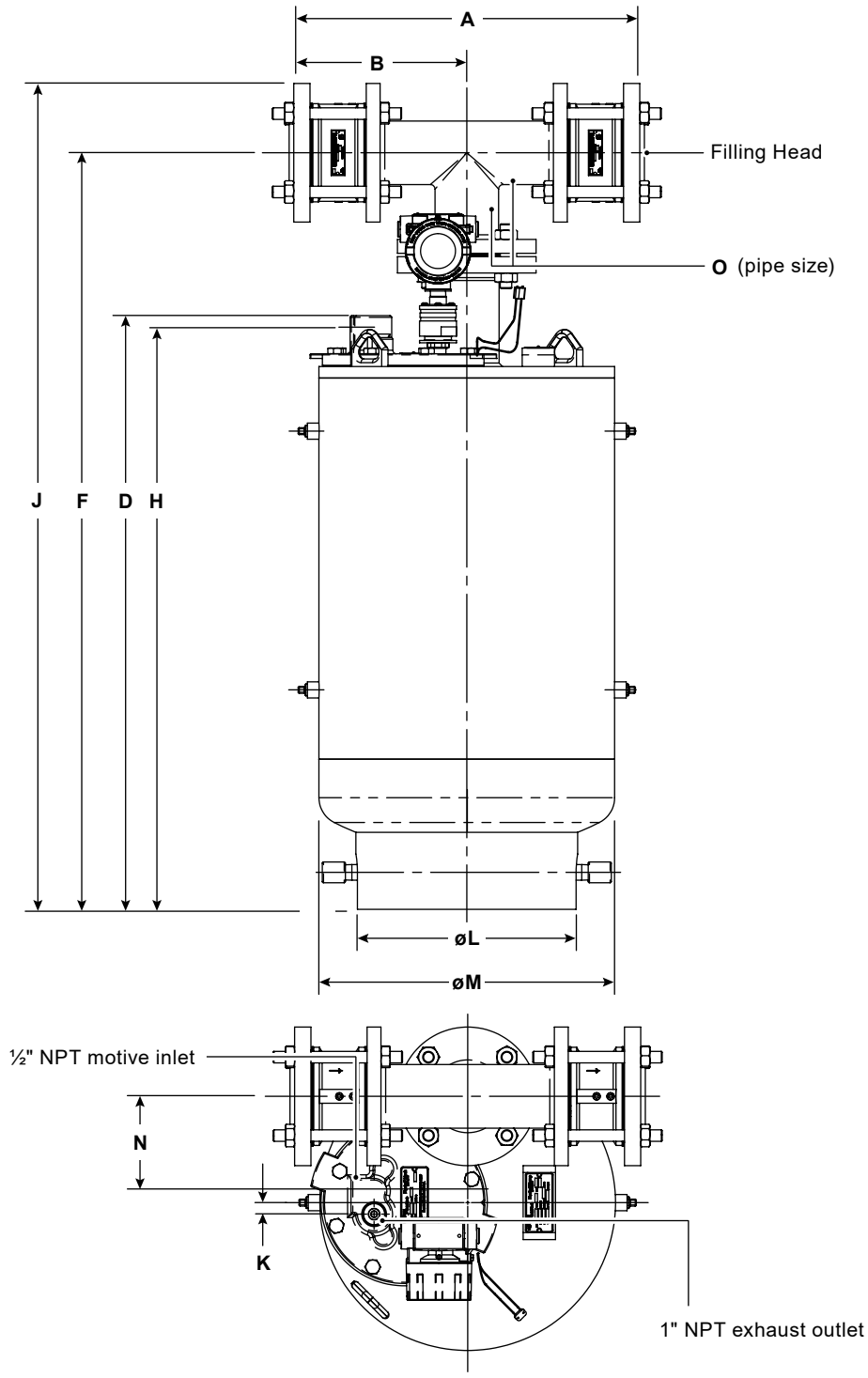
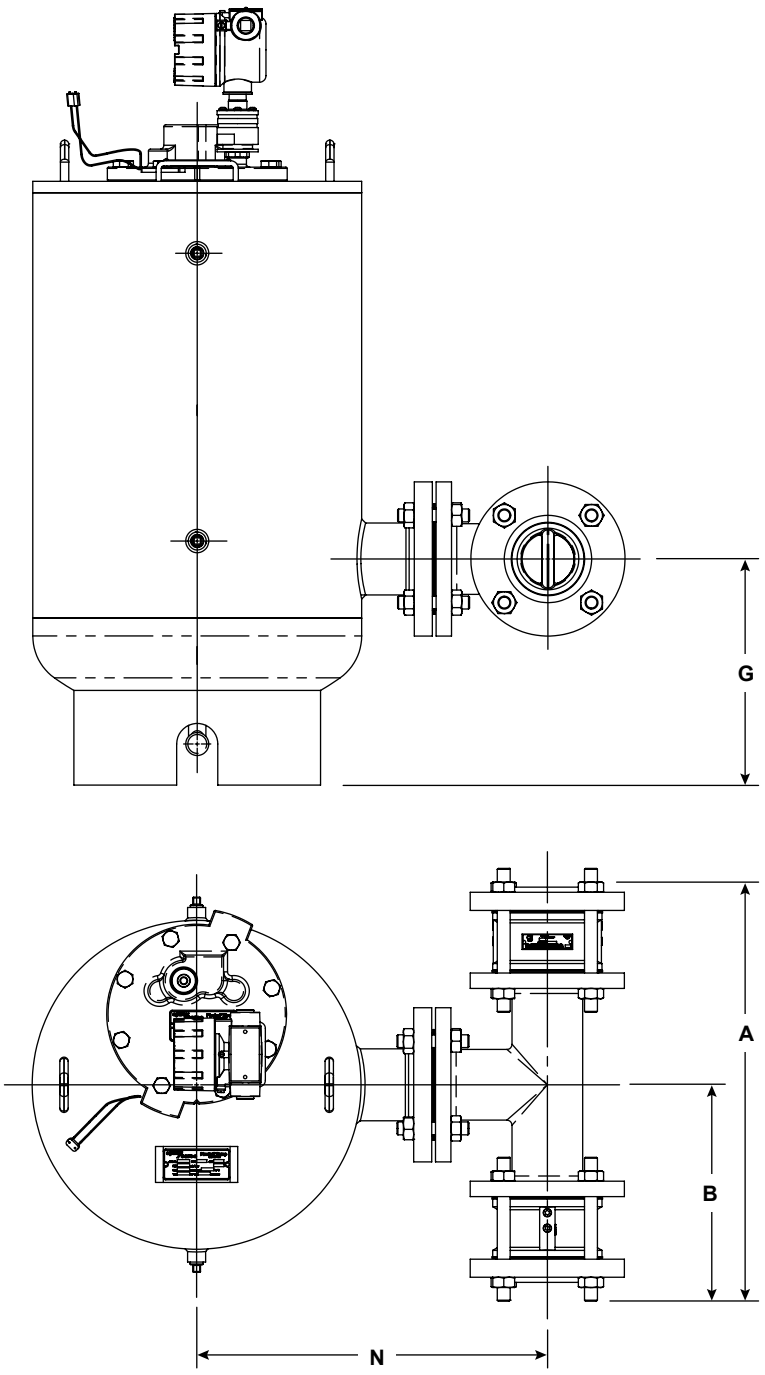
PTF Top - Dimensions/weights (approximate) in inches (mm) and lbs (kg)



Size	Dimensions															Weight
	A	B	C	D	E	F	G	H*	I	J	K	L	M	N	O	Pump
3" x 3" PTF-Top Check Valves	19.2 (488)	9.6 (244	N/A	32.1 (815)	N/A	40.9 (1039)	N/A	31.5 (800)	N/A	44.7 (1135)	0.6 (15)	12 (305)	16 (406)	5.8 (147)	3 (76)	230 lb (104 kg)

* H Dimension is to the centerline of the motive supply inlet.

PTF-Top Bone - Dimensions/weights (approximate) in inches (mm) and lbs (kg)



Size	Dimensions															Weight
	A	B	C	D	E	F	G	H*	I	J	K	L	M	N	O	Pump
3" x 3" PTF-Top Bone Check Valves	19.2 (488)	9.6 (244	N/A	N/A	N/A	N/A	11.0 (279)	N/A	N/A	N/A	N/A	N/A	N/A	17.1 (434	3 (76)	230 lb (104 kg)

* H Dimension is to the centerline of the motive supply inlet.

Sample Specification

The pump shall be Spirax Sarco Pivotrol® Pump (patented) operated by steam, compressed air or other pressurized gas to 200 psi g (13.8 bar g), 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.

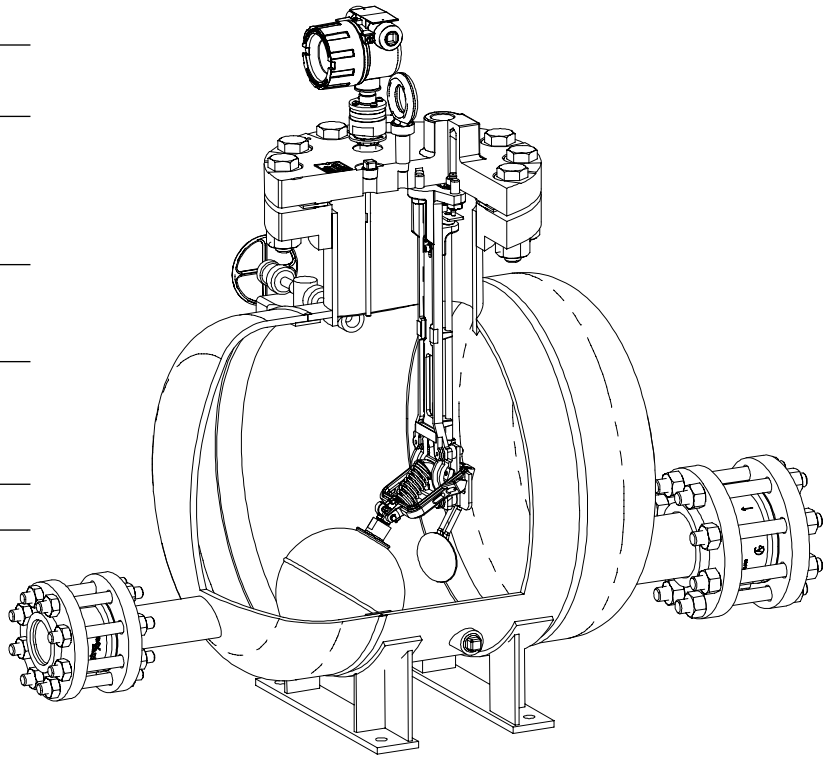
TI-P207-07-US
Issue 2

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 psi g (20.7 bar g)
Sizes	3" x 2" (DN80 x DN50)
Connections	Inlet & Outlet: ANSI 300 flange NPT/SW Motive & Exhaust: NPT/SW
Construction	Fabricated Steel Body 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.

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-P207-10-US

For increased service life - Operate pump with motive pressure 15-20 psi g (1.0-1.4 bar g) above pump back pressure.

Limiting operating conditions

PMO	300 psi g (20.7 bar g)
Maximum operating pressure	
Minimum motive differential required:	5 psi g (0.34 bar g)

Filling head requirements		**Filling height**
Filling head	**Above pump cover**	**From base of pump**
Standard recommended	12" (305 mm)	42.8" (1087 mm)
Maximum filling head	60" (1524 mm)	90.8" (2306 mm)
Minimum filling head	0" (0 mm)	30.8" (782 mm)
Max Number of Cycles per minute = 6		

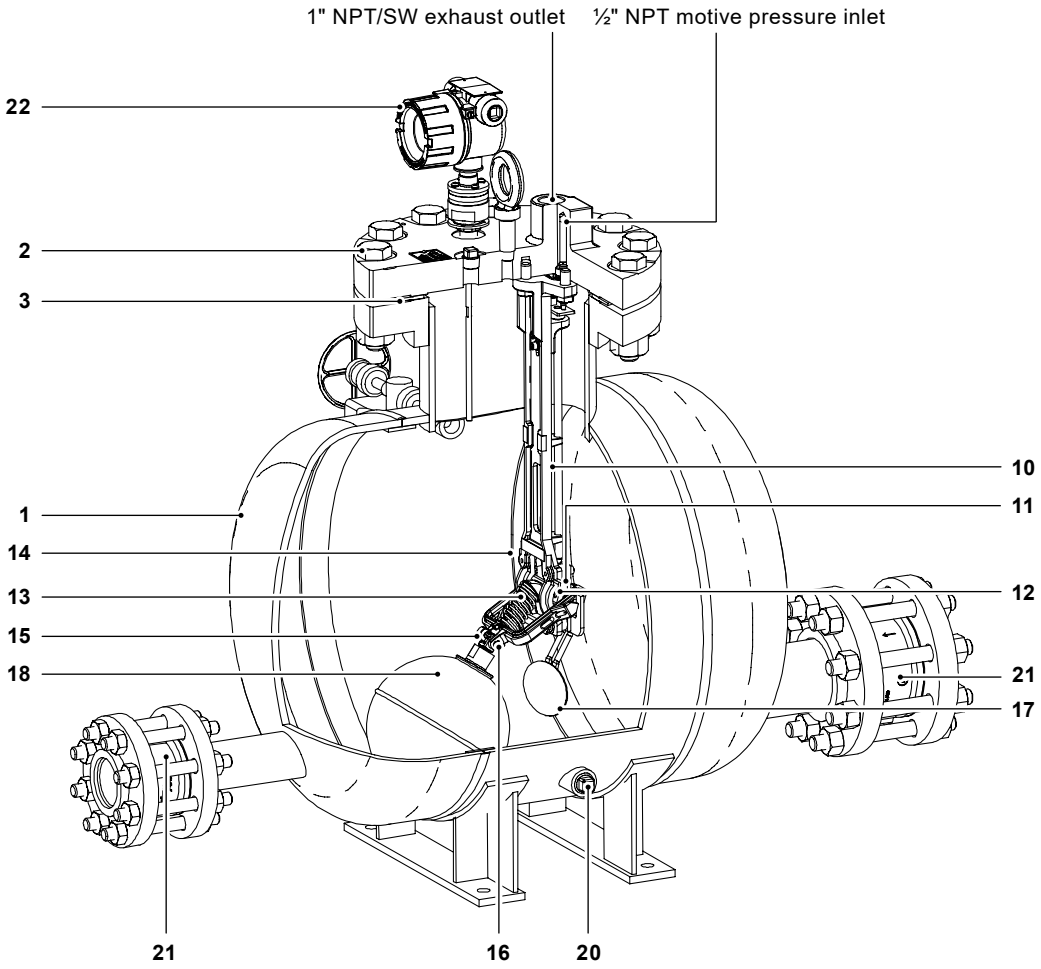
Product is safe for use under full vacuum conditions.

Note: See TI-P207-08-US for cycle counter details

Pressure shell design conditions

PMA	Maximum allowable pressure		300 psi g @ 650 °F	(20.7 bar g @ 343 °C)
TMA	Maximum allowable temperature		650 °F @ 300 psi g	(343 °C @ 20.7 bar g)
		with Reflex Gauge Glass:	600 °F @ 300 psi g	(316 °C @ 20.7 bar g)

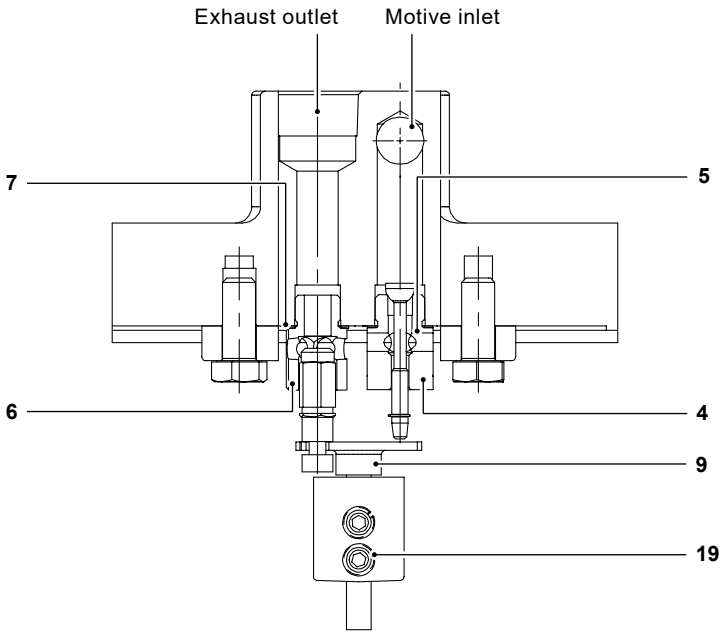
Materials



No.	Part	Material	
1	Body	Fabricated Steel	ASME coded
2	Cover	Cast Steel	ASTM A216 WCB
3	Cover Gasket	Spiral Wound	AISI 304/Graphite
8	Eye Bolt	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	
20	Plugs (typical)	Forged Steel	
21	Check Valves	Stainless steel	
22	Cycle Counter	Various (see TI-5-020-US)	

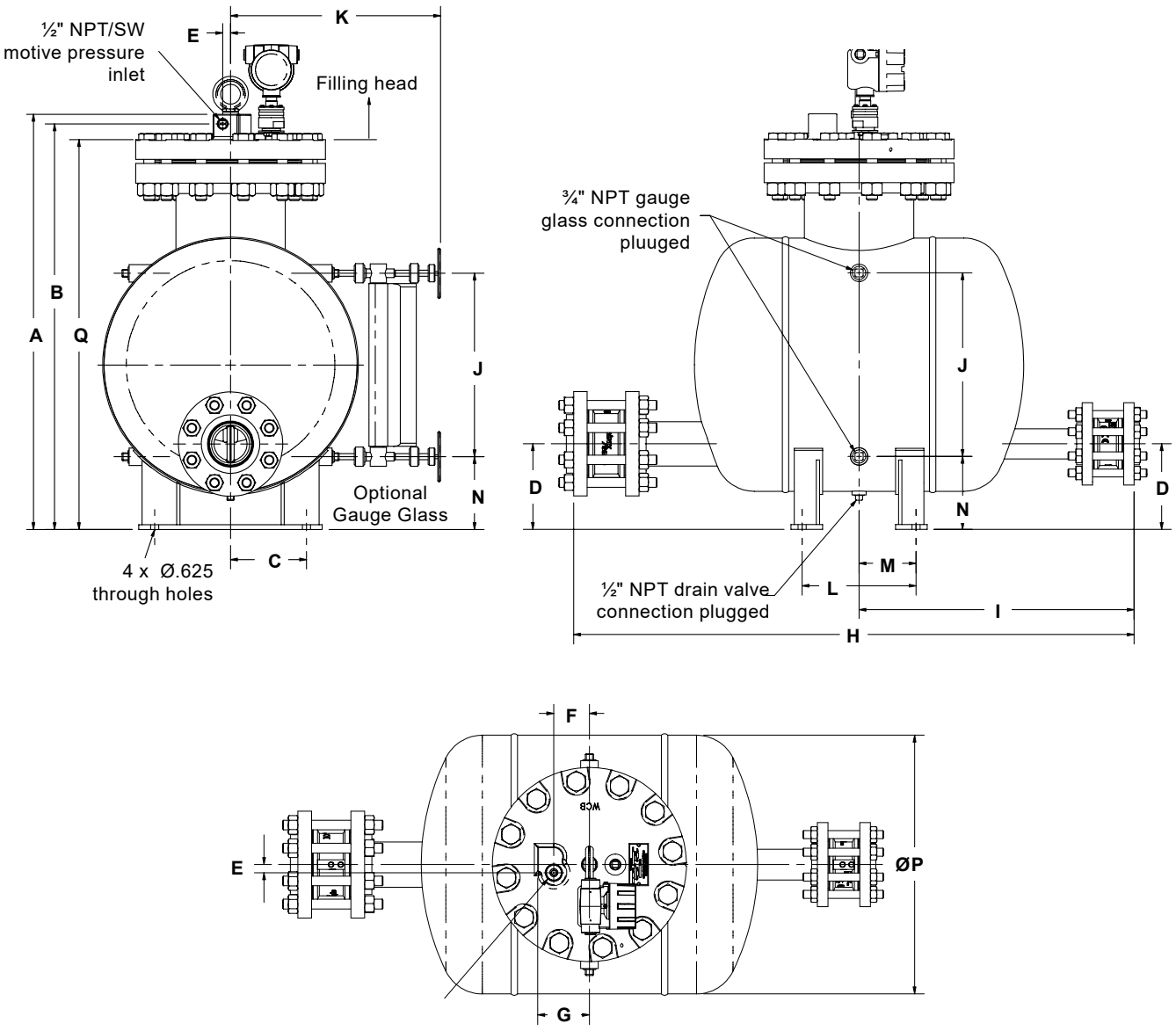
Materials continued on next page

Materials (continued)



No.	Part	Material
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
9	Push Rod Assembly	Stainless steel
19	Screws (typical)	Stainless steel

Dimensions/weights (approximate) in inches (mm) and lbs (kg)



A	B*	C	D	E	F	G	H	I	J	K	L	M	N	P	Q	Weight
32.8 (833)	32.1 (815)	6.0 (152)	6.8 (173)	0.6 (15)	2.8 (71)	4.0 (102)	45.1 (1146)	22.1 (561)	14.5 (368)	18.7 (475)	9.0 (229)	4.5 (114)	5.8 (147)	20.0 (508)	30.8 (782)	472 lb (214)

*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)

Capacities
For sizing and selection data, see TI-P207-10-US.

Sample specification
The pump shall be Spirax Sarco Pivotrol® Pump (patented) PTF-HP, operated by steam, compressed air or other pressurized gas to 300 psi g (20.7 bar g), 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.

TI-P207-11-US
Issue 1

The Pivotrol® Pump Patented PTF-HTF Pressure Powered Pump

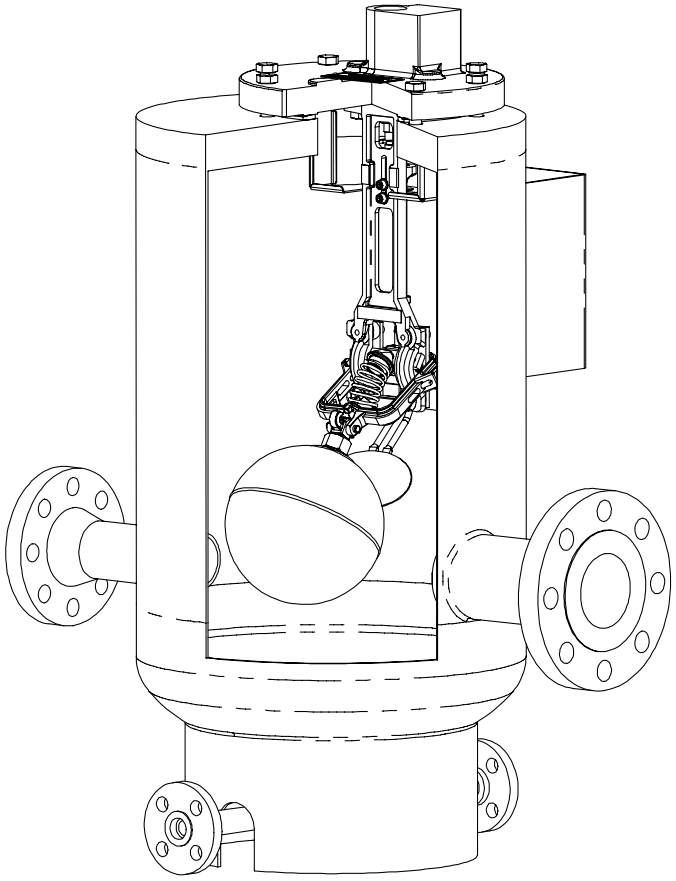
Description

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
PMO	200 psi g (13.8 bar g)
Sizes	3" x 2"
Connections	Inlet & Outlet: ANSI 300 RF with surface finish 125-250 µ 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 µ in. serrated concentric or spiral grooves per ANSI B16.5
Construction	ASME Coded Steel
Warranty	Lifetime Warranty on Spring



Accessories

- Gauge glass with brass cocks.
- Reflex type gauge glass -Insulation cover.

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 psi g above pump back pressure.

Limiting operating conditions

PMO	Maximum operating pressure	200 psi g (13.8 bar g)
Minimum motive differential required:		5 psi g (0.34 bar g)

Filling head requirements		**Filling height**
Filling head	**Above pump cover**	**From base of pump**
Standard recommended	12" (305 mm)	42.8" (1087 mm)
Maximum filling head	48" (1219 mm)	78.8" (2002 mm)
Minimum filling head	-1" (-25 mm)	29.8" (757 mm)
Maximum Number of Cycles per minute = 6		

Pressure shell design conditions

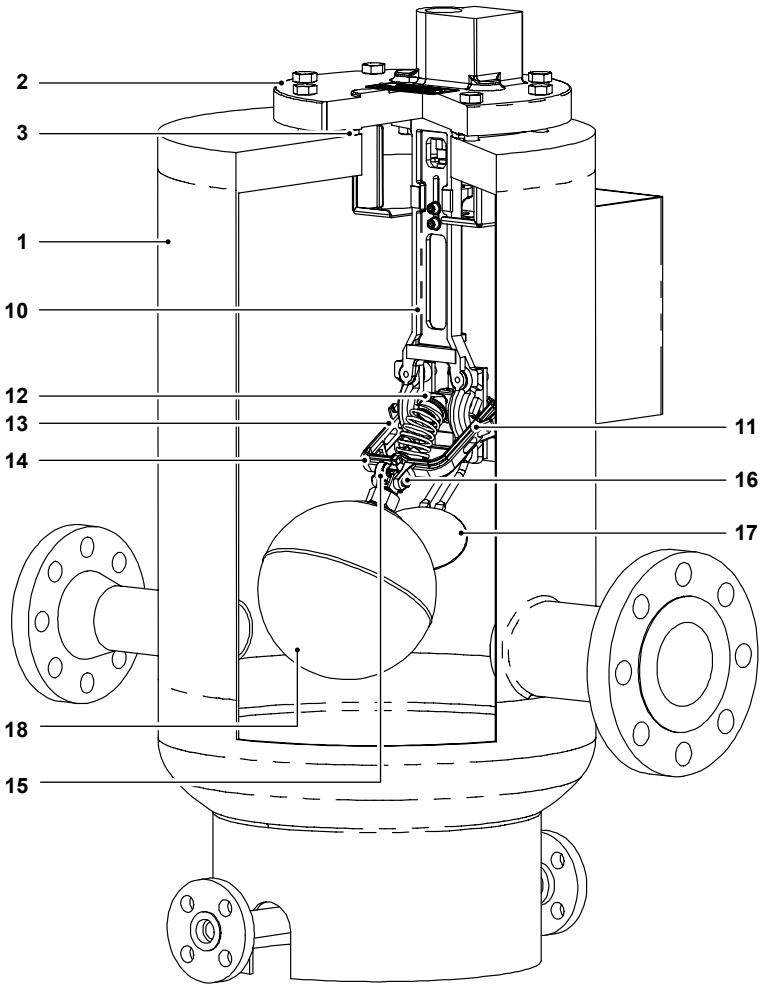
PMA	Maximum allowable pressure	200 psi g @ 750˚F	(13.8 bar g @ 399˚C)
TMA	Maximum allowable temperature	750˚F @ 200 psi g	(399˚C @ 13.8 bar g)

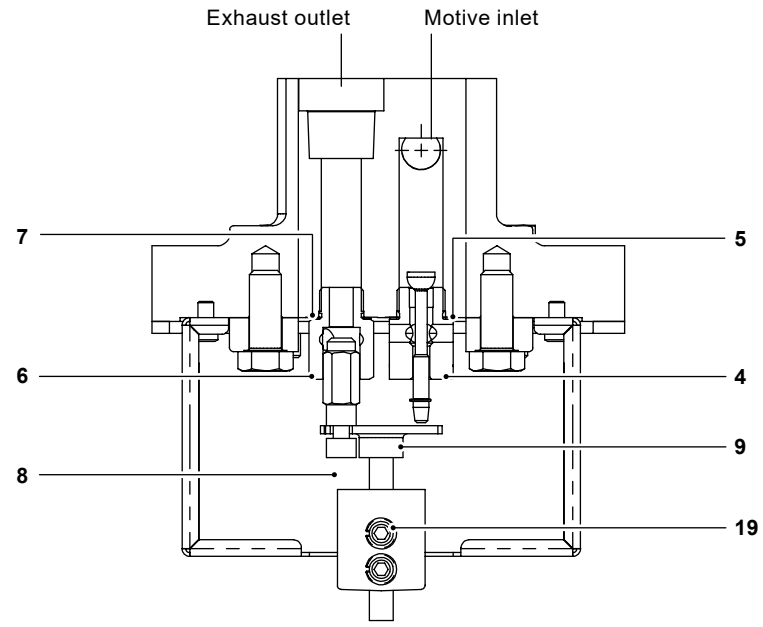
Check valves

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.)

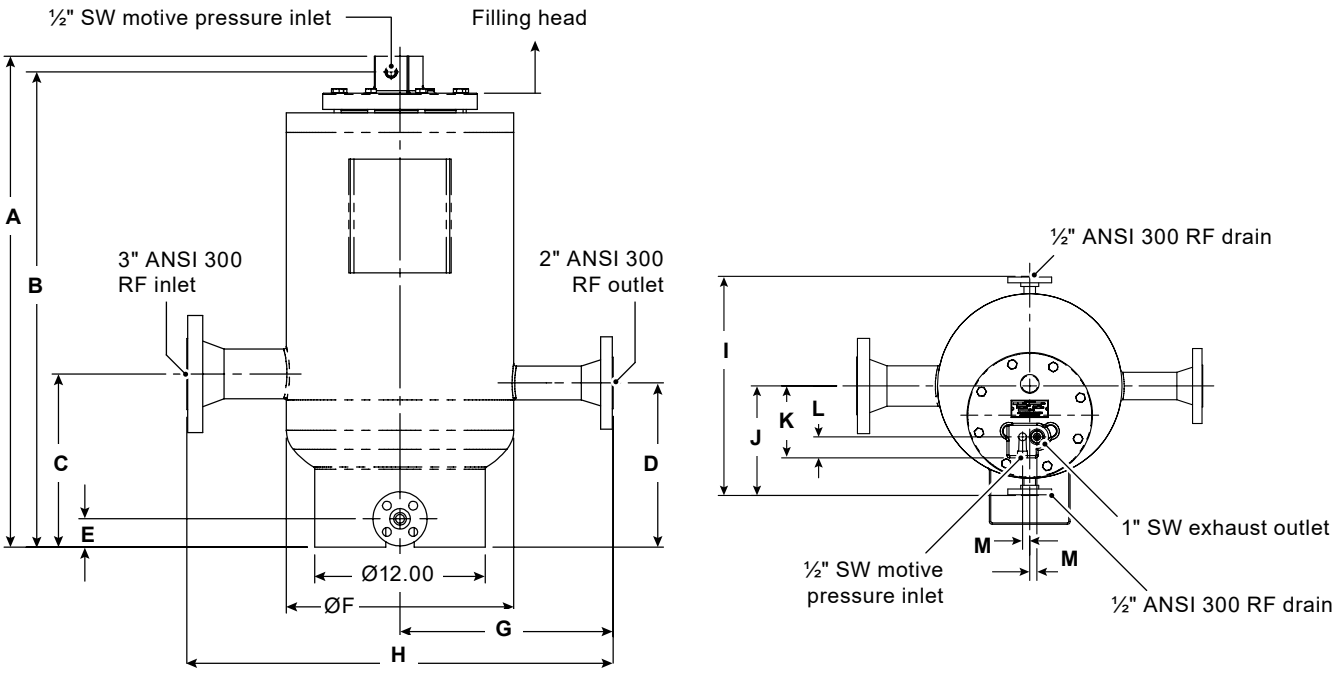
Materials

No.	Part	Material	
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	Stainless steel	
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	





Dimensions/weights (approximate) in inches (mm) and lbs (kg)



A	B*	C	D	E	F	G	H	I	J	K	L	M	Weight
34.6 (879)	33.4 (848)	12.2 (310)	11.6 (295)	2.0 (51)	16.0 (406)	15.0 (381)	30.0 (762)	19.0 (483)	9.5 (241)	6.1 (155)	4.4 (112)	.6 (15)	210 (95.3)

*B Dimensions is to the centerline of the motive supply inlet.

5.1
24

Capacities

For sizing and selection data, see TIS 5.030

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.

TI-P207-10-US
Issue 3

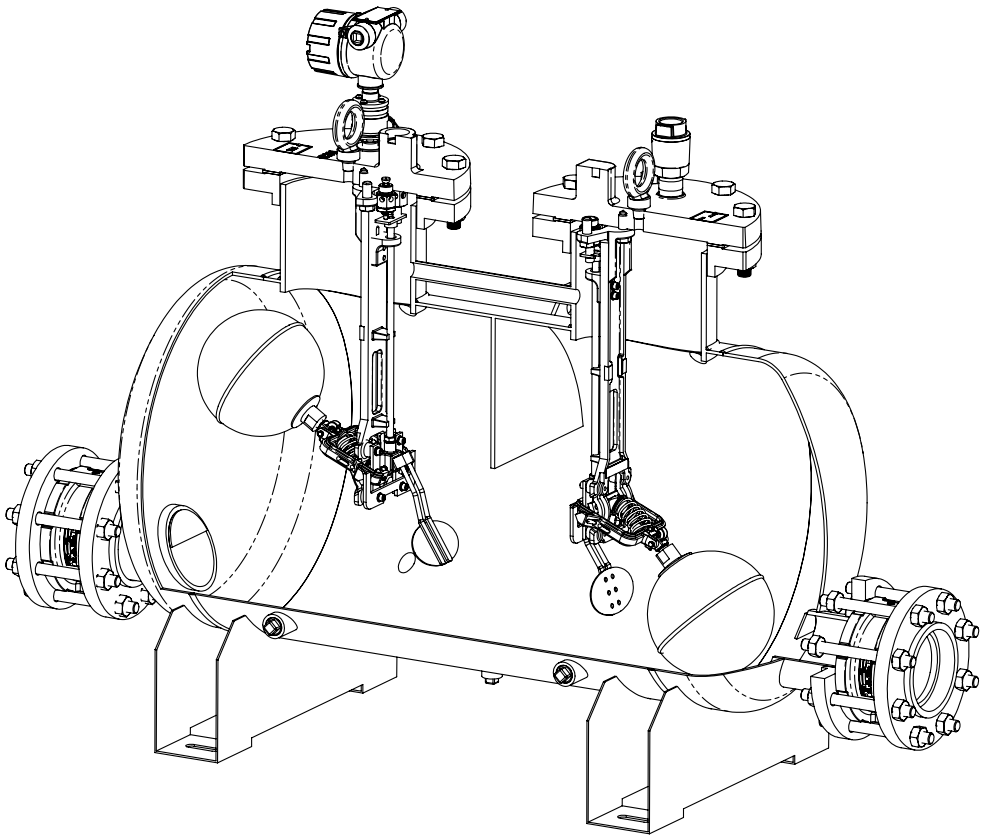
The Pivotrol® Pump Patented PTF4 (High Capacity) Pressure Powered Pump

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
PMO	200 psi g (13.8 bar g)
Sizes	4" x 4" (DN100 x DN100)
Connections	Inlet and outlet: ANSI 150 flange NPT/SW Motive and exhaust: NPT/SW
Construction	Fabricated steel body 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



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-P207-12-US

For increased service life - Operate pump with motive pressure 15-20 psi g (1.0-1.4 bar g) above pump back pressure.

Limiting operating conditions

PMO Maximum operating pressure	200 psi g (13.8 bar g)
Minimum motive differential required:	5 psi g (0.34 bar g)
Maximum back pressure:	75% of motive pressure

Filling head requirements	Filling Head	Filling Height
	Above Pump Cover	From Base of Pump
Standard recommended	36" (914 mm)	69.5" (1765 mm)
Maximum filling head	60" (1524 mm)	92" (2337 mm)
Minimum filling head	-3" (-76 mm)	29.3" (744 mm)

Maximum number of cycles per minute = 6

Product is safe for use under full vacuum conditions.

Note: See TI-P207-08-US for cycle counter details.

