7137	9120	7137	8386	7137
30		8491	7126	8378	7126	8378	7126	8491	7126	8378	7126	8378	7126	8491	7126	8378	7126	8491	7126	8378	7126
20		6375	6374	6374	6374	6374	6374	6374	6374	6374	6374	6374	6374	6374	6374	6374	6374	6374	6374	6374	6374
16		5296	5296	5296	5296	5296	5296	5296	5296	5296	5296	5296	5296	5296	5296	5296	5296	5296	5296	5296	5296
12		3932	3932	3932	3932	3932	3932	3932	3932	3932	3932	3932	3932	3932	3932	3932	3932	3932	3932	3932	3932
8		1695	1695	1695	1695	1695	1695	1695	1695	1695	1695	1695	1695	1695	1695	1695	1695	1695	1695	1695	1695
39	75	7034	6186	5820	6186	5820	6186	7034	6186	5820	6186	5820	6186	7034	6186	5820	6186	7034	6186	5820	6186
30		7022	5879	5804	5879	5804	5879	7022	5879	5804	5879	5804	5879	7022	5879	5804	5879	7022	5879	5804	5879
20		6374	5275	5786	5275	5786	5275	6374	5275	5786	5275	5786	5275	6374	5275	5786	5275	6374	5275	5786	5275
16		5296	4873	5296	4873	5296	4873	5296	4873	5296	4873	5296	4873	5296	4873	5296	4873	5296	4873	5296	4873
12		3932	3932	3932	3932	3932	3932	3932	3932	3932	3932	3932	3932	3932	3932	3932	3932	3932	3932	3932	3932
8		1695	1695	1695	1695	1695	1695	1695	1695	1695	1695	1695	1695	1695	1695	1695	1695	1695	1695	1695	1695
39	30	5018	3539	5191	3539	5191	3539	5018	3539	5191	3539	5018	3539	5018	3539	5191	3539	5018	3539	5191	3539
30		4998	3338	4907	3338	4907	3338	4998	3338	4907	3338	4907	3338	4998	3338	4907	3338	4998	3338	4907	3338
20		4975	3003	4431	3003	4431	3003	4975	3003	4431	3003	4431	3003	4975	3003	4431	3003	4975	3003	4431	3003
16		4966	2796	4135	2796	4135	2796	4966	2796	4135	2796	4135	2796	4966	2796	4135	2796	4966	2796	4135	2796
12		3932	2480	3680	2480	3680	2480	3932	2480	3680	2480	3680	2480	3932	2480	3680	2480	3932	2480	3680	2480
8		1695	1716	2569	1716	2569	1716	1695	1716	2569	1716	2569	1716	1695	1716	2569	1716	1695	1716	2569	1716
39	0	1553	1370	2024	1370	2024	1370	1553	1370	2024	1370	2024	1370	1553	1370	2024	1370	1553	1370	2024	1370
30		1406	1278	1900	1278	1900	1278	1406	1278	1900	1278	1900	1278	1406	1278	1900	1278	1406	1278	1900	1278
20		2927	1129	1677	1129	1677	1129	2927	1129	1677	1129	1677	1129	2927	1129	1677	1129	2927	1129	1677	1129
16		2731	1035	1554	1035	1554	1035	2731	1035	1554	1035	1554	1035	2731	1035	1554	1035	2731	1035	1554	1035
12		992	903	1353	903	1353	903	992	903	1353	903	1353	903	992	903	1353	903	992	903	1353	903
8		850	601	907	601	907	601	850	601	907	601	907	601	850	601	907	601	850	601	907	601

A=DISTANCE FROM FLORR THE RESERVOIR PIPE  
B=MOTIVE STEAM PRESSURE  
C=SYSTEM BACK PRESSURE  
D=VERTICAL LIFT TO CONDENSATE RETURN MAIN  
E=PROCESS OPERATING PRESSURE

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## Vented Pressure Powered Pump Packages PPEC / PTC / PTF

The modular pumping system consists of the standard PPEC / PTC / PTF Pressure Powered Pumps, pre-piped with the necessary auxiliary components and integral receiver mounted on a skid base. The unit offers versatility of providing a base mounted module and pump with added modular options for a comprehensive fully engineered modular package ensuring a technically correct and complete hook up.

### Standard Pump Packages

Model		PPEC Simplex Pump Package	PPEC Duplex Pump Package
Limiting Conditions	PMA:	See TI-5-218-US	See TI-5-218-US
	TMA:	See TI-5-218-US	See TI-5-218-US
	Receiver Tank:	Rated for atmospheric pressure only. 650°F / 0 psig Sized for flash steam rates of up to 375 lb/hr.	Rated for atmospheric pressure only. 650°F / 0 psig Sized for flash steam rates of up to 375 lb/hr for 1" PPEC and 1150 lb/hr for 1 ½" PPEC.
Sizes	Pump:	1" x 1" & 1 ½" x 1 ½"	1" x 1" & 1 ½" x 1 ½"
	Receiver:	8 Gallons	1" PPEC 8 Gallons, 1 ½" PPEC 26 Gallons
Capacity		See TI-5-202	See TI-5-202
Construction		Fabricated steel receiver tank and frame. Cast steel and cast iron pump body Stainless steel pump internals Stainless steel check valves	Fabricated steel receiver tank and frame. Cast steel and cast iron pump body Stainless steel pump internals Stainless steel check valves
Model		PTC Simplex Pump Package	PTC Duplex Pump Package
Limiting Conditions	PMA:	See TI-5-010-US	See TI-5-010-US
	TMA:	See TI-5-010-US	See TI-5-010-US
	Receiver Tank:	Rated for atmospheric pressure only. 650°F / 0 psig Sized for flash steam rates of up to 1150 lb/hr.	Rated for atmospheric pressure only. 650°F / 0 psig Sized for flash steam rates of up to 2000 lb/hr.
Sizes	Pump:	2" x 2" & 3" x 2"	2" x 2" & 3" x 2"
	Receiver:	26 Gallons	57 Gallons
Capacity		See TI-5-030	See TI-5-030
Construction		Fabricated steel receiver tank and frame. Ductile Iron pump body Stainless steel pump internals Stainless steel check valves	Fabricated steel receiver tank and frame. Ductile Iron pump body Stainless steel pump internals Stainless steel check valves
Model		PTF Simplex Pump Package	PTF Duplex Pump Package
Limiting Conditions	PMA:	See TI-5-010-US	See TI-5-010-US
	TMA:	See TI-5-010-US	See TI-5-010-US
	Receiver Tank:	Rated for atmospheric pressure only. 650°F / 0 psig Sized for flash steam rates of up to 1475 lb/hr.	Rated for atmospheric pressure only. 650°F / 0 psig Sized for flash steam rates of up to 2500 lb/hr.
Sizes	Pump:	2" x 2" & 3" x 2"	2" x 2" & 3" x 2"
	Receiver:	31 Gallons	65 Gallons
Capacity		See TI-5-030	See TI-5-030
Construction		Fabricated steel receiver tank and frame. Fabricated pump body, ASME coded. Stainless steel pump internals Stainless steel check valves	Fabricated steel receiver tank and frame. Fabricated pump body, ASME coded. Stainless steel pump internals Stainless steel check valves

### Standard Pump Package Options

- Pump motive inlet (fully trapped) and exhaust piping.
- Overflow pipe.
- Pump drain
- Receiver only
- ASME coded receiver (150 psig @ 450°F)
- Pump and receiver gauge glass
- Inline strainer
- Pressure gauges
- Receiver with modified connections.
- Pump isolation valve on outlet.

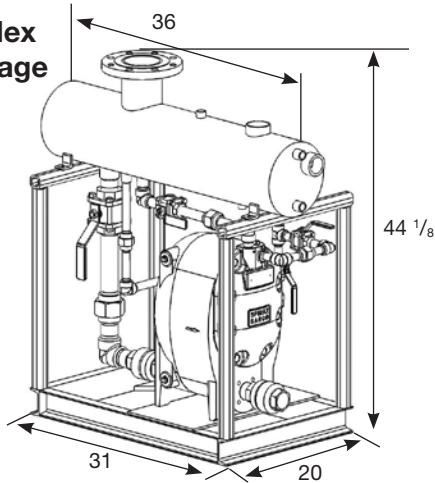
Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only.  
In the interests of development and improvement of the product, we reserve the right to change the specification.

TI-5-203-US 10.14

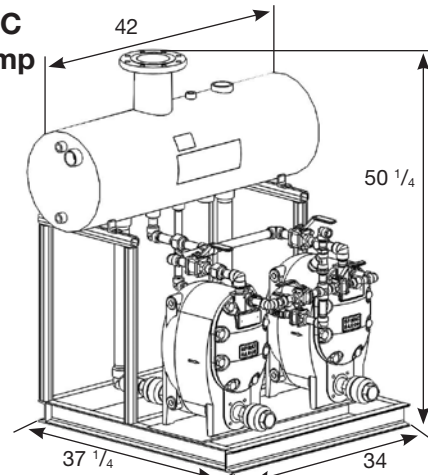


# Vented Pressure Powered Pump Packages PPEC / PTC / PTF

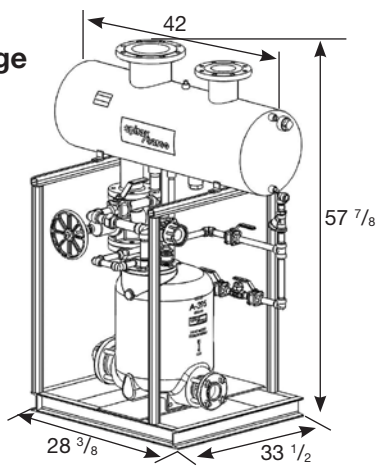
**PPEC Simplex Pump Package**



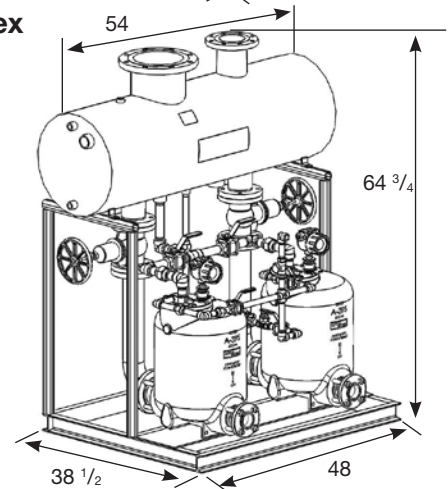
**1-1/2" PPEC Duplex Pump Package**



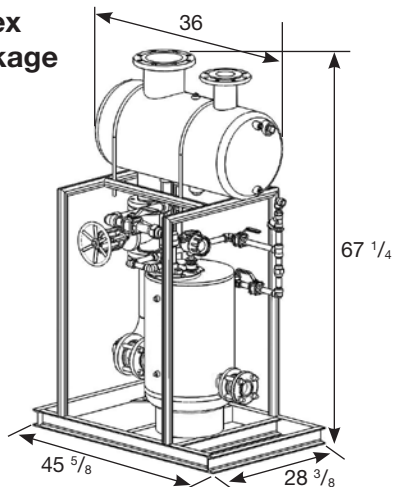
**PTC Simplex Pump Package**



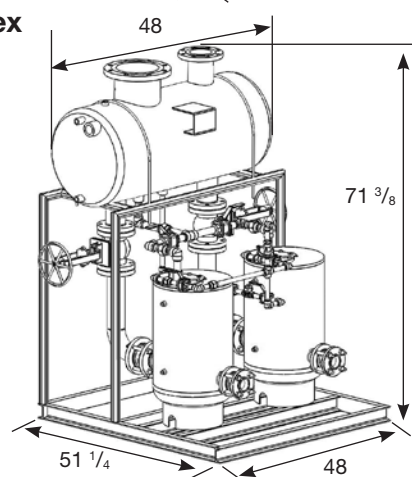
**PTC Duplex Pump Package**



**PTF Simplex Pump Package**



**PTF Duplex Pump Package**



Note: All packages shown as base package with steam inlet and exhaust pipe modular option included. All sizes are approximate.



## Triplex Pressure Powered Pump Packages PTC/PTF

### Description

The Modular pumping system consists of Pressure Powered Pumps pre-engineered with the necessary auxiliary components into a skid-mounted module.

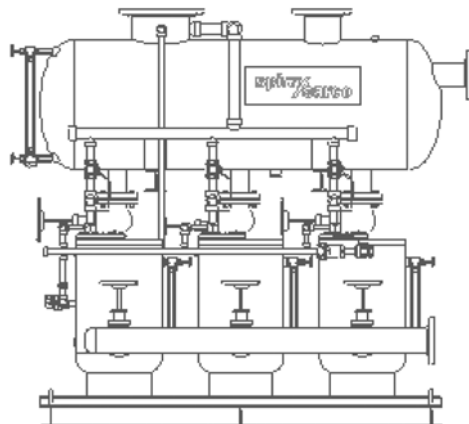
The unit includes a receiver vessel designed to provide adequate separation of flash steam and condensate.

The module requires only service field connections for complete installation and fast startup.

### Typical applications

Condensate recovery modules are used where multiple sources of condensate are to be pumped and flash steam is to be vented (open system).

For Closed systems: Consult ESD



### Capacity Chart

For sizing data, see Selection & Capacity Chart.

### Standard Features

- Spirax Sarco non-electric Pressure Powered Pump with high capacity stainless steel check valves
- TPC3=Cast Ductile Iron Pump Body
- TPF3=Fabricated Steel Pump Body
- Hydrotested, blasted, and painted with SSI industrial black enamel
- Fabricated by ASME Section IX certified welders.
- ASME Section VIII Code Stamped receiver vessel (TPF3 Model Only).
- Completely assembled modular pumping system on structural steel base with all connections protected for shipping.

### Additional Options are available

### Suggested Specification

- Furnish and install where shown on plans;  
Spirax Sarco Inc. Model #TP\_ 3-0-CS-HO- \_ \_ \_  
pressure powered pumping system.
- The system shall be a complete pre-piped factory package requiring only service connections for a fully functional system.
- Electricity shall not be required for system operation
- The Steel receiver shall be ASME Constructed and stamped for 150 PSIG WP (Applicable to TPF3 Model Only)
- The Pumps shall be constructed of Fabricated Steel (TPF3) or Ductile Iron (TPC3) with an allowable working pressure of not less than 200 PSIG.
- All condensate piping shall be schedule 80 Seamless C/S pipe welded
- The package shall be sized to meet (or exceed) the actual required condensate system load.
- The package shall include a structural steel skid and painted with 1 coat Industrial black enamel.

### Typical Construction

Model	TRIPLEX
PMO - PUMPS	200 psig
Design Pressure (PMA)	200 psig @ 400°F
Capacity Range	52,920 lbs./hr @ 200 psig motive pressure and 10 psig back pressure
Receiver Vessel	135 Gallon-ASME Constructed and Stamped 150 psig @ 550°F on TPF3 Models 135 Gallon Non-Code on TPC3 Models
Flash Steam	
Discharge Rates	5292 lbs./hr (10% at maximum capacity)
Hydrotest Pressure	225 psig
Construction Materials	Receiver vessel - Fabricated Steel Pressure Powered Pump - See SSI Tech Sheets Check Valves - Stainless Steel (ANSI 150) Isolation valves - Carbon Steel Piping - A106 Seamless Carbon Steel
Dimensions & Weight	See SSI Sales Drawings
See TI-5-030-US For Pump Capacities	

*Local regulations may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only.  
In the interests of development and improvement of the product, we reserve the right to change the specification.*



## Pressure Powered Pump™ Accessories

### Insulation Covers

The Spirax Sarco Insulation Cover is a removable, reusable cover custom designed for use with all Spirax Sarco Pressure-Powered Pumps. These covers not only offer increased energy savings through quality insulation, but also give personnel protection from exposure to hot metal surfaces. The Spirax Sarco Insulation Cover is made of the highest quality materials available – 1" thick fiberglass material is quilted between two layers of 16 oz. teflon-impregnated fiberglass cloth. The water, oil and chemical resistant

construction provides long-lasting insulating quality and equipment protection indoors, outdoors, and in most corrosive conditions. Less expensive to install than conventional hard insulation, the covers are abuse-resistant and will not wick moisture or hydrocarbons. Removable and reinstalled in minutes, the one-piece construction maximizes energy savings and provides rapid payback.

#### Limiting Operating Conditions

##### Max. Operating Temperature

500°F (260°C) continuous

##### Standard Range

PPEC Insulation Cover

PTC Insulation Cover (up to 3"x2" size)

PTF Insulation Cover (up to 3"x2" size)

4" PPF-P Insulation Cover (has 2 pc. construction)

APT10 Insulation Cover

APT14 Insulation Cover

#### Construction Materials

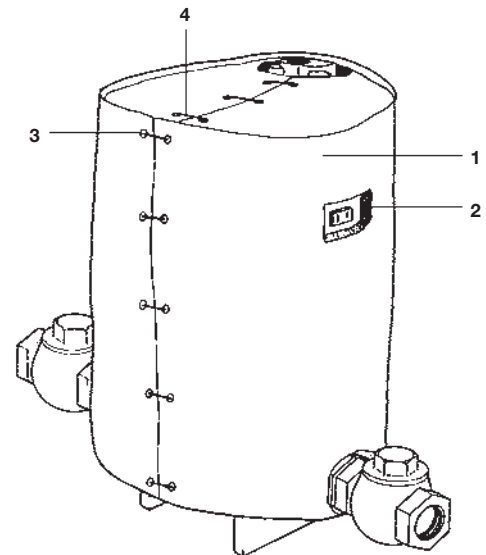
No.	Part	Material
1	Cover Cloth	Teflon Coated Fiberglass
2	Insulation Mat	Fiberglass
3	Anchor Pin	Type 304 Stainless Steel
4	Wire Fastener	Type 304 Stainless Steel

#### Installation

Check the nameplate on the insulation cover and pump to be sure you have the correct cover for your pump, i.e., PTC Cover will fit only model PTC Pump. Slip the cover around the pump, making sure the steam inlet and outlet connections are exposed through their respective cut-outs. Cut-outs are also provided for the optional gauge glass assembly on the pump. Take the stainless steel wires attached to one side of the mating edge and pull them snugly around the lacing pins on the adjacent mating edge of the cover, much like lacing a work boot.

#### Sample Specification

The reusable cover shall be a Spirax Sarco Insulation Cover, custom-fitted for the specific Spirax Sarco Pressure Powered Pump or Automatic Pump Trap required. The cover shall contain no asbestos or silicone materials. The cover cloth shall be teflon-impregnated, with double sewn and binded seams, suitable for continuous temperatures of 500°F, and the insulation shall be minimum 1" thick Burlglass 1200 needled mat with 100% Type E glass fibers. The insulation cover shall not spread flame or smoke and render a V-O rating when tested under the NFPA 701 vertical flame test.



Condensate  
Recovery

Non-Electric  
Pumps



## Quadraplex Pressure Powered Pump Packages PTC/PTF

### Description

The Modular pumping system consists of Pressure Powered Pumps pre-engineered with the necessary auxiliary components into a skid-mounted module.

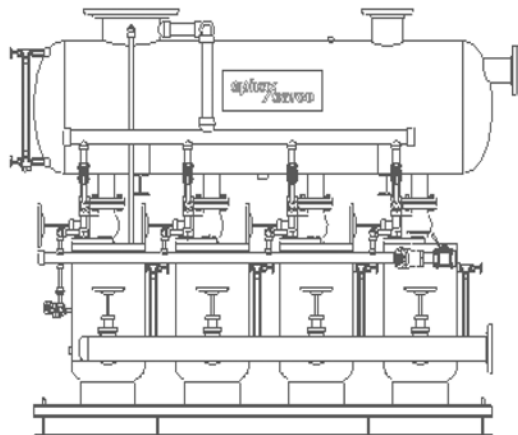
The unit includes a receiver vessel designed to provide adequate separation of flash steam and condensate.

The module requires only service field connections for complete installation and fast startup.

### Typical applications

Condensate recovery modules are used where multiple sources of condensate are to be pumped and flash steam is to be vented (open system).

For Closed systems: Consult ESD



### Standard Features

- Spirax Sarco non-electric Pressure Powered Pump with high capacity stainless steel check valves
- QPC3= Cast Ductile Iron Pump Body
- QPF3= Fabricated Steel Pump Body
- Hydrotested, blasted, and painted with SSI industrial black enamel
- Fabricated in accordance with ASME Section IX certified welders.
- ASME Section VIII Code Stamped receiver vessel (QPF3 Model Only).
- Completely assembled modular pumping system on structural steel base with all connections protected for shipping.

### Additional Options are available

### Suggested Specification

- Furnish and install where shown on plans; Spirax Sarco Inc. Model # **QP\_3-0-CS-HO-\_\_\_** pressure powered pumping system.
- The system shall be a complete pre-piped factory package requiring only service connections for a fully functional system.
- Electricity shall not be required for system operation
- The Steel receiver shall be ASME Constructed and stamped for 150 PSIG WP. (Applicable to QPF3 Models ONLY)
- The Pumps shall be constructed of Fabricated Steel (QPF3) or Ductile Iron (QPC3) with an allowable working pressure of not less than 200 PSIG.
- All condensate piping shall be schedule 80 Seamless C/S pipe welded
- The package shall be sized to meet (or exceed) the actual required condensate system load.
- The package shall include a structural steel skid and painted with 1 coat Industrial black enamel.

### Typical Construction

Model	QUADRAPLEX
PMO - PUMPS	200 psig
Design Pressure (PMA)	200 psig @ 400°F
Capacity Range	70,560 lbs./hr @ 200 psig motive pressure and 10 psig back pressure
Receiver Vessel	185 Gallon-ASME Constructed and Stamped 150 psig @ 550°F on QPF3 Models 185 Gallon Non-Code on QPC3 Models
Flash Steam Discharge Rates	7056 lbs./hr (10% at maximum capacity)
Hydrotest Pressure	225 psig
Construction Materials	Receiver vessel - Fabricated Steel Pressure Powered Pump -See SSI Tech Sheets Check Valves - Stainless Steel (ANSI 150) Isolation valves - Carbon Steel Piping - A106 Seamless Carbon Steel
Dimensions & Weight	See SSI Sales Drawings
See TI-5-030-US for Capacities	

*Local regulations may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only. In the interests of development and improvement of the product, we reserve the right to change the specification.*

# spirax sarco

## APT Pump Packages APT10 Series

### Description

The compact low profile modular pump/trap system consists of the versatile APT 10-4.5 Automatic Pumping Trap pre-piped and mounted on a steel base.

The SPT1 module includes a condensate reservoir sized to accommodate (1) pump cycle.

The module requires only service field connections for complete installation and fast startup.

### Typical applications

APT 10-4.5 pump/trap modules are used where low profile and high capacity condensate removal is required.

The APT 10-4.5 Pump Trap has the features of a conventional F&T trap combined with a pressured pump all in one unit.

- Air handlers
- Heat exchangers
- Absorption Chillers
- Evaporators
- Dryers

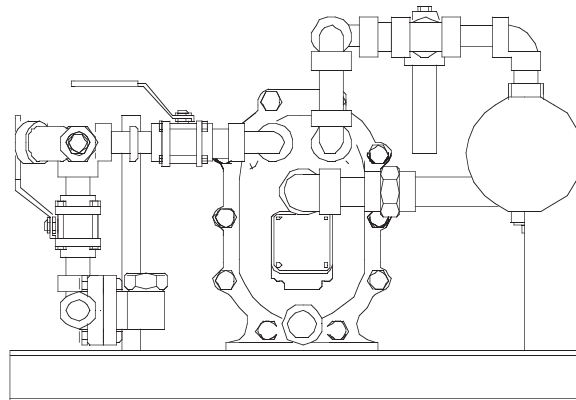
### Standard Features

- Spirax Sarco non-electric APT 10-4.5 Automatic Pump Trap
- Motive steam drip station with Spirax Sarco UTD 52L trap and isolation valves and air vent.
- Hydrotested, blasted, and coated with SSI industrial enamel
- Fabricated by ASME Section IX certified welders.
- Completely assembled modular pumping system on platform steel base with all connections protected for shipping.

### Additional Options are available

### Suggested Specification

- Furnish and install where shown on plans, Spirax Sarco Inc. **Model SPT1-**\_\_\_\_\_ Pressure powered pump/trap system.
- The system shall be a complete pre-piped factory package requiring only service connections for a fully functional system.
- Electricity shall not be required for system operation
- The receiver shall be constructed for 145 PSIG WP.
- The Pump/Trap shall be constructed of Ductile Iron with an allowable operating pressure of 65 PSIG.
- The Pump/Trap shall be a unified system with stainless steel mechanism and no external glands or seals. Individual pump and trap systems will not be acceptable
- The package shall be sized to meet (or exceed) the actual required condensate system load.
- The package shall include a structural steel platform skid and painted with (1) coat enamel.



### Typical Construction

Model	SPT1
PMO – Motive Pressure	65 psig
Design Pressure (PMA)	145 psig @ 392°F
Capacity Range	Trap Mode- 263 to 1558 lbs/hr Pump Mode-156 to 958 lbs/hr
Receiver Vessel	Constructed for 145 psig @ 550°F
Hydrotest Pressure	188 psig
Construction Materials	Receiver vessel - Fabricated Steel APT 10-4.5 - See SSI Tech Sheets TI-5-2301-US Valves - Carbon Steel Ball Valves Piping - A106 Seamless Carbon Steel
Dimensions & Weight	See SSI Sales Drawings

### Capacity

For sizing data, see APT10-4-5 Selection & Capacity Chart TI-5-204-1-US.

*Local regulations may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only.  
In the interests of development and improvement of the product, we reserve the right to change the specification.*

# spirax sarco

## APT Pump Packages APT14 Series

### Description

The compact low profile modular pump/trap system consists of the versatile APT 14 Automatic Pumping Trap pre-piped and mounted on a steel base.

The simplex or duplex modules include a condensate reservoir sized to accommodate the pump cycles.

The module requires only service field connections for complete installation and fast startup.

### Typical applications

APT 14 pump/trap modules are used where low profile and high capacity condensate removal is required.

The APT 14 Pump Trap has the features of a conventional F&T trap combined with a pressured pump all in one unit.

- Air handlers
- Heat exchangers
- Absorption Chillers
- Evaporators
- Dryers

### Standard Features

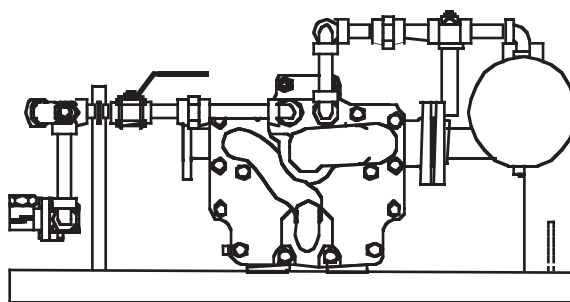
- Spirax Sarco non-electric APT 14 Automatic Pump Trap
- Simplex or Duplex units
- Motive steam drip station with Spirax Sarco UTD 52L trap and isolation valves and air vent.
- Hydrotested, blasted, and coated with SSI industrial enamel
- Fabricated by ASME Section IX certified welders.
- Completely assembled modular pumping system on platform steel base with all connections protected for shipping.

### Additional Options are available

### Suggested Specification

- Furnish and install where shown on plans, Spirax Sarco Inc. Model SPT4/DPT4-\_\_\_\_\_ Pressure powered pump/trap system.
- The system shall be a complete pre-piped factory package requiring only service connections for a fully functional system.
- Electricity shall not be required for system operation
- The receiver shall be constructed for 200 PSIG WP.
- The Pump/Trap shall be constructed of Ductile Iron with an allowable working pressure of no less than 200PSIG.
- The Pump/Trap shall be a unified system with stainless steel mechanism and no external glands or seals. Individual pump and trap systems will not be acceptable
- The package shall be sized to meet (or exceed) the actual required condensate system load.
- The package shall include a structural steel platform skid and painted with 1 coat enamel.

*Local regulations may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only. In the interests of development and improvement of the product, we reserve the right to change the specification.*



### Typical Construction

Model	SPT4/DPT4
PMO	200 psig
Design Pressure (PMA)	232 psig @ 388°F
Capacity Range	Trap Mode- 850 to 10,021 lbs/hr Pump Mode-423 to 3075 lbs/hr
Receiver Vessel	Constructed for 200 psig @ 550°F
Hydrotest Pressure	230 psig
Construction Materials	Receiver vessel - Fabricated Steel APT 14 - See SSI Tech Sheets TI-5-228-US Valves - Carbon Steel Ball Valves Piping - A106 Seamless Carbon Steel
Dimensions & Weight	See SSI Sales Drawings

### Capacity

For sizing data, see APT14 Selection & Capacity Chart TI-5-204-1-US.





## APT Pump Packages

### APT14HC

#### Description

The compact low profile modular pump/trap system consists of the versatile APT14HC Automatic Pumping Trap pre-piped and mounted on a steel base.

The simplex or duplex modules include a condensate reservoir sized to accommodate the pump cycles.

The module requires only service field connections for complete installation and fast startup.

#### Typical applications

APT14HC pump/trap modules are used where low profile and high capacity condensate removal is required.

The APT14HC Pump Trap has the features of a conventional F&T trap combined with a pressured pump all in one unit.

- Air handlers
- Heat exchangers
- Absorption Chillers
- Evaporators
- Dryers

#### Standard Features

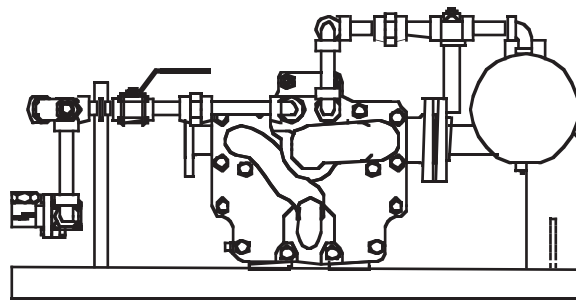
- Spirax Sarco non-electric APT14HC Automatic Pump Trap
- Simplex or Duplex units
- Motive steam drip station with Spirax Sarco UTD 52L trap and isolation valves and air vent.
- Hydrotested, blasted, and coated with SSI industrial enamel
- Fabricated by ASME Section IX certified welders.
- Completely assembled modular pumping system on platform steel base with all connections protected for shipping.

#### Additional Options are available

#### Suggested Specification

- Furnish and install where shown on plans, Spirax Sarco Inc. Model SPT4HC/DPT4HC-\_\_\_\_\_ Pressure powered pump/trap system.
- The system shall be a complete pre-piped factory package requiring only service connections for a fully functional system.
- Electricity shall not be required for system operation
- The receiver shall be constructed for 200 PSIG WP.
- The Pump/Trap shall be constructed of Ductile Iron with an allowable working pressure of no less than 200PSIG.
- The Pump/Trap shall be a unified system with stainless steel mechanism and no external glands or seals. Individual pump and trap systems will not be acceptable
- The package shall be sized to meet (or exceed) the actual required condensate system load.
- The package shall include a structural steel platform skid and painted with 1 coat enamel.

*Local regulations may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only. In the interests of development and improvement of the product, we reserve the right to change the specification.*



#### Typical Construction

Model	SPT4HC/DPT4HC
PMO	200 psig
Design Pressure (PMA)	232 psig @ 388°F
Capacity Range	Trap Mode- 830 to 10,021 lbs/hr Pump Mode-601 to 6186 lbs/hr
Receiver Vessel	Constructed for 200 psig @ 550°F
Hydrotest Pressure	230 psig
Construction Materials	Receiver vessel - Fabricated Steel APT14HC – See SSI Tech Sheets TI-5-228-US Valves - Carbon Steel Ball Valves Piping - A106 Seamless Carbon Steel
Dimensions & Weight	See SSI Sales Drawings

#### Capacity

For sizing data, see APT14 Selection & Capacity Chart TI-5-204-1-US.



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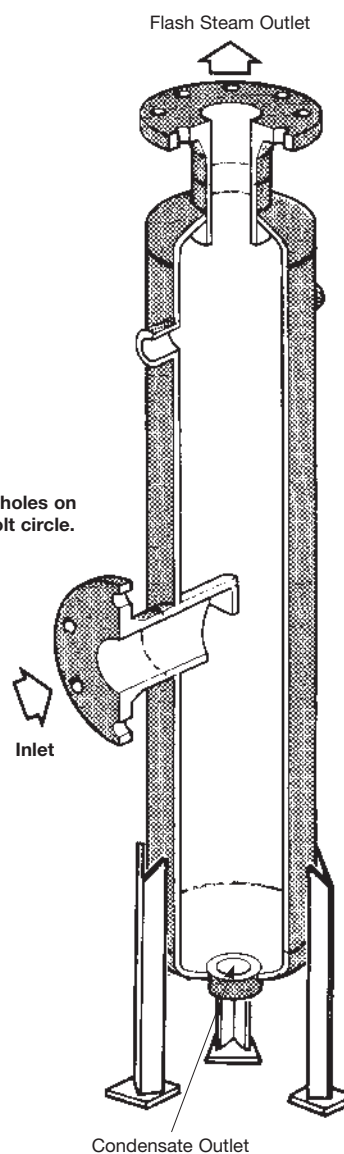
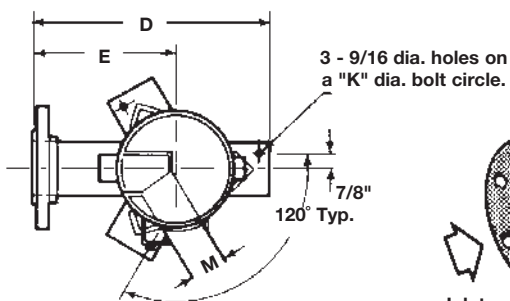
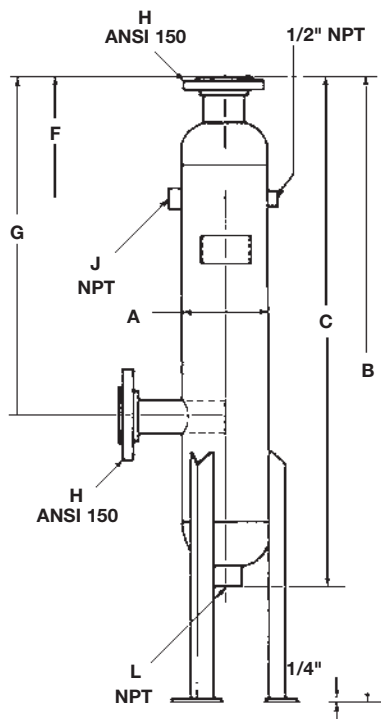
## Flash Recovery Vessels

Flash steam, which is formed when a portion of the high pressure condensate discharged from a steam trap re-evaporates, is separated from the condensate and piped away from the top of the vessel. The remaining condensate drains from the bottom of the vessel to a steam trap. The flash is usually added to the low-pressure steam system.

Model	Flash Recovery Vessels
PMO	150 psig
Sizes	6", 8", 12", 16"
Connections	ANSI 150 RF & NPT
Construction	Mild Steel

### LIMITING OPERATING CONDITIONS

Max. Operating Pressure (PMO)	150 psig (10 barg)
Max. Operating Temperature	500°F (260°C)



### DIMENSIONS (NOMINAL) IN INCHES AND MILLIMETERS

Size	A	B	C	D	E	F	G	H	J	K	L	M	Weight
6	6 152	47 1194	38.6 980	13 330	8 203	9 229	25.5 648	2-1/2"	3/4"	8.8 224	1-1/2"	2.5 64	75 lb 34 kg
8	8 203	48 1219	39.6 1006	14.6 371	8.6 218	9.5 241	25.8 655	4"	3/4"	10.8 274	2"	3.5 89	105 lb 47.6 kg
12	12 305	49.5 1257	41.2 1046	19.9 505	11.8 300	11.5 292	26.8 681	5"	1-1/2"	14.9 378	3"	5 127	165 lb 74.8 kg
16	16 406	58 1473	49.7 1262	23.5 597	13.4 340	12.5 318	32 813	6"	2"	18.9 480	3"	5 127	215 lb 97.5 kg

Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only.  
In the interests of development and improvement of the product, we reserve the right to change the specification.

TI-5-401-US 03.94

# Flash Recovery Vessels

## SAMPLE SPECIFICATION

Flash Recovery Vessel shall be mild steel construction ASME Code Stamped for 150 psig steam service with ANSI 150 RF flanges. Connections for a pressure gauge and a Safety Relief Valve shall be provided in the shell.

## INSTALLATION

The vessel should be installed with the flash steam outlet at the top as shown. Each size vessel incorporates a 1/2" NPT connection for the fitting of a pressure gauge. If a Safety Relief Valve is required, it should be fitted in the NPT connection provided in the side of the shell. For drainage, a properly sized float type steam trap must be connected to the condensate outlet at the bottom of the vessel.

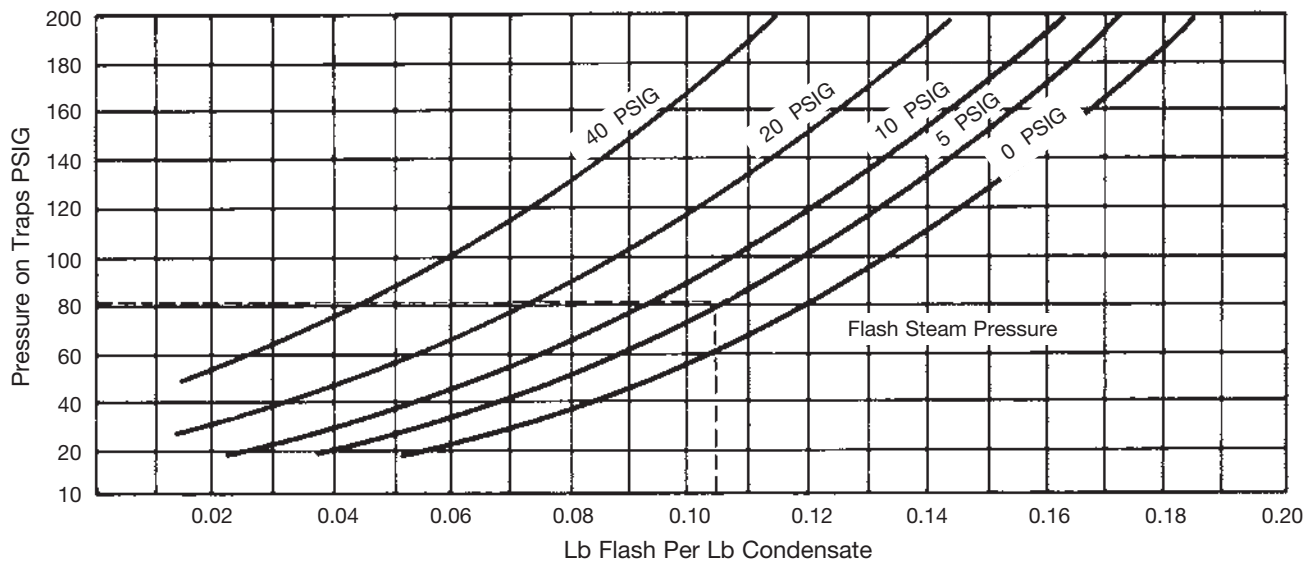
## STANDARDS

These vessels are designed in accordance with ASME Code, Section VIII, Div. 1, and are ASME Code Stamped for 150 psig steam service.

## HOW TO SIZE

Fig. 1 shows the proportion by weight of flash steam formed from condensate with various pressure drops. From Fig. 1, find the weight of flash per unit weight of condensate. Multiply this by the maximum condensing rate to get the maximum weight of flash steam expected from the flash vessel. Select the appropriate size flash vessel from Fig. 2 by finding the area within which both the condensate rate and the flash steam weight fit.

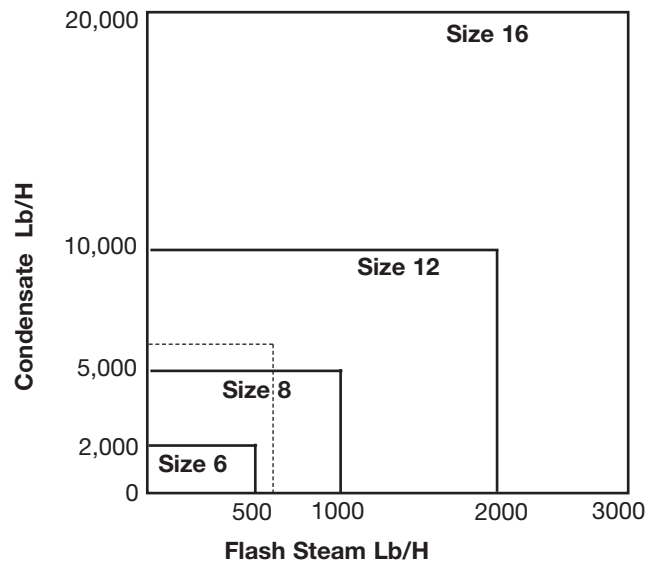
**FIG. 1 PROPORTION OF FLASH STEAM**



## Example:

A plant operating at 80 psig condenses 6000 lb/h of steam. Flash steam from this is to be recovered at 5 psig. Fig. 1 shows that the condensate at 80 psig produces approximately .105 lb of flash steam per lb of condensate when the pressure is dropped to 5 psig. From 6000 lb/h of condensate, 630 lb/h of flash steam will be produced. From Fig. 2 it will be seen that 6000 lb/h of condensate meets the line of 630 lb/h of flash steam in the Size 12 area, so a Size 12 Flash Recovery Vessel is necessary for this duty.

**FIG. 2 RECOVERY VESSEL CAPACITIES**



For kg/h, multiply above by 0.454

TI-5-401-US 03.94

# spirax sarco

## Condensate Return and Boiler Feed Pumps "G" Series

### DESCRIPTION

Spirax Sarco "G" Series condensate and boiler feed pumps are packaged units completely assembled, wired and tested at the factory. They are used in low pressure steam heating systems to collect and quickly return condensate to the boiler or boiler feed unit. Pumping action is controlled by an integral float switch on simplex (one pump) units or mechanical alternator on duplex (two pump) units. Unlike boiler feed units which are controlled by a boiler mounted control and equipped with a makeup valve mechanism, condensate pumps usually do not directly supply boiler makeup water.

### AVAILABLE TYPES

#### Simplex units

Simplex units are equipped with vapor tight, heavy duty float switch control with stainless steel float. Easily field adjustable to provide proper pump control and operation.

#### Duplex units

Duplex units offer some additional distinct advantages over simplex units. They are used where an unusually heavy amount of condensate must be returned or where it is desirable to have a stand-by pump available. Equipped with a float operated, automatic mechanical alternator, they provide several benefits.

- **System overload protection**—The second pump is activated if the rate of condensate return exceeds the limits of the first pump.
- **Extra long service life**—Each of the two pumps is activated automatically on alternating pumping cycles so the work load is evenly distributed between the two pumps.
- **Back-up system protection**—A second pump is automatically actuated if the first one fails to start. Maintenance or repairs can be made on either pump without shutting down the other one or interrupting system operation.

### LIMITING CONDITIONS

Capacity: to 18 gpm. Discharge pressures: 20, 30 and 40 psi.

### RECEIVER

Close grained cast iron.

Simplex unit 6, 15, 21 and 45 gallon sizes.

Duplex unit 15, 21 and 45 gallon sizes.

Welded, copper bearing steel.

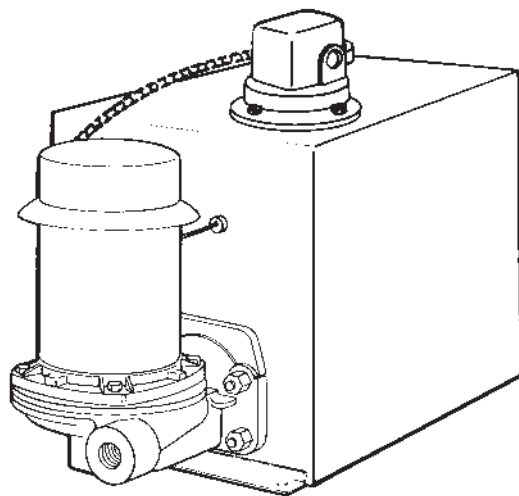
Simplex unit 10, 20 and 45 gallon sizes.

Duplex unit 20 and 45 gallon sizes.

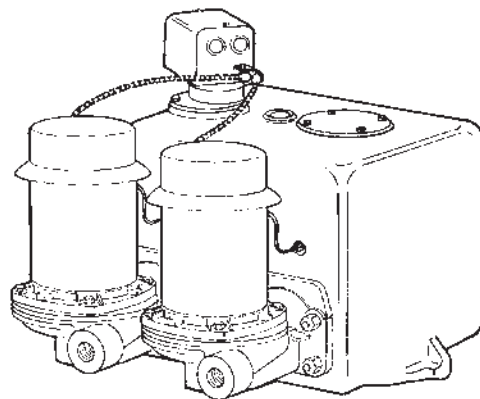
### HEAVY DUTY, DRIP PROOF MOTORS

Heavy duty, drip proof motors are designed for continuous operation. Ball bearings are prelubricated and shielded. Motors have stainless steel shaft -operated at 3450 rpm 60Hz. Both single phase 115/230 volt with built-in overload protection, and three phase 230/460 volt (or 208 volt) motors are available with O.D.P. or special TEFC enclosures.

All parts of the pump and motor which are subject to normal wear are easily accessible by removal of motor and canopy, attached with universal type 4 bolt flange mounting. Service of impeller and seal is also made easy . . . entire motor can be removed without disturbing plumbing or electrical connections.



Simplex Unit



Duplex Unit

### PUMP AND MOTOR ASSEMBLY

Pump and motor assembly is close coupled centrifugal design with enclosed type bronze impeller and wearing ring. The bronze impeller is designed to assure smooth, efficient water passage. No close clearances that are subject to rapid wear and reduced efficiency.

Mechanical shaft seal designed for temperatures to 250 °F. Seal is vented to receiver to insure adequate lubrication at all times.

### OPTIONAL EXTRAS

#### Suction Isolation Valve

When installed between the pump and receiver on simplex units, it allows the pump motor assembly to be removed without draining the receiver. On duplex units, it permits one pump to be removed while the other one continues to operate without interrupting system operation.

*Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only.*

*In the interests of development and improvement of the product, we reserve the right to change the specification.*

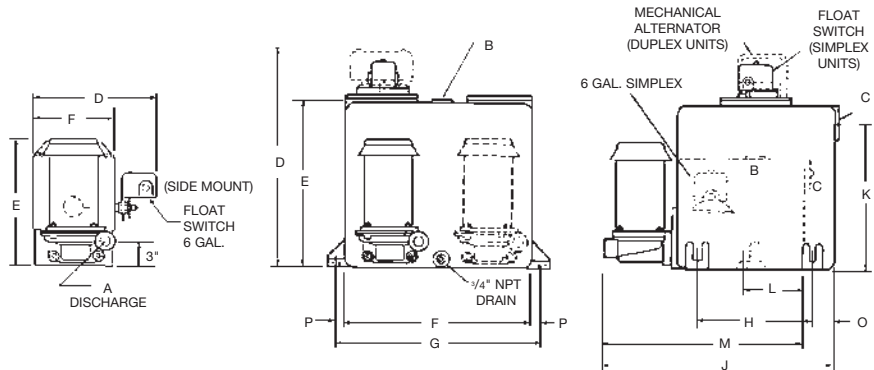
**TI-5-302-US 4.95**

# Condensate Return and Boiler Feed Pumps

## "G" Series

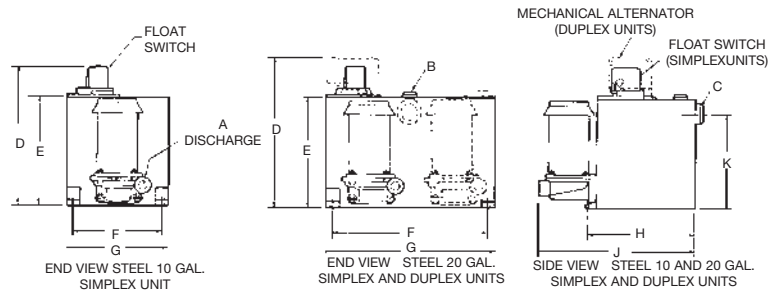
### ORDERING CODES AND MODELS

Motor		Pump		Cast Iron Receiver Sizes								Welded Steel Receiver Sizes					
Phase and Voltage	HP	Discharge Pressure	gpm	6 Gallon 8000 EDR	15 Gallon 12000 EDR		21 Gallon 12000 EDR		45 Gallon 12000 EDR		10 Gallon 8000 EDR	20 Gallon 12000 EDR		45 Gallon 12000 EDR			
		psi		Simplex	Simplex	Duplex	Simplex	Duplex	Simplex	Duplex	Simplex	Simplex	Duplex	Simplex	Duplex		
Single	1/3	20	18	GC2S61	GC2S151	GC2D151	GC2S211	GC2D211	GC2S451	GC2D451	GS2S101	GS2S201	GS2D201	GS2S451	GS2D451		
115/	1/2	30	18	GC3S61	GC3S151	GC3D151	GC3S211	GC3D211	GC3S451	GC3D451	GS3S101	GS3S201	GS3D201	GS3S451	GS3D451		
230 V.	3/4	40	18	GC4S61	GC4S151	GC4D151	GC4S211	GC4D211	GC4S451	GC4D451	GS4S101	GS4S201	GS4D201	GS4S451	GS4D451		
Three	1/3	20	18	GC2S63	GC2S153	GC2D153	GC2S213	GC2D213	GC2S453	GC2D453	GS2S103	GS2S203	GS2D203	GS2S453	GS2D453		
230/	1/2	30	18	GC3S63	GC3S153	GC3D153	GC3S213	GC3D213	GC3S453	GC3D453	GS3S103	GS3S203	GS3D203	GS3S453	GS3D453		
460 V.	3/4	40	18	GC4S63	GC4S153	GC4D153	GC4S213	GC4D213	GC4S453	GC4D453	GS4S103	GS4S203	GS4D203	GS4S453	GS4D453		



### DIMENSIONS (NOMINAL) IN INCHES & MILLIMETERS

Receiver Size	A	B	C	D	E	F	G	H	J	K	L	M	O	P
Simplex 6 gallon	1	1	2	14.5	14.5	9.5	-	-	-	9.0	-	27	-	-
	25	25	50	368	368	241	-	-	-	229	-	686	-	-
Simplex 15 gallon	1	1	2	21	15.6	17.6	19.8	-	26.5	13.3	9.3	-	-	1
	25	25	50	533	396	447	503	-	673	338	236	-	-	25
Duplex 15 gallon	1	1	2	21.5	15.6	17.6	19.8	-	26.5	13.3	9.3	-	-	1
	25	25	50	546	396	447	503	-	673	338	236	-	-	25
Simplex 21 gallon	1	1-1/4	2	17	12.4	22.7	27.7	18	31.8	10.2	-	-	1.5	1.5
	25	32	50	432	315	576	704	457	808	259	-	-	38	38
Duplex 21 gallon	1	1-1/4	2	18	12.4	22.7	27.7	18	31.8	10.2	-	-	1.5	1.5
	25	32	50	457	315	576	704	457	808	259	-	-	38	38
Simplex 45 gallon	1	1-1/2	2-1/2	21.8	17.3	26.7	28.7	20	36.7	15	-	-	2.85	1
	25	38	63	554	439	678	729	508	932	381	-	-	72	25
Duplex 45 gallon	1	1-1/2	2-1/2	22.8	17.3	26.7	28.7	20	36.7	15	-	-	2.85	1
	25	38	63	579	439	678	729	508	932	381	-	-	72	25



### DIMENSIONS (NOMINAL) IN INCHES & MILLIMETERS

Receiver Size	A	B	C	D	E	F	G	H	J	K
Simplex 10 gallon	1	1	2	18.2	14.2	12.5	14.3	15.2	25.2	12.7
	25	25	50	462	361	318	363	386	640	323
Simplex 20 gallon	1	1	2	18.2	14.2	22.5	24.3	15.2	25.2	12.7
	25	25	50	462	361	572	617	386	640	323
Duplex 20 gallon	1	1	2	19.7	14.2	22.5	24.3	15.2	25.2	12.7
	25	25	50	500	361	572	617	386	640	323
Simplex 45 gallon	1	1.5	3	22.4	18.4	24.4	26.4	24.4	35.4	15.7
	25	40	75	569	467	620	671	620	899	399
Duplex 45 gallon	1	1.5	3	24.4	18.4	24.4	26.4	24.4	35.4	15.7
	25	40	75	620	467	620	671	620	899	399

# spirax/sarco

## Boiler Feed Pumps "GB" Series

### DESCRIPTION

Spirax Sarco GB Series boiler feed pumps are packaged units, completely assembled, wired and tested at the factory.

GB Series boiler feed units are used to pump condensate and makeup water directly into the boiler(s). Pumping action is determined by a boiler mounted control which senses boiler water level requirements. Each boiler feed unit is equipped with a heavy duty makeup valve actuated by the position of its seamless float within the receiver. The mechanism is readily adjustable for various water levels. It is mounted on the end of the receiver and can be easily removed as a complete unit.

### AVAILABLE TYPES

Simplex unit  
Duplex unit

### LIMITING CONDITIONS

Capacity to 18 gpm.  
Discharge pressures: 20, 30 and 40 psi

### RECEIVER

Cylindrical welded steel, 49, 71, and 117 gallon sizes are standard. Water level gauge glass and float operated make-up valve are standard.

### PUMP AND MOTOR ASSEMBLY

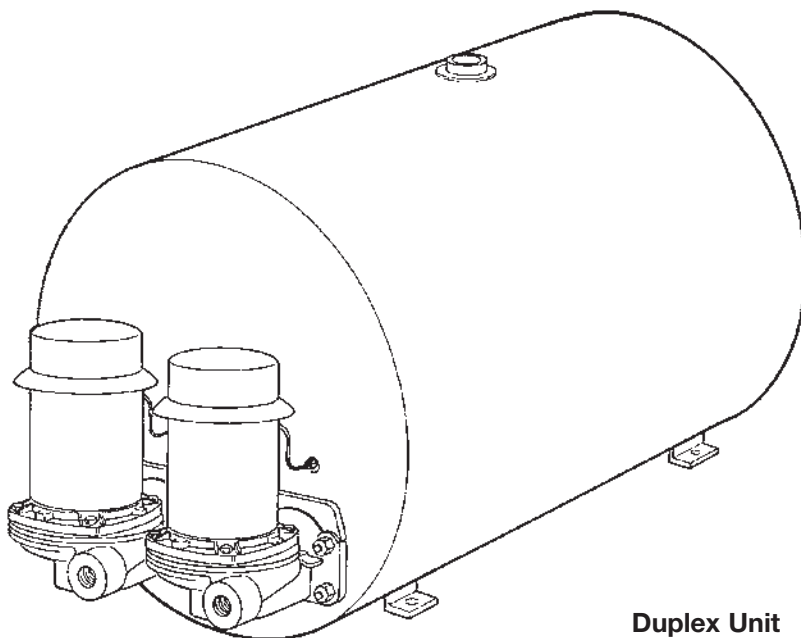
Pump and motor assembly is close coupled centrifugal design with enclosed type bronze impeller and wearing ring. The bronze impeller is designed to assure smooth, efficient water passage. No close clearances that are subject to rapid wear and reduced efficiency.

Mechanical shaft seal designed for temperatures to 250°F. Seal is vented to receiver to insure adequate lubrication at all times.

### HEAVY DUTY, OPEN DRIP PROOF MOTORS

Heavy duty open drip proof motors are designed for continuous operation. Ball bearings are prelubricated and shielded. Motors have stainless steel shaft - operate at 3450 rpm 60 Hz. Both single phase 115/230 volt with built-in overload protection, and three phase 230/460 volt (or 208 volt) motors are available with O.D.P. standard, or special TEFC enclosures.

All parts of the pump and motor which are subject to normal wear are easily accessible by removal of motor and canopy, attached with universal 4 bolt flange mounting. Service of impeller and mechanical seal is also made easy . . . entire pump and motor can be removed without disturbing plumbing or electrical connections.



Duplex Unit

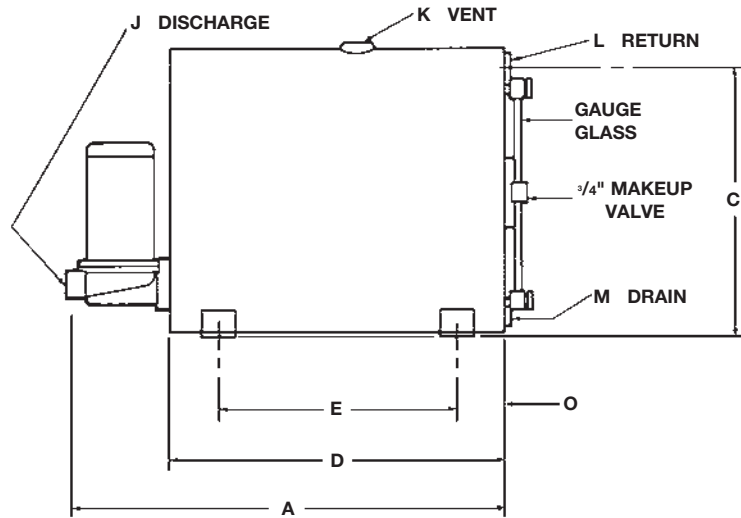
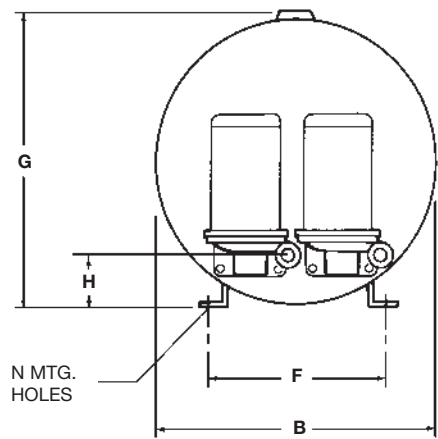
*Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only.  
In the interests of development and improvement of the product, we reserve the right to change the specification.*

TI-5-303-US 4.95

# Boiler Feed Pumps "GB" Series

## MODEL ORDERING CODES

Motor		Pump		Receiver Sizes					
Phase and Voltage	HP	Discharge Pressure psi	gpm	49 Gallon (for 50 boiler HP or less)		71 gallon (for 80 boiler HP or less)		117 Gallon (for 120 boiler HP or less)	
				Simplex	Duplex	Simplex	Duplex	Simplex	Duplex
Single 115/230 V.	1/3	20	18	GB2S491	GB2D491	GB2S711	GB2D711	GB2S1171	GB2D1171
	1/2	30	18	GB3S491	GB3D491	GB3S711	GB3D711	GB3S1171	GB3D1171
	3/4	40	18	GB4S491	GB4D491	GB4S711	GB4D711	GB4S1171	GB4D1171
Three 230/460 V.	1/3	20	18	GB2S493	GB2D493	GB2S713	GB2D713	GB2S1173	GB2D1173
	1/2	30	18	GB3S493	GB3D493	GB3S713	GB3D713	GB3S1173	GB3D1173
	3/4	40	18	GB4S493	GB4D493	GB4S713	GB4D713	GB4S1173	GB4D1173



## DIMENSIONS (NOMINAL) IN INCHES & MILLIMETERS

Receiver Size	A	B	C	D	E	F	G	H	J	K	L	M	N	O
49 gallons	41	24	20.7	30	21	15	25	5.5	1	1-1/4	2-1/2	3/4	5/8	4.5
	1041	610	526	762	533	381	635	140	25	32	63	20	16	114
71 gallons	47	24	22.5	36	27	16	25	5	1	1-1/2	3	3/4	5/8	4.5
	1194	610	572	914	686	406	635	127	25	38	75	20	16	114
117 gallons	71	24	22.5	60	30	19	25	5	1	2	4	3/4	5/8	15
	1803	610	572	1524	762	483	635	127	25	50	100	20	16	381

# spirax sarco

## Condensate Return and Boiler Feed Pumps "V" Series

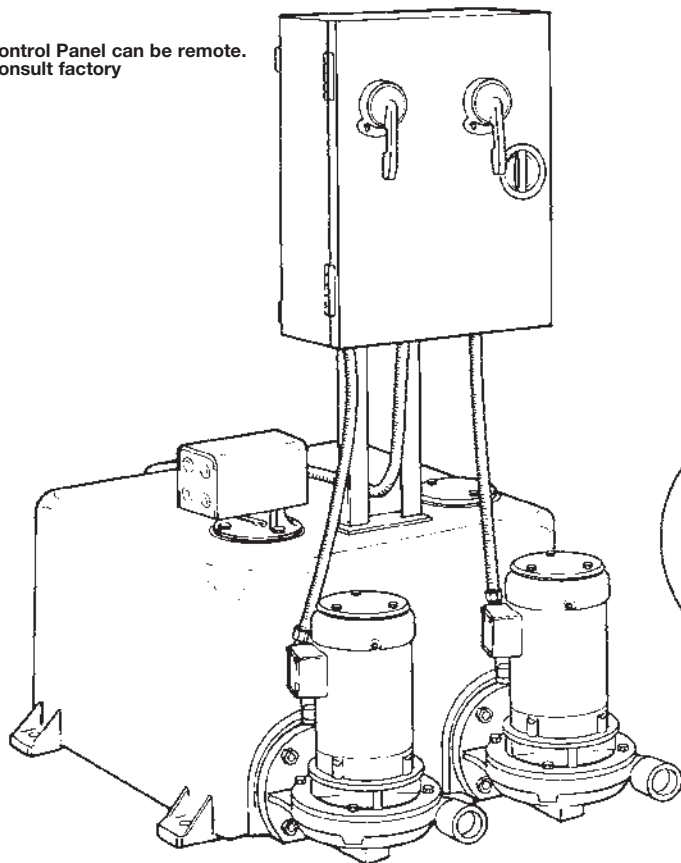
### Description

Condensate pumps are used in low pressure heating systems to collect and quickly return condensate to the boiler feed unit. Their pumping action is controlled by the water level in the receiver. Simplex units consist of an electric motor close-coupled to a centrifugal pump mounted on a cast iron or welded steel storage receiver with a float operated pump control. Multiple pump units are used when greater pumping capacity or back-up pump protection is required.

Boiler feed pumps are used to pump and precisely control the condensate and makeup water required by the boiler(s) in low pressure steam applications. Pumping action is controlled by the fluid level in the boiler. They consist of a cast iron or welded steel storage receiver equipped with a makeup valve and one or more close-coupled centrifugal pumps.

Spirax Sarco V series pumping systems are available in simplex, duplex, triplex or quadruplex configurations from 1,000 to 100,000 sq. ft. EDR capacities. Discharge pressures from 10-40 psi are available on units equipped with 1750 rpm motors; 20-75 psi on 3500 rpm units. True 2 ft. net positive suction head pumps are available.

Control Panel can be remote.  
Consult factory



### Receivers

Cast iron, rectangular receivers are available with 15 to 110 gallon capacities.

Heavy duty, welded, rust resistant, copper bearing steel receivers are available in rectangular or cylindrical configurations with capacities ranging from 21 to 1,000 gallons.

### Spirax Sarco Centrifugal Pumps

Four centrifugal models are available in a large selection of sizes to meet your specific application requirements: VC, VJ, VE, VA and VN.

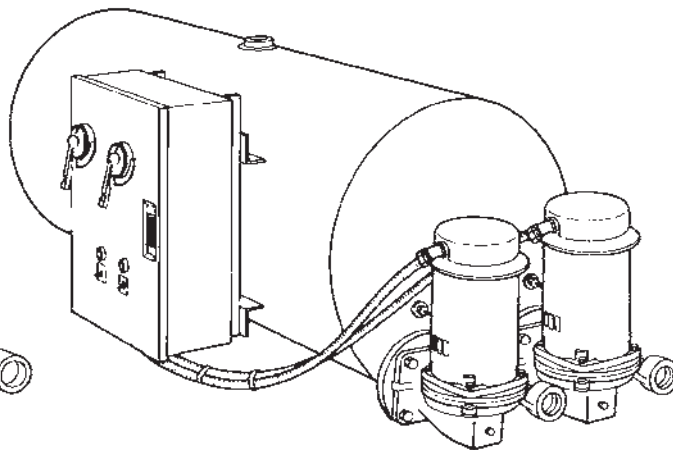
The pumps are bolted directly to the receiver to provide a compact efficient design. Their close-coupled, centrifugal design with bronze enclosed type impeller assures smooth, efficient water passage. A mechanical seal, rated to a maximum temperature of 250°F, is vented to the receiver to assure adequate lubrication at all times.

An advanced impeller and volute design make many of the pumps excellent for applications requiring a true 2 ft Net Positive Suction Head (NPSH). These units are identified with shaded areas in the selection tables on TIS 5.306 & 5.307. The simple, reliable single stage construction eliminates the need for additional impellers and parts used in other low NPSH pumps.

Designed for long-life, low maintenance and reliable service, the pumps are easily serviceable if necessary. Parts subject to normal wear are readily accessible. Impeller and mechanical seal can be serviced without disturbing piping or electrical connections.

All pumps are close-coupled to heavy duty, ball bearing open drip proof electric motors. Fractional horsepower single phase motors have built-in thermal overload protection.

To help you determine the appropriate pump type for your application, specifications for each of the four types are described in the next paragraphs. Refer to selection tables for additional pumping system performance data.



*Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only.  
In the interests of development and improvement of the product, we reserve the right to change the specification.*

TI-5-304-US 4.15



# Condensate Return and Boiler Feed Pumps

## "V" Series

### VC Pumps

1/3 through 15 hp

1750 rpm—discharge pressures are 10, 15 or 20 psi

3500 rpm—discharge pressures are 30 to 75 psi

Motor types available: Open drip proof (ODP)

Totally enclosed fan cooled (TEFC)

Explosion proof

Single phase, 115/230 V, 60 Hz

Three phase, 208 or 230/460 V, 60 Hz

### VJ Pumps

1/2 through 2 hp

3500 rpm—discharge pressures are 15, 20, 30, 40 or 50 psi

Motor types available: Open drip proof (ODP)

Totally enclosed fan cooled (TEFC)

Single phase, 115/230 V, 60 Hz

Three phase, 200V, 60 Hz

Three phase, 230/460 V, 60 Hz

### VE Pumps

3/4 through 2 hp

1750 rpm—discharge pressures are 20, 25 or 30 psi

Motor types available: Open drip proof (ODP)

Totally enclosed fan cooled (TEFC)

Explosion proof

Single phase, 115/230 V, 60 Hz

Three phase, 200 V, 60 Hz

Three phase, 230/460 V, 60 Hz

### VA Pumps

3, 5 or 7 1/2 hp

1750 rpm—discharge pressures are 30 or 40 psi

Motor types available: Open drip proof (ODP)

Totally enclosed fan cooled (TEFC)

Explosion proof

Three phase, 200 V, 60 Hz

Three phase, 230/460 V, 60 Hz

### VN Pumps

1/2 thru 7 1/2 hp

3450 rpm—discharge pressures are 20 to 60 psi

Motor types available: Open drip proof (ODP)

Totally enclosed fan cooled (TEFC)

Explosion proof

Single phase, 115/230 V, 60 Hz

Three phase, 230/460 V, 60 Hz

### Accessories and Optional Equipment

Boiler Feed Pumps—Standard Equipment

- Float operated makeup valve
- Gauge glass and thermometer tappings

Boiler Feed Pumps—Optional Equipment

- Control Panels
- Thermometer
- Makeup feeders—external type, or reverse acting float switch and solenoid valve type
- Magnesium corrosion inhibitor
- Suction isolation valves—butterfly type
- Inlet strainers—"Y" or basket type
- Gauge glass
- Three valve bypass and inlet strainer assembly for solenoid make-up valve
- Feedwater preheaters
- Discharge pressure gauges
- Discharge check valves
- Discharge gate valves
- Corrosion resistant receiver linings

### Accessories and Optional Equipment

Condensate Pumps—Standard Equipment

- Simplex units have opening blanked-off for addition of a second pump at a later date
- One float switch (simplex units)
- Mechanical alternator (duplex units)—equalizes running time between the two pumps and provides emergency back-up in case of excessive condensate return or a pump failure
- Receiver tapping for gauge glass and thermometer

Condensate Pumps—optional equipment

- Control Panels (standard mounted to receiver, remote option available)
- Thermometer
- Two float switches (duplex units)
- Suction isolation valves—butterfly type
- Inlet strainers—"Y" or basket type
- Gauge glass
- Magnesium corrosion inhibitor
- Corrosion resistant receiver linings
- Discharge pressure gauges
- Discharge check valves
- Discharge gate valves

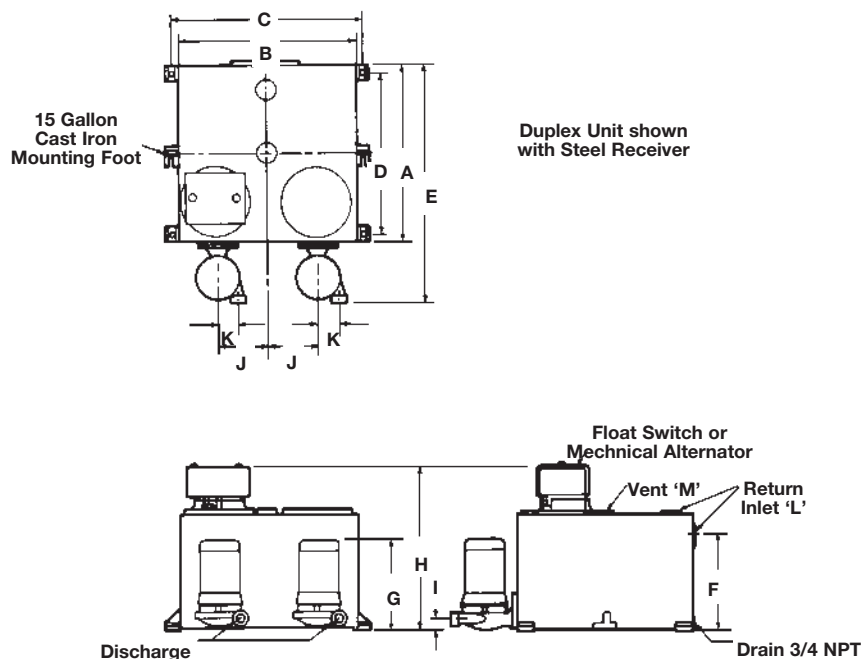
### Ordering Codes

Series and pump type _____	VE	SS	M	1	7-1/2
VC					
VJ					
VE					
VA					
VN					
Receiver type _____					
S = cast iron					
SS = welded steel					
M = boiler feed unit _____					
(omit for condensate return unit)					
Capacity, Sq Ft E.D.R. _____					
1 = 1,000					
2 = 2,000					
4 = 4,000					
6 = 6,000					
8 = 8,000					
10 = 10,000					
15 = 15,000					
20 = 20,000					
25 = 25,000					
30 = 30,000					
40 = 40,000					
50 = 50,000					
65 = 65,000					
80 = 80,000					
100 = 100,000					
Discharge Pressure, psig _____					
1 = 10					
1-1/2 = 15					
2 = 20					
2-1/2 = 25					
3 = 30					
4 = 40					
5 = 50					
6 = 60					
7-1/2 = 75					

# spirax sarco

## Pump Dimensions "V" Series

### VC, VJ, VN, & VE Pumps with Rectangular Cast Iron or Steel Receivers



### Dimensions (nominal) in inches & millimeters

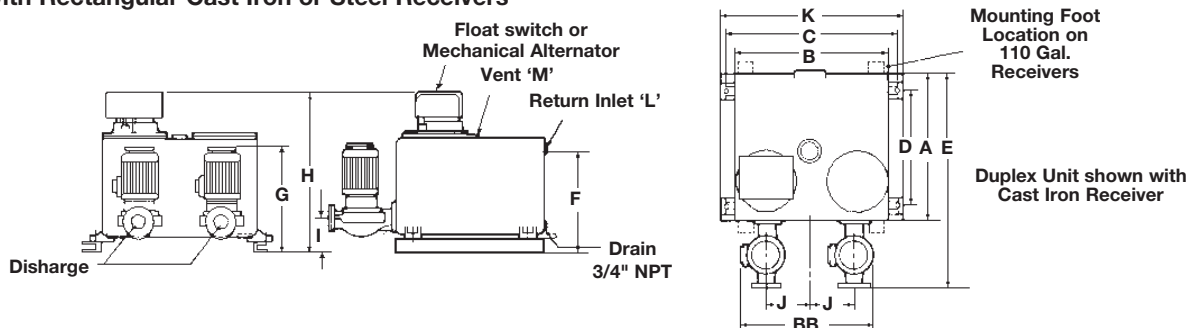
Capacity sq. ft. E,D,R.	Receiver Capacity gal.	A	B	C	D	E	F	G	H	I	J	K	L	M
<b>Cast Iron Receiver</b>														
1,000 to 4,000	15	15 381	17.5 445	19.5 495	Ø	28 711	13 330	16-19 406-483	22 559	4 102	5.25 133	4 102	2 -	1 -
1,000 to 15,000	21	21 533	22.75 578	26 660	14.75 375	34 864	10.25 260	16-21 406-533	19.5 495	4 102	6 152	4 102	2 -	1-1/4 -
20,000 to 30,000	45	26 660	26.75 679	28.75 730	20 508	39 991	15 381	16-21 406-533	23.75 603	4 102	7.5 190	4 102	2-1/2 -	1-1/2 -
40,000 to 50,000	65	28.5 724	28.5 724	30.75 781	22.75 578	41.5 1054	19.5 495	16-21 406-533	29 737	4.75 121	7.5 190	4 102	3 -	2 -
65,000 to 100,000	110	30 762	36.25 921	42 1067	32 813	44 1118	19.5 495	18-28 457-711	28.5 724	4 102	7.5 190	4 102	5 -	2 -
<b>Steel Receiver</b>														
1,000 to 15,000	21	18 457	24 610	26.4 671	16.1 409	31 781	9 229	16-19 406-483	19 483	4 102	6 152	4 102	2-1/2 -	1-1/4 -
20,000 to 30,000	45	24 610	24 610	26.4 671	22.1 561	37 940	15.5 394	16-21 406-533	25 635	4 102	6 152	4 102	3 -	1-1/2 -
40,000 to 50,000	65	24 610	24 610	26.4 671	22.1 561	37 940	21.5 546	16-21 406-533	30.5 775	4 102	6 152	4 102	3 -	2 -
65,000 to 100,000	110	30.5 775	42.5 1080	45 1143	25 635	44.5 1130	17 432	18-28 457-711	27 686	4 102	11 279	4 102	4 -	2 -

Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only.  
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TI-5-305-US 7.13

# Pump Dimensions "V" Series

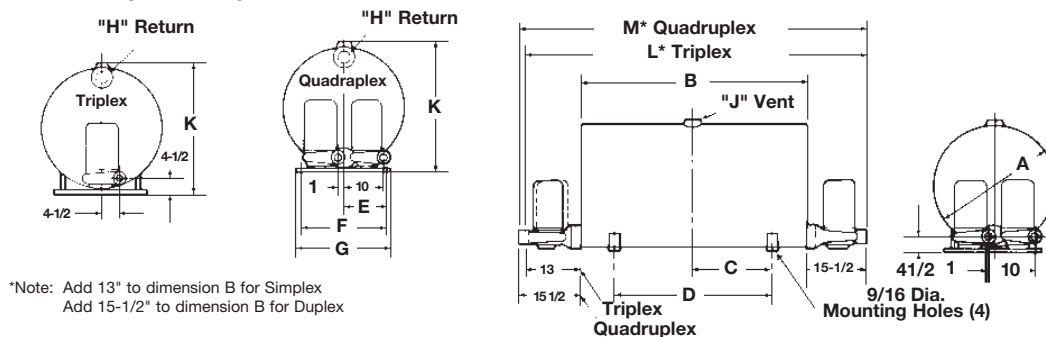
## VA Pumps with Rectangular Cast Iron or Steel Receivers



### Dimensions (nominal) in inches & millimeters

Capacity sq. ft. E.D.R.	Receiver Capacity gal.	A	B	C	D	E	F	G	H	I	J	K	L	M	BB
<b>Cast Iron Receiver</b>															
1,000 to 30,000	45	26 660	26.75 679	28.75 730	20 508	47 1194	18 437	28.75 730	26.75 679	7 178	7.5 191	31.75 806	2-1/2 63	1-1/2 38	28 711
40,000 to 50,000	65	28.5 724	28.5 724	30.75 781	22.75 578	49.5 1257	22.5 571	28.75 730	32 813	7 178	7.5 191	33.5 851	3 75	2 50	28 711
65,000 to 100,000	110	30 762	42 1067	36.25 921	32 813	51 1295	22.5 571	27.5 699	31.5 800	7 178	7.5 191	42 1067	5 125	2 50	34 864
<b>Steel Receiver</b>															
1,000 to 15,000	21	18 457	24 610	26.4 671	16.1 409	39 991	12.75 324	28.75 730	21 533	7 178	7.5 191	28.4 721	2-1/2 63	1-1/4 32	-
20,000 to 30,000	45	24 610	24 610	26.4 671	22.1 561	45 1143	18.5 470	28.75 730	28 711	7 178	7.5 191	28.4 721	3 75	1-1/2 38	28 711
40,000 to 50,000	65	24 610	24 610	26.4 671	22.1 561	45 1143	24.5 662	28.75 730	33 838	7 178	7.5 191	28.4 721	3 75	2 50	28 711
65,000 to 100,000	110	30 762	42.5 1080	45 1143	25 635	51 1295	20 508	27.5 699	30 762	7 178	11 279	47 1208	4 100	2 50	41 1041

## VC, VJ, VN, and VE Pumps with Cylindrical Steel Receivers



\*Note: Add 13" to dimension B for Simplex  
Add 15-1/2" to dimension B for Duplex

### Dimensions (nominal) in inches & millimeters

Capacity sq. ft. E.D.R.	Receiver Capacity gal.	A	B	C	D	E	F	G	H	J	K	L	M
25,000	49	22 559	30 762	10.5 267	21 533	7.5 191	15 381	17 432	2-1/2 63	1-1/4 32	23.5 597	58.5 1486	61 1569
40,000	71	24 610	36 914	13.5 343	27 686	8 203	16 406	18 457	3 75	1-1/2 38	25.5 648	64.5 1638	67 1702
65,000	117	24 610	60 1524	15 381	30 762	8 203	16 406	18 457	4 100	2 50	25.5 648	88.5 2248	91 2311
165,000	209	32 813	60 1524	24 610	48 1219	14 356	28 711	30 762	5 125	2 50	33.5 851	88.5 1638	91 1702
165,000	260	36 914	60 1524	24 610	48 1219	14 356	28 711	30 762	5 125	2 50	37.5 953	88.5 2248	91 2311
295,000	370	36 914	84 2134	28 711	56 1422	14 356	28 711	30 762	5 125	2 50	37.5 953	112.5 2858	115 2921
400,000	500	42 1067	84 2134	28 711	56 1422	14 356	28 711	30 762	5 125	2 50	43.5 1105	112.5 2858	115 2921
600,000	750	48 1219	96 2438	28 711	56 1422	19 483	38 965	40 1016	5 125	2 50	49.5 1237	124.5 3162	127 3226
800,000	1000	48 1219	132 3353	33 838	66 1676	19 483	38 965	40 1016	5 125	2 50	49.5 1237	160.5 4077	163 4140

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## Pump Sizing Selection Tables "V" Series

Capacity Sq. Ft. E.D.R.	Capacity G.P.M.	Dish Press. psig	1750 R.P.M. Units			3500 R.P.M. Units			* Receiver Size (condensate units)			
			Catalog No.	Motor H.P.	Dish. Size	Catalog No.	Motor H.P.	Dish. Size	Cast Iron		Steel	
									Capacity	Return Size	Capacity	Return Size
1,000	1-1/2	10	VCS - 11	1/3	1-1/4"				15 or 21	2"	21	2-1/2"
		15	VCS - 11-1/2	1/3	1-1/4"	VJS - 11-1/2	1/2	1-1/4"				
		20	VCS - 12	1/3	1-1/4"	VJS - 12	1/2	1-1/4"				
		30				VCS - 13	3/4	1-1/4"				
						VJS - 13	1/2	1-1/4"				
		40				VCS - 14	1	1-1/4"				
						VJS - 14	3/4	1-1/4"				
		50				VCS - 15	1-1/2	1-1/4"				
2,000	3	60				VJS - 15	1	1-1/2"	15 or 21	2"	21	2-1/2"
		75				VCS - 16	2	1-1/4"				
						VCS - 17-1/2	3	1-1/4"				
		10	VCS - 21	1/3	1-1/4"							
		15	VCS - 21-1/2	1/3	1-1/4"	VJS - 21-1/2	1/2	1-1/4"				
		20	VCS - 22	1/3	1-1/4"	VJS - 22	1/2	1-1/4"				
		30				VCS - 23	3/4	1-1/4"				
						VJS - 23	1/2	1-1/4"				
4,000	6	40				VCS - 24	1	1-1/4"	15 or 21	2"	21	2-1/2"
						VJS - 24	3/4	1-1/4"				
		50				VCS - 25	1-1/2	1-1/4"				
						VJS - 25	1	1-1/2"				
		60				VCS - 26	2	1-1/4"				
		75				VCS - 27-1/2	3	1-1/4"				
		10	VCS - 41	1/3	1-1/4"				15 or 21	2"	21	2-1/2"
		15	VCS - 41-1/2	1/3	1-1/4"	VJS - 41-1/2	1/2	1-1/4"				
6,000	9	20	VCS - 42	1/2	1-1/4"	VJS - 42	1/2	1-1/4"				
		30				VCS - 43	3/4	1-1/4"				
						VJS - 43	1/2	1-1/4"				
		40				VCS - 44	1	1-1/4"				
						VJS - 44	3/4	1-1/4"				
		50				VCS - 45	1-1/2	1-1/4"				
						VJS - 45	1-1/2	1-1/2"				
		60				VCS - 46	2	1-1/4"				
8,000	12	75				VCS - 47-1/2	3	1-1/4"	21 21 21 21 45 21 21 21 21 21 21	2" 2" 2" 2" 2-1/2" 2" 2" 2" 2" 2" 2"	21 21 21 21 21 21 21 21 21 21 21	2-1/2" 2-1/2" 2-1/2" 2-1/2" 2-1/2" 2-1/2" 2-1/2" 2-1/2" 2-1/2" 2-1/2" 2-1/2"
		10	VCS - 61	1/3	1-1/4"							
		15	VCS - 61-1/2	1/3	1-1/4"	VJS - 61-1/2	1/2	1-1/4"				
		20	VCS - 62	1/2	1-1/4"	VJS - 62/VNS-62	1/2	1-1/4"				
		25	VES - 62-1/2	3/4	1-1/2"							
		30	VES - 63	1	1-1/2"	VCS - 63/VNS-63	3/4	1-1/4"				
						VJS - 63	1/2	1-1/4"				
		40	VAS - 64	3	2"	VCS - 64/VNS-64	1, 1-1/2	1-1/4"				
						VJS - 64	3/4	1-1/4"				
		50				VCS - 65	1-1/2	1-1/4"				
						VJS - 65	1-1/2	1-1/2"				
		60				VCS - 66	2	1-1/4"				
		75				VCS - 67-1/2	3	1-1/4"				
8,000	12	10	VCS - 81	1/3	1-1/4"				21 21 21 21 21 45 21 21 21 21 21	2" 2" 2" 2" 2" 2-1/2" 2" 2" 2" 2" 2"	21 21 21 21 21 21 21 21 21 21 21	2-1/2" 2-1/2" 2-1/2" 2-1/2" 2-1/2" 2-1/2" 2-1/2" 2-1/2" 2-1/2" 2-1/2" 2-1/2"
		15	VCS - 81-1/2	1/3	1-1/4"	VJS - 81-1/2	1/2	1-1/4"				
		20	VCS - 82	1/2	1-1/4"	VJS - 82	1/2	1-1/4"				
		25	VES - 82-1/2	3/4	1-1/2"							
		30	VES - 83	1	1-1/2"	VCS - 83	3/4	1-1/4"				
						VJS - 83	1/2	1-1/4"				
		40	VAS - 84	3	2"	VCS - 84	1	1-1/4"				
						VJS - 84	1	1-1/4"				
		50				VCS - 85	1-1/2	1-1/4"				
						VJS - 85	1-1/2	1-1/2"				
		60				VCS - 86	2	1-1/4"				
		75				VCS - 87-1/2	3	1-1/4"				

Designates 2 Ft. NPSH Capability

\* For boiler feed units, receiver size should be approximately 1 gallon of storage per boiler h.p.

Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only.

In the interests of development and improvement of the product, we reserve the right to change the specification.

TI-5-306-US 5.15

# Pump Sizing Selection Tables

## "V" Series

Capacity Sq. Ft. E.D.R.	Capacity G.P.M.	Dish Press. psig	1750 R.P.M. Units			3500 R.P.M. Units			* Receiver Size (condensate units)			
			Catalog No.	Motor H.P.	Dish Size	Catalog No.	Motor H.P.	Dish Size	Cast Iron		Steel	
									Return Capacity	Size	Return Capacity	Size
10,000	15	10	VCS - 101	1/3	1-1/4"				21	2"	21	2-1/2"
		15	VCS - 101-1/2	1/2	1-1/4"	VJS - 101-1/2	1/2	1-1/4"	21	2"	21	2-1/2"
		20	VCS - 102	1/2	1-1/4"	VJS - 102/VNS-102	1/2, 3/4	1-1/4"	21	2"	21	2-1/2"
		25	VES - 102-1/2	3/4	1-1/2"				21	2"	21	2-1/2"
		30	VES - 103	1-1/2	1-1/2"	VCS - 103/VNS-103	3/4	1-1/4"	21	2"	21	2-1/2"
						VJS - 103	3/4	1-1/4"	21	2"	21	2-1/2"
		40	VAS - 104	3	2"				45	2-1/2"	21	2-1/2"
						VCS - 104/VNS-104	1, 1-1/2	1-1/4"	21	2"	21	2-1/2"
						VJS - 104	1	1-1/4"	21	2"	21	2-1/2"
		50				VCS - 105	1-1/2	1-1/4"	21	2"	21	2-1/2"
15,000	22-1/2					VJS - 105	1-1/2	1-1/2"	21	2"	21	2-1/2"
		60				VCS - 106	2	1-1/4"	21	2"	21	2-1/2"
		75				VCS - 107-1/2	3	1-1/4"	21	2"	21	2-1/2"
		10	VCS - 151	1/3	1-1/2"				21	2"	21	2-1/2"
		15	VCS - 151-1/2	1/2	1-1/4"	VJS - 151-1/2	1/2	1-1/4"	21	2"	21	2-1/2"
		20	VES - 152	3/4	1-1/2"	VJS - 152/VNS-152	1/2	1-1/4"	21	2"	21	2-1/2"
		25	VES - 152-1/2	1	1-1/2"				21	2"	21	2-1/2"
		30	VES - 153	1-1/2	1-1/2"	VCS - 153/VNS-153	1	1-1/4"	21	2"	21	2-1/2"
						VJS - 153	3/4	1-1/4"	21	2"	21	2-1/2"
		40	VAS - 154	3	2"				45	2-1/2"	21	2-1/2"
20,000	30					VCS - 154/VNS-154	1-1/2	1-1/4"	21	2"	21	2-1/2"
						VJS - 154	1	1-1/4"	21	2"	21	2-1/2"
		50				VCS - 155	2	1-1/4"	21	2"	21	2-1/2"
						VJS - 155	1-1/2	1-1/2"	21	2"	21	2-1/2"
		60				VCS - 156	3	1-1/4"	21	2"	21	2-1/2"
		75				VCS - 157-1/2	3	1-1/4"	21	2"	21	2-1/2"
		10	VCS - 201	1/3	1-1/2"				45	2-1/2"	45	3"
		15	VCS - 201-1/2	1/2	1-1/4"	VJS - 201-1/2	1/2	1-1/4"				
		20	VES - 202	3/4	1-1/2"	VJS - 202/VNS-202	3/4	1-1/4"				
		25	VES - 202-1/2	1	1-1/2"							
		30	VES - 203	1-1/2	1-1/2"	VCS - 203/VNS-203	1-1/2, 1	1-1/4"				
						VJS - 203	1	1-1/4"				
		40	VAS-204	3	2"	VCS - 204/VNS-204	1-1/2, 2	1-1/4"				
						VJS - 204	1-1/2	1-1/2"				
		50				VCS - 205	2	1-1/4"				
						VJS - 205	1-1/2	1-1/2"				
25,000	37-1/2	60				VCS - 206	3	1-1/4"				
		75				VCS - 207-1/2	5	1-1/4"				
		10	VCS - 251	1/2	1-1/2"				45	2-1/2"	45	3"
		15	VCS - 251-1/2	3/4	1-1/2"	VJS - 251-1/2	3/4	1-1/4"				
		20	VES - 252	3/4	1-1/2"	VJS - 252	3/4	1-1/4"				
		25	VES - 252-1/2	1-1/2	1-1/2"							
		30	VES - 253	1-1/2	1-1/2"	VCS - 253	1-1/2	1-1/4"				
						VJS - 253	1	1-1/4"				
		40	VAS - 254	3	2"	VCS - 254	2	1-1/4"				
						VJS - 254	1-1/2	1-1/2"				
		50				VCS - 255	3	1-1/2"				
		60				VCS - 256	3	1-1/4"				
30,000	45	75				VCS - 257-1/2	5	1-1/4"				
		10	VCS - 301	1/2	1-1/2"				45	2-1/2"	45	3"
		15	VCS - 301-1/2	3/4	1-1/2"	VJS - 301-1/2	1	1-1/4"				
		20	VES - 302	1	1-1/2"	VJS - 302/VNS-302	1	1-1/4"				
		25	VES - 302-1/2	1-1/2	1-1/2"							
		30	VES - 303	1-1/2	1-1/2"	VCS - 303/VNS-303	1-1/2	1-1/4"				
						VJS - 303	1-1/2	1-1/2"				
		40	VAS - 304	3	2"	VCS - 304/VNS-304	2, 3	1-1/4", 2				
						VJS - 304	2	1-1/2"				
		50				VCS - 305/VNS-305	3, 5	1-1/2", 2				
		60				VCS - 306/VNS-306	3	1-1/4", 2				
30,000	45	75				VCS - 307-1/2	7-1/2	1-1/2"				

Designates 2 Ft. NPSH Capability

\* For boiler feed units, receiver size should be approximately 1 gallon of storage per boiler h.p.

# Pump Sizing Selection Tables

## "V" Series

Capacity Sq. Ft. E.D.R.	Capacity G.P.M.	Dish Press. psig	1750 R.P.M. Units			3500 R.P.M. Units			* Receiver Size (condensate units)			
			Catalog No.	Motor H.P.	Dish Size	Catalog No.	Motor H.P.	Dish Size	Cast Iron		Steel	
									Capacity	Return Size	Capacity	Return Size
40,000	60	10	VCS - 401	3/4	1-1/2"				65	3"	65	3"
		15	VCS - 401-1/2	1	1-1/2"	VJS - 401-1/2	1-1/2	1-1/2"	65	3"	65	3"
		20	VES - 402	1-1/2	1-1/2"	VJS - 402/VNS-402	1-1/2	1-1/2", 2"	65	3"	65	3"
		25	VES - 402-1/2	1-1/2	1-1/2"				65	3"	65	3"
		30	VES - 403	2	1-1/2"	VCS - 403/VNS-403	2, 3	1-1/2", 2"	65	3"	65	3"
						VJS - 403	1-1/2	1-1/2"	65	3"	65	3"
		40	VAS - 404	5	2"	VCS - 404/VNS-404	3	1-1/2", 2"	65	3"	65	3"
		50				VCS - 405/VNS-405	5	1-1/2", 2"	65	3"	65	3"
		60				VCS - 406/VNS-406	5	1-1/2", 2"	65	3"	65	3"
		75				VCS - 407-1/2	7-1/2	1-1/2"	65	3"	65	3"
50,000	75	10	VCS - 501	1	2"				65	3"	65	3"
		15	VCS - 501-1/2	1-1/2	2"	VJS - 501-1/2	1-1/2	1-1/2"	65	3"	65	3"
		20	VES - 502	1-1/2	1-1/2"	VJS - 502/VNS-502	1-1/2, 2	1-1/2", 2"	65	3"	65	3"
		25	VES - 502-1/2	2	1-1/2"				65	3"	65	3"
		30	VAS - 503	3	1-1/2"	VCS - 503/VNS-503	3	1-1/2", 2"	65	3"	65	3"
						VJS - 503	2	1-1/2"				
		40	VAS - 504	5	2"	VCS - 504/VNS-504	3	1-1/2", 2"	65	3"	65	3"
		50				VCS - 505/VNS-505	5	1-1/2", 2"	65	3"	65	3"
		60				VCS - 506/VNS-506	5, 7-1/2	1-1/2", 2"	65	3"	65	3"
		75				VCS - 507-1/2	7-1/2	1-1/2"	65	3"	65	3"
60,000	90	20				VNS-602	2	2"	110	5"	110	4"
		30				VNS-603	3	2"				
		40				VNS-604	5	2"				
		50				VNS-605	7-1/2	2"				
65,000	97-1/2	10	VCS - 651	1-1/2	2"				110	5"	110	4"
		15	VCS - 651-1/2	1-1/2	2"	VJS - 651-1/2	2	1-1/2"				
		20	VES - 652	2	1-1/2"	VJS - 652	2	1-1/2"				
		30	VAS - 653	3	2"	VCS - 653	3	2"				
		40	VAS - 654	5	2"	VCS - 654	5	2"				
		50				VCS - 655	5	2"				
		60				VCS - 656	7-1/2	2"				
80,000	120	10	VCS - 801	1-1/2	2"				110	5"	110	4"
		15	VCS - 801-1/2	2	2"							
		20				VCS - 802	3	1-1/2"				
		30	VAS - 803	5	2"	VCS - 803	5	2"				
		40	VAS - 804	5	2"	VCS - 804	5	2"				
		50				VCS - 805	7-1/2	2"				
		60				VCS - 806	7-1/2	2"				
100,000	150	10	VCS - 1001	1-1/2	2"				110	5"	110	4"
		15				VCS - 1001-1/2	2	2"				
		20				VCS - 1002	5	2"				
		30	VAS - 1003	5	3"	VCS - 1003	5	2"				
		40	VAS - 1004	5	3"	VCS - 1004	5	2"				
		50				VCS - 1005	7-1/2	2"				
		60				VCS - 1006	10	2"				

Designates 2 Ft. NPSH Capability

\* For boiler feed units, receiver size should be approximately 1 gallon of storage per boiler h.p.

Condensate  
Recovery

Electric Pumps



# spirax/sarco

## Control Panels 550 Series and 700 Series

### AVAILABLE TYPES

#### Series 550

Enclosure: Nema Type 1 ONLY

Controls: 2 starters with 3rd leg overload protection  
Reset button in cover

#### Series 700

Enclosure: Nema Type 1.

Controls: 2, 3 or 4 starters, each with 3rd leg overload protection and  
reset button on starters.  
Numbered terminal strip

### OPTIONAL EXTRAS

#### Series 550

Controls: 3 Position Selector Switch Hand-Off-Auto or Lead-Off Lag, or  
Test-Off-Auto  
Pilot Light(s) Red or Green  
230 V Max. Use 700 Series if voltage exceeds 230 V.

#### Series 700

Enclosure: Nema 1, 2, 3, 4X or 12. NEMA 7 or 9 Explosion Proof, consult factory.

Controls: 1 Disconnect per panel with Cover Interlock with provisions for padlock

1-Fuse Block per starter or—

1-Circuit Breaker per starter

Fused Control Circuit Transformer, 110 Volt Secondary.

1-Electric Alternator per panel (duplex models only)

Relays— as required.

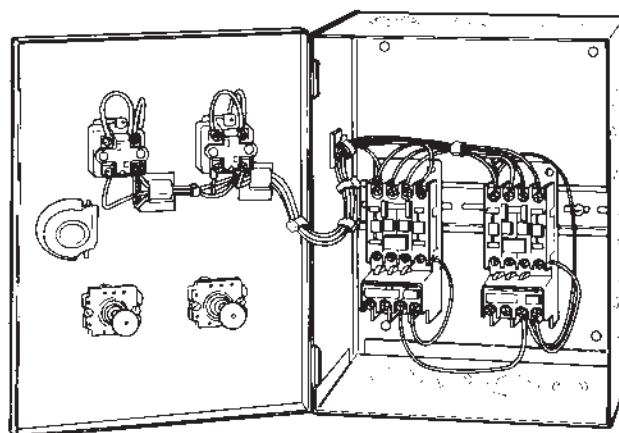
Selector Switches on cover, 1 per starter labeled:

- Hand-Off-Auto
- Lead-Off-Lag
- Boiler No. 1-Off-Boiler No. 2
- Pump No. 1-Off-Pump No. 2
- Test-Off-Auto (spring loaded to off)

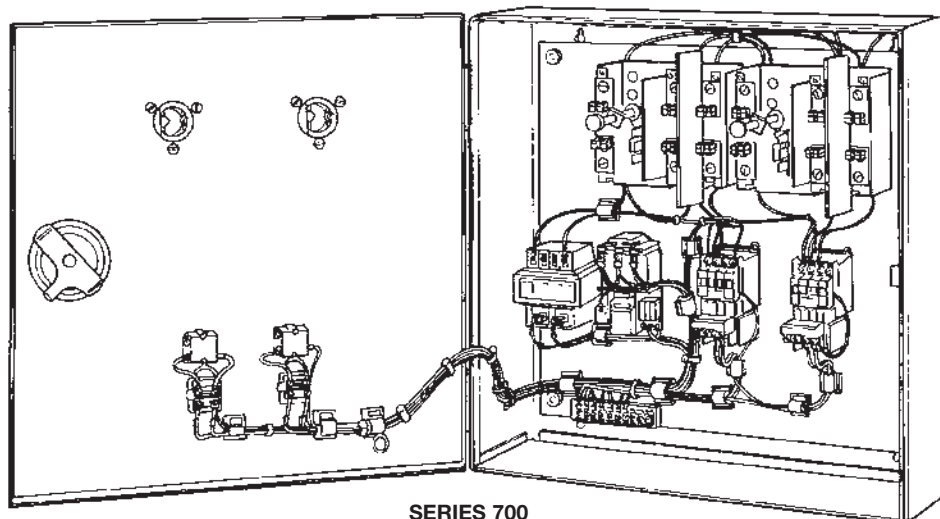
Pilot Lights on cover - 1 per starter

(Green for standard pumps; red for stand by pumps.)

Alarm bell with silencing switch - 1 per panel



SERIES 550



SERIES 700

TI-5-325-US 04.95

Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only.  
In the interests of development and improvement of the product, we reserve the right to change the specification.

# Control Panels

## 550 Series and 700 Series

### NEMA ENCLOSURES

Enclosures For Inside Non-Hazardous Locations

Provides Protection Against	Type of Enclosure			
	1	2*	4*	12*
Accidental contact with enclosed equipment	yes	yes	yes	
Falling dirt	yes	yes	yes	yes
Falling liquids and light splashing		yes	yes	yes
Dust lint fibers and flyings			yes	yes
Hosedown and splashing water			yes	
Oil and coolant seepage			yes	yes
Oil and coolant spraying and splashing				
Corrosive agents				
Occasional submersion				

*\*These enclosures may be ventilated. However Type 1 may not provide protection against small particles of falling dirt when ventilation is provided in the enclosure top; and Type 12, if ventilated, will not be dust-tight*

### TYPE 1 - GENERAL PURPOSE INDOOR

Nonventilated Enclosures

**Type 1** enclosures are intended for use indoors primarily to prevent accidental contact of personnel with the enclosed equipment in areas where unusual service conditions do not exist. In addition, they provide protection against falling dirt. Enclosures which are intended to be flush mounted in building walls shall have provision to align the device with the flush plate and to compensate for the thickness of the wall.

**Type 2** enclosures are intended for use indoors to protect the enclosed equipment against falling non-corrosive liquids and falling dirt. They shall have provision for drainage. If provision is made for the entrance of conduit at the top, it shall consist of a conduit hub or the equivalent. When completely and properly installed, these enclosures shall prevent entrance of dripping liquid at a higher level than the lowest live part within the enclosure.

**Type 12** enclosures are intended for use indoors to protect the enclosed equipment against fibers, flyings, lint, dust and dirt and light splashing, seepage, dripping and external condensation of non corrosive liquids. There shall be no holes through the enclosure and no conduit knockouts or conduit openings, except that oiltight and dust-tight mechanisms may be mounted through holes in the enclosure when provided with oil-resistant gaskets. Doors shall be provided with oil-resistant gaskets. In addition, enclosures for combination controllers shall have hinged doors which swing horizontally and require a tool to open.

### TYPE 4X WATERTIGHT & DUSTTIGHT INDOOR & OUTDOOR

**Type 4X** corrosion resistant enclosures are intended for use indoors or outdoors to protect the enclosed equipment against splashing water, seepage of water, falling or hose-directed water, and severe external condensation. They are sleet-resistant but not sleet-(ice) proof. They shall have conduit hubs or equivalent provision for watertight connection at the conduit entrance and mounting means external to the equipment cavity.

### ENCLOSURES FOR HAZARDOUS LOCATIONS- GENERAL

The term "explosion proof" has been so loosely applied that NEMA deprecates its use. As defined by the "National Electrical Code," the term "explosion proof" applies only to Type 7 and 10 enclosures which, when properly installed and maintained, are designed to contain an internal explosion without causing external hazard. The term should not be applied to Type 8 enclosures which are designed to prevent an explosion through the use of oil-immersed equipment or to Type 9 enclosures which are designed to prevent an explosion by excluding explosive amounts of hazardous dust.

### EXPLOSION PROOF - NONVENTILATED ENCLOSURES

**Type 7** enclosures are intended for use indoors in the atmosphere and locations defined as Class I and Group A, B, C or D in the "National Electrical Code." The letter or letters A, B, C or D which indicate the gas or vapor atmospheres in the hazardous location shall appear as a suffix to the designation "Type 7" to give the complete NEMA designation and correspond to Class I, Group A, B, C or D, respectively, as defined in the "National Electrical Code." These enclosures shall be designed in accordance with the requirements of Underwriters Laboratories, Inc., "Industrial Control Equipment for Use in Hazardous Locations," UL 698. and shall be marked to show the Class and Group letter designations.

**Type 9** enclosures are intended for use indoors in the atmospheres defined as Class II and Group E, F or G in the "National Electrical Code." The letter or letters E, F or G which indicate the dust atmospheres in the hazardous location shall appear as a suffix to the designation "Type 9" to give the complete NEMA designation and correspond to Class II, Group E, F or G, respectively, as defined in the "National Electrical Code." These enclosures shall prevent the ingress of explosive amounts of hazardous dust. If gaskets are used, they shall be mechanically attached and of a noncombustible, nondeteriorating, vermin-proof material.

Condensate  
Recovery

Electric Pumps

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# Strainer Solutions





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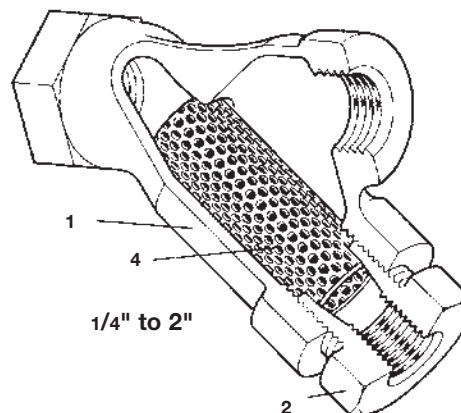
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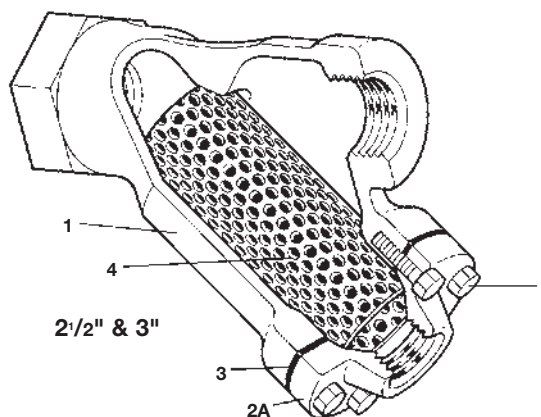
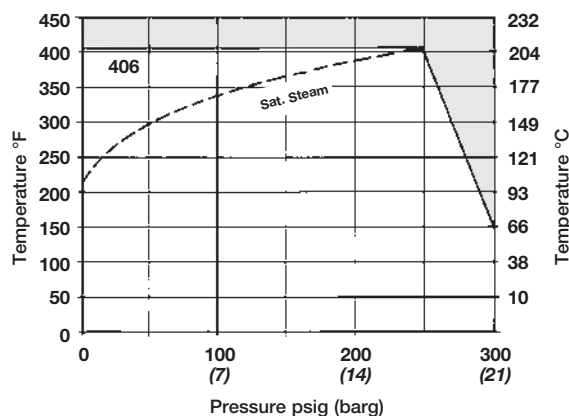
## Cast Iron Strainers IT

Type	IT
Sizes	1/4" to 3"
Connections	NPT
Construction	Cast Iron
Max Saturated Steam Pressure	250 psig
Standard Screen	20 Mesh
Options	60/100 Mesh Screens

Note: 3/8" - 3" IT conforms to WW-S-2739 when equipped with an optional brass plug in the blow-off connection.



### Limiting Operating Conditions (non-shock)



### Pressure Shell Design Conditions

Max. allowable pressure	300 psig/-20-150°F	21 barg/-29-66°C
Max. allowable temperature	406°F/0-250 psig	208°C/0-17 barg

### Construction Materials

No.	Part	Material	
1	Body	Cast Iron	ASTM A 126 CL B
2	Bushing (1/4"-2")	Malleable Iron	
2A	Cap (2-1/2"-3")	Cast Iron	ASTM A 126 CL B
3	Cap Gasket (2-1/2" & 3")	Graphite	
4	Standard Screen	Stainless Steel Type 304	
5	Cap Screws (2-1/2" & 3")	Steel	ASTM A 449

### C<sub>v</sub> Values & Free Area (standard Screen)

Size	C <sub>v</sub>	Free Area (sq. in.)
1/4"	3.5	1.37
3/8"	3.5	1.37
1/2"	6.5	2.20
3/4"	11.5	4.0
1"	20	5.2
1-1/4"	28	6.8
1-1/2"	38	9.45
2"	70	12.56
2-1/2"	100	19.05
3"	160	25.93

Consult factory for free areas of optional screens.

### For water:

$$\text{Pressure Drop} = \frac{(\text{GPM})^2}{(\text{Cv})^2}$$

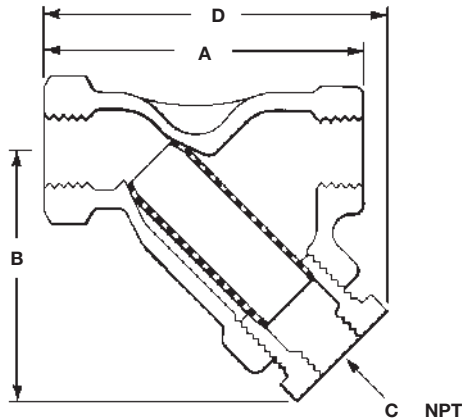
Consult factory for other liquids.

See TI-7-429-US for pressure drops on steam, air and other gases.

Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only.  
In the interests of development and improvement of the product, we reserve the right to change the specification.

TI-7-414-US 03.10

# Cast Iron Strainers IT



## Dimensions

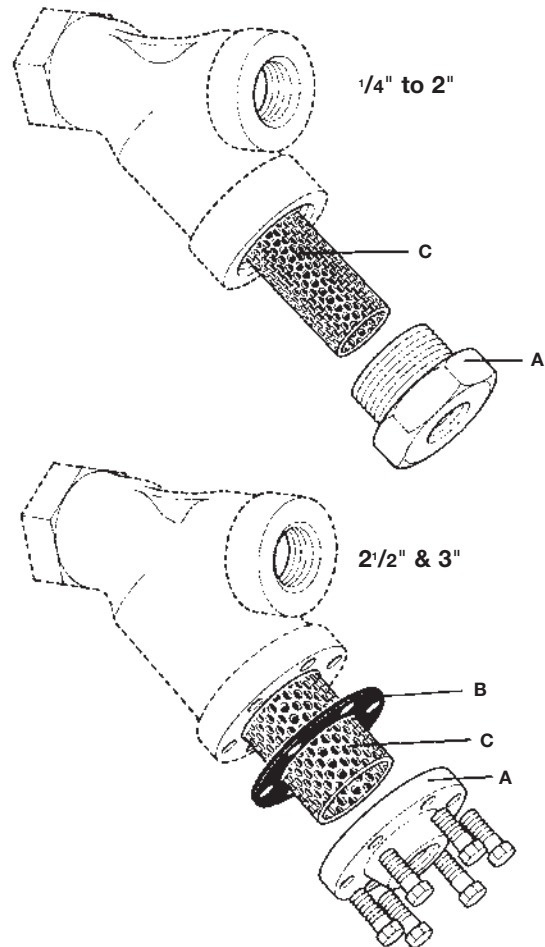
(nominal) in inches and millimeters

Size	A	B	C	D	Weight
1/4" *	3.5 89	2.2 56	1/4"	3.0 76	1.0 lb 0.5 kg
3/8"	2.9 73	2.2 56	1/4"	3.0 76	1.0 lb 0.5 kg
1/2"	3.4 87	2.7 68	3/8"	3.9 99	1.2 lb 0.6 kg
3/4"	4.4 111	3.4 86	1/2"	4.6 117	2.9 lb 1.3 kg
1"	4.9 124	3.5 86	3/4"	5.0 127	4.3 lb 1.9 kg
1-1/4"	5.4 137	4.1 105	1"	5.75 146	6.5 lb 2.9 kg
1-1/2"	6.4 162	4.7 119	1-1/4"	6.6 167	9.6 lb 4.3 kg
2"	7.5 191	5.4 138	1-1/2"	7.75 197	12.9 lb 5.9 kg
2-1/2"	9.0 229	6.4 164	1-1/4"	8.25 210	22.0 lb 10.0 kg
3"	10.0 254	7.6 194	1-1/4"	10.25 260	35.0 lb 15.9 kg

## Installation

The strainer should be installed with the flow direction as indicated on the body, in a vertical down or horizontal pipeline. The strainer must be accessible for periodic removal of accumulated debris, by either blowing down or removal and cleaning of the screen.

## Spare Parts



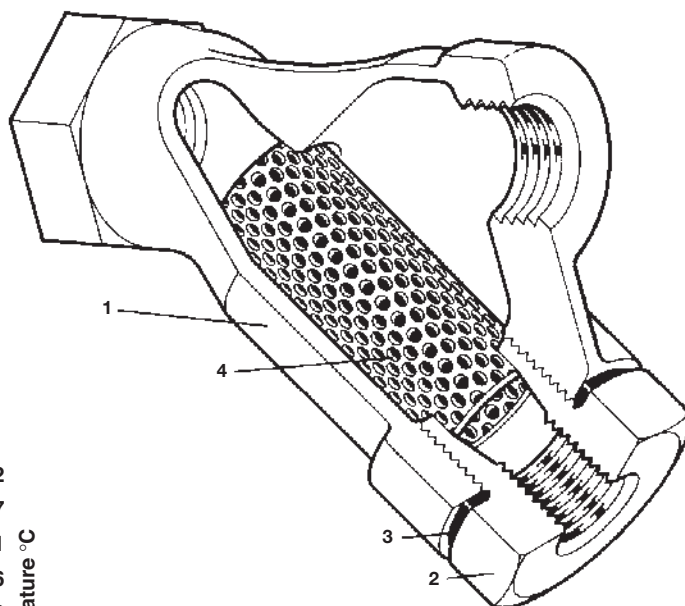
Screen	C
(state material, perforations or mesh & size of strainer)	
Cap Gasket 2-1/2" & 3"	B
Blowoff Bushing, 3/8" - 2"	A
Cap, 2-1/2" & 3"	A



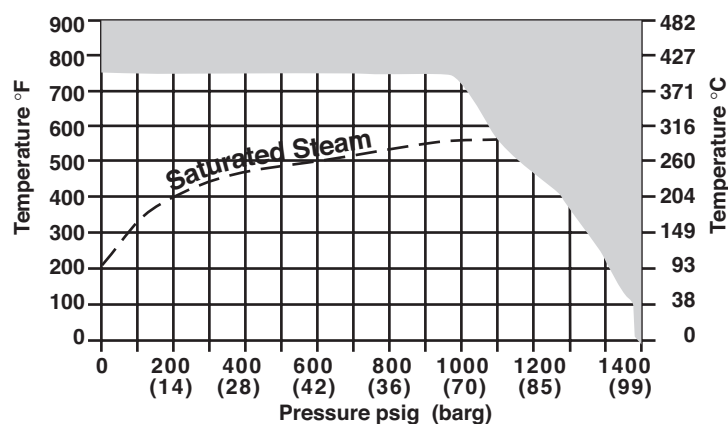
# spirax/sarco

## Carbon Steel Strainers CT

Type	CT
Sizes	1/2" to 2"
Connections	NPT
Construction	Carbon Steel
Max Saturated Steam Pressure	984 psig
Standard Screen	20 Mesh
Options	60/100 Mesh Screens SW Connections Steel Plug



### Limiting Operating Conditions (non-shock)



### Pressure Shell Design Conditions

Max. allowable pressure 1480 psig/-20-150°F 102 barg/-29-66°C

Max. allowable temperature 750°F/0-1010 psig 399°C/0-67 barg

Rated to ANSI 600 up to a Maximum Allowable Temperature of 750°F  
Complies with ASME B31.3 - Chemical Plant and Refinery Piping.

### Construction Materials

No.	Part	Material
1	Body	Carbon Steel ASTM A216 GR WCB
2	Cap	Carbon Steel ASTM A108
3	Cap Gasket	Stainless Steel, Jacketed Graphite Type 304
4	Standard Screen	Stainless Steel, Type 304

### Cv Values & Free Area (standard Screen)

Size	Cv	Free Area (sq. in.)
1/2"	6.5	2.20
3/4"	11.5	4.0
1"	20	5.2
1-1/4"	28	6.8
1-1/2"	38	9.45
2"	70	12.56

Consult factory for free areas of optional screens.

For water:

$$\text{Pressure Drop} = \frac{(\text{GPM})^2}{(\text{Cv})^2}$$

Consult factory for other liquids.

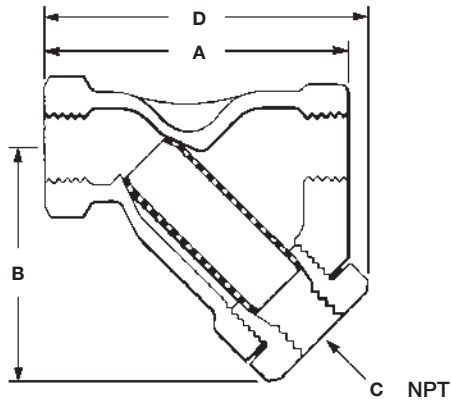
See TI-7-429-US for pressure drops on steam, air and other gases.

Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only.  
In the interests of development and improvement of the product, we reserve the right to change the specification.

TI-7-418-US 4.13



# Carbon Steel Strainers CT



**Dimensions**  
(nominal) in inches and millimeters

Size	A	B	C	D	Weight
1/2"	3.4 87	2.7 70	3/8"	3.75 95	1.5 lb .68 kg
3/4"	4.4 111	3.6 92	3/8"	4.8 122	3.2 lb 1.5 kg
1"	4.9 124	3.8 97	1/2"	5.25 133	3.9 lb 1.8 kg
1-1/4"	5.4 137	4.4 113	3/4"	5.9 151	5.8 lb 2.6 kg
1-1/2"	6.4 162	4.9 124	3/4"	6.8 173	8.5 lb 3.9 kg
2"	7.5 191	5.9 149	1"	8.1 205	14.0 lb 6.3 kg

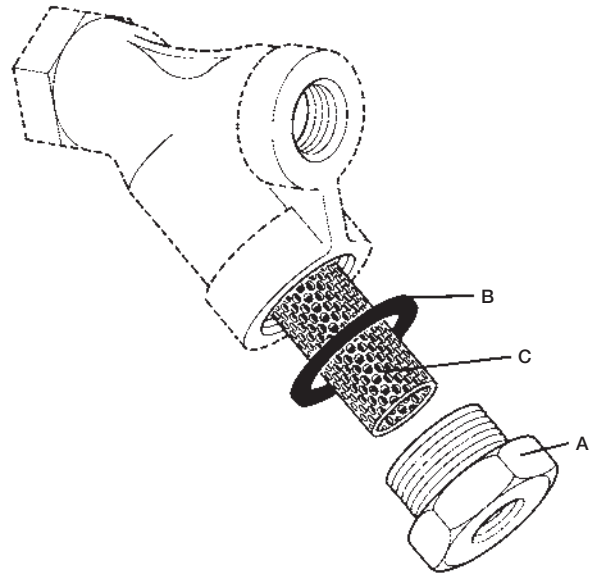
## Installation

The strainer should be installed with the flow direction as indicated on the body, in a vertical down or horizontal pipeline. The strainer must be accessible for periodic removal of accumulated debris, by either blowing down or removal and cleaning of the screen.

## Specification

Spirax Sarco CT Y-Pattern Strainers: Maximum working steam pressure 984 psig; carbon steel body, type 304 stainless-steel screen with 20 mesh stainless steel screen. NPT connections for 1/2" through 2".

## Spare Parts



Screen	C
(state material, perforations or mesh & size of strainer)	
Cap Gasket	B
Blowoff Bushing	A

# spirax sarco

## Bronze Strainers BT, TBT

Type	BT	TBT
Sizes	1/4" to 3"	1/2" to 3"
Connections	NPT	Sweat tubing
Construction	Bronze	
Max Saturated Steam Pressure	250 psig	
Standard Screen	20 Mesh	
Options	Bronze Plug; 60/100 Mesh Screens	

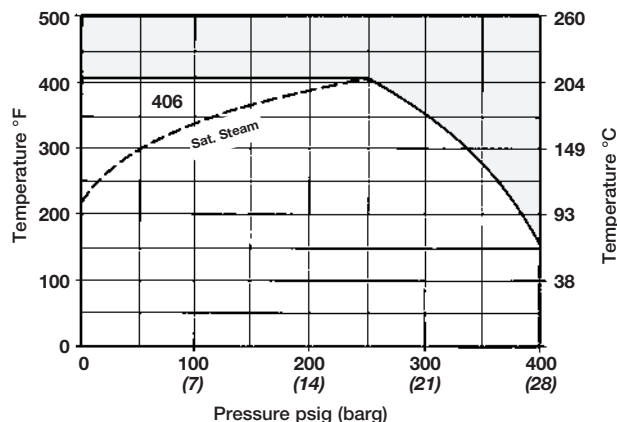
### C<sub>v</sub> Values & Free Area (standard Screen)

Size		C <sub>v</sub>	Free Area (sq. in.)
BT	TBT		
1/4"	—	3.5	1.37
3/8"	1/2"	3.5	1.37
1/2"	3/4"	6.5	2.20
3/4"	1"	11.5	4.0
1"	1-1/4"	20	5.2
1-1/4"	1-1/2"	28	6.8
1-1/2"	2"	38	9.45
2"	2-1/2"	70	12.56
2-1/2"	3"	100	19.05
3"	—	160	25.93

Consult factory for free areas of optional screen.

For water:  
 $\text{Pressure Drop} = \frac{(\text{GPM})^2}{(\text{Cv})^2}$   
 Consult factory for other liquids.  
 See TI-7-429 for pressure drops on steam, air and other gases.

### Limiting Operating Conditions (non-shock)



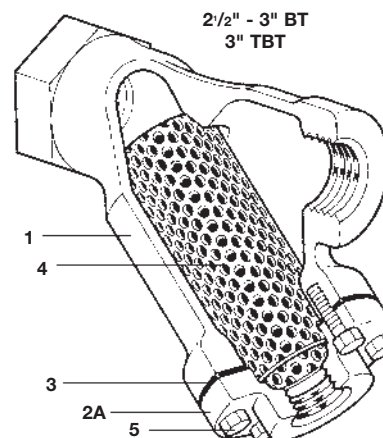
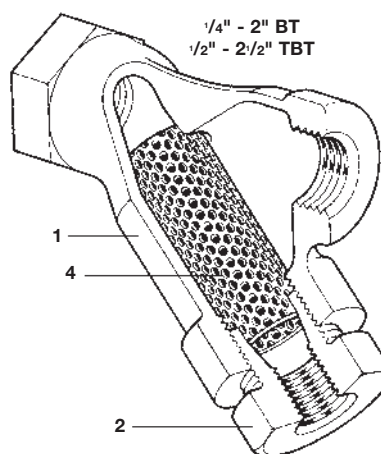
### Pressure Shell Design Conditions

Max. allowable pressure 400 psig/-20-150°F (27 barg/-29°C)

Max. allowable temperature 406°F/0-250 psig (208°C/27 barg)

### Construction Materials

No.	Part	Material	
1	Body	Bronze	ASTM B 62
2	Bushing 3/8" - 2" BT 1/2" - 2-1/2" TBT	Bronze	ASTM B 62
2A	Cap 2-1/2", 3" BT 3" TBT	Bronze	ASTM B 62
3	Cap Gasket 2-1/2", 3" BT 3" TBT	Graphite	
4	Standard Screen	Stainless Steel Type 304	
5	Cap Screws 2-1/2", 3" BT 3" TBT	Steel	ASTM A 449

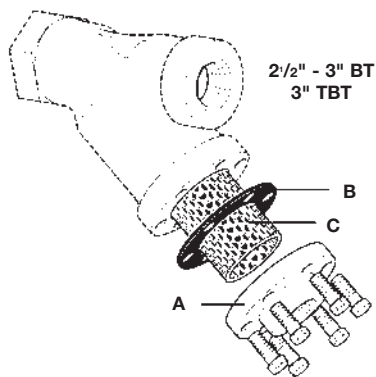
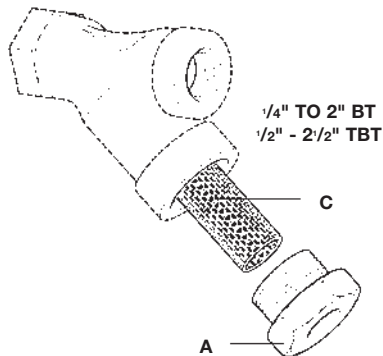


Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only.  
 In the interests of development and improvement of the product, we reserve the right to change the specification.

TI-7-416-US 4.13

# Bronze Strainers BT, TBT

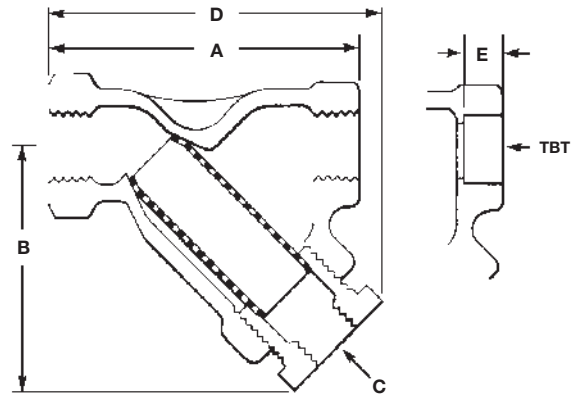
## Spare Parts



Screen	C
(state material, size of perf or mesh, and size of strainer)	
Cap Gasket	B
Blowoff Bushing	A
Cap	A

## Installation

The strainer should be installed with the flow direction as indicated on the body, in a vertical down or horizontal pipeline. The strainer must be accessible for periodic removal of accumulated debris, by either blowing down or removal and cleaning of the screen.



## Dimensions

(nominal) in inches and millimeters

Size BT	Size TBT	A	B	C	D	E	Weight
1/4"	—	3.4 86	2.2 56	1/4"	3.2 81		1 lb .45 kg
3/8"	1/2"	2.9 73	2.2 56	1/4"	3.0 76	.31 7.8	1 lb .45 kg
1/2"	3/4"	3.4 87	2.7 68	3/8"	3.9 98	.44 11.2	1.3 lb .59 kg
3/4"	1"	4.4 111	3.4 86	1/2"	4.6 117	.5 12.7	2.7 lb 1.2 kg
1"	1-1/4"	4.9 124	3.5 89	3/4"	5.0 127	.63 16	3.5 lb 1.6 kg
1-1/4"	1-1/2"	5.4 137	4.2 106	3/4"	5.4 137	.63 16	5.1 lb 2.3 kg
1-1/2"	2"	6.4 162	4.75 121	3/4"	6.6 168	.69 17.5	7.6 lb 3.5 kg
2"	2-1/2"	7.5 191	5.7 144	1"	7.9 200	.72 18.3	13.0 lb 5.9 kg
2-1/2"	3"	8.6 219	6.75 171	1-1/4"	9.1 232	.88 22.4	21.0 lb 9.5 kg
3"	—	10.1 257	7.9 200	1-1/4"	10.75 273		32.0 lb 14.5 kg

\* 1/4" is 3/8" with Bushings



## Stainless Steel Strainers TSSY

Type	TSSY
Sizes	1/2", 3/4", 1", 1-1/4", 1-1/2", 2"
Connections	NPT or SW to ANSI B16.11
Construction	Investment Cast Stainless Steel Type 316L
**Max Saturated Steam Pressure	300 PSI @ 420°F
*Screen	1/32" perf. (.033)

\*Note: 28% open area  
\*\* See Fig16 HP, TI-P169-08 ASME Class 800 Strainer for higher pressures

### C<sub>v</sub> Values

Size	C <sub>v</sub>
1/2"	9.4
3/4"	18.0
1"	30.0
1-1/4"	45.0
1-1/2"	63.0
2"	98.0

For water:

$$\text{Pressure Drop} = \frac{(\text{GPM})^2}{(\text{C}_v)^2}$$

Consult factory for other liquids.

See TI-7-429 for pressure drops on steam, air and other gases.

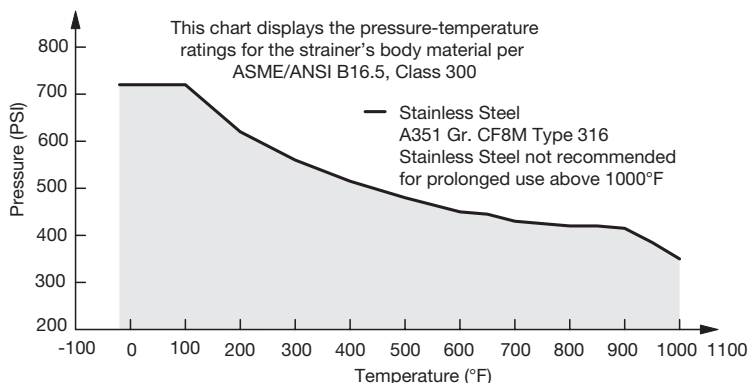
### Bill of Materials<sup>1</sup>

No.	Part	Material
1	Body	ASTM A351 GR: CF8M Type 316
2	Bonnet	ASTM A351 Gr. CF8M Type 316
3	Screen <sup>2</sup>	Stainless Steel
4	Gasket	PTFE
5	NPT Plug	Stainless Steel

<sup>1</sup> Bill of Materials represents standard materials. Equivalent or better materials may be substituted at the manufacturer's discretion.

<sup>2</sup> Denotes recommended spare parts.

### Pressure Temperature Ratings



### Pressure/Temperature Rating<sup>1</sup>

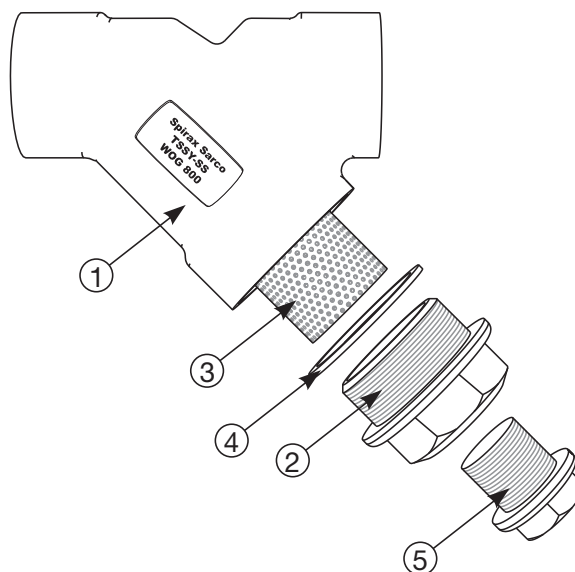
SS - ASTM A351 GR. CF8M

WOG (Non-shock): 720 PSI @ 100 °F

Saturated Steam: 300 PSI @ 420 °F

Maximum Liquid: 350 PSI @ 1000 °F

<sup>1</sup> The above listed temperatures are theoretical and may vary during actual operating conditions.

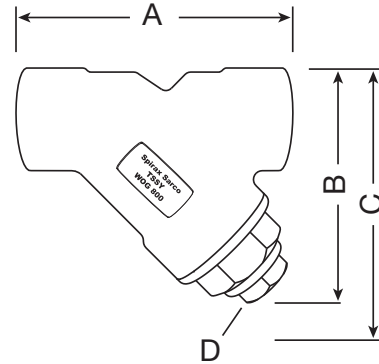


# Stainless Steel Strainers

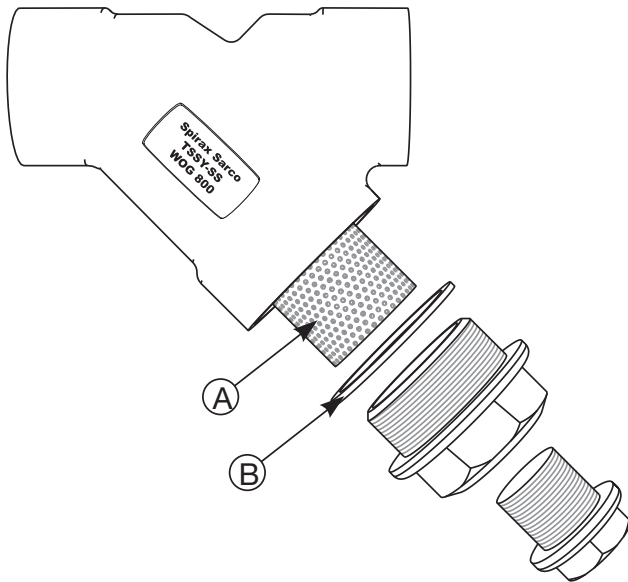
## TSSY

### Dimensions

Size	in	1/2	3/4	1	1 1/4	1 1/2	2
	mm	15	20	25	32	40	50
A DIMENSION FACE TO FACE (NPT) (2)	in	2.55	3.14	3.54	4.13	4.72	5.25
	mm	65	80	90	105	120	133
A DIMENSION FACE TO FACE (SW) (2)	in	2.55	3.14	3.54	4.13	4.72	5.51
	mm	65	80	90	105	120	140
B DIMENSION CENTER LINE TO BOTTOM (NPT)	in	2.00	2.36	2.83	3.03	3.42	4.06
	mm	51	60	72	77	87	103
B DIMENSION CENTER LINE TO BOTTOM (SW)	in	2.00	2.36	2.83	3.03	3.42	4.05
	mm	51	60	72	77	87	103
C DIMENSION SCREEN REMOVAL	in	2.50	3.25	3.75	4.25	4.75	5.50
	mm	64	83	95	108	120	140
D DIMENSION NPT PLUG (BLOW OFF)	in	1/4	3/8	3/8	3/4	3/4	1
	mm	8	10	10	20	20	25
APPROXIMATE ASSEMBLED WEIGHT	lb	0.5	1.0	1.5	2.0	2.5	4.0
	kg	0.2	0.5	0.7	0.9	1.1	1.8



### Spare Parts



Strainer Screen

A

Cap Gasket

B

### Installation

The strainer should be installed with the flow direction as indicated on the body, in a vertical down or horizontal pipeline. The strainer must be accessible for periodic removal of accumulated debris, by either blowing down or removal and cleaning of the screen.

## Fig 16HP Stainless Steel Strainer

### Description

The Fig 16HP is a stainless steel Y-type strainer designed to remove scale, rust and other debris from the pipeline.

The standard stainless steel screen is 1/32" (0.8 mm) perforations.

### Standards

This product fully complies with the requirements of the European Pressure Equipment Directive 97/23/EC.

### Certification

The product is available with a manufacturer's Typical Test Report for the body and cap as standard and EN 10204 3.1 to special order at extra cost.

**Note:** All certification/inspection requirements must be stated at the time of order placement.

### Sizes and pipe connections

1/4", 3/8", 1/2", 3/4", 1", 1 1/4" 1 1/2" and 2"

Screwed NPT

Socket weld ends to BS 3799 Class 3000 lb

### Optional extras

#### Strainer screens

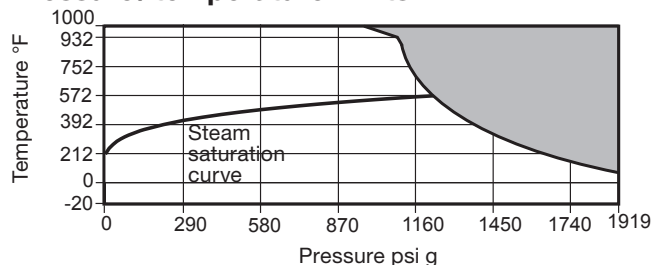
<b>Stainless steel screen</b>	Perforations	1/16"(1.6 mm) and 1/8"(3.0mm)
	Mesh	40, 100 and 200
<b>Monel screen</b>	Perforations	1/32"(0.8 mm) and 1/8"(3.0 mm)
	Mesh	100

#### Blowdown valve connections

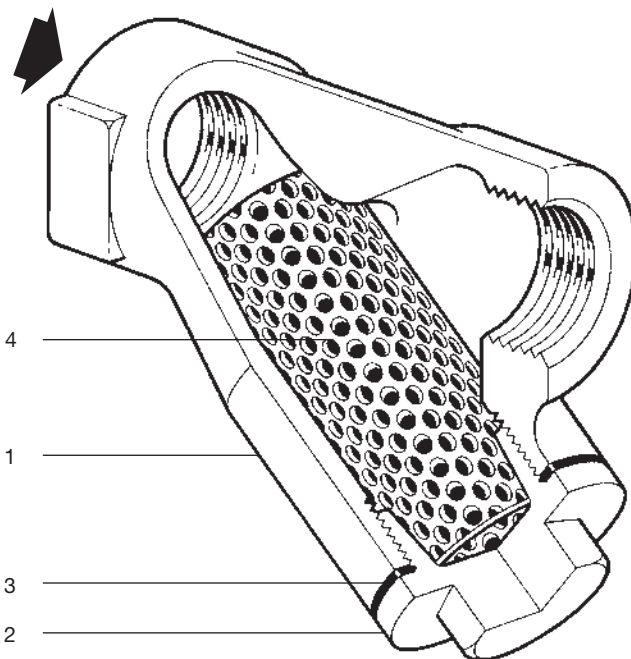
The cap is drilled to the following sizes to enable a blowdown valve to be fitted.

Strainer size	Blowdown valve
1/4", 3/8" and 1/2"	1/4"
3/4" and 1"	1/2"
1 1/4" and 1 1/2"	1"
2"	1 1/4"

### Pressure/temperature limits



 The product **must not** be used in this region.



### Materials

No.	Part	Material
1	Body	1/4" to 1/2" Stainless steel A182 F316L / 1.4404
		3/4" to 2" Stainless steel ASTM A351 CF8M / 1.4408
2	Cap	Stainless steel ASTM A351 CF8M / 1.4408
3	Cap gasket	Reinforced exfoliated graphite
4	Strainer screen	Stainless steel A240 316L

Body design conditions		ASME Class 800
PMA	Maximum allowable pressure	1,919 psi g @ 100°F
TMA	Maximum allowable temperature	1,000°F @ 968 psi g
Minimum allowable temperature		-20°F
PMO	Maximum operating pressure	1,919 psi g @ 100°F
TMO	Maximum operating temperature	1,000°F @ 968 psi g
Minimum operating temperature		-20°F
<b>Note:</b> For lower operating temperatures consult Spirax Sarco		
Designed for a maximum cold hydraulic test pressure of 2,900 psi g		

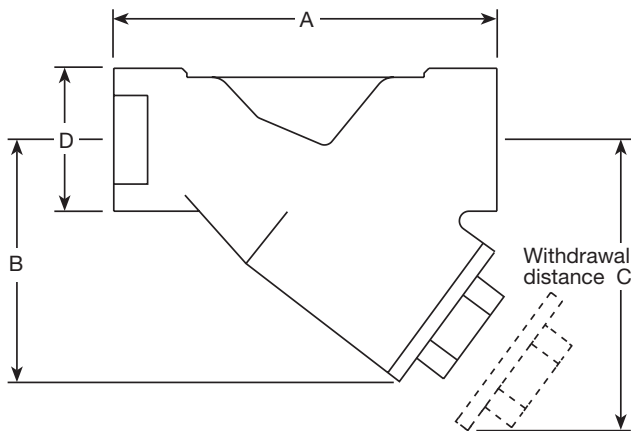
# Fig 16HP Stainless Steel Strainer

## Cv values

Size	1/4"	3/8"	1/2"	3/4"	1"	1 1/4"	1 1/2"	2"
Perforations 1/32", 1/16" 1/8"	1.2	3.0	4.2	12.7	17.9	30	47.3	78.6
Mesh 40 and 100	1.2	3.0	4.2	12.7	17.9	30	47.3	78.6
Mesh 200	1.2	3.0	3.0	10.4	15.0	24.2	40.5	63.6

## Dimensions/weights (approximate) in inches and lb

Size	A	B	C	D	Screening area cm <sup>2</sup>	Weight
1/4"	3	2	3	1	27	1.0
3/8"	3	2	3	1	27	1.2
1/2"	3	2	3	1	27	1.2
3/4"	4	3	4	1	43	1.6
1"	4	3	5	2	73	2.6
1 1/4"	6	4	6	2	135	5.1
1 1/2"	6	5	7	3	164	7.3
2"	7	5	9	3	251	10.9



## Safety information, installation and maintenance

For full details see the Installation and Maintenance Instructions (IM-S60-17) supplied with the product.

### Warning:

The strainer cap gasket contains a thin stainless steel support ring, which may cause physical injury if not handled and disposed of carefully.

### Disposal

The product is recyclable. No ecological hazard is anticipated with disposal of this product, providing due care is taken.

## How to order

**Example:** 1 off Spirax Sarco 1 1/2" Fig 16HP strainer having screwed NPT connections with a stainless steel screen having 1/32" (0.8 mm) perforations.

## Spare parts

The spare parts available are shown in solid outline. Parts drawn in broken line are not supplied as spares.

### Available spares

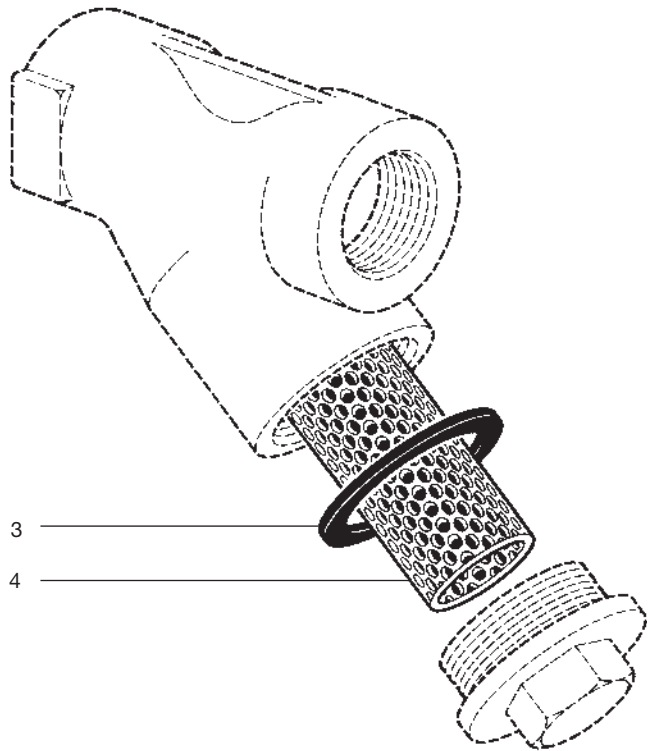
Strainer screen (state material, perforations or mesh and size of strainer)	4
Cap gasket (packet of 3)	3

### How to order spares



Always order spares by using the description given in the column headed 'Available spares' and state the size and type of strainer and perforation or mesh required.

**Example:** 1 off Stainless steel strainer screen having 1/32" (0.8 mm) perforations for a 3/4" Spirax Sarco Fig 16HP strainer.

**Note:** When replacing the strainer cap coat the thread only with anti-seize compound, making sure none gets on the gasket or gasket faces.



## Recommended tightening torques

Item	Size	  mm	FT LBF
2	1/4", 3/8", and 1/2"	22 A/F	37 - 41
	3/4"	27 A/F	44 - 49
	1"	32 A/F	73 - 81
	1 1/4"	46 A/F	73 - 148
	1 1/2"	50 A/F	169 - 191
	2"	60 A/F	243 - 265

TI-P169-08-US 3.14



# spirax sarco

## Cast Iron Strainers CI-125, F-125

Type	CI-125		F-125	
Sizes	2" to 4"	6" to 8"	10" & 12"	14" & 18"
Connections	ANSI 125			
Construction	Cast Iron			
Max Saturated Steam Pressure	147 psig	125 psig		100 psig
Standard Screen	20 Mesh	4" to 8" 1/8" perf	10" to 18" 1/8" perf	
Options	60/100 mesh	100 Mesh 4" to 6" 3/64" perf 8" to 18" 1/16" perf		
	Steel or Brass Plug			

Note: Conforms to WW-S-2739 when equipped with an optional bronze plug in the blow-off connection.

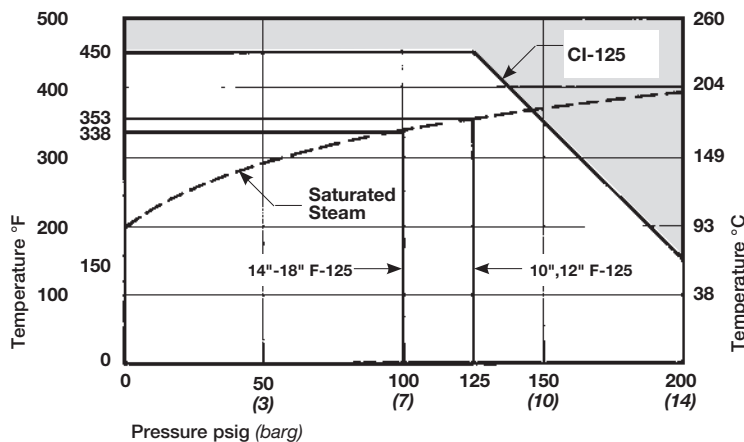
### C<sub>v</sub> Values

Size	C <sub>v</sub>
2"	70
2-1/2"	110
3"	165
4"	280
5"	450
6"	650
8"	1100
10"	1650
12"	2400
14"	3500
16"	5400
18"	6300

For water:  

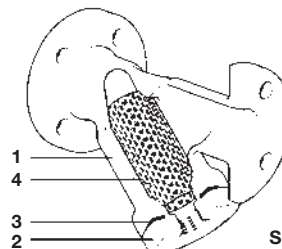
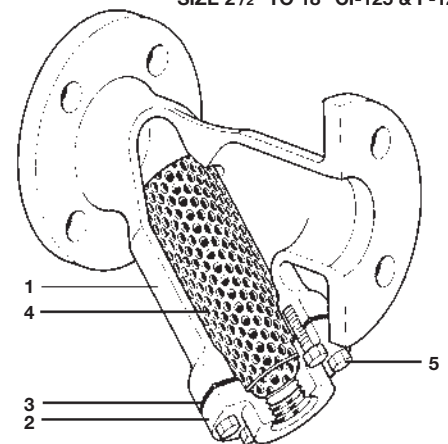
$$\text{Pressure Drop} = \frac{(\text{GPM})^2}{(\text{Cv})^2}$$
 Consult factory for other liquids.  
 See TI-7-429-US for pressure drops on steam, air and other gases.

### Limiting Operating Conditions (non-shock)



BLOWDOWN  
OFFSET ON  
SIZES 4" - 8"

SIZE 2-1/2" TO 18" CI-125 & F-125



SIZE 2" CI-125

### Construction Materials

No.	Part	Material
1	Body	Cast Iron ASTM A126 CLB
2	Cap/Bushing	Cast Iron ASTM A126 CLB
3	Cap Gasket	*Graphite
4	Strainer Screen	Stainless Steel
5	Cap Screws	Steel

\*2" - Copper Jacketed Gasket with Non-Asbestos Filler

### Pressure Shell Design Conditions

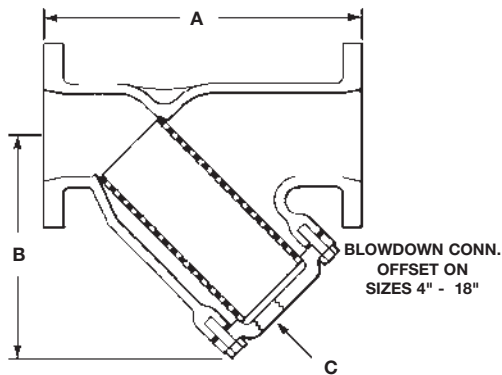
Max. allowable pressure	CI-125: 200 psig/-20-150°F 10",12" F-125: 125 psig/-20-353°F 14",18" F-125: 100 psig/-20-338°F	14 barg/-29-66°C 9 barg/-29-178°C 7 barg/-29-170°C
Max. allowable temperature	CI-125: 450°F/0-125 psig 10",12" F-125: 353°F/0-125 psig 14",18" F-125: 338°F/0-100 psig	232°C/0-9 barg 178°C/0-9 barg 170°C/0-7 barg

Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only.  
 In the interests of development and improvement of the product, we reserve the right to change the specification.

TI-7-415-US 3.14

# Cast Iron Strainers

## CI-125, F-125



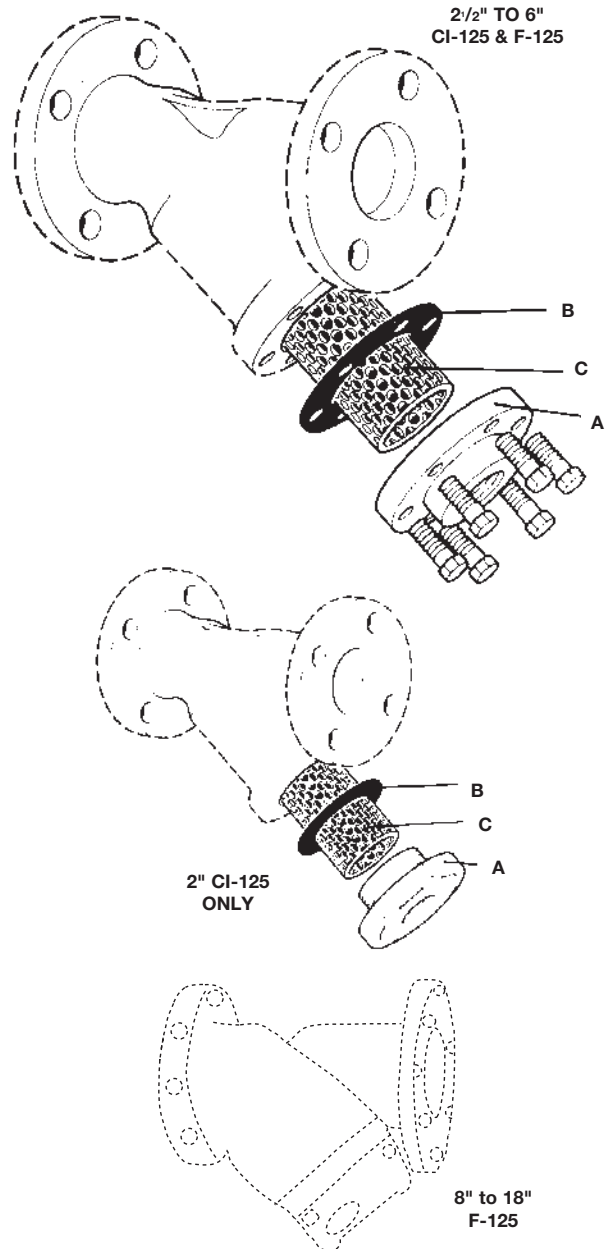
**Dimensions**  
(nominal) in inches and millimeters

Size CI-125	A	B	C (NPT)	Weight
2"	8.7 222	5.7 146	1"	17 lb 7.7 kg
2-1/2"	10.5 267	6.7 171	1-1/4"	29 lb 13 kg
3"	12.0 305	7.6 194	1-1/4"	44 lb 20 kg
4"	14.9 378	10.6 270	1-1/4"	82 lb 37 kg
5"	17.2 438	12.9 327	1-1/2"	115 lb 52 kg
6"	20.0 508	15.4 391	1-1/2"	160 lb 73 kg
8"	21.6 549	15.5 394	2"	247 lb 112 kg
<b>F-125</b>				
10"	25.8 654	18.5 470	2"	381 lb 173 kg
12"	29.9 759	21.8 553	2"	623 lb 282 kg
14"	33.3 845	25 635	2"	818 lb 371 kg
16"	38.8 984	26.5 673	2"	1421 lb 643 kg
18"	43.1 1096	31 788	2"	1582 lb 717 kg

### Installation

The strainer should be installed with the flow direction as indicated on the body, in a vertical down or horizontal pipeline. The strainer must be accessible for periodic removal of accumulated debris, by either blowing down or removal and cleaning of the screen.

### Spare Parts



Screen	C
(state material, perforations or mesh & size of strainer)	
Cap Gasket	B
Blowoff Bushing, 2"	A
Cap	A

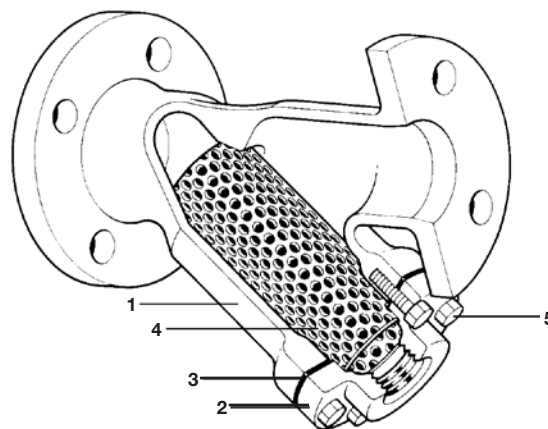
Note: Please provide date code when placing order for spare parts. Contact Technical Support for assistance if needed.