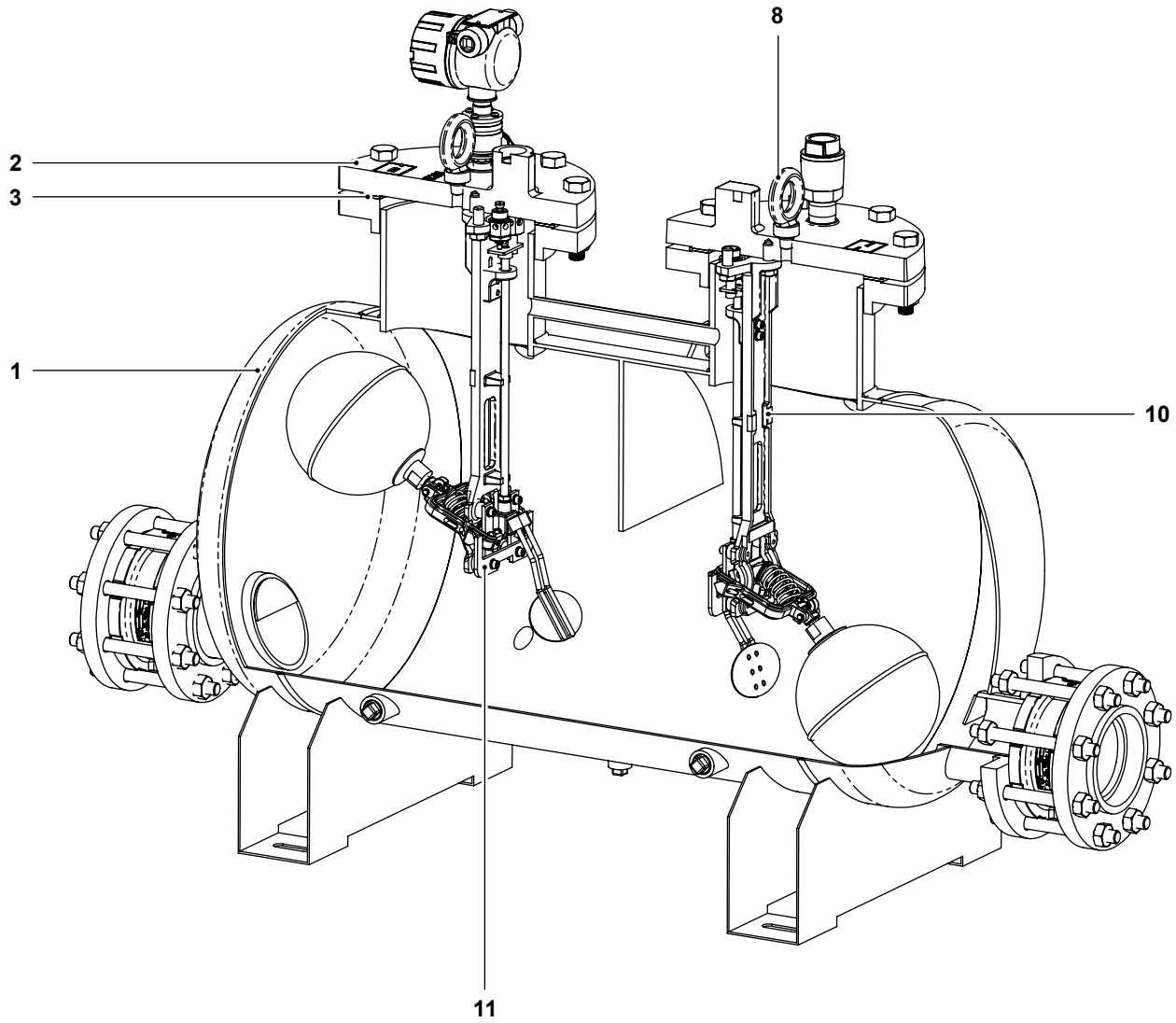
Pressure shell design conditions

PMA	Maximum allowable pressure		200 psi g @ 388 °F	(13.8 bar g @ 198 °C)
TMA	Maximum allowable temperature		650 °F @ 124 psi g	(343 °C @ 8.55 bar g)
		with reflex gauge glass:	600 °F @ 125 psi g	(316 °C @ 8.6 bar g)

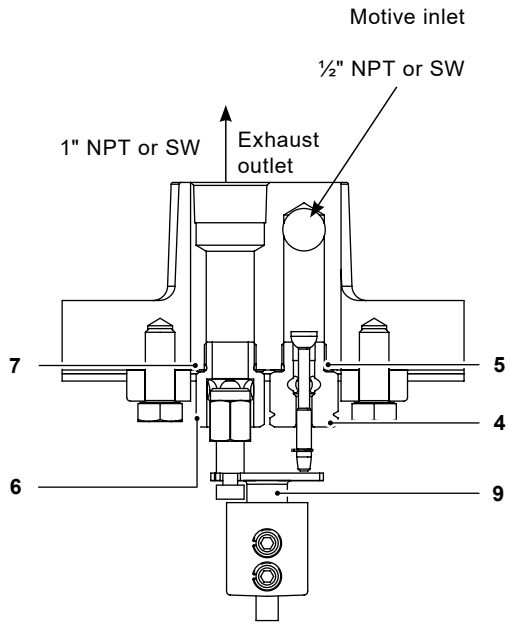
Capacities

For sizing and selection data, see TI-P207-12-US

Materials

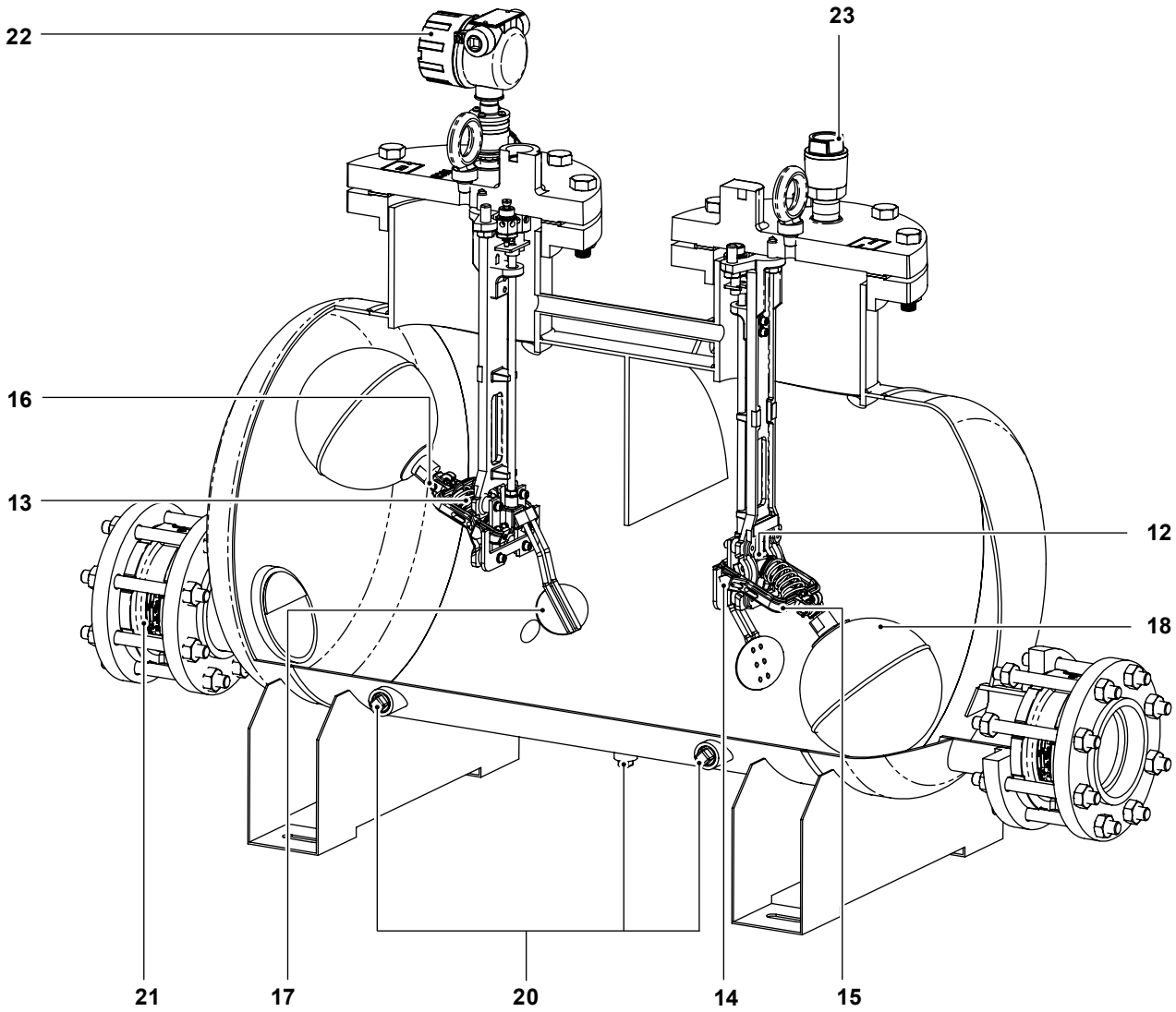


No.	Part	Material	
1	Body	Fabricated steel	ASME coded
2	Cover	Cast steel	ASTM A216 WCB
3	Cover gasket	Spiral wound	AISI 304/Graphite
4	Steam inlet valve assembly	Stainless steel	
5	Steam inlet valve gasket	Stainless steel	
6	Exhaust valve assembly	Stainless steel	
7	Exhaust valve gasket	Stainless steel	
8	Eye bolt	Stainless steel	
9	Push rod assembly	Stainless steel	
10	Mechanism support	Stainless steel	
11	Bushing mounting plate (Bushings)	Stainless steel Carbide	

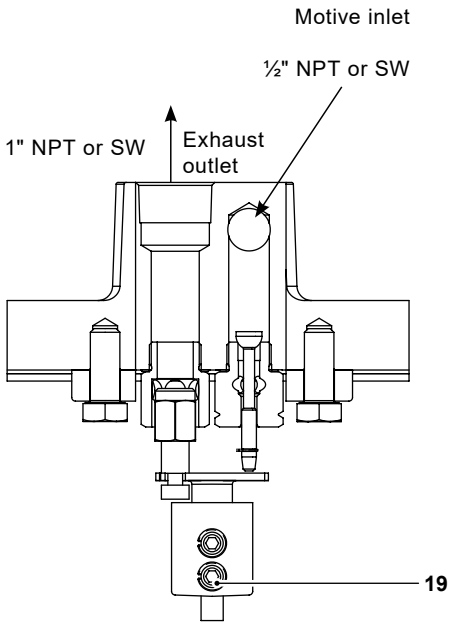


Materials continued on next page

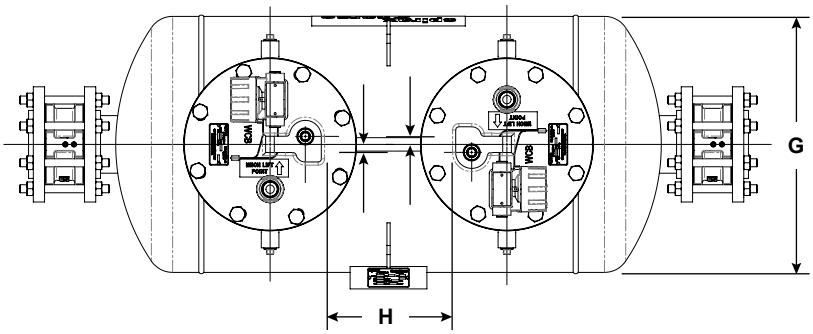
Materials

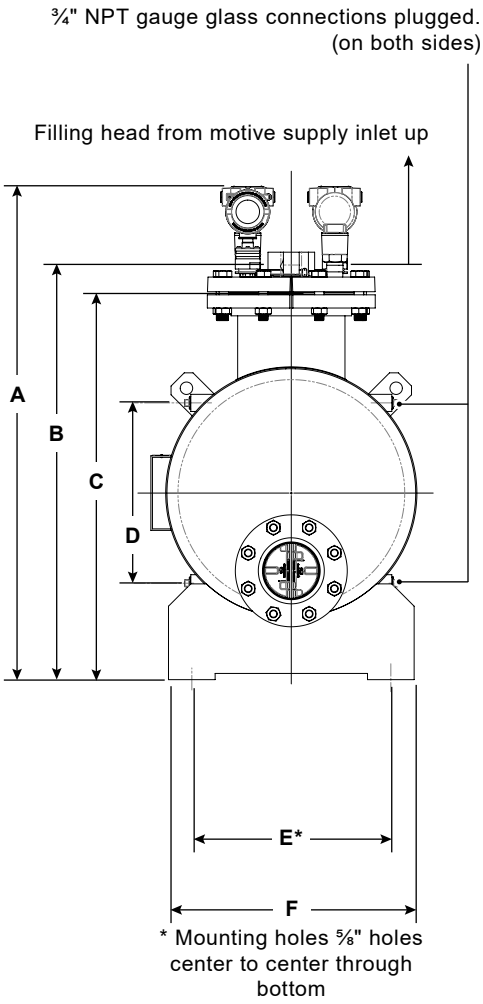


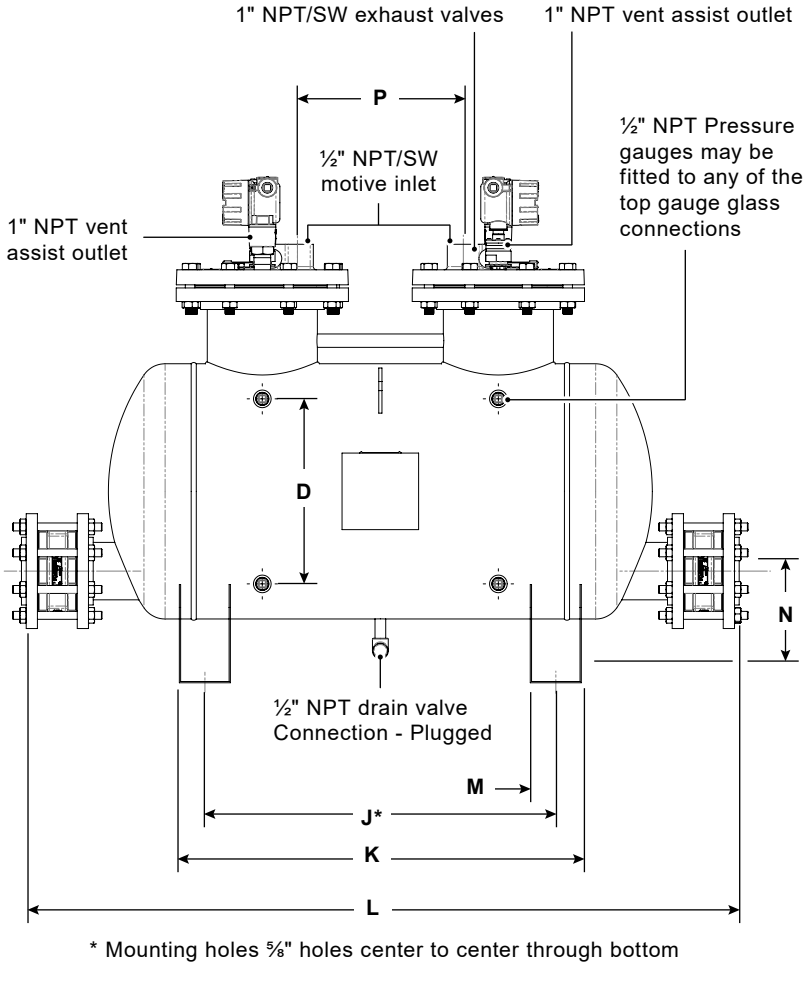
No.	Part	Material
12	Spring anchor	Carbide
13	Spring	Inconel
14	Float arm assembly (Pivots)	Stainless steel carbide
15	Float pivot	Stainless steel
16	Pin	Stainless steel
17	Paddle	Stainless steel
18	Float	Stainless steel
19	Screws (typical)	Stainless steel
20	Plugs (typical)	Forged stainless steel
21	Check valves (SDCV44)	Stainless steel (see TI-P154-10-US)
22	Cycle counter	Various (see TI-P207-08-US)
23	Vent assist valve	Stainless steel



Dimensions/weights (approximate) in inches (mm) and lbs (kg)







A (Ref Only)	B*	C	D	E	F	G	H	I	J	K	L	M	N	P	Weight
39.5 (1002)	33.5 (851)	32.0 (813)	14.5 (368)	16.0 (406)	19.8 (503)	20.0 (508)	10.5 (267)	0.6 (15)	27.5 (699)	31.5 (800)	56.2 (1427)	4.0 (102)	8.8 (224)	13.0 (330)	550 lb (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)

Sample specification

The pump shall be Spirax Sarco Pivotrol® Pump (patented) PTF4, operated by steam, compressed air or other pressurized gas to 200 psi g (13.8 bar g), 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-5-211-US, which accompanies the product.

Maintenance

Complete installation and maintenance instructions are given in IM-5-211-US, which accompanies the product.

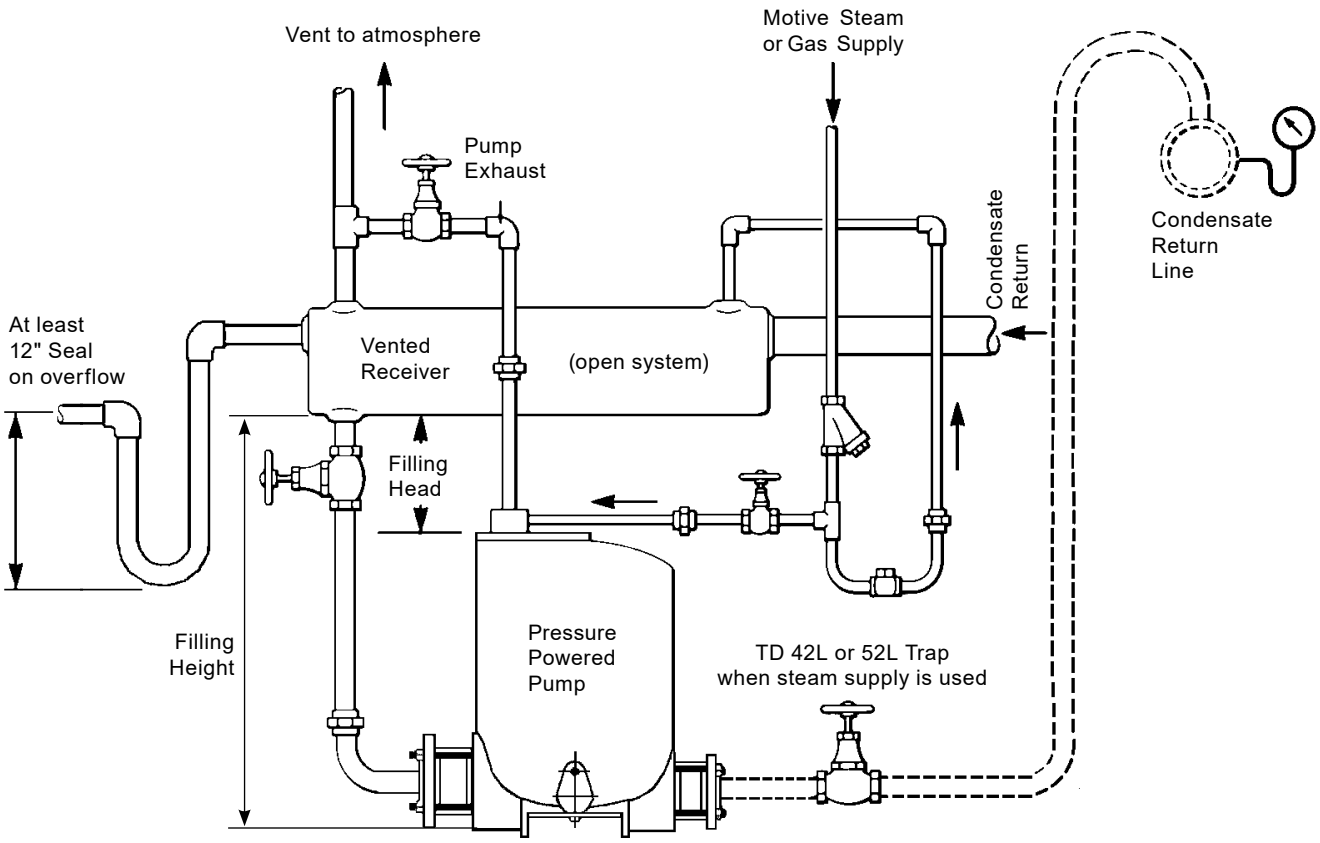
TI-P207-12-US
Issue 1

The Pivotrol® Pump Patented Selection and Sizing

How to Select and 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 PTC or PTF. 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 psi g in return line, plus downstream piping friction pressure drop in psi g 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.



Recommended installation
The pump is fitted with vented receiver or an inlet reservoir.
Details of the application will determine whether a vented receiver or an inlet reservoir will be needed to accomplish this.

For capacities, condensate load and solution, see next page

Capacity lb/h

When installed with recommended filling head above top of pump.

Condensate load	7000 lb/h	(3175 kg/h)
Steam pressure available for operating pump	80 psi g	(5.51 bar g)
Vertical lift from pump to the return piping	30 feet	(914 cm)
Pressure in the return piping (piping friction negligible)	25 psi g	(1.72 bar g)
Filling head on the pump available	12"	(304 mm)

Solution:

1. Calculate "H", the total lift or back pressure, against which the condensate must be pumped = (30 x 0.433) + 25=38 psi g
2. From capacity table, with 80 psi g (5.51 bar g) inlet pressure and 40 psi g (2.75 bar g) back pressure, choose a 2" x 2" (50 mm x 50 mm) pump with stainless steel check valves, which ha a capacity of 6,935 lb/h.

Note from capacity multiplying factor charts:
A. Pump capacity if filling head is 24": 1.16 x 6,935 = 8045 lb/h
B. Pump capacity using compressed air: 1.12 x 6,935 = 7767 lb/h (% back pressure is 38—75=50%)

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 reachng 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.

	Flash Steam up to —	Pipe Size Diameter	Length	Vent Line Diameter
Pump size - up to 3"x 2"	75 lb/h	4" (102 mm)	36" (914 mm)	1½" (38.1 mm)
	150 lb/h	6" (152 mm)	36" (914 mm)	2" (50.8 mm)
	300 lb/h	8" (203 mm)	36" (914 mm)	3" (76.2 mm)
	600 lb/h	10" (254 mm)	36" (914 mm)	4" (102 mm)
	900 lb/h	12" (305 mm)	36" (914 mm)	6" (152 mm)
	1200 lb/h	16" (406 mm)	36" (914 mm)	6" (152 mm)
	2000 lb/h	20" (508 mm)	36" (914 mm)	8" (203 mm)
	Flash Steam up to —	**Pipe Size Diameter**	**Length**	**Vent Line Diameter**
Pump Size - PTF4	1000 lb/h	16" (406 mm)	60" (1524 mm)	6" (152 mm)
	2000 lb/h	20" (508 mm)	60" (1524 mm)	8" (203 mm)
	3000 lb/h	24" (610 mm)	60" (1524 mm)	8" (203 mm)
	4000 lb/h	26'' (660 mm)	60" (1524 mm)	10" (254 mm)
	5000 lb/h	28" (711 mm)	60" (1524 mm)	10" (254 mm)
	6000 lb/h	30" (762 mm)	72" (1829 mm)	12" (305 mm)
	7000 lb/h	32" (813 mm)	72" (1829 mm)	12" (305 mm)
	8000 lb/h	36" (914 mm)	72" (1829 mm)	14" (356 mm)

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 dischare 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' (0.61 m)				
1000	2' (0.61 m)				
1500	3' (0.91 m)	2' (0.61 m)			
2000	3.5' (1.1 m)	2' (0.61 m)	1' (0.30 m)		
3000		3' (0.91 m)	2' (0.61 m)		
4000		4' (1.2 m)	2' (0.61 m)	1' (0.30 m)	
5000		6' (1.8 m)	3' (0.91 m)	2' (0.61 m)	
6000			3' (0.91 m)	2' (0.61 m)	
7000			3' (0.91 m)	2' (0.61 m)	
8000			4' (1.2 m)	2' (0.61 m)	
9000			4.5' (1.4 m)	3' (0.91 m)	2' (0.61 m)
10,000			5' (1.5 m)	3' (0.91 m)	2' (0.61 m)
11,000			5' (1.5 m)	3' (0.91 m)	2' (0.61 m)

Pump Size – PTF4

Liquid Load lb/h	Reservoir Pipe Size*			
	12"	16"	20"	24"
10,000	5' (1.5 m)	3' (0.91 m)	2' (0.61 m)	
20,000	10' (3.0 m)	7' (2.1 m)	4' (1.2 m)	
30,000		9' (2.7 m)	6' (1.8 m)	4' (1.2 m)
40,000		12' (3.7 m)	7.5' (2.3 m)	6' (1.8 m)
50,000			9' (2.7 m)	6' (1.8 m)
60,000			9' (2.7 m)	6' (1.8 m)

* 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									Capacity Multiplying Factors
1.19	1.43	1.43	1.53	1.85	2.04	2.14	2.20	2.44	
PTF4									Capacity Multiplying Factors
1.19	1.43	1.43	1.53	1.85	2.04	2.14	2.20	2.44	

Motive Pressure psi g	Back Pressure psi g	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
200	180	-	-	-
200	160	-	5250	3518
200	140	6375	7375	4941
200	120	7375	9440	6325
200	100	8250	11145	7467
200	80	9000	12565	8419
200	60	9685	14260	9554
200	50	10000	14875	9966
200	40	10310	15690	10512
200	30	10635	16310	10928
200	20	10950	17000	11390
200	10	11195	17640	11819
180	160	-	3750	2513
180	140	5425	6335	4244
180	120	6685	8555	5732
180	100	7760	10375	6951
180	80	8600	11980	8027
180	60	9450	13625	9129
180	50	9830	14375	9631
180	40	10230	15150	10151
180	30	10560	15875	10636
180	20	10895	16665	11166
180	10	11195	17505	11728
160	140	4250	4860	3256
160	120	5750	7500	5025
160	100	7040	9375	6281
160	80	8065	11135	7460
160	60	9105	12940	8670
160	50	9565	13750	9213
160	40	9990	14565	9759
160	30	10440	15400	10318
160	20	10870	16270	10901
160	10	11195	17315	11601
140	120	4625	6085	4077
140	100	6120	8145	5457
140	80	7420	10065	6744
140	60	8625	12120	8120
140	50	9190	13000	8710
140	40	9690	13940	9340

Motive Pressure psi g	Back Pressure psi g	3" x 2" PTF-HP 12" Filling Head lb/hr
300	200	12550
300	185	13875
300	160	14565
300	140	15750
300	120	17125
300	100	19125
300	80	20315
300	60	22065
300	40	24375
300	20	27500
300	10	28750
280	200	11125
280	180	12435
280	160	13250
280	140	14435
280	120	16875
280	100	17875
280	80	19125
280	60	20850
280	40	23125
280	20	26125
280	10	27565
250	200	9190
250	180	10185
250	160	11000
250	140	12190
250	120	13935
250	100	15935
250	80	17065
250	60	19000
250	40	21200
250	20	24125
250	10	25700
200	180	6065
200	160	7190
200	140	8315
200	120	11935
200	100	12500
200	80	14065

Table continued on next page

Motive Pressure psi g	Back Pressure psi g	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
140	30	10245	14875	9966
140	20	10760	15840	10613
140	10	11195	17045	11420
120	100	4700	6300	4221
120	80	6475	8625	5779
120	60	7845	10970	7350
120	50	8530	12100	8107
120	40	9240	13160	8817
120	30	9865	14250	9548
120	20	10535	15280	10238
120	10	11065	16655	11159
100	80	4995	6260	4194
100	60	6620	9255	6201
100	50	7500	10680	7156
100	40	8370	12040	8067
100	30	9145	13310	8918
100	20	9900	14460	9688
100	10	10630	16100	10787
80	60	5010	6485	4345
80	50	6000	8435	5651
80	40	6935	10185	6824
80	30	7970	11750	7873
80	20	8870	13250	8878
80	10	10000	15190	10177
60	50	4250	5000	3350
60	40	5315	7485	5015
60	30	6360	9625	6449
60	20	7460	11580	7759
60	10	9190	13750	9213
50	40	4440	5500	3685
50	30	5625	8125	5444
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

Motive Pressure psi g	Back Pressure psi g	3" x 2" PTF-HP 12" Filling Head lb/hr
200	60	15825
200	40	18125
200	20	20815
200	10	22315
150	120	7875
150	100	8875
150	80	10750
150	60	12625
150	40	14935
150	20	17375
150	10	19000
125	100	7065
125	80	9065
125	60	10875
125	40	13250
125	20	15500
125	10	16685
100	80	7245
100	60	9125
100	40	11435
100	20	13810
100	10	15375
75	60	7035
75	40	9435
75	20	12125
75	10	13565
50	40	5085
50	20	10185
50	10	11625
25	20	2750
25	10	9685

PTF4

Motive Pressure psi g	Back Pressure psi g	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

Motive Pressure psi g	Back Pressure psi g	36” Fill Head (70” Fill Height) lb/hr
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 (psi g) – min. VAV delta P (psi g) > Back Pressure (psi g)
- Capacity charts to be read as normal, i.e. at pump motive and back pressure.
- If, Pump Motive Pressure (psi g) – min. VAV delta P (psi g) < Back Pressure (psi g), 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 psi g. Static Back Pressure = 45 psi g.

Open System.

PTF4

Capacity charts show capacity at 150 psi g motive with 45 psi g back pressure.

Closed System.

The Vent Assist Valve on the PTF4 requires at least 75 psi g differential
pressure to operate in a closed system.

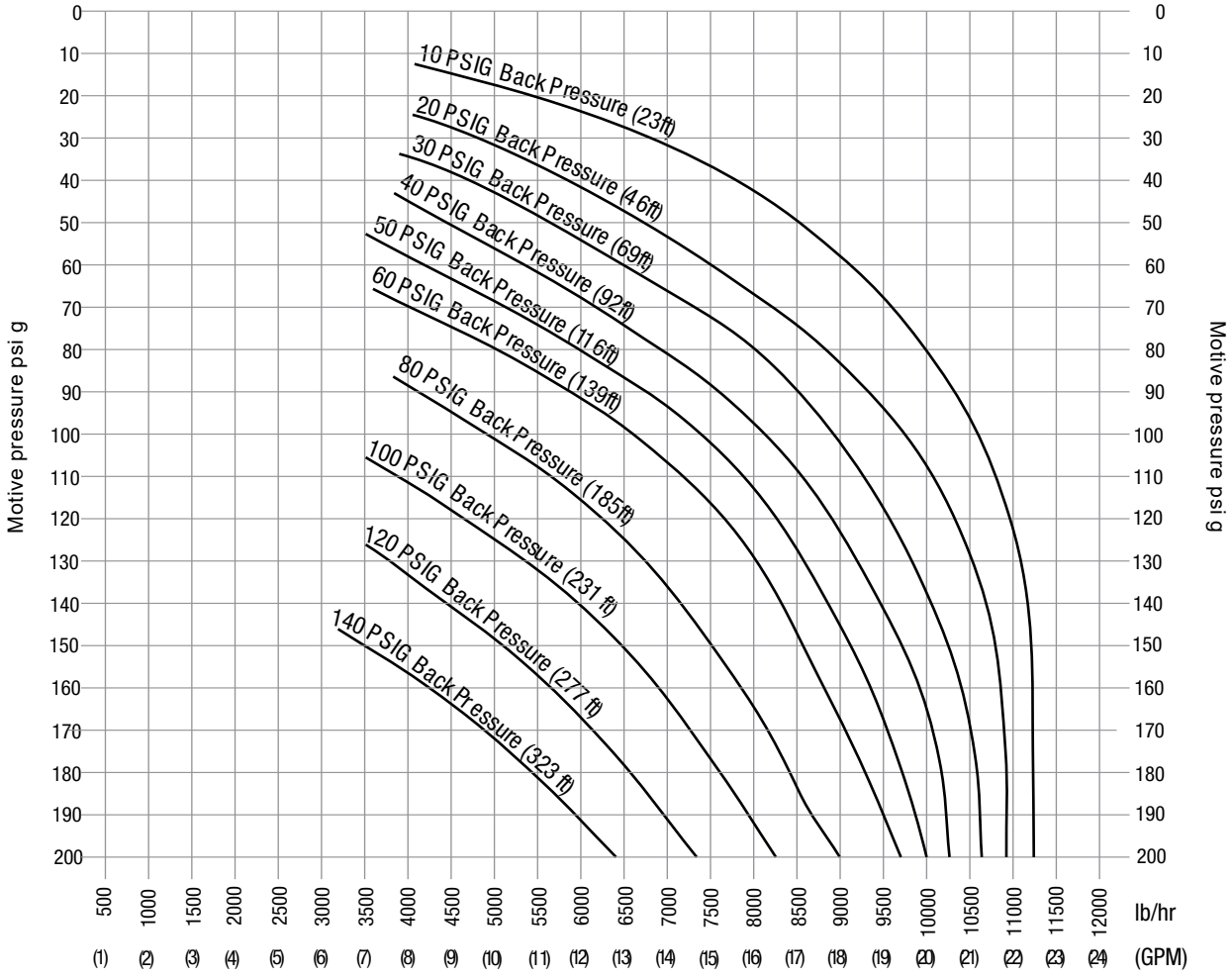
To size the PTF4 pump:

- Pump Motive Pressure – min. VAV delta P > Back Pressure.
- 150 psi g – 75 psi g > 45 psi g

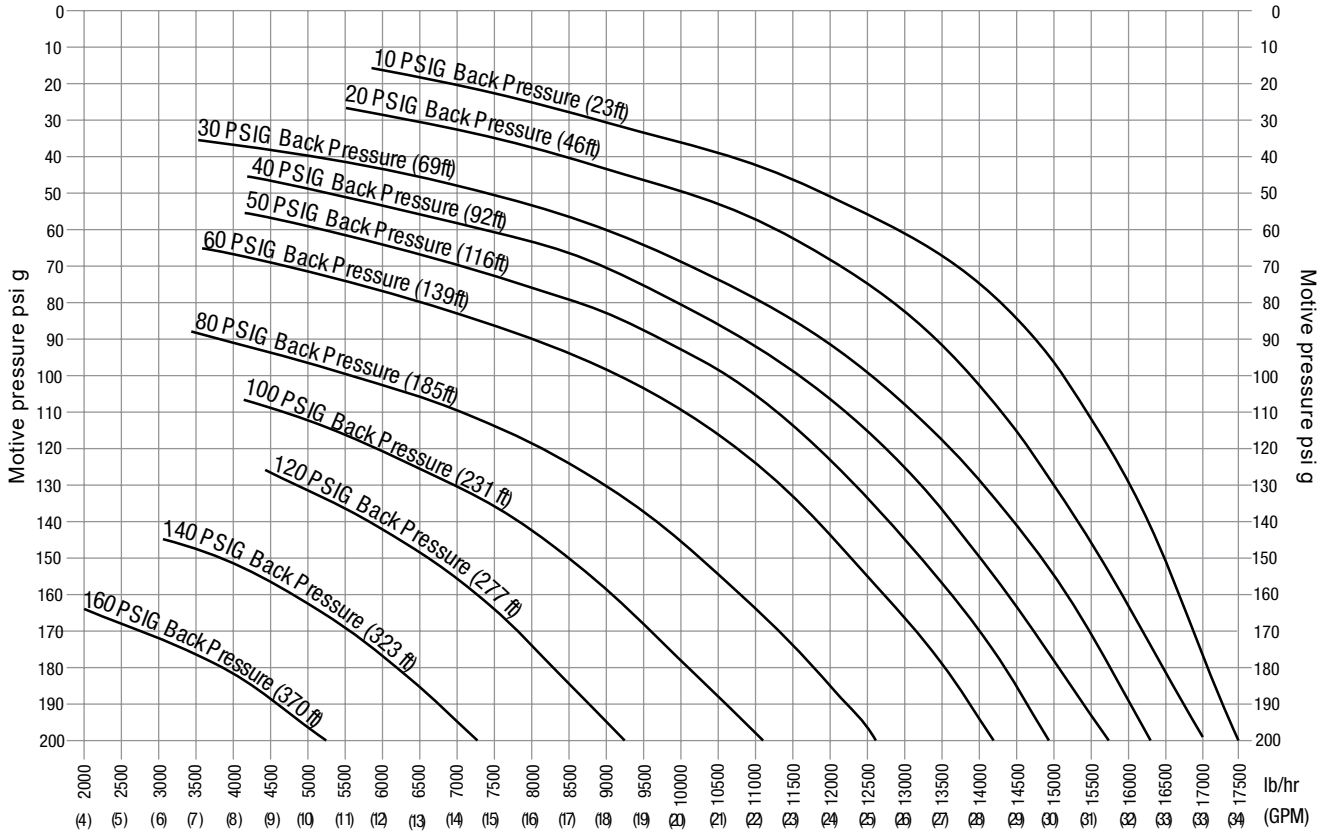
As the motive pressure is 150 psi g and the VAV requires a minimum 120 psi g to operate (75 + 45 = 120), this combination is sized correctly.

Capacity Charts

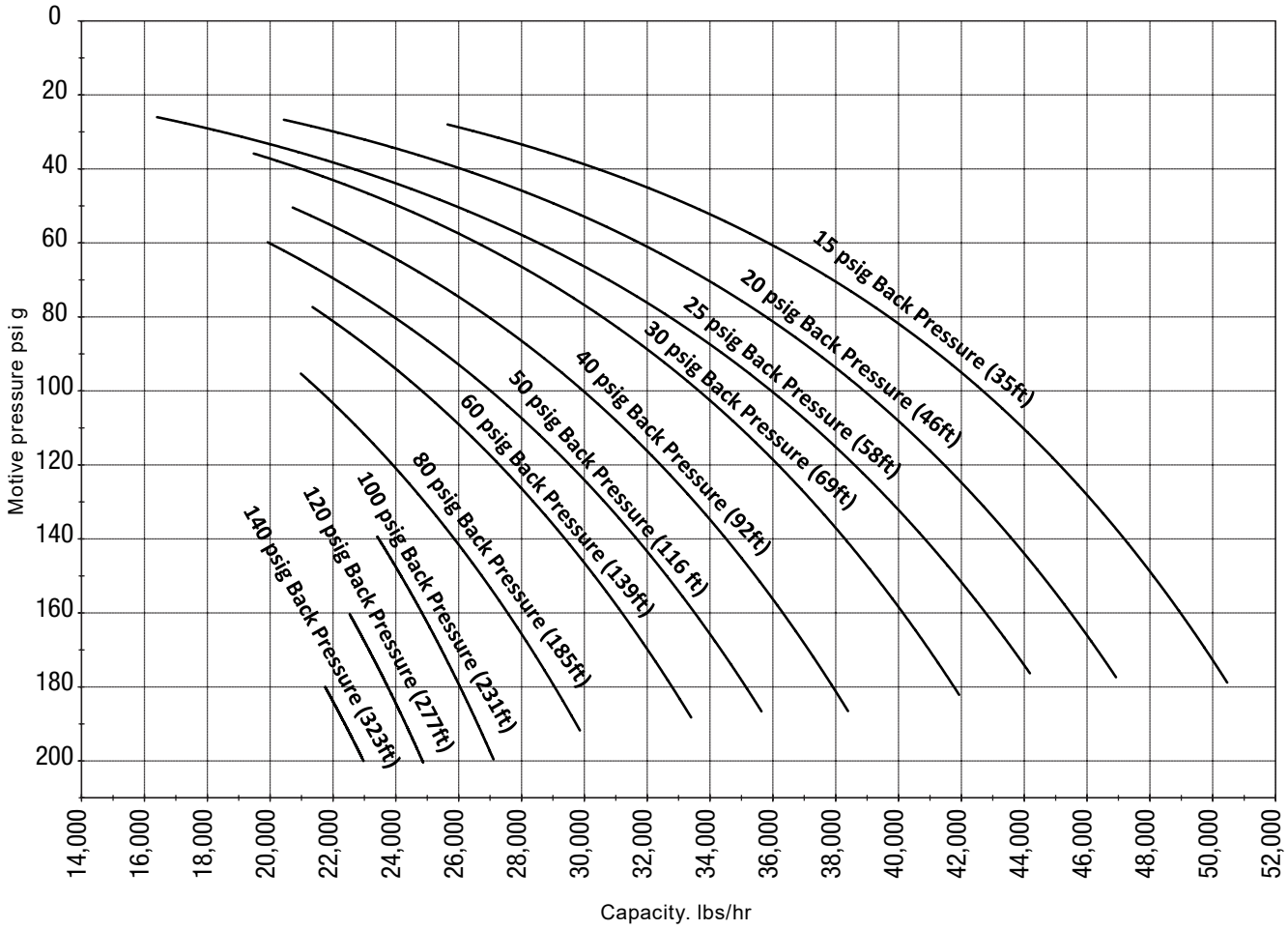
2" x 2" Pivotrol® Pump



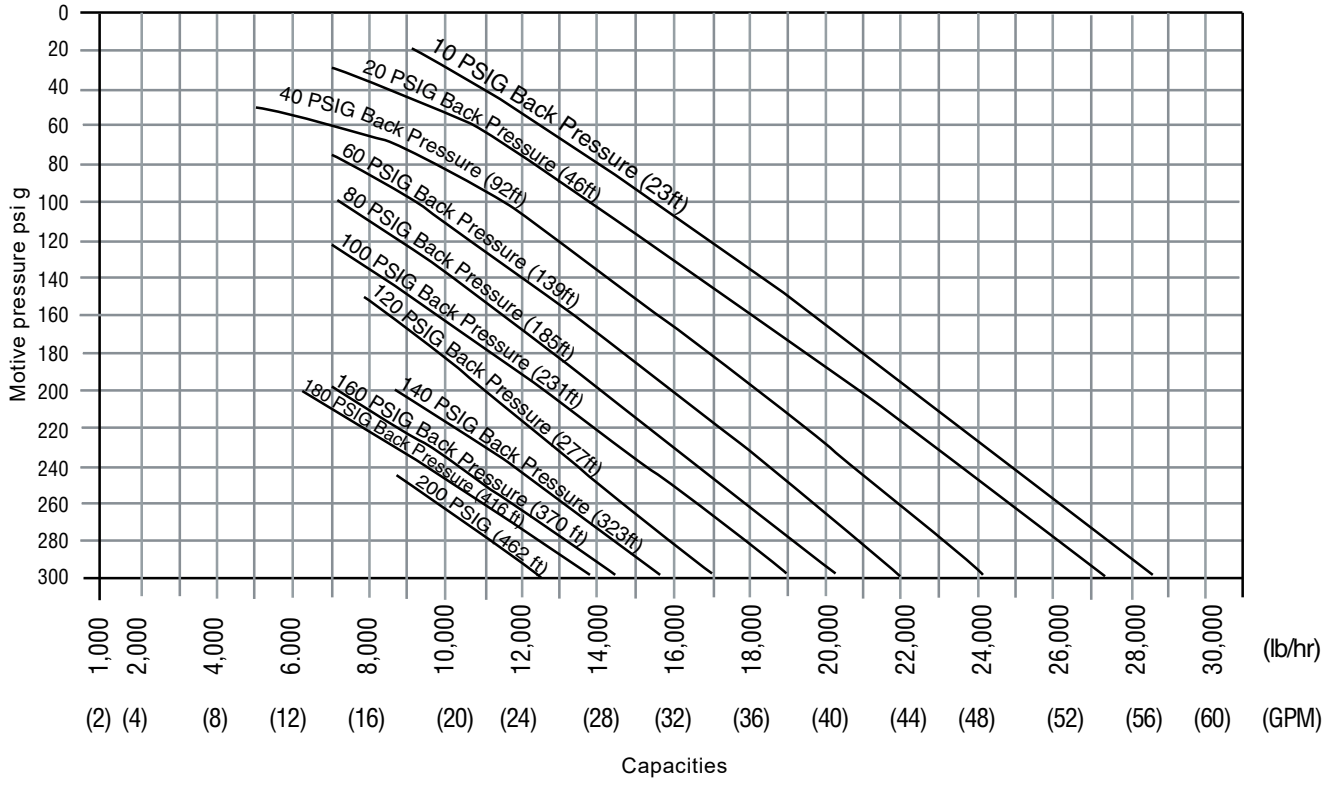
3" x 2" Pivotrol® Pump



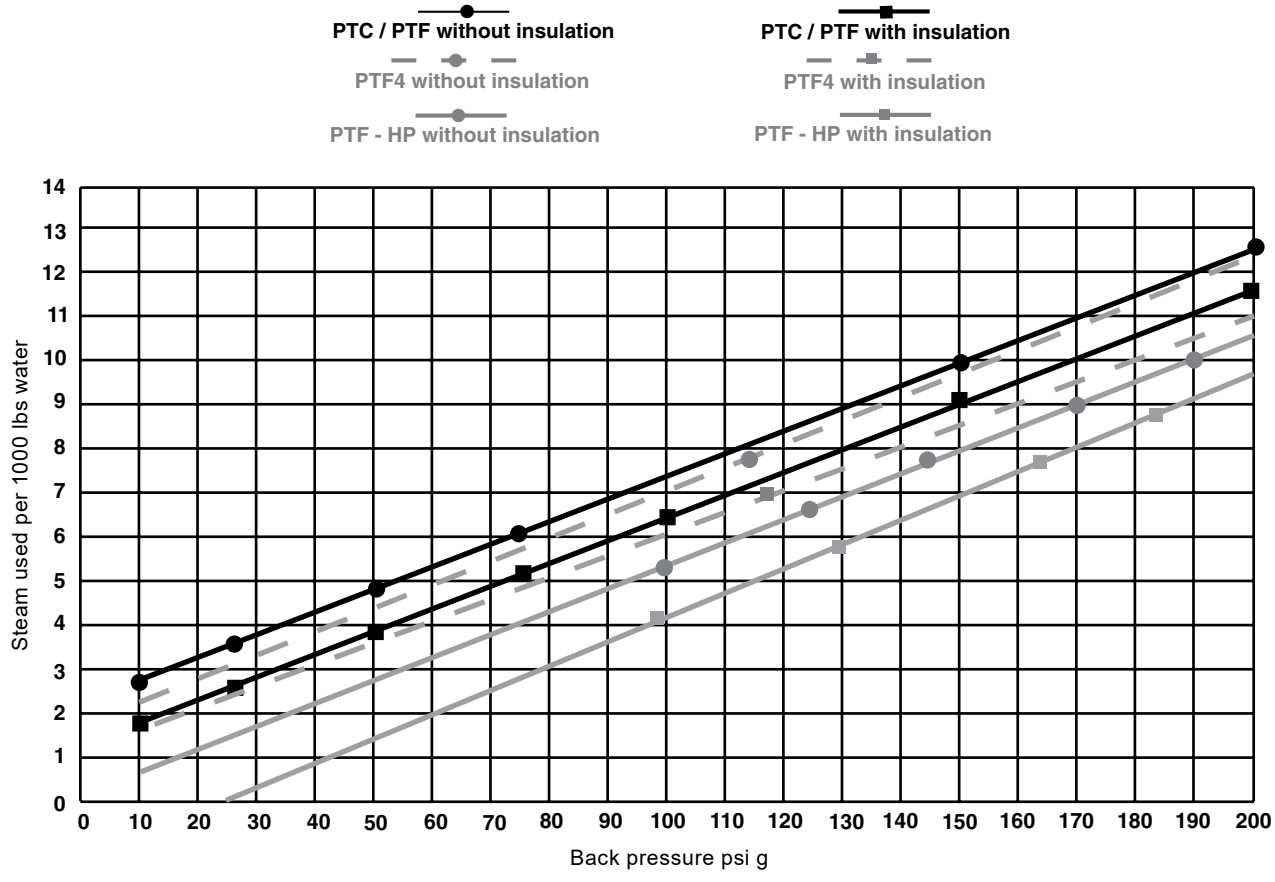
PTF4 Capacity Chart



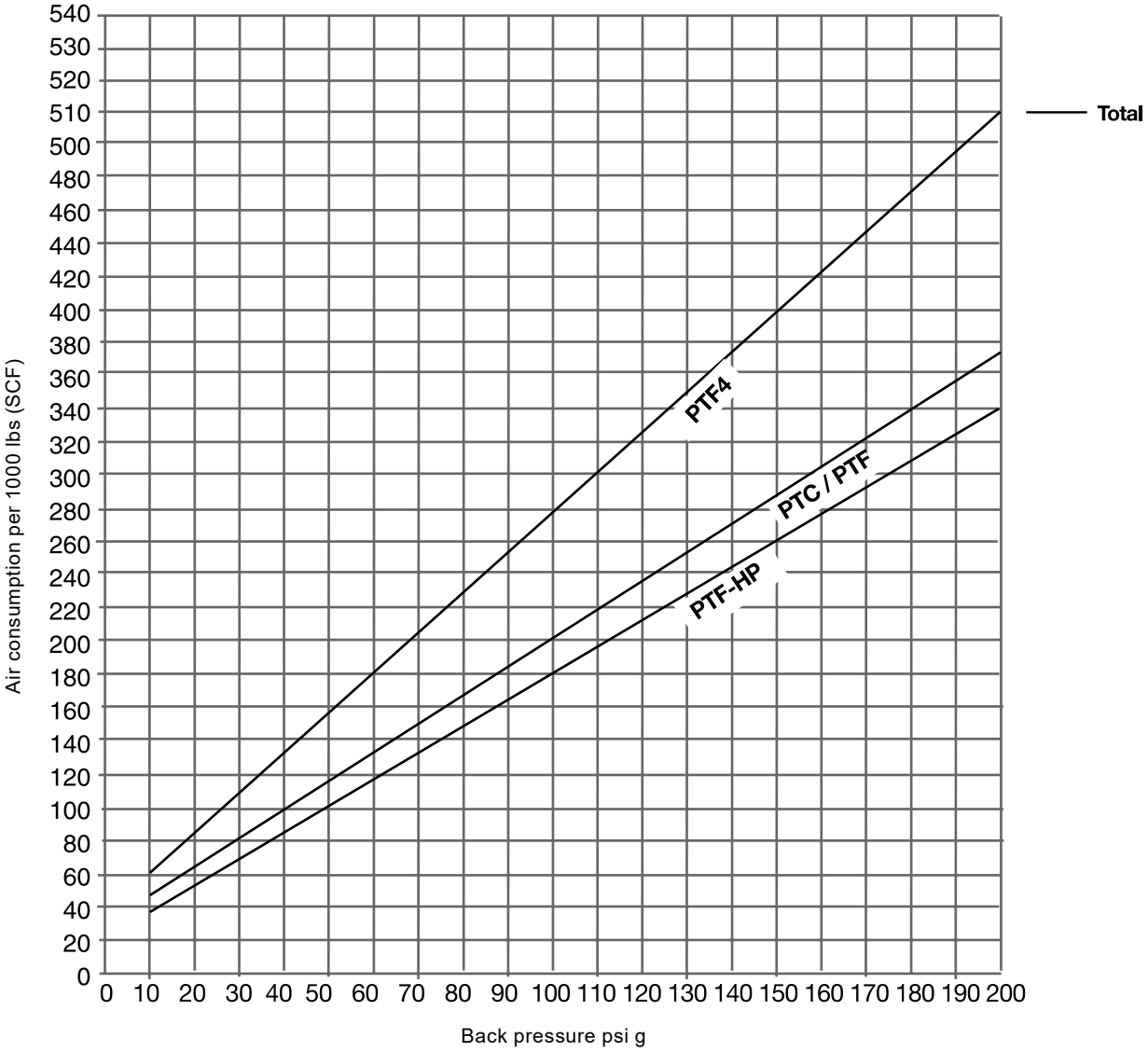
3" x 2" PTF-HP Pivotrol® Pump



Pivotrol® Steam Consumption Chart



Pivotrol® air consumption chart

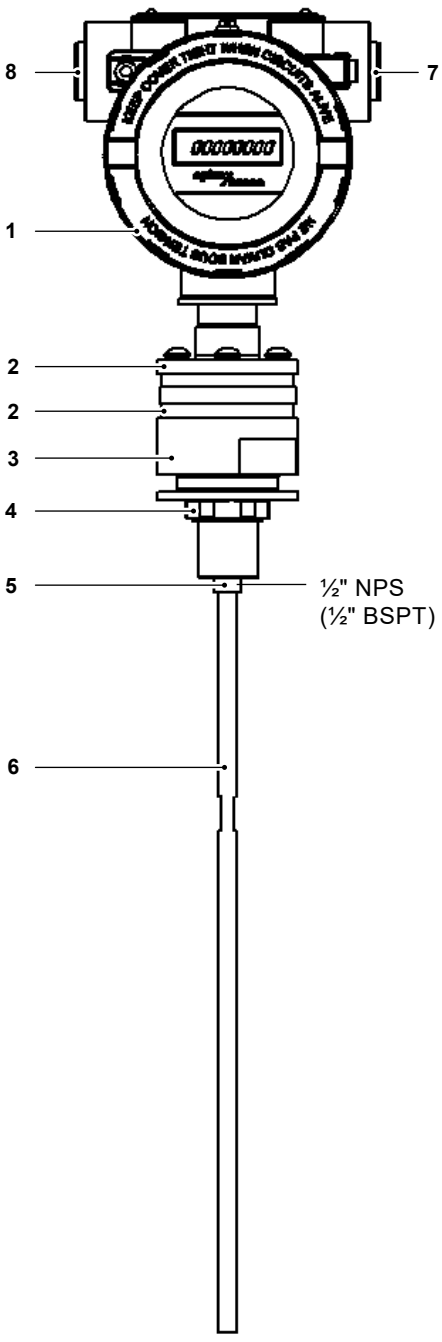


TI-P207-08-US
Issue 2

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.



Standard unit

Specifications

Counter	8 Digit LCD display — NEMA 4 X, IP65
Options	BSP Threaded version (Standard counter only)

Limiting operating conditions

External operating temperature range	Counter	14 °F to 122 °F (-10 °C to 50 °C)
Maximum sensor pressure	PMO	300 psi g (21 bar g)
Maximum operating temperature	TMO	500 °F (260 °C)

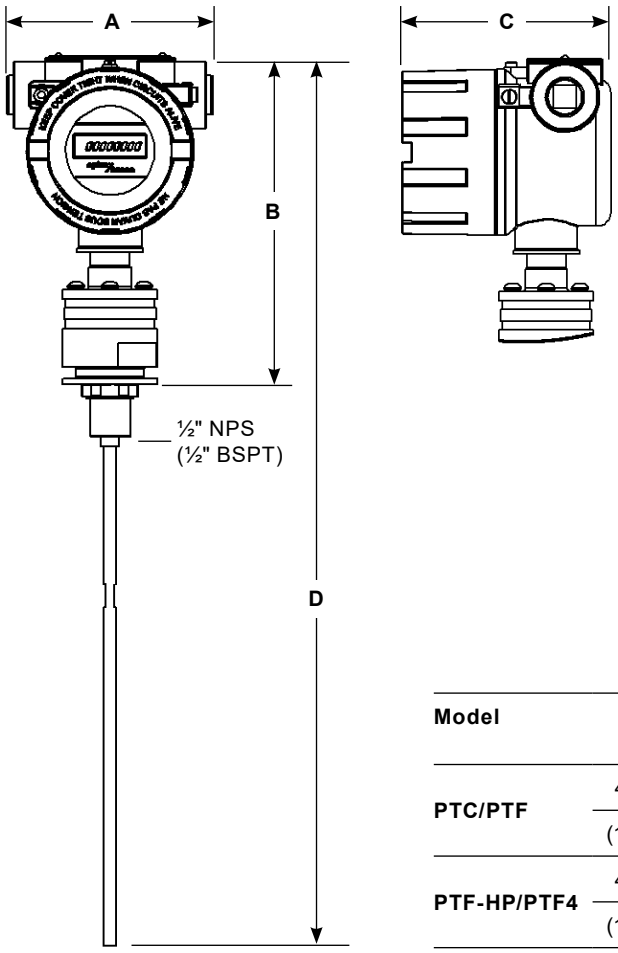
Pump capacities

Model	Approximate Gallons/Cycle
PTC	7.1 / 26.9L
PTF	8.4 / 31.8L
PTF-HP	16 / 60.6L
PTF4	26.9 / 102L

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

Dimensions/weights (approximate) in inches (mm) and lbs (kg)



Model	A	A w/Aux	B	C	D	Weight
PTC/PTF	4.4	4.9	7.0	4.4	17.0	5 lb
	(112)	(124)	(178)	(112)	(432)	(2.3 kg)
PTF-HP/PTF4	4.4	4.9	7.0	4.4	25.4	5.1 lb
	(112)	(124)	(178)	(112)	(645)	(2.3 kg)

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 ºC to + 85 ºC (- 40 ºF to 185 ºF)

Battery is suitable for up to 10 years of uninterrupted operation.

Safety and regulatory compliance

Seating nut contains Teflon®.

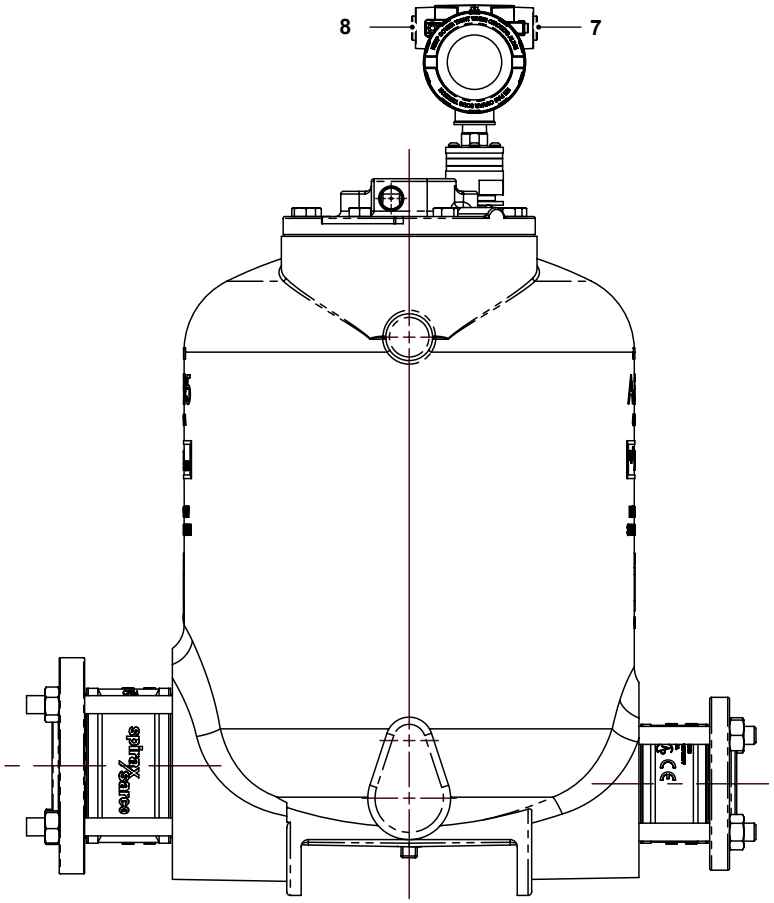
This product is not intended to be submerged.

Installation (see IM-P207-09-US)

1. Place counter in ½" NPS (½" 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) and (8) should not be unscrewed and will void warranty.



Orientation (see IM-P207-09-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 be 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.

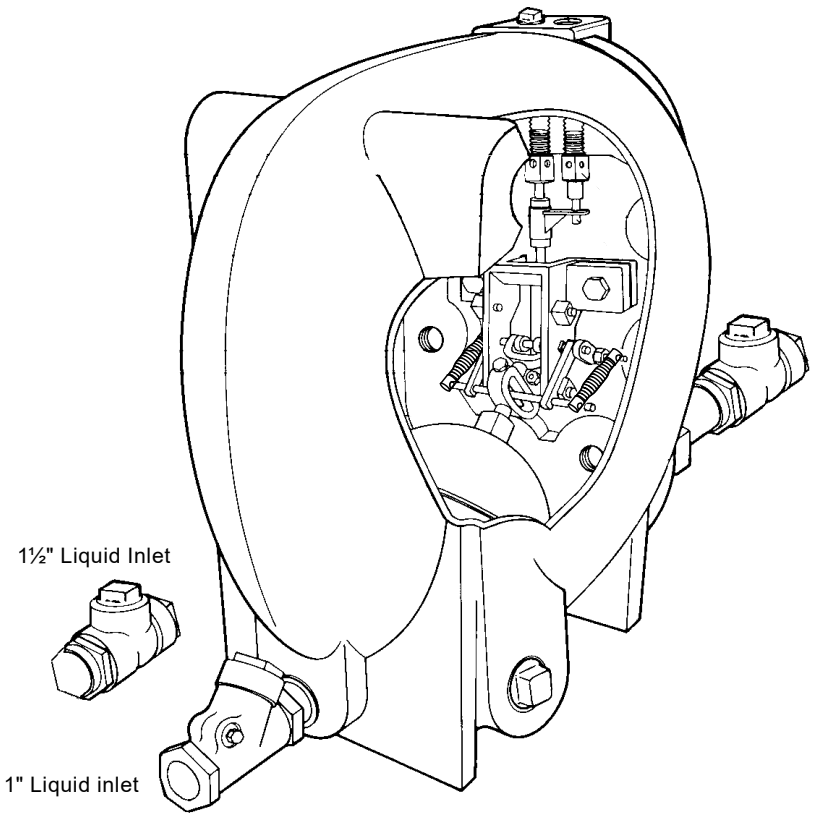
TI-P208-02-US
Issue 2

Low-Profile Pressure Powered Pump™ PPEC

Description

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 psi g (8.6 bar g)		
Sizes	1" and 1½"		
Connections	NPT		NPT/ANSI150
Construction	Cast Iron Body	Cast Steel Body	Cast Stainless Steel Body
	Stainless Steel Internals, Bronze Check Valves Stainless Steel Check valves	Stainless Steel Internals, Stainless Steel Check Valves	
Options	BSP Connections	S.W. and 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. (1.4 kg) of steam per 1000 lbs. (454 kg) of liquid pumped
Air consumption	100 SCF per 1000 lbs. (454 kg) 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.

Limiting operating conditions

Maximum Operating Pressure (PMO)	125 psi g (9 bar g)
Minimum motive pressure required:	5 psi g (0.34 bar g)
Specific Gravity of pumped liquid	0.9 to 1.0
Specific Gravity of pumped liquid options -	0.89 to 0.8 and 0.79 to 0.65
Filling head recommended above pump is	6" (152 mm) See TI-P208-03-US

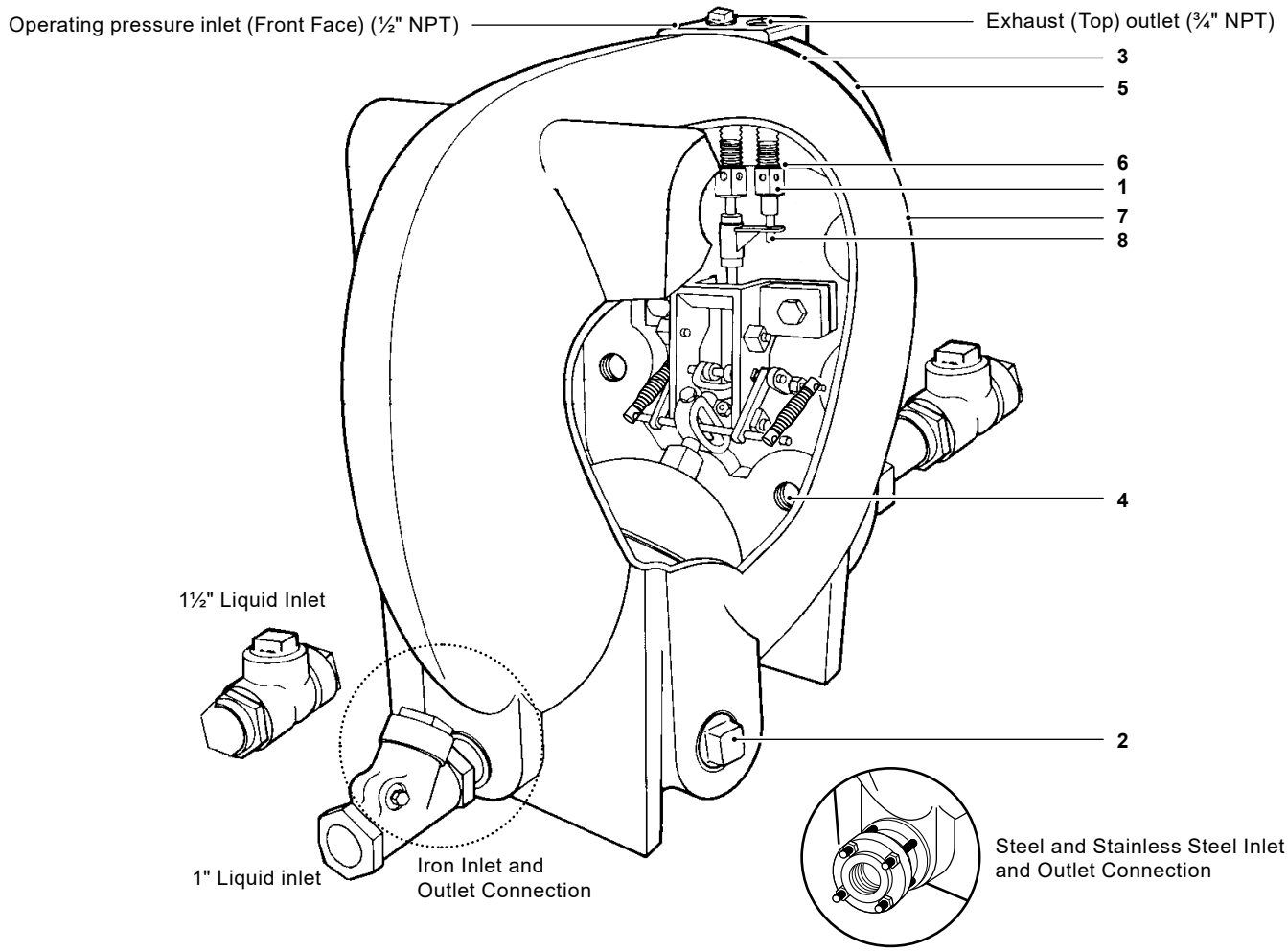
Pressure shell design condition

PMA	Maximum allowable pressure	Iron	125 psi g /0-450 °F	(9 bar g/0-232 °C)	**For increased service life, operate pump with motive pressure 15-20 psi g above pump back pressure.**
		Steel	285 psi g /0-650 °F	(20 bar g/343 °C)	
		316 SS	220 psi g /0-400 °F	(15 bar g/204 °C)	
TMA	Maximum allowable temperature	Iron	450 °F/0-125 psi g	(232 °/0-9 bar g)	
		Steel	750 °F/240 psi g	(399 °C/17 bar g)	
		316 SS	850 °F/180 psi g	(454 °C/12 bar g)	

Capacities

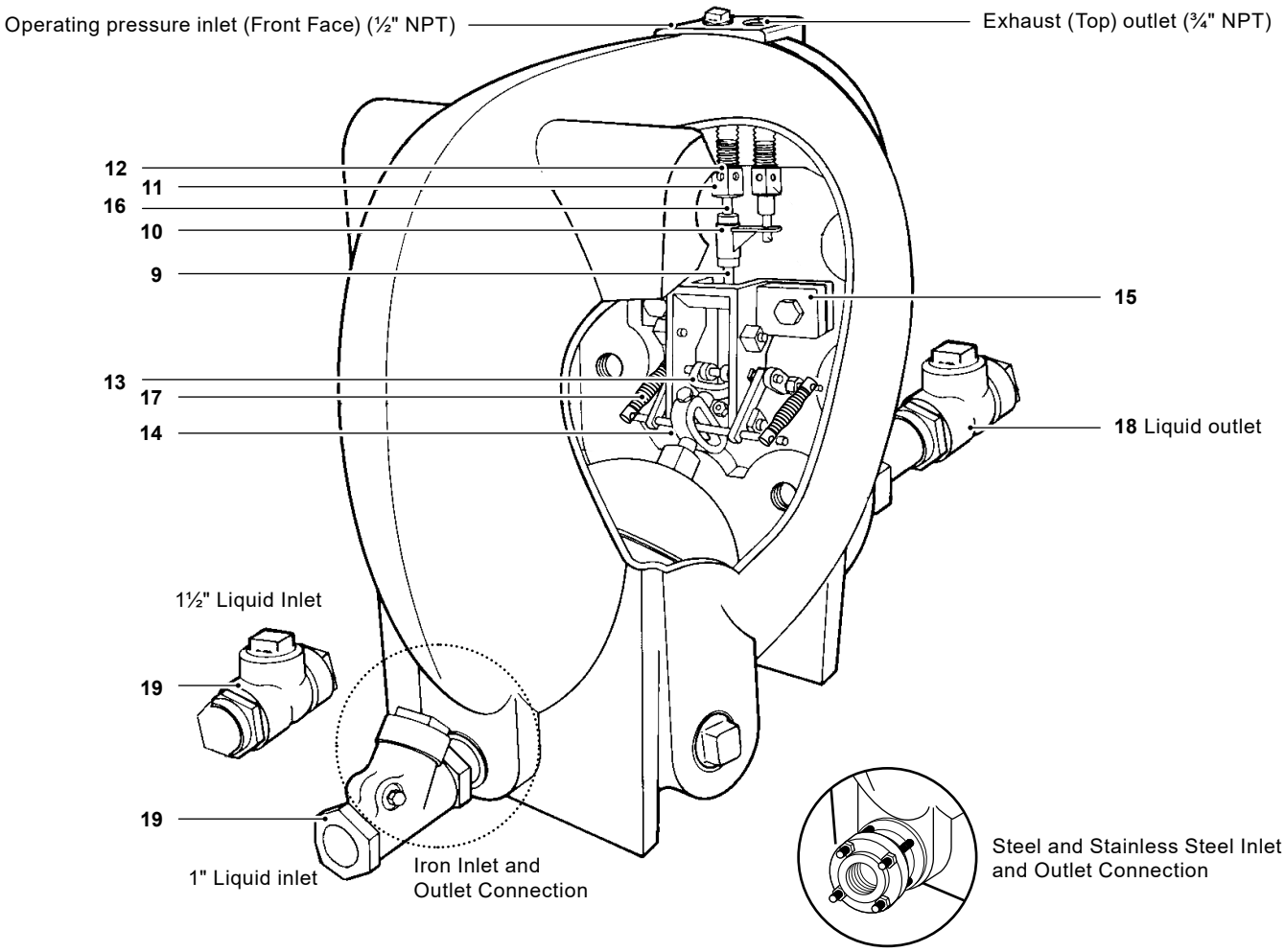
For sizing and selection data, see TI-P208-03-US.

Materials



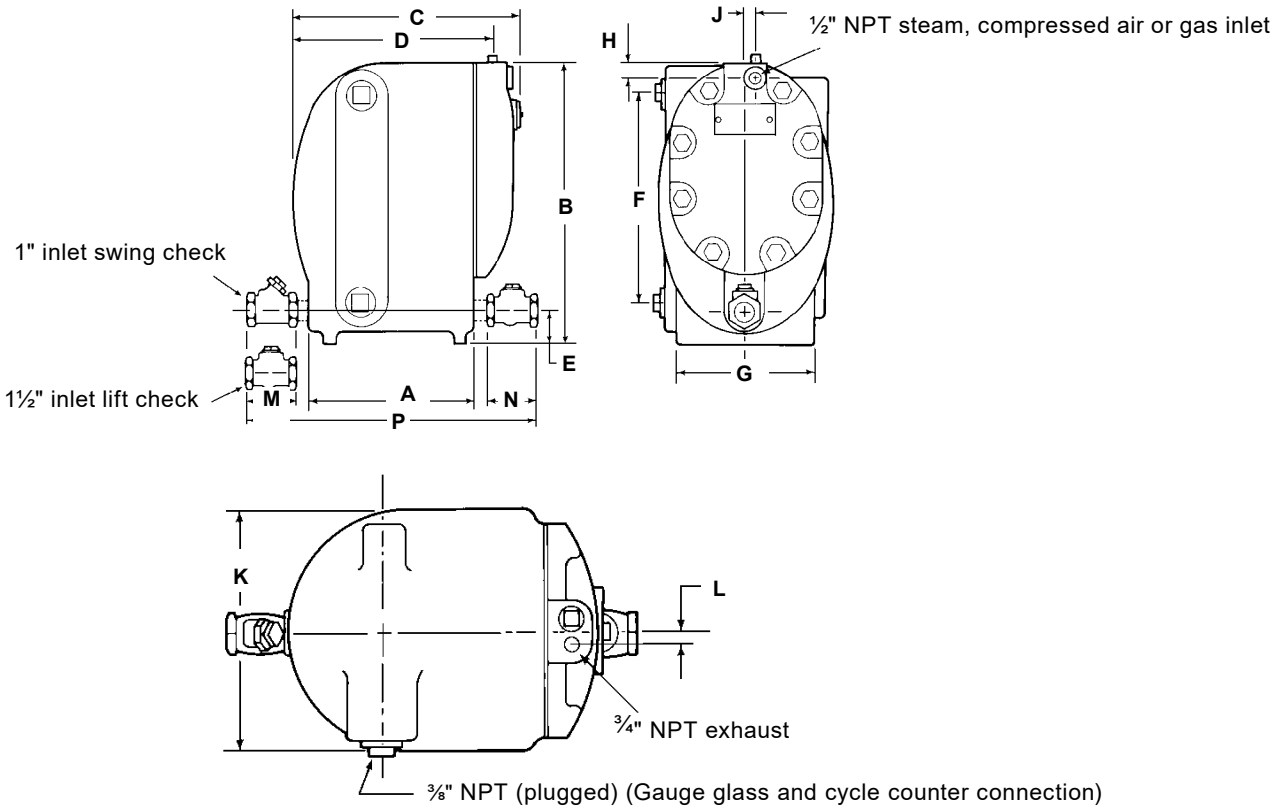
No.	Body Style	Part	Material	
1	Iron Steel 316 SS	Body	Cast Iron	ASTM A126 CL B
			Cast Steel	ASTM A216 WCB
			Cast 316 Stainless Steel	ASTM A351 CF8M
2	Iron Steel 316 SS	Plug ⅜"	Forged Steel	
		Plug ½"	Forged Steel	
		Plug ½"	Forged 316 Stainless Steel	
3	All	Cover Gasket	Graphite	
4	Iron Steel 316 SS	Cover Screws	Steel	
			Steel	
			Stainless Steel	
5	Iron Steel 316 SS	Cover	Iron	ASTM A126 CL B
			Steel	ASTM A216 WCB
			Stainless Steel	ASTM A351 CF8M
6	All	Exhaust Valve Seat Gasket	Stainless Steel	
7	All	Exhaust Valve Seat	Stainless Steel	
8	All	Exhaust Valve Head	Stainless Steel	

Materials (continued)



No.	Body Style	Part	Material
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 and Arm	Stainless Steel
15	All	Mechanism Casting	Cast Stainless Steel
		Screws ½" – 13 x 1¼	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
		1½" Lift Check Vlv (inlet)	Bronze with bronze disc
		1" and 1½" Wafer Check Vlv (inlet)	Austenitic stainless steel

Cast Iron- Dimensions/weights (nominal) in inches (mm) and lbs (kg)

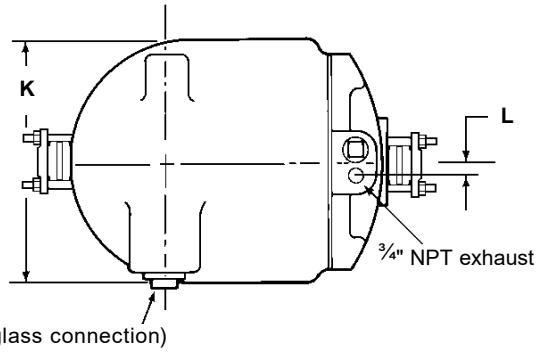


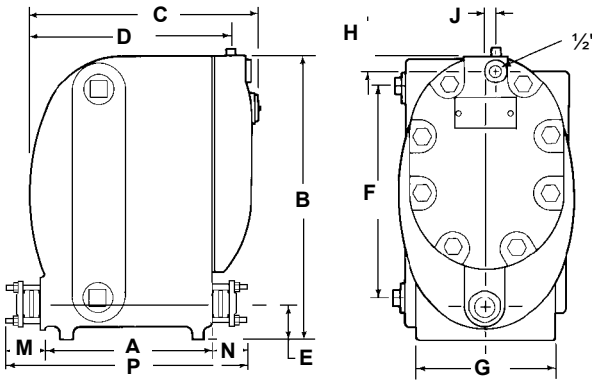
Size	Style	A	B	C	D	E	F	G	H	J	K	L	M	N	P	Pump with Check Valve Package*
1" Brz Ch.valve	Iron	11.0 (279)	18.9 (480)	14.6 (371)	13.1 (333)	2.1 (53)	14.0 (356)	9.0 (229)	1.1 (28)	.6 (15)	11.5 (292)	.6 (15)	3.6 (91)	3.4 (86)	20.3 (516)	154 lb (69.9 kg)
1½" Brz Ch.valve													4.3 (109)	4.3 (109)	23.1 (587)	155 lb (70 kg)
1" SS Ch.valve		11.0 (279)	18.9 (480)	14.6 (371)	13.1 (333)	2.8 (71)	14.0 (356)	9.0 (229)	1.1 (28)	.6 (15)	11.5 (292)	.6 (15)	3.3 (84)	3.3 (84)	19.4 (493)	154 lb (69.9 kg)
1½" SS Ch.valve													4.8 (122)	4.8 (122)	23.8 (605)	155 lb (70 kg)
1"	Steel	11.7 (297)	19.6 (498)	14.6 (371)	13.1 (333)	2.8 (70)	14.0 (356)	9.0 (229)	1.1 (28)	.6 (15)	11.6 (294)	.6 (15)	2.1 (53)	2.1 (53)	15.9 (404)	166 lb (75 kg)
1½"	Steel												2.7 (69)	2.7 (69)	17.1 (434)	171 lb (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).

Steel and Stainless Steel- Dimensions/weights (nominal) in inches (mm) and lbs (kg)





Size	Style	A	B	C	D	E	F	G	H	J	K	L	M	N	P	Pump with Check Valve Package*
1"	316 SS	11.7 (297)	19.6 (498)	14.6 (371)	13.1 (333)	2.8 (71)	14.0 (356)	9.0 (229)	1.1 (28)	.6 (15)	11.6 (295)	.6 (15)	2.1 (53)	2.1 (53)	15.9 (404)	166 lb (75 kg)
1½"	316 SS												2.7 (69)	2.7 (69)	17.1 (434)	171 lb (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).

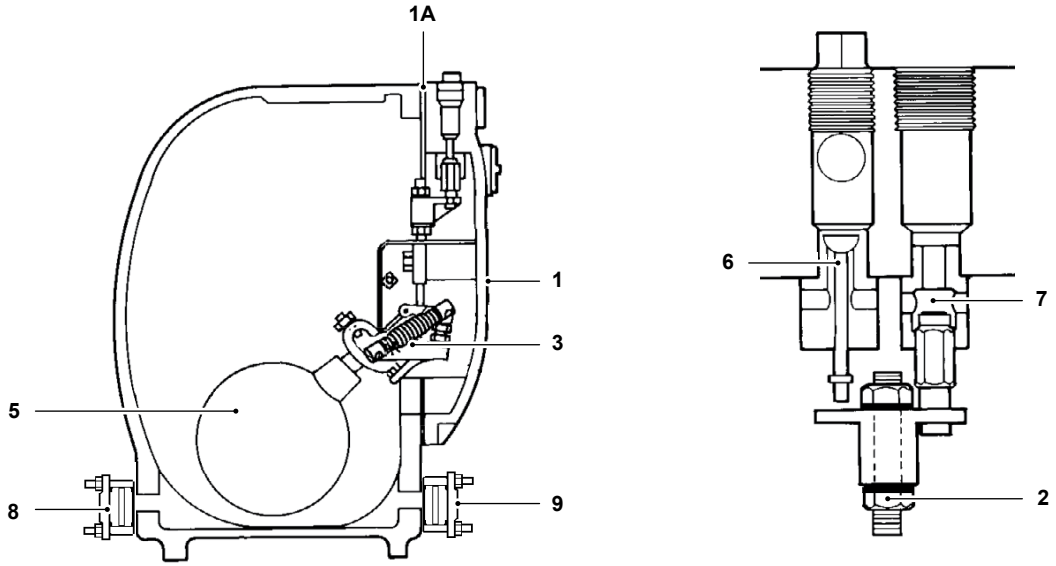
Sample specification

The pump shall be Spirax Sarco type PPEC low profile pressure powered pump operated by steam, compressed air or other pressurized gas to 125 psi g, 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-P208-03-US. Full details are given in IM-5-200-US, which accompanies the product.

Spare parts



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 and Gasket for PPEC Exhaust Valve Head, Seat and 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 and Complete Mechanism Assembly for PPEC	

TI-P208-03-US
Issue 1

PPEC Pressure Powered Pump Selection and Sizing

How to Select and 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 psi g in return line, plus downstream piping friction pressure drop in psi g. 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	(1360 kg/h)
Steam pressure available for operating pump	75 psi g	(5.17 bar g)
Vertical lift from pump to the return piping	30 feet	(9.144 meters)
Pressure in the return piping (piping friction negligible)	25 psi g	(1.72 bar g)
Filling head on the pump available	6 inches	(152.4 mm)

Solution:

1. Calculate "H", the total lift or back pressure, against which the condensate must be pumped. = (30 x 0.433) + 25 = 38 psi g
2. From capacity table, with 75 psi g inlet pressure and 40 psi g back pressure, choose a 1½" 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 psi g	Total Lift Back Pressure psi g	Filling head 6"			
		Liquid Specific Gravity 0.9 to 1.0			
		Single pump PPEC			
		Check valve Size			
		1" Bronze	1½" Bronze	1" Stainless steel	1½" Stainless steel
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.

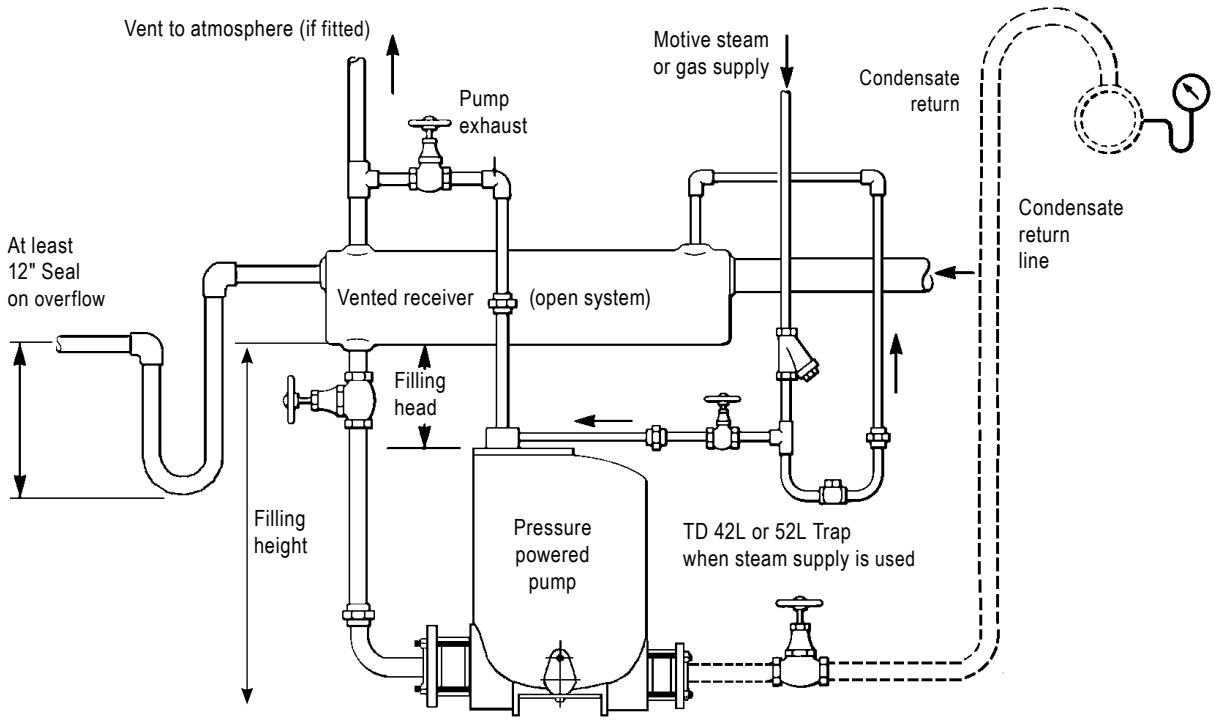
Capacity multiplying factors for motive gas supply (other than steam)

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
1½" 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 Check valve and piping size, pump type
Inches	mm	1" and 1½" PPEC
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.



Recommended installation

The pump is fitted with vented receiver or an inlet reservoir. Details of the application will determine whether a vented receiver or an inlet reservoir will be needed to accomplish this.

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 up to	Pipe size		Vent line diameter
	Diameter	Length	
75 lb/h	4"	36"	1½"
150 lb/h	6"	36"	2"
300 lb/h	8"	36"	3"
600 lb/h	10''	36"	4"
900 lb/h	14"	36"	6"
1200 lb/h	16"	36"	6"
2000 lb/h	20"	36"	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'

TI-S27-01-US
Issue 4

APT Pump Packages
APT10, APT14, APT14HC and APT14SHC Series

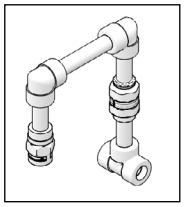
Description

The compact low profile modular pump/trap system consists of the versatile APT10, APT14, APT14HC and APT14SHC 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.

The air vent assembly is to be fitted by the customer



Simplex

Typical applications

The APT pump/trap modules are used where low profile and high capacity condensate removal is required.

The APT Pump Trap has the features of a conventional F&T trap combined with a pressure powered pump all in one unit.

- Air handlers
- Heat exchangers
- Absorption chillers
- Evaporators
- Dryers

A duplex example is shown on page 2

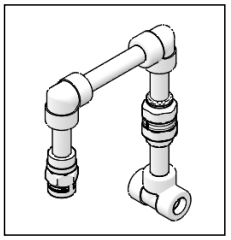
Standard features

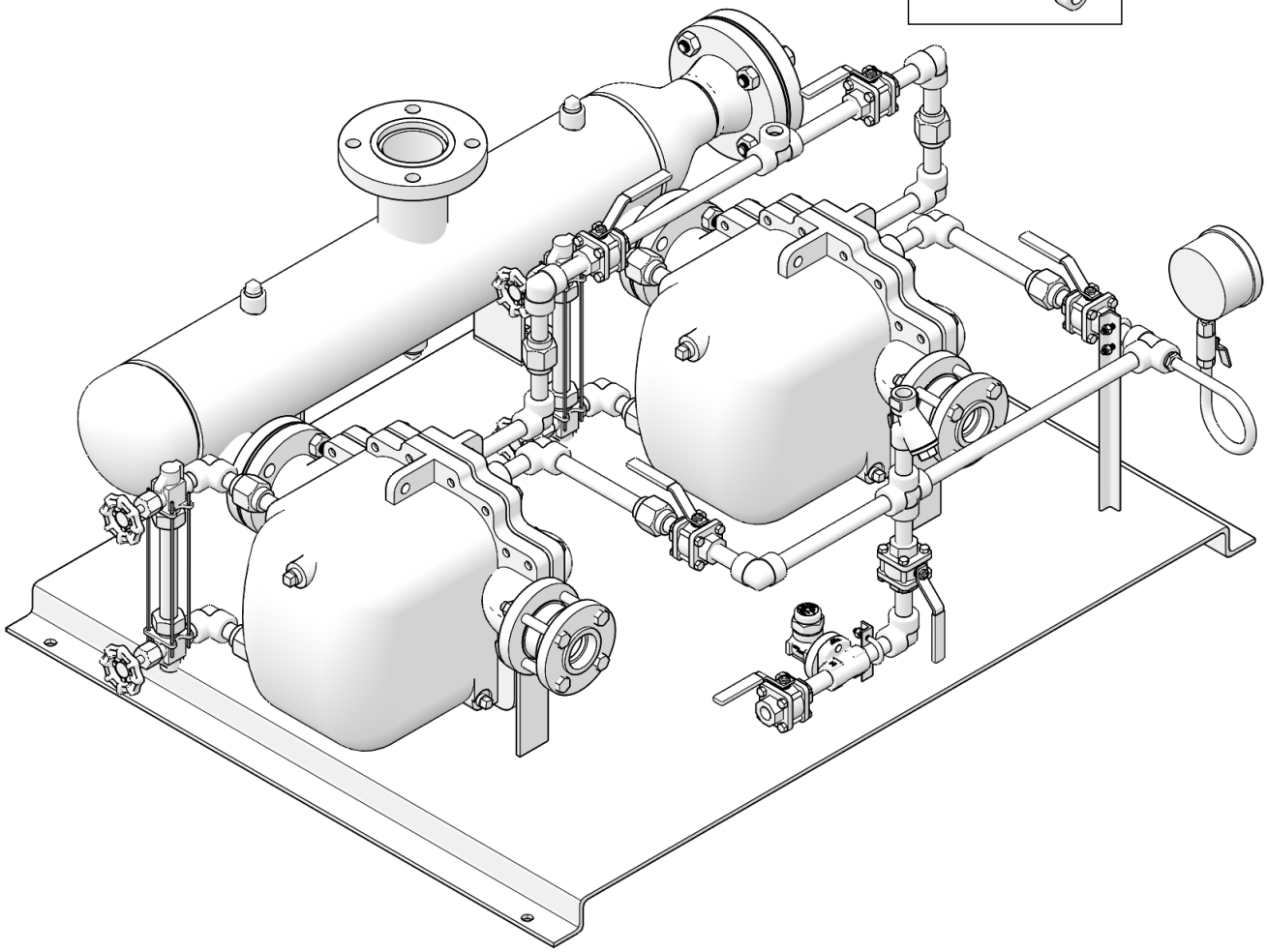
- Spirax Sarco non-electric APT10, APT14, APT14HC and APT14SHC Automatic Pump Trap
- Simplex or Duplex units
- Motive steam drip station with Spirax Sarco UTD52L trap, isolation valves and air vent
- Hydrotested and coated with SSI industrial enamel
- Fabricated by ASME Section IX certified welders
- Completely assembled modular pumping system on platform steel base with all connections protected for shipping

Additional options are available

Duplex

The air vent assembly is to be fitted by the customer





Suggested specifications

APT10

- Furnish and install where shown on plans, Spirax Sarco Inc. model SPT10 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 Pump/Trap shall be constructed of Ductile Iron with an allowable operating pressure of 65 psi g (4.48 bar g).
- 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.
- 3000# fittings with threaded pipe connections included wherever possible.