TI-7-415-US 3.14

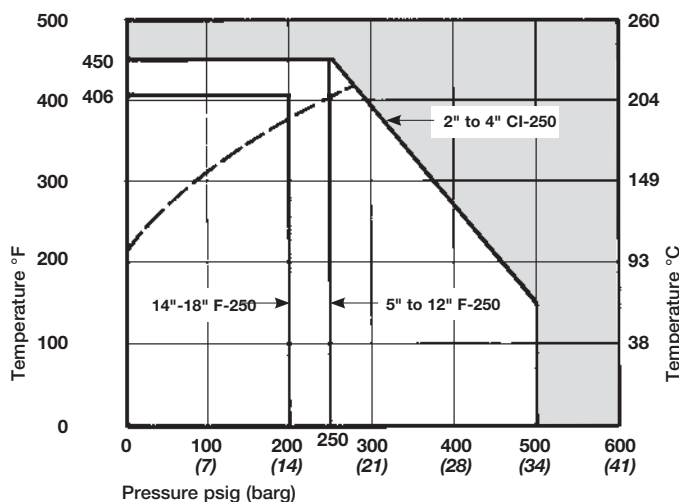
# spirax/sarco

## Cast Iron Strainers CI-250, F-250

Type	CI-250			F-250	
Sizes	2"	2-1/2" & 3"	4"	5" to 12"	14" to 18"
Connections	ANSI 250				
Construction	Cast Iron				
Max Saturated Steam Pressure	280 psig		250 psig		200 psig
Standard Screen	1/32"	20 Mesh	4" to 18" 1/8" perf		
Optional	100 mesh	60/100	4" to 18" 3/64" perf		



### Limiting Operating Conditions (non-shock)



### C<sub>v</sub> Values

Size	C <sub>v</sub>
2"	70
2-1/2"	110
3"	165
4"	280
5"	450
6"	650
8"	1100
10"	1650
12"	2400
14"	3500
16"	5400
18"	Consult factory

For water:  

$$\text{Pressure Drop} = \frac{(\text{GPM})^2}{(\text{Cv})^2}$$

Consult factory for other liquids.

See TI-7-429-US for pressure drops on steam, air and other gases.

### Pressure Shell Design Conditions

Max. allowable pressure	CI-250: 500 psig/-20-150°F	34 barg/-29-66°C
	5"-12" F-250: 250 psig/-20-450°F	17 barg/-29-208°C
	14"-18" F-250: 200 psig/-20-406°F	14 barg/-29-208°C

Max. allowable temperature	CI-250: 450°F/0-250 psig	232°C/0-17 barg
	5"-12" F-250: 450°F/0-250 psig	208°C/0-17 barg
	14"-18" F-250: 406°F/0-200 psig	208°C/0-14 barg

### Construction Materials

No.	Part	Material
1	Body	Cast Iron ASTM A 126 CL B
2	Cap	Cast Iron ASTM A 126 CL B
3	Cap Gasket	Graphite
4	Strainer Screen	Stainless Steel Type 304
5	Cap Screws	Steel

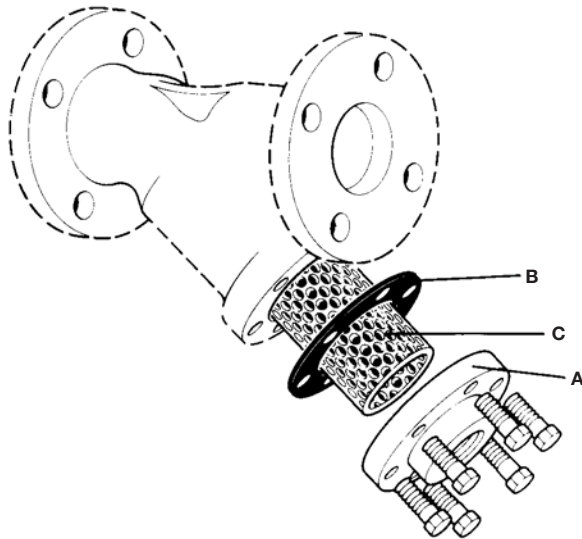
Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only.  
 In the interests of development and improvement of the product, we reserve the right to change the specification.

TI-7-417-US 3.14

# Cast Iron Strainers

## CI-250, F-250

### Spare Parts



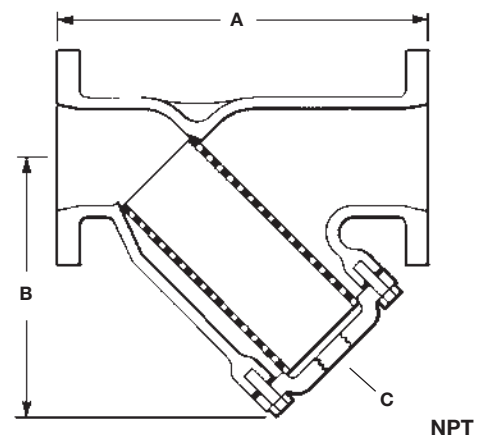
Screen	C
(state material, perforations or mesh & size of strainer)	
Cap Gasket	B
Cap	A

Note: Please provide date code when placing order for spare parts. Contact Technical Support for assistance if needed.

### Installation

The strainer should be installed with the flow direction as indicated on the body, in a vertical down or horizontal pipeline.

The strainer must be accessible for periodic removal of accumulated debris, by either blowing down or removal and cleaning of the screen.



### Dimensions

(nominal) in inches and millimeters

Size	A	B	C (NPT)	Weight
<b>CI-250</b>				
2"	11.6 295	6.34 161	1-1/4"	30 lb 13.6 kg
2-1/2"	13.0 330	7.13 181	1-1/4"	44 lb 20 kg
3"	14.0 356	8.0 203	1-1/4"	60 lb 27 kg
4"	17.06 433	11.25 286	1-1/4"	117 lb 53 kg
<b>F-250/CI-250 to 8"</b>				
5"	18.3 464	12.9 329	2"	146 lb 66 kg
6"	20.2 512	14.5 368	2"	194 lb 88 kg
8"	23.4 594	16.4 410	2"	316 lb 143 kg
10"	27.4 696	19.0 483	2"	475 lb 215 kg
12"	32.0 813	22.0 559	2"	750 lb 341 kg
14"	38.8 984	28.8 730	2"	908 lb 412 kg
16"	44.1 1128	29.6 752	2"	1135lb 515 kg
18"	47.8 1213	34.7 881	2-1/2"	2400 lb 1090 kg

TI-7-417-US 3.14

## Fig. 34 Carbon Steel Strainer - ASTM Material

Type	Fig. 34 Carbon Steel Strainer			
Sizes	1/2", 3/4", 1", 1 1/2", 2", 3"	4", 6", 8"	1/2", 3/4", 1", 1 1/2", 2", 3"	4", 6", 8"
Connections	ANSI 150		ANSI 300	
Maximum saturated steam pressure	190 psig		435 psig	
Standard screen (stainless steel)	1/32"	1/8"	1/32"	1/8"
Optional screen	100 mesh			

### Description

The Fig 34 is an integrally flanged Y-type strainer designed to remove rust, scale and other debris from the pipeline. It is produced from carbon steel, ASTM material.

### Standards

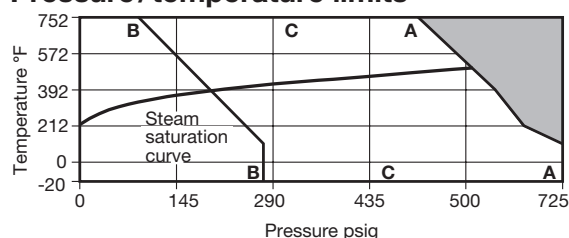
This product fully complies with the requirements of the European Pressure Equipment Directive 97/23/EC.

### Certification

The product is available with material certification to EN 10204 2.2 as standard and EN 10204 3.1.B for body and cap by order.

**Note:** All certification/inspection requirements must be stated at the time of order placement.

### Pressure/temperature limits



This product **must not** be used in this region.

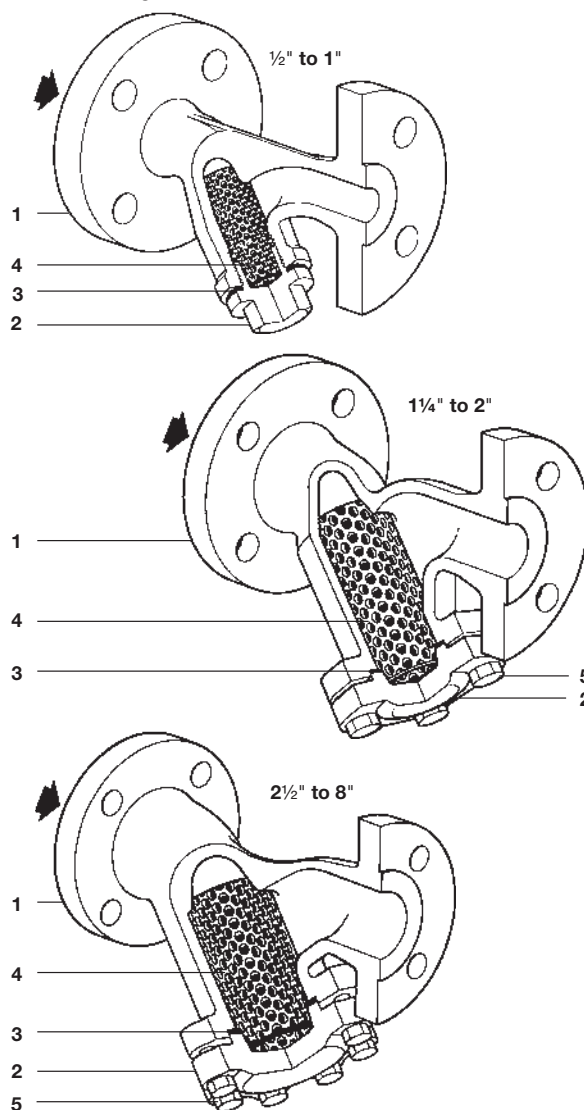
Body design conditions		ANSI 300
PMA	Maximum allowable pressure	725 psig @ 99.8°F
TMA	Maximum allowable temperature	749.8°F @ 504 psig
Minimum allowable temperature		-20°F
PMO	Maximum operating pressure	725 psig @ 99.8°F
TMO	Maximum operating temperature	749.8°F @ 504 psig
Minimum operating temperature		-20°F

**Note:** For lower operating temperatures consult Spirax Sarco.

Designed for a maximum cold hydraulic test pressure of 78 bar g

### Sizes and pipe connections

Standard flange ANSI Class 150 and 300



### Materials

No.	Part	Material	
1	Body	Carbon steel	ASTM A216 WCB
2	Cap	1/2" to 2"	Forged steel A105N
		2 1/2" to 8"	Carbon steel ASTM A216 WCB
3	Cap gasket	Reinforced exfoliated graphite	
4	Strainer screen	Stainless steel	ASTM A240 316L
5	Bolts	Carbon steel	ASTM A193 B7

Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only.

In the interests of development and improvement of the product, we reserve the right to change the specification.

TI-7-409-US 2.16

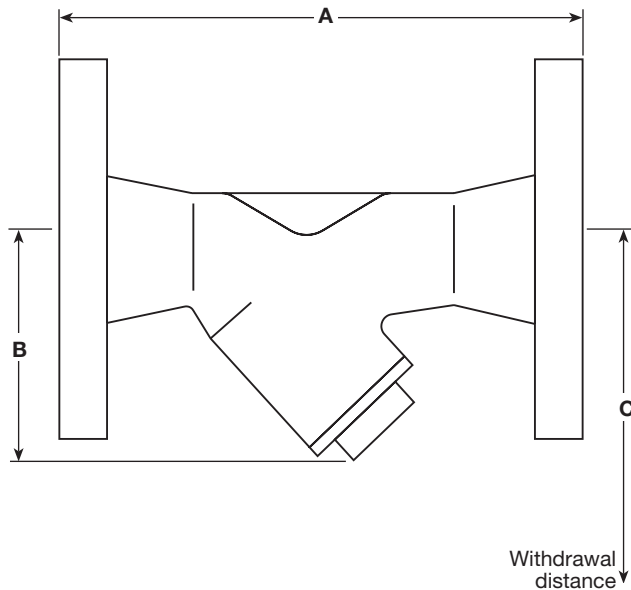
# Fig. 34 Carbon Steel Strainer - ASTM Material

## C<sub>V</sub> values

Size	1/2"	3/4"	1"	1 1/2"	2"	2 1/2"	3"	4"	6"	8"
Perforations 1/32" (0.8 mm), 1/16" (1.6 mm), and 1/8" (3.0 mm)	6	9	15	34	53	83	119	179	393	680
Mesh 100	6	9	15	34	53	83	119	179	393	680

## Dimensions / weights (approximate) in inches and lbs

Size	ANSI		Screening				Weight
	150	300	A	B	C	Blowdown area cm <sup>2</sup>	
1/2"	5	5	3	4	1/4"	27	4.6
3/4"	6	6	3	5	1/2"	43	6.4
1"	6	6	4	6	1/2"	73	8.4
1 1/2"	8	8	6	10	3/4"	164	18.8
2"	9	9	7	13	3/4"	251	23.1
2 1/2"	11	11	8	13	3/4"	327	38.5
3"	12	12	8	13	1"	361	52.8
4"	14	14	10	16	1 1/2"	545	66.0
6"	19	19	14	22	2"	1 117	149.6
8"	23	24	17	28	2"	1 909	281.6



## Safety information, installation and maintenance

For full details see the Installation and Maintenance Instructions (IM-S60-18) supplied with the product.

### Installation note:

The strainer should be installed in the direction of flow, as indicated on the body. On applications involving steam or gases the pocket should be in the horizontal plane. On liquid systems the pocket should point downwards.

### Warning:

The strainer cap gasket contains a thin stainless steel support ring, which may cause physical injury if not handled and disposed of carefully.

### Disposal

The product is recyclable. No ecological hazard is anticipated with disposal of this product, providing due care is taken.

## How to order

**Example:** 1 off Spirax Sarco 1 1/2" Fig 34 strainer having flanged ANSI 300 connections with stainless steel screen having 1/32" (0.8 mm) perforations.

## Spare parts

The spare parts available are shown in solid outline. Parts drawn in broken line are not supplied as spares.

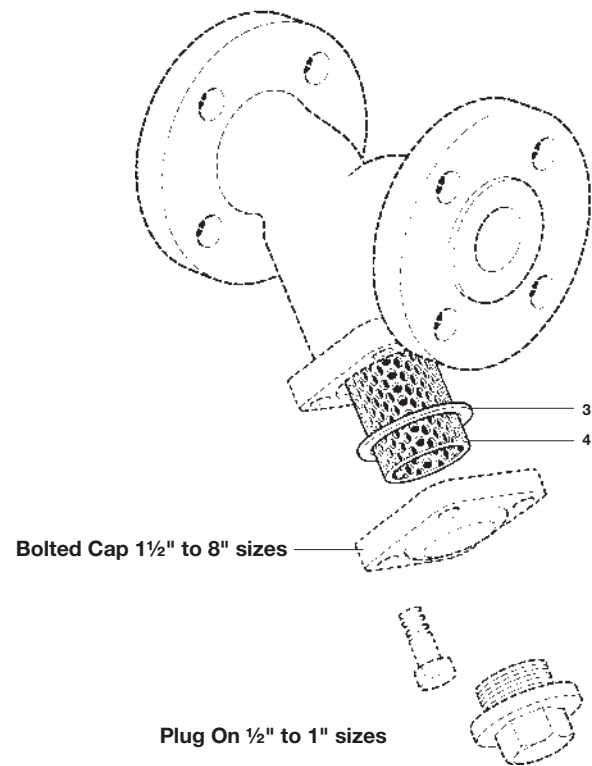
### Available spares

Strainer screen (state material, perforations or mesh and size of strainer)	4
Cap gasket (packet of 3)	3



### How to order spares

Always order spares by using the description given in the column headed 'Available spares' and state the size and type of strainer and perforation or mesh required.

**Example:** 1 off Strainer screen, stainless steel having 1/32" (0.8 mm) perforations for a 1/2" Spirax Sarco Fig 34 strainer having ANSI 300 connections.



## Recommended tightening torques

Item	Size	Qty	 or  mm	ft - lb	
2	1/2"	1	22	37 - 40	
	3/4"	1	27	44 - 48	
	1"	1	27	74 - 81	
5	1 1/4" to 2 1/2"	4	19	M12 x 30	15 - 18
	3"	4	19	M12 x 35	22 - 26
	4"	8	24	M16 x 45	37 - 41
	6"	8	30	M20 x 55	59 - 65
	8"	12	36	M24 x 65	89 - 96

TI-7-409-US 2.16



# spirax sarco

## Fig 18HP Alloy Steel Strainer

### Description

The Fig 18HP is an alloy steel butt weld Y-type strainer with flanged screen cover that has been designed in accordance with ASME B16.34:2004 and ASME VIII. The standard stainless steel screen in the ½" to 2" size range has 1/32" (0.8 mm) perforations – See 'Optional extras' for alternative perforations/mesh sizes and screen materials. If required, the strainer cover can be drilled and tapped for blowdown and drain valves.

### Standards

This product fully complies with the requirements of the European Pressure Equipment Directive 97/23/EC and carries the **CE** mark when so required.

### Certification

This product is available with certification to EN 10204 3.1 and NACE Approval.

**Note:** All certification/inspection requirements must be stated at the time of order placement.

### Sizes and pipe connections

½", ¾", 1", 1¼", 1½", 2"

NPT (ASME B 1.20.1)

Socket weld ASME B 16.11

Butt weld ASME B16.25 Schedule 160, Schedule 80 and Schedule 40

### Optional extras

The following optional extras are available for all unit sizes at an extra cost and must be stated at the time of order placement:

1/32" (standard), 3/64", 1/16", 1/8", and 1/4"

**Perforations:** Contact Spirax Sarco for availability of perforations not displayed.

M20, M40, M60, M100, M200 and M400

**Mesh:** Contact Spirax Sarco for availability of mesh screens not displayed.

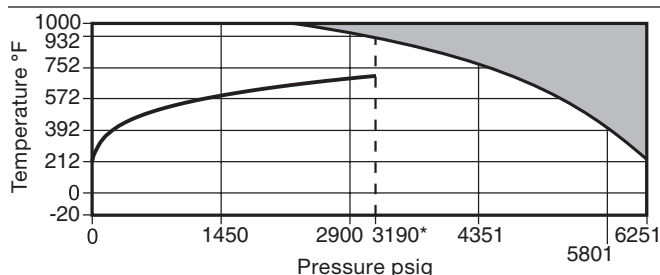
**Screen material:** AISI 316, AISI 316L (standard), AISI 304, AISI 304L and Monel

### Blowdown connection

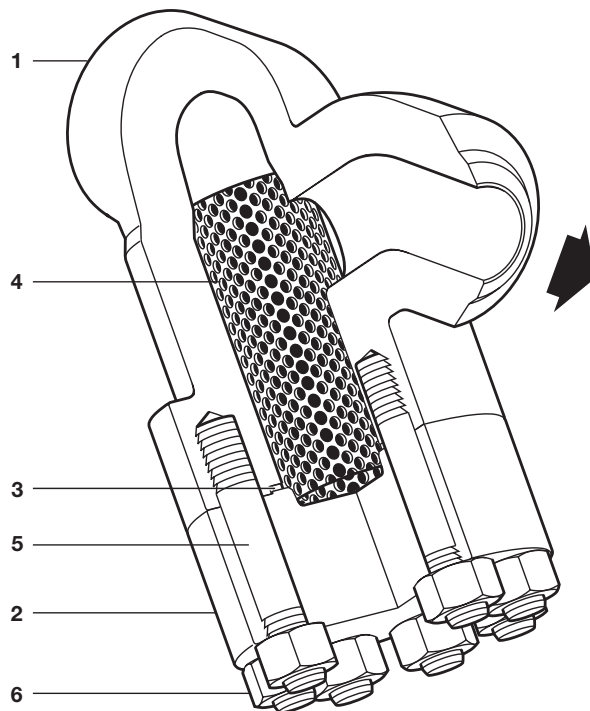
The cover is drilled to the following sizes to enable a blowdown valve to be fitted.

Strainer size	Blowdown valve
½" - 1"	½"
1¼" - 2"	1¼"

### Pressure / temperature limits



The product **must not** be used in this region.



### Materials

No.	Body	Material	
1	Body	Alloy steel	EN 10213: 1.7379 and ASTM A217 WC9
2	Cover	Alloy steel	EN 10213: 1.7379 and ASTM A217 WC9
3	Cover gasket	Stainless steel + Graphite	
4	Strainer screen	Stainless steel	AISI 316L
5	Cover studs	Alloy steel	ASTM A193 Gr. B16
6	Cover nuts	Alloy steel	ASTM A194 Gr. 7

Body design conditions ASME 2500

PMA Maximum allowable pressure 6251 psig @ 100°F

TMA Maximum allowable temperature 1000°F @ 2233 psig

Minimum allowable temperature -20°F

PMO Maximum operating pressure for saturated steam service 3190 psig @ 705°F

TMO Maximum operating temperature 1000°F @ 2233 psig

Minimum operating temperature -20°F

**Note:** For lower operating temperatures consult Spirax Sarco  
Designed for a maximum cold hydraulic test pressure of 9369 psig

Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only.

In the interests of development and improvement of the product, we reserve the right to change the specification.

TI-P162-03-US 3.14



# Fig 18HP Alloy Steel Strainer

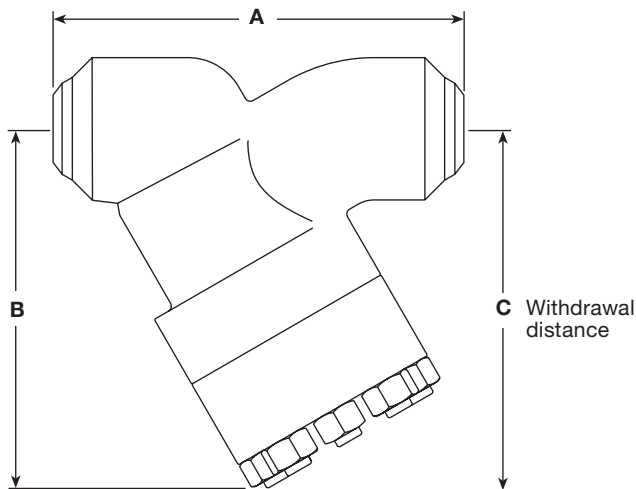
## C<sub>V</sub> values

Size	½"	¾"	1"	1¼"	1½"	2"
<b>perforations</b> 1/32", 1/16", and 1/8"	4.3	6.8	11.1	18.9	24.9	39.5
<b>Mesh M200</b>	3.4	5.1	8.6	14.6	19.8	31.9

**Please consult** Spirax Sarco for the C<sub>V</sub> values of the following screens: 1 mm, 6 mm, M20, M40, M60, M100 and M400.

## Dimensions / weights (approximate) inches and lb

Size	A	B	C	Weight	Volume (L)	Screening area (cm <sup>2</sup> )
½"	7.0	5.9	7.7	19	0.130	73 cm <sup>2</sup>
¾"				19.3	0.140	
1"				19.5	0.145	
1¼"	11.0	9.4	12.1	63	0.850	251 cm <sup>2</sup>
1½"				63.5	0.850	
2"				63.9	0.850	



## Safety information, installation and maintenance

For full details see the Installation and Maintenance Instructions (IM-P162-04) supplied with the product.

### Warning:

The strainer cover gasket contains a thin stainless steel support ring, which may cause physical injury if not handled and disposed of carefully.

### Installation note:

The strainer should be installed in the direction of flow, as indicated on the body. On applications involving steam or gases the pocket should be in horizontal plane. On liquid systems pocket should be point downwards.

### Disposal

This product is recyclable. No ecological hazard is anticipated with the disposal of this product, provided due care is taken.

## How to order

**Example:** 1 off Spirax Sarco ½" Fig 18HP strainer having the standard stainless steel screen with 1/32" (0.8 mm) perforations and Schedule 160 butt weld connections.

## Spare parts

The spare parts available are shown in solid outline. Parts drawn in broken line are not supplied as spares.

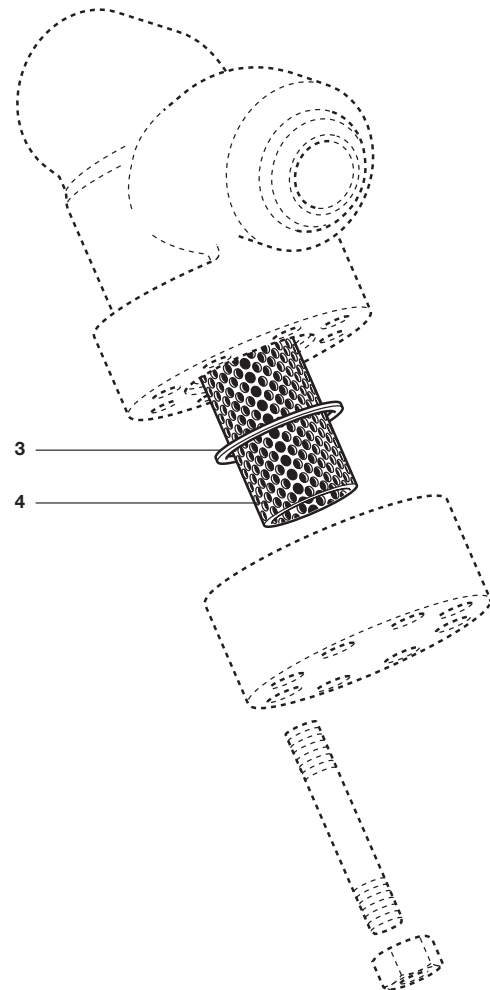
### Available spares

Spares kit 1	Strainer screen and Cover gasket (state material, perforations or mesh and size of strainer)	4 and 3
Spares kit 2	Cover gasket (set of 3)	3

### How to order spares

Always order spares by using the description given in the column headed 'Available spares' and state the spares kit required plus the size and type of strainer and perforations or mesh required for the screen.

**Example:** 1 off Spares kit 1 for a 2" Spirax Sarco Fig 18HP strainer having butt weld connections. The strainer screen is to be stainless steel with 1/16" (1.6 mm) perforations.



## Recommended tightening torques - Items 5 and 6

Sizes	Qty	mm	FT - LBF
½" - 1"	4	1¼" ¾" - 10 UNC	103 - 110
1¼" - 2"	8	1¼" ¾" - 10 UNC	88 - 95

TI-P162-03-US 3.14



## Fig 34HP Carbon Steel Strainer

### Description

The Fig 34HP is a cast carbon steel Y-type strainer that has been designed in accordance with ASME B16.34:2004 and ASME VIII, that is readily available with integrally flanged or butt weld connections. The standard stainless steel screen in the ½" to 3" size range has 0.8 mm perforations, and 1.6 mm perforations in the 4" to 8" size range - See 'Optional extras' for alternative perforations / mesh sizes and screen materials. If required, the strainer cover can be drilled and tapped for blowdown and drain valves.

### Standards

This product fully complies with the requirements of the European Pressure Equipment Directive 97/23/EC and carries the CE mark when so required.

### Certification

This product is available with certification to EN 10204 3.1 and NACE Approval.

**Note:** All certification / inspection requirements must be stated at the time of order placement.

### Sizes and pipe connections

#### Flanged:

ASME (ANSI) B16.5 Class 600 and ASME (ANSI) 600 RTJ - ½", ¾", 1", 1½", 2", 2½", 3", 4", 6" and 8"

**Screwed:** NPT - ½", ¾", 1", 1½" and 2"

#### Socket weld:

ASME (ANSI) B16.11 Class 3000 - ½", ¾", 1", 1½" and 2"

#### Butt weld:

ASME (ANSI) B16.25 Schedule 40 and Schedule 80 - ½", ¾", 1", 1½", 2", 2½", 3", 4", 6" and 8"

### Optional extras

The following optional extras are available for all unit sizes at an extra cost and must be stated at the time of order placement:

**Perforations:** 0.8 mm (standard), 1 mm, 1.6 mm, 3 mm and 6 mm  
Contact Spirax Sarco for availability of perforations not displayed.

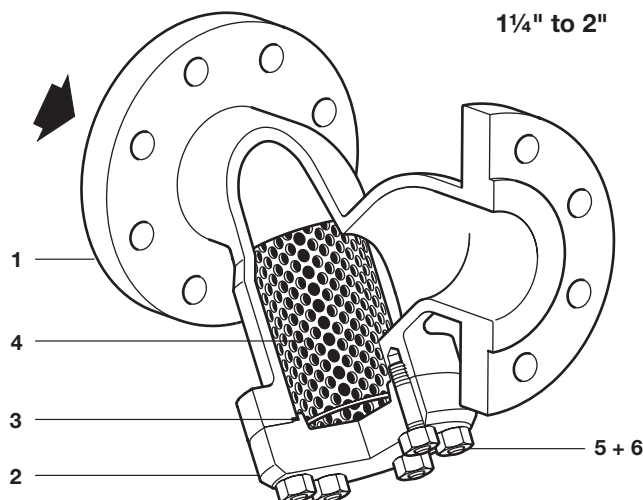
**Mesh:** M20, M40, M60, M100, M200 and M400  
Contact Spirax Sarco for availability of mesh screens not displayed.

**Screen material:** AISI 316, AISI 316L (standard), AISI 304, AISI 304L and Monel

### Blowdown valve connection

The cover is drilled to the following sizes to enable a blowdown valve to be fitted.

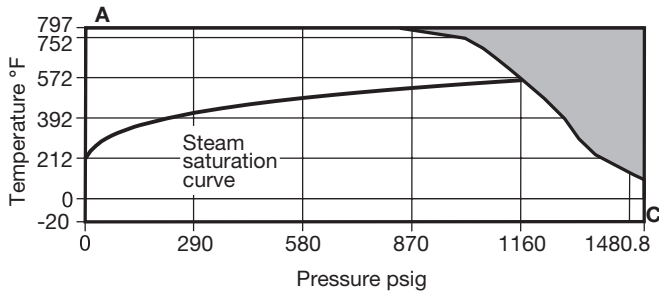
Strainer size	Blowdown valve
½"	¼"
¾" and 1"	½"
1½"	1"
2" to 4"	1¼"
6" to 8"	2"



### Materials

No. Part	Material
1 Body	Carbon steel EN 10213 10619+N and ASTM A216 WCB
2 Cover	Carbon steel EN10213 1.0619+N and ASTM A216 WCB
3 Cover gasket	Stainless steel + Graphite Spiral wound
4 Strainer screen	Stainless steel AISI 316L
5 Cover stud	Carbon steel ASTM A193 Gr. B7
6 Cover nut	Carbon steel ASTM A194 Gr. 2H

## Pressure / temperature limits



The product **must not** be used in this region.

**A - C** Flanged ASME (ANSI) B16.5 Class 600, ASME (ANSI) 600 RTJ, Screwed NPT, Socket weld ASME (ANSI) B16.11 Class 3000 and Butt weld ASME (ANSI) B16.25 Schedule 40 and 80.

**A - C**  
Flanged  
ASME 600 and 600 RTJ  
Screwed NPT  
Socket weld  
and  
Butt weld

Body design conditions		ASME 600
PMA	Maximum allowable pressure	1480.8 psig @ 100.4°F
TMA	Maximum allowable temperature	797°F @ 833.9 psig
Minimum allowable temperature		-20°F
PMO	Maximum operating pressure	1480.8 psig @ 100.4°F
TMO	Maximum operating temperature	797°F @ 833.9 psig
Minimum operating temperature		-20°F
<b>Note:</b> For lower operating temperatures consult Spirax Sarco.		
Designed for a maximum cold hydraulic test pressure of:		2219 psi g

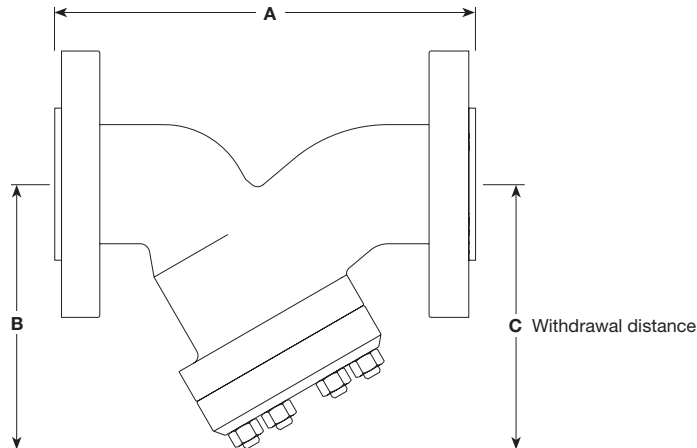
## C<sub>V</sub> values

Size	1/2"	3/4"	1"	1 1/2"	2"	2 1/2"	3"	4"	6"	8"
Perforations 0.8, 1.6 and 3 mm	5	9	15	33	53	83	119	179	393	680
Mesh M40 and M100	5	9	15	33	53	83	119	179	393	680
Mesh M200	4	7	11	26	43	67	96	143	310	536

Please consult Spirax Sarco for the C<sub>V</sub> values of the following screens: 1 mm, 6 mm, M20, M60 and M400.

## Dimensions / weights (approximate) inches and lbs

Size					Weights	
	A ASME 600	A Screwed Socket weld Butt weld	B	C	ASME 600	Screwed Socket weld Butt weld
1/2"	6.5	6.5	4.6	7.9	7.9	3.5
3/4"	7.5	7.5	4.6	7.9	10.1	4.0
1"	8.5	8.5	4.6	7.9	12.3	4.8
1 1/2"	9.5	9.5	7.6	13.0	26.8	15.8
2"	11.5	11.5	7.6	13.0	38.3	16.7
2 1/2"	13.0	13.0	8.7	13.4	74.8	35.6
3"	14.0	14.0	8.7	13.4	77.0	45.3
4"	17.0	17.0	11.0	18.0	132.0	70.2
6"	22.0	22.0	14.2	24.0	286.0	164.6
8"	26.0	26.0	17.9	30.5	488.4	315.7



TI-P168-01-US 3.14

## Safety information, installation and maintenance

For full details see the Installation and Maintenance Instructions (IM-S60-18) supplied with the product.

### Installation note:

The strainer should be installed in the direction of flow, as indicated on the body. On applications involving steam or gases the pocket should be in horizontal plane. On liquid systems the pocket should point downwards.

### Warning:

The strainer cover gasket contains a thin stainless steel support ring, which may cause physical injury if not handled and disposed of carefully.

### Disposal

This product is recyclable. No ecological hazard is anticipated with the disposal of this product, provided due care is taken.

## How to order

**Example:** 1 off Spirax Sarco 1½" Fig 34HP strainer having the standard stainless steel screen with 0.8 mm perforations and flanged ANSI 600 connections.

## Spare parts

The spare parts available are shown in solid outline. Parts drawn in broken line are not supplied as spares.

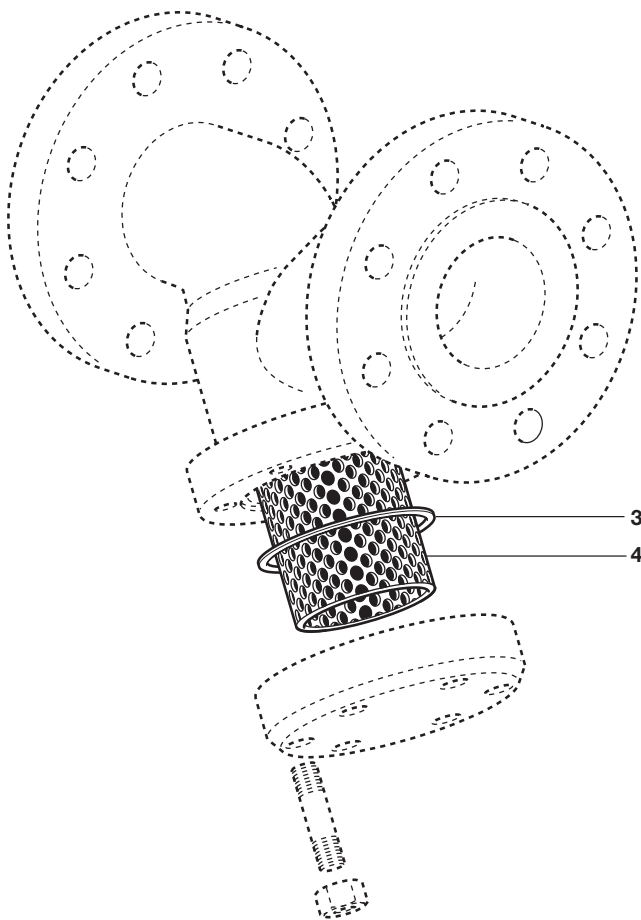
### Available spares

Cover gasket (packet of 3)		<b>3</b>
Strainer screen + Cover gasket	Strainer screen	<b>4</b>
	Cover gasket	<b>3</b>



### How to order spares

Always order spares by using the description given in the column headed 'Available spares' and state the size and type of strainer and perforation or mesh required.

**Example:** 1 - Strainer screen + Cover gasket. The strainer screen is to be stainless steel having 0.8 mm perforations for a 2" Spirax Sarco Fig 34HP strainer having ANSI 600 flanged connections.



## Recommended tightening torques - Items 5 and 6

Sizes	Qty	mm		ft - lb
			 or	
½" - 1"	4	7/16"	½" - 13 UNC	14.7 - 22.1
1½" - 2"	8	7/16"	½" - 13 UNC	22.1 - 29.5
2½" - 3"	8	1 1/16"	5/8" - 11 UNC	36.8 - 44.2
4"	8	1 ¼"	¾" - 10 UNC	59.0 - 66.3
6"	8	1 7/16"	7/8" - 9 UNC	73.7 - 81.1
8"	12	1 3/16"	1 ¼" - 7 UNC	132.7 - 140.1

TI-P168-01-US 3.14

## Fig 36 Austenitic Stainless Steel Strainer

### Description

The Fig 36 is an austenitic stainless steel integrally flanged Y-type strainer. The standard stainless steel screen in the 1/2" to 3" size range has 1/32" (0.8 mm) perforations, in the 4" to 8" size range it has 1/16" (1.6 mm) perforations. Other perforations, mesh sizes and monel screens are available as options. The strainer cap can be drilled and tapped for blowdown and drain valves if required.

### Standards

This product fully complies with the requirements of the European Pressure Equipment Directive 97/23/EC and carries the CE mark when so required.

### Certification

The product is available with a manufacturers' Typical Test Report as standard and EN 10204 3.1 for body and cap by special request.

**Note:** All certification/inspection requirements must be stated at the time of order placement.

### Optional extras

#### Strainer screens

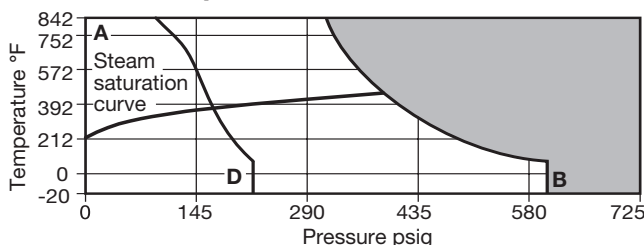
Stainless steel screens	Perforations	1/16" (1.6 mm) 1/2" to 3"
		1/8" (3.0 mm) 1/2" to 8"
	Mesh	40, 100, 200
Monel screens		1/32" (0.8 mm) 1/2" to 3"
	Perforations	1/16" (1.6 mm) 4" to 8"
		1/8" (3.0 mm) 1/2" to 8"
	Mesh	100

#### Standard blowdown valve connections.

The cap is drilled to the following sizes to enable a blowdown valve to be fitted. Threaded (NPT)

Strainer size	Blowdown valve
1/2"	1/4"
3/4" to 1"	1/2"
1 1/4" and 1 1/2"	1"
2" to 5"	1 1/4"
6" and 8"	2"

### Pressure/temperature limits



This product **must not** be used in this region.

A - B Flanged ANSI 300.

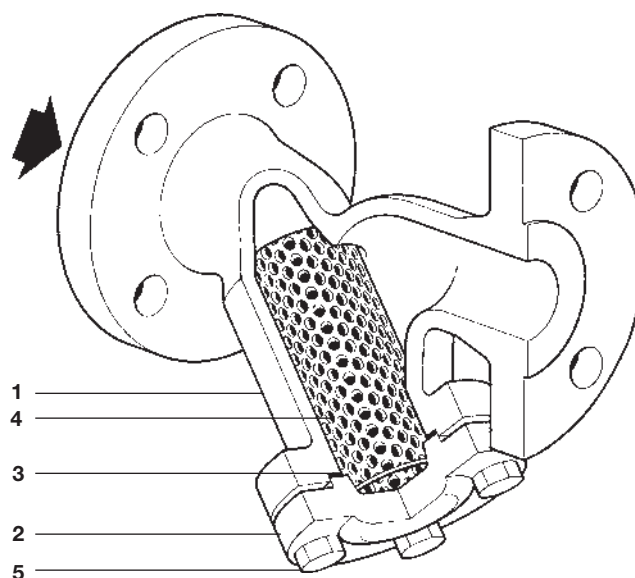
A - D Flanged ANSI 150.

Body design conditions		ANSI 300
PMA	Maximum allowable pressure	595 psig @ 100°F
TMA	Maximum allowable temperature	842°F @ 305 psig
Minimum allowable temperature		-20°F
		ANSI 150 232 psig
PMO	Maximum operating pressure	ANSI 300 595 psig
TMO	Maximum operating temperature	892°F @ 305 psig
Minimum operating temperature		-20°F
<b>Note:</b> For lower operating temperatures consult Spirax Sarco.		
Designed for a maximum cold hydraulic test pressure of 1102 psig		

### Sizes and pipe connections

Standard flange: 1/2", 3/4", 1", 1 1/4", 2", 2 1/2", 3", 4", 5", 6", and 8"

ANSI Class 150 and ANSI Class 300 (All sizes)



### Materials

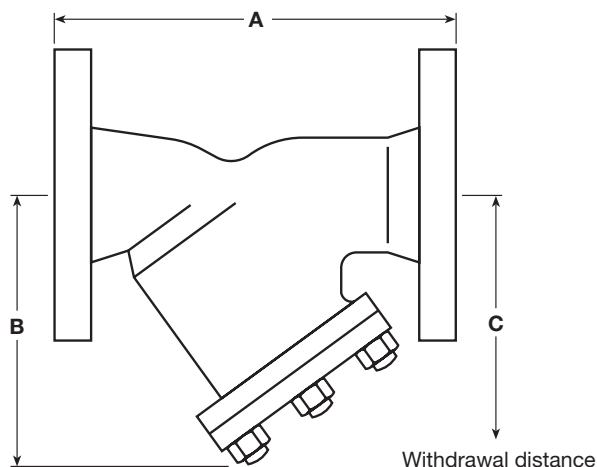
No.	Part	Size	Material
1	Body		Austenitic stainless steel ASTM A351 CF3M
2	Cap	1/2" - 2"	Austenitic stainless steel ASTM A182F316L
		2 1/2" - 8"	Austenitic stainless steel ASTM A351 CF3M
3	Cap gasket		Reinforced exfoliated graphite
4	Strainer screen		Austenitic stainless steel ASTM A240 316L
5	Cap bolt		Austenitic stainless steel ISO 3506 A2-70

## Cv values

Size	1/2"	3/4"	1"	1 1/4"	1 1/2"	2"	2 1/2"	3"	4"	5"	6"	8"
<b>Perforations</b> 1/32" (0.8 mm), 1/16" (1.6 mm), and 1/8" (3.0 mm)	6	9	15	25	34	53	83	119	179	274	393	680
<b>Mesh 40 and 100</b>	6	9	15	25	34	53	83	119	179	274	393	680
<b>Mesh 200</b>	6	7	12	18	27	43	67	96	143	215	310	536

## Dimensions / weights (approximate) in inches and lbs

Size	ANSI 150 A	ANSI 300 A	B	C	Screening area cm <sup>2</sup>	Weight
1/2"	5	5	3	5	28	5.5
3/4"	6	6	3	5	46	9.9
1"	6	6	4	6	79	11.0
1 1/4"	7	7	5	9	135	22.0
1 1/2"	8	8	6	10	161	26.4
2"	9	9	7	13	251	36.3
2 1/2"	11	11	8	13	325	50.6
3"	12	12	8	13	360	78.3
4"	14	14	10	16	540	84.7
5"	16	16	12	20	840	167.2
6"	19	19	14	22	1 115	239.8
8"	23	24	17	28	1 905	316.8



## Safety information, installation and maintenance

For full details see the Installation and Maintenance Instructions (IM-S60-18) supplied with the product.

### Installation note:

The strainer should be installed in the direction of flow, as indicated on the body. On applications involving steam or gases the pocket should be in the horizontal plane. On liquid systems the pocket should point downwards. Suitable isolation valves must be installed to allow for safe maintenance and trap replacement.

### Maintenance note:

Maintenance can be completed with the strainer in the pipeline, once the safety procedures have been observed. It is recommended that a new gasket is used whenever maintenance is undertaken.

### Warning:

The strainer cap gasket contains a thin stainless steel support ring, which may cause physical injury if it is not handled and disposed of carefully.

### Disposal

The product is recyclable. No ecological hazard is anticipated with disposal of this product, providing due care is taken.

## How to order

**Example:** 1 off Spirax Sarco 1 1/4" Fig 36 strainer having a stainless steel screen with 1/32" 0.8 mm perforations. The connections are to be flanged ANSI 150.

## Spare parts

The spare parts available are shown in solid outline. Parts drawn in broken line are not supplied as spares.

### Available spares

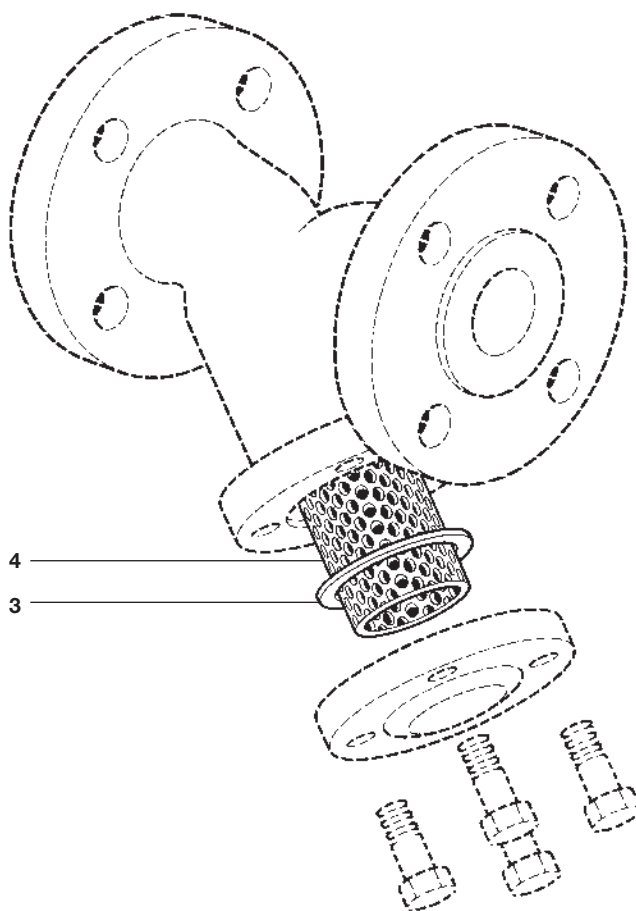
Strainer screen (state material, size of perforations or mesh and size of strainer) **4**

Cap gasket (3 off) **3**



### How to order spares

Always order spares by using the description given in the column headed 'Available spares' and state the size and type of strainer and perforation or mesh required.

**Example:** 1 off stainless steel strainer screen, having 1/32" (0.8 mm) perforations for a 2" Spirax Sarco Fig 36 strainer having ANSI 150 connections.



## Recommended tightening torques

Item	Size	Qty	 or mm 	ft - lb
5	½" - 1"	4	16 A/F M10 x 30	16 - 18
	1¼" - 1½"	4	19 A/F M12 x 35	30 - 33
	2"	8	19 A/F M12 x 35	30 - 33
	2½"	8	19 A/F M12 x 45	30 - 33
	3"	8	19 A/F M12 x 50	30 - 33
	4"	8	24 A/F M16 x 50	74 - 81
	5"	8	30 A/F M20 x 60	118 - 125
	6"	8	30 A/F M20 x 65	155 - 169
	8"	8	36 A/F M20 x 75	155 - 169

TI-7-413-US 3.14



# spirax/sarco

## Fig 36HP Stainless Steel Strainer

### Description

The Fig 36HP is a Stainless steel Y-type strainer that has been designed in accordance with ASME B16.34:2004 and ASME VIII, that is readily available with integrally flanged or butt weld connections. The standard stainless steel screen in the 1/2" to 3" size range has 1/32" (0.8 mm) perforations, and 1/16" (1.6 mm) perforations in the 4" to 8" size range - See 'Optional extras' for alternative perforations / mesh sizes and screen materials. If required, the strainer cover can be drilled and tapped for blowdown and drain valves.

### Standards

This product fully complies with the requirements of the European Pressure Equipment Directive 97/23/EC and carries the **CE** mark when so required.

### Certification

This product is available with certification to EN 10204 3.1 and NACE Approval.

**Note:** All certification / inspection requirements must be stated at the time of order placement. NACE Certification cannot be done after shipment.

### Sizes and pipe connections

#### Flanged:

ASME (ANSI) B16.5 Class 600 and ASME (ANSI) 600 RTJ - 1/2", 3/4", 1", 1 1/2", 2", 2 1/2", 3", 4", 6", and 8"

**Screwed:** NPT - 1/2", 3/4", 1", 1 1/2" and 2"

#### Socket weld:

ASME (ANSI) B16.11 Class 3000 - 1/2", 3/4", 1", 1 1/2" and 2"

#### Butt weld:

ASME (ANSI) B16.25 Schedule 40 and Schedule 80 - 1/2", 3/4", 1", 1 1/2", 2", 2 1/2", 3", 4", 6" and 8"

### Optional extras

The following optional extras are available for all unit sizes at an extra cost and must be stated at the time of order placement:

3/64" (1 mm), 1/16" (1.6 mm), 1/8" (3 mm) and 1/4" (6 mm)

**Perforations:** Contact Spirax Sarco for availability of perforations not displayed.

#### Mesh:

M20, M40, M60, M100, M200 and M400  
Contact Spirax Sarco for availability of mesh screens not displayed.

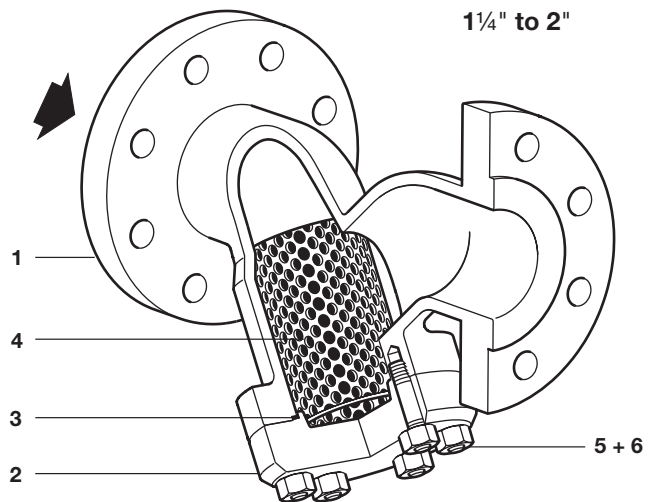
#### Screen material:

AISI 316, AISI 316L (standard), AISI 304, AISI 304L and Monel

### Blowdown valve connection

The cover is drilled to the following sizes to enable a blowdown valve to be fitted. Threaded (NPT) or socket weld available

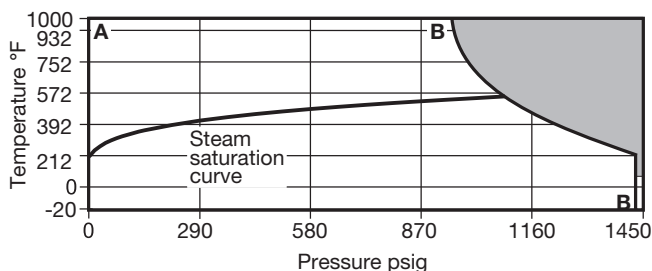
Strainer size	Blowdown valve
1/2"	1/4"
3/4" and 1"	1/2"
1 1/2"	1"
2" to 4"	1 1/4"
6" to 8"	2"



### Materials

No.	Part	Material	
1	Body	Stainless steel	EN 10213 1.4408 and ASTM A351 CF8M
2	Cover	Stainless steel	EN 10213 1.4408 and ASTM A351 CF8M
3	Cover gasket	Stainless steel + Graphite	Spiral wound
4	Strainer screen	Stainless steel	AISI 316L
5	Cover stud	Stainless steel	ASTM A193 Gr. B8M2
6	Cover nut	Stainless steel	ASTM A194 Gr. 8M

## Pressure / temperature limits



The product **must not** be used in this region.

**A - B** Flanged ASME (ANSI) B16.5 Class 600, ASME (ANSI) 600 RTJ, Screwed NPT, Socket weld ASME (ANSI) B16.11 Class 3000 and Butt weld ASME (ANSI) B16.25 Schedule 40 and 80.

**A - B**  
Flanged  
ASME 600 and 600 RTJ  
Screwed NPT  
Socket weld  
and  
Butt weld

Body design conditions		ASME 600
PMA	Maximum allowable pressure	1439 psig @ 100°F
TMA	Maximum allowable temperature	1000°F @ 725 psig
Minimum allowable temperature		-20°F
PMO	Maximum operating pressure	1439 psig @ 100°F
TMO	Maximum operating temperature	211°F @ 725 psig
Minimum operating temperature		-20°F
<b>Note:</b> For lower operating temperatures consult Spirax Sarco.		
Designed for a maximum cold hydraulic test pressure of:		2219 psig

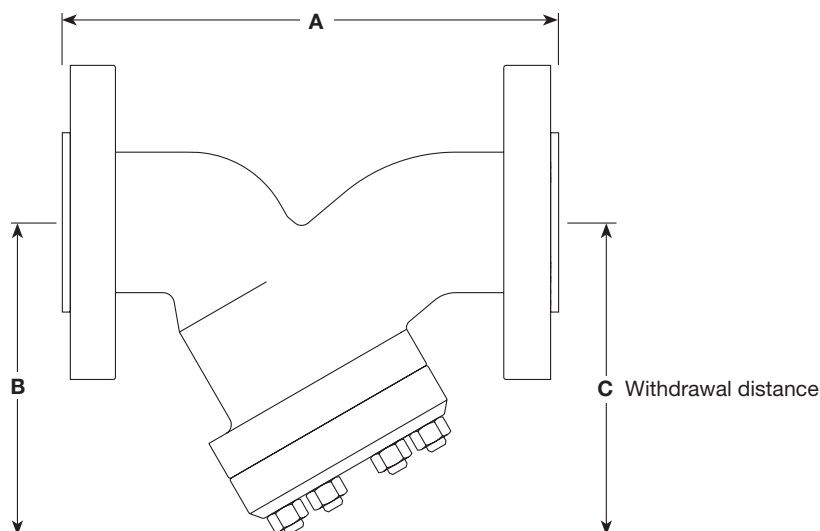
## C<sub>v</sub> values

Size	1/2"	3/4"	1"	1 1/2"	2"	2 1/2"	3"	4"	6"	8"
<b>Perforations</b> 1/32" (0.8 mm), 1/16" (1.6 mm), and 1/8" (3.0 mm)	6	9	15	34	53	83	119	179	393	680
<b>Mesh M40 and M100</b>	6	9	15	34	53	83	119	179	393	680
<b>Mesh M200</b>	5	7	12	27	43	67	96	143	309	536

Please consult Spirax Sarco for the C<sub>v</sub> values of the following screens: 1 mm, 6 mm, M20, M60 and M400.

## Dimensions / weights (approximate) in inches and lbs

Size	A ASME 600	A Screwed Socket weld Butt weld	B	C	ASME 600	Screwed Socket weld Butt weld
1/2"	6.5	6.5	4.6	7.9	7.9	3.5
3/4"	7.5	7.5	4.6	7.9	10.1	4.0
1"	8.5	8.5	4.6	7.9	12.4	4.9
1 1/2"	9.5	9.5	7.7	13.0	26.9	15.9
2"	11.5	11.5	7.7	13.0	38.4	16.8
2 1/2"	13.0	13.0	8.7	13.4	75.0	35.7
3"	14.0	14.0	8.7	13.4	77.2	45.4
4"	17.0	17.0	11.0	18.0	132.3	70.3
6"	22.0	22.0	14.2	24.0	286.7	164.9
8"	26.0	26.0	17.9	30.5	488.5	316.2



## Safety information, installation and maintenance

For full details see the Installation and Maintenance Instructions (IM-S60-18) supplied with the product.

### Installation note:

The strainer should be installed in the direction of flow, as indicated on the body. On applications involving steam or gases the pocket should be in horizontal plane. On liquid systems the pocket should point downwards.

### Warning:

The strainer cover gasket contains a thin stainless steel support ring, which may cause physical injury if not handled and disposed of carefully.

### Disposal

This product is recyclable. No ecological hazard is anticipated with the disposal of this product, provided due care is taken.

## How to order

**Example:** 1 off Spirax Sarco 1½" Fig 36HP strainer having the standard stainless steel screen with 1/32" (0.8 mm) perforations and flanged ANSI 600 connections.

## Spare parts

The spare parts available are shown in solid outline. Parts drawn in broken line are not supplied as spares.

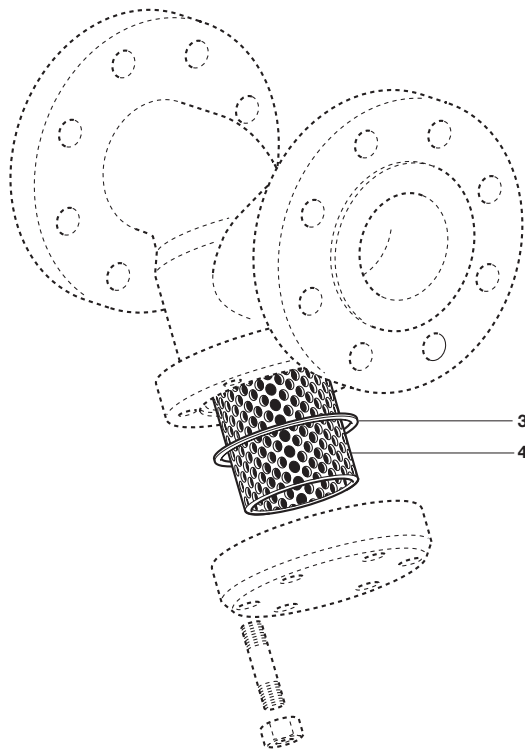
### Available spares

Cover gasket (packet of 3)	3
Strainer screen + Cover gasket	4
Cover gasket	3

### How to order spares

Always order spares by using the description given in the column headed 'Available spares' and state the size and type of strainer and perforation or mesh required.

**Example:** 1 - Strainer screen + Cover gasket. The strainer screen is to be stainless steel having 1/32" (0.8 mm) perforations for a 2" Spirax Sarco Fig 36HP strainer having ANSI 600 flanged connections.



## Recommended tightening torques - Items 5 and 6

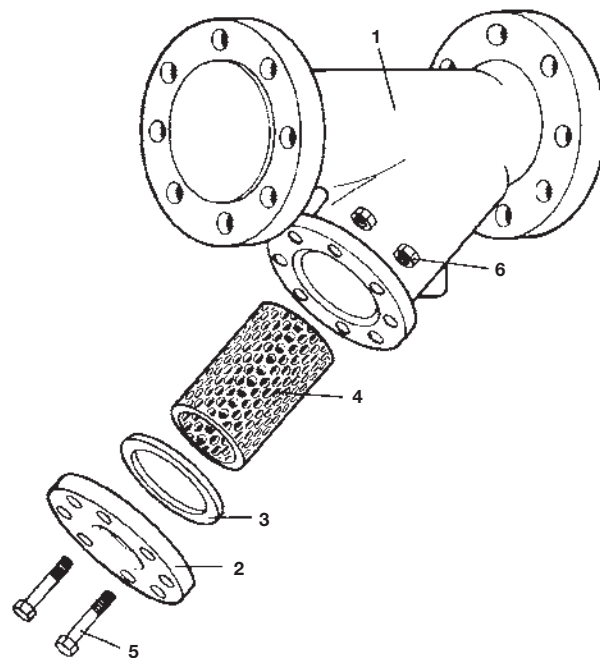
Sizes	Qty	mm or	ft - lb
½" - 1"	4	7/16" ½" - 13 UNC	14 - 22
1½" - 2"	8	7/16" ½" - 13 UNC	22 - 29
2½" - 3"	8	1 1/16" 5/8" - 11 UNC	37 - 44
4"	8	1 ¼" ¾" - 10 UNC	59 - 66
6"	8	1 7/16" 7/8" - 9 UNC	74 - 81
8"	12	1 13/16" 1 ¼" - 7 UNC	133 - 140



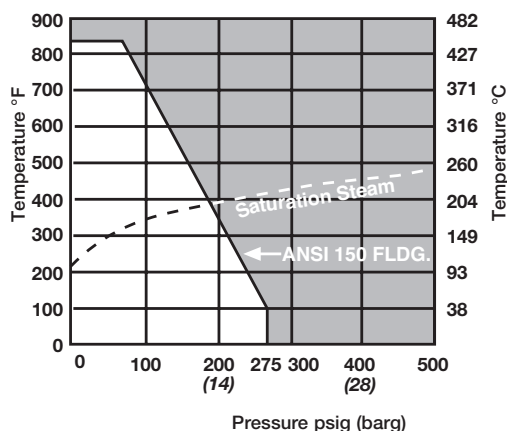
# spirax sarco

## Stainless Steel Strainers CSS

Type	CSS-150
Sizes	10" to 14"
Connections	ANSI 150
Construction	Cast 316 stainless steel
Max Saturated Steam Pressure	197 psig
Standard Screen	2-1/2" to 8": 3/64" perf 10" to 14": 1/16" perf



### Limiting Operating Conditions (non-shock)



### Pressure Shell Design Conditions

Max. allowable pressure 275 psig/-20-100°F 19 barg/-29-38°C

Max. allowable temperature 850°F/0-65 psig 454°C/0-28 barg

### Construction Materials

No.	Part	Material	
1	Body	Stainless Steel	ASTM A 743 Gr CF-8M
2	Cap 10", 12", 14"	Stainless Steel	ASTM A 240 Type 316
3	Cap Gasket	Graphite	
4	Strainer Screen	Stainless Steel	AISI 316
5	Cap Studs 10" to 14"	Stainless Steel	ASTM A 193 Grade B7
6	Nuts 10" to 14"	Stainless Steel	ASTM A 194 Grade 2H

### C<sub>v</sub> Values

Size	Cv
10"	1650
12"	2400
14"	3500

For water:

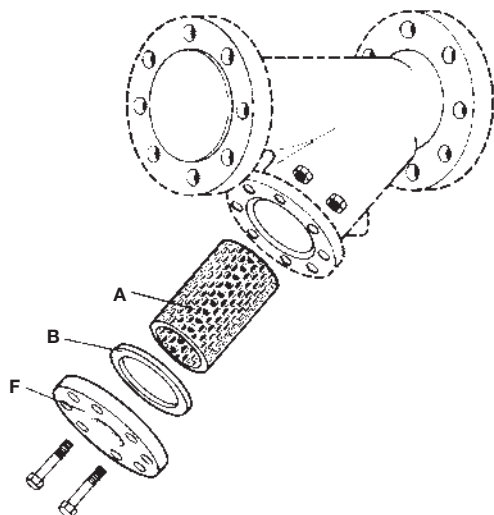
$$\text{Pressure Drop} = \frac{(\text{GPM})^2}{(\text{Cv})^2}$$

Consult factory for other liquids.

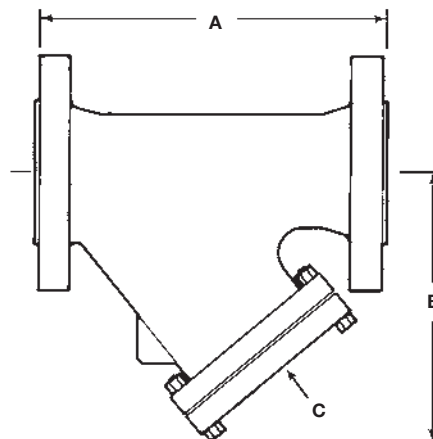
See TI-7-429-US for pressure drops on steam, air and other gases.

# Stainless Steel Strainers CSS

## Spare Parts



Strainer Screen	A
state material, size of perf or mesh, and size of strainer	
Cap Gasket	B
Cap	F



**Dimensions**  
(nominal) in inches and millimeters

Size	A	B	C	Weight
10"	30.01 765	20.5 520	2" NPT	132 lb 290 kg
12"	33.5 850	24.0 610	2" NPT	180 lb 397 kg
14"	38.6 980	24.8 630	2" NPT	1212 lb 550 kg

## Installation

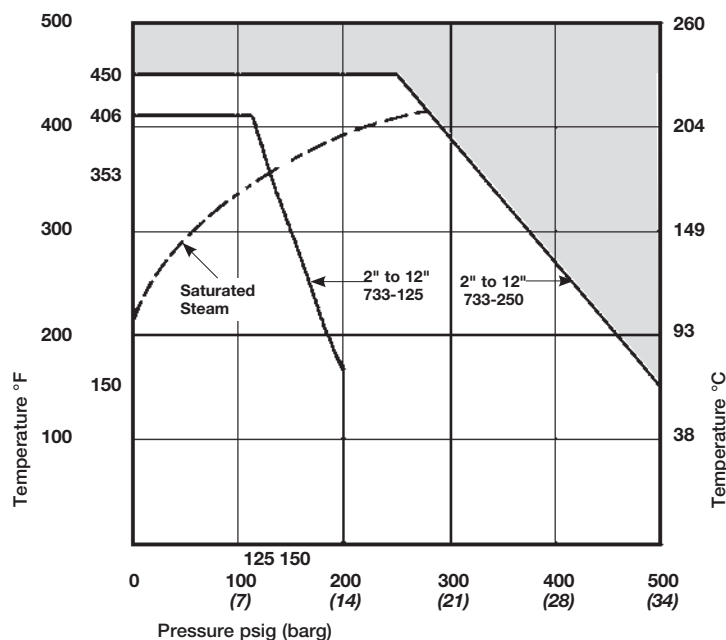
The strainer should be installed with the flow direction as indicated on the body, in a vertical down or horizontal pipe-line. The strainer must be accessible for periodic removal of accumulated debris, by either blowing down or removal and cleaning of the screen.

# spirax/sarco

## Cast Iron Basket Strainers 733

Type	733-125	733-250	733C-125
Sizes	2" to 16"		2" to 16"
Connections	ANSI 125	ANSI 250	ANSI 125
Construction	Cast Iron		
Max Saturated Steam Pressure	see below		
Standard Screen			
Steam	2" to 8": .045 perf 10" to 20": .125 perf		N/A N/A
Liquid	2" to 4": .063 perf 6" and up: .125 perf		2" to 4": 0.062 perf 6" and up: 0.125 perf

### Limiting Operating Conditions (non-shock)



### Referenced Standards and Codes

Code	Description
ASME/ANSI B16-1	Cast Iron Pipe Flanges and Flanged Fittings

### Pressure Shell Design Conditions

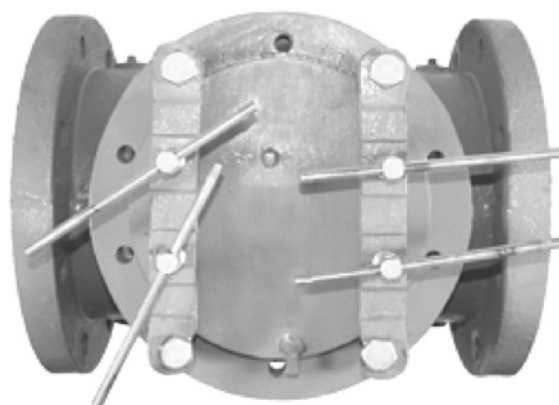
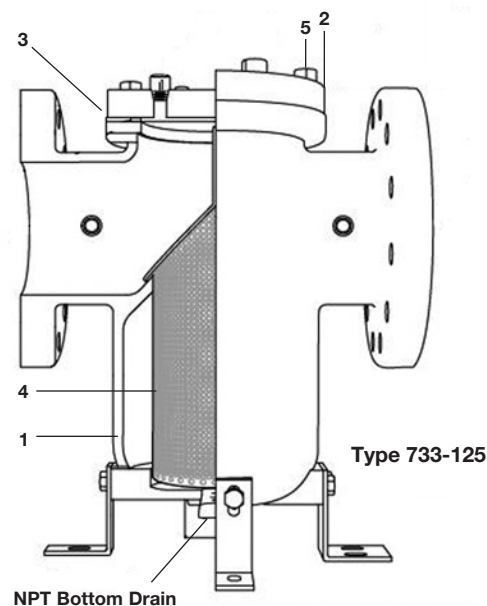
ANSI CLASS 125	733-125	733C-125
WOG (water, oil, gas):	200 psig @ 150°F	200 psig @ 100°F
Saturated Steam:	125 psig @ 353°F	Not Recommended
Maximum Liquid:	125 psig @ 450°F	Not Recommended

### ANSI CLASS 250 733-250

WOG (water, oil, gas)
Saturated Steam
Maximum Liquid

Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only.

In the interests of development and improvement of the product, we reserve the right to change the specification.



Clamp Cover for Type 733C-125

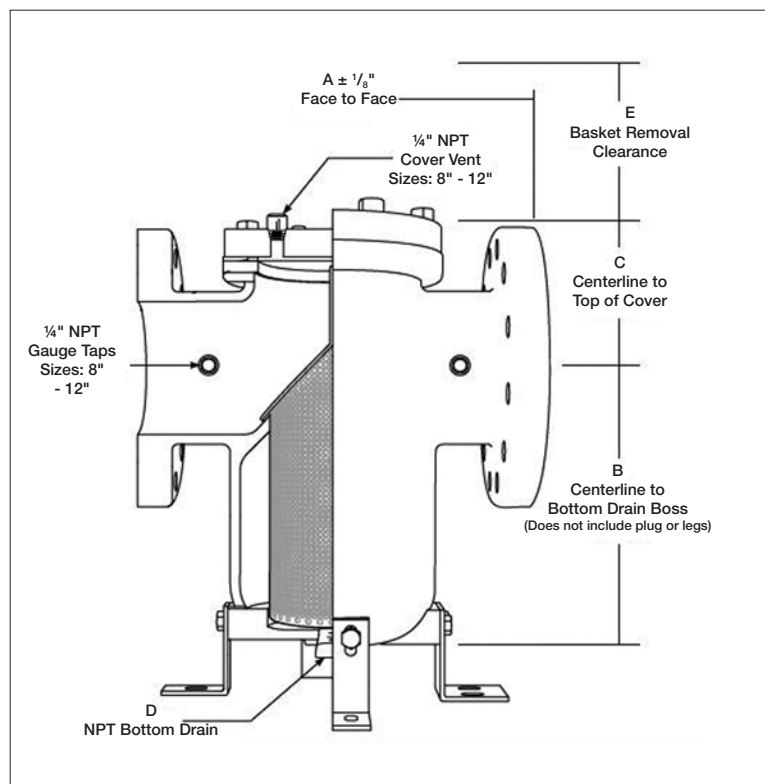
### Construction Materials

No.	Part	Material
1	Body	Cast Iron ASTM A126 Gr. B
2	Cover/Clamp Cover	Cast Iron ASTM A126 Gr. B
3	Cover/Clamp Gasket	Non-Asbestos BUNA-N O-Ring(733C)
4	Strainer Screen	Stainless Steel Type 304
5	Cover Screws/Bolts	Carbon Steel



# Cast Iron Basket Strainers

## 733



### C<sub>v</sub> Values (GPM)

Size	C <sub>v</sub>
2"	43
2-1/2"	86
3"	135
4"	290
6"	780
8"	1600
10"	3250
12"	5200
14"	7600
16"	9200

For water:  

$$\text{Pressure Drop} = \frac{(\text{GPM})^2}{(\text{Cv})^2}$$

Consult factory for other liquids.

See TI-7-429-US for pressure drops on steam, air and other gases.

### Installation

The strainer should be installed with the flow direction as indicated on the body, in a horizontal pipeline. The strainer must be accessible for periodic removal and cleaning of the screen.

### Spare Parts

Screen

Gasket

Note: Please provide date code when placing order for spare parts. Contact Technical Support for assistance if needed.

### Dimensions

(nominal) in inches and millimeters

	ANSI 125	ANSI 250	ANSI 125	ANSI 250	ANSI 125	ANSI 250	NPT			WEIGHT	
Size	A	A	B	B	C	C	D	E	ANSI 125	Clamp Cover	ANSI 250
2"	8.63	8.63	5.88	5.88	4.38	5.75	1/2	10.88	27.00	28.40	40.00
	220	220	150	150	112	146	15	277	12.2	12.8	18.2
2-1/2"	7.56	8.40	5.44	5.40	3.75	5.20	3/4	10.88	30.00	31.50	30.00
	193	213	139	138	96	132	20	277	13.6	14.3	13.6
3"	8.75	9.60	5.25	5.30	5.13	6.60	3/4	11.25	40.00	42.00	52.00
	223	243	134	133	131	169	20	286	18.1	19	23.6
4"	11.19	11.50	7.88	8.00	5.38	7.40	3/4	15.50	76.00	79.80	90.00
	285	292	201	203	137	188	20	394	34.4	36.2	41.0
6"	14.00	15.50	8.00	10.40	5.63	8.90	3/4	18.25	154.00	161.70	224.00
	356	394	204	264	143	225	20	464	69.8	73.3	102.0
8"	17.13	18.10	10.63	15.50	7.00	9.60	1-1/2	23.38	244.00	256.20	240.00
	435	461	270	394	178	244	40	594	110.6	116.1	109.0
10"	22.00	23.30	16.00	16.00	9.25	12.40	1-1/2	29.00	416.00	436.80	460.00
	559	591	407	406	235	315	40	737	188.5	197.9	209.0
12"	25.25	26.50	23.75	23.80	11.63	13.90	2	37.50	752.00	789.60	854.00
	642	673	604	603	296	354	50	953	340.7	357.8	388.0

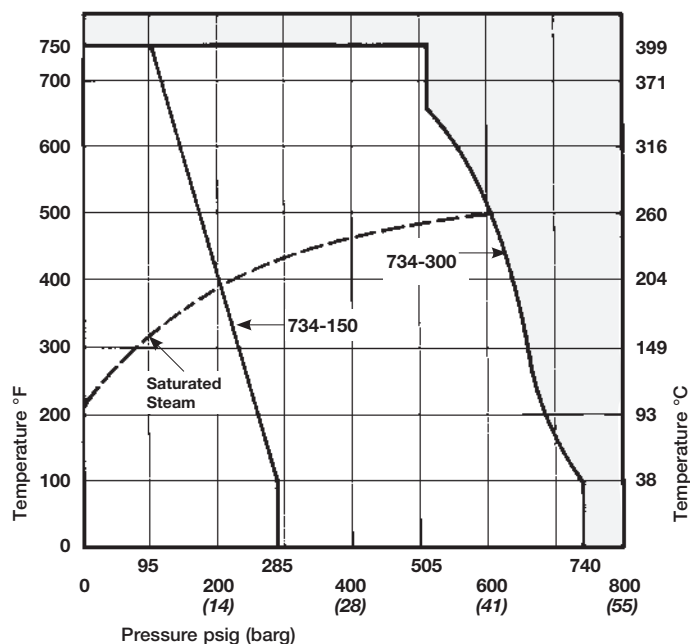
TI-7-435-US 03.10

# spirax sarco

## Carbon Steel Basket Strainers 734

Type	734-150	734-300
Sizes	1-1/2" to 14"	
Connections	ANSI 150	ANSI 300
Construction	Carbon Steel	
Max Saturated Steam Pressure	203 psig	604 psig
Standard Screen	1-1/2" to 8": .045 perf 10" to 14": .125 perf 1-1/2" to 4": .063 perf 6" and up: .125 perf	
Steam		
Liquid		

### Limiting Operating Conditions (non-shock)



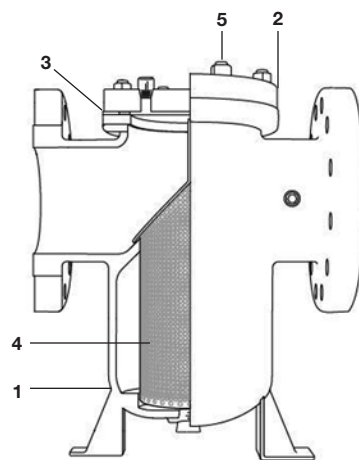
### Referenced Standards and Codes

Code	Description
ASME/ANSI B16-5	Pipe Flanges, Flanged Fittings and Body

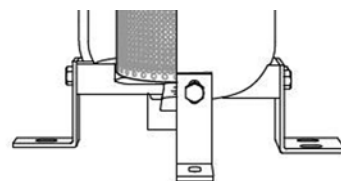
Note: Strainers are not ANSI stamped as standard

### Construction Materials

No.	Part	Material
1	Body	Carbon Steel ASTM A216 Gr. WCB
2	Cover	Carbon Steel ASTM A216 Gr. WCB
3	Cover Gasket	Spiral Wound, Stainless Steel, Non Asbestos
4	Strainer Screen	Stainless Steel Type 304
5	Cover Studs	Alloy Steel A193 Gr. B7
	Nut	Carbon Steel A194 Gr. 2H



Type 734-150



Supporting Brackets for Type 734-300

### Pressure Shell Design Conditions

ANSI CLASS 150	734-150
WOG (water, oil, gas):	285 psig @ 100°F
Saturated Steam:	150 psig @ 366°F
Maximum Liquid:	80 psig @ 800°F

ANSI CLASS 300	734-300
WOG (water, oil, gas):	740 psig @ 100°F
Saturated Steam:	300 psig @ 420°F
Maximum Liquid:	400 psig @ 800°F

### C<sub>v</sub> Values

Size	C <sub>v</sub>
1-1/2"	43
2"	43
2-1/2"	86
3"	135
4"	290
6"	780
8"	1600
10"	3250
12"	5000
14"	N/A

For water:  
 $\text{Pressure Drop} = \frac{(\text{GPM})^2}{(\text{C}_v)^2}$   
 Consult factory for other liquids.  
 See TI-7-429-US for pressure drops on steam, air and other gases.

Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only.  
 In the interests of development and improvement of the product, we reserve the right to change the specification.

TI-7-436-US 3.14

# Cast Steel Basket Strainers

## 734

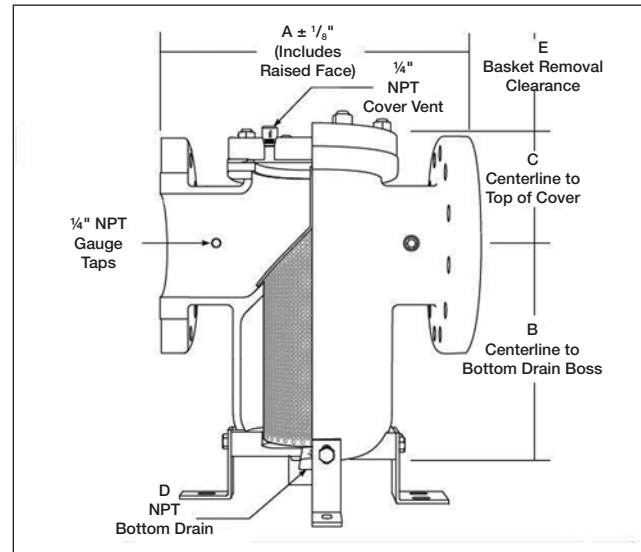
### Installation

The strainer should be installed with the flow direction as indicated on the body, in a horizontal pipeline. The strainer must be accessible for periodic removal and cleaning of the screen.

### Spare Parts

Screen	4
Gasket	3

Note: Please provide date code when placing order for spare parts. Contact Technical Support for assistance if needed.



### Dimensions

(nominal) in inches and millimeters

	ANSI 150	ANSI 300	ANSI 150	ANSI 300	ANSI 150	ANSI 300	NPT	ANSI 150	ANSI 300	WEIGHT	
Size	A  (Face-to-Face)		B  (Center-line to Bottom)		C  (Center-line to Top)		D	E  (Screen Removal)		ANSI 150	ANSI 300
1-1/2"	6.50	7.00	4.13	4.13	4.02	4.02	1/2"	n/a	n/a	23.0	23.3
	165	178	105	105	102	102		n/a	n/a	10.4	11.6
2"	8.50	8.50	5.88	6.13	5.00	4.91	1/2"	8.00	9.00	24.0	40.0
	216	216	150	156	127	125		204	229	10.9	18.1
2-1/2"	8.00	8.69	5.44	6.25	4.75	5.45	3/4"	7.50	10.00	33.0	63.0
	204	221	139	159	121	139		191	254	15	28.5
3"	8.75	9.56	5.25	8.00	5.50	6.08	3/4"	8.50	10.00	38.0	63.0
	223	243	134	204	140	155		216	254	17.2	28.5
4"	11.19	11.88	7.88	8.53	6.13	5.31	1"	11.00	10.00	64.0	108.0
	285	302	201	217	156	135		280	254	29	48.9
6"	13.88	14.75	13.13	12.75	6.75	6.38	1-1/4"	14.50	20.00	128.0	200.0
	353	375	334	324	172	162		369	508	58	90.6
8"	17.38	18.13	16.38	15.63	8.88	8.08	1-1/2"	19.25	20.00	227.0	342.0
	442	461	416	397	226	206		489	508	102.9	155
10"	22.00	22.88	19.38	16.52	10.75	9.70	1-1/2"	22.75	26.00	362.0	542.0
	559	582	493	420	274	247		578	661	164	245.6
12"	26.25	25.38	23.75	24.52	13.75	11.70	2"	27.00	35.00	487.0	n/a
	667	645	604	623	350	298		686	889	220.7	n/a
14"	37.00	38.00	33.00	33.00	16.50	16.50	2"	45.00	45.00	951.0	1397.0
	989	965	838	838	419	419		1143	1143	431	633

TI-7-436-US 3.14

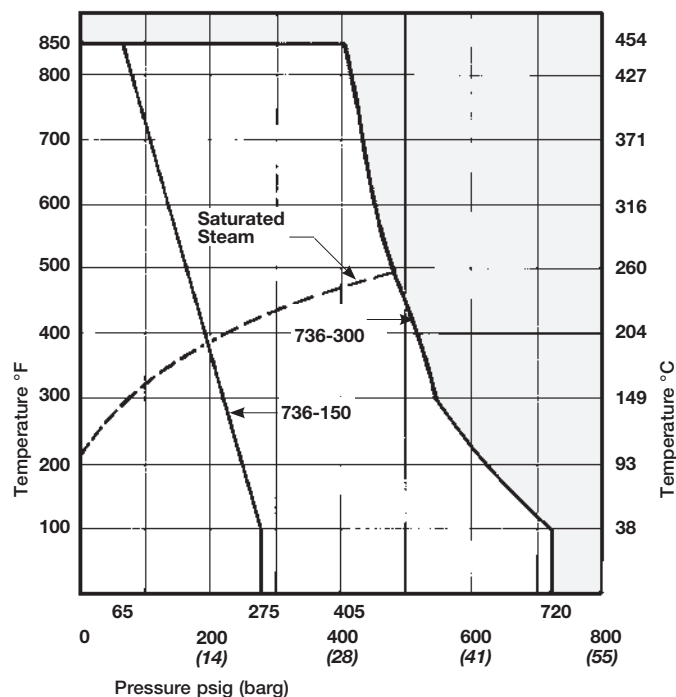


## Stainless Steel Basket Strainers

### 736

Type	736-150	736-300
Sizes	1-1/2" to 12"	1-1/2" to 8"
Connections	ANSI 150	ANSI 300
Construction	Stainless Steel	
Max Saturated Steam Pressure	198 psig	491 psig
Standard Screen	Steam 1-1/2" to 8": .045 perf 10" to 12": .125 perf Liquid 1-1/2" to 4": .063 perf 6" and up: .125 perf	

#### Limiting Operating Conditions (non-shock)



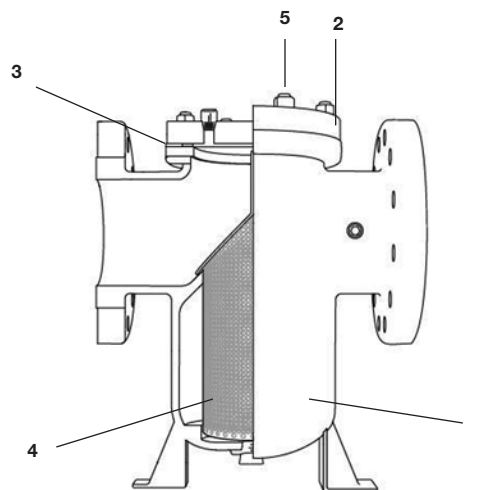
#### Referenced Standards and Codes

Code	Description
ASME/ANSI B16-5	Pipe Flanges, Flanged Fittings and Body

\*Note: Strainers are not ANSI stamped as standard.

#### Construction Materials

No.	Part	Material
1	Body	Stainless Steel Type 316 ASTM A351 CF8M
2	Cover	Stainless Steel Type 316 ASTM A351 CF8M
3	Cover Gasket	Non-Asbestos
4	Strainer Screen	Stainless Steel Type 304 ASTM A240
5	Cover Studs	Stainless Steel 18-8 Series 300
	Nuts	Stainless Steel 18-8 Series 300



#### Pressure Shell Design Conditions

##### Pressure/Temperature Rating

**SS-ASTM A351 GR. CF8M - CLASS 150**

WOG: 275 psi @ 100°F

Saturated Steam: 150 psi @ 366°F

Maximum Liquid: 20 psi @ 1000°F

##### Pressure/Temperature Rating

**SS-ASTM A351 GR. CF8M - CLASS 300**

WOG: 720 psi @ 100°F

Saturated Steam: 300 psi @ 420°F

Maximum Liquid: 350 psi @ 1000°F

Stainless Steel not recommended for prolonged use above 1000°F

#### C<sub>v</sub> Values (GPM)

Size	C <sub>v</sub>
1-1/2"	43
2"	43
2-1/2"	86
3"	135
4"	290
6"	780
8"	1600
10"	3250
12"	5200

For water:

$$\text{Pressure Drop} = \frac{(\text{GPM})^2}{(\text{Cv})^2}$$

Consult factory for other liquids.

See TI-7-429-US for pressure drops on steam, air and other gases.

Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only.  
In the interests of development and improvement of the product, we reserve the right to change the specification.

TI-7-437-US 3.14

# Stainless Steel Basket Strainers

## 736

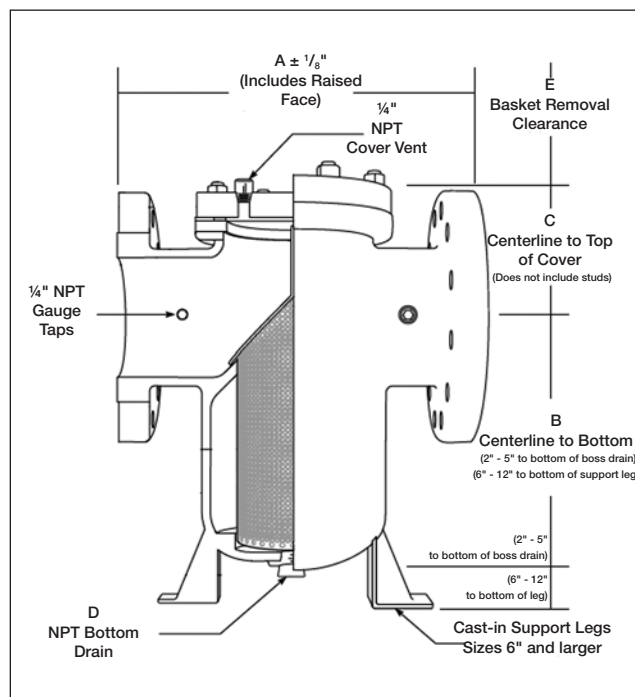
### Installation

The strainer should be installed with the flow direction as indicated on the body, in a horizontal pipeline. The strainer must be accessible for periodic removal and cleaning of the screen.

### Spare Parts

Screen	4
Gasket	3

Note: Please provide date code when placing order for spare parts. Contact Technical Support for assistance if needed.



### Dimensions

(nominal) in inches and millimeters

	ANSI 150		ANSI 300		ANSI 150		ANSI 300		NPT	ANSI 150		ANSI 300		WEIGHT	
Size	A (Face-to-Face)		B (Center-line to Bottom)		C (Center-line to Top)		D			E (Screen Removal)		ANSI 150		ANSI 300	
1-1/2"	6.50	7.00	4.13	4.13	4.02	4.02	1/2"			n/a	n/a	23.0	23.3		
	165	178	105	105	102	102				n/a	n/a	10.4	11.6		
2"	8.50	8.50	5.88	6.13	5.00	4.91	1/2"			8.00	9.00	24.0	40.0		
	216	216	150	156	127	125				204	229	10.9	18.1		
2-1/2"	8.00	8.68	5.44	6.25	4.75	5.45	3/4"			7.50	10.00	33.0	63.0		
	204	221	139	159	121	139				191	254	15	28.5		
3"	8.75	9.56	5.25	8.00	5.50	6.08	3/4"			8.50	10.00	38.0	63.0		
	223	243	134	204	140	155				216	254	17.2	28.5		
4"	11.19	11.88	7.88	8.53	6.13	5.31	1"			11.00	10.00	64.0	108.0		
	285	302	201	217	156	135				280	254	29	48.9		
6"	13.88	14.75	13.13	12.75	6.75	6.38	1-1/4"			14.50	20.00	128.0	200.0		
	353	375	334	324	172	162				369	508	58	90.6		
8"	17.38	18.13	16.38	15.63	8.88	8.08	1-1/4"			19.25	20.00	227.0	342.0		
	442	461	416	397	226	206				489	508	102.9	155		
10"	22.00	n/a	19.38	n/a	10.75	n/a	1-1/2"			22.75	n/a	362.0	n/a		
	559	n/a	493	n/a	274	n/a				578	n/a	164	n/a		
12"	26.25	n/a	23.75	n/a	13.75	n/a	2"			27.00	n/a	487.00	n/a		
	667	n/a	604	n/a	350	n/a				686	n/a	220.7	n/a		

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TI-7-437-US 3.14


## TP1 and TP2 Stainless Steel Temporary Cone Shaped Strainers

### Description

The conical (TP1) and truncated conical (TP2) temporary strainers have been designed to fit between two flanges and are generally used during commissioning and start-up to remove any coarse debris. They are suitable for use on a wide range of fluids for applications in process lines, hot water systems, steam and condensate systems etc. The standard screens are manufactured using 3 mm perforated stainless steel. Other perforations or material of construction are available on request.

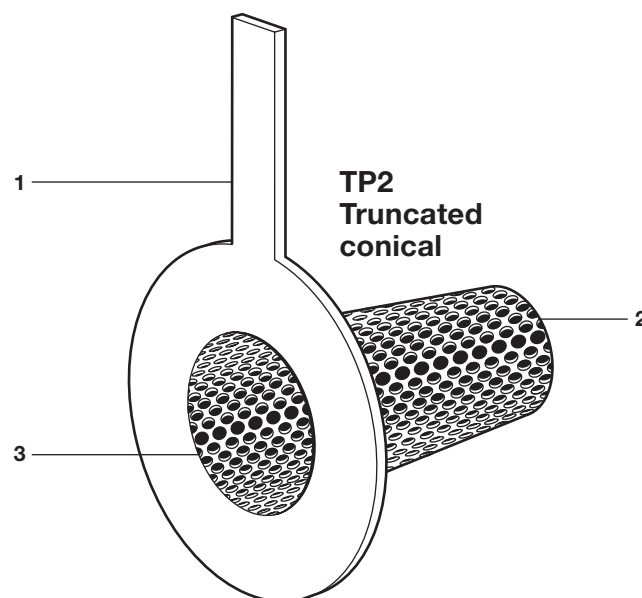
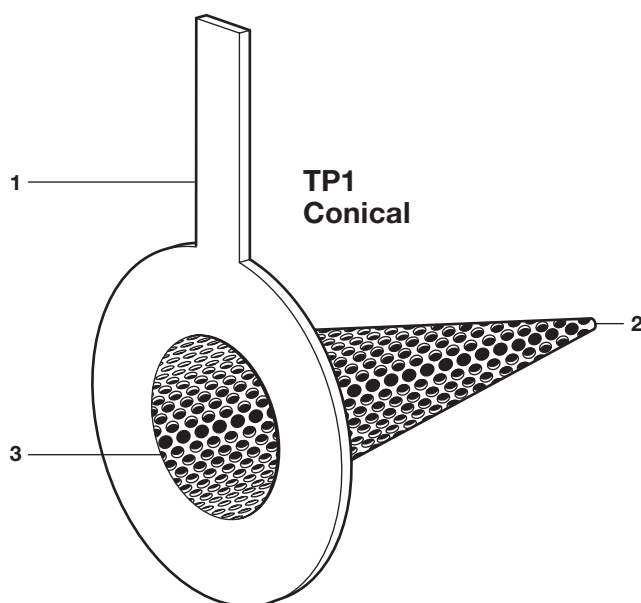
Temporary strainers are not intended to be used for permanent applications. Contact Spirax Sarco when permanent applications are required.

### Standards

Designed in accordance with BS EN 14341:2006. These products fully comply with the requirements of the European Pressure Equipment Directive 97 / 23 / EC and carry the  mark when so required.

### Certification

These products are available with certification to EN 10204 3.1 and NACE approval. **Note:** All certifications/inspections requirements must be stated at the time of order placement.



### Sizes and pipe connections

1½" – 28"

Designed for installation between the following flanges:  
ASME (ANSI) 150, 300 and 600

### Materials

No.	Part	Material
1	Collar	Stainless steel    AISI 304L
2	Screen	Stainless steel    AISI 304L
3	Mesh lining	Stainless steel    AISI 304L

### Optional extras

The following optional extras are available for all unit sizes at an extra cost and must be stated at the time of order placement:

**Perforations:** 3 mm (standard), 1.6 mm and 6 mm. Contact Spirax Sarco for availability of perforations not displayed.

**Mesh:** M40, M100 and M200. Contact Spirax Sarco for availability of mesh screens not displayed.

**Screen material:** AISI 304L (standard), AISI 316L and Monel 400.

**Specific surface finish for collar:** Ra 0.025 µm to 50 µm.

TI-P169-06-US 10.11

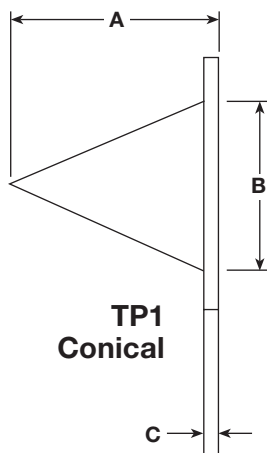
*Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only.*

*In the interests of development and improvement of the product, we reserve the right to change the specification.*

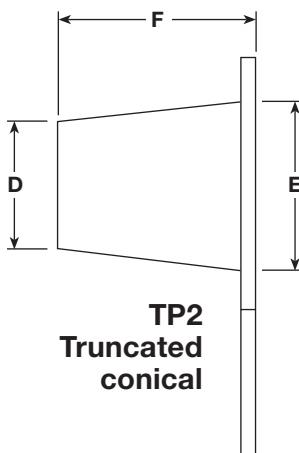
# TP1 and TP2

## Stainless Steel Temporary Cone Shaped Strainers

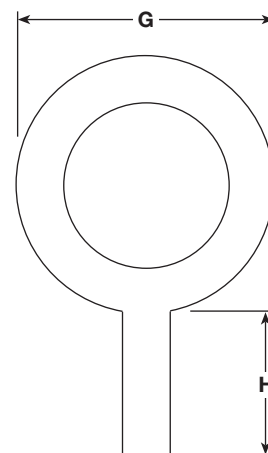
Dimensions (approximate) inches



**TP1  
Conical**



**TP2  
Truncated  
conical**



Size	A	B	C	D	E	F	G ASME	H
1½"	2	1.4	0.07	0.5	1.4	4.8	2.8	3.9
2"	2.5	1.8	0.07	0.7	1.7	5	3.6	3.9
2½"	2.9	2.4	0.07	1	2	5.4	4.0	3.9
3"	2.9	2.9	0.07	1.4	2.7	5.8	4.9	3.9
4"	5	3.7	0.07	1.5	3.6	8	6	3.9
5"	5.5	4.6	0.07	1.9	4.6	8.5	7	4.9
6"	5.9	5.6	0.07	2.7	5.5	9.7	8	4.9
8"	10	7.5	0.11	3.8	6.9	11.6	10	4.9
10"	10	9.5	0.11	4.2	8.8	13.9	12.5	5.9
12"	24.5	11.4	0.11	4.6	11	16	14.7	5.9
14"	25	12.7	0.11	5.8	12.7	17	15.9	5.9
16"	28.9	14.9	0.19	5.8	15	20.8	18	5.9
20"	36	18.7	0.19	6	17	23	20.6	7.8
24"	43	22.6	0.19	6.9	18.7	24.7	22.5	7.8
28"	81	26.4	0.19	7.7	22.6	29.3	26.7	7.8

### Safety information, installation and maintenance

For full details see the installation and maintenance instructions (IM-P169-07) supplied with the product.

**Warning:** Carry strainers with gloves.

**Disposal:** These products are recyclable. No ecologic hazard is anticipated with disposal of these products providing due care is taken.

### How to order

**Example:** 1 off Spirax Sarco 4" TP1 temporary conical shaped strainer having the standard 3 mm stainless steel screen, for installation between ASME ANSI 150 flanges.



# High Purity Solutions



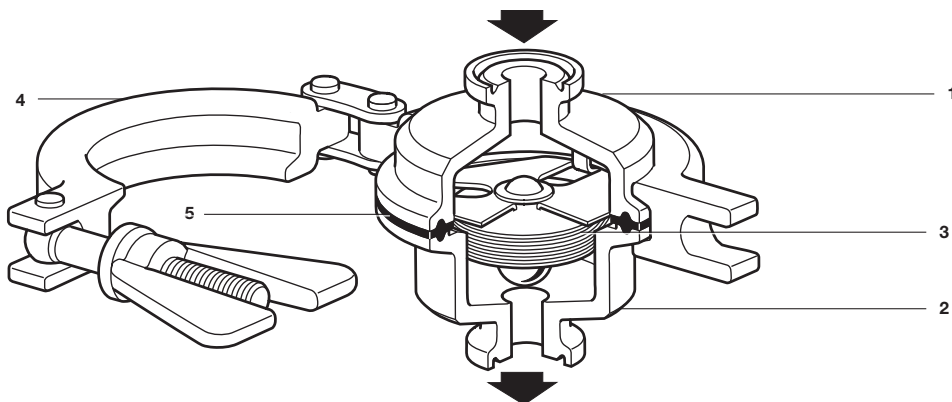


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TI-7-010-US	Clean Steam Sampling Cart	740
TI-P486-04-US	CSM-C 600 Compact Clean Steam Generator	742



## BT6-B Sanitary Balanced Pressure Thermostatic Steam Trap



### Description

The Spirax Sarco BT6-B sanitary balanced pressure thermostatic steam trap is designed to remove condensate from clean and pure steam applications with minimal condensate retention. Applications include sterile steam barriers, block and bleed installations, mains drainage and CIP/SIP of vessels and reactors and process lines. Manufactured in 316L, the crevice free body design of the BT6-B incorporates a 15° angled seat to ensure full drainability. The standard element is extremely sensitive to changes in condensate temperature and is designed to open with a minimum of sub-cooling, less than 3.6°F (2°C) from steam saturation temperature at pressures below 36 psig (2.5 barg) for typical operating conditions. Exact operating performance may be affected by operating pressure, installation and ambient conditions. Each trap is individually packaged within a 'clean' environment with protective end caps and sealed in a protective plastic bag.

### Available types

<b>BT6-BL</b>	Low capacity
<b>BT6-BH</b>	High capacity

### Body surface finish

(measured to ISO 4287-1997 and ISO 4288-1997):

- Internal surfaces have a finish of mechanical and electropolishing to 0.375 µm (15 µ-in Ra)
- External surfaces have a finish of 1.0 µm (40 µ-in Ra)

### Options:

- For applications requiring closer to steam saturation temperatures, for example, critical SIP applications, please consult Spirax Sarco.

### Standard

This product fully complies with ASME BPE and the requirements of the European Pressure Equipment Directive 97/23/EC. All seals comply with FDA CFR title 21, part 177, section 1550 and USP24 class VI.

### Certification

This product is available with the following certification at extra cost:

- EN 10204 3.1 material certificates.
- Typical internal surface finish certificates.
- Typical certification of seals FDA/USP/ADI and 3-A compliance.

**Note:** All certification / inspection requirements must be stated at the time of order placement.

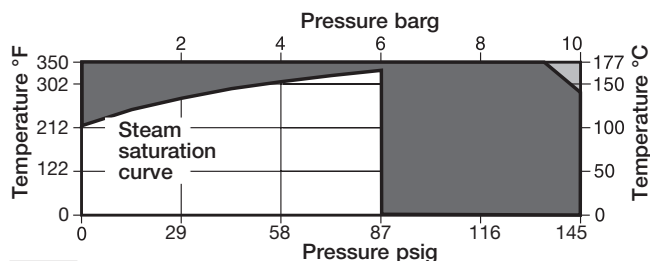
### Sizes and pipe connections

½", ¾", 1" and 1½" sanitary clamp ends to ASME BPE. For other connections please consult Spirax Sarco.

### Materials

No.	Part	Material
1	Body (inlet)	Stainless steel ASTM A276 316L
2	Body (outlet)	Stainless steel ASTM A276 316L
3	Capsule element	Stainless steel AISI 316L
4	Body clamp	Stainless steel AISI 316
5	Seal	Tuf-Steel® PTFE & AISI 316

### Pressure / temperature limits (ISO 6552)



The product must not be used in this region.

The product should not be used in this region as damage to the internals may occur.

**Note:** For hygienic/sanitary clamp ends the maximum pressure / temperature may be restricted by the gasket or sanitary clamp used. Please consult Spirax Sarco.

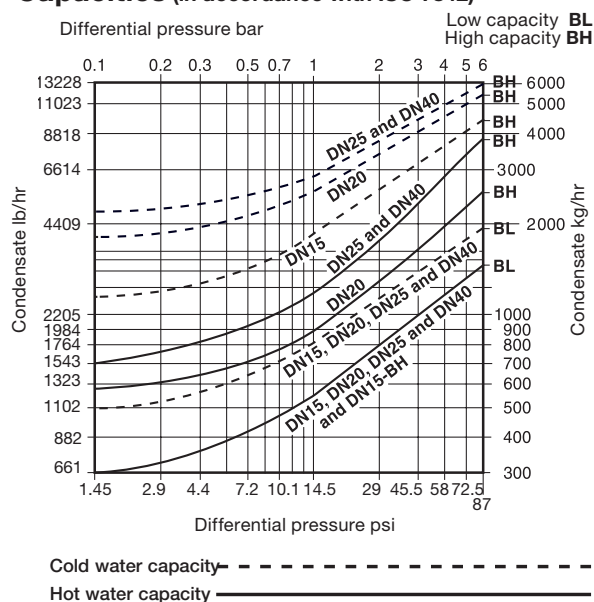
Body design condition	PN10
PMA Maximum allowable pressure	145psig@284°F (10barg@140°C)
TMA Maximum allowable temperature	350°F@133psig (177°C@9.2barg)
Minimum allowable temperature	-425°F (-254°C)
PMO Maximum operating pressure for saturated steam service	87 psig (6barg)
TMO Maximum operating temperature	329°F@87psig (165°C@6barg)
Minimum operating temperature	32°F (0°C)
Designed for a maximum cold hydraulic test pressure of	218 psig (15 barg)

Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only.

In the interests of development and improvement of the product, we reserve the right to change the specification.

TI-P180-30-US 1.15

## Capacities (in accordance with ISO 7842)



**Safety information, installation and maintenance**  
For full details see the Installation and Maintenance Instructions (IM-P180-31) supplied with the product.

### Installation note

The BT6-B is designed to be installed in vertical lines with the flow downwards so that the body is self-draining. Check the flow arrow on the body for correct orientation. Fittings and pipe clamps are not supplied.

Installation should include a suitable cooling leg to avoid condensate back-up into process equipment under normal operating conditions.

Do not expose the capsule element to superheat conditions. Handle all components carefully to avoid damage to surfaces.

### Operation

The operation relies on a stainless steel capsule that is filled with a temperature sensing fluid. During cold or start-up conditions the capsule will be fully open allowing large volumes of air, condensate and/or CIP fluid to be drained. As the system approaches steam temperature the fluid in the capsule expands and the valve closes the trap to prevent live steam loss. This closure occurs very close to steam temperature to ensure efficient drainage of the system.

### How to order

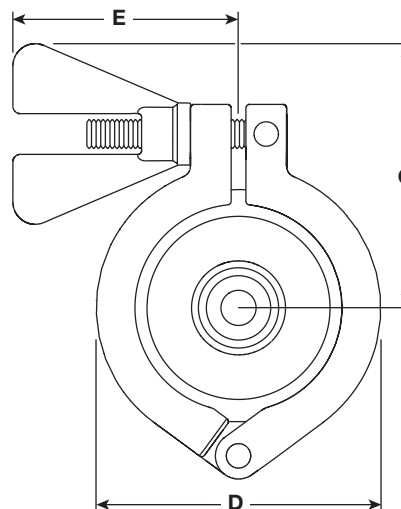
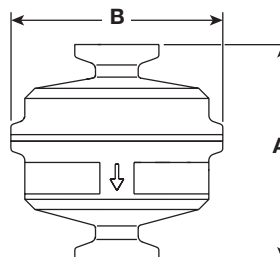
**Example:** 1 off Spirax Sarco ½" BT6-BH sanitary balanced pressure thermostatic steam trap with self-draining body. Connections to be sanitary clamp ends to meet the requirements of ASME BPE. Suitable for pressure up to 6 bar g. Internal surface finish to be electropolished to 15 µ-in Ra (0.375 µm). Material certification to EN 10204 3.1 for pressure containing parts.

### Sample Specification

Balanced pressure steam traps with in-line connections shall be designed for specific use in sanitary/hygienic applications. The trap shall be suitable for CIP/SIP systems requiring large cold condensate discharge capacities at low pressures typically encountered at the start of sterilizing cycles. The trap must be available in both high and low capacity versions. High capacity traps must discharge at least 2400 lb/h (1100 kg/h) of cold condensate with 3'3" (1.4 psi) water column differential. Traps must open approximately 3.6°F (2°C) below steam temperature at discharge pressures of 36 psig (2.5 barg) or less for minimal sub-cooling of condensate, and typical condensate back up shall be 6" (150 mm) or less at all times. The trap shall have a sanitary safety body clamp and housing design to prevent accidental disassembly and incorrect reassembly. The trap shall be self-draining with at least a 15° angled seat to ensure full drainability when mounted vertically. Construction shall be of 100% 316L, including bodies, internals and related systems. The maximum allowable internal surface finish for wetted parts shall be 15 µ-in Ra (0.375 µm), and 40 µ-in Ra (1 µm) for external surfaces. Traps must comply fully with ASME BPE and the European PED 97/23/EC, and all seals must comply with FDA CFR title 21, part 177, section 1550 and USP24 class VI.

## Dimensions/weights (approximate) in inches and pounds (mm and kg)

Size	A	B	C	D	E	Weight
½"	2.56 (65)	2.52 (64)	2.42 (71.5)	3.03 (77)	2.4 (61)	1.54 (0.70)
¾"	2.56 (65)	2.52 (64)	2.42 (71.5)	3.03 (77)	2.4 (61)	1.56 (0.71)
1"	2.56 (65)	2.52 (64)	2.42 (71.5)	3.03 (77)	2.4 (61)	2.07 (0.94)
1½"	2.56 (65)	2.52 (64)	2.42 (71.5)	3.03 (77)	2.4 (61)	1.89 (0.86)



### Spare parts

The available spare parts are detailed below. No other parts are supplied as spares.

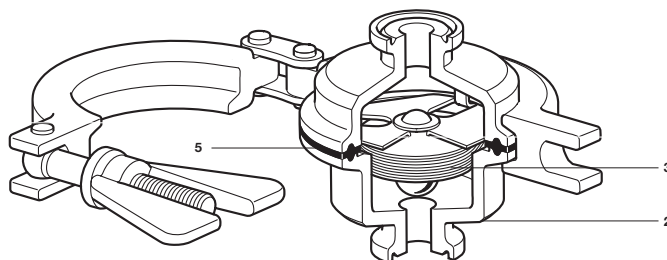
#### Available spares

Capsule element assembly	3
Seal	5
Body (outlet) including seat	2

#### How to order spares

Always order spares by using the description given in the column headed 'Available spares' and state the size and type of trap.

**Example:** 1 - Capsule element assembly for a ½" BT6-BH sanitary balanced pressure thermostatic steam trap.





## BTM7

# Stainless Steel Thermostatic Clean Steam Trap

### Description

The Spirax Sarco BTM7 is a maintainable thermostatic steam trap designed to remove condensate from clean steam systems with minimal backing up. Applications include sterile steam barriers, process vessels and CIP/SIP systems. Manufactured in 316L stainless steel with minimal crevices, it is self-draining and operates close to steam temperature. Traps are individually packaged with protective end caps and sealed in a polythene bag.

### Standards

The BTM7 has been designed in general accordance with ASME BPE. It also complies with the requirements of the European Pressure Equipment Directive 97 / 23 / EC.

All wetted parts of this trap are manufactured from FDA approved materials.

Part 3, 'O' ring - Complies with USP Class VI and FDA CFR title 21, Paragraph 177, Section 2600.

### Certification

This product is available with certification to EN 10204 3.1.

**Note:** All certification / inspection requirements must be stated at the time of order placement.

**Fixed bleed** to ensure fail open operation available at extra cost

### Sizes and pipe connections

1/4", 1/2", 3/4", 1" screwed BSP or NPT.

1/2", 3/4", 1" O/D x 16 swg (0.065") wall thickness tube end.

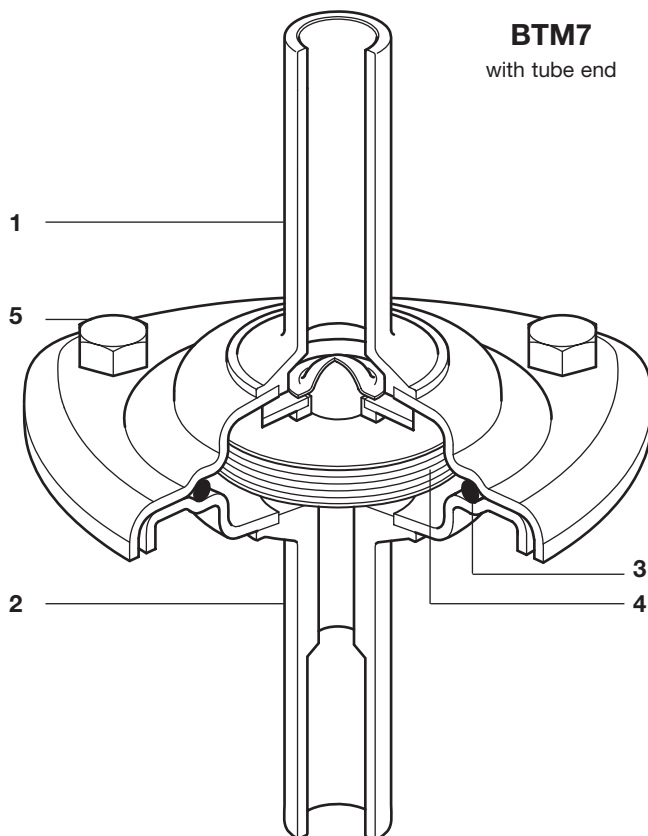
1/2", 3/4", 1" sanitary clamp compatible hygienic connection.

### Pressure and Temperature Limits

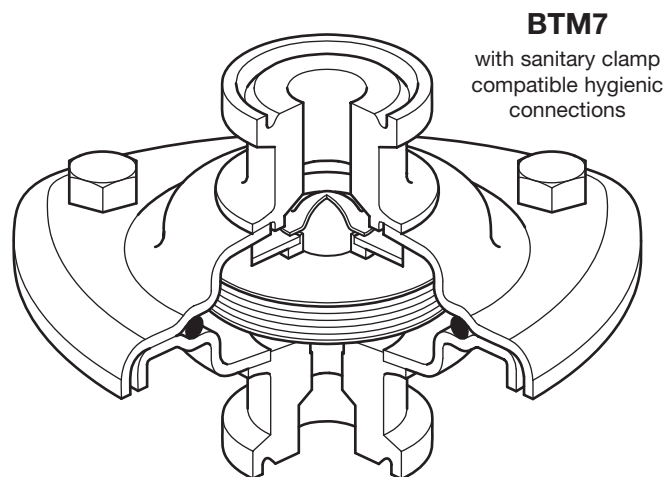
Body design conditions		PN7
PMA Maximum allowable pressure	102 psig @ 338°F (7 barg @ 170°C)	
TMA Maximum allowable temperature	338°F @ 102 psig (170°C @ 7 barg)	
Minimum allowable temperature		14°F (-10°C)
PMO Maximum operating pressure for saturated steam service	102 psig (7 bar g)	
TMO Maximum operating temperature	338° F (170°C)	
Minimum operating temperature	32°F (0°C)	
Designed for a maximum cold hydraulic test pressure of 152 psig (10.5 barg)		

### Materials

No.	Part	Material
1	Body (inlet)	Stainless steel AISI 316L (1.4404)
2	Body with seal (outlet)	Stainless steel AISI 316L (1.4404)
3	'O' ring	FKM Compound complies with FDA 21CFR 177.2600 and is USP Class VI approved. For use on all clean systems or where lactic acid may be present
4	Element	Stainless steel AISI 316L (1.4404)
5	Nuts and bolts	Stainless steel BS 6105 Gr. A4 80
	Washers	Austenitic stainless steel



**BTM7**  
with tube end



**BTM7**  
with sanitary clamp  
compatible hygienic  
connections

Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only.

In the interests of development and improvement of the product, we reserve the right to change the specification.

TI-2-0002-US 3.14

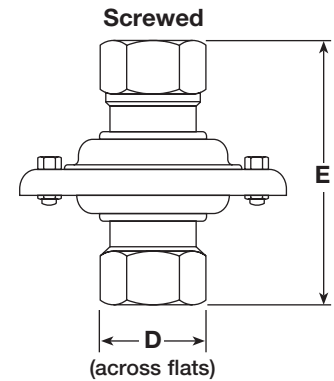
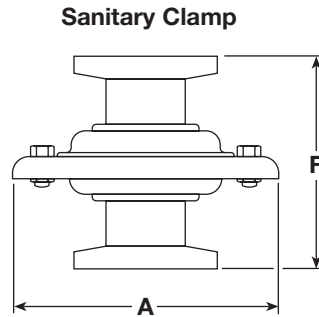
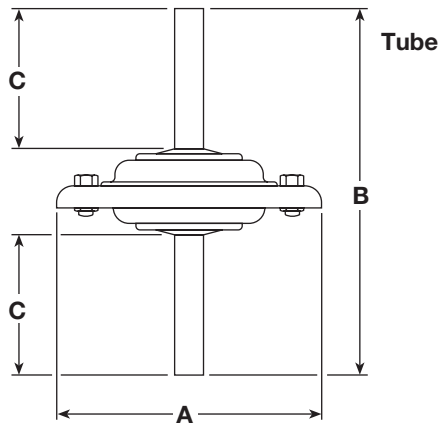


# BTM7

## Stainless Steel Thermostatic Clean Steam Trap

Dimensions /weights (approximate) in inches (millimeters), lbs (kg)

Size	Tube			Screwed		Sanitary clamp	Weight		
	A	B	C	D	E		Tube	Screwed	Sanitary clamp
¼"	2.8 (70)	-	-	1.0 (27)	2.3 (58)	-	-	1.2 (0.53)	-
½"	2.8 (70)	4.2 (106)	1.5 (40)	1.0 (27)	2.9 (74)	1.9 (49)	1.3 (0.62)	1.4 (0.66)	1.3 (0.62)
¾"	2.8 (70)	4.2 (106)	1.5 (40)	1.2 (32)	3.2 (81)	1.9 (49)	1.5 (0.68)	1.7 (0.77)	1.3 (0.62)
1"	2.8 (70)	4.2 (106)	1.5 (40)	1.6 (41)	3.7 (95)	2.1 (53)	1.7 (0.77)	2.0 (0.90)	2.0 (0.90)



### Capacities

Pressure (psig)	cold water #/hr	½" and larger hot condensate #/hr.	¼" only hot condensate #/hr.
1	565	50	50
5	1125	124	124
10	1513	217	217
20	2036	404	404
30	2422	590	590
40	2740	777	737
50	3014	963	779
75	3586	1429	855
100	4056	1896	910

### Safety information, installation and maintenance

For full details see the Installation and Maintenance Instructions (IM-P180-05) supplied with the product.

Installation note:

The trap is designed for installation in vertical lines with the flow downward to ensure self-draining operation. Do not expose element to superheat conditions since over-expansion may result. Suitable isolation valves must be installed to allow for safe maintenance / replacement.

### Sample Specification

Steam trap shall be self-adjusting balanced pressure type capable of operating close to saturated steam temperature. All wetted parts shall be manufactured from 316L stainless steel. Trap shall be sealed construction and shall be completely self-draining when installed in vertical pipeline. Connections shall be 0.065" extended O.D. tube, Tri-Clamp® compatible, or screwed NPT. All wetted parts of this trap are manufactured from FDA/3-A approved materials.

### Spare parts

Available parts are shown in solid outline. Parts drawn in broken line are not available as spares.

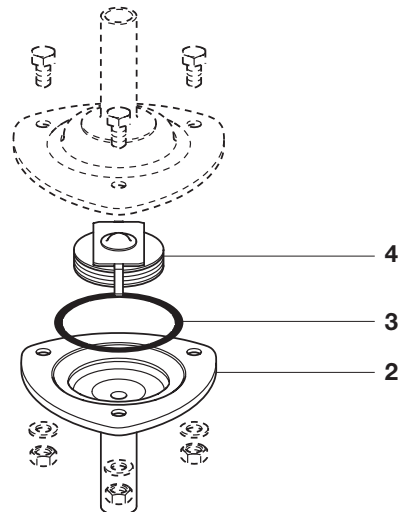
#### Available spares

Element assembly	4
'O' ring (packet of 3)	3
Body with seat (outlet) - state connections	2

#### How to order spares

Always order spares by using the description given in the column headed 'Available spares' and state the size, type and end connection of the trap.

**Example:** 1 off Element assembly for a Spirax Sarco ½" BTM7 thermostatic clean steam trap having screwed NPT connections.



#### Recommended tightening torques

Item No.	Part	or		lb - ft (N m)
		mm	M5	
5	Nuts and bolts	8 A/F	M5	2.2-3 (3-4)

TI-2-0002-US 3.14



## BTS7 and BTS7.1 Stainless Steel Clean Steam Traps

### Description

The Spirax Sarco BTS7 and BTS7.1 are sealed thermostatic steam traps designed to remove condensate from clean steam systems with minimal back up. Applications include sterile steam barriers, process vessels and CIP / SIP systems. Manufactured in 316L stainless steel with minimal crevices, it is self-draining and operates close to steam temperature. When supplied, they are individually packaged with protective end caps and sealed in a polythene bag.

### Options

Fixed bleed to ensure fail open operation.

### Standards

The BTS7 and BTS7.1 fully comply with the ASME BPE, where applicable. They also comply with the requirements of the European Pressure Equipment Directive 97/23/EC. All wetted parts of these traps are manufactured from FDA/3-A approved materials.

### Certification BTS7: Certification to EN 10204 2.2

This product is available with certification to EN 10204 3.1.

**Note:** All certification/inspection requirements must be stated at the time of order placement.

### Surface Finish

BTS7.1	Internal 20µin (0.5µm) Ra. SF1 External 32 µin (.075µm) Ra.
BTS7	Machined finish

### Sizes and pipe connections

**BTS7.1:** ½" and ¾" with sanitary clamp connections.

### BTS7:

¼", ½", ¾", 1" screwed BSP or NPT.

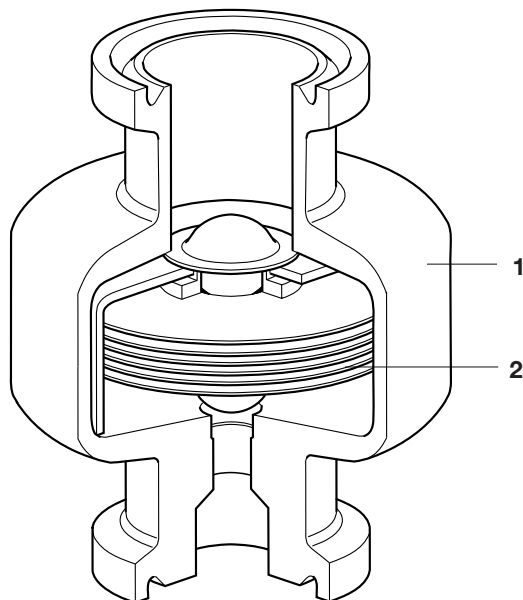
½", ¾", 1" O/D x 16 swg (0.065") wall thickness tube end.

### Pressure and Temperature Limits

Body design conditions		PN7
PMA Maximum allowable pressure	102 psig @ 338°F (7 barg @ 170°C)	
TMA Maximum allowable temperature	338°F @ 102psig (170°C @ 7 barg)	
Minimum allowable temperature	14°F (-10°C)	
PMO Maximum operating pressure for saturated steam service	102 psig (7 bar g)	
TMO Maximum operating temperature	338° F (170°C)	
Minimum operating temperature	32°F (0°C)	
Designed for a maximum cold hydraulic test pressure of 152 psig (10.5 barg)		

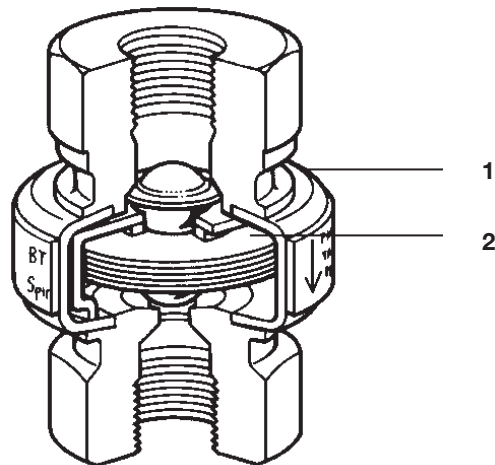
### Materials

No.	Part	Material
1	Body	Stainless steel AISI 316L (1.4404)
2	Element	Stainless steel AISI 316L (1.4404)



**BTS7.1**

with sanitary clamp connections



**BTS7**

with screwed connection

Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only.

In the interests of development and improvement of the product, we reserve the right to change the specification.

TI-P180-40-US 9.13



## Capacities

Pressure (psig)	cold water #/hr	½" and larger hot condensate #/hr.	¼" only hot condensate #/hr.
1	565	50	50
5	1125	124	124
10	1513	217	217
20	2036	404	404
30	2422	590	590
40	2740	777	737
50	3014	963	779
75	3586	1429	855
100	4056	1896	910

## Safety information, installation and maintenance

For full details see the Installation and Maintenance Instructions (IM-P180-05) supplied with the product.

**Installation note:** The trap is designed for installation in vertical lines with the flow downward to ensure self-draining operation. Do not expose the element to superheat conditions since over-expansion may result. Suitable isolation valves must be installed to allow for safe maintenance / replacement.

## How to order example

1 off Spirax Sarco non-maintainable ¾" BTS7.1 clean steam trap suitable for pressures up to 101 psig (7 bar g) with a body that is self-draining.

## Spare parts

There are no spare parts.

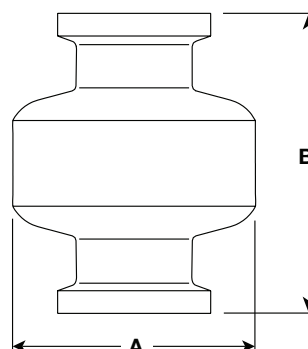
## Sample Specification

Steam trap shall be self-adjusting balanced pressure type capable of operating close to saturated steam temperature. All wetted parts shall be manufactured from 316L stainless steel. Trap shall be sealed construction and shall be completely self-draining when installed in vertical pipeline. Connections shall be 0.065" extended O.D. tube, Tri-Clamp® compatible, or screwed NPT. All wetted parts of this trap are manufactured from FDA/3-A approved materials.

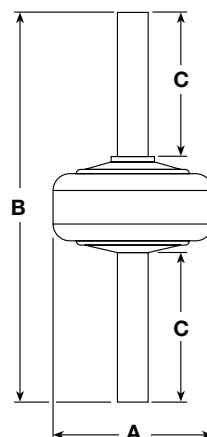
## Dimensions/weights (approximate) in mm and kg

Size	A		B		C		D		Weight		
	Tube	Clamp	Tube	Clamp	Tube	Clamp	Tube	Clamp	Tube	Screwed	Clamp
¼"	1.5 (40)	-	-	-	-	-	2.3 (58)	-	-	0.53	-
½"	1.5 (40)	4.1 (106)	1.9 (49)	1.5 (40)	2.9 (74)	-	0.44	0.49	0.3 (.15)	-	-
¾"	1.5 (40)	4.1 (106)	1.9 (49)	1.5 (40)	3.2 (81)	-	0.51	0.60	0.3 (.15)	-	-
1"	1.5 (40)	4.1 (106)	-	1.5 (40)	3.7 (95)	-	0.60	0.73	-	-	-

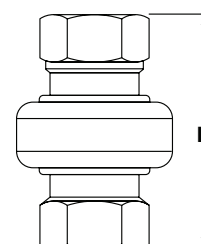
**BTS7.1**



**Tube**



**Screwed**





## Thermo-Dynamic® Steam Trap BTD52L

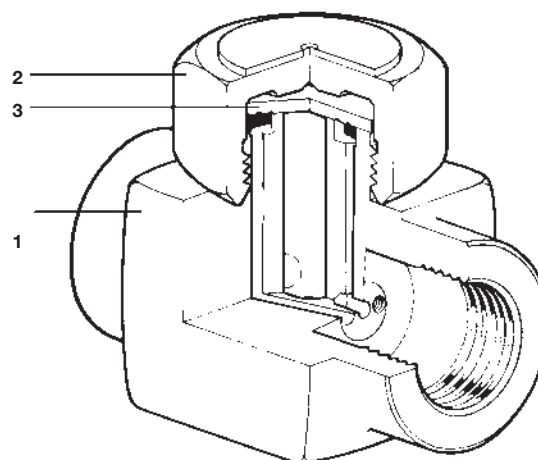
The BTD52L Thermo-Dynamic® Steam Trap is constructed entirely of 316L stainless steel and is suitable for aggressive condensate often found in clean steam systems using deionized water. Condensate and air are discharged at saturated steam temperature without the need for a water seal.

Model □	BTD52L
PMO	150 psig
Sizes	1/4", 3/8" & 1/2"
Connections	NPT, 0.065" O.D. Tube (1/2" only) Tri-Clamp®* compatible (1/2" only)
Construction	316L Stainless Steel
Options	BSP connections Insulcap

\* A registered trademark of Tri-Clover Inc.

### Typical Applications

In the biotechnology, pharmaceutical, fine chemical, food, dairy and beverage industries: main drip service, WFI system sterilization, and drainage of steam filter housing and separators.



### Limiting Operating Conditions

**Max. Operating Pressure (PMO)** 150psig (10 barg)

Minimum pressure for satisfactory operation is 3.5 psi (0.24 bar)  
Maximum back pressure should not exceed 80% of the inlet pressure under any conditions of operation, otherwise the trap may not shut.

**Max. Operating Temperature** 850°F(454°C)  
at all operating pressures

### Pressure Shell Design Conditions

**PMA** 230 psig/0-850°F 16 barg/0-454°C  
Max. allowable pressure

**TMA** 850°F/0-230 psig 454°C/0-16 barg  
Max. allowable temperature

### Capacities

Pressure (psig)	1/2" sanitary clamp, 1/2" OD tube end, 1/4" NPT Flow (lb/h)	3/8", 1/2" NPT Flow (lb/h)
5	71	167
10	89	185
15	101	196
20	111	204
25	120	210
50	150	270
75	171	331
100	188	393
125	203	454
150	215	515

All flows shown are differential flows

### Construction Materials

No.	Part	Material
1	Body	Stainless Steel AISI 316L
2	Cap	Stainless Steel AISI 316L
3	Disc	Stainless Steel AISI 316L
	Insulcap (optional)	Stainless Steel AISI 304

### Material Certification

Actual mill test reports covering the O.D. tube and Tri-Clamp® body and cap material are available if specified at the time of ordering.

Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only.  
In the interests of development and improvement of the product, we reserve the right to change the specification.

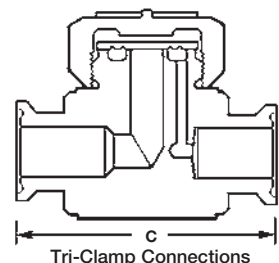
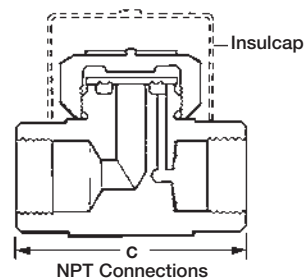
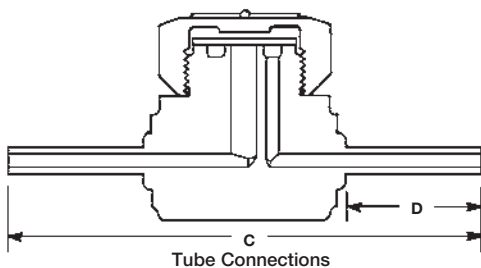
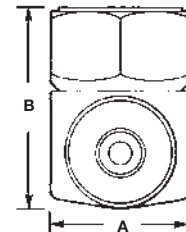
TI-2-518-US 03.07

# Thermo-Dynamic® Steam Trap BTD52L

## Dimensions

(nominal) in inches and millimeters

Size	A	B	C Tube	C Screwed	C Tri-Clamp	D Tube	Weight Tube	Weight Screwed	Weight Tri-Clamp
1/4"	1.4 36	2.1 53	-	2.6 65	-	-	-	1 lb .45 kg	-
3/8"	1.4 36	2.1 53	-	2.6 65	-	-	-	1 lb .45 kg	-
1/2"	1.4 36	2.1 53	4.4 111	2.6 65	2.6 65	1.5 40	1 lb .45 kg	1 lb .45 kg	1.2 lb .55 kg



## Options

**Insulcap** – The insulcap is a friction-fit cover designed to reduce the effect of excessive heat loss resulting from low ambient temperatures, wind, rain, etc. Available as a spare part.

## Sample Specification

Steam trap shall be all ANSI 316L stainless steel thermodynamic disc type with connections on a common center line which can be installed in any position. Integral seat design. Shall not require any water seal for normal operation. Spirax Sarco type BTD52L for all pressures between 3.5 psig (0.24 barg), and 150 psig (10 barg).

## Installation

Preferably install in a horizontal line as close as possible to equipment or pipeline being drained. For freeze proof or self-draining installations, or where horizontal fitting is not possible, the BTD52L may be installed vertically. Full-flow isolating valves should be installed upstream and downstream of the trap.

## Maintenance

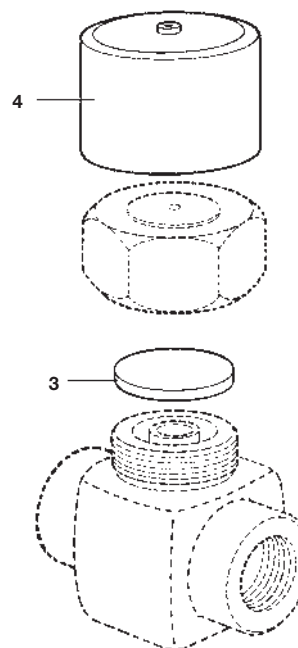
This product can be maintained without disturbing the piping connections. Complete isolation of the trap from both supply and return line is required before any servicing is performed.

The trap should be disassembled periodically for inspection and cleaning of the disc and seat.

The only wearing parts of the trap are the disc and seat rings, which should be inspected and cleaned periodically. Slight wear can often be corrected by resurfacing on a lapping plate.

Complete installation and maintenance instructions are given in the IMI sheet, which accompanies the product.

## Spare Parts



Disc	3
Insulcap	4

Only parts listed above are available as spares



## Horizontal BT6 Hygienic Sanitary Balanced Pressure Steam Trap

### Description

The Spirax Sarco Horizontal BT6 thermostatic balanced pressure steam trap is designed to remove condensate from hygienic and sanitary steam systems with minimal backing up. Applications include sterile steam barriers, block and bleed systems, drainage of steam distribution lines, process vessels and CIP/SIP systems. Manufactured in 316L stainless steel with a crevice free body, it is self-draining and operates close to steam temperature. Traps are individually packaged with protective end caps and sealed in a polythene bag.

### Surface finish

All internal wetted surfaces have a finish of 32  $\mu$  in Ra (0.8  $\mu$ m).

### Standards

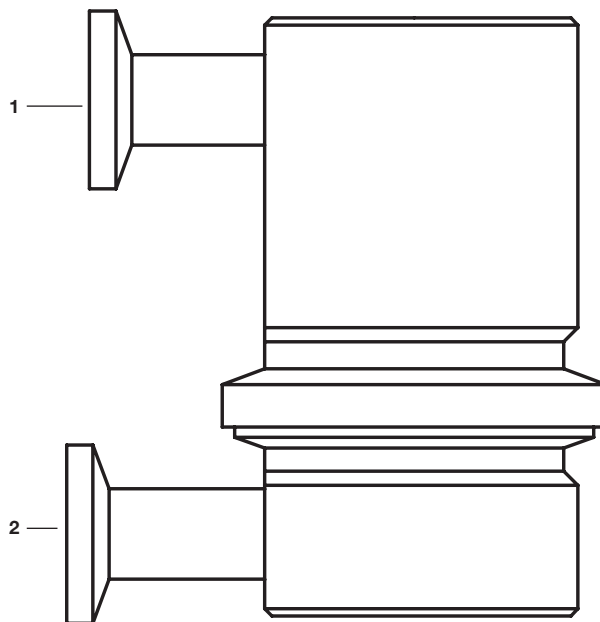
The Horizontal BT6 fully complies with the ASME BPE, where applicable. It also complies with the requirements of the European Pressure Equipment Directive 97/23/EC. The seal complies with FDA CFR title 21, paragraph 177, section 1550. All wetted parts of this trap are constructed from FDA/3-A approved materials.

### Certification

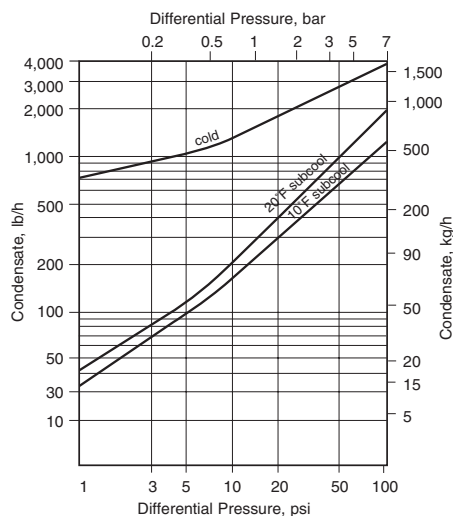
This product is available with certification to EN 10204 3.1.B. Note: All certification/inspection requirements must be stated at the time of order placement.

### Sizes and pipe connections

1/2" sanitary clamp compatible connections.



### Capacities



Body design conditions		PN10
PMA Maximum allowable pressure	338°F@145psig (140°C@10 bar g)	
TMA Maximum allowable temperature	350°F@132psig (177°C@9.2 barg)	
Minimum allowable temperature	-425°F (-254°C)	
PMO Maximum operating pressure	87 psig (6 bar g)	
for saturated steam service		
TMO Maximum operating temperature	329°F@87psig (165°C@6 bar g)	
Minimum operating temperature	32°F (0°C)	
Designed for a maximum cold hydraulic test pressure of	217 psig (15 bar g)	

### Construction Materials

No.	Part	Material
1	Body (Inlet Side)	Stainless Steel ASTM A276-87 Gr. 316L
2	Body (Outlet Side)	Stainless Steel ASTM A276-87 Gr. 316L
3	Element	Stainless Steel AISI 316L
4	Body Clamp	Stainless Steel AISI 304L
5	Gasket	PTFE Jacketed Viton

**Note:** PTFE complies with FDA, CFR title 21, paragraph 177, section 1550. All wetted parts of this trap are constructed from FDA approved materials.

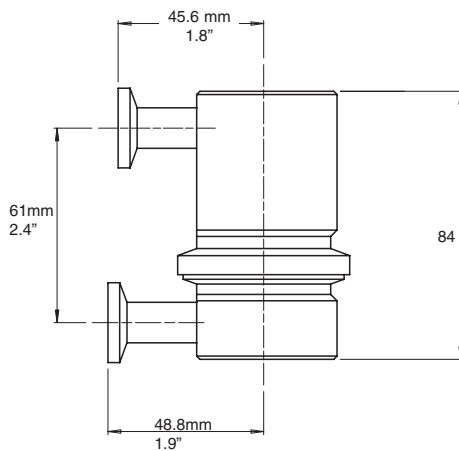
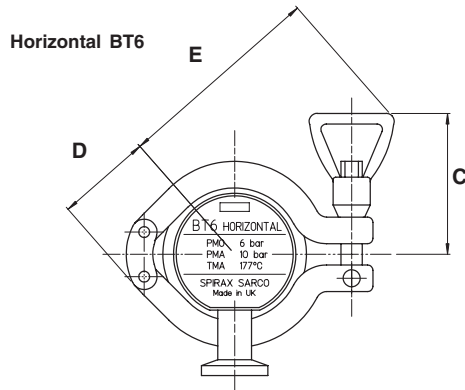
### Material Certification

Actual mill test reports covering the Horizontal BT6 body material are available if specified at the time of ordering.

# Horizontal BT6 Hygienic Sanitary Balanced Pressure Steam Trap

## Dimensions/weights (approximate) in inches and lb

Size	A	B	C	D	E	Weight
½"	2.6"	2.1"	2.1"	1.4"	3.3"	1.9 lb



## Spare parts

### Available spares

Element assembly	1
Seal Gasket Kit (set of 3)	2

## How to order spares

Always order spares by using the description given in the column headed 'Available spares' and state the size and type of trap.

**Example:** 1 - Element assembly for a Spirax Sarco ½" Horizontal BT6 hygienic sanitary balanced pressure steam trap.

## Installation

The trap is designed to be fitted in horizontal lines with the flow downwards so that it can be completely self-draining. Check flow arrow for correct orientation. Fittings, clamps and gaskets for pipe end connections are not supplied. Do not over expose the element to superheat conditions since over expansion may result.

Note: The body and element must be handled carefully to ensure that the machined surfaces are not damaged.

## Sample Specification

Steam trap shall be self-adjusting balanced pressure type capable of operating close to saturated steam temperature. All wetted parts shall be manufactured from 316L grade stainless steel with body parts finished internally and externally to 32 µ in Ra. Trap shall have body clamp to allow maintenance of internals, and shall be completely self-draining when installed in vertical pipeline.

## Maintenance

Before undertaking any maintenance on the trap, it must be isolated from the supply line and return line and any pressure allowed to normalize to atmosphere. The trap assembly should then be allowed to cool.



# Stainless Steel Balanced Pressure Thermostatic Air Vent AVM7

## Description

The AVM7 (maintainable) is a vertical body thermostatic air vent, with all AISI 316L construction designed for use in clean steam systems. Normal operation is close to saturated steam temperature.

Model	AVM7
PMO	102 psig
Sizes	1/4, 1/2", 3/4", 1"
Connections	0.065" O.D. Tube, NPT or Tri-Clamp®*
Construction	All 316L Stainless Steel
Options	3.1B available (upon request) FEP encapsulated silicone 'O' ring is recommended and available. For use on systems where there is, or maybe lactic acid present.

\* A registered trademark of Tri-Clover Inc.

## Limiting Operating Conditions

Max. Operating Pressure (PMO) 102 psig (7 barg)

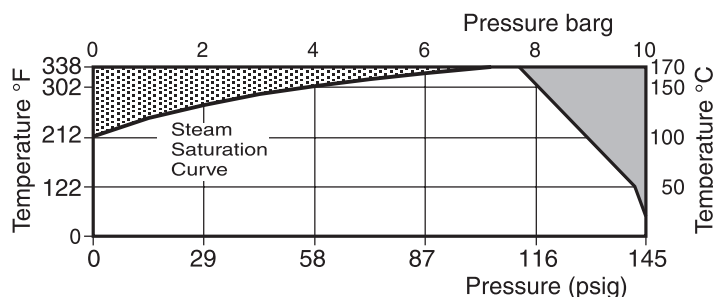
Max. Operating Temperature Saturated Steam Temperature

## Pressure Shell Design Conditions

PMA	145 psig/0-302°F	10 barg/0-150°C
Max. allowable pressure	132 psig/338°F	9 barg/170°C

TMA	338°F/0-132 psig	170°C/0-9 barg
Max. allowable temperature		

## Pressure / temperature limits (ISO 6552)



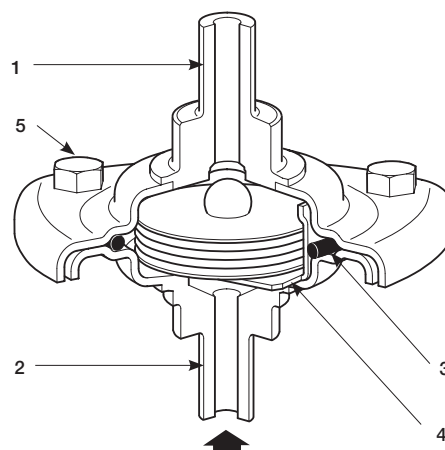
## Capacities

Pressure (psig)	Flow (SCFM)
1	7
5	8
10	11
20	15
30	19
50	28
75	39

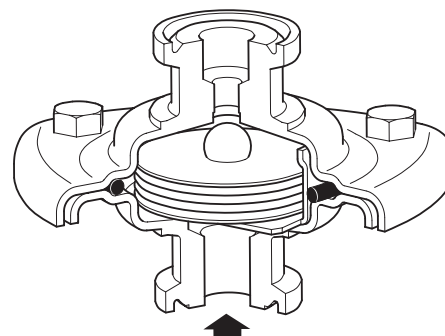
## Typical Applications

Fermenter sterilization, steam barriers (block & bleed systems), sterilizer drainage and air venting, CIP/SIP system condensate drainage, and sterilization of process vessels and pipes.

### AVM7 with butt weld ends



### AVM7 with sanitary clamp compatible hygienic connections



## Construction Materials

No.	Part	Material
1	Body (Inlet)	Stainless steel AISI 316L (1.4404)
2	Body with seal (outlet)	Stainless steel AISI 316L (1.4404)
3	O-Ring gasket	FKM compound (V1274-80) complies with FDA 21CFR 177.2600 and is USP Class VI approved. For use on all clean systems or where lactic acid may be present.
4	Element	Stainless Steel AISI 316L
5	Nuts & Bolts Washers	Stainless Steel BS6105 Gr A4 80 Austenitic stainless steel

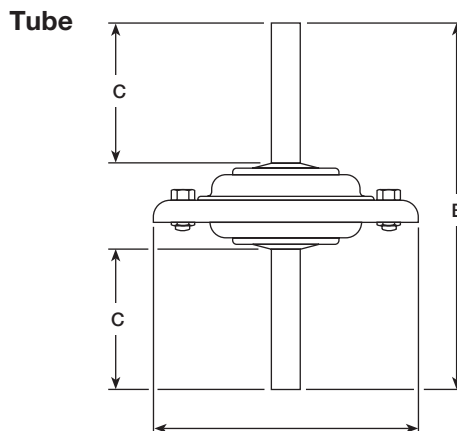
Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only.  
In the interests of development and improvement of the product, we reserve the right to change the specification.

TI-P123-22-US 2.09

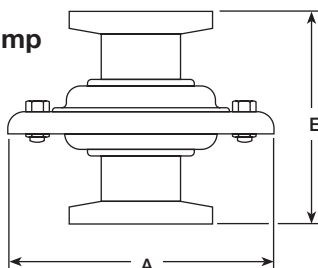
# Stainless Steel Balanced Pressure Thermostatic Air Vent AVM7

**Dimensions** (nominal in inches and millimeters)

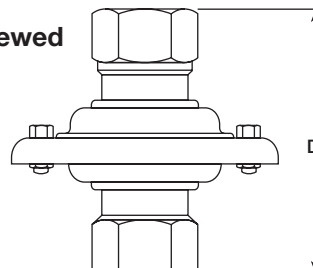
AVM7								
Size	A	B	C	D	E	Weight		
		Tube	Tube	Screwed	Tri-Clamp*	Tube	Screwed	Tri-Clamp*
1/4"	2.8 70			2.3 .58			1.2 .53	
1/2"	2.8 70	4.2 106	1.5 40	2.9 74	1.85 47	.62 lb .28 kg	.66 lb .30 kg	.48 lb .22 kg
3/4"	2.8 70	5.1 130	1.5 40	3.2 81	1.85 47	.68 lb .31 kg	.77 lb .35 kg	.48 lb .22 kg
1"	2.8 70	5.0 126	1.5 40	3.7 95	1.85 47	.77 lb .35 kg	.90 lb .41 kg	.78 lb .37 kg



**Sanitary clamp**



**Screwed**



## Sample Specification

Steam trap shall be self-adjusting balanced pressure type capable of operating close to saturated steam temperature. All wetted parts shall be manufactured from 316L stainless steel. Air Vent shall be maintainable, and shall be completely self-draining when installed in vertical pipeline. Connections shall be 0.065" extended O.D. tube, Tri-Clamp® compatible, or screwed NPT.

## Installation

The traps are designed for installation in vertical lines with the flow downward to ensure self-draining. The element may be damaged if it is exposed to superheated steam. Full-flow isolating valves, such as Spirax Sarco Model M70i Clean Steam Ball Valve, should be installed so as to permit servicing.

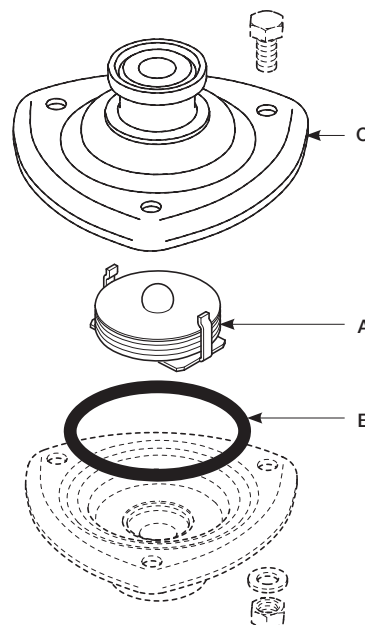
## Maintenance

The AVM7 is a maintainable trap. Maintenance on the AVM7 can be performed once the steam trap is isolated from system and return line pressure. Complete Installation & Maintenance instructions are given in IM-P123-23, which is included with the product.

## Spare Parts

Element Assembly	A
Gasket (Pkt of 3)	B
Body with Seat	C

Available spare parts are shown in heavy outline. Parts shown in broken lines are not available as spares.







## Stainless Steel Sanitary Pressure Regulator SRV6

The SRV6 is an angle pattern, sanitary pressure regulator with polished 316/316L stainless steel construction for use on steam, process liquids and gases.

<b>Model</b>	SRV6
<b>Sizes</b>	1", 1-1/2", 2"
<b>Connections</b>	Sanitary Clamp
<b>Construction</b>	All 316/316L Stainless Steel Wetted Parts

### Typical Applications

Clean steam, gas, and liquid supplies to bioreactors, centrifuges, freeze dryers (lyophilizers), sterilizers, autoclaves, process tanks, production suites, humidifiers, and culinary equipment.

### Construction Materials

No.	Part	Material	
1	Adjusting screw	Stainless Steel (PTFE coated)	AISI 303
2	Lock nut	Stainless Steel	AISI 304
3	Spring chamber	Stainless Steel	AISI 316L
4	Spring pusher	Stainless Steel	AISI 304
5	Spring	Stainless Steel	
6	Diaphragm nut	Stainless Steel	AISI 304
7	Spring washer	Stainless Steel	
8	Spacer ring	Stainless Steel	AISI 304
9	Retainer	Stainless Steel	AISI 304
10	Upper disc	Stainless Steel	AISI 304
11	V-band clamp	Stainless Steel	AISI 300 Series
12	Lower disc	Stainless Steel	AISI 316
13	Main valve	Stainless Steel	AISI 316
14	Body	Stainless Steel	AISI 316L
15	Diaphragm	Viton/PTFE (FDA approved)	

### Surface Finish

All wetted parts mechanically polished to 20 microinch Ra then electropolished. All external parts electropolished

### Pressure Ranges

Downstream Control Range: 7-75 psi 0.5– 5.2 bar

### Shutoff

ANSI Class III

Note: The SRV6 should not be used for line isolation. If line isolation is required, a suitable shut-off valve should be installed upstream of the SRV6.

### Limiting Operating Conditions

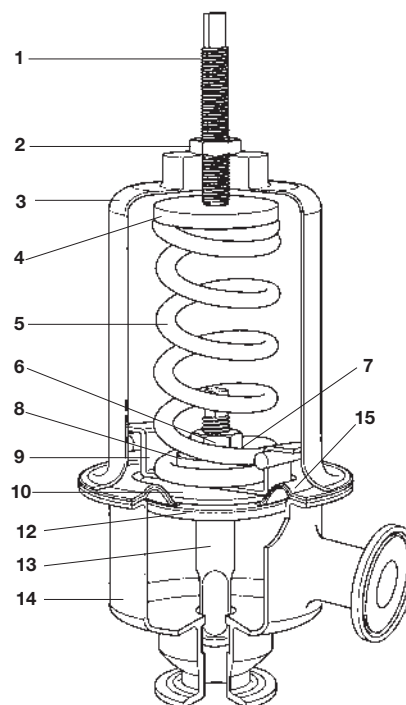
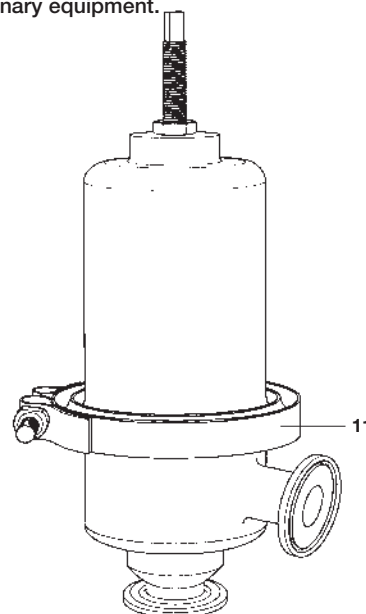
Max. Operating Pressure (PMO) 116 psig 8.0 barg

Max. Operating Temperature 347°F 175°C

### Pressure Shell Design Conditions

PMA 232 psig 15 barg  
Max. allowable pressure

TMA 347°F 175°C  
Max. allowable temperature



Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only.  
In the interests of development and improvement of the product, we reserve the right to change the specification.