Suggested specifications (continued)

APT14	- 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 Pump/Trap shall be constructed of Ductile Iron with an allowable working pressure of no less than 200 psi g (13.8 bar g). - 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. - 3000# fittings with threaded pipe connections included wherever possible.
APT14HC	- 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 Pump/Trap shall be constructed of Ductile Iron with an allowable working pressure of no less than 200 psi g (13.8 bar g). - 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. - 3000# fittings with threaded pipe connections included wherever possible.
APT14SHC	- Furnish and install where shown on plans, Spirax Sarco Inc. model SPT4SHC- 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 Pump/Trap shall be constructed of Ductile Iron with an allowable working pressure of no less than 200 psi g (13.8 bar g). - 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. - 3000# fittings with socket weld pipe connections included wherever possible. - Valves greater than 1" to be carbon steel ANSI 150 flanged. Valves smaller than 1" to be 800# forged steel socket weld.

Typical construction

APT10	**Model**	**SPT10**
	PMO – Motive pressure	65 psi g (4.48 bar g)
	Design pressure (PMA)	145 psi g @ 392°F (10 bar g @ 200 °C)
	Design temperature (TMA)	392 °F (200 °C)
	Capacity range *	Trap mode - max 2022 lb/hr (917 kg/hr) Pump mode - max 1420 lb/hr (644 kg/hr)
	Hydrotest pressure	100 psi g (6.89 bar g)
	Construction materials	Receiver vessel - Fabricated steel APT 10-4.5 - See SSI Technical sheets TI-P612-28 Valves - NPT Threaded Carbon Steel Ball Valves Piping: 2" and under Sch 80 >2" Sch 40
	Dimensions and weight	See SSI sales drawings
APT14	**Model**	**SPT4/DPT4**
	PMO	200 psi g (13.8 bar g)
	Design pressure (PMA)	232 psi g @ 248 °F (111 bar g @ 120 °C)
	Design temperature (TMA)	482 °F (250 °C)
	Capacity range **	Trap mode - max 8800 lb/hr (3992 kg/hr) Pump mode - max 2420 lb/hr (1098 kg/hr)
	Hydrotest pressure	300 psi g (20.7 bar g)
	Construction materials	Receiver vessel - Fabricated steel APT14 - See SSI Technical sheets TI-P612-02 Valves - NPT Threaded Carbon Steel Ball Valves Piping: 2" and under Sch 80 >2" Sch 40
	Dimensions and weight	See SSI sales drawings
APT14HC	**Model**	**SPT4HC/DPT4HC**
	PMO	200 psi g (13.8 bar g)
	Design pressure (PMA)	232 psig @ 248 °F (111 bar g @ 120 °C)
	Design temperature (TMA)	482 °F (250 °C)
	Capacity range **	Trap mode - max 19,800 lb/hr (8981 kg/hr) Pump mode - max 6160 lb/hr (2794 kg/hr)
	Hydrotest pressure	300 psi g (20.7 bar g)
	Construction materials	Receiver vessel - Fabricated steel APT 14HC - See SSI Technical sheets TI-P612-02 Valves - NPT Threaded Carbon Steel Ball Valves Piping: 2" and under Sch 80 >2" Sch 40
	Dimensions and weight	See SSI sales drawings

Typical construction (continued)

APT14SHC

Model	SPT4SHC
PMO	200 psi g (13.8 bar g)
Design pressure (PMA)	232 psi g @ 248 °F (111 bar g @ 120 °C)
Design temperature (TMA)	482 °F (250 °C)
Capacity range **	Trap mode - max 19,800 lb/hr (8981 kg/hr) Pump mode - max 6160 lb/hr (2794 kg/hr)
Hydrotest pressure	300 psi g (20.7 bar g)
Construction materials	Receiver vessel - Fabricated steel APT 14HC - See SSI Technical sheets TI-P612-02 Valves - ANSI 150 Carbon steel gate valves, 800# forged steel gate valves Piping: 2" and under Sch 80 >2" Sch 40
Dimensions and weight	See SSI sales drawings

*Based on 39" installation head, 65 psi g (29.5 bar g) motive steam, 21 psi g (9.53 bar g) back pressure.
**Based on 39" installation head, 73 psi g (33.1 bar g) motive steam, 15 psi g (6.80 bar g) back pressure.

Capacity

For sizing data, see APT Selection and capacity chart TI-S27-02-US.

TI-P612-28
CMGT Issue 11

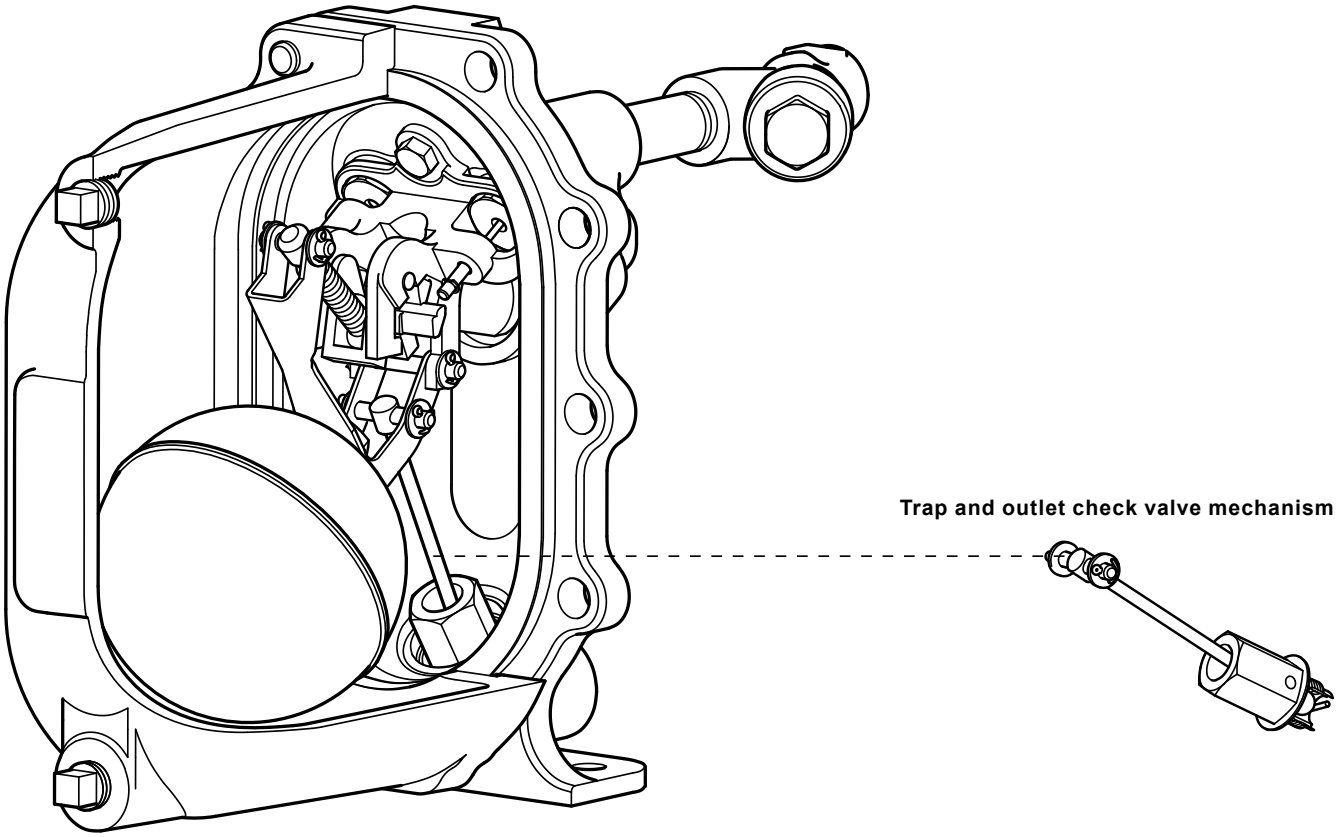
APT10 and APT10SS
Automatic Pump Traps

Description
The Spirax Sarco APT10 and APT10SS automatic pump traps are screwed displacement receivers, pressure rated to PN10 and PN16 respectively. Both units are capable of automatically trapping or pumping, depending on line conditions. The units are operated by steam and are used to remove condensate from process and heating plant under all operating conditions, including vacuum. The shell body and cover are available in SG iron (designated APT10) and stainless steel (designated APT10SS).
The APT10 is available with a standard blue paint finish or coated in ENP (Electroless Nickel Plate), while the APT10SS is available with electropolish as the standard finish.

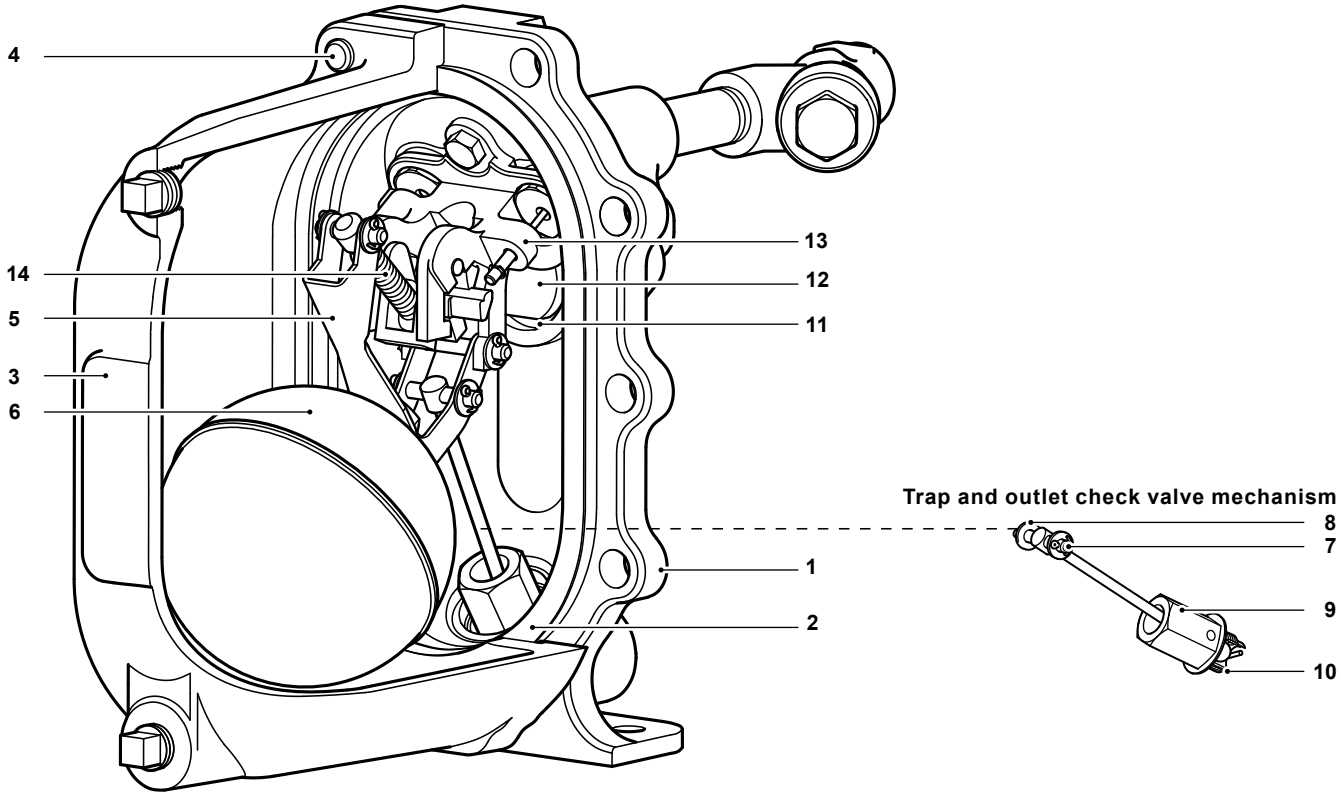
Certification
This product is available with certification to EN 10204 3.1.
Note: All certification/inspection requirements must be stated at the time of order placement.

Standards
This product fully complies with the requirements of the European Pressure Equipment Directive 2014/68/EU, ATEX Directive 2014/34/EU and carries the CE and Ex marks when so required.

Design compliance
Shell designed in accordance with A.D. Merkblatter/ASME VIII.



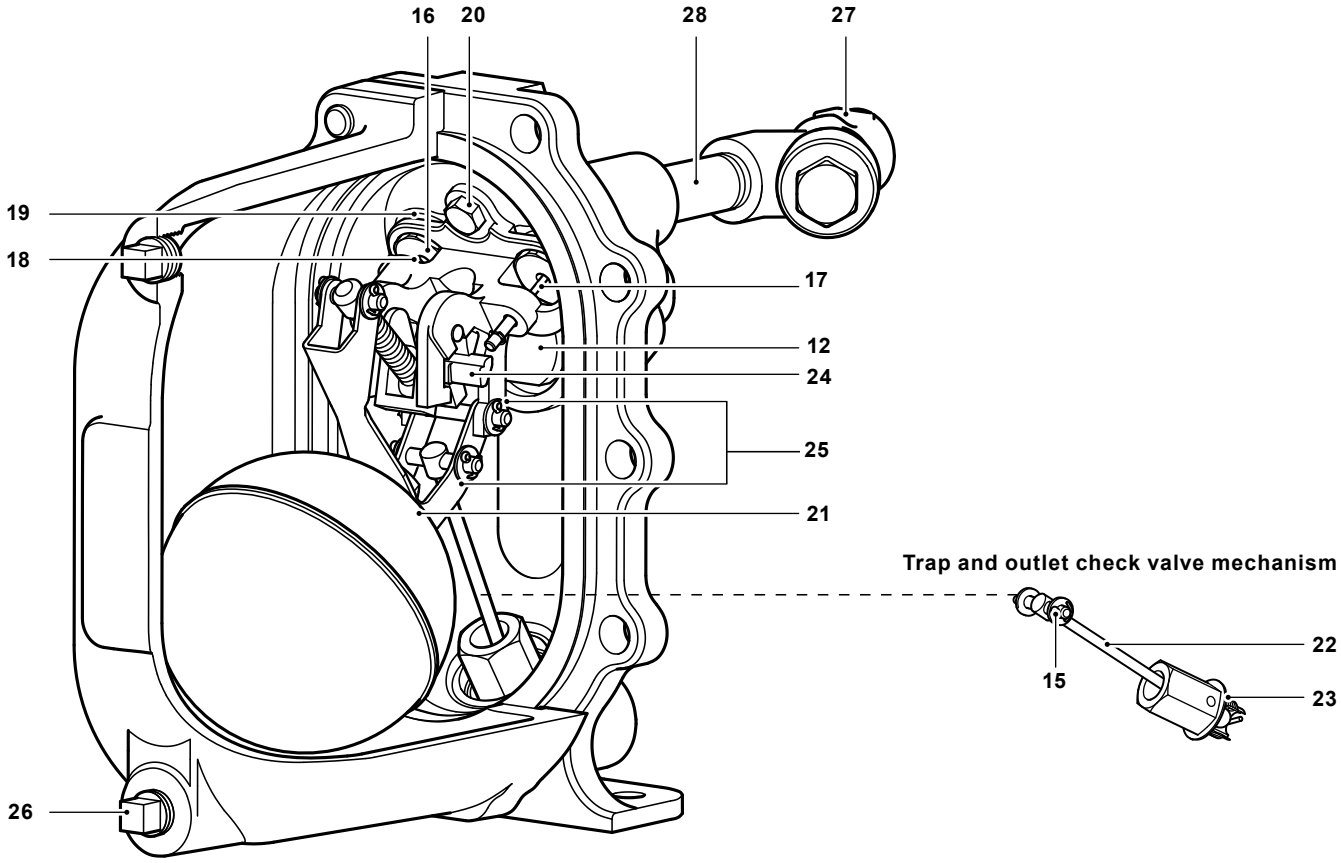
Materials



No.	Part		Material	
1	Cover	APT10	SG iron	EN-GJS-40018-LT (5.3103)/ASTM A395
		APT10SS	Stainless steel	GX5CrNi19-10 (1.4308)/A351 CF8
2	Cover gasket		Graphite laminate with stainless steel insert	
3	Body	APT10	SG iron	EN-GJS-40018-LT (5.3103)/ASTM A395
		APT10SS	Stainless steel	GX5CrNi19-10 (1.4308)/A351 CF8
4	Cover bolts		Stainless steel	BS EN ISO 3506 Gr. A2-70
5	Pump trap lever		Stainless steel	BS 1449 304 S15
6	Float		Stainless steel	BS 1449 304 S16
7	Pivot shaft		Stainless steel	BS 970 431 S29/ASTM A276 431
8	Washer		Stainless steel	BS 1449 316
9	Trap housing		Stainless steel	BS 970 431 S29/ASTM A276 431
10	Ball		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

Materials continued on the next page

Materials (continued)



No.	Part		Material	
15	Split pin		Stainless steel	BS 1574
16	Exhaust seat		Stainless steel	BS 970 431 S29/ASTM A276 431
17	Inlet valve and seat assembly		Stainless steel	BS 970 431 S29
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	BS EN ISO 3506 Gr. A2-70
21	Float bolt		Stainless steel	BS EN ISO 3506 Gr. A2-70
22	Trap 1st stage valve		Stainless steel	BS 970 431 S29/ASTM A276 431
23	Trap gasket		Stainless steel	BS 1449 409 S19
24	Actuator arm		Stainless steel	BS 3146 ANC 2
25	Name-plate		Stainless steel	BS 1449 304 S16
26	Drain plug	APT10	Carbon steel	C22.8/A105
		APT10SS	Stainless steel	1.4308/A351 CF8
27	Motive supply strainer	APT10	SG iron	EN-GJS-400-15
		APT10SS	Stainless steel	1.4409/A351 CF3M
28	Threaded barrel	APT10	Steel pipe	
		APT10SS	Stainless steel	

Sizes and pipe connections

Size	DN20 x DN20	
Fluid connections		
Inlet	**Outlet**	**Motive/Exhaust**
DN20 (¾")	DN20 (¾")	DN15 (½")
BSP T Rp (ISO 7-1)		BSP
NPT		NPT

Limiting conditions

Body design conditions	APT10		PN10
	APT10SS		PN16
Maximum motive inlet pressure		4.5 bar g	65 psi g
Maximum operating pressure		4.5 bar g	65 psi g
Maximum backpressure		4.0 bar g	58 psi g
Maximum operating temperature		155 °C	311 °F
Minimum operating temperature		-10 °C	14 °F
Temperature limits (Ambient Ex)		-10°C to 200 °C	14 °F to 392 °F
Designed for a maximum cold hydraulic test pressure of:	APT10	15.0 bar g	217 psi g
	APT10SS	24.0 bar g	348 psi g
Minimum installation head (from base of pump)		0.2 m	7.8"
Recommended minimum installation head (from base of pump)		0.3 m	11.8"

Safety information, installation and maintenance

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

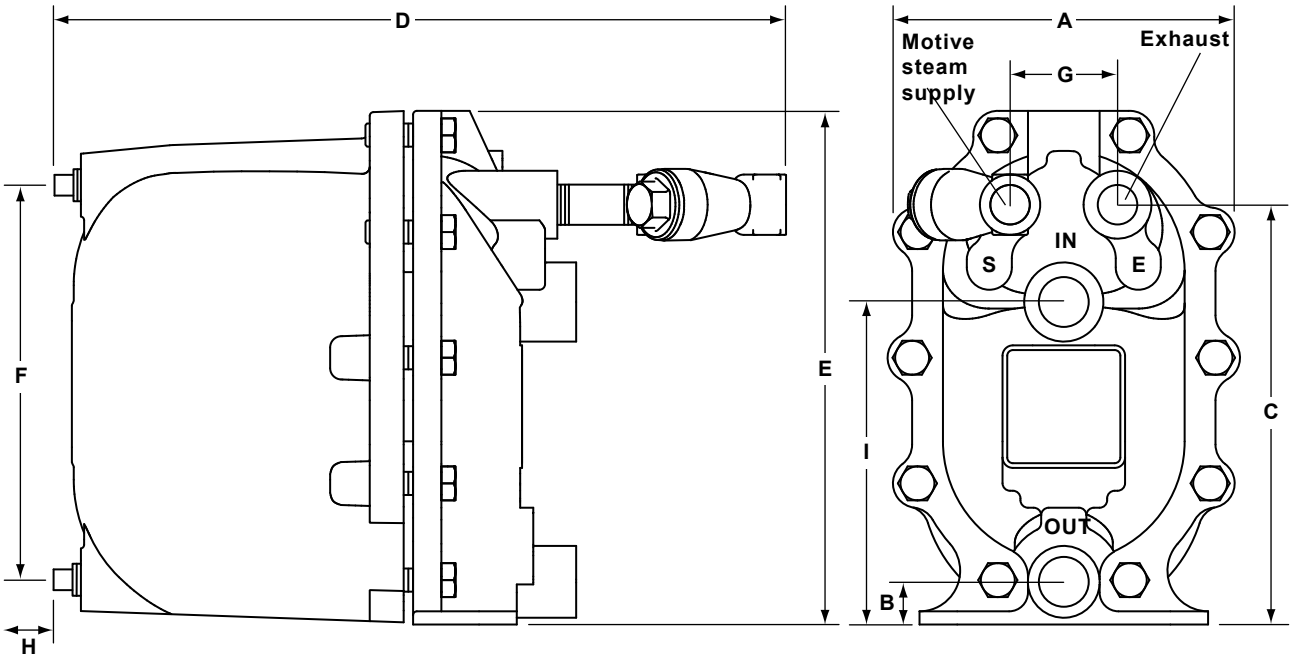
Nominal capacities

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 (bar g) (psi g).
3. Total backpressure in the condensate return system (bar g) (psi g).
4. Heat exchanger full load operating pressure (bar g) (psi g).
5. Heat exchanger maximum steam load (kg/h) (lb/hr).
6. Minimum temperature of secondary fluid (°C) (°F).
7. Maximum controlled temperature of secondary fluid (°C) (°F).

Size	DN20 x DN20
Pump discharge/cycle	2.6 litres (0.55 gallons)

Dimensions/weights (approximate) in mm (inches) and kg (lbs)



Size	A	B	C	D	E	F	G	H	I	Weight
DN20 x DN20	187 (7.4)	23 (0.9)	223 (8.8)	398 (15.6)	273 (10.7)	209 (8.2)	57 (2.2)	135 (5.3)	171 (6.7)	14 (31)

How to specify

The pump trap shall be a Spirax Sarco automatic pump trap type APT10 operated by steam to 4.5 bar g (65 psi g.). No electrical energy shall be required. Body construction from SG iron (5.3103 or ASTM A395) 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 of 200 mm (7.8") installation head from the base of the unit.

How to order

Example: 1 off Automatic pump trap, type APT10, DN20 x DN20 (¾" x ¾"), complete with motive supply strainer screwed BSP with BSP T Rp (ISO 7-1) motive fluid connections.

Spare parts

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

Available spares (see page 7 for part number identification)

A	Cover gasket	**2**
B	Inlet check valve	**2, 12**
C	Spring and actuator arm	**2, 14, 24**
D	Float	**2, 5, 6, 21**
E	Trap and outlet check valve mechanism	**2, 7, 8, 9, 10, 22, 23**
F	Inlet/exhaust valve and seat kit	**2, 16, 17, 18, 19**
G	Motive supply strainer (Fig. 12 SG iron or Fig 16L Stainless Steel) - see separate literature	**27**

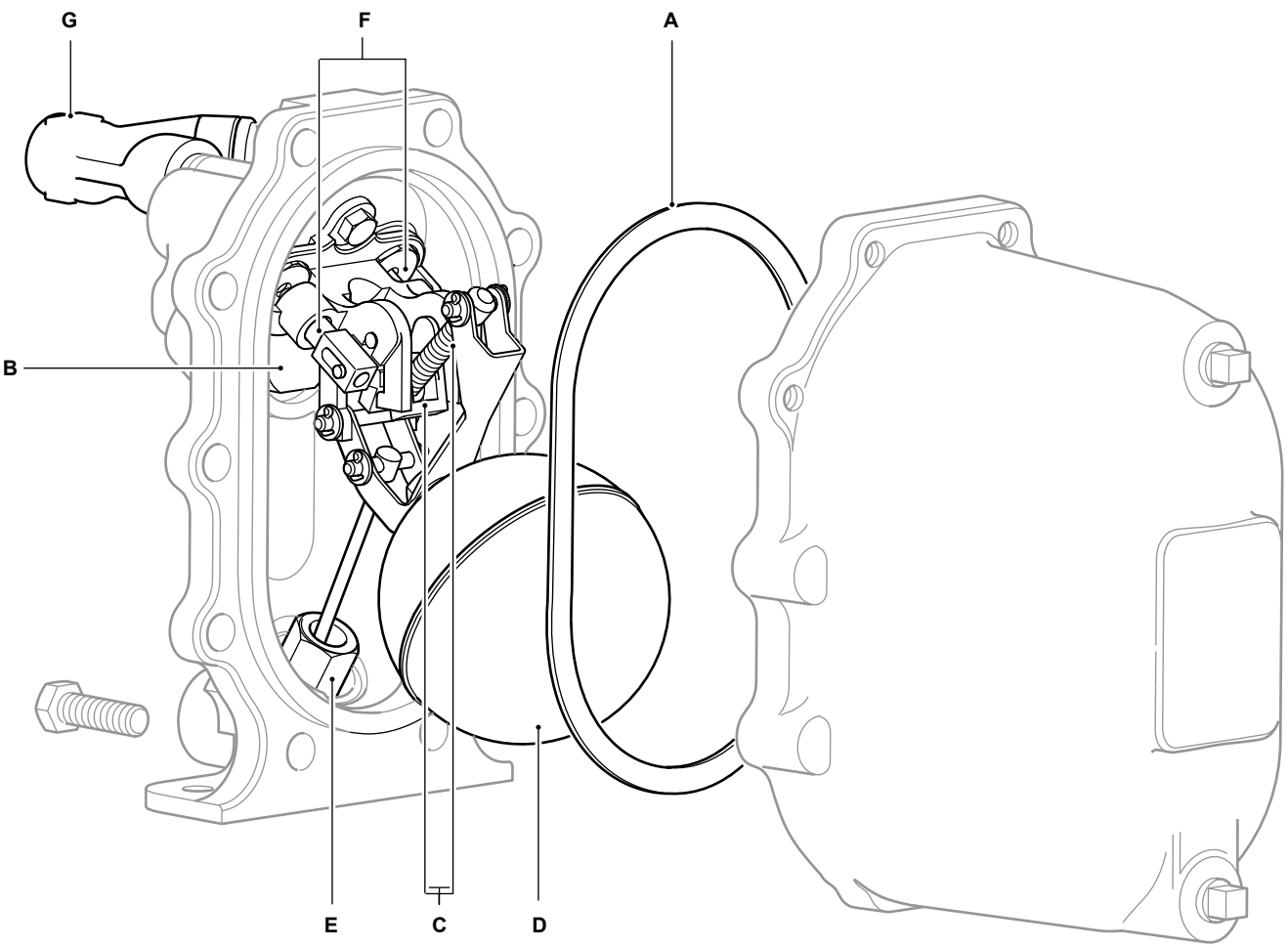
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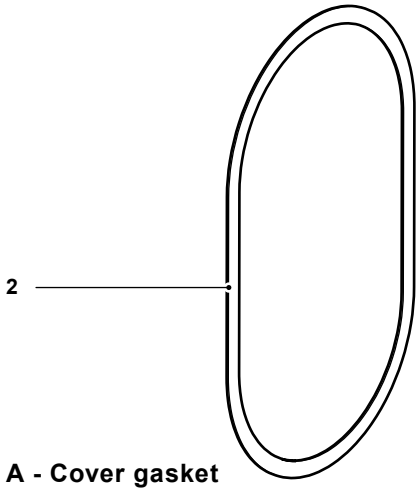
For customer convenience, spares are supplied in kits to ensure all the appropriate replacement parts are available e.g. when an inlet/exhaust valve and seat assembly is ordered, all replacement split pins, washers and gaskets will be provided in addition to the key components listed.

How to order spares

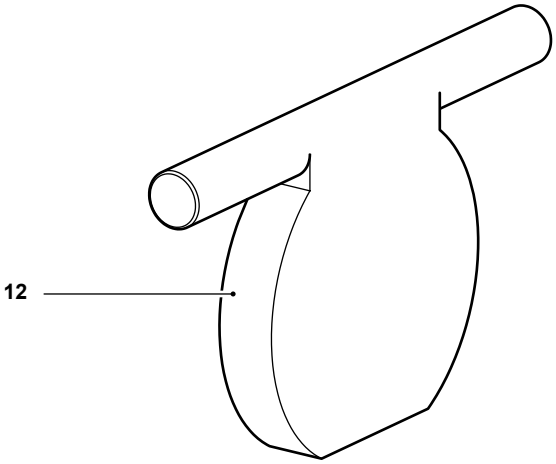
Always order spares by using the description given in the column headed 'Available spares' and state the size and type of unit.

Example: 1 off Inlet/exhaust valve and seat kit for a Spirax Sarco DN20 x DN20 (¾" x ¾") APT10 automatic pump trap.

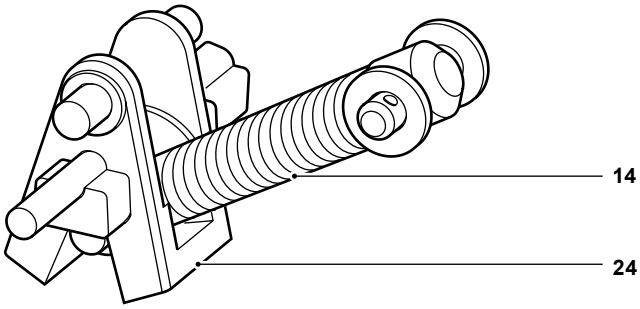




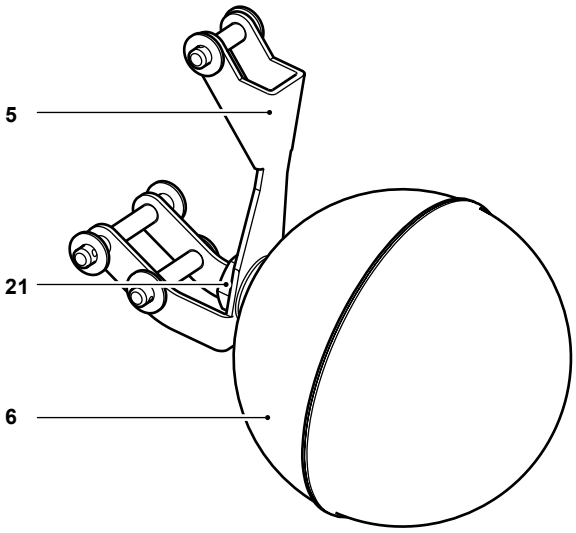
A - Cover gasket



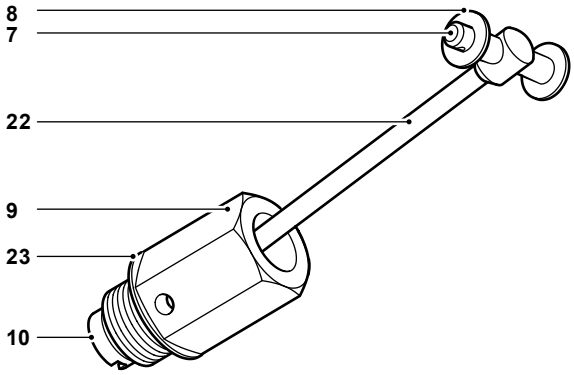
B - Inlet check valve



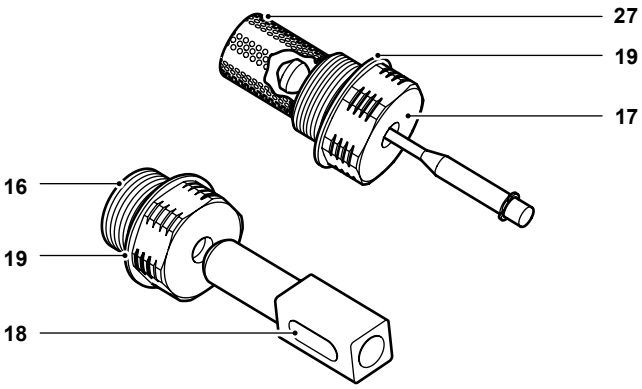
C - Spring and actuator arm



D - Float



E - Trap and outlet check valve mechanism



F - Inlet/exhaust valve and seat kit

TI-P612-02
CMGT Issue 15

APT14, APT14HC and APT14SHC
Automatic Pump Traps

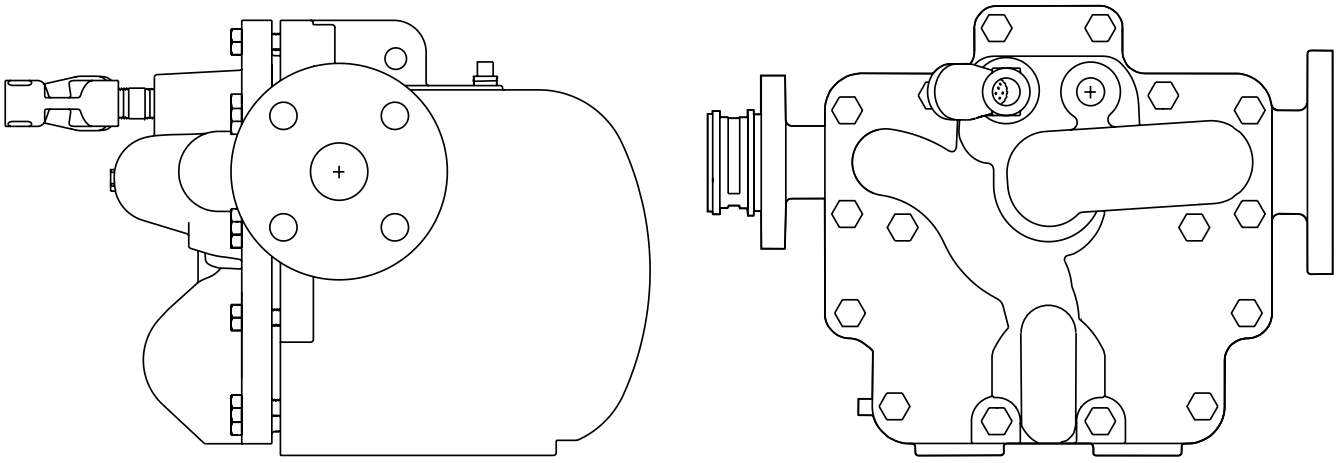
Description
The Spirax Sarco APT14, APT14HC and APT14SHC automatic pump traps are flanged or screwed displacement receivers pressure rated to PN16. The units are capable of automatically trapping or pumping, depending on pipeline conditions. The unit is operated by steam (saturated or superheated) and is used to remove condensate from process plant under all operating conditions including vacuum. For optional extras see 'How to order' on page 6.

Definition of Motive Steam
For clarity throughout this document, it is important to note that the term ‘motive steam’ is used to describe both saturated steam and superheated steam.

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 2014/68/EU, ATEX Directive and carry the CE and Ex marks when so required.

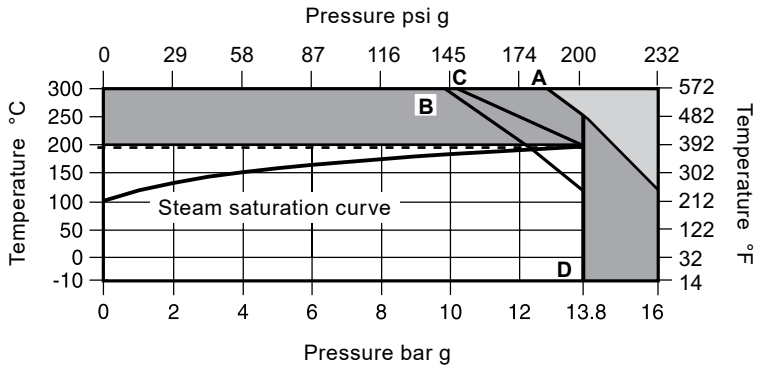
Certification
These products are available with certification to EN 10204 3.1.
Note: All certification/inspection requirements must be stated at the time of order placement.



Sizes and pipe connections

Model and body material	Inlet and outlet sizes and pipe connections		Connections					
			Motive / exhaust		Sight glass		Drain	
APT14 SG iron	Flanged DN40 inlet x DN25 outlet	EN 1092 PN16	BSP T Rp (ISO 7-1) or NPT	DN15 (½")	BSP T Rp (ISO 7-1)	DN15 (½")	BSP T Rp (ISO 7-1)	DN10 (⅜")
		ASME B 16.5 150	NPT		NPT		NPT	
		JIS 10 (JIS B 2210)	BSP T Rp (ISO 7-1)		BSP T Rp (ISO 7-1)		BSP T Rp (ISO 7-1)	
		KS 10 (KS B 1511)	BSP T Rp (ISO 7-1)		BSP T Rp (ISO 7-1)		BSP T Rp (ISO 7-1)	
	Screwed 1½" inlet x 1" outlet	BSP T Rp (ISO 7-1)	BSP T Rp (ISO 7-1)		BSP T Rp (ISO 7-1)		BSP T Rp (ISO 7-1)	
		NPT	NPT		NPT		NPT	
APT14HC SG iron	Flanged DN50 inlet x DN40 outlet	EN 1092 PN16	BSP T Rp (ISO 7-1)		BSP T Rp (ISO 7-1)		BSP T Rp (ISO 7-1)	
		ASME B 16.5 150	NPT		NPT		NPT	
APT14SHC Carbon steel		JIS 10 (JIS B 2210)	BSP T Rp (ISO 7-1)		BSP T Rp (ISO 7-1)		BSP T Rp (ISO 7-1)	
		KS 10 (KS B 1511)	BSP T Rp (ISO 7-1)		BSP T Rp (ISO 7-1)		BSP T Rp (ISO 7-1)	

Pressure/temperature limits - APT14 and APT14HC (SG iron)



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.

- - - - - Superheated steam should not exceed the following parameters: 13.8 bar g @ 198 °C (200 psi g @ 388 °F)

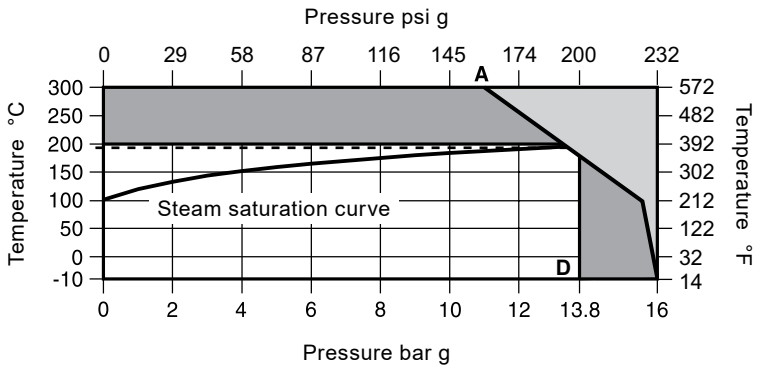
A - D Flanged PN16.

B - D Flanged JIS/KS 10.

C - D Flanged ASME 150.

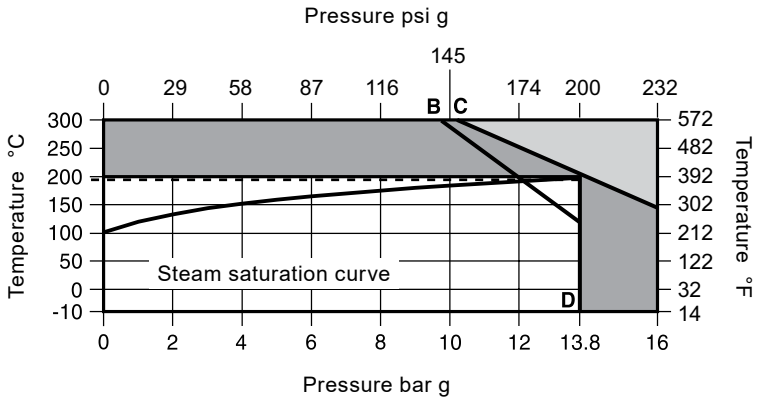
Body design conditions			PN16
Maximum motive inlet pressure		13.8 bar g	200 psi g
PMA	Maximum allowable pressure	16 bar g @ 120 °C	232 psi g @ 248 °F
TMA	Maximum allowable temperature	300 °C @ 12.8 bar g	572 °F @ 186 psi g
Minimum allowable temperature **Note:** For lower temperatures consult Spirax Sarco.		-10 °C	14 °F
PMO	Maximum operating pressure for saturated and superheated steam service	13.8 bar g @ 198 °C	200 psi g @ 388 °F
Maximum backpressure for standard pumps (for higher backpressures contact Spirax Sarco)		5 bar g	73 psi g
TMO	Maximum operating temperature for saturated and superheated steam service	198 °C @ 13.8 bar g	388 °F @ 200 psi g
Temperature limits (Ambient ⟨Ex⟩)		-10 °C to 200 °C	14 °F to 392 °F
Product is safe for use under full vacuum conditions			
Designed for a maximum cold hydraulic test pressure of:		24 bar g	348 psi g
Filling/ Installation	Recommended filling head above the pump (from the base of the receiver / process)	0.3 m	1 ft
	Maximum recommended installation (from the base of the pump) for higher installation heads refer to Spirax Sarco	1 m	3.2 ft
	Minimum installation head required (from the base of the pump)	0.2 m	0.7 ft

Pressure/temperature limits - APT14SHC (carbon steel)



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 ASME 150.