TI-3-111-US 6.13

# Stainless Steel Sanitary Pressure Regulator SRV6

## Valve Selection:

### Step 1

#### For Steam:

Establish whether the flow is critical or non-critical, and calculate the required  $C_v$  using one of the following formula:

$$\text{Critical } \Delta P \quad P_2 < \frac{1}{2} P_1 \quad C_v = \frac{Q}{1.6 \times P_1}$$

$$\text{Noncritical } \Delta P \quad P_2 > \frac{1}{2} P_1 \quad C_v = \frac{Q}{3.2 \times \sqrt{(P_1 - P_2) \times P_2}}$$

All pressures in psi absolute

#### For Liquids:

Calculate the required  $C_v$  using the following formula:

$$C_v = W \sqrt{\frac{S.G.}{\Delta P}}$$

Q = Steam load lb/h  
P1 = Primary pressure (psia)  
P2 = Secondary pressure (psia)  
W = Liquid flow rate (GPM)  
SG = Specific gravity of liquid  
 $\Delta P$  = Pressure differential

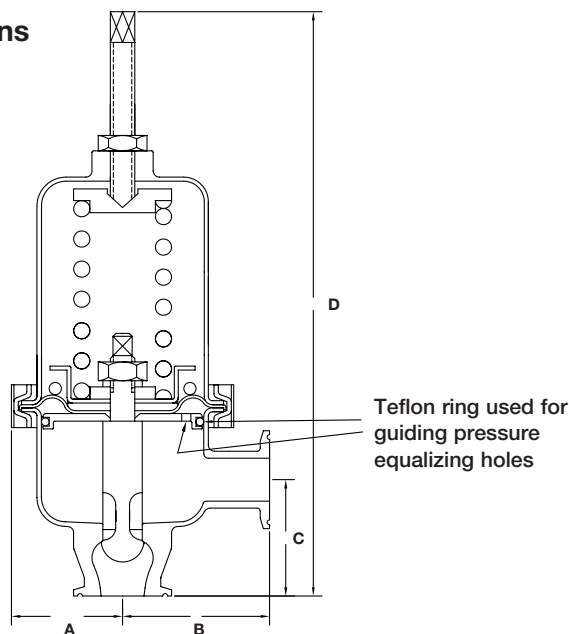
### STEP 2

For highest control accuracy, especially on widely fluctuating loads, select the valve size with the closest  $C_v$  at 20% droop to the required value.

For steady load applications, or where high accuracy of control is not required, the maximum  $C_v$  figure can be used for selection.

$C_v$ Values				
Valve size	1"	1-1/2"	2"	
Average $C_v$ at 20% droop	2.5	3.0	4.2	
Maximum $C_v$	5.5	13.5	27	

## Dimensions



### Dimensions (nominal) in inches and millimeters

Size	A	B	C	D	Weight lb(kg)
1"	2.3	3.0	2.4	12	6.5
	58	77	60	305	3.0
1-1/2"	2.3	3.0	3.5	13.3	7.2
	58	77	90	340	3.3
2"	2.3	3.0	4.3	14.8	8.9
	58	77	110	355	4.0

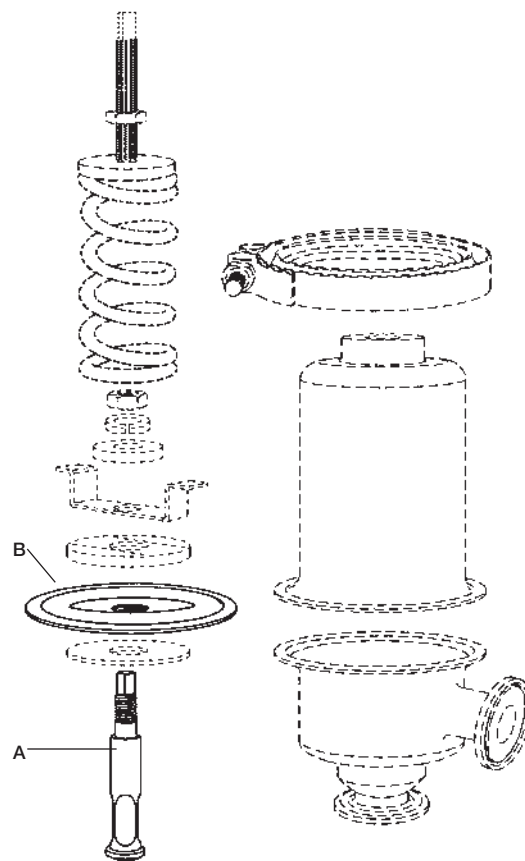
## Installation

The SRV6 should be installed with the inlet vertical and the spring chamber upward. Full installation instructions accompany each valve.

## Maintenance

Complete isolation of the valve is required before any servicing is performed. Full installation & maintenance instructions are given in IMI 3.111 which accompanies the product.

## Spare Parts



Main Valve A  
Diaphragm B  
Only parts listed above are available as spares.

## Sample Specification

Stainless steel sanitary pressure regulator shall be diaphragm actuated with integral valve guide and have all wetted parts in AISI 316/316L mechanically polished to 20 microinch Ra then electropolished. All parts AISI 300 series with electropolished external surfaces. Angle pattern design shall be fully self-draining when installed with inlet vertical. Spirax Sarco SRV6 sanitary pressure regulator

TI-3-111-US 6.13



## SSC20 Sanitary Sample Cooler

### Description

The Spirax Sarco SSC20 sanitary sample cooler has been specifically designed for taking high quality chemical, conductivity and microbiological samples quickly and safely from clean/pure steam, water for injection (WFI) and other high purity media systems.

The unit consists of high quality 316L stainless steel components and utilizes a counter current flow to maximize cooler efficiency, resulting in a compact, space saving design.

All sample contact surfaces are compliant to current ASME BPE requirements, surface finish of better than 20  $\mu$ -in Ra (0.5  $\mu$ -m Ra).

The unit is provided with an integral pre drilled mounting bracket to allow simple installation at point of use.

### Principal features:

- Internal surface finish of coil better than 20  $\mu$ -in Ra (0.5  $\mu$ -m Ra) to ensure high sterility.
- Coil manufactured from fully traceable 316L stainless steel.
- Self-draining design to eliminate sample retention.
- Fully sterilizable/autoclavable - to ensure integrity of unit between samples.
- Integral mounting bracket to facilitate simple installation.

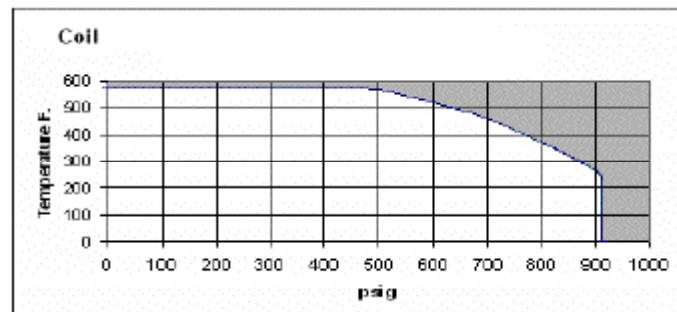
### Sizes and pipe connections

Cooling water inlet and outlet connections	NPT version	1/2" NPT
	Optional - BSP version	1/2" BSP

Sample tube inlet and outlet connections	1/2" adaptor for clamp fitting (clamp not supplied) on sample inlet. 6 mm O/D on sample outlet.
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### Limiting conditions

Part	Design temperature	Design pressure
Body	212°F	145 psig
Cold hydraulic test pressure		232 psig

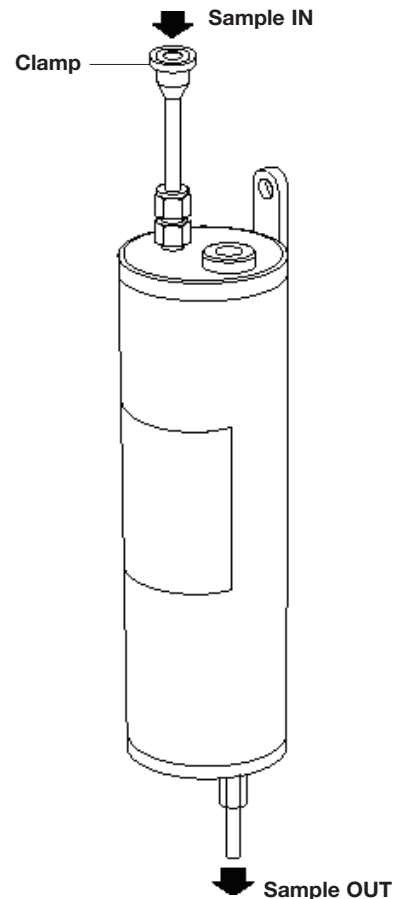


The product must not be used in this region.

**Clamp** - Pressure and temperature dependent on clamp manufacturers recommendation.

### Materials

Body	Austenitic stainless steel grade 316L
Coil	Austenitic stainless steel grade 316L



### Surface finish

Sample contact surfaces are compliant to current ASME BPE requirements.

Ra Maximum 20  $\mu$ -in Ra (0.5  $\mu$ -m Ra).

### Packaging

All packaging of the SSC20 sanitary sample cooler is conducted in a clean environment segregated from other non stainless steel manufacture and is in accordance with ASME BPE:

- Sample Inlet and outlet connections are capped.
- Sample coolers are sealed in 100-micron thick plastic bags.

### Certification

If requested at the time of order the SSC20 can be supplied with the following certification:

- Materials certificates to EN 10204 3.1
- Internal coil surface finish certification.

# SSC20 Sanitary Sample Cooler

## Performance

The tables below show typical sample outlet temperatures above cooling water inlet temperatures for several pressures and cooling water flowrates.

### Example

A sample flowrate of 0.13 GPM is required from a boiler operating at 145 psig. For a cooling water flowrate of 4.8 GPM from Table 1 the sample outlet temperature would be 7°F above the cooling water inlet temperature. If the cooling water is at 60°F, the sample temperature would be 67°F. Table 2 is used in the same way for steam. Samples may not be taken where marked '-' as the flow is limited by the sample inlet valve capacity.

**Table 1 Saturated water (e.g. boiler water)**

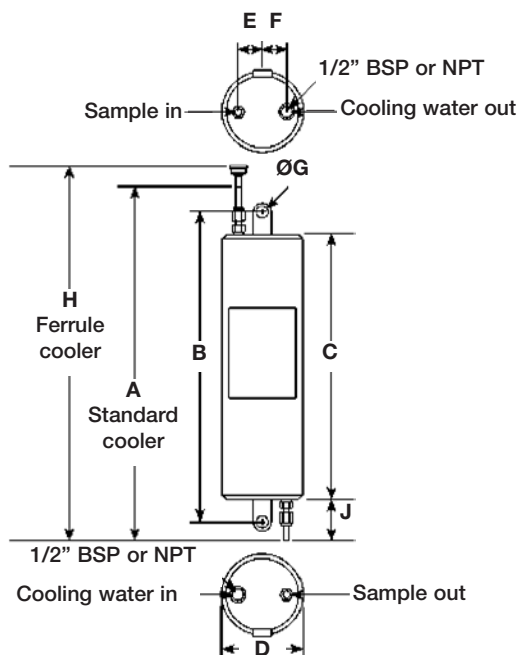
Sample Flowrate GPM	Cooling water flowrate 1.6 GPM					Cooling water flowrate 4.8 GPM					Cooling water flowrate 9.5 GPM				
	Boiler pressure psig														
	15	45	100	145	290	15	45	100	145	290	15	45	100	145	200
0.04	2°F	2°F	5°F	11°F	11°F	0°F	0°F	2°F	2°F	7°F	0°F	0°F	0°F	0°F	4°F
0.09	4°F	4°F	11°F	14°F	14°F	2°F	2°F	4°F	4°F	11°F	0°F	0°F	0°F	2°F	7°F
0.13	9°F	9°F	14°F	20°F	20°F	5°F	5°F	7°F	7°F	14°F	0°F	0°F	4°F	5°F	11°F
0.18	13°F	13°F	20°F	23°F	23°F	9°F	9°F	11°F	11°F	18°F	2°F	2°F	4°F	5°F	14°F
0.22	18°F	18°F	23°F	27°F	27°F	11°F	11°F	14°F	14°F	22°	5°F	5°F	7°F	9°F	16°F
0.26	25°F	25°F	29°F	32°F	32°F	16°F	16°F	18°F	18°F	25°F	7°F	9°F	9°F	11°F	20°F
0.35	29°F	32°F	36°F	40°F	40°F	20°F	22°F	23°F	25°F	32°F	11°F	13°F	14°F	16°F	27°F
0.44	32°F	36°F	43°F	47°F	49°F	27°F	29°F	29°F	32°F	40°F	18°F	20°F	22°F	23°F	32°F
0.53	40°F	41°F	52°F	54°F	56°F	31°F	32°F	36°F	41°F	47°F	20°F	23°F	27°F	31°F	40°F

**Table 2 Saturated steam**

Sample Flowrate bl/h	Cooling water flowrate 1.6 GPM						Cooling water flowrate 4.8 GPM						Cooling water flowrate 9.5 GPM					
	Boiler pressure psig																	
	7	30	75	100	145	290	7	30	75	100	145	290	7	30	75	100	145	290
11	5°F	5°F	7°F	9°F	11°F	11°F	4°F	4°F	5°F	5°F	7°F	7°F	2°F	2°F	2°F	4°F	4°F	4°F
22	-	13°F	14°F	14°F	14°F	16°F	-	7°F	7°F	7°F	7°F	9°F	-	2°F	4°F	4°F	4°F	4°F
33	-	-	16°F	18°F	18°F	20°F	-	-	9°F	11°F	11°F	13°F	-	-	4°F	4°F	5°F	7°F
44	-	-	-	22°F	23°F	25°F	-	-	-	14°F	16°F	16°F	-	-	-	7°F	9°F	11°F
66	-	-	-	-	38°F	38°F	-	-	-	-	25°F	25°F	-	-	-	-	16°F	18°F
88	-	-	-	-	-	50°F	-	-	-	-	-	36°F	-	-	-	-	-	23°F
110	-	-	-	-	-	63°F	-	-	-	-	-	45°F	-	-	-	-	-	31°F
132	-	-	-	-	-	76°F	-	-	-	-	-	54°F	-	-	-	-	-	38°F
154	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

## Dimensions (approximate) in inches

A	B	C	D	E	F	G	H	J
16.1	13.8	11.8	3.5	1.0	0.9	0.5	17.7	2.2



## How to order

Example: 1 of Spirax Sarco type SSC20 sanitary sample cooler with 1/2" sanitary clamp sample inlet connection and maximum coil internal surface finish of 20 µ-in Ra (0.5 µ-m Ra). The cooling water connections are to be BSP.

## Installation

See Installation and Maintenance Instructions for full details, as insufficient information is given here for safe installation.

### Notes on installation

**WARNING:-** To avoid the risk of scalding, it is essential that a full flow of cooling water is present before opening the sample inlet valve. Always close the sample inlet valve before turning off the cooling water. Sample pipework becomes very hot under normal working conditions, and will cause burns if touched.

We recommend the use of corrosion resistant pipework suitable for the fluid being sampled.

Keep the length of all pipe runs to the minimum.

Cooling water must be clean and free from scale forming salts.

The sample cooler must be mounted vertically.

The cooling water inlet is connected in 1/2" nominal bore pipe via an inlet valve.

The cooling water outlet should be piped to an open drain or funnel.

The sample inlet pipe should be in 6 mm O/D tube.

We recommend that a funnel piped to drain is located under the outlet, with sufficient space below it for a beaker or similar sample container.

## Weights (approximate)

Cooler	6.8 lbs
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## Maintenance

No routine maintenance is required.

TI-P403-82-US 5.13



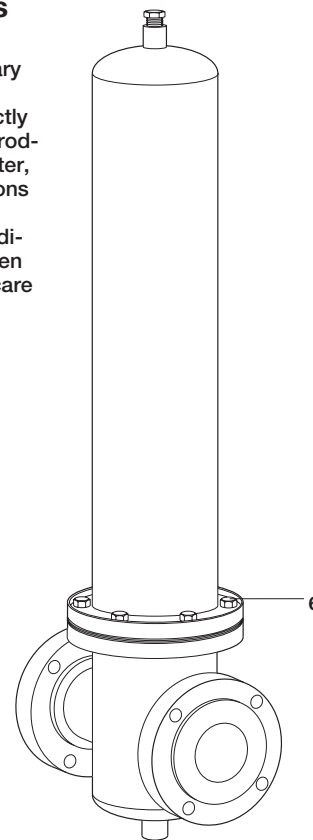
## Stainless Steel Filter CSF26

The CSF26 is an in-line all 316 stainless steel filter suitable for use in steam, gas and liquid systems. The CSF26 is USDA approved, and conforms to the requirements of 3-A Accepted Practice Number 609-03 for the production of culinary steam. The CSF26 utilizes a fully cleanable sintered stainless steel element for reduced cost of ownership.

Model	CSF26
Sizes	1/2", 3/4", 1", 1-1/2", 2", 2-1/2", 3"
Connections	NPT (1/2" - 2"), ANSI 150 (2-1/2" & 3")
Construction	Body: 316 Stainless Steel Element: 316 Stainless Steel
Element Rating	2.8 microns Absolute
Options	Tri-Clamp® compatible, flanged ANSI 150 (1/2"-2") and BSP connections, 4" & 6" sizes

### Typical Applications

The CSF26 is ideally suited for culinary applications, where steam is being directly injected into food product, wash-down water, etc. Other applications include autoclaves, sterilizers and humidification systems often found in the healthcare and pharmaceutical industries.



### Limiting Operating Conditions

Max. Operating Pressure (PMO) 150 psig/(10.3 barg)

Max. Operating Temperature (TMO) 366°F/(186°C)

### Pressure Shell Design Conditions

PMA 275 psig/0-100°F 19 barg/0-38°C

Max. allowable pressure

TMA 750°F/0-95 psig 399°C/0-6.5 barg

Max. allowable temp.

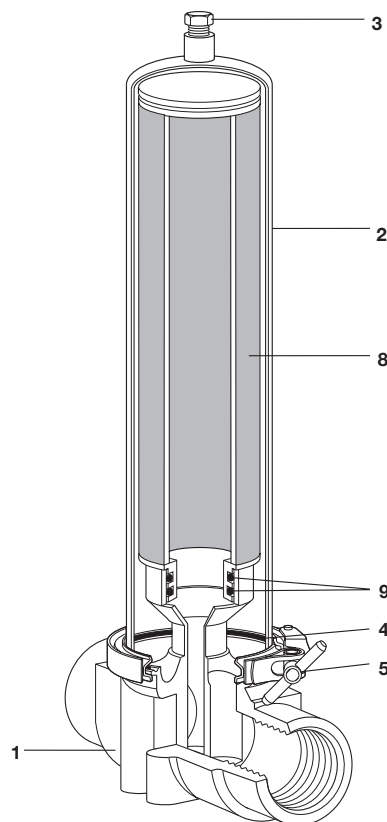
Element Design Conditions 15 psi/1 bar

Max. element differential pressure

### Construction Materials

No.	Part	Material
1	Filter Body	Stainless Steel
		1/2" & 3/4" SA-351 CF3M
		1" - 2-1/2" SA-351 CF8M
		3" SA-240 Gr. 316
2	Filter Bowl	Stainless Steel
		1/2" & 1" SA-240 Gr. 316L
		1-1/2" - 3" SA-240 Gr. 316
3	Plug	Stainless Steel 316
4	O-Ring	EPDM
5	Body Clamp (1/2"-2-1/2")	Stainless Steel 300 Series
6	Bolt (3" only)	Stainless Steel SA-193 Gr. B8
7*	Nut (3" only)	Stainless Steel 304
8	Element	
		Sintered Material Stainless Steel 316L Sintered Media
		End Caps Stainless Steel SA-479 Gr. 316
9	O-Rings (2)	EPDM

\* Not shown in drawing.



Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only.  
In the interests of development and improvement of the product, we reserve the right to change the specification.

TI-7-005-US 01.11

# Stainless Steel Filter CSF26

## Dimensions (nominal) in inches and millimeters

Size	A	B	C	D	E	Weight
1/2"	8.0 203	4.3 110	0.6 14	2.5 64	7.0 178	3.6 lb 1.6 kg
3/4"	8.9 225	4.9 124	0.6 16	2.5 64	8.0 203	4.2 lb 1.9 kg
1"	9.6 245	4.9 124	1.3 32	4.0 102	7.0 178	5.9 lb 2.7 kg
1-1/2"	13.8 349	6.3 160	1.6 40	4.0 102	10.0 254	10.5 lb 4.8 kg
2"	22.3 565	6.7 170	1.9 48	4.0 102	18.0 457	14.0 lb 6.3 kg
2-1/2"	28.9 734	11.0 279	3.5 89	4.0 102	23.0 584	33.0 lb 15.0 kg
3"	44.0 1118	14.0 356	6.1 154	6.6 168	30.0 762	80.0 lb 36.4 kg

Vent and drain connection on all sizes - 1/4" NPT. Weight includes element.

**Capacities** – The following table lists CSF26 capacities, in lb/h of saturated steam, based on a pipeline velocity of 100 ft/s and an approximate differential pressure across the filter of 1 psi.

Steam Supply Pressure	Filter Size						
psig	1/2"	3/4"	1"	1-1/2"	2"	2-1/2"	3"
10	35	65	110	270	445	640	1,000
20	50	90	150	370	615	880	1,375
30	60	110	190	470	780	1,120	1,745
40	75	135	230	565	945	1,350	2,110
50	90	160	270	660	1,105	1,585	2,470
60	100	185	310	755	1,265	1,810	2,830
70	115	210	350	850	1,420	2,040	3,180
80	125	230	385	950	1,580	2,270	3,535
90	140	255	425	1,040	1,740	2,495	3,885
100	150	280	460	1,130	1,895	2,710	4,235
110	165	300	500	1,230	2,050	2,945	4,585
120	175	325	540	1,320	2,210	3,170	4,945
130	190	350	575	1,400	2,365	3,395	5,290
140	200	370	615	1,500	2,520	3,615	5,635
150	210	390	650	1,600	2,675	3,840	5,985

For liquid and gas applications, consult factory.

Higher capacities are available with 4" and 6" size filters. For further information, consult factory.

## Steam Filter Efficiency

The 2.8 micron absolute rated filter element will remove 95% of all particles exceeding 2 microns.

## Filter Stations

Also available from Spirax Sarco are a range of steam filter stations which conform to the requirements of the 3-A Accepted Practice Number 609-03. Each filter station includes a moisture separator with trap-set, strainer, CSF26 filter, together with the necessary auxiliary products required for efficient steam filtration. Further details are available upon request.

## Sample Specification

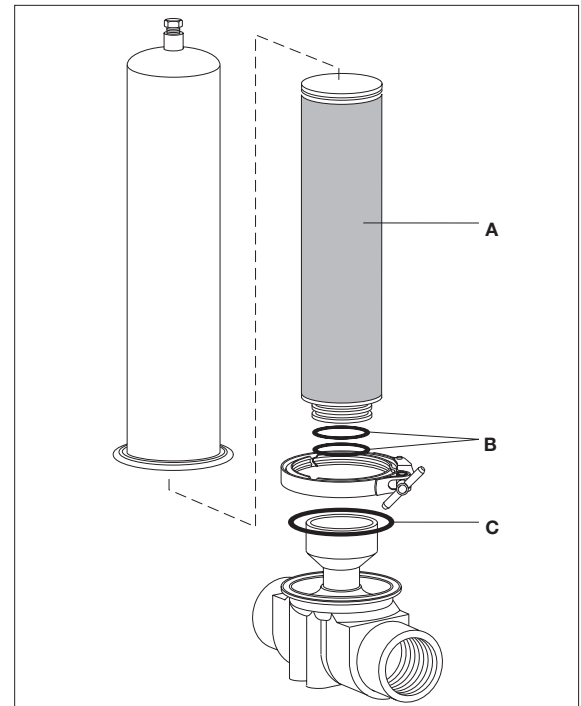
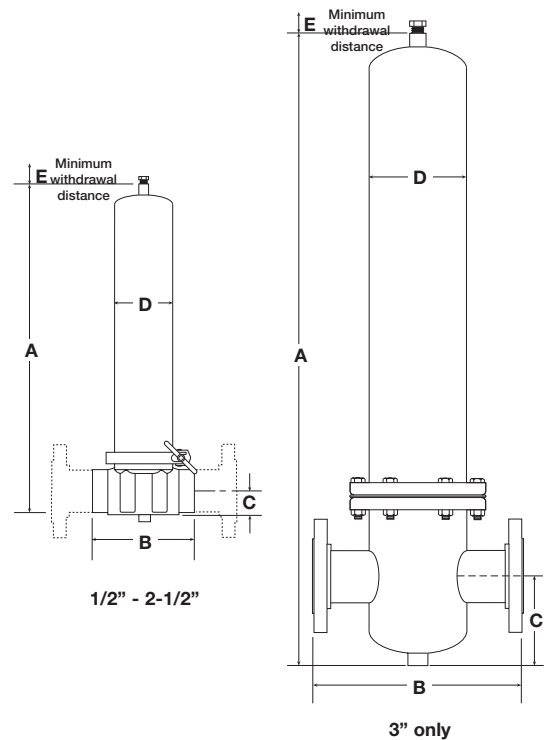
Steam filter shall be all 316 stainless steel, with cleanable sintered stainless steel element. Filter element to utilize double O-Ring seal, and be capable of removing 95% of all particles 2 microns and above. Body and element seals to be an FDA approved material. Vent and drain connection on all sizes.

## Installation & Maintenance

When used in steam service, it is recommended to remove the plastic drain plug and fit the CSF26 with a condensate drain trap and an air vent (Spirax Sarco MST 21). To prolong service life and ensure optimum filter efficiency, a strainer and separator should be installed upstream of the filter. This will ensure that entrained moisture and larger solid particles such as rust and pipscale are removed prior to filtration.

It is recommended that the element be removed for cleaning when the differential pressure across the filter reaches 10 - 15 psi. Cleaning can be achieved either chemically or ultrasonically. Complete installation and maintenance instructions, which include element cleaning procedures, accompany the product.

Spirax Sarco, Inc., 1150 Northpoint Blvd, Blythewood, SC 29016



## Spare Parts

Filter Element with O-Rings	A
Filter Element O-Rings(Pack of 2)	B
Body O-Rings(Pack of 2)	C

High Purity

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TI-7-005-US 01.11

Telephone: (803) 714-2000 FAX (803) 714-2222





## Stainless Steel Filter 4" CSF26

The CSF26 is an in-line all 316 stainless steel filter suitable for use in steam, gas and liquid systems. The CSF26 is USDA approved, and conforms to the requirements of 3-A Accepted Practice Number 609-03 for the production of culinary steam. The CSF26 utilizes a fully cleanable sintered stainless steel element for reduced cost of ownership.

Model	CSF26
Sizes	4"
Connections	ANSI 150
Construction	Body: 316 Stainless Steel Element: 316 Stainless Steel (2 Elements Required)
Element Rating	2.8 microns Absolute
Options	Tri-Clamp® compatible, BSP connections

### Typical Applications

The CSF26 is ideally suited for culinary applications, where steam is being directly injected into food product, wash-down water, etc. Other applications include autoclaves, sterilizers and humidification systems often found in the healthcare and pharmaceutical industries.

### Limiting Operating Conditions

Max. Operating Pressure (PMO) 195 psig/(10.4 barg)

Max. Operating Temperature (TMO) 375°F/(190°C)

### Pressure Shell Design Conditions

**PMA** 200 psig/0-100°F 13.8 barg/0-38°C  
Max. allowable pressure

**TMA** 375°F/0-95 psig 190°C/0-6.5 barg  
Max. allowable temp.

**Element Design Conditions** 20 psi/1.4 bar

Max. element differential pressure  
Housing is designed to contain (2) filter cartridges. Cartridges are not factory installed.

### Construction Materials

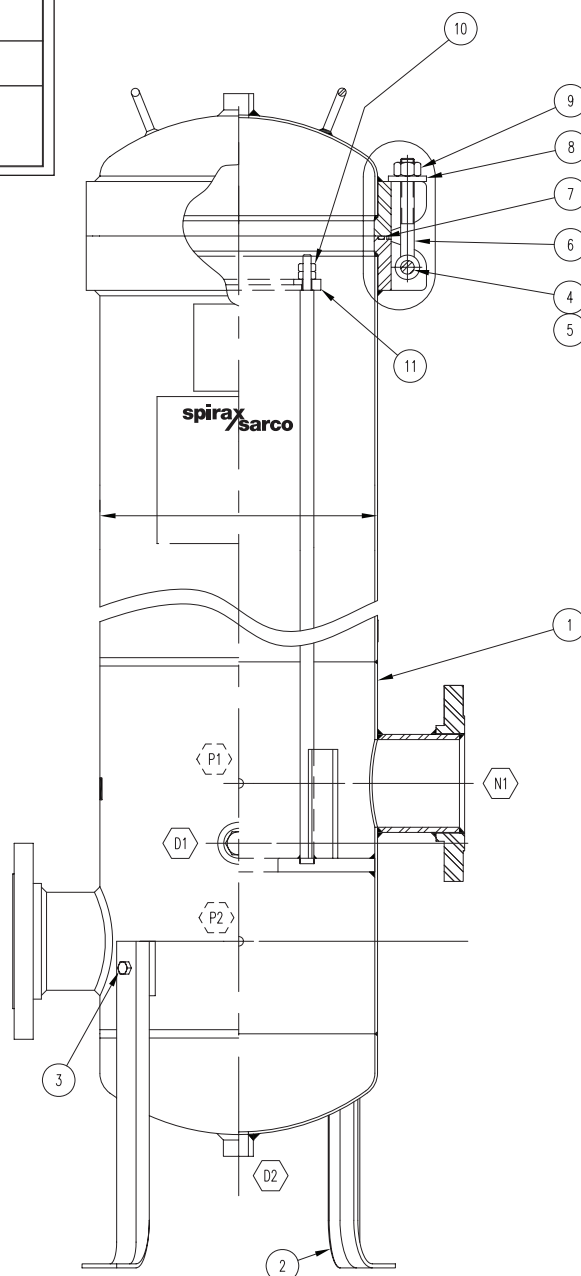
No.	Part	Material
1	HSG, Filter	316 SST
2	LEG, Filter (4)	304 SST
3	Kit, Accessory (4)	SST
4	Ring, RTNG (16)	Truarc 5133-62
5	Pin (5)	SA193 GRB7 ZP
6	Bolt Rod End (8)	5/8-11 UNC-2A x 5.00LG SA193 GRB7 ZP
7	O-Ring	EPDM
8	Washer, Plain (8)	5/8" x 1/4" THK CS Zinc Pltd
9	Nut, Hex (8)	5/8-11 UNC-2B SA194 GR2H ZP
10	Nut, Hex (4)	3/8-16UNC, 316SST SA184 GR8M
11	Plate, Guide	SA240 316

### Minimum Clearance

29.875" (758.8) minimum required for element removal

### Surface Finish

All internal process wetted surfaces are 316 stainless steel material. The interior surface is electropolished. The exterior surface is left in the as-fabricated and as-welded condition, then electropolished.



Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only.  
In the interests of development and improvement of the product, we reserve the right to change the specification.

TI-7-008-US 3.12



# Stainless Steel Filter

## 4" CSF26

### Nozzle Schedule

N1	Inlet	4" - 150 lb ANSI RFSO Flange
N2	Outlet	4" - 150 lb ANSI RFSO Flange
D1, D2	Drain	¾" NPT 3000 lb Half Coupling
V1	Vent	¾" NPT 3000 lb Half Coupling
P1, P2	Pressure Tap	¼" NPT 3000 lb Half Coupling

**Capacities** – The following table lists CSF26 capacities, in lb/h of saturated steam, based on a pipeline velocity of 100 ft/s and an approximate differential pressure across the filter of 1 psi.

Steam Supply Pressure psig	Filter Size
	4"
10	1850
20	2500
30	3200
40	3910
50	4940
60	5450
70	6250
80	6850
90	7500
100	7750
110	8350
120	9000
130	9650
140	10300
150	10950

For liquid and gas applications, consult factory.

### Steam Filter Efficiency

The 2.8 micron absolute rated filter element will remove 95% of all particles exceeding 2 microns.

### Filter Stations

Also available from Spirax Sarco are a range of steam filter stations which conform to the requirements of the 3-A Accepted Practice Number 609-03. Each filter station includes a moisture separator with trap-set, strainer, CSF26 filter, together with the necessary auxiliary products required for efficient steam filtration. Further details are available upon request.

### Sample Specification

Steam filter shall be all 316 stainless steel, with cleanable sintered stainless steel element. Filter element to utilize double O-Ring seal, and be capable of removing 95% of all particles 2 microns and above. Body and element seals to be an FDA approved material.

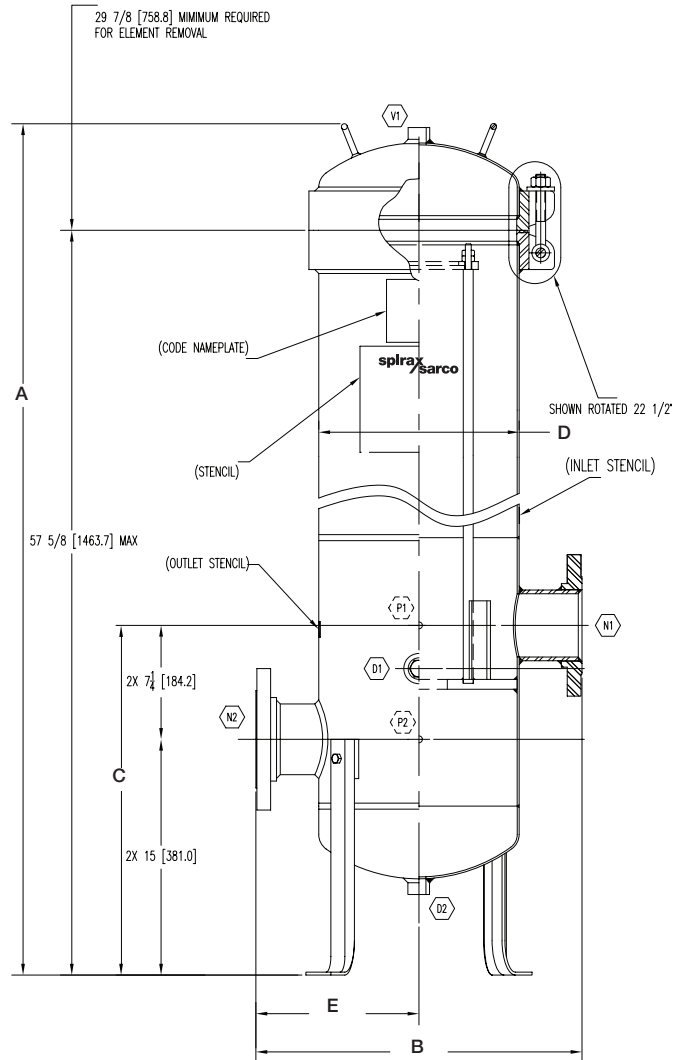
### Installation & Maintenance

When used in steam service, it is recommended to remove the plastic drain plug and fit the CSF26 with a condensate drain trap and and air vent (Spirax Sarco MST 21). To prolong service life and ensure optimum filter efficiency, a strainer and separator should be installed upstream of the filter. This will ensure that entrained moisture and larger solid particles such as rust and pipescale are removed prior to filtration.

It is recommended that the elements be removed for cleaning when the differential pressure across the filter reaches 15 - 20 psi. Cleaning can be achieved either chemically or ultrasonically. **Complete installation and maintenance instructions, which include element cleaning procedures, accompany the product.**

### Dimensions (nominal) in inches and millimeters

Size	A	B	C	D	E	Weight
4"	67 1702	20.75 527	22.25 565.2	12.75 323.9	10.375 263.5	254 lb 115 kg



### Spare Parts

Filter Element with O-Rings

Filter Element O-Rings (Pack of 2)

Body O-Rings (Pack of 2)

# spirax sarco

## Stainless Steel Filter 6" CSF26

The CSF26 is an in-line all 316 stainless steel filter suitable for use in steam, gas and liquid systems. The CSF26 is made of USDA approved material, and conforms to the requirements of 3-A Accepted Practice Number 609-03 for the production of culinary steam. The CSF26 utilizes a fully cleanable sintered stainless steel element for reduced cost of ownership.

<b>Model</b>	<b>CSF26</b>
<b>Sizes</b>	6"
<b>Connections</b>	ANSI 150
<b>Construction</b>	Body: 316 Stainless Steel Element: 316 Stainless Steel (4 Elements Required)
<b>Element Rating</b>	2.8 microns Absolute
<b>Options</b>	Tri-Clamp® compatible, BSP connections

### Typical Applications

The CSF26 is ideally suited for culinary applications, where steam is being directly injected into food product, wash-down water, etc. Other applications include autoclaves, sterilizers and humidification systems often found in the healthcare and pharmaceutical industries.

### Limiting Operating Conditions

**Max. Operating Pressure (PMO)** 195 psig/(13.4 barg)

**Max. Operating Temperature (TMO)** 375°F/(19°C)

### Pressure Shell Design Conditions

**PMA** 200 psig/0-100°F 13.8 barg/0-38°C  
Max. allowable pressure

**TMA** 375°F/0-95 psig 190°C/0-6.5 barg  
Max. allowable temp.

**Element Design Conditions** 100 psig/70 barg

Max. element differential pressure  
Housing is designed to contain (4) filter cartridges. Cartridges are not factory installed.

### Construction Materials

No.	Part	Material
1	Tank Weldment	SA240-316
2	Cover Weldment	SA240-316
3	Davit Weldment	Carbon Steel
4	O-Ring	EPDM
5	Capture Plate	SA240-316
6	Hex Nut (8)	SA194GR8
7	Eyebolt - 5/8-11NC (14)	SA193B37
8	Hex Nut (14)	SA194GR2H
9	Washer (14)	ZP Steel
10	Pin (14)	SA193B7 ZP
11	Retainer (28)	SST
12	Stud ¾" - 10NC	SA193B7 Zinc Plated
13	Hex Nut	SA194GR2H
14	Washer	ZP Steel
15	Crank Handle	Malleable Iron - ZP
16	Grease Fitting	303 S/S
17	Pipe Plug (3)	SA182F316
18	Pipe Plug (2)	SA182F316
19	Code Nameplate	302 S/S
20	Stencil Plate	S/S

### Minimum Clearance

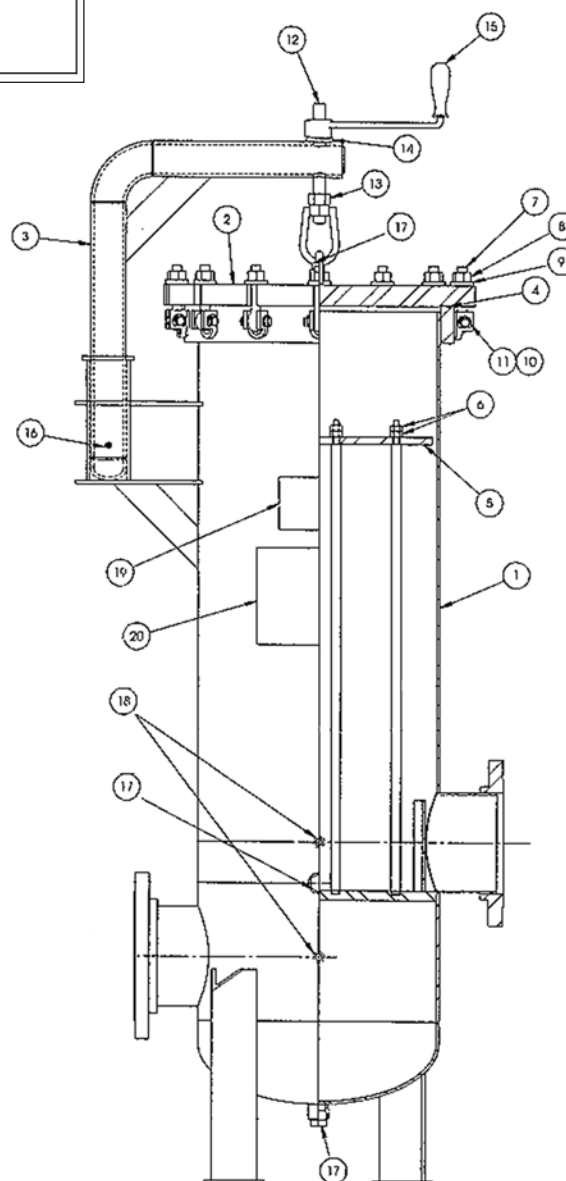
33" (838.2) minimum required for element removal

### Surface Finish

All internal process wetted surfaces are 316 stainless steel material. The interior surface is electropolished. The exterior surface is left in the as-fabricated and as-welded condition, then electropolished.

*Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only.*

*In the interests of development and improvement of the product, we reserve the right to change the specification.*



# Stainless Steel Filter

## 6" CSF26

### Connections

Inlet	6" - 150 lb ANSI RFSO Flange
Outlet	6" - 150 lb ANSI RFSO Flange
Drain	3/4" NPT 3000 lb Half Coupling
Vent	3/4" NPT 3000 lb Half Coupling
Pressure Tap	1/4" NPT 3000 lb Half Coupling

**Capacities** – The following table lists CSF26 capacities, in lb/h of saturated steam, based on a pipeline velocity of 100 ft/s and an approximate differential pressure across the filter of 1 psi.

Steam Supply Pressure psig	Filter Size
	6"
10	4050
20	5625
40	8900
60	12050
100	18100
150	25000

For liquid and gas applications, consult factory.

### Steam Filter Efficiency

The 2.8 micron absolute rated filter element will remove 100% of particles 2.8 micron particles and larger and 95% of 1 micron particles.

### Filter Stations

Also available from Spirax Sarco are a range of steam filter stations which conform to the requirements of the 3-A Accepted Practice Number 609-03. Each filter station includes a moisture separator with trap-set, strainer, CSF26 filter, together with the necessary auxiliary products required for efficient steam filtration. Further details are available upon request.

### Sample Specification

Steam filter shall be all 316 stainless steel, with cleanable sintered stainless steel element. Filter element to utilize double O-Ring seal, and be capable of removing 100% of all particles 2.8 microns and above. Body and element seals to be an FDA approved material.

### Installation & Maintenance

When used in steam service, it is recommended to remove the plastic drain plug and fit the CSF26 with a condensate drain trap and and air vent (Spirax Sarco MST 21). To prolong service life and ensure optimum filter efficiency, a strainer and separator should be installed upstream of the filter. This will ensure that entrained moisture and larger solid particles such as rust and pipescale are removed prior to filtration. It is recommended that the elements be removed for cleaning when the differential pressure across the filter reaches 15 - 20 psi. Cleaning can be achieved either chemically or ultrasonically. **Complete installation and maintenance instructions, which include element cleaning procedures, accompany the product.**

### Spare Parts

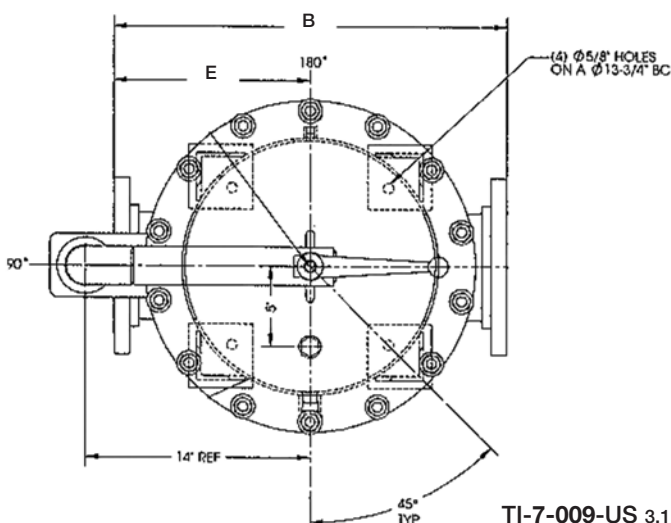
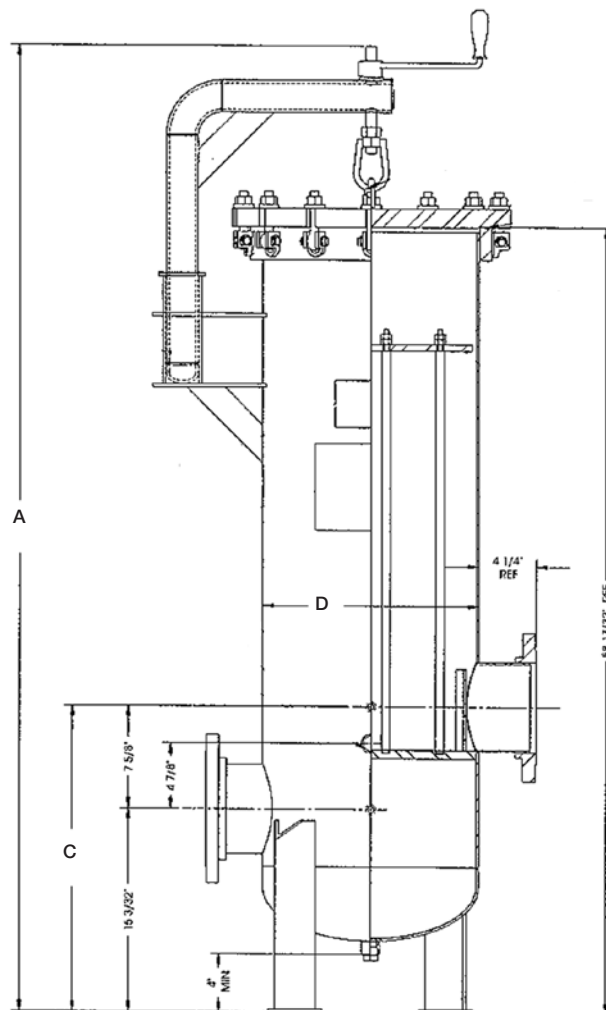
Filter Element with O-Rings

Filter Element O-Rings (Pack of 2)

Body O-Rings (Pack of 2)

### Dimensions (nominal) in inches and millimeters

Size	A	B	C	D	E	Weight
6"	74 1880	24.5 622	22.72 577	16.0 406	12.25 311	490 lb 222 kg



TI-7-009-US 3.12

## CS10-1 Stainless Steel Clean Steam Separator

### Description

Even in the cleanest and best designed clean steam system entrained moisture can still occur, resulting in an unacceptably low dryness fraction, non-compliance of critical sterilization standards, damage to control valves/instrumentation and a generally low efficiency of the system.

The CS10-1 clean steam separator has been designed in full accordance with the latest edition of ASME BPE to overcome the issues of removing entrained moisture from clean and pure steam systems.

It has been designed with the feature of a removable baffle plate, allowing the unit to be fully inspected prior to installation and to ease periodic cleaning and de-rousing.

### Available types

Model	CS10-1
<b>Internal</b>	20 µ-in Ra (0.5 µm) maximum/SF5 as outlined in ASME BPE, with all welds ground and electropolished.
<b>External</b>	63 µ-in (1.6 µm) Ra maximum, with a satin bead blast finish.
<b>Optional surface finish (CS10-1 only)</b>	
<b>Internal</b>	Polish to 20 µ-in Ra (0.5 µm) maximum + Electropolished.

### Standards

This product has been designed in accordance with the latest standard of the ASME BPE guide (2005 edition). It also complies with the requirements of the European Pressure Equipment Directive 97/23/EC. All elastomers used comply with FDA regulation CFR 21 paragraph 177 section 2600. 1/2", 3/4" and 1" sizes are available with USP class VI.

### Certification

This product is available with the following certification:

- EN 10204 3.1 material certifications.
- Certificate of conformities.
- Passivation certificates.
- Welding certificates.
- Internal surface finish certificate.

**Note:** All certification/inspection requirements must be stated at the time of order placement.

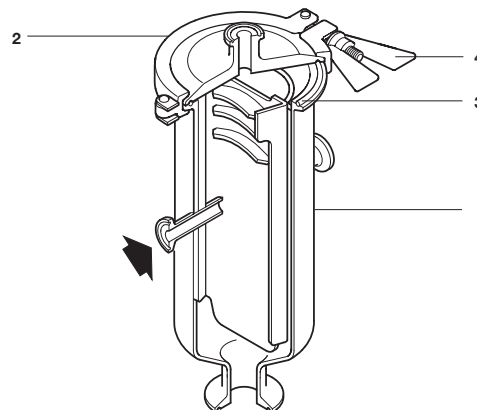
### Packaging

Packaging for this product is conducted in a clean environment, segregated from other non stainless steel products, and in accordance with ASME BPE for optimum protection and cleanliness; The inlet and outlet connections of the product are fitted with protective caps before being sealed in a plastic bag.

### Sizes and pipe connections

<b>Steam inlet and outlet pipe</b>	1/2", 3/4", 1", 1 1/2" and 2" Sanitary clamp ASME BPE (Tri-clamp®) Extended tube weld ends (ETO) ASME BPE.
<b>Drain</b>	1" ASME BPE (Tri-clamp®)
<b>Vent</b>	1/2" ASME BPE (Tri-clamp®)

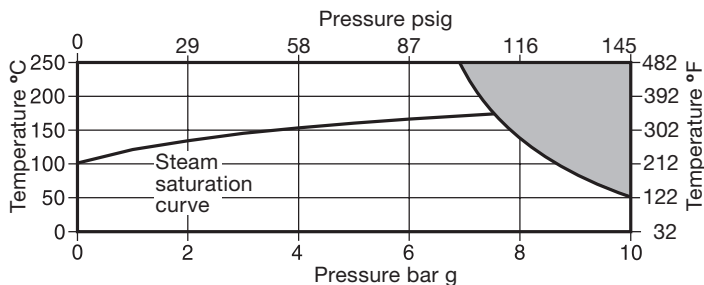
**Note:** Other connections are available upon request.



### Materials

No.	Part	Material	
1	Body	Fabricated stainless steel	ASTM A312 316L ASTM A240 316L ASTM A276 316L
2	Cover + Baffle	Fabricated stainless steel	ASTM A240 316L ASTM A276 316L
3	Seal	Viton	
4	Clamp	Stainless steel	AISI 316

### Pressure/temperature limits (ISO 6552)



**The product must not be used in this region.**

**Note:** For hygienic/sanitary clamp ends the maximum pressure / temperature may be restricted by the gasket or sanitary clamp used. Please consult Spirax Sarco.

Body design conditions		PN10
PMA	Maximum allowable pressure	10 bar g @ 50°C (145 psig @ 122°F)
TMA	Maximum allowable temperature	250°C (482°F)
Minimum allowable temperature		-10°C (14°F)
PMO	Maximum operating pressure for saturated steam service	7.6 bar g (110 psi g)
TMO	Maximum operating temperature	250°C @ 6.8 bar g (99 psig @ 482°F)
Minimum operating temperature		0°C (32°F)
Designed for a maximum cold hydraulic test pressure of 15 bar g (217 psig)		

Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only.

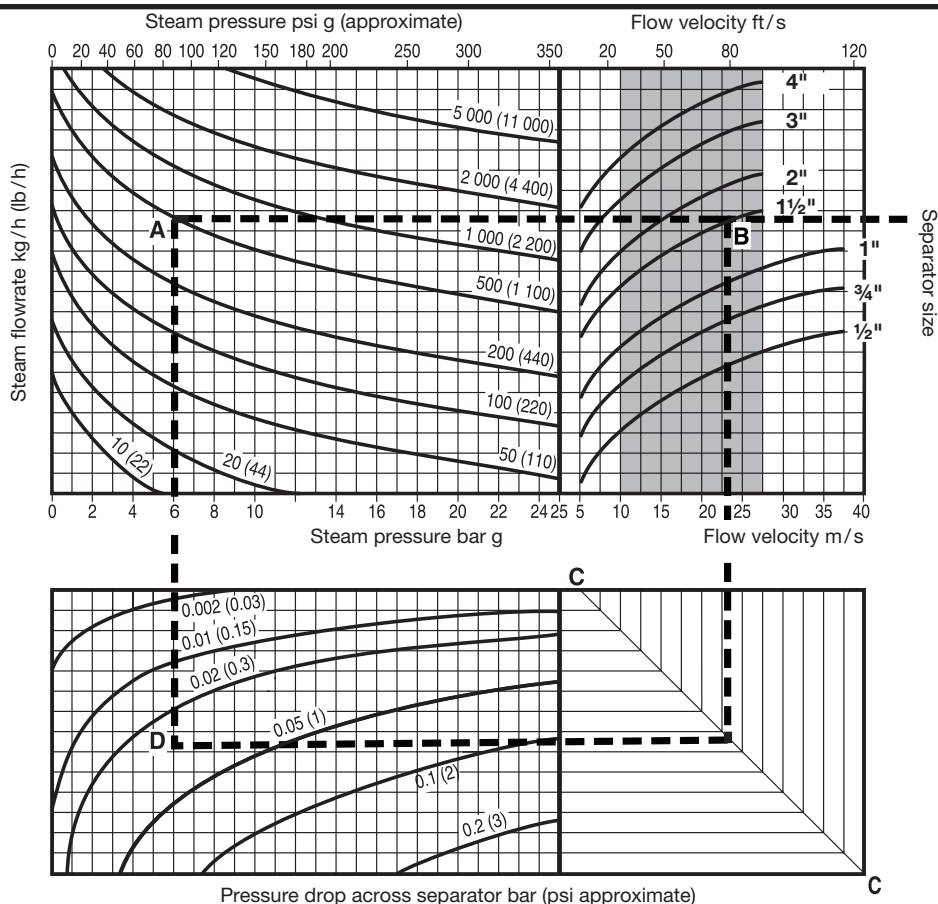
In the interests of development and improvement of the product, we reserve the right to change the specification.

TI-P023-59-US 3.14

## Steam sizing example

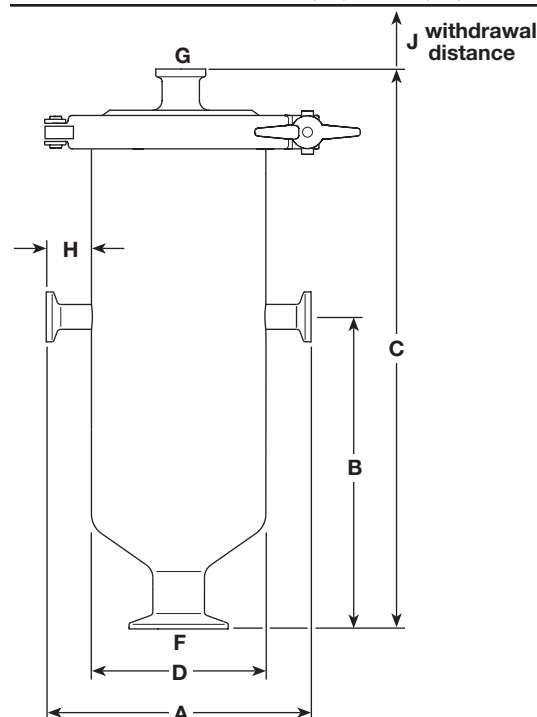
- Plot point A** where the steam pressure and flowrate cross, e.g. 6 bar g / 500 kg/h: Draw a horizontal line.
- Select line size.** Any separator curve that is bisected by this line within the shaded area will operate at near 100% efficiency, e.g. 1½" (DN40), point B.
- Ascertain velocity.** Line velocity for any size can be determined by dropping a vertical line from this intersection. From point B this line crosses the velocity axis at 23 m/s.
- Pressure drop.** Where the line extended from point B crosses the line C – C, plot a horizontal line. Now drop a vertical line from point A. The point of intersection, D, is the pressure drop across the separator, i.e. about 0.035 bar.
- Separators should be selected on the basis of the best compromise between line size, velocity and pressure drop for each application.**

**Note:** For larger sizes and alternative, metals and pressure and temperatures that exceed these operating conditions please contact Spirax Sarco for a bespoke product. Independent research carried out by Liverpool University in England provided the experimental data from which the above graph was derived.



## Dimensions, weights and volume (approximate) mm, kg and litres (inches, lbs and gallons)

Steam inlet/outlet size	A	B	C	D	F (drain)	G (vent)	H	J	Weights	Volume
½"	135 (5.3)	161 (6.3)	290 (11.4)	88.9 (3.5)	1"	½"	23 (0.9)	215 (8.5)	3.0 (6.6)	1.2 (0.3)
¾"	160 (6.3)	178 (7.0)	371 (14.6)	114.3 (4.5)	1"	½"	23 (0.9)	290 (11.4)	5.0 (11.0)	2.5 (0.7)
1"	160 (6.3)	178 (7.0)	371 (14.6)	114.3 (4.5)	1"	½"	23 (0.9)	290 (11.4)	5.0 (11.0)	2.5 (0.7)
1½"	195 (7.7)	213 (8.4)	485 (19.1)	141.3 (5.6)	1"	½"	27 (1.1)	400 (15.7)	9.2 (20.3)	5.5 (1.5)
2"	195 (7.7)	213 (8.4)	535 (21.0)	141.3 (5.6)	1"	½"	27 (1.1)	450 (17.7)	10.0 (22.0)	6.3 (1.7)



## Safety information, installation and maintenance

For full details see the Installation and Maintenance Instructions (IM-P023-60) supplied with the product.

### Installation note

The CS10-1 is designed for installation in horizontal lines. Check arrow for correct orientation.

**Note:** The body and internals must be handled carefully to ensure that the surface finishes are not damaged.

## How to order

**Example:** 1 off 2" Spirax Sarco CS10-1 stainless steel clean steam separator with removable baffle plate. Sanitary clamp connections to ASME BPE, internal surface finish of 20 micro-inch complete with material certification to EN 10204 3.1.

## Spare parts

Please refer to the dimension drawing to the left.

### Available spares

Seal	3
Clamp	4

### How to order spares

Always order spares by using the description given in the column headed 'Available spares' and state the size and type of separator.

**Example:** 1 x Seal for a Spirax Sarco 1½" CS10-1 stainless steel clean steam separator.

TI-P023-59-US 3.14



# spirax/sarco

## CVS10 Sanitary Check Valve with Metal Seat

### Description

The CVS10 sanitary in-line spring assisted check valve is manufactured from 316L stainless steel and prevents reverse flow in fluid lines. The CVS10 with metal seat is designed for steam applications or other aggressive applications where a soft seat is not suitable, within the food, medical and pharmaceutical industries.

### Optional:

For water, process fluid and gas applications soft-seated versions with EPDM, Viton or FEP-Silicone seats are available - See Technical Information sheet TI-P029-10-US for further data.

### Available types and surface finish

**CVS10-1** has an internal surface finish of 20  $\mu$ -in (0.5 micron) Ra (within ASME BPE SF1), and external surface finish of 32  $\mu$ -in (0.8 micron) Ra and a metal seat.

**CVS10-2** has an electropolished internal surface finish of 15  $\mu$ -in 0.38 Ra (within ASME BPE SF4), and external surface finish of 32  $\mu$ -in (0.8 micron) Ra and a metal seat.

### Standards

- The CVS10 fully complies with the European Pressure Equipment Directive 97/23/EC.
- The CVS10 is designed in accordance with ASME-BPE.

### Standard shut-off

The standard shut-off of the CVS10 with metal seat conforms to EN 12266-1: 2003 Rate D.

### Certification:

- EN 10204 3.1 material certification.
- Typical surface finish certificates.

**Note:** All certification inspection requirements must be stated at time of order placement.

### Packaging

Packaging for this product is conducted in a clean environment segregated from other non stainless steel products, and in accordance with ASME BPE. Inlet and outlet connections are capped and the product is sealed in a plastic bag prior to boxing.

No.	Part	Material
1	Body	Stainless steel 316L
2	Valve head	Stainless steel 316L
3	Spring	Stainless steel 316

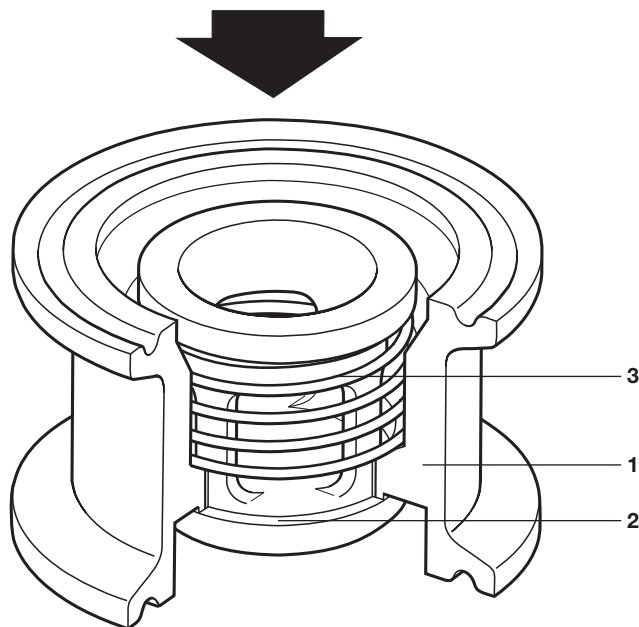
### Sizes and pipe connections

1/2", 3/4", 1", 1 1/2" and 2" to ASME BPE available as standard.

Sanitary clamp:

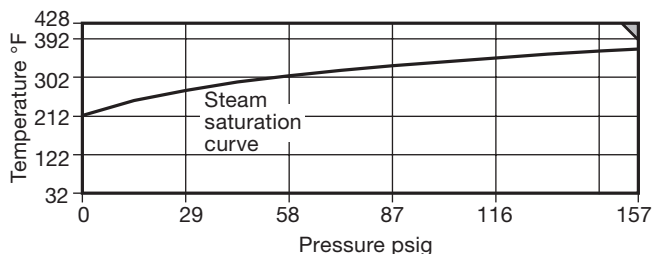
- ASME BPE clamp.

**Please note:** other connections, sizes and opening pressures are available on request.



1" valve shown

### Pressure/temperature limits



■ The product **must not** be used in this region.

Body design conditions		PN10
PMA	Maximum allowable pressure	157 psig @ 392°F (10.8 barg @ 200°C)
TMA	Maximum allowable temperature	428°F @ 152 psig (220°C @ 10.5 bar g)
Minimum allowable temperature		-425°F (-254°C)
PMO	Maximum operating pressure for saturated steam service	145 psig (10 bar g)
TMO	Maximum operating temperature	428°F @ 145 psig (220°C @ 10 bar g)
Minimum operating temperature		32°F (0°C)
Designed for a maximum cold hydraulic test pressure of 218 psig (15 barg)		

Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only.

In the interests of development and improvement of the product, we reserve the right to change the specification.

TI-P029-21-US 12.10

# CVS10 Sanitary Check Valve with Metal Seat

**Dimensions / weights** (approximate) in inches (mm)  
and lbs. (kg)

## Sanitary clamp

Size	A	B	Weight
1/2"	1.57 (40)	1.0 (25.4)	.2 (0.10)
3/4"	1.57 (40)	1.0 (25.4)	.2 (0.10)
1"	.98 (25)	2.0 (50.5)	.3 (0.15)
1 1/2"	1.18 (30)	2.0 (50.5)	.4 (0.18)
2"	1.37 (35)	2.5 (64.0)	.8 (0.35)

## K<sub>V</sub> values

Size	1/2"	3/4"	1"	1 1/2"	2"
K <sub>V</sub>	2	2	4	8	18

For conversation:  $C_V(\text{UK}) = K_V \times 0.963$   $C_V(\text{US}) = K_V \times 1.156$

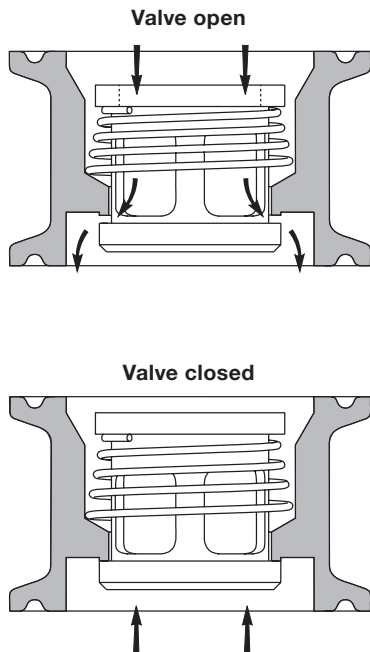
## Opening pressures in psi (mbar)

Differential pressure with zero flow in a horizontal installation.

Size	1/2"	3/4"	1"	1 1/2"	2"
psi (mbar)	.507 (35)	.507 (35)	.507 (35)	.507 (35)	.507 (35)

## Operation

The valve is opened by the pressure of the fluid. When fluid flow stops the spring closes the valve before reverse flow can occur.

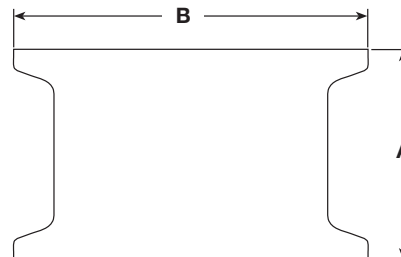


## Safety information, installation and maintenance

For full details see the Installation and Maintenance Instructions (IM-P029-11) supplied with the product.

## How to order

**Example:** 1 off Spirax Sarco 1" CVS10-1 sanitary check valve with metal seat, ASME BPE sanitary clamp connections, and having an internal surface finish of 20 µ-in (0.5 micron) Ra. Complete with certification dossier.







# spirax/sarco

## Sanitary Pressure Gauge

### Description

The hygienic pressure gauge for clean steam applications is made of stainless steel and can be used in adverse service conditions where pulsation or vibration exists. It is 3A compliant and suitable for corrosive environments and gaseous or liquid media that will not obstruct the pressure system.

#### Available dial size and ranges:

Dial Size	Range	Range	Range	Range
2-1/2"	0-30 psi	0-60 psi	0-100 psi	0-160 psi
4"	0-30 psi	0-60 psi	0-100 psi	30hg/60psi

Note: Other sizes and ranges are available through special request.

#### Certification

All certification/inspection requirements must be stated at the time of order placement.

#### Pipe connection 1½" sanitary clamp connection.

Note: Other pipe connections are available through a special quote.

#### Pressure/temperature limits

PMA	Maximum allowable pressure	Short time	1.3 x Full scale reading
		Steady	Full scale reading
		Fluctuating	0.9 x Full scale reading
TMA	Maximum allowable temperature	200°C	
	Minimum allowable temperature	-20°C	
PMO	Maximum operating pressure	Range 1	6 bar
		Range 2	10bar
TMO	Maximum operating temperature	184°C	

### Accuracy

Accuracy	4" Dial = 0.5% Full Scale (ANSI Grade 2A)
	2-1/2" Dial = 1.0% Full Scale (ANSI Grade 1A)

When the temperature of the pressure element rises above 68°F add the accuracy error and when it falls below 68°F subtract the accuracy error.

Note: These errors are computer generated and for guidance only.

#### Installation note:

It is recommended that all gauges are fitted with suitable isolation valves to allow for safe maintenance/replacement. Fittings, clamps and gaskets for pipe end connections are not supplied.

#### Maintenance note:

The only maintenance work necessary is regular cleaning of the polycarbonate window. Solvents should not be used to clean the window as it may impair clarity.

#### Caution

Do not over-tighten the clamp as this may cause the gasket to spread/extrude.

#### Disposal

The product is recyclable. Care must be taken to ensure disposal of oil is carried out in accordance with national and local regulations regarding disposal of waste oil.

### Spare parts

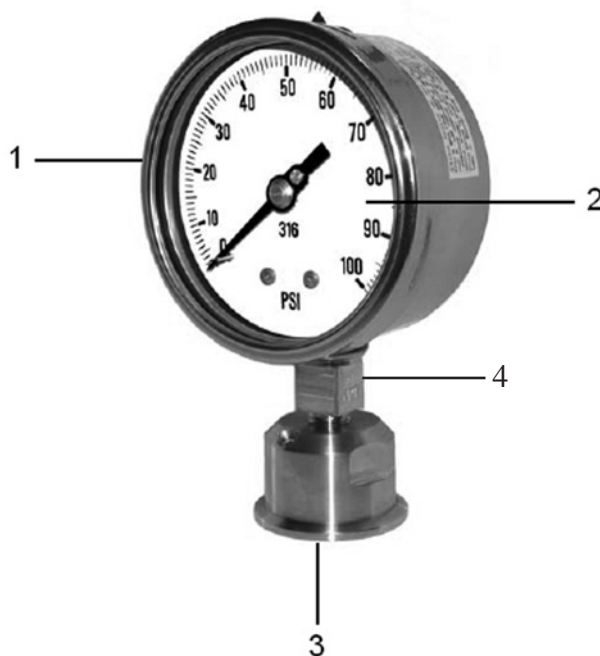
No spare parts are available for the hygienic pressure gauge.

### How to order

Example: 1 off Spirax Sarco 2½" hygienic pressure gauge with a pressure range of 0 - 100 psi and having sanitary clamp connections.

Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only.

In the interests of development and improvement of the product, we reserve the right to change the specification.



### Materials

No.	Part	Material
1	Gauge case	Stainless steel
2	Gauge window	Laminated Safety Glass
3	Diaphragm	316 Stainless steel
4	Process Housing	316 Stainless Steel

Hermetically Sealed/Weather Proof

### Dimensions/weight (approximate) in inches and pounds

Tri-Clamp

Dial Size	Size	C	E	F	G	H	J	M	T
2½"	1½"	2.72 [69.1]	2.87 [73]	0.39 [10]	CENTER	1.63 [41.5]	1.14 [29]	2.48 [63]	1.98 [50]
	2"	2.72 [69.1]	3.07 [78]	0.39 [10]	CENTER	1.83 [46.5]	1.14 [29]	2.48 [63]	2.51 [64]
4"	1½"	4.18 [106.2]	4.02 [102]	0.96 [24.4]	1.24 [24.4]	1.93 [49]	2.15 [54.6]	3.85 [97.8]	1.98 [50]
	2"	4.18 [106.2]	4.21 [107]	0.96 [24.4]	1.24 [54]	2.12 [54]	2.15 [54.6]	3.85 [97.8]	2.51 [64]

# spirax/sarco

## Clean Steam Sampling Cart

### Description

The Clean Steam Sampling Cart is engineered and fabricated to improve safety, efficiency, and operability in the collection of clean steam samples for testing. The unit is specifically designed for taking critical quality samples for total organic carbon (TOC), conductivity and microbiological/endotoxin monitoring. The highest regard is given to maintaining the integrity of your quality samples.

The Clean Steam Sampling Cart is a complete and comprehensive package for pure or clean steam systems.

### Typical applications

Pure/clean steam sampling, point-of-use cooling in hot purified water systems.

### Principal features

- Cooling Heat Exchanger
- Sample Outlet Valve
- Cooling Water Pressure Gauge
- Cooling Water Isolation Valve
- Pressure Relief Valve
- Sanitary Pipe Supports
- Swivel Casters With Brakes
- Tri-Clamp Connections
- Cleanroom Compatible Construction

### Sizes, Pipe, and Connections

- All piping is 316L SS
- Steam side piping will be fully documented
- Cooling water supply, cooling water return, clean steam supply, sample outlet
- All 1/2" Tri-Clamp connections

### Limiting conditions

Steam  
PMO Maximum operating pressure 100 psig  
TMO Maximum operating temperature 347°F @ 100 psig

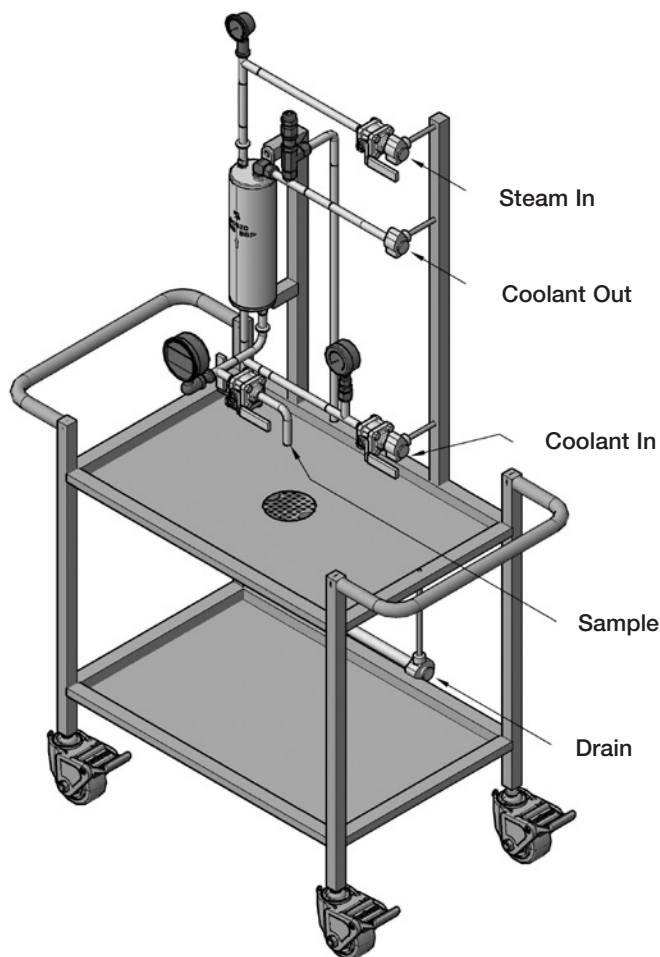
Water  
PMO Maximum operating pressure 145 psig  
TMO Maximum operating temperature 212°F

<sup>1</sup>Maximum operating pressure for sanitary fittings is determined by the sanitary flange clamp rating used for connections. Refer to manufacturer's literature for details.

### Materials

Cart	304 Stainless Steel, 1x1x11 gauge, #4 finish
Clean Steam Piping	316L Stainless Steel, SF4, 15Ra Ep
Cooling Water Piping	316L Stainless Steel
Casters	304 Stainless Steel with non-marking polyurethane wheels

Material certification documents provided.



## Packaging

All packaging of the cart is conducted in a clean environment segregated from other non stainless steel manufacturing and is in accordance with ASME BPE.

## How to order

Time to produce the sample volume is based on the SSC20 heat transfer area. Actual sample delivery rates are dependent upon clean steam pressure, cooling water inlet temperature and available cooling water flow.

## Specification

The mobile steam sampling cart shall be of all-stainless steel, clean room-compatible construction, with sanitary, self-draining piping design. The steam condenser shall be a clean steam-compliant and shall be able to accommodate chilled water, cooling tower water or municipal water as a cooling source. The system shall include the following instrumentation and controls at minimum: a sample temperature gauge, a cooling water pressure gauge, a sample outlet valve, a cooling water isolation valve and a pressure relief valve. All wetted-surface pipeline components shall be manufactured from 316L stainless steel and provided with Tri-Clamp sanitary couplings. Service connections shall be ½" Tri-Clamp. Vertical clearance beneath the sample outlet valve shall be at least 6 in. A validatable documentation package shall be provided upon delivery, including drawings, material certification documents and weld certification documents.

## Weights (nominal)

Standard cart in pounds	110–125
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## Installation

Approach piping for both clean steam and cooling water should be evaluated by a qualified engineer and necessary modifications undertaken to minimize the potential for destructive and/or dangerous water hammer events during operation.

Cooling water pressure, including momentary spikes, should be controlled so as not to exceed the heat exchanger operational specification. Soft opening and closing control valves are recommended.

Correct condensate drainage within the clean steam line is important to protection of clean steam sample cooler cart as well as other steam system components to guard against potential water hammer damage.

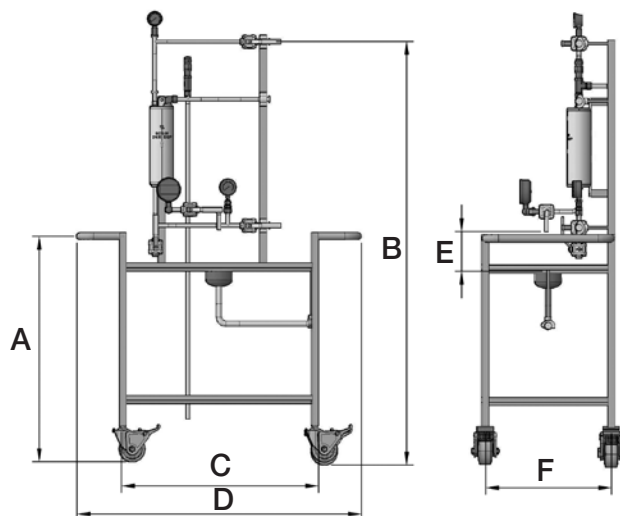
## Safety and operation

**NOTE:** This cart is engineered to provide a safer way of obtaining clean steam samples efficiently. However, no steam sample collection device is completely fail-safe. The prudent manager will consider the capabilities of employees and evaluate potential risks and advisability of configuring the system with additional safety-related instrumentation and controls. Your Spirax Sarco representative is available to offer advice.

**WARNING:** To avoid the risk of scalding, it is essential that cooling water is flowing before opening the sample valve. Always close the sample inlet valve before turning off the cooling water.

## Dimensions (nominal)

	inches
A	2'-10"
B	5'-4"
C	2'-5¾"
D	3'-7"
E	6"
F	1'-7"





## CSM-C 600 Compact Clean Steam Generator

### Description

The CSM-C 600 compact clean steam generator has been designed to provide clean steam from suitably treated water using plant steam as the heating medium.

The CSM-C 600 generator can produce up to a maximum of 1,275 lb/hr of clean steam at 45 psig – dependent on plant steam pressure and feedwater temperature. Each unit comes complete, fully assembled, tested and ready to produce clean steam once connected to the available services. The generator pressure vessel is designed, manufactured, tested and stamped “U” in accordance with ASME Section VIII division 1. The generator pressure vessel and all surfaces in contact with generated clean steam or treated feedwater are manufactured in AISI 316L stainless steel.

The unit is supplied as standard with a compact frame, protective side cover panels and control panel all fabricated from carbon steel. Other standard features include dual “U” tube bundles, mounting feet, pneumatic control valves fitted to the primary (plant) steam supply and feedwater inlet. A piston actuated valve is fitted to the bottom of the generator vessel for timed blowdown to control TDS levels. Available standard options are listed in the Technical Data section of this document.

### Applications

The CSM-C 600 is suitable for a wide range of sterilization, humidification and process applications within the Healthcare, Institutional, Food and Beverage, Pharmaceutical and Electronics industries.

### Principal features:

- Produces clean steam for sterilization, humidification and direct injection processes using plant steam and treated feed water.
- Fully assembled skid-mounted system (transportable).
- Pneumatic modulating steam and feedwater control.
- All clean steam and feed water wetted parts in AISI 316L stainless steel.
- Produces clean steam in accordance with HTM2031, HTM2010, CFPP01-01 part C: 2013, and EN285 standards.
- Clean steam and feedwater sample points with sanitary connections
- PLC controller with 5.7” full color touch screen HMI
- NEMA 4 control panel enclosure with UL compliant components

### Pipework connections

Connection	Type	Size
Plant steam inlet	Flanged ANSI 150 RF	2"
Clean steam outlet	Flanged ANSI 150 RF	3"
Condensate return outlet	Flanged ANSI 150 RF	2"
Feedwater inlet	Flanged ANSI 150 RF	1/2"
Vessel drain/blowdown	Flanged ANSI 150 RF	1"
Air supply	Push fit for nylon tube	3/8"
Safety valve discharge	Flanged ANSI 150 RF	2"
Safety valve drain	Welded tube	1/2"
Feed water sampling valve	Tri-clamp	1/2"
Clean steam (HTM) test point	Tri-clamp	1/2"



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In the interests of development and improvement of the product, we reserve the right to change the specification.*

# CSM-C 600

## Compact Clean Steam Generator

### Outputs

Plant Steam Pressure	Clean Steam Production* (lb/hr) at:						
	75 psig	60 psig	45 psig	37.5 psig	30 psig	22.5 psig	15 psig
150 psig	836	1,122	1,496	1,760			
135 psig	660	946	1,276	1,496	1,804		
120 psig	462	748	1,078	1,276	1,540	1,870	
105 psig		550	880	1,056	1,276	1,562	1,892
90 psig			638	836	1,034	1,276	1,628
75 psig				594	792	1,012	1,298
60 psig					528	748	1,012
45 psig						462	704

\*Feedwater at 60°F

Note: Feedwater pressure must be at least 15psig above desired clean steam pressure.

- = HTM2031/2010 & EN285 compliance guaranteed  
 = HTM2031/2010 & EN285 compliance not guaranteed  
 = Inadequate thermodynamic conditions

### Steam pressure / temperature limits

Primary (tube) side plant steam	Maximum operating pressure	150 psig
	Maximum operating temperature	366°F
	M.A.W.P.	174 psig @ 428°F
Secondary (vessel) side clean steam	Maximum operating pressure	75 psig
	Maximum operating temperature	320°F
	M.A.W.P.	101 psig @ 392°F

### Materials

Vessel shell	AISI 316L stainless steel
Heating coils (U-tubes)	AISI 316L stainless steel
Frame	Carbon steel, painted
Plant steam pipework	Carbon steel, painted
Clean steam pipework	AISI 316L stainless steel
Condensate pipework	Carbon steel, painted
Feedwater pipework	AISI 316L stainless steel
Vessel drain/blowdown pipework	Carbon steel, painted
Safety valve discharge pipework	AISI 316L stainless steel
Pipework insulation covers	Fireproof synthetic fiber jacket
Pipework insulation	Glass fiber

### Technical data

Pneumatics	<b>Compressed air:</b> A minimum 90 psig compressed air supply is required; where this is unavailable an optional compressor can be supplied at extra cost (see options). <b>Power supply:</b> 110 VAC, 50-60 Hz, Single Phase
Electrical requirements	<b>Supply fuse:</b> 5 Amps (T) A fused isolator must be incorporated in the supply line as near as possible to the unit
Feedwater quality	Thorough analysis of the feedwater system should be undertaken prior to installation and commissioning. To ensure reliability, longevity, efficient operation and to meet the requirements of HTM2031 and EN285, the feed water stream should be pretreated with one or more processes, as necessary, such as filtration, deionization, reverse osmosis, softening and de-chlorination to produce feed water that has the following characteristics: pH: 6.5 – 8.5 Hardness: absent Chlorine: absent Conductivity: <600 ppm Total Dissolved Solids
Control panel	The clean steam generator is PLC controlled to regulate clean steam outlet pressure, water level and blow-down operation. NEMA 4 control panel enclosure with UL compliant components. Full color touch screen HMI. Analog 4-20mA retransmission for water level and clean steam pressure. Relay contacts for retransmission of fault conditions and general power failure.
Communication protocols	Modbus RTU Modbus TCP/IP BACnet MSTP BACnet TCP/IP
Options	External compressor Transportation (handling wheels)

TI-P486-04-US 8.15



# CSM-C 600

## Compact Clean Steam Generator

### Safety information, installation and maintenance

For full details including spares information, refer to the Installation and Maintenance Instructions supplied with the unit.

### Typical specification

Spirax Sarco CSM-C 600 compact clean steam generator designed and built to produce 1,275 lb/hr of clean steam at 45 psig to HTM2031, HTM2010, CFPP01-01 part C: 2013 & EN285 (dependent on feedwater) when supplied with plant steam at 135 psig.

All items are to be pre-assembled and mounted to a compact frame and accompanied with all necessary documentation.

### Warranty

Spirax Sarco, Inc. warrants to the original user, that the CSM-C 600 Clean Steam Generator, being used in the service and the manner for which it was intended, shall be free from defects in material and workmanship for a period of 12 months from date of commissioning and no longer than 18 months from the date of shipment from the factory. The validity of this warranty is subject to the completion of the mandatory commissioning and start-up service performed by a Spirax Sarco Service Technician. This warranty does not extend to any product that has been subject to misuse, neglect or alteration after shipment from the Spirax Sarco factory, except as may be expressly provided in a written agreement between Spirax Sarco, Inc. and the user and which is signed by both parties. The use of the CSM-C 600 Clean Steam Generator with poor quality feed water that does not meet the minimum feed water quality requirements as published by Spirax Sarco will be considered misuse and neglect and will void the warranty. Defective components or assemblies found during the warranty period may be repaired or replaced at the discretion of Spirax Sarco and must be completed by a Spirax Sarco service technician or qualified representative; otherwise the warranty will be terminated.

### How to order

**Example:** 1 off Spirax Sarco CSM-C 600 compact clean steam generator.

**Please provide** details of primary steam pressure, clean steam pressure, clean steam flowrate and feedwater system.

### Ancillary items (to be used depending on installation):

- Blowdown vessel and heat recovery package
- Clean steam check valves
- Clean steam isolation valves
- Primary (plant) steam isolation valves
- Feedwater isolation valves
- Condensate isolation valves
- Clean steam separator

For other items that may be required, please contact Spirax Sarco.

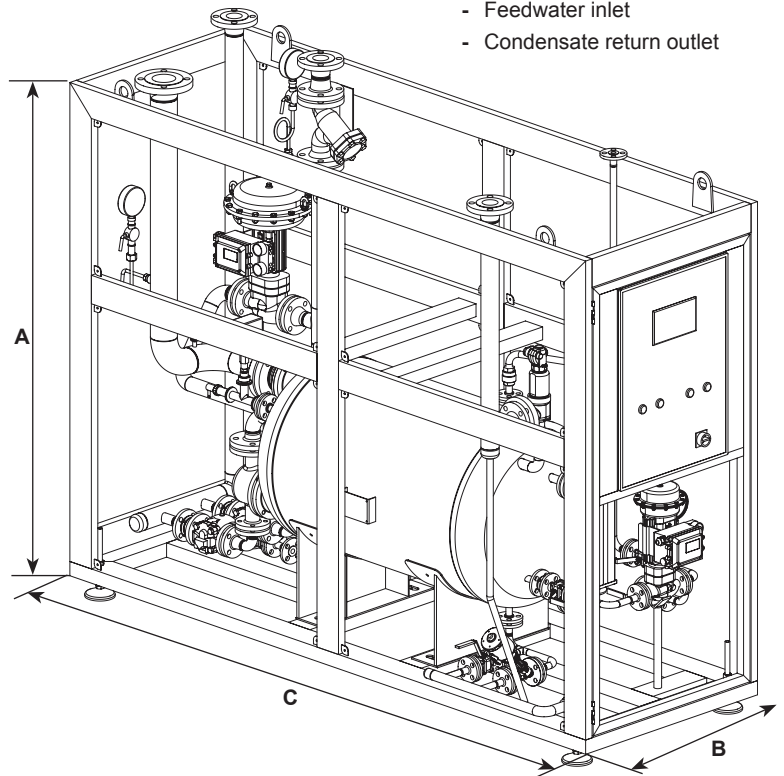
### Dimensions and weights (approximate)

Dimensions (inches)			Weight (lb)	
A	B	C	Dry	Wet
74	32	95	1763	3086

**Please note:** to allow for safe and comfortable working access, it is recommended that at least 3 ft is kept clear of obstacles at the front and rear of the unit.

### Top connections for:

- Plant steam inlet
- Clean steam outlet
- Safety valve vent
- Feedwater inlet
- Condensate return outlet



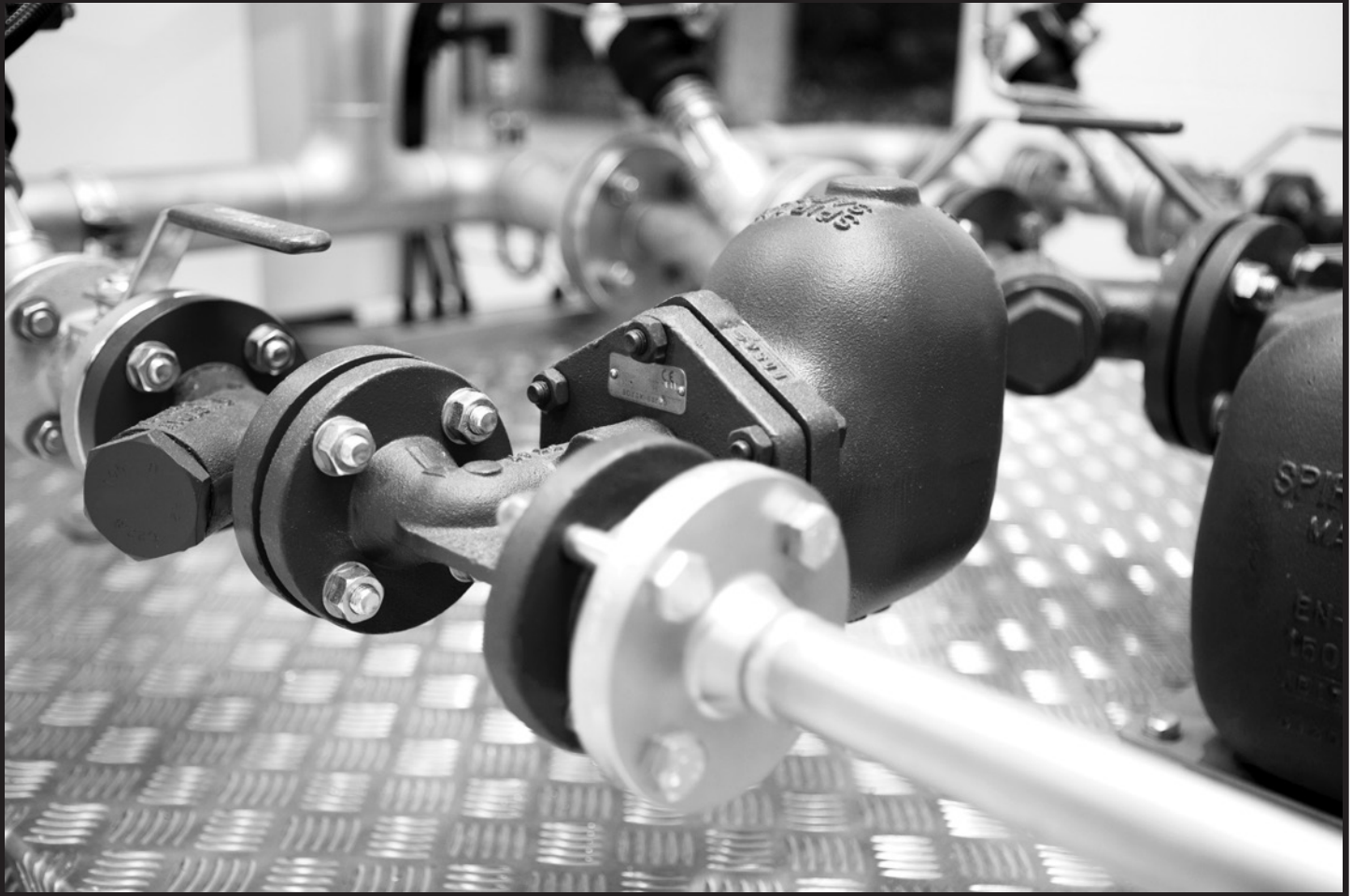
### Bottom connections for:

- Vessel drain/blowdown
- Safety valve drain
- Air supply





# Liquid Drain Trap Solutions





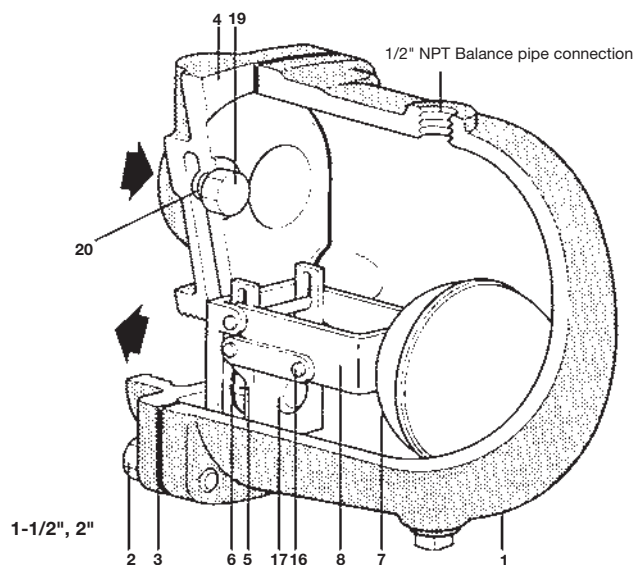
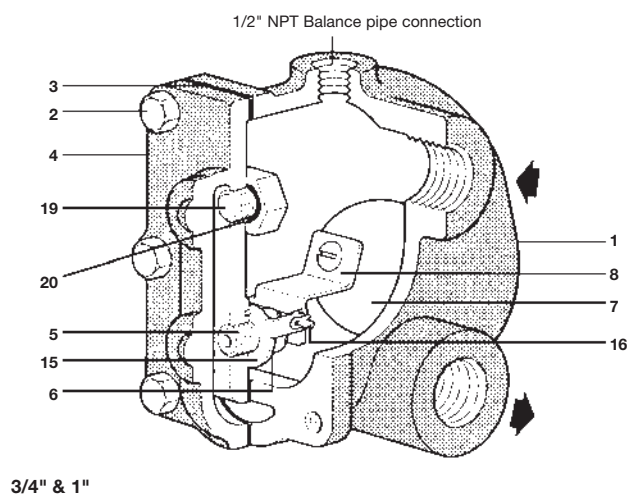
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The float-operated liquid drain trap discharges continuously in direct response to variations in liquid flow rate, assuring thorough drainage of the system.

Model	FA-30	FA-75	FA-150
Sizes	3/4", 1", 1-1/2", 2"		
Connections	NPT		
Construction	Cast Iron Body, Stainless Steel Internals		

Receiver and air line drainage, draining a liquid from its vapor phase



## Max. Operating Pressure (PMO)

Up to 150 psig. The PMO depends on the model selected and the specific gravity of the liquid being drained. See TIS 7.318.

<b>Max. Operating Temperature</b>	<b>FA-30, 75</b>	450°F (232°C)
	<b>FA-150</b>	200 °F (93°C)

## Pressure Shell Design Conditions

<b>PMA</b>	<b>FA-30,75:</b> 125 psig/0-450°F	9 barg/0-232°C
Max. allowable pressure	<b>FA-150:</b> 150 psig/0-200°F	10 barg/0-93°C

<b>TMA</b>	<b>FA-30,75:</b> 450°F/0-125 psig	232°C/0-9 barg
Max. allowable temperature	<b>FA-150:</b> 200°F/0-150 psig	93°C/0-10 barg

No.	Part	Material	
1	Body	Cast Iron	ASTM A126 CL B
2	Cover Screws	Steel	ASTM A449
3	Cover Gasket	Graphite	
4	Cover	Cast Iron	ASTM A126 CL B
5	Valve Seat	Stainless Steel	AISI 420F
6	Valve Seat Gasket	Stainless Steel	AISI 302
7	Float	Stainless Steel	AISI 304
8	Lever	Stainless Steel	AISI 301/304
15	Seat Bracket	Stainless Steel	AISI 301/304
16	Pivot Pin	Stainless Steel	AISI 302/303
17	Valve Head & Bracket Assy	Stainless Steel	AISI 300/440
19	Plug	Brass	ASTM B16
20	Plug Gasket	Stainless Steel	ASTM A240

*Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only.*  
*In the interests of development and improvement of the product, we reserve the right to change the specification.*

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# Iron Liquid Drain Traps

## FA-30, FA-75, FA-150

### Capacity

The discharge capacity depends on the differential pressure (inlet pressure minus outlet pressure) and the specific gravity of the liquid being drained. See TIS 7.318.

### Sample Specification

The liquid drain trap shall be of the float type with screwed NPT connections. Valve mechanism and float shall be stainless steel with hardened working surfaces, designed to retain a water seal at all times. A 1/2" NPT tapping shall be provided for a balance pipe. All internals are to be renewable and field serviceable.

### Installation

The trap must be fitted in a horizontal pipe line with direction of flow as indicated and so that the float mechanism is free to rise and fall in a vertical plane. Full-flow isolating valves should be placed to permit servicing. The high point of the body is provided with a 1/2" NPT tapping for a balance pipe, which is essential for satisfactory operation of this unit. The balance pipe must be connected with a continuous rise between the tapping provided on the body of the trap and the vessel being drained. The trap discharge should be piped to a safe place.

### Maintenance

This product can be maintained without disturbing the piping connections. Complete isolation of the trap from both supply and return line is required before any servicing is performed.

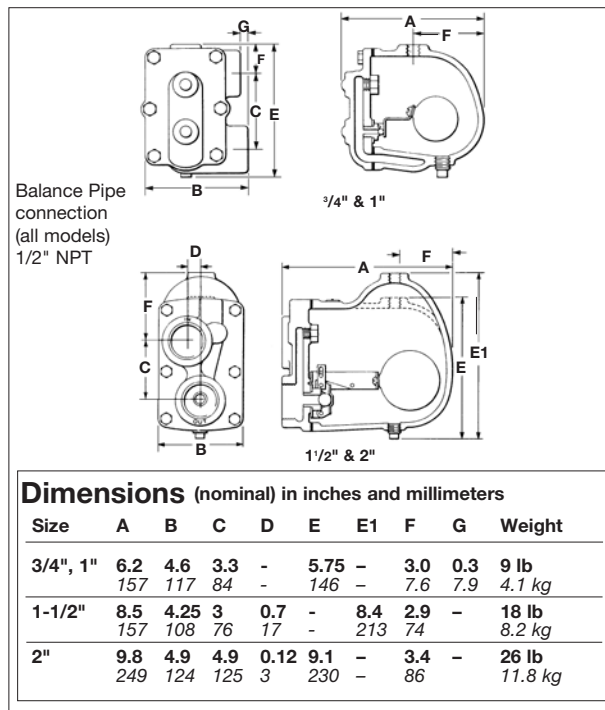
The trap should be disassembled periodically for inspection and cleaning of the valve head and seat.

Worn or damaged parts should be replaced using a complete repair kit.

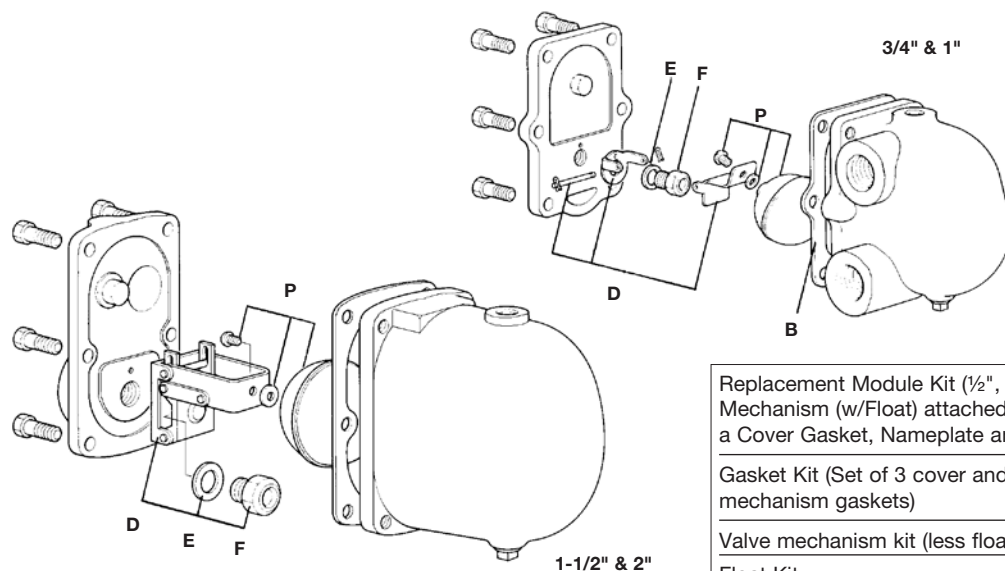
**Complete installation and maintenance instructions are given in IMI 7.306 which accompanies the product.**

Liquid drain traps can be used to drain most liquids from most gases. However, some applications, particularly those involving hazardous or unusual fluids, may be subject to regulation or may otherwise require special consideration.

Spirax Sarco will endeavor to provide whatever data is necessary to assist in product selection.



### Spare Parts



Replacement Module Kit (1/2", 3/4", 1" only)- Consists of: Valve Mechanism (w/Float) attached to a Cover and supplied with a Cover Gasket, Nameplate and a set of Cover Bolts.

Gasket Kit (Set of 3 cover and mechanism gaskets)

B, E

Valve mechanism kit (less float)

D, E, F

Float Kit

P

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## Iron Liquid Drain Trap FA-200

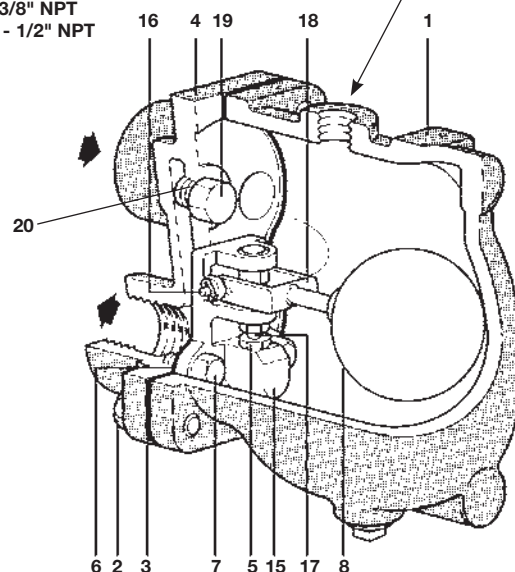
The float-operated liquid drain trap discharges continuously in direct response to variations in liquid flow rate, assuring thorough drainage of the system.

Model	FA-200
PMO	200 psig
Sizes	1" & 1-1/2"
Connections	NPT
Construction	Cast Iron

### Construction Materials

No.	Part	Material	
1	Body	Cast Iron	ASTM A126 CL B
2	Cover Screws	Steel	ASTM A449
3	Cover Gasket	Graphite	
4	Cover	Cast Iron	ASTM A126 CL B
5	Valve Seat	Stainless Steel	(1") AISI 304 (1-1/2") AISI 303
6	Main Valve Assembly Gasket	Graphite	
7	Cap Screw	Copper Alloy	Everdur 1015 or ASTM B 97-S1 Alloy
B14			
8	Float	Stainless Steel	AISI 304
15	Main Valve Assembly Housing	Cast Brass	ASTM B 62
16	Pivot Pin	Stainless Steel	AISI 303
17	Valve Head	Stainless Steel	(1") AISI 304 (1-1/2") AISI 303
18	Pivot Rod	Die Forged Brass	(1") ASTM B 124 (1-1/2") ASTM B62
19	Plug	Brass	ASTM B16
20	Plug Gasket	Stainless Steel	ASTM A240

Balance Pipe Connection  
1" - 3/8" NPT  
1-1/2" - 1/2" NPT



### Typical Applications

Receiver and air line drainage, draining a liquid from its vapor phase.

### Limiting Operating Conditions

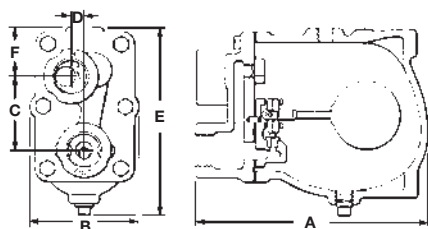
#### Max. Operating Pressure (PMO)

Up to 200 psig. The PMO depends on the model selected and the specific gravity of the liquid being drained. See TIS 7.318

**Max. Operating Temperature** 450°F (232°C)

### Pressure Shell Design Conditions

<b>PMA</b>	200 psig/0-450°F	14 barg/0-232°C
Max. allowable pressure		
<b>TMA</b>	450°F/0-200 psig	232°C/0-14 barg
Max. allowable temperature		



### Dimensions (nominal) in inches and millimeters

Size	A	B	C	D	E	F	Weight
1"	8.5 216	3.9 100	2.6 65	0.37 9	6.9 175	1.8 46	15 lb 6.8 kg
1-1/2"	10.75 273	5.75 146	3 76	0.56 14	9.1 232	2.5 64	30 lb 13.6 kg

Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only.  
In the interests of development and improvement of the product, we reserve the right to change the specification.

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# Iron Liquid Drain Trap

## FA-200

### Capacity

The discharge capacity depends on the differential pressure (inlet pressure minus outlet pressure) and the specific gravity of the liquid being drained. See TIS 7.318.

### Sample Specification

The liquid drain trap shall be of the float type with screwed NPT connections. Float and valve head and seat shall be stainless steel designed to retain a water seal at all times. An NPT tapping shall be provided for a balance pipe. All internals are to be renewable and field serviceable.

Liquid drain traps can be used to drain most liquids from most gases. However, some applications, particularly those involving hazardous or unusual fluids, may be subject to regulation or may otherwise require special consideration.

Spirax Sarco will endeavor to provide whatever data is necessary to assist in product selection.

### Installation

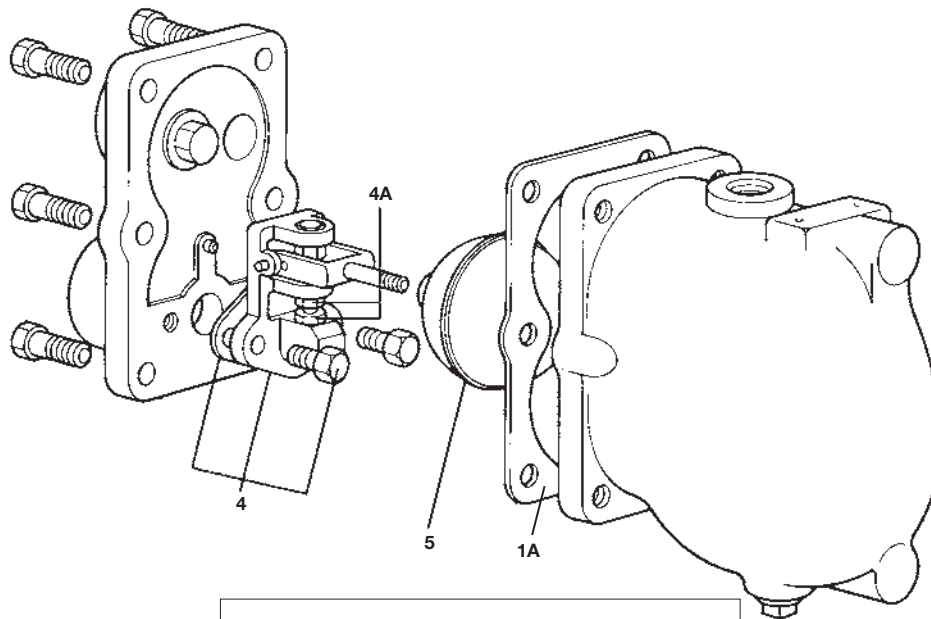
The trap must be fitted in a horizontal pipe line with direction of flow as indicated and so that the float mechanism is free to rise and fall in a vertical plane. Full-flow isolating valves should be placed to permit servicing. The high point of the body is provided with an NPT tapping for a balance pipe, which is essential for satisfactory operation of this unit. The balance pipe must be connected with a continuous rise between the tapping provided on the body of the trap and the vessel being drained. The trap discharge should be piped to a safe place.

### Maintenance

This product can be maintained without disturbing the piping connections. Complete isolation of the trap from both supply and return line is required before any servicing is performed. The trap should be disassembled periodically for inspection and cleaning of the valve head and seat. Worn or damaged parts should be replaced using a complete repair kit.

**Complete installation and maintenance instructions are given in IMI 7.306 which accompanies the product.**

### Spare Parts



Gasket kit (set of 3)	1A
Valve mechanism kit (less float)	4, 4A
Float kit	5

TI-7-309-US 2.14



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## Iron Liquid Drain Traps FAB Super Capacity Series

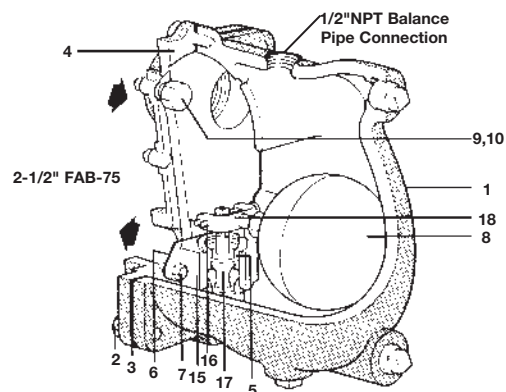
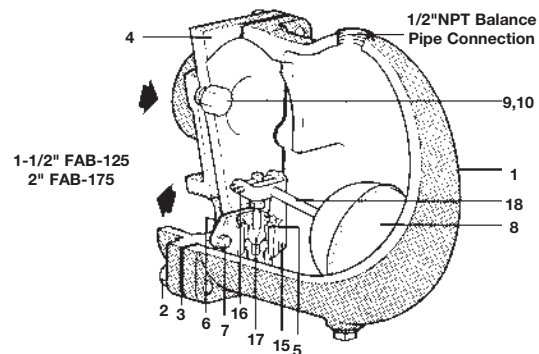
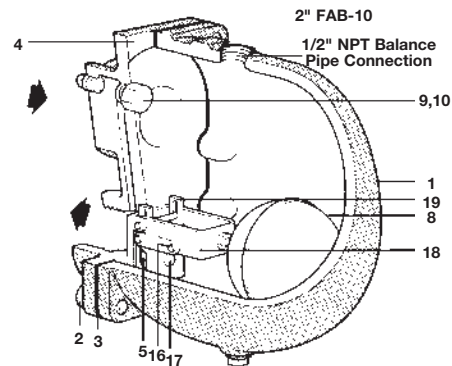
The **float-operated liquid drain trap** discharges continuously in direct response to variations in liquid flow rate, assuring thorough drainage of the system.

Model	FAB-10	FAB-150	FAB-75	FAB-175
Sizes	2"	1-1/2"	2-1/2"	2"
Connections	NPT			
Construction	Cast Iron Body			
	Stainless Steel Internals		Stainless Steel valve head & seat Brass valve housing	
Options	Gauge glass			

**Note:** FAB-75, FAB-150 and FAB-175 valves are double-seated and may not shut tight under no-load conditions. Normally, the liquid level will always be greater than the small residual leakage.

### Construction Materials

No.	Part	Material
1	Body	Cast Iron ASTM A126 CL B
2	Cover Screws	Carbon Steel ASTM A449
3	Cover Gasket	Graphite
4	Cover	Cast Iron ASTM A126 CL B
5	Valve Seat	Stainless Steel Type 303
6	Valve Seat Gasket	(FAB-10) Stainless Steel Type 302
7	Main Valve Assembly Gasket	Graphite
7	Main Valve Assembly Screws	Copper Alloy Everdur 1015
8	Float	Stainless Steel Type 304
9	Plug	Brass ASTM B16
10	Plug Gasket	Stainless Steel ASTM A240
15	Main Valve Assy. Housing	Stainless Steel ASTM A743 CF8M
16	Pivot Pin	Stainless Steel Type 303
17	Valve Head	Stainless Steel (FAB-10, 150, 175) Type 303 ASTM A351GR. CF8M
18	Float Arm	Stainless Steel Type 301
19	Seat Bracket	Stainless Steel (FAB-10) Type 304
	Head Bracket, Stop, Link	Stainless Steel (FAB-10) Type 301



### Typical Applications

Receiver and air line drainage, draining a liquid from its vapor phase.

### Limiting Operating Conditions

**Max. Operating Pressure (PMO)** Up to 175 psig. The PMO depends on the model selected and the specific gravity of the liquid being drained. See TI-7-318-US.

**Max. Operating Temperature** 450°F (232°C)

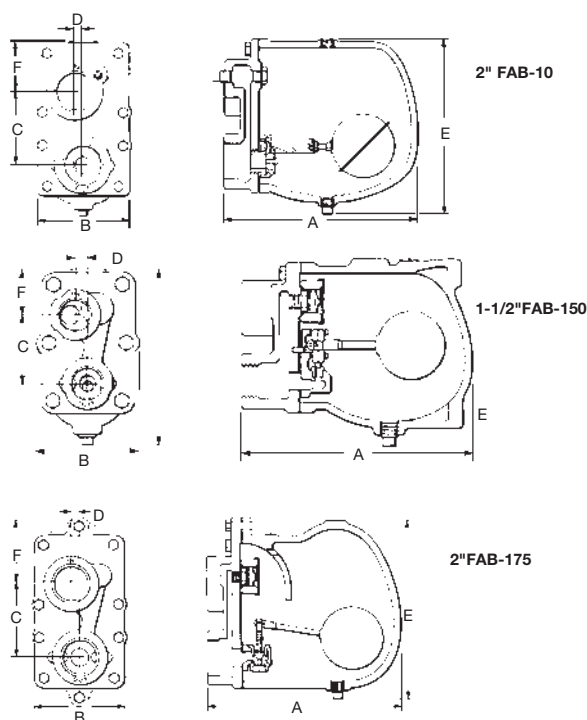
### Pressure Shell Design Conditions

<b>PMA</b> Max. allowable pressure	<b>FAB-75, 150, 175</b>	175 psig/0-450°F	12 barg/0-232°C
	<b>FAB-10</b>	125 psig/0-450°F	9 barg/0-232°C
<b>TMA</b> Max. allowable temp.	<b>FAB-75, 150, 175</b>	450° F/0-175 psig	232°C/0-12 barg
	<b>FAB-10</b>	450° F/0-125 psig	232°C/0-9 barg

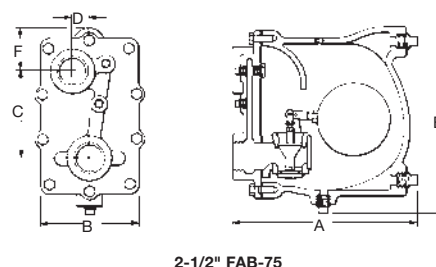
Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only.  
In the interests of development and improvement of the product, we reserve the right to change the specification.

TI-7-312-US 04.14

# Iron Liquid Drain Traps FAB Super Capacity Series



Dimensions (nominal) in inches and millimeters							
Type & Size	A	B	C	D	E	F	Weight
FAB-10 2"	12.2 309	5.9 149	4.5 114	0.5 13	10.7 271	3 76	43 lb 19.5 kg
FAB-150 1-1/2"	8.8 224	4.25 108	3 76	0.68 17	8.3 211	2.5 64	22 lb 10.0 kg
FAB-175 2"	12.1 306	5.9 149	4.5 114	0.5 13	11 279	4 102	48 lb 21.8 kg
FAB-75 2-1/2"	15.4 390	9.25 235	7.25 184	1.4 35	15.6 397	3.75 95	90 lb 40.8 kg



## Capacity

The discharge capacity depends on the differential pressure (inlet pressure minus outlet pressure) and the specific gravity of the liquid being drained. See TIS 7.318.

## Sample Specification

The liquid drain trap shall be of the float type with screwed NPT connections. Float and valve heads and seats shall be stainless steel. An NPT tapping shall be provided for a balance pipe. All internals shall be renewable and field serviceable.

## Installation

The trap must be fitted in a horizontal pipe line with direction of flow as indicated and so that the float mechanism is free to rise and fall in a vertical plane.

The high point of the body is provided with an NPT tapping for a balance pipe, which is essential for satisfactory operation of this unit. The balance pipe must be connected with a continuous rise between the tapping provided on the body of the trap and the vessel being drained. The trap discharge should be piped to a safe place.

## Maintenance

This product can be maintained without disturbing the piping connections. Complete isolation of the trap from both supply and return line is required before any servicing is performed.

The trap should be disassembled periodically for inspection and cleaning of the valve head and seat.

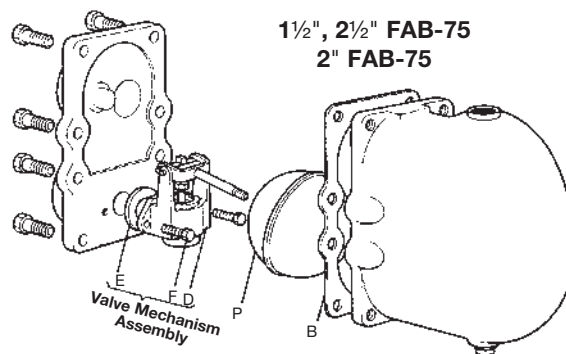
Worn or damaged parts should be replaced using a complete repair kit.

**Complete installation and maintenance instructions are given in IM-7-306-US which accompanies the product.**

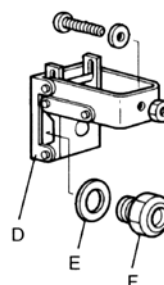
Liquid drain traps can be used to drain most liquids from most gases. However, some applications, particularly those involving hazardous or unusual fluids, may be subject to regulation or may otherwise require special consideration. Spirax Sarco will endeavor to provide whatever data is necessary to assist in product selection.

## Spare Parts

1 1/2", 2 1/2" FAB-75  
2" FAB-75



2" FAB-10  
Valve Mechanism Kit



Gasket Kit (set of 3 cover and Mechanism Gaskets)	B, E
Valve Mechanism Kit (less float)	D, E, F
Float Kit	P

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## Iron Liquid Drain Traps FAI-30, FAI-75, FAI-150, FAI-200

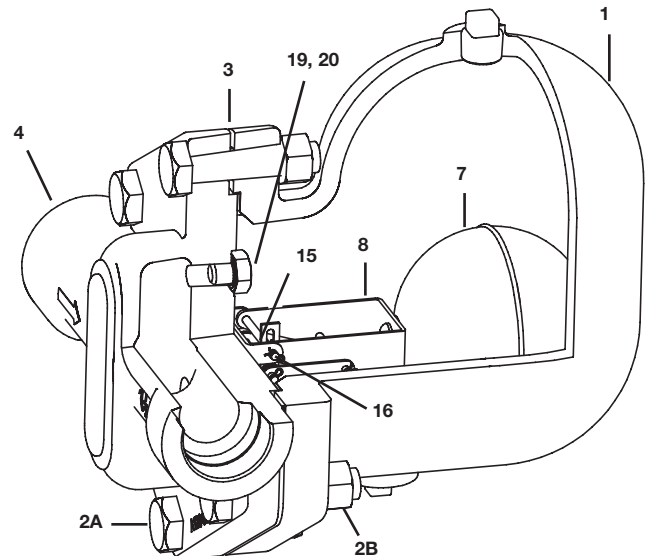
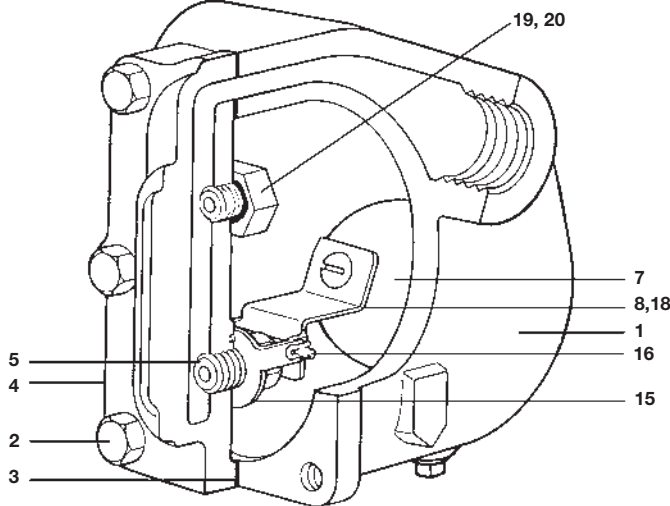
The **float-operated liquid drain trap** discharges continuously in direct response to variations in liquid flow rate, assuring thorough drainage of the system.

Model	FAI-30	FAI-75	FAI-150	FAI-200
<b>Sizes</b>	1/2", 3/4", 1", 1-1/2"			
<b>Connections</b>	NPT			
<b>Construction</b>	Cast Iron Body & Cover Stainless Steel Internals 1-1/2" FAI 30 and FAI 200 only			

### TYPICAL APPLICATIONS

Receiver and air line drainage, draining a liquid from its vapor phase

FAI-30 and FAI-200 only



### LIMITING OPERATING CONDITIONS

**Max. Operating Pressure (PMO)** Up to 200 psig. The PMO depends on the model selected and the specific gravity of the liquid being drained. See TIS 7.318.

**Max. Operating Temperature** 450°F (232°C)

### PRESSURE SHELL DESIGN CONDITIONS

**PMA** 200 psig/0-450°F 13.8 barg/0-232°C  
Max. allowable pressure

**TMA** 450°F/0-200 psig 232°C/0-13.8 barg  
Max. allowable temperature

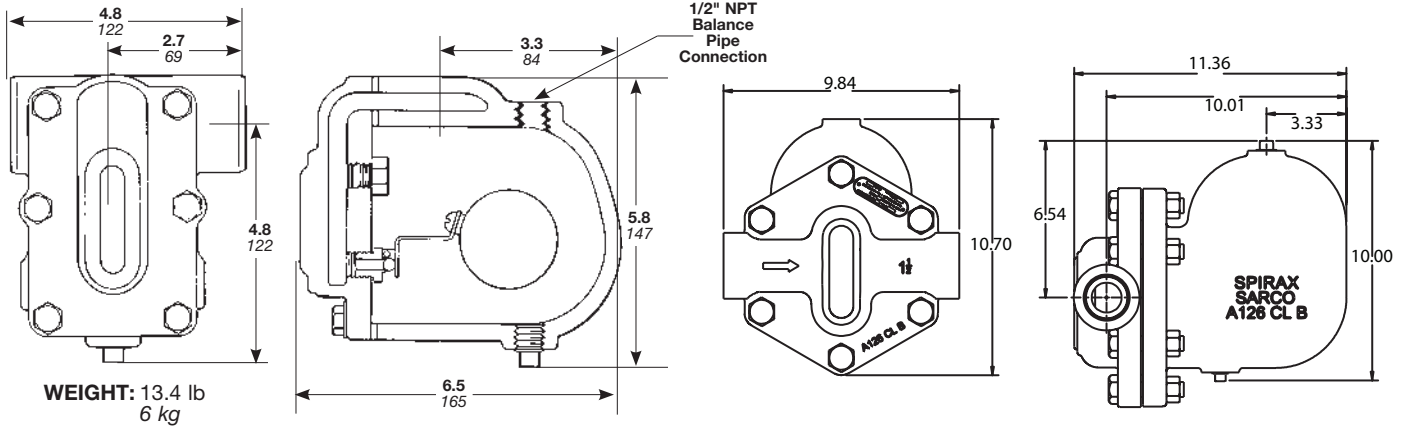
### CONSTRUCTION MATERIALS

No.	Part	Material	
1	Body	Cast Iron	ASTM A126 CL B
2	Cover Screws	Carbon Steel	ASTM A449
2A	Cover Bolts	Alloy Steele	ASTM A 193 B7
2B	Cover Nuts 3/4" & 1"	7/16 - 14 UNC-2A	ASTM A 194 2H
3	Cover Gasket	Graphite	
4	Cover	Cast Iron	ASTM A126 CL B
5	Valve Seat	Stainless Steel	Type 420F
7	Ball Float	Stainless Steel	Type 304
8	Float Arm	Stainless Steel	AISI 301/302/304
15	Seat Bracket	Stainless Steel	AISI 301/302/304
16	Pivot Pin	Stainless Steel	Type 302 or 303
18	Valve Head	Stainless Steel	Type 440 Gr.C
19	Plug	Brass	ASTM B16
20	Plug Gasket	Stainless Steel	ASTM A167

Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only.  
In the interests of development and improvement of the product, we reserve the right to change the specification.

TI-7-316-US 1.14

# Iron Liquid Drain Traps FAI-30, FAI-75, FAI-150, FAI-200



## CAPACITY

The discharge capacity depends on the differential pressure (inlet pressure minus outlet pressure) and the specific gravity of the liquid being drained. See TIS 7.318.

## SAMPLE SPECIFICATION

The liquid drain trap shall be of the float type with horizontal in-line NPT connections. Valve mechanism and float shall be stainless steel with hardened working surfaces, designed to retain a water seal at all times. A 1/2" NPT tapping shall be provided for a balance pipe. All internals are to be renewable and field serviceable.

Liquid drain traps can be used to drain most liquids from most gases. However, some applications, particularly those involving hazardous or unusual fluids, may be subject to regulation or may otherwise require special consideration. Spirax Sarco will endeavor to provide whatever data is necessary to assist in product selection.

## INSTALLATION

The trap must be fitted in a horizontal pipe line with direction of flow as indicated and so that the float mechanism is free to rise and fall in a vertical plane. Full-flow isolating valves should be placed to permit servicing. The high point of the body is provided with a 1/2" NPT tapping for a balance pipe, which is essential for satisfactory operation of this unit. The balance pipe must be connected with a continuous rise between the tapping provided on the body of the trap and the vessel being drained. The trap discharge should be piped to a safe place.

## MAINTENANCE

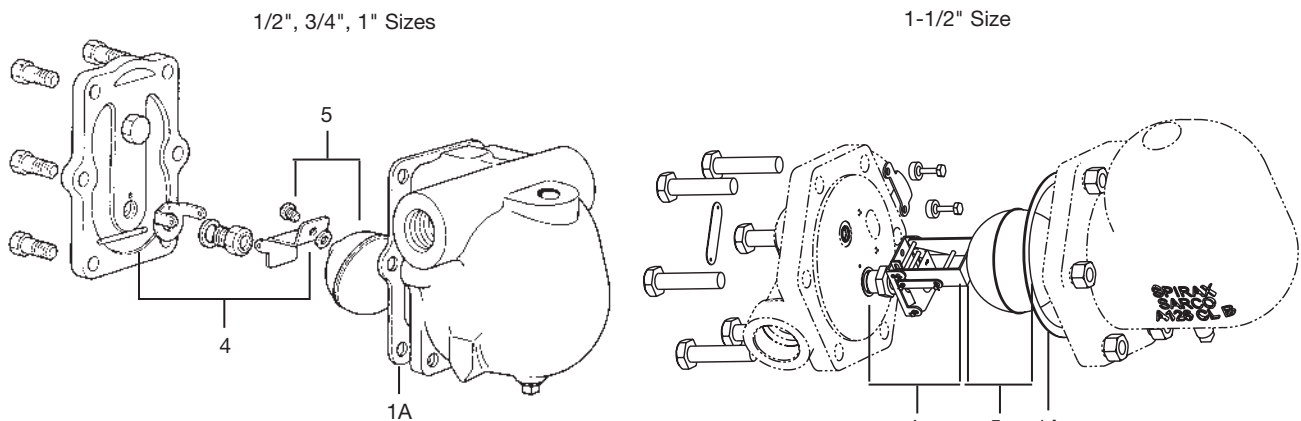
This product can be maintained without disturbing the piping connections. Complete isolation of the trap from both supply and return line is required before any servicing is performed.

The trap should be disassembled periodically for inspection and cleaning of the valve head and seat.

Worn or damaged parts should be replaced using a complete repair kit.

**Complete installation and maintenance instructions are given in IMI 7.306 which accompanies the product.**

## SPARE PARTS



Gasket Kit (set of 3 Cover)	1A
Complete Valve Mechanism Kit (less float)	4
Float Kit	Float, Screw, Washer

TI-7-316-US 1.14

# spirax/sarco

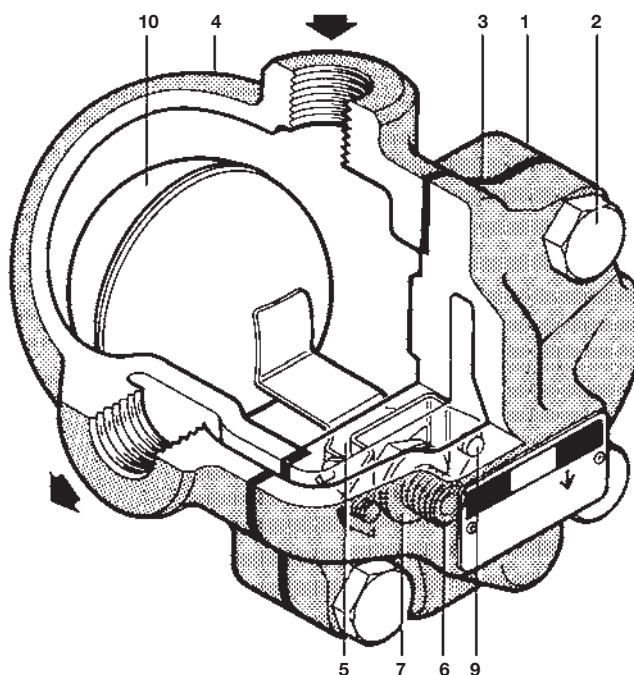
## Ductile Iron Liquid Drain Trap CA14

The **float-operated liquid drain trap** discharges continuously in direct response to variations in liquid flow rate, assuring thorough drainage of the system. The CA 14 has a synthetic rubber valve head for positive closure.

Model □	CA 14
<b>PMO</b>	203 psig
<b>Sizes</b>	1/2" & 3/4"
<b>Connections</b>	NPT
<b>Construction</b>	Ductile Iron
<b>Options</b>	BSP Connections

### TYPICAL APPLICATIONS

Receiver and airline drainage, draining a liquid from its vapour phase.



### LIMITING OPERATING CONDITIONS

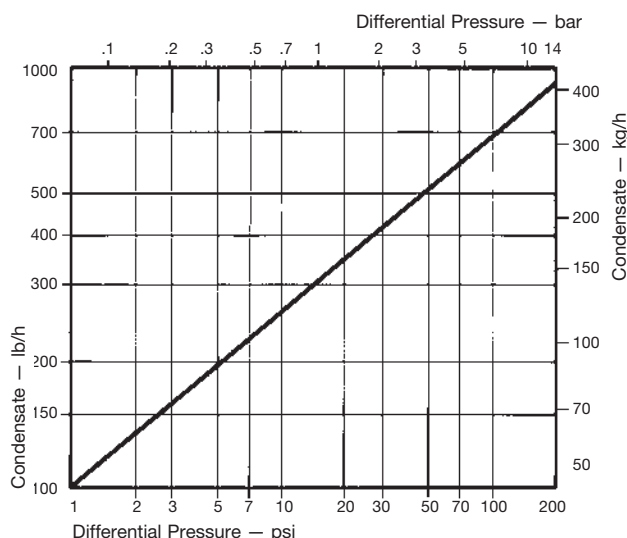
**Max. Operating Pressure (PMO)** 203 psig (14 barg)

**Max. Operating Temperature** 260°F (127°C)

### PRESSURE SHELL DESIGN CONDITIONS

**PMA** 232 psig/0-248°F 16 barg/0-120°C  
Max. allowable pressure 203 psig/389°F 14 barg/198°C  
188 psig/482°F 13 barg/250°C

**TMA** 482°F/0-188 psig 250°C/0-13 barg  
Max. allowable temperature



### CONSTRUCTION MATERIALS

No.	Part	Material	
1	Cover	Ductile (SG) Iron	DIN 1693 GGG 40
2	Cover Bolts	Steel	BS 3692 Gr B.8
3	Cover Gasket	Asbestos-free Synthetic Fiber	BS 2815 Gr.B
4	Body	Ductile (SG) Iron	DIN 1693 GGG 40
5	Main Valve	Synthetic Rubber	Viton
6	Main Valve Seat	Stainless Steel	AISI 431
7	Main Valve Seat Gasket	Stainless Steel	AISI 304
9	Main Valve Assembly Screws	Stainless Steel	BS 6105 C1 A2-70
10	Ball Float & Lever	Stainless Steel	AISI 304

Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only.

In the interests of development and improvement of the product, we reserve the right to change the specification.

TI-7-317-US 03.94

# Ductile Iron Liquid Drain Trap CA14

## SAMPLE SPECIFICATION

The liquid drain trap shall be of the float type with screwed NPT connections (top inlet, side outlet.) Body material shall be Ductile (SG) Iron. Valve mechanism shall be stainless steel with viton valve head designed to retain a water seal at all times. All internals are to be renewable & field servicable without disturbing the piping connections.

## INSTALLATION

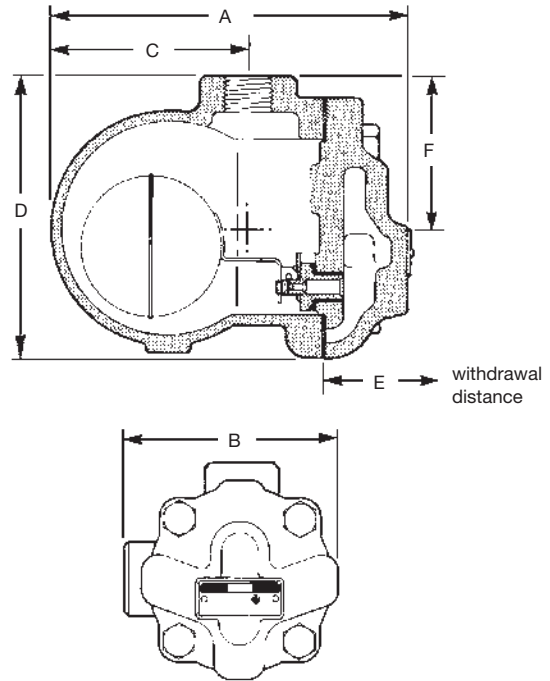
The trap must be fitted in a horizontal plane, as shown, with the inlet at the top so that the float mechanism is free to rise and fall vertically. The discharge should be piped to a safe place.

## MAINTENANCE

This product can be maintained without disturbing the piping connections. Complete isolation of the trap from both supply and return line is required before any servicing is performed. The trap should be disassembled periodically for inspection and cleaning of the valve head and seat.

Worn or damaged parts should be replaced using a complete repair kit.

**Complete installation and maintenance instructions are given in the IMI sheet which accompanies the product.**



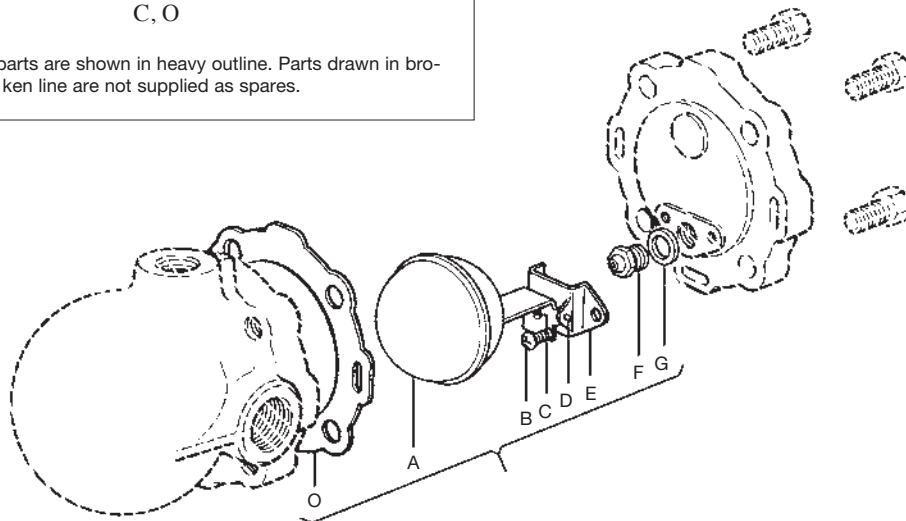
**DIMENSIONS (NOMINAL) IN INCHES & MILLIMETERS**

Size	A	B	C	D	E	F	Weight
1/2", 3/4"	5.8 147	4.5 114	3.15 80	4.5 114	4.1 105	2.4 60.5	5.5 lb 2.5 kg

Maintenance Kit	A, B (2 off), C, D, E, F, G, O
Seal Kit	C, O

Available spare parts are shown in heavy outline. Parts drawn in broken line are not supplied as spares.

## SPARE PARTS





# spirax sarco

## Steel Liquid Drain Trap FA450

The **float-operated liquid drain trap** discharges continuously in direct response to variations in liquid flow rate, assuring thorough drainage of the system.

Model	FA450
<b>PMO</b>	465 psig (see below)
<b>Sizes</b>	3/4" to 2"
<b>Connections</b>	NPT
<b>Construction</b>	Carbon Steel Body Stainless Steel Internals
<b>Options</b>	ANSI 150, 300 or 600 flanges SW Connections to ANSI B16.11 1/2" Bottom Drain

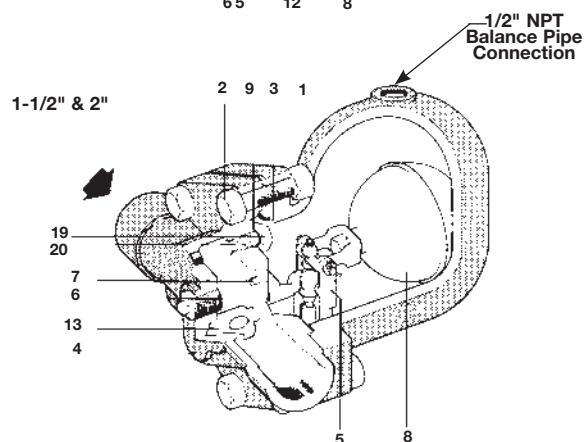
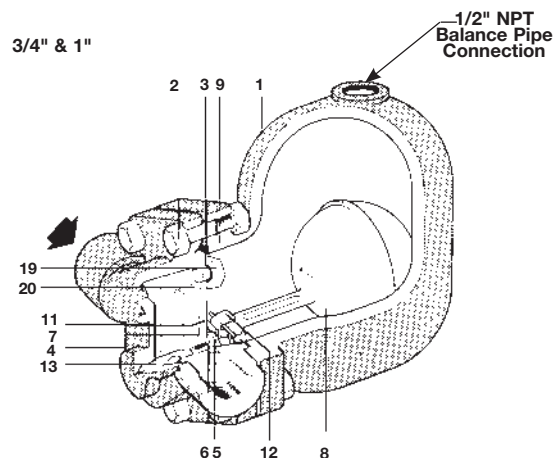
**Note:** 1-1/2" and 2" valves are double-seated, and may not shut tight under no-load conditions. Normally, the liquid load will always be greater than the small residual leakage.

### Construction Materials

No.	Part	Material	
1	Body	Steel	ASTM A216 WCB
2	Cover Bolts	Steel	ASTM A 193 B7
	Cover Nuts 3/4" & 1"	7/16 - 14 UNC-2A	ASTM A 194 2H
	1-1/2" & 2" 5/8-11UNC-2A		
3	Cover Gasket	Stainless Steel Reinforced Exfoliated Graphite	
4	Cover	Steel	ASTM A216 WCB
5	Valve Seat (3/4" & 1")	Stainless Steel	ASTM A276 Type 420F
	Main Valve Assembly w/ erosion deflector (1-1/2" & 2")	Stainless Steel	AISI 431
6	Valve Seat Gasket (3/4" & 1")	Stainless Steel	ASTM A240 Type 301
	Main Valve Assy Gasket 1-1/2" & 2"	Stainless Steel Reinforced Exfoliated Graphite	
7	Pivot Frame Assy	Stainless Steel	AISI 18-8
	Set Screws (3/4" & 1")	10-24 Fillister Head	ANSI B 18.6.3
	Main Valve Assembly Cap Screws (1-1/2")	1/4-20	ASTM 276 Type 304
	Studs & Nuts (2")	5/16-18	ASTM 276 Type 431 & 304
8	Ball Float & Lever	Stainless Steel	ASTM A240 Type 304
11	Support Frame	Stainless Steel	ASTM A240 Type 304
12	Pivot Frame	Stainless Steel	ASTM A240 Type 304
13	Erosion Deflector	Stainless Steel	ASTM A582 Type 303
19	Plug	Stainless Steel	
20	Plug Gasket	Stainless Steel	ASTM A240

### Typical Applications

Receiver and air line drainage, draining a liquid from its vapor phase



### Limiting Operating Conditions\*

**Max. Operating Pressure (PMO)** Up to 465 psig. The PMO depends on the model selected and the specific gravity of the liquid being drained. See TIS 7.318.

**Max. Operating Temperature** 750 °F (400°C)

### Pressure Shell Design Conditions\*

**PMA** 535 psig/650°F 37 barg/343°C  
Max. allowable pressure 505 psig/750°F 35 barg/400°C

**TMA** 750°F/0-505 psig 400°C/0-34 barg  
Max. allowable temperature

\* The limiting operating and design conditions for ANSI 150 flanged units will be limited by the flange rating



# Steel Liquid Drain Trap FA450

## Capacity

The discharge capacity depends on the differential pressure (inlet pressure minus outlet pressure) and the specific gravity of the liquid being drained. See TIS 7.318.

## Sample Specification

Liquid drain traps shall be of the mechanical ball float type having steel bodies, horizontal in-line connections, and stainless steel valve heads, seats and ball floats. Internals of the trap shall be completely servicable without disturbing the piping.

## Installation

The trap must be fitted in a horizontal pipe line with direction of flow as indicated and so that the float mechanism is free to rise and fall in a vertical plane. Full-flow isolating valves should be placed to permit servicing.

The high point of the body is provided with a 1/2" NPT tapping for a balance pipe, which is essential for satisfactory operation of this unit. The balance pipe must be connected with a continuous rise between the tapping provided on the body of the trap and the vessel being drained. The trap discharge should be piped to a safe place.

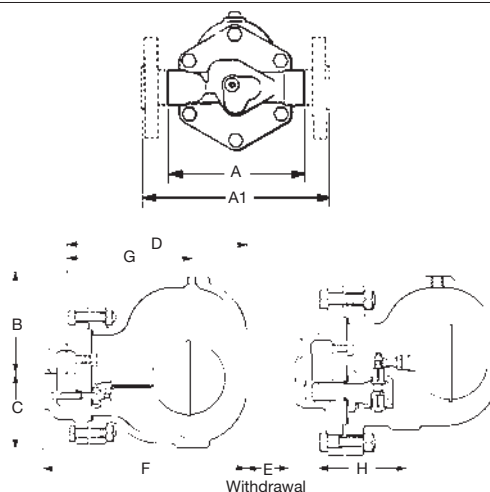
## Maintenance

This product can be maintained without disturbing the piping connections. Complete isolation from both supply and return line is required before any servicing is performed.

The trap should be disassembled periodically for inspection and cleaning of the valve head and seat.

Worn or damaged parts should be replaced using a complete valve mechanism kit.

**Complete installation and maintenance instructions are given in IMI 7.306, which accompanies the product.**

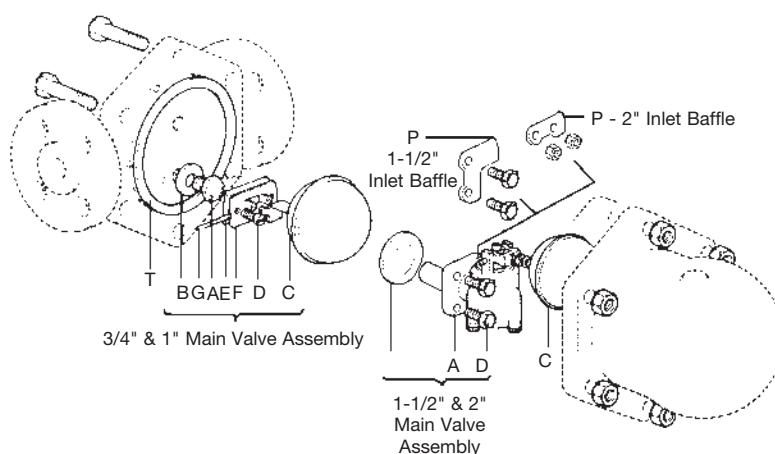


**Dimensions**  
(nominal) in inches and millimeters

Size	A	A1	B	C	D	E	F	G	H	Scr/SW	Flg
3/4"	6.1 155	10.1 255	3.0 76	3.1 79	6.4 163	4.7 120	7.4 189	4.0 102	—	18.0 lb 8.2 kg	23.8 lb 10.8 kg
1"	6.5 165	10.4 264	5.0 127	3.8 96	8.2 208	6.3 160	9.2 234	5.8 147	—	24.2 lb 11.0 kg	33 lb 15 kg
1-1/2"	9.8 250	14.0 356	5.6 142	3.6 92	9.8 250	7.7 195	11.1 282	6.4 163	4.7 119	55.1 lb 25.0 kg	64.0 lb 29.0 kg
2"	11.8 300	16.0* 406*	6.0 152	4.0 102	10.0 255	7.7 195	11.6 295	6.5 165	6.0 152	66.1 lb 30.0 kg	70.5 lb 32.0 kg

\*ANSI 600 16.5" 419 mm

## Spare Parts



Valve Mechanism Kit w/ Float (3/4" & 1")	A,B,C,D,E,F,G
Valve Mechanism Kit (1-1/2" & 2")	A,B,D,P
Gasket Kit (3 sets of cover and Mechanism Gaskets)	B,T
Float Kit (1-1/2" & 2")	C

*The erosion deflector is pressed into the body during manufacture and not available as a spare.*

Liquid drain traps can be used to drain liquids from most gases. However, some applications, particularly those involving hazardous or unusual fluids, may be subject to regulation or may otherwise require special consideration. Spirax Sarco will endeavor to provide whatever data is necessary to assist in product selection.

## Steel Liquid Drain Trap 3" and 4" FA450

The float-operated liquid drain trap discharges continuously in direct response to variations in liquid flow rate, assuring thorough drainage of the system.

Model	FA450	
Sizes	3"	4"
Connections	NPT, SW, Flanged	Flanged
Construction	Carbon Steel Body Stainless Steel Internals	

### Standards

The product fully complies with the requirements of the European Pressure Equipment Directive 97/23/EC, and carries the CE mark when so required.

### Certification

This product is available with certification to EN 10204 3.1. Designed in accordance with ASME VIII Div 1. **Note:** All certification/inspection requirements must be stated at the time of order placement.

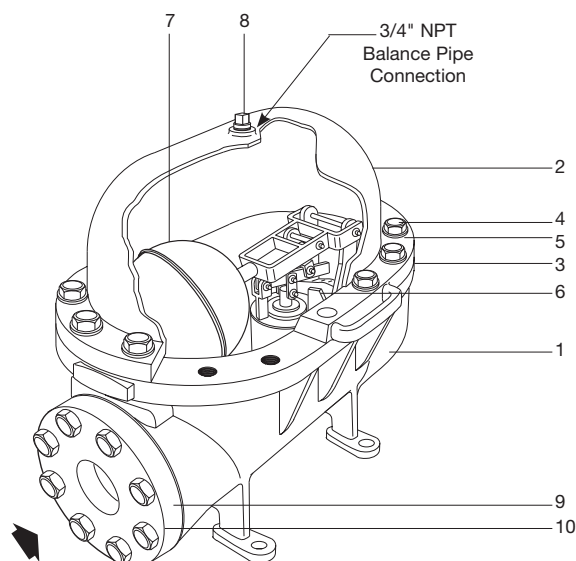
**Note:** The double seated valve may not shut tight under no-load conditions. Normally, the liquid load will always be greater than the small residual leakage.

### Construction Materials

No.	Part	Material
1	Body	Cast Carbon Steel ASTM A216 WCB
2	Cover	Cast Carbon Steel ASTM A216 WCB
3	Cover Gasket	Graphite with SS insert
4	Cover Bolts	Steel ASTM A193 GR B7
5	Lockwashers	Steel
6	Main Valve Assembly	Stainless Steel
	Valve Mech. Gasket	Graphite
	Valve Mech. Screws	Stainless Steel
7	Float	Stainless Steel
8	Cover Plug (3/4" NPT)	Steel
	Drain Plug (3/4" NPT)	Steel
9	Companion Flange	Forged Steel
10	Flange Bolts	Steel ASTM A193 GR B7

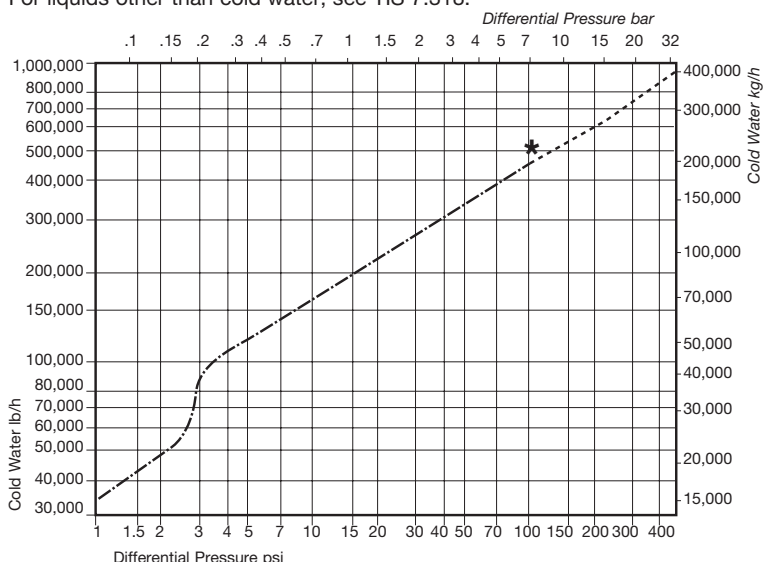
### Typical Applications

Draining a liquid from a gas in large process applications.



### Capacities

For liquids other than cold water, see TIS 7.318.



### Limiting Operating Conditions\*

**Max. Operating Pressure (PMO)** Up to 450 psig, depending on the specific gravity of the liquid being drained. See TIS 7.318.

**Max. Operating Temperature** 650°F (343°C) at 450 psig (31 barg)

750°F (400°C) at operating pressures below 375 psig (26 barg)

### Pressure Shell Design Conditions\*

<b>PMA</b>	450 psig/0-650°F	31 barg/0-343°C
Max. allowable pressure	425 psig/700°F	29 barg/371°C
	375 psig/750°F	26 barg/400°C

<b>TMA</b>	750°F/0-375 psig	400°C/0-26 barg
Max. allowable temperature		

\* The limiting operating and design conditions for ANSI 150 flanged units will be limited by the flange rating.

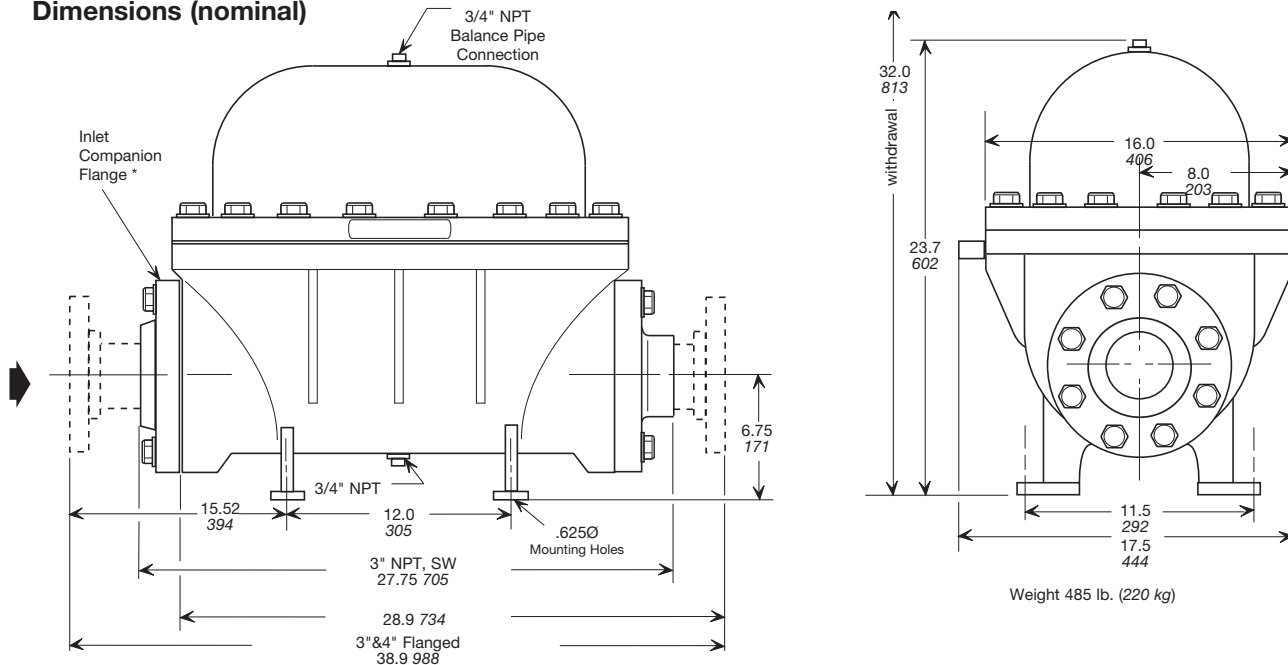
Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only.

In the interests of development and improvement of the product, we reserve the right to change the specification.

TI-7-3151-US 2.14

# Steel Liquid Drain Trap 3" and 4" FA450

## Dimensions (nominal)



\* The inlet connection on NPT and SW traps is a standard 4" ANSI 300 RF Flange bolted to the trap body. The flange bore is 3", NPT or SW to match the outlet connection of the trap.

## Sample Specification

Liquid drain traps shall be of the mechanical ball float type having steel bodies with stainless steel internal parts. The piping connections shall be horizontal in-line, and the body shall incorporate mounting legs with drilled pads. The trap body shall be horizontally split and all internal parts shall be completely serviceable without disturbing the inlet and outlet piping.

## Installation

The trap should be located below and close to the equipment drain point. A pipeline strainer should be installed ahead of the trap, and full-flow isolating valves should be placed to permit servicing. The mounting legs should be bolted to a firm horizontal support. Access above the trap must be provided for servicing. The cover has a plugged 3/4" NPT balance pipe connection. The balance pipe must be connected with a continuous rise between the trap and the equipment being drained.

Complete installation instructions are given in IMI 7.3151.

## Maintenance

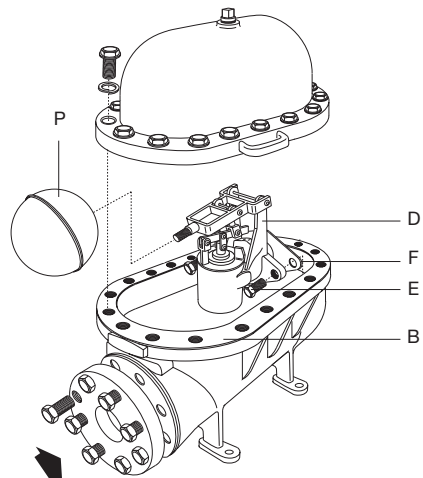
This product can be maintained without disturbing the piping connections. Complete isolation from both supply and return line is required before any servicing is performed. The trap should be disassembled periodically for inspection and cleaning of the valve mechanism.

Complete installation and maintenance instructions are given in IMI 7.3151, which accompanies the product.

Liquid drain traps can be used to drain most liquids from most gases. However, some applications, particularly those involving hazardous or unusual fluids, may be subject to regulation or may otherwise require special consideration.

Spirax Sarco will endeavor to provide whatever data is necessary to assist in product selection.

## Spare Parts



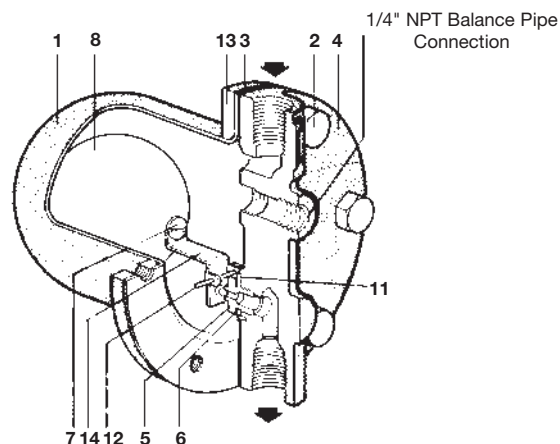
Valve Mechanism Kit	D,E,F
Gasket Kit (pkt of 3 each)	B,F
Float Kit	P

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## Steel Liquid Drain Trap F-150V, F-300V

The **float-operated liquid drain trap** discharges continuously in direct response to variations in liquid flow rate, assuring thorough drainage of the system.

Model	F-150V	F-300V
PMO	150 psig	300 psig
Sizes	1/2"	
Connections	NPT	
Construction	Stainless Steel Body Carbon Steel Cover	
Options	SW to ANSI B16.11	



### Typical Applications

Receiver and air line drainage, draining a liquid from its vapor phase.

### Limiting Operating Conditions

#### Max. Operating Pressure (PMO)

Specific Gravity	F-150V		F-300V	
	psig	barg	psig	barg
1.0	150	10.3	300	20.7
.95	150	10.3	300	20.7
.90	150	10.3	300	20.7
.85	150	10.3	300	20.7
.80	138	9.5	282	19.4
.75	119	8.1	243	16.7
.70	100	6.8	203	13.9
.65	80	5.5	164	11.2
.60	61	4.2	125	8.6
.55	42	2.8	86	5.9
.50	23	1.5	46	3.1

Max. Operating Temperature 750°F (399°C)

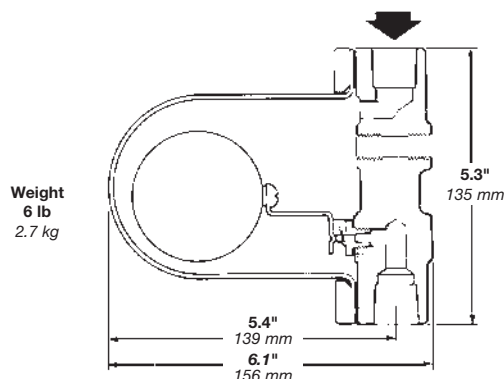
### Pressure Shell Design Conditions

**PMA** 450 psig/0-750°F 31 barg/0-399°C  
Max. allowable pressure

**TMA** 750°F/0-450 psig 399°C/0-31 barg  
Max. allowable temperature

### Construction Materials

No.	Part	Material
1	Body	Stainless Steel AISI 304
2	Cover Screws	Steel ASTM A449 Type 1
3	Cover Gasket	Graphite
4	Cover	Forged Steel ASTM A105
5	Valve Seat	Stainless Steel AISI 420F
6	Valve Seat Gasket	Stainless Steel AISI 303
7	Float Screw & washer	Stainless Steel AISI 304
8	Ball Float	Stainless Steel AISI 304
11	Valve Seat Bracket	Stainless Steel AISI 301
12	Pivot Pin	Stainless Steel AISI 303
13	Body Retaining Ring	Forged Steel ASTM A105
14	Lever & Ball Head	Stainless Steel AISI 301/304 Lever AISI 440 Ball Head



### Cold Water Capacity lb/h

psi bar	Differential pressure														
	1	2	5	10	20	30	50	65	75	100	125	150	250	300	
F-150V	150	200	295	395	530	625	785	880	940	1060	1160	1250	—	—	
F-300V	80	105	145	210	280	335	420	470	500	570	620	680	850	920	

For kg/h, multiply lb/hr by .454

Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only.

In the interests of development and improvement of the product, we reserve the right to change the specification.

TI-7-310-US 2.14

# Steel Liquid Drain Trap F-150V, F-300V

## Conversion Factors

for equivalent cold water capacity of light liquids

Specific gravity	.95-.99	.90-.94	.85-.89	.80-.84	.75-.79	.70-.74	.65-.69	.60-.64	.55-.59	.50-.54
Conversion Factor	1.03	1.06	1.09	1.12	1.16	1.20	1.24	1.29	1.35	1.42

## Draining Cold Water & Liquids of specific gravity 1.0

Obtain the required cold water capacity by multiplying the peak load by a safety factor of 1.5. Select the drain trap from the capacity table which satisfies the required cold water capacity and operates at the minimum pressure differential of the application.

## Sample Specification

The liquid drain trap shall be of the float type with screwed NPT connections. Valve mechanism shall be stainless steel with hardened working surfaces designed to retain a water seal at all times. A 1/4" NPT tapping shall be provided for a balance pipe. All internals are to be renewable and field serviceable.

## Draining Liquids of specific gravity 0.5 to 0.95

Determine the "Equivalent Cold Water Capacity" of the light liquid by multiplying its peak load (include a safety factor of 1.5) by the conversion factor given in the table above. If the maximum load is accurately known, the safety factor can be reduced or eliminated.

Refer next to Limiting Conditions table which gives the maximum operating pressure with various gravity liquids. For liquids between those listed, use the next lower specific gravity. Determine the maximum operating pressure equal to, or greater than, the inlet pressure of the application.

## Installation

The trap must be fitted in a vertical pipe line with direction of flow as indicated and so that the float mechanism is free to rise and fall in a vertical plane.

The cover is provided with a 1/4" tapping for a balance pipe, which is essential for satisfactory operation of this unit. The balance pipe must be connected with a continuous rise between the tapping provided on the trap and the vessel being drained. The trap discharge should be piped to a safe place.

## Maintenance

This product can be maintained without disturbing the piping connections. Complete isolation of the trap from both supply and return line is required before any servicing is performed. The trap should be disassembled periodically for inspection and cleaning of the valve head and seat. Worn or damaged parts should be replaced using a complete repair kit.

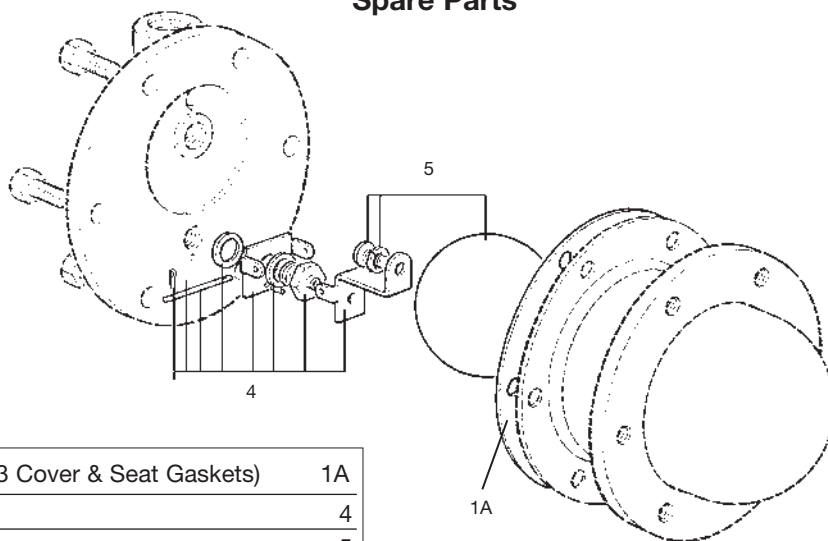
**Complete installation and maintenance instructions are given in the IMI 7.306 which accompanies the product.**

Liquid drain traps can be used to drain most gases.

However, some applications, particularly those involving hazardous or unusual fluids, may be subject to regulation or may otherwise require special consideration.

Spirax Sarco will endeavor to provide whatever data is necessary to assist in product selection.

## Spare Parts



Cover Gasket (Set of 3 Cover & Seat Gaskets)	1A
Valve Mechanism Kit	4
Float Kit	5

TI-7-310-US 2.14



## Stainless Steel Liquid Drain Trap FA-150

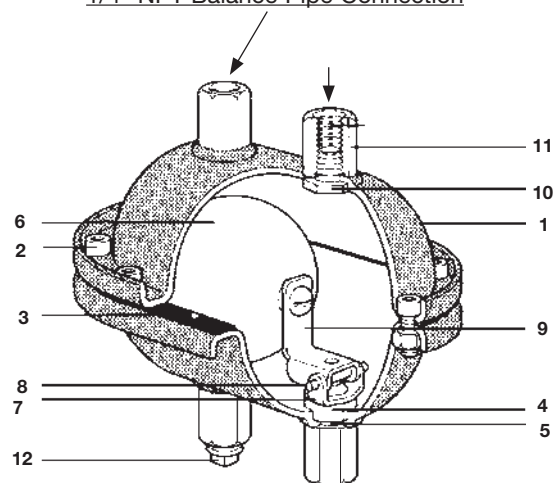
The **float-operated liquid drain trap** discharges continuously in direct response to variations in liquid flow rate, assuring thorough drainage of the system.

<b>Model</b>	<b>FA-150</b>
<b>PMO</b>	150 psig
<b>Sizes</b>	1/4"
<b>Connections</b>	NPT
<b>Construction</b>	Stainless Steel Body and Internals

### Typical Applications

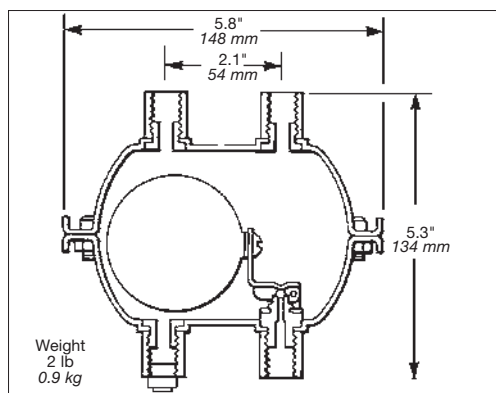
Receiver and air line drainage, draining liquid from its vapor phase.

1/4" NPT Balance Pipe Connection



### Construction Materials

No.	Part	Material	
1	Body	Stainless Steel	AISI 304
2	Cover Screws	Plated Steel	ASTM A574
	Cover Nuts		ASTM A 563
3	Cover Gasket	Graphite	
4	Valve Seat	Stainless Steel	AISI 420F
5	'O' Rings	BUNA-N	
6	Float	Stainless Steel	AISI 304
7	Seat Bracket	Stainless Steel	AISI 301
8	Pivot Pin	Stainless Steel	AISI 303
9	Valve Head & Arm	Stainless Steel	AISI 300/440
10	Connection Stud	Stainless Steel	AISI 304
11	Connection Nut	Stainless Steel	AISI 303
12	Drain Plug	Stainless Steel	AISI 316



### Limiting Operating Conditions

#### Max. Operating Pressure (PMO)

Specific Gravity	psig	barg
1.0	150	10.3
.95	135	9.3
.90	119	8.2
.85	104	7.1
.80	89	6.1
.75	73	5.0
.70	58	4.0
.65	43	2.9
.60	25	1.7
.55	12	0.8

#### Max. Operating Temperature 250°F (121°C) Pressure Shell Design Conditions

**PMA**150 psig/0-250°F 10 barg/0-121°C  
Max. allowable pressure

**TMA**250°F/0-150 psig 121°C/0-10 barg  
Max. allowable temperature

### Cold Water Capacity lb/h .10" (2.5mm) orifice diameter

	Differential pressure											
psi	1	2	5	10	20	30	50	65	75	100	125	150
bar	.07	.14	.34	.69	1.4	2.1	3.5	4.5	5.2	6.9	8.6	10.3
1/4" FA-150	125	165	250	330	450	530	650	750	790	900	980	1025

For kg/h, multiply lb/h by .454

Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only.  
In the interests of development and improvement of the product, we reserve the right to change the specification.

TI-7-307-US 2.14



# Stainless Steel Liquid Drain Trap

## FA-150

### Conversion Factors

for equivalent cold water capacity of light liquids

Specific gravity	.95-.99	.90-.94	.85-.89	.80-.84	.75-.79	.70-.74	.65-.69	.60-.64	.55-.59
Conversion Factor	1.03	1.06	1.09	1.12	1.16	1.20	1.24	1.29	1.35

### Draining Cold Water & Liquids of specific gravity 1.0

Obtain the required cold water capacity by multiplying the peak load by a safety factor of 1.5. Select the drain trap from the capacity table which satisfies the required cold water capacity and operates at the minimum pressure differential of the application.

### Draining Liquids of specific gravity 0.55 to 0.95

Determine the "Equivalent Cold Water Capacity" of the light liquid by multiplying its peak load (include a safety factor of 1.5) by the conversion factor given in the table above. If the maximum load is accurately known, the safety factor can be reduced or eliminated.

Refer next to Limiting Conditions table which gives the maximum operating pressure with various gravity liquids. For liquids between those listed, use the next lower specific gravity. Ensure that the maximum operating pressure is equal to, or greater than, the inlet pressure of the application.

### Sample Specification

The liquid drain trap shall be of the float type with screwed NPT connections. Body shall be stainless steel, and valve mechanism shall be stainless steel with hardened working surfaces designed to retain a water seal at all times. An NPT tapping shall be provided for a balance pipe. All internals are to be renewable and field serviceable.

### Installation

The trap must be fitted in a vertical pipe line so that the float mechanism is free to rise and fall in a vertical plane.

The high point of the cover is provided with a 1/4" NPT tapping for a balance pipe, which is essential for satisfactory operation of this unit. The balance pipe must be connected with a continuous rise between the tapping provided on the cover of the trap and the vessel being drained. The trap discharge should be piped to a safe place.

### Maintenance

This product can be maintained without disturbing the inlet piping connections. Complete isolation of the trap from both supply and return line is required before any servicing is performed.

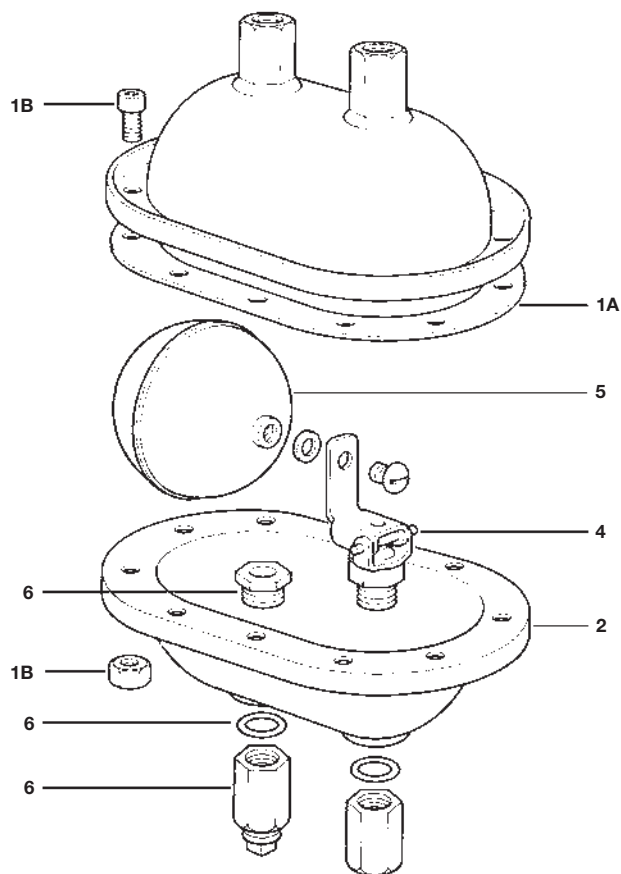
The trap should be disassembled periodically for inspection and cleaning of the valve head and seat.

Worn or damaged parts should be replaced using a complete repair kit. **Complete installation and maintenance instructions are given in IM-7-306-US which accompanies the product.**

Liquid drain traps can be used to drain most liquids from most gases. However, some applications, particularly those involving hazardous or unusual fluids, may be subject to regulation or may otherwise require special consideration.

Spirax Sarco will endeavor to provide whatever data is necessary to assist in product selection.

### Spare Parts



Gasket Kit (Set of 3)	1A
Complete valve mechanism assembly	4
Float with Screw & Washer	5

TI-7-307-US 2.14



# spirax sarco

## Stainless Steel Drain Trap CAS14 and CAS14S

The **float-operated liquid drain trap** discharges continuously in direct response to variations in liquid flow rate, assuring thorough drainage of the system.

Model	CAS14	CAS14S
<b>Sizes</b>	1/2", 3/4", 1"	
<b>Connections</b>	NPT, SW	
<b>Construction</b>	316 Stainless Steel Body, Stainless Steel Internals	

### Typical Applications

Process applications requiring an austenitic stainless steel liquid drain trap.

### Limiting Operating Conditions

Max. Operating Conditions PMO up to 200 psig 14 barg  
(see chart below for sg lower than 1)

Max. Operating Temperature TMO CAS14 392°F 200°C  
CAS14S 437°F 225°C

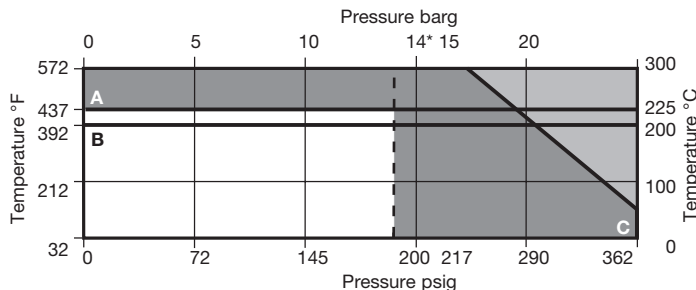
Minimum specific gravity .6

### Pressure Shell Design Conditions

PMA - Maximum Allowable Pressure 362 psig 25 barg

TMA - Maximum Allowable Temperature 572 °F 300°C

### Operating range



The product must not be used in this region.  
The Viton soft seat versions should not be used in this region as damage to the internals may occur.

\*PMO Maximum operating pressure 200 psig - 14 barg.

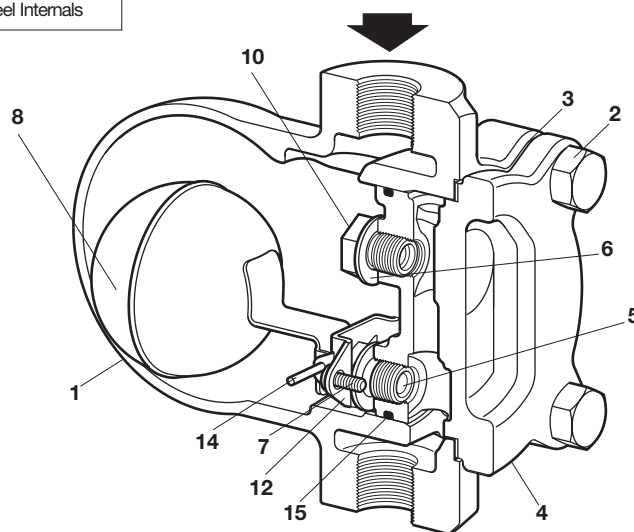
**A - C** CAS14S

**B - C** CAS14

### ΔPMX - Maximum differential pressure

The maximum differential pressure depends on the specific gravity of the liquid being drained.

Trap	Specific gravity				
	1.0	0.9	0.8	0.7	0.6
<b>Maximum differential pressure psig</b>					
<b>CAS14</b>	200	200	200	130	72
<b>CAS14S</b>	200	200	200	130	72



### Construction Materials

No.	Part	Material
1	Body	Austenitic stainless steel (316) EN 10213-4 (1.4408) ASTM A351 CF8M
2	Cover bolts	Stainless steel BS EN 3506 A2-70
3	Cover gasket	Reinforced exfoliated graphite
4	Cover	Austenitic stainless steel (316) EN 10213-4 (1.4408) ASTM A351 CF8M
5	Main valve seat	Stainless steel BS 970 431 S29
6	Main valve seat gasket	Stainless steel
7	Main valve assembly screws	Stainless steel
8	Ball float and lever	Stainless steel BS 1449 304 S16
9	Valve cone	CAS14 Viton CAS14S Stainless steel AISI 440B
10	Blanking plug	Stainless steel
12	Pivot frame	Stainless steel
14	Pivot pin	Stainless steel
15	'O' ring	FDA approved viton to FDA regulation 177.2600
*16	Valve spring (1" only)	Stainless steel

\*Note: Items 9 and 16 are clearly identified on the backside.

Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only.

In the interests of development and improvement of the product, we reserve the right to change the specification.

TI-P148-38-US 4.14

# Stainless Steel Liquid Drain Trap CAS14 and CAS14S

## Capacity

The discharge capacity depends on the differential pressure (inlet pressure minus outlet pressure) and the specific gravity of the liquid being drained. See TI-7-318.

## Sample Specification

Drain traps shall be of the mechanical ball float type having stainless steel bodies, vertical line connections, and all stainless steel internals. All internals are to be renewable and field serviceable.

## Installation

The trap must be fitted in a vertical pipe line with direction of flow as indicated and so that the float mechanism is free to rise and fall in a vertical plane. Full-flow isolating valves should be placed to permit servicing.

The trap discharge should be piped to a safe place.

## Maintenance

This product can be maintained without disturbing the piping connections. Complete isolation of the trap from both supply and return line is required before any servicing is performed.

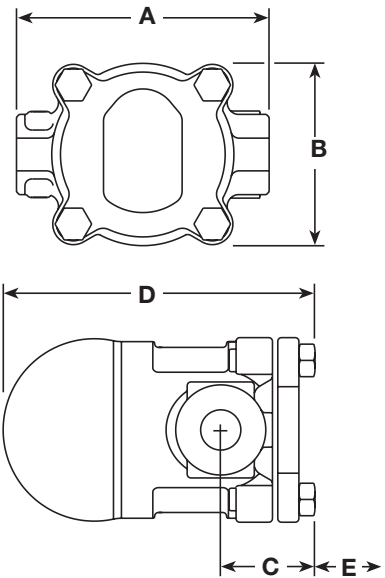
The trap should be disassembled periodically for inspection and cleaning of the valve head and seat.

Worn or damaged parts should be replaced using a complete repair kit.

**Complete installation and maintenance instructions are given in IM-P148-39 which accompanies the product.**

Liquid drain traps can be used to drain most liquids from most gases. However, some applications, particularly those involving hazardous or unusual fluids, may be subject to regulation or may otherwise require special consideration. Traps used on volatile gas application should never discharge to atmosphere. They need to drain into a containment system or flare line.

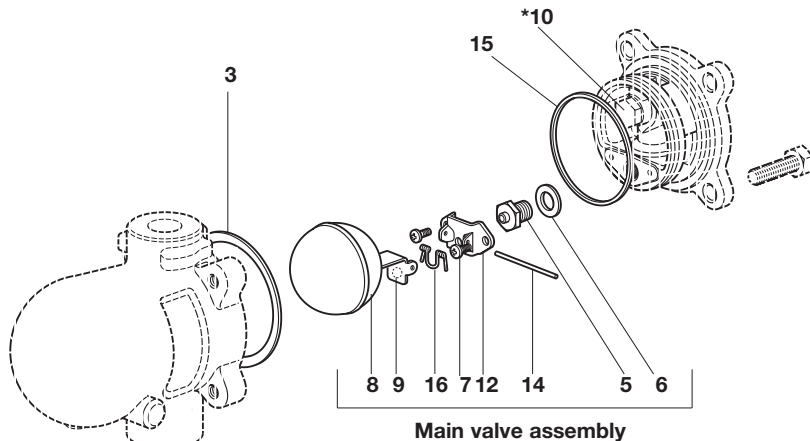
Spirax Sarco will endeavor to provide whatever data is necessary to assist in product selection.



**Dimensions**  
(nominal) in inches and millimeters

Size	A	B	C	D	E Withdrawal distance	Weight lbs kg
1/2"	5.3 135	3.8 97	1.9 48	6.4 162	5.3 135	8.2 3.73
3/4"	5.3 135	3.8 97	1.9 48	6.4 162	5.3 135	8.2 3.73
1"	5.5 139	4.4 113	2.0 51	7.0 179	5.7 1145	9.3 4.23

## Spare Parts



## Spare parts

The spare parts available are shown in heavy outline. Parts drawn in broken line are not supplied as spares.

### Available spares

Maintenance Kit	CAS14	3, 5, 6, 7 (2 off), 8, 9, 12, 14, 15
Seal Kit	CAS14S	3, 5, 6, 7 (2 off), 8, 9, 12, 14+16 (1" only), 15

### How to order spares

Always order spares by using the description given in the column headed 'Available spares' and state the size and type of trap.

**Example:** 1 - Maintenance kit for a Spirax Sarco 1/2" CAS14 austenitic stainless steel liquid drain trap.

### Recommended tightening torques

Item	Part	or mm	FT./LBS
2	Cover bolt	M10 x 30	15 - 18
5	Main valve seat	17 A/F	36 - 37
7	Main valve assembly screws	Pozidrive M4 x 6	2 - 2.2
10	Blanking plug	17 A/F	36 - 37

TI-P148-38-US 4.14



## Stainless Steel Liquid Drain Trap CA46S

The float-operated liquid drain trap discharges continuously in direct response to variations in liquid flow rate, assuring thorough drainage of the system.

Model	CA46S-4.5	CA46S-10	CA46S-14	CA46S-21
Sizes	1/2", 3/4", and 1"			
Connections	ANSI 150 and ANSI 300			
Sizes	1 1/2", 2"	N/A	N/A	1 1/2", 2"
Connections	ANSI 150	N/A	N/A	ANSI 300
Construction	316 Stainless Steel Body, Stainless Steel Internals			

**Note:** 1-1/2" and 2" CAS46 drain trap are double-seated, and may not shut tight under no-load or light load condition. Normally, the liquid load will always be greater than the residual leakage.

### Construction Materials

No.	Part	Material	
1	Body	Stainless Steel	AISI 316
2	Cover Bolts	Stainless Steel	Class A2 Gr80
	1/2", 3/4", 1"	M10 x 60 mm	
	1-1/2", 2"	M16 x 85 mm	
3	Cover Gasket	Stainless Steel	BS 1449 304 S16
4	Cover	Stainless Steel	AISI 316
5	Valve Seat 1/2", 3/4", 1"	Stainless Steel	BS 970 431 S29
	Main Valve Assembly w/ Erosion Deflector	Stainless Steel	BS 3146 Pt2 type ANC2
	1-1/2", 2"		BS 970 416 S37
6	Valve Seat Gasket	Stainless Steel	BS 1449 304 S11
	1/2", 3/4", 1"		
	Main Valve Assembly Gasket	Stainless Steel	AISI 316
7	Pivot Frame Assembly	Stainless Steel	
	Set Screws 1/2", 3/4", 1"	M5 x 20 mm	BS 4183 18/8
	Main Valve Assembly	Stainless Steel	
	Bolts 1-1/2"	M6 x 20 mm	BS 970 304 S15
	Studs & Nuts 2"	M8 x 20 mm	BS 6105 A4.80
8	Ball Float & Lever	Stainless Steel	BS 1449 304 S16
11	Support Frame	Stainless Steel	BS 1449 304 S16
12	Pivot Frame	Stainless Steel	BS 1449 304 S16

### Limiting Operating Conditions

**Max. Operating Pressure (PMO)** Up to 304 psig (21 barg)  
The PMO depends on the model selected and the specific gravity of the liquid being drained. See TIS 7.318.

**Max. Operating Temperature** 752°F (400°C)

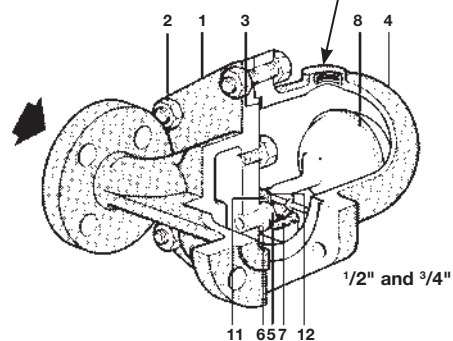
### Pressure Shell Design Conditions

<b>PMA</b>	580 psig/up to 121°F	40 barg/up to 49°C
Max. allowable pressure	398 psig/448°F	27 barg/231°C
	304 psig/752°F	21 barg/400°C
<b>TMA</b>	752°F/0-304 psig	400°C/0-21 barg
Max. allowable temperature		

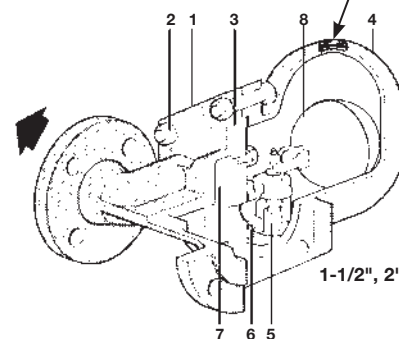
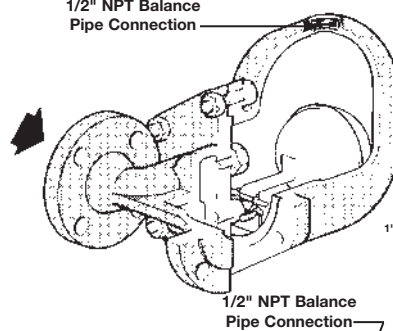
### Typical Applications

Process applications requiring an austenitic stainless steel liquid drain trap.

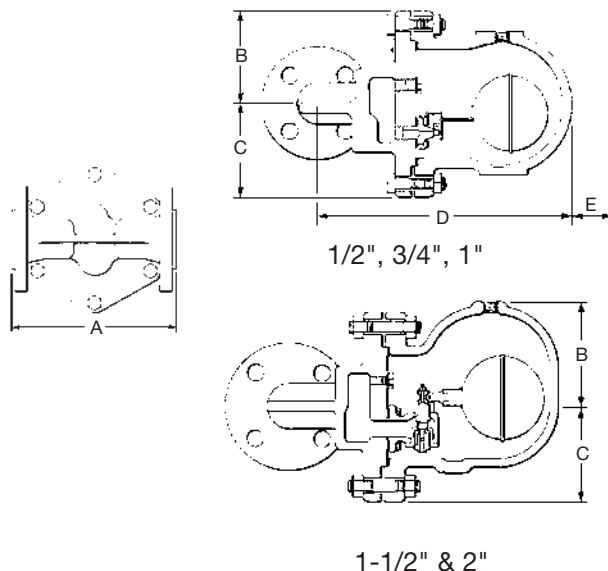
1/2" NPT Balance Pipe Connection



1/2" NPT Balance Pipe Connection



# Stainless Steel Liquid Drain Trap CA46S



Dimensions (nominal) in inches and millimeters						
Size/DN	A	B	C	D	E	Weight
1/2" 15	5.8 150	3.2 80	3.2 80	8.4 215	4.7 120	23.8 lb 10.8 kg
3/4" 20	5.8 150	3.2 80	3.2 80	8.8 225	4.7 120	23.8 lb 10.8 kg
1" 25	6.2 160	4.5 115	3.4 85	10.8 276	6.7 170	33 lb 15 kg
1-1/2" 40	9.0 230	4.8 130	4.5 115	12.7 326	7.9 200	72.8 lb 33 kg
2" 50	9.0 230	5.5 141	4.8 123	12.9 332	7.9 200	94.8 lb 43 kg

## Capacity

The discharge capacity depends on the differential pressure (inlet pressure minus outlet pressure) and the specific gravity of the liquid being drained. See TIS 7.318.

## Sample Specification

Steam traps shall be of the mechanical ball float type having stainless steel bodies, horizontal line connections, and all stainless steel internals. A 1/2" NPT tapping shall be provided for a balance pipe. All internals are to be renewable and field serviceable.

## Installation

The trap must be fitted in a horizontal pipe line with direction of flow as indicated and so that the float mechanism is free to rise and fall in a vertical plane. Full-flow isolating valves should be placed to permit servicing. The high point of the body is provided with a 1/2" NPT tapping for a balance pipe, which is essential for satisfactory operation of this unit. The balance pipe must be connected with a continuous rise between the tapping provided on the body of the trap and the vessel being drained. The trap discharge should be piped to a safe place.

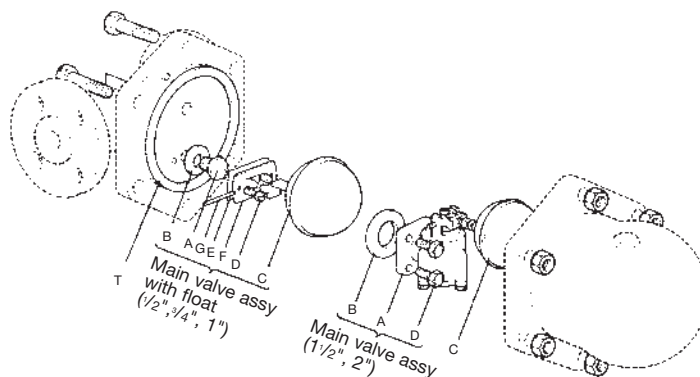
## Maintenance

This product can be maintained without disturbing the piping connections. Complete isolation of the trap from both supply and return line is required before any servicing is performed. The trap should be disassembled periodically for inspection and cleaning of the valve head and seat. Worn or damaged parts should be replaced using a complete repair kit.

**Complete installation and maintenance instructions are given in IM-7-306 which accompanies the product.**

Liquid drain traps can be used to drain most liquids from most gases. However, some applications, particularly those involving hazardous or unusual fluids, may be subject to regulation or may otherwise require special consideration. Spirax Sarco will endeavor to provide whatever data is necessary to assist in product selection.

## Spare Parts



Main Valve Assembly w/ Float	A,B,C,D,E,F,G
Main Valve Assembly w/ Erosion Deflector (1-1/2", 2")	A,B,D
Ball Float (1-1/2", 2")	C
Three complete sets of Gaskets (Pkt of 3 sets)	B,T

# spirax/sarco

## Thermo-Dynamic® Liquid Drain Trap TDA52

The Thermo-Dynamic® type liquid drain trap cycles periodically, discharging liquid as quickly as it accumulates, so as to prevent harmful back-up.

<b>Model</b>	<b>TDA52</b>
<b>PMO</b>	250 psig
<b>Sizes</b>	1/2"
<b>Connections</b>	NPT
<b>Construction</b>	stainless steel

### Typical Applications

Receiver and air line drainage,  
gas line drainage

### Limiting Operating Conditions

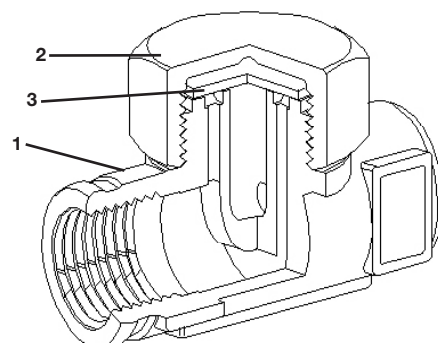
**Max. Operating Pressure (PMO)** 250psig(17 barg)

**Max. Operating Temperature** 800°F (427°C)  
Minimum pressure for satisfactory operation is 50 psi (3.5 bar) Maximum back pressure should not exceed 80% of the inlet pressure under any conditions of operation, otherwise the trap may not shut.

### Pressure Shell Design Conditions

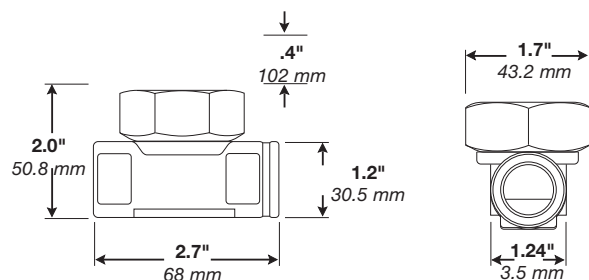
**PMA** 600 psig/0-800°F 42 barg/0-427°C  
Max. allowable pressure

**TMA** 800°F/0-600 psig 427°C/0-42 barg  
Max. allowable temperature



### Construction Materials

No.	Part	Material
1	Body	Stainless Steel AISI 420F
2	Cap	Stainless Steel AISI 416
3	Disc	Stainless Steel AISI 420



**Weight**  
.9 lb  
0.41 kg

### Capacities

Pounds of water per hour continuous discharge to atmosphere

Inlet Pressure psig	bar	1/2" TDA52
50	3.5	1140
75	5.2	1400
100	6.9	1650
150	10.3	2050
200	13.8	2400
250	17.2	2800

For kg/hr, multiply lb/hr by .454

Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only.

In the interests of development and improvement of the product, we reserve the right to change the specification.

TI-7-314-US 11.00

# Thermo-Dynamic® Liquid Drain Trap TDA52

## Sample Specification

Drain trap shall be all stainless steel Thermo-Dynamic® type with connections on a common center line. Integral seat design with hardened disc and seating surfaces, Spirax Sarco type TDA52 for all pressures from 50 psig 250 psig.

## Installation

The trap should be installed in a vertical position (discharging downward) as close as possible to the equipment being drained. The discharge should be piped to a safe place.

## Maintenance

This product can be maintained without disturbing the piping connections. Complete isolation of the trap from both supply and return line is required before any servicing is performed.

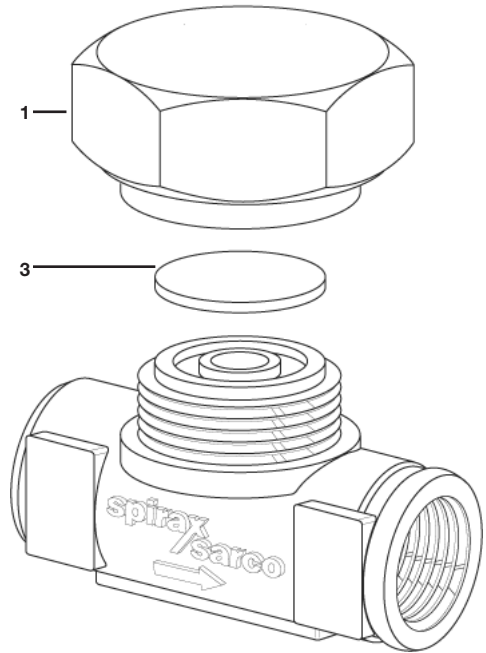
The trap should be disassembled periodically for inspection and cleaning of the seat and disc.

Worn or damaged parts should be replaced using a complete repair kit.

**Complete installation and maintenance instructions are given in the IMI sheet which accompanies the product.**

Liquid drain traps can be used to drain most liquids from most gases. However, some applications, particularly those involving hazardous or unusual fluids, may be subject to regulation or may otherwise require special consideration. Spirax Sarco will endeavor to provide whatever data is necessary to assist in product selection.

## Spare Parts



Disc	3
Cap	1



# spirax/sarco

## ADV Automatic Drain Valve

### Description

The Spirax Sarco Automatic Drain Valve (ADV) has been designed to remove condensate from low points in a compressed air system where automatic drainage is required. The mentioned condensate is a mixture of water, petroleum or synthetic based oil, system particulants and dirt.

### Principle Features

- Adjustable "on" and "off" cycle times
- Low power consumption
- Bright LED lights indicating operational status.
- Cycle test button
- Brass body with FKM elastimers for both petroleum and synthetic based oils.
- Simple reliable construction.
- Easy serviceability with Strainer Ball Valve.

### Applications

The ADV can be installed at any low point in a compressed air system where condensate forms or is collected. Applications include: after coolers, separators, receivers, compressor accumulators, large filter units, drain legs, etc.

### Sizes and pipe connection

1/2" NPT inlet at strainer ball valve

1/4", 3/8" and 1/2" NPT outlet from valve body

### Technical Data

Operating temperature range	Ambient temperature:	14°F (-10°C) to 122°F (50°C)
	Media temperature:	14°F (-10°C) to 266°F (130°C)
Pressure rating:	300 psig	
Voltage/ Power:	120V AC/30VA inrush, 15VA holding current	
	240V AC/30VA inrush, 15VA holding current	
Timer adjustment:	ON time:	0.5 to 10 seconds.
	OFF time:	0.5 to 45 minutes.
Electrical connection:	DIN 43650 — ISO4400 / 6952	
Coil insulation:	class F (155°C).	
Environmental protection:	IP65.	
Agency approvals:	c UR us, CE	

### Product complies with:

EN50081-1: 1995EMC Generic Emissions Standards - Residential, commercial and light industry.

EN61010-1/A2: 1995 Safety requirements for electrical equipment, for measurement, control and laboratory use.

**Note:** This product may be affected by electro-magnetic interference in an industrial environment.

The Spirax Sarco ADV can be used with compressed air, synthetic or petroleum based oils, water and some non-corrosive gasses.





# ADV Automatic Drain Valve

## ADV25, 38 & 50 Series (Heavy Duty)

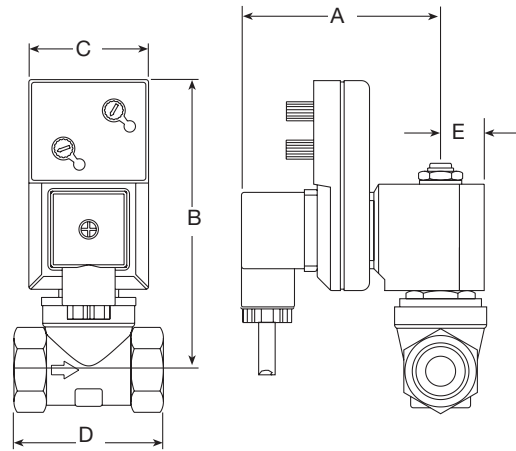
These ADV lines are of heavy duty construction and are designed to allow high flow for quick and efficient dumping of condensate. They are available in 1/4", 3/8" and 1/2" NPT pipe sizes. Construction includes brass bodies stainless steel internals and FKM seals.

### Component parts

Part	Material
Coil	Thermoplastic
Timer	ABS
Valve body	Brass
Seals	FKM (not shown)
Powercord	ABS and PVC
Strainer Ball Valve	Brass and Stainless Steel

### Dimensions/Weight (approx.) in. / lbs.

A	B	C	D	E	Wgt.
2.92	4.13	1.74	2.13	0.61	1.3



### Cv values (approximate)

Valve size	ADV25 ADV26 1/4"	ADV38 ADV39 3/8"	ADV50 ADV51 1/2"
Cv	1.5	1.7	1.8
Discharge-gallons (5 sec, at 90 psig)	1.2	1.3	1.4

### Product Number Information

Listed below are the variations for the **Heavy Duty** 1/4", 3/8" and 1/2" ADV sizes.

<b>ADV25</b>	1/4"	120V AC	<b>ADV38</b>	3/8"	120V AC	<b>ADV50</b>	1/2"	120V AC
<b>ADV26</b>	1/4"	240V AC	<b>ADV39</b>	3/8"	240V AC	<b>ADV51</b>	1/2"	240V AC

For a system with 1/2" NPT piping, 120V ac voltage available you would select (1) **ADV50** Automatic Drain Valve (ADV)

### Spare parts

The spare parts are available for only those components listed below.

**Seal Kit:** A replacement diaphragm assembly (D) is available for all the above sizes. Request "Diaphragm Assembly" for the ADV valve in your system.

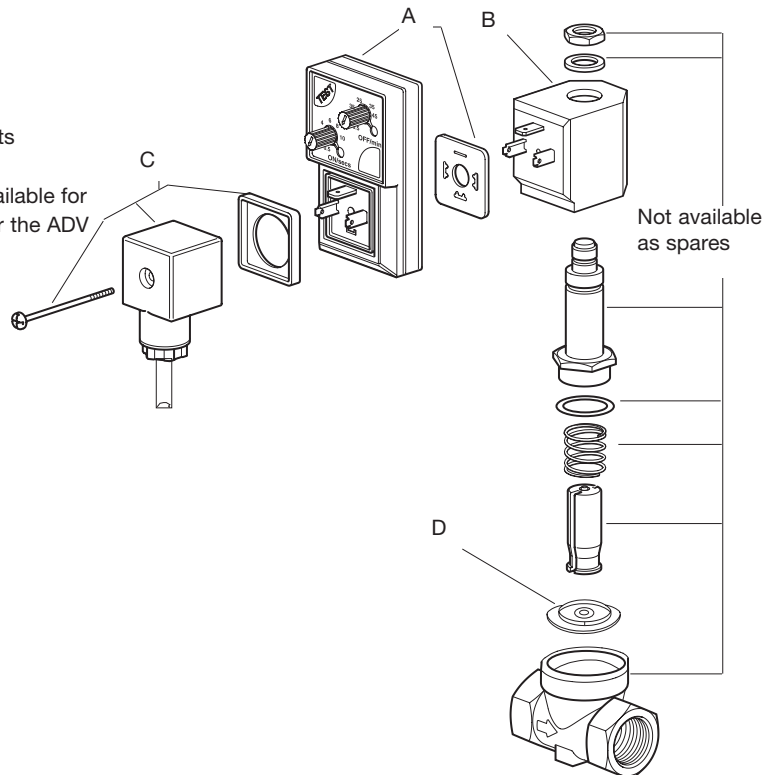
Ex.: Diaphragm Assembly for the ADV38.

Component parts available:

- Coil (B) specify voltage
- Timer (A)
- Powercord (C)

Request the specific "component" for the ADV valve in your system.

EX.: 120V Coil for the ADV51.



Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only.  
In the interests of development and improvement of the product, we reserve the right to change the specification.

TI-P509-06-US 6.14

# ADV Automatic Drain Valve

## ADV10 Series (Standard Duty)

The ADV line is of standard construction and designed to allow adequate flow from smaller systems or those producing lesser condensate. This line is available only in the 1/4" NPT pipe size. Construction includes brass body, stainless steel internals and FKM seals.

### Component parts

Part	Material
Coil	Thermoplastic
Timer	ABS
Valve body	Brass
Seals	FKM
Powercord	ABS and PVC

### Cv values (approximate)

Valve size	1/4"
Cv	0.1
Discharge-gallons (5 sec, at 90 psig)	0.08

### Product Number Information

Listed below are the variations for the 1/4" Standard Duty ADV's  
 ADV10 1/4" 120V AC  
 ADV11 1/4" 240V AC

For system with 1/4" NPT piping, 120V AC voltage available with little condensate yield you would select (1) **ADV10** Automatic Drain Valve.

### Spare parts

The spare parts are available for only those components listed below.

**Seal kit:** None, replace valve

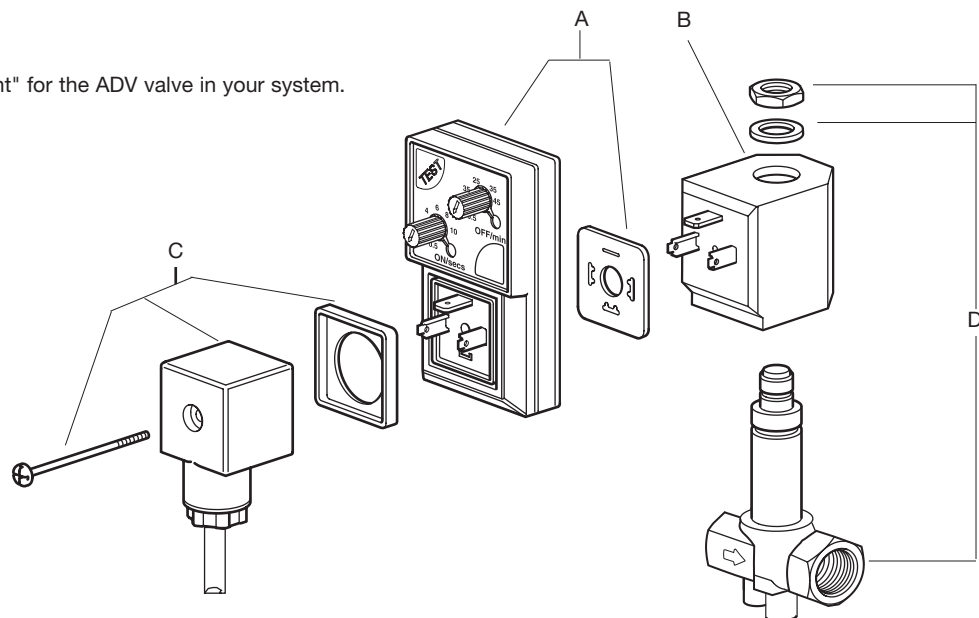
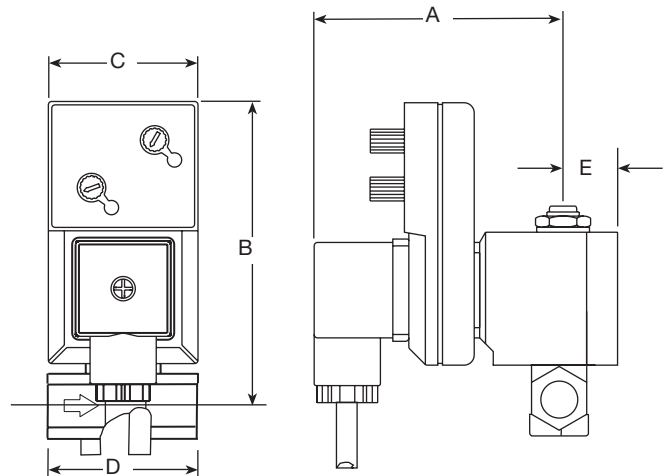
**Component parts available:**

- Coil (B) specify voltage,
- Timer (A)
- Powercord (C)
- Valve (D)

Request the specific "component" for the ADV valve in your system.  
 Ex.: 120V Coil for the ADV 10.

### Dimensions/Weight (approx.) in. / lbs.

A	B	C	D	E	Wgt.
2.92	3.55	1.74	1.50	0.61	0.85



Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only.  
 In the interests of development and improvement of the product, we reserve the right to change the specification.

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# ADV

## Automatic Drain Valve

### Strainer Ball Valves

The Strainer Ball Valve is a very important part of your condensate drain system, because it allows the isolation of the ADV from the pressurized compressor tank as well as containing a 30 mesh stainless steel screen to collect debris that has been produced upstream. The major benefit is that it allows servicing of the ADV without removal and/or depressurizing the system. Also, the use of this device greatly

improves the life of the ADV by not allowing the system debris to enter the solenoid valve, which likely will cause damage to the moving parts and/or the main seal. It is strongly recommended that the Strainer Ball Valve be used in all ADV applications. Failure to use this device could void warranties associated with the ADV product.

**Note: All Strainer Ball Valves are packed with the ADV but detached to allow ease of assembly.**

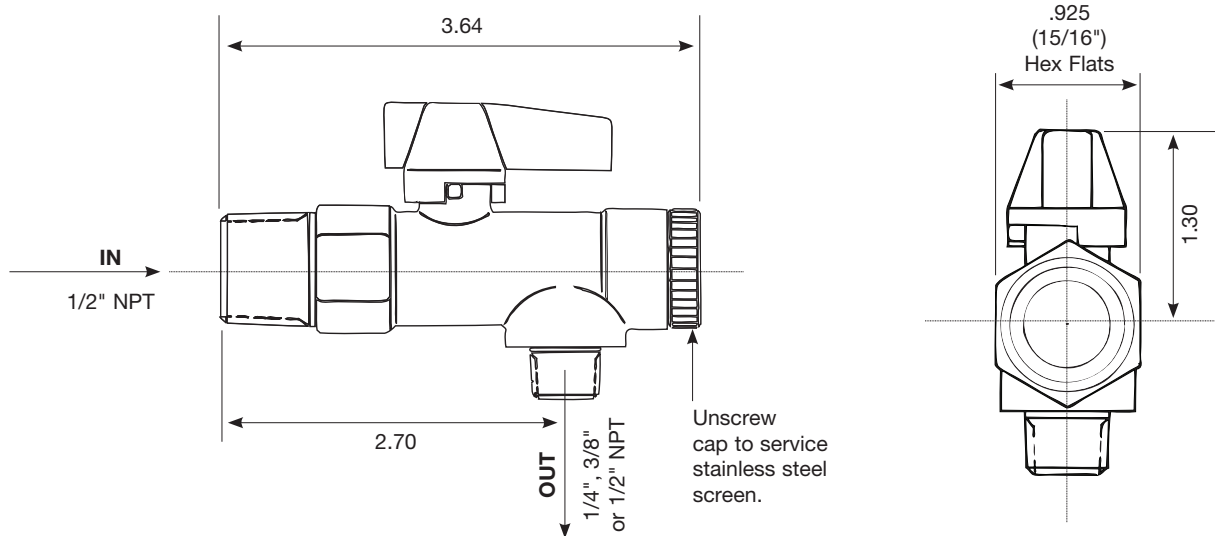
### Product Number Information

Listed below are the variations for the 1/4", 3/8" and 1/2" sizes.

**360/01** 1/2" NPT IN x 1/4" NPT OUT  
**360/02** 1/2" NPT IN x 3/8" NPT OUT  
**360/03** 1/2" NPT IN x 1/2" NPT OUT

### Spare parts

**Screen:** A stainless steel, 30 mesh screen is available in one size (package of three) for all ADV sizes. Request the "Strainer Ball Valve filter screen" for the ADV valve in your system.  
*Ex.: Strainer Ball Valve "filter screen" pack for the ADV25361.*



### Ordering Your Automatic Drain Valve

**Note: All ADV packages will include the appropriate strainer ball valve.**

When ordering, know the pipe connection size, available voltage and the amount of condensate that is to be drained. Also, the size of the compressor tank should be considered, as in the volume that is contained within. Listed below are the variations for the Standard 1/4" & Heavy Duty 1/4", 3/8" and 1/2" ADV sizes.

Size	ADV	SBV	Order no.	Description
1/4"	ADV10 + 360/01		<b>ADV10361</b>	1/4" standard flow, 120V AC ADV with Strainer Ball Valve.
	ADV11 + 360/01		<b>ADV11361</b>	1/4" standard flow, 240V AC ADV with Strainer Ball Valve.
1/4"	ADV25 + 360/01		<b>ADV25361</b>	1/4" high flow, 120V AC ADV with Strainer Ball Valve.
	ADV26 + 360/01		<b>ADV26361</b>	1/4" high flow, 240V AC ADV with Strainer Ball Valve.
3/8"	ADV38 + 360/02		<b>ADV38362</b>	3/8" high flow, 120V AC ADV with Strainer Ball Valve.
	ADV39 + 360/02		<b>ADV39362</b>	3/8" high flow, 240V AC ADV with Strainer Ball Valve.
1/2"	ADV50 + 360/03		<b>ADV50363</b>	1/2" high flow, 120V AC ADV with Strainer Ball Valve.
	ADV51 + 360/03		<b>ADV51363</b>	1/2" high flow, 240V AC ADV with Strainer Ball Valve.

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## Liquid Drain Traps Selection and Sizing

The discharge rate depends on the differential pressure across the trap (that is, the pressure at the trap inlet minus the pressure at the outlet). The capacity charts show the maximum cold water discharge rate versus the differential pressure. **Note:** Although the differential pressure is used for sizing, the trap body must be designed for the full maximum system pressure.

### Operation Against Return

#### Line Back-Pressure

If the pressure in the return line (the "back-pressure") is above atmospheric at all times, the maximum operating pressure (PMO) of the trap is increased by the amount of the back-pressure. (But the increased PMO must never be higher than the PMA — the maximum allowable pressure.)

#### Example:

If the nameplate PMO is 100 psig, and the back-pressure is always at least 25 psig, the drain trap may be used at a working pressure of up to 125 psig, provided that the nameplate PMA is at least 125 psig at the operating temperature. The excess pressure will not hold the valve closed because the differential pressure is not greater than the nameplate PMO.

### Safety Factors

Both the amount of liquid to be discharged and the differential pressure may fluctuate. To ensure continuous drainage during periods of high load and/or low pressure, the liquid drain trap should be selected to handle the estimated load times a safety factor of 1.5 at the lowest expected differential pressure. If the capacity requirements or operating conditions cannot be predicted accurately, the safety factor should be increased accordingly. If the maximum peak load and minimum differential pressure are accurately known, the safety factor may be reduced or eliminated.

### Liquids other than cold water

For liquids higher than cold water (that is, liquids with a specific gravity less than 1.0), both the discharge capacity and the maximum operating pressure will be reduced. The required capacity of the light liquid (including the safety factor) must be multiplied by the appropriate conversion factor from figure 1. The resulting equivalent cold water capacity is used to select a trap using the cold water capacity charts. Table 1 must be consulted to ensure that the reduced PMO of the selected trap is higher than the expected maximum system pressure. If there is a back-pressure in the return line, the PMO of the trap may be increased (see above).

### Flashing Liquids

The capacity charts are based on single-phase (liquid only) flow. If the pressure/temperature conditions upstream and downstream of the trap are such that a portion of the liquid will re-evaporate, or "flash" as it passes through the valve, the resulting two-phase (liquid and gas) flow will reduce the capacity of the trap. If two-phase flow is expected, the safety factor should be increased by 1-1/2 to 2 times.

**Table 1: Maximum Operating Pressure with Light Liquids**

Model(s)*		Size(s) s.g.	Maximum Operating Pressure, psig										
			1.00	.99 to .95	.94 to .90	.89 to .85	.84 to .80	.79 to .75	.74 to .70	.69 to .65	.64 to .60	.59 to .55	.54 to .50
FA/FAI-30	1/2",3/4",1"	35	31	28	24	21	17	14	10	7	3	—	
	1-1/2",2"	34	31	28	25	22	20	17	14	11	8	6	
FA/FAI-75	1/2",3/4",1"	90	81	73	65	57	49	41	33	25	16	8	
	1-1/2"	88	81	73	66	58	51	43	36	28	21	13	
	2"	75	60	54	49	44	38	33	28	23	17	12	
FA/FAI-150	1/2",3/4",1"	150	142	128	114	100	86	71	57	43	29	15	
	1-1/2"	150	140	127	115	103	90	78	65	53	40	28	
	2"	150	139	127	115	103	91	79	67	55	43	31	
FAI-200	1/2",3/4",1"	200	184	168	152	135	119	103	87	71	54	38	
FA-200	1"	200	200	200	190	164	139	113	88	62	37	11	
	1-1/2"	200	200	200	191	168	145	122	99	76	53	30	
FAB-10	2"	10	9	8	7.5	7	6	5.5	5	4	3.5	3	
FAB150	1-1/2"	150	138	126	114	100	88	74	62	50	38	26	
FAB-75	2-1/2"	75	69	63	57	50	44	37	31	25	19	13	
FAB-175	2"	175	163	150	137	124	111	98	85	72	59	46	
CA-14	1/2",3/4"	200	198	195	173	152	130	110	87	65	45	26	
CAS14	1/2", 3/4", 1"	250	200	200	200	200	160	130	97	72	—	—	
FA450 CA46S	-4.5	1/2",3/4"	65	65	65	65	65	55	50	38	26	16	7
		1"	65	65	65	65	65	57	50	39	29	20	11
		1-1/2",2"	65	59	53	47	42	36	30	24	18	12	6
	-10**	1/2",3/4"	145	145	145	125	108	94	80	60	43	30	19
		1"	145	145	145	125	107	93	80	65	50	35	21
		1-1/2",2"	145	132	119	105	92	79	66	53	40	26	13
	-14	1/2",3/4"	203	198	195	173	152	130	110	87	65	45	26
		1"	203	203	203	180	160	135	113	92	72	50	29
		1-1/2",2"	203	203	203	203	203	203	203	165	99	54	27
	-21	1/2",3/4"	304	304	304	280	261	225	165	155	116	75	36
		1"	304	290	275	245	217	187	159	130	100	66	36
		1-1/2",2"	304	304	304	304	295	253	211	165	99	54	27
	-32	3/4"	465	464	464	440	420	350	300	240	185	125	65
		1"	465	450	435	385	340	290	246	195	145	100	55
		1-1/2",2"	465	422	380	337	295	253	211	165	99	54	27
FA450	3",4"	450	450	450	450	450	450	390	275	158	40	—	
FA-150	1/4"	150	135	119	104	89	73	58	43	25	12	—	
F-150V	1/2"	150	150	150	150	138	119	100	80	61	42	23	
F-300V	1/2"	300	300	300	300	282	243	203	164	125	86	46	

\*Some models are not available in all of the listed sizes. For liquids with a specific gravity less than 0.5, please consult factory.

\*\* FA450 Only

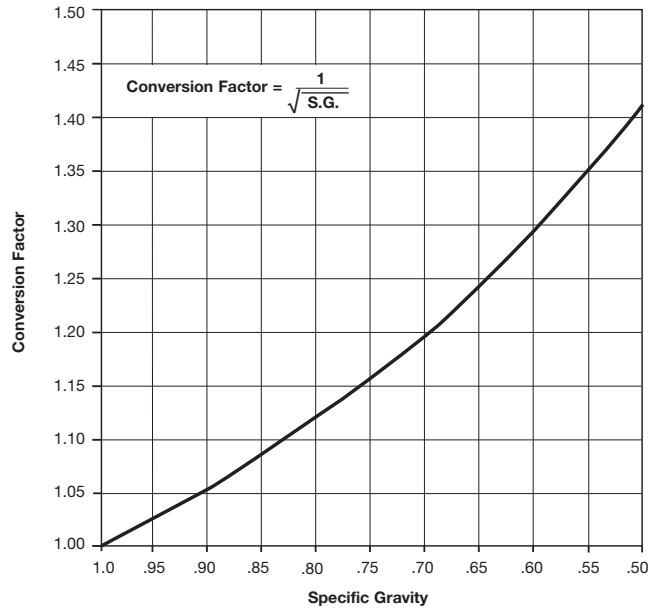
Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only.

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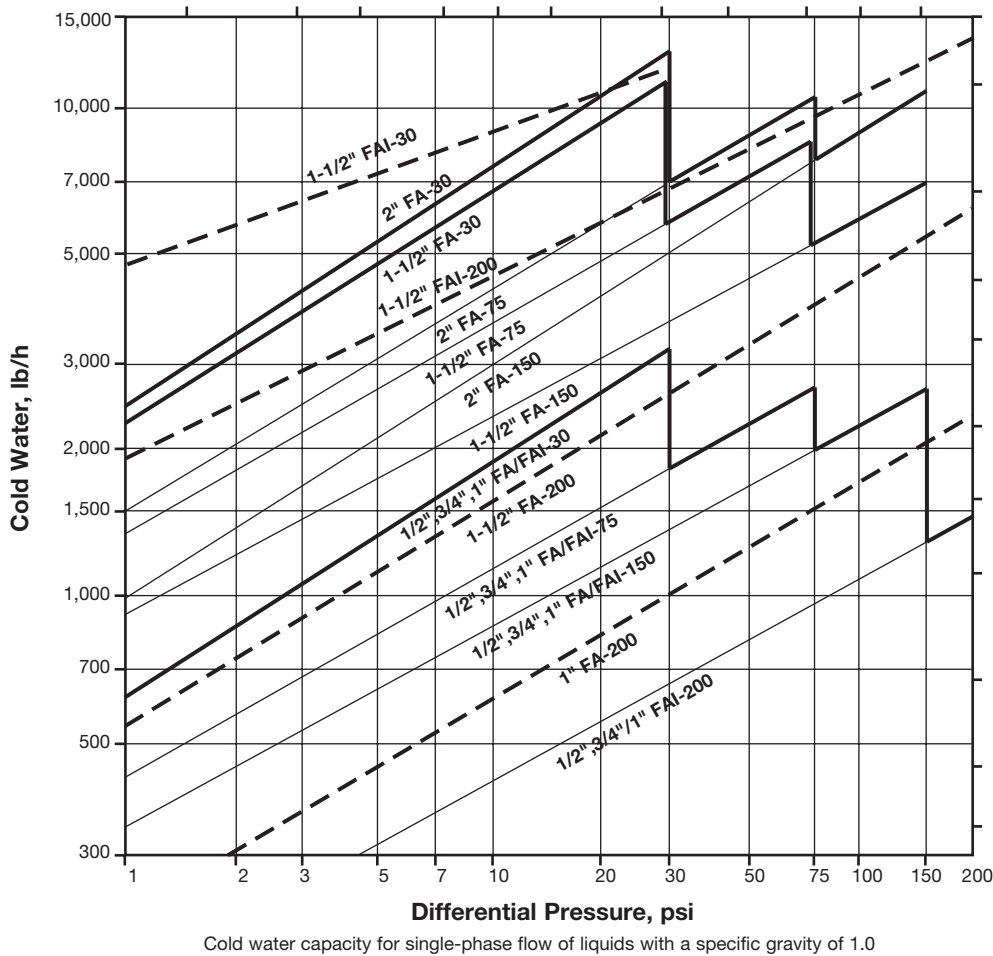
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# Liquid Drain Traps Selection and Sizing

Figure 1: Capacity Conversion Factors



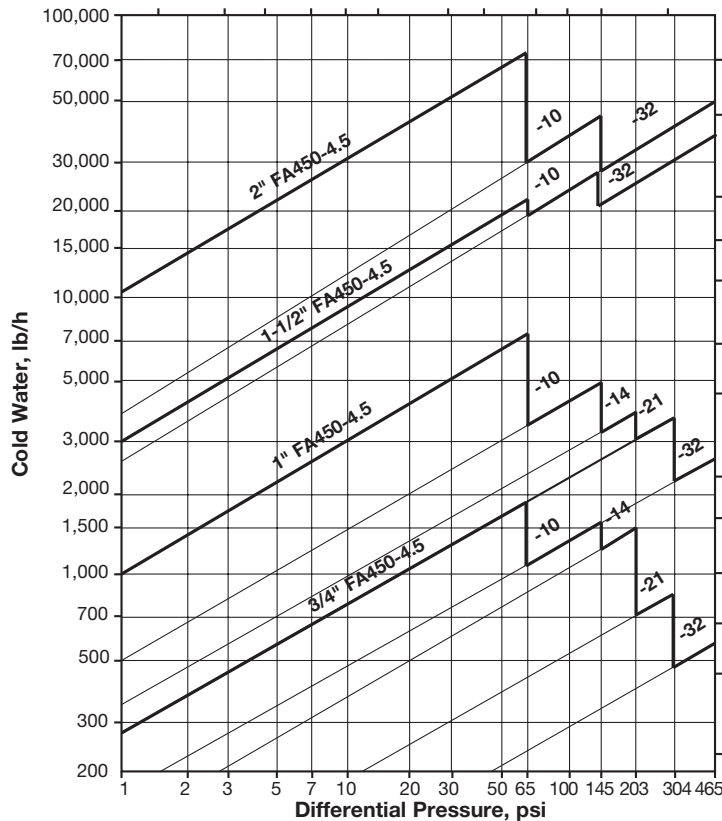
## 1/2" to 2" FA/FAI Capacities



Trap	Orifice
1/2", 3/4", 1" FA / FA 130	.218"
1-1/2" FA30	.390"
2" FA30	.500"
1/2", 3/4", 1" FA / FA 175	.166"
1-1/2" FA 75	.312"
2" FA 75	.421"
1/2", 3/4", 1" FA / FAI 150	.125"
1-1/2" FA 150	.246"
2" FA 150	.332"
1/2", 3/4", 1" FAI 200	.100"
1" FA 200	.128"
1-1/2" FA 200	.203"
1-1/2" FAI 30	.500"
1-1/2" FAI 200	.332"

# Liquid Drain Traps Selection and Sizing

## 3/4" to 2" FA450 Capacities



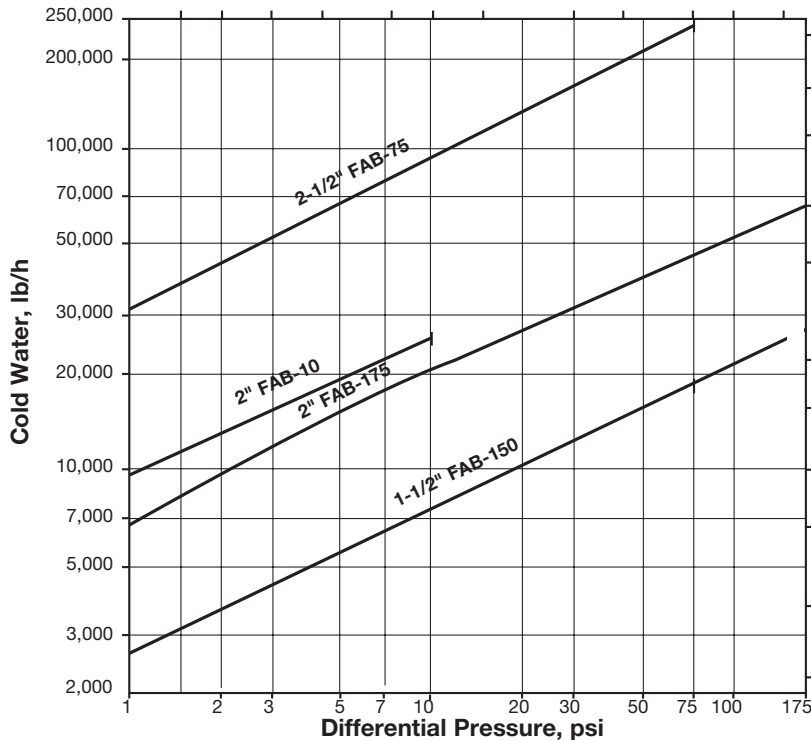
Trap	Orifice (inches)
3/4", FA 450-4.5	.157
3/4" FA 450-10	.126
3/4", FA 450-14	.106
3/4" FA 450-21	.079
3/4" FA 450-32	.063
1", FA 450-4.5	.276
1", FA 450-10	.205
1", FA 450-14	.185
1", FA 450-21	.157
1", FA 450-32	.126
1-1/2", FA 450-4.5	.689*
1-1/2", FA 450-10	.591*
1-1/2", FA 450-14	.531*
1-1/2", FA 450-21	.531*
1-1/2", FA 450-32	.531*
2", FA 450-4.5	1.112*
2", FA 450-10	.807*
2", FA 450-14	.657*
2", FA 450-21	.657*
2", FA 450-32	.657*

\* Double Seated (2 valve orifices)

Cold water capacity for single-phase flow of liquids with a specific gravity of 1.0

Note: 1-1/2" and 2" FA450 traps have double-seated valves which may not close tight under no-load conditions. Normally, the liquid load will always be greater than the small residual leakage.

## 1-1/2" TO 2-1/2" FAB CAPACITIES



Trap	Orifice (inches)
2-1/2", FAB-75	1.500*
2", FAB-10	.937
2", FAB-175	.750*
1-1/2", FAB-150	.375*

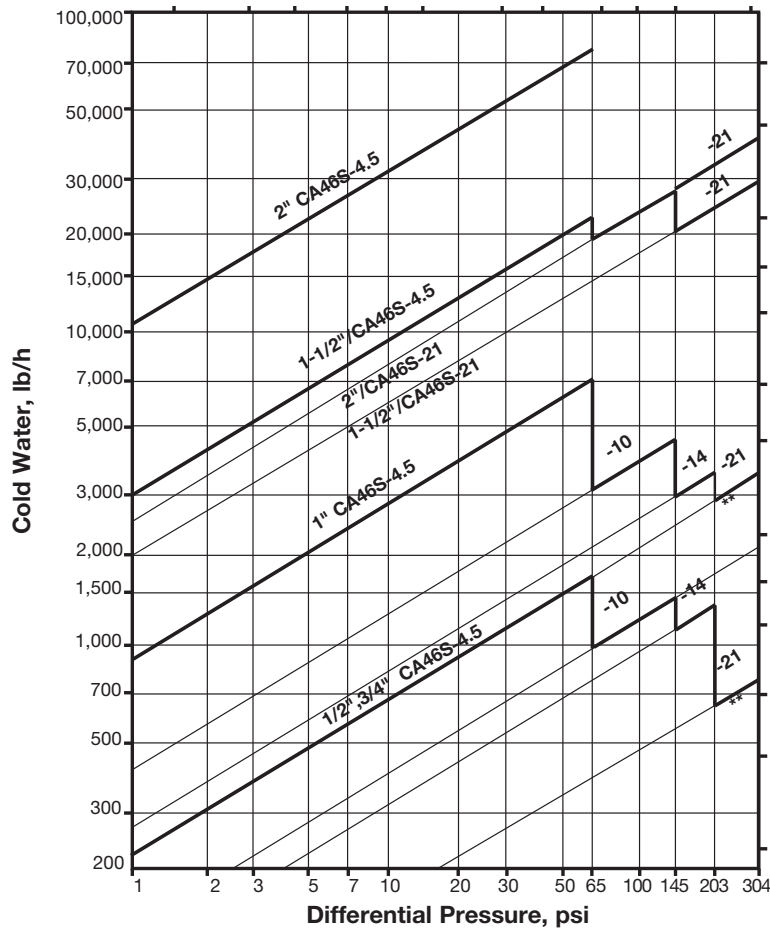
\* Double Seated (2 valve orifices)

Cold water capacity for single-phase flow of liquids with a specific gravity of 1.0

Note: FAB-75, FAB-150 and FAB-175 traps have double-seated valves which may not close tight under no-load conditions. Normally, the liquid load will always be greater than the small residual leakage.

# Liquid Drain Traps Selection and Sizing

## CA46S Capacities



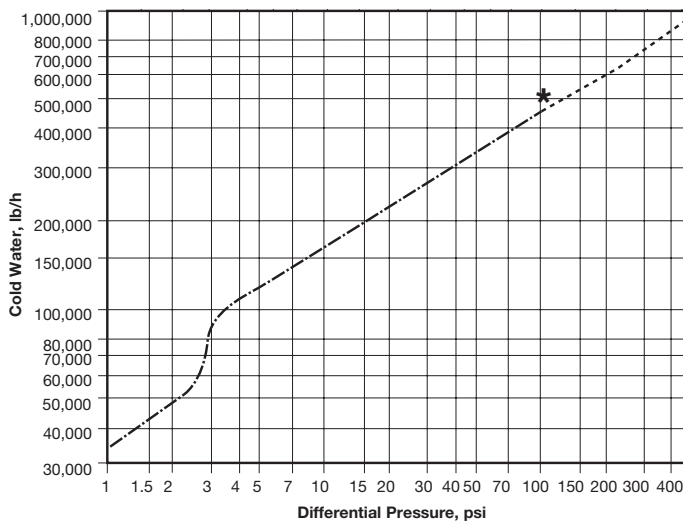
LIQUID DRAINER	SIZE	ORIFICE DIA (inches)
CA14	All	0.079
CAS14	1/2", 3/4"	0.079
CA46S-4.5	1/2", 3/4"	0.157
CA46S-10	1/2", 3/4"	0.126
CA46S-14	1/2", 3/4"	0.106
CA46S-21	1/2", 3/4"	0.079
CA46S-4.5	1"	0.276
CA46S-10	1"	0.205
CA46S-14	1"	0.185
CA46S-21	1"	0.157
CA46S-4.5	1-1/2" **	0.689
CA46S-21	1-1/2" **	0.531
CA46S-4.5	2" **	1.122
CA46S-21	2" **	0.657
FA-150	1/4"	0.100

\*\* Double seated (2 valve orifices)

Cold water capacity for single-phase flow of liquids with a specific gravity of 1.0

**Note:** 1-1/2" and 2" traps have double-seated valves which may not close tight under no-load conditions. Normally, the liquid load will always be greater than the small residual leakage.

## 3", 4" FA450 Capacities



Cold water capacity for single-phase flow of liquids with a specific gravity of 1.0

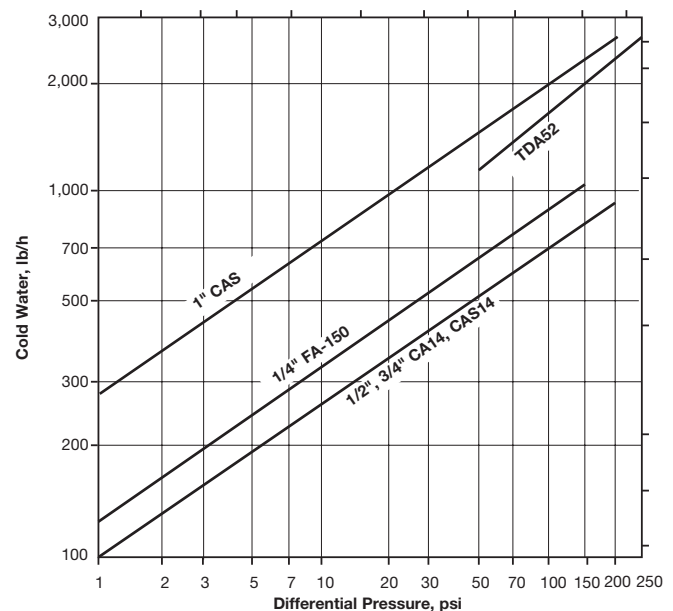
\* In this region the trap capacity may exceed the flow capacity of the connection piping.

**Note:** This trap has a double-seated valve which may not close tight under no-load conditions. Normally, the liquid load will always be greater than the small residual leakage.

Trap	Orifice (inches)
3" & 4" FA450	2.063*

\* Double Seated (2 Valve Orifices)

## CA14, CAS14 1/4" FA-150, TDA52 Capacities



Cold water capacity for single-phase flow of liquids with a specific gravity of 1.0

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# Isolation Valve Solutions



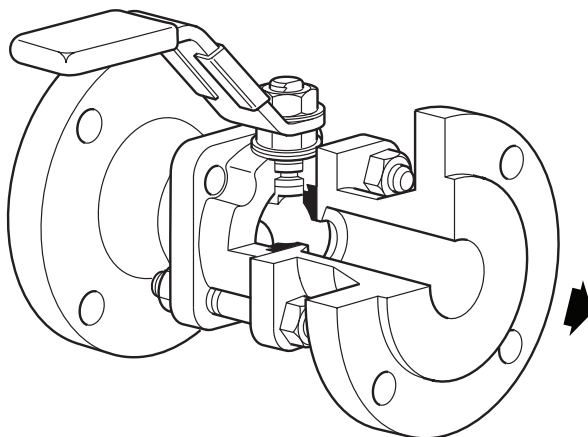


## Isolation: Ball Valves Table of Contents

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TI-P133-70-US	M10Hi ISO Ball Valve 1/4" to 2-1/2"	794
TI-P133-71-US	M10HPi ISO Ball Valve 1/4" to 2-1/2"	798
TI-P133-68-US	M10Ti ISO Ball Valve 1/4" to 2-1/2"	802
TI-P133-67-US	M10HTi ISO Teflon Free Valve 1/4" to 2-1/2"	806
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**Ball Valves**

## M10S Manual Ball Valve 1/4" to 2 1/2" (Medium Pressure Applications)



### Description

The M10S three-piece body ball valve has been designed for use as an isolating valve, not a control valve, and can be serviced without removal from the pipeline (screwed and welded versions only). It can be used with the majority of industrial fluids for services ranging from vacuum to the higher temperatures and pressures.

### Available types

<b>M10S2</b>	Zinc plated carbon steel body, PDR 0.8 seats.
<b>M10S4</b>	Complete stainless steel, PDR 0.8 seats.

**Note:** The nomenclature will be followed with either **FB** (full bore) or **RB** (reduced bore).

### Standards

This product fully complies with the requirements of the European Pressure Equipment Directive 97/23/EC and carries the **CE** mark when so required.

### Certification

This product is available with certification to EN 10204 3.1. **Note:** All certification / inspection requirements must be stated at the time of order placement.

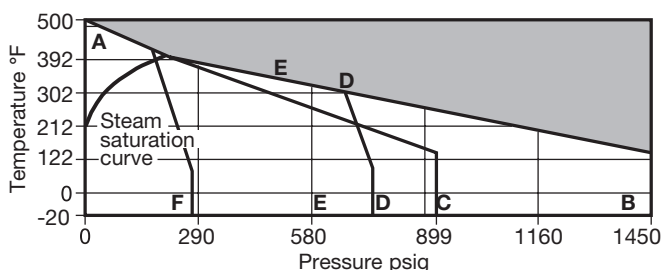
### Sizes and pipe connections

Full bore	Flanged 1/2" to 2"
1/4", 3/8", 1/2", 3/4", 1", 1 1/4", 1 1/2" and 2"	ASME Class 150, ASME Class 300,
Screwed and welded NPT, BW, SW	
Reduced bore	Flanged 1/2" to 2 1/2"
1/4", 3/8", 1/2", 3/4", 1", 1 1/4", 1 1/2", 2" and 2 1/2"	ASME Class 150, ASME Class 300,
Screwed and welded NPT, BW, SW	

### Technical data

Flow characteristic	Modified linear
Port	Full and reduced port versions
Leakage test procedure to ISO 5208 (Rate A)	
Antistatic device	Complies with ISO 7121

### Pressure/temperature limits



The product **must not** be used in this region.

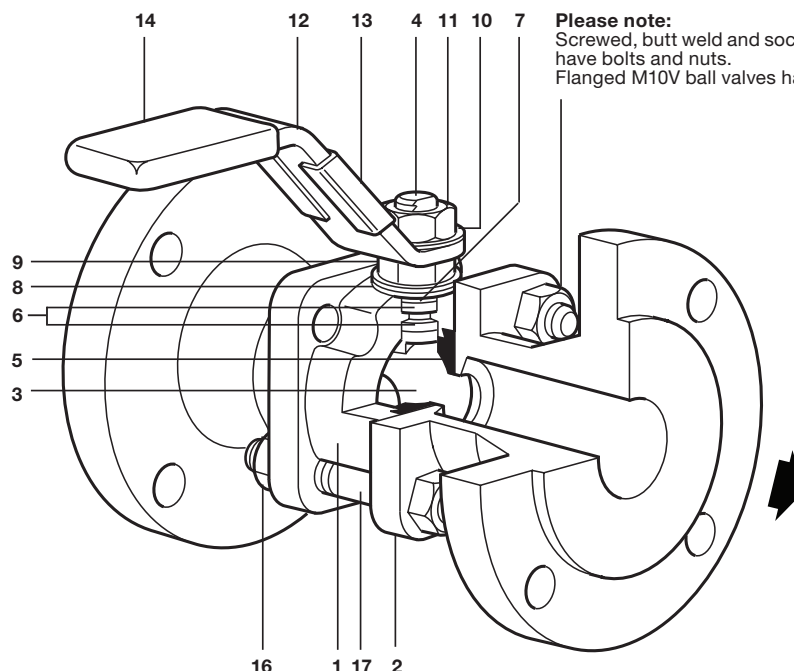
- A - B** Screwed, SW and BW 1/4" - 1 1/2" FB, RB and 2" RB.
- A - C** Screwed, SW and BW 2" FB and 2 1/2" RB only.
- A - D** Flanged ASME 300.
- A - F** Flanged ASME 150.

**Note 1:** On the 2" FB and 2 1/2" RB a PTFE gasket is fitted between the body and cap.

**Note 2:** The flange standard may restrict the maximum operating pressure. Please check with Spirax Sarco.

### Limiting Conditions

Body design conditions*		
PMA	Maximum allowable pressure	1450 psig @ 140°F
TMA	Maximum allowable temperature	500°F @ 0 psig
Minimum allowable temperature		-20°F
PMO	Maximum operating pressure for saturated steam service	254 psig
TMO	Maximum operating temperature	500°F @ 0 psig
Minimum operating temperature		-20°F
<b>Note:</b> For lower operating temperatures consult Spirax Sarco		
ΔPMX	Maximum differential pressure is limited to the PMO	
Designed for a maximum cold hydraulic test pressure of 2175 psig		
<b>*Note:</b> Do not exceed end connection design conditions.		



**Please note:**  
Screwed, butt weld and socket weld M10V ball valves have bolts and nuts.  
Flanged M10V ball valves have studs and nuts.

## Materials

No.	Part		Material	
1	Body	M10S2	Zinc plated carbon steel	ASTM A105
		M10S4	Stainless steel	ASTM A 182 F 316L
2	Cap	M10S2	Zinc plated carbon steel	ASTM A105
		M10S4	Stainless steel	ASTM A 182 F 316L
3	Ball		Stainless steel	AISI 316
4	Stem		Stainless steel	AISI 316
**5	Seat		Carbon/graphite reinforced PTFE	PDR 0.8
**6	Stem seal		Reinforced PTFE antistatic	
7	Separator	M10S2	Zinc plated carbon steel	SAE 1010
		M10S4	Stainless steel	AISI 316
8	Spring washers		Stainless steel	AISI 301
9	Nut	M10S2	Zinc plated carbon steel	SAE 12L14
		M10S4	Stainless steel	AISI 304
10	Name-plate (DN)		Stainless steel	AISI 430
11	Stem nut	M10S2	Zinc plated carbon steel	SAE 12L14
		M10S4	Stainless steel	AISI 304
12	Lever	M10S2	Zinc plated carbon steel	SAE 1010
		M10S4	Stainless steel	AISI 316
13	Name-plate		Stainless steel	AISI 430
14	Grip		Vinyl	
*15	Bolts	M10S2	Zinc plated carbon steel	A 193 B7
		M10S4	Stainless steel	AISI 304
16	Nuts	M10S2	Zinc plated carbon steel	SAE 1010
		M10S4	Stainless steel	AISI 304
17	Studs	M10S2	Zinc plated carbon steel	Grade 5
		M10S4	Stainless steel	AISI 304

\*Note: Item 15 not shown - Screwed, butt weld and socket weld versions only.

\*\*Note: Available spare parts sold as a kit.

**Dimensions (approximate) in inches****Reduced bore**

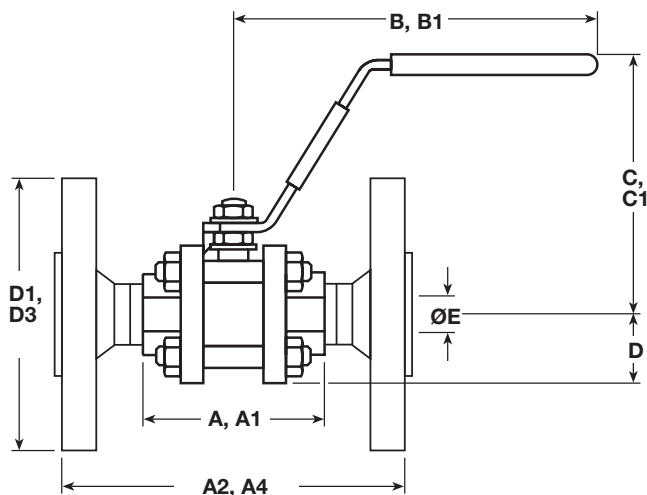
Size	A	A1	A2	A4	B	B1	C	C1	D	D1	D3	E
1/4"	2.2	2.1	-	-	4.7	-	2.4	-	0.9	-	-	0.4
3/8"	2.2	2.1	-	-	4.7	-	2.4	-	0.9	-	-	0.4
1/2"	2.5	2.1	4.3	5.5	4.7	4.7	2.4	3	0.9	3.5	3.7	0.4
3/4"	2.7	2.4	4.6	6.0	4.7	4.7	2.5	4	1.0	3.9	4.6	0.6
1"	3.4	3.3	5.0	6.5	6.2	6.2	3.6	3.6	1.2	4.3	4.9	0.8
1 1/4"	3.9	3.7	5.5	7.0	6.2	6.2	3.7	3.7	1.5	4.6	5.2	0.9
1 1/2"	4.3	4.0	6.5	7.5	7.1	7.1	4.3	4.3	1.6	5.0	6.1	1.2
2"	4.9	4.7	7.0	8.5	7.1	7.1	4.5	4.5	1.9	6.0	6.5	1.5
2 1/2"	5.9	5.9	7.5	9.5	9.6	-	5.2	5.2	2.2	-	7.5	2.0

**Full bore**

Size	A	A1	A2	A4	B	B1	C	C1	D	D1	D3	E
1/4"	2.4	2	-	-	4.7	-	2.4	-	0.9	-	-	0.4
3/8"	2.4	2.4	-	-	4.7	-	2.4	-	0.9	-	-	0.4
1/2"	2.7	2.7	-	5.5	4.7	4.7	2.5	-	1.0	-	3.7	0.5
3/4"	3.4	3.4	-	6.0	6.2	6.2	3.6	3.6	1.2	-	4.6	0.8
1"	3.8	3.8	-	6.5	6.2	6.2	3.7	3.7	1.5	-	4.9	1.0
1 1/4"	4.2	4.2	-	7.0	7.1	7.1	4.3	4.3	1.6	-	5.2	1.2
1 1/2"	4.9	4.9	-	7.5	7.1	7.1	4.5	4.5	1.9	-	6.1	1.5
2"	6.0	6.0	-	8.5	9.6	9.6	5.2	5.2	2.2	-	6.5	2.0

**Weights (approximate) in lbs**

Size	Scrd (NPT) / BW/SW	Reduced bore		Full bore	
		ASME 150	ASME 300	Scrd (NPT) / BW/SW	ASME 300
1/4"	1.3	-	-	1.3	-
3/8"	1.3	-	-	1.3	-
1/2"	1.3	3.6	4.8	1.5	5.5
3/4"	1.5	4.8	6.3	2.8	9.2
1"	2.8	7.5	9.9	3.9	11.2
1 1/4"	3.9	9.8	15.4	5.5	16.5
1 1/2"	5.5	12.8	18.4	7.7	22.0
2"	7.7	19.8	24.7	15.2	29.5
2 1/2"	15.2	-	38.6	-	-



- A** : Screwed and Butt weld  
**A1** : Socket weld  
**A2** : Flanged ASME 150  
**A4** : Flanged ASME 300  
**B** : Screwed, Butt weld and Socket weld  
**B1** : Flanged ASME 150  
**C** : Screwed, Butt weld and Socket weld  
**C1** : Flanged ASME 150  
**D** : Screwed, Butt weld and Socket weld  
**D1** : Flanged ASME 150  
**D3** : Flanged ASME 300

## C<sub>v</sub> values

Size	1/4"	3/8"	1/2"	3/4"	1"	1 1/4"	1 1/2"	2"	2 1/2"
Reduced bore	3	8	7	12	31	57	81	119	194
Full bore	3	8	20	42	67	102	176	240	-

## Operating torque (ft / lbf)

Size	1/4"	3/8"	1/2"	3/4"	1"	1 1/4"	1 1/2"	2"	2 1/2"
Reduced bore	1.5	1.5	1.5	3	10	15.5	23	29.5	33.5
Full bore	1.5	1.5	3	10	15.5	23	29.5	33	-

The indicated torque values are for valves frequently operated, that are submitted to a maximum differential pressure of 1500 psig. Valves that are subject to long static periods, may require greater break-out torque.

## Safety information, installation and maintenance

For full details see the Installation and Maintenance Instructions, IM-P133-16.

## How to order example:

1 off Spirax Sarco 1/2" screwed NPT M10S2FB ball valve.

### Optional extras:

- Self-venting ball.
- Extended stems 2" (50 mm) and 4" (100 mm) to allow full insulation.
- Lockable handle.
- Oval handle for confined spaces. Ideal for trap modules.

## Spare parts

The spare parts available are shown in solid outline. Parts drawn in broken line are not supplied as spares.

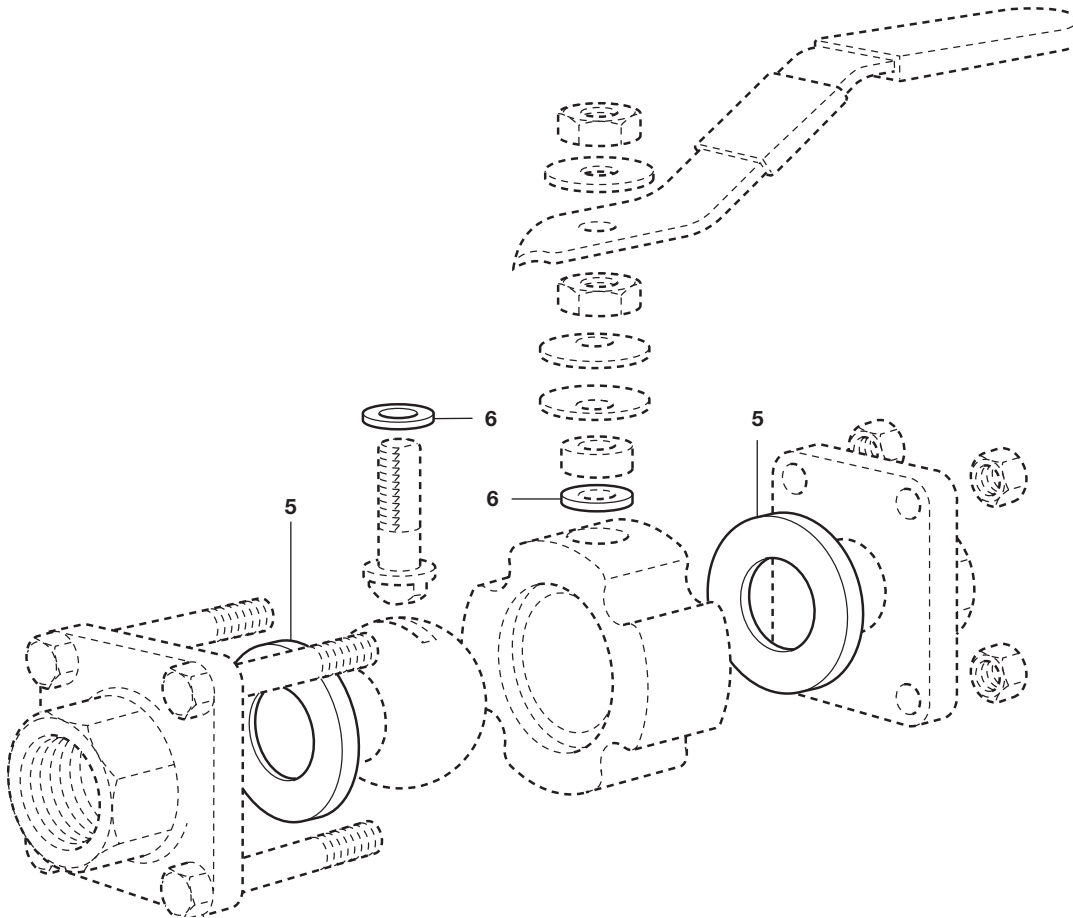
### Available spares

Seat and stem seal set	5, 6
------------------------	------

### How to order spares

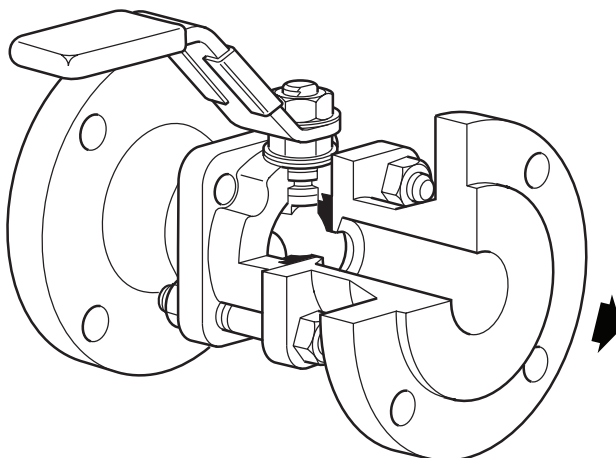
Always order spares by using the description given in the column headed 'Available spares' and state the size and type of ball valve.

**Example:** 1 - Seat and stem seal set for a 1/2" M10S2FB ball valve.



## M10V

### Manual Ball Valve 1/4" to 2-1/2" (Low Pressure Applications)



#### Description

The M10V three-piece body ball valve has been designed for use as an isolating valve, not a control valve, and can be serviced without removal from the pipeline (screwed and welded versions only). It can be used with the majority of industrial fluids.

#### Available types

**M10V2** Zinc plated carbon steel body, PTFE seats.

**M10V4** Complete stainless steel, PTFE seats.

**Note:** The nomenclature will be followed with either **FB** (full bore) or **RB** (reduced bore).

#### Standards

This product fully complies with the requirements of the European Pressure Equipment Directive 97/23/EC and carries the **CE** mark when so required.

#### Certification

This product is available with certification to EN 10204 3.1.

**Note:** All certification/inspection requirements must be stated at the time of order placement.

#### Sizes and pipe connections

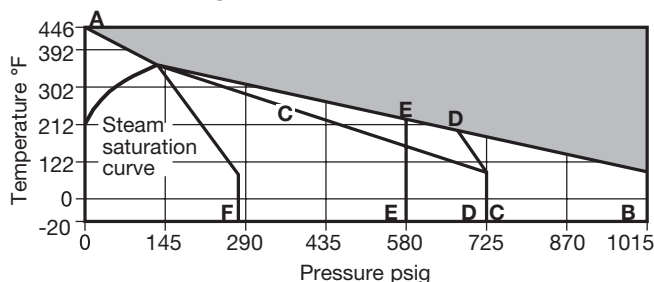
Full bore	Flanged 1/2" to 2"
1/4", 3/8", 1/2", 3/4", 1", 1 1/4", 1 1/2" and 2"	ASME Class 150, ASME Class 300,
Screwed and welded API/NPT, BW, SW	

Reduced bore	Flanged 1/2" to 2 1/2"
1/4", 3/8", 1/2", 3/4", 1", 1 1/4", 1 1/2", 2" and 2 1/2"	ASME Class 150, ASME Class 300,
Screwed and welded API/NPT, BW, SW	

#### Technical data

Flow characteristic	Modified linear
Port	Full and reduced port versions
Leakage test procedure to ISO 5208 (Rate A)	
Antistatic device	Complies with ISO 7121

#### Pressure / temperature limits



The product **must not** be used in this region.

- A - B** Screwed, SW and BW 1/4" - 1 1/2" FB, RB and 2" RB.
- A - C** Screwed, SW and BW 2" FB and 2 1/2" RB only.
- A - D** Flanged ASME 300.
- A - F** Flanged ASME 150.

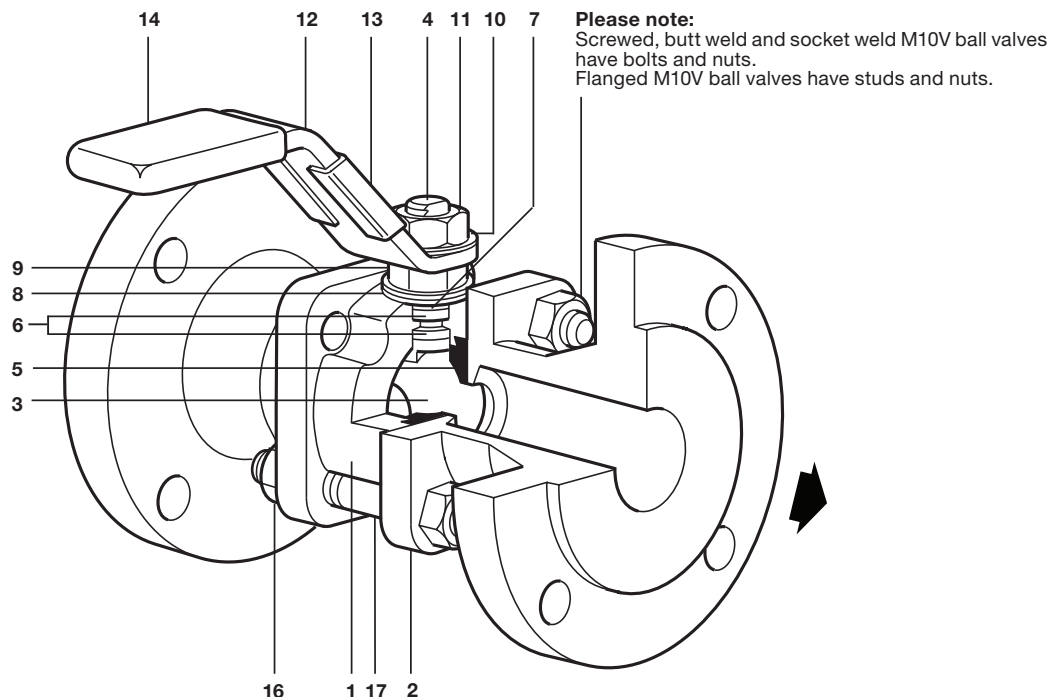
**Note 1:** On the 2" FB and 2 1/2" RB a PTFE gasket is fitted between the body and cap.

**Note 2:** The flange standard may restrict the maximum operating pressure. Please check with Spirax Sarco.

Body design conditions*		
PMA	Maximum allowable pressure	1015 psig @ 104°F
TMA	Maximum allowable temperature	446°F @ 0 psig
Minimum allowable temperature		-20°F
PMO	Maximum operating pressure for saturated steam service	145 psig @ 363°F
TMO	Maximum operating temperature	449°F @ 0 psig
Minimum operating temperature		-20°F
<b>Note:</b> For lower operating temperatures consult Spirax Sarco		
ΔPMX	Maximum differential pressure is limited to the PMO	
Designed for a maximum cold hydraulic test pressure of 1523 psig		

\*Note: Do not exceed end connection design condition





## Materials

No.	Part	Material	
1	Body	<b>M10V2</b>	Zinc plated carbon steel
		<b>M10V4</b>	Stainless steel
2	Cap	<b>M10V2</b>	Zinc plated carbon steel
		<b>M10V4</b>	Stainless steel
3	Ball		Stainless steel
4	Stem		Stainless steel
**5	Seat		Virgin PTFE
**6	Stem seal		Reinforced PTFE antistatic
7	Separator	<b>M10V2</b>	Zinc plated carbon steel
		<b>M10V4</b>	Stainless steel
8	Spring washers		Stainless steel
9	Nut	<b>M10V2</b>	Zinc plated carbon steel
		<b>M10V4</b>	Stainless steel
10	Name-plate (DN)		Stainless steel
11	Stem nut	<b>M10V2</b>	Zinc plated carbon steel
		<b>M10V4</b>	Stainless steel
12	Lever	<b>M10V2</b>	Zinc plated carbon steel
		<b>M10V4</b>	Stainless steel
13	Name-plate		Stainless steel
14	Grip		Vinyl
*15	Bolts	<b>M10V2</b>	Zinc plated carbon steel
		<b>M10V4</b>	Stainless steel
16	Nuts	<b>M10V2</b>	Zinc plated carbon steel
		<b>M10V4</b>	Stainless steel
17	Studs	<b>M10V2</b>	Zinc plated carbon steel
		<b>M10V4</b>	Stainless steel

\*Note: Item 15 not shown - Screwed, butt weld and socket weld versions only

\*\*Note: Available spare parts sold as a kit.

**Dimensions (approximate) in inches****Reduced bore**

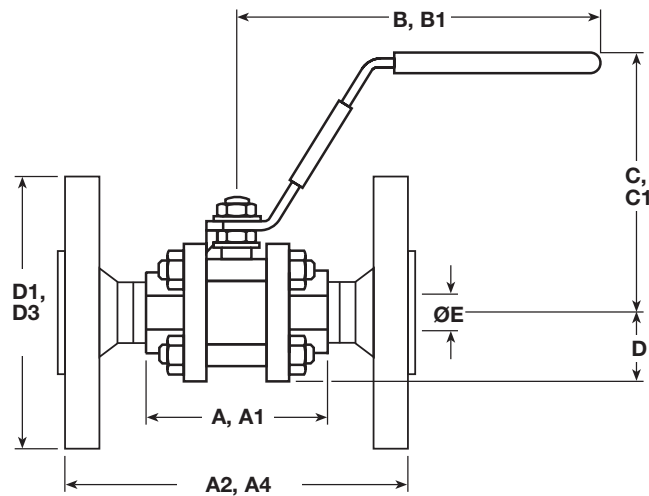
Size	A	A1	A2	A4	B	B1	C	C1	D	D1	D3	E
1/4"	2.5	2.4	-	-	4.7	-	2.4	-	0.9	-	-	0.4
3/8"	2.5	2.5	-	-	4.7	-	2.4	-	0.9	-	-	0.4
1/2"	2.5	2.0	4.3	5.5	4.7	4.7	2.4	3.4	0.9	3.5	3.7	0.4
3/4"	2.7	2.3	4.6	5.9	4.7	4.7	2.5	3.5	1.0	3.8	4.6	0.6
1"	3.4	3.3	5.0	6.5	6.2	6.2	3.6	3.6	1.2	4.3	4.9	0.8
1 1/4"	3.8	3.6	5.5	7.0	6.2	6.2	3.7	3.7	1.4	4.6	5.2	0.9
1 1/2"	4.2	4.0	6.5	7.5	7.1	7.1	4.3	4.3	1.6	5.0	6.1	1.2
2"	4.9	4.6	7.0	8.5	7.1	7.1	4.5	4.5	1.8	5.9	6.5	1.5
2 1/2"	6.0	6.0	7.5	9.5	9.6	-	5.2	5.2	2.2	-	7.5	2.0

**Full bore**

Size	A	A1	A2	A4	B	B1	C	C1	D	D1	D3	E
1/4"	2.5	2.4	-	-	4.7	-	2.4	-	0.9	-	-	0.4
3/8"	2.5	2.5	-	-	4.7	-	2.4	-	0.9	-	-	0.4
1/2"	2.7	2.7	-	5.5	4.7	4.7	2.5	3.5	1.0	-	3.7	0.6
3/4"	3.4	3.4	-	6.0	6.2	6.2	3.6	3.6	1.2	-	4.6	0.8
1"	3.8	3.8	-	6.5	6.2	6.2	3.7	3.7	1.5	-	4.9	0.9
1 1/4"	4.2	4.2	-	7.0	7.1	7.1	4.3	4.3	1.6	-	5.2	1.2
1 1/2"	4.9	4.9	-	7.5	7.1	7.1	4.5	4.5	1.9	-	6.1	1.5
2"	6.0	6.0	-	8.5	9.6	9.6	5.2	5.2	2.2	-	6.5	2.0

**Weights (approximate) in lbs**

Size	Socrd / BW / SW	Reduced bore		Full bore	
		ASME 150	ASME 300	ASME 150	ASME 300
1/4"	1.3	-	-	1.3	-
3/8"	1.3	-	-	1.3	-
1/2"	1.3	3.6	4.8	1.5	5.5
3/4"	1.5	4.8	6.3	2.8	9.2
1"	2.8	7.5	9.9	3.9	11.2
1 1/4"	3.9	9.8	15.4	5.5	16.5
1 1/2"	5.5	12.8	18.4	7.7	22.0
2"	7.7	19.8	24.7	15.2	29.5
2 1/2"	15.2	-	38.6	-	-



- A** : Screwed and Butt weld  
**A1** : Socket weld  
**A2** : Flanged ASME 150  
**A4** : Flanged ASME 300  
**B** : Screwed, Butt weld and Socket weld  
**B1** : Flanged ASME 150  
**C** : Screwed, Butt weld and Socket weld  
**C1** : Flanged ASME 150  
**D** : Screwed, Butt weld and Socket weld  
**D1** : Flanged ASME 150  
**D3** : Flanged ASME 300

## C<sub>v</sub> values

Size	1/4"	3/8"	1/2"	3/4"	1"	1 1/4"	1 1/2"	2"	2 1/2"
Reduced bore	2.9	2.9	7	12	32	57	82	121	197
Full bore	2.9	8.0	20	42	68	104	179	240	-

## Operating torque (ft/lbf)

Size	1/4"	3/8"	1/2"	3/4"	1"	1 1/4"	1 1/2"	2"	2 1/2"
Reduced bore	1.5	1.5	7.5	3	10	15.5	23	29.5	33.5
Full bore	1.5	1.5	3	10	15.5	23	29.5	33.5	-

The indicated torque values are for valves frequently operated, that are submitted to a maximum differential pressure of 62 bar. Valves that are subject to long static periods, may require greater break-out torque.

## Safety information, installation and maintenance

For full details see the Installation and Maintenance Instructions, IM-P133-15.

## How to order example:

1 off Spirax Sarco 1/2" screwed NPT M10V2FB ball valve.

### Optional extras:

- Self-venting ball.
- Extended stems 2" (50 mm) and 4" (100 mm) to allow full insulation.
- Lockable handle.
- Oval handle for confined spaces. Ideal for trap modules.

## Spare parts

The spare parts available are shown in solid outline. Parts drawn in broken line are not supplied as spares.

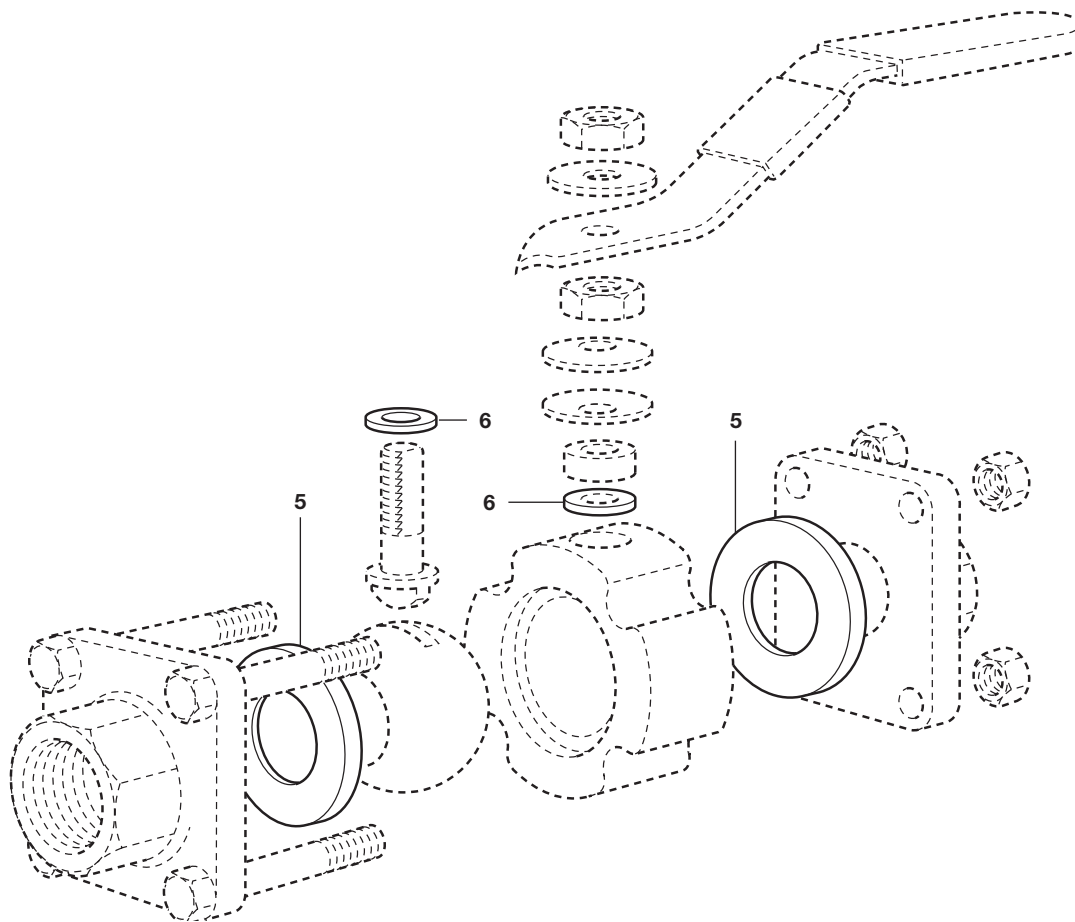
### Available spares

Seat and stem seal set	5, 6
------------------------	------

### How to order spares

Always order spares by using the description given in the column headed 'Available spares' and state the size and type of ball valve.

**Example:** 1 - Seat and stem seal set for a 1/2" M10V2FB ball valve.





## M10Si ISO Automation Ball Valve 1/4" to 2-1/2" (Medium Pressure Applications)

### Description

The M10Si ISO Automation three piece body ball valve has ISO mounting as standard. It is designed for use as an automated isolating valve, not a control valve, on applications that use steam and other industrial fluids for services ranging from vacuum to the higher temperatures and pressures. The M10Si ISO Automation ball valve is specifically designed for pneumatic or electric actuation and not manual operation and can be serviced without removing the valve from the pipeline (screwed and welded versions only).

### ISO mounting

The integral ISO body mounting allows the valve to be automated without losing seal integrity, as the body does not require disassembly. Manual to remote control may therefore be easily accomplished by the ISO range of Spirax Sarco ball valves.

### Standards

This product fully complies with the requirements of the European Pressure Equipment Directive 97/23/EC and carries the mark when so required.

### Certification

This product is available with certification to EN 10204 3.1.

**Note:** All certification / inspection requirements must be stated at the time of order placement.

### Available types

<b>M10Si2 ISO Automation</b>	Zinc plated carbon steel body, PDR 0.8 seats.
<b>M10Si4 ISO Automation</b>	Complete stainless steel, PDR 0.8 seats.

**Note:** The nomenclature will be followed with either **FB** (full bore) or **RB** (reduced bore).

### Options

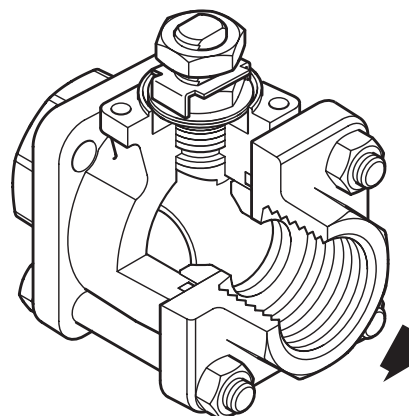
- Self-venting ball.
- Operation by pneumatic actuator URPA series.

### Technical data

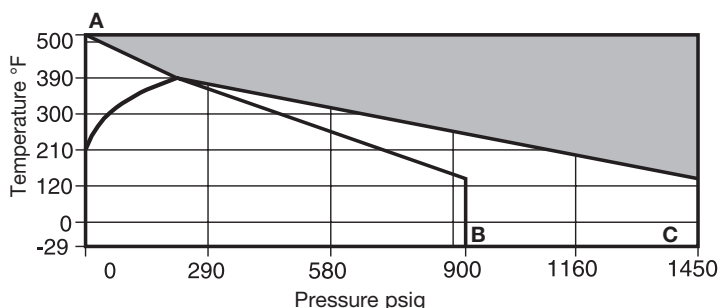
Flow characteristic	Modified linear
Port	Full and reduced bore versions
Leakage	Test procedure to ISO 5208 (rate A)
Antistatic	Complies with ISO 7121 and BS 5351

### Sizes and pipe connections

1/4", 3/8", 1/2", 3/4", 1", 1-1/4", 1-1/2", 2", (2-1/2" only available with reduced bore). Screwed NPT, BW, SW full bore and reduced bore. The 1/4" to 2" (2 1/2" only available with reduced bore) flanged ASME 150 and ASME 300 full bore and reduced bore.



### Pressure / temperature limits



The product must not be used in this region.

**A - B** 2" FB and 2-1/2" RB only

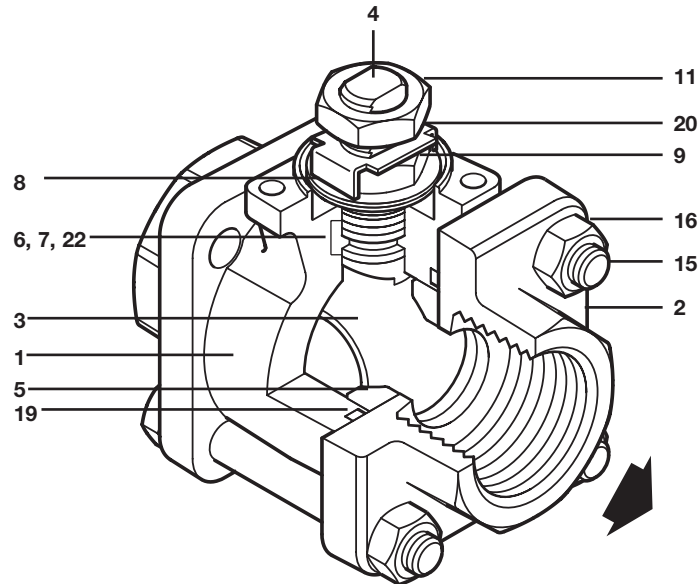
**A - C** 1/4" - 1-1/2" FB, RB and 2" RB

**Note:** The flange standard may restrict the maximum operating pressure. Please check with Spirax Sarco.

PMA	Maximum allowable pressure	1450 psig @ 140°F
TMA	Maximum allowable temperature	500°F @ 0 psig
	Minimum allowable temperature	-21°F
PMO	Maximum operating pressure for saturated steam service	254 psig
TMO	Maximum operating temperature	500°F (260°C) @ 0 psig
	Minimum operating temperature	-21°F
<b>Note:</b> For lower operating temperatures consult Spirax Sarco		
ΔPMX Maximum differential pressure is limited to the PMO		
Designed for a maximum cold hydraulic test pressure of		2175 psig

# M10Si ISO Automation Ball Valve

## 1/4" to 2-1/2"



### Materials

No.	Part	Material		
1	Body	M10Si2 ISO automation	Zinc plated carbon steel	ASTM A105
		M10Si4 ISO automation	Stainless steel	ASTM A 182 F 316L
2	Cap	M10Si2 ISO automation	Zinc plated carbon steel	ASTM A105
		M10Si4 ISO automation	Stainless steel	ASTM A 182 F 316L
3	Ball		Stainless steel	AISI 316
4	Stem		Stainless steel	AISI 316
*5	Seat		Carbon / graphite reinforced PTFE	PDR 0.8
*6	Stem seal		Reinforced PTFE antistatic	
7	Separator	M10Si2 ISO automation	Zinc plated carbon steel	SAE 1010
		M10Si4 ISO automation	Stainless steel	AISI 316
8	Belleville washer		Stainless steel	AISI 301
9	Nut	M10Si2 ISO automation	Zinc plated carbon steel	SAE 1010
		M10Si4 ISO automation	Stainless steel	AISI 304
10	Name-plate - DN (Not shown)		Stainless steel	AISI 430
11	Stem nut	M10Si2 ISO automation	Zinc plated carbon steel	SAE 1010
		M10Si4 ISO automation	Stainless steel	AISI 304
13	Name-plate (Not shown)		Stainless steel	AISI 430
15	Bolts	M10Si2 ISO automation	Zinc plated carbon steel	Grade 5
		M10Si4 ISO automation	Stainless steel	AISI 304
16	Nuts	M10Si2 ISO automation	Zinc plated carbon steel	SAE 1010
		M10Si4 ISO automation	Stainless steel	AISI 304
17	Studs	M10Si4 ISO automation	Stainless steel	AISI 316
Note: Item 17 can not be shown as it is only applicable to welded versions				
*19	Body / cap gasket - 'O' ring		EPDM geothermal	
20	Nut locker		Stainless steel	AIS 316
*22	Stem seal		PEEK	

\*Note: Available spare parts sold as a kit.

# M10Si ISO Automation Ball Valve

## 1/4" to 2-1/2"

### Dimensions (approximate) in inches

#### Reduced bore

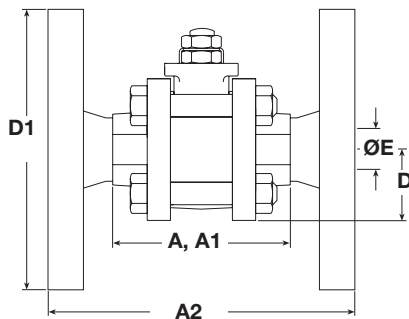
Size	A	A1	A2	D	D1	E
1/4"	2.21	2.05	-	.87	-	.32
3/8"	2.21	2.05	-	.87	-	.32
1/2"	2.48	2.05	4.26	.95	3.51	.43
3/4"	2.68	2.36	4.61	1.02	3.86	.55
1"	3.39	3.31	5.00	1.22	4.26	.83
1-1/4"	3.90	3.70	5.52	1.46	4.65	.99
1-1/2"	4.26	4.02	6.50	1.62	5.00	1.22
2"	4.89	4.65	7.01	1.89	5.99	1.50
2-1/2"	5.99	5.99	-	2.25	-	2.01

#### Full bore

Size	A	A1	A2	D	D1	E
1/4"	2.21	2.29	-	.87	-	.32
3/8"	2.48	2.36	-	.95	-	.43
1/2"	2.68	2.52	-	1.02	-	.55
3/4"	3.39	3.31	-	1.22	-	.83
1"	3.90	3.86	-	1.46	-	.99
1-1/4"	4.26	4.18	-	1.62	-	1.22
1-1/2"	4.89	4.89	-	1.89	-	1.50
2"	5.99	5.99	-	2.25	-	2.01

### Weights (approximate) in lbs

Size	Reduced bore		Full bore
	Scrd /BW/SW	ASME 150	Scrd /BW/SW
1/4"	1.4	-	1.4
3/8"	1.4	-	1.6
1/2"	1.6	3.9	2.1
3/4"	2.1	5.2	3.5
1"	3.5	7.7	4.5
1-1/4"	4.5	9.9	6.1
1-1/2"	6.1	13.2	9.4
2"	9.4	20.2	16.6
2-1/2"	16.6	-	-



A : Scrd and BW  
A1: SW  
A2: Flanged ASME 150  
D : Scrd, BW, SW  
D1: Flanged ASME 150  
E : All versions

### Cv values

Size	1/4"	3/8"	1/2"	3/4"	1"	1-1/4"	1-1/2"	2"	2-1/2"
Reduced bore	2.9	2.9	6.9	11.6	31	57	81	119	194
Full bore	2.9	7.9	20	42	67	103	177	237	-

### Operating torque (Inch - lbs)

Size	1/4"	3/8"	1/2"	3/4"	1"	1-1/4"	1-1/2"	2"	2-1/2"
Reduced bore	18	18	18	31	115	185	265	355	398
Full bore	18	18	31	115	185	265	355	398	-

The indicated torque values are for valves frequently operated, that are submitted to a maximum differential pressure of 88 psi (40 bar). Valves that are subject to long static periods may require up to 75% greater break-out torque.

### Safety Information, Installation and Maintenance

Installation and Maintenance Instructions, IM-P133-61.

### How to order example:

1 off Spirax Sarco 1/2" screwed NPT M10Si2FB ISO automation ball valve.

### Spare parts

The spare parts available are shown in solid outline. Parts drawn in broken line are not supplied as spares.

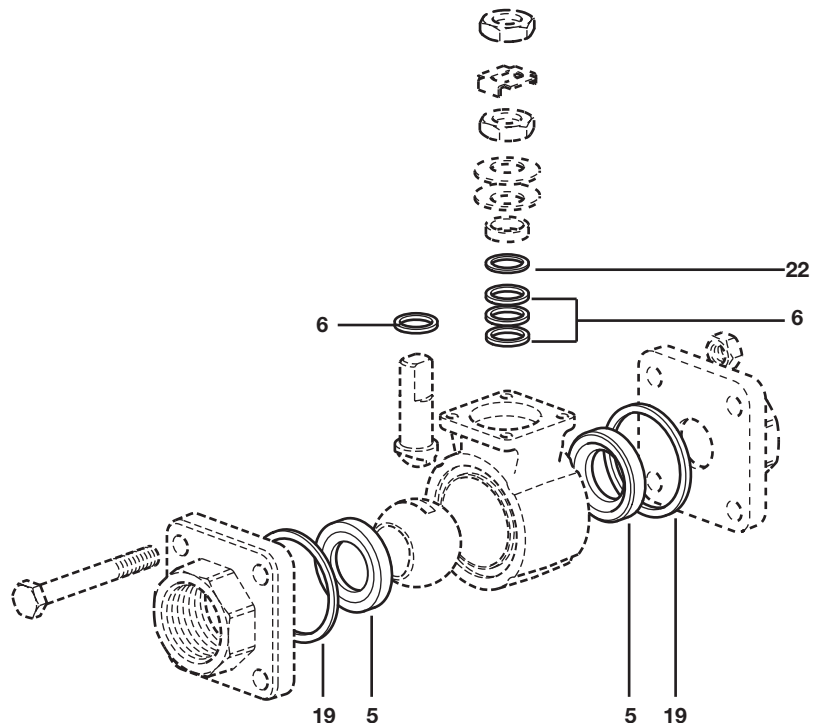
### Available spare

Seat, seals and body gasket set **5, 6, 19, 22**

### How to order spares

Always order spares by using the description given in the column headed 'Available spare' and state the size and type of ball valve.

**Example:** 1 - Seat, seals and body gasket set for a Spirax Sarco 1/2" M10Si2FB ISO automation ball valve.





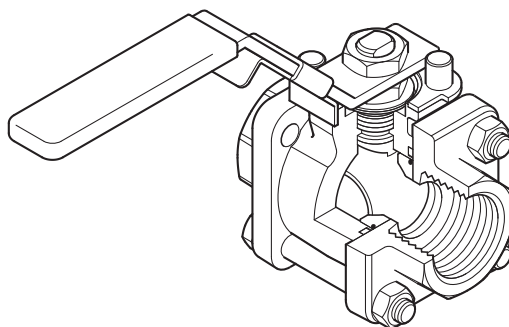


# spirax sarco

## M10Hi ISO Ball Valve

### 1/4" to 2 1/2"

### (High Pressure Applications)



#### Description

The M10Hi ISO three-piece body ball valve has a lockable handle and ISO mounting as standard and features a special ball, which has received a surface hardening. It can be used on applications that use steam and other industrial fluids for services ranging from vacuum to the higher temperatures and pressures. The M10Hi ISO has been designed for use as an isolating valve, not a control valve, and can be serviced without removal from the pipeline.

#### ISO mounting

The integral ISO body mounting allows the valve to be automated without losing seal integrity, as the body does not require disassembly. Manual to remote control may therefore be easily accomplished by the ISO range of Spirax Sarco ball valves.

#### Available types

<b>M10Hi2 ISO</b>	Zinc plated carbon steel body and caps.
<b>M10Hi4 ISO</b>	Complete stainless steel construction.

**Note:** The nomenclature will be followed with either **FB** (full bore) or **RB** (reduced bore) and needs to be stated when placing an order.

#### Standards

This product fully complies with the requirements of the European Pressure Equipment Directive 97/23/EC and carries the **CE** mark when so required.

#### Certification

This product is available with certification to EN 10204 3.1.

**Note:** All certification / inspection requirements must be stated at the time of order placement.

#### Options

- Self-venting ball.
- Extended stem 4" (100 mm) to allow full insulation. (manual operation only)

#### Technical data

Flow characteristic	Modified linear
Port	Full and reduced bore versions
Leakage test procedure to ISO 5208 (Rate A)/EN 12266-1 (Rate A)	

#### Sizes and pipe connections

##### Full bore

1/4", 3/8", 1/2", 3/4", 1", 1 1/4", 1 1/2" and 2"  
**Screwed** NPT, BW, SW

##### Flanged

1/4" to 2"  
ASME 150, 300

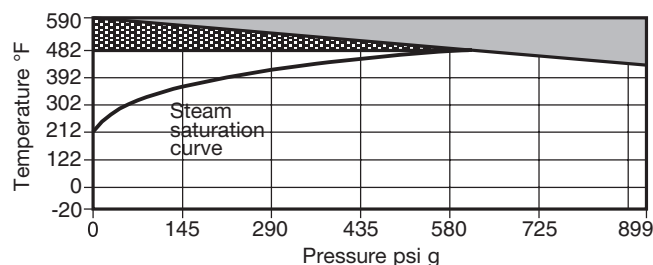
##### Reduced bore

1/4", 3/8", 1/2", 3/4", 1", 1 1/4", 1 1/2", 2" and 2 1/2"  
**Screwed** NPT, BW, SW

##### Flanged

1/4" to 2 1/2"  
ASME 150, 300

#### Pressure / temperature limits



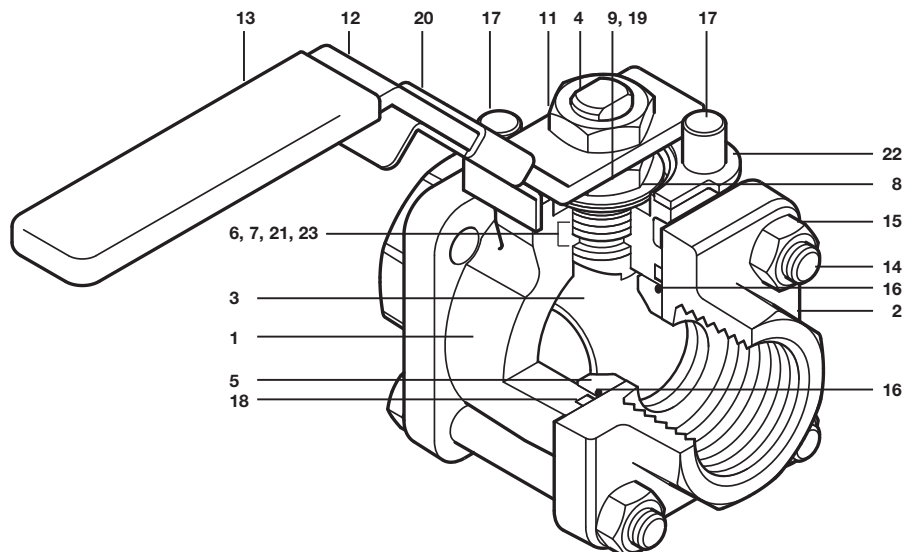
The product **must not** be used in this region.

The product can only be used in this region for short periods of time.

PMA	Maximum allowable pressure	899 psig @ 419°F
TMA	Maximum allowable temperature	590°F @ 0 psig
Minimum allowable temperature		-20°F
PMO	Maximum operating pressure for saturated steam service	565 psi g
TMO	Maximum operating temperatures For short periods	590°F @ 0 psi g
	For continuous operation	482°F @ 565 psi g
Minimum operating temperature		-20°F
<b>Note:</b> For lower operating temperatures consult Spirax Sarco		
ΔPMX Maximum differential pressure is limited to the PMO		
Designed for a maximum cold hydraulic test pressure of 1348 psi g		

Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only.  
In the interests of development and improvement of the product, we reserve the right to change the specification.

TI-P133-70-US 12.14



## Materials

No.	Part		Material	
1	Body	<b>M10Hi2 ISO</b>	Zinc plated carbon steel	ASTM A105
		<b>M10Hi4 ISO</b>	Stainless steel	ASTM A 182 F 316L
2	Cap	<b>M10Hi2 ISO</b>	Zinc plated carbon steel	ASTM A105
		<b>M10Hi4 ISO</b>	Stainless steel	ASTM A 182 F 316L
3	Ball		Stainless steel (hardened)	AISI 316
4	Stem		Stainless steel	AISI 316
*5	Seat		Reinforced PEEK	
*6	Stem seal		Reinforced PTFE	
7	Separator	<b>M10Hi2 ISO</b>	Zinc plated carbon steel	SAE 1010
		<b>M10Hi4 ISO</b>	Stainless steel	AISI 316
8	Belleville washer		Stainless steel	AISI 301
9	Lower stem nut	<b>M10Hi2 ISO</b>	Zinc plated carbon steel	SAE 1010
		<b>M10Hi4 ISO</b>	Stainless steel	AISI 304
10	Name-plate (Not shown)		Stainless steel	AISI 430
11	Upper stem nut	<b>M10Hi2 ISO</b>	Zinc plated carbon steel	SAE 1010
		<b>M10Hi4 ISO</b>	Stainless steel	AISI 304
12	Lever	<b>M10Hi2 ISO</b>	Zinc plated carbon steel	SAE 1010
		<b>M10Hi4 ISO</b>	Stainless steel	AISI 316
13	Grip		Vinyl yellow	
14	Studs	<b>M10Hi2 ISO</b>	Zinc plated carbon steel	A193 B7
		<b>M10Hi4 ISO</b>	Stainless steel	AISI 316
15	Nuts	<b>M10Hi2 ISO</b>	Zinc plated carbon steel	A194 2H
		<b>M10Hi4 ISO</b>	Stainless steel	AISI 304
*16	Seat 'O' ring		Geothermal EPDM	
17	Stop screw	<b>M10Hi2 ISO</b>	Zinc plated carbon steel	SAE 12L 14
		<b>M10Hi4 ISO</b>	Stainless steel	AISI 304
*18	Body / cap 'O' ring		Geothermal EPDM	
19	Nut locker		Stainless steel	AISI 304
20	Lockable handle		Stainless steel	AISI 304L
*21	Stem seal		Graphite	
22	Lock-plate		Stainless steel	AISI 304L
*23	Stem seal		Stainless steel	AISI 316

\*Note: Available spare parts sold as a kit.

**Dimensions (approximate) in Inches****Reduced Bore**

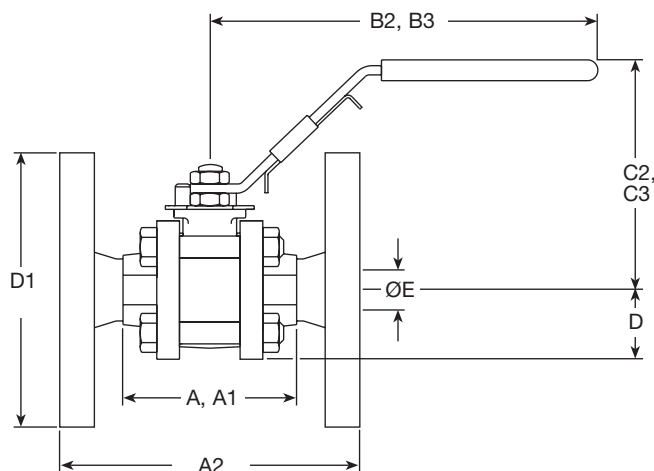
Size	A	A1	A2	B2	B3	C2	C3	D	D1	E
1/4"	2.6	2.6	-	6.4	-	0.4	-	0.9	-	0.4
3/8"	2.6	2.6	-	6.4	-	0.4	-	0.9	-	0.4
1/2"	2.6	2.6	4.3	6.4	6.4	0.4	0.4	0.9	3.5	0.4
3/4"	2.8	2.8	4.6	6.4	6.4	3.7	3.7	1	3.8	0.5
1"	3.4	3.4	5	6.4	6.4	3.9	3.9	1.2	4.3	0.8
1-1/4"	4	4	5.5	6.4	6.4	4.2	4.2	1.5	4.6	1
1-1/2"	4.3	4.3	6.5	7.3	7.3	4.6	4.6	1.6	5	1.2
2"	4.9	4.7	7	7.3	7.3	4.8	4.8	1.9	5.9	1.5
2-1/2"	6	6	-	9.8	9.8	5.5	5.5	2.2	-	2

**Full Bore**

Size	A	A1	A2	B2	B3	C2	C3	D	D1	E
1/4"	2.6	2.6	-	6.4	-	0.4	-	0.9	-	0.4
3/8"	2.6	2.6	-	6.4	-	0.4	-	0.9	-	0.4
1/2"	2.8	2.8	-	6.4	6.4	3.7	3.7	1	-	0.5
3/4"	2.8	2.8	-	6.4	6.4	3.9	3.9	1.2	-	0.8
1"	3.4	3.4	-	6.4	6.4	4.2	4.2	1.5	-	1
1-1/4"	4	4	-	7.3	7.3	4.6	4.6	1.6	-	1.2
1-1/2"	4.3	4.3	-	7.3	7.3	4.8	4.8	1.9	-	1.5
2"	6	6	-	9.8	9.8	5.5	5.5	2.2	-	2

**Weights (approximate) in lb**

Size	Reduced Bore		Full Bore
	Scrd / BW / SW	ASME 150	Scrd / BW / SW
1/4"	1.8	-	1.8
3/8"	1.8	-	1.8
1/2"	1.9	3.7	2.2
3/4"	2.2	4.9	3.4
1"	3.4	6.4	5.1
1-1/4"	5.1	9.1	6.7
1-1/2"	6.7	14.1	9.7
2"	9.7	18.4	19.9
2-1/2"	18.0	-	-



- A:** Scrd and BW  
**A1:** SW  
**A2:** Flanged ASME 150  
**B2:** Scrd, BW and SW  
**B3:** ASME 150  
**C2:** Scrd, BW and SW  
**C3:** ASME 150  
**D:** Scrd, BW and SW  
**D1:** Flanged ASME 150  
**E:** All versions

**Cv values**

Size	1/4"	3/8"	1/2"	3/4"	1"	1-1/4"	1-1/2"	2"	2-1/2"
Reduced Bore	5.7	7.8	6.9	11.56	31.2	56.6	80.9	119	194.2
Full Bore	5.7	7.8	19.6	41.6	67	102.8	176.8	236.9	-

**Operating torque (Lb-Ft)**

Size	1/4"	3/8"	1/2"	3/4"	1"	1-1/4"	1-1/2"	2"	2-1/2"
Reduced Bore	7.3	7.3	7.3	10.3	17.7	33.1	40.5	47.9	59.0
Full Bore	7.3	7.3	10.3	17.7	33.1	40.5	47.9	59.0	-

The indicated torque values are for valves frequently operated, that are submitted to a maximum differential pressure of 580 psig. Valves that are subject to long static periods, may require greater break-out torque.

**Safety information, installation and maintenance**

Installation and Maintenance Instructions, IM-P133-76.

**How to order example:**

1 off Spirax Sarco 1/2" screwed NPT M10Hi2FB ISO ball valve.

**Spare parts**

The spare parts available are shown in solid outline. Parts drawn in broken line are not supplied as spares.

**Available spares**

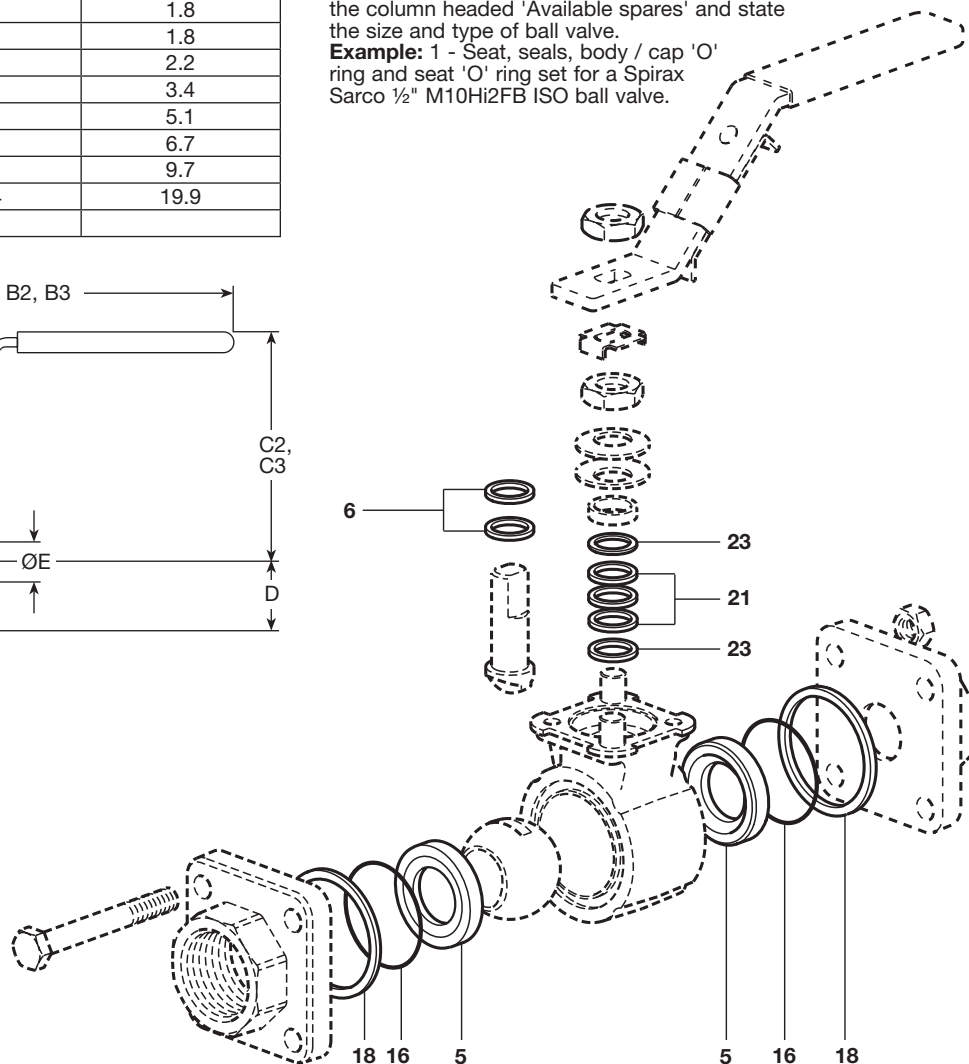
Seat, seals, body / cap 'O' ring  
and seat 'O' ring set

5, 6, 16, 18, 21, 23

**How to order spares**

Always order spares by using the description given in the column headed 'Available spares' and state the size and type of ball valve.

**Example:** 1 - Seat, seals, body / cap 'O' ring and seat 'O' ring set for a Spirax Sarco 1/2" M10Hi2FB ISO ball valve.



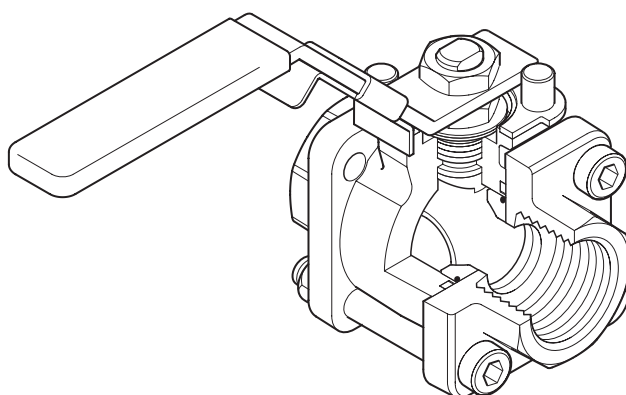




## M10HPi ISO Ball Valve

1/4" to 2 1/2"

(High Pressure Applications) \*Not suitable for steam



### Description

The M10HPi ISO three-piece body ball valve has a lockable handle and ISO mounting as standard. It features a special floating ball, which has received a surface hardening and a blow-out proof stem. This particular ball valve has been specially designed for manual isolation of applications using high-pressure gas. The M10HTi ISO has been designed for use as an isolating valve, not a control valve, and can be serviced without removal from the pipeline.

### ISO mounting

The integral ISO body mounting allows the valve to be automated without losing seal integrity, as the body does not require disassembly. Manual to remote control may therefore be easily accomplished by the ISO range of Spirax Sarco ball valves.

### Available types

**M10HPi2 ISO** Zinc plated carbon steel body and caps.

**M10HPi3 ISO** Stainless steel body and caps.

**Note:** The nomenclature will be followed with either **FB** (full bore) or **RB** (reduced bore).

### Standards

This product fully complies with the requirements of the European Pressure Equipment Directive 97/23/EC and carries the **CE** mark when so required.

### Certification

This product is available with certification to EN 10204 3.1.

**Note:** All certification / inspection requirements must be stated at the time of order placement.

### Options

- Self-venting ball.
- Extended stem 4" (100 mm) to allow full insulation.\*
- Oval handle for confined spaces. Ideal for trap modules.\*

\*manual operation only

### Technical data

Flow characteristic	Modified linear
Port	Full and reduced bore versions
Leakage test procedure to ISO 5208 (Rate A)/EN 12266-1 (Rate A)	
Antistatic device	Complies with ISO 7121 and BS 5351

### Sizes and pipe connections

#### Full bore

1/4", 3/8", 1/2", 3/4", 1", 1 1/4" and 1 1/2"

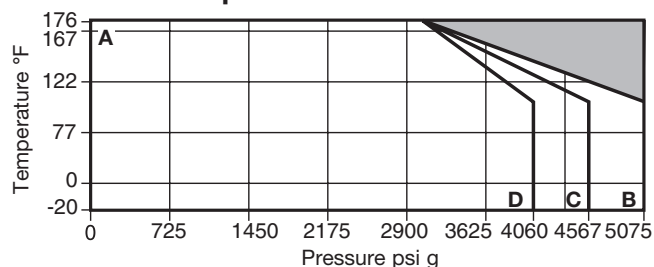
**Screwed NPT, BW, SW**

#### Reduced bore

1/4", 3/8", 1/2", 3/4", 1", 1 1/4", 1 1/2" and 2"

**Screwed NPT, BW, SW**

### Pressure / temperature limits



The product **must not** be used in this region.

**A - B** 1/4", 3/8" and 1/2" RB

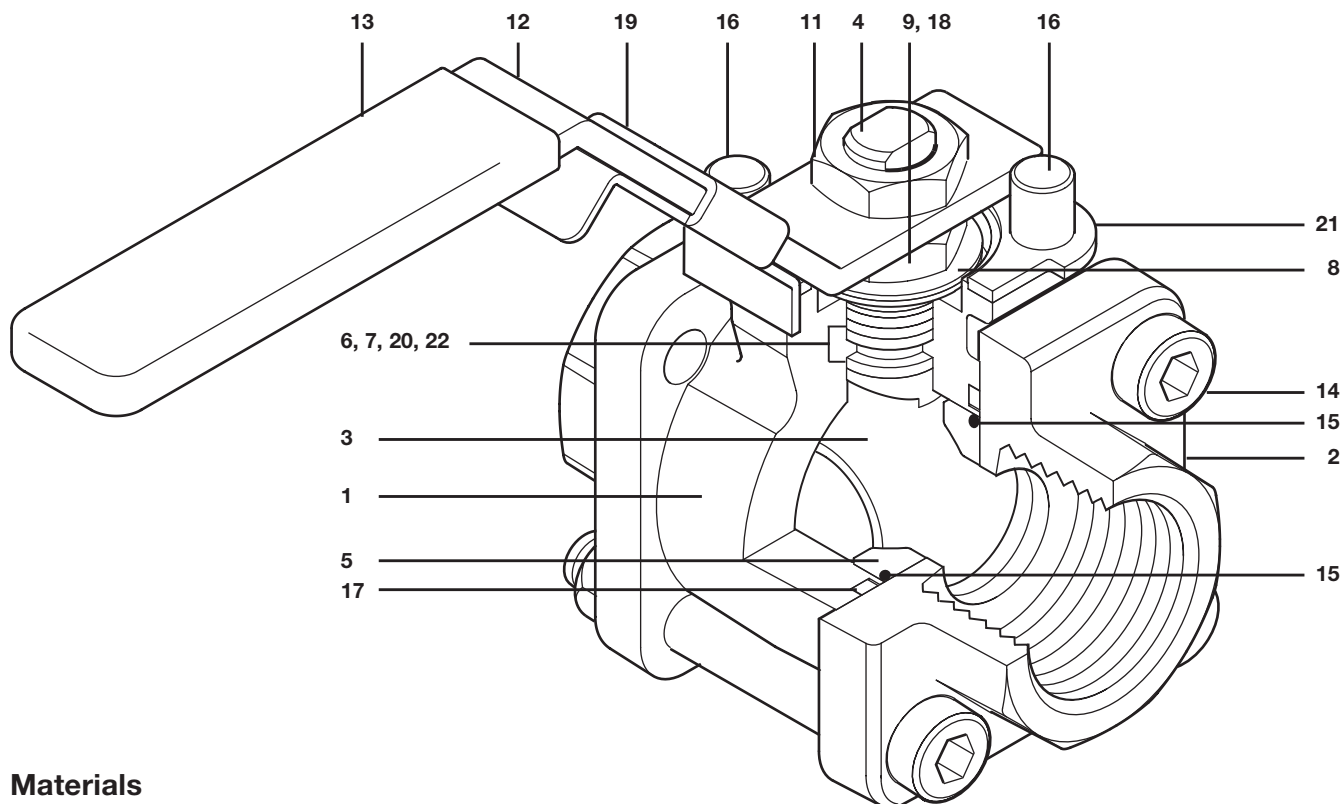
**A - C** 1/2" FB; 3/4" and 1" RB

**A - D** 1" FB; 1 1/4", 1 1/2" and 2" RB

	Maximum	1/4", 3/8" and 1/2" RB	5075 psi
PMA	allowable (operating) pressure (PMO)	1/2" FB; 3/4" and 1" RB	4567 psi
		1" FB; 1 1/4", 1 1/2" and 2" RB	4060 psi
TMA	Maximum allowable temperature		176°F
Minimum allowable temperature			-20°F
TMO	Maximum operating temperature		176°F @ 3045 psi g
Minimum operating temperature			-20°F
<b>Note:</b> For lower operating temperatures consult Spirax Sarco			
ΔPMX Maximum differential pressure is limited to the PMO			
Designed for a maximum cold hydraulic test pressure of 1.5 x PMO			

Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only.  
In the interests of development and improvement of the product, we reserve the right to change the specification.