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- - - - - Superheated steam should not exceed the following parameters: 13.8 bar g @ 198 °C (200 psi g @ 388 °F)

Body design conditions			PN16
Maximum motive inlet pressure		13.8 bar g	200 psi g
PMA	Maximum allowable pressure	16 bar g @ 120 °C	232 psi g @ 248 °F
TMA	Maximum allowable temperature	300 °C @ 12.8 bar g	572 °F @ 186 psi g
Minimum allowable temperature **Note:** For lower temperatures consult Spirax Sarco.		-10 °C	14 °F
PMO	Maximum operating pressure for saturated and superheated steam service	13.8 bar g @ 198 °C	200 psi g @ 388 °F
Maximum backpressure for standard pumps (for higher backpressures contact Spirax Sarco)		5 bar g	73 psi g
TMO	Maximum operating temperature for saturated and superheated steam service	198 °C @ 13.8 bar g	388 °F @ 200 psi g
Temperature limits (Ambient ⟨Ex⟩)		-10 °C to 200 °C	14 °F to 392 °F
Product is safe for use under full vacuum conditions			
Designed for a maximum cold hydraulic test pressure of:		24 bar g	348 psi g
Filling/ Installation	Recommended filling head above the pump (from the base of the receiver / process)	0.3 m	1 ft
	Maximum recommended installation (from the base of the pump) for higher installation heads refer to Spirax Sarco	1 m	3.2 ft
	Minimum installation head required (from the base of the pump)	0.2 m	0.7 ft



Warning 1
Consideration of Condensate Temperature Increase
In situations where the temperature of the motive steam is considerably higher than that of the condensate, it is important that the design of the system located downstream of the pump adequately addresses this temperature difference.



Warning 2
Control of Motive Pressure and Risk Assessment
It is essential to implement reliable and effective control of the motive pressure supplied to the pump. This control is necessary to ensure that the temperatures within the system do not exceed the maximum allowable temperature limits specified for the equipment.



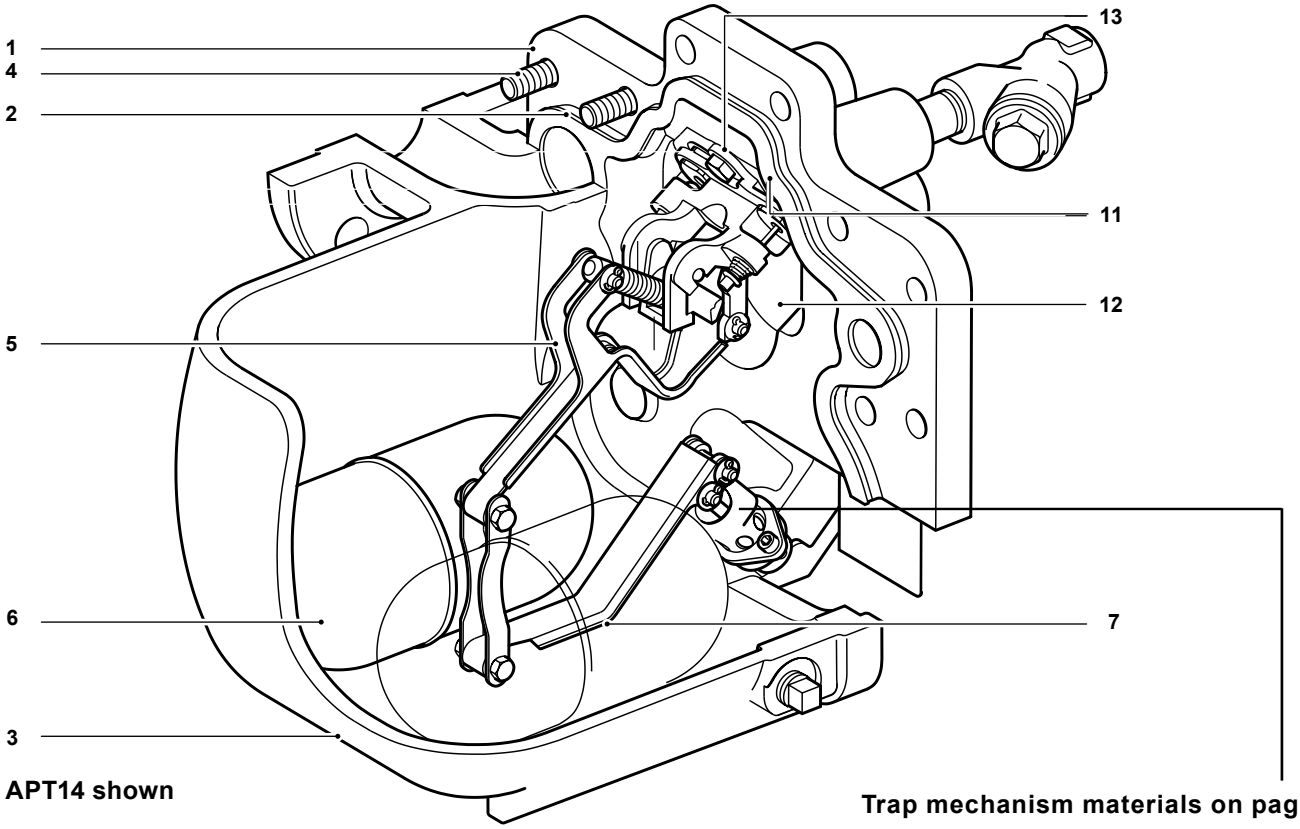
Warning 3
Steam Backflow Risk and Upstream Device Rating
There is a risk of steam backflow through the balance line in systems utilising the APT14 pump. To mitigate this risk, it is strongly advised that the device situated upstream of the pump is specified to withstand the temperature of the steam employed as motive steam. This precaution is particularly crucial in installations where a second steam line—be it superheated or saturated steam—is introduced to the system.



Warning 4
Specification of Sight Glass
When specifying a sight glass for the system, it is imperative that the component is capable of withstanding the maximum temperature gradient that the pump may encounter during operation. This temperature gradient is defined as the difference between the highest possible steam temperature and the temperature of the coldest condensate present in the system.

It is the responsibility of the user to conduct an appropriate level of risk assessment for the application. This assessment should ensure that all necessary precautions are in place and that the system operates within safe parameters at all times.

Materials



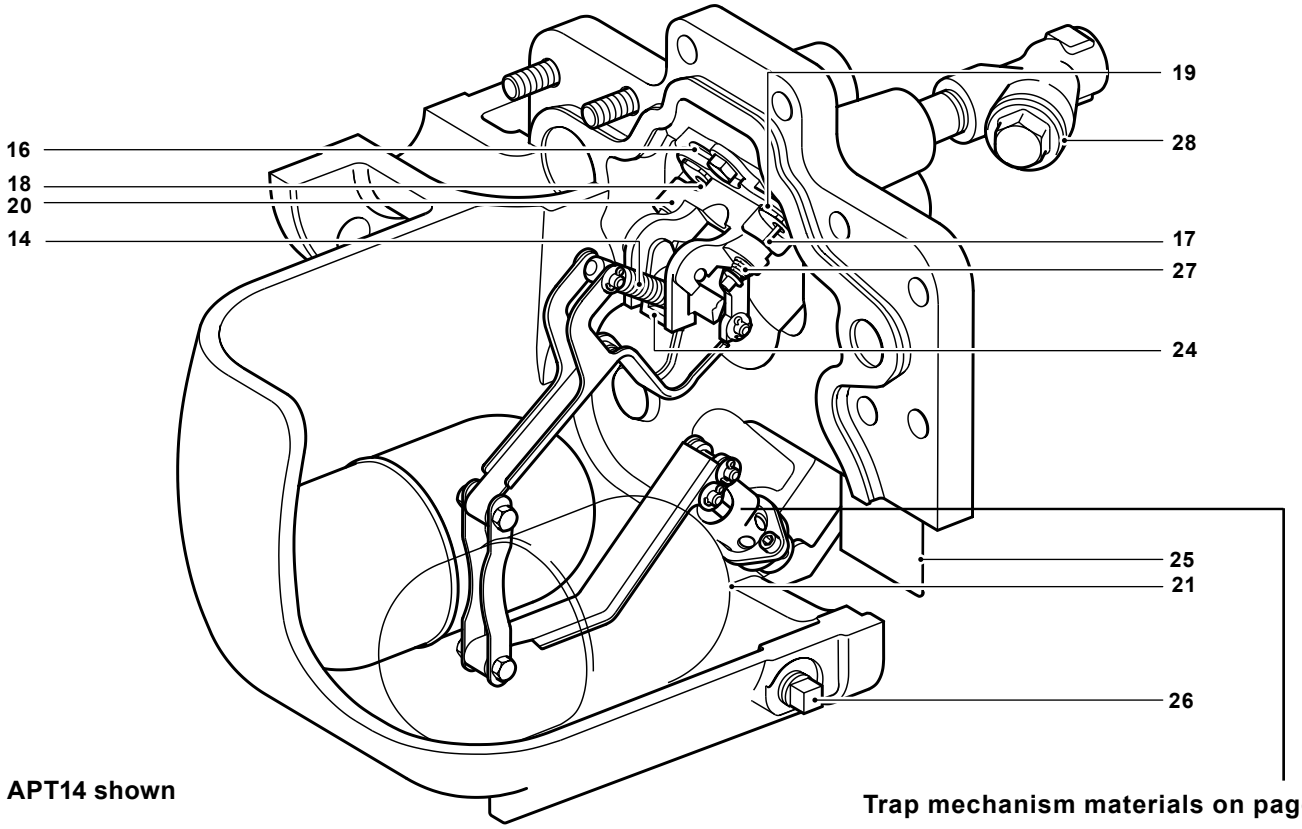
APT14 shown

Trap mechanism materials on page 8

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	APT14	Graphite laminated with stainless steel insert	
		APT14HC	Graphite laminated with stainless steel insert	
		APT14SHC	Novapit SSTC expanded 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
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

Materials continued on next page

Materials (continued)



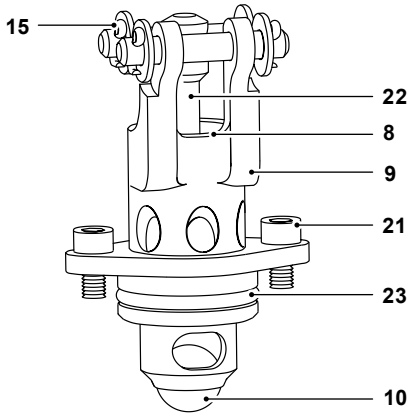
APT14 shown

Trap mechanism materials on page 8

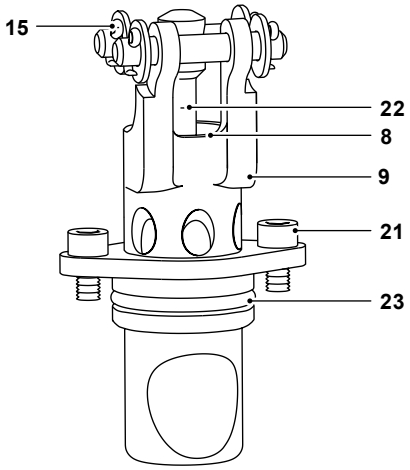
No.	Part		Material	
14	Spring (pump)		Stainless steel	BS 2056 302 S26 Gr. 2
16	Exhaust seat		Stainless steel	BS 970 431 S29 or ASTM A276 431
17	Inlet valve and seat assembly		Stainless steel	
18	Exhaust valve		Stainless steel	BS 3146 ANC 2
19	Valve seat gasket		Stainless steel	BS 1449 409 S19
20	Pump mechanism bolt		Stainless steel	ISO 3506 Gr. A2 70
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)	

Materials for the trap mechanism

APT14



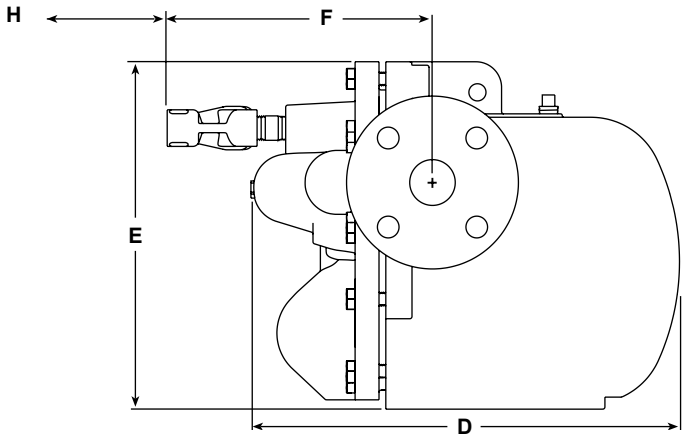
APT14HC and APT14SHC

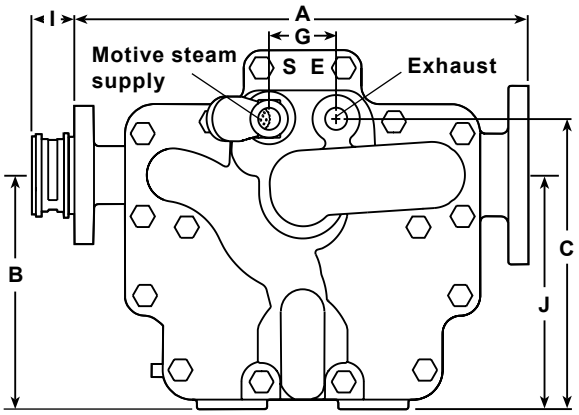


No.	Part	Material	
8	Trap 2nd stage valve	Stainless steel	ASTM A276 440 B
9	Trap housing	Stainless steel	BS 3146 ANC 2
10	Ball (APT14 only)	Stainless steel	ASTM A276 440 B
15	Split pin	Stainless steel	BS 1574
21	Trap housing bolt	Stainless steel	BS 6105 A4 80
22	Trap 1st stage valve	Stainless steel	BS 970 431 S29 or ASTM A276 431
23	'O' ring	EPDM	

Dimensions/weightS (approximate) in mm (inches) and kg (lbs)

Withdrawal distance





Model	Connection	A				B	C	D	E	F	G
		BSP T Rp (ISO 7-1)/NPT	PN16	JIS/KS10	ASME						
APT14	Screwed	350 (13.8)	389 (15.3)	385 (15.1)	386.5 (15.2)	198 (7.7)	246 (9.68)	385 (15.1)	304 (11.9)	258 (10.1)	57 (2.24)
APT14HC	Flanged		512 (20.1)	506 (19.9)	524 (20.6)		270 (10.6)	400 (15.7)	335 (13.1)	261 (10.2)	
APT14SHC	Flanged		552 (21.7)	546 (21.4)	544 (21.1)	206 (8.11)	278 (10.9)	407 (16)	351 (13.8)		

Model	Connection	H	I			J	Weight
			Screwed BSP T Rp (ISO 7-1)/NPT	Flanged PN16	JIS/KS10	ASME		
APT14	Screwed	250 9.8					198 (7.8)	45 (99)
APT14HC	Flanged	275 10.8		31.5 (1.2)	31.5 (1.2)	45 (1.8)		65 (143)
APT14SHC	Flanged						206 (8.11)	105 (232)

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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 (bar g).
3. Total backpressure in the condensate return system (bar g).
4. Heat exchanger full-load operating pressure (bar g).
5. Heat exchanger maximum steam load (kg / h).
6. Minimum temperature of secondary fluid (°C).
7. Maximum controlled temperature of secondary fluid (°C).

Model	APT14	APT14HC and APT14SHC
Pump discharge/cycle	5 litres (1.3 gallons)	8 litres (2.1 gallons)

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 13.8 bar g (200 psi g). 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 13.8 bar g. 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 off Spirax Sarco automatic pump trap, type APT14, DN40 x DN25, flanged EN 1092 PN16 with BSP T Rp (ISO 7-1) 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 sight level gauges. **Note:** Sight level gauges can not be fitted retrospectively to the standard APT14, APT14HC or APT14SHC.

Spare parts

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

Available spares

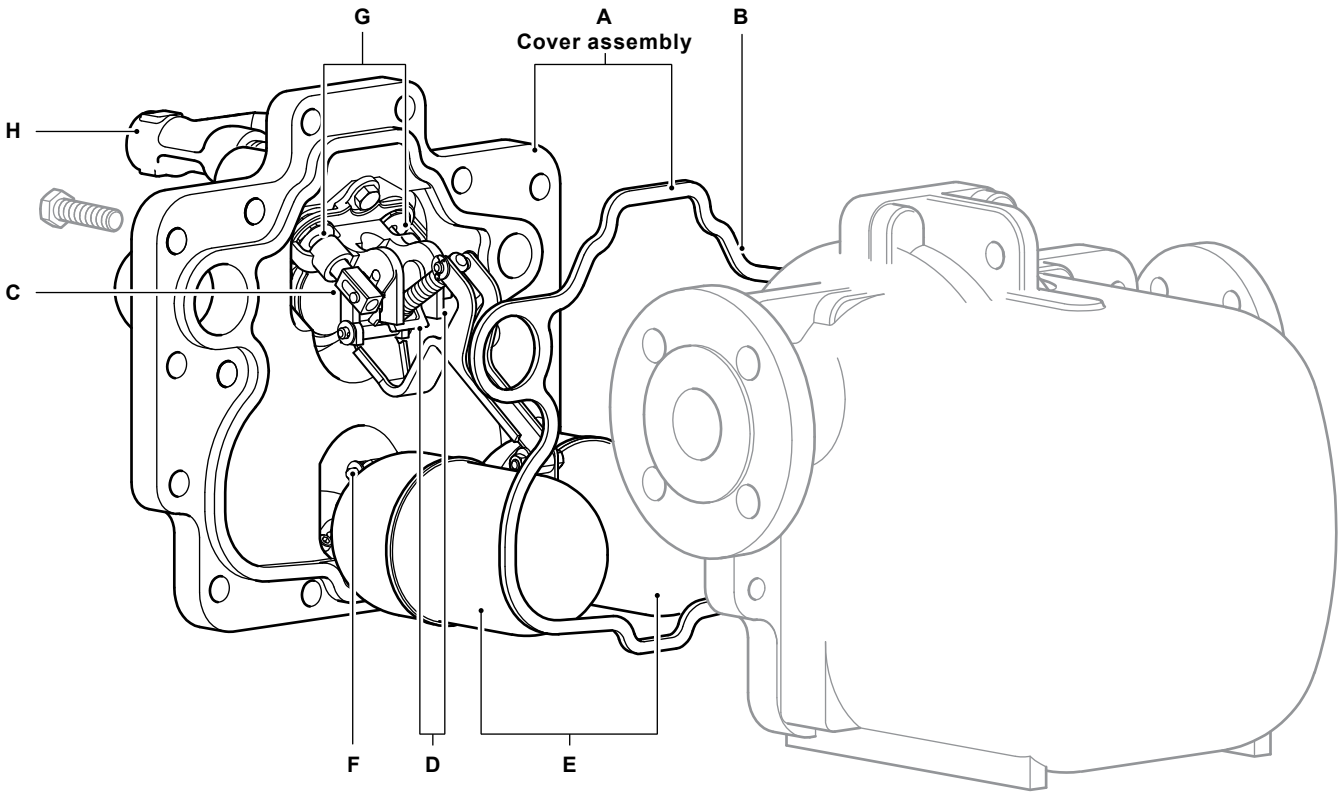
A	Cover assembly (**A - G** inclusive)	**1, 2, 5-25**
B	Cover gasket	**2**
C	Inlet check valve	**2, 12**
D	Spring and actuator arm	**2, 14, 24**
E	Floats	**2, 5, 6, 7**
F	Trap and outlet check valve mechanism	**2, 8, 9, 10** (APT14 only), **21, 22, 23**
G	Inlet/exhaust valve and seat kit	**2, 16, 17, 18, 19, 27**
H	See separate literature: For the **APT14** or **APT14HC** see TI-P163-01 and for the **APT14SHC** 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 off Inlet/exhaust valve and seat kit for a Spirax Sarco DN40 x DN25 APT14 automatic pump trap.

A
Cover assembly (APT14 shown)

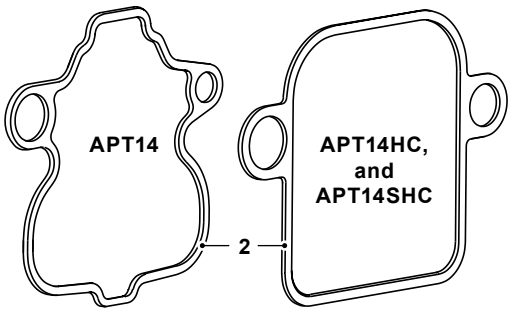


Available spares continued on next page

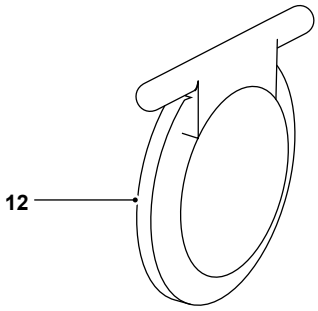
Available spares (continued)

A	Cover assembly (**A - G** inclusive)	**1, 2, 5-25**
B	Cover gasket	**2**
C	Inlet check valve	**2, 12**
D	Spring and actuator arm	**2, 14, 24**
E	Floats	**2, 5, 6, 7**

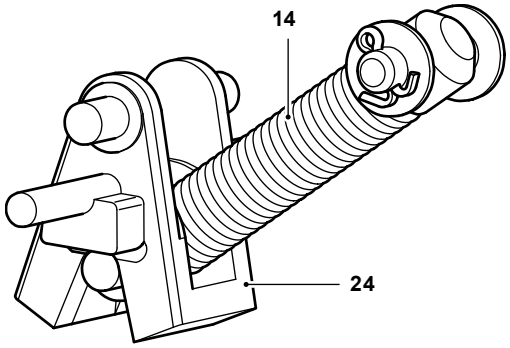
B
Cover gasket



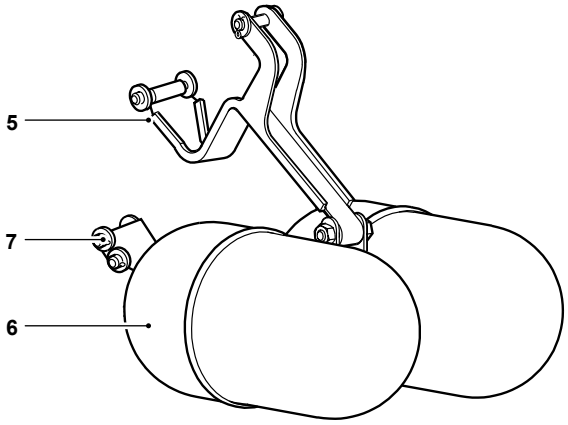
C
Inlet check valve



D
Spring and actuator arm



E
Floats



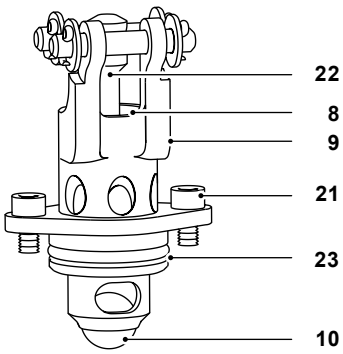
Available spares continued on next page

Available spares (continued)

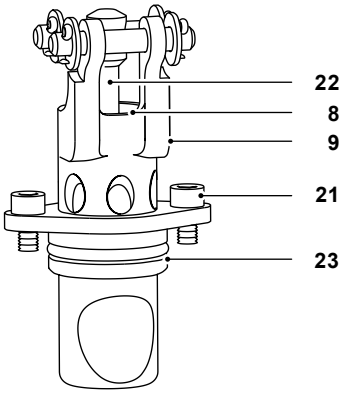
F	Trap and outlet check valve mechanism	**2, 8, 9, 10** (APT14 only), **21, 22, 23**
G	Inlet/exhaust valve and seat kit	**2, 16, 17, 18, 19, 27**

F
Trap and outlet check valve mechanism
Note: Item **10** is not included for the APT14HC and APT14SHC

APT14

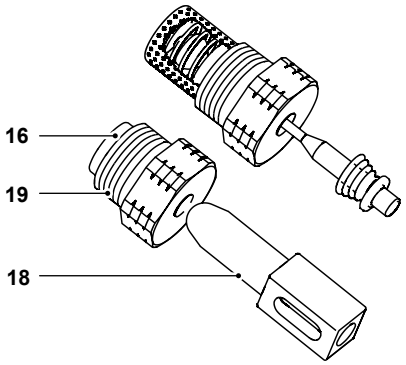


APT14HC and APT14SHC

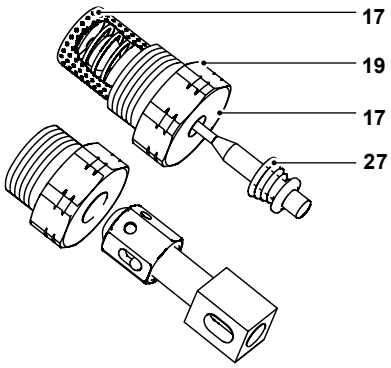


G
Inlet/exhaust valve and seat kit

APT14



APT14HC and APT14SHC



TI-S27-02-US
Issue 1

APT
Selection and Sizing

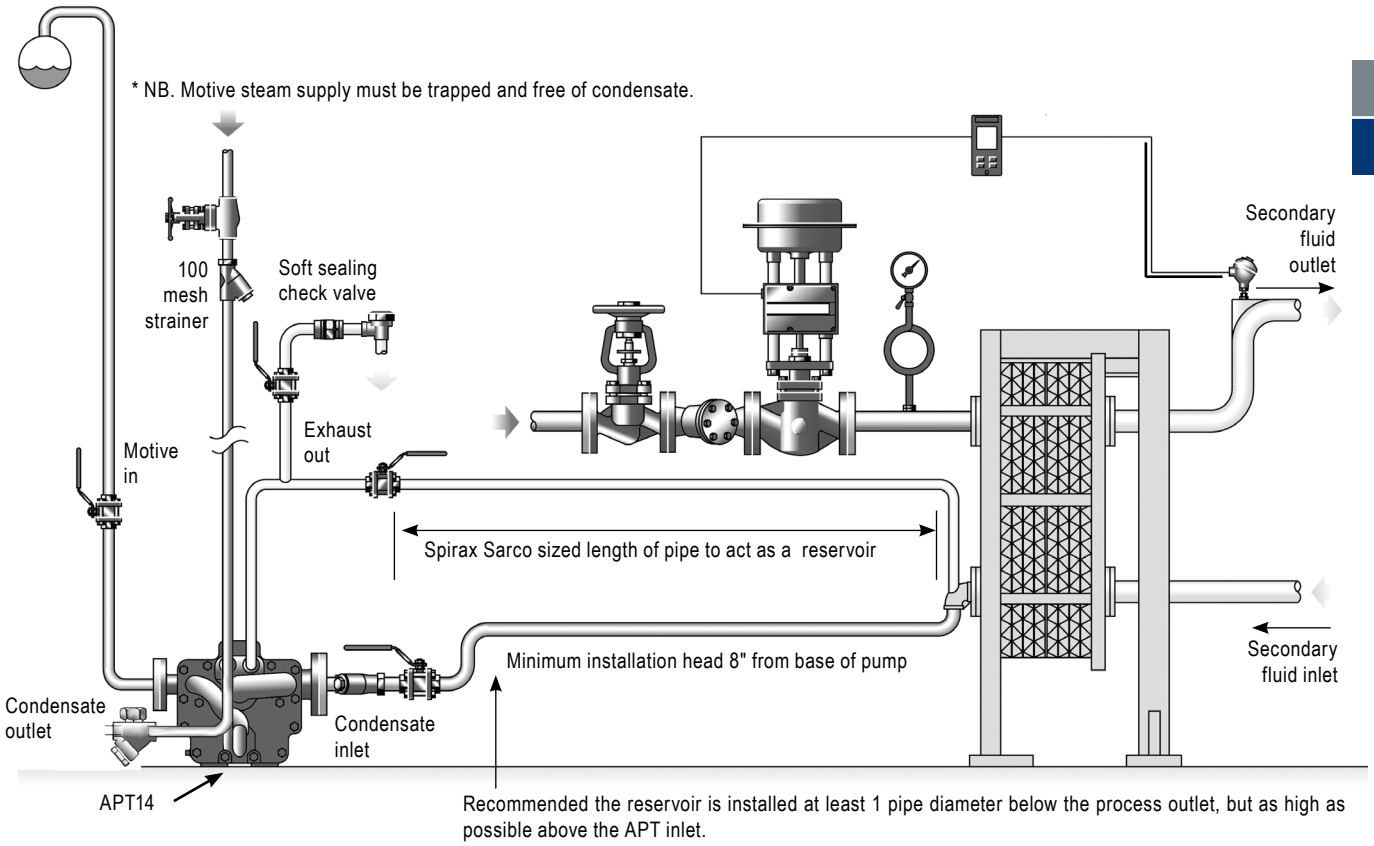
Spirax Sarco will ensure that the APT is accurately matched to your process and will provide you with a detailed sizing chart, tailored to your specific application.

Providing the information below is known, we can even provide you with confirmation over the telephone and fax you your specific chart.

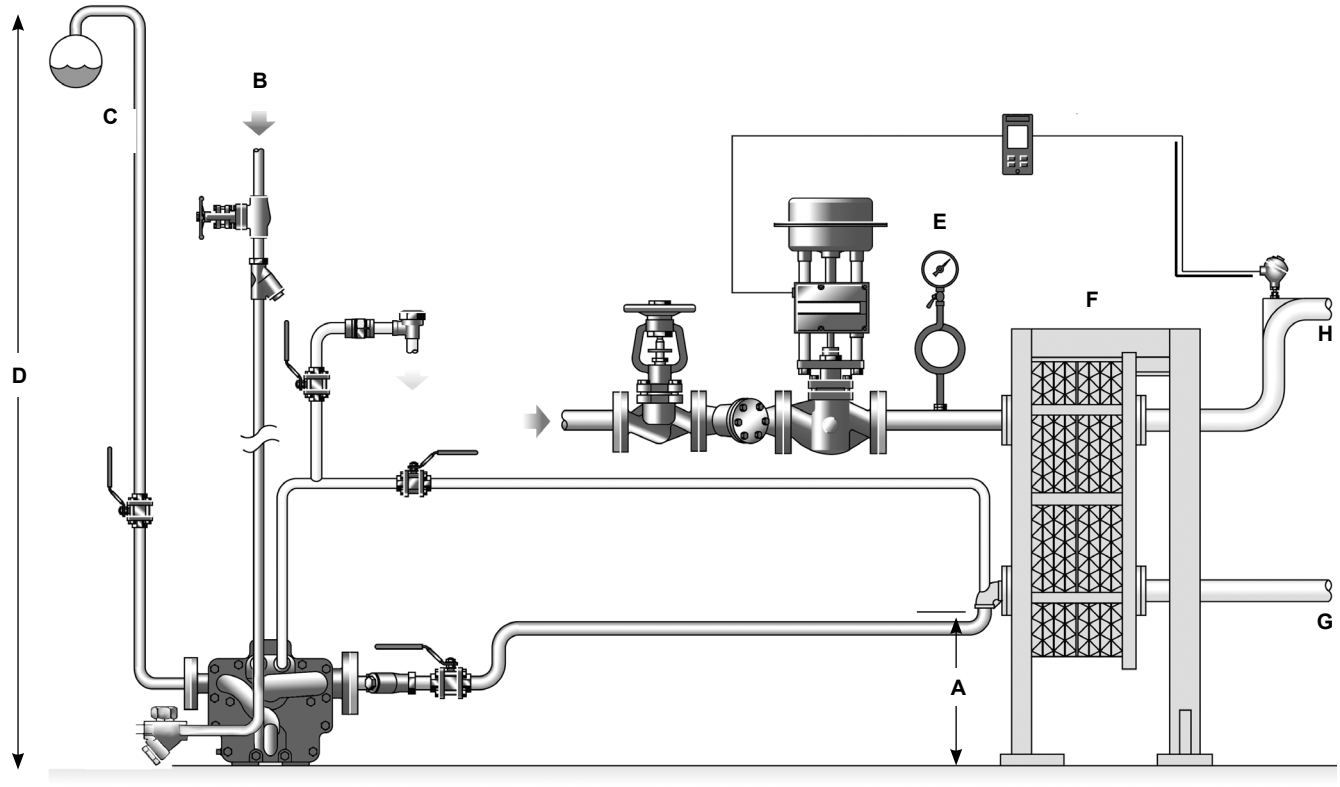
Alternatively arrange a visit for your local Spirax Sarco representative who can provide detailed APT sizing information for all your specific needs.

To help us size the APT for your application simply provide us with the following information: -

Recommended installation



Recommended installation



A	Installation head available from the base of the pump to the centerline of the heat exchanger/process condensate outlet.	ft
B	Motive steam pressure available to power the pump trap.	psi g
C	Pressure in the condensate return system.	psi g
D	Height of condensate return from floor level.	fl
E	Heat exchanger full load operating pressure.	psi g
F	Maximum steam load on the heat exhanger.	lb/hr
G	Minimum secondary fluid temperature.	°F
H	Maximum controlled temperature of secondary fluid.	°F

How to select and 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 psi g in return line, (C), plus piping friction in psi g.

Examples:

Steam condensate load	**(F)**	750 lb/h
Steam pressure available for operating APT	**(B)**	100 psi g
Vertical lift from APT to the return piping	**(D)**	50 feet
Pressure in the return piping (piping friction negligible)	**(C)**	50 psi g
Filling head available from base of APT	**(A)**	8 inches
System pressure	**(E)**	150 psi g

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 on the following pages 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 representive will provide detailed APT sizing information for all conditions.

Capacities - 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)	
Installation head (A) inches	System pressure (E) psig	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	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	

A = Distance from the floor to the reservoir pipe
B = Motive steam pressure
C = System back pressure
D = Vertical lift to condensate return valve main
E = Process operating pressure

Capacities - APT14

		200 psi motive steam (B)					
		Pressure (C+D)		Pressure (C+D)		Pressure (C+D)	
Installation head (A) inches	System pressure (E) psi g	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		9561		8592
30			8491		8491		8491
20			6375		6374		6374
16			5296		5296		5296
12			3932		3932		3932
8			1695		1695		1695
39	150		9120		8386		7135
30			8491		8378		7126
20			6375		6374		6374
16			5296		5296		5296
12			3932		3932		3932
8			1695		1695		1695
39	75		7034		5820	3075	
30			7022		5804	2844	
20			6374		5786	2490	
16			5296		5296	2272	
12			3932		3932		2165
8			1695		1695		1695
39	30		5018	2419		2104	
30			4998	2248		1955	
20			4975	1695		1707	
16			4966	1792		1557	
12			3932	1534		1332	
8			1695	941		815	
39	0		1553	1223		1066	
30			1406	1136		990	
20		1220		994		865	
16		1119		908		790	
12			992	780		678	
8			850	487		423	

A = Distance from the floor to the reservoir pipe
B = Motive steam pressure
C = System back pressure
D = Vertical lift to condensate return valve main
E = Process operating pressure

APT14 continued on next page

Capacities - APT14 (continued)

		100 psi motive steam (B)					
		0 psi back pressure (C+D)		30 psi back pressure (C+D)		72 psi back pressure (C+D)	
Installation head (A) inches	System pressure (E) psi g	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		9561		8592
30			8491		8491		8491
20			6374		6374		6374
16			5296		5296		5296
12			3932		3932		3932
8			1695		1695		1695
39	150		9120		8386		7137
30			8491		8378		7126
20			6374		6374		6374
16			5296		5296		5296
12			3932		3932		3932
8			1695		1695		1695
39	75		7034		5820	2694	
30			7022		5804	2569	
20			6374		5786	2345	
16			5296		5296		2200
12			3932		3932		2165
8			1695		1695		1695
39	30		5018	2626		1974	
30			4998	2475		1875	
20			4975	2215		1700	
16			4966	2050		1587	
12			3932	1795		1408	
8			1695	1160		941	
39	0	1763		1425		1112	
30		1657		1337		1050	
20		1478		1189		944	
16		1366		1097		877	
12		1196		958		773	
8			850	620		513	

A = Distance from the floor to the reservoir pipe
B = Motive steam pressure
C = System back pressure
D = Vertical lift to condensate return valve main
E = Process operating pressure

APT14 continued on next page

Capacities - APT14 (continued)

		30 psi motive steam (B)			
		0 psi back pressure (C+D)		30 psi back pressure (C+D)	
Installation head (A) inches	System pressure (E) psi g	Pumping capacity lb/h	Trapping capacity lb/h	Pumping capacity lb/h	Trapping capacity lb/h
39	200		10021		9561
30			8491		8491
20			6374		6374
16			5296		5296
12			3932		3932
8			1695		1695
39	150		9120		8386
30			8491		8378
20			6374		6374
16			5296		5296
12			3932		3932
8			1695		1695
39	75		7034		5820
30			7022		5804
20			6374		5786
16			5296		5296
12			3932		3932
8			1695		1695
39	30		5018		1553
30			4998		1406
20			4975		1205
16			4966		1107
12			3932		992
8			1695		850
39	0	1915			
30		1835			
20		1692			
16		1598			
12		1445			
8		1026			

A = Distance from the floor to the reservoir pipe
B = Motive steam pressure
C = System back pressure
D = Vertical lift to condensate return valve main
E = Process operating pressure

Capacities - APT14HC

		200 psi motive steam (B)					
		0 psi back pressure (C+D)		30 psi back pressure (C+D)		72 psi back pressure (C+D)	
Installation head (A) inches	System pressure (E) psi g	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		9561		8592
30			8491		8491		8491
20			6375		6374		6374
16			5296		5296		5296
12			3932		3932		3932
8			1695		1695		1695
39	150		9120		8386		7137
30			8491		8378		7126
20			6375		6374		6374
16			5296		5296		5296
12			3932		3932		3932
8			1695		1695		1695
39	75		7034		5820	6186	
30			7022		5804	5879	
20			6374		5786	5275	
16			5296		5296	4873	
12			3932		3932		2165
8			1695		1695		1695
39	30		5018	5191		3539	
30			4998	4907		3338	
20			4975	4431		3003	
16			4966	4135		2796	
12			3932	3680		2480	
8			1695	2569		1716	
39	0		1553	2024		1370	
30			1406	1900		1278	
20		2927		1677		1129	
16		2731		1554		1035	
12			992	1353		903	
8			850	907		601	

A = Distance from the floor to the reservoir pipe
B = Motive steam pressure
C = System back pressure
D = Vertical lift to condensate return valve main
E = Process operating pressure

APT14HC continued on next page

Capacities - APT14HC (continued)

		100 psi motive steam (B)					
		0 psi back pressure (C+D)		30 psi back pressure (C+D)		72 psi back pressure (C+D)	
Installation head (A) inches	System pressure (E) psi g	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		9561		8592
30			8491		8491		8491
20			6374		6374		6374
16			5296		5296		5296
12			3932		3932		3932
8			1695		1695		1695
39	150		9120		8386		7137
30			8491		8378		7126
20			6374		6374		6374
16			5296		5296		5296
12			3932		3932		3932
8			1695		1695		1695
39	75		7034		5820	4436	
30			7022		5804	4313	
20			6374		5786	4089	
16			5296		5296		2200
12			3932		3932		2165
8			1695		1695		1695
39	30		5018	6136		2824	
30			4998	5842		2728	
20			4975	5339		2556	
16			4966	5019		2442	
12			3932	4520		2257	
8			1695	3247		1737	
39	0	4493		2486		1241	
30		4255		2348		1184	
20		3854		2102		1086	
16		3617		1943		1023	
12		3216		1716		925	
8		2260	850	1175		670	

A = Distance from the floor to the reservoir pipe
B = Motive steam pressure
C = System back pressure
D = Vertical lift to condensate return valve main
E = Process operating pressure

APT14HC continued on next page

Capacities - APT14HC (continued)

		30 psi motive steam (B)			
		0 psi back pressure (C+D)		30 psi back pressure (C+D)	
Installation head (A) inches	System pressure (E) psi g	Pumping capacity lb/h	Trapping capacity lb/h	Pumping capacity lb/h	Trapping capacity lb/h
39	200		10021		9561
30			8491		8491
20			6374		6374
16			5296		5296
12			3932		3932
8			1695		1695
39	150		9120		8386
30			8491		8378
20			6374		6374
16			5296		5296
12			3932		3932
8			1695		1695
39	75		7034		5820
30			7022		5804
20			6374		5786
16			5296		5296
12			3932		3932
8			1695		1695
39	30		5018		1553
30			4998		1406
20			4975		1205
16			4966		1107
12			3932		992
8			1695		850
39	0	6174			
30		5867			
20		5379			
16		5067			
12		4597			
8		3331			

A = Distance from the floor to the reservoir pipe
B = Motive steam pressure
C = System back pressure
D = Vertical lift to condensate return valve main
E = Process operating pressure

TI-P208-01-US
Issue 4

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.

All packages are designed for service in open loop, vented applications; Care should be taken to ensure adequate venting is available based on the maximum rated flash steam loads per pump package.