TI-P133-71-US 12.14



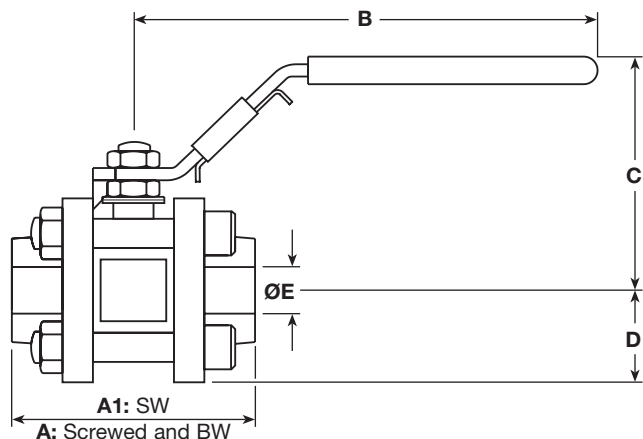
## Materials

No.	Part	Material
1	Body	<b>M10HPi2 ISO</b> Zinc plated carbon steel ASTM A105
		<b>M10HPi3 ISO</b> Stainless steel ASTM A 182 F 316L
2	Cap	<b>M10HPi2 ISO</b> Zinc plated carbon steel ASTM A105
		<b>M10HPi3 ISO</b> Stainless steel ASTM A 182 F 316L
3	Ball	Stainless steel (hardened) AISI 316
4	Stem	Stainless steel AISI 316
*5	Seat	Acetal
*6	Stem seal	Reinforced PEEK
7	Separator	Zinc plated carbon steel SAE 1010
8	Belleville washer	Stainless steel AISI 301
9	Stem nut	Zinc plated carbon steel SAE 1010
10	Name-plate (Not shown)	Stainless steel AISI 430
11	Upper stem nut	Zinc plated carbon steel SAE 1010
12	Lever	Zinc plated carbon steel SAE 1010
13	Grip	Vinyl green
14	Bolts	Zinc plated carbon steel Grade 12.9
*15	Seat 'O' ring	Viton
16	Stop screw	Zinc plated carbon steel SAE 12L 14
*17	Body / cap 'O' ring	Viton
18	Nut locker	Stainless steel AISI 316
19	Lockable handle	Stainless steel AISI 316
*20	Stem seal	Glass - PTFE
21	Lock-plate	Stainless steel AISI 316
*22	Stem seal	Stainless steel AISI 316

\*Note: Available spare parts sold as a kit.

## Dimensions (approximate) in Inches / lb's Reduced Bore

Size	A	A1	B	C	D	E	Weight
1/4"	3.2	3.2	3.6	6.3	1.1	0.4	3.2
3/8"	3.3	3.3	3.6	6.3	1.1	0.4	3.2
1/2"	3.3	3.3	3.6	6.3	1.1	0.4	3.3
3/4"	3.6	3.6	3.7	6.3	1.1	0.5	3.8
1"	4.5	4.5	3.9	6.3	1.3	0.8	5.6
1-1/4"	5.2	5.2	4.1	6.3	1.6	0.9	8.6
1-1/2"	5.7	5.7	4.7	7.3	1.8	1.2	12.3
2"	6	6	4.9	7.3	2	1.5	15.3



## Full Bore

Size	A	A1	B	C	D	E	Weight
1/4"	3.3	3.3	3.6	6.3	1.1	0.4	3.2
3/8"	3.3	3.3	3.6	6.3	1.1	0.4	3.2
1/2"	3.6	3.6	3.7	6.3	1.1	0.5	3.8
3/4"	4.5	4.5	3.9	6.3	1.3	0.8	5.6
1"	5.2	5.2	4.1	6.3	1.6	0.9	8.6
1-1/4"	5.7	5.7	4.7	7.3	1.8	1.2	12.3
1-1/2"	6	6	4.9	7.3	2	1.5	15.3

## Cv values

Size	1/4"	3/8"	1/2"	3/4"	1"	1-1/4"	1-1/2"	2"
Reduced Bore	5.7	7.8	6.9	11.5	31.1	56.5	80.7	118.7
Full Bore	5.7	7.8	19.6	41.5	66.8	102.6	176.4	-

## Operating torque (Lb-Ft)

Size	1/4"	3/8"	1/2"	3/4"	1"	1-1/4"	1-1/2"	2"
Reduced Bore	7.3	7.3	7.3	11.0	18.4	29.5	40.5	73.7
Full Bore	7.3	7.3	11.0	18.4	29.5	40.5	73.7	-

The indicated torque values are for valves frequently operated, that are submitted to a maximum differential pressure.

Valves that are subject to long static periods, may require greater break-out torque.

## Safety information, installation and maintenance

Installation and Maintenance Instructions, IM-P133-74.

## How to order example:

1 off Spirax Sarco 1/2" screwed NPT M10HPi2FB ISO ball valve.

## Spare parts

The spare parts available are shown in solid outline. Parts drawn in broken line are not supplied as spares.

## Available spares

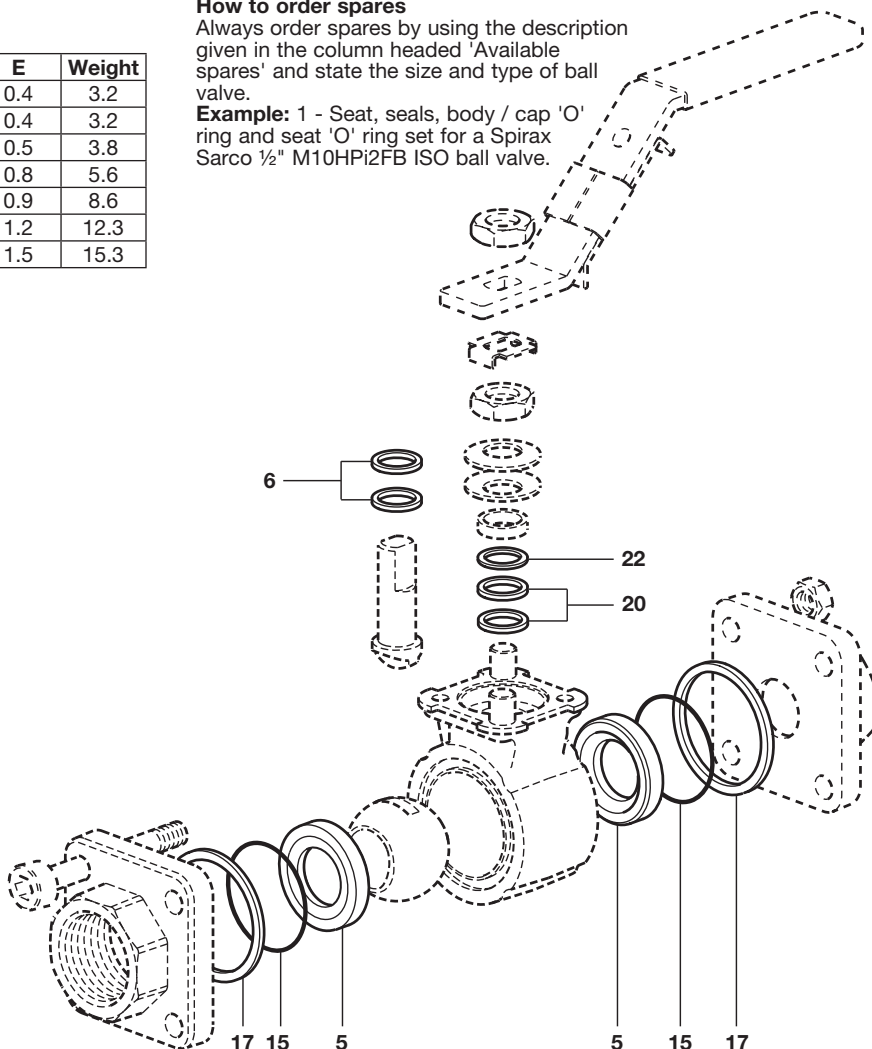
Seat, seals, body / cap 'O' ring  
and seat 'O' ring set

5, 6, 15, 17, 20, 22

## How to order spares

Always order spares by using the description given in the column headed 'Available spares' and state the size and type of ball valve.

**Example:** 1 - Seat, seals, body / cap 'O' ring and seat 'O' ring set for a Spirax Sarco 1/2" M10HPi2FB ISO ball valve.

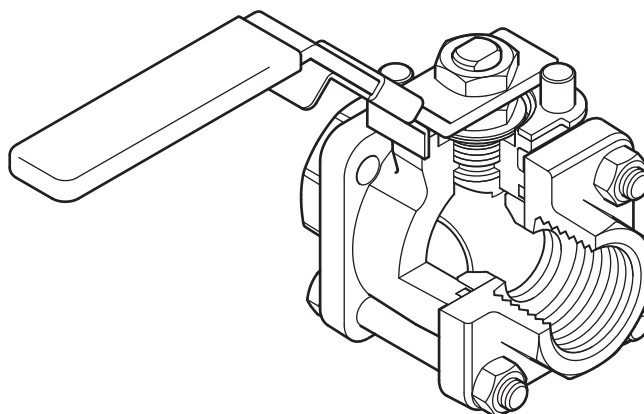








## M10Ti ISO "Teflon Free" Ball Valve 1/4" to 2 1/2" (Not Suitable for Steam)



### Description

The M10Ti ISO three-piece body ball valve has been designed for use as an isolating valve, not a control valve, has a lockable handle as standard and can be serviced without removal from the pipeline (screwed and welded versions only). It has been specially designed for applications that cannot use Teflon, for example the tobacco industry. The seat and seals are of UHMWPE (Ultra High Molecular Weight Polyethylene).

### ISO mounting

The integral ISO body mounting allows the valve to be automated without losing seal integrity, as the body does not require disassembly. Manual to remote control may therefore be easily accomplished by the ISO range of Spirax Sarco ball valves.

### Available types

<b>M10Ti2 ISO</b>	Zinc plated carbon steel body and caps.
<b>M10Ti4 ISO</b>	Complete stainless steel construction.

**Note:** The nomenclature will be followed with either **FB** (full bore) or **RB** (reduced bore).

### Standards

This product fully complies with the requirements of the European Pressure Equipment Directive 97/23/EC and carries the **CE** mark when so required.

### Certification

This product is available with certification to EN 10204 3.1.  
**Note:** All certification/inspection requirements must be stated at the time of order placement.

### Options

- Self-venting ball.
- Extended stem 4" (100 mm) to allow full insulation. (manual operation only)

### Technical data

Flow characteristic	Modified linear
Port	Full and reduced bore versions
Leakage test procedure to ISO 5208 (Rate A)/EN 12266-1 (Rate A)	
Antistatic device (optional)	Complies with ISO 7121 and BS 5351

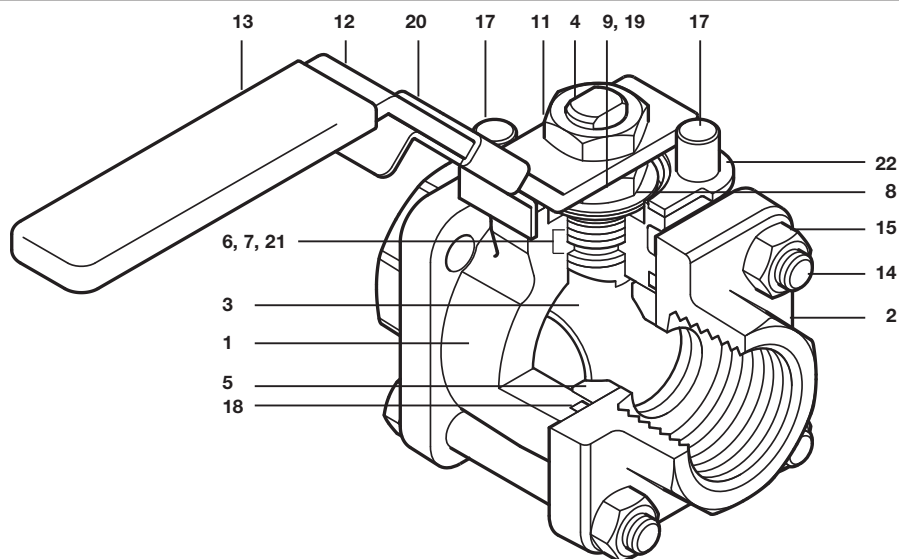
### Sizes and pipe connections

<b>Full bore</b> 1/4", 3/8", 1/2", 3/4", 1", 1 1/4", 1 1/2" and 2" <b>Screwed</b> NPT, BW, SW	<b>Flanged</b> 1/2" to 2" ASME (ANSI) Class 150, ASME (ANSI) Class 300
<b>Reduced bore</b> 1/4", 3/8", 1/2", 3/4", 1", 1 1/4", 1 1/2", 2" and 2 1/2" <b>Screwed</b> NPT, BW, SW	<b>Flanged</b> 1/2" to 2 1/2" ASME (ANSI) Class 150, ASME (ANSI) Class 300

PMA	Maximum allowable pressure	1015 psi g @ 158°F
TMA	Maximum allowable temperature	158°F @ 1015 psi g
Minimum allowable temperature		-20°F
PMO	Maximum operating pressure	1015 psi g
TMO	Maximum operating temperature	158°F @ 1015 psi g
Minimum operating temperature		-20°F
<b>Note:</b> For lower operating temperatures consult Spirax Sarco		
ΔPMX	Maximum differential pressure	1015 bar
Designed for a maximum cold hydraulic test pressure of 1523 psig		

Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only.  
In the interests of development and improvement of the product, we reserve the right to change the specification.

TI-P133-68-US 12.14



## Materials

No. Part		Material	
1 Body	M10Ti2 ISO	Zinc plated carbon steel	ASTM A105
	M10Ti4 ISO	Stainless steel	ASTM A 182 F 316L
2 Cap	M10Ti2 ISO	Zinc plated carbon steel	ASTM A105
	M10Ti4 ISO	Stainless steel	ASTM A 182 F 316L
3 Ball		Stainless steel	AISI 316
4 Stem		Stainless steel	AISI 316
*5 Seat		UHMWPE	
*6 Stem seal		UHMWPE	
7 Separator	M10Ti2 ISO	Zinc plated carbon steel	SAE 1010
	M10Ti4 ISO	Stainless steel	AISI 316
8 Belleville washer		Stainless steel	AISI 301
9 Lower stem nut	M10Ti2 ISO	Zinc plated carbon steel	SAE 1010
	M10Ti4 ISO	Stainless steel	AISI 304
10 Name-plate - DN (Not shown)		Stainless steel	AISI 430
11 Upper stem nut	M10Ti2 ISO	Zinc plated carbon steel	SAE 1010
	M10Ti4 ISO	Stainless steel	AISI 304
12 Lever	M10Ti2 ISO	Zinc plated carbon steel	SAE 1010
	M10Ti4 ISO	Stainless steel	AISI 316
13 Grip		Vinyl light blue	
14 Bolts	M10Ti2 ISO	Zinc plated carbon steel	Grade 5
	M10Ti4 ISO	Stainless steel	AISI 304
15 Nuts	M10Ti2 ISO	Zinc plated carbon steel	SAE 1010
	M10Ti4 ISO	Stainless steel	AISI 304
16 Studs	M10Ti4 ISO	Stainless steel	AISI 316
<b>Note:</b> Item 16 can not be shown as it is only applicable to welded versions			
17 Stop screw	M10Ti2 ISO	Zinc plated carbon steel	SAE 12L 14
	M10Ti4 ISO	Stainless steel	AISI 304
*18 Body/cap 'O' ring		Geothermal EPDM	
19 Nut locker		Stainless steel	AISI 316
20 Lockable handle		Stainless steel	AISI 316
*21 Stem seal		Stainless steel	
22 Lock-plate		Stainless steel	AISI 316

\*Note: Available spare parts sold as a kit.

## Dimensions (approximate) in Inches

### Reduced Bore

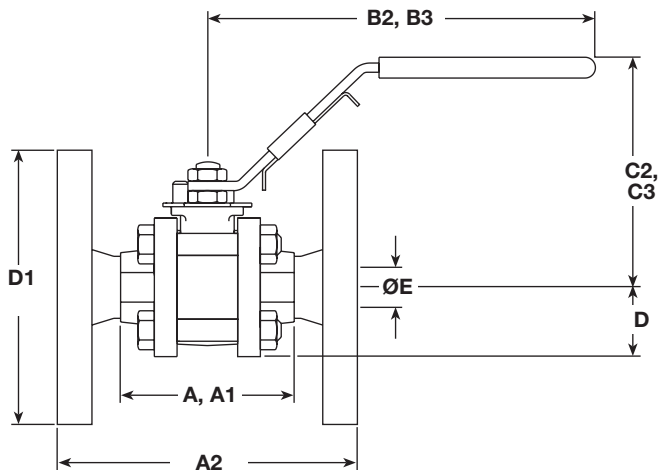
Size	A	A1	A2	B2	B3	C2	C3	D	D1	E
1/4"	2.6	2.6	-	6.4	-	0.4	-	0.9	-	0.4
3/8"	2.6	2.6	-	6.4	-	0.4	-	0.9	-	0.4
1/2"	2.6	2.6	4.3	6.4	6.4	0.4	0.4	0.9	3.5	0.4
3/4"	2.8	2.8	4.6	6.4	6.4	3.7	3.7	1	3.8	0.5
1"	3.4	3.4	5	6.4	6.4	3.9	3.9	1.2	4.3	0.8
1-1/4"	4	4	5.5	6.4	6.4	4.2	4.2	1.5	4.6	1
1-1/2"	4.3	4.3	6.5	7.3	7.3	4.6	4.6	1.6	5	1.2
2"	4.9	4.7	7	7.3	7.3	4.8	4.8	1.9	5.9	1.5
2-1/2"	6	6	-	9.8	9.8	5.5	5.5	2.2	-	2

### Full Bore

Size	A	A1	A2	B2	B3	C2	C3	D	D1	E
1/4"	2.6	2.6	-	6.4	-	0.4	-	0.9	-	0.4
3/8"	2.6	2.6	-	6.4	-	0.4	-	0.9	-	0.4
1/2"	2.8	2.8	-	6.4	6.4	3.7	3.7	1	-	0.5
3/4"	2.8	2.8	-	6.4	6.4	3.9	3.9	1.2	-	0.8
1"	3.4	3.4	-	6.4	6.4	4.2	4.2	1.5	-	1
1-1/4"	4	4	-	7.3	7.3	4.6	4.6	1.6	-	1.2
1-1/2"	4.3	4.3	-	7.3	7.3	4.8	4.8	1.9	-	1.5
2"	6	6	-	9.8	9.8	5.5	5.5	2.2	-	2

### Weights (approximate) in lb

Size	Reduced Bore		Full Bore
	Scrd / BW / SW	ASME 150	Scrd / BW / SW
1/4"	1.8	-	1.8
3/8"	1.8	-	1.8
1/2"	1.9	3.7	2.2
3/4"	2.2	4.9	3.4
1"	3.4	6.4	5.1
1-1/4"	5.1	9.1	6.7
1-1/2"	6.7	14.1	9.7
2"	9.7	18.4	19.9
2-1/2"	18.0	-	-



- A:** Scrd  
**A1:** SW  
**A2:** Flanged ASME 150  
**B2:** Scrd, BW and SW  
**B3:** ASME 150  
**C2:** Scrd, BW and SW  
**C3:** ASME 150  
**D:** Scrd, BW and SW  
**D1:** Flanged ASME 150  
**E:** All versions

### Cv values

Size	1/4"	3/8"	1/2"	3/4"	1"	1-1/4"	1-1/2"	2"	2-1/2"
Reduced Bore	5.7	7.8	6.9	11.56	31.2	56.6	80.9	119	194.2
Full Bore	5.7	7.8	19.6	41.6	67	102.8	176.8	236.9	-

### Operating torque (Lb-Ft)

Size	1/4"	3/8"	1/2"	3/4"	1"	1-1/4"	1-1/2"	2"	2-1/2"
Reduced Bore	2.4	2.4	2.4	4.0	9.7	14.7	36.8	44.2	55.3
Full Bore	2.4	2.4	4.0	9.7	14.7	36.8	44.2	55.3	-

The indicated torque values are for valves frequently operated, that are submitted to a maximum differential pressure of 580 psi. Valves that are subject to long static periods, may require greater break-out torque.

### Safety information, installation and maintenance

Installation and Maintenance Instructions, IM-P133-73.

### How to order example:

1 off Spirax Sarco 1/2" screwed NPT M10Ti2FB ISO ball valve.

### Spare parts

The spare parts available are shown in solid outline. Parts drawn in broken line are not supplied as spares.

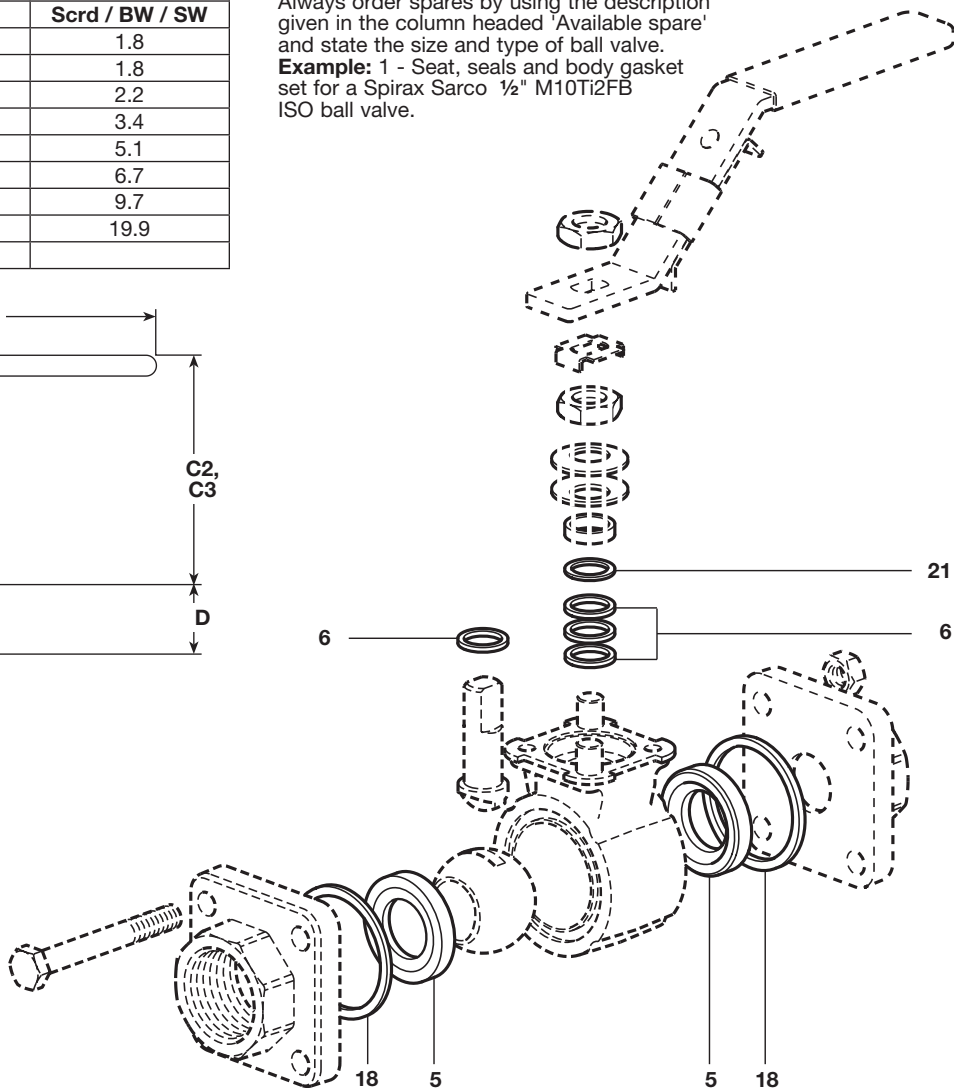
### Available spare

Seat, seals and body gasket set **5, 6, 18, 21**

### How to order spares

Always order spares by using the description given in the column headed 'Available spare' and state the size and type of ball valve.

**Example:** 1 - Seat, seals and body gasket set for a Spirax Sarco 1/2" M10Ti2FB ISO ball valve.



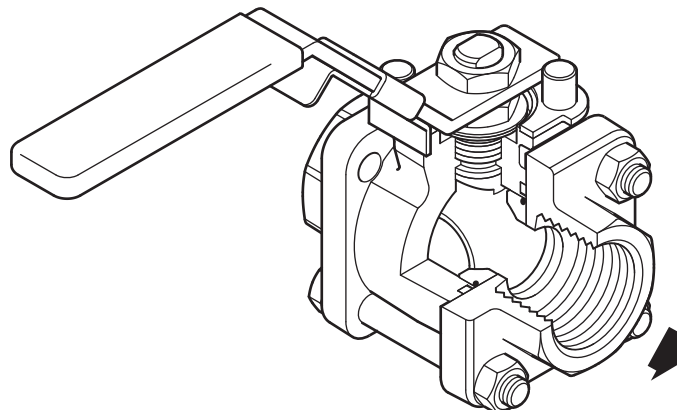




# M10HTi ISO "Teflon Free" Ball Valve

## 1/4" to 2 1/2"

### (Medium Pressure Applications)



#### Description

The M10HTi ISO three-piece body ball valve has a lockable handle and ISO mounting as standard and features a special ball, which has received a surface hardening. This particular ball valve has been specially designed for applications that cannot use Teflon at high temperatures, for example the tobacco industry. The M10HTi ISO has been designed for use as an isolating valve, not a control valve, and can be serviced without removal from the pipeline.

#### ISO mounting

The integral ISO body mounting allows the valve to be automated without losing seal integrity, as the body does not require disassembly. Manual to remote control may therefore be easily accomplished by the ISO range of Spirax Sarco ball valves.

#### Available types

<b>M10HTi2 ISO</b>	Zinc plated carbon steel body and caps.
<b>M10HTi4 ISO</b>	Complete stainless steel construction.

**Note:** The nomenclature will be followed with either **FB** (full bore) or **RB** (reduced bore) and needs to be stated when placing an order.

#### Standards

This product fully complies with the requirements of the European Pressure Equipment Directive 97/23/EC and carries the **CE** mark when so required.

#### Certification

This product is available with certification to EN 10204 3.1.

**Note:** All certification / inspection requirements must be stated at the time of order placement.

#### Options

- Self-venting ball.
- Extended stem 4" (100 mm) to allow full insulation. (manual operation only)

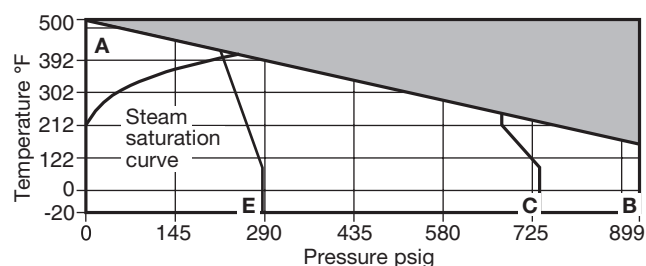
#### Technical data

Flow characteristic	Modified linear
Port	Full and reduced bore versions
Leakage test procedure to ISO 5208 (Rate A)/EN 12266-1 (Rate A)	

#### Sizes and pipe connections

<b>Full bore</b> 1/4", 3/8", 1/2", 3/4", 1", 1 1/4", 1 1/2" and 2"	<b>Flanged</b> 1/4" to 2" ASME 150, 300
<b>Screwed NPT, BW, SW</b>	
<b>Reduced bore</b> 1/4", 3/8", 1/2", 3/4", 1", 1 1/4", 1 1/2", 2" and 2 1/2"	<b>Flanged</b> 1/4" to 2 1/2" ASME 150, 300
<b>Screwed NPT, BW, SW</b>	

#### Pressure / temperature limits



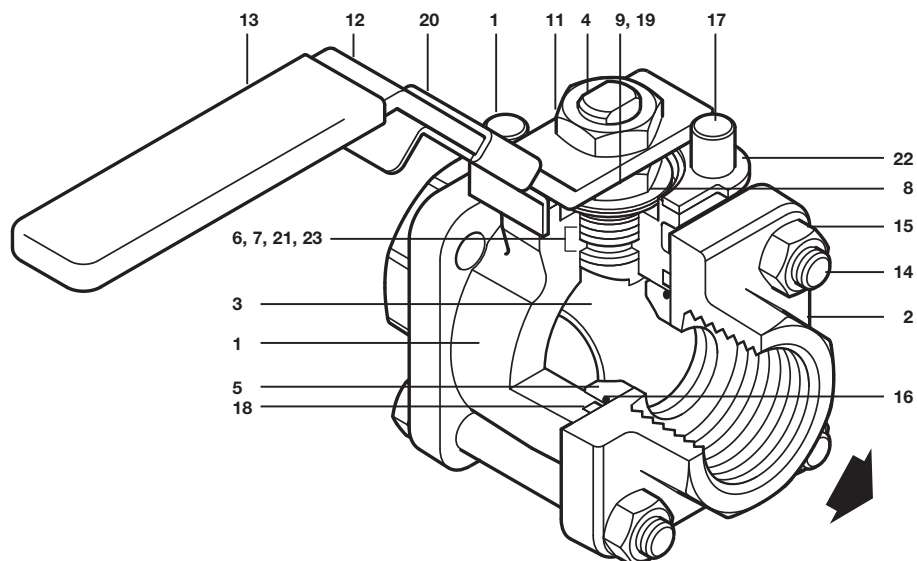
**The product must not be used in this region.**

- A - B** Screwed, socket weld and butt weld.
- A - C** Flanged ASME 300.
- A - E** Flanged ASME 150.

PMA	Maximum allowable pressure	899 psi g @ 140°F
TMA	Maximum allowable temperature	500°F @ 0 psi g
Minimum allowable temperature		-20°F
PMO	Maximum operating pressure for saturated steam service	254 psig
TMO	Maximum operating temperature	500°F @ 0 psi g
Minimum operating temperature		-20°F
<b>Note:</b> For lower operating temperatures consult Spirax Sarco		
ΔPMX Maximum differential pressure is limited to the PMO		
Designed for a maximum cold hydraulic test pressure of 1349 psi g		

Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only.  
In the interests of development and improvement of the product, we reserve the right to change the specification.

TI-P133-67-US 12.14



## Materials

No.	Part	Material	
1	Body	<b>M10HTi2 ISO</b>	Zinc plated carbon steel
		<b>M10HTi4 ISO</b>	ASTM A105
2	Cap	<b>M10HTi2 ISO</b>	Stainless steel
		<b>M10HTi4 ISO</b>	ASTM A 182 F 316L
3	Ball		Zinc plated carbon steel
4	Stem		ASTM A105
*5	Seat		Stainless steel
*6	Lower stem seal		ASTM A 182 F 316L
7	Separator	<b>M10HTi2 ISO</b>	Virgin PEEK
		<b>M10HTi4 ISO</b>	Reinforced PTFE antistatic
8	Belleville washer		Zinc plated carbon steel
9	Lower stem nut		SAE 1010
10	Name-plate (Not shown)		Stainless steel
11	Upper stem nut		AISI 316
12	Lever	<b>M10HTi2 ISO</b>	Stainless steel (hardened)
		<b>M10HTi4 ISO</b>	AISI 316
13	Grip		Stainless steel
14	Studs		Virgin PEEK
15	Nuts	<b>M10HTi2 ISO</b>	Reinforced PTFE antistatic
		<b>M10HTi4 ISO</b>	Zinc plated carbon steel
*16	Seat 'O' ring		SAE 1010
17	Stop screw		Stainless steel
18	Body / cap 'O' ring	<b>M10HTi2 ISO</b>	Stainless steel
		<b>M10HTi4 ISO</b>	AISI 301
19	Nut locker		Stainless steel
20	Lockable handle		Stainless steel
*21	Stem seal		Stainless steel
22	Lock-plate		Graphite
*23	Stem seal		Stainless steel

\*Note: Available spare parts sold as a kit.



## Dimensions (approximate) in Inches

### Reduced Bore

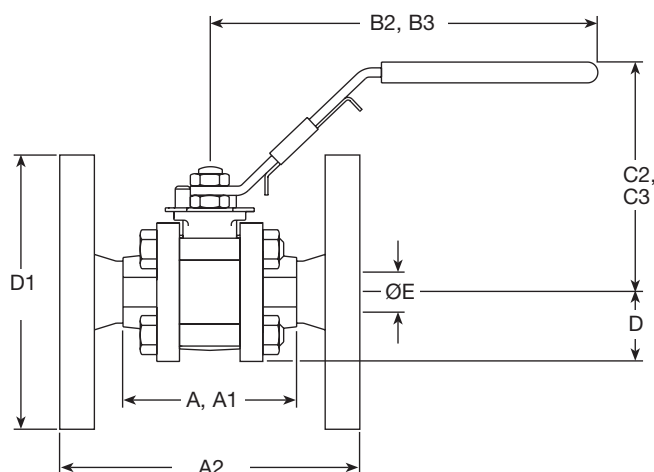
Size	A	A1	A2	B2	B3	C2	C3	D	D1	E
1/4"	2.6	2.6	-	6.4	-	0.4	-	0.9	-	0.4
3/8"	2.6	2.6	-	6.4	-	0.4	-	0.9	-	0.4
1/2"	2.6	2.6	4.3	6.4	6.4	0.4	0.4	0.9	3.5	0.4
3/4"	2.8	2.8	4.6	6.4	6.4	3.7	3.7	1	3.8	0.5
1"	3.4	3.4	5	6.4	6.4	3.9	3.9	1.2	4.3	0.8
1-1/4"	4	4	5.5	6.4	6.4	4.2	4.2	1.5	4.6	1
1-1/2"	4.3	4.3	6.5	7.3	7.3	4.6	4.6	1.6	5	1.2
2"	4.9	4.7	7	7.3	7.3	4.8	4.8	1.9	5.9	1.5
2-1/2"	6	6	-	9.8	9.8	5.5	5.5	2.2	-	2

### Full Bore

Size	A	A1	A2	B2	B3	C2	C3	D	D1	E
1/4"	2.6	2.6	-	6.4	-	0.4	-	0.9	-	0.4
3/8"	2.6	2.6	-	6.4	-	0.4	-	0.9	-	0.4
1/2"	2.8	2.8	-	6.4	6.4	3.7	3.7	1	-	0.5
3/4"	2.8	2.8	-	6.4	6.4	3.9	3.9	1.2	-	0.8
1"	3.4	3.4	-	6.4	6.4	4.2	4.2	1.5	-	1
1-1/4"	4	4	-	7.3	7.3	4.6	4.6	1.6	-	1.2
1-1/2"	4.3	4.3	-	7.3	7.3	4.8	4.8	1.9	-	1.5
2"	6	6	-	9.8	9.8	5.5	5.5	2.2	-	2

## Weights (approximate) in lb

Size	Reduced Bore		Full Bore
	Scrd / BW / SW	ASME 150	Scrd / BW / SW
1/4"	1.8	-	1.8
3/8"	1.8	-	1.8
1/2"	1.9	3.7	2.2
3/4"	2.2	4.9	3.4
1"	3.4	6.4	5.1
1-1/4"	5.1	9.1	6.7
1-1/2"	6.7	14.1	9.7
2"	9.7	18.4	19.9
2-1/2"	18.0	-	-



- A:** Scrd and BW  
**A1:** SW  
**A2:** Flanged ASME 150  
**B2:** Scrd, BW and SW  
**B3:** ASME 150  
**C2:** Scrd, BW and SW  
**C3:** ASME 150  
**D:** Scrd, BW and SW  
**D1:** Flanged ASME 150  
**E:** All versions

## Cv values

Size	1/4"	3/8"	1/2"	3/4"	1"	1-1/4"	1-1/2"	2"	2-1/2"
Reduced Bore	5.7	7.8	6.9	11.56	31.2	56.6	80.9	119	194.2
Full Bore	5.7	7.8	19.6	41.6	67	102.8	176.8	236.9	-

## Operating torque (Lb-Ft)

Size	1/4"	3/8"	1/2"	3/4"	1"	1-1/4"	1-1/2"	2"	2-1/2"
Reduced Bore	2.4	2.4	2.4	4.0	9.7	14.7	36.8	44.2	55.3
Full Bore	2.4	2.4	4.0	9.7	14.7	36.8	44.2	55.3	-

The indicated torque values are for valves frequently operated, that are submitted to a maximum differential pressure of 580 psi. Valves that are subject to long static periods, may require greater break-out torque.

## Safety information, installation and maintenance

Installation and Maintenance Instructions, IM-P133-75.

## How to order example:

1 off Spirax Sarco 1/2" screwed NPT M10HTi2FB ISO ball valve.

## Spare parts

The spare parts available are shown in solid outline. Parts drawn in broken line are not supplied as spares.

## Available spares

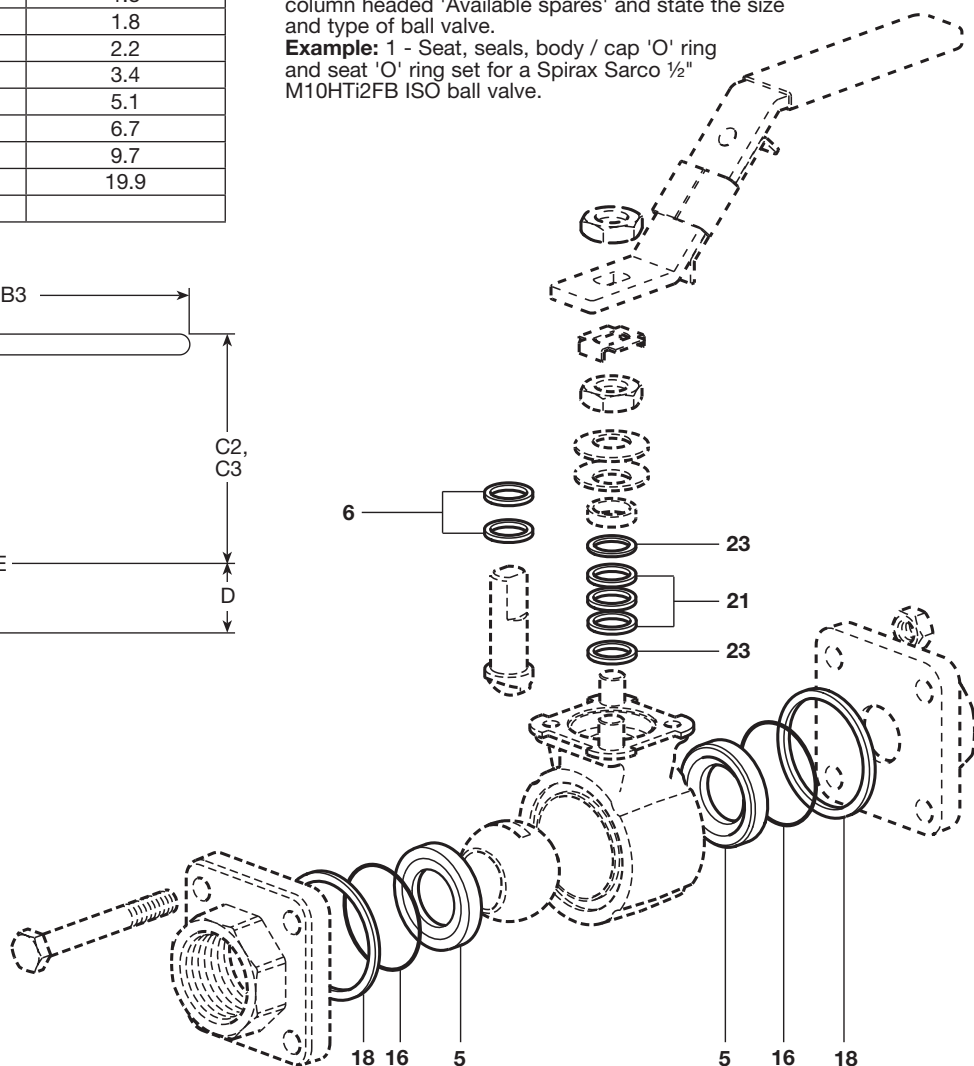
Seat, seals, body / cap 'O' ring  
and seat 'O' ring set

5, 6, 16, 18, 21, 23

## How to order spares

Always order spares by using the description given in the column headed 'Available spares' and state the size and type of ball valve.

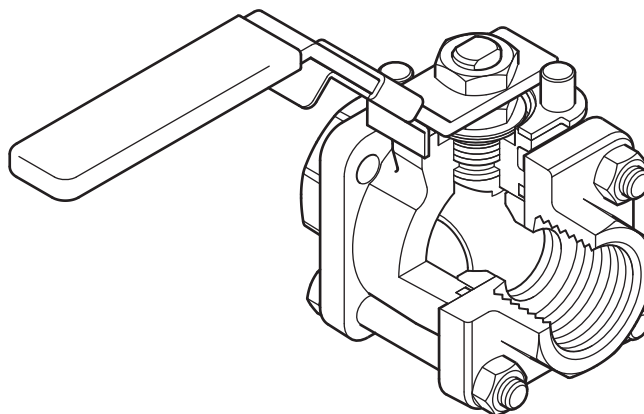
**Example:** 1 - Seat, seals, body / cap 'O' ring and seat 'O' ring set for a Spirax Sarco 1/2" M10HTi2FB ISO ball valve.







## M10Pi ISO Ball Valve 1/4" to 2 1/2" (High Static Pressure Applications)



### Description

The M10Pi ISO three-piece body ball valve has been designed for use as an isolating valve, not a control valve, has a lockable handle as standard and can be serviced without removal from the pipeline (screwed and welded versions only). It can be used with process fluids for services ranging from vacuum to the higher temperatures and pressures.

### ISO mounting

The integral ISO body mounting allows the valve to be automated without losing seal integrity, as the body does not require disassembly. Manual to remote control may therefore be easily accomplished by the ISO range of Spirax Sarco ball valves.

### Available types

**M10Pi2 ISO** Zinc plated carbon steel body and caps.

**M10Pi4 ISO** Complete stainless steel construction.

**Note:** The nomenclature will be followed with either **FB** (full bore) or **RB** (reduced bore).

### Standards

This product fully complies with the requirements of the European Pressure Equipment Directive 97/23/EC and carries the **CE** mark when so required.

### Certification

This product is available with certification to EN 10204 3.1.

**Note:** All certification / inspection requirements must be stated at the time of order placement.

### Options

- Self-venting ball.
  - Extended stem 4" (100 mm) to allow full insulation.\*
  - Oval handle for confined spaces. Ideal for trap modules.\*
- \*manual operation only

### Technical data

Flow characteristic	Modified linear
Port	Full and reduced bore versions
Leakage test procedure to ISO 5208 (Rate A)/EN 12266-1 (Rate A)	
Antistatic device	Complies with ISO 7121 and BS 5351

### Sizes and pipe connections

#### Full bore

1/4", 3/8", 1/2", 3/4", 1", 1 1/4", 1 1/2" and 2"

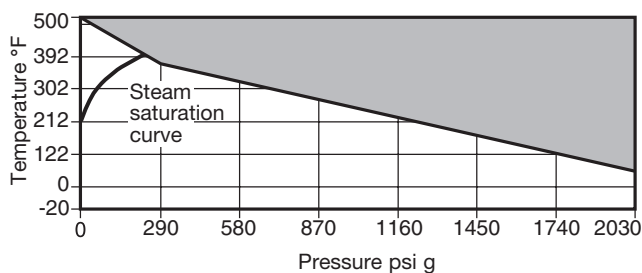
**Screwed** NPT, BW, SW

#### Reduced bore

1/4", 3/8", 1/2", 3/4", 1", 1 1/4", 1 1/2", 2" and 2 1/2"

**Screwed** NPT, BW, SW

### Pressure/temperature limits

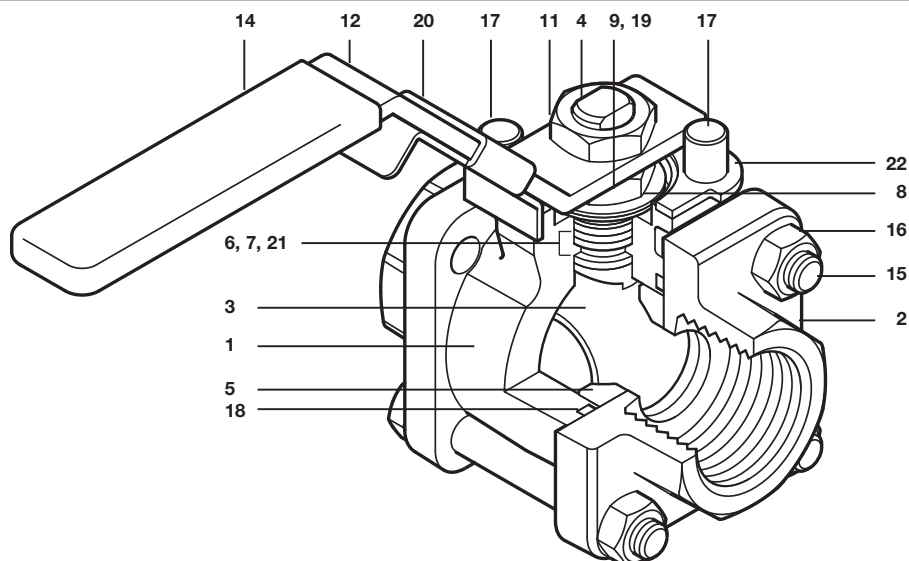


 The product **must not** be used in this region.

PMA	Maximum allowable pressure	2030 psi g @ 89°F
TMA	Maximum allowable temperature	500°F @ 0 psi g
Minimum allowable temperature		-20°F
PMO	Maximum operating pressure for saturated steam service	254 psi g
TMO	Maximum operating temperature	500°F @ 0 psi g
Minimum operating temperature		-20°F
<b>Note:</b> For lower operating temperatures consult Spirax Sarco		
ΔPMX Maximum differential pressure is limited to the PMO		
Designed for a maximum cold hydraulic test pressure of 3045 psi g		

Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only.  
In the interests of development and improvement of the product, we reserve the right to change the specification.

TI-P133-69-US 12.14



## Materials

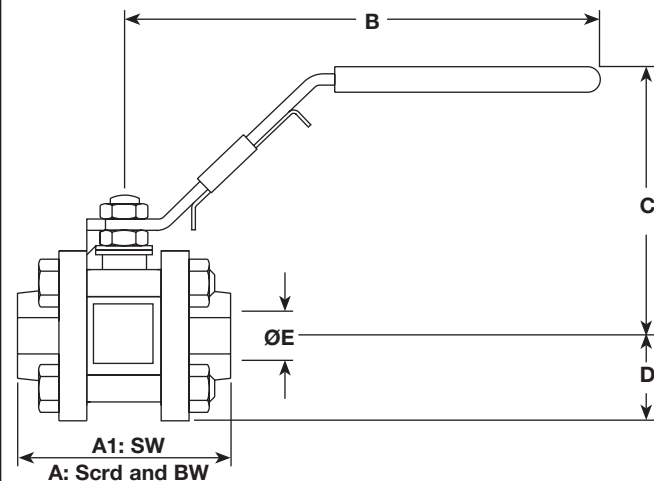
No.	Part	Material	
1	Body	<b>M10Pi2 ISO</b>	Zinc plated carbon steel
		<b>M10Pi4 ISO</b>	Stainless steel
2	Cap	<b>M10Pi2 ISO</b>	Zinc plated carbon steel
		<b>M10Pi4 ISO</b>	Stainless steel
3	Ball		Stainless steel
4	Stem		Stainless steel
*5	Seat		Reinforced PTFE
*6	Stem seal		Reinforced PTFE antistatic
7	Separator	<b>M10Pi2 ISO</b>	Zinc plated carbon steel
		<b>M10Pi4 ISO</b>	Stainless steel
8	Belleville washer		Stainless steel
9	Lower stem nut	<b>M10Pi2 ISO</b>	Zinc plated carbon steel
		<b>M10Pi4 ISO</b>	Stainless steel
10	Name-plate - DN (Not shown)		Stainless steel
11	Upper stem nut	<b>M10Pi2 ISO</b>	Zinc plated carbon steel
		<b>M10Pi4 ISO</b>	Stainless steel
12	Lever	<b>M10Pi2 ISO</b>	Zinc plated carbon steel
		<b>M10Pi4 ISO</b>	Stainless steel
13	Name-plate (Not shown)		Stainless steel
14	Grip		Vinyl black
15	Studs	<b>M10Pi2 ISO</b>	Zinc plated carbon steel
		<b>M10Pi4 ISO</b>	Stainless steel
16	Nuts	<b>M10Pi2 ISO</b>	Zinc plated carbon steel
		<b>M10Pi4 ISO</b>	Stainless steel
17	Stop screw	<b>M10Pi2 ISO</b>	Zinc plated carbon steel
		<b>M10Pi4 ISO</b>	Stainless steel
*18	Body/cap 'O' ring		Geothermal EPDM
19	Nut locker		Stainless steel
20	Lockable handle		Stainless steel
*21	Stem seal		Stainless steel
22	Lock-plate		Stainless steel

\*Note: Available spare parts sold as a kit.

## Dimensions (approximate) in Inches / lb's

### Reduced Bore

Size	A	A1	B	C	D	E	Weight
1/4"	2.6	2.6	6.4	0.4	0.9	0.4	1.6
3/8"	2.6	2.6	6.4	0.4	0.9	0.4	1.6
1/2"	2.6	2.6	6.4	0.4	0.9	0.4	1.8
3/4"	2.8	2.8	6.4	3.7	1	0.5	2.2
1"	3.4	3.4	6.4	3.9	1.2	0.8	3.4
1-1/4"	4	4	6.4	4.2	1.5	1	5.1
1-1/2"	4.3	4.3	7.3	4.6	1.6	1.2	6.7
2"	4.9	4.7	7.3	4.8	1.9	1.5	9.7
2-1/2"	6	6	9.8	5.5	2.2	2	18



### Full Bore

Size	A	A1	B	C	D	E	Weight
1/4"	2.6	2.6	6.4	0.4	0.9	0.4	1.6
3/8"	2.6	2.6	6.4	0.4	0.9	0.4	1.8
1/2"	2.8	2.8	6.4	3.7	1	0.5	2.2
3/4"	2.8	2.8	6.4	3.9	1.2	0.8	3.4
1"	3.4	3.4	6.4	4.2	1.5	1	5.1
1-1/4"	4	4	7.3	4.6	1.6	1.2	6.7
1-1/2"	4.3	4.3	7.3	4.8	1.9	1.5	9.7
2"	6	6	9.8	5.5	2.2	2	19.9

### Cv values

Size	1/4"	3/8"	1/2"	3/4"	1"	1-1/4"	1-1/2"	2"	2-1/2"
Reduced Bore	5.7	7.8	6.9	11.56	31.2	56.6	80.9	119	194.2
Full Bore	5.7	7.8	19.6	41.6	67	102.8	176.8	236.9	-

### Operating torque (Lb-Ft)

Size	1/4"	3/8"	1/2"	3/4"	1"	1-1/4"	1-1/2"	2"	2-1/2"
Reduced Bore	2.5	2.5	2.5	4.4	10.3	15.4	36.8	44.2	55.3
Full Bore	2.5	2.5	4.4	10.3	15.4	36.8	44.2	55.3	-

The indicated torque values are for valves frequently operated, that are submitted to a maximum differential pressure of 2030 psi. Valves that are subject to long static periods, may require greater break-out torque.

### Safety information, installation and maintenance

Installation and Maintenance Instructions, IM-P133-72.

### How to order example:

1 off Spirax Sarco 1/2" screwed NPT M10Pi2FB ISO ball valve.

### Spare parts

The spare parts available are shown in solid outline. Parts drawn in broken line are not supplied as spares.

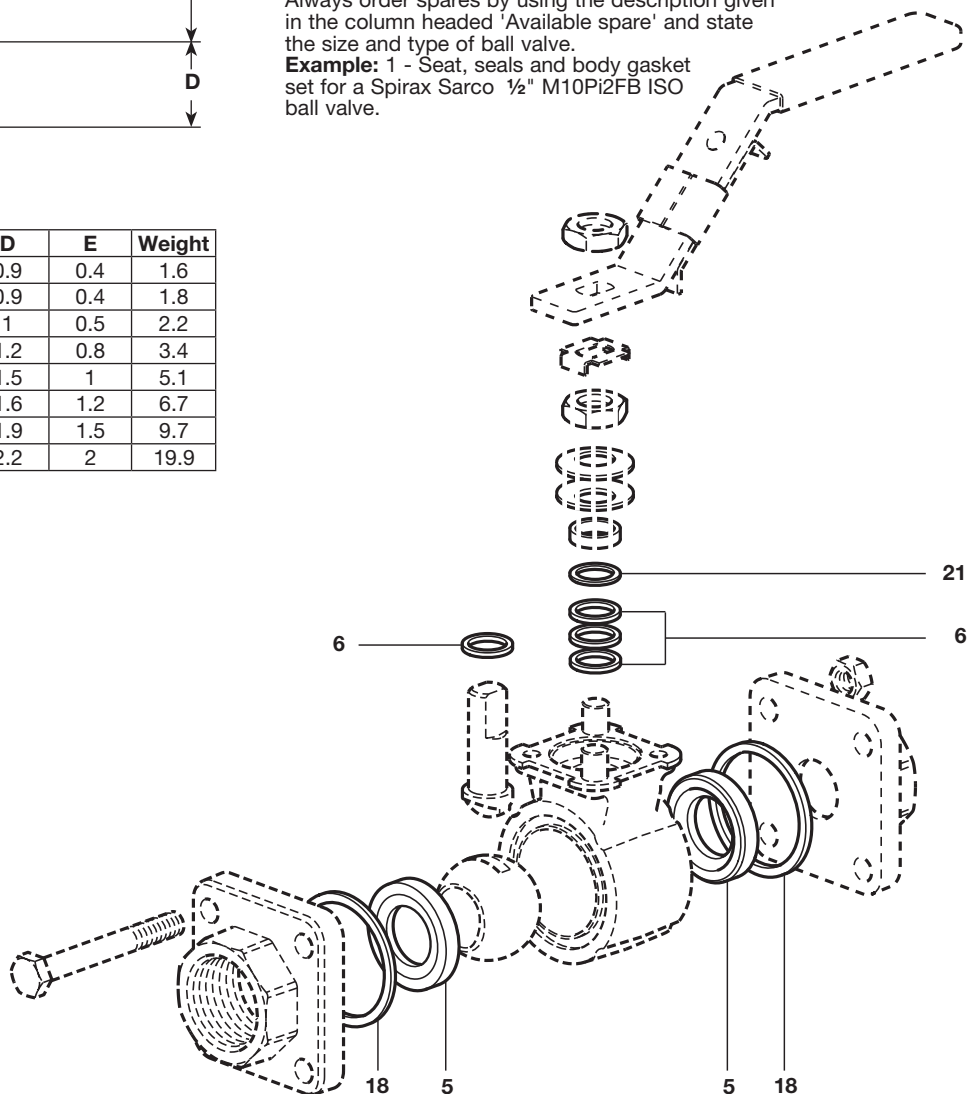
#### Available spare

Seat, seals and body gasket set 5, 6, 18, 21

#### How to order spares

Always order spares by using the description given in the column headed 'Available spare' and state the size and type of ball valve.

**Example:** 1 - Seat, seals and body gasket set for a Spirax Sarco 1/2" M10Pi2FB ISO ball valve.





## M70i ISO Forged Stainless Steel Ball Valve for Sanitary Applications (up to 2")

### Description

The M70i forged 316L stainless steel, three-piece body ball valve has ISO mounting as standard. It has been designed in accordance with ASME BPE for use as an isolating valve, not a control valve on clean steam and other high purity and aseptic processes where bacteria and media deposits can put product quality at risk. The low maintenance, clean design is suitable for steam, liquid and gas services ranging from vacuum to the higher temperatures and pressures. Applications include the pharmaceutical, biotech, food and beverage and cosmetics industries.

### Principal features:

- **True port design** - The internal diameter of the end connections and ball precisely match that of the connecting tubing to guarantee drainability.
- **Forged material** - The M70i is manufactured from high integrity ASTM A182 F316L.
- **Low ferrite** - Body and end connections have <1% ferrite content to help prevent rouge.
- **Designed with orbital welding in mind** - ASME BPE compliant extended tube weld end connections means that automatic orbital welding can be performed without valve disassembly and low sulphur (0.005% to 0.017%) content helps a consistent and fully penetrated weld.
- **Designed for automation** - ISO 5211 mounting pad as standard enabling simple actuator mounting.
- **Lockable handle** - A spring loaded lockable handle allows the valve to be locked in the chosen position – ensuring system integrity.

### Surface finish

Standard internal surface finish is 0.5 micron Ra (20 micro inch). Electro-polishing to 0.375 micron Ra (15 micro inch) is available to special order. External surface finishes are as forged / machined.

### Available types

<b>M70iV ISO</b>	Virgin PTFE TFM 1600
<b>M70iVEP ISO</b>	Virgin PTFE TFM 1600 electro-polished to 0.375 micron Ra
<b>M70iG ISO</b>	Mineral filled RPTFE
<b>M70iGEP ISO</b>	Mineral filled RPTFE electro-polished to 0.375 micron Ra

### Optional extras:

- Extended stem 4" (100 mm) to allow for insulation. (manual operation only)
- Cavity fillers are provided as standard. If cavity fillers are not required please specify when placing an order.

### Standards

This product fully complies with the requirements of the European Pressure Equipment Directive 97/23/EC.

### Certification:

- Material Certification to EN 10204 3.1
- Elastomer FDA / USP compliance certificate.
- Surface finish certification.

**Note:** All certification / inspection requirements must be stated at the time of order placement.

### Packaging

The M70i is finished and packaged in a segregated clean environment. Each valve is end capped and sealed in a plastic bag, in accordance with ASME BPE, to ensure the ingress of dirt is avoided.

### Sizes and pipe connections

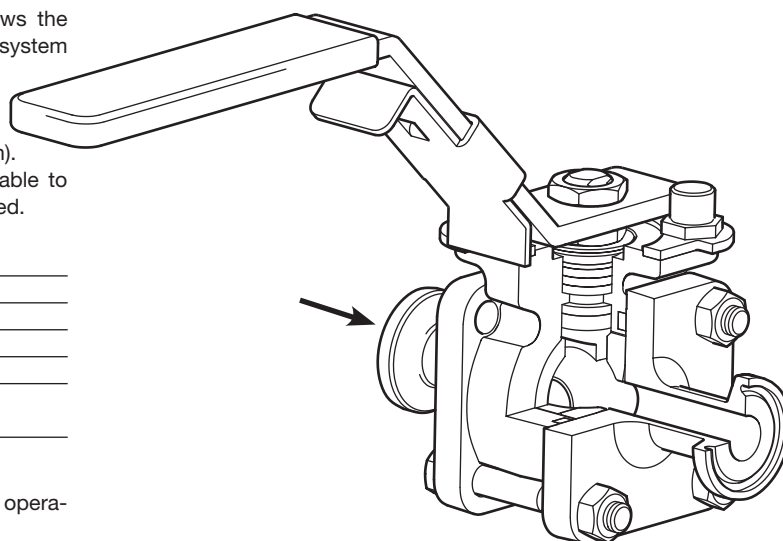
1/2", 3/4", 1", 1-1/2", 2" sanitary clamp (ASME BPE).  
1/2", 3/4", 1", 1-1/2", 2" extended O/D tube weld ends (ETO) (ASME BPE).

Sanitary clamp / ETO combinations are also available.

2-1/2", 3" and 4" forged valves are also available to special order.

**Alternatively:** 2-1/2", 3" and 4" investment cast sanitary ball valves are available through our M80i range - see TI-P182-06-US.

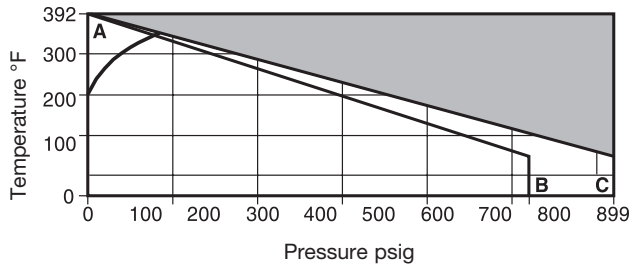
**Note:** Other connection options are available on request. Please consult Spirax Sarco.





# M70i ISO Forged Stainless Steel Ball Valve for Sanitary Applications

## Pressure / temperature limits



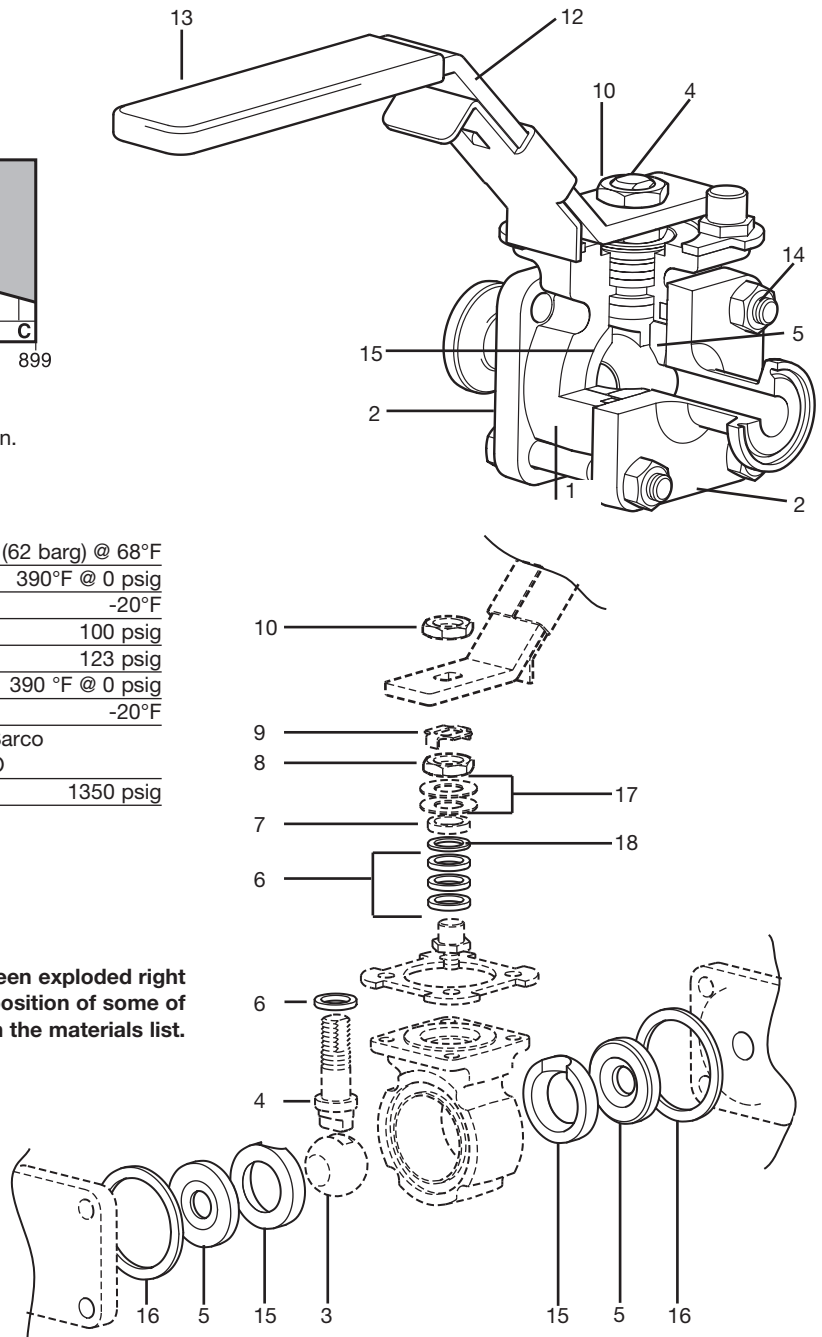
The product must not be used in this region.

A - B Virgin PTFE TFM 1600.

A - C Mineral filled PTFE

<b>PMA</b>	Maximum allowable pressure	900 psig (62 barg) @ 68°F
<b>TMA</b>	Maximum allowable temperature	390°F @ 0 psig
<b>Minimum allowable temperature</b>		-20°F
	Maximum operating pressure	Virgin PTFE 100 psig
	for saturated steam service	Mineral filled PTFE 123 psig
<b>PMO</b>	Maximum operating temperature	390 °F @ 0 psig
<b>Minimum operating temperature</b>		-20°F
<b>Note:</b> For lower operating temperatures consult Spirax Sarco		
$\Delta$ PMX Maximum differential pressure is limited to the PMO		
Designed for a maximum cold hydraulic test pressure of		1350 psig

The internals have been exploded right to help identify the position of some of the parts in the materials list.



## Materials

No.	Part	Material
1	Body	Stainless steel ASTM A 182 F316L
2	End connections	Stainless steel ASTM A 182 F316L
3	Ball	Stainless steel AISI 316L
4	Stem	Stainless steel AISI 316L
*5	Seat	<b>M70iG</b> Mineral filled RPTFE
		<b>M70iv</b> Virgin PTFE TFM 1600
*6	Stem seals	Virgin PTFE TFM 1600
7	Spacer	Stainless steel AISI 316
8	Compression nut	Stainless steel AISI 316
9	Lock washer	Stainless steel AISI 316

10	Stem nut	Stainless steel	AISI 316
11	Name-plate (not shown)	Stainless steel	AISI 430
12	Handle	Stainless steel	AISI 316
13	Cover	Vinyl	
14	Bolts and nuts	Stainless steel	AISI 316
*15	Cavity filler	Virgin PTFE TFM 1600	
*16	Body cap gasket	Virgin PTFE TFM 1600	
17	Bellville washer	Stainless steel	AISI 316
*18	Stem seal	PEEK	

\*Note: Available spare parts sold as a kit.

# M70i ISO Forged Stainless Steel Ball Valve for Sanitary Applications

## Technical data

<b>Leakage</b>	Test procedure to ISO 5208 (rateA)
<b>Stem seal and seat</b>	Materials comply with: —FDA CFR title 21 paragraph 177. section 1550. —USP23 Class VI
<b>Flow characteristic</b>	Modified linear
<b>Port</b>	True port design

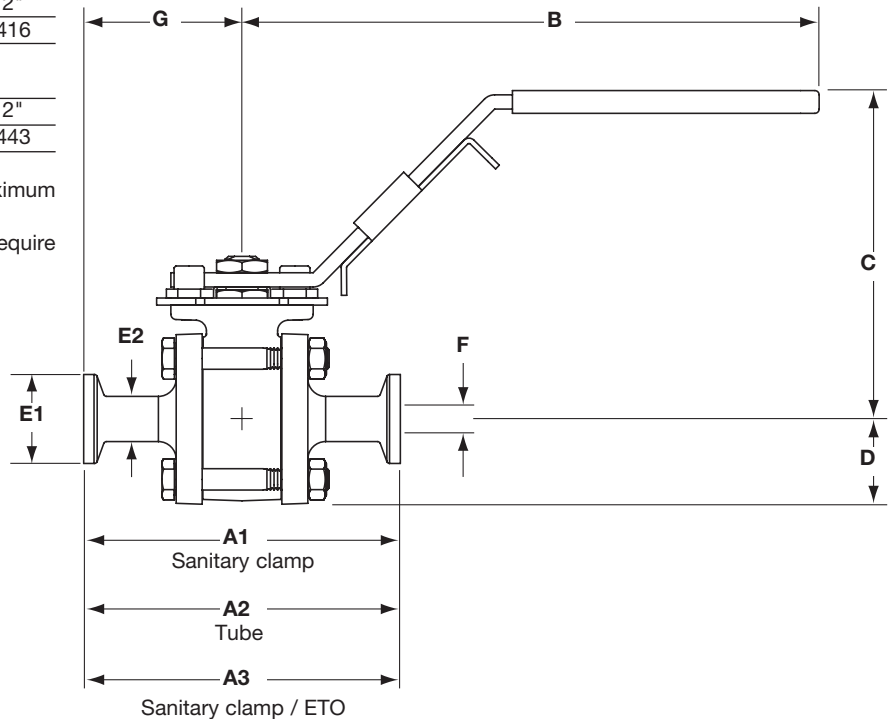
## C<sub>v</sub> values

Size	1/2"	3/4"	1"	1-1/2"	2"
C <sub>v</sub>	8.1	29	65	190	416

## Torque value

Size	1/2"	3/4"	1"	1-1/2"	2"
in lbs	62	80	133	195	443

The torque figures shown are for a valve at maximum operating pressure that is operated frequently. Valves that are subject to long static periods may require at least 75% greater break out torque



## Dimensions / weights approximate in inches and pounds.

Size	A1	A2	A3	B	C	D	E1	E2	F	G (Clamp)	G (ETO)	Weight
1/2"	3.51	5.52	4.51	6.34	3.62	0.95	0.99	0.50	0.37	1.75	2.76	1.8
3/4"	4.00	6.00	5.00	6.34	3.70	1.02	0.99	0.75	0.62	2.00	3.00	2.2
1"	4.50	6.50	5.50	6.34	3.98	1.22	1.99	1.00	0.87	2.25	3.25	3.5
1-1/2"	5.50	7.50	6.50	7.29	4.96	1.89	1.99	1.50	1.37	2.75	3.75	10.0
2"	6.25	8.00	7.13	9.85	5.56	2.25	2.52	2.00	1.87	3.13	4.00	17.0

## Safety Information, installation and maintenance

For full details see the Installation and Maintenance Instructions (IM-P182-07-US) supplied with the product.

## How to order

The M70i has a number of features that must be specified at the time of order placement; they are size, end connection, seat material, internal surface finish, and any certification that is required.

**Note:** Cavity fillers are provided as standard. If cavity fillers are not required, please specify so, when placing an order.

**Example:** 1 of Spirax Sarco M70iV ISO forged sanitary ball valve complete with sanitary clamp connections (ASME BPE) and an internal surface finish of 0.5 micron Ra (20 micro inch).  
The unit is to be supplied complete with EN 10204 3.1 material certification.

# M70i ISO Forged Stainless Steel Ball Valve for Sanitary Applications

## Spare parts

The spare parts available are shown in solid outline. Parts drawn in broken line are not supplied as spares.

## Available spares

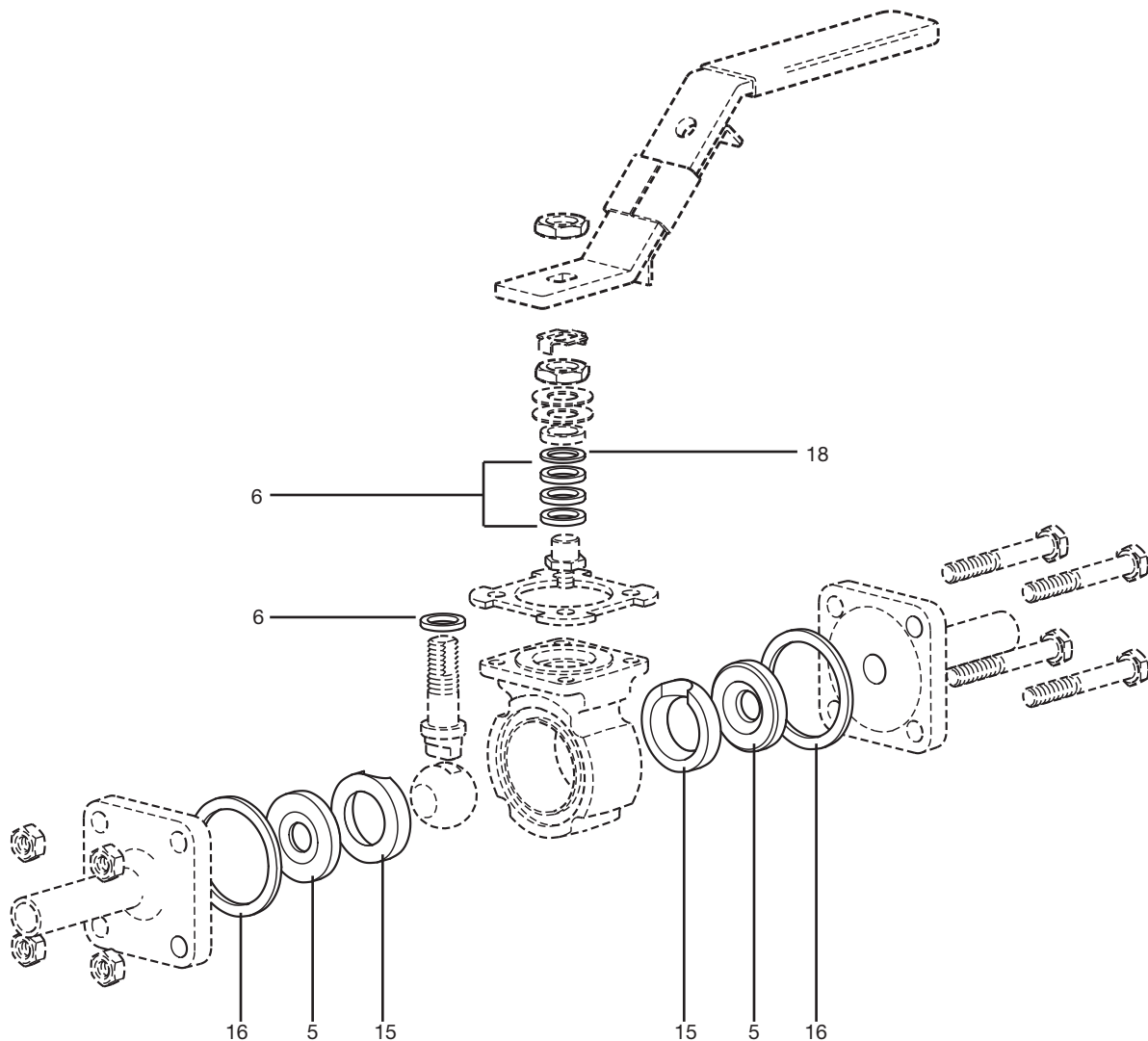
Seat and seal set with cavity filler.

5, 6, 15, 16, 18

## How to order spares

Always order spares by using the description given in the column headed 'Available spares' and state the size and type of ball valve.

**Example:** 1- Virgin PTFE-TFM 1600 seat and seal set with cavity filler for a Spirax Sarco 1/2" M70iV ISO forged stainless steel ball valve.



## M80i ISO Stainless Steel Ball Valve for Sanitary Applications (2½" to 4")

### Description

The M80i cast 316L stainless steel, three-piece body ball valve has ISO mounting as standard. It has been designed in accordance with ASME BPE for use as an isolating valve, not a control valve on clean steam and other high purity and aseptic processes where bacteria and media deposits can put product quality at risk. The low maintenance, clean design is suitable for steam, liquid and gas services ranging from vacuum to the higher temperatures and pressures. Applications include the pharmaceutical, biotech, food and beverage and cosmetics industries.

### Principal features:

- **True port design** - The internal diameter of the end connections and ball precisely match that of the connecting tubing to guarantee drainability.
- **Low ferrite** - M80i has <3% ferrite content on all wetted parts helping to prevent rouge.
- **Designed with orbital welding in mind** - ASME BPE compliant extended tube weld end connections means that automatic orbital welding can be performed without valve disassembly and low sulphur (0.005% to 0.017%) content helps a consistent and fully penetrated weld.
- **Designed for automation** - ISO 5211 mounting pad as standard enabling simple actuator mounting.
- **Lockable handle** - A spring loaded lockable handle allows the valve to be locked in the closed position – ensuring system integrity.

### Surface finish

The M80i standard internal surface finish is electro-polished to 0.375 micron Ra (15 micro inch).  
External surface finishes are as cast / machined.

### Available types

<b>M80iV ISO</b>	Virgin PTFE TFM 1600 electro-polished to 0.375 micron Ra
------------------	---

### Standards

This product fully complies with the requirements of the European Pressure Equipment Directive 97/23/EC.

### Certification:

- Material Certification to EN 10204 3.1
- Elastomer FDA / USP compliance certificate.
- Surface finish certification.

**Note:** All certification / inspection requirements must be stated at the time of order placement.

### Packaging

The M80i is finished and packaged in a segregated clean environment. Each valve is end capped and sealed in a plastic bag, in accordance with ASME BPE, to ensure the ingress of dirt is avoided.

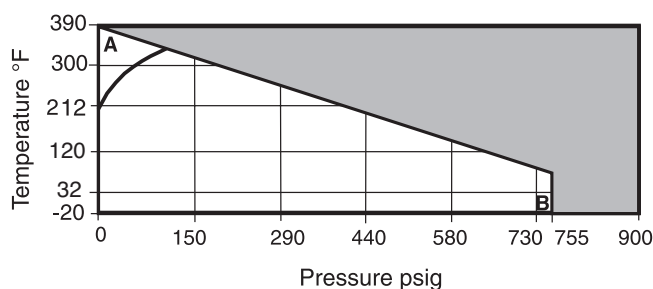
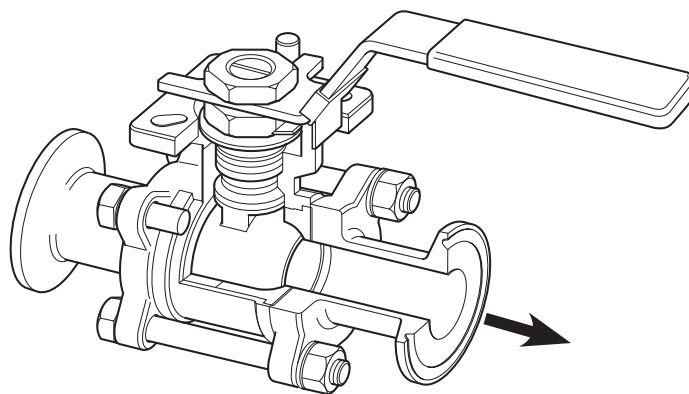
### Sizes and pipe connections

2-1/2", 3" and 4" Sanitary clamp (ASME BPE).

2-1/2", 3" and 4" extended O/D tube weld ends (ETO) (ASME BPE).

**Alternatively:** 1/2", 3/4", 1", 1-1/2" and 2" sanitary ball valves are available through our M70i range - see TI-P182-05-US.

**Note:** Other connection options are available on request. Please consult Spirax Sarco.

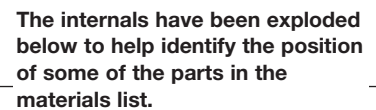


The product **must not** be used in this region.

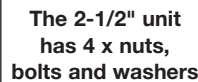
**A - B** Virgin PTFE TFM 1600

PMA Max. allowable pressure	900 psig @ 68°F
TMA Max. allowable temperature	390°F @ 0 psig
Minimum allowable temperature	-20°F
PMO Max. operating pressure for saturated steam service	100 psig
TMO Max. operating temperature	390°F @ 0 psig
Minimum operating temperature	-20°F
<b>Note:</b> For lower operating temperatures consult Spirax Sarco	
ΔPMX Maximum differential pressure is limited to the PMO	
Designed for a max. cold hydraulic test pressure of	1350 psig

## Isolation Valves



The torque figures shown are for a valve at maximum operating pressure that is operated frequently.  
Valves that are subject to long static periods may require at least 75% greater break out torque

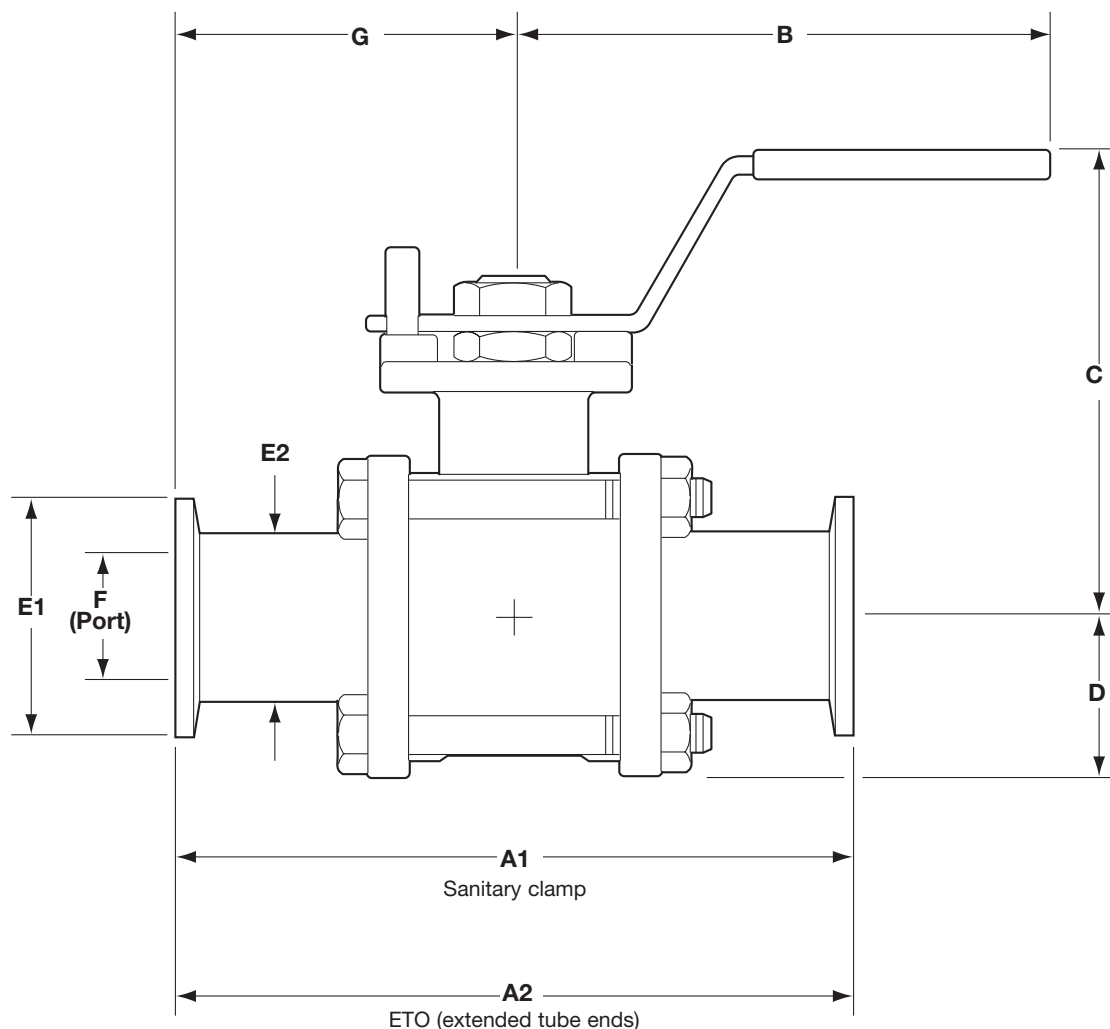


The 3" and 4" units have  
6 x studs and  
12 x nuts and washers

# M80i ISO Stainless Steel Ball Valve for Sanitary Applications

**Dimensions / weights** approximate in inches and pounds.

Size	A1	A2	B	C	D	E1 (Clamp)	E2 (ETO)	F	G (Clamp)	G (ETO)	Weight
2½"	6.76	7.53	14.58	4.14	2.21	3.05	2.50	2.38	33.81	3.76	20
3"	9.01	9.06	14.58	4.53	3.07	3.58	3.00	2.88	4.50	4.53	40
4"	10.01	9.99	15.76	5.59	3.96	4.68	4.00	3.84	5.01	4.99	51



## Safety Information, installation and maintenance

Installation and Maintenance Instructions IM-P182-07-US.

## How to order

The size, end connections and certification requirements must be specified at time of order placement.

**Example:** 1 of Spirax Sarco 4" M80iV ISO forged sanitary ball valve complete with sanitary clamp (ASME BPE) end connections, electro-polished to 0.375 micron Ra (15 micro inch)  
The unit is to be supplied complete with EN 10204 3.1 material certification.

# M80i ISO Stainless Steel Ball Valve for Sanitary Applications

## Spare parts

The spare parts available are shown in solid outline. Parts drawn in broken line are not supplied as spares.

## Available spares

Integrated seat and cavity filler, stem, seats, stem 'O' ring and body seals kit

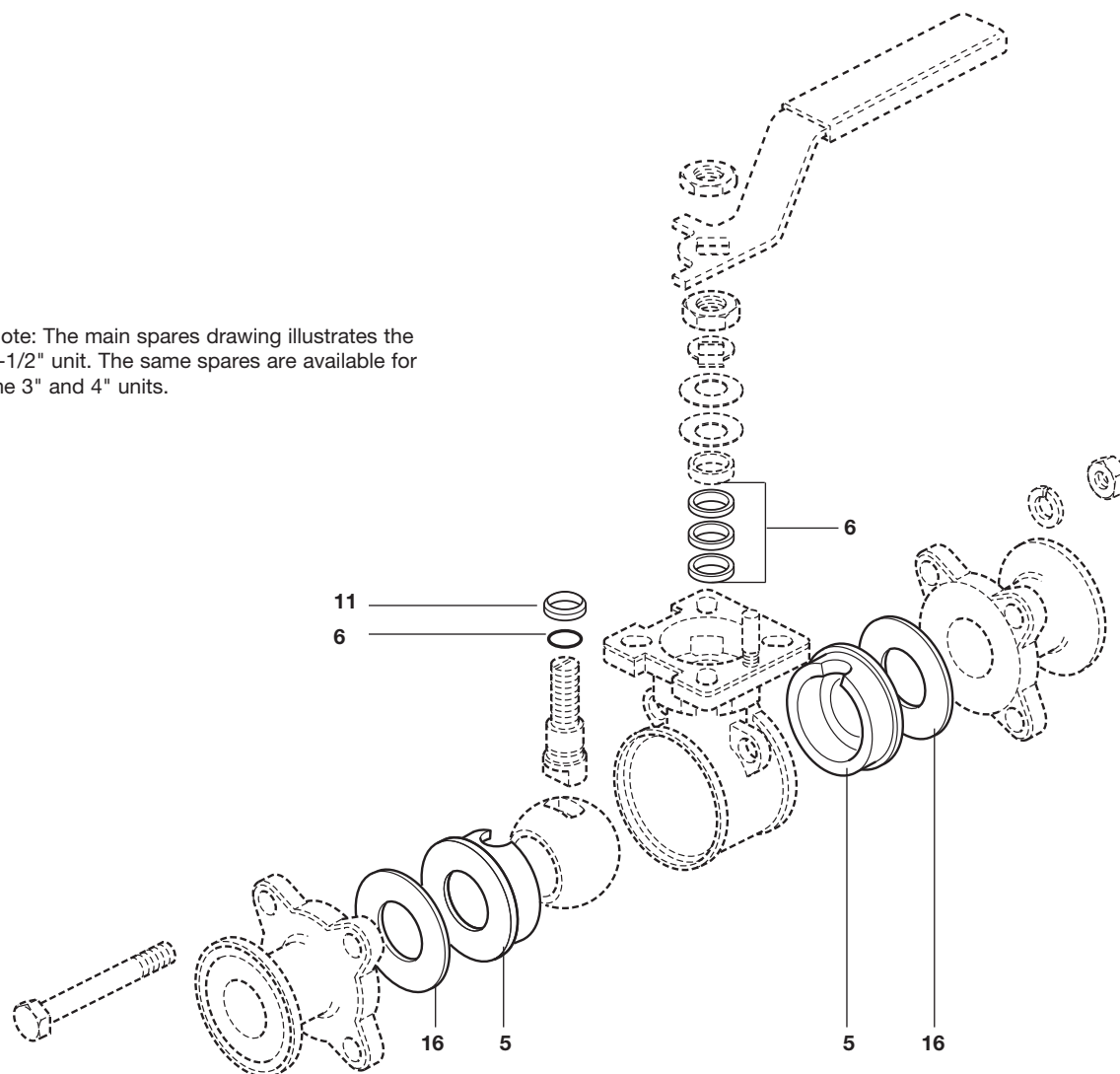
5, 6, 11, 16

## How to order spares

Always order spares by using the description given in the column headed 'Available spares' and state the size and type of ball valve.

**Example:** 1- Integrated seat and cavity filler, stem seals, stem 'O' ring and body seals kits for a Spirax Sarco 4" M80iV ISO cast stainless steel ball valves.

Note: The main spares drawing illustrates the 2-1/2" unit. The same spares are available for the 3" and 4" units.





## M33S ISO Full Bore Ball Valve API 6D 2" to 8" ASME 150 and ASME 300 (Medium Pressure Applications)

### Description

Produced in accordance with API 6D the M33S ISO full bore two-piece body ball valve with floating ball, has been designed for use as an isolating valve, not a control valve. It can be used with the majority of industrial fluids on applications, which include steam, condensate, water, oil, gases, and other fluids within its operating range.

The M33S ISO ASME has as standard an ISO mounting pad in accordance with ISO 5211.

### Available types

<b>M33S2 ISO</b>	Zinc plated carbon steel body, PDR 0.8 seats (for high temperatures) and ISO mounting.
<b>M33S3 ISO</b>	Stainless steel body, PDR 0.8 seats (for high temperatures) and ISO mounting.

### Standards

This product fully complies with the requirements of the European Pressure Equipment Directive 97/23/EC and carries the CE mark when so required.

### Certification

This product is available with certification to EN 10204 3.1.

**Note:** All certification / inspection requirements must be stated at the time of order placement.

### Options

- Hollow ball for 6" and 8" sizes - Not API 6D rated.
- Self-venting ball.
- Ring joint flanges.
- Extended stems to allow full insulation for 3" and 4" sizes.\*
- Operation by mechanical or pneumatic actuator URPA series for all sizes.
- Operation by pneumatic actuator URPA series and mechanical declutchable actuator.
- Lockable handle.\*
- Materials according to NACE MR 0175.
- Surge valve.
- Drain plug.

\*manual operation only

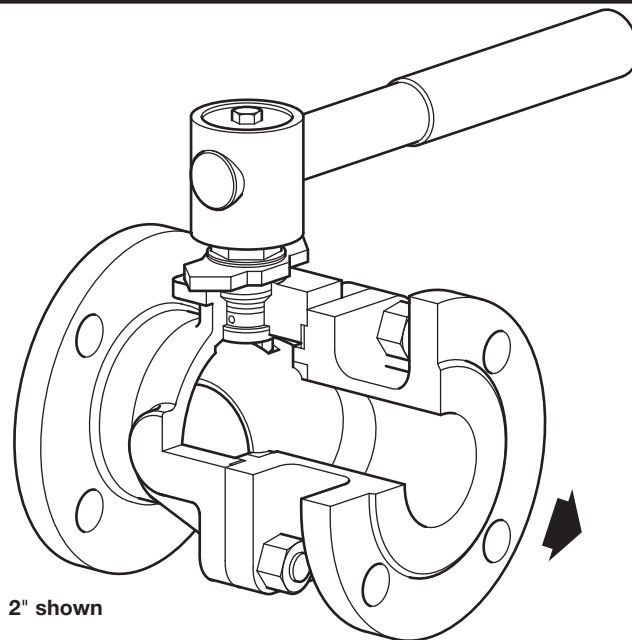
### Sizes and pipe connections

2", 2½", 3", 4", 6" and 8"

Standard flange ASME Class 150 and 300 with face-to-face dimensions according to B 16.10.

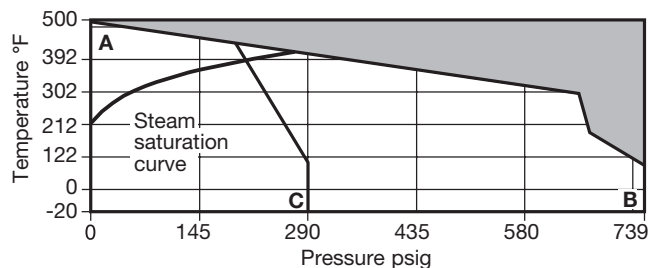
### Technical data

Flow characteristic	Modified linear
Port	Full bore
Leakage test procedure to ISO 5208 (Rate A) / EN 12266-1 (Rate A) and BS 5351	
Antistatic device	Complies with ISO 7121 and BS 5351



2" shown

### Pressure/temperature limits



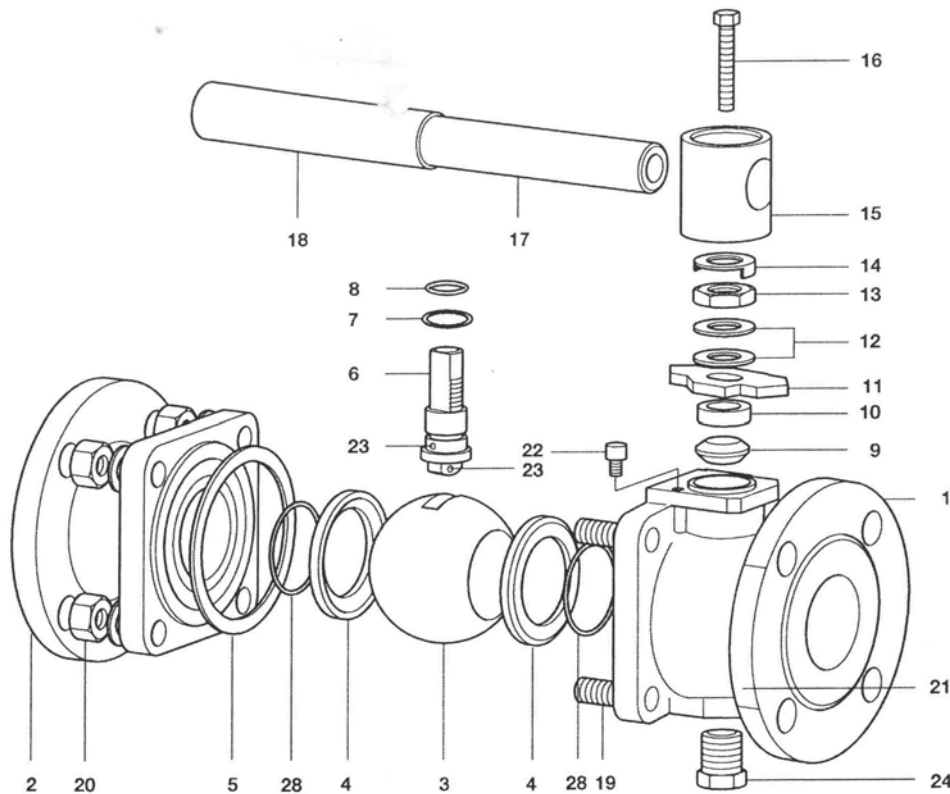
The product must not be used in this region.

A - B Flanged ASME 300.

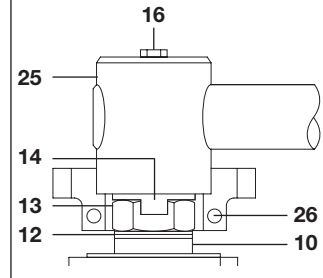
A - C Flanged ASME 150.

PMA	Maximum allowable pressure	ASME 150	290 psig@100°F
		ASME 300	739 psig@100°F
TMA	Maximum allowable temperature		500°F@0psig
	Minimum allowable temperature		-20°F
PMO	Maximum operating pressure for saturated steam service		253 psig
TMO	Maximum operating temperature		500°F@0psig
	Minimum operating temperature		-20°F
<b>Note:</b> For lower operating temperatures consult Spirax Sarco			
ΔPMX Maximum differential pressure is limited to the PMO			
Designed for a maximum		ASME 150	413 psig
cold hydraulic test pressure of:		ASME 300	1109 psig

2" (DN50) shown for the main illustration



2½" (DN65) to 8" (DN200)



## Materials

No.	Part	Material
1	Body	<b>M33S2 ISO</b> Zinc plated carbon steel ASTM A 216 WCB
		<b>M33S3 ISO</b> Stainless steel ASTM A 351 CF8M
2	Insert	<b>M33S2 ISO</b> Zinc plated carbon steel ASTM A 21 6 WCB
		<b>M33S3 ISO</b> Stainless steel ASTM A 351 CF8M
3	Solid ball	Stainless steel AISI 316
*4	Seats	Carbon and graphite R-PTFE PDR 0.8
*5	Body gasket	Graphoil with metal insert
6	Stem	Stainless steel AISI 316 / AISI 420
*7	Lower stem seal	Carbon and graphite R-PTFE
*8	'O' ring	Viton
*9	Upper stem packing	PTFE
10	Separator	Zinc plated carbon steel SAE 1010
11	Stop plate with indicator for 2"	Zinc plated carbon steel SAE 1010
12	Belleville stem washer	Carbon steel / stainless steel
13	Gland nut	Carbon steel SAE 12L14
14	Locking plate	Stainless steel AISI 304
15	Adaptor 2"	Zinc plated SG iron
16	Screw	Carbon steel Grade 5
17	Handle	Zinc plated carbon steel SAE 1010
18	Grip	Vinyl (Blue)
19	Stud	Carbon steel A1 93-B7
20	Nut	Zinc plated carbon steel A1 94-2H
21	Photochemical name-plate	Stainless steel AISI 304
22	Stop screw	Zinc plated carbon steel SAE 12L14
23	Antistatic device ball	Stainless steel AISI 304
24	Drain plug (optional)	Carbon steel
25	Adaptor with indicator for 2½" to 8"	Zinc plated SG iron
26	Stop screw for 2½" to 8"	Carbon steel
27	Lifting eye 8" not shown	Zinc plated carbon steel SAE 1010
*28	'O' ring	EPDM

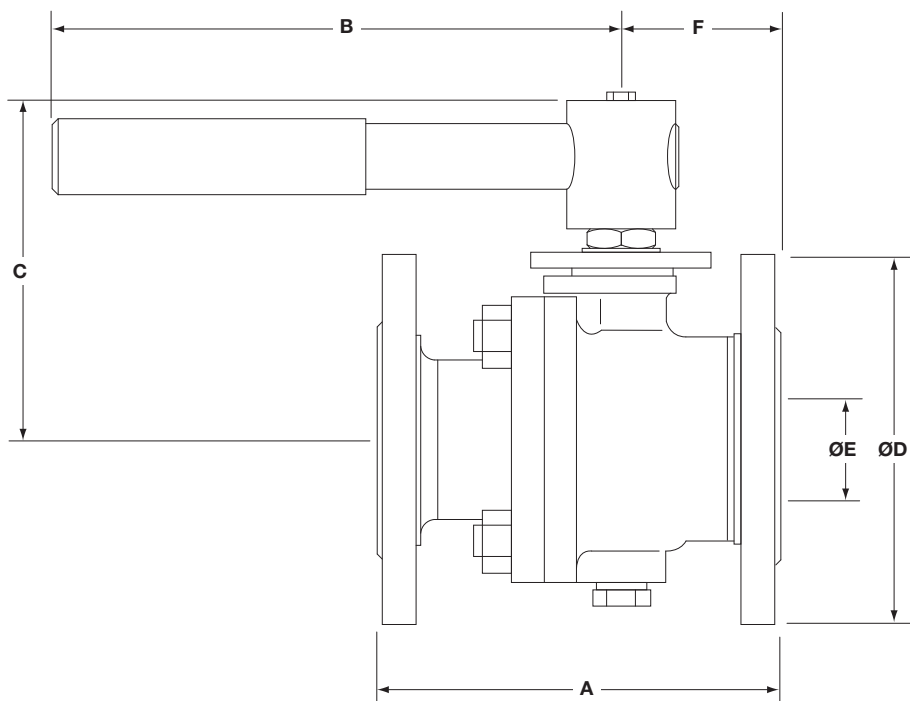
\*Note: Available spare parts sold as a kit.

**Dimensions/weights (approximate) in inches and lbs****Flanged ASME 150**

Size	A	B	C	D	E	F	Weight
2"	7.0	10.8	5.5	6.0	2.0	2.8	24
2½"	7.5	16.3	6.3	7.0	2.5	3.2	36
3"	8.0	20.3	6.6	7.5	2.9	3.4	44
4"	9.0	27.5	8.0	9.0	3.9	4.2	78
6"	15.5	33.5	11.1	10.9	5.9	7.8	177
8"	18.0	37.4	12.5	13.5	7.9	9.0	309

**Flanged ASME 300**

Size	A	B	C	D	E	F	Weight
2"	8.5	10.8	5.5	6.5	2.0	3.4	33
2½"	9.5	16.3	6.3	7.5	2.5	3.6	50
3"	11.1	20.3	6.6	8.3	2.9	3.9	66
4"	12.0	27.5	8.0	10.0	3.9	4.8	110
6"	15.8	33.5	11.1	12.5	5.9	7.0	245
8"	19.7	37.4	12.5	15.0	7.9	8.4	409

**C<sub>v</sub> values**

Inches	2"	2½"	3"	4"	6"	8"
C <sub>v</sub>	346	497	867	1191	2786	5549

**Operating torque lb/ft**

Inches	2"	2½"	3"	4"	6"	8"
lb/ft	44	59	73	147	442	553

The torque figures shown are for a valve at maximum operating pressure that is operated frequently. Valves that are subject to long static periods, may require greater break-out torque.

**Safety information, installation and maintenance**

Installation and Maintenance Instructions, IM-P133-65.

**How to order**

Specify:	Size	2", 2½", 3", 4", 6", 8"
	Model	M33S_ISO
	Body material	2 = Carbon steel 3 = Stainless steel
	Flanges	ASME 150 or ASME 300

**Example:** 1 off Spirax Sarco 2" flanged ASME 150 M33S2 ISO ball valve.

Spirax Sarco, Inc., 1150 Northpoint Blvd., Blythewood, SC 29016 • Phone: (803) 714-2000 • Fax: (803) 714-2222

TI-P133-63-US 12.14

## Spare parts

The spare parts available are shown in solid outline. Parts drawn in broken line are not supplied as spares.

### Available spares

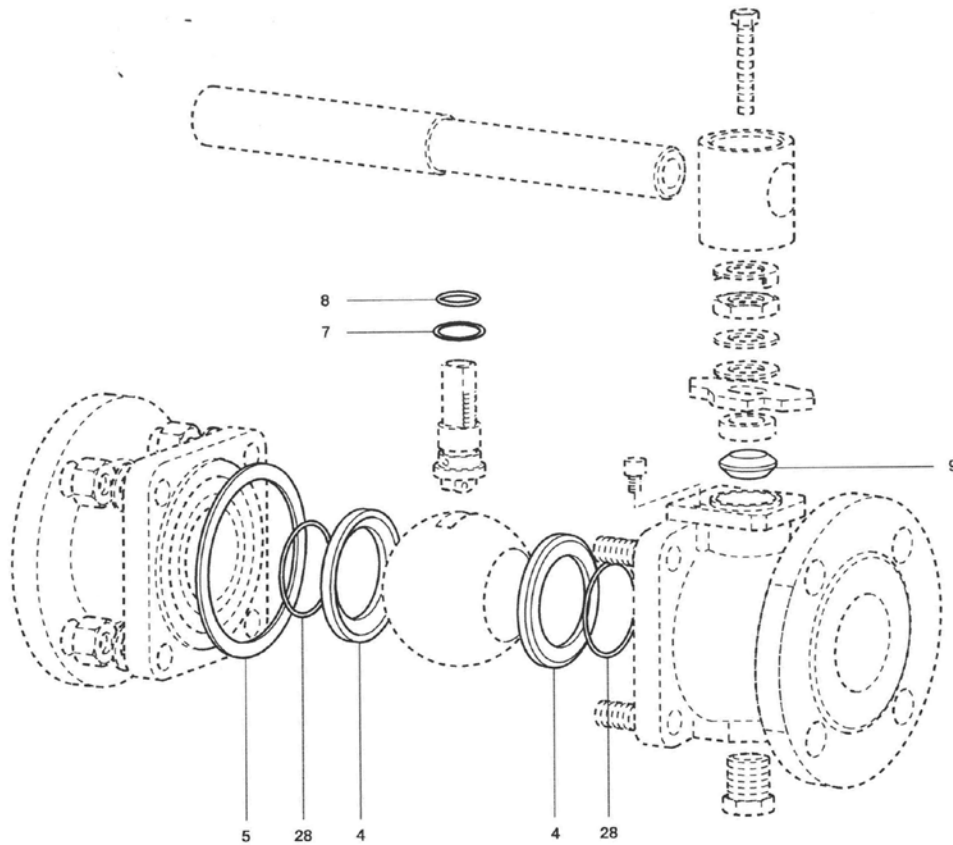
Seats, body gasket, stem seals, stem 'O' ring set and seat 'O' ring

4, 5, 7, 8, 9, 28

### How to order spares

Always order spares by using the description given in the column headed 'Available spares' and state the size and type of ball valve.

**Example:** 1 - Seats, body gasket, stems seals and stem and seat 'O' ring set for a Spirax Sarco 3" flanged ASME M33S2 ISO ball valve





# M33V ISO Full Bore Ball Valve API 6D

## 2" to 8" ASME 150 and 300

### (Low Pressure Application)

#### Description

Produced in accordance with API 6D the M33V ISO full bore two-piece body ball valve with floating ball, has been designed for use as an isolating valve, not a control valve, on applications at low temperatures which use natural gas and most of the hydrocarbon fluids in the OPC refinery sites. The M33V ISO ASME has as standard an ISO mounting pad in accordance with ISO 5211.

#### Available types

<b>M33V2 ISO</b>	Zinc plated carbon steel body, PTFE seats and ISO mounting.
<b>M33V3 ISO</b>	Stainless steel body, PTFE seats and ISO mounting.

#### Standards

This product fully complies with the requirements of the European Pressure Equipment Directive 97/23/EC and carries the **CE** mark when so required.

#### Certification

This product is available with certification to EN 10204 3.1. **Note:** All certification / inspection requirements must be stated at the time of order placement.

#### Options

- Hollow ball for 6" and 8" sizes - Not API 6D rated.
- Self-venting ball.
- Ring joint flanges.
- Extended stems to allow full insulation for 3" and 4" sizes.\*
- Operation by mechanical or pneumatic actuator URPA series for all sizes.
- Operation by pneumatic actuator URPA series and mechanical declutchable actuator.
- Lockable handle.\*
- Materials according to NACE MR 0175.
- Surge valve.
- Drain plug.

\*manual operation only

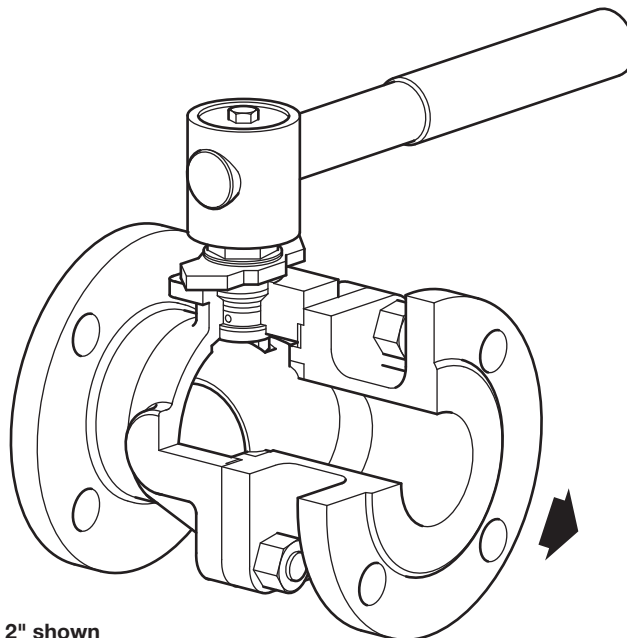
#### Sizes and pipe connections

2", 2½", 3", 4", 6" and 8"

**Standard flange** ASME Class 150 and 300 with face-to-face dimensions according to B 16.10.

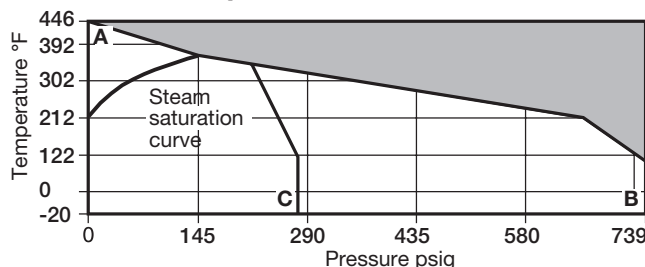
#### Technical data

Flow characteristic	Modified linear
Port	Full bore
Leakage test procedure to ISO 5208 (Rate A) / EN 12266-1 (Rate A) and BS 5351	
Antistatic device	Complies with ISO 7121 and BS 5351



2" shown

#### Pressure/temperature limits



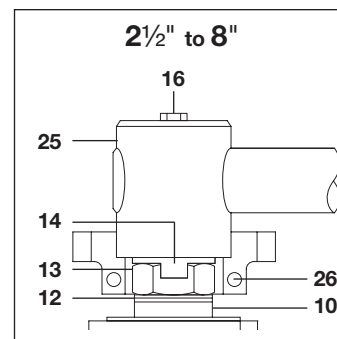
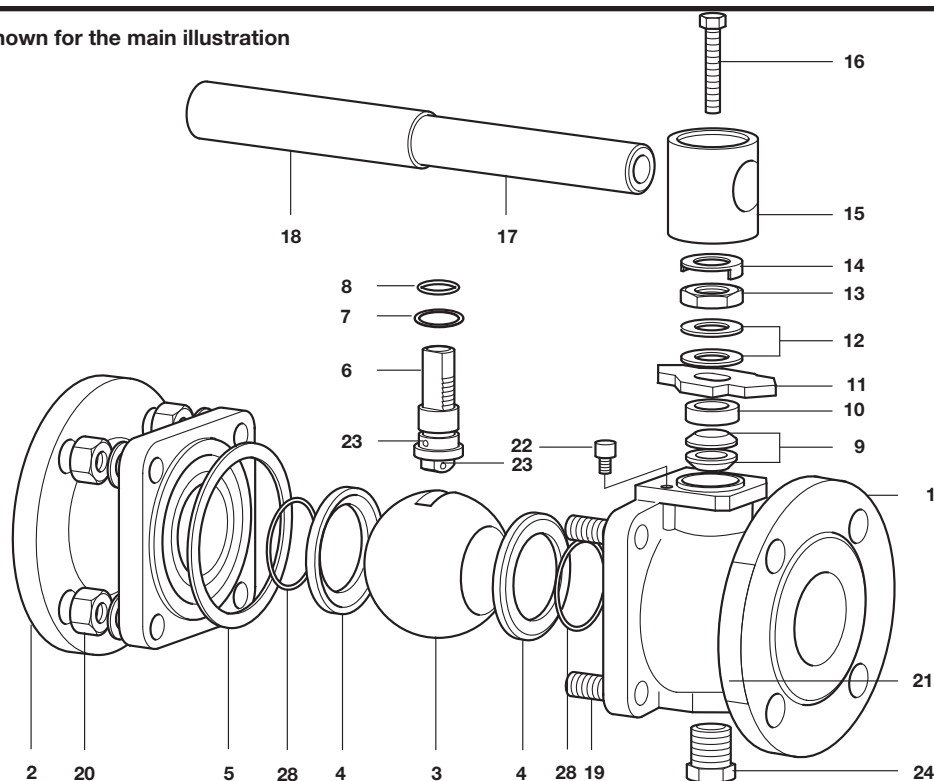
The product **must not** be used in this region.

**A - B** Flanged ASME 300.

**A - C** Flanged ASME 150.

PMA	Maximum allowable pressure	ASME 150	290psig@100°F
		ASME 300	739psig@113°F
TMA	Maximum allowable temperature		446°F@0psig
	Minimum allowable temperature		-20°F
PMO	Maximum operating pressure for saturated steam service		145 psig
TMO	Maximum operating temperature		446°F@0psig
	Minimum operating temperature		-20°F
<b>Note:</b> For lower operating temperatures consult Spirax Sarco			
ΔPMX	Maximum differential pressure is limited to the PMO		
Designed for a maximum		ASME 150	413psig
cold hydraulic test pressure of:		ASME 300	1109psig

2" shown for the main illustration



## Materials

No.	Part	Material
1	Body	M33V2 ISO Zinc plated carbon steel ASTM A 216 WCB
		M33V3 ISO Stainless steel ASTM A 351 CF8M
2	Insert	M33V2 ISO Zinc plated carbon steel ASTM A 21 6 WCB
		M33V3 ISO Stainless steel ASTM A 351 CF8M
3	Solid ball	Stainless steel AISI 316
*4	Seats	PTFE
*5	Body gasket	Graphoil with metal insert
6	Stem	Stainless steel AISI 316 / AISI 420
*7	Lower stem seal	Carbon and graphite R-PTFE
*8	'O' ring	Viton
*9	Upper stem packing	PTFE
10	Separator	Zinc plated carbon steel SAE 1010
11	Stop plate with indicator for 2"	Zinc plated carbon steel SAE 1010
12	Belleville stem washer	Carbon steel / stainless steel
13	Gland nut	Carbon steel SAE 12L14
14	Locking plate	Stainless steel AISI 304
15	Adaptor 2"	Zinc plated SG iron
16	Screw	Carbon steel Grade 5
17	Handle	Zinc plated carbon steel SAE 1010
18	Grip	Vinyl (Orange)
19	Stud	Carbon steel A193-B7
20	Nut	Zinc plated carbon steel A194-2H
21	Photochemical name-plate	Stainless steel AISI 304
22	Stop screw	Zinc plated carbon steel SAE 12L14
23	Antistatic device ball	Stainless steel AISI 304
24	Drain plug (optional)	Carbon steel
25	Adaptor with indicator for 2 1/2" to 8"	Zinc plated SG iron
26	Stop screw for 2 1/2" to 8"	Carbon steel
27	Lifting eye 8" - not shown	Zinc plated carbon steel SAE 1010
*28	'O' ring	Viton

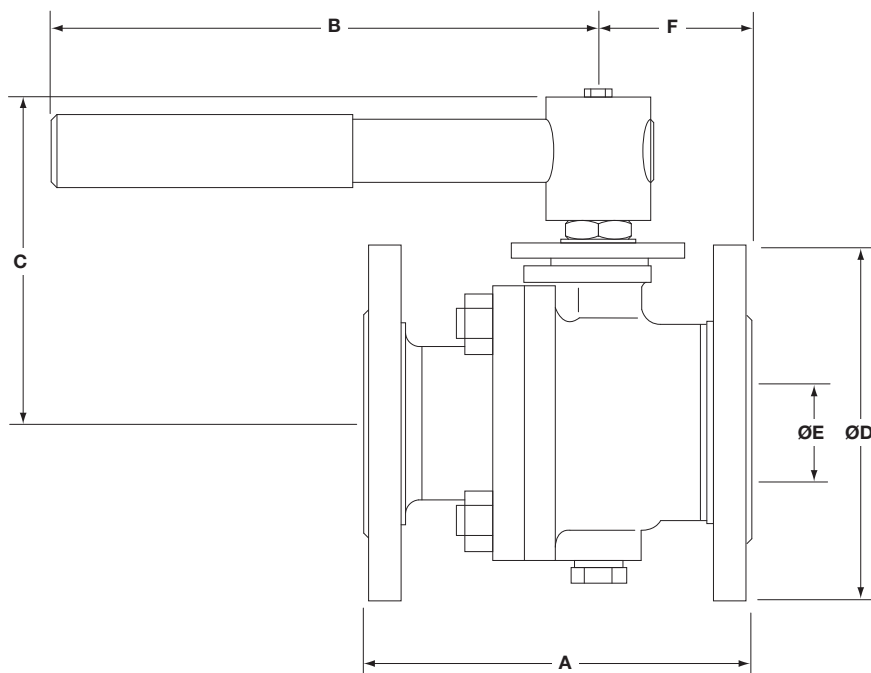
\*Note: Available spare parts sold as a kit.

**Dimensions/weights (approximate) in inches and lbs****Flanged ASME 150**

Size	A	B	C	D	E	F	Weight
2"	7.0	10.8	5.5	6.0	2.0	2.8	24
2½"	7.5	16.3	6.3	7.0	2.5	3.2	36
3"	8.0	20.3	6.6	7.5	2.9	3.4	44
4"	9.0	27.5	8.0	9.0	3.9	4.2	78
6"	15.5	33.5	11.1	10.9	5.9	7.8	177
8"	18.0	37.4	12.5	13.5	7.9	9.0	309

**Flanged ASME 300**

Size	A	B	C	D	E	F	Weight
2"	8.5	10.8	5.5	6.5	2.0	3.4	33
2½"	9.5	16.3	6.3	7.5	2.5	3.6	50
3"	11.1	20.3	6.6	8.3	2.9	3.9	66
4"	12.0	27.5	8.0	10.0	3.9	4.8	110
6"	15.8	33.5	11.1	12.5	5.9	7.0	245
8"	19.7	37.4	12.5	15.0	7.9	8.4	409

**C<sub>v</sub> values**

Inches	2"	2½"	3"	4"	6"	8"
C <sub>v</sub>	346	497	867	1191	2786	5549

**Operating torque lb/ft**

Inches	2"	2½"	3"	4"	6"	8"
lb/ft	44	59	73	147	442	553

The torque figures shown are for a valve at maximum operating pressure that is operated frequently. Valves that are subject to long static periods, may require greater break-out torque.

**Safety information, installation and maintenance**

Installation and Maintenance Instructions, IM-P133-65.

**How to order**

Specify:	Size	2", 2½", 3", 4", 6", 8"
	Model	M33V_ISO
	Body material	2 = Carbon steel 3 = Stainless steel
	Flanges	ASME 150 or ASME 300

**Example:** 1 off Spirax Sarco 2" flanged ASME 150 M33V2 ISO ball valve.



## Spare parts

The spare parts available are shown in solid outline. Parts drawn in broken line are not supplied as spares.

### Available spares

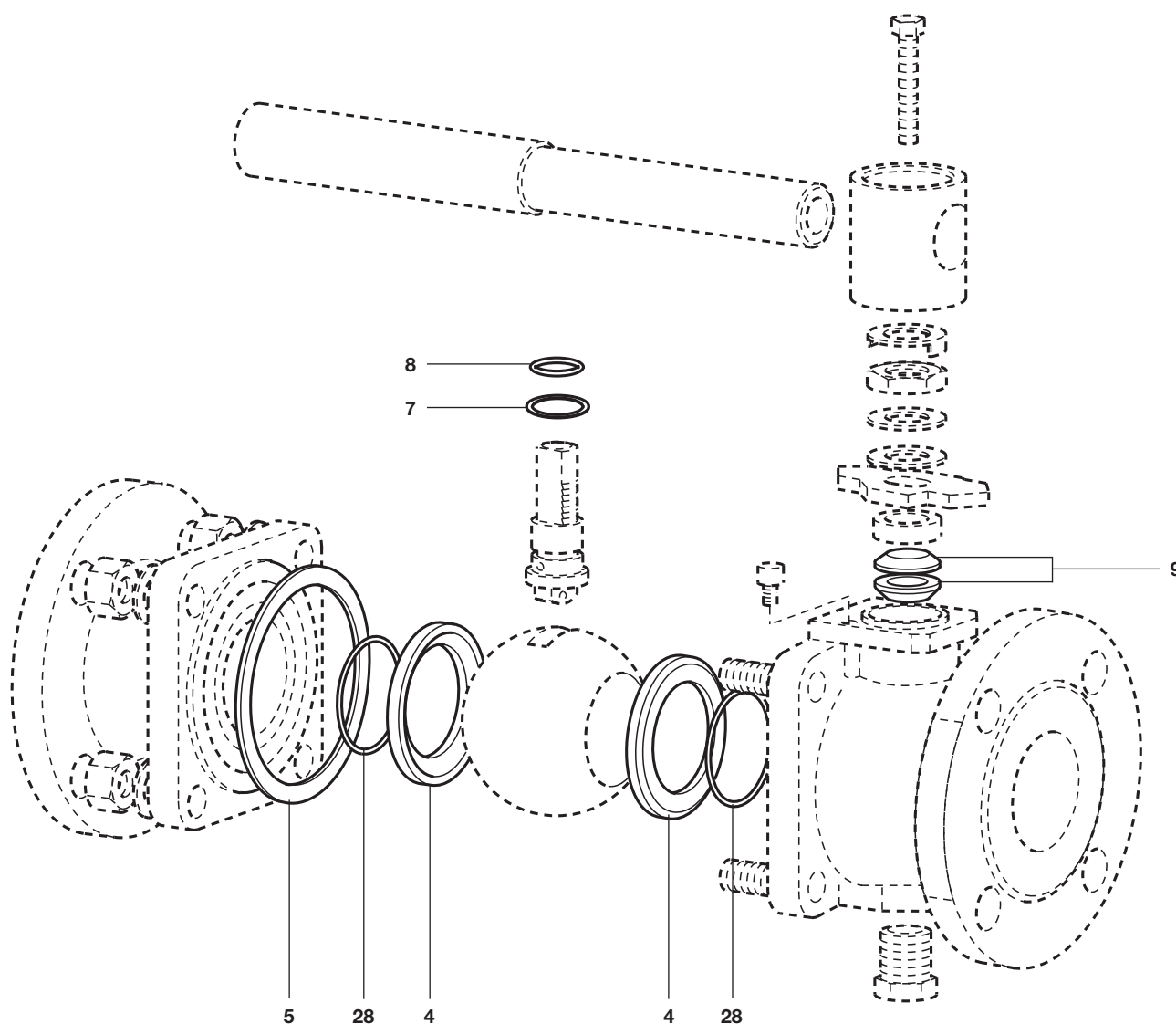
Seats, body gasket, stem seals, stem 'O' ring set and seat 'O' ring set

4, 5, 7, 8, 9, 28

### How to order spares

Always order spares by using the description given in the column headed 'Available spares' and state the size and type of ball valve.

**Example:** 1 - Seats, body gasket, stems seals and stem and seat 'O' ring set for a Spirax Sarco 3" flanged ASME M33V2 ISO ball valve





## M33F ISO Full Bore Ball Valve API 6D Firesafe API 607 2" to 8" ASME 150 and 300

### Description

Produced in accordance with API 6D the M33F ISO full bore two-piece body ball valve with floating ball, has an API 607 firesafe proof design. It is designed for use as an isolating valve, not a control valve and can be used with the majority of industrial fluids on applications, which include steam, condensate, water, oil, gases, and other fluids within its operating range.

The M33F ISO ASME has as standard an ISO mounting pad in accordance with ISO 5211.

### Firesafe design

In normal working conditions, the ball rests against two TAT seats ensuring total closure. When the valve is submitted to temperature above the limits the seats can withstand, the seat becomes deformed and renders to extrusion. When the seats have been totally destroyed, the ball will come to rest firmly against the metal seat in the cap, producing a metal-to-metal closing. This secondary seat in the valve cap ensures the valve will operate to international API 607 standards.

### Available types

<b>M33F2 ISO</b>	Zinc plated carbon steel body, TAT seats (for high temperatures) and ISO mounting.
<b>M33F3 ISO</b>	Stainless steel body, TAT seats (for high temperatures) and ISO mounting.

### Standards

This product fully complies with the requirements of the European Pressure Equipment Directive 97/23/EC and carries the **CE** mark when so required.

### Certification

This product is available with certification to EN 10204 3.1.  
**Note:** All certification / inspection requirements must be stated at the time of order placement.

### Options

- Hollow ball for 6" and 8" sizes - Not API 6D rated.
- Self-venting ball.
- Ring joint flanges.
- Extended stems to allow full insulation for 3" and 4" sites.\*
- Operation by pneumatic actuator URPA series and mechanical declutchable actuator.
- Operation by mechanical or pneumatic actuator URPA series for all sizes.
- Lockable handle.\*
- Materials according to NACE MR 0175.
- Surge valve.
- Drain plug.

\*manual operation only

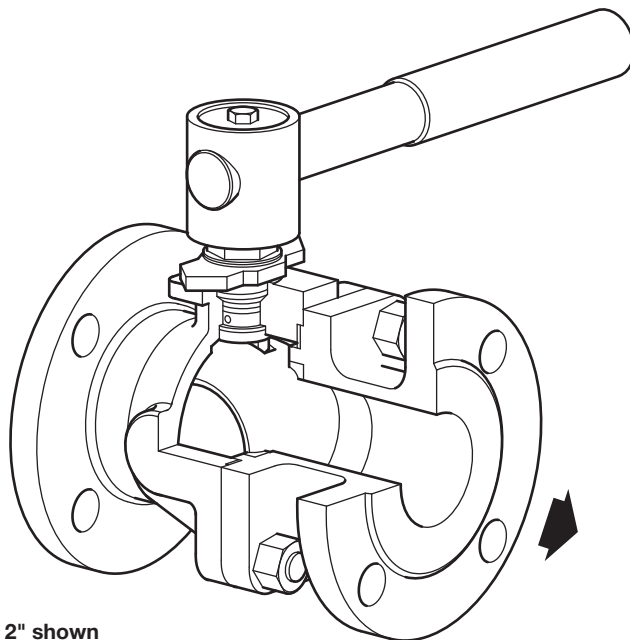
### Sizes and pipe connections

2", 2½", 3", 4", 6", and 8"

**Standard flange** ASME Class 150 and 300 with face-to-face dimensions according to B 16.10.

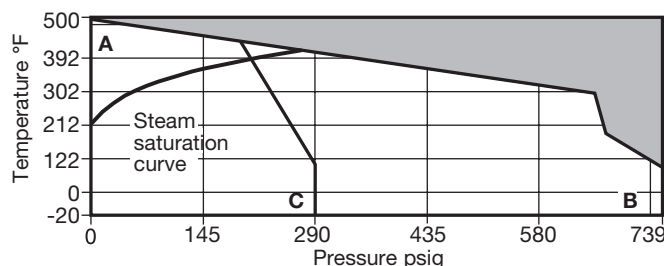
### Technical data

Flow characteristic	Modified linear
Port	Full bore
Leakage test procedure to ISO 5208 (Rate A) / EN 12266-1 (Rate A) and BS 5351	
Antistatic device	Complies with ISO 7121 and BS 5351



2" shown

### Pressure/temperature limits



**The product must not be used in this region.**

**A-B** Flanged ASME 300.

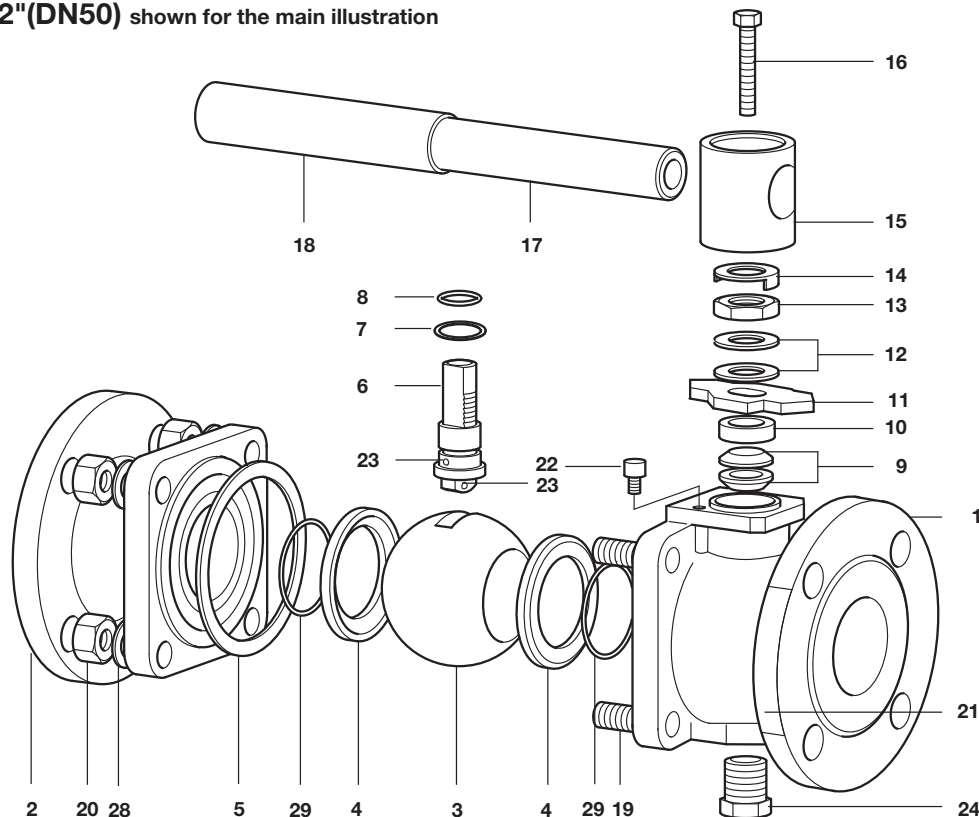
**A-C** Flanged ASME 150.

PMA	Maximum allowable ASME 150	290psig@100°F
	pressure ASME 300	739psig@100°F
TMA	Maximum allowable temperature	500°F@0psig
Minimum allowable temperature		-20°F
PMO	Maximum operating pressure for saturated steam service	253 psig
TMO	Maximum operating temperature	500°F@0psig
Minimum operating temperature		-20°F
<b>Note:</b> For lower operating temperatures consult Spirax Sarco		
ΔPMX Maximum differential pressure is limited to the PMO		
Designed for a maximum ASME 150		413 psig
cold hydraulic test pressure of: ASME 300		1109.3 psig

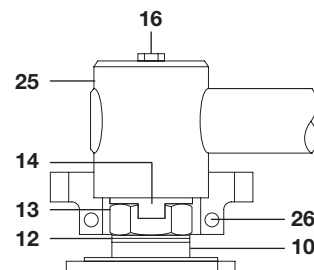
Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only.  
In the interests of development and improvement of the product, we reserve the right to change the specification.

TI-P133-64-US 12.14

2"(DN50) shown for the main illustration



2 1/2"(DN65) to 8"(DN200)



## Materials

No.	Part	Material	
1	Body	M33F2 ISO	Zinc plated carbon steel
		M33F3 ISO	Stainless steel
2	Insert	M33F2 ISO	Zinc plated carbon steel
		M33F3 ISO	Stainless steel
3	Solid ball	Stainless steel	AISI 316
*4	Seats	TAT reinforced teflon	
*5	Body gasket	Graphoil with metal insert	
6	Stem	Stainless steel	AISI 316 / AISI 420
*7	Lower stem seal	Carbon and graphite R-PTFE	
*8	'O' ring	Viton	
*9	Upper stem packing	Graphoil	
10	Separator	Zinc plated carbon steel	SAE 1010
11	Stop plate with indicator for (DN50) 2"	Zinc plated carbon steel	SAE 1010
12	Belleville stem washer	Carbon steel / stainless steel	
13	Gland nut	Carbon steel	SAE 12L14
14	Locking plate	Stainless steel	AISI 304
15	Adaptor (DN50) 2"	Zinc plated SG iron	
16	Screw	Carbon steel	Grade 5
17	Handle	Zinc plated carbon steel	SAE 1010
18	Grip	Vinyl (Red)	
19	Stud	Stainless steel	A193-B8
20	Nut	Stainless steel	A194-8MA
21	Photochemical name-plate	Stainless steel	AISI 304
22	Stop screw	Zinc plated carbon steel	SAE 12L14
23	Antistatic device ball	Stainless steel	AISI 304
24	Drain plug (optional)	Carbon steel	
25	Adaptor with indicator for (DN65 to DN200) 2 1/2" to 8"	Zinc plated SG iron	
26	Stop screw for (DN65 to DN200) 2 1/2" to 8"	Carbon steel	
27	Lifting eye (DN200 only) 8" - not shown	Zinc plated carbon steel	SAE 1010
28	Belleville stud washer	Stainless steel	
*29	'O' ring	EPDM	

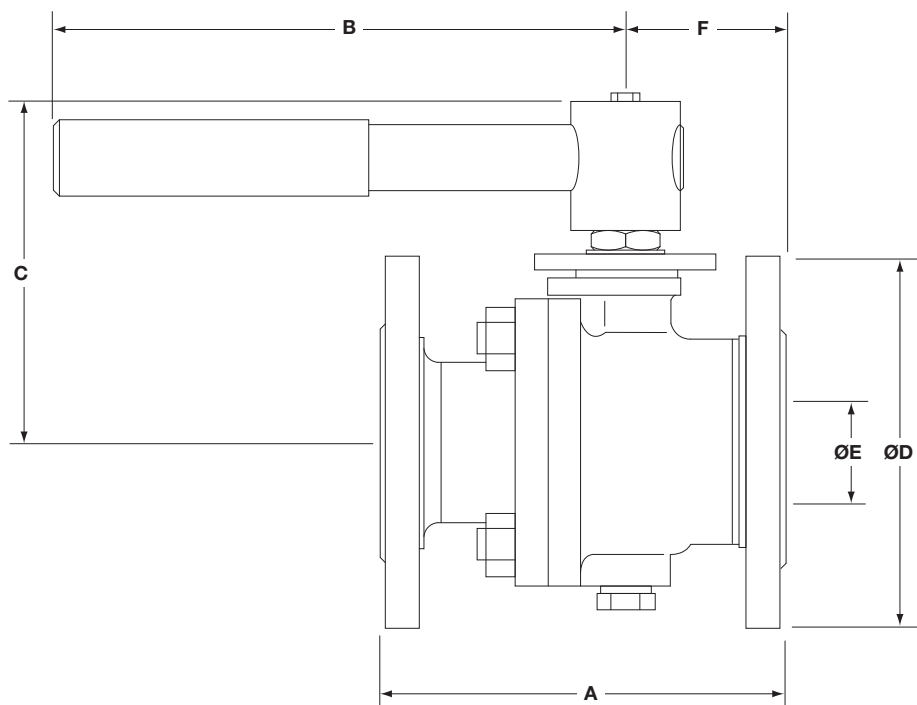
\*Note: Available spare parts sold as a kit.

**Dimensions/weights (approximate) in inches and lbs****Flanged ANSI 150**

Size	A	B	C	D	E	F	Weight
2"(DN50)	7.0	10.8	5.5	6.0	2.0	2.8	24
2½"(DN65)	7.5	16.3	6.3	7.0	2.5	3.2	36
3"(DN80)	8.0	20.3	6.6	7.5	2.9	3.4	44
4"(DN100)	9.0	27.5	8.0	9.0	3.9	4.2	78
6"(DN150)	15.5	33.5	11.1	10.9	5.9	7.8	177
8"(DN200)	18.0	37.4	12.5	13.5	7.9	9.0	309

**Flanged ANSI 300**

Size	A	B	C	D	E	F	Weight
2"(DN50)	8.5	10.8	5.5	6.5	2.0	3.4	33
2½"(DN65)	9.5	16.3	6.3	7.5	2.5	3.6	50
3"(DN80)	11.1	20.3	6.6	8.3	2.9	3.9	66
4"(DN100)	12.0	27.5	8.0	10.0	3.9	4.8	110
6"(DN150)	15.8	33.5	11.1	12.5	5.9	7.0	245
8"(DN200)	19.7	37.4	12.5	15.0	7.9	8.4	409

**C<sub>v</sub> values**

Inches	2"	2½"	3"	4"	6"	8"
C <sub>v</sub>	346	497	867	1191	2786	5549

**Operating torque lb/ft (N m)**

Inches	2"	2½"	3"	4"	6"	8"
lb/ft	44	59	73	147	442	553

The torque figures shown are for a valve at maximum operating pressure that is operated frequently.

Valves that are subject to long static periods, may require greater break-out torque.

**Safety information, installation and maintenance**

Installation and Maintenance Instructions, IM-P133-65.

**How to order**

Specify:	Size	2", 2½", 3", 4", 6", 8"
	Model	M33F_ISO
	Body material	2 = Carbon steel 3 = Stainless steel
	Flanges	ASME 150 or ASME 300

Example: 1 off Spirax Sarco 2" flanged ANSI 150 M33F2 ISO ball valve.

Spirax Sarco, Inc., 1150 Northpoint Blvd., Blythewood, SC 29016 • Phone: (803) 714-2000 • Fax: (803) 714-2222

TI-P133-64-US 12.14

## Spare parts

The spare parts available are shown in solid outline. Parts drawn in broken line are not supplied as spares.

### Available spares

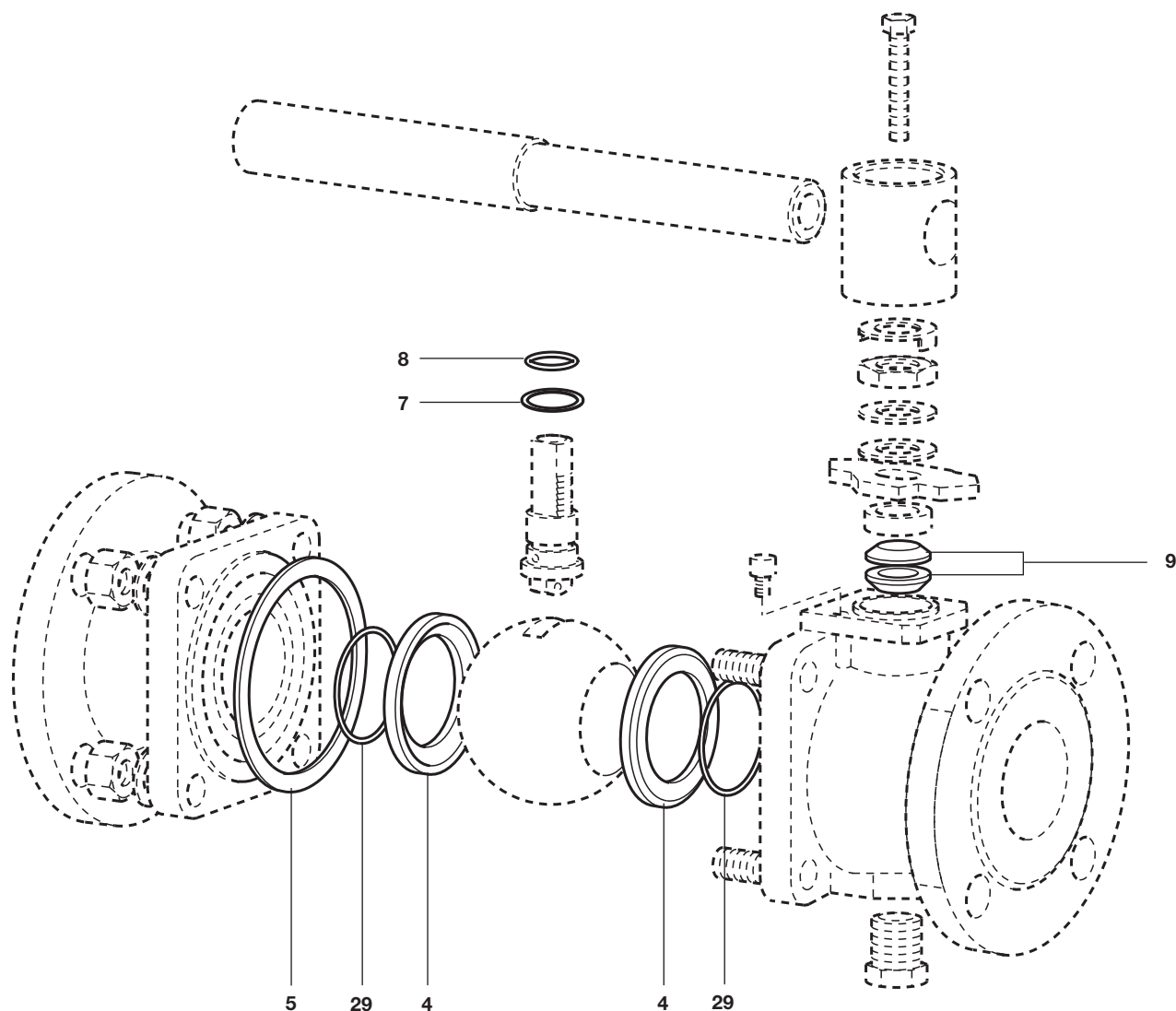
Seats, body gasket, stem seals, stem 'O' ring set and seat 'O' ring set

4, 5, 7, 8, 9, 29

### How to order spares

Always order spares by using the description given in the column headed 'Available spares' and state the size and type of ball valve.

**Example: 1** - Seats, body gasket, stems seals and stem and seat 'O' ring set for a Spirax Sarco 3" flanged ASME M33F2 ISO ball valve



## M40Si ISO (Medium Pressure Application) and M40Vi ISO (Low Pressure Application) Reduced Bore Ball Valves 1" to 6" ASME 150 and 300

### Description

Both the M40Si and M40Vi are reduced bore ball valves, with a single piece body, having ISO mounting as standard. They are designed to be isolating valves, which can be used with the majority of industrial fluids, not control valves.

### Available types

<b>M40Si2 ISO</b>	Zinc plated carbon steel body, PDR 0.8 seats.
<b>M40Si3 ISO</b>	Stainless steel body, PDR 0.8 seats.
<b>M40Vi2 ISO</b>	Zinc plated carbon steel body, PTFE seats.
<b>M40Vi3 ISO</b>	Stainless steel body, PTFE seats.

### Standards

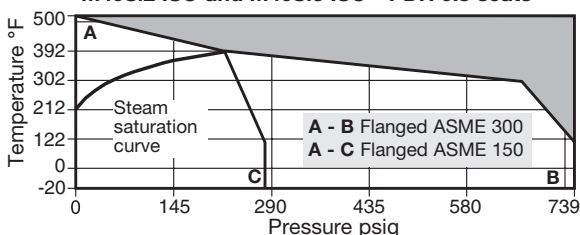
These products fully comply with the requirements of the European Pressure Equipment Directive 97/23/EC and carry the CE mark when so required.

### Certification

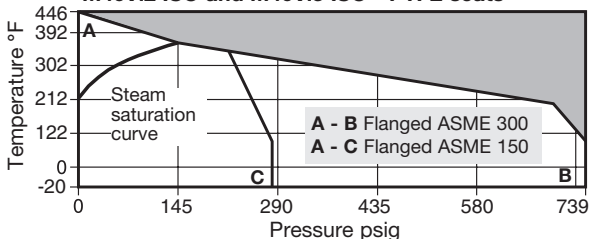
These products are available with certification to EN 10204 3.1. **Note:** All certification/inspection requirements must be stated at the time of order placement.

### Pressure/temperature limits

M40Si2 ISO and M40Si3 ISO - PDR 0.8 seats



M40Vi2 ISO and M40Vi3 ISO - PTFE seats



 The product **must not** be used in this region.

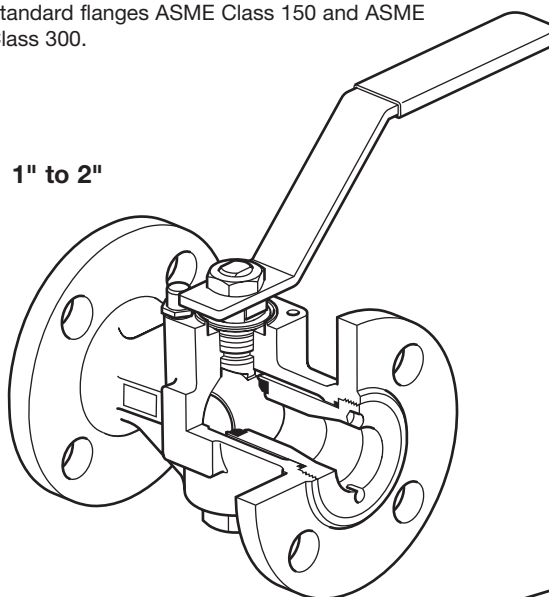
PMA	Maximum allowable pressure	739 psig @ 100°F
TMA	Maximum allowable temperature	M40Si 500°F @ 0 psig
		M40Vi 446°F @ 0 psig
Minimum allowable temperature		-20°F
PMO	Maximum operating pressure for saturated steam service	M40Si 253 psig
		M40Vi 145 psig
TMO	Maximum operating temperature	M40Si 500°F @ 0 psig
		M40Vi 446°F @ 0 psig
Minimum operating temperature		-20°F

**Note:** For lower operating temperatures consult Spirax Sarco  
ΔPMX Maximum differential pressure is limited to the PMO  
Designed for a maximum cold hydraulic test pressure of 1109 psig

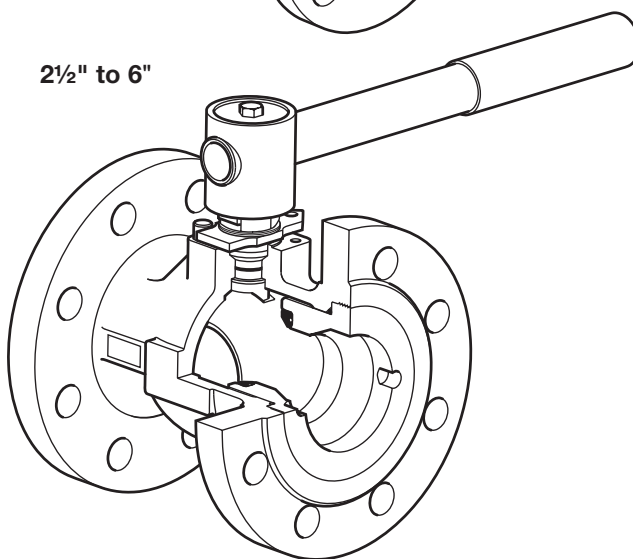
### Sizes and pipe connections

1", 1¼", 1½", 2", 2½", 3", 4" and 6".

Standard flanges ASME Class 150 and ASME Class 300.



1" to 2"

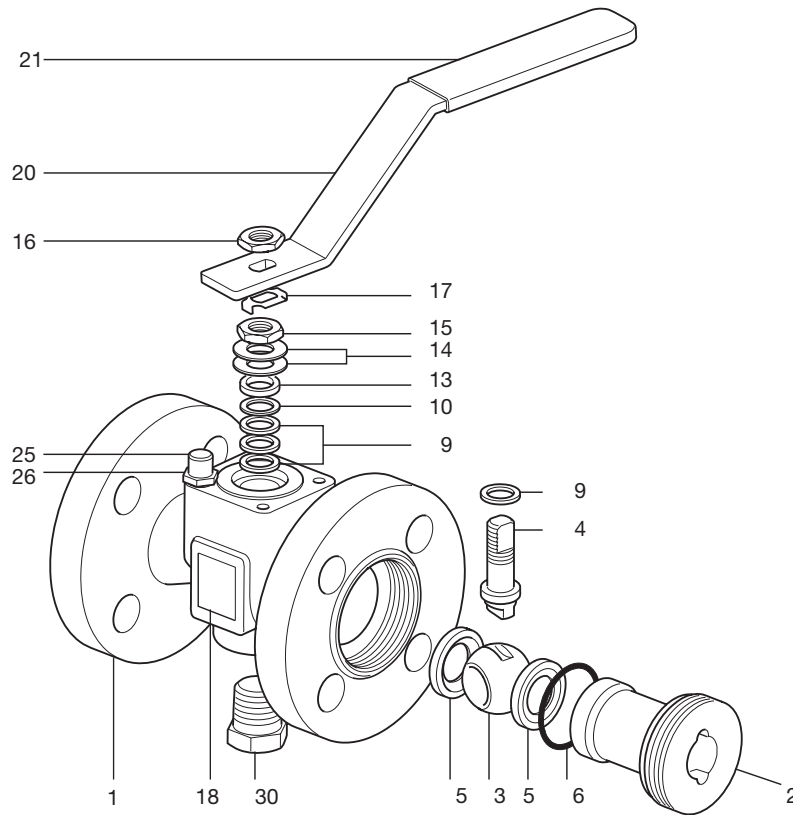


2½" to 6"

### Technical data

Flow characteristic	Modified linear
Port	Reduced bore
Leakage test procedure to ISO 5208 (Rate A)/EN 12266-1 (Rate A)	
Antistatic device (optional) complies with ISO 7121 and BS 5351	

1" to 2"



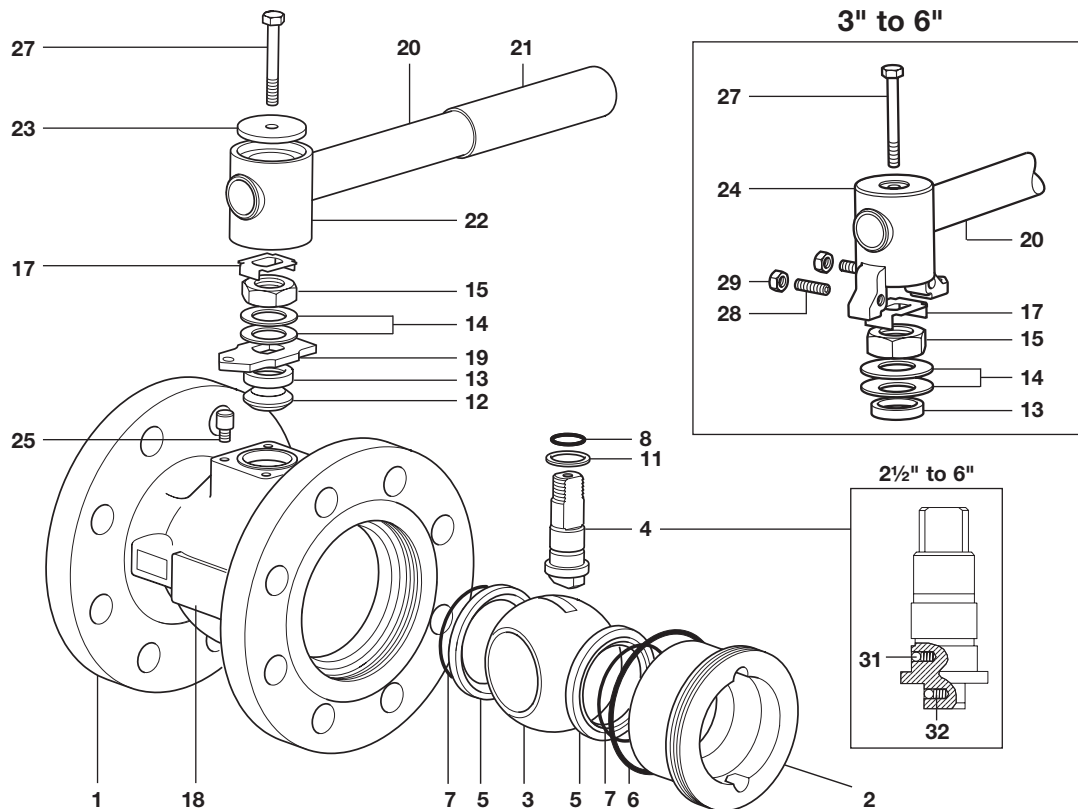
## Materials

No.	Part	Material		
1	Body	M40Si2 ISO and M40Vi2 ISO	Zinc plated carbon steel	ASTM A216 WCB
		M40Si3 ISO and M40Vi3 ISO	Stainless steel	ASTM A351 CF8M
2	Insert	M40Si2 ISO and M40Vi2 ISO	Zinc plated carbon steel	SAE 1040
		M40Si3 ISO and M40Vi3 ISO	Stainless steel	AISI 316
3	Ball		Stainless steel	AISI 316
4	Stem		Stainless steel	AISI 316/AISI 420
*5	Seats	M40Si2 ISO and M40Si3 ISO	Carbon and graphite reinforced PTFE	PDR 0.8
		M40Vi2 ISO and M40Vi3 ISO	Virgin PTFE	
*6	Insert 'O' ring		EPDM	Geothermal
*9	Stem seals		Antistatic R-PTFE	
*10	Stem seals		Stainless steel	AISI 304
13	Separator		Zinc plated carbon steel	SAE 1010
14	Belleville washer		Stainless steel	AISI 301
15	Gland nut		Zinc plated carbon steel	SAE 1010/SAE 12L14
16	Upper stem nut		Zinc plated carbon steel	SAE 1010/SAE 12L14
17	Locking plate		Stainless steel	AISI 304
18	Name-plate		Stainless steel	AISI 430
20	Lever		Zinc plated carbon steel	SAE 1010
21	Grip		Vinyl	
25	Stop screw		Zinc plated carbon steel	SAE 12L14
26	Split locker washer		Stainless steel	AISI 304
30	Plug	1" only	Carbon steel / stainless steel	

\*Note: Available spare parts sold as a kit.



2½" to 6"

**Materials**

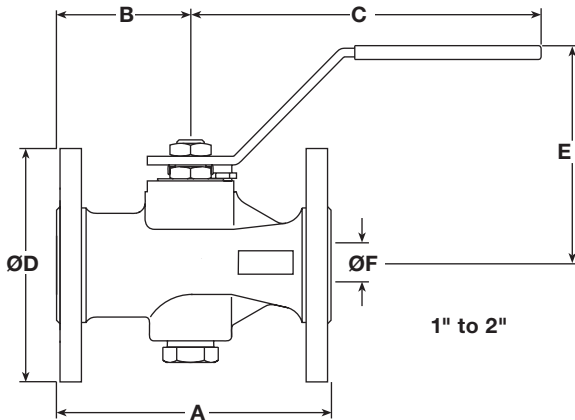
No.	Part	Material	
1	Body	M40Si2 ISO and M40Vi2 ISO	Zinc plated carbon steel
		M40Si3 ISO and M40Vi3 ISO	Stainless steel
2	Insert	M40Si2 ISO and M40Vi2 ISO	Zinc plated carbon steel
		M40Si3 ISO and M40Vi3 ISO	Stainless steel
3	Ball	Stainless steel	AISI 316
4	Stem	Stainless steel	AISI 316/AISI 420
*5	Seats	M40Si2 ISO and M40Si3 ISO	Carbon and graphite reinforced PTFE
		M40Vi2 ISO and M40Vi3 ISO	Virgin PTFE
*6	Insert 'O' ring	EPDM	Geothermal
*7	Seat 'O' ring	EPDM	Geothermal
*8	Stem 'O' ring	EPDM	Geothermal
*11	Lower stem seals	Antistatic R-PTFE	
*12	Upper stem packaging	Virgin PTFE	
13	Separator	Zinc plated carbon steel	SAE 1010
14	Belleville washer	Stainless steel	AISI 301
15	Gland nut	Zinc plated carbon steel	SAE 1010/SAE 12L14
17	Locking plate	Stainless steel	AISI 304
18	Name-plate	Stainless steel	AISI 430
19	Stop plate with indicator 2½"	Zinc plated carbon steel	SAE 1010
20	Lever	Zinc plated carbon steel	SAE 1010
21	Grip	Vinyl	
22	Adaptor	Zinc plated SG iron	
23	Adaptor plate	Zinc plated carbon steel	SAE 1010
24	Adaptor with indicator 3" to 6"	Zinc plated SG iron	
25	Stop screw 3" to 6"	Zinc plated carbon steel	SAE 12L14
27	Adaptor screw	Zinc plated carbon steel	Grade 5
28	Stop screw 3" to 6"	Carbon steel	
29	Adaptor hex. nut 3" to 6"	Zinc plated carbon steel	
31	Antistatic device ball	Stainless steel	
32	Antistatic device spring	Stainless steel	AISI 301

\*Note: Available spare parts sold as a kit.

## Dimensions/weights (approximate) inches and lb

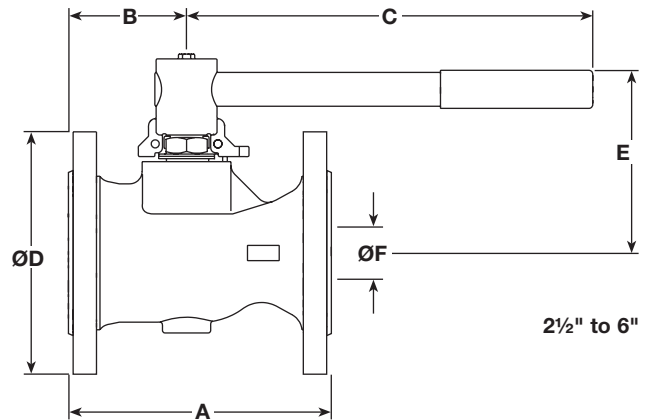
### Flanged ASME 150

Size	A	B	C	D	E	F	Weight
1"	5.0	2.4	6.4	4.3	3.9	0.7	6.3
1¼"	5.5	2.6	7.2	4.6	4.2	0.9	8.3
1½"	6.5	2.7	7.3	5.0	4.6	1.2	11.8
2"	7.0	3.0	7.3	5.9	4.8	1.5	17.4
2½"	7.5	3.1	10.9	7.0	5.7	2.0	26.4
3"	7.9	3.6	16.4	7.5	6.2	2.2	34.8
4"	9.0	3.9	20.3	9.0	6.8	3.0	54.6
6"	10.5	5.1	27.5	10.9	8.1	3.9	96.4



### Flanged ASME 300

Size	A	B	C	D	E	F	Weight
1"	6.5	2.4	6.4	4.9	3.9	0.7	9.9
1¼"	7.0	2.6	7.2	5.3	4.2	0.9	12.5
1½"	7.5	2.7	7.3	6.1	4.6	1.2	180.4
2"	8.5	3.0	7.3	6.5	4.8	1.5	22.6
2½"	9.5	3.1	10.9	7.5	5.7	2.0	35.2
3"	11.1	3.6	16.4	8.3	6.2	2.2	49.1
4"	12.0	3.9	20.3	10.0	6.8	3.0	79.4
6"	15.9	5.1	27.5	12.5	8.1	3.9	146.5



### Cv values

Inches	1"	1¼"	1½"	2"	2½"	3"	4"	6"
Cv	34	46	93	119	227	286	671	849

### Operating torques (ft - lb)

Inches	1"	1¼"	1½"	2"	2½"	3"	4"	6"
ft-lb	14	18	26	33	41	66	89	103

**Note:** The torque figures shown are for a valve that is frequently operated at the maximum operating pressure. Valves that are subject to long static periods, may require a greater break-out torque.

## Safety information, installation and maintenance

Installation and Maintenance Instructions, IM-P133-79.

### How to order

Specify	Size	Seats	S = Reinforced PTFE - PDR 0.8
	Model		V = Virgin PTFE
	Seats	Body material	2 = Carbon steel
	Material		3 = Stainless steel

S = Reinforced PTFE - PDR 0.8

V = Virgin PTFE

2 = Carbon steel

3 = Stainless steel

**Example:** 1 off Spirax Sarco 2" M40Vi2 ISO ball valve having flanged ASME 150 connections.

### Optional extras:

- Self-venting ball.
- Extended stems 50 mm (2") and 100 mm (4") to allow full insulation.\*
- Lockable handle.\*
- 100 mm extended stem with lockable handle.\*

\*manual operation only

## 1" to 2" - Spare parts

The spare parts available are shown in solid outline. Parts drawn in broken line are not supplied as spares.

### Available spares

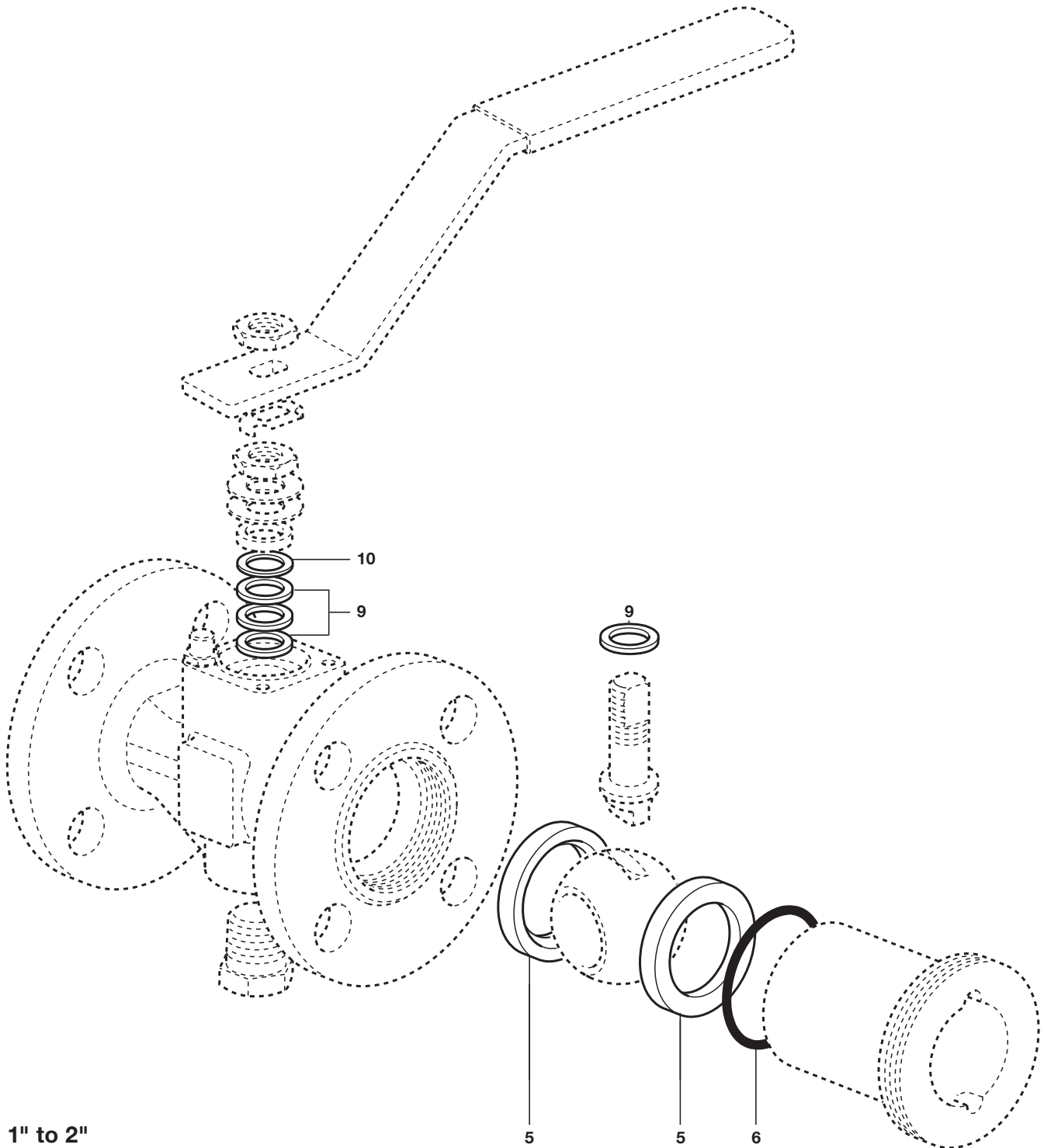
Seats, insert 'O' ring and stem seals

5, 6, 9, 10

### How to order spares

Always order spares by using the description given in the column headed 'Available spares' and state the size and type of ball valve.

**Example:** 1 set of seats, insert 'O' ring and stem seals for a Spirax Sarco 2" flanged ASME 150 M40Si2 ball valve.



## 2½" to 6" - Spare parts

The spare parts available are shown in solid outline. Parts drawn in broken line are not supplied as spares.

### Available spares

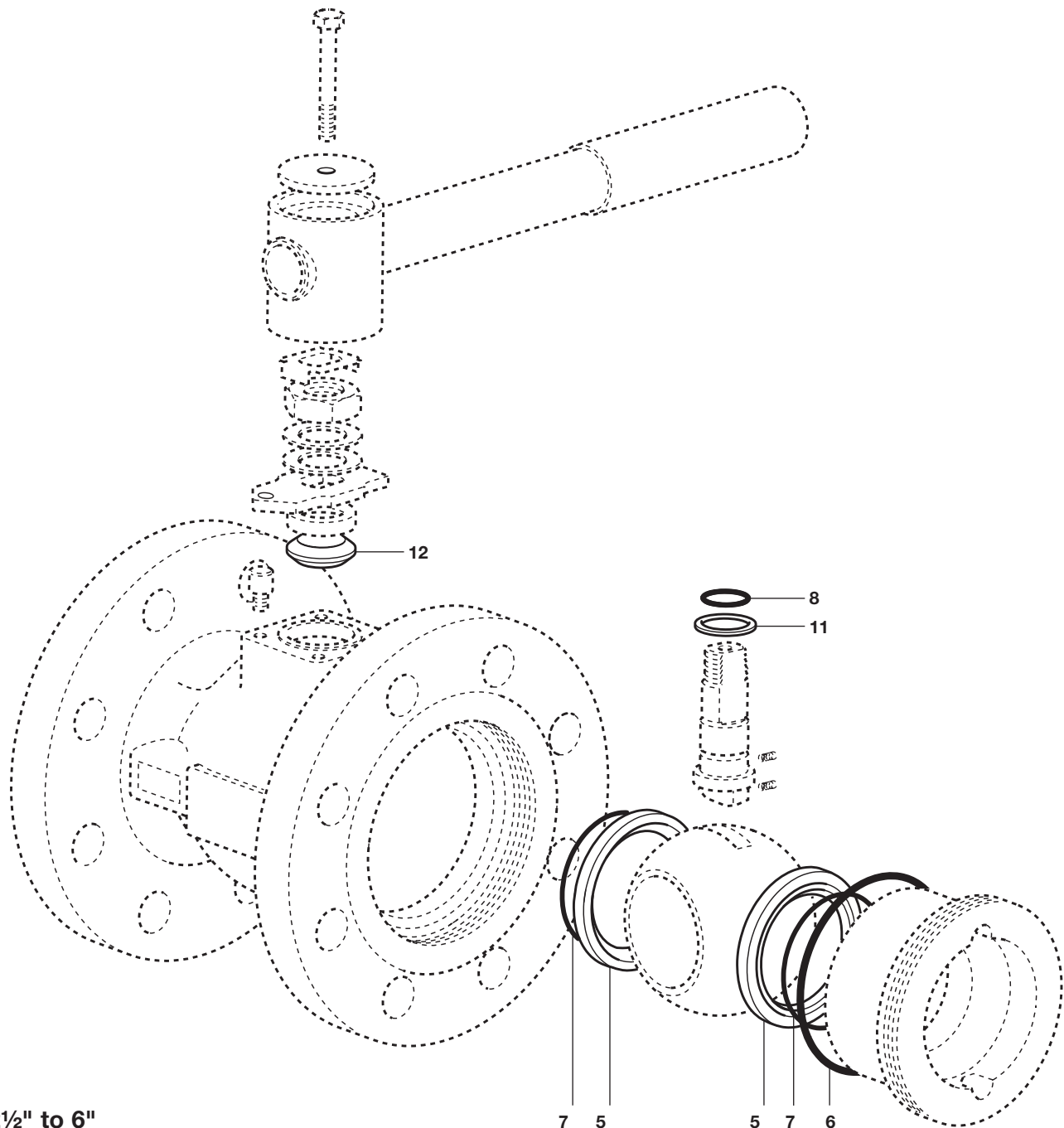
Seats, insert 'O' ring, seat 'O' ring, stem 'O' ring, lower stem seals and upper stem packaging

5, 6, 7, 8, 11, 12

### How to order spares

Always order spares by using the description given in the column headed 'Available spares' and state the size and type of ball valve.

**Example:** 1 set of seats, insert 'O' ring, seat 'O' ring, stem 'O' ring, lower stem seals and upper stem packaging for a Spirax Sarco 2" flanged ASME 150 M40Si2 ball valve.



2½" to 6"

7 5

5 7 6

## BVA300 Series

### Pneumatic Actuators for Spirax Sarco Ball Valves

#### Description

The BVA300 series are pneumatic rotary actuators which automate Spirax Sarco ball valves in a wide range of industrial applications. BVA300 actuators are provided with bi-directional travel stop that allow a rotation of  $90^{\circ} \pm 5^{\circ}$ . Linkage is made with the new BVL\_X kits with extended stem.

**The pneumatic actuated ball valve range comprises:-**

**Actuators combined with three-piece ball valves:**

M10Vi ISO, M10Si ISO, M10HPi ISO, M10Pi ISO\*, M10Ti ISO, M10F ISO, M10Hi ISO, M10HTi, M70i ISO and M80i ISO

**Actuators combined with two-piece ball valves:**

M33V ISO, M33S ISO and M33F ISO

**Actuators combined with one-piece ball valves:**

M21S ISO, M20S, M20H\*, M40V ISO, M40S ISO, M40F ISO and M40H ISO\*

\***BVA300 note:** For use with these valves, contact Spirax Sarco.

#### Available types of BVA actuator

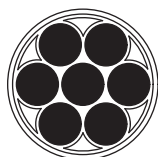
**Double acting:** 310D, 315D, 320D, 325D, 330D, 335D, 340D, 345D, 350D, 355D, 360D, 365D

**Single acting (spring return):** 310S, 315S, 320S, 325S, 330S, 335S, 340S, 345S, 350S, 355S, 360S, 365S.

**Note:** The BVA365D will be selected when higher torques are required for further data contact Spirax Sarco.

#### Spring quantity selection

According to the available air pressure, the BVA has different spring configurations. For more details, see the Installation and Maintenance Instructions IM-P372-24.



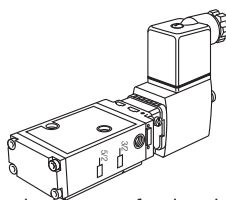
	Springs					
BVA	S/4	S/6	S/8	S/10	S/12	S/14
310	•	•	•			
315 - 365			•	•	•	•

**Example:** BVA325S/10 has 10 springs.

#### Optional extras

**Solenoid valve:** a range of Namur electrical valves with an encapsulation rating to IP65 minimum is available for use with BVA actuators. These can be used to drive actuators with compressed air or non-corrosive gas.

Solenoid	Coil voltage
3/2 NAMUR for BVAS	220 Vac
	110 Vac
	24 Vac/dc
5/2 NAMUR for BVAD	220 Vac
	110 Vac
	24 Vac/dc

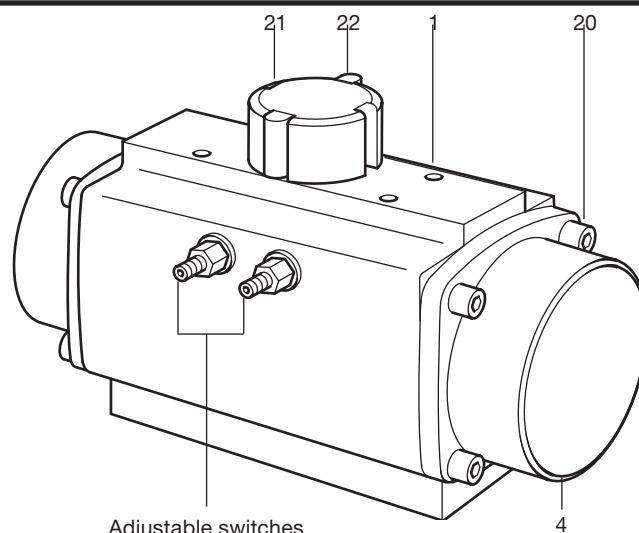


**Note: IP65 and IP67 Electric Protection** Explosion proof solenoid valves and ASI option available on request.

**Limit switch box:** a range of limit switch boxes are available to indicate ball valve position. It also allows switching points to be adjustable over the full range of actuators. See TI-P372-26 for details.

#### Available types

LSB3 IP67 Protection	IP68 (optional)
LSB7 Exp. Proof Exd IIc	T6, IP67 (optional)



Adjustable switches

#### Technical data

Maximum pressure	(8 bar g) 120 psig
Minimal pressure	(3 bar g) 45 psig
Operating pressure range (standard)	(3, 4, 5 or 6 bar g) 45, 60, 75 or 90 psig
Operating temperature range	(-30°C to 100°C) -22°F to 212°F
<b>Note:</b> Other operating temperature ranges available on request.	
Operating media	Compressed air (clean and dry) Non corrosive gas Light hydraulic oil (must be compatible with 'O' rings)
Rotation $90^{\circ} \pm 5^{\circ}$	Anti-clockwise with port 'A' pressurised

#### Materials

No	Part	Material
1	Body	Aluminium hard anodized
3	Pinion	Nickel plated carbon steel
4	End caps	Aluminium epoxy coated
20	Bolt	Stainless steel
21	Indicator cap	Polyamide
22	Colored indicator	Polyamide

**Note:** Item 3 is shown clearly in the spares drawing on page 2.

#### BVL\_X linkage kit components and materials

**Note:** The BVL\_X for the M20 is made in zinc plated carbon steel.

Frame	Stainless steel AISI 304
Stem adapter	Stainless steel AISI 304
Frame-to-actuator screws	Stainless steel Gr. 5
Washers	Stainless steel
Frame-to-valve screws	Stainless steel Gr. 5
Stem nut	Stainless steel

## Compressed air consumption

Nm<sup>3</sup>/stroke

BVA	310	315	320	325	330	335	340	345	350	355	360	365
Single Acting	0.0001	0.0002	0.0006	0.0008	0.0011	0.0019	0.0029	0.0047	0.007	0.01	0.02	0.03
Double Acting	0.0002	0.0005	0.0011	0.0015	0.0023	0.0036	0.0056	0.0085	0.01	0.02	0.05	0.06

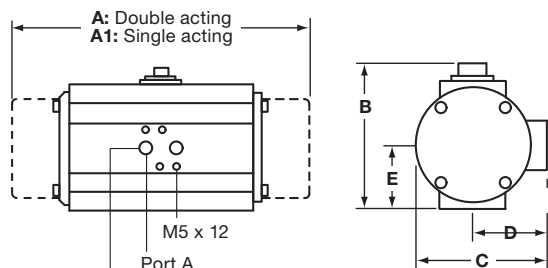
Notes:

- Normal m<sup>3</sup> per open/close cycle when supplied with air at 87 psig
- Consumption for BVA 310 considering S/06 spring configuration

- Consumption for BVA 315 - BVA 365 considering S/14 spring configuration

## Dimensions / weights approximate in inches (mm) and lbs. (kg)

Type	A1	A	B	C	D	E	Weights	
							Single	Double
BVA310	6.42 (163)	5.71 (145)	3.78 (96)	2.99 (76)	1.89 (48)	1.34 (34)	3.5 (1.6)	3.1 (1.4)
BVA315	7.68 (195)	6.23 (158)	4.53 (115)	3.59 (91)	2.21 (56)	1.77 (45)	5.1 (2.3)	4.6 (2.1)
BVA320	8.55 (217)	6.97 (177)	5.40 (137)	4.37 (111)	2.60 (66)	2.17 (55)	8.2 (3.7)	6.6 (3.0)
BVA325	10.17 (258)	7.72 (196)	5.79 (147)	4.81 (122)	2.80 (71)	2.36 (60)	10.6 (4.8)	8.4 (3.8)
BVA330	11.78 (299)	8.87 (225)	6.50 (165)	5.36 (136)	3.07 (78)	2.76 (70)	16.1 (7.3)	12.3 (5.6)
BVA335	13.75 (349)	10.76 (273)	7.17 (182)	6.03 (153)	3.39 (86)	3.15 (80)	23.8 (10.8)	18.7 (8.5)
BVA340	15.62 (397)	11.96 (304)	7.83 (199)	6.81 (173)	3.77 (96)	3.34 (85)	33.9 (15.4)	24.6 (11.2)
BVA345	18.64 (473)	14.66 (372)	8.71 (221)	7.56 (192)	4.18 (106)	3.86 (98)	49 (22.2)	38 (16.9)
BVA350	22.06 (560)	17.30 (439)	9.81 (249)	8.39 (213)	4.57 (116)	4.49 (114)	76 (34.3)	57 (25.8)
BVA355	23.68 (601)	18.16 (461)	11.03 (280)	9.57 (243)	5.16 (131)	5.12 (130)	102 (46.0)	72 (32.5)
BVA360	29.08 (738)	20.41 (518)	15.09 (383)	14.03 (356)	7.01 (178)	6.97 (177)	221 (99.9)	154 (69.6)
BVA365	37.04 (940)	24.82 (630)	17.10 (434)	16.35 (415)	8.39 (213)	7.92 (201)	404 (183)	286 (129.4)



Air inlet connection

NAMUR G 1/4" DIN

Note: 1/4 NPT adaptor fitting is available

## How to order

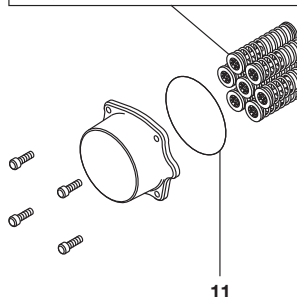
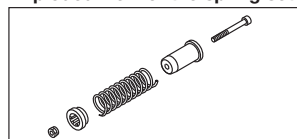
Note: You will need to refer to the selection tables (pages 3 to 8) before placing an order.

### How to order example:

- 1 - Spirax Sarco BVA320S/8 actuator
- 1 - 3/2 NAMUR solenoid 24 VAC
- 1 - BVL337X linkage kit
- 1 - LSB3 limit switch box

Note: Actuated ball valves may be supplied completely assembled to suit the application.

Exploded view of the spring set



## Typical assembly

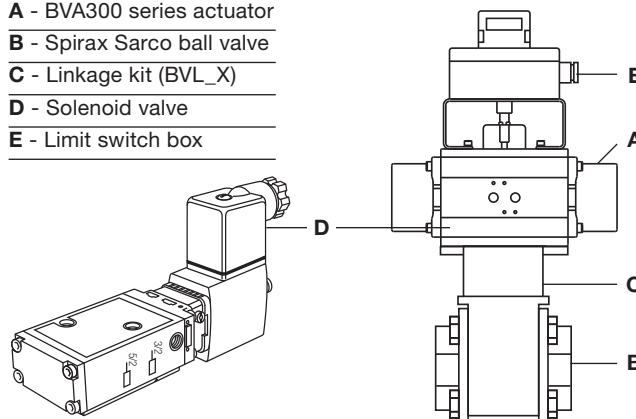
A - BVA300 series actuator

B - Spirax Sarco ball valve

C - Linkage kit (BVL\_X)

D - Solenoid valve

E - Limit switch box



## Spare parts

The spare parts available are detailed below. No other parts are supplied as spares.

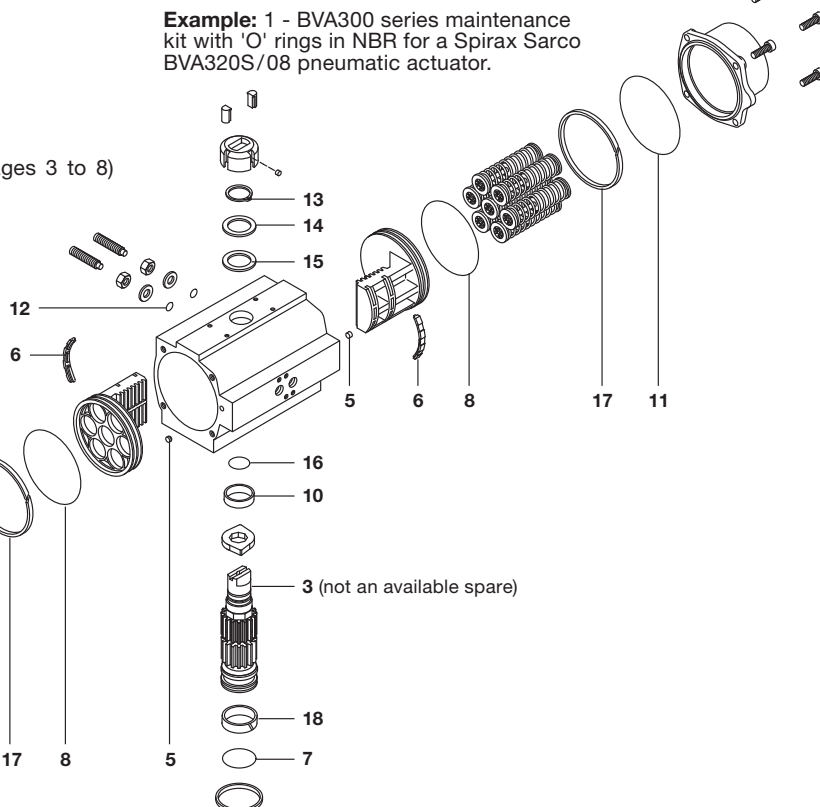
### Available spares

BVA300 series maintenance kit	'O' rings set	7, 8, 11, 12, 16
	(available either in NBR, Viton or Silicon)	
	Pinion washers	13, 14, 15
	Others	5, 6, 10, 17, 18

### How to order spares

Always order spares by using the description given in the column headed 'Available spares' and state the nomenclature of the pneumatic actuator that they are intended for. Note: all the spares mentioned above are sold together in one spare part kit.

Example: 1 - BVA300 series maintenance kit with 'O' rings in NBR for a Spirax Sarco BVA320S/08 pneumatic actuator.





## Pneumatic actuator selection tables for three-piece ball valves

### M10Vi ISO, M10Si ISO and M10Ti ISO ball valves

Actuator operating pressure (3 bar g) 45 psig

DN	Double acting		Single acting	
	BVA	BVL	BVA	BVL
1/4" RB - 3/8" RB	310D	300X	310S/4	300X
1/2" RB - 3/8" FB	310D	300X	310S/4	300X
3/4" RB - 1/2" FB	310D	300X	315S/8	300X
1" RB - 3/4" FB	315D	302X	320S/8	303X
1 1/4" RB - 1" FB	320D	311X	325S/8	311X
1 1/2" RB - 1 1/4" FB	330D	305X	340S/8	316X
2" RB - 1 1/2" FB	330D	306X	340S/8	307X
2 1/2" RB - 2" FB	335D	309X	340S/8	309X

Actuator operating pressure (5 bar g) 75 psig

DN	Double acting		Single acting	
	BVA	BVL	BVA	BVL
1/4" RB - 3/8" RB	310D	300X	310S/6	300X
1/2" RB - 3/8" FB	310D	300X	310S/6	300X
3/4" RB - 1/2" FB	310D	300X	310S/6	300X
1" RB - 3/4" FB	315D	302X	320S/12	303X
1 1/4" RB - 1" FB	315D	310X	320S/12	311X
1 1/2" RB - 1 1/4" FB	320D	305X	330S/12	305X
2" RB - 1 1/2" FB	325D	306X	335S/12	307X
2 1/2" RB - 2" FB	325D	308X	335S/12	309X

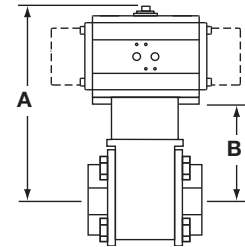
Actuator operating pressure (4 bar g) 60 psig

Double acting		Single acting	
BVA	BVL	BVA	BVL
310D	300X	310S/6	300X
310D	300X	310S/6	300X
310D	300X	315S/10	300X
315D	302X	320S/10	303X
315D	310X	320S/10	311X
325D	305X	335S/10	316X
325D	306X	335S/10	307X
330D	308X	340S/10	309X

Actuator operating pressure (6 bar g) 90 psig

Double acting		Single acting	
BVA	BVL	BVA	BVL
310D	300X	310S/8	300X
310D	300X	310S/8	300X
310D	300X	310S/8	300X
310D	302X	315S/14	302X
315D	310X	320S/14	311X
320D	305X	330S/14	305X
320D	306X	330S/14	306X
325D	308X	335S/14	309X

Dimensions \*



inches (mm)

DN	A	B
1/4"	(218) 8.59	(122) 4.81
3/8"	(218) 8.59	(122) 4.81
1/2"	(237) 9.34	(122) 4.81
3/4"	(261) 10.28	(124) 4.89
1"	(276) 10.88	(129) 5.09
1 1/4"	(333) 13.12	(134) 5.28
1 1/2"	(336) 13.24	(137) 5.40
2"	(342) 13.48	(143) 5.64
2 1/2"	(356) 14.03	(157) 6.19

\*Note: The dimensions A and B represents the maximum size (mm) for the biggest recommended actuator according to each valve.

### M10Pi ISO ball valves

Actuator operating pressure (3 bar g) 45 psig

DN	Double acting		Single acting	
	BVA	BVL	BVA	BVL
1/4" RB - 3/8" RB	310D	490X	310S/4	490X
1/2" RB - 3/8" FB	310D	490X	310S/4	490X
3/4" RB - 1/2" FB	310D	490X	315S/8	490X
1" RB - 3/4" FB	315D	492X	320S/8	493X
1 1/4" RB - 1" FB	320D	494X	325S/8	494X
1 1/2" RB - 1 1/4" FB	330D	496X	340S/8	497X
2" RB - 1 1/2" FB	330D	498X	340S/8	499X
2 1/2" RB - 2" FB	330D	505X	340S/8	502X

Actuator operating pressure (5 bar g) 75 psig

DN	Double acting		Single acting	
	BVA	BVL	BVA	BVL
1/4" RB - 3/8" RB	310D	490X	310S/6	490X
1/2" RB - 3/8" FB	310D	490X	310S/6	490X
3/4" RB - 1/2" FB	310D	490X	310S/6	490X
1" RB - 3/4" FB	315D	492X	320S/12	493X
1 1/4" RB - 1" FB	315D	504X	320S/12	494X
1 1/2" RB - 1 1/4" FB	320D	496X	330S/12	496X
2" RB - 1 1/2" FB	325D	498X	335S/12	499X
2 1/2" RB - 2" FB	325D	505X	335S/12	502X

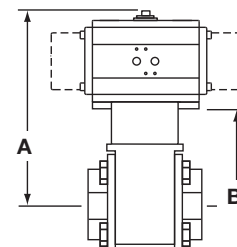
Actuator operating pressure (4 bar g) 60 psig

Double acting		Single acting	
BVA	BVL	BVA	BVL
310D	490X	310S/6	490X
310D	490X	310S/6	490X
310D	490X	315S/10	490X
315D	492X	320S/10	493X
315D	504X	320S/10	494X
325D	496X	335S/10	497X
325D	498X	335S/10	499X
330D	505X	340S/10	502X

Actuator operating pressure (6 bar g) 90 psig

Double acting		Single acting	
BVA	BVL	BVA	BVL
310D	490X	310S/8	490X
310D	490X	310S/8	490X
310D	490X	310S/8	490X
310D	492X	315S/14	492X
315D	504X	320S/14	494X
320D	496X	330S/14	496X
320D	498X	330S/14	498X
325D	505X	335S/14	502X

Dimensions \*



inches (mm)

DN	A	B
1/4"	(218) 8.59	(122) 4.81
3/8"	(218) 8.59	(122) 4.81
1/2"	(237) 9.34	(122) 4.81
3/4"	(261) 10.28	(124) 4.89
1"	(276) 10.88	(129) 5.09
1 1/4"	(333) 13.12	(134) 5.28
1 1/2"	(336) 13.24	(137) 5.40
2"	(342) 13.48	(143) 5.64
2 1/2"	(356) 14.03	(157) 6.19

\*Note: The dimensions A and B represents the maximum size (mm) for the biggest recommended actuator according to each valve.



## Pneumatic actuator selection tables for three-piece ball valves

### M10HPi ISO ball valves

Actuator operating pressure (3 bar g) 45 psig

DN	Double acting		Single acting	
	BVA	BVL	BVA	BVL
1/4" RB - 3/8" RB	315D	490X	320S/8	491X
1/2" RB - 3/8" FB	315D	490X	320S/8	491X
3/4" RB - 1/2" FB	315D	490X	325S/8	491X
1" RB - 3/4" FB	320D	493X	330S/8	493X
1 1/4" RB - 1" FB	325D	494X	340S/8	495X
1 1/2" RB - 1 1/4" FB	330D	496X	340S/8	497X
2" RB - 1 1/2" FB	335D	499X	345S/8	500X

Actuator operating pressure (5 bar g) 75 psig

DN	Double acting		Single acting	
	BVA	BVL	BVA	BVL
1/4" RB - 3/8" RB	310D	490X	315S/12	490X
1/2" RB - 3/8" FB	310D	490X	315S/12	490X
3/4" RB - 1/2" FB	315D	490X	320S/12	491X
1" RB - 3/4" FB	315D	492X	325S/12	493X
1 1/4" RB - 1" FB	320D	494X	330S/12	494X
1 1/2" RB - 1 1/4" FB	325D	496X	335S/12	497X
2" RB - 1 1/2" FB	330D	498X	340S/12	499X

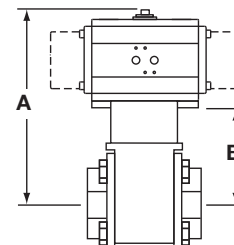
Actuator operating pressure (4 bar g) 60 psig

DN	Double acting		Single acting	
	BVA	BVL	BVA	BVL
310D	490X	320S/10	491X	
310D	490X	320S/10	491X	
315D	490X	320S/10	491X	
320D	493X	325S/10	493X	
325D	494X	335S/10	495X	
325D	496X	335S/10	497X	
335D	499X	340S/10	499X	

Actuator operating pressure (6 bar g) 90 psig

DN	Double acting		Single acting	
	BVA	BVL	BVA	BVL
310D	490X	315S/14	490X	
310D	490X	315S/14	490X	
310D	490X	320S/14	491X	
315D	492X	320S/14	493X	
320D	494X	330S/14	494X	
320D	496X	330S/14	496X	
330D	498X	340S/14	499X	

Dimensions \*



inches (mm)

DN	A	B
1/4"	(259) 10.19	(122) 4.8
3/8"	(259) 10.19	(122) 4.8
1/2"	(259) 10.19	(122) 4.8
3/4"	(271) 10.67	(124) 4.9
1"	(294) 11.57	(129) 5.07
1 1/4"	(333) 13.11	(134) 5.27
1 1/2"	(336) 13.22	(137) 5.39
2"	(364) 14.33	(143) 5.63

\*Note: The dimensions A and B represents the maximum size (mm) for the biggest recommended actuator according to each valve.

### M10Hi ISO and M10HTi ball valves

Actuator operating pressure (3 bar g) 45 psig

DN	Double acting		Single acting	
	BVA	BVL	BVA	BVL
1/4" RB - 3/8" RB	315D	490X	320S/8	491X
1/2" RB - 3/8" FB	315D	490X	320S/8	491X
3/4" RB - 1/2" FB	315D	490X	325S/8	491X
1" RB - 3/4" FB	320D	493X	330S/8	493X
1 1/4" RB - 1" FB	325D	494X	340S/8	495X
1 1/2" RB - 1 1/4" FB	330D	496X	340S/8	497X
2" RB - 1 1/2" FB	330D	498X	340S/8	499X
2 1/2" RB - 2" FB	335D	502X	345S/8	503X

Actuator operating pressure (5 bar g) 75 psig

DN	Double acting		Single acting	
	BVA	BVL	BVA	BVL
1/4" RB - 3/8" RB	310D	490X	315S/12	490X
1/2" RB - 3/8" FB	310D	490X	315S/12	490X
3/4" RB - 1/2" FB	315D	490X	320S/12	491X
1" RB - 3/4" FB	315D	492X	325S/10	493X
1 1/4" RB - 1" FB	320D	494X	330S/12	494X
1 1/2" RB - 1 1/4" FB	325D	496X	335S/12	497X
2" RB - 1 1/2" FB	325D	498X	335S/12	499X
2 1/2" RB - 2" FB	330D	505X	335S/12	502X

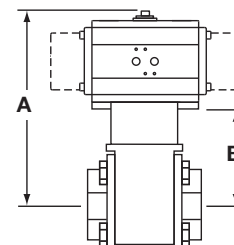
Actuator operating pressure (4 bar g) 60 psig

DN	Double acting		Single acting	
	BVA	BVL	BVA	BVL
310D	490X	320S/10	491X	
310D	490X	320S/10	491X	
315D	490X	320S/10	491X	
320D	493X	325S/10	493X	
325D	494X	335S/10	495X	
325D	496X	335S/10	497X	
330D	498X	340S/10	499X	
335D	502X	340S/10	502X	

Actuator operating pressure (6 bar g) 90 psig

DN	Double acting		Single acting	
	BVA	BVL	BVA	BVL
310D	490X	315S/14	490X	
310D	490X	315S/14	490X	
310D	490X	320S/14	491X	
315D	492X	320S/14	493X	
320D	494X	330S/14	494X	
320D	496X	330S/14	496X	
325D	498X	335S/14	499X	
325D	505X	335S/14	502X	

Dimensions \*



inches (mm)

DN	A	B
1/4"	10.19 (259)	(122) 4.8
3/8"	10.19 (259)	(122) 4.8
1/2"	10.19 (259)	(122) 4.8
3/4"	10.67 (271)	(124) 4.9
1"	11.57 (294)	(129) 5.07
1 1/4"	13.11 (333)	(134) 5.27
1 1/2"	13.22 (336)	(137) 5.39
2"	13.46 (342)	(143) 5.63
2 1/2"	14.03 (356)	(157) 6.19

\*Note: The dimensions A and B represents the maximum size (mm) for the biggest recommended actuator according to each valve.

## Pneumatic actuator selection tables for three-piece ball valves

### M10F ISO ball valves

Actuator operating pressure (3 bar g) 45 psig

DN	Double acting		Single acting	
	BVA	BVL	BVA	BVL
1/4" RB - 3/8" RB	310D	440X	310S/4	440X
1/2" RB - 3/8" FB	310D	441X	310S/4	441X
3/4" RB - 1/2" FB	310D	442X	315S/8	442X
1" RB - 3/4" FB	315D	443X	320S/8	444X
1 1/4" RB - 1" FB	320D	446X	325S/8	446X
1 1/2" RB - 1 1/4" FB	330D	447X	340S/8	448X
2" RB - 1 1/2" FB	330D	449X	340S/8	450X
2 1/2" RB - 2" FB	335D	452X	340S/8	452X

Actuator operating pressure (5 bar g) 75 psig

DN	Double acting		Single acting	
	BVA	BVL	BVA	BVL
1/4" RB - 3/8" RB	310D	440X	310S/6	440X
1/2" RB - 3/8" FB	310D	441X	310S/6	441X
3/4" RB - 1/2" FB	310D	442X	310S/6	442X
1" RB - 3/4" FB	315D	443X	320S/12	444X
1 1/4" RB - 1" FB	315D	445X	320S/12	446X
1 1/2" RB - 1 1/4" FB	320D	447X	330S/12	447X
2" RB - 1 1/2" FB	325D	449X	335S/12	450X
2 1/2" RB - 2" FB	325D	451X	335S/12	452X

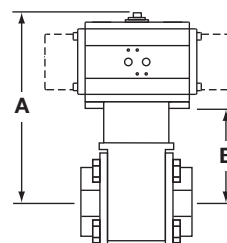
Actuator operating pressure (4 bar g) 60 psig

Double acting		Single acting	
BVA	BVL	BVA	BVL
310D	440X	310S/6	440X
310D	441X	310S/6	441X
310D	442X	315S/10	442X
315D	443X	320S/10	444X
315D	445X	320S/10	446X
325D	447X	335S/10	448X
325D	449X	335S/10	450X
330D	451X	340S/10	452X

Actuator operating pressure (6 bar g) 90 psig

Double acting		Single acting	
BVA	BVL	BVA	BVL
310D	440X	310S/8	440X
310D	441X	310S/8	441X
310D	442X	310S/8	442X
310D	443X	315S/14	443X
315D	445X	320S/14	446X
320D	447X	330S/14	447X
320D	449X	330S/14	449X
325D	451X	335S/14	452X

Dimensions \*



DN	A	B
1/4"	(213) 8.3	(117) 4.6
3/8"	(213) 8.3	(117) 4.6
1/2"	(235) 9.2	(120) 4.7
3/4"	(260) 10.2	(123) 4.8
1"	(275) 10.8	(128) 5.0
1 1/4"	(334) 13.1	(135) 5.3
1 1/2"	(336) 13.2	(137) 5.4
2"	(345) 13.6	(146) 5.7
2 1/2"	(358) 14.1	(159) 6.2

\*Note: The dimensions A and B represents the maximum size (mm) for the biggest recommended actuator according to each valve.

## Pneumatic actuator selection tables for three-piece ball valves

### M70i ISO ball valve

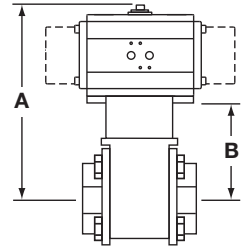
Actuator operating pressure (3 bar g) 45 psig

DN	Double acting		Single acting	
	BVA	BVL	BVA	BVL
½"	315D	300X	320S/8	301X
¾"	315D	300X	325S/8	301X
1"	320D	303X	325S/8	303X
1½"	330D	306X	340S/8	307X
2"	335D	309X	345S/8	318X

Actuator operating pressure 60 psig  
(4 bar g)

Double acting		Single acting	
BVA	BVL	BVA	BVL
315D	300X	320S/10	301X
315D	300X	320S/10	301X
315D	302X	325S/10	303X
330D	306X	340S/10	307X
335D	309X	340S/10	309X

Dimensions \*



Actuator operating pressure (5 bar g) 75 psig

DN	Double acting		Single acting	
	BVA	BVL	BVA	BVL
½"	310D	300X	320S/12	301X
¾"	315D	300X	320S/12	301X
1"	315D	302X	320S/12	303X
1½"	325D	306X	335S/12	307X
2"	330D	308X	340S/12	309X

Actuator operating pressure 90 psig  
(6 bar g)

Double acting		Single acting	
BVA	BVL	BVA	BVL
310D	300X	315S/14	300X
310D	300X	320S/14	301X
315D	302X	320S/14	303X
325D	306X	335S/14	307X
330D	308X	335S/14	309X

inches (mm)

DN	A	B
½"	(259) 10.21	(122) 4.81
¾"	(271) 10.68	(124) 4.89
1"	(276) 10.88	(129) 5.09
1½"	(342) 13.48	(143) 5.64
2"	(378) 14.90	(157) 6.19

\*Note: The dimensions **A** and **B** represents the maximum size (mm) for the biggest recommended actuator according to each valve.

### M80i ISO ball valve

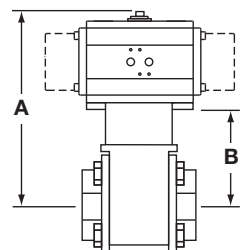
Actuator operating pressure (3 bar g) 45 psig

DN	Double acting		Single acting	
	BVA	BVL	BVA	BVL
2½"	335D	481X	345S/8	482X
3"	340D	481X	345S/8	482X
4"	340D	484X	350S/8	486X

Actuator operating pressure 60 psig  
(4 bar g)

Double acting		Single acting	
BVA	BVL	BVA	BVL
335D	481X	340S/10	481X
335D	481X	345S/10	482X
335D	484X	345S/10	485X

Dimensions \*



Actuator operating pressure (5 bar g) 75 psig

DN	Double acting		Single acting	
	BVA	BVL	BVA	BVL
2½"	330D	480X	340S/12	481X
3"	335D	481X	340S/12	481X
4"	335D	484X	345S/12	485X

Actuator operating pressure 90 psig  
(6 bar g)

Double acting		Single acting	
BVA	BVL	BVA	BVL
330D	480X	340S/14	481X
330D	480X	340S/14	481X
335D	484X	340S/14	484X

inches (mm)

DN	A	B
2½"	(407) 16.04	(186) 7.33
3"	(434) 17.10	(213) 8.40
4"	(499) 19.66	(250) 9.85

\*Note: The dimensions **A** and **B** represents the maximum size (mm) for the biggest recommended actuator according to each valve.

## Pneumatic actuator selection tables for two-piece ball valves

### M33V ISO, M33S ISO and M33F ISO ball valves

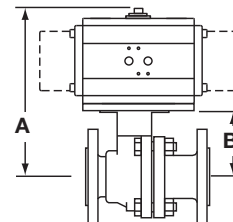
Actuator operating pressure (3 bar g) 45 psig

DN	Double acting		Single acting	
	BVA	BVL	BVA	BVL
2"	330D	510X	340S/8	511X
2½"	335D	513X	345S/8	514X
3"	340D	513X	350S/8	526X
4"	350D	517X	360S/8	527X
6"	360D	520X	365S/8	521X
8"	365D	525X	-	-

Actuator operating pressure (4 bar g)  
60 psig

Double acting		Single acting	
BVA	BVL	BVA	BVL
330D	510X	335S/10	511X
335D	513X	340S/10	513X
335D	513X	345S/10	514X
345D	516X	355S/10	517X
355D	519X	360S/10	520X
360D	524X	365S/10	525X

Dimensions \*



Actuator operating pressure (5 bar g) 75 psig

DN	Double acting		Single acting	
	BVA	BVL	BVA	BVL
2"	325D	510X	335S/12	511X
2½"	330D	512X	340S/12	513X
3"	335D	513X	340S/12	513X
4"	345D	516X	355S/12	517X
6"	350D	519X	360S/12	520X
8"	360D	524X	365S/12	525X

Actuator operating pressure (6 bar g)  
90 psig

Double acting		Single acting	
BVA	BVL	BVA	BVL
325D	510X	335S/14	511X
330D	512X	335S/14	513X
335D	513X	340S/14	513X
345D	516X	350S/14	517X
350D	519X	360S/14	520X
360D	524X	365S/14	525X

inches (mm)

DN	A	B
2"	(356) 14.01	(157) 6.18
2½"	(390) 15.35	(169) 6.65
3"	(426) 16.77	(177) 6.96
4"	(647) 25.47	(264) 10.39
6"	(750) 29.53	(316) 12.44
8"	(785) 30.9	(351) 13.81

\*Note: The dimensions **A** and **B** represents the maximum size (mm) for the biggest recommended actuator according to each valve.

## Pneumatic actuator selection tables for one-piece ball valves

### M20S ball valve

Actuator operating pressure (3 bar g) 45 psig

DN	Double acting		Single acting	
	BVA	BVL	BVA	BVL
1"	320D	461X	325S/8	461X
1¼"	320D	461X	325S/8	461X
1½"	320D	463X	330S/8	463X
2"	320D	463X	330S/8	463X
2½"	330D	464X	340S/8	465X
3"	335D	467X	345S/8	468X
4"	335D	467X	345S/8	468X
6"	355D	471X	365S/8	473X

Actuator operating pressure (5 bar g) 75 psig

DN	Double acting		Single acting	
	BVA	BVL	BVA	BVL
1"	315D	460X	320S/12	461X
1¼"	315D	460X	320S/12	461X
1½"	315D	462X	325S/12	463X
2"	320D	463X	325S/12	463X
2½"	325D	464X	335S/12	465X
3"	330D	466X	340S/12	467X
4"	330D	466X	340S/12	467X
6"	350D	471X	360S/12	472X

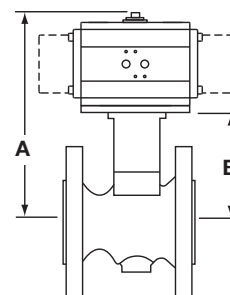
Actuator operating pressure (4 bar g) 60 psig

	Double acting		Single acting	
	BVA	BVL	BVA	BVL
315D	460X	320S/10	461X	
315D	460X	320S/10	461X	
320D	463X	325S/10	463X	
320D	463X	330S/10	463X	
325D	464X	335S/10	465X	
330D	466X	340S/10	467X	
335D	467X	340S/10	467X	
355D	471X	360S/10	472X	

Actuator operating pressure (6 bar g) 90 psig

	Double acting		Single acting	
	BVA	BVL	BVA	BVL
315D	460X	320S/14	461X	
315D	460X	320S/14	461X	
315D	462X	325S/14	463X	
315D	462X	325S/14	463X	
320D	464X	330S/14	464X	
325D	466X	335S/14	467X	
330D	466X	340S/14	467X	
345D	470X	360S/14	472X	

Dimensions \*



inches (mm)

DN	A	B
1"	(276) 10.68	(129) 5.07
1¼"	(279) 10.98	(132) 5.19
1½"	(308) 12.12	(143) 5.6
2"	(316) 12.44	(151) 5.9
2½"	(355) 13.97	(156) 6.1
3"	(389) 15.31	(168) 6.6
4"	(401) 15.78	(180) 7.08
6"	(649) 25.55	(215) 8.46

\*Note: The dimensions **A** and **B** represents the maximum size (mm) for the biggest recommended actuator according to each valve.

### M40Vi ISO, M40Si ISO and M40Fi ISO ball valve

Actuator operating pressure (3 bar g) 45 psig

DN	Double acting		Single acting	
	BVA	BVL	BVA	BVL
½"	310D	300X	320S / 8	301X
¾"	310D	300X	320S / 8	301X
1"	315D	302X	320S / 8	303X
1¼"	320D	494X	325S / 8	494X
1½"	320D	306X	330S / 8	306X
2"	320D	306X	330S / 8	306X
2½"	330D	510X	340S / 8	511X
3"	335D	513X	345S / 8	514X
4"	340D	513X	350S / 8	526X
6"	345D	516X	350S / 8	517X

Actuator operating pressure (5 bar g) 75 psig

DN	Double acting		Single acting	
	BVA	BVL	BVA	BVL
½"	310D	300X	315S / 12	300X
¾"	310D	300X	315S / 12	300X
1"	315D	302X	320S / 12	303X
1¼"	315D	504X	320S / 12	494X
1½"	315D	506X	325S / 12	306X
2"	320D	306X	325S / 12	306X
2½"	325D	510X	335S / 12	511X
3"	330D	512X	340S / 12	513X
4"	335D	513X	340S / 12	513X
6"	340D	515X	345S / 12	516X

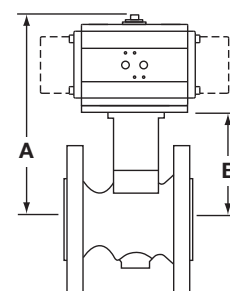
Actuator operating pressure (4 bar g) 60 psig

	Double acting		Single acting	
	BVA	BVL	BVA	BVL
310D	300X	315S / 10	300X	
310D	300X	315S / 10	300X	
315D	302X	320S / 10	303X	
315D	504X	320S / 10	494X	
320D	306X	325S / 10	306X	
320D	306X	330S / 10	306X	
325D	510X	335S / 10	511X	
335D	513X	340S / 10	513X	
335D	513X	345S / 10	514X	
340D	515X	350S / 10	517X	

Actuator operating pressure (6 bar g) 90 psig

	Double acting		Single acting	
	BVA	BVL	BVA	BVL
310D	300X	315S / 14	300X	
310D	300X	315S / 14	300X	
310D	302X	315S / 14	302X	
315D	504X	320S / 14	494X	
315D	506X	325S / 14	306X	
315D	506X	325S / 14	306X	
320D	510X	330S / 14	510X	
330D	512X	335S / 14	513X	
335D	513X	340S / 14	513X	
335D	515X	345S / 14	516X	

Dimensions \*



DN	A	B
½"	(261) 10.2	(124) 4.8
¾"	(261) 10.2	(124) 4.8
1"	(266) 10.5	(129) 5.0
1¼"	(281) 11.0	(134) 5.2
1½"	(303) 11.9	(138) 5.4
2"	(308) 12.1	(143) 5.6
2½"	(356) 14.0	(157) 6.1
3"	(383) 15.0	(162) 6.3
4"	(426) 16.7	(177) 6.9
6"	(513) 20.2	(264) 10.4

\*Note: The dimensions **A** and **B** represents the maximum size (mm) for the biggest recommended actuator according to each valve.



## URPA Series

### Pneumatic Rack and Pinion Actuators for Spirax Sarco Ball Valves (M10Si, M10Vi, M10Ti, M33, & M40)

#### Description

The URPA series is a range of spring return (90°) pneumatic rack and pinion actuators which automate Spirax Sarco ball valves in a wide range of industrial applications. Actuators will operate at temperatures between -10°F to 195°F and input pressures at 80 psig. Two types of service are available: Light Service and Heavy Service. Patented spring cartridges are preloaded and designed to remain self-contained.

**Note:** A Double Acting model (90°, 120°, 135° and 180°) is available upon request.

#### Standards and Approvals

The URPA series pneumatic rack and pinion actuators are manufactured in compliance with the following agency standards and approvals:

- UL & CSA approved
- Safety Integrity Level (SIL) 3 certified under IEC Standards 61508 and 61511
- ISO 9001:2008
- ATEX certified under Directive 94/9/CE

Accessory mounting patterns on the actuator body conform to NAMUR standards and the actuator drive shaft meets all ISO 5211 dimensional standards.

#### The pneumatic actuated ball valve range

Actuators combined with three-piece ball valves:

M10Si, M10Vi and M10Ti

Actuators combined with two-piece ball valves:

M33S, M33V and M33F

Actuators combined with one-piece ball valves:

M40Si, M40Vi and M40Hi

For all other ranges to be mounted with URPA actuators, please contact Spirax Sarco, Inc, Blythwood, SC

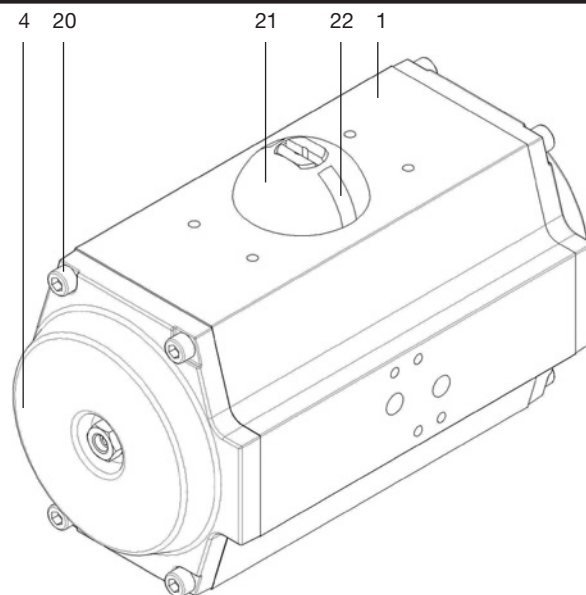
#### Spring Cartridges

The patented spring cartridges are preloaded and uniquely designed to remain self-contained. The actuators can easily be changed in the field from double acting to spring return by simply inserting the required number of our spring cartridges into the actuator body.



According to the available air pressure, the URPA has different cartridge spring configurations. The actuator can accept up to 6 cartridge springs in each end cap, but not less than 2 spring cartridges per end cap. The number of cartridge springs loaded into the actuator affects the amount of torque the actuator will be able to generate during the closing and opening cycles. For more details, see the Installation and Maintenance Instructions.

Total # of Cartridge Springs	2	3	4	5	6
Spring Location (Right cap)	1/4	1/3/5	2/3/5/6	1/3/4/5/6	All Positions
Spring Location (Left cap)	1/4	1/3/5	2/3/5/6	1/3/4/5/6	All Positions



#### Materials

No	Part	Material
1	Body	Extruded Aluminium Alloy ASTM 6063 Anodized 10681
	Pinion	Steel IISMNP337 Electroless Nickle plated
4	End caps	Die Cast Aluminium Alloy EN AC-46100 UNII EN 1706:1999
20	Bolt	Stainless steel
21	Indicator cap	Polyamide
22	Colored indicator	Polyamide

#### URPA linkage kit components and materials

Frame	Stainless steel AISI 304
Stem adapter	Stainless steel AISI 304
Frame-to-actuator screws	Stainless steel Gr. 5
Washers	Stainless steel
Frame-to-valve screws	Stainless steel Gr. 5
Stem nut	Stainless steel

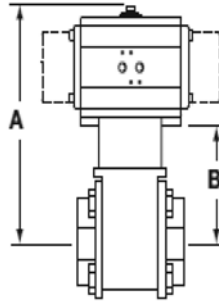
Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only. In the interests of development and improvement of the product, we reserve the right to change the specification.

TI-1-623-US 10.15



# URPA Series

## Pneumatic Rack and Pinion Actuators for Spirax Sarco Ball Valves



### Pneumatic actuator selection tables for three-piece ball valves

#### M10Si ISO and M10Ti ISO ball valves

Actuator operating pressure 80 psig

Size	Torque [N.m]	Light Service	
		Actuator	Linkage Kit
1/2"RB	3	URPA-K20K33	A/2
3/4"RB & 1/2"FB	4	URPA-K20K33	A/2
1"RB & 3/4"FB	8	URPA-K34K44	A/3
1 1/4"RB & 1"FB	15	URPA-K48K55	A/1
1 1/2"RB & 1-1/4"FB	28	URPA-K105K44	B/6
2"RB & 1-1/2"FB	35	URPA-K105K55	B/8
2 1/2"RB & 2"FB	65	URPA-K237K44	C/10

Size	Torque [N.m]	Heavy Service	
		Actuator	Linkage Kit
1/2"RB	3	URPA-K20K33	A/2
3/4"RB & 1/2"FB	6	URPA-K20K55	A/2
1"RB & 3/4"FB	13	URPA-K48K44	A/3
1 1/4"RB & 1"FB	20	URPA-K75K44	A/5
1 1/2"RB & 1-1/4"FB	50	URPA-K157K55	B/7
2"RB & 1-1/2"FB	60	URPA-K157K55	B/9
2 1/2"RB & 2"FB	75	URPA-K237K55	C/10

### Pneumatic actuator selection tables for two-piece ball valves

#### M33V ISO, M33S ISO and M33F ISO

Actuator operating pressure 80 psig

Size	Torque [N.m]	Light Service		Dimensions (Flanged)		
		Actuator	Linkage Kit	A1	B1	B2
2" ANSI 150	50	URPA-K157K55	B/11	14.2	8.0	8.0
2" ANSI 300	50	URPA-K157K55	B/11	14.2	8.0	8.0
2 1/2" ANSI 150	85	URPA-K331K55	C1/12	15.5	8.4	8.4
3" ANSI 150	120	URPA-K406K55	C1/13	17.3	8.7	8.7
4" ANSI 150	200	URPA-K633K55	D/14	18.8	9.8	9.8
6" ANSI 150	500	URPA-K1831K44	E/17	25.8	12.8	12.8
6" ANSI 300	500	URPA-K1831K44	E/17	25.8	12.8	12.8
8" ANSI 150	800	URPA-K2928K55	F/17	27.2	14.1	14.1
8" ANSI 300	800	URPA-K2928K55	F/17	27.2	14.1	14.1

Size	Torque [N.m]	Heavy Service		Dimensions (Flanged)		
		Actuator	Linkage Kit	A1	B1	B2
2" ANSI 150	70	URPA-K237K55	B/11	14.2	8.0	8.0
2" ANSI 300	70	URPA-K237K55	B/11	14.2	8.0	8.0
2 1/2" ANSI 150	180	URPA-K633K55	C1/13	17.4	8.4	8.4
3" ANSI 150	180	URPA-K633K55	C1/13	17.4	8.4	8.4
4" ANSI 150	220	URPA-K633K55	D/14	17.4	8.4	8.4
6" ANSI 150	500	URPA-K1831K44	E/17	25.8	12.8	12.8
6" ANSI 300	500	URPA-K1831K44	E/17	25.8	12.8	12.8
8" ANSI 150	750	URPA-K2928K55	F/17	27.2	14.1	14.1
8" ANSI 300	750	URPA-K2928K55	F/17	27.2	14.1	14.1

### Pneumatic actuator selection tables for one-piece ball valves

#### M40Vi ISO, M40Si ISO and M40Fi ISO

Actuator operating pressure 80 psig

Size	Torque [N.m]	Light Service		Dimensions (Flanged)		
		Actuator	Linkage Kit	A1	B1	B2
1" ANSI 150	8	URPA-K34K44	A1/3	10.5	6.3	6.4
1" ANSI 300	8	URPA-K34K44	A1/3	10.5	6.3	6.4
1 1/4" ANSI 150	12	URPA-K48K44	A/16	11.2	6.5	6.6
1 1/4" ANSI 300	12	URPA-K48K44	A/16	11.2	6.5	6.6
1 1/2" ANSI 150	22	URPA-K75K55	B/8	11.9	6.9	7.1
2" ANSI 150	30	URPA-K105K55	B/8	12.4	7.0	7.3
2 1/2" ANSI 150	40	URPA-K157K44	B/11	14.2	8.0	8.0
3" ANSI 150	65	URPA-K237K44	C1/12	14.4	8.1	8.1
4" ANSI 150	120	URPA-K406K55	C1/13	17.3	8.7	9.0
6" ANSI 150	160	URPA-K633K44	D/15	18.8	9.8	10.3
6" ANSI 300	160	URPA-K633K44	D/15	18.8	9.8	10.3

Size	Torque [N.m]	Heavy Service		Dimensions (Flanged)		
		Actuator	Linkage Kit	A1	B1	B2
1" ANSI 150	20	URPA-K75K44	A1/4	11.3	6.3	6.4
1" ANSI 300	20	URPA-K75K44	A1/4	11.3	6.3	6.4
1 1/4" ANSI 150	25	URPA-K75K55	A/18	11.5	6.5	6.6
1 1/4" ANSI 300	25	URPA-K75K55	A/18	11.5	6.5	6.6
1 1/2" ANSI 150	45	URPA-K157K55	B/9	13.1	6.9	7.1
2" ANSI 150	50	URPA-K157K55	B/9	13.3	7.0	7.3
2 1/2" ANSI 150	70	URPA-K237K55	B/11	14.2	8.0	8.0
3" ANSI 150	90	URPA-K331K55	C1/12	15.2	8.1	8.1
4" ANSI 150	120	URPA-K406K55	C1/13	17.3	8.7	9.0
6" ANSI 150	160	URPA-K633K44	D/15	18.8	9.8	10.3
6" ANSI 300	160	URPA-K633K44	D/15	18.8	9.8	10.3



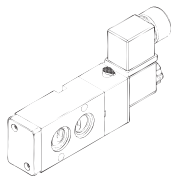
# URPA Series

## Pneumatic Rack and Pinion Actuators for Spirax Sarco Ball Valves

Dimensions / weights approximate in inches and pounds

### Optional extras

**Solenoid valve:** a range of direct Namur electrical valves. 5/2 or 3/2 NC operation. Intended for use with URPA actuators. These can be used to drive actuators with compressed air or non-corrosive gas. UL, CSA and CE certification is available.



### Performance Data

CV Rating	Body	Positions	Airports
1.4	Anodized aluminum SS available	5/2 or 3/2 NC	¼" NPT
Working Temperature	Working Medium	Working Life	Frequency
23°F - 176°F	Less than 40 microns of filtered and dried air	1 million cycles	5 cycles per second

### Number of Coils

1 - Single Coil

### Enclosure Rating

Nema 4, 4x (UL CSA)

### Voltage

110/120VAC

24VDC Standard (6.9 Watt)

### Option

SC - Speed Control Needle Valve

**Note: IP65 and IP67 Electric Protection** Explosion proof solenoid valves and ASI option available on request.

**Limit switch box:** a range of limit switch boxes are available to indicate ball valve position. It also allows switching points to be adjustable over the full range of actuators.

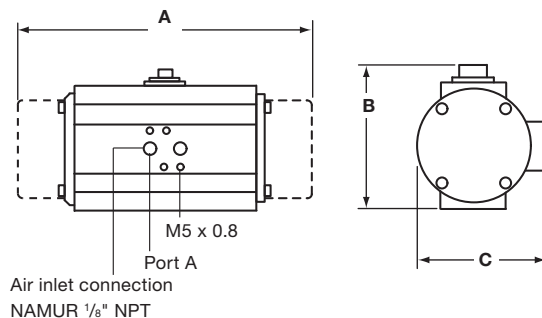
### Available types

SENITEC NEMA 4 Copolyester NAMUR

### Technical data

Maximum pressure	120 psig
Minimal pressure	45 psig
Operating pressure range	80 psig (standard)
<b>Note:</b> Other operating pressure ranges available on request	
Operating temperature range	-22°F to 212°F
Operating media	Compressed air (clean and dry)
	Non corrosive gas
	Light hydraulic oil (must be compatible with 'O' rings)
Rotation 90 ±5°	Anti-clockwise with port 'A' pressurised

Actuator	A	B	C	Weight
URPA-K20K33	4.6	3.4	2.4	2.0
URPA-K34K44	5.4	4.3	3.2	3.0
URPA-K48K44	6.3	4.7	3.6	4.3
URPA-K48K55	6.3	4.7	3.6	4.3
URPA-K75K44	7.1	5.0	3.9	5.5
URPA-K105K44	8.2	5.4	4.4	7.4
URPA-K157K55	8.7	6.3	4.7	10.6
URPA-K237K44	11.5	6.3	4.7	15.0
URPA-K331K55	11.9	7.1	5.4	15.0
URPA-K406K55	13.3	8.6	6.8	31.0
URPA-K633K44	14.9	9.0	6.8	34.0
URPA-K633K55	14.9	9.0	6.8	34.0
URPA-K1831K44	24	13.1	10.7	132.3
URPA-K2928K55	24	13.1	10.7	132.3



### Typical assembly

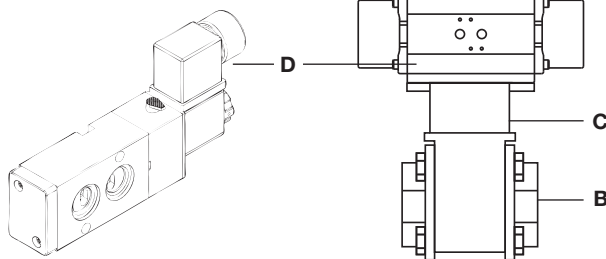
A - URPA series actuator

B - Spirax Sarco ball valve

C - Linkage kit

D - Solenoid valve

E - Limit switch box



### Spare parts

The spare parts available are detailed below. No other parts are supplied as spares.

### Available spares

URPA series	'O' rings set
maintenance kit	Pinion washers

### How to order

You will need to refer to the selection tables on this technical sheet before placing an order.

**Example:** Pneumatic Rack and Pinion Actuator needed to fit a 1½" M10Si2FB. Available air operating pressure is 80 psi

### How to order example:

1 - URPA-K105K44 Actuator  
1 - B/6 Linkage Kit



# Pipeline Ancillaries Solutions





## Pipeline Ancillaries Table of Contents

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TI-7-003A-US	Sizing Chart for S5 & S6 Separators	904
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TI-7-101-US	Sight Check (Combined Sight Glass & Check Valve)	908
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TI-7-006-US	Steel Pressure Gauge	912
TI-P027-03-US	Stainless Steel Pressure Gauge	914
TI-11-002-US	Steam Water Washdown Unit	916
TI-11-003-US	Hot & Cold Water Washdown Unit	918
TI-7-220-US	BSA3T Bellows Sealed Stop Valve	920
TI-7-221-US	A3S Bellows Sealed Stop Valve	922
TI-P184-08-US	Spirax SafeBloc DBB3 Double Block and Bleed Bellows Sealed Stop Valve	925

# spirax/sarco

## Air Eliminators 13WS, 13WHS

13WS and 13WHS Air Eliminators improve the circulation of pressurized liquids by eliminating air and other non-condensable gases which may collect at high points in the system. The EPDM valve head ensures tight shut-off.

Model	13WS	13WHS
<b>PMO</b>	150 psig	300 psig
<b>Sizes</b>	3/4" x 3/8", 1" x 3/8"	3/4" x 3/8"
<b>Connections</b>	NPT	
<b>Construction</b>	Cast Iron Body Stainless Steel internals w/ EPDM valve head	
<b>Options</b>	Brass Body; 13WS only	

### Limiting Operating Conditions

**Max. Operating Pressure (PMO)** 13WS: 150 psig (10 barg)  
13WHS: 300 psig (21 barg)

**Max. Operating Temperature** 13WS & 13WHS: 338°F (170°C)

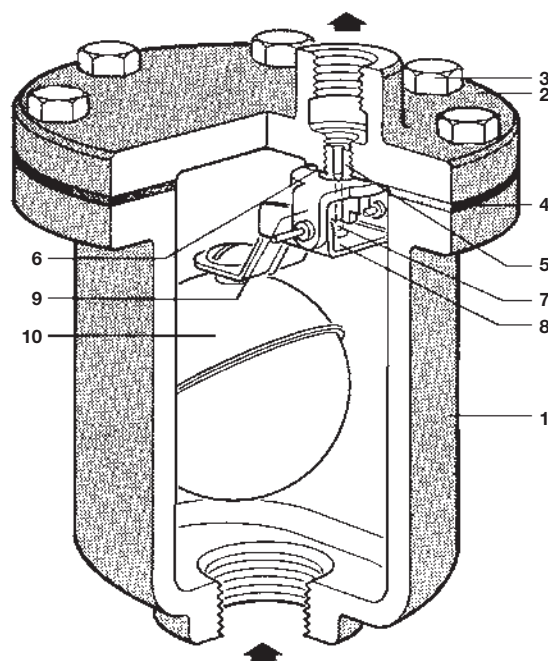
### Pressure Shell Design Conditions

**PMA** 13WS: 150 psig/0-353°F 10 barg/0-178°C  
Max. allowable pressure 13WHS: 300 psig/0-317°F 21 barg/0-158°C

**TMA** 13WS: 450°F/0-125 psig 232°C/0-9 barg  
Max. allowable temperature 13WHS: 450°F/0-250 psig 232°C/0-17 barg

### Construction Materials

No.	Part	Material
1	Body	Cast Iron ASTM A126 CL B
		Optional 13WS Brass ASTM B62
2	Cover	Cast Iron ASTM A126 CL B
		Optional 13WS Brass ASTM B62
3	Cover Bolts	Steel ASTM A449
4	Cover Gasket	Graphite
5	Valve Seat	Stainless Steel Type 303
6	Seat Gasket	Stainless Steel Type 304
7	Valve Head	EPDM
8	Float Arm	Stainless Steel Type 304
9	Bracket	Stainless Steel Type 301
10	Float	Stainless Steel Type 304



### Typical Applications

Air vents can be used on both hot and cold liquid services. Typical applications are cold water lines, suction lines to pumps, mixing tanks, condensate return lines, cooling water lines on air compressors, and water storage tanks.

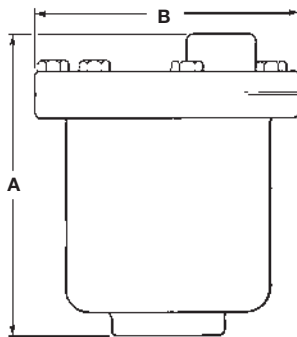
# Air Eliminators

## 13WS, 13WHS

### Air Capacity (discharge to atmosphere)

SCFM cubic feet per minute at standard conditions of 14.7 psia at 60°F. For dm<sup>3</sup>/s multiply by .4719.

Type	Inlet Pressure								
	psi	25	50	75	100	150	200	250	300
	bar	1.7	3.4	5.2	6.9	10.3	13.8	17.2	20.7
13WS		1.6	2.7	3.7	4.8	6.9	—	—	—
13WHS		1.1	1.8	2.5	3.2	4.6	6.0	7.4	8.8



### Dimensions (nominal) in inches and millimeters

Size		A	B	Weight
3/4"	13WS	5.1	4.4	4.75 lb
		129	111	2.2 kg
1"	13WS	5.1	4.4	4.75 lb
		129	111	2.2 kg
3/4"	13WHS	6.0	4.75	5.0 lb
		152	121	2.3 kg

### Installation

An air vent is required at all high points of a liquid system, on terminal equipment and wherever air can collect. The air vent must be installed vertically above the pipe or equipment with the inlet at the bottom. The inlet piping should be the same size as the body piping connection, and a full-port isolating valve should be installed to permit servicing. The discharge must be piped to drain or other safe place to prevent damage if the air vent should malfunction.

### Maintenance

This product can be maintained without disturbing the inlet piping connection. Complete isolation is required before any servicing is performed.

The air vent should be disassembled periodically for inspection and cleaning of the valve head and seat and operating mechanism.

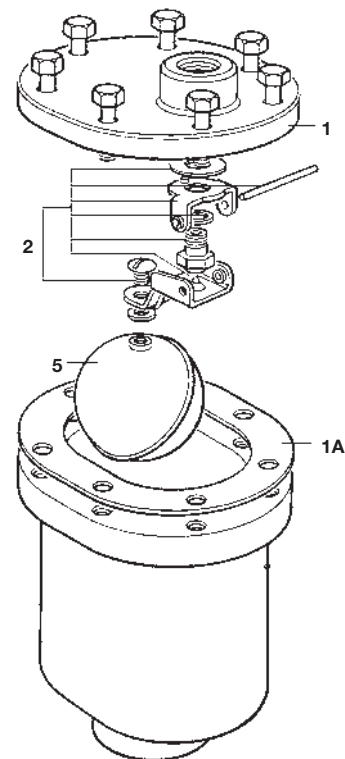
Worn or damaged parts should be replaced using a complete valve mechanism assembly and new cover gasket.

Complete installation and maintenance instructions are given in IM-4-006, which accompanies the product.

### Sample Specification

Automatic Air Eliminators shall be mounted at high points to provide for immediate removal of contained air or other non-condensable gases in liquid piping systems. They shall be of the float type design, having cast iron (brass or stainless steel) bodies with threaded connections. Valve head shall be of EPDM material to provide positive shut-off. All other internals to be stainless steel. Air vent shall have minimum venting capacity of 4.8 SCFM at 100 psig. Spirax Sarco model 13WS for 150 psig service and model 13WHS for 300 psig service.

### Spare Parts



Cover w/Gasket	1
Gasket Kit (set of 3)	1A
Valve Mechanism Kit	2
Float Kit	5



# spirax/sarco

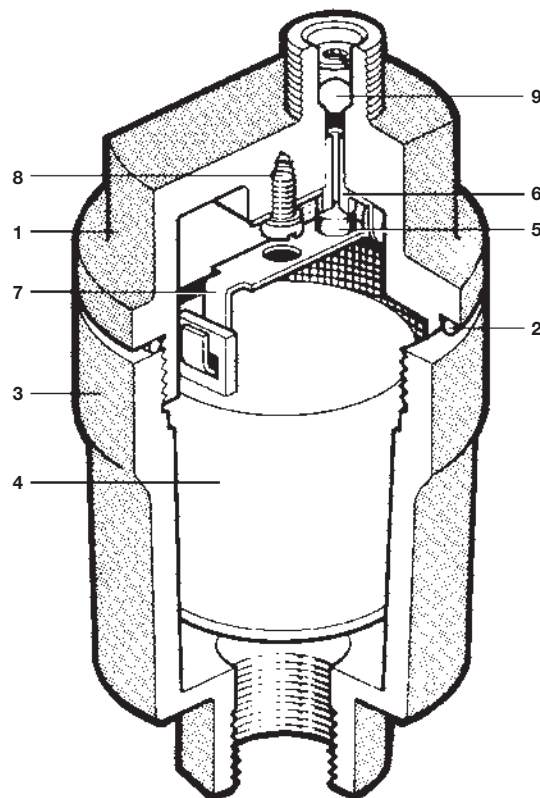
## Air Eliminators AE30, AE30A

AE30 and AE30A Air Eliminators are designed to improve the circulation of pressurized liquids by eliminating air and other non-condensable gases which may collect at high points in the system. The AE30A has a check valve in the outlet orifice.

Model	AE30 AE30A
PMO	116 psig
Sizes	1/2" x 1/4"
Connections	NPT
Construction	Brass Body Stainless Steel, Rubber and Plastic Internals
Options	BSP Connections

### CONSTRUCTION MATERIALS

No.	Part	Material	
1	Cap	Brass Alloy	Delta Alloy S10
2	Cap "O" Ring	Nitrile Rubber	
3	Body	Brass Alloy	Delta Alloy S10
4	Float	Plastic	
5	Valve	Viton Rubber	
6	Valve Seat	Stainless Steel	BS 970 431 S29
7	Bracket & Lever Assy.	Stainless Steel	BS 1449 304 S12
8	Bracket Screw 4 mm Cheese Head x 6 mm	Stainless Steel	BS 4183 18/8
9	Check Valve (for AE30CV)	Stainless Steel	AISI 440 B



### LIMITING OPERATING CONDITIONS

**Max. Operating Pressure (PMO)** 116 psig (8 barg)

**Max. Operating Temperature** 230°F (110°C)

### PRESSURE SHELL DESIGN CONDITIONS

**PMA** 145 psig/0-230°F 10 barg/0-110°C  
Max. allowable pressure

**TMA** 230°F/0-145 psig 110°C/0-10 bar  
Max. allowable temperature

### TYPICAL APPLICATIONS

Air vents can be used on both hot and cold liquid services. Typical applications are cold water lines, suction lines to pumps, mixing tanks, condensate return lines, cooling water lines on air compressors, and water storage tanks.

Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only.  
In the interests of development and improvement of the product, we reserve the right to change the specification.

TIS 4.009 US 01.97



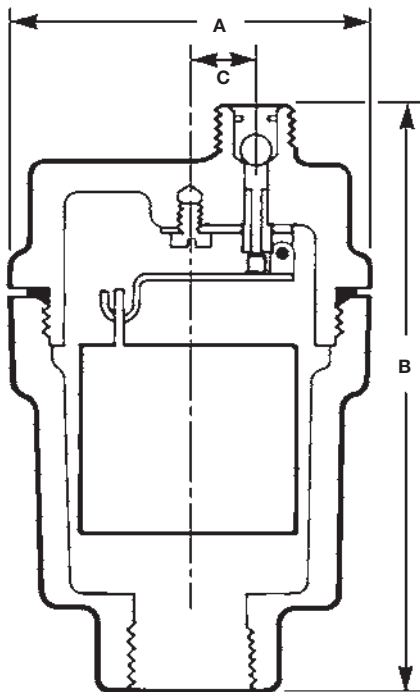
# Air Eliminators

## AE30, AE30A

**AIR CAPACITY** (discharge to atmosphere)  
SCFM cubic feet per minute at standard conditions of 14.7  
psia at 60°F. For dm³/s multiply by .4719.

### Inlet Pressure

psi	25	50	75	100
bar	1.7	3.4	5.2	6.9
Capacity	1.5	2.7	3.9	5.0



### DIMENSIONS (NOMINAL) IN INCHES AND MILLIMETERS

Size					
Inlet	Outlet	A	B	C	Weight
1/2	1/4	2.2	4.1	0.40	1.5 lb
		56	105	10	0.7 kg

### MAINTENANCE

This product can be maintained without disturbing the inlet piping connection. Complete isolation is required before any servicing is performed.

The air vent should be disassembled periodically for inspection and cleaning of the valve head and seat and operating mechanism. Worn or damaged parts should be replaced using a complete set of internals.

**Complete installation and maintenance instructions are given in IMI 4.006, which accompanies the product.**

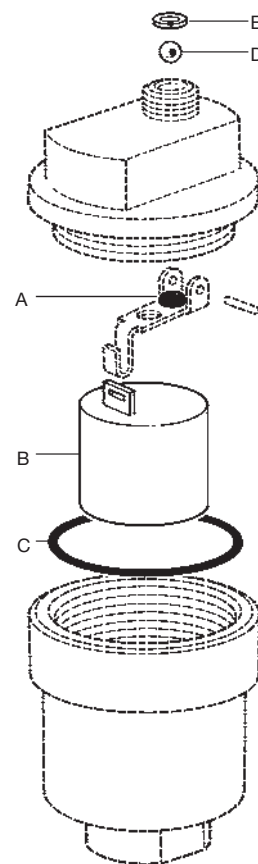
### SAMPLE SPECIFICATION

Automatic Air Eliminators shall be mounted at high points to provide for immediate removal of contained air or other non-condensable gases in liquid piping systems. They shall be of the float type design having brass body with threaded connections, valve head shall be of viton rubber material to provide positive shut-off. Air vent shall have a minimum venting capacity of 5.0 SCFM at 100 psig.

### INSTALLATION

An air vent is required at all high points of a liquid system, on terminal equipment and wherever air can collect. The air vent must be installed vertically above the piping with the inlet at the bottom so that the float mechanism is rising and falling in the vertical plane. The inlet piping should be the same size as the piping connection on the body, and a full-port isolating valve should be installed upstream of the air vent. As with all air vents, dribbling may occur if the valve becomes fouled with dirt. For this reason, it is recommended that a pipe be fitted to the outlet discharge to drain or to a safe place where damage cannot occur.

### SPARE PARTS



Set of Internals

A, B, C, D, E

TI-4-009-US 01.97

## AE50S Automatic Air and Gas Vent for Liquid Systems

### Description

The AE50S automatic air and gas vent is designed for use on liquid systems. It has a welded construction and the body is manufactured in 304L austenitic stainless steel.

### Standards

This product fully complies with the requirements of the European Pressure Equipment Directive 97/23/EC and carries the **CE** mark when so required.

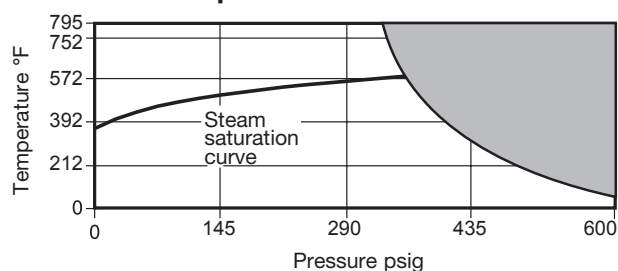
### Certification

The product is available with material certification EN 10204 3.1 for bowl, cover and inlet connection as standard.

### Sizes and pipe connections

<b>Inlet</b>	¾" female	NPT (optional BSP)
<b>Outlet</b>	½" female	NPT (optional BSP)

### Pressure/temperature limits

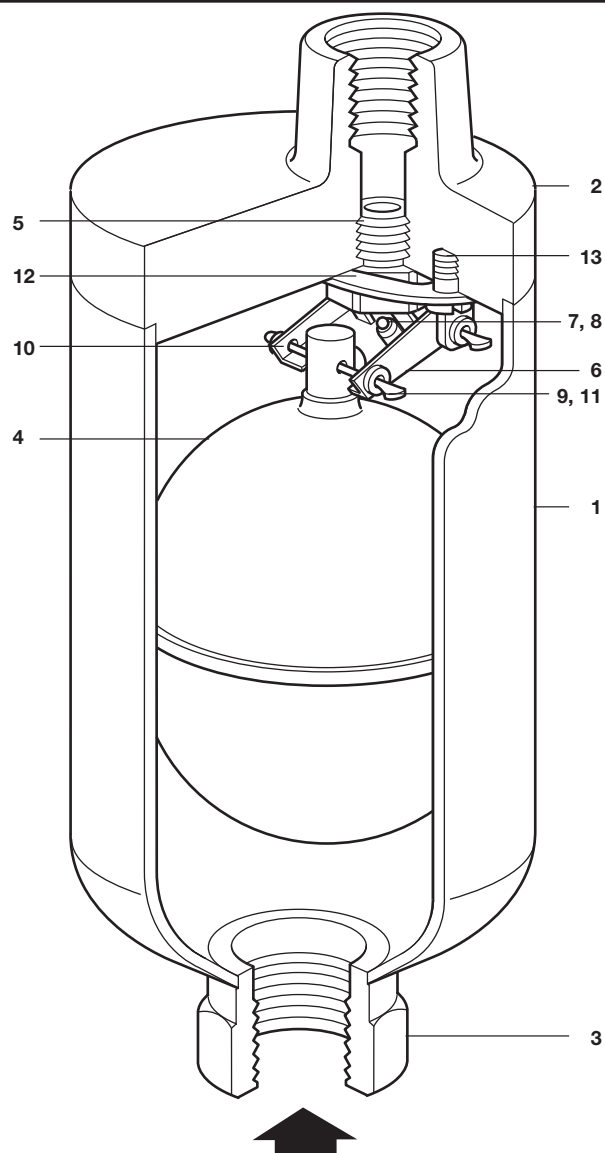


 The product **must not** be used in this region.

<b>Body design conditions</b>		ANSI 300
PMA	Maximum allowable pressure	600 psig @ 86°F (41.4 barg @ 30°C)
TMA	Maximum allowable temperature	800°F (427°C)
Minimum allowable temperature		425.2°F (-254°C)
PMO	Maximum operating pressure	600 psig @ 86°F (41.4 barg @ 30°C)
TMO	Maximum operating temperature	800°F @ 342 psig (427°C @ 23.6 barg)
Minimum operating temperature		-40°F (-40°C)
<b>Note:</b> For lower operating temperatures consult Spirax Sarco		
ΔPMX	Maximum differential pressure	435 psig (30 bar g)
Designed for a maximum cold hydraulic test pressure of 914 psig		(63 bar g)
Minimum specific gravity of liquid		0.65

### Materials

No.	Part	Material
1	Bowl	Austenitic stainless steel ASTM A240 304L
2	Cover	Austenitic stainless steel ASTM A182 304L
3	Inlet connection	Austenitic stainless steel AISI 304
4	Float	Austenitic stainless steel AISI 316L
5	Valve seat	Austenitic stainless steel ASTM A276 316
6	Lever	Austenitic stainless steel AISI 304 2B
7	Valve cone	Stainless steel X30 Cr 13
8	Washer	Austenitic stainless steel AISI 301



No.	Part	Material
9	Washer	Austenitic stainless steel AISI 304
10	'E' cap	Austenitic stainless steel AISI 316
11	Hinge pin	Austenitic stainless steel AISI 304
12	Support	Austenitic stainless steel AISI 304 2B
13	Screw	Austenitic stainless steel B5 6105 CI A2.70

TI-P017-10-US 2.16

Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only.  
In the interests of development and improvement of the product, we reserve the right to change the specification.

# AE50S

## Automatic Air and Gas Vent for Liquid Systems

### Free air discharge capacity

For air at 14.7 psi @ 60°F

psig	25	50	75	100	200	300	400
barg	1.7	3.4	5.2	6.9	13.8	20.7	27.6
Capacity (SCFM)	2.1	3.2	4.9	7.4	12.5	17.6	23.3

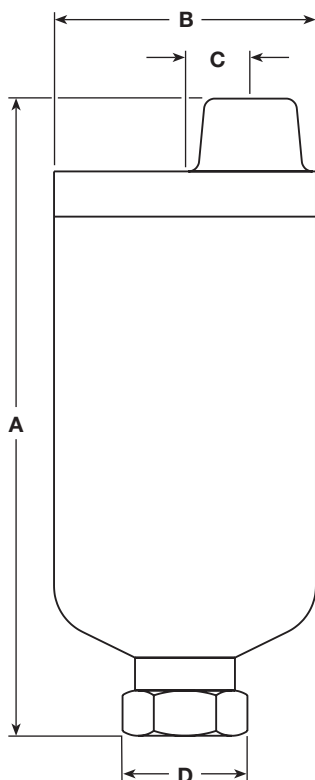
If the temperature of the air differs from 15°C, the discharge capacity from the graph can be corrected by multiplying it by the following equation:

$$\frac{289}{273 + T} \text{ (T is the actual temperature in } ^\circ\text{C)}$$

It may be assumed that the temperature of the air is equal to the temperature of the water.

### Dimensions / weight approx in inches (mm) and pounds (kg)

A	B	C	D	Weight
6.9 (175)	3.1 (79)	0.73 (18.5)	1.26 (32 A/F)	2.2 (1)



### How to order

**Example:** 1 off Spirax Sarco ¾" AE50S automatic air and gas vent manufactured in austenitic stainless steel having screwed NPT connections.

### Safety information, installation and maintenance

For full details see the Installation and Maintenance Instructions (IM-P017-11) supplied with the product.

#### Installation note:

The AE50S should be installed vertically with the inlet at the bottom. We recommend piping the discharge to a safe visible point or drain via an air break.

#### Installation in superheated water:

For superheated water applications we recommend that 3 ft to 6 ft of ¾" vertical pipeline be fitted prior to the inlet of the vent. On superheated water systems the outlet pipework must be sized to accommodate any flash steam created during discharge.

Direct the outlet pipework to a safe point of discharge where there is no risk of injury to personnel or damage to property.

### Spare parts

There are no spare parts available for this sealed, maintenance free product.

# spirax/sarco

## Air Vent 6A

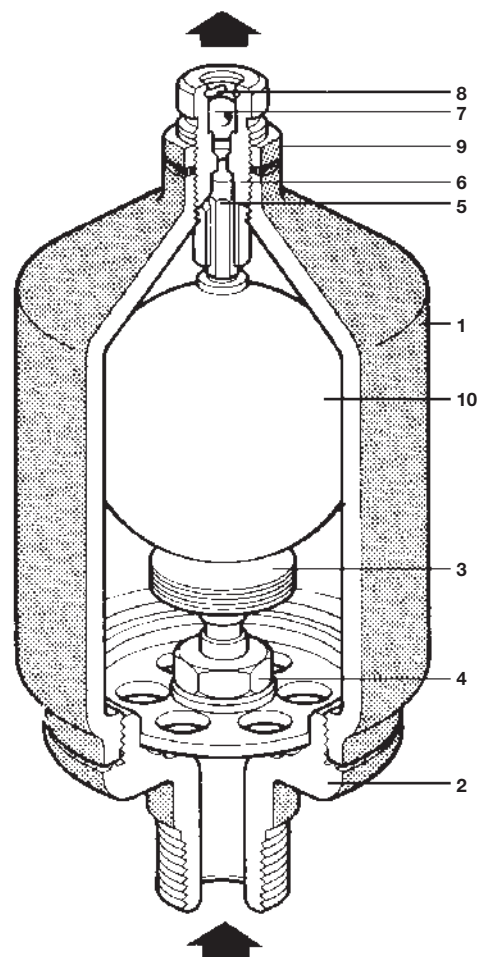
The 6A Air Vent has both a float and a thermostatic bellows for use where air, condensate and steam may be present (as in one pipe steam heating systems.)

The 6A will discharge air, while preventing the escape of either condensate or steam. An outlet check valve prevents the re-entry of air.

<b>Model</b>	<b>6A</b>
<b>PMO</b>	15 psig
<b>Sizes</b>	3/4"
<b>Connections</b>	NPT
<b>Construction</b>	Cast Iron Body Stainless Steel Internals Nylon Check Valve

### CONSTRUCTION MATERIALS

No.	Part	Material	
1	Body	Cast Iron	ASTM A126 CL B
2	Cap	Cast Iron	ASTM A126 CL B
3	Element	Stainless Steel	AISI 304 & AISI 316L
4	Element Holder	Stainless Steel	AISI 303
5	Valve Head	Stainless Steel	AISI 316
6	Valve Seat	Bronze	ASTM B21 Alloy 464
7	Ball Valve	Nylon	
8	Spring Clip	Stainless Steel	AISI 304
9	Sealing Nut	Steel	Chromated cadmium plated steel w/ Teflon seat
10	Float	Stainless Steel	AISI 304



### LIMITING OPERATING CONDITIONS

**Max. Operating Pressure (PMO)** 15 psig (1 barg)

**Max. Operating Temperature** Saturated Steam Temperature

### PRESSURE SHELL DESIGN CONDITIONS

**PMA** 125 psig/up to 450°F 9 barg/up to 232°C  
Max. allowable pressure

**TMA** 450°F/0-125 psig 232°C/0-9 barg  
Max. allowable temperature

### TYPICAL APPLICATIONS

Venting air from one-pipe steam heating systems or other applications where air must be removed from a space containing both steam and condensate.

Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only.  
In the interests of development and improvement of the product, we reserve the right to change the specification.

TI-4-008-US 03.94

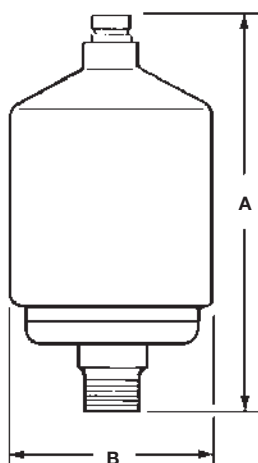
# Air Vent 6A

AIR CAPACITY (discharge to atmosphere)

SCFM cubic feet per minute at standard conditions of 14.7 psia at 60°F. For dm³/s multiply by .4719.

## Inlet Pressure

	psi	2.5	5.0	7.5	10	12.5	15
	bar	.17	.34	.52	.68	.86	1.0
Capacity		2.5	4.0	5.0	6.0	6.5	7.2



## DIMENSIONS (NOMINAL) IN INCHES AND MILLIMETERS

Size	A	B	Weight
3/4"	7.25	3.6	4.5 lb
	185	92	2.0 kg

## INSTALLATION

The air vent should be positioned with the inlet at the bottom at the highest point in the piping system or equipment where air collects. The valve will be closed when either condensate or steam enters the body. The discharge can be hot and wet, and the 6A should be positioned accordingly.

## MAINTENANCE

This product can be maintained without disturbing the inlet piping connection. Complete isolation is required before any servicing is performed.

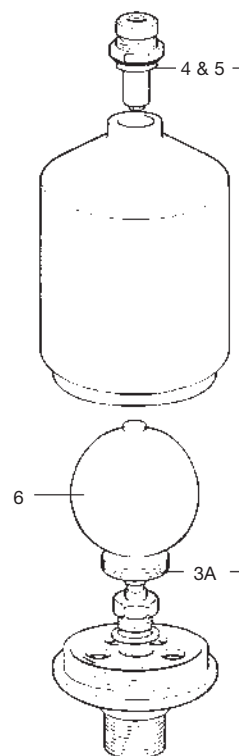
The air vent should be disassembled periodically for inspection and cleaning of the valve head and seat and operating mechanism. Worn or damaged parts should be replaced using a complete valve mechanism assembly and new cover gasket.

**Complete installation and maintenance instructions are given in IMI 4.008, which accompanies the product.**

## SAMPLE SPECIFICATION

Air vents shall be self-adjusting balanced pressure thermostatic type with precision welded multiple plate stainless steel bellows and stainless steel float. Head and seat shall be stainless steel. Body and cap shall be cast iron and internals shall be renewable. The outlet shall incorporate a nylon-ball check valve.

## SPARE PARTS



Element Set*	3
Element	3A
Seat & Gasket	4 & 5
Float	6

\* Part No. 3 Element Set converts Type 6T Air Vent to current Type 6A design.

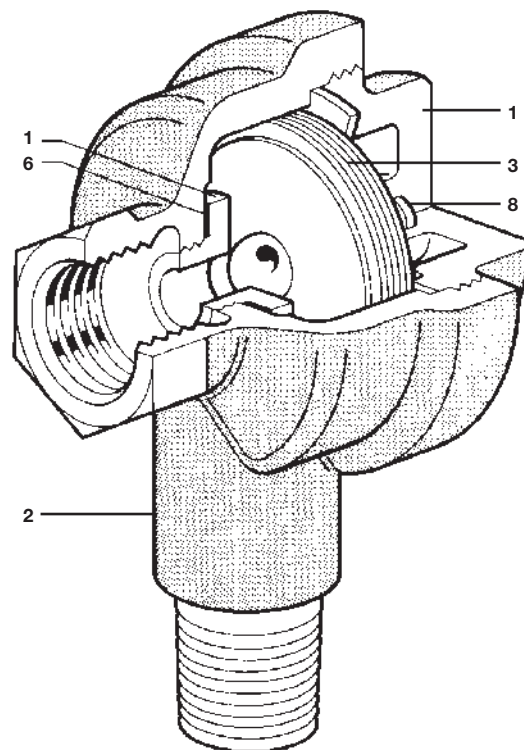
TI-4-008-US 03.94



## Balanced Pressure Thermostatic Air Vent T202

The T202 air vent is designed for use on steam systems to remove air and other non-condensable gases, which may impair heat transfer during start-up and normal operation.

<b>Model</b>	<b>T202</b>
<b>PMO</b>	125 psig
<b>Sizes</b>	3/8" x 1/4"
<b>Connections</b>	NPT
<b>Construction</b>	Brass Body with Stainless Steel Internals



### Limiting Operating Conditions

**Max. Operating Pressure (PMO)** 125 psig (8.6 barg)

**Max. Operating Temperature** Saturated Steam Temperature

### Pressure Shell Design Conditions

**PMA** 125 psig/up to 353°F 9 barg/up to 178°C  
Max. allowable pressure

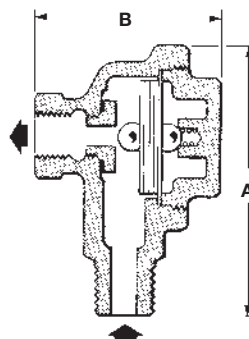
**TMA** 353°F/0-125 psig 178°C/0-9 barg  
Max. allowable temperature

### Construction Materials

No.	Part	Material
1	Cap	Brass ASTM B124 Class 2
2	Body	Brass ASTM B62
3	Thermostatic Bellows	Stainless Steel
5	Seat	Stainless Steel
6	Seat Gasket	Brass
8	Spring	Stainless Steel

### Typical Applications

For installation at end of all steam mains and headers, on all steam equipment such as air coils, heat exchangers, autoclaves, sterilizers, platen presses, rotating cylinders, jacketed kettles, laundry equipment and reboilers.



### Dimensions

(nominal) in inches and millimeters

Size	Outlet	A	B	Weight
3/8"	1/4"	2.9	2.1	1.0 lb
		75	54	.045 kg

Seat orifice – 1/4" diameter

Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only.  
In the interests of development and improvement of the product, we reserve the right to change the specification.

TI-4-104-US 9.14

# Balanced Pressure Thermostatic Air Vent T202

## Sample Specification

Air Vents shall be installed at the end of all steam mains and headers, and on large equipment steam spaces to facilitate start-up and heat transfer. They shall be self-adjusting balanced pressure thermostatic type with precision welded multiple plate stainless steel bellows. Head shall be hardened and both head and seat shall be stainless steel. Body and cap shall be brass and internals shall be renewable.

## Installation

The air vent should be positioned at a high point of the piping system or equipment, or where the air collects. The discharge can be hot and wet; the outlet should therefore be piped to a safe place. An isolation valve should be fitted upstream of the air vent.

## Maintenance

This product can be maintained without disturbing the inlet piping connections. Complete isolation is required before any servicing is performed.

The air vent should be disassembled periodically for inspection and cleaning of the valve head and seat.

Worn or damaged parts should be replaced using a complete element set.

**Complete installation and maintenance instructions are given in IM-4-101, which accompanies the product.**

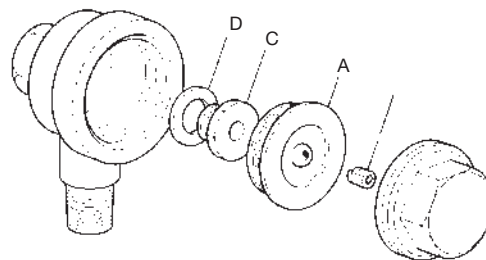
## Air Capacity (discharge to atmosphere)

SCFM cubic feet per minute at standard conditions of 14.7 psig at 60°F. For dm<sup>3</sup>/s multiply by .4719.

	Inlet Pressure					
psi	5	10	25	50	100	125
bar	.34	.68	1.7	3.4	6.9	8.6
SCFM	8	13	25	40	70	80

Orifice Size = .25

## Spare Parts



Element Set

A, B, C, D





## Balanced Pressure Thermostatic Air Vent VS204, VS206

The VS204 and VS206 air vents are designed for use on steam systems to remove air and other non-condensable gases, which may impair heat transfer during start-up and normal operation.

Model	VS204	VS206
<b>PMO</b>	250 psig	
<b>Sizes</b>	1/2"	3/4"
<b>Connections</b>	NPT	
<b>Construction</b>	Cast Iron Body with Stainless Steel Internals	

### Limiting Operating Conditions

**Max. Operating Pressure (PMO)** 250 psig (17 barg)

**Max. Operating Temperature** Saturated Steam

### Pressure Shell Design Conditions

**PMA** 250 psig/up to 450°F 17 barg/up to 232°C  
Max. allowable pressure

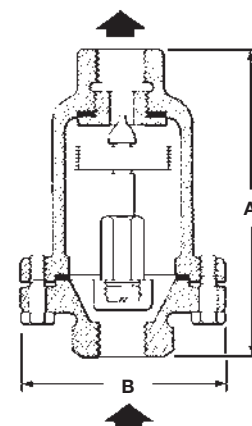
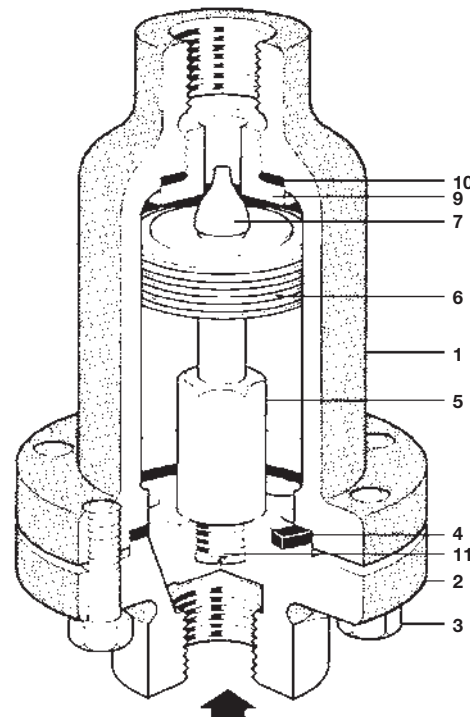
**TMA** 450°F/0-250 psig 232°C/0-17 bar  
Max. allowable temperature

### Construction Materials

No.	Part	Material
1	Body	Cast Iron ASTM A126 CL B
2	Cap	Cast Iron ASTM A126 CL B
3	Cap Screws	Steel ASTM A 449
4	Cap Gasket	Stainless Steel clad, non-asbestos fill
5	Element Holder	Stainless Steel
6	Bellows	Stainless Steel
7	Valve Head	Stainless Steel
9	Valve Seat	Stainless Steel
10	Valve Seat Gasket	Stainless Steel clad, non-asbestos fill
11	Lockwasher	Stainless Steel

### Typical Applications

For installation at end of all steam mains and headers, on all steam equipment such as air coils, heat exchangers, autoclaves, sterilizers, platen presses, rotating cylinders, jacketed kettles, laundry equipment and reboilers.



### Dimensions

(nominal) in inches and millimeters

Size	A	B	Weight
<b>1/2"</b>	<b>4.9</b>	<b>3.1</b>	<b>3.25 lb</b>
	125	79	1.5 kg
<b>3/4"</b>	<b>5.5</b>	<b>3.9</b>	<b>5.0 lb</b>
	140	100	2.3 kg

Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only.  
In the interests of development and improvement of the product, we reserve the right to change the specification.

TI-4-105-US 9.14

# Balanced Pressure Thermostatic Air Vent VS204, VS206

## Air Capacity (discharge to atmosphere)

SCFM cubic feet per minute at standard conditions of 14.7 psia at 60°F. For dm³/s multiply by .4719.

Type	Inlet Pressure							
	psi bar	10	25	50	100	125	150	200
		.68	1.7	3.4	6.9	8.6	10.3	13.8
VS204		34	54	88	160	196	232	304
VS206		44	68	112	208	250	298	392

Orifice Size:

VS204 = .44"

VS206 = .50"

## Sample Specification

Air Vents shall be installed at the end of all steam mains and headers, and on large equipment steam spaces to facilitate start-up and heat transfer. They shall be self-adjusting balanced pressure thermostatic type with precision welded multiple plate stainless steel bellows. Head shall be hardened and both head and seat shall be stainless steel. Body and bolted cap shall be cast iron and internals shall be renewable.

## Installation

The air vent should be positioned at a high point of the piping system or equipment, or where the air collects. The discharge can be hot and wet; the outlet should therefore be piped to a safe place. An isolation valve should be fitted upstream of the air vent.

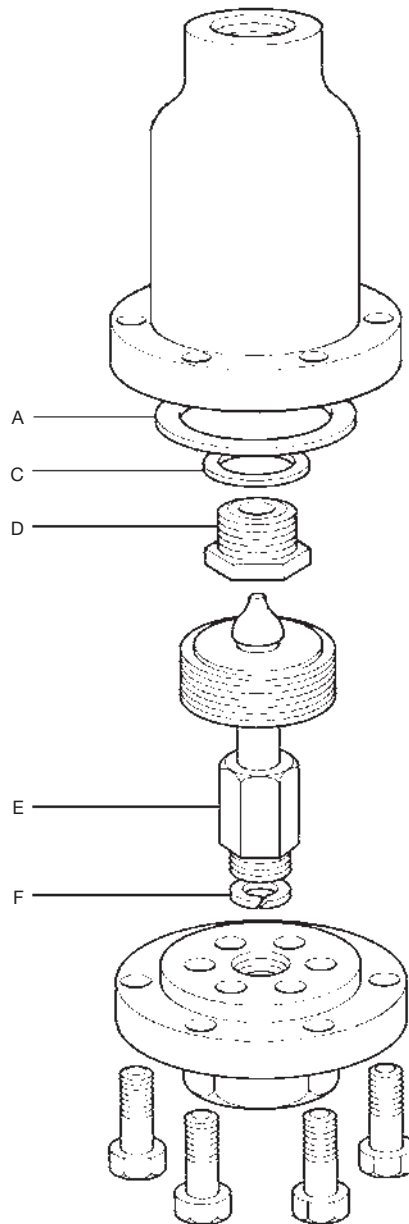
## Maintenance

This product can be maintained without disturbing the inlet piping connections. Complete isolation is required before any servicing is performed. The air vent should be disassembled periodically for inspection and cleaning of the valve head and seat.

Worn or damaged parts should be replaced using a complete element set.

**Complete installation and maintenance instructions are given in IM-4-105, which accompanies the product.**

## Spare Parts



Cap gasket	A
Element Set	C, D, E, F

TI-4-105-US 9.14



## Thermo-matic Air Vent TM600, TM600L

The TM600 and TM600L air vents are designed for use on steam systems to remove air and other non-condensable gases, which may impair heat transfer during start-up and normal operation. The TM600 and TM600L are identical except for the valve head and seat.

Model	TM600 TM600L
PMO	600 psig
Sizes	1/2", 3/4"
Connections	NPT
Construction	Ductile Iron Body with Stainless Steel Internals
Options	BSP Connections

### Limiting Operating Conditions

**Max. Operating Pressure (PMO)** 600 psig (41 barg)

**Max. Operating Temperature** 489°F (254°C)

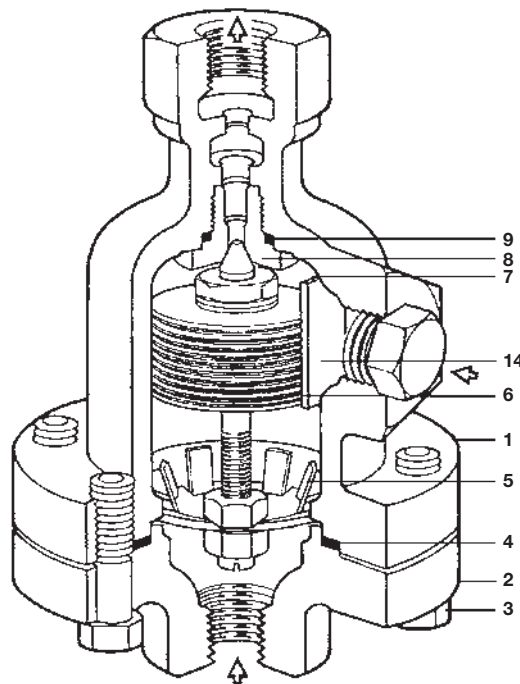
### Pressure Shell Design Conditions

**PMA** 600 psig/up to 650°F 41 barg/up to 343°C

Max. allowable pressure

**TMA** 650°F/0-600 psig 343°C/0-41 barg

Max. allowable temperature

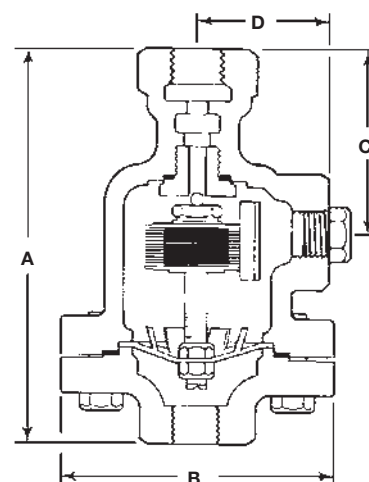


### Construction Materials

No.	Part	Material
1	Body	Ductile Iron ASTM A395
2	Cover	Ductile Iron ASTM A395
3	Cover Screws	Steel ASTM A 449 Type 1 3/8" - 16 x 1-1/4"
4	Cover Gasket	Spiral Wound Stainless Steel Graphite Filled
5	Support Plate	Stainless Steel
6	Element Assembly	Stainless Steel
7	Valve Head	Stainless Steel Hardened
8	Valve Seat	Stainless Steel
9	Valve Seat Gasket	Spiral Wound Stainless Steel Graphite Filled
14	Baffle	Stainless Steel

### Typical Applications

For installation at end of all steam mains and headers, on all steam equipment such as air coils, heat exchangers, autoclaves, sterilizers, platen presses, rotating cylinders, jacketed kettles, laundry equipment and reboilers.



#### Dimensions

(nominal) in inches and millimeters

Size	A	B	C	D	Weight
1/2", 3/4"	6.25 159	4.2 106	2.8 71	2.0 51	6.75 lb 3.1 kg

Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only.  
In the interests of development and improvement of the product, we reserve the right to change the specification.

TI-4-106-US 4.12

# Thermo-matic Air Vent

## TM600, TM600L

### Air Capacity (discharge to atmosphere)

SCFM cubic feet per minute at standard conditions of 14.7 psia at 60°F. For dm3/s multiply by .4719.

Type	psi bar	Inlet Pressure											
		10 .68	25 1.7	50 3.4	100 6.9	125 8.6	150 10.3	200 13.8	250 17.2	300 20.7	400 27.6	500 34.5	600 41.4
TM600L		5.9	9.7	16	28	34	40	52	63	75	100	125	149
TM600		19	31	50	89	108	127	165	200	240	320	400	475

Orifice Size:

TM600L = .149"

TM600 = .258"

### Sample Specification

Air Vents shall be installed at the end of all steam mains and headers, and on large equipment steam spaces to facilitate start-up and heat transfer. They shall be self-adjusting balanced pressure thermostatic type with solidly filled element made of stainless steel. Head shall be hardened and both head and seat shall be stainless steel. Body and bolted cap shall be ductile iron and internals shall be renewable.

### Installation

The air vent should be positioned at a high point of the piping system or equipment, or where the air collects. The discharge can be hot and wet; the outlet should therefore be piped to a safe place. An isolation valve should be fitted upstream of the air vent.

### Maintenance

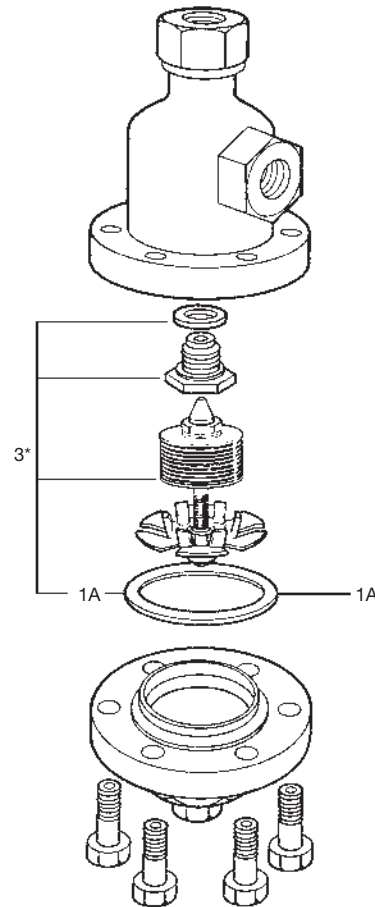
This product can be maintained without disturbing the inlet piping connections. Complete isolation is required before any servicing is performed.

The air vent should be disassembled periodically for inspection and cleaning of the valve head and seat.

Worn or damaged parts should be replaced using a complete element set.

Complete installation and maintenance instructions are given in the IMI sheet, which accompanies the product.

### Spare Parts



\* TM600L has ball head

Cover Gasket	1A
Element Set (Specify TM600 or TM600L)	3

TI-4-106-US 4.12



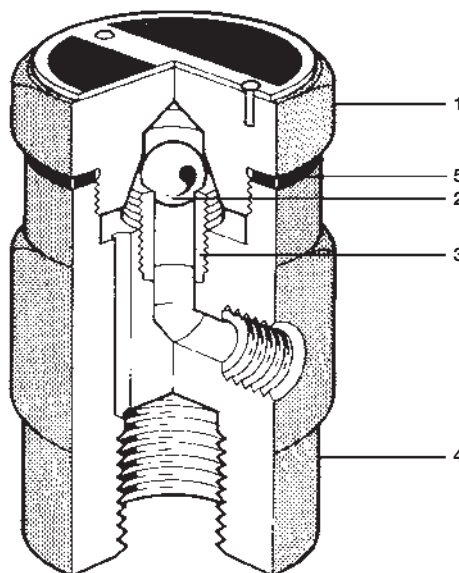
## Vacuum Breaker VB14, VB21

The VB14 and VB21 are designed to admit air to condensing vapor (steam) or liquid systems where vacuum formation may inhibit system drainage or operation.

Model	VB14	VB21
<b>Sizes</b>	1/2" x 1/8"	
<b>Connections</b>	NPT	
<b>Construction</b>	Brass Body	Stainless Steel Body
	Stainless Steel Valve	
<b>Options</b>	BSP Connections	

### Typical Applications

Used on steam inlet to air coils, heat exchangers, sparge systems, jacketed kettles, boiler feed water tanks, chilled water lines and liquid process lines, all of which at one time or another generate vacuum conditions which must be relieved to allow proper system operation.



### Construction Materials

No.	Part	Material
1	Cap	VB14 Brass
		CU ZN 39 PB2
2	Valve Check Ball	VB21 Stainless Steel
		Type 303
3	Valve Seat	VB14 Stainless Steel
		Z 100 CD 17
4	Body	VB21 Stainless Steel
		Type 440C
5	Gasket	VB14 Stainless Steel
		Z10 CN 18 08
		VB21 Stainless Steel
		Type 303
		VB14 Brass
		CU ZN 39 PB2
		VB21 Stainless Steel
		Type 303
		VB14 Nickel Reinforced Exfoliated Graphite
		VB21 Stainless Steel
		Type 304

### Limiting Operating Conditions

**Max. Operating Pressure (PMO)** VB14: 210 psig (14 barg)  
VB21: 304 psig (21 barg)

**Max. Operating Temperature** VB14: 500°F (260°C)  
VB21: 752°F (400°C)

### Pressure Shell Design Conditions

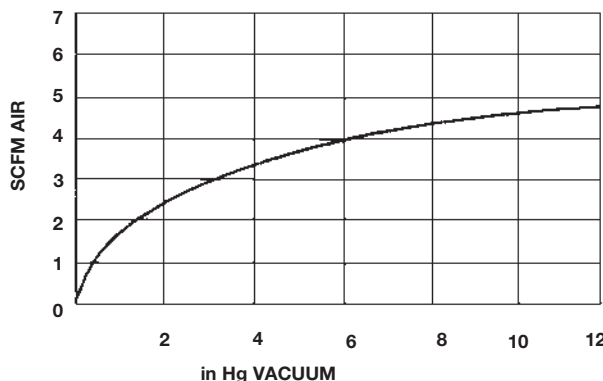
<b>PMA</b>	VB14:	232 psig/0-500°F	16 barg/0-260°C
Max. allowable pressure	VB21:	304 psig/0-752°F	21 barg/0-400°C
<b>TMA</b>	VB14:	500°F/0-232 psig	260°C/0-14 barg
Max. allowable temperature	VB21:	752°F/0-304 psig	400°C/0-21 barg

### Operating Characteristics

Maximum Cv – 0.625.

Vacuum required to open – 2 in H<sub>2</sub>O (0.15 in Hg)

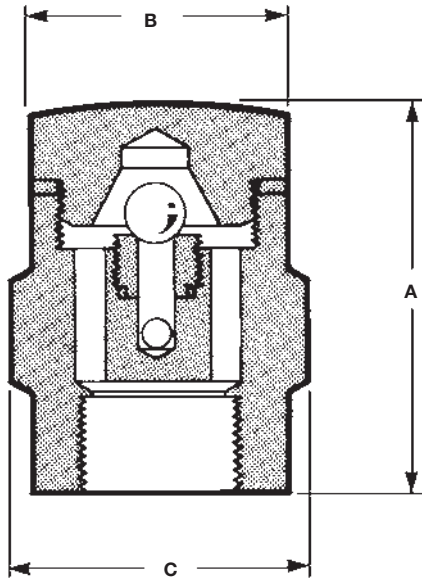
#### AIR HANDLING CAPACITIES



Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only.  
In the interests of development and improvement of the product, we reserve the right to change the specification.

TI-4-103-US 01.05

# Vacuum Breaker VB14, VB21



**Dimensions (nominal) in inches and millimeters**

Size		A	B	C	Weight
1/2"	VB14	2.2 55	1.3 34	1.5 39	0.77 lb 0.35 kg
1/2"	VB21	2.0 52	1.3 34	1.5 39	0.73 lb 0.33 kg

## Sample Specification

Vacuum Breakers shall be used on all modulating or on/off heat exchangers and coils, except in vacuum return systems. They shall be installed in the supply side between the control valve and equipment and be of hardened ball check valve design with all working parts manufactured from stainless steel. Bodies shall be made from either brass or stainless steel depending on the application, and shall be suitable for operating conditions of 210 psig (or 304 psig) saturated steam.

## Installation

Always install in a vertical position with cap at the top. Generally the device should be mounted on the highest point of the circuit. Large coils or equipment may require more than one vacuum breaker to be fitted. An isolating valve should be fitted to facilitate servicing.

## Maintenance

After the vacuum breaker is isolated from system pressure, the cap can be unthreaded to examine the valve and valve seat areas for debris which can become trapped and cause breakage of system pressure during normal operation. The vacuum breaker is not repairable.



## Combination Vacuum Breaker/Balanced Pressure Thermostatic Air Vent VB-VS

### Description

The VB-VS Vacuum Breaker/Air Vent is designed for use on steam systems to remove air and other non-condensable gases, which may impair heat transfer during start-up and normal operation, and admit air when system drops in vacuum.

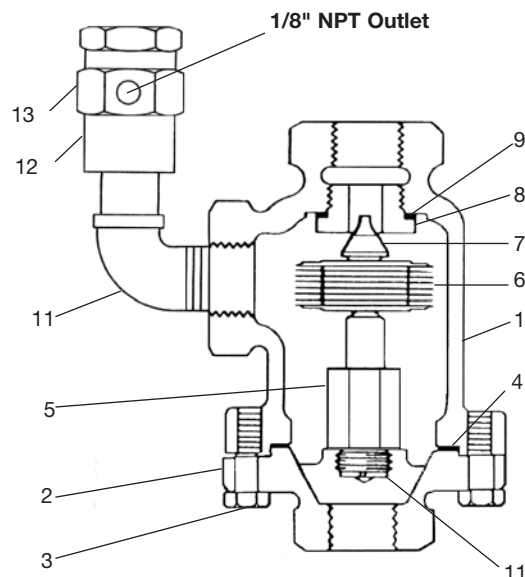
Model	VB-VS
PMO	200 psig
Sizes	1/2"
Connections	NPT
Construction	Cast Iron Body with Stainless Steel Internals Brass VB-14

### Limiting Operation Conditions

<b>Max. Operating Pressure (PMO)</b>	200 psig (14 barg)
<b>Max. Operating Temperature</b>	Saturated Steam

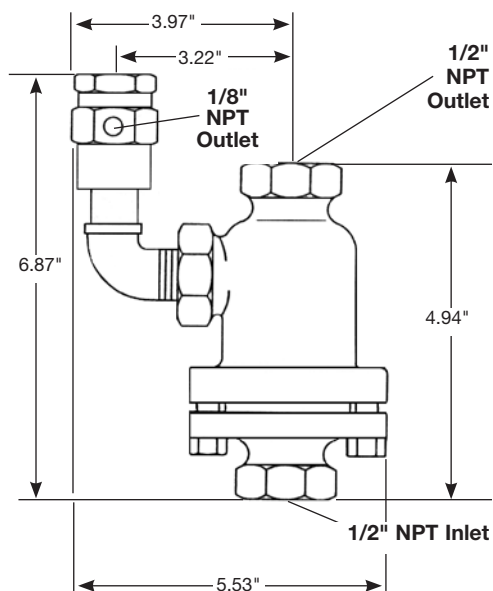
### Pressure Shell Design Conditions

<b>PMA</b>	200 psig/up to 450°F	14 barg/up to 232°C
Max. allowable pressure		
<b>TMA</b>	450°F/0-200 psig	232°C/0-14 barg
Max. allowable temperature		



### Construction Materials

No.	Part	Material	
1	Body	Cast Iron	ASTM A126 CL B
2	Cap	Cast Iron	ASTM A126 CL B
3	Cap Screws	Steel	ASTM A 449
4	Cap Gasket	Stainless Steel clad, non-asbestos fill	AISI 304
5	Element Holder	Stainless Steel	AISI 300
6	Bellows	Stainless Steel	AISI 300 & 400 series
7	Valve Head	Stainless Steel	AISI 303
8	Valve Seat	Stainless Steel	AISI 303
9	Valve Seat Gasket	Stainless Steel clad, non-asbestos fill	AISI 304
10	Lockwasher	Stainless Steel	AISI 304
11	Elbow	Cast Iron	
12	Nipple	Steel	
13	VB-14	See TIS 4.103 for material data	



### Typical Applications

For installation at end of all steam mains and headers, on all steam equipment such as air coils, heat exchangers, autoclaves, sterilizers, platen presses, rotating cylinders, jacketed kettles, laundry equipment and reboilers.

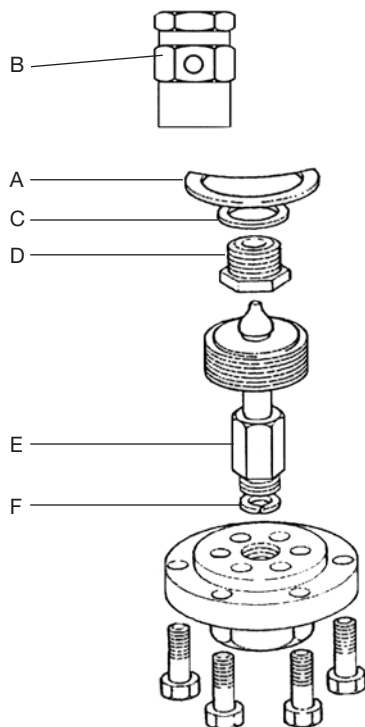
Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only.  
In the interests of development and improvement of the product, we reserve the right to change the specification.

TI-4-107-US 9.14



# Combination Vacuum Breaker/Balanced Pressure Thermostatic Air Vent VB-VS

## Spare Parts



Cap Gasket	A
VB-14	B
Element Set	C, D, E, F

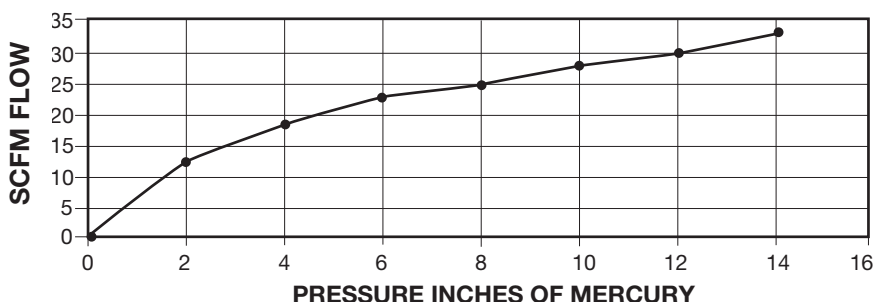
### Note

See VS-204 for Cap Gasket and Element Set in Spares book.

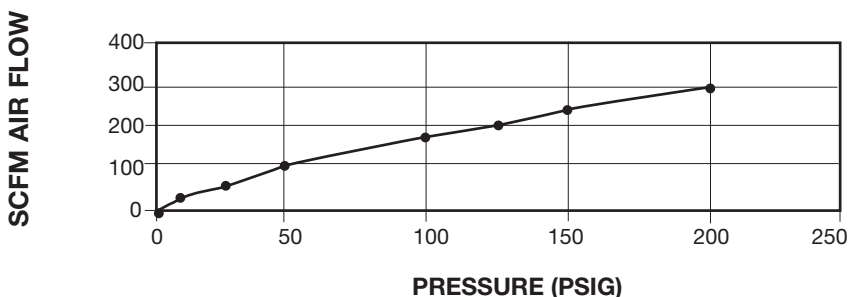
## Air Capacity (discharge to atmosphere)

SCFM cubic feet per minute at standard conditions of 14.7 psia at 60°F.  
For dm<sup>3</sup>/s multiply by .4719

VB-VS Vacuum Breaker/Air Vent In-Flow In Vacuum



VB-VS Vacuum Breaker/Air Vent Out-Flow



## Installation

The VB-VS should be positioned at the high point of the piping system or equipment or where air collects and vacuum needs to be broken. The VB-VS must be piped in a vertical position so only air and steam surround the thermostatic bellows and vacuum breaker. The discharge can be hot and wet. The outlet should be piped to a safe place. An isolation valve should be placed on the inlet side of the VB-VS.

## Maintenance

This product can be maintained without disturbing the inlet piping connections. Complete isolation is required before any servicing is performed. The vent must be cooled down to prevent over-expansion of the thermostat and oil prevent steam from escaping from the unit which could burn the operator.

The VB-VS should be disassembled periodically for inspection and cleaning of the valve head and seat. Worn or damaged parts should be replaced.

Complete Installation and Maintenance Instructions are given in IM-4-107.

TI-4-107-US 9.14

# spirax sarco

## Packless Radiator Supply Valve RV Series

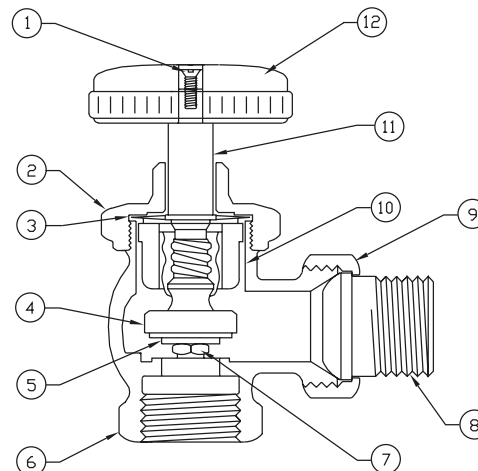
The RV Series are packless, non-rising stem series brass radiator valves for steam and liquid services, available in angle pattern and straight connections.

<b>Model</b>	RV
<b>Sizes</b>	1/2" to 1-1/2"
<b>Connections</b>	Union /Threaded
<b>Construction</b>	Brass
<b>Options</b>	Lock Shields Vented Bypass Extension Stem Assembly

### Materials

No.	Part	Material	
1	Handle Screw	Yellow Brass	ASTM B-16
2	Valve Bonnet	Red Brass	ASTM B-62
3	Metaflex Sealing Disc	Copper	Copper
4	Composition Disc	Special	CFF/TEF
5	Washer	Yellow Brass	ASTM B-16
6	Valve Body	Red Brass	ASTM B-62
7	Sealing Disk Support	Yellow Brass	ASTM B-16
8	Tailpiece	Yellow Brass	ASTM B-16
9	Union Nut	Yellow Brass	ASTM B-16
10	Thrust Nut	Yellow Brass	ASTM B-16
11	Valve Stem	Yellow Brass	ASTM B-16
12	Handle	Spec Plastic	NYL/FBGL 22

### RV-AP shown



### Limiting Conditions

Steam: 150 psig (10.3 bar)  
366°F (186°C)  
Liquid: 200 psig (13.9 bar)

### Sizes & Pipe Connections

Model	Pattern	Connection	Size
RV-AP	Angle	Pipe to Male Union	1/2", 3/4", 1", 1-1/4", 1-1/2"
RV-ST	Straightway	Pipe to Male Union	1/2", 3/4", 1", 1-1/4", 1-1/2"

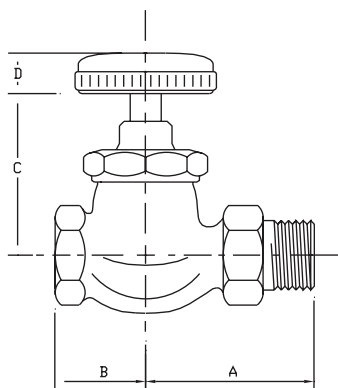
RV-AP Series meets Mil. Spec. WWV-160B, Section 3.1.1, Style A  
RV-ST Series meets Mil. Spec. WWV-160B, Section 3.1.1, Style A

### Sample Specification

Low profile non-rising stem packless radiator valve.  
All brass construction with pipe to male connections.

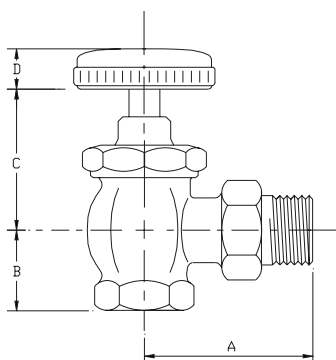
#### MODEL ST

Straightaway Pattern  
(Typical)



#### MODEL AP

Angle Pattern  
(Typical)



### Dimensions nominal in inches and millimeters

No	Size	A	B	C	D	lbs/kg
AP-1	1/2"	2.375	1.187	2.187	0.625	1.15
		57	30	55	16	0.52
	3/4"	2.875	1.187	2.187	0.625	1.5 0.
		73	30	55	16	68
	1"	3.125	1.5	2.313	.75	2.25
		83	38	59	19	1.02
	1-1/4"	3.5	1.75	2.625	0.875	2.55
		89	44	67	22	1.157
	1-1/2"	3.875	1.94	2.813	0.875	3.55
		98	49	71	22	1.161
ST-1	1/2"	2.375	1.375	2.688	0.625	1.25
		57	35	68	16	0.567
	3/4"	2.875	1.375	2.813	0.625	1.65
		73	35	72	16	0.75
	1"	3.125	1.688	3.062	0.75	2.75
		83	43	78	19	1.25
	1-1/4"	3.625	2	3.563	0.75	3.15
		92	51	89	19	1.429
	1-1/2"	3.875	2.375	3.875	0.865	4.52
		98	60	98	22	2.05

Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only.  
In the interests of development and improvement of the product, we reserve the right to change the specification.

TI-7-2122-US 12.07

# spirax/sarco

## LCV1 Bronze Lift Check Valve

### Description

The LCV1 is a bronze lift check valve which is installed in horizontal lines to prevent reverse flow.

### Sizes and pipe connections

1/2", 3/4", 1", 1-1/4", 1-1/2", 2" and 3".

Screwed NPT

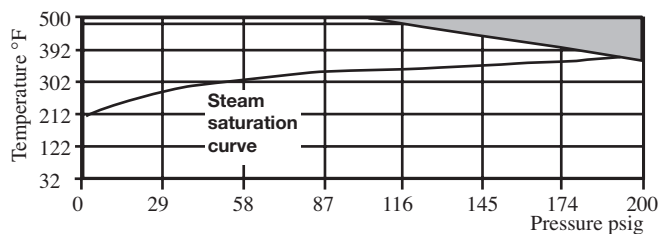
### Limiting conditions

PMA - Maximum allowable pressure 200 psig

TMA - Maximum allowable temperature 500°F

Maximum cold hydraulic test pressure 406 psig

### Operating range



The product must not be used in this region

### Cv values

Size	1/2"	3/4"	1"	1-1/4"	1-1/2"	2"	3"
Cv	2.2	5.0	9.9	13.9	22.0	36.0	80.0

### Opening pressures in inches of water

Without springs

Size	1/2"	3/4"	1"	1-1/4"	1-1/2"	2"
Flow pressures	2.5	3.0	2.6	2.9	2.9	2.8

With springs fitted the opening pressure is the same as the spring strength.

### Materials

No	Part	Material
1	Body	Bronze
2	Cone	Brass
3	Cap	Brass
4*	Spring	Stainless steel

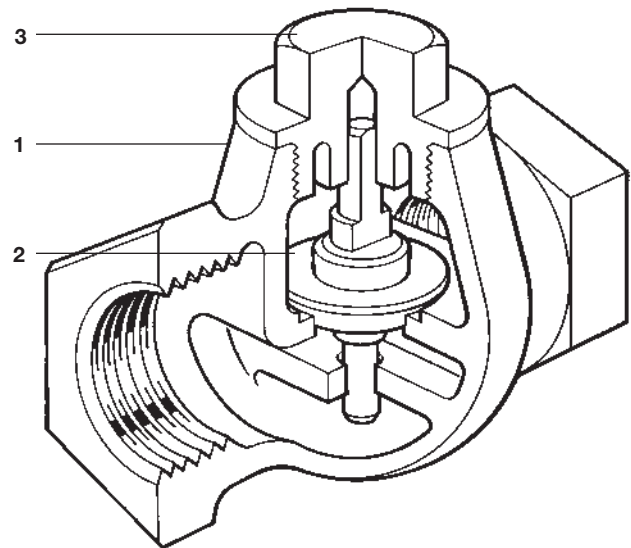
\* Not illustrated

### Installation

Always install with the flow in the direction as indicated on the body.

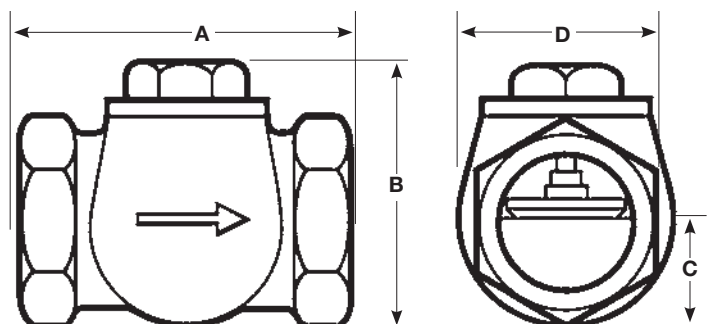
### How to order

1/2" NPT Spirax Sarco LCV1 lift check valve.



### Dimensions (approximate) in inches and lbs.

Size	A	B	C	D
Weight				
1/2"	2.1	1.8	0.7	1.4
3/4"	2.8	2.3	0.8	1.6
1"	3.4	2.8	1.1	2.2
1-1/4"	3.4	2.8	1.1	2.2
1-1/2"	4.3	3.6	1.4	2.8
2"	5.3	4.1	1.7	3.4
3"	7.1	6.0	2.4	4.8



Pipeline  
Ancillaries

Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only.

In the interests of development and improvement of the product, we reserve the right to change the specification. TI-7-223-US 04.01



## LCV3, LCV4, LCV6 and LCV7 Lift Check Valves

### Description

The LCV3, LCV4, LCV6 and LCV7 lift check valves are designed in accordance with EN 12516 and **ASME B16.34** to prevent reverse flow in horizontal pipeline installations. The design of these valves allows them to be easily serviced without removing the valve from the pipeline - See Spare parts.

### Available types:

**LCV3** Cast iron bodied with stainless steel internals.

**LCV4** Cast steel bodied with stainless steel internals.

**LCV6** Stainless steel bodied with stainless steel internals.

**LCV7** SG iron bodied with stainless steel internals.

### Optional for the LCV4:

High temperature bolting (stainless steel A2-70).

### Standards

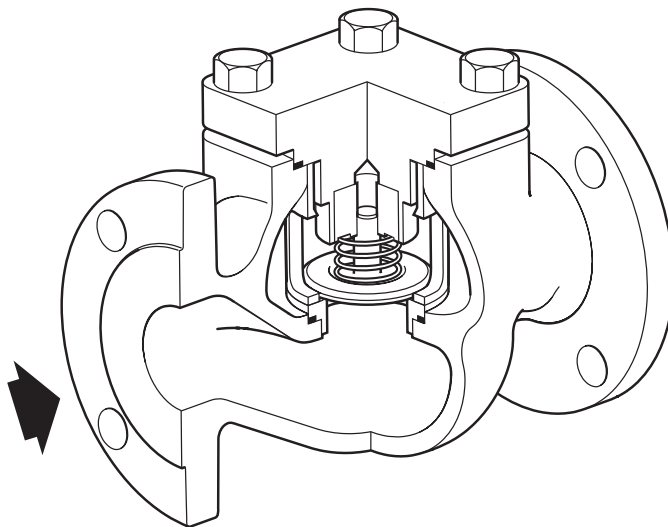
These products fully comply with the requirements of the European Pressure Equipment Directive 97/23/EC and carries the **CE** mark when so required.

### Standard shut-off

This range of lift check valves conform to EN 12266-1: 2003 Rate F.

### Certification

With the exception of the LCV3 these products are available with certification to EN 10204 3.1. **Note:** All certification / inspection requirements must be stated at the time of order placement.



### Sizes and pipe connections

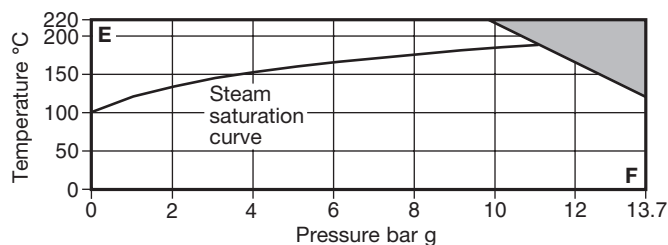
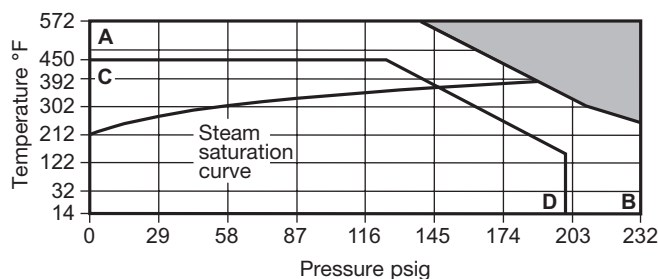
Unit	LCV3			LCV4			LCV6			LCV7		
Connections	PN16 JIS/KS10	ASME 125	BSP NPT	PN40 JIS/KS 20	ASME 150 ASME 300	NPT SW	PN40 JIS/KS 20	ASME 150 ASME 300	BSP NPT SW	PN16 PN25 JIS/KS 10	ASME 125 ASME 250	BSP NPT
DN15 1/2"	•		•	•	•	•	•	•	•	•		•
DN20 3/4"	•		•	•	•	•	•	•	•	•		•
DN25 1"	•	•	•	•	•	•	•	•	•	•	•	•
DN32 1 1/4"	•		•	•		•	•		•	•		•
DN40 1 1/2"	•	•	•	•	•	•	•	•	•	•	•	•
DN50 2"	•	•	•	•	•	•	•	•	•	•	•	•
DN65 2 1/2"	•	•		•	•		•	•		•	•	
DN80 3"	•	•		•	•		•	•		•	•	
DN100 4"	•	•		•	•		•	•		•	•	

Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only.  
In the interests of development and improvement of the product, we reserve the right to change the specification.

# LCV3, LCV4, LCV6 and LCV7

## Lift Check Valves

### LCV3 pressure / temperature limits



 The product **must not** be used in this region.

 The product **must not** be used in this region.

**A - B** Screwed BSP and flanged EN 1092 PN16.

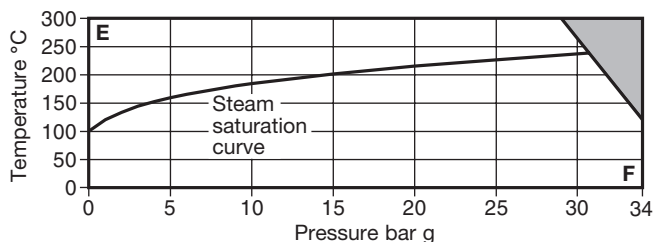
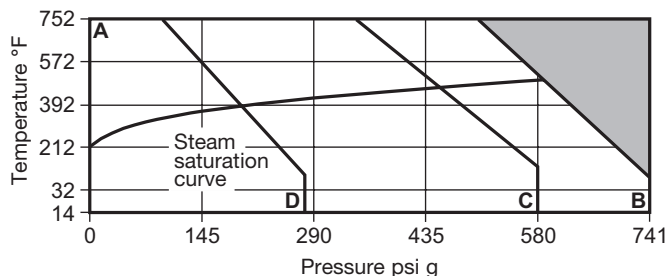
**E - F** Flanged JIS / KS 10.

**C - D** Screwed NPT, socket weld and flanged ASME 125.

<b>Screwed and Flanged EN 1092 PN16</b>	Body design conditions		PN16
	PMA	Maximum allowable pressure	16 bar g @ 120°C
	TMA	Maximum allowable temperature	300°C @ 9.6 bar g
		Minimum allowable temperature	-10°C
	PMO	Maximum operating pressure for saturated steam service	13 bar g
	TMO	Maximum operating temperature	300°C @ 9.6 bar g
		Minimum operating temperature	-10°C
	<b>Note:</b> For lower operating temperatures consult Spirax Sarco.		
<b>Flanged ASME 125</b>	Designed for a maximum cold hydraulic test pressure of:		24 bar g
	Body design conditions		ASME 125
	PMA	Maximum allowable pressure	200 psi g @ 149°F
	TMA	Maximum allowable temperature	449°F @ 125 psi g
		Minimum allowable temperature	14°F
	PMO	Maximum operating pressure for saturated steam service	145 psi g
	TMO	Maximum operating temperature	449°F @ 125 psi g
		Minimum operating temperature	14°F
<b>Flanged JIS / KS 10</b>	<b>Note:</b> For lower operating temperatures consult Spirax Sarco.		
	Designed for a maximum cold hydraulic test pressure of:		297 psi g
	Body design conditions		JIS / KS 10
	PMA	Maximum allowable pressure	13.7 bar g @ 120°C
	TMA	Maximum allowable temperature	220°C @ 9.8 bar g
		Minimum allowable temperature	0°C
	PMO	Maximum operating pressure for saturated steam service	11.2 bar g
	TMO	Maximum operating temperature	220°C @ 9.8 bar g
		Minimum operating temperature	0°C
	<b>Note:</b> For lower operating temperatures consult Spirax Sarco.		
	Designed for a maximum cold hydraulic test pressure of:		20 bar g

# LCV3, LCV4, LCV6 and LCV7 Lift Check Valves

## LCV4 pressure / temperature limits



**A - B** Screwed NPT, socket weld and flanged ASME 300.

**A - C** Flanged EN 1092 PN40.

**A - D** Flanged ASME 150.

**E - F** Flanged JIS / KS 20.

### Flanged EN 1092 PN40

Body design conditions		PN40
PMA	Maximum allowable pressure	40 bar g @ 50°C
TMA	Maximum allowable temperature	300°C @ 27.6 bar g
	Maximum allowable temperature with high temperature bolting	400°C @ 23.8 bar g
Minimum allowable temperature		-10°C
PMO	Maximum operating pressure for saturated steam service	31.1 bar g
TMO	Maximum operating temperature	300°C @ 27.6 bar g
	Maximum operating temperature with high temperature bolting	400°C @ 23.8 bar g
Minimum operating temperature		-10°C
<b>Note:</b> For lower operating temperatures consult Spirax Sarco.		
Designed for a maximum cold hydraulic test pressure of:		60 bar g

### Flanged ASME 150

Body design conditions		ASME 150
PMA	Maximum allowable pressure	280 psi g @ 100°F
TMA	Maximum allowable temperature	572°F @ 148 psi g
	Maximum allowable temperature with high temperature bolting	752°F @ 94 psi g
Minimum allowable temperature		14°F
PMO	Maximum operating pressure for saturated steam service	202 psi g
TMO	Maximum operating temperature	572°F @ 148 psi g
	Maximum operating temperature with high temperature bolting	752°F @ 94 psi g
Minimum operating temperature		14°F
<b>Note:</b> For lower operating temperatures consult Spirax Sarco.		
Designed for a maximum cold hydraulic test pressure of:		435 psi g

### Screwed NPT Socket weld and Flanged ASME 300

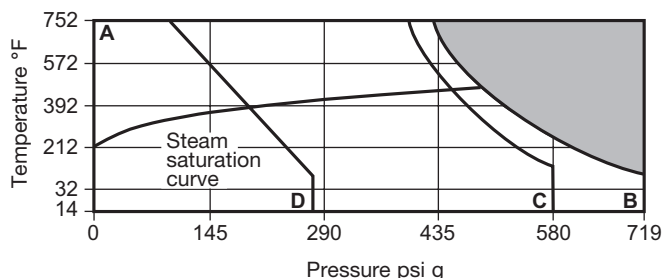
Body design conditions		ASME 300
PMA	Maximum allowable pressure	741 psi g @ 100°F
TMA	Maximum allowable temperature	572°F @ 577 psi g
	Maximum allowable temperature with high temperature bolting	752°F @ 503 psi g
Minimum allowable temperature		14°F
PMO	Maximum operating pressure for saturated steam service	606 psi g
TMO	Maximum operating temperature	572°F @ 577 psi g
	Maximum operating temperature with high temperature bolting	752°F @ 503 psi g
Minimum operating temperature		14°F
<b>Note:</b> For lower operating temperatures consult Spirax Sarco.		
Designed for a maximum cold hydraulic test pressure of:		1117 psi g

### Flanged JIS / KS 20

Body design conditions		JIS / KS 20
PMA	Maximum allowable pressure	34 bar g @ 120°C
TMA	Maximum allowable temperature	300°C @ 32 bar g
Minimum allowable temperature		0°C
PMO	Maximum operating pressure for saturated steam service	30 bar g
TMO	Maximum operating temperature	300°C @ 32 bar g
Minimum operating temperature		0°C
<b>Note:</b> For lower operating temperatures consult Spirax Sarco.		
Designed for a maximum cold hydraulic test pressure of:		51 bar g

# LCV3, LCV4, LCV6 and LCV7 Lift Check Valves

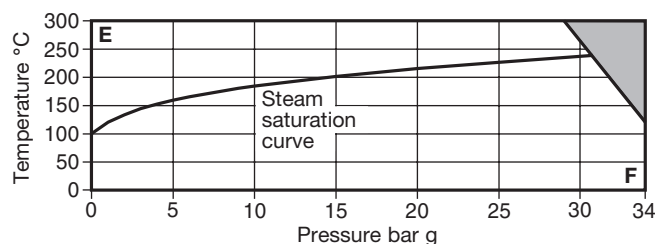
## LCV6 pressure / temperature limits



**A - B** Screwed NPT, socket weld and flanged ASME 300.

**A - C** Screwed BSP and flanged EN 1092 PN40.

**A - D** Flanged ASME 150.



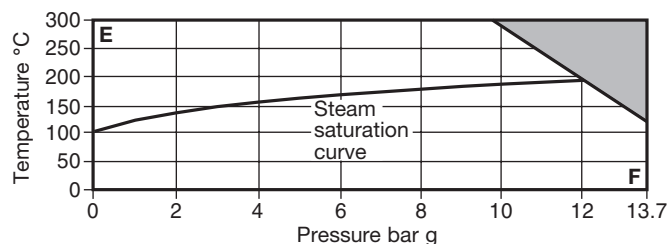
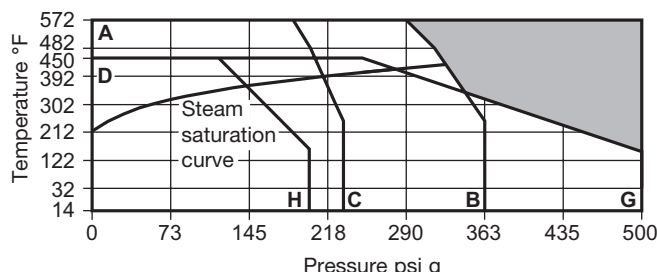
**E - F** Flanged JIS / KS 20.