Standard Pump Packages

Model		PPEC Simplex Pump Package	PPEC Duplex Pump Package
Limiting conditions	PMA:	See TI-P208-02-US	
	TMA:		
	Receiver Tank:	Non-ASME: Rated for atmospheric pressure only. 650 °F @ 0 psi g (343 °C @ 0 bar g) ASME: Rated for 200 psi g @ 400 °F	Non-ASME: Rated for atmospheric pressure only. 650 °F @ 0 psi g (343 °C @ 0 bar g) ASME: Rated for 200 psi g @ 400 °F
		Sized for flash steam rates of up to 600 lb/hr (272 kg/hr).	Sized for flash steam rates of up to 1200 lb/hr (544 kg/hr).
Sizes	Pump:	1½" x 1½"	1½" x 1½"
	Receiver:	Commercial Grade: 8 Gallons (35 L)	Commercial Grade: 1" PPEC 8 Gallons (35 L) 1½" PPEC 26 Gallons (115 L)
		Industrial Grade: 14 Gallon (62 L) ASME	Industrial Grade: 1½" PPEC 35 Gallon (154 L) ASME
Capacity		See TI-P208-03-US	
Construction		Commercial Grade: Fabricated steel receiver tank and frame Cast iron pump body Stainless steel pump internals Stainless steel check valves Industrial Grade: Fabricated steel receiver tank and frame Cast steel pump body Stainless steel pump internals Stainless steel check valves	Commercial Grade: Fabricated steel receiver tank and frame Cast iron pump body Stainless steel pump internals Stainless steel check valves Industrial Grade: Fabricated steel receiver tank and frame Cast steel pump body Stainless steel pump internals Stainless steel check valves

Standard Pump Packages (continued)

Model		PTC Simplex Pump Package	PTC Duplex Pump Package
Limiting conditions	PMA	See TI-P207-05-US	
	TMA		
	Receiver Tank	Rated for atmospheric pressure only. 650 °F @ 0 psi g (343 °C @ 0 bar g)	Rated for atmospheric pressure only. 650 °F @ 0 psi g (343 °C @ 0 bar g)
		Sized for flash steam rates of up to 1,350 lb/hr (612 kg/hr).	Sized for flash steam rates of up to 2,700 lb/hr (1225 kg/hr).
Sizes	Pump	3" x 2"	3" x 2"
	Receiver	49 Gallons (185 L)	82 Gallons (310 L)
Capacity		See TI-P207-12-US	
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		PTC Triplex Pump Package	PTC Quadraplex Pump Package
Limiting conditions	PMA	See TI-P207-05-US	
	TMA		
	Receiver Tank	Rated for atmospheric pressure only. 650 °F @ 0 psi g (343 °C @ 0 bar g)	Rated for atmospheric pressure only. 650 °F @ 0 psi g (343 °C @ 0 bar g)
		Sized for flash steam rates of up to 4,000 lb/hr (1814 kg/hr)	Sized for flash steam rates of up to 4,500 lb/hr (2041 kg/hr)
Sizes	Pump	3" x 2"	3" x 2"
	Receiver	158 Gallons (598 L)	207 Gallons (784 L)
Capacity		See TI-P207-12-US	
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-P207-06-US	
	TMA		
	Receiver Tank	Rated for 200 psi g @ 395 °F (13.8 bar g @ 202 °C)	Rated for 200 psi g @ 395 °F (13.8 bar g @ 202 °C)
		Sized for flash steam rates of up to 1,350 lb/hr.(612 kg/hr)	Sized for flash steam rates of up to 2,700 lb/hr (1225 kg/hr)
Sizes	Pump	3" x 2"	3" x 2"
	Receiver	49 Gallons (185 L)	82 Gallons (310 L)
Capacity		See TI-P207-12-US	
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 Packages (continued)

Model		PTF Triplex Pump Package	PTF Quadraplex Pump Package
Limiting conditions	PMA	See TI-P207-06-US	
	TMA		
	Receiver Tank	Rated for 200 psi g @ 395 °F (13.8 bar g @ 202 °C)	Rated for 200 psi g @ 395 °F (13.8 bar g @ 202 °C)
		Sized for flash steam rates of up to 4,000 lb/hr (1814 kg/hr)	Sized for flash steam rates of up to 4,500 lb/hr (2041 kg/hr)
Sizes	Pump	3" x 2"	3" x 2"
	Receiver	158 Gallons (598 L)	207 Gallons (784 L)
Capacity		See TI-P207-12-US	
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

Standard Pump Package Includes [1]:

- Motive and exhaust piping with motive drip trap
- Inlet Isolation Valve(s)
- Inlet Strainer(s)
- Pump Gauge Glass Assembly(s)

[1]: For a complete list of the bill of materials, please consult the pump package sales drawing.

Additional Options Include:

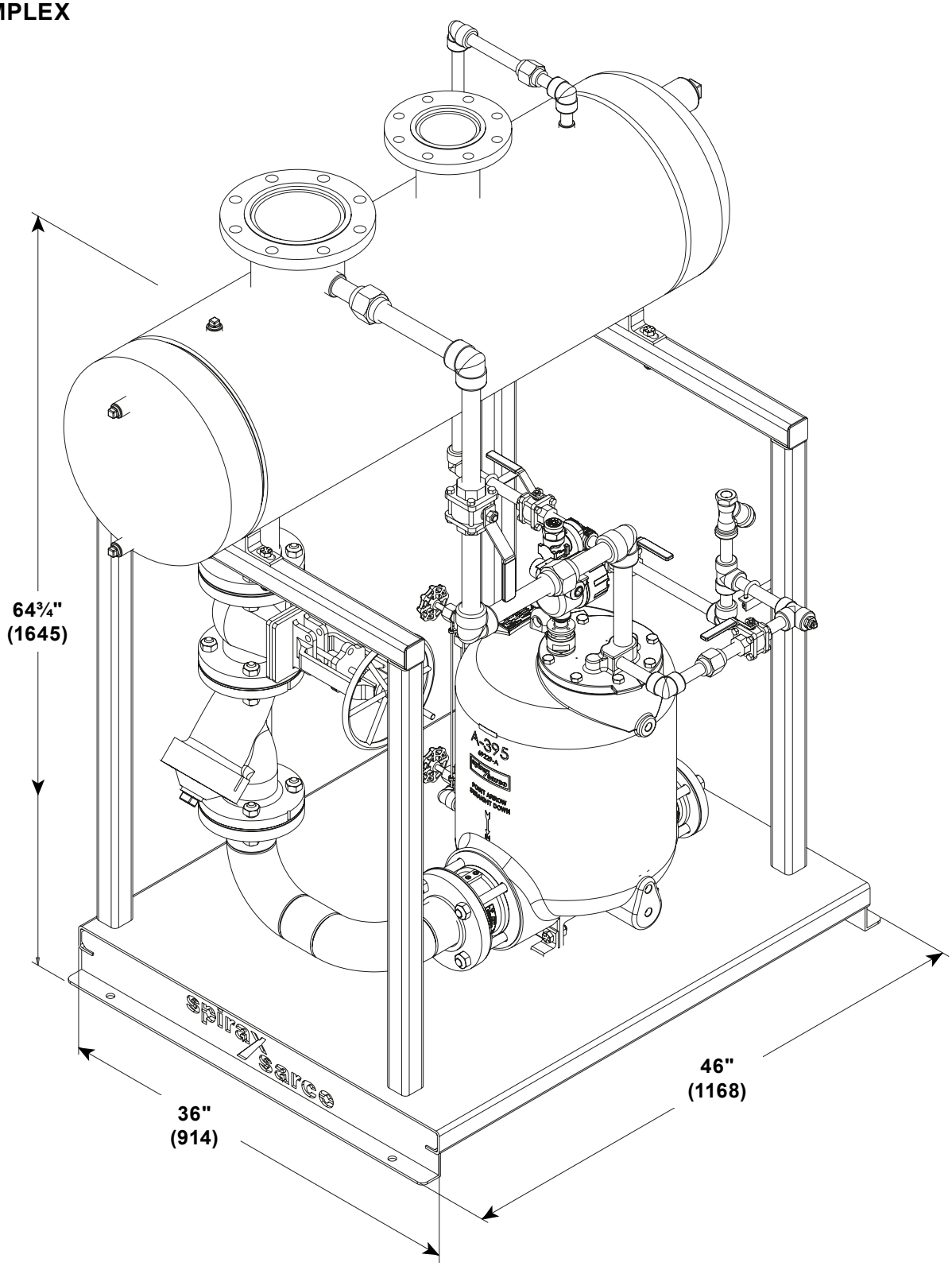
- Pump Insulation Blanket(s)
- Receiver Insulation Blanket
- Receiver Gauge Glass [1]
- Overflow Piping [1]
- Pump Discharge Gate Valve(s)
- Pump Drain Valve(s)
- Discharge Manifold [2]

[1]: Item ships loose with package

[2]: Not available with Simplex; Does not include discharge gate valves

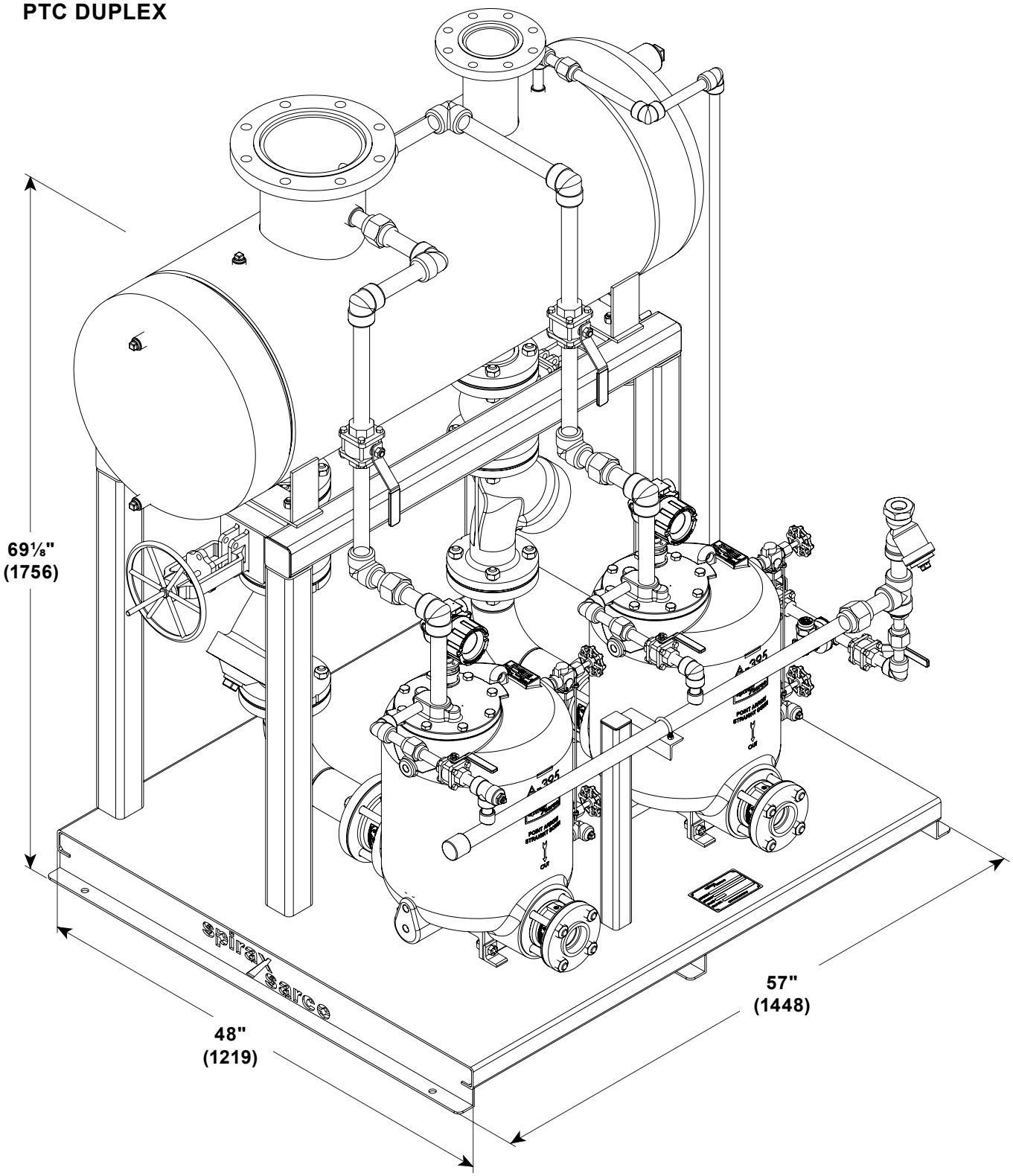
Dimensions (continued) (approximate in inches(mm))

PTC SIMPLEX



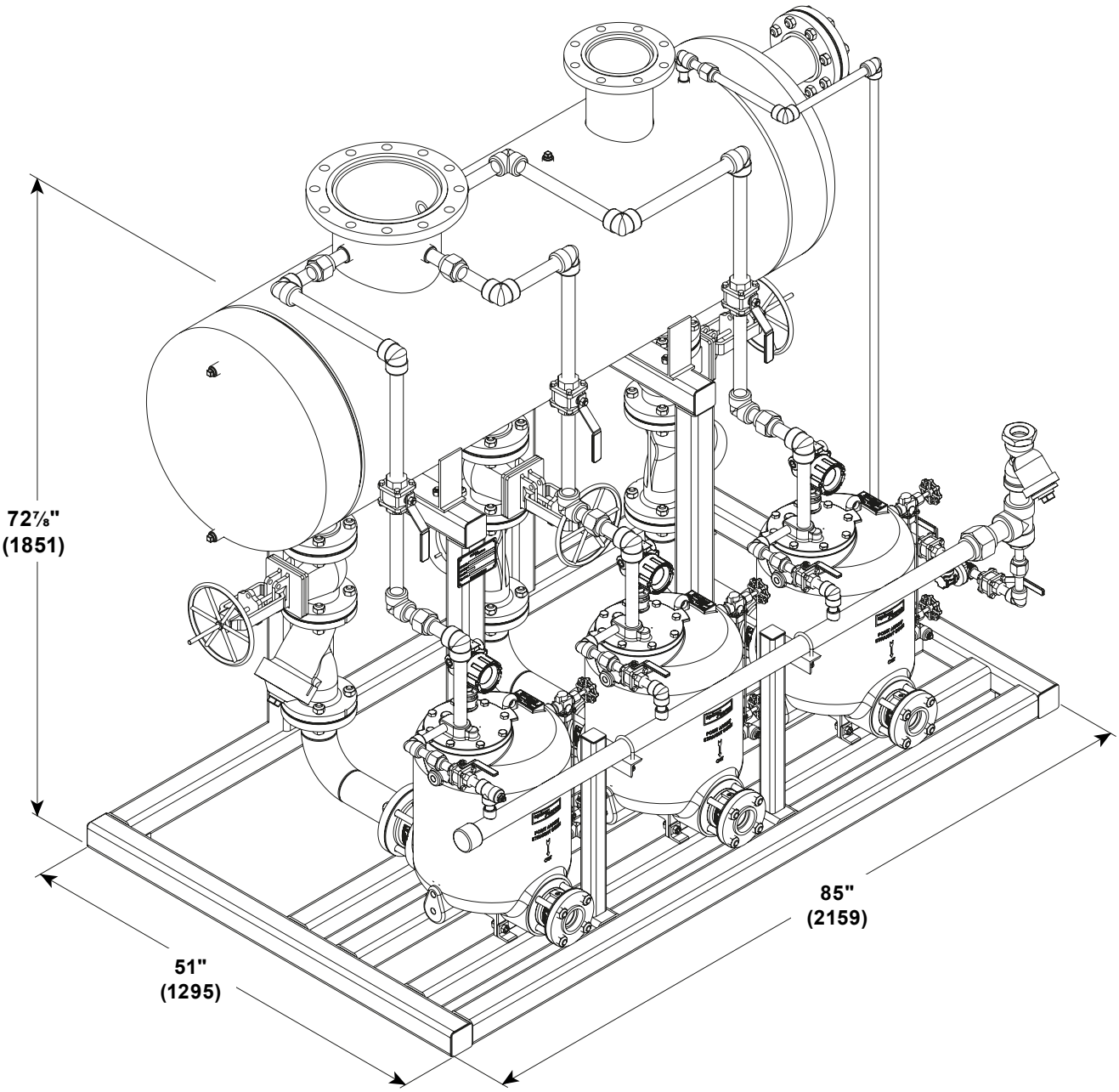
Dimensions (continued) (approximate in inches(mm))

PTC DUPLEX



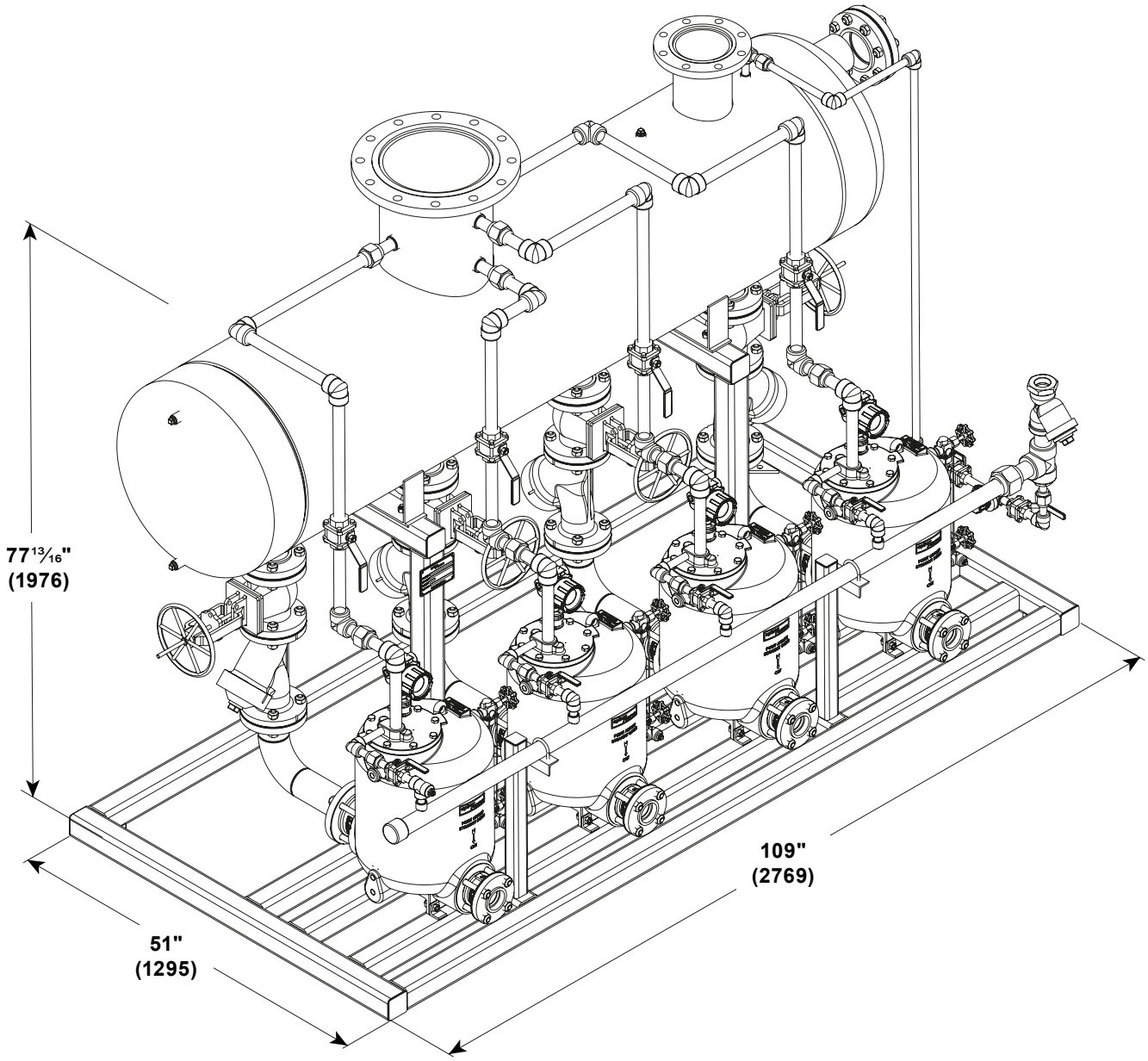
Dimensions (continued) (approximate in inches(mm))

PTC TRIPLEX



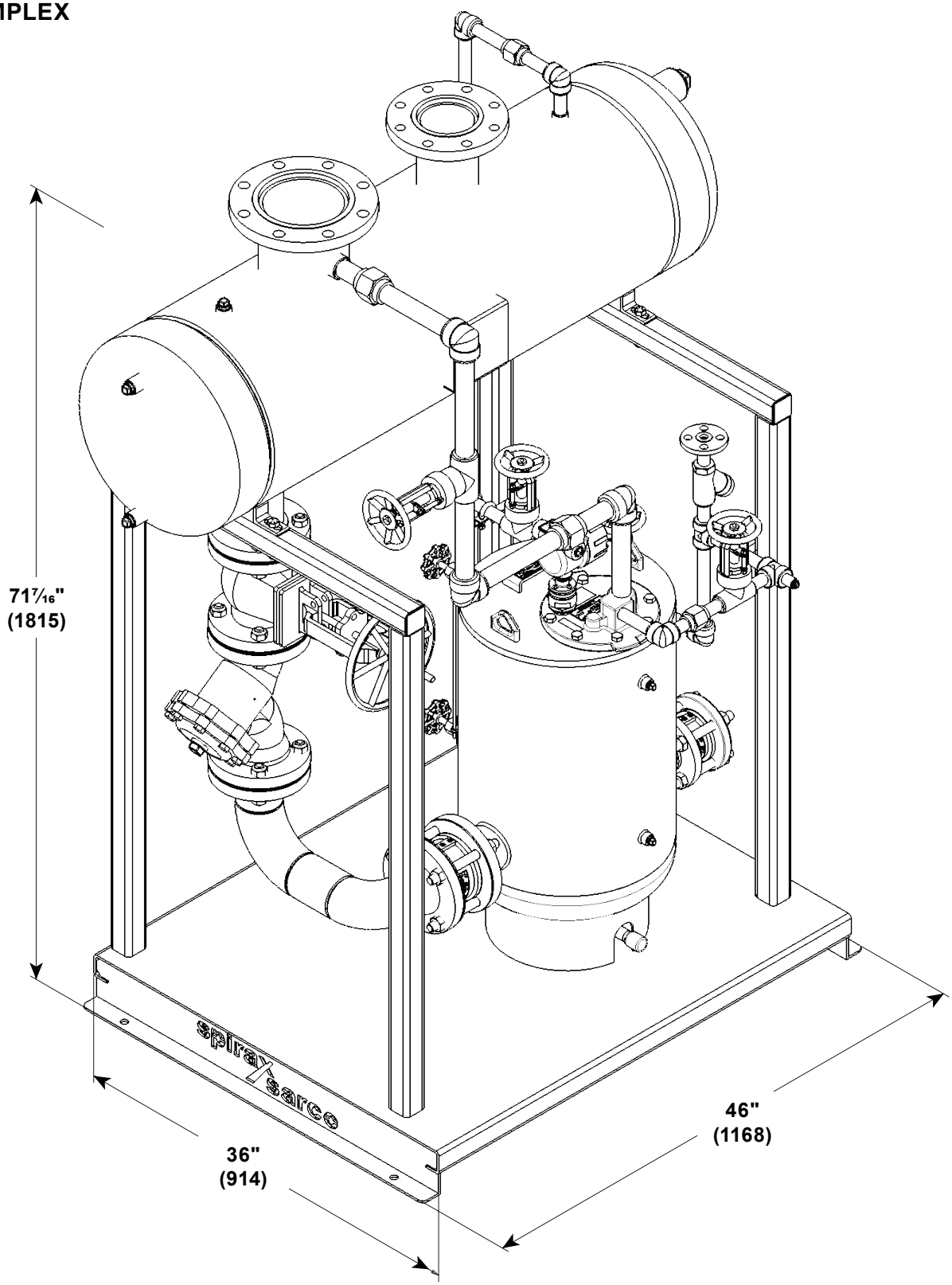
Dimensions (continued) (approximate in inches(mm))

PTC QUADRAPLEX



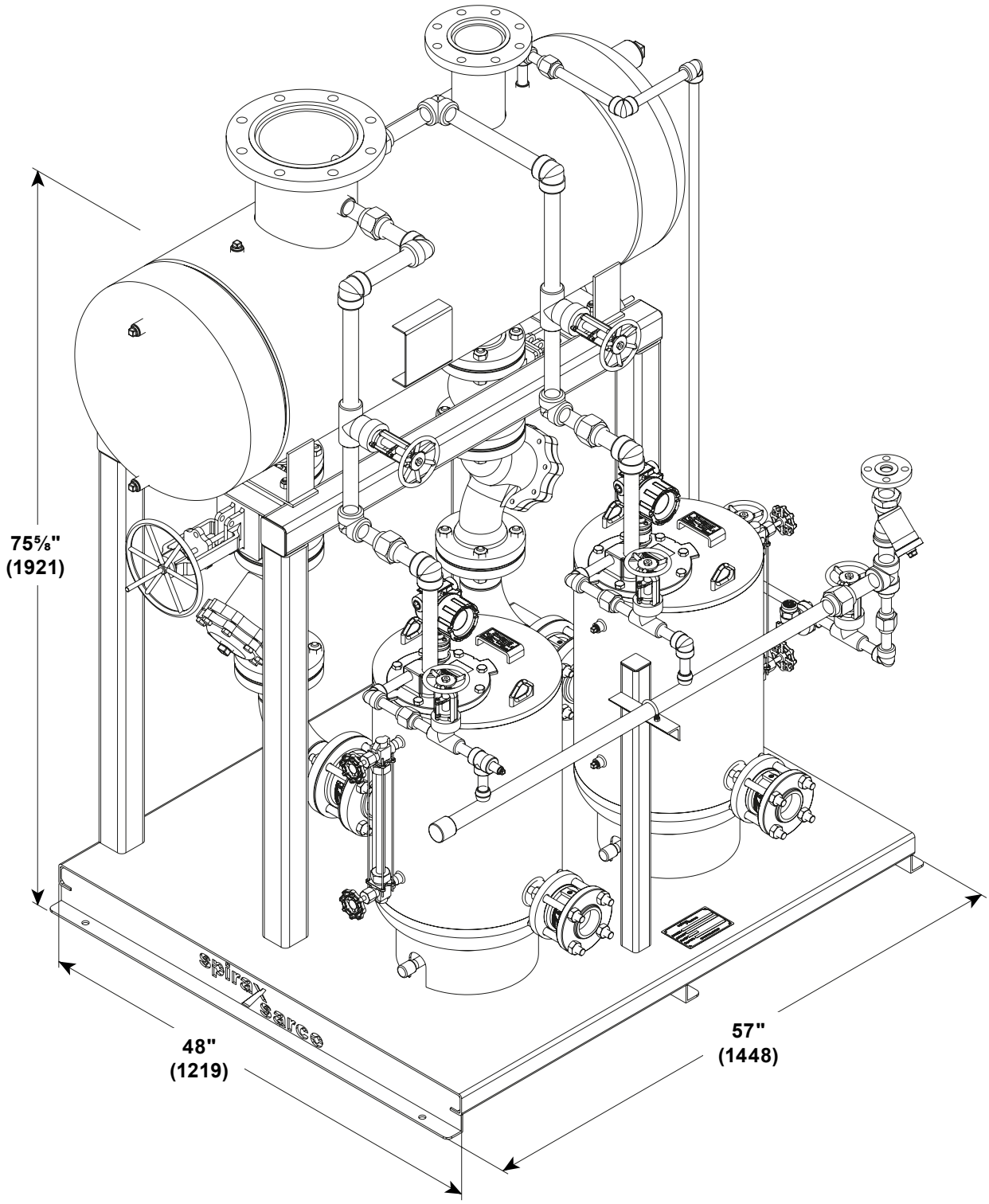
Dimensions (continued) (approximate in inches(mm))

PTF SIMPLEX



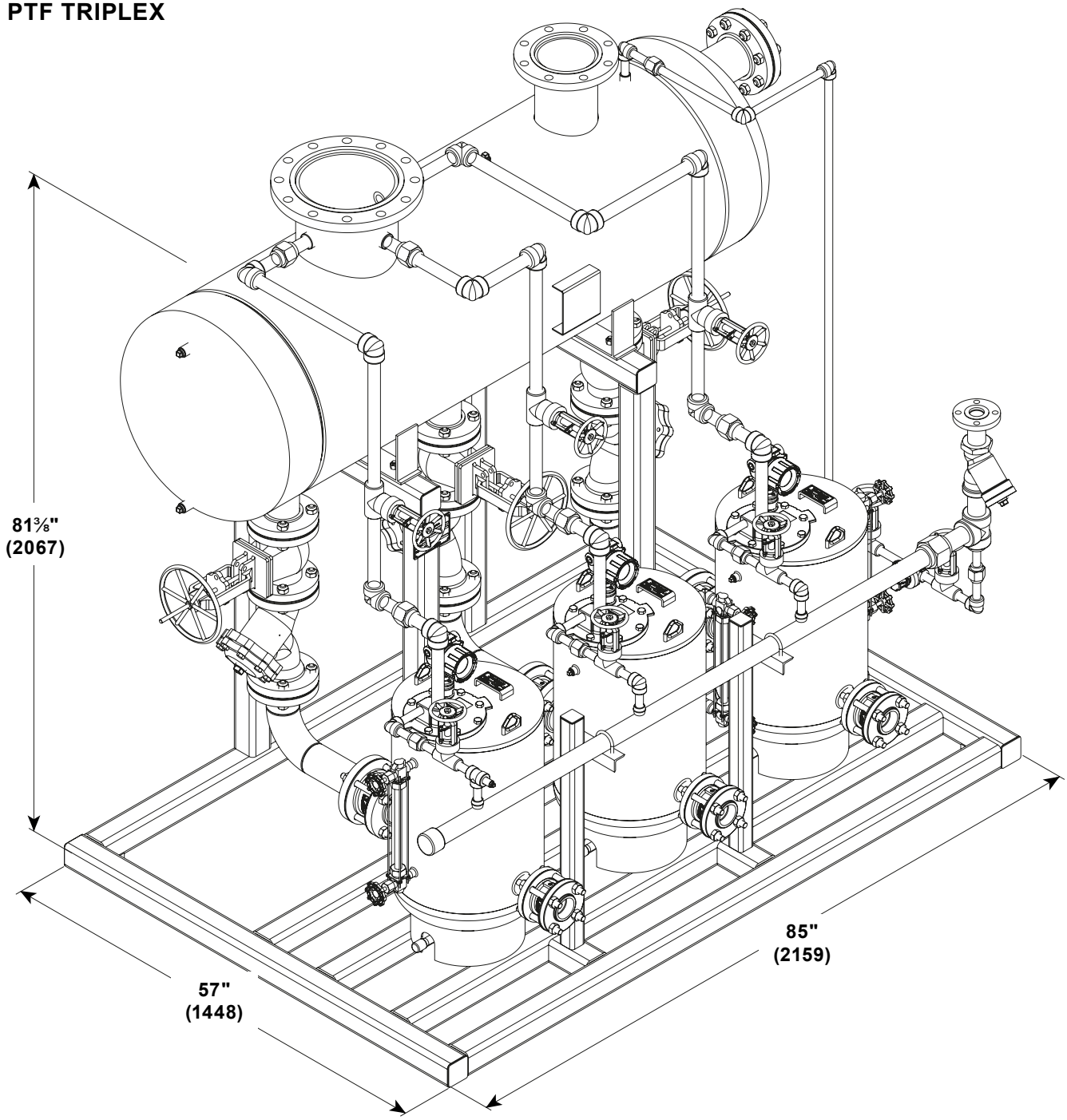
Dimensions (continued) (approximate in inches(mm))

PTF DUPLEX



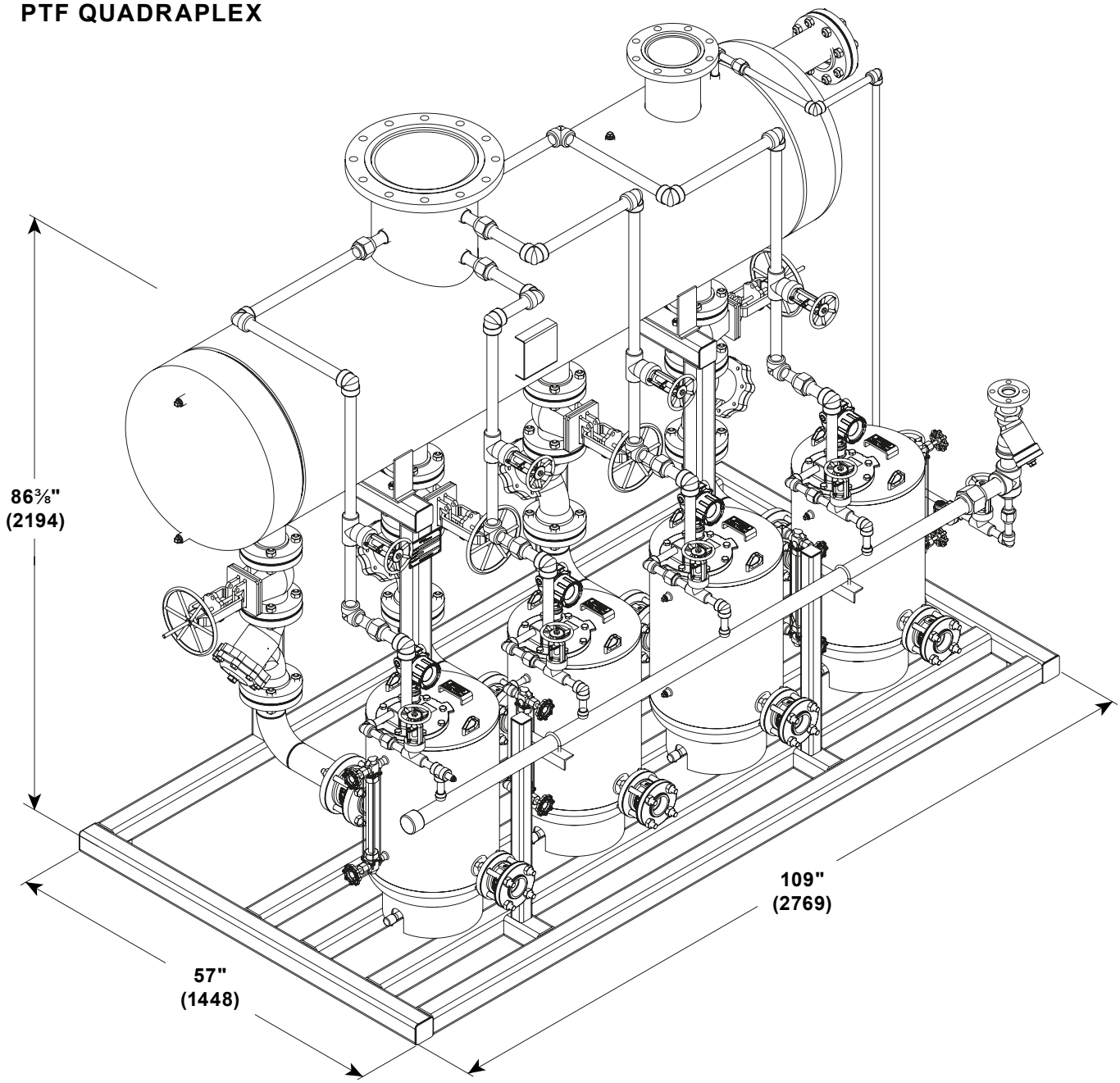
Dimensions (continued) (approximate in inches(mm))

PTF TRIPLEX



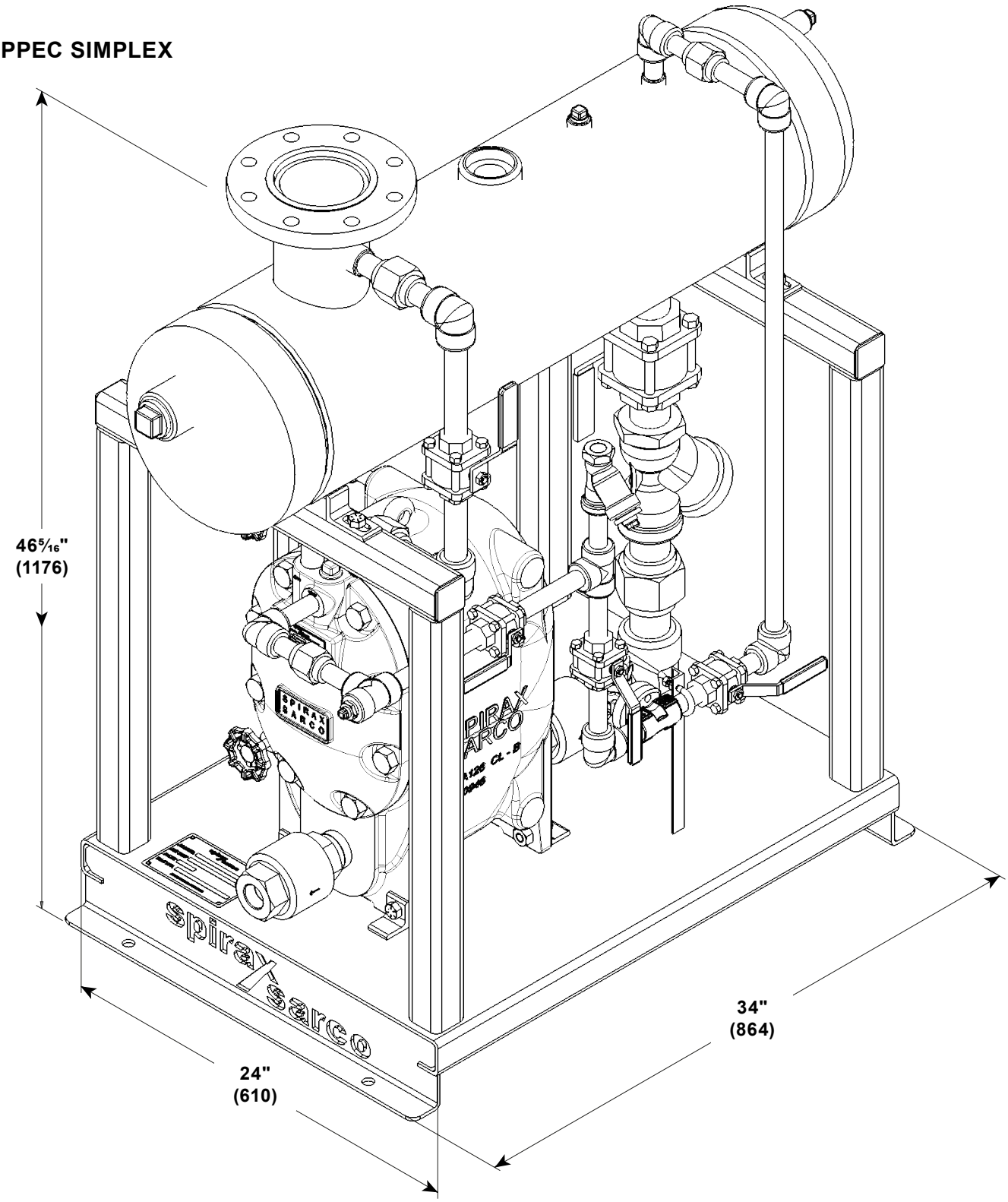
Dimensions (continued) (approximate in inches(mm))

PTF QUADRAPLEX



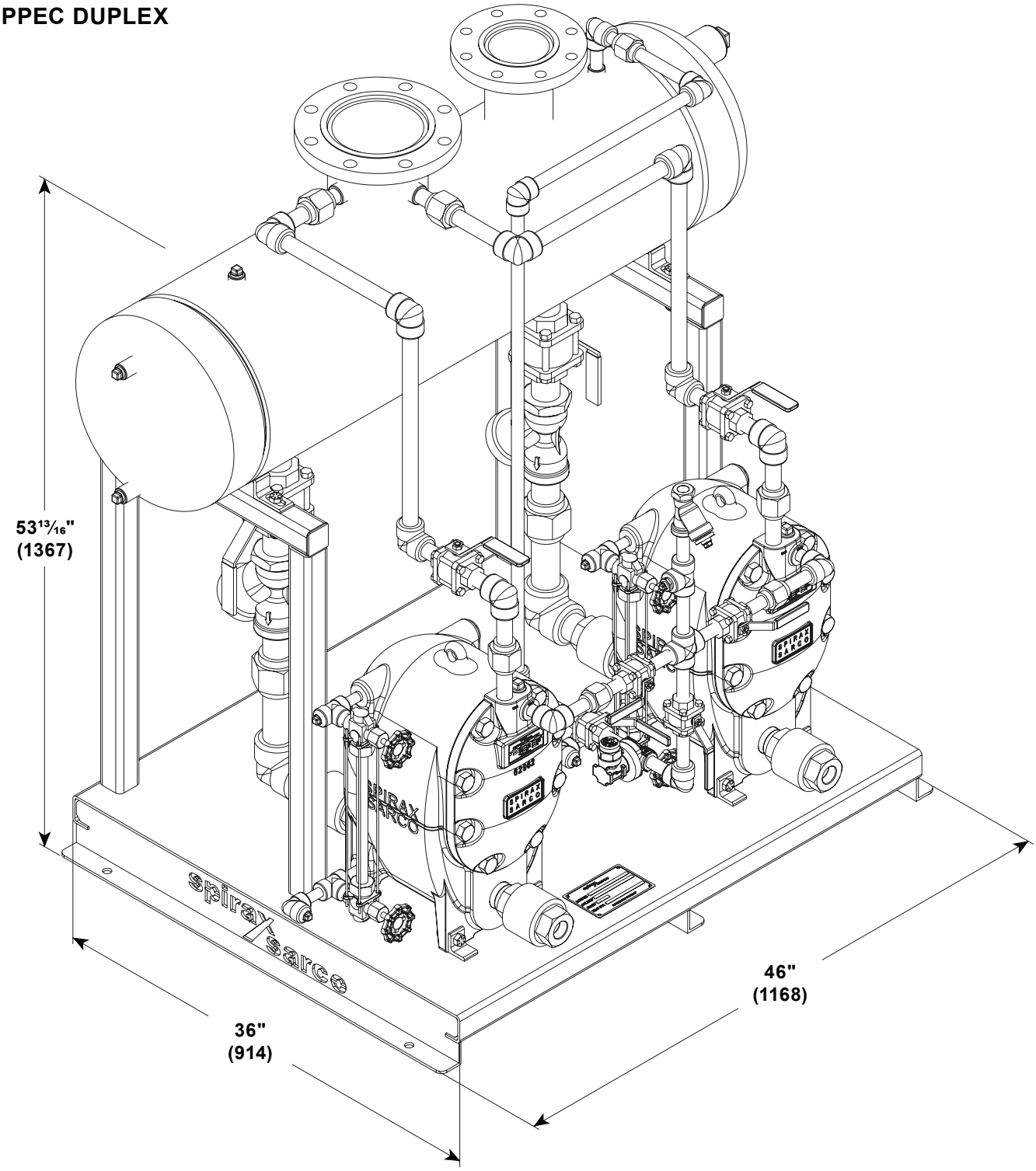
Dimensions (continued) (approximate in inches(mm))