<b>Screwed BSP and Flanged EN 1092 PN40</b>	Body design conditions	PN40
	PMA Maximum allowable pressure	40 bar g @ 50°C
	TMA Maximum allowable temperature	400°C @ 27.4 bar g
	Minimum allowable temperature	-10°C
	PMO Maximum operating pressure for saturated steam service	32.3 bar g
	TMO Maximum operating temperature	400°C @ 27.4 bar g
	Minimum operating temperature	-10°C
	<b>Note:</b> For lower operating temperatures consult Spirax Sarco.	
<b>Screwed NPT Socket weld and Flanged ASME 300</b>	Designed for a maximum cold hydraulic test pressure of:	60 bar g
	Body design conditions	ASME 300
	PMA Maximum allowable pressure	720 psi g @ 100°F
	TMA Maximum allowable temperature	752°F @ 426 psi g
	Minimum allowable temperature	14°F
	PMO Maximum operating pressure for saturated steam service	493 psi g
	TMO Maximum operating temperature	752°F @ 426 psi g
	Minimum operating temperature	14°F
<b>Flanged ASME 150</b>	<b>Note:</b> For lower operating temperatures consult Spirax Sarco.	
	Designed for a maximum cold hydraulic test pressure of:	1102 psi g
	Body design conditions	ASME 150
	PMA Maximum allowable pressure	276 psi g @ 100°F
	TMA Maximum allowable temperature	752°F @ 94 psi g
	Minimum allowable temperature	14°F
	PMO Maximum operating pressure for saturated steam service	200 psi g
	TMO Maximum operating temperature	752°F @ 94 psi g
<b>Flanged JIS / KS 20</b>	Minimum operating temperature	14°F
	<b>Note:</b> For lower operating temperatures consult Spirax Sarco.	
	Designed for a maximum cold hydraulic test pressure of:	435 psi g
	Body design conditions	JIS / KS 20
	PMA Maximum allowable pressure	34 bar g @ 120°C
	TMA Maximum allowable temperature	300°C @ 32 bar g
	Minimum allowable temperature	0°C
	PMO Maximum operating pressure for saturated steam service	23.5 bar g
	TMO Maximum operating temperature	300°C @ 32 bar g
	Minimum operating temperature	0°C
	<b>Note:</b> For lower operating temperatures consult Spirax Sarco.	
	Designed for a maximum cold hydraulic test pressure of:	51 bar g



# LCV3, LCV4, LCV6 and LCV7 Lift Check Valves

## LCV7 pressure / temperature limits



The product **must not** be used in this region.

The product **must not** be used in this region.

**A - B** Screwed BSP and flanged EN 1092 PN25.

**A - C** Screwed NPT and flanged EN 1092 PN16.

**D - G** Flanged ASME 250.

**D - H** Flanged ASME 125.

**E - F** Flanged JIS / KS 10.

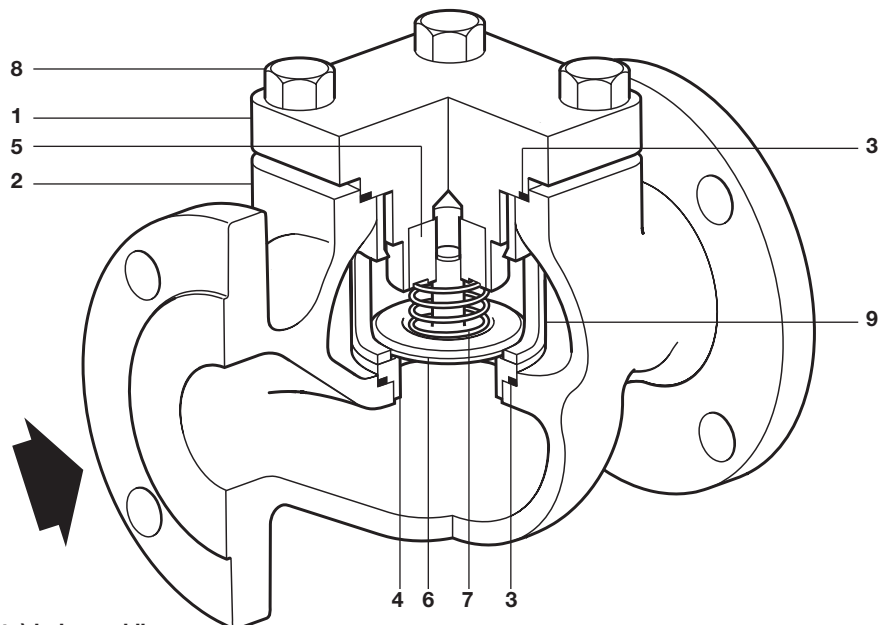
<b>Flanged EN 1092 PN16</b>	Body design conditions	PN16
	PMA Maximum allowable pressure	16 bar g @ 120°C
	TMA Maximum allowable temperature	300°C @ 12.8 bar g
	Minimum allowable temperature	-10°C
	PMO Maximum operating pressure for saturated steam service	14.7 bar g
	TMO Maximum operating temperature	300°C @ 12.8 bar g
<b>Screwed BSP and Flanged EN 1092 PN25</b>	Minimum operating temperature	-10°C
	<b>Note:</b> For lower operating temperatures consult Spirax Sarco.	
	Designed for a maximum cold hydraulic test pressure of:	24 bar g
	Body design conditions	PN25
	PMA Maximum allowable pressure	25 bar g @ 120°C
	TMA Maximum allowable temperature	300°C @ 20 bar g
<b>Flanged ASME 125</b>	Minimum allowable temperature	-10°C
	PMO Maximum operating pressure for saturated steam service	22.5 bar g
	TMO Maximum operating temperature	300°C @ 20 bar g
	Minimum operating temperature	-10°C
	<b>Note:</b> For lower operating temperatures consult Spirax Sarco.	
	Designed for a maximum cold hydraulic test pressure of:	38 bar g
<b>Flanged ASME 250</b>	Body design conditions	ASME 125
	PMA Maximum allowable pressure	200 psi g @ 149°F
	TMA Maximum allowable temperature	450°F @ 125 psi g
	Minimum allowable temperature	14°F
	PMO Maximum operating pressure for saturated steam service	145 psi g
	TMO Maximum operating temperature	450°F @ 125 psi g
<b>Screwed NPT and Flanged ASME 250</b>	Minimum operating temperature	14°F
	<b>Note:</b> For lower operating temperatures consult Spirax Sarco.	
	Designed for a maximum cold hydraulic test pressure of:	297 psi g
	Body design conditions	ASME 250
	PMA Maximum allowable pressure	500 psi g @ 149°F
	TMA Maximum allowable temperature	450°F @ 250 psi g
<b>Flanged JIS / KS 10</b>	Minimum allowable temperature	14°F
	PMO Maximum operating pressure for saturated steam service	281 psi g
	TMO Maximum operating temperature	450°F @ 250 psi g
	Minimum operating temperature	14°F
	<b>Note:</b> For lower operating temperatures consult Spirax Sarco.	
	Designed for a maximum cold hydraulic test pressure of:	754 psi g
<b>Flanged JIS / KS 10</b>	Body design conditions	JIS / KS 10
	PMA Maximum allowable pressure	13.7 bar g @ 120°C
	TMA Maximum allowable temperature	300°C @ 9.8 bar g
	Minimum allowable temperature	0°C
	PMO Maximum operating pressure for saturated steam service	12.3 bar g
	TMO Maximum operating temperature	300°C @ 9.8 bar g
<b>Flanged JIS / KS 10</b>	Minimum operating temperature	0°C
	<b>Note:</b> For lower operating temperatures consult Spirax Sarco.	
	Designed for a maximum cold hydraulic test pressure of:	20 bar g

# LCV3, LCV4, LCV6 and LCV7 Lift Check Valves

## Materials

## Standard

No.	Part		Material		PN /BSP	ASME /NPT /SW	
1 and 2	Body and cover	LCV3	ASME	Cast iron body with SG iron cover	Cover (1)	EN 1561 GJL250	ASTM A395
			PN	SG iron body with cast iron cover	Body (2)	EN 1563 GJS400-15	ASTMA126ClassB
		LCV4		Carbon steel		EN 10213 1.0619+N	ASTM A216 WCB
		LCV6		Stainless steel		EN 10213 1.4408	ASTM A351-CF8M
		LCV7		SG iron		EN 1563 GJS400-18LT	ASTM A395
3	Gasket			Reinforced exfoliated graphite	Graphite	Graphite	
4 and 5	Seat and guide	LCV3		Stainless steel	431	431	
		LCV4		Stainless steel	431	431	
		LCV6		Stainless steel	316L	316L	
		LCV7		Stainless steel	431	431	
6	Disc			Stainless steel	316L	316L	
7	Spring			Stainless steel	316 S 42	316 S 42	
8	Bolt	LCV3		Cast steel	Grade 8.8	Grade 8.8	
		LCV4		Cast steel	Grade 8.8	Grade 8.8	
		LCV6		Stainless steel	A2-70	A2-70	
		LCV7		Cast steel	Grade 8.8	Grade 8.8	
9	Seat retainer			Stainless steel	316L	316L	



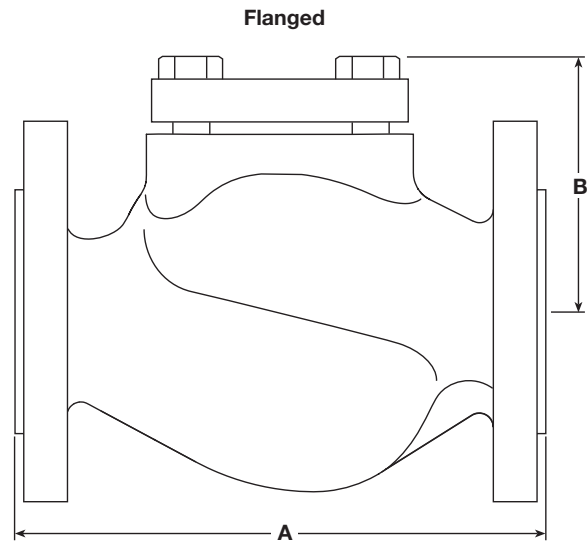
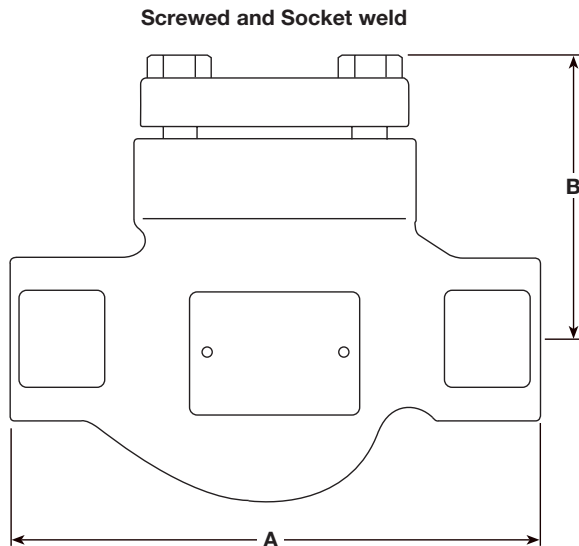
## Weights (approximate) in kg and lb

Unit		LCV3				LCV4				LCV6				LCV7			
		Flanged		Screwed		Flanged		Screwed		Flanged		Screwed		Flanged		Screwed	
		kg	lb	kg	lb	kg	lb	kg	lb	kg	lb	kg	lb	kg	lb	kg	lb
DN15	½"	4.30	9	3.10	7	5.05	11	3.65	8	5.19	11	3.79	8	4.64	10	3.24	7
DN20	¾"	5.50	12	4.10	9	6.43	14	5.33	12	6.60	15	5.50	12	5.89	13	4.29	9
DN25	1"	5.82	13	4.10	9	6.58	15	4.18	9	6.77	15	4.37	10	6.04	13	3.74	8
DN32	1¼"	10.23	23	7.20	16	12.89	28	9.59	21	13.37	29	10.07	22	11.99	26	8.69	19
DN40	1½"	11.43	25	8.00	18	14.35	32	9.55	21	14.77	33	9.97	22	13.18	29	9.28	20
DN50	2"	14.96	33	10.50	23	16.86	37	12.06	27	17.51	39	12.71	28	15.65	35	10.65	23
DN65	2½"	27.04	60			32.25	71			33.13	73			29.53	65		
DN80	3"	29.47	65			36.02	79			37.00	82			33.00	73		
DN100	4"	48.93	108			52.06	115			53.47	118			48.82	108		

# LCV3, LCV4, LCV6 and LCV7 Lift Check Valves

**Dimensions** (approximate) in mm

Please note: Flanged ASME versions are (approximate) in inches



Dimension	Connection	Screwed BSP Socket weld	Flanged PN40 PN16 PN25 JIS 10/KS 10 JIS 20/KS 20	Screwed NPT	Flanged ASME 125		Flanged ASME 250 ASME 300
					LCV3	LCV7	
<b>A</b>	DN15 1/2"	130	130	6 1/2"	7 1/4"		7 1/2"
	DN20 3/4"	155	150	6 1/2"	7 1/4"		7 1/2"
	DN25 1"	160	160	7 3/4"	7 1/4"	7 1/4"	7 3/4"
	DN32 1 1/4"	185	180	8 1/2"			
	DN40 1 1/2"	205	200	9 1/4"	8 3/4"	8 3/4"	9 1/4"
	DN50 2"	230	230	10 1/2"	10"	10"	10 1/2"
	DN65 2 1/2"		290		10 1/2"	10 1/2"	11 1/2"
	DN80 3"		310		11 3/4"	11 3/4"	12 1/2"
	DN100 4"		350		13 3/4"	13 3/4"	14 1/2"
<b>B</b>	DN15 1/2"	88	88	4"	4"	4"	4"
	DN20 3/4"	88	88	4"	4"	4"	4"
	DN25 1"	88	88	4"	4"	4"	4"
	DN32 1 1/4"	117	117	5 3/16"			
	DN40 1 1/2"	117	117	5 3/16"	5 3/16"	5 3/16"	5 3/16"
	DN50 2"	117	117	5 3/16"	5 3/16"	5 3/16"	5 3/16"
	DN65 2 1/2"		166		7 7/8"	7 7/8"	7 7/8"
	DN80 3"		166		7 7/8"	7 7/8"	7 7/8"
	DN100 4"		180		8 1/2"	8 1/2"	8 1/2"

# LCV3, LCV4, LCV6 and LCV7 Lift Check Valves

## Capacities

Capacity	DN15 ½"	DN20 ¾"	DN25 1"	DN32 1¼"	DN40 1½"	DN50 2"	DN65 2½"	DN80 3"	DN100 4"
K <sub>v</sub>	5	8.3	11	18	34	42	87	113	135
CV (US)	5.9	9.7	12.9	21.1	39.8	49.1	101.8	132.2	158

## Opening pressures in (mbar) and psi

Differential pressures with zero flow

Flow direction	DN15 to DN25	DN32 to DN50	DN65 to DN100
Horizontal	(22.5) 0.33	(24.5) 0.36	(25.5) 0.37
Vertical	(20) 0.30	(20) 0.29	(20) 0.29

## Safety information, installation and maintenance

For full details see the Installation and Maintenance Instructions (IM-P029-17) supplied with the product.

### Installation note:

Always install the lift check valve horizontally with the flow in the direction indicated on the body.

### Disposal

These products are recyclable. No ecological hazard is anticipated with the disposal of these products, providing due care is taken.

## How to order

**Example:** 1 off Spirax Sarco DN15 LCV4 lift check valve having flanged EN 1092 PN40 connections.

## Spare parts

The spare parts available are shown in solid outline. Parts drawn in broken line are not supplied as spares.

### Available spares



LCV Gaskets kit (Cover gasket and seat gasket)	<b>Spare 1</b>
LCV Internals kit (Cover gasket, seat gasket, spring, disc and seat)	<b>Spare 2</b>

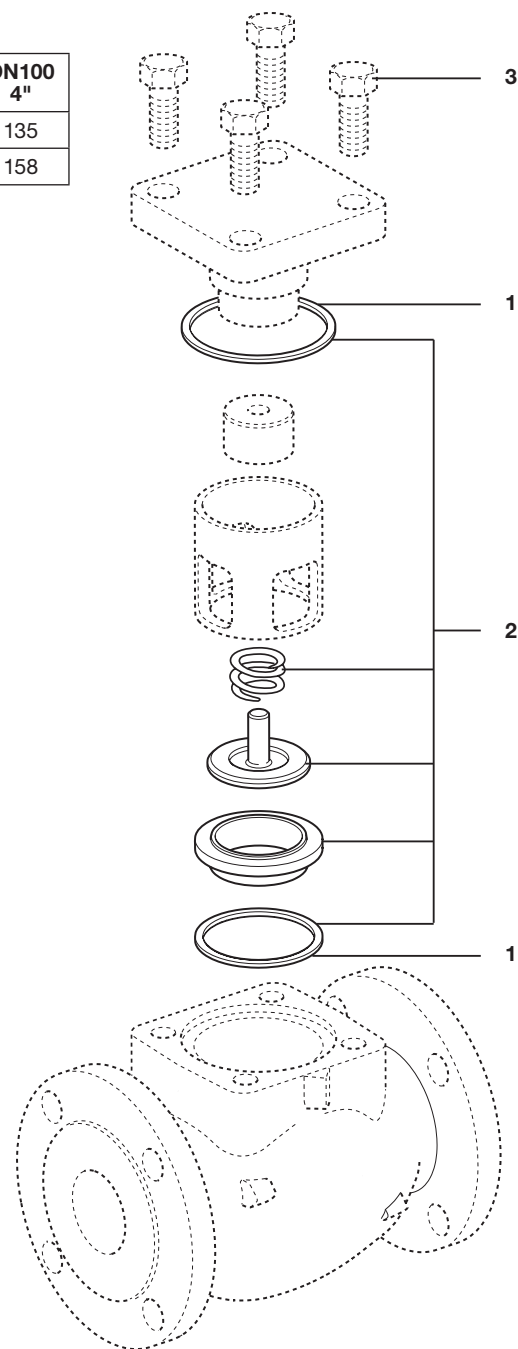
### How to order spares

Always order spares by using the description given in the column headed 'Available spares' and state the size and type of trap. Always order spares by using the description of the LCV and Spare 1 or Spare 2.

**Example:** 1 off LCV Internals kit – Spare 2, for a Spirax Sarco DN15 LCV4 lift check valve having flanged EN 1092 PN40 connections.

## Recommended tightening torques

Item	Size					N m
		EN	ASME	EN	ASME	
3	DN15 to DN25 (½" to 1")	LCV3	17 A/F	LCV3	M10	40 - 50
		Others	19 A/F	Others	M12	
	DN32 to DN50 (1¼" to 2")	LCV3	19 A/F	LCV3	M12	80 - 90
		Others	24 A/F	Others	M16	
	DN65 to DN80 (2½" to 3")		24 A/F		M16	90 - 100
	DN100 (4")		24 A/F		M16	70 - 80



# spirax sarco

## DCV 4 Wafer Check Valve

The DCV 4 Wafer Check Valve is designed to be fitted between ANSI flanges. It is suitable for use on a wide range of fluids for applications in process lines, hot water systems, steam and condensate systems.

Model	DCV 4
Sizes	1/2", 3/4", 1", 1-1/2", 2", 3", 4"
Connections	ANSI 150 or 300
Construction	Austenitic Stainless Steel
Standard Internals	Standard Disk: Metal - Metal Seat Standard Spring: Stainless Steel
Soft Seat Options	Viton (for oils & gases): temp. limits: -5°F to +482°F (-15°C to +250°C) EPDM (for water): temp. limits: -58°F to +302°F (-50°C to +150°C)
Spring Options	high temperature nimonic or supplied without spring

### LIMITING OPERATING CONDITIONS

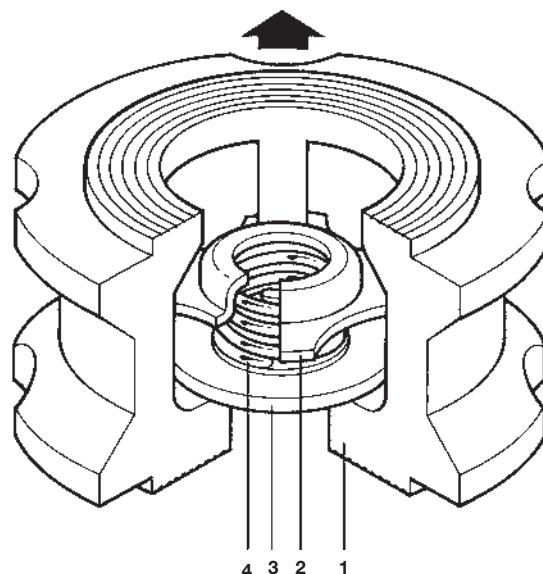
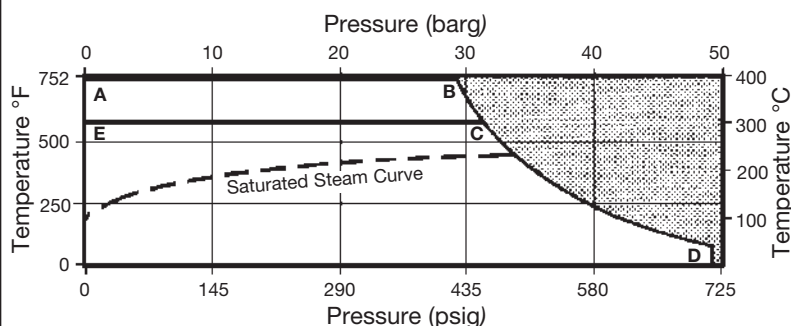
#### Maximum design conditions ANSI 300

**Max. Operating Pressure (PMO)** 725 psig (50 barg)

**Max. Operating Temperature (TMO)** 572°F (300°C) with standard spring  
752°F (400°C) nimonic high temperature spring  
752°F (400°C) without spring

**Minimum temperature (Standard Disc)** -58°F (-50°C)

**Maximum cold hydraulic test** 1102 psig (76 barg)



### OPENING PRESSURES

Differential pressures with Zero Flow (in **psi** and **mbar**)

Flow	1/2"	3/4"	1"	Size 1-1/2"	2"	3"	4"
▲	<b>0.36</b> 25	<b>0.36</b> 25	<b>0.36</b> 25	<b>0.41</b> 28	<b>0.42</b> 29	<b>0.45</b> 31	<b>0.48</b> 33
▶	<b>0.33</b> 22.5	<b>0.33</b> 22.5	<b>0.33</b> 22.5	<b>0.35</b> 24	<b>0.36</b> 24.5	<b>0.37</b> 25.5	<b>0.38</b> 26.5
▼	<b>0.29</b> 20	<b>0.29</b> 20	<b>0.29</b> 20	<b>0.29</b> 20	<b>0.29</b> 20	<b>0.29</b> 20	<b>0.29</b> 20

Where lowest opening pressures are required, valves without springs can be installed in vertical pipes with bottom-to-top flow.

#### Without spring

▲	<b>0.04</b> 2.5	<b>0.04</b> 2.5	<b>0.04</b> 2.5	<b>0.06</b> 4	<b>0.07</b> 4.5	<b>0.08</b> 5.5	<b>0.09</b> 6.5
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### STANDARDS

Designed and manufactured in accordance with BS 7438.

#### Standard of shut off

Standard valves conform to DIN 3230 Part 3, BN 2. Valves conforming to DIN 3230 Part 3, BO3 available on request. Soft seated versions meet DIN 3230 Part 3 BN1 and BO1 provided a differential pressure exists.

### CONSTRUCTION MATERIALS

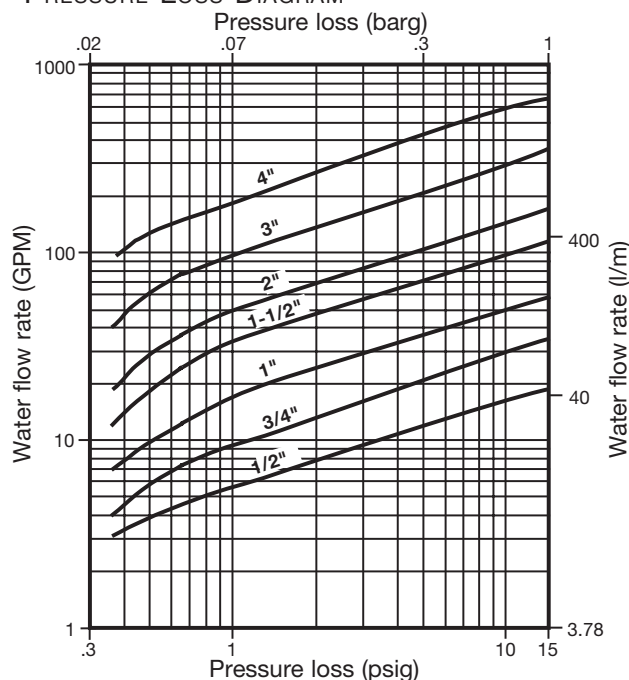
No.	Part	Material	
1	Body	Austenitic Stainless Steel	ASTM A351 CF3M
2	Disc	Austenitic Stainless Steel	BS 1449 316 S 11
3	Spring Retainer	Austenitic Stainless Steel	BS 1449 316 S 11
4	Standard Spring	Austenitic Stainless Steel	BS2056 316 S 42
	High Temperature Spring	Nickel alloy	Nimonic 90

Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only.  
In the interests of development and improvement of the product, we reserve the right to change the specification.

TI-7-222-US 4.14

# DCV 4 Wafer Check Valve

PRESSURE LOSS DIAGRAM



Pressure loss diagram with open valve at 68°F (20°C). The values indicated are applicable to spring loaded valves with horizontal flow. With vertical flow, insignificant deviations occur only within the range of partial opening. The curves given in the chart are valid for water at 68°F (20°C). To determine the pressure drop for other fluids, the equivalent water volume flowrate must be calculated and used in the graph.

$$V_w = \sqrt{S.G.} \times V$$

$V_w$  = Equivalent water volume flow in GPM

S.G. = Specific Gravity

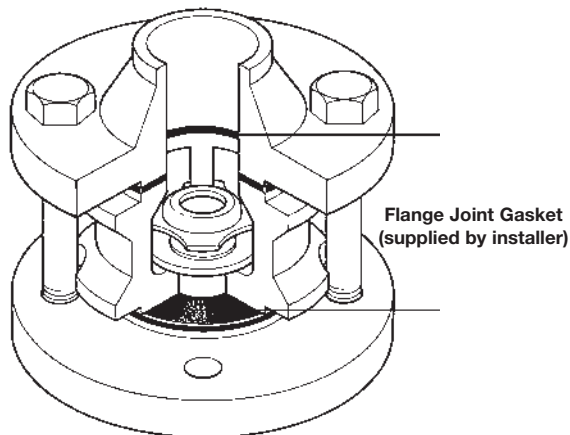
$V$  = Volume of fluid GPM

Pressure loss information for steam, compressed air, and gases is available from Spirax Sarco.

## INSTALLATION

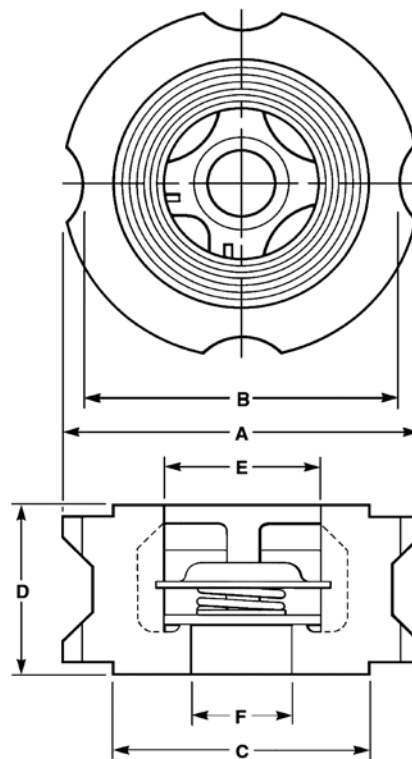
DCV 4 Wafer Check Valves must be fitted in accordance with the direction of flow arrow indicating correct fluid flow direction. When fitted with a spring they can be installed in any plane. When supplied without a spring these must be fitted in a vertical flow line with the flow from bottom to top.

**Note:** Disc Check valves are not suitable for use where heavily pulsating flow exists, such as close to a compressor.



DIMENSIONS (NOMINAL) IN INCHES AND MILLIMETERS

Size	A	B	C	D	E	F	Weight
1/2"	2.1 54	1.9 47	1.5 38	1 25	.9 22.4	.5 15	0.53 lb 0.24 kg
3/4"	2.7 67	2.3 57	1.8 46	1.3 31	1.5 27.4	.75 20	0.90 lb 0.41 kg
1"	2.9 73	2.7 67	2.1 54	1.4 35	1.3 33.2	1 25	1.19 lb 0.54 kg
1-1/2"	3.8 95	3.4 86	3 76	1.8 45	2 49.2	1.5 40	2.54 lb 1.15 kg
2"	4.4 111	4.1 105	3.8 95	2.3 56	2.3 59.2	2 50	4.06 lb 1.84 kg
3"	5.9 149	5.3 136	5.1 130	2.8 71	3.5 90.2	3 80	8.14 lb 3.69 kg
4"	7.1 181	6.9 174	6.3 160	3.1 80	4.4 111.2	4 100	12.57 lb 5.70 kg



## HOW TO SPECIFY

Spirax Sarco DCV 4 Wafer Check Valve for fitting between ANSI 300 flanges.

### Valve bodies that are marked with:

- "N" — Have a nimonic spring fitted for operating temperatures up to 752°F
- "W" — Have no return spring fitted. These must be fitted with flow from bottom to top in a vertical line.
- "T" — Valves tested to DIN 3230 Part 3, BO3.

### Discs that are marked with a:

- "V" — Have a Viton soft seating face—temperature limit 482°F
- "E" — Have an EPDM soft seating face—temperature limit 302°F.

## HOW TO ORDER

1-1/2" Spirax Sarco DCV 4 Wafer Check Valve, steam at 400 psi, Austenitic stainless steel body to fit between ANSI 300 flanges.

TI-7-222-US 4.14



## DCV 10 Stainless Steel Disc Check Valve for use with Automatic Pump Traps

### Description

The DCV10 disc check valve has been designed specifically for use with Spirax Sarco's APT14HC and APT14SHC automatic pump-traps. The check valve ensures the correct flow of condensate and other suitable fluids through these condensate pumps and also prevents reverse flow.

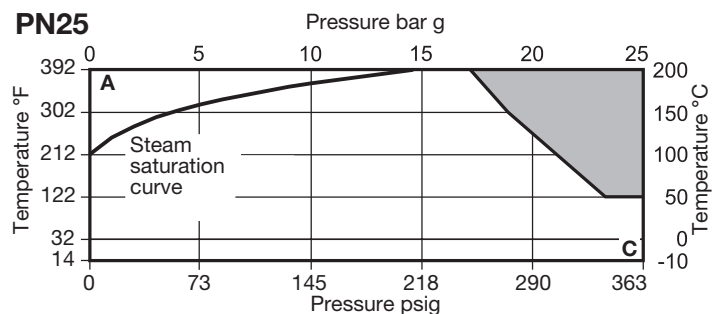
**Standards** - Designed in accordance with BS EN 14341:2006. This product fully complies with the requirements of the European Pressure Equipment Directive 97/23/EC.

**Shut-off** - Shut-off conforms to EN 12266-1:2003 Rate F.

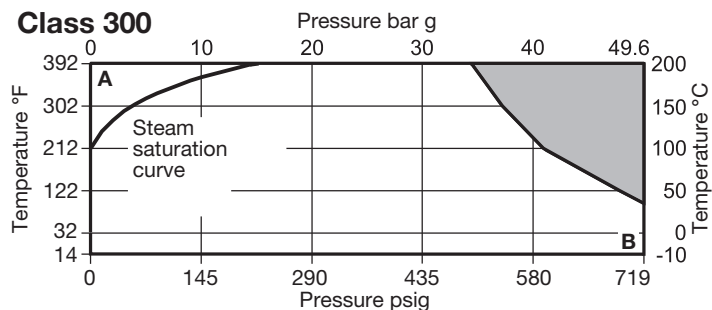
**Certification** - This product is available with certification to EN 10204 3.1. **Note:** All certification/inspection requirements must be stated at the time of order placement.

### Pressure/temperature limits

#### PN25



#### Class 300



The product **must not** be used in this region.

**A - B** For fitting between Class 150 and Class 300 flanges.

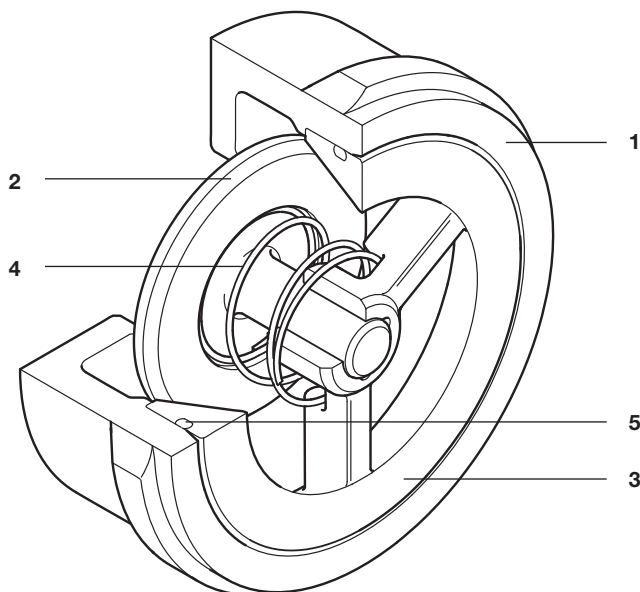
**A - C** For fitting between EN 1092 PN16 and JIS/KS 10K flanges.

Body design condition			PN25 or Class 300
PMA	Maximum allowable pressure	PN25	363 psig @ 32°F
		Class 300	719 psig @ 32°F
TMA	Maximum allowable temperature	PN25	392°F @ 250 psig
		Class 300	392°F @ 500 psig
Minimum allowable temperature			-10°C
PMO	Maximum operating pressure	PN25	363 psig @ 32°F
		Class 300	718 psig @ 32°F
TMO	Maximum operating temperature	PN25	392°F @ 250 psig
		Class 300	392°F @ 500 psig
Temperature limits			14°F to 392°F
Minimum operating temperature			14°F
Designed for a maximum cold hydraulic test pressure of:		PN25	544 psig
		Class 300	1079 psig

### Sizes and pipe connections

The PN25 design is available in sizes 1½" to fit between EN 1092 PN16 and JIS/KS 10K flanges.

**Please note:** The Class 300 design is available in size 1½" only to fit between ASME B 16.5 (ANSI) Class 150 and Class 300 flanges.



### Materials

No.	Part	Material	
1	Body	PN	Austenitic stainless steel 1.4308
		ANSI	Austenitic stainless steel A351 CF8
2	Disc	Austenitic stainless steel A276 316L	
3	Spider	Martensitic stainless steel BS 3146-2 ANC2	
4	Springs	Stainless steel BS 2056 316 S42	
5	'O' ring	Fluorocarbon polymer FEPM (TFEP)	

### C<sub>v</sub> values

Size 1½"

C<sub>v</sub> 30

For conversion: C<sub>v</sub> (UK) = K<sub>v</sub> x 0.963 C<sub>v</sub> (US) = K<sub>v</sub> x 1.156

### Opening pressures in psi (mbar)

Differential pressures with zero flow.

→ Flow direction

Size	1½"
↑	0.41 (28)
→	0.36 (24.5)
↓	0.29 (20)

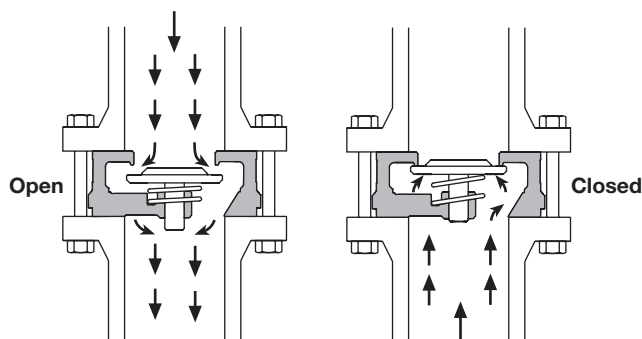
Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only.

In the interests of development and improvement of the product, we reserve the right to change the specification. TI-P601-32-US 10.14

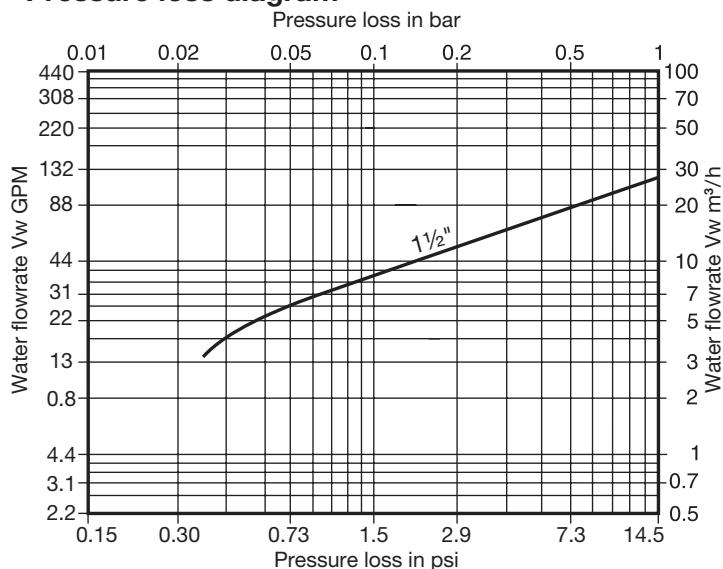


## Operation

The DCV10 is opened by the pressure and flow of condensate and is closed by the pressure of the spring when flow ceases and before reverse flow occurs.



## Pressure loss diagram



Pressure loss diagram with open valve at 68°F (20°C).

The values indicated are applicable with to spring loaded valves with horizontal flow. With vertical flow, insignificant deviations occur only within the range of partial opening.

The curves given in the chart are valid for water at 68°F (20°C). To determine the pressure drop for other fluids, the equivalent water volume flowrate must be calculated and used in the graph.

$$V_w = \sqrt{S.G.} \times V$$

$V_w$  = Equivalent water volume flow in GPM

S.G. = Specific Gravity

$V$  = Volume of fluid GPM

Pressure loss information for steam, compressed air and gases is available from Spirax Sarco.

## Safety information, installation and maintenance

For full details see the Installation and Maintenance Instructions (IM-P601-33) supplied with the product.

### Installation note:

The DCV10 must be installed close coupled to the pump. It can be fitted in either a horizontal or vertical line in accordance with the direction of flow arrow on the body. **Note:** Flanges, bolts (or studs), nuts and gaskets to be supplied by the installer.

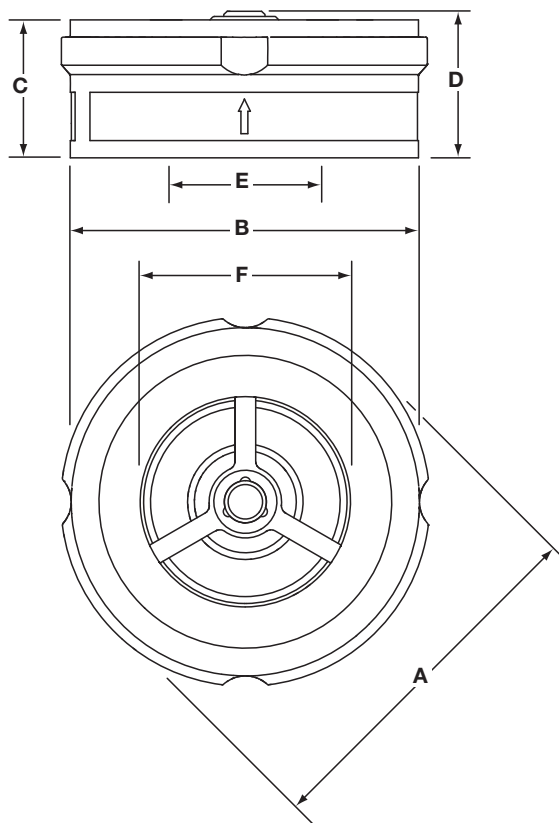
## How to order

**Example:** 1 Spirax Sarco 1 1/2" DCV10 stainless steel check valve to fit between ANSI 150 flanges for use with an APT 14 HC pump.

## Dimensions / weights (approximate) in inches and lb.

### ANSI 150 and ANSI 300

Size	A	B	C	D		E	F	Weight
				Open	Closed			
1 1/2"	3.7	3.4	1.8	1.9	1.8	1.6	1.9	1.8



## DCV41 Austenitic Stainless Steel Disc Check Valve

### Description

DCV41 is an austenitic stainless steel disc check valve with screwed or socket weld end connections. Its function is to prevent reverse flow on a wide variety of fluids for applications in process lines, hot water systems, steam and condensate systems. For oils and gases, a Viton seat is available and for water an EPDM seat is available. Soft seat versions provide a zero leakage rate or bubble tight shut-off, i.e. they meet DIN 3230 BN1 and DIN 3230 BO1, provided a differential pressure exists (**Note:** Soft seat options are not available with socket weld ends). The shut-off of the standard valve conforms to DIN 3230 BN2. When a heavy duty spring is installed with an EPDM seat, the valve is suitable for boiler feedwater check applications.

A high temperature spring version is available to operate at 752°F. (400°C)

### Sizes and pipe connections

1/2", 3/4", 1", Screwed NPT to ANSI B 1.20.1 and (screwed BSP to BS 21 female taper) socket weld to ANSI B 16.11 Class 3000.

### Optional extras

Heavy duty springs 10 psi (700 mbar) opening pressure for boiler feed applications.

High temperature spring.

Viton soft seals for water applications - screwed connections only

EPDM soft seals for water applications - screwed connections only.

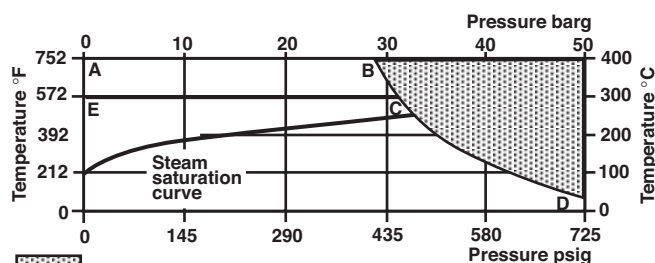
### Limiting conditions

Maximum body design condition		PN50
PMO - Maximum operating pressure		(50 barg) 725 psig
TMO - Maximum Operating Temperature	With metal seat and standard spring	(300°C) 572°F
	With metal seat and high temperature spring	(400°C) 752°F
	Without spring	(400°C) 752°F
	Viton seat	(250°C) 482°F
	EPDM seat	(150°C) 302°F
Minimum operating temperature	With metal seat	(-29°C) -20°F
	With viton seat	(-15 to +250°C) 5°F to 482°F
	With EPDM seat	(-29 to +250°C) -20°F to 482°F

Designed for a maximum cold hydraulic test pressure of 1102 psig (76 barg)

**Note:** Special testing to allow lower temperature operation can be provided at extra cost. Consult Spirax Sarco.

### Operating range



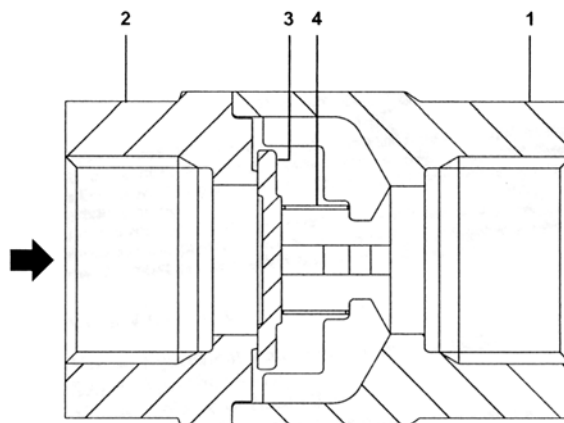
This product must not be used in this region.

A - B - D High temperature spring and without spring

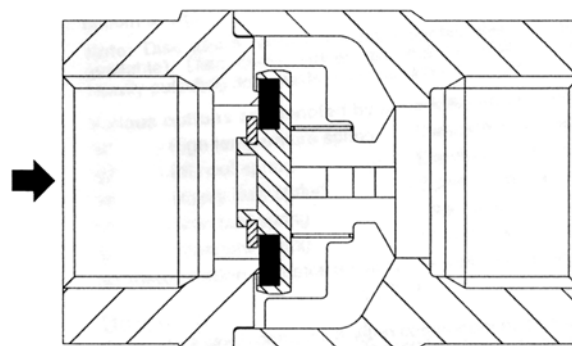
E - C - D Standard spring

Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only.

In the interests of development and improvement of the product, we reserve the right to change the specification. TI-P601-18-US 06.02



### Soft seat option (screwed connections only)



### Certification

The product is available with certification to EN 10204 3.1.B for body as standard.

### Standards

Designed and manufactured in accordance with BS 7438.

### Standard shut-off

Standard valves conform to DIN 3230 BN2.

Soft seated versions meet DIN 3230 BN1 and DIN 3230 BO1 provided a differential pressure exists.

### Operation

Disc check valves are opened by the pressure of the fluid and closed by the spring as soon as the flow ceases and before the reverse flow occurs.

### Materials

1 Body	Austenitic stainless steel	ASTM A351 CF 3M
2 Seat	Austenitic stainless steel	ASTM A351 CF3M
3 Disc	Austenitic stainless steel	BS 1449 316 S11
Standard spring	Austenitic stainless steel	BS 2056 316 S42
4 Heavy duty spring	Austenitic stainless steel	BS 2056 316 S42
High temp. spring	Nickel alloy	Nimonic 90

# DCV41 Austenitic Stainless Steel Disc Check Valve

## C<sub>v</sub> values

Size	1/2"	3/4"	1"
C <sub>v</sub>	5.1	8.8	14

## Opening pressures in psi (mbar)

Differential pressures with zero flow for standard and high temperature springs

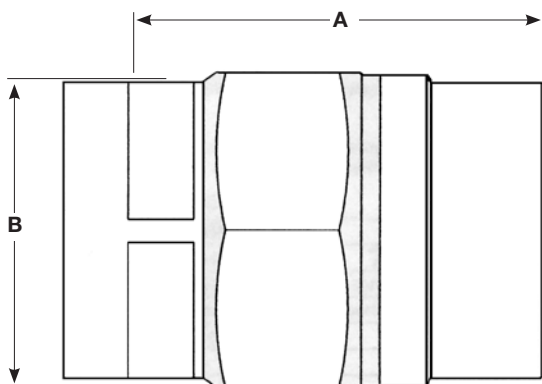
◀ Flow direction

Size	1/2"	3/4"	1"
✓	0.36 (25)	0.36 (25)	0.36 (25)
◀	0.33 (22.5)	0.33 (22.5)	0.33 (22.5)
^	0.29 (20)	0.29 (20)	0.29 (20)

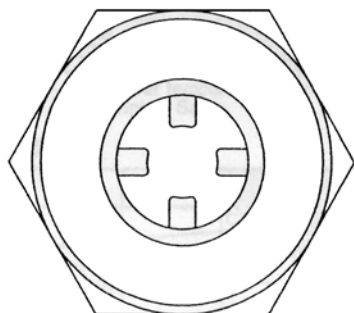
Where lower opening pressures are required, valves without springs can be installed in vertical pipes with bottom-to-top-flow.

## Dimensions / weight (approximate) in inches (mm) and lb (kg)

Size	A Socket weld	A Screwed	B A/F	Weight
1/2"	2.0 (50)	2.0 (51)	1.3 (34)	0.4 (0.2)
3/4"	2.6 (67)	2.7 (68)	2.0 (50)	1.1 (0.5)
1"	2.6 (67)	2.7 (68)	2.0 (50)	1.1 (0.5)



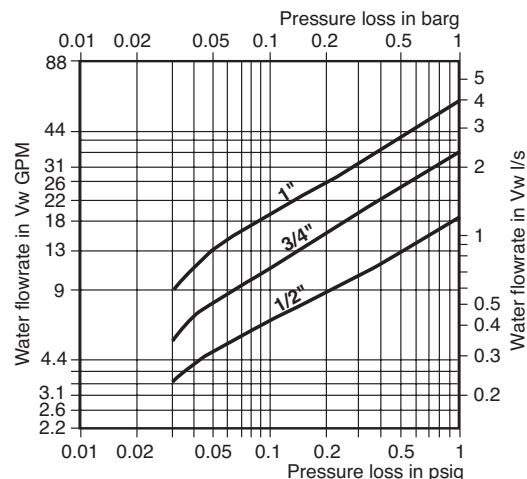
End elevation



## How to order

**Example:** 1 Spirax Sarco DCV41 in an austenitic stainless steel body having 1/2" screwed NPT connections and complete with certification to EN 10204 3.1.B for the body.

## Pressure loss diagram



Pressure loss diagram with open valve at 68°F (20°C). The valves indicated are applicable to spring loaded valves with horizontal flow. With vertical flow, insignificant deviations occur only within the range of partial opening.

The curves given in the chart are valid for water at 68°F (20°C). To determine the pressure for other fluids the equivalent water volume flow rate must be calculated and used in the graph.

$$V_w = \sqrt{S.G.} \times V$$

V<sub>w</sub> = Equivalent water volume flow in GPM

S.G. = Specific Gravity

V = Volume of fluid GPM

Pressure loss information for steam, compressed air, and gases is available from Spirax Sarco.

## Installation

For more detailed installation and maintenance instructions please refer to IM-P601-19 which is supplied with the product. The DCV41 must be fitted in accordance with the direction of flow arrow indicating correct fluid flow direction. When fitted with a spring, they can be installed in any plane. When supplied without spring, they must be fitted in a vertical flow line with the flow from bottom-to-top.

**Note:** Disc check valves are non-maintainable (no spares are available). Disc check valves are not suitable for use where heavily pulsating flow exists, such as close to a compressor.

Various options are denoted by a marking on the valve body: -

'N'	-High temperature spring	-Standard metal seat
'W'	-Without spring	-Standard metal seat
'H'	-Heavy duty spring	-Standard metal seat
'V'	-Standard spring	-Viton seat
'E'	-Standard spring	-EPDM seat

**No identification** indicates a standard spring with a metal disc.

## Disposal

If a product which contains a Viton component has been subjected to a temperature approaching 599°F (315°C) or higher, then it may have decomposed and formed hydrofluoric acid. Avoid skin contact and inhalation of any fumes as the acid will cause deep skin burns and damage to the respiratory system. Viton must be disposed of in a recognized manner as stated in the Installation and Maintenance Instructions (IM-P601-19). No other ecological hazard is anticipated with the disposal of this product providing due care is taken.



## SDCV44 Austenitic Stainless Steel Split Disc Check Valve

### Description

A range of austenitic stainless steel split disc check valves in a wafer pattern suitable for fitting between ANSI Class 150 and class 300 flanges. Their function is to prevent reverse flow on a wide variety of fluids for applications in process lines, hot water systems, steam and condensate systems. The face-to-face dimension of the SDCV44 conforms to API 594. As standard the valve has a metal-to-metal seat. 4" SDCV44 Patent Pending.

### Size and pipe connections

2" (DN50), 3" (DN80), 4" (DN100)

Suitable for installation between the following flanges:

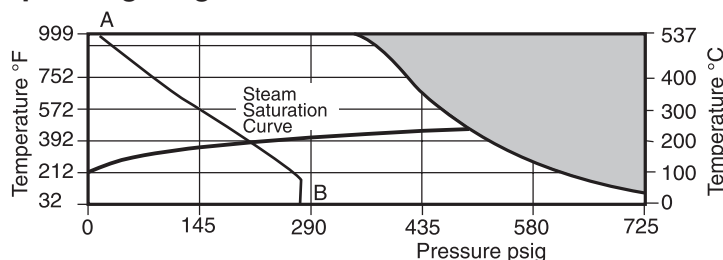
ANSI B 16.5 class 150, 300.

### Limiting conditions

Maximum Body Design Condition	
PMA - Maximum allowable pressure	720 psig (49.6 barg)
TMA - Maximum allowable temperature	650°F (343.3°C)
PMO - Maximum operating pressure	720 psig (49.6 barg)
TMO - Maximum Metal seat operating temperature	650°F (343.5°C)
Minimum operating Metal seat temperature	-20°F (-28.88°C)
Designed for a maximum Cold hydraulic test pressure	1100 psig (137.9 barg)

**Note:** Limited to flange rating

### Operating range



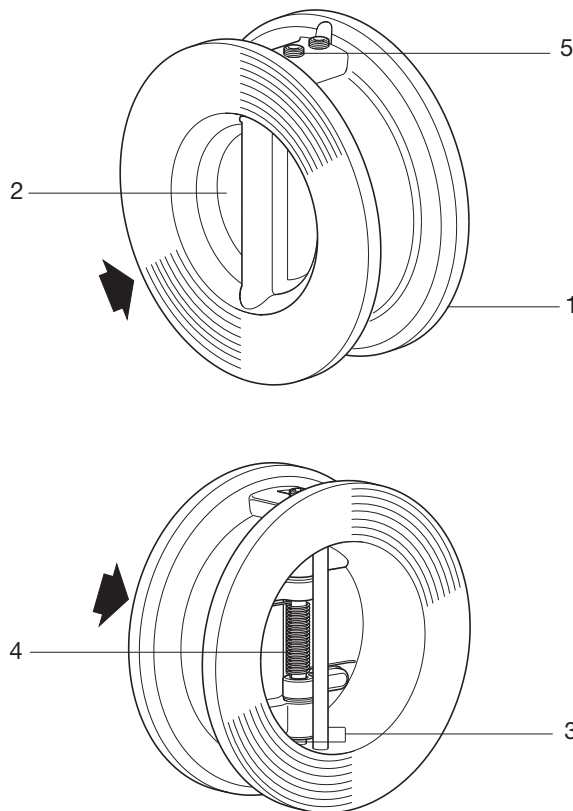
The product **must not** be used in this region.

A - B ANSI 150 flanges

A - C ANSI 300 flanges

### Materials

No.	Part	Material
1	Body	Austenitic stainless steel ASTM A351 CF8M
2	Plate	Austenitic stainless steel ASTM A351 CF8M
3	Hinge/stop pin	Austenitic stainless steel AISI 316
4	Spring	Nickel alloy Inconel-718
5	Retainer plug	Austenitic stainless steel AISI 316



### Certification

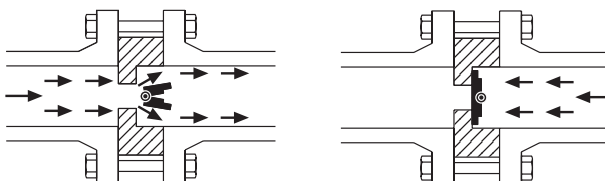
The product is available with certification to EN 10204 3.1.B for the body at extra cost. Certification must be specified at the time of order placement.

### Standard shut-off

Valve shut off to API 598 available on request.

### Operation

A split disc check valve is opened by the pressure of the fluid and closed by the spring as soon as the flow ceases and before the reverse flow occurs.



Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only.  
In the interests of development and improvement of the product, we reserve the right to change the specification.

TI-7-224-US 2.14

# SDCV44 Austenitic Stainless Steel Split Disc Check Valve

**Dimensions** approximate in inches and pounds (mm and kg)

		Ø A	B	Ø C	Ø D	Weight
2"	DN50	4.1" (111.7mm)	2.2" (55.9mm)	1.7" (43.2mm)	2.7" (63mm)	5.5 lbs (2.5kg)
3"	DN80	5.3" (134.6mm)	2.9" (73mm)	2.6" (66mm)	3.7" (95mm)	11.5 lbs (5.2kg)
4"	DN100	7.1" (180mm)	3.0" (76mm)	3.5" (89mm)	4.75" (121mm)	15.2 lbs (6.9kg)

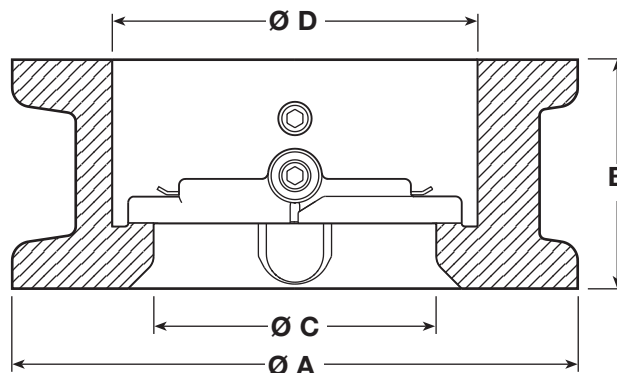
## Kv values

Size	DN50 2"	DN80 3"	DN100 4"
Kv	40	111	226
For conversion Cv (US) = Kv x 1.17      Cv (UK) = Kv x 0.97			

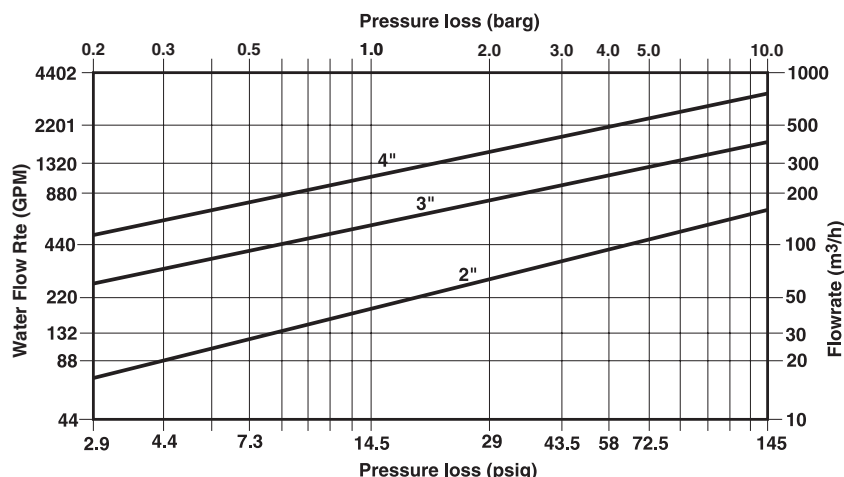
## Opening pressures in psi (mbar)

Differential pressures with zero flow.

	DN50	DN80	DN100
→ Flow direction	0.44 (30)	0.44 (30.0)	0.38 (26)
↑	0.7 (48)	0.65 (45.5)	0.62 (43)



## Pressure loss diagram



Pressure loss diagram with open valve at 68°F (20°C).

The values indicated are applicable to spring loaded valves with horizontal flow. With vertical flow, insignificant deviations occur only within the range of partial opening.

The curves given in the chart are valid for water at 68°F (20°C). To determine the pressure drop for other fluids, the equivalent water volume flowrate must be calculated and used in the graph.

$$V_w = \sqrt{S.G.} \times V$$

$V_w$  = Equivalent water volume flow in GPM

S.G. = Specific Gravity

$V$  = Volume of fluid GPM

Pressure loss information for steam, compressed air, and gases is available from Spirax Sarco.

## How to order

Example: 1 of Spirax Sarco SDCV44 having an austenitic stainless steel body for installation between DN50, ANSI Class 150 flanges.

## Safety information, installation and maintenance

For full details see the Installation and Maintenance Instructions IM-7-224-US supplied with the product.

**Note:** The SDCV44 is not suitable for heavy pulsating flows (compressors) or vertical down flows. Flanges, bolts (or studs), nuts and joint gaskets are to be provided by the installer.

TI-7-224-US 2.14



# spirax sarco

## Steam Injectors IN15, IN25M, IN40M

### Steam Injectors Type IN are:

- All stainless steel
- Ideal for boiler feedtank heating of water and other fluids
- Heats, mixes and circulates- no moving parts
- Compact design- minimizes noise and vibration

Model	IN15	IN25M	IN40M
Sizes	1/2"	1"	1-1/2"
Connections	NPT	NPT male & Butt-weld	
Construction	Austenitic Stainless Steel grade 316L		

### Description

Spirax Sarco steam injectors use steam to raise the temperature of water or other liquids. They work by using a jet of steam to draw in the liquid through radial ports, mix it, and distribute the heated liquid throughout the tank vessel. The circulation induced by the injector ensures thorough mixing and avoids temperature stratification. Three sizes of injectors are available to suit a wide range of applications.

The smallest, the IN15, has a male and a female thread for direct mounting to a tank wall from the outside, or to pipework within the tank.

The IN25M and IN40M are available in male thread or butt-weld form and are fitted to pipework in the tank, or to a tank wall connection.

For higher capacities, two or more injectors may be mounted in parallel.

### Limiting Operating Conditions

#### Body Design Rating

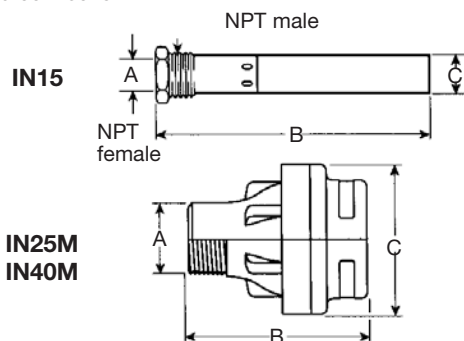
#### Maximum Saturated Steam Conditions

#### Maximum Heated Liquid Temperature

350 psig (PN25)  
250 psig at 400°F  
(17 barg 207°C)  
190°F (90°C)

### Available Types

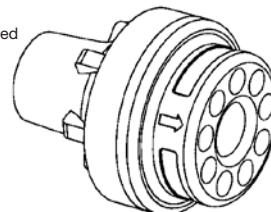
Steam injectors for horizontal installation are available as type IN15, IN25M and IN40M. The choice of injector depends on the flowrate of steam required to heat the liquid. The IN15 can be fitted to the end of the steam supply pipework or directly through the tank weld using a female threaded connection.



Dimensions (approximate) in inches and (millimeters)				
Type	A	B	C	Weight (lb kg)
IN15	1/2"	8.2 (205)	1.1 28	.8 (.4)
IN25M	1"	3.4 (84)	2.8 (71)	2.0 (.8)
IN40M	1-1/2"	4.6 (115)	3.5 (88)	3.2 (1.6)

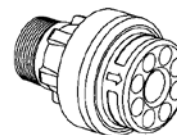
### IN40M

(available screwed or butt-weld)

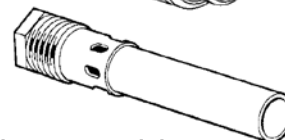


### IN25M

(available screwed or butt-weld)



### IN15



### Capacities -selecting a steam injector

The choice of steam injector depends on the flowrate of steam required to heat the liquid. The table below shows steam injector capacities in lb/h of injected steam when heating tanks are vented to atmosphere, and are up to 10 feet deep. The choice of control valve can affect the steam capacity. For higher capacities use two or more injectors in parallel.

Injector type	IN15	IN25M	IN40M
Steam pressure psig	Saturated steam capacity lb/h		
15	44	297	880
30	105	385	1226
45	145	616	1771
60	185	770	2134
75	224	920	2475
90	264	1100	2849
105	303	1276	3179
120	343	1408	3564
135	382	1540	4004
150	422	1683	4290
165	462	1826	4950
180	501	1980	5214
195	541	2145	5709
210	580	2299	5962
225	620	2409	6193
240	661	2574	6743
255	699	2697	7040

Intermediate values may be obtained by linear interpolation. For higher capacities use 2 or more injectors in parallel.

$$\begin{matrix} \text{* Steam pressure at} \\ \text{inlet of injector} \end{matrix} = \begin{matrix} \text{Steam supply} \\ \text{pressure to} \\ \text{control valve} \end{matrix} - \begin{matrix} \text{Pressure drop across} \\ \text{control valve} \end{matrix}$$

### C<sub>v</sub> values

Injector type	IN15	IN25M	IN40M
C <sub>v</sub> 1.81	10.7	16.9	

### Sample Specification

Steam injectors shall be all 316L stainless steel, with radial inlet ports and full length discharge nozzle.

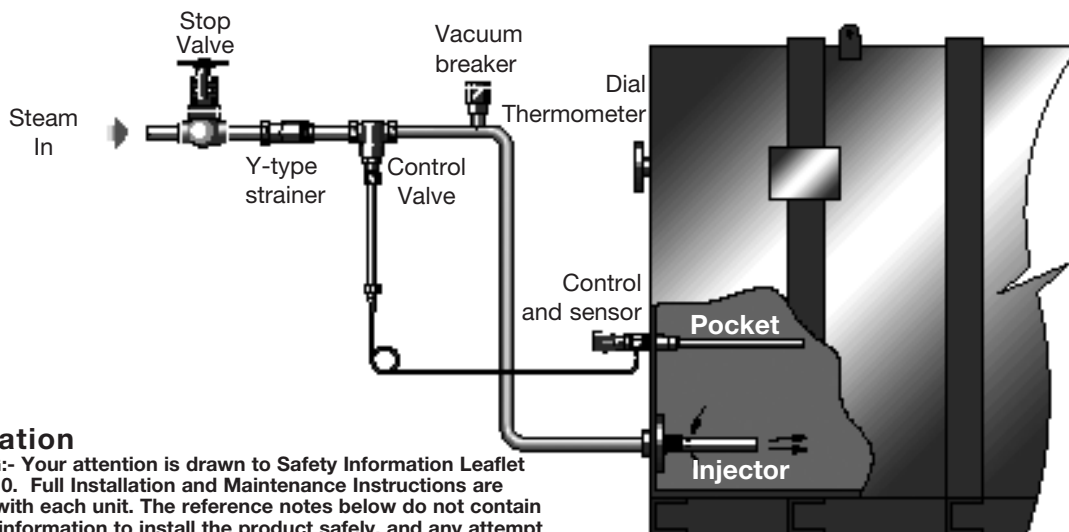
Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only.

In the interests of development and improvement of the product, we reserve the right to change the specification. TI-10-1430-US 04.01

# Steam Injectors IN15, IN25M, IN40M

## Self-Acting Control System

IN15 shown



## Installation

**WARNING:-** Your attention is drawn to Safety Information Leaflet IM GCM-10. Full Installation and Maintenance Instructions are provided with each unit. The reference notes below do not contain sufficient information to install the product safely, and any attempt to do so may be hazardous.

The injectors are installed at a low level in a tank, ideally along the center line, and discharging horizontally along the length. Pipework may be routed inside or outside the tank wall. We recommend the use of a suitable thread locking compound on all threaded connections.

Use the same size pipe as the injector, i.e. 1" pipe for IN25M. Pipe sizes for multiple injector installations are as follows:-

No. of injectors	Type	Minimum Pipe Size
2	IN15	3/4"
2	IN40M	2-1/2"
3	IN40M	3"

Allow a minimum of 6" between the injector(s) and the sides and bottom of the tank, and as much length as possible between the injector outlet and the end of the tank. See IMI for minimum limits. Space multiple injectors equally across the tank width.

Injector package	INS10	INS20	INS30	INS40	INS50	INS60	INS70	INS80
Valve type & size	BX6 1/2	SB 1/2	SB 3/4	KB51 1	KB51 1-1/4	KC51 1-1/2	KB51 2	KC51 2
Valve C <sub>v</sub>	1.92	3.0	4.5	11.4	19.2	19.2	39.6	39.6
Controller type	128 with 13' capillary. Range 1 — 0 to 230°F				121 with 13' capillary. Range 2 — 105 to 225°F			
Injector type	IN15	IN15	IN25M	IN40M	IN40M	IN40M	IN40M	IN40M
Number of Injectors	1	2	1	1	2	2	3	3
Steam supply pressure psig	Saturated steam capacity lb/h							
20	75	140	170	565	915	915	1850	1850
30	105	180	245	710	1175	1175	2330	2330
40	130	220	310	855	1435	1435	2805	2805
50	150	270	365	990	1695	1695	3285	3285
60	175	310	425	1140	1955	1955	3760	3760
70	200	350	485	1285	2215	2215	4235	4235
80	225	395	545	1430	2475	2475	4825	4825
90	245	440	600	1575	2700	2700	5195	5195
100	285	485	660	1715	2995	2995	5675	5675
120	320	530	780	2005	3510	3510	-	6625
140	360	600	900	2295	-	4035	-	7580
160	400	740	-	-	-	4550	-	8535
180	430	820	-	-	-	5075	-	9490
200	470	900	-	-	-	5670	-	10,445

Each INS system also includes a valve size model 10 ball valve and type CT strainer, a stainless steel well, and VB14 vacuum breaker. Full technical details for each of the products contained in the INS systems are available upon request.

## Type INS Steam Injector Systems

The IN injectors are also available as part of a steam injection system, type INS. The table to the left covers eight preferred INS steam injection systems available from Spirax Sarco.

## Estimating Steam Flow by Calculation

The following formulas can be used to calculate an approximate steam load:

For general heating applications -

$$Q = \frac{W \times C_p \times \Delta T}{1000 \times t}$$

For boiler feedtanks -

$$Q = \frac{G \times \Delta T}{1000}$$

Q = Steam load (lb/h)

W = Mass of liquid (lb)

G = Feedwater flow rate (lb/h) Note: 1 Boiler hp = 34.5 lb/h

C<sub>p</sub> = Specific heat of liquid (Btu/lb°F)

ΔT = Temperature rise (°F)

t = heating time (hours)

## Sample Specification

Steam Injector system shall include an isolation valve, Y type strainer, self acting control system with stainless steel well, vacuum breaker and 316L grade stainless steel injector.

## Installation

Spirax Sarco steam injectors are designed to operate with the minimum of noise provided installation is correct. For full details refer to the Installation and Maintenance Instructions supplied with the product.

## Maintenance

Injectors require no maintenance. We recommend an annual inspection of the steam supply pipework and injector to check that the fittings are securely fastened. All other system components should be maintained in accordance with the relevant Installation and Maintenance Instructions which are available upon request.

TI-10-1430-US 04.01

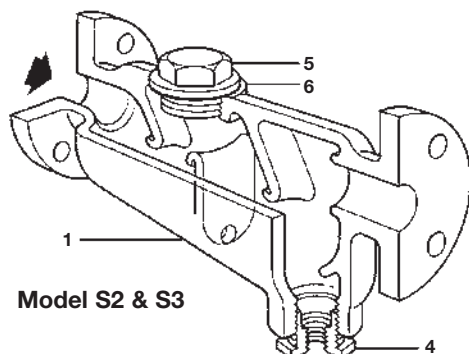


# spirax/sarco

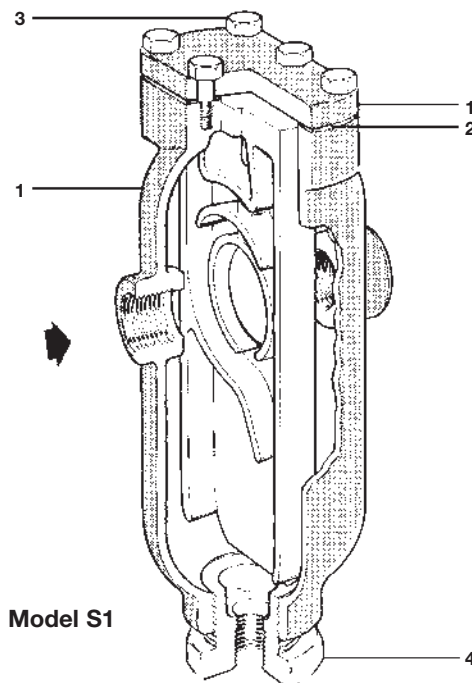
## Iron Separators S1, S2, S3

Moisture Separators are used to improve the quality of steam or compressed air either within the distribution system or on the supply inlet to equipment. Removal of moisture is by a series of baffles on which the suspended water droplets impinge and fall out by gravity to the drain, which must be piped to a trap.

Model	S1	S2	S3
PMO	200 psig	145 psig	
Sizes	1/2", 3/4", 1"	1-1/2", 2"	1-1/2" to 6"
Connections	NPT		ANSI 125
Construction	Ductile Iron	Cast Iron	



Model S2 & S3



Model S1

### Construction Materials

No.	Part	Material
1	S1 Body & Cover S2 & S3 Body	Ductile (SG) Iron Cast Iron
2	Gasket	Semi Rigid Graphite Laminate
3	Bolts	Steel UNF BS 1768 Gr 5
4	Bushing	Malleable Iron
5	Plug	Malleable Iron
6	Gasket	Reinforced Exfoliated Graphite

### Limiting Operating Conditions

**Max. Operating Pressure (PMO)** S1: 200 psig (14 barg)  
S2, S3: 145 psig (10 barg)

**Max. Operating Temperature** S1: 388°F (198°C)  
S2, S3: 363°F (184°C)

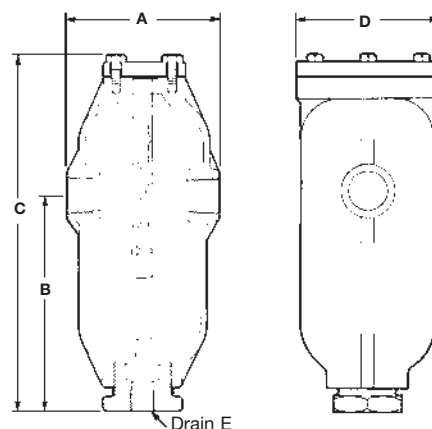
### Pressure Shell Design Conditions

**PMA** S1: 232 psig/0-248°F 16 barg/0-120°C  
Max. allowable pressure 160 psig/572°F 11 barg/300°C  
S2, S3: 232 psig/0-248°F 16 barg/0-120°C  
188 psig/428°F 13 barg/220°C

**TMA** S1: 572°F/0-160 psig 300°C/0-11 barg  
Max. allowable temp. S2, S3: 428°F/0-188 psig 220°C/0-13 barg

### Typical Applications

On steam mains, as a drip station ahead of steam pressure reducing or temperature control valves. On the steam inlet to laundry presses and other process equipment which require dry saturated steam. On the compressed air supply to sensitive instruments and before filters.



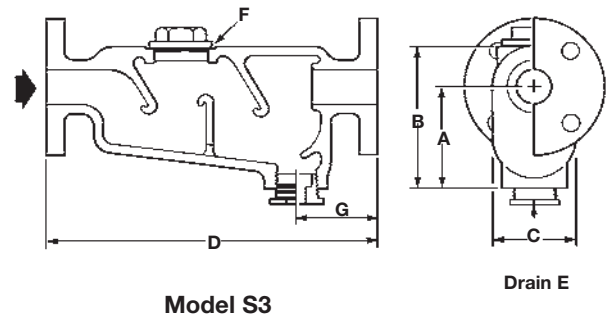
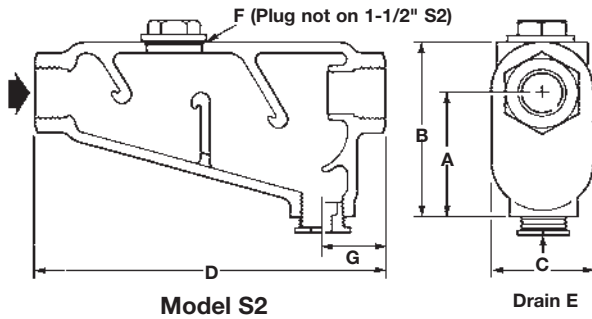
Dimensions Type S1 (nominal) in inches and millimeters

Size	A	B	C	D	E	Weight
1/2"	3.5 89	4.8 124	8.9 225	3.4 86	1/2"	6.0 LB 2.7 KG
3/4"	4.5 114	6.1 156	10.3 260	4.4 111	1/2"	9.3 LB 4.2 KG
1"	6.0 152	8.8 222	15.0 381	5.6 143	1/2"	18.0 LB 8.1 KG

Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only.  
In the interests of development and improvement of the product, we reserve the right to change the specification.

TI-7-001-US 8.06

# Iron Separators S1, S2, S3



## Recommended air capacities in SCFM

(SCFM based on approximately

60 ft/s for 1/2" – 2-1/2" units, and 55 ft/s for 3" – 6" units)

Convert CFM to SCFM =  $\frac{35.4 \times P_1 \times \text{CFM}}{460 + T}$  T = °F  
P<sub>1</sub> = psia

### Operating Pressure psig

Size	20	40	60	80	100	150	200
1/2"	20	30	40	55	65	95	125
3/4"	30	50	65	85	100	145	190
1"	50	80	105	135	165	240	315
1-1/2"	120	185	255	325	395	570	
2"	200	310	425	540	655	940	
2-1/2"	280	445	605	770	930	1340	
3"	360	570	780	990	1200	1725	
4"	625	985	1345	1705	2070	2970	
6"	1420	2240	3060	3880	4695	6745	

## Recommended saturated steam capacities

(lb/h based on approximately 100 ft/s)

Based on flows and velocity indicated, the pressure drop will be no more than equivalent length of pipe.

### Operating Pressure psig

Size	5	10	25	50	100	150	200
1/2"	37	46	71	113	195	277	354
3/4"	66	80	125	199	342	486	622
1"	107	130	203	323	555	788	1009
1-1/2"	253	308	480	761	1308	1792	
2"	417	508	791	1255	2156	2953	
2-1/2"	595	725	1129	1791	3076	4214	
3"	919	1120	1743	2766	4751	6507	
4"	1583	1928	3002	4764	8182	11206	
6"	3593	4377	6813	10813	18567	25431	

## Dimensions (nominal) in inches and millimeters

### Type S2 with screwed connections

Size	A	B	C	D	E	F	G	Weight
1-1/2"	4.4 111	6.1 156	3.5 89	12.0 304	1/2"	-	2.4 60	21.5 lb 9.6 kg
2"	6.5 166	8.1 205	4.6 117	15.6 397	1/2"	M72	2.8 71	42.0 lb 19.0 kg

### Type S3 with flanged connections

1-1/2"	4.4 111	6.1 156	3.5 89	14.4 365	1/2"	M56	3.7 94	31.0 lb 14.0 kg
2"	5.7 146	8.1 206	4.6 117	18.0 456	1/2"	M72	3.85 98	56.0 lb 25.4 kg
2-1/2"	7.2 184	9.1 232	5.6 146	16.0 406	3/4"	M56	3.85 98	81.0 lb 36.7 kg
3"	7.4 187	10.4 264	6.0 152	19.0 483	1"	M72	3.85 98	99.0 lb 44.9 kg
4"	9.4 238	13.3 337	7.8 197	27.3 692	1"	M72	4.6 118	165.0 lb 74.8 kg
6"	9.1 232	16.1 409	15.0 381	27.8 706	1"	M72	4.8 121	400 lb 181.4 kg

## Sample Specification

Moisture Separator shall be of the high efficiency internal baffle type having a pressure drop that does not exceed an equivalent length of pipe. Body shall be iron with screwed or flanged connections. A screwed bottom drain shall be provided for the installation of a trap to discharge any accumulated liquid.

## Installation

Install in a horizontal pipeline with the drain directly below the line. Recommended trap is a continuous draining float operated type.

## Maintenance

The trap at the separator drain should be serviced periodically according to the manufacturer's instructions. The separator itself requires no maintenance.

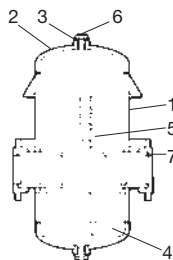
TI-7-001-US 8.06

# spirax sarco

## Steel Separator S4A

Moisture Separators are used to improve the quality of steam or compressed air either within the distribution system or on the supply inlet to equipment. Removal of moisture is by a series of baffles on which the suspended water droplets impinge and fall out by gravity to the drain, which must be piped to a trap.

Model	S4A	
PMO	600 psig	150/300 psig
Sizes	1/2" to 2"	2-1/2" to 6"
Connections	NPT, SW	ANSI 150 ANSI 300
Construction	Fabricated steel body	
ASME code stamped	600 psig	150 psig/300psig
Options stamped.	2-1/2" to 6" to 600 psig ASME code Gauge Glass Assembly 2-1/2" to 6"	



### Construction Materials

No.	Part	Material
1	Body (1/2" to 2") (2-1/2" to 6")	Steel SA-106 GRB ASTM A 53 GRB
2	End Caps (1/2" to 6")	Steel SA-234 WPB
3	Coupling	Steel SA-105
4	Screen (4" & 6")	Steel ASTM A 569
5	Baffle	Steel ASTM A 569
6	Plug	Steel ASTM A105
7	End Connections (1/2" to 2") (2-1/2" to 6")	Steel SA-105 ASTM A105

Designed to Section VIII Division I of the ASME Boiler & Pressure Vessel Code.

### Pressure Shell Design Conditions

(1/2" to 2")

**NPT and Socket Weld**

**MAWP**

600 psig/41.4 barg

Max. allowable working pressure

-20°F to 650°F/-29°C to 344°C

(2-1/2" to 6")

**ANSI 150 flanged**

150 psig/10.4 barg

-20°F to 650°F/-29°C to 344°C

**ANSI 300 flanged**

300 psig/20.7 barg

-20°F to 650°F/-29°C to 344°C

### Optional Pressure Shell Design Conditions

(2-1/2" to 6")

**ANSI 600 Flanged**

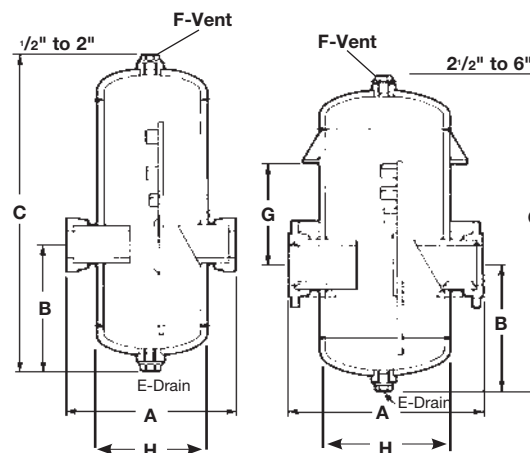
600 psig/41.4 barg

Max. allowable working pressure

-20°F to 650°F/-29°C to 344°C

### Typical Applications

On steam mains, as a drip station ahead of steam pressure reducing or temperature control valves. On the steam inlet to laundry presses and other process equipment which require dry saturated steam. On the compressed air supply to sensitive instruments and before filters.



### Dimensions (nominal) in inches and millimeters

Size	Conn.	A	B	C	E	F	G	H	Weight
1/2" 15	Scr/SW	9.0 229	5.2 132	10.6 269	3/4"	3/4"	—	2.5"	9.0 lb 4.1 kg
3/4" 20	Scr/SW	9.3 236	5.9 150	12.1 307	3/4"	3/4"	—	2.5"	10.0 lb 4.5 kg
1" 25	Scr/SW	11.8 300	6.0 152	14.1 358	3/4"	3/4"	—	4"	19.0 lb 8.6 kg
1-1/4" 32	Scr/SW	13.3 338	7.1 180	16.3 414	3/4"	3/4"	—	5"	30.0 lb 13.6 kg
1-1/2" 40	Scr/SW	15.4 391	7.6 193	19.0 483	1"	3/4"	—	6"	43.0 lb 19.5 kg
2" 50	Scr/SW	15.9 404	8.1 206	20.6 523	1"	3/4"	—	6"	50.0 lb 22.7 kg
2-1/2" 65	ANSI 150	22.5 572	9.4 239	24.5 622	1"	3/4"	7.1 180	8.7"	109.0 lb 49.4 kg
	ANSI 300	22.5 572	9.4 239	24.5 622	1"	3/4"	7.1 180		112.0 lb 50.8 kg
	ANSI 600	22.5 572	9.9 251	25.6 650	1"	3/4"	7.1 180		113.0 lb 51.3 kg
3" 80	ANSI 150	25.3 643	12.0 305	28.6 726	2"	3/4"	7.9 201	10.8"	163.0 lb 73.9 kg
	ANSI 300	25.3 643	12.0 305	28.8 732	2"	3/4"	7.9 201		169.0 lb 76.7 kg
	ANSI 600	25.3 645	12.7 323	29.9 759	2"	3/4"	7.9 201		189.0 lb 85.7 kg
4" 100	ANSI 150	29.0 737	12.6 320	31.2 792	2"	1-1/2"	8.8 224	12.8"	237.0 lb 107.5 kg
	ANSI 300	29.0 737	12.6 320	31.2 792	2"	1-1/2"	8.8 224		256.0 lb 116.1 kg
	ANSI 600	29.0 737	13.2 335	32.1 815	2"	1-1/2"	9.0 229		297.0 lb 134.7 kg
6" 150	ANSI 150	35.8 909	12.3 312	36.7 932	2"	1-1/2"	11.4 290	16.0"	365.0 lb 165.6 kg
	ANSI 300	35.8 909	12.4 315	36.9 937	2"	1-1/2"	11.4 290		401.0 lb 181.9 kg
	ANSI 600	35.8 909	13.0 330	37.8 960	2"	1-1/2"	11.4 290		551.0 lb 249.9 kg

Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only.

In the interests of development and improvement of the product, we reserve the right to change the specification.

TI-7-000-US 05.02

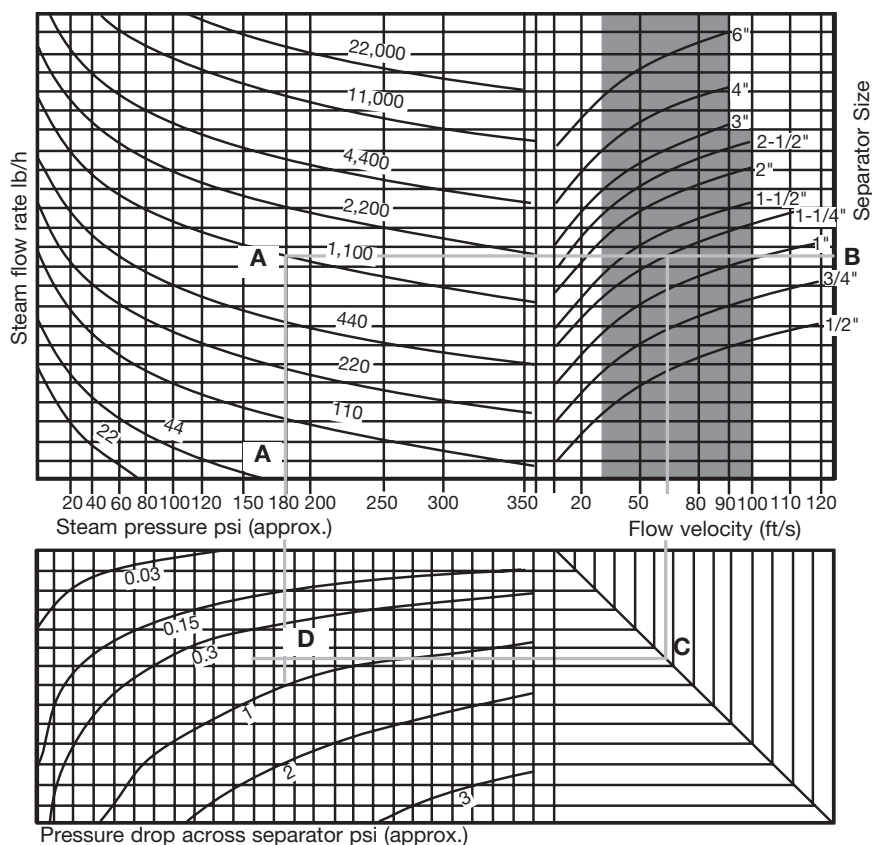
# Steel Separator S4A

## S4A Steam Sizing Chart

### Sizing Example for Model S4A

1. Taking a steam pressure of 180 psig and flow rate of 1100 lb/h draw line A-A.
2. Draw horizontal line A-B.
3. Any separator curve that is bisected by line A-B within the shaded area will operate at near 100% efficiency.
4. Line velocity for any size can be determined by dropping a vertical line B-C (eg. 60 ft/s for 1-1/4" unit).
5. Pressure drop is determined by plotting lines C-D and A-D. The point of intersection is the pressure drop across the separator, ie: 0.5 psi.
6. Separators should be selected on the basis of the best compromise between line size, velocity and pressure drop for each application.

The shaded area denotes recommended selection for better than 99% separation efficiency.

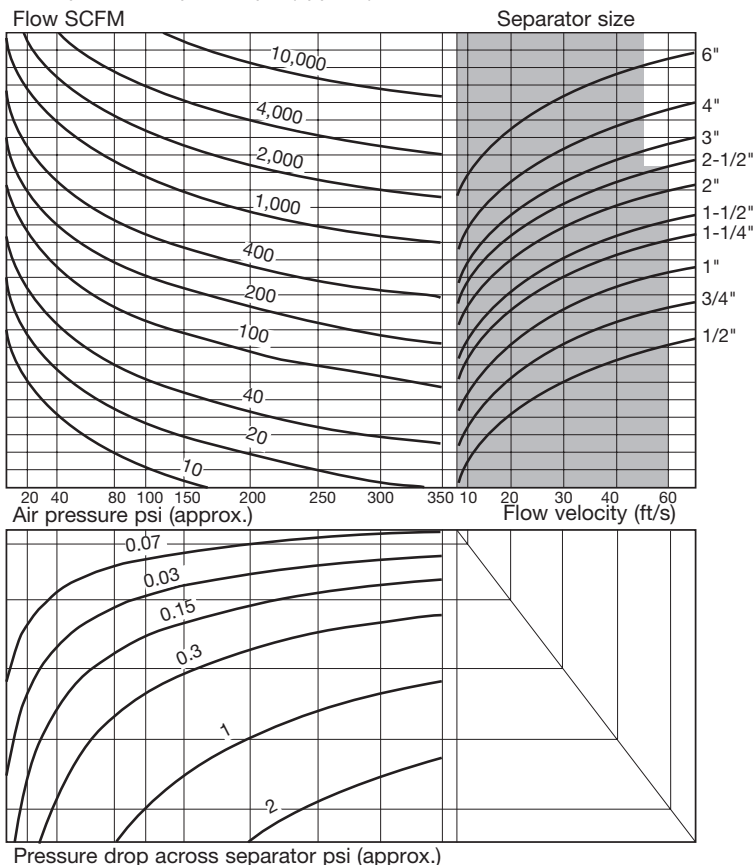


### S4A Separator Flow Velocity & Pressure Drop for compressed Air

Note: Any Separator curve that is bisected within the shaded area will operate at near 100% efficiency.

### Sample Specification

Moisture Separator shall be of the high efficiency internal baffle type having a pressure drop that does not exceed an equivalent length of pipe. Separator shall be of steel construction in accordance with Section VIII, Division I of the ASME Boiler and Pressure Vessel Code. ASME Code Stamped for maximum working pressures of 150, 300, or 600 psig. A screwed bottom drain connection shall be provided for the installation of a trap to discharge accumulated liquid. A Spirax Sarco Float Operated Drain Trap and "Y" Type Strainer shall be installed on the drain connection.



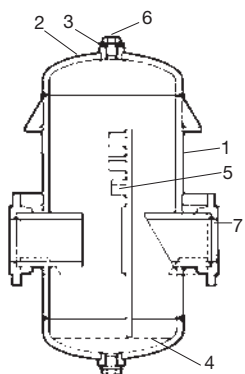
TI-7-000-US 05.02

# spirax sarco

## Steel Separator 8" to 18" S4A

Moisture Separators are used to improve the quality of steam or compressed air either within the distribution system or on the supply inlet to equipment. Removal of moisture is by a series of baffles on which the suspended water droplets impinge and fall out by gravity to the drain, which must be piped to a trap.

Model	S4A		
PMO	150 psig	300 psig	600 psig
Sizes	8" to 18"		
Connections	ANSI 150	ANSI 300	ANSI 600
Construction	Fabricated steel body		
ASME code stamped	150 psig	300 psig	600 psig
Options	Gauge Glass Assembly		



### Construction Materials

No.	Part	Material
1	Body	Steel
2	End Caps	Steel
3	Coupling	Steel
4	Screen	Steel
5	Baffle	Steel
6	Plug	Steel
7	End Connections	Steel

Designed to Section VIII Division I of the ASME Boiler & Pressure Vessel Code.

### Pressure Shell Design Conditions

(8" to 18")

#### MAWP

Max. allowable working pressure

#### ANSI 150 flanged

150 psig/10.4 barg

-20°F to 650°F/-29°C to 344°C

#### ANSI 300 flanged

300 psig/20.7 barg

-20°F to 650°F/-29°C to 344°C

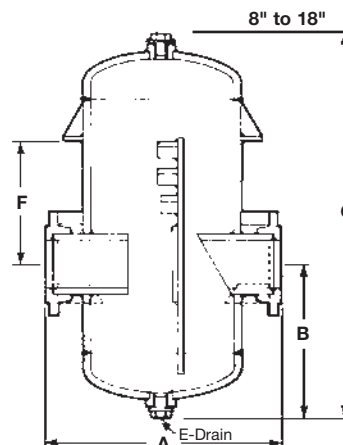
#### ANSI 600 Flanged

600 psig/41.4 barg

-20°F to 650°F/-29°C to 344°C

### Typical Applications

On steam mains, compressed air lines, steam turbines, heat transfer processes, meter protection, steam distribution systems, protection of equipment requiring dry saturated steam, removal of moisture from steam, air, or gas systems.



### Dimensions (nominal) in inches and millimeters

Size	Conn.	A	B	C	E	F	Weight
8" 200	ANSI 150	41.9 1064	15.3 389	48.1 1222	2"	15.0 381	445 lb 202 kg
	ANSI 300	41.9 1064	15.5 394	48.3 1227	2"	15.0 381	601 lb 273 kg
	ANSI 600	41.9 1064	15.7 399	48.8 1240	2"	15.0 381	972 lb 441 kg
10" 250	ANSI 150	48.7 1237	27.0 686	63.2 1605	2"	16.4 417	805 lb 365 kg
	ANSI 300	48.7 1237	27.1 688	63.5 1613	2"	16.4 417	969 lb 440 kg
	ANSI 600	48.7 1237	27.4 696	64.1 1628	2"	16.4 417	1740 lb 789 kg
12" 300	ANSI 150	49.5 1257	29.8 757	68.0 1727	2"	19.0 483	828 lb 376 kg
	ANSI 300	49.5 1257	29.9 759	68.3 1735	2"	19.0 483	1145 lb 519 kg
	ANSI 600	49.5 1257	30.3 770	68.9 1750	2"	19.0 483	2008 lb 911 kg
14" 350	ANSI 150	54.8 1392	30.8 782	72.1 1831	2"	20.1 511	1282 lb 582 kg
	ANSI 300	54.8 1392	30.8 782	72.2 1834	2"	20.1 511	1634 lb 741 kg
	ANSI 600	54.8 1392	31.1 790	72.8 1849	2"	20.1 511	2851 lb 1293 kg
16" 400	ANSI 150	59.0 1499	32.8 833	77.6 1971	2"	20.1 511	1509 lb 684 kg
	ANSI 300	59.0 1499	32.9 836	77.9 2007	2"	20.1 511	1953 lb 886 kg
	ANSI 600	59.0 1499	33.5 851	79.0 2007	2"	20.1 511	3578 lb 1623 kg
18" 450	ANSI 150	67.2 1707	35.2 894	83.9 2131	2"	20.1 511	2186 lb 992 kg
	ANSI 300	67.2 1707	35.2 894	84.0 2134	2"	20.1 511	2858 lb 1296 kg
	ANSI 600	67.2 1707	36.3 922	86.2 2189	2"	20.1 511	5155 lb 2338 kg

Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only.

In the interests of development and improvement of the product, we reserve the right to change the specification. TI-7-0001-US 05.01

# Steel Separator

## 8" to 18" S4A

### Recommended Saturated Steam Capacities

(lb/h based on 90 ft/sec velocity)

Based on flows and velocity indicated, the pressure drop will be no more than equivalent length of pipe.

Operating Pressure psig	Separator Size					
	8"	10"	12"	14"	16"	18"
5	5,754	8,871	12,576	15,153	19,812	25,190
10	7,020	10,822	15,342	18,487	24,171	30,733
25	10,933	16,855	23,894	28,791	37,643	47,862
50	17,262	26,613	37,728	45,460	59,437	75,573
100	29,576	45,597	64,640	77,888	101,836	129,481
150	42,005	64,759	91,805	110,620	144,631	183,894
200	53,744	82,856	117,460	141,533	185,049	235,283
250	65,713	101,308	143,618	173,052	226,259	287,681
300	78,257	120,647	171,034	206,087	269,451	342,597
325	84,587	130,405	184,868	222,756	291,245	370,307
350	89,881	138,566	196,438	236,697	309,472	393,483
375	96,671	149,034	211,277	254,578	332,851	423,208
400	102,770	158,438	224,608	270,641	353,853	449,911
450	115,084	177,422	251,521	303,069	396,252	503,819
500	129,355	199,422	282,709	340,650	445,387	566,293
550	140,403	216,455	306,855	369,744	483,427	614,640
600	153,062	239,971	334,523	403,082	527,015	670,080

Capacities for air and other gases available upon request.

*Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only.  
In the interests of development and improvement of the product, we reserve the right to change the specification.*

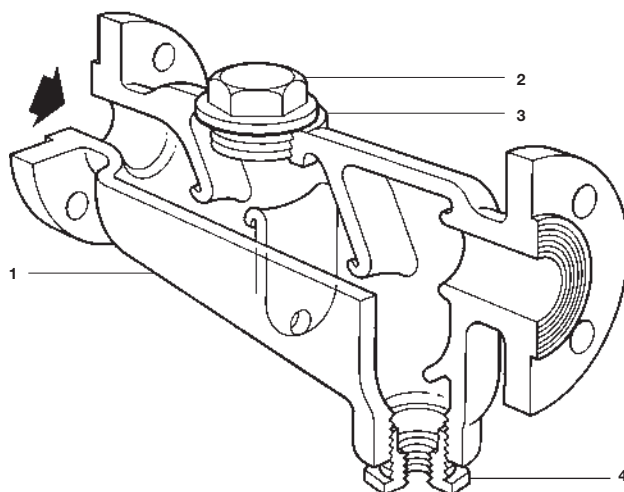
### Sample Specification

Moisture Separator shall be of the high efficiency internal baffle type having a pressure drop that does not exceed an equivalent length of pipe. Separator shall be of steel construction in accordance with Section VIII, Division I of the ASME Boiler and Pressure Vessel Code. ASME Code Stamped for maximum working pressures of 150, 300, or 600 psig. A screwed bottom drain connection shall be provided for the installation of a trap to discharge accumulated liquid. A Spirax Sarco Float Operated Drain Trap and "Y" Type Strainer shall be installed on the drain connection.



# spirax/sarco

## S13 SG Iron Separator (Flanged)



### Description

The S13 separator is an SG iron baffle type separator used for the removal of entrained liquids in steam, compressed air or gas systems. The fitting of insulation jackets will increase the performance of the separator.

### Standards

This product fully complies with the requirements of the European Pressure Equipment Directive 97/23/EC.

### Certification

This product is available with a manufacturers' Typical Test Report.

**Note:** All certification/inspection requirements must be stated at the time of order placement.

### Sizes and pipe connections

DN40, DN50, DN65, DN80, DN100, DN125, DN150 and DN200.

Flanged EN 1092 PN16 and PN25 with screwed BSP drain.

Flanged JIS/KS 10K with screwed BSP drain.

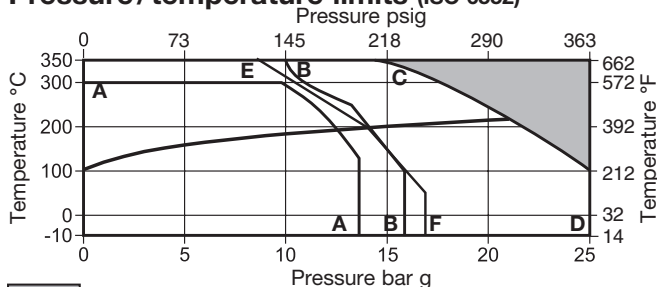
Flanged JIS/KS 20K with screwed BSP drain - DN40, DN50, DN65 and DN200 only.

Flanged ANSI 150 - DN200 (8") only.

### Materials

No.	Part	Material	
1	Body	SG iron	DIN 1693 GGG40 ASTM A395
2	Plug	Carbon steel	1.0460 (C22.8)
3	Gasket	Reinforced exfoliated graphite	
4	Drain reducing bush	Forged carbon steel	ASTM A105

### Pressure/temperature limits (ISO 6552)



The product **must not** be used in this region.

- A - A Flanged JIS 10K
- B - B Flanged EN 1092 PN16
- B - C - D Flanged EN 1092 PN25 and JIS 20K
- E - F Flanged ANSI 150

**Note:** S13 flanged type separators may be supplied with a lower pressure rating than that cast into the body. Reference should be made to the appropriate operating chart to determine the actual product limitations.

Body design conditions		PN25
PMA	Maximum allowable pressure	362psig@212°F (25barg@100°C)
TMA	Maximum allowable temperature	662°F@203psig (350°C@14barg)
Minimum allowable temperature		14°F(-10°C)
PMO	Maximum operating pressure for saturated steam service	JIS/KS 10K 178psig (12.3barg)
		PN16 199psig (13.7barg)
		PN25 and JIS/KS 20K 309psig (21.3barg)
		ANSI 150 200psig (13.8barg)
TMO	Maximum operating temperature	662°F@203psig (350°C@14barg)
Minimum operating temperature		14°F (-10°C)
<b>Note:</b> For lower operating temperatures consult Spirax Sarco		
Designed for a maximum cold hydraulic test pressure of:	JIS/KS 10K	296psig (20.4barg)
	PN16	348psig (24.0barg)
	PN25 and JIS/KS 20K	544psig (37.5barg)
	ANSI 150	375psig (25.9barg)

Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only.

In the interests of development and improvement of the product, we reserve the right to change the specification. TI-P023-26-US 6.09





# S13 SG Iron Separator (Flanged)

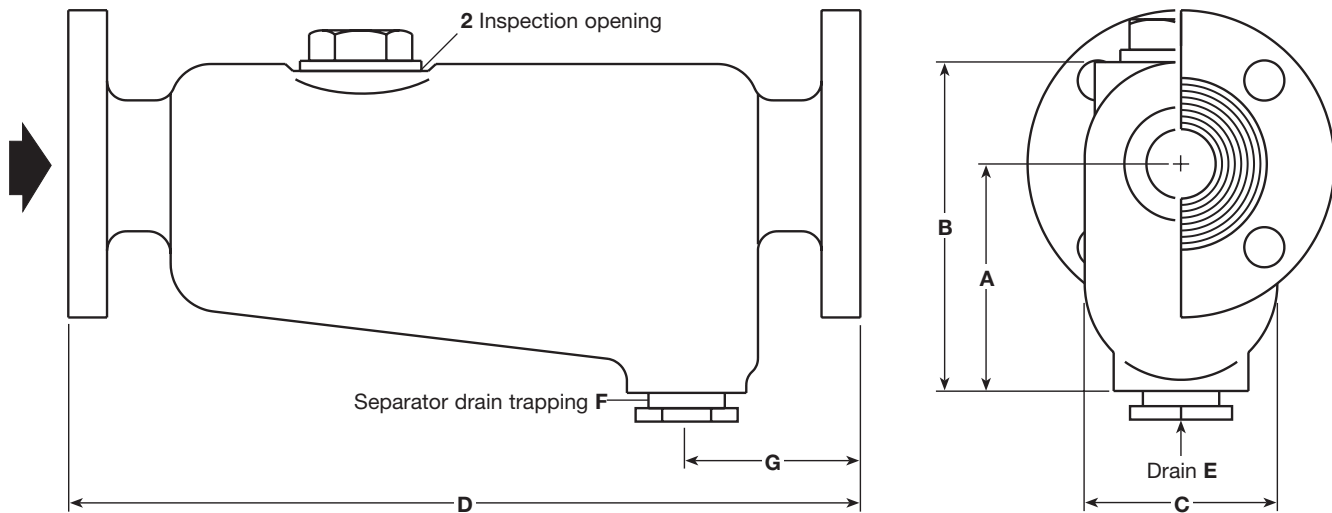
## Dimensions, weight and volumes (approximate) in mm, kg and litres

Size	A	B	C	D	E	F	G	Weight	Volume
DN40	111	156	89	365	½"	1"	94	14	1.6
DN50	146	205	117	456	½"	1"	98	25	3.2
DN65	178	249	146	406	¾"	1½"	98	28	4.6
DN80	178	252	152	483	1"	1½"	98	36	6.5
DN100	223	315	197	692	1"	1½"	118	60	13.5
DN125	226	397	381	706	1"	1½"	121	128	38.5
DN150	226	397	381	706	1"	1½"	121	130	42.5
DN200	308	502	426	762	1½"	1½"	140	190	68.0
*8"	(12.1")	(19.8")	(16.8")	(30.7")	1½"	1½"	(5.5")	(419)	(18.0)

\*8" ANSI 150 version only

## Recommended tightening torques

Item	Size	 or  mm	N m
2	DN40	46 A/F M56	150 - 165
	DN50	46 A/F M56	150 - 165
	DN65	46 A/F M56	150 - 165
	DN80	60 A/F M72	190 - 210
	DN100	60 A/F M72	190 - 210
	DN125	60 A/F M72	190 - 210
	DN150	60 A/F M72	190 - 210
	DN200	60 A/F M72	190 - 210



## Safety information, installation and maintenance

For full details see the Installation and Maintenance Instructions (IM-P023-55) supplied with the product.

### Installation note:

Install in a horizontal pipeline with the drain directly below. **Note:** To ensure that any separated liquid is drained away quickly, a suitable liquid drainer or steam trap must be connected to the drain connection 'E' - consult Spirax Sarco for further details.

### Disposal

This product is recyclable. No ecological hazard is anticipated with the disposal of this product, providing due care is taken.

## How to order

**Example:** 1 off DN50 Spirax Sarco S13 separator with SG iron body having flanged EN 1092 PN16 connections.

# spirax sarco

## S5 Carbon Steel Separator

### Description

The S5 is a carbon steel baffle type separator used for the removal of entrained liquids in steam, compressed air and gas systems.

### Optional extras

Insulation jackets are available which will increase the performance of the separator, (see TI-P138-01).

### Standards

This product fully complies with the requirements of the European Pressure Equipment Directive 97/23/EC and carries the **CE** mark when so required.

### Certification

This product is available with certification to EN 10204 3.1.

**Note:** All certification/inspection requirements must be stated at the time of order placement.

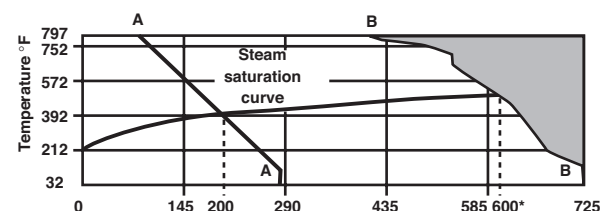
### Sizes and pipe connections

1/2", 3/4", 1", 1 1/4", 1 1/2" and 2"

Screwed NPT, butt weld, socket weld.

Flanged BS ANSI Class 150 or 300 with screwed NPT drain and air vent.

### Pressure / temperature limits



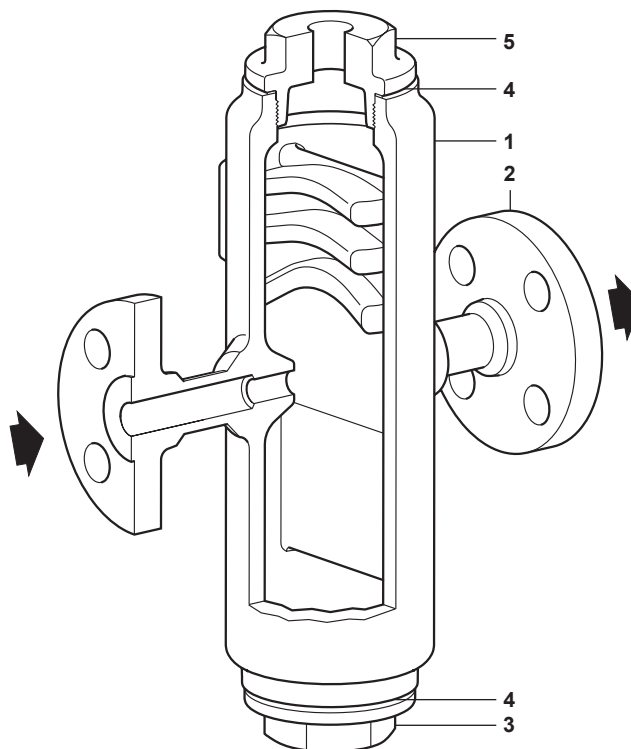
The product must not be used in this region.

\*PMO Maximum operating pressure for saturated steam

A - A Flanged ANSI Class 150

B - B Flanged ANSI Class 300, screwed NPT, socket weld and butt weld

Body design conditions		PN50/ASME 300	
PMA	Maximum allowable pressure	725 psig @ 122°F	
TMA	Maximum allowable temperature	797°F @ 406 psig	
Minimum allowable temperature		14°F	
PMO	Maximum operating pressure for saturated steam service	ASME 150	218 psig
		ASME 300	600 psig
		Scrd / SW/BW	600 psig
TMO	Maximum operating temperature	797°F @ 406 psig	
Minimum operating temperature		32°F	
Designed for a maximum cold hydraulic test pressure of 1111 psig			



Flanged S5 shown

### Capacities

See TIS 7.003A US

### Materials

No.	Part	Material	
1	Body	Carbon steel	ASTM A216 WCB
2	Flange	Carbon steel	ASTM A105N
3	Cap	Carbon steel	Steel
4	Cap gasket	Reinforced exfoliated graphite	
5	Cap	Carbon steel	Steel

Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only.

In the interests of development and improvement of the product, we reserve the right to change the specification. TI-P023-11-US 12.12

# S5 Carbon Steel Separator

## Dimensions (approximate) in inches and (mm)

Size	Screwed SW, BW A	ASME 150 A	ASME 300 A	B	C	D	F	G	H
DN15 - 1/2"	5.12" (130)	8.03" (204)	8.03" (204)	5.91" (150)	11.57" (294)	2.68" (68)	1"	1/2"	3.54" (90)
DN20 - 3/4"	5.12" (130)	8.35" (212)	8.35" (212)	5.75" (146)	13.66" (347)	2.68" (68)	1"	1/2"	3.54" (90)
DN25 - 1"	7.01" (178)	10.24" (260)	10.24" (260)	6.71" (170.5)	15.20" (386)	2.68" (68)	1"	1/2"	5.00" (127)
DN32 - 1 1/4"	7.48" (190)	10.79" (274)	10.79" (274)	7.68" (195)	17.32" (440)	2.68" (68)	1"	1/2"	5.55" (141)
DN40 - 1 1/2"	8.66" (220)	12.20" (310)	12.20" (310)	8.19" (208)	20.00" (508)	2.68" (68)	1"	1"	6.61" (168)
DN50 - 2"	8.43" (214)	12.20" (310)	12.20" (310)	8.19" (208)	21.97" (558)	2.68" (68)	1"	1"	6.61" (168)

## Weights/volume

(approximate) in pounds and US gallons (kg and litres)

Size	Weight		Volume	
	Scrd/SW/BW	Flanged	Scrd/SW/BW	Flanged
DN15 - 1/2"	12.8" (5.8)	16.3" (7.4)	0.2" (0.71)	0.2" (0.72)
DN20 - 3/4"	15.0" (6.8)	20.0" (9.1)	0.2" (0.90)	0.24" (0.92)
DN25 - 1"	26.2" (11.9)	32.6" (14.8)	0.75" (2.83)	0.76" (2.86)
DN32 - 1 1/4"	35.1" (15.9)	41.0" (18.6)	1.1" (4.15)	1.1" (4.19)
DN40 - 1 1/2"	48.5" (22.0)	56.2" (25.5)	1.8" (6.93)	1.85" (7.00)
DN50 - 2"	52.7" (23.9)	64.2 (29.1)	2.0" (7.74)	2.1" (7.88)

## Safety information, installation and maintenance

For full details see the Installation and Maintenance Instructions (IM-P023-55) supplied with the product.

### Installation note:

Install in a horizontal pipeline with the drain directly below.

To ensure that any separated liquid is drained quickly, a suitable steam trap/liquid drainer must be connected to the drain connection. For those steam systems where air can be present, air can collect in the upper portion of the separator. In this situation a suitable air vent should be connected to the air vent connection.

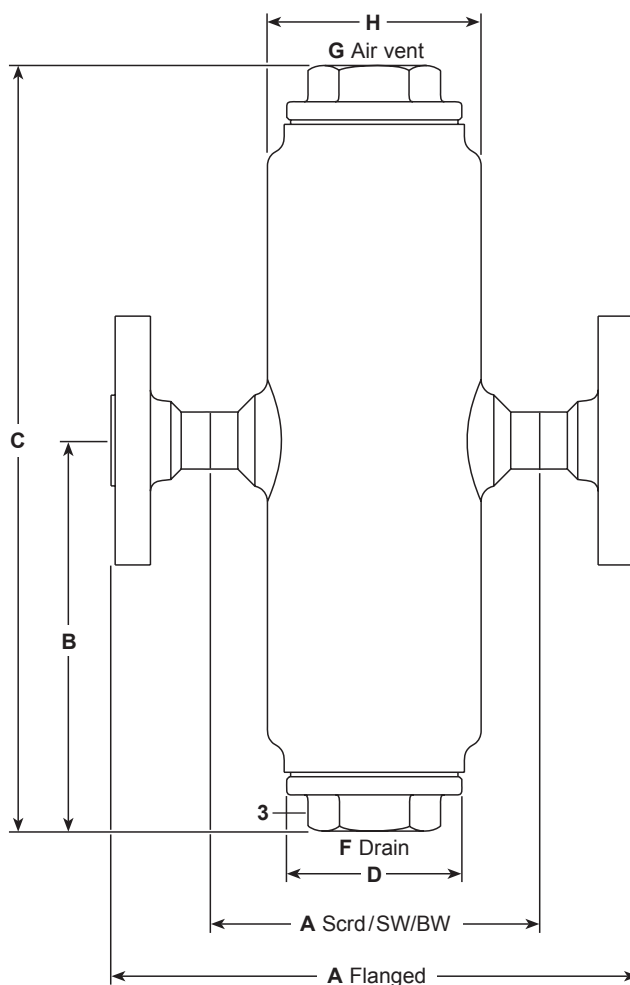
If an air vent is not being fitted then the connection must have the plastic transit protection plug removed and must have a carbon steel class 3000 lb plug fitted.

### Disposal:


The product is recyclable. No ecological hazard is anticipated with disposal providing due care is taken.

## How to order

**Example:** 1 off Spirax Sarco 3/4" S5 separator with a carbon steel body flanged to ANSI 150.



## Recommended tightening torques

Items	 (mm)	lb - ft (N m)
3 and 5	1.8" A/F (46 A/F)	133-148 (180-200)

# spirax/sarco

## S6 Austenitic Stainless Steel Separator

### Description

The S6 is an austenitic stainless steel (316L) baffle type separator used for the removal of entrained liquids in steam, compressed air and gas systems.

### Optional extras

Insulation jackets are available which will increase the performance of the separator, (see TI-P138-01).

### Standards

This product fully complies with the requirements of the European Pressure Equipment Directive 97/23/EC and carries the **CE** mark when so required.

### Certification

This product is available with certification to EN 10204 3.1.

**Note:** All certification/inspection requirements must be stated at the time of order placement.

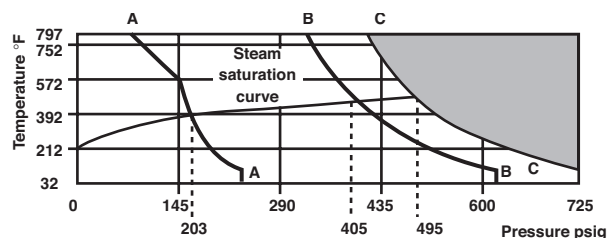
### Sizes and pipe connections

1/2", 3/4", 1", 1 1/4", 1 1/2" and 2"

Screwed BSP or NPT, butt weld, socket weld.

Flanged ANSI Class 150 or 300 with screwed NPT drain and air vent.

### Pressure / temperature limits



The product must not be used in this region.

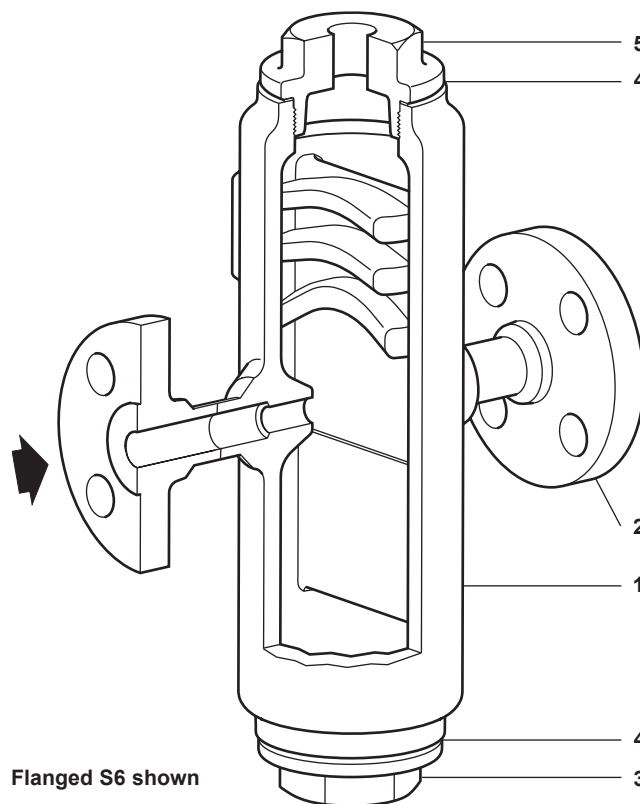
\*PMO Maximum operating pressure for saturated steam

A - A Flanged ANSI Class 150

B - B Flanged ANSI Class 300

C - C Screwed NPT, socket weld and butt weld

Body design conditions		PN50/ASME 300	
PMA	Maximum allowable pressure	725 psig @ 122°F	
TMA	Maximum allowable temperature	797°F @ 406 psig	
Minimum allowable temperature		14°F	
PMO	Maximum operating pressure for saturated steam service	ASME 150	165 psig
		ASME 300	405 psig
		Scrd / SW / BW	495 psig
TMO	Maximum operating temperature	797°F @ 406 psig	
Minimum operating temperature		32°F	
Designed for a maximum cold hydraulic test pressure of 1111 psig			



Flanged S6 shown

### Capacities

See TIS 7.003A US

### Materials

No. Part	Material	
1 Body	Austenitic stainless steel 316L	ASTM A351CF3M
2 Flange	Austenitic stainless steel	ASTM A182 F316L
3 Cap	Austenitic stainless steel	ASTM A351 Gr. CF8M (316)
4 Cap gasket	Reinforced exfoliated graphite	
5 Cap	Austenitic stainless steel	ASTM A351 Gr. CF8M (316)

# S6 Austenitic Stainless Steel Separator

## Dimensions (approximate) in inches and (mm)

Size	Screwed SW, BW A	ASME 150 A	ASME 300 A	B	C	D	F	G	H
DN15 - ½"	5.12" (130)	8.03" (204)	8.03" (204)	5.91" (150)	11.57" (294)	2.68" (68)	1"	½"	3.54" (90)
DN20 - ¾"	5.12" (130)	8.35" (212)	8.35" (212)	5.75" (146)	13.66" (347)	2.68" (68)	1"	½"	3.54" (90)
DN25 - 1"	7.01" (178)	10.24" (260)	10.24" (260)	6.71" (170.5)	15.20" (386)	2.68" (68)	1"	½"	5.00" (127)
DN32 - 1¼"	7.48" (190)	10.79" (274)	10.79" (274)	7.68" (195)	17.32" (440)	2.68" (68)	1"	½"	5.55" (141)
DN40 - 1½"	8.66" (220)	12.20" (310)	12.20" (310)	8.19" (208)	20.00" (508)	2.68" (68)	1"	1"	6.61" (168)
DN50 - 2"	8.43" (214)	12.20" (310)	12.20" (310)	8.19" (208)	21.97" (558)	2.68" (68)	1"	1"	6.61" (168)

## Weights/volume

(approximate) in pounds and US gallons (kg and litres)

Size	Weight		Volume	
	Scrd/SW/BW	Flanged	Scrd/SW/BW	Flanged
DN15 - ½"	12.8" (5.8)	16.3" (7.4)	0.2" (0.71)	0.2" (0.72)
DN20 - ¾"	15.0" (6.8)	20.0" (9.1)	0.2" (0.90)	0.24" (0.92)
DN25 - 1"	26.2" (11.9)	32.6" (14.8)	0.75" (2.83)	0.76" (2.86)
DN32 - 1¼"	35.1" (15.9)	41.0" (18.6)	1.1" (4.15)	1.1" (4.19)
DN40 - 1½"	48.5" (22.0)	56.2" (25.5)	1.8" (6.93)	1.85" (7.00)
DN50 - 2"	52.7" (23.9)	64.2" (29.1)	2.0" (7.74)	2.1" (7.88)

## Safety information, installation and maintenance

For full details see the Installation and Maintenance Instructions (IM-P023-55) supplied with the product.

### Installation note:

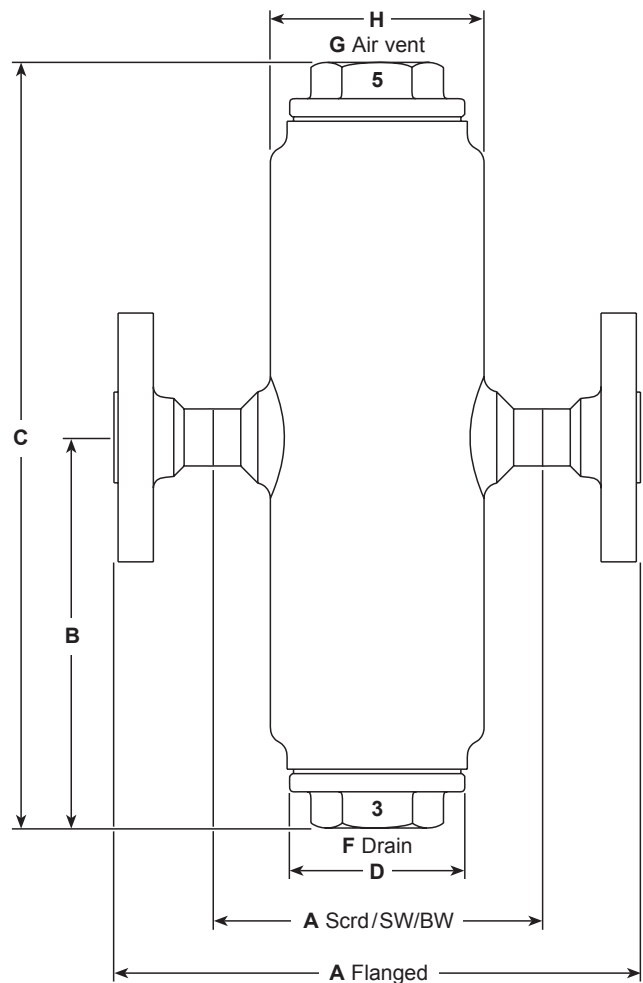
Install in a horizontal pipeline with the drain directly below.  
To ensure that any separated liquid is drained quickly, a suitable steam trap/liquid drainer must be connected to the drain connection.  
For those steam systems where air can be present, air can collect in the upper portion of the separator. In this situation a suitable air vent should be connected to the air vent connection.  
If an air vent is not being fitted then the connection must have the plastic transit protection plug removed and must have a stainless steel class 3000 lb plug fitted.

### Disposal:

The product is recyclable. No ecological hazard is anticipated with disposal providing due care is taken.

### How to order

**Example:** 1 off Spirax Sarco ¾" S6 separator with an austenitic stainless steel body flanged to ANSI 150.



## Recommended tightening torques

Items	(mm)	lb - ft (N m)
3 and 5	1.8" A/F (46 A/F)	133-148 (180-200)

# spirax sarco

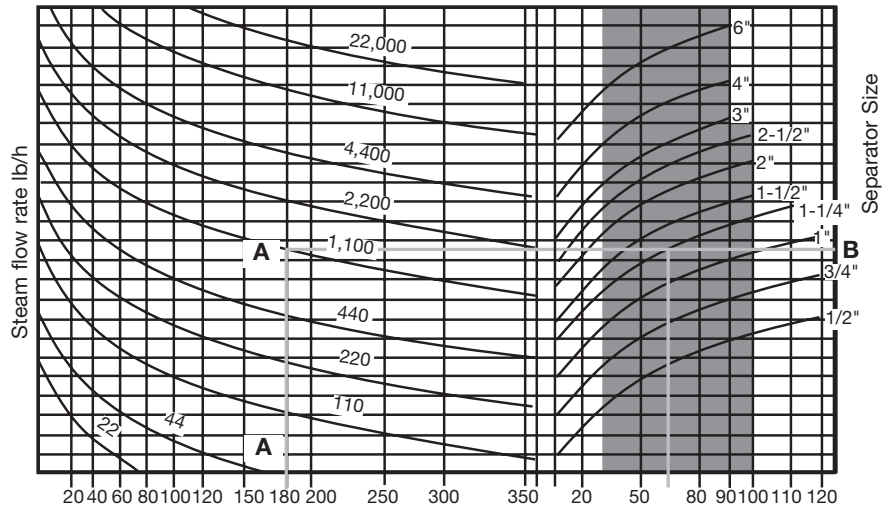
## Sizing Chart for S5 & S6 Separators

### Steam Sizing Chart

#### Sizing Example

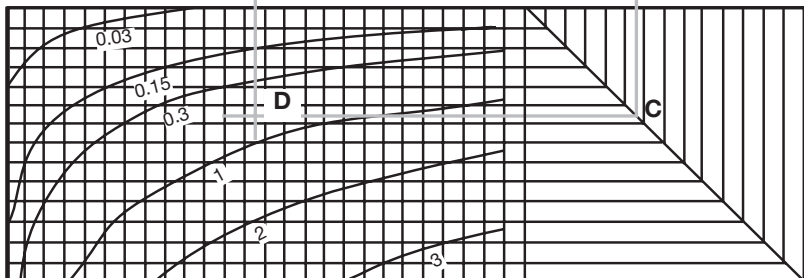
1. Taking a steam pressure of 180 psig and flow rate of 1100 lb/h draw line A-A.
2. Draw horizontal line A-B.
3. Any separator curve that is bisected by line A-B within the shaded area will operate at near 100% efficiency.
4. Line velocity for any size can be determined by dropping a vertical line B-C (eg. 60 ft/s for 1-1/4" unit).
5. Pressure drop is determined by plotting lines C-D and A-D. The point of intersection is the pressure drop across the separator, ie: 0.5 psi.
6. Separators should be selected on the basis of the best compromise between line size, velocity and pressure drop for each application.

The shaded area denotes recommended selection for better than 99% separation efficiency.



Steam pressure psi (approx.)

Flow velocity (ft/s)



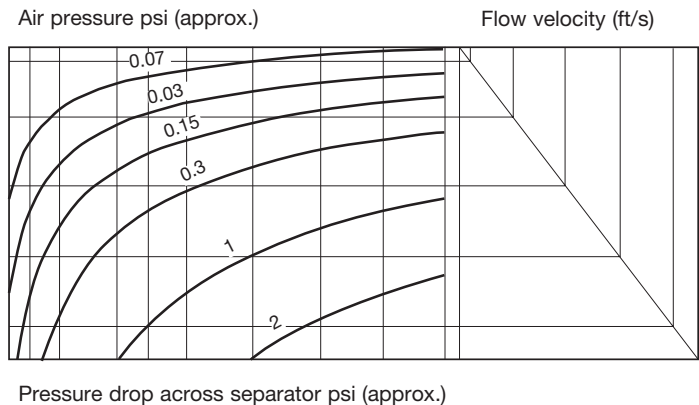
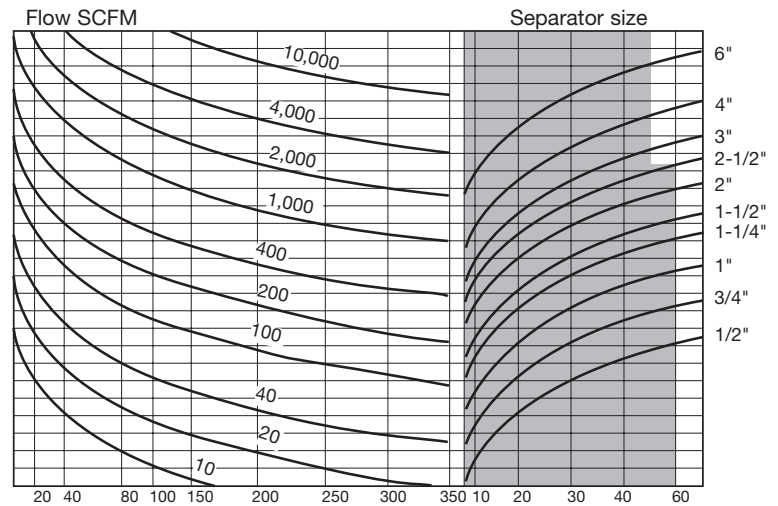
Pressure drop across separator psi (approx.)

Note: Any Separator curve that is bisected within the shaded area will operate at near 100% efficiency.

# Sizing Chart for S5 & S6 Separators

## Separator Flow Velocity & Pressure Drop for compressed Air

Note: Any Separator curve that is bisected within the shaded area will operate at near 100% efficiency.



Pressure drop across separator psi (approx.)



# spirax/sarco

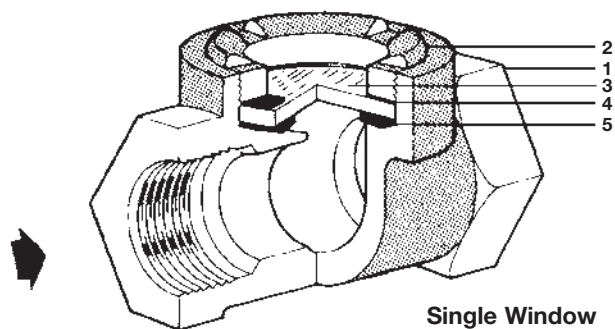
## Sight Glass

A Sight Glass provides a visual indication of liquid flow through pipe-work.

Model	Single Window	Double Window
Sizes	1/2", 3/4", 1"	1-1/4", 1-1/2", 2"
Connections	NPT	
Construction	Brass Body	Bronze Body
	Toughened Glass	
Options	BSP Connections	

### Construction Materials

No.	Part	Material	
1	Body 1/2" to 1"	Brass	BS 1400 LG2
	1-1/4" to 2"	Bronze	BS 1400 LG2 GpA
2	Bezel	Brass	BS 2872 CZ 122
3	Window	Toughened Soda Lime Glass	BS 3463
4	Top Washer (thin)	Reinforced Exfoliated Graphite	
5	Bottom Washer	Reinforced Exfoliated Graphite	



Single Window

### Limiting Operating Conditions

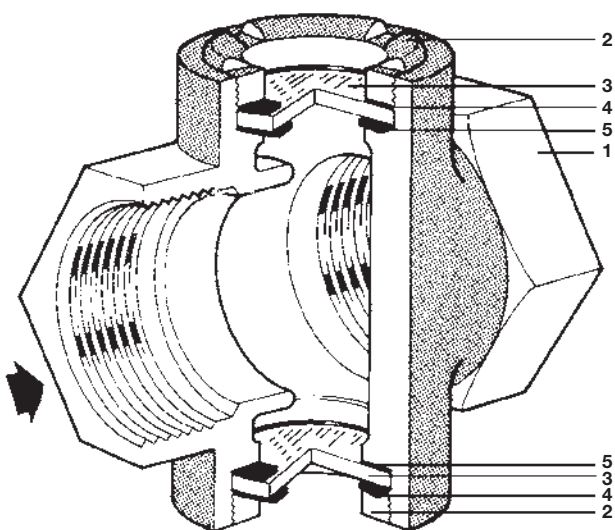
**Max. Operating Pressure (PMO)** 50 psig (3.5 barg)

**Max. Operating Temperature** 298°F  
(148°C)

### Pressure Shell Design Conditions

**PMA** 72 psig/0-298°F 5 barg/0-148°C  
Max. allowable pressure

**TMA** 298°F/0-72 psig 148°C/0-5 barg  
Max. allowable temperature



Double Window

### Typical Applications

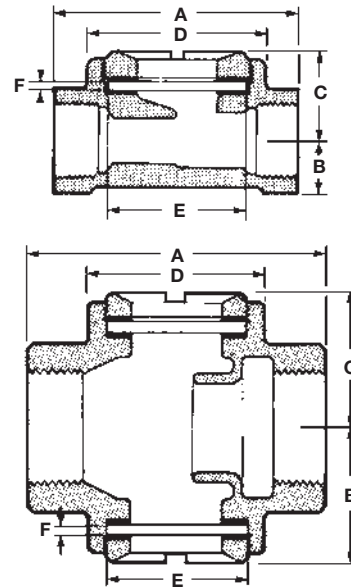
On any liquid system where indication of flow through pipe is required. Applications such as water lines, outlet condensate side of steam traps and discharge of pumps.

*Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only.  
In the interests of development and improvement of the product, we reserve the right to change the specification.*

TI-7-100-US 07.04

# Sight Glass

Dimensions (nominal) in inches and millimeters							
Size	A	B	C	D	E	F	Weight
Single Window							
1/2"	3.5 89	0.63 16	1.3 32	2.5 64	2.0 50	0.18 4.8	1.5lb 0.6 kg
3/4"	3.5 89	0.75 19	1.4 35	2.5 64	2.0 50	0.18 4.8	1.7 lb 0.7 kg
1"	3.5 89	0.94 24	1.5 38	2.5 64	2.0 50	0.18 4.8	2.0 lb 0.9 kg
Double Window							
1-1/4"	4.3 108	2.0 51	2.0 51	2.9 73	2.0 50	0.18 4.8	4.4 lb 1.9 kg
1-1/2"	4.3 108	2.0 51	2.0 51	2.9 73	2.0 50	0.18 4.8	4.0 lb 1.8 kg
2"	4.5 114	2.2 57	2.2 57	3.0 76	2.0 50	0.18 4.8	5.5 lb 2.5 kg



## Sample Specification

Sight Glass shall be single/double type having brass body with screwed connections and removable toughened glass windows.

## Installation

When installed on the outlet of a steam trap having a blast action discharge, the sight glass should be positioned at least 3 feet (1 meter) from trap outlet.

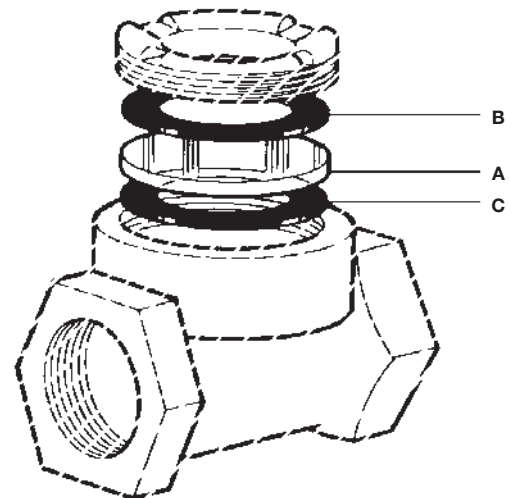
## Maintenance

This product can be maintained without disturbing the piping connections. Complete isolation of the sight glass is required before any servicing is performed.

The sight glass should be disassembled as necessary for cleaning of the glass. The glass should be examined carefully for any evidence of erosion or chemical attack.

Worn or damaged parts should be replaced using a complete Repair Kit comprised of toughened glass and gaskets.

## Spare Parts



Set of Windows & Gaskets/Washers A, B, C

Set of Gaskets/Washers B, C

Spare Parts are common to all sizes.  
Available spare parts are shown in heavy outline. Parts drawn in broken line are not supplied as spares.

# spirax sarco

## Sight Check (Combined Sight Glass & Check Valve)

The Sight Check provides visual indication of liquids flowing through pipework. An integral check valve prevents back flow of liquids.

<b>Model</b> □	Sight Check
<b>Sizes</b>	1/2", 3/4",
<b>Connections</b>	NPT
<b>Construction</b>	Bronze Body Stainless Steel Ball
<b>Options</b>	BSP Connections

### Construction Materials

No.	Part	Material
1	Body	Bronze BS 1400 LG1
2	Gasket	Glass reinforced granite laminate
3	Sight Tube	Borosilicate Glass
4	Discharge Tube	Copper BS 2871 PT2 C106
5	Ball Check	Stainless Steel BS 970 420 S45
6	Cover	Brass BS 1400 PC81
7	Cover Bolts	Steel Zinc Plated BS 3692 GR.8.8
8	Shake Proof Washers	Steel Zinc Plated

### Limiting Operating Conditions

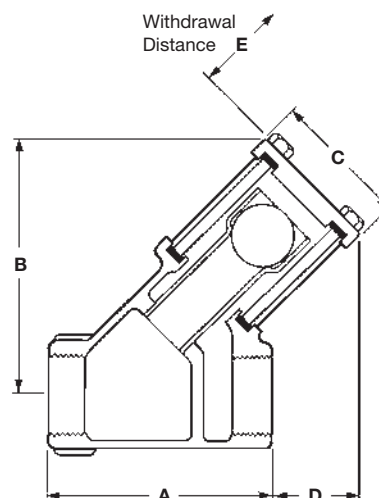
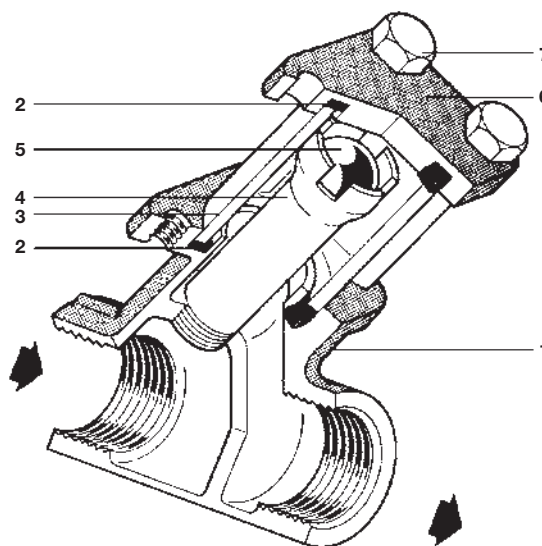
**Max. Operating Pressure (PMO)** 50 psig (3.5 barg)

**Max. Operating Temperature** 298°F (148°C)

### Pressure Shell Design Conditions

**PMA** 66 psig/0-298°F 4.6 barg/0-148°C  
Max. allowable pressure

**TMA** 298°F/0-66 psig 148°C/0-4.6 barg  
Max. allowable temperature



### Dimensions (nominal) in inches and millimeters

Size	A	B	C	D	E	
<b>Weight</b>						
<b>1/2"</b>	3.0 76	3.7 95	1.7 44	1.5 38	2.5 64	1.4 lb 0.6 kg
<b>3/4"</b>	3.0 76	3.8 96	1.7 44	1.5 38	2.5 64	1.4 lb 0.6 kg
<b>1"</b>	3.5 89	4.3 108	2.1 54	1.5 38	2.5 64	2.7 lb 1.2 kg

### Typical Applications

On any liquid system where indication of flow through the pipe is required, along with the prevention of liquid backflow. Applications such as water lines, outlet discharge of steam traps and discharge of pumps.

Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only.  
In the interests of development and improvement of the product, we reserve the right to change the specification.

TI-7-101-US 7.04

# Sight Check (Combined Sight Glass & Check Valve)

## Sample Specification

Sight Check valves shall have a borosilicate viewing glass and internal ball check valve. The ball check valve shall be situated so as to provide a visual indication of flow.

## Installation

When installed on the outlet of a steam trap having a blast action discharge, the sight glass should be positioned at least 3 feet (1 meter) from the trap outlet. This is to ensure the glass tube is not subjected to thermal shock. The sight check can be installed in horizontal or vertical pipework, provided that the ball check can close by gravity.

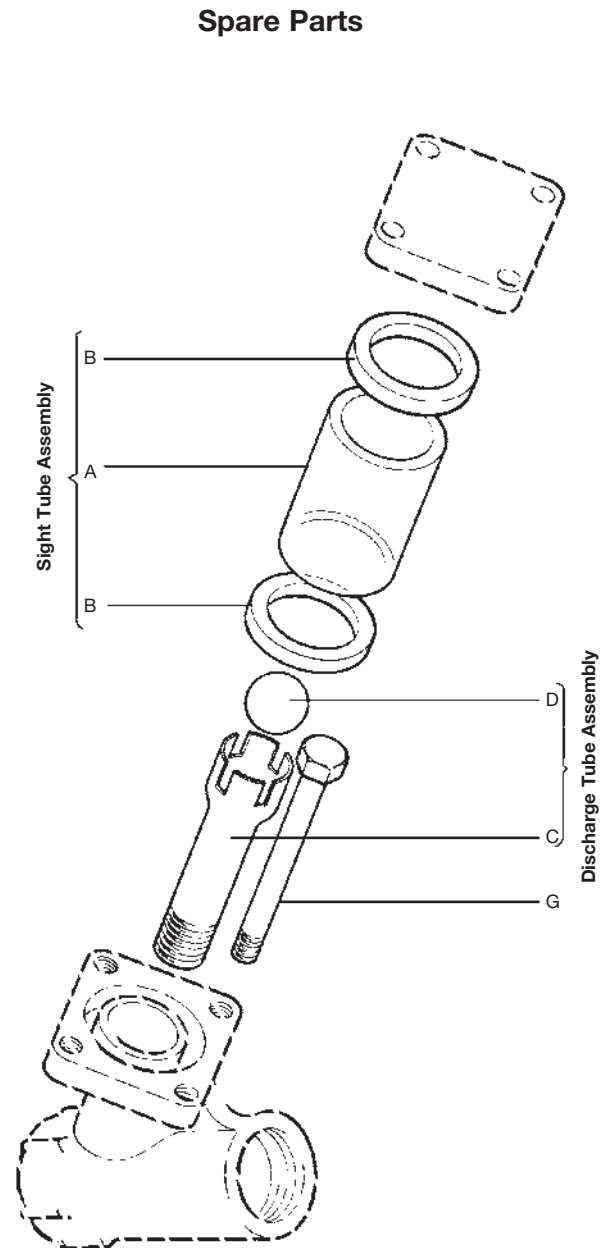
**Warning:** Since condensate can, in some cases, act as a solvent on glass, it is advisable to check the tube periodically for thinning and to take reasonable steps to protect people from injury, should the glass break.

## Maintenance

This product can be maintained without disturbing the piping connections. Complete isolation of the sight check is required before any servicing is performed.

The sight check should be disassembled periodically for inspection and cleaning of the glass, ball check and seat. Worn or damaged parts should be replaced as required.

**Complete installation and maintenance instructions are given in the IMI sheet, which accompanies the product.**



Sight Tube Assembly	A
	B (2 off)
Discharge Tube Assembly	C, D
Set of Bolts	G (set of 4)
Gaskets	B (pkt of 6)
Available spares are common to 1/2" & 3/4", but not 1"	

Available spare parts are shown in heavy outline. Parts drawn in broken line are not supplied as spares.



# spirax/sarco

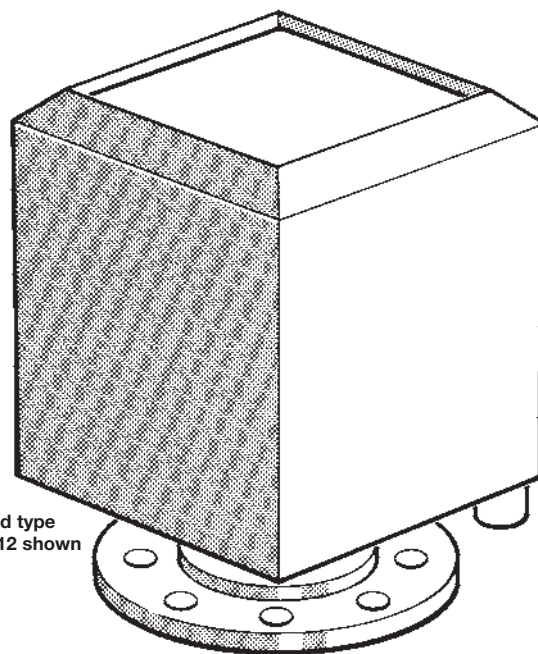
## Vent Head Type VH

Spirax Sarco Vent Heads type VH are designed for fitting to vertical open-ended steam vent pipes. The vent head will discharge dry steam at low velocity safely to atmosphere protecting personnel from injury and buildings from material damage. The vent head incorporates an internal baffle to separate entrained water from the steam and discharges separately through the drain connection.

Model	VH 2S-VH 3S	VH 3-VH 12
Sizes	2" and 3"	3" - 12"
Vent Connection	NPT	ANSI 150
Drain Connection	NPT	
Construction	Stainless Steel	Stainless Steel Flange - Plated Steel

### Typical Applications

Vent heads type VH are ideal for condensate tanks, blowdown vessels, boiler feedtanks, deaerators, hot water storage tanks, etc. Caution: Vent heads are not recommended for safety valve outlets.



### Available Types

Vent heads are available as types VH 2S, 3S, 3, 4, 6, 8, 10 and 12. The vent head should be selected so that it is the same nominal size as the vent pipe, when sized for a maximum velocity of 3500 ft/min at atmospheric pressure.

### Materials

300 grade austenitic stainless steel except the flange (VH 3-VH 12 only) which is electroplated carbon steel

### Sample Specification

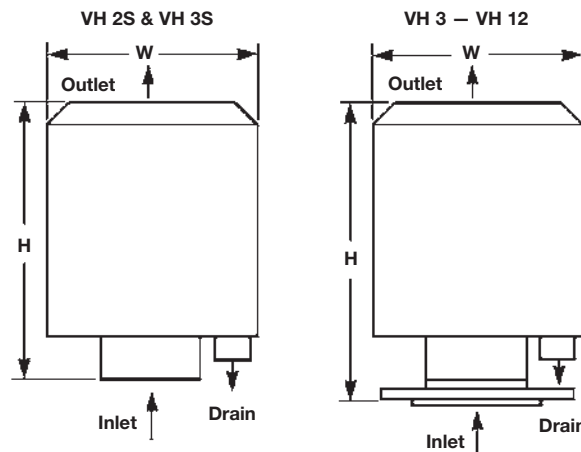
Vent head shall be baffle type, manufactured in stainless steel with threaded drain connection. Flanged units shall have a lap type flange to allow rotation and easy orientation of the drain connection during installation.

### Installation

The lap joint flange allows rotation and easy orientation of the drain connection. The drain should be piped to a safe position. An annual inspection is recommended to ensure that the outlet drain connection is unobstructed.

### Dimensions (nominal) in inches and millimeters

Vent Head Type	Inlet size	Drain Size	H	W	Weight
VH 2S	2"	3/4" NPT	8.3	6.0	4.4 lb
	50		210	152	2.0 kg
VH 3S	3"	3/4" NPT	10.6	8.0	5.5 lb
	80		270	202	2.5 kg
VH 3	3"	3/4" NPT	12.0	8.6	12.0 lb
	80		305	218	5.5 kg
VH 4	4"	1" NPT	12.6	9.5	13.0 lb
	100		320	240	6.0 kg
VH 6	6"	1" NPT	15.4	13.4	29.0 lb
	150		390	340	13.0 kg
VH 8	8"	1-1/2" NPT	16.9	16.7	44.0 lb
	200		430	425	20.0 kg
VH 10	10"	1-1/2" NPT	19.5	20.7	62.0 lb
	250		495	525	28.0 kg
VH 12	12"	2" NPT	22.4	24.6	77.0 lb
	300		570	625	35.0 kg



**Inlet Connections:** VH 2S is screwed 2" NPT; VH3S is screwed 3" NPT  
VH 3 - VH 12 flanged to suit ANSI 150  
Flanges are the lap joint type.

## Steel Pressure Gauge

### Description

Pressure gauge with 4" (100mm) diameter dial with units marked in psi as appropriate. The gauge can be supplied with either:

Ring type syphon tube and cock or a 'U' type syphon tube and cock as an optional accessory.

Bourdon tube gauge, constructed in accordance with DIN 16005.

#### Available pressure range

<b>Range 1</b>	0 - 30 psi	<b>Range 2</b>	0 - 60 psi
<b>Range 3</b>	0 - 100 psi	<b>Range 4</b>	0 - 160 psi
<b>Range 5</b>	0 - 300 psi	<b>Range 6</b>	0 - 400 psi

**Note:** Other ranges are available upon request

#### Standards

The product fully complies with the requirements of the Pressure Equipment Directive 97/23/EC.

#### Certification

A certificate of conformity and test report is available as standard for this product. A calibration certificate is available by special order at extra cost. **Note:** All certificate/inspection requirements must be specified at the time of order placement.