PPEC SIMPLEX



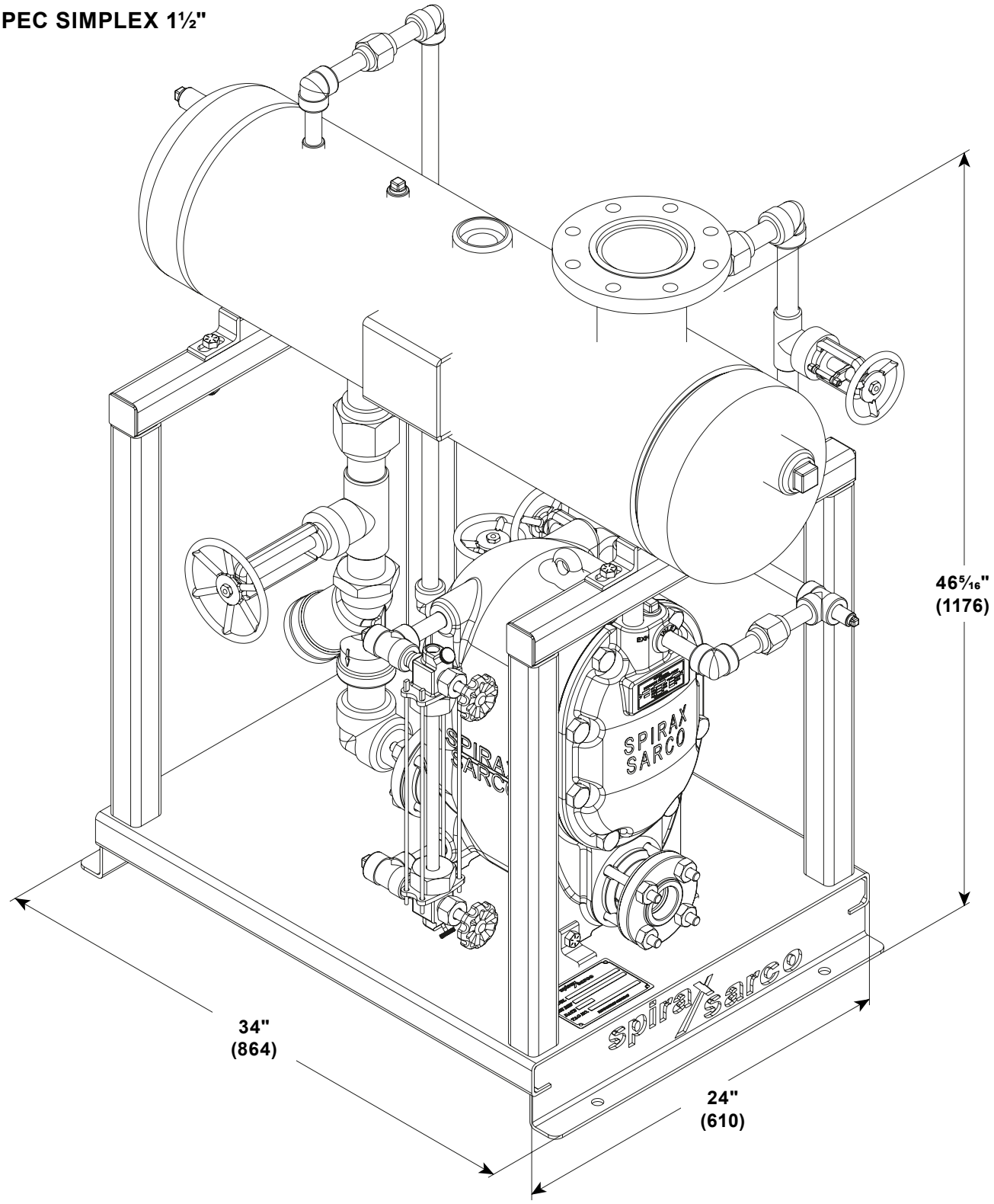
Dimensions (continued) (approximate in inches(mm))

PPEC DUPLEX



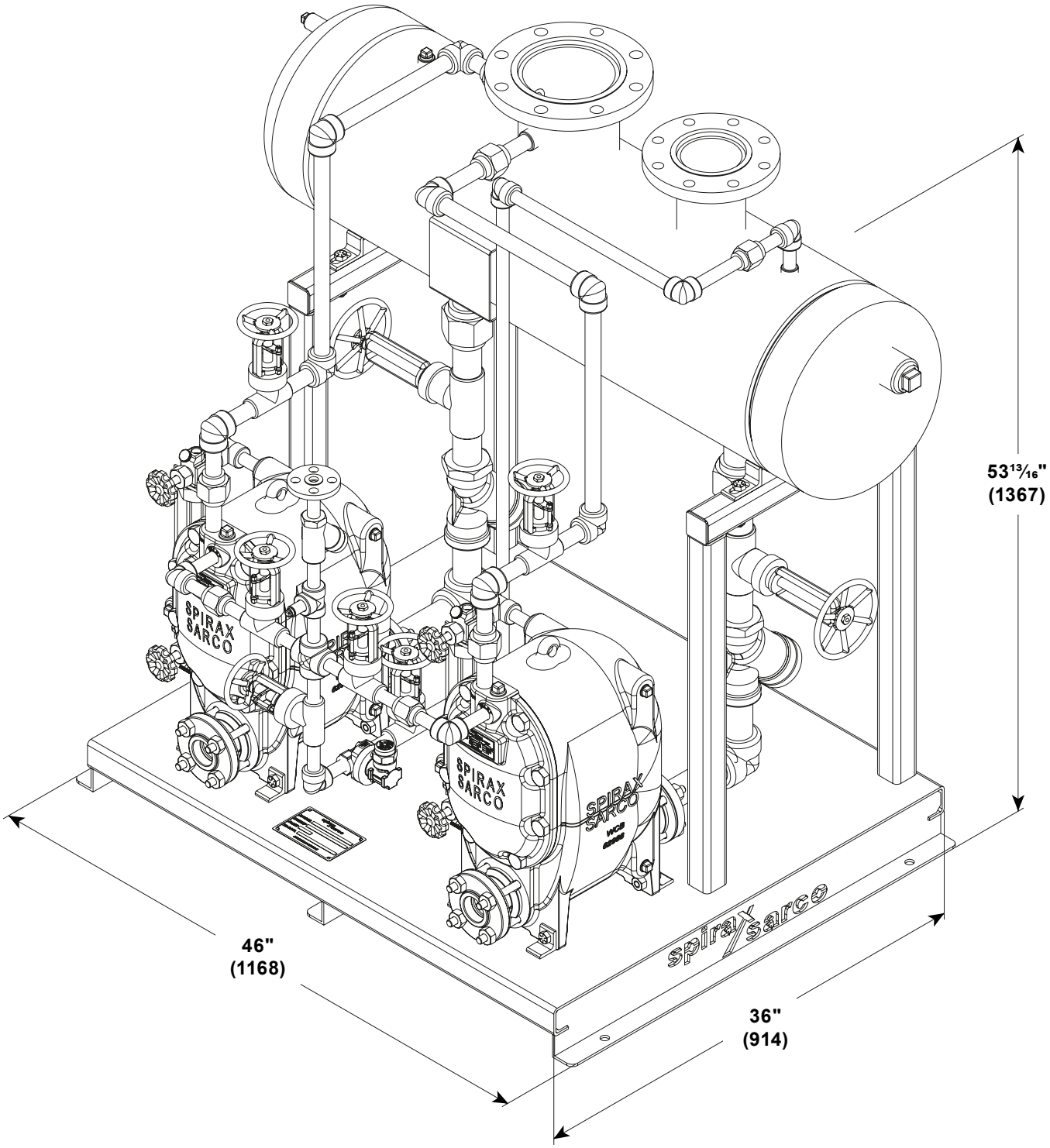
Dimensions (continued) (approximate in inches(mm))

PPEC SIMPLEX 1½"



Dimensions (continued) (approximate in inches(mm))

PPEC DUPLEX 1½"



Vented Pressure Powered Pump Packages - PPEC/PTC/PTF

Standard Pump Package Series Selection Guide:

Pump		Part Number	Description	
Series	PPEC	ES001618	Simplex Industrial PPEC Package	ES003140
		ES001619	Duplex Industrial PPEC Package	
		ES003120	Simplex Commercial PPEC Package	
		ES003220	Duplex Commercial PPEC Package	
	PTC	ES003140	Simplex PTC Package	
		ES003240	Duplex PTC Package	
		ES003340	Triplex PTC Package	
		ES003440	Quadraplex PTC Package	
	PTF	ES003160	Simplex PTF Package	
		ES003260	Duplex PTF Package	
		ES003360	Triplex PTF Package	
		ES003460	Quadraplex PTF Package	
Options	All	A	Pump Insulation Blanket [1]	-ABE
		B	Receiver Insulation Blanket	
		C	Receiver Gauge Glass [2]	
		D	Overflow Piping [2]	
		E	Pump Discharge Gate Valve [1]	
		F	Pump Drain Valve [1]	
		G	Discharge Manifold [3]	
				ES003140-ABE

[1] Options A, E, and F will include QTY (1) per pump on standard skid package
[2] Options C and D will ship loose for field installation by customer
[3] Option G is not available with one pump (Simplex) designs

How to order/selection example:

1 off Simplex PTC package with Pump Insulation Blanket, Receiver Insulation Blanket, and Pump Discharge Gate Valves

TI-P225-08-US
Issue 1

Pressure Powered Pump™ Accessories
Insulation Covers

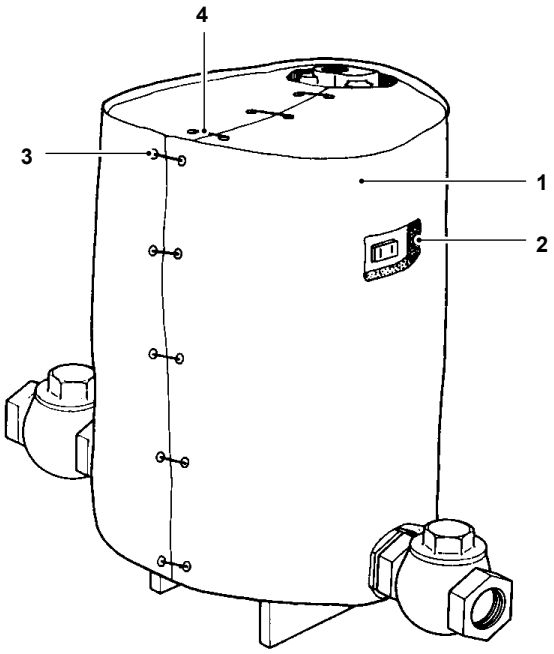
Description

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

Maximum operating temperature	500 °F (260 °C) continuous
Standard range	PPEC Insulation cover
	PTC Insulation cover (up to 3" x 2" size)
	PTF Insulation cover (up to 3" x 2" size)
	PTF4 Insulation cover (has 2 pc. construction)
	APT10-4.5 Insulation cover
	APT14 Insulation cover
	APT14HC Insulation cover



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 (260 °C), 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.

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

TI-P140-01-US
Issue 1

Flash Recovery Vessels

Description

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 psi g
Sizes (body ø)	6", 8", 12", 16"
Connections	ANSI 150 RF & NPT
Construction	Mild steel

Limiting operating conditions

PMO	Maximum operating pressure	150 psi g (10 bar g)
	Maximum operating temperature	500 °F (260 °C)

Standards

These vessels are designed in accordance with ASME Code, Section VIII, Div. 1, and are ASME Code Stamped for 150 psi g steam service.

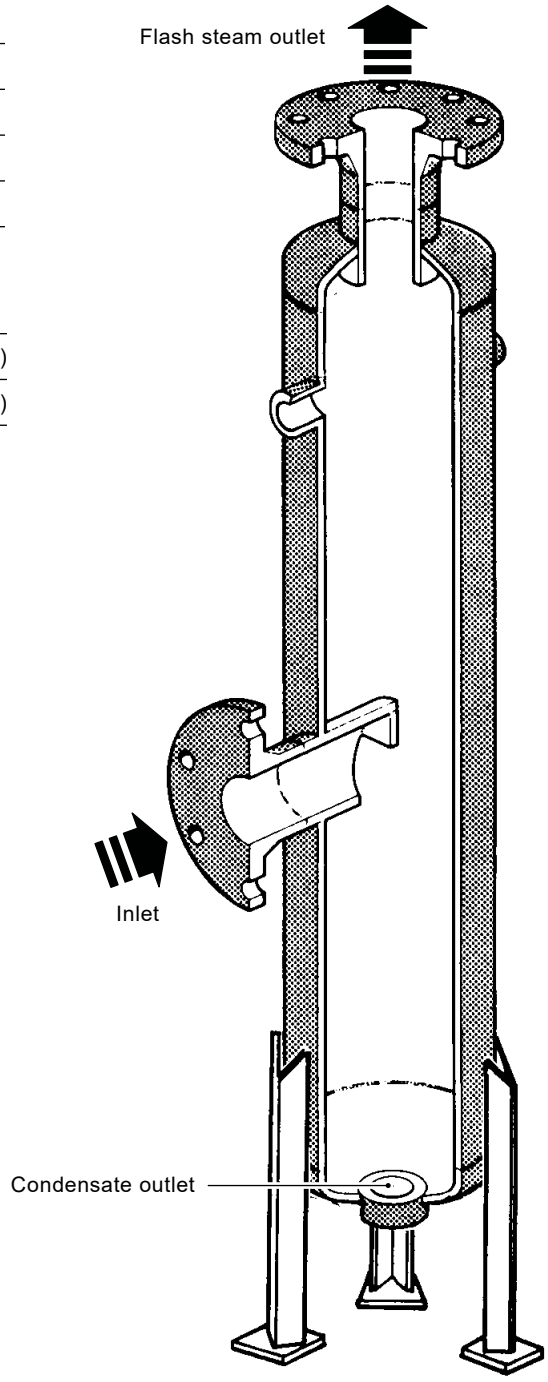


Fig. 1 Proportion of flash Steam

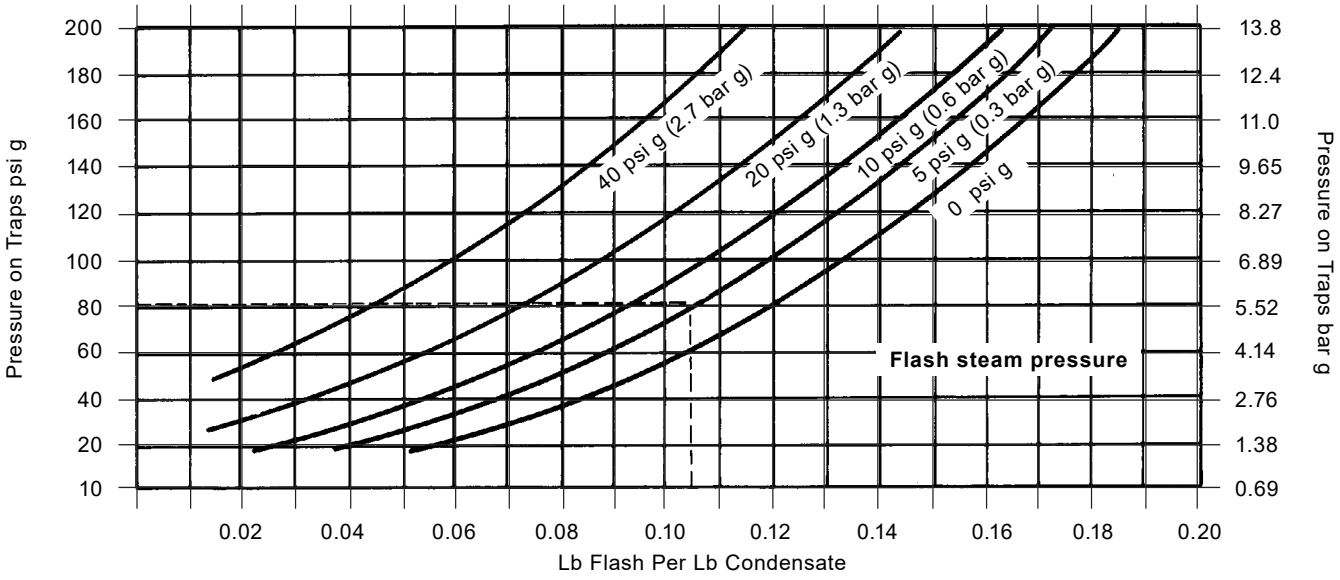
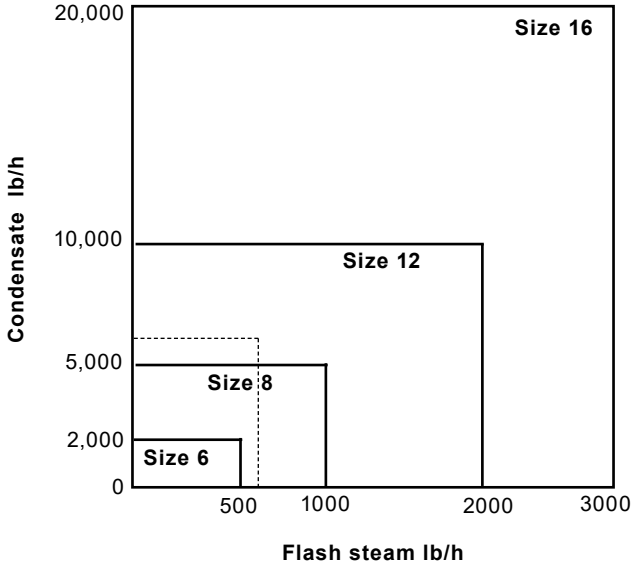


Fig. 2 Recovery vessel capacities



For kg/h, multiply above by 0.454

Example:
A plant operating at 80 psig (5.52 bar g) 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 psi g (0.34 bar g).

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.

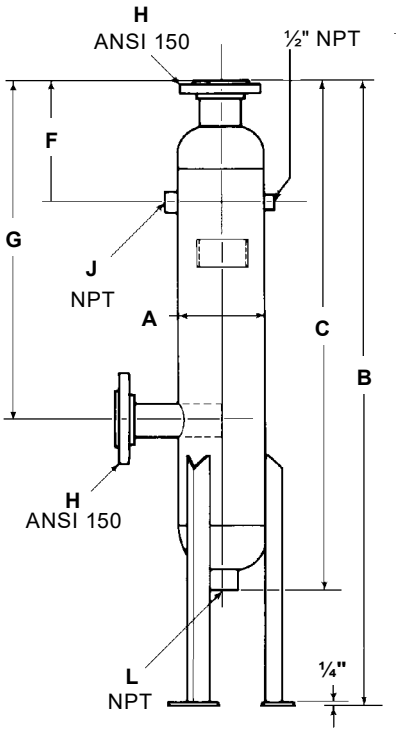
How to size

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.

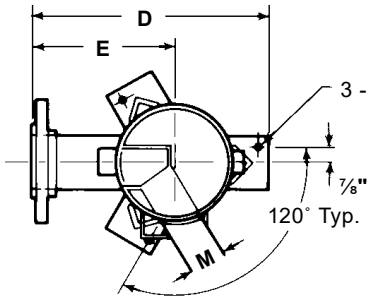
Select the appropriate size flash vessel from Fig. 2 by finding the area within which both the condensate rate and the flash steam weight fit.

Dimensions/weights (approximate) in inches (mm) and lbs (kg)



Size	A	B	C	D	E	F	G
6	6.6	47	38.6	13	8	9	25.5
	(168)	(1194)	(980)	(330)	(203)	(229)	(648)
8	8.6	48	39.6	14.6	8.6	9.5	25.8
	(218)	(1219)	(1006)	(371)	(218)	(241)	(655)
12	12.7	49.5	41.2	20	11.8	11.5	26.8
	(323)	(1257)	(1046)	(508)	(300)	(292)	(681)
16	16	58	49.7	23.5	13.4	12.5	32
	(406)	(1473)	(1262)	(597)	(340)	(318)	(813)

Size	H	J	K	L	M	Weight
6	2½"	¾"	8.8"	1½"	2.5"	75 lb
	(63.5)	(19.05)	(224)	(38.1)	(64)	(34 kg)
8	4"	¾"	10.8"	2"	3.5	105 lb
	(101.6)	(19.05)	(274)	(50.8)	(89)	(47.6 kg)
12	5"	1½"	14.9"	3"	5"	165 lb
	(127)	(38.1)	(378)	(76.2)	(127)	(74.8 kg)
16	6"	2"	18.9"	3"	5"	215 lb
	(152.4)	(50.8)	(480)	(76.2)	(127	(97.5 kg)



Installation

The vessel should be installed with the flash steam outlet at the top as shown. Each size vessel incorporates a ½" 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.

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.

TI-P215-02-US
Issue 1

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.

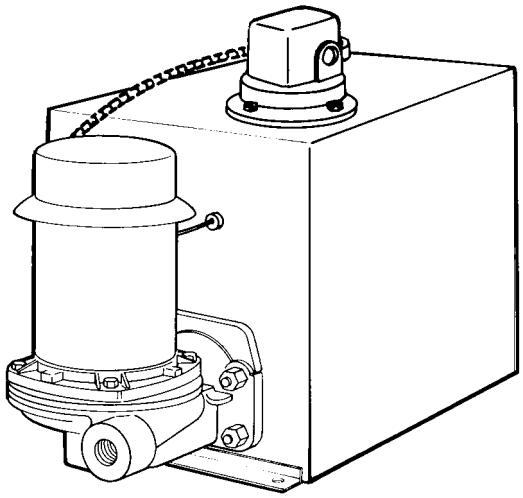
Duplex units

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.

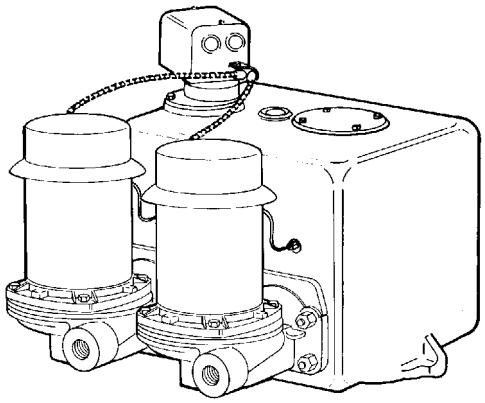
- **System overload protection**
  The second pump is activated if the rate of condensate return exceeds the limits of the first pump.
- **Extra long service life**
  Each of the two pumps is activated automatically on alternating pumping cycles so the work load is evenly distributed between the two 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 (68 Liters per minutes). Discharge pressures: 20, 30 and 40 psi (1.4, 2.1 and 2.8 bar).



Simplex Unit



Duplex Unit

Receiver

Close grained cast iron.
Simplex unit 6,15, 21 and 45 gallon sizes (23, 57, 79 and 170 Liter sizes).
Duplex unit 15, 21 and 45 gallon sizes (57, 79 and 170 Liter sizes).
Welded, copper bearing steel.
Simplex unit 10, 20 and 45 gallon sizes (38, 76 and 170 Liter sizes).
Duplex unit 20 and 45 gallon sizes (76 and 170 Liter 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 phase115/230 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.

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 (121 °C). Seal is vented to receiver to insure adequate lubrication at all times.

Optional extras

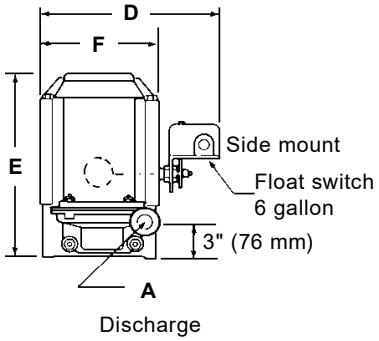
Suction Isolation Valve
When installed between the pump and receiver on simplex units, it allows the pump motor assembly to be removed without draining the receiver. On duplex units, it permits one pump to be removed while the other one continues to operate without interrupting system operation.

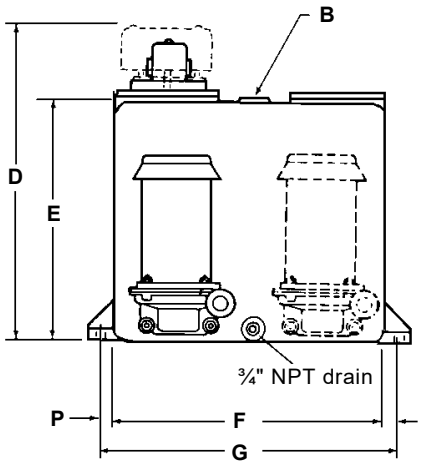
Ordering codes and models

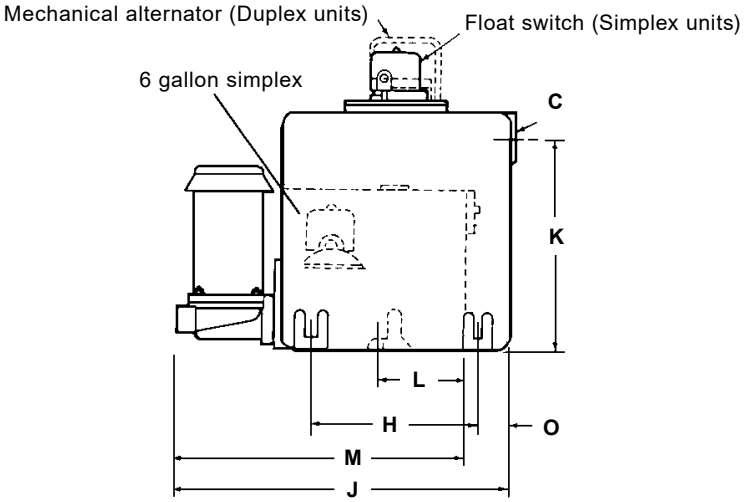
Motor		Pump		Cast Iron Receiver Sizes						
				6 Gallon 8000 EDR	15 Gallon 12000 EDR		21 Gallon 12000 EDR		45 Gallon 12000 EDR	
Phase and Voltage	HP	Discharge Pressure psi	gpm	Simplex	Simplex	Duplex	Simplex	Duplex	Simplex	Duplex
Single 115/ 230 V.	1/3	20	18	GC2S61	GC2S151	GC2D151	GC2S211	GC2D211	GC2S451	GC2D451
	½	30	18	GC3S61	GC3S151	GC3D151	GC3S211	GC3D211	GC3S451	GC3D451
	¾	40	18	GC4S61	GC4S151	GC4D151	GC4S211	GC4D211	GC4S451	GC4D451
Three 230/ 460 V.	1/3	20	18	GC2S63	GC2S153	GC2D153	GC2S213	GC2D213	GC2S453	GC2D453
	½	30	18	GC3S63	GC3S153	GC3D153	GC3S213	GC3D213	GC3S453	GC3D453
	¾	40	18	GC4S63	GC4S153	GC4D153	GC4S213	GC4D213	GC4S453	GC4D453

Motor		Pump		Welded Steel Receiver Sizes				
				10 Gallon 8000 EDR	20 Gallon 12000 EDR		45 Gallon 12000 EDR	
Phase and Voltage	HP	Discharge Pressure psi	gpm	Simplex	Simplex	Duplex	Simplex	Duplex
Single 115/ 230 V.	1/3	20	18	GS2S101	GS2S201	GS2D201	GS2S451	GS2D451
	½	30	18	GS3S101	GS3S201	GS3D201	GS3S451	GS3D451
	¾	40	18	GS4S101	GS4S201	GS4D201	GS4S451	GS4D451
Three 230/ 460 V.	1/3	20	18	GS2S103	GS2S203	GS2D203	GS2S453	GS2D453
	½	30	18	GS3S103	GS3S203	GS3D203	GS3S453	GS3D453
	¾	40	18	GS4S103	GS4S203	GS4D203	GS4S453	GS4D453

Dimensions (approximate) in inches (mm) and lbs (kg)



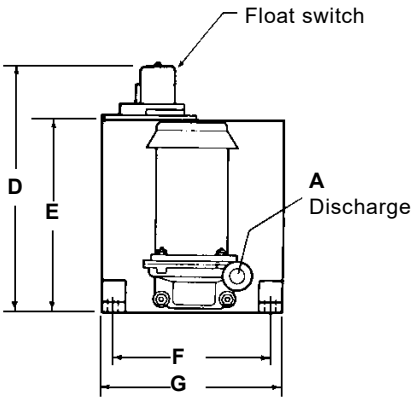




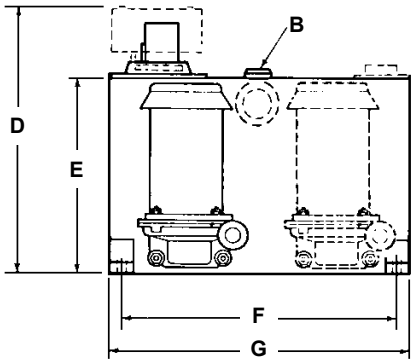
Cast Iron receivers

Receiver size	A	B	C	D	E	F	G	H	J	K	L	M	O	P	Weight
Simplex 6 gallon	1 (25)	1 (25)	2 (51)	14.5 (368)	14.5 (368)	9.5 (241)				9.0 (229)		27 (686)			115 (52)
Simplex 15 gallon				21 (533)	15.6 (396)	17.6 (447)	19.8 (503)		26.5 (673)	13.3 (338)	9.3 (236)			1 (25)	215 (98)
Duplex 15 gallon				21.5 (546)											260 (118)
Simplex 21 gallon		1¼ (32)		17 (432)	12.4 (315)	22.7 (577)	27.7 (704)	18 (457)	31.8 (808)	10.2 (259)			1.5 (38)	1.5 (38)	260 (118)
Duplex 21 gallon				18 (457)											310 (141)
Simplex 45 gallon		1½ (38)	2½ (64)	21.8 (554)	17.3 (439)	26.7 (678)	28.7 (729)	20 (508)	36.7 (932)	15 (381)			2.85 (72)	1 (25)	410 (186)
Duplex 45 gallon				22.8 (579)											460 (209)

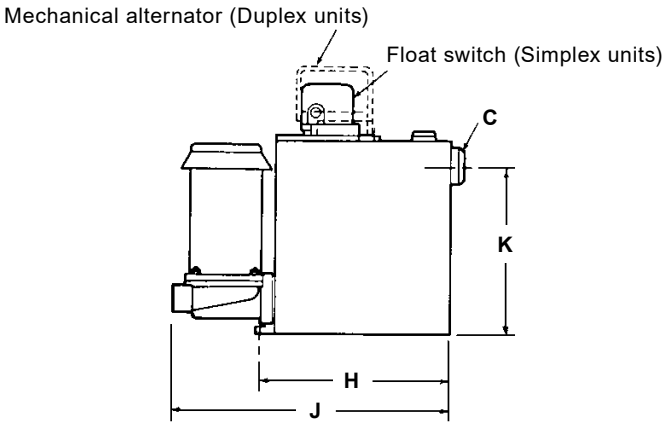
Dimensions (approximate) in inches (mm) and lbs (kg)



End view steel 10 gallon
Simplex unit



End view steel 20 gallon
Simplex and duplex unit



Side view steel 10 and 20 gallon
Simplex and duplex unit

Receiver size	A	B	C	D	E	F	G	H	J	K	Weight
Simplex 10 gallon	1 (25)	1 (25)	2 (51)	18.2 (462)	14.2 (361)	12.5 (318)	14.3 (363)	15.2 (386)	25.2 (640)	12.7 (323)	108 (49)
Simplex 20 gallon						22.5 (572)	24.3 (617)				138 (63)
Duplex 20 gallon				19.7 (500)							190 (86)
Simplex 45 gallon		1.5 (38)	3 (76)	22.4 (569)	18.4 (467)	24.4 (620)	26.4 (671)	24.4 (620)	35.4 (899)	15.7 (399)	238 (108)
Duplex 45 gallon				24.4 (620)							290 (132)

TI-P540-01-US
Issue 1

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

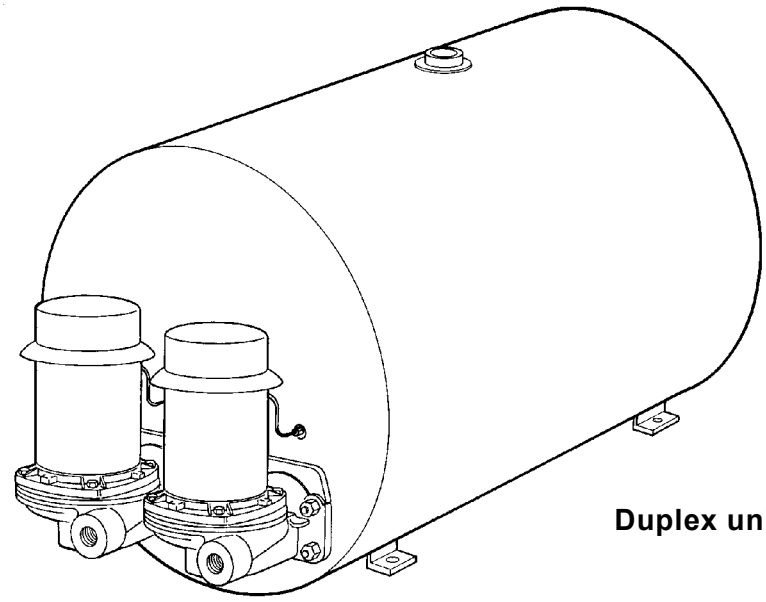
Simplex unit
Duplex unit

Limiting conditions

Capacity to 18 gpm (68 liters per minute).
Discharge pressures: 20,30 and 40 psi (1.4, 2.1, 2.8 bar)

Receiver

Cylindrical welded steel, 49, 71, and 117 gallon sizes (185, 269 and 443 litres) are standard. Water level gauge glass and float operated make-up valve are standard.



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 (121 °C). 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.

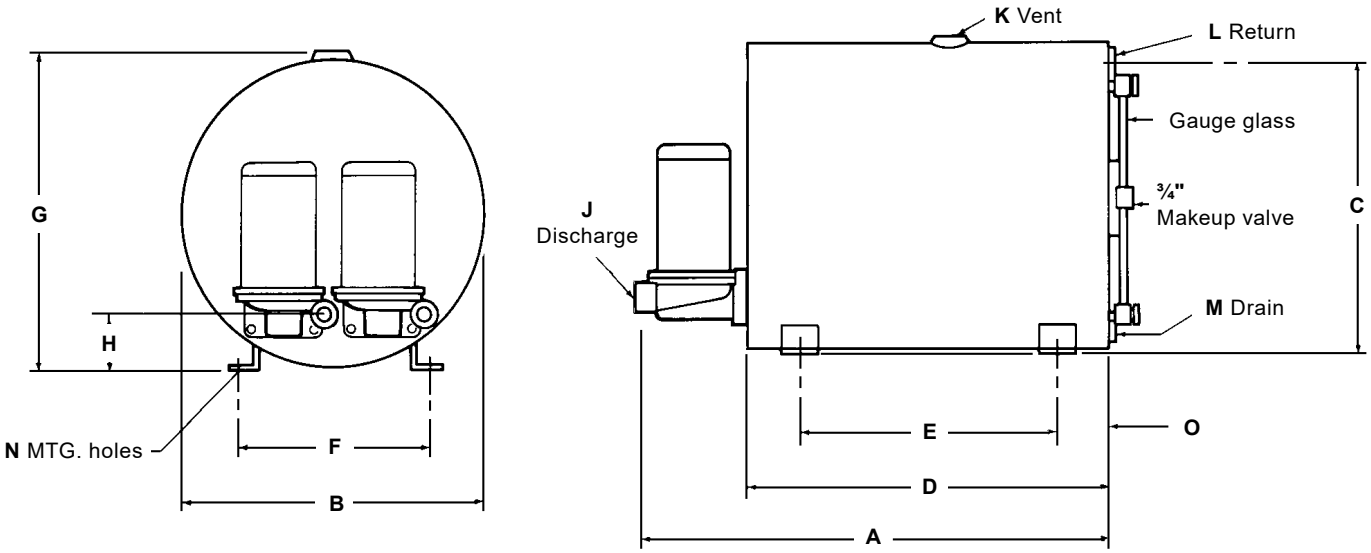
All parts of the pump and motor which are subject to normal wear are easily accessible by removal of motor and canopy, attached with universal 4 bolt flange mounting. Service of impeller and mechanical seal is also made easy, entire pump and motor can be removed without disturbing plumbing or electrical connections.

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.	⅓	20	18	GB2S491	GB2D491	GB2S711	GB2D711	GB2S1171	GB2D1171
	½	30	18	GB3S491	GB3D491	GB3S711	GB3D711	GB3S1171	GB3D1171
	¾	40	18	GB4S491	GB4D491	GB4S711	GB4D711	GB4S1171	GB4D1171
Three 230/ 460 V.	⅓	20	18	GB2S493	GB2D493	GB2S713	GB2D713	GB2S1173	GB2D1173
	½	30	18	GB3S493	GB3D493	GB3S713	GB3D713	GB3S1173	GB3D1173
	¾	40	18	GB4S493	GB4D493	GB4S713	GB4D713	GB4S1173	GB4D1173

5.2
10

Dimensions (approximate) in inches (mm)



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	1¼	2½	¾	⅝	4.5
	(1041)	(610)	(526)	(762)	(533)	(381)	(635)	(140)	(25)	(32)	(64)	(19)	(16)	(114)
71 gallons	47	24	22.5	36	27	16	25	5	1	1½	3	¾	⅝	4.5
	(1194)	(610)	(572)	(914)	(686)	(406)	(635)	(127)	(25)	(38)	(76)	(19)	(16)	(114)
117 gallons	71	24	22.5	60	30	19	25	5	1	2	4	¾	⅝	15
	(1803)	(610)	(572)	(1524)	(762)	(483)	(635)	(127)	(25)	(51)	(102)	(19)	(16)	(381)

TI-P540-02-US
Issue 1

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.

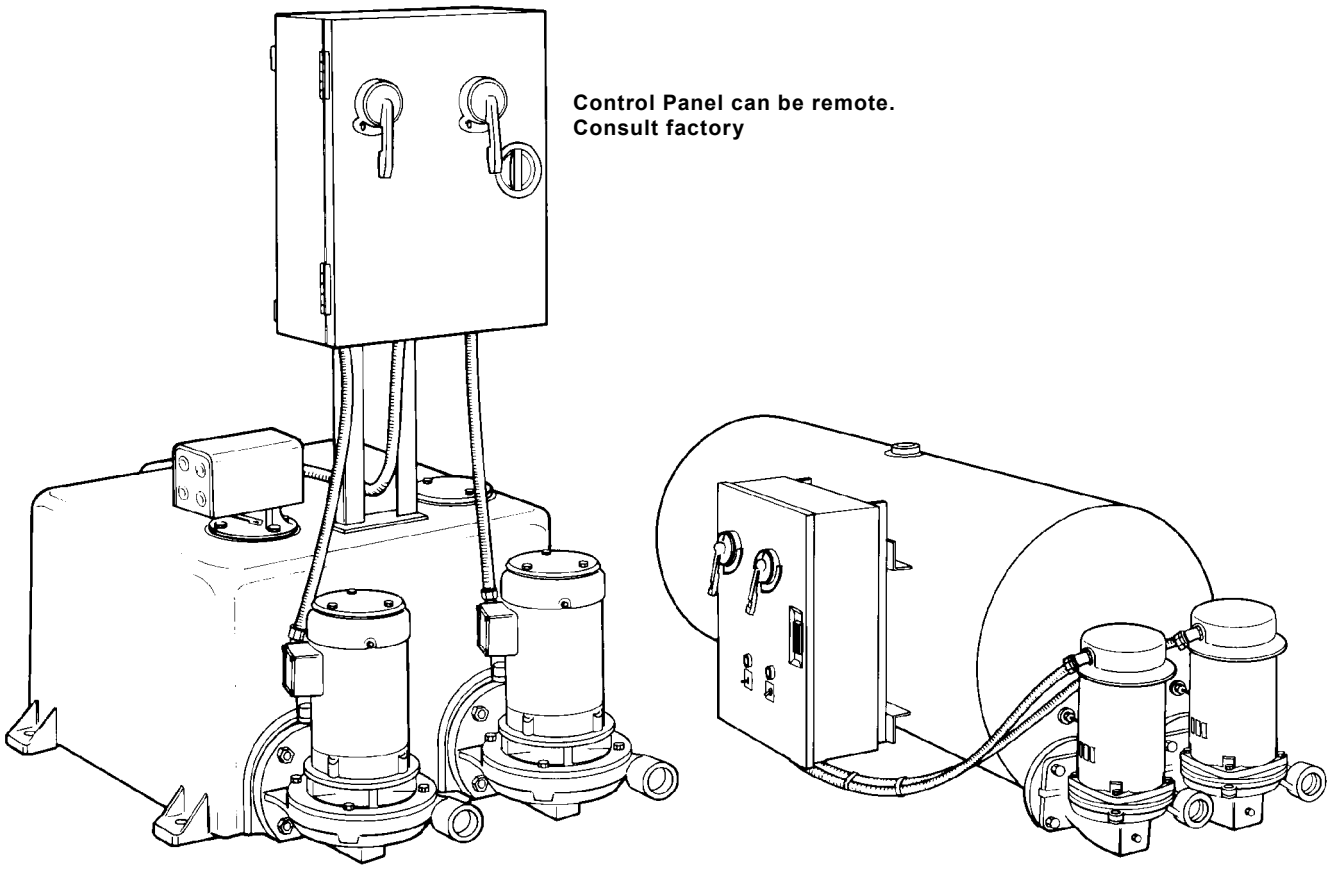
Boiler feed pumps are used to pump and precisely control the condensate and makeup water required by the boiler(s) in low pressure steam applications. Pumping action is controlled by the fluid level in the boiler. They consist of a cast iron or welded steel storage receiver equipped with a makeup valve 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. (93 to 9290 sq. m.).
EDR capacities. Discharge pressures from 10-40 psi (0.69 - 2.76 bar) are available on units equipped with 1750 rpm motors; 20-75 psi (1.4 - 5.17 bar) on 3500 rpm units. True 2 ft. (0.61 m) net positive suction head pumps are available.