### Sizes and pipe connections

<b>Pressure gauge</b>		1/2" NPT
<b>Gauge cock</b>	Gauge end	1/2" NPT
	Syphon end	1/2" NPT
<b>Ring / 'U' syphon</b>	Cock end	1/2" NPT
	Process end	1/2" NPT

### Pressure/temperature limits

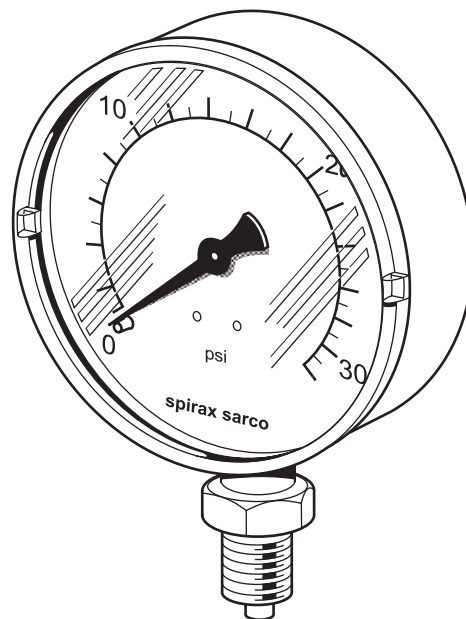
Maximum design conditions	Full scale reading
PMA Maximum allowable pressure	Full scale reading
TMA Maximum allowable temperature	423°F

**Note:** Either a 'U' or a ring syphon must be fitted to achieve this.

PMO Maximum operating pressure	Range 1	30 psi
<b>Please note:</b> For compressed air and steam services the maximum operating pressure for this product is 300 psi.	Range 2	60 psi
	Range 3	100 psi
	Range 4	160 psi
	Range 5	300 psi
TMO Maximum operating temperature		140°F

### Materials

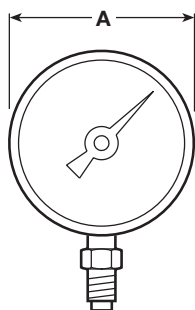
Part	Material
<b>Gauge</b>	Case Pressed steel
	Glass Snap fit perspex
	Bourdon tube CuSh 8 (92% Cu 8% Zn)
<b>Ring and 'U' syphon</b>	Mild steel tube BS 1387 heavy grade
<b>Gauge cock</b>	Body Brass
	Handle Phenolic



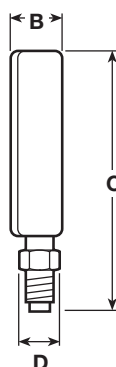


## Dimensions/weights (approximate) in inches and lbs

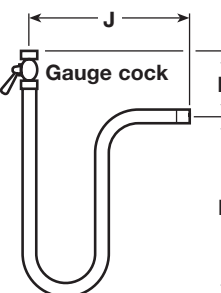
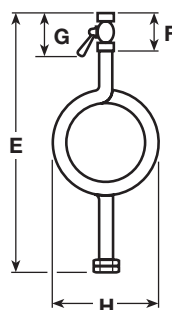
Gauge						Ring syphon						'U' syphon					
A	B	C	D	Weight		E	F	G	H	Syphon	Cock	J	K	L	Syphon	Cock	Weight
4	1.1	5.2	0.9 A/F	0.95		15.4	2.3	3.5	4	2.4	0.51	8.5	3.6	6.9	2.0	0.51	



Gauge



Ring syphon



'U' syphon

## Safety information, installation and maintenance

For full details see the Installation and Maintenance Instructions (IM-P027-02) supplied with the product.

### Installation note:

As with all instrumentation, the Spirax Sarco pressure gauge is a delicate measuring device and care has to be taken in its installation and use if it is to remain reliable.

It is recommended that all gauges are fitted with a gauge cock to assist when calibration or maintenance is necessary. When used on steam or other hot gases, gauges **must** be protected from heat by the use of a 'U' syphon or ring syphon tube and gauge cock. The syphon pipe should be primed with water prior to fitting the gauge. Care should be taken if the installation is exposed to frost as gauges can burst.

### Disposal:

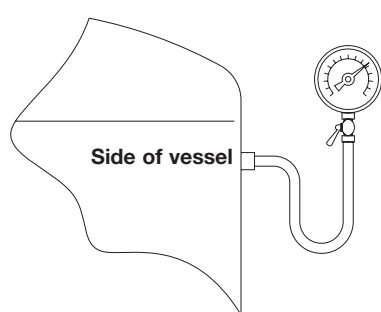
The product is recyclable. No ecological hazard is anticipated with the disposal of this product providing due care is taken.

## Spare parts

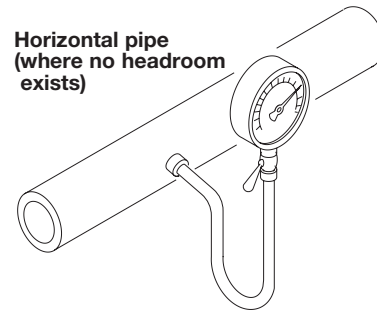
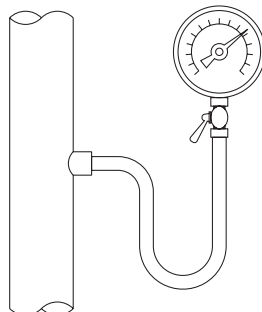
There are no spare parts available for Spirax Sarco pressure gauges.

## Typical uses of a 'U' syphon and gauge

Vertical pipe

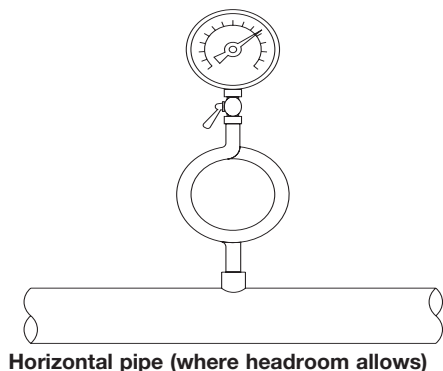


Side of vessel

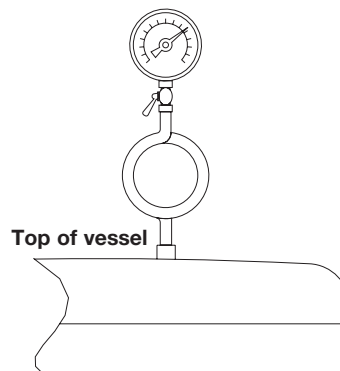


Horizontal pipe  
(where no headroom  
exists)

## Typical uses of a ring syphon and gauge



Horizontal pipe (where headroom allows)



Top of vessel

## Steel Pressure Gauge



## Stainless Steel Pressure Gauge

### Description

Stainless Steel case pressure gauge with 4" diameter dial with units marked in psig and inches Hg for vacuum as appropriate. The gauge is supplied with 316 stainless steel bourdon tube. The gauge is available dry but, with a special dampening agent, giving performance like a liquid-filled gauge. Pressure gauge comes with a 1-1/2% accuracy.

### Sizes and pipe connections

**Pressure Gauge:** 1/4" NPT

**\*Ball Valve** 1/4" NPT x 1/4" NPT

**Syphon:** 1/4" NPT x 1/4" NPT

\*Valve for use w/syphon and pressure gauge. Not to be used as a stand-alone isolation valve.

### Limiting Conditions

Maximum design conditions = full scale reading.

Maximum design temperature 400°F

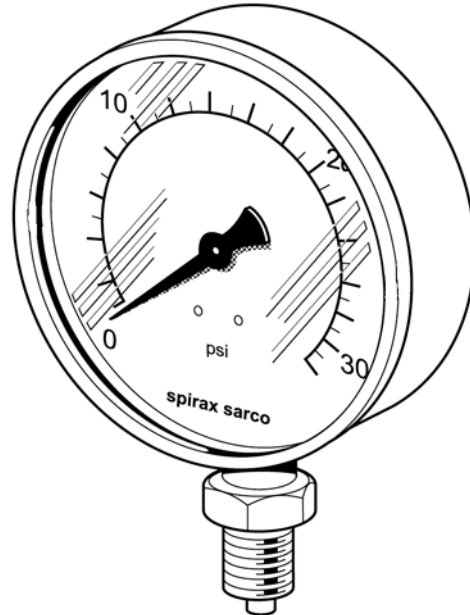
(Coil syphon must be fitted to achieve this)

Maximum service temperature, if the syphon tube is not fitted is 150°F. On applications with a service temperature above 150°F syphon tube must be fitted.

The pressure gauge has a standard vent plug and should be used in an indoor dry environment. Gauges with vented plugs are not weatherproof or hermetically sealed.

### Pressure ranges

Range	psig
1	0 - 30
2	0 - 60
3	0 - 100
4	0 - 160
5	0 - 200
6	0 - 30/0 Hg
7	30" Hg - 15 psig
8	30" Hg - 30 psig
9	30" Hg - 60 psig



### Materials

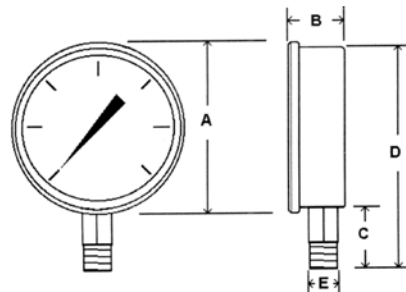
Case	304 Stainless Steel
Gauge Window	Polycarbonate
Bourdon tube	316 Stainless Steel
Coil syphon	ASTM A-106 seamless steel/grade A
Ball valve	Bronze

### Certification

A calibration certificate is available by special order at extra cost.

### Dimensions / weights (approximate) in inches

Gauge				
A	B	C	D	Weight
4.2	1.5	1.6	5.48	.50



# Stainless Steel Pressure Gauge

## Installation

As with all instrumentation, the Spirax Sarco pressure gauge is a delicate measuring device and care has to be taken in its installation and use if it is to remain reliable.

It is recommended that all gauges are fitted with a ball valve to assist when maintenance is necessary. When used on steam or other hot gases, gauges **must** be protected from heat by the use of a syphon tube and ball valve. To protect live steam from entering the bourdon tube, a syphon filled with water should be installed between the gauge and the process line.

Care should be taken if the installation is exposed to frost as gauges can burst.

Tighten the gauge with care using a 22mm A/F spanner not by twisting the gauge case. Gauges should be selected so as not to exceed 75% of maximum scale reading during normal use.

**Note: Ball valves should always be opened and closed slowly to avoid pressure shocks to the gauges.**

## Safety

### Pressure

Ensure that any pressure is isolated upstream and downstream of the product and safely vented atmospheric pressure before attempting to maintain the product.

### Temperature

Allow time for temperature to normalize after isolation to avoid the danger of burns and consider whether protective clothing (including safety glasses) is required.

### Isolation

Consider whether closing isolating valves will put any other part of the system or personnel at risk. Dangers might include: isolation of vents, protective devices or alarms. Ensure isolation valves are turned on and off in a gradual way to avoid system shocks.

## Steam-Water Washdown Unit

### Description

The Spirax Sarco Steam-Water Washdown Unit dual output design provides hot water for washdown economically by mixing steam and cold water instantly with the ability to supply two individual terminals. The unit's safe design also allows the temperature to be set with its lock nut cap locking device. The internal steam poppet design does not allow live steam to pass if water is interrupted making this unit safe for operation.

Washdown unit operates under a wide range of steam and water pressure with no changing of components.

### Range

Each Steam-Water Washdown Station comprises of a steam-water washdown unit with check valves, globe valves, dual temperature gauge (Fahrenheit and Celsius), hose rack and mounting bracket. Each unit is fully assembled, pressure tested and is supplied with installation and maintenance instructions.

### Recommended ancillaries

- Installation Kit: consist TD52 Steam Trap, (2) Strainers and miscellaneous pipefittings
- Hose
- Nozzle
- 5 liter Sanitizer Bottle Kit
- 3ft Nozzle Stainless Steel Nozzle wand \*Does not include High Flow Nozzle
- Sanitary Fittings

### Operation

While nozzle is held firmly at a wide open position, open cold water globe valve, then steam globe valve slowly to pressurize the washdown unit and begin to spray. Adjust the temperature with the temperature control hand wheel if temperature is not met with a steam globe valve in a fully open position. Once desired temperature is achieved, close-tighten lock nut on steam globe valve in a tight position.

If water pressure is interrupted, steam poppet spring will push the steam poppet back into its closed position for safe shut-down.

### Installation

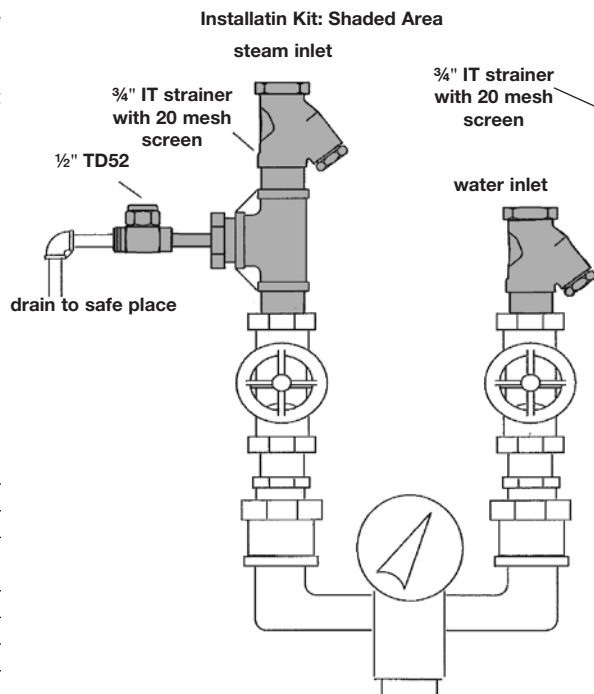
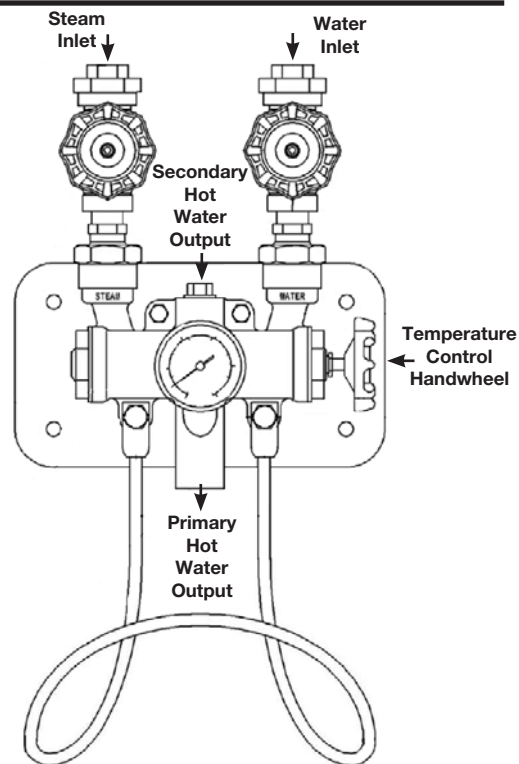
Full details are provided in the installation and maintenance instructions supplied with each system. Instructions can also be downloaded from our website. (IM-8-002-US)

### Sizes and pipe connections

Washdown Unit	3/4" NPT inlets and outlet (primary and secondary)
Hose	3/4" NPT (male) x 1/2" NPT (male)
Nozzle	1/2" NPT (female)

### Materials

Steam-Water Washdown Unit	Bronze / Stainless Steel
Globe Valves	Bronze / Stainless Steel
Check Valves	Bronze / Stainless Steel
Temperature Gauge	Stainless Steel/ Polycarbonate (face)
Mounting Bracket	Stainless Steel
Pipe Fittings	Bronze / Stainless Steel
Hose Rack	Stainless Steel



# Steam-Water Washdown Unit

## Technical Data Bronze Stainless Steel

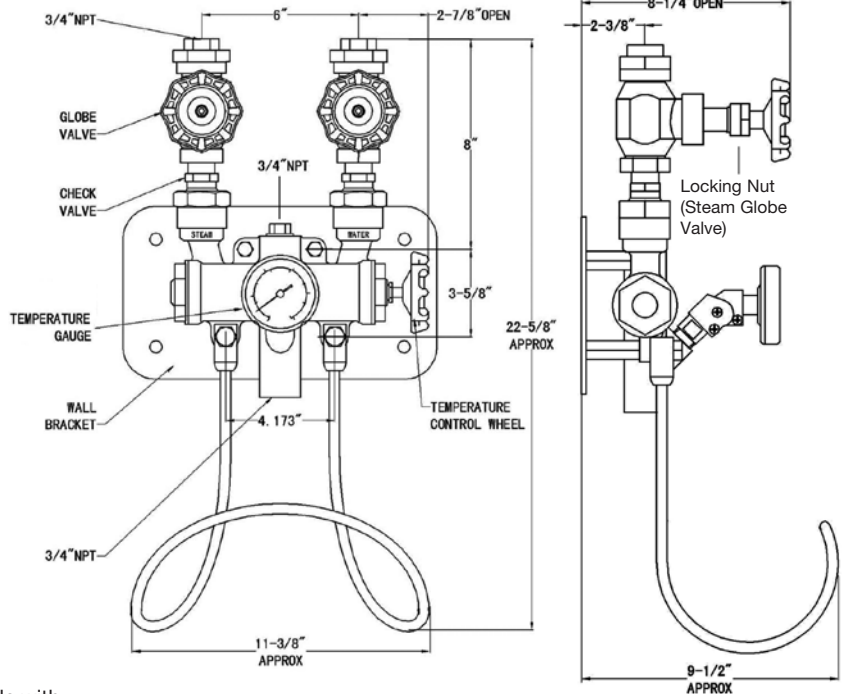
*Steam Pressure (min)	30 psi (2.0 bar)	30 psi (2.0 bar)
*Steam Pressure (max)	150 psi (10.0 bar)	150 psi (10.0 bar)
Water Pressure (min)	30 psi (2.0 bar)	30 psi (2.0 bar)
Water Pressure (max)	150 psi (10.0 bar)	150 psi (10.0 bar)
Maximum Water Output Temperature	200F (93C)	200F (93C)
*Saturated Steam		

Note: Steam to water ratio 2:1

## Temperature Rise vs. GPM

(for reference only)

Input		Output	
*Steam	Water	Temperature Rise	GPM
100 psig (6.9 bar)	60 psig (4.1 bar)	55°F (12°C)	14.0
100 psig (6.9 bar)	60 psig (4.1 bar)	100° F (37°C)	9.0
100 psig (6.9 bar)	60 psig (4.1 bar)	134° F (57°C)	7.8
*Saturated Steam Only			



## Nozzles



The standard flow nozzles we offer are durable with variable spray patterns, adjustable from fan spray to solid stream. Standard nozzles are stainless steel material. Aluminum and brass nozzle material is available upon request. Cover colors available in Blue, Red and White.

## Optional Nozzles

Temperature indicating nozzles are also available. Nozzle provides accurate water temperature reading at the nozzle output.

Rating: 150 psi / 200°F (93°C)

**NOTE:** Not for use with steam

## Hoses

All hoses are flexible, lightweight, durable and safe. Standard hoses from Spirax Sarco come with 360° ball type swivel adapter (SS or Bronze) for our nozzles to prevent hose kinking and ease of use.

Lengths available in 25', 50', 75', and 100'. Colors available in white, black, yellow and red.



## Weight

Bronze	Stainless Steel
20lbs	20lbs

Inner Diameter	Max Pressure	Cover Color	Cover Material	Tube Material	Reinforcement
3/4"	250 PSI (17.2 bar)	White	Smooth EPDM	EPDM	4 Polyester Yarn Spirals
3/4"	250 PSI (17.2 bar)	Black	Smooth EPDM	EPDM	4 Polyester Yarn Spirals
3/4"	300 PSI (20.6 bar)	Red	Smooth Nitrile	Nitrile	2 Polyester Yarn Spirals
3/4"	400 PSI (27.5 bar)	Yellow	Smooth Nitrile	Nitrile	2 Polyester Yarn Spirals



## Hot & Cold Water Washdown Unit

### Description

Spirax Sarco's hot & cold water washdown unit was specifically designed for thoroughly blending hot and cold water instantly. The unit uses "Y" style body mechanics with lift check valves and ball joint unions for superior flexibility during installation. Spirax Sarco's inlet center lines have the same dimensions as most competitors' units.

### Range

Our units come with a mounting plate for easy behind the unit cleanup, hose rack for easy user access to the hose, and temperature gauge for accurate temperature readings at outlet.

### Recommended ancillaries

- Hose
- Nozzle

### Installation

Full details are provided in the installation and maintenance instructions supplied with each system.

### Sizes and pipe connections

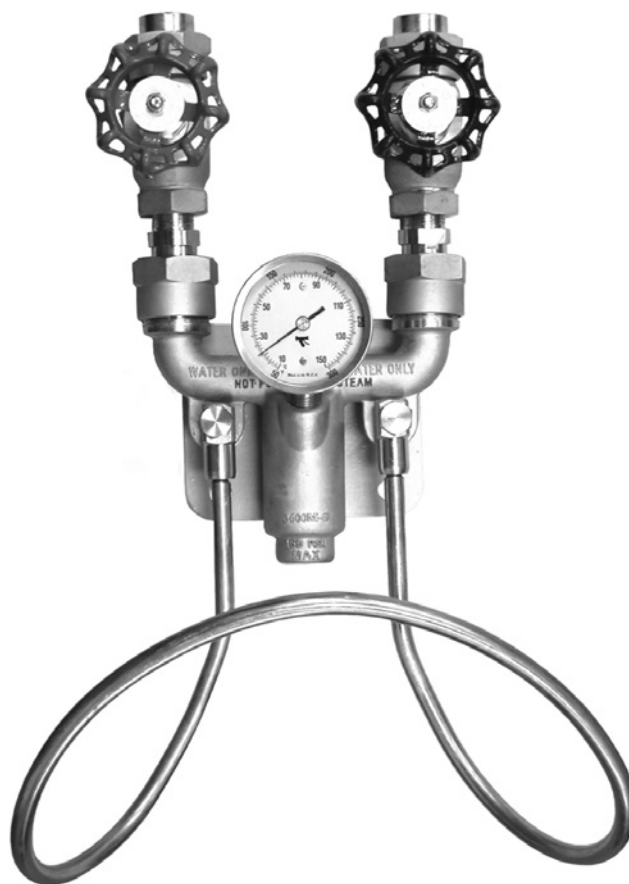
Washdown Unit	3/4" NPT inlets and outlet (primary and secondary)
Hose	3/4" NPT (male) x 1/2" NPT (male)
Nozzle	1/2" NPT (female)

### Materials

Hot & Cold Water Washdown Unit	Brass / Stainless Steel
Globe Valves	Brass / Stainless Steel
Check Valves	Brass / Stainless Steel
Temperature Gauge (Dual Scale °F/°C)	Stainless Steel
Mounting Bracket	Stainless Steel
Pipe Fittings	Bronze / Stainless Steel
Hose Rack	Stainless Steel

### Spare Parts

Connection Nut Teflon Gasket
Check Valve Teflon Coated Copper Gasket
Globe Style Valve, Brass/Stainless Steel
Check Valve, Brass/Stainless Steel
Hand Wheel, Red/Blue Epoxy Coated





# Hot & Cold Water Washdown Unit

## Technical Data Brass Steel Stainless

Water Pressure (min)	30 psi (2.0 bar)	30 psi (2.0 bar)
Water Pressure (max)	150 psi (10.0 bar)	150 psi (10.0 bar)
Maximum Water Output Temperature	200F (93C)	200F (93C)

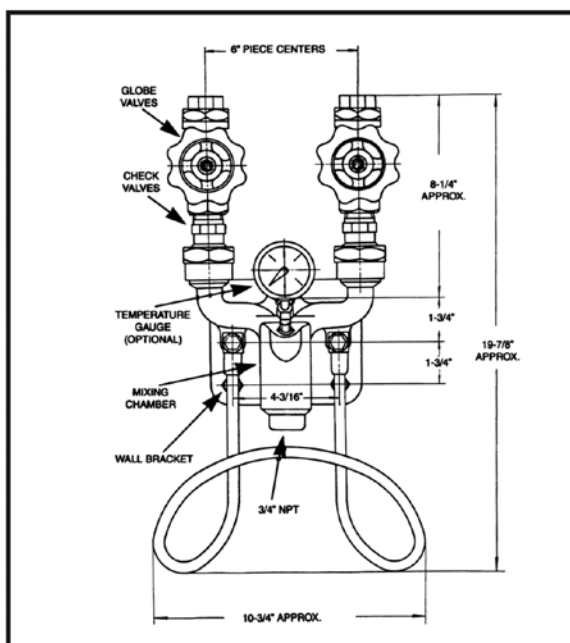
## Weight

Bronze	Stainless Steel
20lbs	20lbs

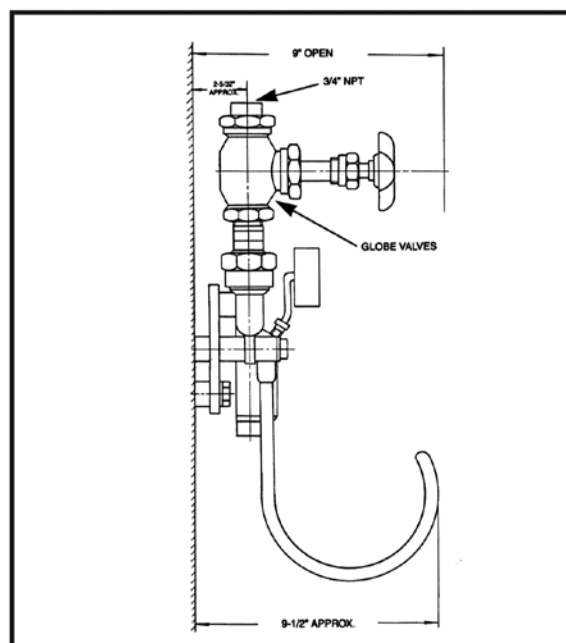
## Inlet Pressure

## Flow Rate

30 psi	5.3 gpm
40 psi	6.2 gpm
50 psi	6.9 gpm
60 psi	7.5 gpm
70 psi	8.1 gpm
80 psi	8.7 gpm
90 psi	9.2 gpm
100 psi	9.8 gpm



FRONT VIEW



SIDE VIEW

## Nozzles

The standard flow nozzles we offer are durable with variable spray patterns, adjustable from fan spray to solid stream. Nozzles are available in stainless steel, aluminum, and brass. Cover colors available in Blue, Red and White.

## Optional Nozzle

Temperature indicating nozzles are also available. Nozzle provides accurate water temperature reading at the nozzle output.

Rating: 150 psi / 200°F (93°C)

NOTE: Not for use with steam

## Hoses

All hoses are flexible, lightweight, durable and safe. Standard hoses from Spirax Sarco come with 360° ball type swivel adapter (SS or Bronze) for our nozzles to prevent hose kinking and ease of use.

Lengths available in 25', 50' 75', and 100'. Colors available in white, black, yellow and red.



Inner Diameter	Max Pressure	Cover Color	Cover Material	Tube Material	Reinforcement
3/4"	250 PSI (17.2 bar)	White	Smooth EPDM	EPDM	4 Polyester Yarn Spirals
3/4"	250 PSI (17.2 bar)	Black	Smooth EPDM	EPDM	4 Polyester Yarn Spirals
3/4"	300 PSI (20.6 bar)	Red	Smooth EPDM	EPDM	2 Polyester Yarn Spirals
3/4"	400 PSI (27.5 bar)	Yellow	Smooth Nitrile	Nitrile	2 Polyester Yarn Spirals

TI-11-003-US 12.13



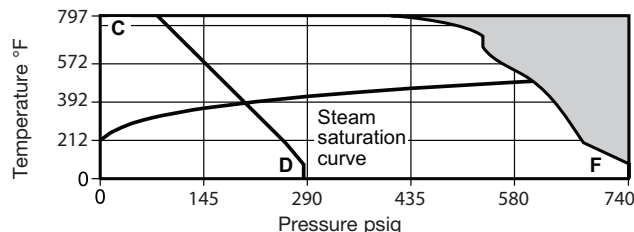
## BSA3T Bellows Sealed Stop Valve

The BSA3T is a low maintenance flanged in-line Bellows Sealed Isolation Valve for use on steam, condensate, gas and other fluid applications where zero emissions from the stem seal are important. BSA3T is fitted with a throttling valve plug that allows close control when opening the valve. Locking screw and stroke limiter maintains correct flow rate once the flow rate is obtained. The "T" version is to be used for regulating duties.

Model	BSA3T
Sizes	1/2" to 8"
Connections	ANSI 300/Optional ANSI 150
Body Design	ANSI Class 300
Construction	Cast Steel
Options	Gland Flange assembly (1/2" to 4") Balancing Disc (6" & 8") R-PTEF Throttling Plug

### Limiting Operating Conditions

Body design conditions	ANSI 300
Maximum design temperature	797°F
Maximum cold hydraulic test pressure	1116 psig



■ The product must not be used in this region.

C - D Flanged ANSI 150 (optional connection)

C - F Flanged ANSI 300

### Construction Materials

No.	Part	Material	
1	Body	Cast Steel	ASTM A 216 WCB
2	Bonnet	Forged Steel (1/2"-3") Cast Steel (4"-8")	ASTM A 105 ASTM A 216 WCB
3	Seat	Stainless Steel	AISI 420
4	Disc	Stainless Steel	DIN 17440x30Cr13
5	Bellows	Stainless Steel	DIN 17440x6CRNiTi1810
6	Stem	Stainless Steel	AISI 420
7	Handwheel	Pressed Steel	BS1449 CR4
8	Stem Packing	Graphite	
9	Bonnet Studs	Steel	ASTM A 193 B7
	Bonnet Nuts	Steel	ASTM A 192 2 H
10	Body/Bonnet Gasket	Graphite laminated with Stainless Steel insert	

### C<sub>v</sub> Values

Size	1/2"	3/4"	1"	1-1/2"	2"	3"	4"	6"	8"
	4.7	8.2	14	35	55	140	226	480	848

### Sample Specification

1" Spirax Sarco Type BSA3T bellows sealed stop valve, flanged ANSI 300 (Available with optional gland flange assembly up to 4").

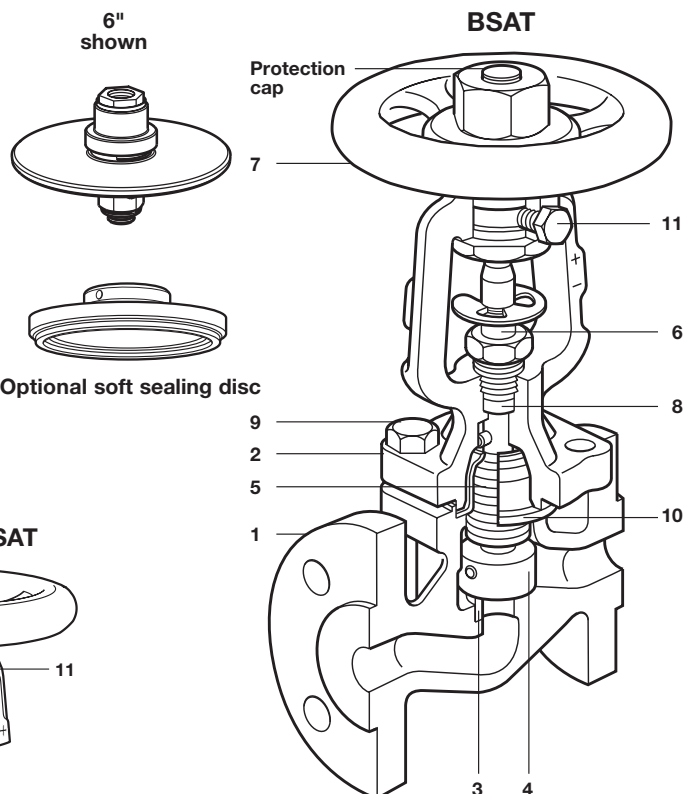
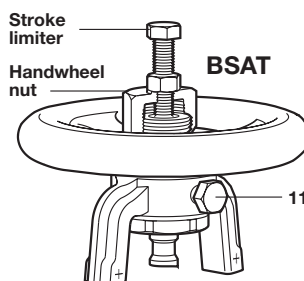
Note: Should the differential pressure exceed those listed against the respective sizes in the table below, then please ensure Balancing discs are specified for use in the valves. (see diagram).

Size	6"	8"
Differential Pressure (psi)	247	145

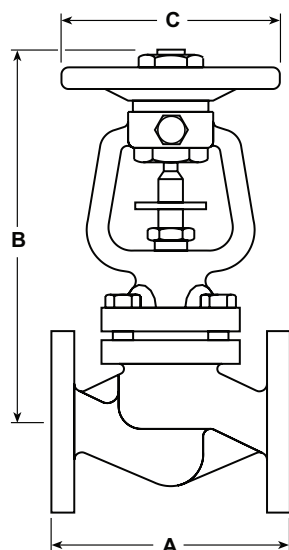
### Stroke limiter for throttling versions

The handwheel nut on the BSA1T, BSA2T and BSA3T has a threaded hole for provision of a stroke limiter. Customer to supply standard nuts and bolts as indicated in the table below.

Size	Hexagon bolt
1/2" to 3"	M8 x 50 mm
4" to 6"	M12 x 75 mm
8"	M12 x 100 mm



# BSA3T Bellows Sealed Stop Valve

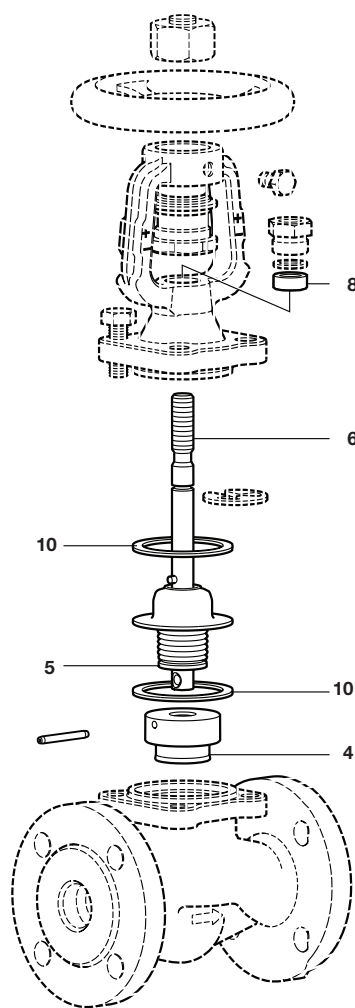


**Dimensions** (nominal) in inches and millimeters

Size	A	B	C	Weight
1/2"	6.0 152	8.07 205	4.92 125	13.2 lb 6.0 kg
3/4"	7.0 178	8.07 205	4.92 125	15.4 lb 7.0 kg
1"	8.0 203	8.54 217	4.92 125	20.0 lb 9.0 kg
1-1/2"	9.0 229	9.56 243	4.92 125	24.3 lb 11 kg
2"	10.5 267	9.56 243	7.87 200	33.0 lb 15.0 kg
3"	12.5 317	11.29 287	7.87 200	64.0 lb 29.0 kg
4"	14.0 356	15.07 383	12.40 315	108.0 49.0 kg
6"	17.5 445	17.7 450	12.40 315	207.0 lb 94.0 kg
8"	22.0 559	24.48 622	12.40 315	424.0 lb 193.0 kg

## Installation

Install in the direction of flow given by the arrow on the body with the handwheel in a suitable position. The preferred position is with the spindle vertical. Refer to IM-P137-02 for full installation and maintenance instructions.



## Spare Parts

The spare parts are shown in heavy outline.

Parts drawn in broken line are not supplied as spares.

### Available spares

Body/bonnet gasket and stem packing	10, 8 (2 off)
Stem and bellows assembly	
(state if BSA or BSAT)	5, 6, 8, 10
Disc (and optional disc where fitted) - state full description of the valve	4, 8, 10

Note: The gaskets contain sharp metal reinforcement, please handle with care.

### How to order spares

Please note: for customer convenience spares are supplied in kits to ensure all the appropriate replacement parts are supplied to carry out a specific maintenance task. e.g. when a stem / bellows assembly is ordered, parts (10), (8) and (6, 5) will be included in the kit.

Always order spares by using the description given in 'Available spares' and state the size and type of stop valve.

**Example: 1** - Body / bonnet gasket and stem packing for a 1/2" Spirax Sarco BSA3T ANSI300 bellows sealed stop valve.

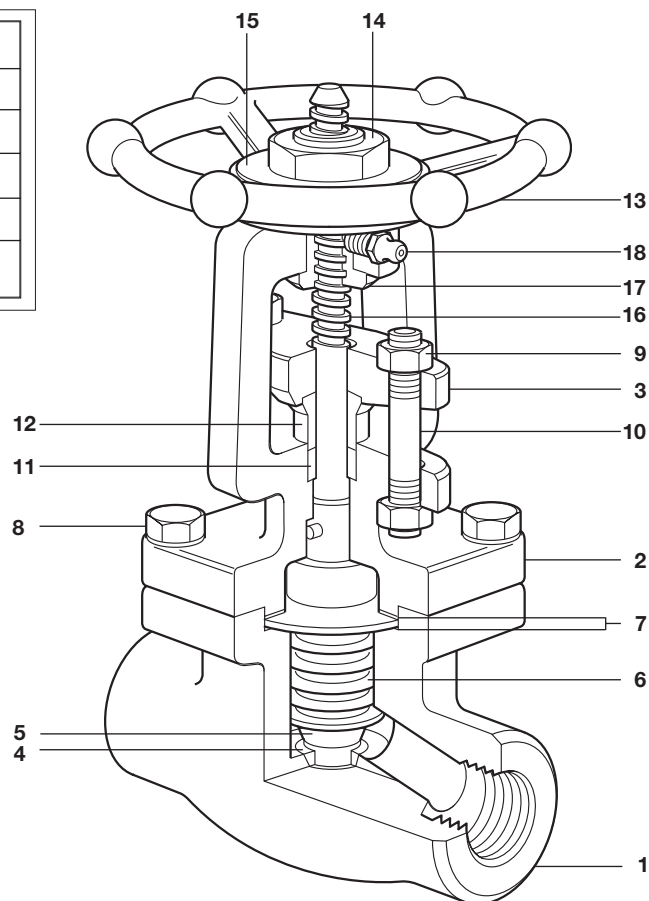
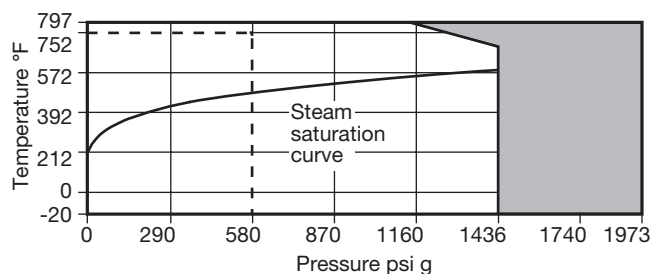
TI-7-220-US 4.14

## A3S Bellows Sealed Stop Valve

The A3S is a Class 800 bel-  
lows sealed isolation valve  
used on steam, gas, liquid,  
condensate, and water sys-  
tems. The metallic bellows  
replaces conventional stem  
packing and acts as an imper-  
vious barrier between the fluid  
and environment. This design  
guarantees zero emissions  
from the stem seal.

Model	A3S
Sizes	1/2" to 2"
Connections	NPT, Socketweld
Body Design	ANSI Class 800
Construction	Forged Steel
Options	BSP

### Pressure/temperature limits (Class 800)



### Construction Materials

No.	Part	Material	
1	Body	Forged Steel	ASTM A105N
2	Bonnet	Forged Steel	ASTM A105N
3	Gland Flange	Forged Steel	ASTM A105
4	Integral Seat	Stellite	Gr. 6
5	Disc	Stainless Steel	ASTM A276 Type 410 + stellite Gr. 6
6	Bellows	Stainless Steel	ASTM A479 Type 321
7	Gaskets	Stainless Steel/Graphite	
8	Body Bolts	Carbon Steel	ASTM A193 B7
9	Gland Nuts	Carbon Steel	ASTM A194 2H
10	Gland Studs	Stainless Steel	AISI 410
11	Stem Packing	Graphite	
12	Stem Follower	Stainless Steel	ASTM A276 Type 410
13	Handwheel	Carbon Steel	
14	Wheel Nut	Carbon Steel	
15	Nameplate	Stainless Steel	
16	Stem	Stainless Steel	ASTM A276 Type 410
17	Yoke Nut	Stainless Steel	ASTM A582 Type 416
18	Grease Nipple	Carbon Steel	

### Standards

Valve bellows fatigue life conforms to ISO 15761.

### Certification

All valves are EN 10204 (3.1.B) certifiable as standard.  
Note: All certification/inspection requirements must be  
stated at the time of order placement.

### Seat Leakage

Disc to seat shut off conforms to API 598 and DIN 3230  
leakage rate B01.

### C<sub>v</sub> Values

Size	1/2"	3/4"	1"	1-1/4"	1-1/2"	2"
	1.5	3.7	6.8	10.5	19.9	22.5

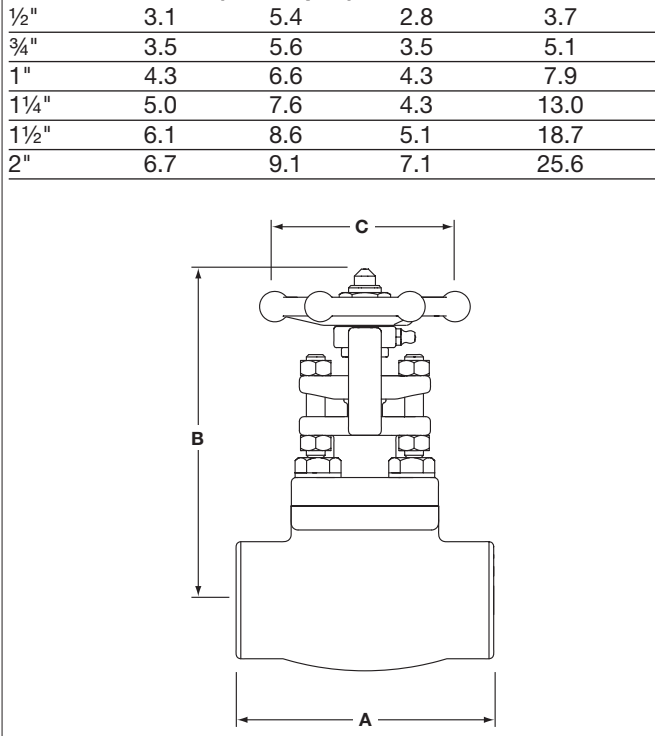
### Sample Specification

1" Spirax Sarco Type A3S bellows sealed stop valve  
screwed NPT.

# A3S Bellows Sealed Stop Valve

**Dimensions /weights (approximate) in inches and lbs**

Size	A	B	C	Weight
1/2"	3.1	5.4	2.8	3.7
3/4"	3.5	5.6	3.5	5.1
1"	4.3	6.6	4.3	7.9
1 1/4"	5.0	7.6	4.3	13.0
1 1/2"	6.1	8.6	5.1	18.7
2"	6.7	9.1	7.1	25.6



## Safety Information, Installation and Maintenance

For full details see the Installation and Maintenance Instructions (IM-P132-11) supplied with the product.

Install in the direction of flow given by the arrow on the body with the handwheel in a suitable position. The preferred position is with the spindle vertical.

## Disposal

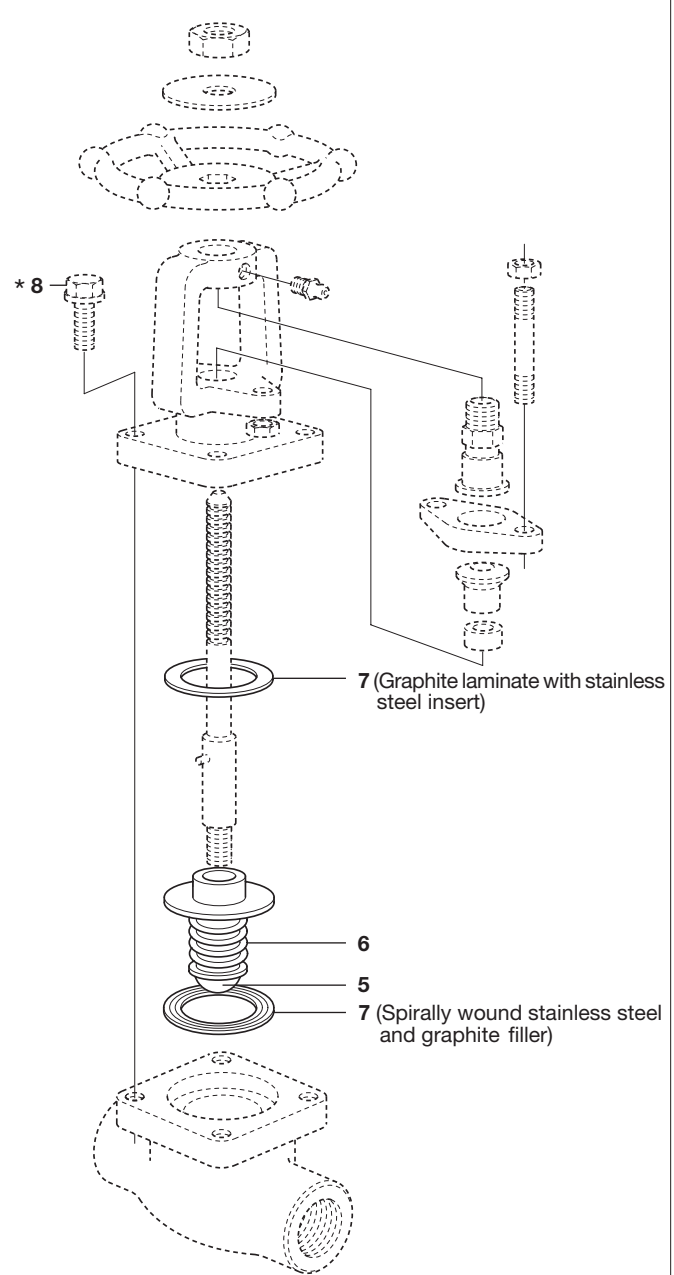
The product is recyclable. No ecological hazard is anticipated with the disposal of this product, providing due care is taken.

## How To Order

**Example: 1** off Spirax Sarco A3S bellows sealed stop valve having screwed NPT connections.

## Recommended tightening torques

Item	Part	Size	or mm	lb f/ft
8	Body bolt	1/2"	M10	22 - 27
		3/4"	M10	22 - 27
		1"	M12	38 - 90
		1 1/4"	M12	38 - 90
		1 1/2"	M14	59 - 71
		2"	M16	87 - 103



## Spare Parts

The spare parts available are shown in heavy outline. Parts drawn in broken line are not supplied as spares.

## Available spares

Set of body gaskets	7
Disc and bellows assembly	5, 6, 7

## How to order spares

Always order spares by using the description given in the column headed 'Available spares' and state the size and type of valve.

**Example: 1** - Disc and bellows assembly plus 1 - Set of body gaskets for a 1" Spirax Sarco type A3S bellows sealed stop valve having screwed NPT connections.





## Spirax SafeBloc™ DBB3

### Double Block and Bleed Bellows Sealed Stop Valve

#### Description

The Spirax SafeBloc™ is a double block and bleed bellows sealed stop valve, accommodated within the same face-to-face dimension of a single valve. It has been designed for use as an in-line double isolation valve on steam, gas, liquid, condensate and water systems.

#### Available types

**DBB3** steel body and bonnet with ANSI 300 connections and optional PN40 connections.

#### Seat leakage

Disc to seat shut-off conforms to EN 12266-1 leakage Rate A and ISO 5208 Rate A.

#### Bleed valve options

A **bleed valve connection** is provided to depressurise the downstream when the upstream valve is isolated. This can be supplied with either a ½" flanged, ½" screwed NPT or BSP or ½" socket weld connection. Bleed valve connection must be stated at the time of order placement.

#### Standards

This product fully complies with the requirements of the European Pressure Equipment Directive 97/23/EC and carries the CE mark when so required.

#### Certification

This product is available with certification to EN 10204 3.1.

**Note:** All certification/inspection requirements must be stated at the time of order placement.

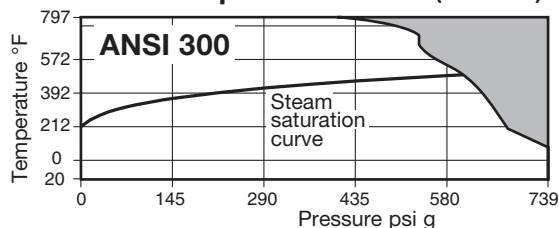
#### Size and pipe connections

½", ¾", 1", 1½", 2", 2½", 3" and 4" flanged ANSI B 16.5 Class 300. EN 1092 PN40 optional. The face-to-face dimensions conform to BS EN 558:2008

#### C<sub>v</sub> values

Size	½"	¾"	1"	1½"	2"	2½"	3"	4"
	DN15	DN20	DN25	DN40	DN50	DN65	DN80	DN100
<b>C<sub>v</sub></b>	4.6	5.2	9	25	37	81	142	167
<b>K<sub>v</sub></b>	4	4.5	8	22	32	70	123	144

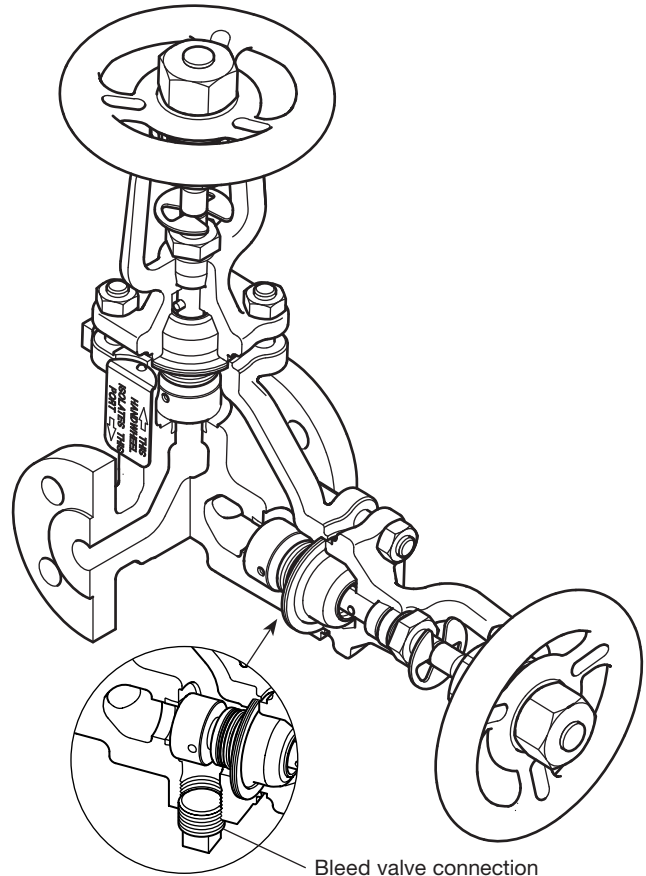
#### Pressure / temperature limits (ISO 6552)



**The product must not be used in this region.**

Body design conditions		ANSI 300
PMA	Maximum allowable pressure	739 psig @ 99.8°F
TMA	Maximum allowable temperature	797°F @ 406 psi g
Minimum allowable temperature		-20°F
PMO	Maximum operating pressure for saturated steam service	603.2 psi g
TMO	Maximum operating temperature	797°F @ 406 psig
Minimum operating temperature		-20°F

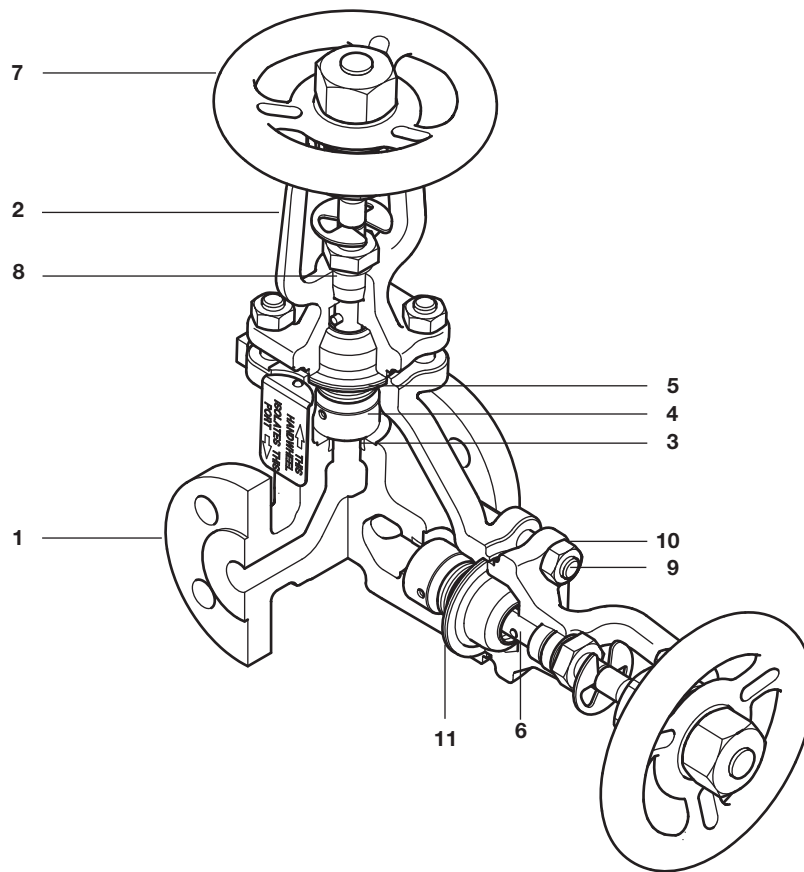
**Note:** For lower operating temperatures consult Spirax Sarco  
Designed for a maximum cold hydraulic test pressure of 1116.5 psi g



Bleed valve connection

# Spirax SafeBloc™ DBB3

## Double Block and Bleed Bellows Sealed Stop Valve

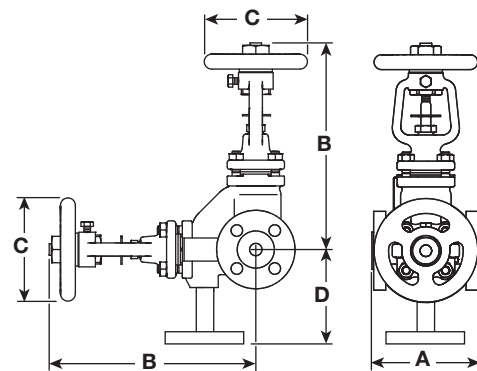


### Materials

No.	Part	Material		
1	Body	Cast steel	ANSI	ASTM A 216 WCB
		1/2" - 3"	Forged steel	ANSI ASTM A 105 N
2	Bonnets	4"	Cast steel	ANSI ASTM A 216 WCB
3	Seats		Stainless steel	AISI 420
4	Discs		Stainless steel	DIN17440 X30 Cr13
5	Bellows		Stainless steel	DIN17440 X6CrNiTi 1810
6	Stems		Stainless steel	AISI 420
7	Handwheels			BS 1449 CR4
8	Stem packing		Graphite	
9	Bonnet studs		Steel	ANSI ASTM A 193 B7
10	Bonnet nuts		Steel	ANSI ASTM A 192 2 H
11	Body/bonnet gaskets		Graphite laminated with stainless steel insert	

### Dimensions/weights (approximate in inches and lb)

Size	A ANSI 300	B	C	D	Weight
1/2"	6	9	5	3.5	18.3
3/4"	7	9	5	3.5	20.3
1"	8	10	5	4	23.1
1 1/2"	9	12	8	4	45.8
2"	10.5	12	8	4	55.6
2 1/2"	11.5	13	8	4	81.8
3"	12.5	15	8	5	113.3
4"	14	20	12	5	202.8



TI-P184-08-US 4.12

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# Spirax SafeBloc™ DBB3

## Double Block and Bleed Bellows Sealed Stop Valve

### Safety information, installation and maintenance

For full details see the Installation and Maintenance Instructions (IM-P184-09) supplied with this product.

### Disposal

This product is recyclable. No ecological hazard is anticipated with the disposal of this product, providing due care is taken.

### How to order

**Example:** 1 off ½" Spirax SafeBloc™ DBB3 double block and bleed bellows sealed stop valve having flanged ANSI 300 connections. The bleed valve connection is to be ½" flanged ANSI 300.

**Note:** The bleed valve is to be ordered separately. For example: 1 off Spirax Sarco ½" BSA3T bellows sealed stop valve having flanged ANSI 300 connections.

### Spare parts

The spare parts available are shown in solid outline. Parts drawn in broken line are not supplied as spares.

#### Available spares

Body/bonnet gasket and stem packing	8 (2 off), 11a, 11b
Stem and bellows assembly	6, 5
Disc	4

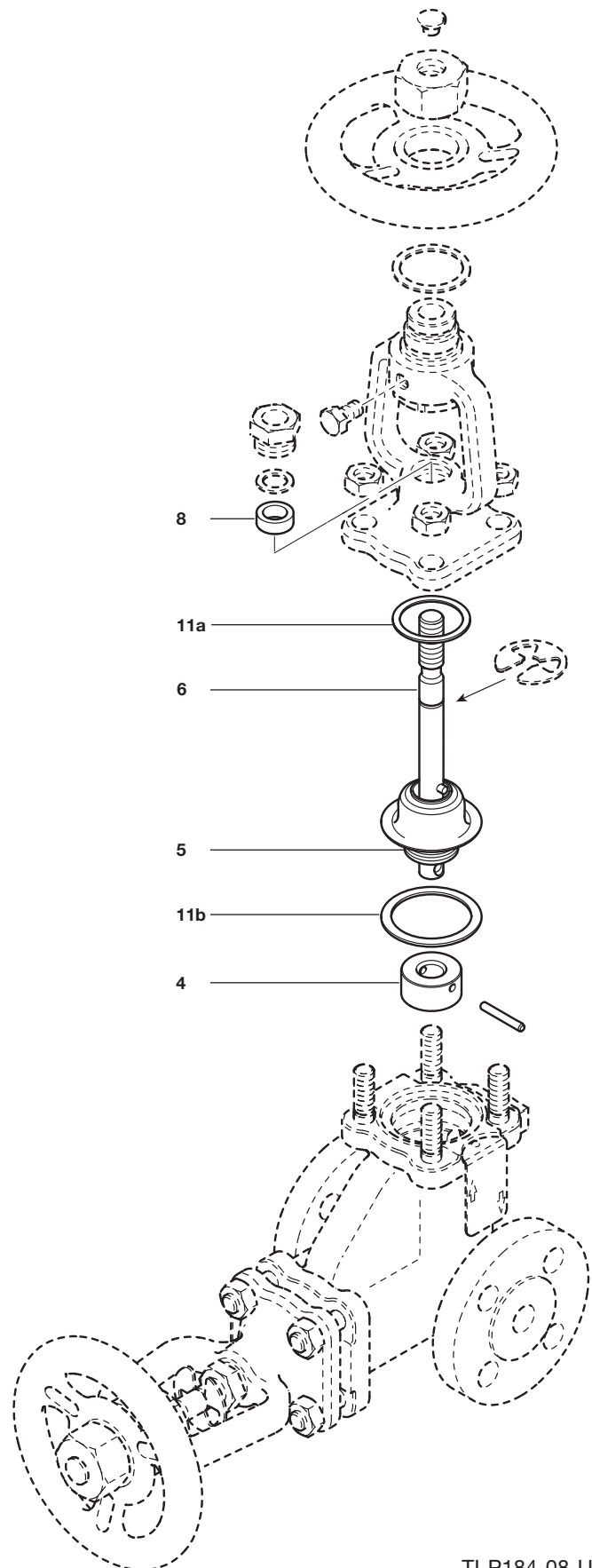
**Note:** The gasket contains sharp metal reinforcement, please handle with care. For a complete overhaul of the valve 2 x each spare is required.

#### How to order spares

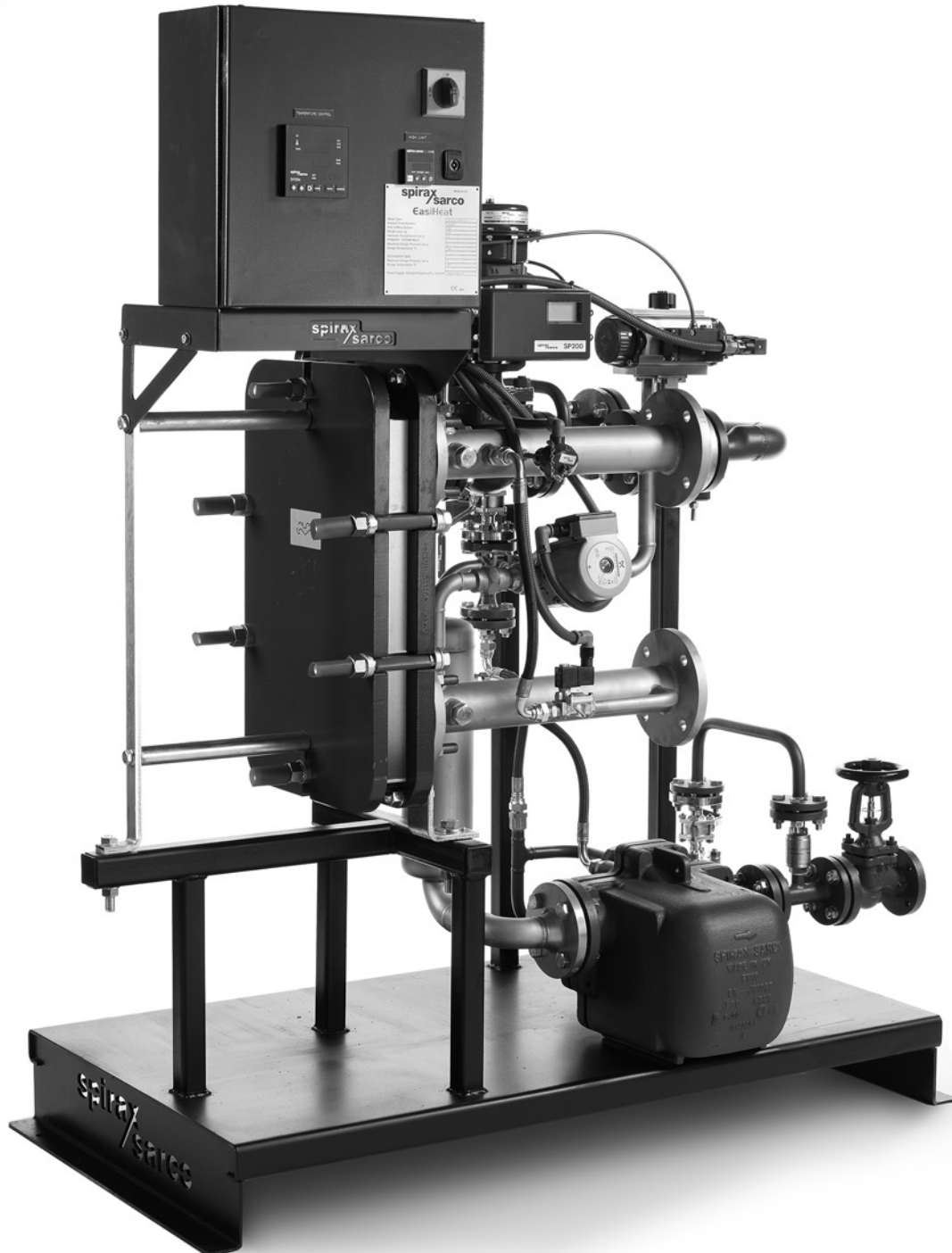
**Please note:** for customer convenience spares are supplied in kits to ensure all the appropriate replacement parts are supplied to carry out a specific maintenance task e.g. when a stem and bellows assembly is ordered, parts (8, 11a and 11b) and (6 and 5) will be included in the kit.

Always order spares by using the description given above and state the size and type of stop valve.

**Example:** 1 - Body/bonnet gasket and stem packing for a ½" Spirax SafeBloc™ DBB3 double block and bleed bellows sealed stop valve having ANSI 300 connections.



# Heat Transfer Solutions





## Heat Transfer Table of Contents

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## Blowdown Separators “BDSP” Series

### Description

The Blowdown Separator system is an effective means of Processing water from the boiler during bottom blowdown reducing the pressures to atmospheric levels and cooling the residual condensate for safe discharge to drain. The BDSP units centrifugally separate the flash steam from the hot discharge systems. The separators are ASME Section VIII Div I constructed stamped. Various options and accessories are available.

### Typical applications

Boiler Blowdown controlling the presence of sediment and particulates in the boiler. Use with single or multiple boilers to handle the blow down loads and cool the effluent for safe discharge to drain.

### Standard Features

- Spirax Sarco centrifugal high efficiency flash tank
- Heavy duty C/S base
- Hydrotested, blasted, and coated with SSI Hi temp black enamel
- ASME Section VIII Code Stamped separator vessel with SS internal wear plate

### Additional Options are available

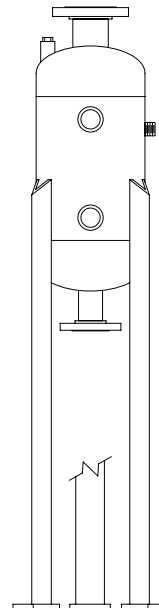
### Suggested Specification

- Furnish and install where shown on plans,  
Spirax Sarco Inc. Model# **BDSP** \_\_\_\_ - \_\_\_\_ - \_\_\_\_ - \_\_\_\_  
Blowdown Separator

- The carbon steel receiver shall be ASME Constructed and stamped for 150 PSIG WP. With integral Stainless steel wear plate.
- No threaded connections above 2" NPS on the package piping are permitted.
- The package shall be sized to meet (or exceed) the actual required blowdown system load.
- The package shall include a structural steel skid and painted with 1 coat Hi-Temp black enamel.

### Capacity

For sizing data, see Selection & Capacity Chart.



### Typical Construction

Model	BDSP- Series
PMO	150 psig
Design Pressure (PMA)	150 psig @ 550°F
Capacity Range	100 to 100,000 lbs./hr
Vessel	ASME Constructed and Stamped 150 psig @ 550°F
Hydrotest Pressure	225 psig
Construction Materials	Flash Vessel – Carbon Steel Supports- Carbon steel Piping - A106 Seamless Carbon Steel
Dimensions & Weight	See SSI Sales Drawings

*Local regulations may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only.  
In the interests of development and improvement of the product, we reserve the right to change the specification.*

TI-ESD2002-US 04.14



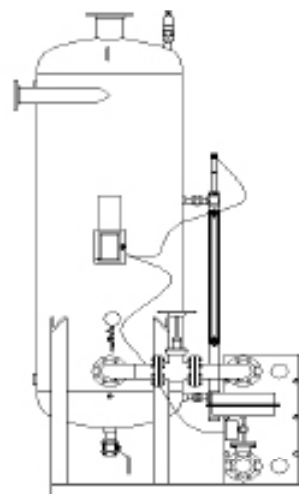
## Blowdown Heat Recovery Modules “BDHR” Series

### Description

The packaged Blowdown Heat Recovery system is an effective means of reclaiming valuable heat normally lost in the control of boiler water chemistry and cooling the wastewater to temperatures safe for discharge into sewer systems. The centrifugal blowdown vessel effectively separates flash energy from the condensate and discharges condensate through a heat exchanger typically to preheat make up water. The flash steam generated is used to heat make up water in the DA tank maximizing energy efficiency.

### Typical applications

Automatic Boiler Blowdown Systems controlling the level of dissolved solids in make up water. Use with single or multiple boilers to recover valuable heat energy.



### Standard Features

- Spirax Sarco centrifugal high efficiency flash tank
- Pressure relief valve
- Spirax Sarco mechanical or electronic level controls
- Plate and Frame heat exchanger
- Heavy duty C/S base
- Hydrotested, blasted, and coated with SSI Hi temp black enamel
- Fabricated in accordance with ANSI/ASME B31.3 by ASME Section IX certified welders.
- ASME Section VIII Code Stamped flash vessel and heat exchanger.

### Additional Options are available

### Suggested Specification

- Furnish and install where shown on plans,  
Spirax Sarco Inc. Model# BDHR\_\_\_\_-\_\_\_\_-\_\_\_\_-\_\_\_\_  
Blowdown Heat Recovery System
- The system shall be a complete pre-piped factory package requiring only service connections for a fully functional system.
- The carbon steel receiver shall be ASME Constructed and stamped for 150 PSIG WP.
- All condensate piping shall be schedule 40 Seamless C/S pipe
- No threaded connections above 2" NPS on the package piping are permitted.
- The package shall be sized to meet (or exceed) the actual required condensate system load.
- The package shall include a structural steel skid and painted with 1 coat Hi-Temp black enamel.

### Capacity

For sizing data, see Selection & Capacity Chart.

### Typical Construction

Model	BDHR- Series
PMO	125 psig
Design Pressure (PMA)	125 psig @ 320°F
Capacity Range	100 to 100,000 lbs./hr
Flash Vessel	ASME Constructed and Stamped 150 psig @ 550°F
Heat Exchanger	Plate and Frame – ASME Constructed and stamped for 150 Psig .316L stainless steel plates and EPDM gaskets
Hydrotest Pressure	188 psig
Construction Materials	Flash Vessel – Carbon Steel Heat exchanger- Carbon steel covers with 316L SS plates Frame- Carbon steel Isolation valves - Carbon Steel 150# Piping - A106 Seamless Carbon Steel
Dimensions & Weight	See SSI Sales Drawings

*Local regulations may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only.  
In the interests of development and improvement of the product, we reserve the right to change the specification.*

TI-ESD2001-US 4.14



## EasiHeat Packaged Heat Exchanger System

- Hot water for heating, potable & process applications.
- Non ferrous waterside construction.
- Stable temperature control  $\pm 9^{\circ}\text{F}$  on instantaneous duty
- Spirax Sarco steam control and condensate products.
- Plate and frame heat exchanger.
- Fully assembled skid-mounted system.

### EasiHeat system

The EasiHeat system uses steam to provide accurate heating of low temperature hot water (HTG), domestic hot water (DHW) or hot water for processes. Systems can be sized for any heating duty up to approximately 6 MBTUH and are supplied fully assembled and pressure tested ready for installation.

The EasiHeat provides the core of the system. Additional items such as steam pressure reduction, safety valve and safety high limit shut-off should be selected separately.

### Temperature control

The steam flowrate is modulated to exactly match the system demand. The control valve is pneumatically actuated and the system uses a fast response temperature sensor and programmer/ controller for precise temperature control. Electric operated control systems are available.

### Heat exchanger

The plate heat exchanger for steam is used for efficient heat transfer within a very compact design. The high surface/ volume ratio of the plates enables rapid heat transfer, allowing a fast response to temperature control. The heat exchanger is easily dismantled for examination or cleaning of the heat transfer surfaces without disrupting any steam or water connections. All wetted parts are stainless steel.

### Design

**Heat exchanger-** Plate and Frame Type — ASME Constructed & Stamped at 150 psig

Steam Side = 125 PSIG Max allowable pressure @ 356°F

Water Side = 150 PSIG Max allowable working pressure @ 230°F

### Materials

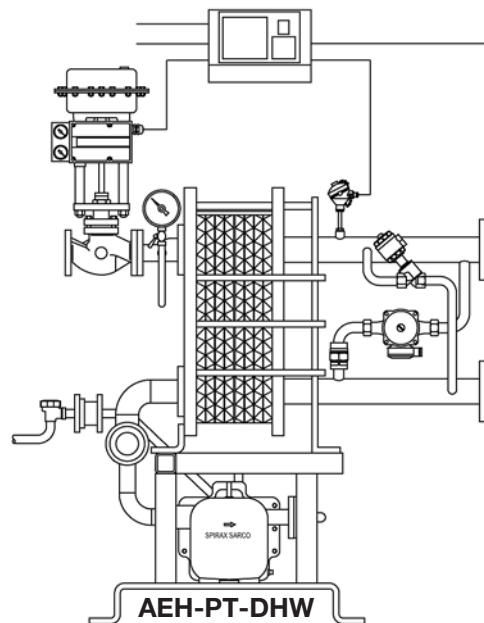
Steam and Condensate Piping = Carbon Steel

Water side Piping = 316/316L Stainless Steel

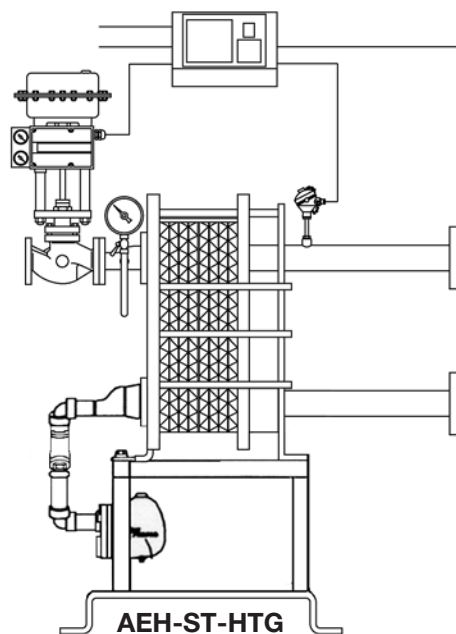
Circulation Pump - Stainless Steel

### Condensate removal

Effective condensate removal from the heat exchanger under all operating conditions is essential to achieve a stable water temperature. At part load the pressure inside the heat exchanger may go below atmospheric so a pressure powered pump is usually used to ensure condensate removal. For suitable applications a steam trap may be used instead.



EasiHeat with condensate pump and secondary recirculation for domestic hot water service



EasiHeat with steam trap for low temperature of water (heating) service

# EasiHeat

## Packaged Heat Exchanger System

### Pipework

All pipework is correctly sized for the application and is fabricated using modern welding techniques, approved welders and weld procedures. Flanged products are used where possible for reliability and easy maintenance.

### Electrics and pneumatics

All control equipment is pre-wired and piped ready for connection to the air supply and power source.

Supply voltage	AEH...HTG	115VAC / 230VAC
	AEH...DHW	115VAC / 230VAC

### Support frame

The whole system is delivered pre-assembled on a compact frame and baseplate suitable for moving into position with a fork lift truck.

### Domestic hot water applications

In many cases the very fast response of the packaged plate heat exchanger system will mean that large hot water storage tanks are no longer required. The system uses pumped hot water circulation. The first hot water draw-off point must be at least 15' from the heat exchanger.

### Scale formation

For open systems where the water is being used for washing etc. there is continuous make-up and there may be a danger of scale formation in the heat exchanger. This depends mainly on the water quality, and expert advice from a water treatment specialist should be sought. By reducing the steam pressure and by careful design of the system the heat exchanger metal temperature can be kept low to minimize scale formation. After long service the plate heat exchanger is easily dismantled for cleaning. If the water is scale forming, consult Spirax Sarco.

### Typical specification

The HTG / DHW heat provider shall be a Spirax Sarco packaged heat exchanger system with plate heat exchanger. The system shall come complete with pneumatic controls, heat exchanger and condensate removal equipment. All items shall be pre-assembled and mounted on a compact frame.

### How to order

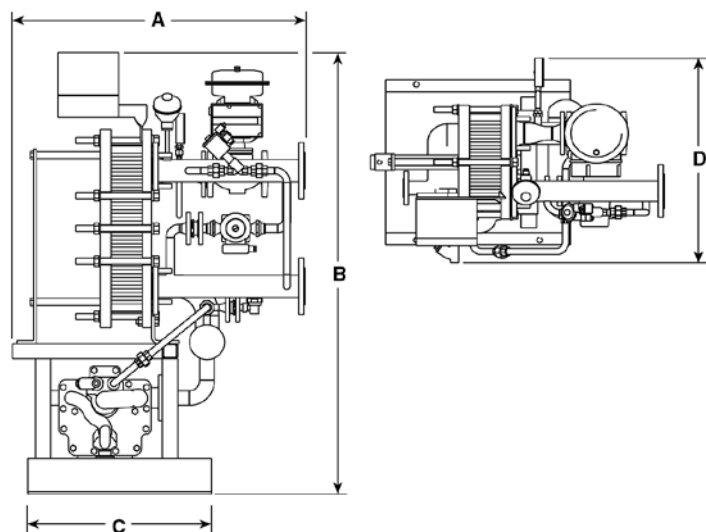
Standard EasiHeat systems are designed for conditions specified in the sizing and selection chart. The best way of ensuring that we have all the necessary information for your application is to complete our inquiry data sheet. Copies can be supplied on request. Any special requirements or access limitations should be detailed.

### Core System

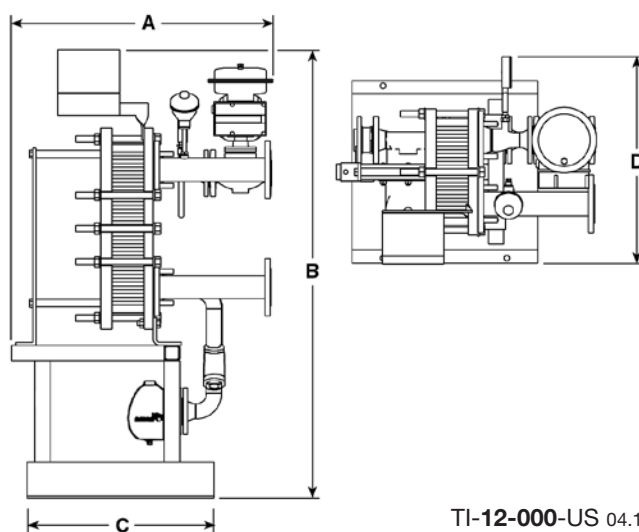
Dimensions / weight (approximate) in inches (Additional models available)

	Model	A	B	C	D	lbs	Pipe connections		
							Steam	Water	Condensate
AEH-PT-DHW	AEH-1-PT-DHW	44"	58"	29"	28"	416	3/4"	3"	1"
	AEH-2-PT-DHW	44"	58"	29"	28"	429	1"	3"	1"
	AEH-3-PT-DHW	44"	58"	29"	28"	440	1-1/4"	3"	1"
	Model	A	B	C	D	lbs	Pipe connections		
							Steam	Water	Condensate
AEH-ST-HTG	AEH-1-ST-HTG	39"	57"	24"	25"	326	3/4"	3"	1"
	AEH-2-ST-HTG	39"	57"	24"	25"	339	1"	3"	1"
	AEH-3-ST-HTG	39"	57"	24"	26"	360	1-1/4"	3"	1-1/2"

EasiHeat AEH-PT-DHW



EasiHeat AEH-ST-HTG



Spirax Sarco, Inc., 1150 Northpoint Blvd, Blythewood, SC 29016

Telephone: (803) 714-2000 FAX (803) 714-2222

TI-12-000-US 04.10





## Sizing RediHeat Instantaneous Water Heaters

Use the tables below to select the RediHeat model that meets the required GPM of hot water at the desired temperature.

**Note:** Supply pressures above 15 psig must be reduced through a pressure regulator ("H" Package).

### Single Wall

Desired Outlet Temp (°F)		Winter Conditions 40°F Inlet Water Hot Water Output (GPM)					Summer Conditions 60°F Inlet Water Hot Water Output (GPM)					
		Pressure	10	15	20	25	30+	10	15	20	25	30+
110	RH-30	30	30	30	30	32	35	30	30	30	40	40
	RH-60	60	60	60	60	65	70	60	60	60	75	80
	RH-90	90	90	90	90	90	90	90	90	90	90	90
	RH-120	120	120	120	120	120	120	120	120	120	120	120
120	RH-30	30	30	30	30	30	35	30	30	30	35	40
	RH-60	60	60	60	60	60	65	60	60	60	75	80
	RH-90	90	90	90	90	90	90	90	90	90	90	90
	RH-120	120	120	120	120	120	120	120	120	120	120	120
140	RH-30	25	25	25	25	30	30	25	30	30	30	35
	RH-60	60	60	60	60	60	60	60	60	60	60	70
	RH-90	90	90	90	90	90	90	90	90	90	90	90
	RH-120	115	120	120	120	120	120	120	120	120	120	120
150	RH-30	20	25	25	25	25	30	25	25	30	30	30
	RH-60	55	55	55	55	55	55	55	60	60	60	65
	RH-90	80	80	80	80	80	80	85	90	90	90	90
	RH-120	110	110	110	110	110	110	115	115	115	115	120
160	RH-30	10	15	20	25	25	25	15	15	20	30	30
	RH-60	45	45	45	50	50	50	50	55	55	55	60
	RH-90	65	70	70	70	70	70	75	85	85	85	85
	RH-120	90	90	90	90	90	95	105	110	110	110	115

Capacities are based on water pressure ranges of 30 to 150 psig.

Presence of residual superheat following pressure reduction on steam supply pressures greater than 15 psig can increase capacity as shown.

Inlet steam pressure above 50 psig (RH-90 & RH-120) and 75 psig (RH-30 & RH-60) require the installation of a safety relief valve.

Units utilizing alternate tube materials will exhibit lower maximum capacities. To determine actual capacity, multiply the above values as follows:

Admiralty - 0.95, Cupro Nickel - 0.81, Stainless Steel - 0.85

### Double Wall

Desired Outlet Temp (°F)		Winter Conditions 40°F Inlet Water Hot Water Output (GPM)					Summer Conditions 60°F Inlet Water Hot Water Output (GPM)					
		Pressure	10	15	20	25	30+	10	15	20	25	30+
110	RH-30D	30	30	30	30	30	30	30	30	30	30	30
	RH-60D	60	60	60	60	60	60	60	60	60	60	60
120	RH-30D	30	30	30	30	30	30	30	30	30	30	30
	RH-60D	60	60	60	60	60	60	60	60	60	60	60
140	RH-30D	25	25	25	25	25	25	25	30	30	30	30
	RH-60D	60	60	60	60	60	60	60	60	60	60	60
160	RH-30D	10	15	20	20	20	20	15	15	20	20	20
	RH-60D	45	45	45	45	45	45	50	55	55	55	60

Capacities are based on water pressure ranges of 30 to 150 psig.

Inlet steam pressure above 50 PSIG (RH-90 & RH-120) and 75 psig (RH-30 & RH-60) requires the installation of a safety relief valve.

Double wall units are available only with copper tubes

# Sizing RediHeat "H" Package Pressure Regulator

When steam supply pressure to the RediHeat unit exceeds 15 psig the "H" Package must be furnished with the base unit. The "H" Package consists of 1 pressure reducing valve complete with pressure pilot and 1 strainer.

1. Determine the flow of steam in lbs/hr required to meet the unit's capacity.
2. Enter chart below at supply steam pressure and continue to move across until the required capacity in lbs/hr is found. From that point move vertically and read the valve size indicated.

Example: RH-30 to heat 20 GPM water from 40-120°F. Supply steam pressure is 100 psig.

$$\text{Formula: } \frac{\text{GPM} \times 500 \times \Delta T (^{\circ}\text{F})}{946} = \text{lbs/hr}$$

$$\frac{20 \times 500 \times 80}{946} = 846 \text{ lbs/hr}$$

In this example with a 100 psig steam supply pressure, a 3/4" pressure regulator will be suitable for the required duty of 846 lbs/hr of steam.

Steam Supply Pressure (psig)	Pressure Regulator Selection Chart Capacity (lbs/hr) by valve size								
	1/2"	3/4"	1"	1-1/4"	1-1/2"	2"	2-1/2"	3"	4"
25	145	270	435	580	830	1,450	2,325	3,070	4,770
30	220	410	665	890	1,270	2,220	3,555	4,700	7,300
40	280	525	850	1,135	1,620	2,835	4,535	5,995	9,315
50	350	650	1,050	1,400	2,000	3,500	5,600	7,400	11,500
60	385	720	1,165	1,555	2,220	3,885	6,215	8,215	12,765
75	470	875	1,415	1,890	2,700	4,725	7,560	9,990	15,525
85	515	960	1,555	2,070	2,960	5,180	8,290	10,950	17,020
100	600	1,120	1,815	2,420	3,460	6,055	9,690	12,800	19,895
125	730	1,365	2,200	2,940	4,200	7,350	11,760	15,540	24,150
150	860	1,600	2,590	3,460	4,940	8,645	13,830	18,280	28,400
175	985	1,840	2,970	3,960	5,660	9,900	15,850	20,950	32,545
200	1,125	2,100	3,390	4,520	6,460	11,300	18,000	23,900	37,145
225	1,250	2,340	3,780	5,000	7,200	12,600	20,160	26,640	41,400
250	1,385	2,590	4,180	5,570	7,960	13,930	22,300	29,450	45,800

## Notes:

Pressure regulators supplied are Cast Iron as standard.

1/2" – 2" regulators are threaded NPT as standard.

2 1/2" – 4" regulators (for steam supply pressures up to 125 psig) are flanged ANSI 125 as standard.

For 2 1/2" – 4" regulators where the steam supply pressure is above 125 psig, consult Spirax Sarco for 150 ANSI flanged regulator pricing.



## RediHeat Instantaneous Water Heater

### Description

The RediHeat is a steam (shell side) to water (tube side) heat exchange package that incorporates a unique feed-forward temperature control system to instantly produce hot water within  $\pm 4^{\circ}\text{F}$  of the set temperature under widely varying demands. This outstanding performance makes the RediHeat the ideal solution for domestic hot water applications where tight temperature control and instant response to changes in demand are required.

### Temperature Control

Water temperature is controlled by a mechanical blending valve that operates based on demand. A manual adjustment compensates for seasonal changes in cold water supply temperature. The blending valve has a fail-safe design ensuring consumers can never be exposed to hot water at temperatures above set point – vital for domestic hot water applications. Potential failure or damage to the unit will produce only cold water.

### Heat Exchanger

The RediHeat features a spiral tubed helical heat exchanger for efficient heat transfer in a compact space. The coiled tube technology does not require tube supports allowing the tubes to be in very close proximity resulting in a more compact heat transfer bundle. The helical design of the coil allows it to expand and contract with temperature change such that any scale that has hardened on the inside of the tubes is broken up by the changing shape of the coil. The rugged casing and bourdon tube configuration also allows the entire assembly to expand and contract in response to temperature change without localized stressing. This is ideal for intermittent cycling that is common with domestic hot water applications.

### Efficiency

The typical domestic hot water system only places a demand on the heat exchanger 15% of the time. The feed forward design of the RediHeat only consumes energy when responding to demand. With no hot water storage required, this mode of operation can save as much as 40% in energy costs when compared to a hot water tank system.

### Anti-Bacterial

The perfect environment for the growth of legionella bacteria is stagnant water between  $68^{\circ}\text{F}$  and  $122^{\circ}\text{F}$ . The presence of scale and sediment only expedites colonization. With the RediHeat feed-forward design, water is over-heated to  $160^{\circ}\text{F}$  -  $200^{\circ}\text{F}$  in the heat exchanger before being blended (in response to demand) with incoming cold water to the desired output temperature. In this way the presence of stagnant water at bacteria-friendly temperatures is eliminated.

### Recirculation System

A problem many hot water systems encounter is the delayed supply of hot water to fixtures that are a substantial distance from the heater. During idle periods, heat loss in the piping system will result in cool water at the faucet until hot water produced from the heater is able to reach that point. Delays in providing hot water at the faucet can result in user dissatisfaction. To provide instantaneous



hot water on demand in systems with long pipe runs a recirculation system incorporating a pump (not included) to maintain constant flow should be installed. The RediHeat recirculation system maintains loop temperatures by measuring the temperature of the returning hot water and, dependent on temperature, either passing it back through the heat exchanger for re-heating or diverting it back to the hot water loop.

### Installation

With a footprint of only 6.5 square feet and a height of 33.5" for the largest unit, the RediHeat is the most compact instantaneous water heater available – important when space is at a premium. The unit requires no extraneous power sources, controls or temperature sensors making installation quick and simple. The RediHeat may be wall or floor stand mounted or can be suspended from the ceiling. Approximately 3' clearance from the floor is required to allow room for steam and condensate connections and the hot water outlet. An optional angle iron stand is available and recommended for floor mounting. For optimal heater performance, the steam trap should discharge to 0 psig, below the level of the trap. If lift of condensate is required or the trap must discharge to a back pressure, an automatic pump trap (APT) should be fitted for correct operation. Contact Spirax Sarco for details. The steam inlet pressure to the heat exchanger is limited to 15 psig. Greater steam supply pressures require installation of a pressure regulator. A pressure relief valve set at 75 psig (for RH-30 & RH-60) or 50 psig (for RH-90 & RH-120) should be installed in the steam inlet pipe downstream of the pressure regulator if steam pressure to the heat exchanger can exceed these limits. Acceptable cold water inlet pressure range is 30 to 150 psi. Water pressure must be at least 15 psi greater than steam pressure for correct operation. The RediHeat incorporates an integral pressure relief valve (located on side of the blending valve) to relieve excess water pressure caused by thermal expansion.

*Local regulations may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only.  
In the interests of development and improvement of the product, we reserve the right to change the specification.*

TI-12-008-US 3.13

# RediHeat Instantaneous Water Heater

## Maintenance

When maintenance on the helical heat exchanger is required, the coiled tube bundle can be either removed for cleaning or cleaned in place. Due to the helical design, removal is easy and does not require the withdraw space typical with other shell and tube designs. An acid pump cleaning system is available for cleaning the coil in situ when poor water quality can result in scaling.

## Typical Specification

The domestic hot water heater shall be a Spirax Sarco RediHeat steam-fired, instantaneous water heater incorporating feed forward temperature control to instantly produce hot water within  $\pm 4^{\circ}\text{F}$  of the set temperature under widely varying demands. The unit will incorporate an ASME code stamped helical coil heat exchanger and blending valve. The coiled tube bundle must be capable of being removed for inspection and service without breaking steam connections or removing the unit from its installed position. The unit shall be completely self-contained and require hook-up only to steam and water. There shall be no electric or pneumatic requirements. Each heater shall be a factory assembled package with the capacity to heat \_\_\_ gpm of water from \_\_\_ to \_\_\_ degrees Fahrenheit without the use of thermostatic control devices or storage tanks. Supply steam pressure is \_\_\_ psig.

RediHeat Model	RH-30		RH-60		RH-90		RH-120		
Performance									
Nominal maximum output (gpm)	30		60		90		120		
Capacity	Heat 40 °F water up to 140 °F. Outlet temperature adjustable.								
Steam inlet pressure	10 to 15 psig standard 20 to 250 psig requires pressure regulator (H package)								
Steam flow	Approximately 50 lbs/hr per 1 gpm of water heated.								
Water inlet pressure	30 to 150 psig (must be at least 15 psi above steam pressure for correct operation)								
Connections (NPT)									
Potable Water: In – Out	1½”	2”	2”		2½”		2½”		
Steam In - Condensate Out	3”	1¼”	3”	2”	4” ANSI	2”	4” ANSI	2½”	
Materials of Construction									
Steam side piping	Steel								
Potable water side piping	Brass								
Heat Exchanger (standard)	Cast iron shell, copper tubes								
Heat Exchanger (options)	Cast steel shell Tubes: admiralty, 70/30 Cu Ni, 316SS & Double Wall (copper only)								
Blending Valve	Bronze body, Hastalloy valve plug, Neoprene diaphragm								
Design									
Blending Valve	Instantaneous: responds to pressure differential Fail-safe (cold) Integral pressure relief valve								
Piping	Quick disconnect Victaulic fittings								
Pressure	Potable water side: 150 psi Steam side: 50 psi (RH-90 & RH-120), 75 psi (RH-30 & RH-60)								
Certification	ASME Section VIII								
Accessories									
Included with RediHeat	Steel frame, steam inlet pressure gauge, water outlet temperature gauge								
Required (not included)	Main and Drip traps plus strainers								
Optional	"H" (pressure reducing) package, angle iron stand, recirculation package, solenoid safety shut-off system, thermal insulation blanket, OSHA cover, chemical cleaning system								
Nominal Dimensions (inches)									
Height	21		22½		33		33½		
Width	22½		25		23½		24½		
Length	31½		31½		31½		39		



## Spirax EasiHeat™ DHW

# ASME Domestic (Potable) and Process Water Heating System Compact Heat Transfer Solution

### Domestic (potable) and process water heating system

The Spirax EasiHeat™ DHW incorporating SIMS technology is a complete, compact system using steam for accurate heating of potable hot water for domestic use or process applications. Standard systems can be sized to heat up to 110 GPM of water over a 100°F temperature rise and are supplied fully assembled and tested ready for installation.

### Principal features and benefits:

- Energy usage monitoring, real time CO<sub>2</sub> emission calculations, multiple communication options, remote monitoring, SMS text or E-mail system alarms notification.
- Designed with integral condensate sub-cooling for maximum efficiency and zero flash steam loss.
- Precisely engineered system with matched components that provide accurate temperature control under wide and fluctuating load demands.
- Guaranteed performance
- Fully assembled and tested ready for on-site installation
- Options to suit all applications including single and double wall construction

### Heat exchanger

The plate and frame heat exchanger, designed specifically for steam to hot water service, delivers high heat transfer efficiency in a compact footprint with low volume to pressure ratio. The heat exchanger can be easily dismantled for examination and cleaning of the heat transfer surfaces without disruption to any steam or water connections. Additionally the connecting pipework incorporates CIP connections as standard. The heat exchanger is ASME constructed and stamped to 150psig. All wetted parts are 316 stainless steel with EPDM gaskets suitable for 356°F working temperature. Double wall heat exchangers are available as an option.

### Temperature control

Temperature control is achieved by the use of a programmable logic controller (PLC) and fast response Pt100 temperature sensors, which in turn provide a modulated control signal to the fast acting steam control valve. The control valve, that can be either pneumatically or electrically actuated, regulates steam flow to accurately maintain the required temperature set points over widely fluctuating heat demands.

### Metering

A key component guaranteeing accurate measurement of energy usage, CO<sub>2</sub> emissions and cost control. The TVA flowmeter (included when energy monitoring option selected), is specifically designed for large turndowns on steam applications

### Condensate management

The EasiHeat incorporates a closed loop, non-vented condensate removal system comprising a pressure powered pump with integral or separate steam trap that provides the total solution to all stall conditions by removing condensate under all operating conditions.

### Materials

Steam and condensate (primary) side piping	ASTM A105 Carbon Steel	≤2" nominal bore schedule 80 >2" nominal bore schedule 40
Water (secondary) side piping	304L Stainless Steel	≤2" nominal bore schedule 80 >2" nominal bore schedule 40
Heat exchanger plates	316 Stainless Steel	
Heat Exchanger gaskets	EPDM	
Steam control valve	Cast Iron	
Condensate pump trap	Ductile or S.G. Iron	
All secondary side components (wetted parts)	Stainless Steel (except for P&T relief valves - Lead-free Brass)	

### Control panel

The Spirax EasiHeat™ DHW features innovative control processes incorporating SIMS technology delivering increased monitoring and communications. The NEMA 12 enclosures houses a PLC with color touch-screen HMI providing ease of use and clear visual access to all system parameters and energy data. The system offers optional energy monitoring, using a mass steam flow signal from a wide turndown flowmeter installed in the steam inlet, to accurately calculate energy usage, cost of hot water per gallon, CO<sub>2</sub> emissions and carbon footprint.



### Pressure and temperature limits

Pipework design	ASME 150
Maximum saturated steam supply pressure	130 psig
Maximum secondary pressure	150 psig
Maximum secondary temperature	210°F
Maximum gasket temperature	356°F

# Spirax EasiHeat™ DHW

## ASME Domestic (Potable) and Process Water Heating System

### Compact Heat Transfer Solution

#### Pipework

All pipework is correctly sized for the application and is fabricated using modern welding techniques, approved welders and weld procedures. Flanged products are used where possible for reliability and easy maintenance.

All pipework, components and fittings on the secondary side that come into contact with potable water meet and fully comply with the lead-free requirements of the Safe Drinking Water Act.

#### Support frame

The Spirax EasiHeat™ DHW system is delivered pre-assembled on a compact frame and baseplate ready to position at the installation location with a fork lift truck or other lifting device. The EasiHeat™ is designed to fit through a standard 36" door and can be fitted with optional wheels for easy maneuvering in tight locations.

#### Electrics and pneumatics

All control equipment is pre-wired and piped ready for connection to the air supply and power source.

Electrical supply	Power supply	110–240 v AC / 50–60 Hz
	Supply fuse	5 Amps (T)
Actuators	Electric	24 v AC / 50–60 Hz
	Pneumatic	60–90 psig

#### Communications

The Spirax EasiHeat™ offers a range of communication protocols including:

Modbus RTU	Modbus TCP/IP
BACnet MS/TP	BACnet TCP/IP
DeviceNet	CANopen
Profibus	LonWorks

#### Safety

- The Spirax EasiHeat™ provides precise control of outgoing temperature and offers data logging capabilities for a minimum of 30 days.
- Steam supply is modulated via a pneumatic or electric actuated globe type steam control valve with smart positioner and class IV shut off.
- An integrated high limit alarm circuit actuates a steam isolating valve offering bubble tight shut off to protect against high temperature excursions by preventing steam from entering the heat exchanger. In addition, there is a temperature controlled quench valve that guards against temperature overshoots by adding cold feed water in the hot water outlet. This prevents nuisance high limit alarm activation. Both these functions automatically terminate once satisfactory outlet water temperature has been re-established.
- Optional manually operated isolation ball valve for secure steam shut off.
- A recirculating pump with connections to the secondary side inlet and outlet spools provides uniform water temperature throughout the heat exchanger and across RTD's to ensure accurate temperature measurement and control.
- Pressure & Temperature safety relief valves on secondary side.
- All wetted parts on the secondary (water) side are lead-free and conform to the requirements of the Safe Drinking Water Act.
- UL® listed control panel enclosure, components and wiring.



# Spirax EasiHeat™ DHW

## ASME Domestic (Potable) and Process Water Heating System

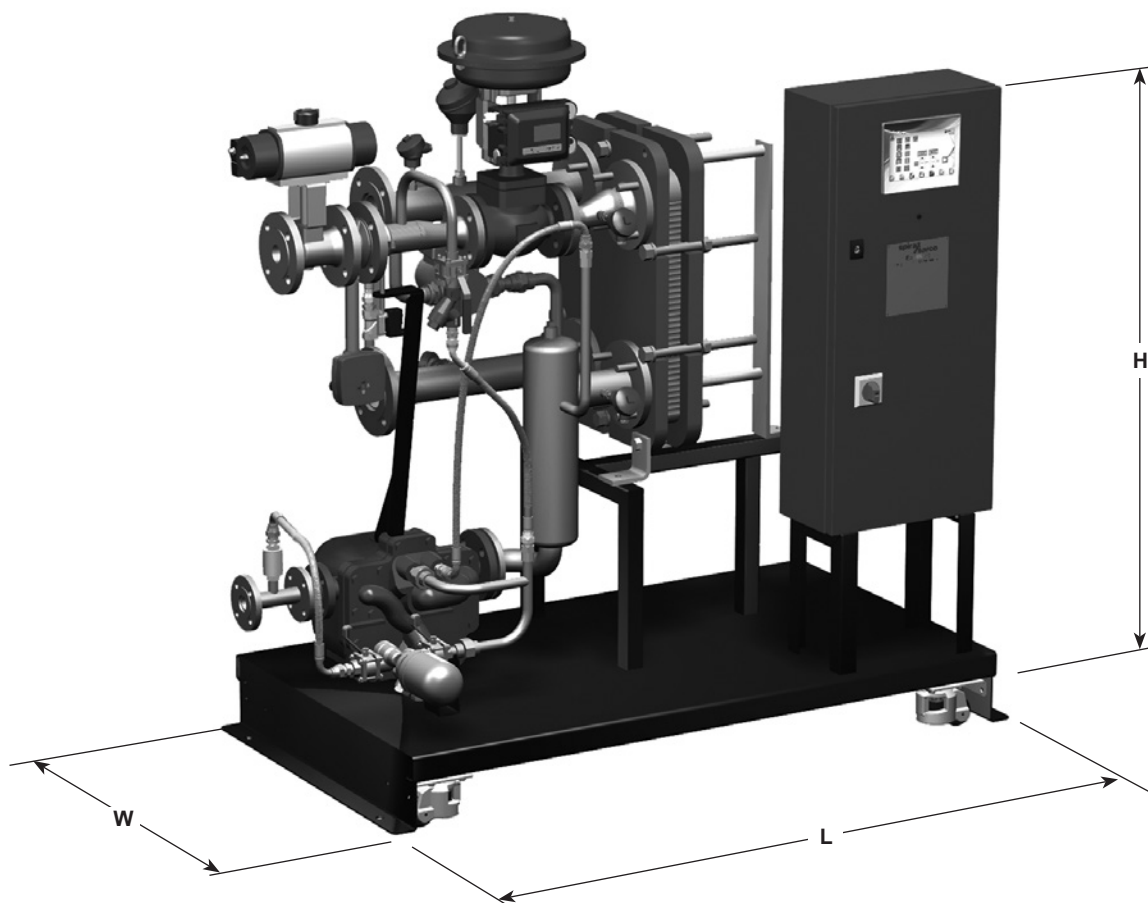
### Compact Heat Transfer Solution

**Dimensions** approximate in inches

Heat Load MMBtu/hr. (Flow: GPM)		Model	Valve Actuation	Maximum Dimensions			Piping Connections	
Minimum	Maximum			H	L	W	Steam	Condensate
	0.41 (8.3)	EHD1	EL or PN	58.7"	76.5"	33.5"	1½" flanged	1" flanged
0.41 (8.3)	0.52 (10.4)	EHD2	EL or PN	58.7"	76.5"	33.5"	1½" flanged	1" flanged
0.52 (10.4)	1.33 (26.5)	EHD3	EL or PN	60.3"	76.5"	33.5"	1½" flanged	1" flanged
1.33 (26.5)	1.73 (34.5)	EHD4	EL or PN	60.5"	76.5"	33.5"	2½" flanged	1½" flanged
1.73 (34.5)	3.13 (62.5)	EHD5	EL or PN	61.3"	76.5"	33.5"	3" flanged	1½" flanged

#### Notes

1. The heat loads listed above are based on a steam inlet pressure of 30 psig and a backpressure of 10 psig. Higher heat transfer rates / flow rates can be achieved by using higher pressure steam.
2. Capacities have been based on a 40°F to 140°F (100°F ΔT) temperature rise.
3. Capacities are for single wall heat exchangers. Double wall heat exchangers will reduce capacity.
4. The height of the skid will increase by 1" if wheels are fitted.
5. Dimensions shown are for units without split range control valves, energy monitoring and manual isolation valve.
6. Connection sizes shown are for units without energy monitoring (flowmeter) and manual isolation valve options.
7. Length (longest horizontal plane) x Width (shortest horizontal plane) x Height (vertical plane)





# Spirax EasiHeat™ DHW

## ASME Domestic (Potable) and Process Water Heating System

### Compact Heat Transfer Solution

**Spirax EasiHeat™ Domestic (Potable) Hot Water (DHW) nomenclature example:**

EHD	2	A	EL4	PT	-	HL	B	V1	G1	W	-	E	R2	C1	
-----	---	---	-----	----	---	----	---	----	----	---	---	---	----	----	--

#### Spirax EasiHeat™ DHW nomenclature

<b>Compulsory selection</b>	Domestic hot water	EHD = Spirax EasiHeat™ DHW	<div>EHD</div>
		1 = 1" reduced trim	
		1.2 = Split range: 1" reduced trim & 1"	
		2 = 1"	<div>2</div>
		2.2 = Split range: 1" & 1½"	
	Control valve size	3 = 1½"	
	<i>*"L" after valve size code denotes low noise trim</i>	3.2 = Split range: 1½" & 2"	
		4 = 2"	
		5 = 2½"	
		6 = 3"	
	Pressure vessel code	A = ASME	<div>A</div>
		EL4 = Electric (SIMS)	
	Actuation	EL3 = Electric (SX90)	<div>EL4</div>
		PN = Pneumatic	
	Condensate removal	PT = Pump trap	<div>PT</div>
		PTHC = Pump trap high capacity	
	High limit	HL = Integrated high limit	<div>HL</div>
<b>Mechanical options</b>	High limit actuation (EL only)	B = Battery back-up	<div>B</div>
	Manual isolation valve	V1 = Ball valve	<div>V1</div>
	Gasket material	G1 = EPDM	<div>G1</div>
	Extras	W = Wheels	<div>W</div>
			<div>E</div>
<b>Panel options</b>	Energy monitoring	E = With energy monitoring	
		R1 = Level 1 – SMS Text and E-mail	
	Remote access	R2 = Level 2 – 3G web access	<div>R2</div>
		R3 = Level 3 – Both of the above (R1+R2)	
<b>Communication options</b>		C1 = Modbus RTU	
		C2 = BACnet MS/TP (RS485)	
		*C3 = Modbus TCP/IP	<div>C1</div>
		C4 = DeviceNet	
		C5 = CANopen	
		*C6 = BACnet TCP/IP (Client)	
<b>Heat exchanger option</b>		C7 = Profibus	
		O1 = Double wall	

**\*Note: not available when panel options R2 or R3 selected**

#### Typical specification

The packaged, skid mounted, steam fired heat transfer system for the generation and supply of potable hot water for domestic and process applications shall be a Spirax EasiHeat™ complete with plate and frame heat exchanger, interconnected pipe work, electronic data logging, PLC, pneumatic or electric actuated globe type steam control valve with smart positioner and class IV shut off, actuated high limit steam isolating valve offering bubble tight shut off, closed loop non-vented condensate removal system and all required specialties and controls as specified / required. All items shall be preassembled, hydrostatic and dry function tested prior to shipping.

Temperature control to be achieved by the use of a programmable logic controller and temperature sensors, which in turn will provide a modulated control signal to the steam control valve to accurately maintain the required temperature set points. An actuated steam shut off valve protects against excessively high temperature excursions by preventing steam from entering the heat exchanger until satisfactory outlet water temperature has been re-established. All control equipment is to be pre-wired to the integral temperature controller. All components to be factory installed, wired and ready to connect to building services. Supply voltage is 110/1/60. Control enclosure to be NEMA 12. Integral temperature controller to have a local touchscreen HMI. The heat exchanger shall be fully serviceable, including chemical and manual cleaning, without the need to disconnect any of the steam, condensate or water pipework connections.

#### How to order

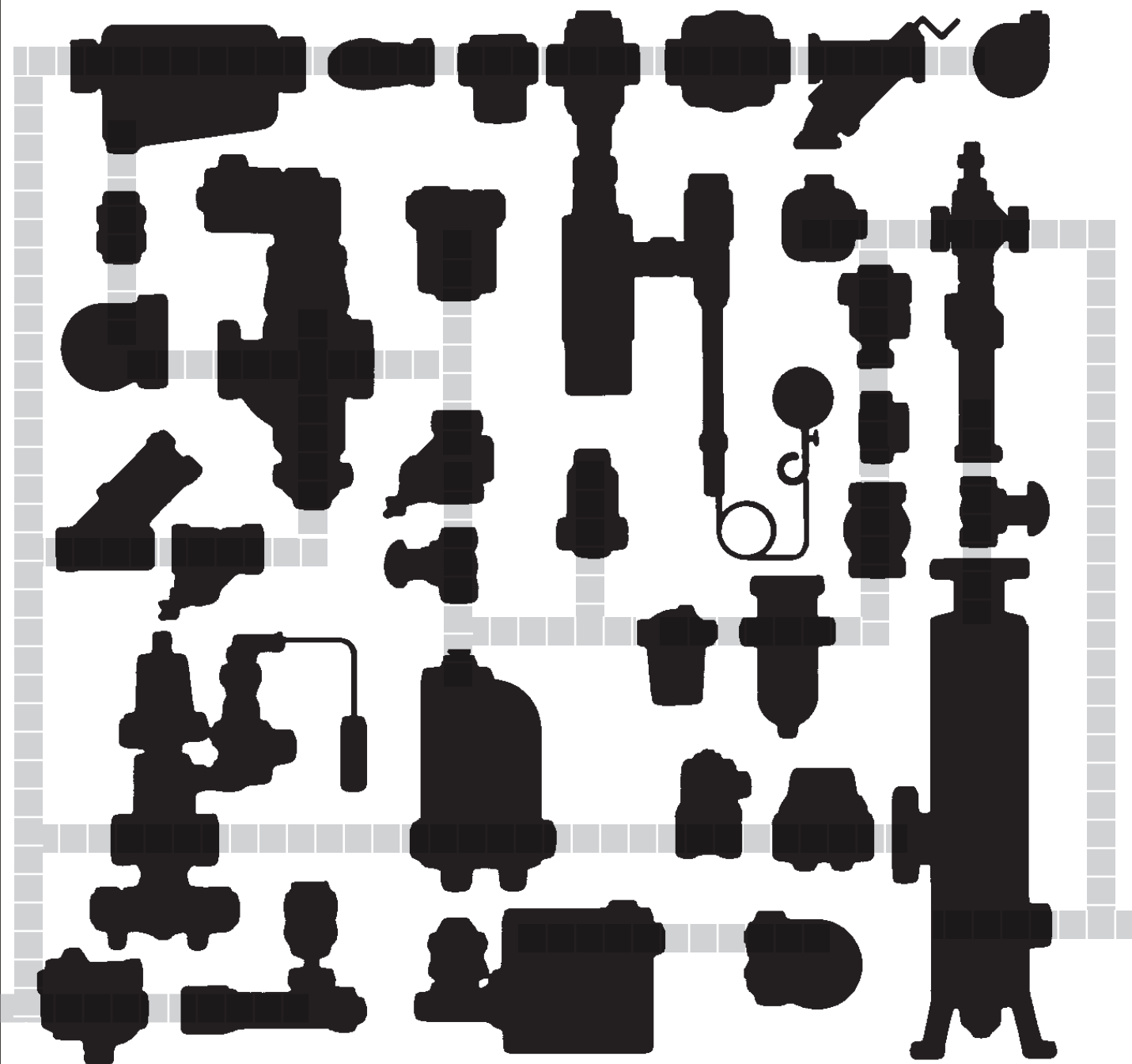
All systems are designed for the required heat load with controls to suit the application. To ensure that all pertinent information for quotation and manufacture is accurately communicated, a Spirax Sarco Engineered Systems RFQ Data Sheet should be completed and all special requirements should be noted.

**Spirax Sarco, Inc., 1150 Northpoint Blvd, Blythewood, SC 29016**

**Telephone: (803) 714-2000 FAX (803) 714-2222**



## Engineering Data



## Properties of Saturated Steam

	Gauge Pressure psig	Temperature °F	Heat in Btu/lb			Specific Volume ft³/lb
			Sensible	Latent	Total	
INS. VAC.	25	134	102	1017	1119	142
	20	162	129	1001	1130	73.9
	15	179	147	990	1137	51.3
	10	192	160	982	1142	39.4
	5	203	171	976	1147	31.8
	0	212	180	970	1150	26.8
	1	215	183	968	1151	25.2
	2	219	187	966	1153	23.5
	3	222	190	964	1154	22.3
	4	224	192	962	1154	21.4
	5	227	195	960	1155	20.1
	6	230	198	959	1157	19.4
	7	232	200	957	1157	18.7
	8	233	201	956	1157	18.4
	9	237	205	954	1159	17.1
	10	239	207	953	1160	16.5
	12	244	212	949	1161	15.3
	14	248	216	947	1163	14.3
	16	252	220	944	1164	13.4
	18	256	224	941	1165	12.6
	20	259	227	939	1166	11.9
	22	262	230	937	1167	11.3
	24	265	233	934	1167	10.8
	25	267	234	933	1169	10.3
	26	268	236	933	1169	10.3
	28	271	239	930	1169	9.85
	30	274	243	929	1172	9.46
	32	277	246	927	1173	9.10
	34	279	248	925	1173	8.75
	35	281	250	924	1174	8.6
	36	282	251	923	1174	8.42
	38	284	253	922	1175	8.08
	40	286	256	920	1176	7.82
	42	289	258	918	1176	7.57
	44	291	260	917	1177	7.31
	45	292	261	916	1177	7.21
	46	293	262	915	1177	7.14
	48	295	264	914	1178	6.94
	50	298	267	912	1179	6.68
	55	300	271	909	1180	6.27
	60	307	277	906	1183	5.84
	65	312	282	901	1183	5.49
	70	316	286	898	1184	5.18
	75	320	290	895	1185	4.91
	80	324	294	891	1185	4.67
	85	328	298	889	1187	4.44
	90	331	302	886	1188	4.24
	95	335	305	883	1188	4.05
	100	338	309	880	1189	3.89
	105	341	312	878	1190	3.74
	110	344	316	875	1191	3.59
	115	347	319	873	1192	3.46
	120	350	322	871	1193	3.34
	125	353	325	868	1193	3.23
	130	356	328	866	1194	3.12
	140	361	333	861	1194	2.92
	145	363	336	859	1195	2.84
	150	366	339	857	1196	2.74
	155	368	341	855	1196	2.68

	Gauge Pressure psig	Temperature °F	Heat in Btu/lb			Specific Volume ft³/lb
			Sensible	Latent	Total	
	160	371	344	853	1197	2.60
	165	373	346	851	1197	2.54
	170	375	348	849	1197	2.47
	175	377	351	847	1198	2.41
	180	380	353	845	1198	2.34
	185	382	355	843	1198	2.29
	190	384	358	841	1199	2.24
	195	386	360	839	1199	2.19
	200	388	362	837	1199	2.14
	205	390	364	836	1200	2.09
	210	392	366	834	1200	2.05
	215	394	368	832	1200	2.00
	220	396	370	830	1200	1.96
	225	397	372	828	1200	1.92
	230	399	374	827	1201	1.89
	235	401	376	825	1201	1.85
	240	403	378	823	1201	1.81
	245	404	380	822	1202	1.78
	250	406	382	820	1202	1.75
	255	408	383	819	1202	1.72
	260	409	385	817	1202	1.69
	265	411	387	815	1202	1.66
	270	413	389	814	1203	1.63
	275	414	391	812	1203	1.60
	280	416	392	811	1203	1.57
	285	417	394	809	1203	1.55
	290	418	395	808	1203	1.53
	295	420	397	806	1203	1.49
	300	421	398	805	1203	1.47
	305	423	400	803	1203	1.45
	310	425	402	802	1204	1.43
	320	427	405	799	1204	1.38
	330	430	408	796	1204	1.34
	340	433	411	793	1204	1.31
	350	435	414	790	1204	1.28
	360	438	417	788	1205	1.24
	370	441	420	785	1205	1.20
	380	443	422	783	1205	1.18
	390	446	425	780	1205	1.14
	400	448	428	777	1205	1.12
	450	460	439	766	1205	1.00
	500	470	453	751	1204	.89
	550	479	464	740	1204	.82
	600	489	473	730	1203	.75
	650	497	483	719	1202	.69
	700	505	491	710	1201	.64
	750	513	504	696	1200	.60
	800	520	512	686	1198	.56
	900	534	529	666	1195	.49
	1000	546	544	647	1191	.44
	1250	574	580	600	1180	.34
	1500	597	610	557	1167	.23
	1750	618	642	509	1151	.22
	2000	636	672	462	1134	.19
	2250	654	701	413	1114	.16
	2500	669	733	358	1091	.13
	2750	683	764	295	1059	.11
	3000	696	804	213	1017	.08

# Calculating Condensate Loads

When the normal condensate load is not known, the load can be approximately determined by calculations using the following formulae.

## General Usage Formulae

Heating water with steam (Exchangers)\*

$$\text{lb/h Condensate} = \frac{\text{GPM}}{2} \times (1.1) \times \text{Temperature Rise } ^\circ\text{F}$$

Heating fuel oil with steam

$$\text{lb/h Condensate} = \frac{\text{GPM}}{4} \times (1.1) \times \text{Temperature Rise } ^\circ\text{F}$$

Heating air with steam coils

$$\text{lb/h Condensate} = \frac{\text{CFM}}{800} \times \text{Temperature Rise } ^\circ\text{F}$$

Steam Radiation

$$\text{lb/h Condensate} = \frac{\text{Sq. Ft. E. D. R.}}{4}$$

$$\text{lb/h Condensate} = \frac{\text{BTU/HR}}{\text{Latent Heat at Operating Pressure}}$$

$$\text{lb/h Condensate} = \frac{\text{MBH} \times 1,000}{\text{Latent Heat at Operating Pressure}}$$

\*Delete the (1.1) factor when steam is injected directly into water.

## Specialized Applications

### Sterilizers, Autoclaves, Retorts Heating Solid Material

$$\text{lb/h Condensate} = \frac{W \times C_p \times \Delta T}{L \times t}$$

W = Weight of material — lbs.  
Cp = Specific heat of the material  
ΔT = Temperature rise of the material °F  
L = Latent heat of steam Btu/lb  
t = Time in hours

### Steam Jacketed Dryers

$$\text{lb/h Condensate} = \frac{1000 (W_i - W_f) + (W_i \times \Delta T)}{L}$$

W<sub>i</sub> = Initial weight of the material — pounds per hour  
W<sub>f</sub> = Final weight of the material — pounds per hour  
ΔT = Temperature rise of the material °F  
L = Latent heat of steam Btu/lb

### Heating Liquids in Steam Jacketed Kettles and Steam Heated Tanks

$$\text{lb/h Condensate} = \frac{G \times \text{s.g.} \times C_p \times \Delta T \times 8.3}{L \times t}$$

G = Gallons of liquid to be heated  
s.g. = Specific gravity of the liquid  
Cp = Specific heat of the liquid  
ΔT = Temperature rise of the liquid °F  
L = Latent heat of the steam Btu/lb  
t = Time in hours

### Heating Air with Steam; Pipe Coils and Radiation

$$\text{lb/h Condensate} = \frac{A \times U \times \Delta T}{L}$$

A = Area of the heating surface in square feet  
U = Heat transfer coefficient (2 for free convection)  
ΔT = Steam temperature minus the air temperature °F  
L = Latent heat of the steam Btu/lb

Note: The condensate load to heat the equipment must be added to the condensate load for heating the material. Use same formula

## Steam Tracing Lines:

Approximate load is 10 to 50 lb/h for each 100 ft. of tracer

## Recommended Safety Factors for Steam Traps

The actual safety factor to use for any particular application will depend upon accuracy of:  
1. Estimated load  
2. Estimated pressure at trap  
3. Estimated backpressure  
Any unusual or abnormal conditions must be taken into consideration.

Safety Factor by Type of Trap	Safety Factor
Balanced-Pressure Thermo-static Traps	2 to 4
Thermo-Matic Thermostatic Traps	1.5 to 2.5
Liquid Expansion Traps	2 to 4
Bimetallic Traps	2 to 3
Float and Thermostatic Traps	1.5 to 2.5
Inverted Bucket Traps	2 to 3
Thermo-Dynamic® Traps	1.2 to 2

Safety Factor by Application	General	With Temp. Control
Mains Drainage	x 2	—
Storage Heaters	x 2	—
Unit Heaters	x 2	x 3
Air Heating Coils	x 2	x 4
Submerged Coils (low level drain)	x 2	—
Submerged Coils (siphon drain)	x 3	—
Rotating Cylinders	x 3	—
Tracing Lines	x 2	—
Platen Presses	x 2	—

Rule of Thumb: Use factor of 2 on everything except Temperature Controlled Air Heater Coils and Converters, and Siphon applications

## Effect of Backpressure on Steam Trap Capacity

### % Reduction in Capacity

Backpressure % of Inlet	Inlet Pressure PSIG			
	5	25	100	200
25%	6%	3%	0%	0%
50	20	12	10	5
75	38	30	28	23

## Warm-up and Condensate Load Tables

### Warm-up Load in Pounds of Steam per 100 ft of Steam Main (based on a start-up timer of 1 hour)

Ambient Temperature 70°F. Based on Sch. 40 Pipe to 250 psi, Sch. 80 Above 250 Except Sch. 120 5" and Larger Above 800 psi.

Steam Pressure Pressure (psig)	2"	2-1/2"	3"	4"	5"	6"	8"	10"	12"	14"	16"	18"	20"	24"	0°F Correction Factor*
0	6.2	9.7	12.8	18.2	24.6	31.9	48	68	90	107	140	176	207	208	1.50
5	6.9	11.0	14.4	20.4	27.7	35.9	48	77	101	120	157	198	233	324	1.44
10	7.5	11.8	15.5	22.0	29.9	38.8	58	83	109	130	169	213	251	350	1.41
20	8.4	13.4	17.5	24.9	38.8	44	66	93	124	146	191	241	284	396	1.37
40	9.9	15.8	20.6	29.3	39.7	52	78	110	145	172	225	284	334	465	1.32
60	11.0	17.5	22.9	32.6	44	57	86	122	162	192	250	316	372	518	1.29
80	12.0	19.0	24.9	35.3	48	62	93	132	175	208	271	342	403	561	1.27
100	12.8	20.3	26.6	37.8	51	67	100	142	188	222	290	366	431	600	1.26
125	13.7	21.7	28.4	40	55	71	107	152	200	238	310	391	461	642	1.25
150	14.5	23.0	30.0	43	58	75	113	160	212	251	328	414	487	679	1.24
175	15.3	24.2	31.7	45	61	79	119	169	224	265	347	437	514	716	1.23
200	16.0	25.3	33.1	47	64	83	125	177	234	277	362	456	537	748	1.22
250	17.2	27.3	35.8	51	69	89	134	191	252	299	390	492	579	807	1.21
300	25.0	38.3	51	75	104	143	217	322	443	531	682	854	1045	1182	1.20
400	27.8	43	57	83	116	159	241	358	493	590	759	971	1163	1650	1.18
500	30.2	46	62	91	126	173	262	389	535	642	825	1033	1263	1793	1.17
600	32.7	50	67	98	136	187	284	421	579	694	893	1118	1367	1939	1.16
800	38	58	77	113	203	274	455	670	943	1133	1445	1835	2227	3227	1.156
1000	42	72	86	126	227	305	508	748	1052	1264	1613	2048	2485	3601	1.147
1200	47	72	96	140	253	340	566	833	1172	1407	1796	2280	2768	4010	1.140
1400	52	79	106	155	280	376	627	922	1298	1558	1988	2525	3064	4440	1.135
1600	57	87	117	171	309	415	692	1018	1432	1720	2195	2787	3383	4901	1.130
1750	62	94	126	184	333	448	746	1098	1545	1855	2367	3006	3648	5286	1.128
1800	63	97	129	189	341	459	765	1126	1584	1902	2427	3082	3741	5420	1.127

\*For outdoor temperature of 0°F, multiply load value in table for each main size by correction factor shown.

### Condensate Load in Pounds per Hour per 100 ft. of Insulated Steam Main

Ambient Temperature 70°F — Insulation 80% Efficient. Load Due to Radiation and Convection for Saturated Steam

Steam Pressure Pressure (psig)	2"	2-1/2"	3"	4"	5"	6"	8"	10"	12"	14"	16"	18"	20"	24"	0°F Correction Factor*
10	6	7	9	11	13	16	20	24	29	32	36	39	44	53	1.58
40	8	9	11	14	17	20	26	32	38	42	48	51	57	68	1.50
60	10	12	14	18	24	27	33	41	49	54	62	67	74	89	1.45
100	12	15	18	22	28	33	41	51	61	67	77	83	93	111	1.41
125	13	16	20	24	30	36	45	56	66	73	84	90	101	121	1.36
175	16	19	23	26	33	38	53	66	78	86	98	107	119	142	1.38
250	18	22	27	34	42	50	62	77	92	101	116	126	140	168	1.36
300	20	25	30	37	46	54	68	85	101	111	126	138	154	184	1.33
400	23	28	34	43	53	63	80	99	118	130	148	162	180	216	1.32
500	27	33	39	49	61	73	91	114	135	148	170	185	206	246	1.32
600	30	37	44	55	68	82	103	128	152	167	191	208	232	277	1.31
800	36	44	53	69	85	101	131	164	194	214	244	274	305	365	1.30
1000	43	52	63	82	101	120	156	195	231	254	290	326	363	435	1.27
1200	51	62	75	97	119	142	185	230	274	301	343	386	430	515	1.26
1400	60	73	89	114	141	168	219	273	324	356	407	457	509	610	1.25
1600	70	85	103	132	163	195	253	315	375	412	470	528	588	704	1.22
1750	77	93	113	145	179	213	278	346	411	452	516	580	645	773	1.22
1800	79	96	117	150	185	221	288	358	425	467	534	600	667	800	1.21

\*For outdoor temperature of 0°F, multiply load value in table for each main size by correction factor shown.

## Heat Transfer Calculations

### Heat Emission Rates from Pipes Submerged in Water

Published Overall Heat Transfer Rates	Btu/ft <sup>2</sup> h °F
Tank Coils, Steam/Water (Temperature difference 50°F)	100 to 225
Tank Coils, Steam/Water (Temperature difference 100°F)	175 to 300
Tank Coils, Steam/Water (Temperature difference 200°F)	225 to 475
Reasonable Practical Heat Transfer Rates	
Tank Coils, low pressure with natural circulation	100
Tank Coils, high pressure with natural circulation	200
Tank Coils, low pressure with assisted circulation	200
Tank Coils, high pressure with assisted circulation	300

### Heat Emission Coefficients from Pipes Submerged in Miscellaneous Fluids

The viscosity of fluids has a considerable bearing on heat transfer characteristics and this varies in any case with temperature. The following figures will therefore serve only as a rough guide.

Immersed steam coil, medium pressure, natural convection

	Btu/ft <sup>2</sup> h °F difference
Light Oils	30
Heavy Oils	15 to 20
*Fats	5 to 10

Immersed steam coil, medium pressure, natural convection

	Btu/ft <sup>2</sup> h °F difference
Light Oils (220 SSU at 100°F)	100
Medium Oils (1100 SSU at 100°F)	60
Heavy Oils (3833 SSU at 100°F)	30

### Average Heat Loss from Oil in Storage Tanks and Pipe Lines

Position	Oil Temperature	* Heat Transfer Rate in Btu/ft <sup>2</sup> h °F temperature difference between oil and surrounding air	
		Exposed	Insulated
Tank Sheltered	Up to 50°F	1.2	.3
	Up to 80°F	1.3	.325
	Up to 100°F	1.4	.35
Tank Exposed	Up to 50°F	1.4	.35
	Up to 80°F	1.5	.375
	Up to 100°F	1.6	.4
Tank In Pit	All Temperatures	1.2	—
Pipe Sheltered Line	Up to 80°F	1.5	.375
	80 to 260°F	2.3	.575
Pipe Exposed Line	Up to 80°F	1.8	.45
	80 to 260°F	2.75	.7

\* For maximum heat loss the "surrounding air temperature" may be 25°F higher or lower according to country and locality.

For rough calculations it may be taken that 1 ton of fuel oil occupies 36 .4 ft<sup>3</sup>. The specific heat capacity of heavy fuel is 0.45 to 0.48 Btu/lb °F.

### Heat Transfer from Steam Coils

Approximately 20 Btu/h per square foot of heating surface per °F difference between oil and steam temperature.

### Heat Transfer from Hot Water Coils

Approximately 10 Btu/h per square foot of heating surface per °F difference between oil and steam temperature.

### Heat Loss from Open Tanks

Liquid Temp. °F	Heat Loss from Liquid Surface Btu/ft <sup>2</sup> h			Heat Lost through Tank Wall Btu/ft <sup>2</sup> h			
	Evap. Loss	Rad. Loss	Total	Bare Steel	1" Insulation	2" Insulation	3" Insulation
90	80	50	130	50	12	6	4
100	160	70	230	70	15	8	6
110	240	90	330	90	19	10	7
120	360	110	470	110	23	12	9
130	480	135	615	135	27	14	10
140	660	160	820	160	31	16	12
150	860	180	1040	180	34	18	13
160	1100	210	1310	210	38	21	15
170	1380	235	1615	235	42	23	16
180	1740	260	2000	260	46	25	17
190	2160	290	2450	290	50	27	19
200	2680	320	3000	320	53	29	20
210	3240	360	3590	360	57	31	22

The above values are for open tanks in 60°F still ambient air.

## Steam Tracing

### Designing of Steam Tracing

Recommended number of 1/2" tracers to meet average requirements

	<b>Type A</b> General frost protection or where solidification may occur at temps. below 75°F	<b>Type B</b> Where solidification may occur at temps. between 75 - 150°F	<b>Type C</b> When solidification may occur at temps. between 150 - 300°F
Product Line Size	Number of 1/2" Tracers	Number of 1/2" Tracers	Number of 1/2" Tracers
1"	1	1	1
1-1/2"	1	1	2
2"	1	1	2
3"	1	1	3
4"	1	2	3
6"	2	2	3
8"	2	2	3
10"-12"	2	3	6
14"-16"	2	3	8
18"-20"	2	3	10

As a general rule, length of tracers to 3/8" size should not exceed 60 ft. Larger size tracers should not exceed 150 ft. in length.

### Steam Size Connections for Jacketed Lines

Product Line	Jacket Diameter	Steam Connection
2-1/2"	4"	1/2"
3"	6"	3/4"
4"	6"	3/4"
6"	8"	3/4"
8"	10"	1"
10"	12"	1"

Length of jacket should not exceed 20 ft. In most cases 1/2" condensate outlet would be adequate but it is usual to make this same size as the steam connection as it simplifies installation.

### Recommended Header Size for Supplying Steam Tracer Lines

Header Size	Number of 1/2" Tracers
3/4"	2
1"	3 to 5
1-1/2"	6 to 15
2"	16 to 30

### Recommended Header Size for Condensate Lines

Header Size	Number of 1/2" Tracers
1"	Up to 5
1-1/2"	6 to 10
2"	11 to 25

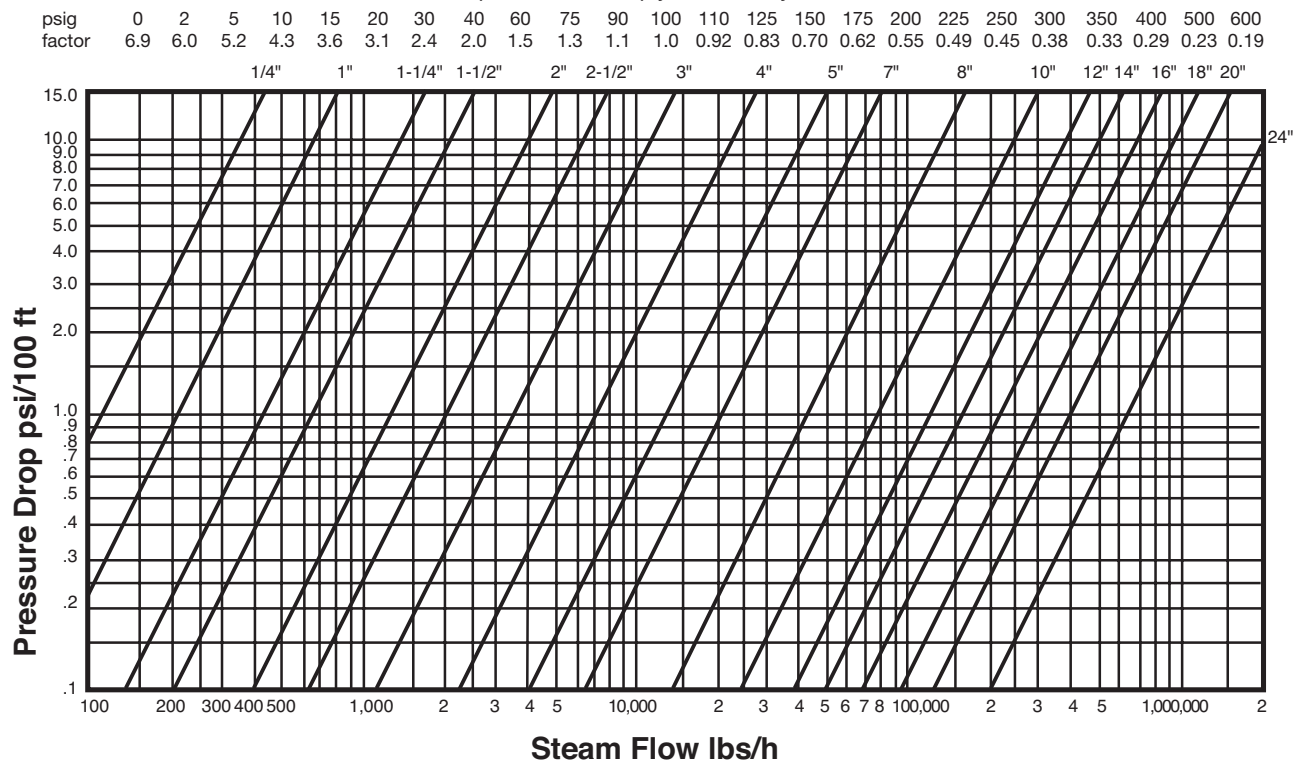
## Steam Pipe Sizing

### Sizing for Pressure Drop per 100 ft. in Schedule 40 Pipe

Divide "Allowable Drop" by pressure factor and use chart to select pipe size.

#### Based on 100 psig saturated steam

For other pressures, multiply chart  $\Delta P$  by factor below





# Steam Pipe Sizing

## How to Size Steam Pipes for Various Pressure and Velocity Conditions

To select pipe size in long mains and where supply pressure is critical, use the pressure drop chart to assure it is within allowable limits. Most saturated steam lines may be sized for a velocity of 4800 to 7200 ft/min; higher velocities should be avoided unless appreciable superheat is present.

Piping at pressure reducing stations should be sized for the same velocity on both sides of the PRV. This generally results in a valve smaller than the supply piping with still larger downstream pressure piping due to the increase in steam volume (see example below.)

Trap discharge piping contains a bi-phase flash steam/condensate mixture, and a lower velocity of 4000 to 6000 ft/min to the receiver encourages gravity separation. The receiver vent line is sized for the amount of flash vented at atmospheric pressure at a velocity of 3000 to 4000 ft/min.

### Velocity Chart Example

Given a steam heating piping system with a 100 psig inlet pressure ahead of a control valve with a capacity of 1,000 lb/h of steam reduced to 25 psig, find the smallest sizes of upstream and downstream piping for reasonable quiet steam velocities.

### Upstream Pressure Piping Sizing

Enter the velocity chart above at A for steam flow of 1,000 lb/h. Go over to point B where the 100 psig diagonal line intersects. Follow up vertically to C where an intersection with a diagonal line falls inside the 4,000-to-6,000 ft/min velocity band. Actual velocity at D is about 4,800 ft/min for 1-1/2" upstream piping. Selecting a smaller pipe size results in greater steam velocity and noise level.

### Downstream Piping Sizing

Enter the velocity chart at A for 1,000 lb/h. Go over to point E where the 25 psig diagonal line intersects. Follow up vertically to F where an intersection with a diagonal line falls inside the 4,000-to-6,000 ft/min velocity band. Actual velocity at G is 5,500 ft/min for 2-1/2" downstream piping.

### Formula for Velocity of Steam in Pipes:

$$V = \frac{2.4Q V_s}{A}$$

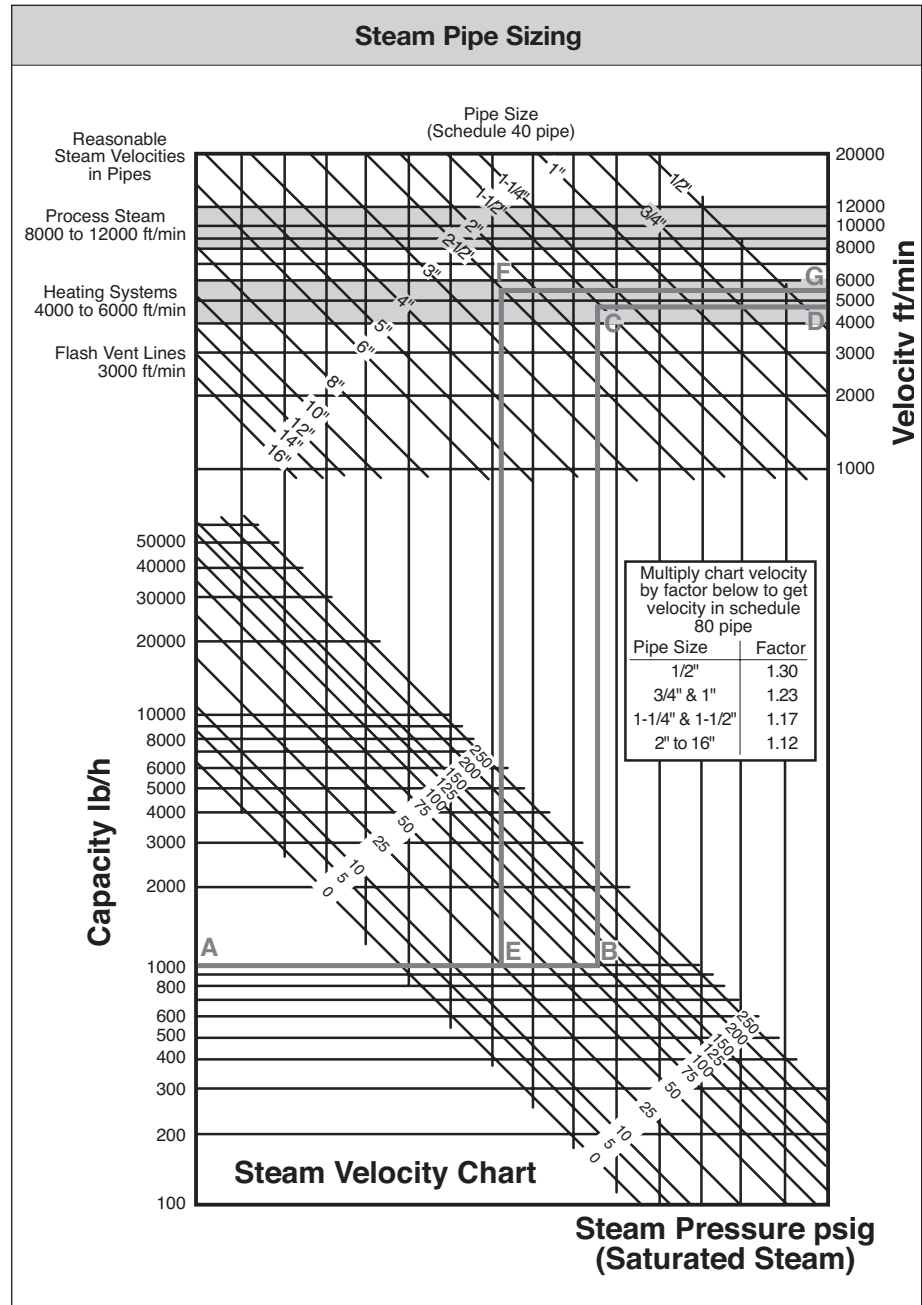
Where:

V = Velocity in ft/min

Q = Flow lb/h steam

Vs = Sp. Vol. in cu. ft/lb at the flowing pressure

A = Internal area of the pipe — in<sup>2</sup>



## Condensate Line Sizing

Condensate return lines on the discharge side of steam traps must be able to accommodate the flow of both water and flash steam. While the percentage, by weight, of flash steam may be rather low, its overall volume in comparison to the liquid is very large. By determining the quantity of flash steam and sizing the return line for velocities between 4,000 and 6,000 ft/min, the two-phase flow within the pipe can be accommodated. The information required for sizing is the condensate load in lb/h, inlet pressure to steam trap(s) in psig and return line system pressure.

### Example:

Size a condensate return line from a 160 psig steam trap discharging to 20 psig. flash tank. Load is 3,000 lb/h.

1. Determine percent flash steam produced using table. With a steam pressure of 160 psig and a flash tank pressure of 20 psig read a value of 12.4%.
2. Next, multiply the condensate load by the percent flash from step #1 to determine the flowrate, of flash steam produced.  
 $3,000 \text{ lb/h} \times .124 = 372 \text{ lb/h}$ .

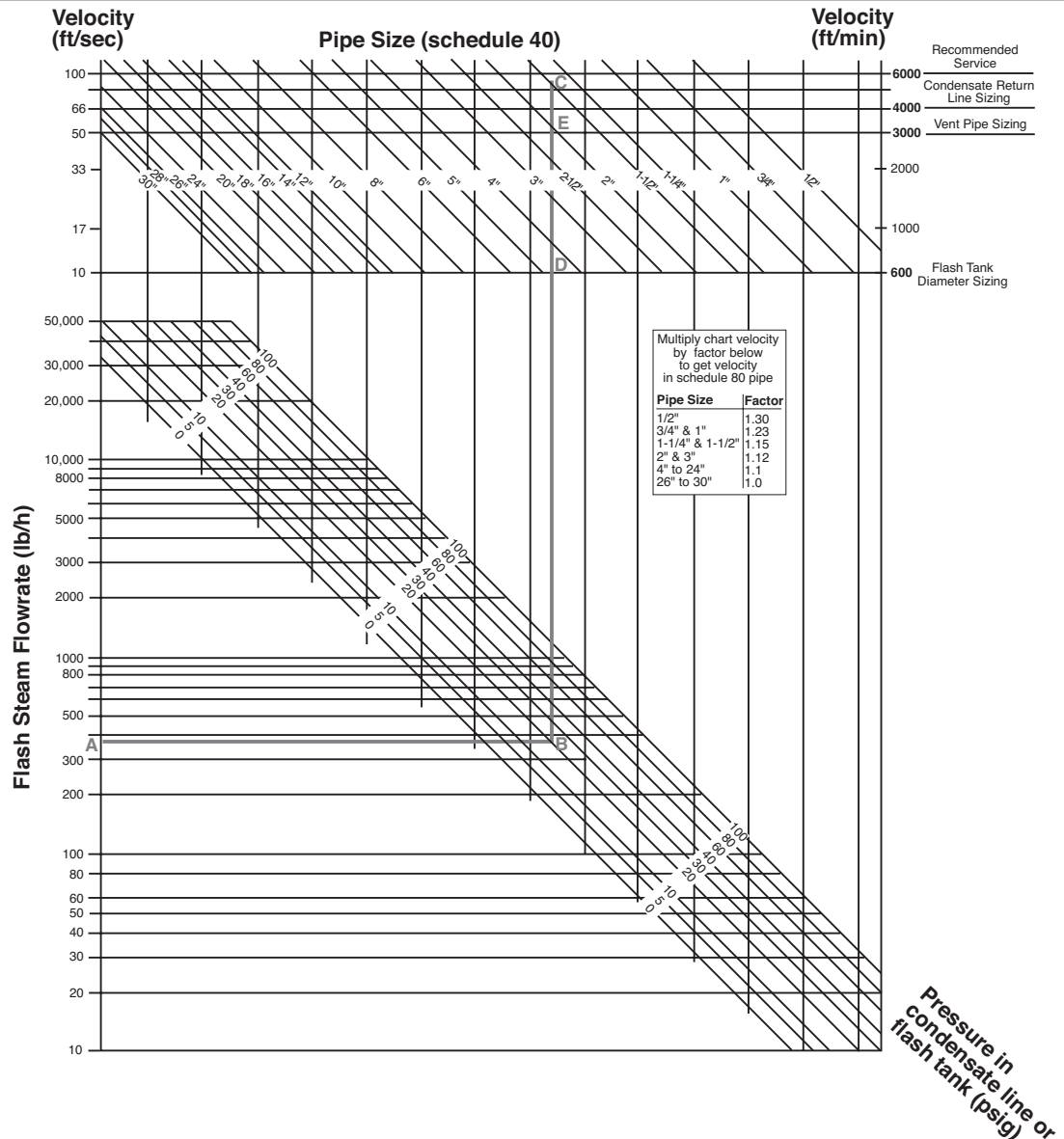
3. Enter Condensate Recovery Sizing chart at the flash steam flowrate of 372 lb/h at "A" and move horizontally to the right to the flash tank pressure of 20 psig "B". Rise vertically to choose a condensate return line size which will give a velocity between 4,000 and 6,000 ft/min, "C". In this example, an 1-1/2" schedule 40 pipe with a velocity of approximately 5,000 ft/min. If schedule 80 pipe is to be used, refer to table within body of chart. Multiply the velocity by the factor to determine whether the velocity is within acceptable limits.

### Percent Flash Steam

Produced when Condensate is discharged to atmosphere or into a flash tank controlled at various pressures.

Pressure psig	Atmo- sphere 0	2	5	Flash Tank Pressure — psig							
				10	15	20	30	40	60	80	100
5	1.7	1.0	0								
10	2.9	2.2	1.4	0							
15	4.0	3.2	2.4	1.1	0						
20	4.9	4.2	3.4	2.1	1.1	0					
30	6.5	5.8	5.0	3.8	2.6	1.7	0				
40	7.8	7.1	6.4	5.1	4.0	3.1	1.3	0			
60	10.0	9.3	8.6	7.3	6.3	5.4	3.6	2.2	0		
80	11.7	11.1	10.3	9.0	8.1	7.1	5.5	4.0	1.9	0	
100	13.3	12.6	11.8	10.6	9.7	8.8	7.0	5.7	3.5	1.7	0
125	14.8	14.2	13.4	12.2	11.3	10.3	8.6	7.4	5.2	3.4	1.8
160	16.8	16.2	15.4	14.1	13.2	12.4	10.6	9.5	7.4	5.6	4.0
200	18.6	18.0	17.3	16.1	15.2	14.3	12.8	11.5	9.3	7.5	5.9
250	20.6	20.0	19.3	18.1	17.2	16.3	14.7	13.6	11.2	9.8	8.2
300	22.7	21.8	21.1	19.9	19.0	18.2	16.7	15.4	13.4	11.8	10.1
350	24.0	23.3	22.6	21.6	20.5	19.8	18.3	17.2	15.1	13.5	11.9
400	25.3	24.7	24.0	22.9	22.0	21.1	19.7	18.5	16.5	15.0	13.4

### Condensate Recovery Sizing



## Flash Tank and Vent Line Sizing

### How to Size Flash Tanks and Vent Lines

Whether a flash tank is to be atmospheric or pressurized for flash recovery, the procedure for determining its size is the same. The most important dimension is the diameter. It must be large enough to provide adequate separation of the flash and condensate to minimize condensate carry over.

#### Example:

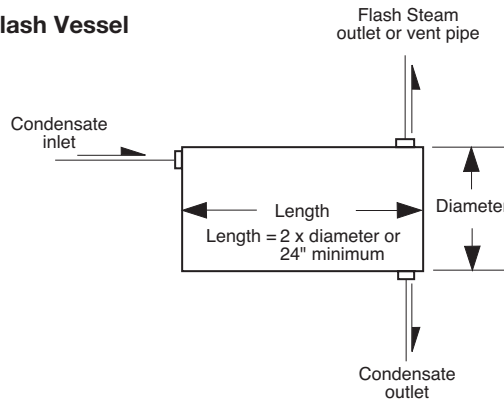
Size a 20 psig flash recovery vessel based on the information in the example on page 582 (condensate line sizing).

1. Using the calculated flash steam quantity of 372 lb/h enter Condensate Recovery Sizing chart on page 112 at "A" and move horizontally to the right to the flash tank pressure of 20 psig "B". Rise vertically to the flash tank diameter line (600 ft/min) at "D". Read tank diameter of 5". If schedule 80 pipe is to be installed, the table within the body of the chart can be used to determine whether the velocity will exceed the recommended limit of 600 ft/min.
2. From point "D" continue to rise vertically to "E" to determine the size of vent pipe to give a velocity between 3000 and 4000 ft/min. In this case 2" schedule 40 pipe. As before, use the table within the body of chart for schedule 80 pipe.

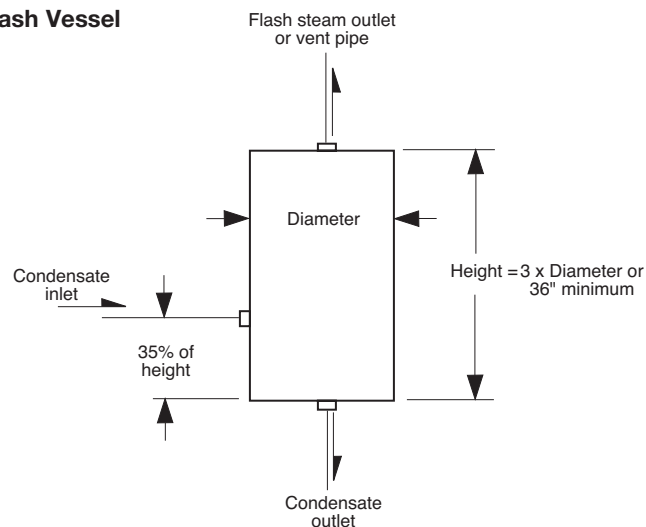
Flash vessels can be either horizontal or vertical. For flash steam recovery (pressurized receiver) the vertical style is preferred because of its ability to provide better separation of steam and water.

### Flash Vessel Sizing

#### Horizontal Flash Vessel



#### Vertical Flash Vessel



For proper installation of flash vessels, controls and traps refer to Design of Fluid Systems Hook-Ups.

## Steam Trap Selection Guide

As the USA's leading provider of steam system solutions, Spirax Sarco recognizes that no two steam trapping systems are identical. Because of the wide array of steam trap applications with inherently different characteristics, choosing the correct steam trap for optimum performance is difficult. Waterhammer, superheat, corrosive condensate, or other damaging operating characteristics dramatically affect performance of a steam trap. With over 80 years of experience in steam technology, Spirax Sarco is committed to helping it's customers design, operate and maintain an efficient steam system. You have our word on it!

Application	1st Choice						2nd Choice					
	Float & Thermostatic	Thermo-Dynamic®	Balanced Pressure	Bimetallic	Liquid Expansion	Inverted Bucket	Float & Thermostatic	Thermo-Dynamic®	Balanced Pressure	Bimetallic	Liquid Expansion	Inverted Bucket
<b>Steam Mains</b>												
to 30 psig	✓											✓
30-400 psig		✓										✓
to 600 psig		✓										✓
to 900 psig		✓										✓
to 2000 psig		✓										✓
with Superheat		✓								✓		
<b>Separators</b>	✓											
<b>Steam Tracers</b>		✓							✓			
Critical		✓							✓			
Non-Critical			✓					✓				
<b>Heating Equipment</b>												
Shell & Tube Heat Exchangers	✓											✓
Heating Coils	✓											✓
Unit Heaters	✓											✓
Plate & Frame Heat Exchangers	✓											✓
Radiators			✓									
<b>General Process Equipment</b>												
to 30 psig	✓											✓
to 200 psig	✓											✓
to 465 psig	✓											✓
to 600 psig						✓						
to 900 psig						✓						
to 2000 psig						✓						
<b>Hospital Equipment</b>												
Autoclaves	✓								✓			
Sterilizers	✓								✓			
<b>Fuel Oil Heating</b>												
Bulk Storage Tanks			✓				✓					
Line Heaters	✓											
<b>Tanks &amp; Vats</b>												
Bulk Storage Tanks			✓				✓					
Process Vats	✓							✓				
<b>Vulcanizers</b>		✓					✓					
<b>Evaporators</b>	✓											✓
<b>Reboilers</b>	✓											✓
<b>Rotating Cylinders</b>	✓											
<b>Freeze Protection</b>					✓							

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