Receivers

Cast iron, rectangular receivers are available with 15 to 110 gallon (57 to 416 liter) 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 (79 to 3785 liters).



**Control Panel can be remote.
Consult factory**

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 (121 °C), 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 TI-P215-03-US. 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.

VC Pumps	1/3 through 15 hp 1750 rpm—discharge pressures are 10, 15 or 20 psi (0.69, 1.0 and 1.4 bar) 3500 rpm—discharge pressures are 30 to 75 psi (2.1 to 5.2 bar) 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 (1.0, 1.4, 2.1, 2.8 or 3.4 bar) 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 (1.4, 1.7 and 2.1 bar) 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 71/2 hp 1750 rpm—discharge pressures are 30 or 40 psi (2.06 or 2.75 bar) 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 (1.37 or 4.13 bar) 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 reciever, 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

VE	SS	M	1	7½

Series and pump type

VC

VJ

VE

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 = 1 0,000

15 = 1 5,000

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, psi g

1 = 10

1½ = 15

2 = 20

2½ = 25

3 = 30

4 = 40

5 = 50

6 = 60

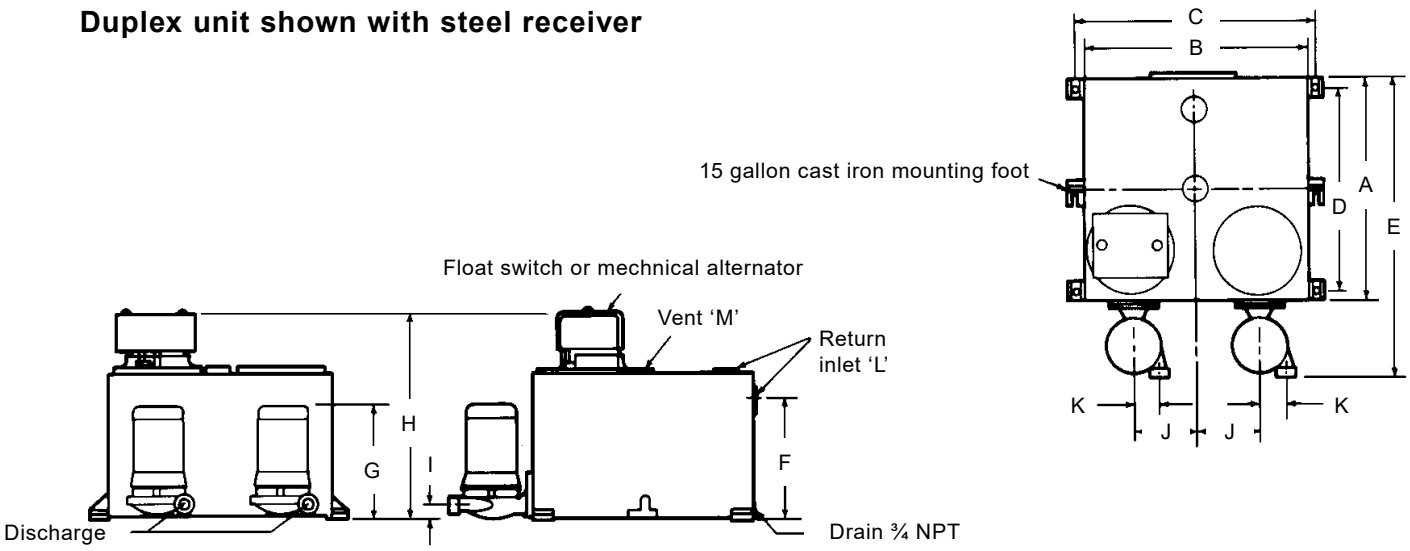
7½ = 75

TI-P540-03-US
Issue 1

Pump Dimensions
"V" Series

VC, VJ, VN, and VE pumps with rectangular cast iron or steel receivers

Duplex unit shown with steel receiver

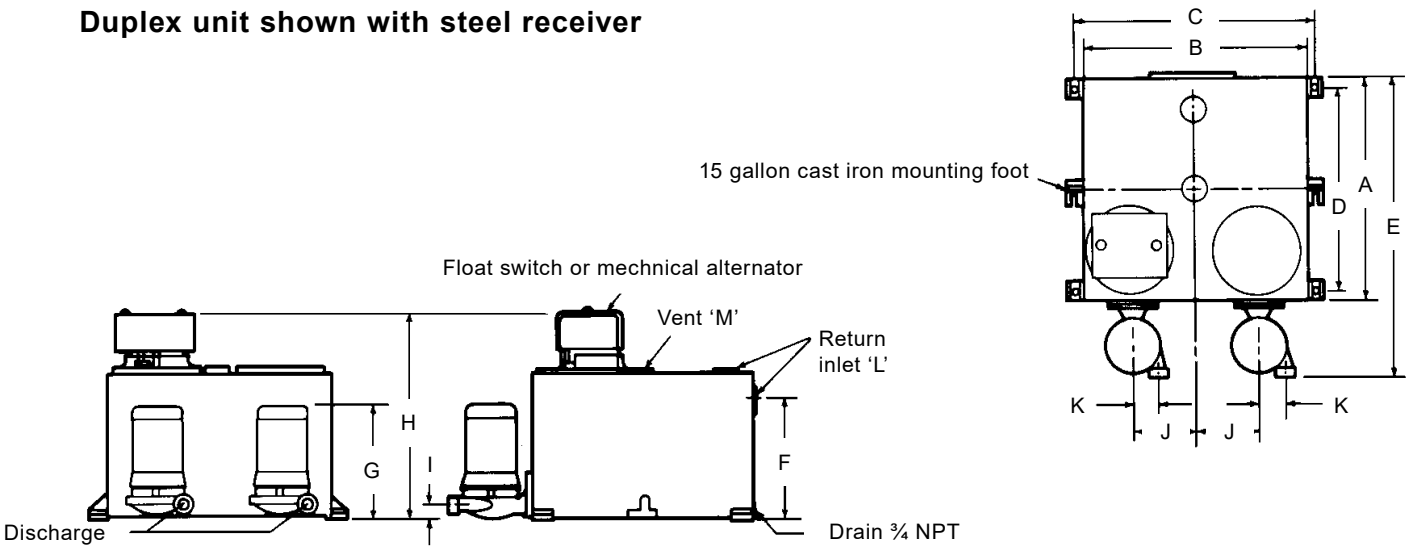


	Capacity sq. ft. E, D, R.	Receiver Capacity gal. (litres)	Dimensions (approximate) in inches (mm) A	B	C	D	E	F	G	H	I	J	K	L	M
Cast Iron Receiver	1,000 to 4,000	15 (57)	15	17.5	19.5	℄	28	13	16-19	22	4	5.25	4	2	1
			(381)	(445)	(495)		(711)	(330)	(406-483)	(559)	(102)	(133)	(102)	–	–
	1,000 to 15,000	21 (79)	21	22.75	26	14.75	34	10.25	16-21	19.5	4	6	4	2	1¼
			(533)	(578)	(660)	(375)	(864)	(260)	(406-533)	(495)	(102)	(152)	(102)	–	–
	20,000 to 30,000	45 (170)	26	26.75	28.75	20	39	15	16-21	23.75	4	7.5	4	2½	1½
			(660)	(679)	(730)	(508)	(991)	(381)	(406-533)	(603)	(102)	(190)	(102)	–	–
	40,000 to 50,000	65 (246)	28.5	28.5	30.75	22.75	41.5	19.5	16-21	29	4.75	7.5	4	3	2
			(724)	(724)	(781)	(578)	(1054)	(495)	(406-533)	(737)	(121)	(190)	(102)	–	–
	65,000 to 100,000	110 (416)	30	36.25	42	32	44	19.5	18-28	28.5	4	7.5	4	5	2
			(762)	(921)	(1067)	(813)	(1118)	(495)	(457-711)	(724)	(102)	(190)	(102)	–	–

Duplex unit shown continued on next page

VC, VJ, VN, and VE pumps with rectangular cast iron or steel receivers

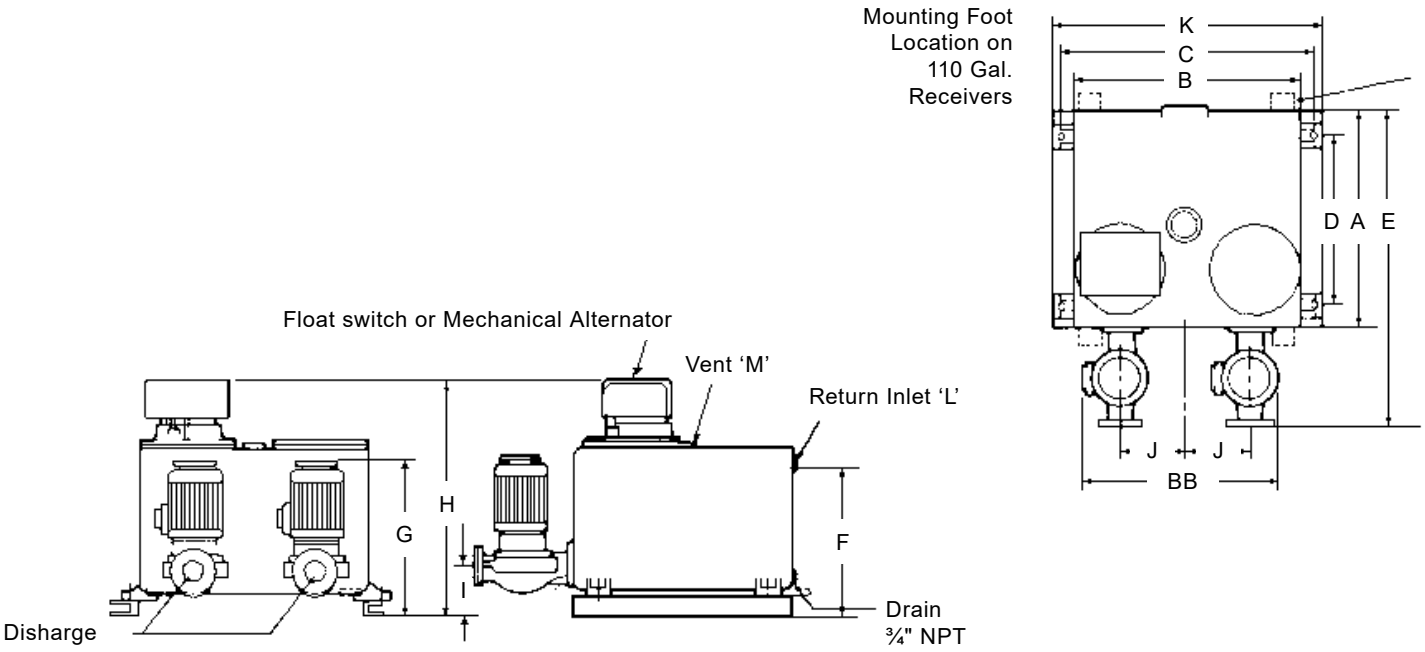
Duplex unit shown with steel receiver



	Capacity sq. ft. E, D, R.	Receiver Capacity gal. (litres)	Dimensions (approximate) in inches (mm) A	B	C	D	E	F	G	H	I	J	K	L	M
Steel Receiver	1,000 to 15,000	21 (79)	18	24	26.4	16.1	31	9	16-19	19	4	6	4	2½	1¼
			(457)	(610)	(671)	(409)	(781)	(229)	(406-483)	(483)	(102)	(152)	(102)	–	–
	20,000 to 30,000	45 (170)	24	24	26.4	22.1	37	15.5	16-21	25	4	6	4	3	1½
			(610)	(610)	(671)	(561)	(940)	(394)	(406-533)	(635)	(102)	(152)	(102)	–	–
	40,000 to 50,000	65 (246)	24	24	26.4	22.1	37	21.5	16-21	30.5	4	6	4	3	2
			(610)	(610)	(671)	(561)	(940)	(546)	(406-533)	(775)	(102)	(152)	(102)	–	–
	65,000 to 100,000	110 (416)	30.5	42.5	45	25	44.5	17	18-28	27	4	11	4	4	2
			(775)	(1080)	(1143)	(635)	(1130)	(432)	(457-711)	(686)	(102)	(279)	(102)	–	–

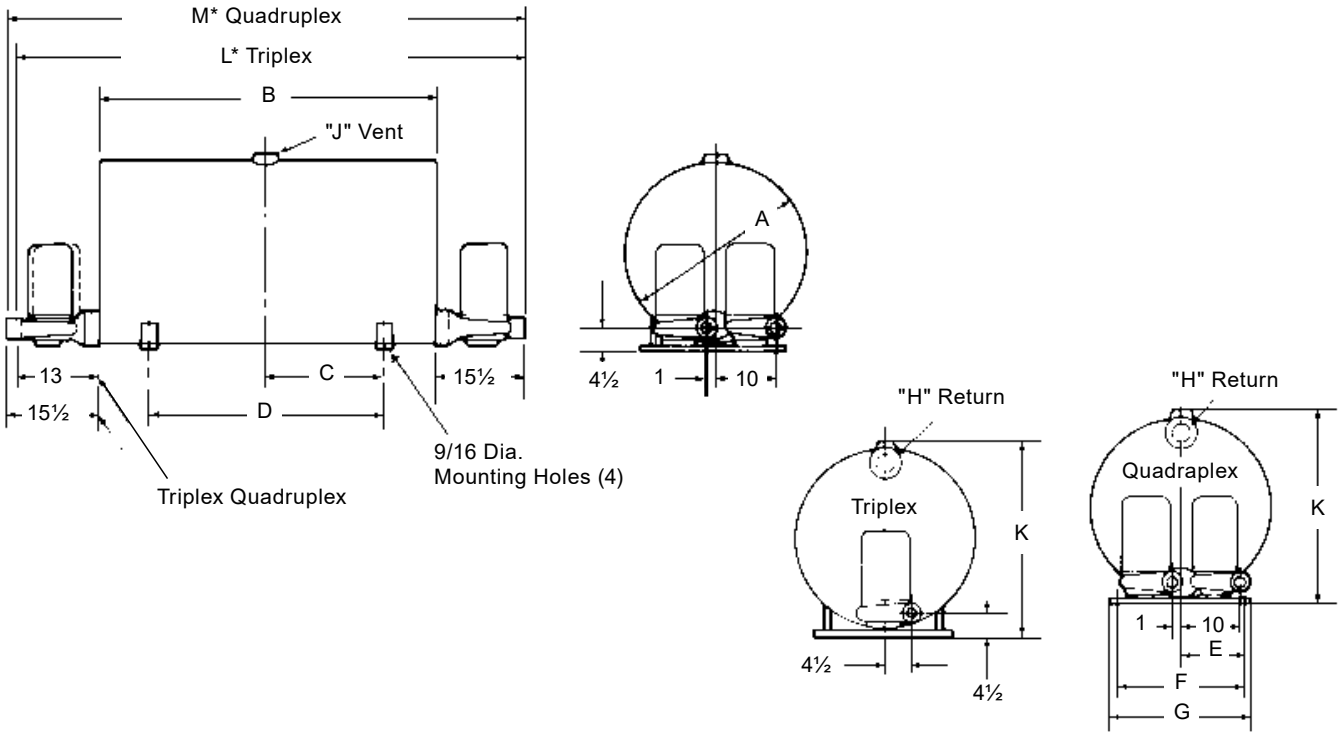
VA Pumps with Rectangular Cast Iron or Steel Receivers

Duplex Unit shown with Cast Iron Receiver



	Capacity sq. ft. E, D, R.	Receiver Capacity gal. (litres)	Dimensions (approximate) in inches (mm) A	B	C	D	E	F	G	H	I	J	K	L	M	BB
Cast Iron Receiver	1,000 to 30,000	45 (170)	26	26.75	28.75	20	47	18	28.75	26.75	7	7.5	31.75	2½	1½	28
			(660)	(679)	(730)	(508)	(1194)	(437)	(730)	(679)	(178)	(191)	(806)	(63)	(38)	(711)
	40,000 to 50,000	65 (246)	28.5	28.5	30.75	22.75	49.5	22.5	28.75	32	7	7.5	33.5	3	2	28
			(724)	(724)	(781)	(578)	(1257)	(571)	(730)	(813)	(178)	(191)	(851)	(75)	(50)	(711)
	65,000 to 100,000	110 (416)	30	42	36.25	32	51	22.5	27.5	31.5	7	7.5	42	5	2	34
			(762)	(1067)	(921)	(813)	(1295)	(571)	(699)	(800)	(178)	(191)	(1067)	(125)	(50)	(864)
Steel Receiver	1,000 to 15,000	21 (79)	18	24	26.4	16.1	39	12.75	28.75	21	7	7.5	28.4	2½	1¼	–
			(457)	(610)	(671)	(409)	(991)	(324)	(730)	(533)	(178)	(191)	(721)	(63)	(32)	
	20,000 to 30,000	45 (170)	24	24	26.4	22.1	45	18.5	28.75	28	7	7.5	28.4	3	1½	28
			(610)	(610)	(671)	(561)	(1143)	(470)	(730)	(711)	(178)	(191)	(721)	(75)	(38)	(711)
	40,000 to 50,000	65 (246)	24	24	26.4	22.1	45	24.5	28.75	33	7	7.5	28.4	3	2	28
			(610)	(610)	(671)	(561)	(1143)	(662)	(730)	(838)	(178)	(191)	(721)	(75)	(50)	(711)
	65,000 to 100,000	110 (416)	30	42.5	45	25	51	20	27.5	30	7	11	47	4	2	41
			(762)	(1080)	(1143)	(635)	(1295)	(508)	(699)	(762)	(178)	(279)	(1208)	(100)	(50)	(1041)

VC, VJ, VN, and VE Pumps with Cylindrical Steel Receivers



*Note: Add 13" to dimension B for Simplex
Add 15½" to dimension B for Duplex

Capacity sq. ft. E, D, R.	Receiver Capacity gal. (litres)	Dimensions (approximate) in inches (mm)											
		A	B	C	D	E	F	G	H	J	K	L	M
25,000	49 (185)	22	30	10.5	21	7.5	15	17	2½	1¼	23.5	58.5	61
		(559	762	267	533	191	381	432	63	32	597	1486	1569
40,000	71 (269)	24	36	13.5	27	8	16	18	3	1½	25.5	64.5	67
		(610)	(914)	(343)	(686)	(203)	(406)	(457)	(75)	(38)	(648)	(1638)	(1702)
65,000	117 (443)	24	60	15	30	8	16	18	4	2	25.5	88.5	91
		(610)	(1524)	(381)	(762)	(203)	(406)	(457)	(100)	(50)	(648)	(2248)	(2311)
165,000	209 (791)	32	60	24	48	14	28	30	5	2	33.5	88.5	91
		(813)	(1524)	(610)	(1219)	(356)	(711)	(762)	(125)	(50)	(851)	(1638)	(1702)
165,000	260 (984)	36	60	24	48	14	28	30	5	2	37.5	88.5	91
		(914)	(1524)	(610)	(1219)	(356)	(711)	(762)	(125)	(50)	(953)	(2248)	(2311)
295,000	370 (1401)	36	84	28	56	14	28	30	5	2	37.5	112.5	115
		(914)	(2134)	(711)	(1422)	(356)	(711)	(762)	(125)	(50)	(953)	(2858)	(2921)
400,000	500 (1893)	42	84	28	56	14	28	30	5	2	43.5	112.5	115
		(1067)	(2134)	(711)	(1422)	(356)	(711)	(762)	(125)	(50)	(1105)	(2858)	(2921)
600,000	750 (2839)	48	96	28	56	19	38	40	5	2	49.5	124.5	127
		(1219)	(2438)	(711)	(1422)	(483)	(965)	(1016)	(125)	(50)	(1237)	(3162)	(3226)
800,000	1000 (3785)	48	132	33	66	19	38	40	5	2	49.5	160.5	163
		(1219)	(3353)	(838)	(1676)	(483)	(965)	(1016)	(125)	(50)	(1237)	(4077)	(4140)

TI-P215-03-US
Issue 1

Pump Sizing Selection Tables
"V" Series

Capacity Sq. Ft. E.D.R.	Capacity G.P.M.	Dish pressure psi g	1750 R.P.M. Units Catalog No.	Motor H.P.	Dish. size	3500 R.P.M. Units Catalog No.	Motor H.P.	Dish. Size	* Receiver Size (condensate units) Cast Iron Return capacity	Cast Iron Size	Steel Return capacity	Steel Size
1,000	1½	10	VCS-1100-3.00	⅓	1¼"							
		15	VCS-1100-2.00	⅓	1¼"	VJS-1000-1.10	½	1¼"				
		20	VCS-1100-1.00	⅓	1¼"	VJS-1000-1.10	½	1¼"				
		30				VCS-1000-3.04	¾	1¼"				
						VJS-1000-1.05	½	1¼"				
		40				VCS-1000-3.00	1	1¼"				
						VJS-1000-1.02	¾	1¼"				
		50				VCS-1000-2.03	1½	1¼"				
						VJS-2000-1.02	1	1½"				
		60				VCS-1000-2.00	2	1¼"				
		75				VCS-1000-1.02	3	1¼"				
2,000	3	10	VCS-1100-3.00	⅓	1¼"							
		15	VCS-1100-2.00	⅓	1¼"	VJS-1000-1.10	½	1¼"				
		20	VCS-1100-1.00	⅓	1¼"	VJS-1000-1.10	½	1¼"				
		30				VCS-1000-3.04	¾	1¼"				
						VJS-1000-1.05	½	1¼"				
		40				VCS-1000-3.00	1	1¼"	15 or 21	2"	21	2½"
						VJS-1000-1.02	¾	1¼"				
		50				VCS-1000-2.03	1½	1¼"				
						VJS-2000-1.02	1	1½"				
		60				VCS-1000-2.00	2	1¼"				
		75				VCS-1000-1.02	3	1¼"				
4,000	6	10	VCS-1100-3.00	⅓	1¼"							
		15	VCS-1100-2.00	⅓	1¼"	VJS-1000-1.10	½	1¼"				
		20	VCS-1100-1.00	½	1¼"	VJS-1000-1.09	½	1¼"				
		30				VCS-1000-3.04	¾	1¼"				
						VJS-1000-1.05	½	1¼"				
		40				VCS-1000-3.00	1	1¼"				
						VJS-1000-1.02	¾	1¼"				
		50				VCS-1000-2.03	1½	1¼"				
						VJS-2000-1.02	1½	1½"				
		60				VCS-1000-2.00	2	1¼"				
		75				VCS-1000-1.02	3	1¼"				

Designates 2 Ft. NPSH Capability

* For boiler feed units, receiver size should be approximately 1 gallon of storage per boiler h.p.

Capacity Sq. Ft. E.D.R.	Capacity G.P.M.	Dish pressure psi g	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
6,000	9	10	VCS-1100-3.00	⅓	1¼"				21	2"	21	2½"
		15	VCS-1100-2.00	⅓	1¼"	VJS-1000-1.10	½	1¼"				
		20	VCS-1100-1.00	½	1¼"	VJS-1000-1.09 / VNS-1000-1.12	½	1¼"				
		25	VES-1100-1.05	¾	1½"							
		30	VES-1100-1.01	1	1½"	VCS-1000-3.04 / VNS-1000-1.06	¾	1¼"				
						VJS-1000-1.05	½	1¼"				
		40				VCS-1000-3.00 / VNS-1000-1.00	1 / 1½	1¼"				
						VJS-1000-1.02	¾	1¼"				
		50				VCS-1000-2.03	1½	1¼"				
						VJS-2000-1.00	1½	1½"				
		60				VCS-1000-2.00	2	1¼"				
		75				VCS-1000-1.02	3	1¼"				
8,000	12	10	VCS-1100-3.00	⅓	1¼"							
		15	VCS-1100-2.00	⅓	1¼"	VJS-1000-1.10	½	1¼"				
		20	VCS-1100-1.00	½	1¼"	VJS-1000-1.09	½	1¼"				
		25	VES-1100-1.05	¾	1½"							
		30	VES-1100-1.01	1	1½"	VCS-1000-3.04	¾	1¼"				
						VJS-1000-1.05	½	1¼"				
		40				VCS-1000-3.00	1	1¼"				
						VJS 1000-1.02	1	1¼"				
		50				VCS-1000-2.03	1½	1¼"				
						VJS-2000-1.00	1½	1½"				
		60				VCS-1000-2.00	2	1¼"				
		75				VCS-1000-1.02	3	1¼"				

Designates 2 Ft. NPSH Capability

* For boiler feed units, receiver size should be approximately 1 gallon of storage per boiler h.p.

Capacity Sq. Ft. E.D.R.	Capacity G.P.M.	Dish pressure psi g	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-1100-3.00	⅓	1¼"						21	2"	21	2½"
		15	VCS-1100-2.00	½	1¼"	VJS-1000-1.08		½		1¼"				
		20	VCS-1100-1.00	½	1¼"	VJS-1000-1.08	VNS-1000-1.12	½	½	1¼"				
		25	VES-1100-1.05	¾	1½"									
		30	VES-1100-1.01	1½	1½"	VCS-1000-3.04	VNS-1000-1.06	¾		1¼"				
						VJS-1000-1.05		¾		1¼"				
		40				VCS-1000-3.00	VNS-1000-1.00	1	1½	1¼"				
						VJS-1000-1.02		1		1¼"				
		50				VCS-1000-2.03		1½		1¼"				
						VJS-2000-1.00		1½		1½"				
		60				VCS-1000-2.00		2		1¼"				
		75				VCS-1000-1.02		3		1¼"				
15,000	22½	10	VCS-2100-1.09	⅓	1½"									
		15	VCS-1100-1.02	½	1¼"	VJS-1000-1.08		½		1¼"				
		20	VES-1100-1.07	¾	1½"	VJS-1000-1.07	VNS-1000-1.11	½		1¼"				
		25	VES-1100-1.05	1	1½"									
		30	VES-1100-1.01	1½	1½"	VCS-1000-3.03	VNS-1000-1.06	1		1¼"				
						VJS-1000-1.05		¾		1¼"				
		40				VCS-1000-3.00	VNS-1000-1.00	1½		1¼"				
						VJS-1000-1.02		1		1¼"				
		50				VCS-1000-2.03		2		1¼"				
						VJS-2000-1.00		1½		1½"				
		60				VCS-1000-2.00		3		1¼"				
		75				VCS-1000-1.02		3		1¼"				

Designates 2 Ft. NPSH Capability

* For boiler feed units, receiver size should be approximately 1 gallon of storage per boiler h.p.

Capacity Sq. Ft. E.D.R.	Capacity G.P.M.	Dish pressure psi g	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
20,000	30	10	VCS-2100-1.09	⅓	1½"				45	2½"	45	3"
		15	VCS-1100-1.01	½	1¼"	VJS-1000-1.07	½	1¼"				
		20	VES-1100-1.07	¾	1½"	VJS-1000-1.06 / VNS-1000-1.11	¾	1¼"				
		25	VES-1100-1.05	1	1½"							
		30	VES-1100-1.01	1½	1½"	VCS-1000-3.02 / VNS-1000-1.04	1½ / 1	1¼"				
						VJS-1000-1.02	1	1¼"				
		40				VCS-1000-3.00 / VNS-1000-1.00	1½ / 2	1¼"				
						VJS-2000-1.03	1½	1½"				
		50				VCS-1000-2.03	2	1¼"				
						VJS-2000-1.00	1½	1½"				
		60				VCS-1000-2.00	3	1¼"				
		75				VCS-1000-1.02	5	1¼"				
25,000	37½	10	VCS-2100-1.09	½	1½"							
		15	VES-1100-1.09	¾	1½"	VJS-1000-1.06	¾	1¼"				
		20	VES-1100-1.07	¾	1½"	VJS-1000-1.06	¾	1¼"				
		25	VES-1100-1.05	1½	1½"							
		30	VES-1100-1.01	1½	1½"	VCS-1000-3.02	1½	1¼"				
						VJS-1000-1.01	1	1¼"				
		40				VCS-1000-2.07	2	1¼"				
						VJS-2000-1.02	1½	1½"				
		50				VCS-2000-1.08	3	1½"				
		60				VCS-1000-1.05	3	1¼"				
		75				VCS-2000-1.01	5	1¼"				
30,000	45	10	VCS-2100-1.09	½	1½"							
		15	VES-1100-1.08	¾	1½"	VJS-1000-1.03	1	1¼"				
		20	VES-1100-1.07	1	1½"	VJS-1000-1.02 / VNS-1000-1.10	1	1¼"				
		25	VES-1100-1.05	1½	1½							
		30	VES-1100-1.01	1½	1½"	VCS-1000-3.02 / VNS-1000-1.02	1½	1¼"				
						VJS-2000-1.05	1½	1½"				
		40				VCS-1000-2.05 / VNS-2000-1.09	2 / 3	1¼" / 2"				
						VJS-2000-1.02	2	1½"				
		50				VCS-2000-1.08 / VNS-2000-1.04	3 / 5	1½" / 2"				
		60				VCS-1000-1.05 / VNS-2000-1.01	3	1¼" / 2"				
		75				VCS-2000-1.01	7½	1½"				

Designates 2 Ft. NPSH Capability

* For boiler feed units, receiver size should be approximately 1 gallon of storage per boiler h.p.

Capacity Sq. Ft. E.D.R.	Capacity G.P.M.	Dish pressure psi g	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
40,000	60	10	VCS-2100-1.05	¾	1½"					65	3"	65	3"
		15	VCS-2100-1.02	1	1½"	VJS-2000-1.06		1½	1½"				
		20	VES-1100-1.06	1½	1½"	VJS-2000-1.05	VNS-2000-1.17	1½	1½" 2"				
		25	VES-1100-1.04	1½	1½								
		30	VES-1100-1.01	2	1½"	VCS-2000-2.01	VNS-2000-1.12	2 3	1½" 2"				
						VJS-2000-1.02		1½	1½"				
		40				VCS-2000-1.12	VNS-2000-1.09	3	1½" 2"				
		50				VCS-2000-1.07	VNS-2000-1.04	5	1½" 2"				
		60				VCS-2000-1.03	VNS-2000-1.00	5	1½" 2"				
		75				VCS-2000-1.01		7½	1½"				
50,000	75	10	VCS-3100-1.09	1	2"								
		15	VCS-3100-1.03	1½	2"	VJS 2000-1.05		1½	1½"				
		20	VES-1100-1.05	1½	1½"	VJS-2000-1.02	VNS-2000-1.16	1½ 2	1½" 2"				
		25	VES-1100-1.03	2	1½"								
		30				VCS-2000-2.01	VNS-2000-1.11	3	1½" 2"				
						VJS-2000-1.01		2	1½"				
		40				VCS-2000-1.11	VNS-2000-1.08	3	1½" 2"				
		50				VCS-2000-1.07	VNS-2000-1.03	5	1½" 2"				
		60				VCS-2000-1.03		5	1½"				
		75				VCS-2000-1.00		7½	1½"				

Designates 2 Ft. NPSH Capability

* For boiler feed units, receiver size should be approximately 1 gallon of storage per boiler h.p.

Capacity Sq. Ft. E.D.R.	Capacity G.P.M.	Dish pressure psi g	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
		20				VNS-2000-1.15	2	2"				
		30				VNS-2000-1.11	3	2"				
60,000	90	40				VNS-2000-1.06	5	2"				
		50				VNS-2000-1.03	7½	2"				
		10	VCS-3100-1.07	1½	2"							
		15	VCS-3100-1.01	1½	2"	VJS-2000-1.01	2	1½"				
		20	VES-1100-1.02	2	1½"	VJS-2000-1.01	2	1½"				
65,000	97½	30				VCS-3000-1.18	3	2"				
		40				VCS-3000-1.14	5	2"				
		50				VCS-2000-1.06	5	1½"				
		60				VCS-3000-1.06	7½	2"				
		10	VCS-3100-1.05	1½	2"							
		15	VCS-3100-1.00	2	2"				110	5"	110	4"
		20				VCS-2000-2.00	3	1½"				
80,000	120	30				VCS-3000-1.17	5	2"				
		40				VCS-3000-1.13	5	2"				
		50				VCS-3000-1.09	7½	2"				
		60				VCS-3000-1.05	7½	2"				
		10	VCS-3100-1.01	1½	2"							
		15				VCS-3000-1.23	2	2"				
		20				VCS-2000-1.10	5	1½"				
100,000	150	30				VCS-3000-1.15	5	2"				
		40				VCS-3000-1.11	5	2"				
		50				VCS-3000-1.07	7½	2"				
		60				VCS-3000-1.03	10	2"				

Designates 2 Ft. NPSH Capability

* For boiler feed units, receiver size should be approximately 1 gallon of storage per boiler h.p.

TI-P216-04-US
Issue 1

Control Panels
550 Series and 700 Series

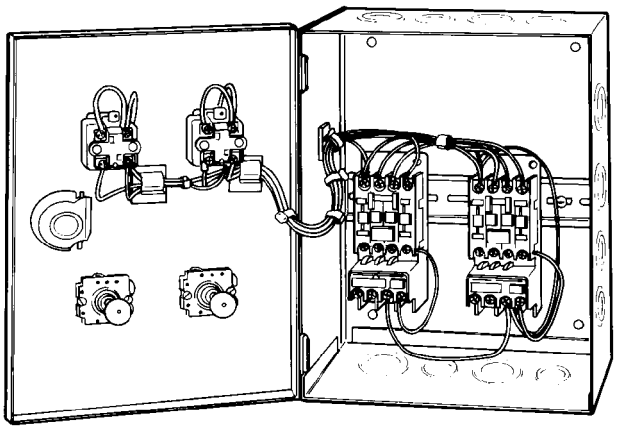
Available types

Series 550

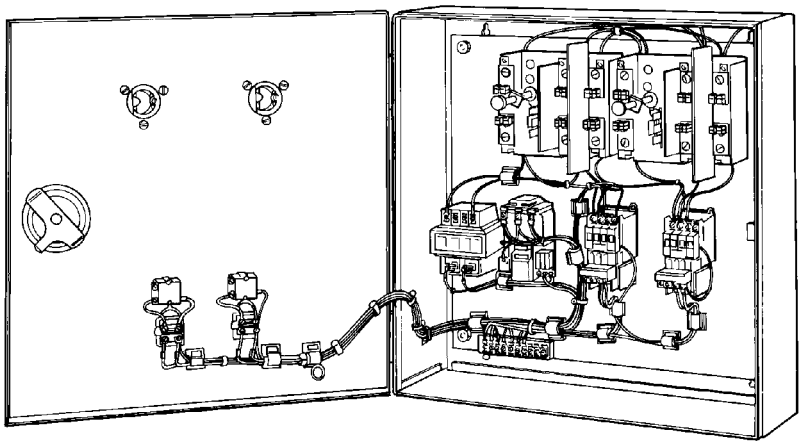
Enclosure:	Nema Type 1 ONLY
Controls:	2 starters with 3rd leg overload protection. Reset button in cover

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



Series 550



Series 700

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 Maximum 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
	l-Fuse Block per starter or—
	l-Circuit Breaker per starter
	Fused Control Circuit Transformer, 110 Volt Secondary.
	l-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. l-Off-Boiler No. 2
	- Pump No. l-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

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	yes	*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
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					

Type 1 - General purpose indoor - Non-ventilated 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 dusttiqht 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 and dust tight indoor and 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 condiut 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 - Non-ventilated 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 1, 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.

TI-P216-02-US
Issue 2

Stainless Steel Electric Condensate Return Units SSCRU 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.

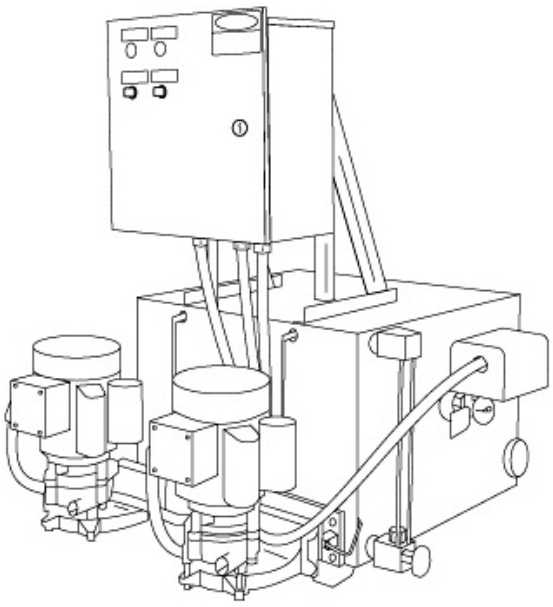
Available in either simplex or duplex configuration, simplex units consist of an electric motor close-coupled to a centrifugal pump mounted on a receiver with a float operated pump control, duplex units are used when greater pumping capacity or back-up pump protection is required.

The SSCRU Series is designed for long-life, low maintenance and reliable service.

Stainless Steel Washdown Duty, Epoxy Washdown Duty and Explosion Proof Options Available.

Features

- 304 Stainless Steel Receivers with 20 year warranty
- 304 Stainless Steel Vertical Flange Mounted Pumps
- Heavy Duty SS Sight Gauge Valve Assembly
- NEMA 1 Float Switch (Simplex)
- NEMA 1 Mechanical Alternator (Duplex)
- TEFC Motor Enclosures
- NEMA 3R Control Panel Rating



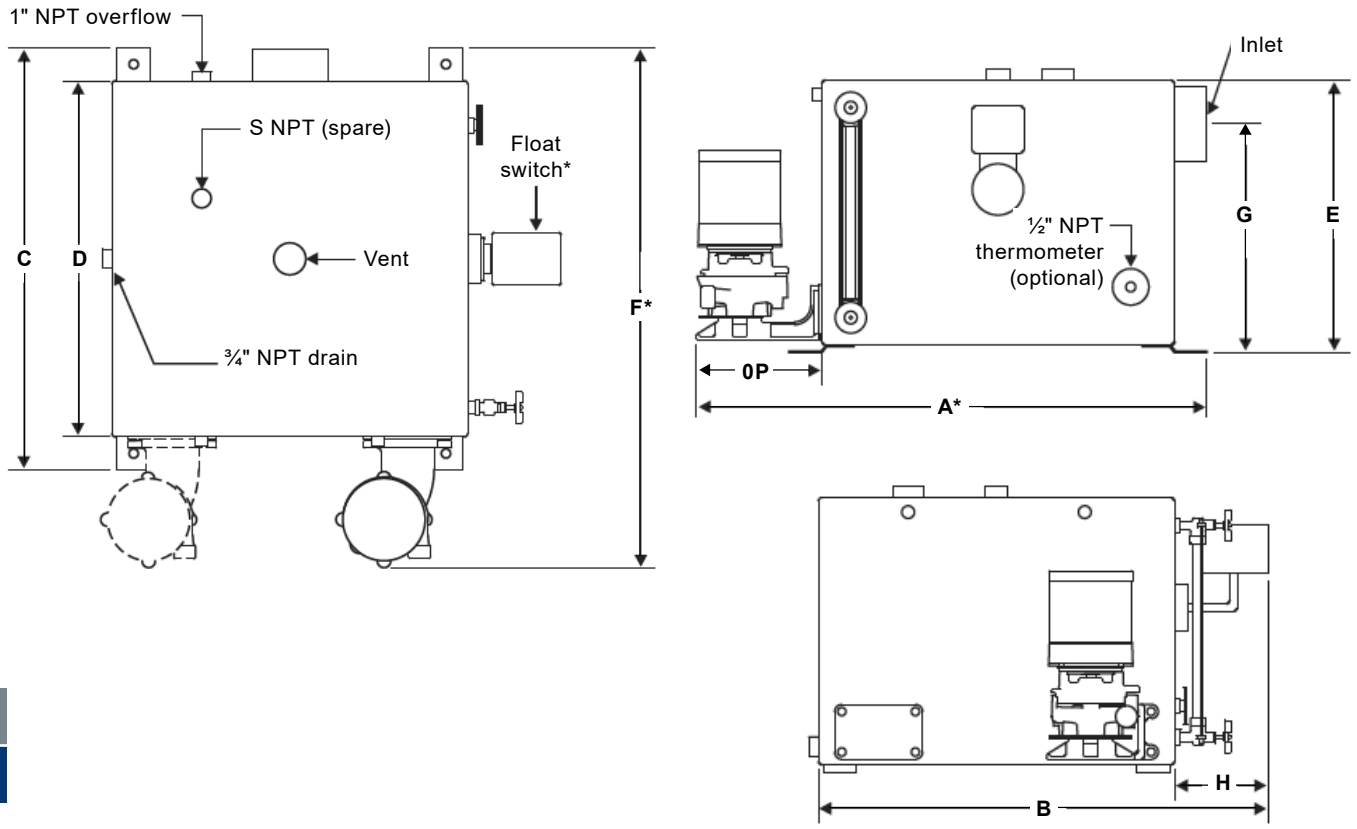
Standard configurations

- Capacities: 1,000-150,000 Sq Ft (93 - 13,935 m²) EDR
- Receiver: 12-135 gallons (45 - 511 liters)
- Discharge Pressures: 10-50 psi g (0.69 - 3.4 bar g)
- Motor Voltages: 115V, 208V, 230V, 460V, 575V
- Other configurations and enclosure ratings available upon request.

Available accessories

- 3" SS Dial Thermometer
- Stainless Steel Pump Suction Isolation Valve
- Discharge Check Valve
- Discharge Ball Valve
- Discharge Throttling (Globe) Valve
- Discharge Pressure Gauge
- Inlet Basket Strainer

Tank Dimensions (approximate) in inches (mm)



Tank	Inlet	Vent	A*	B	C	D	E	F	G	H	S
12	2 (50.8)	1 (25.4)	26 (660)	22 (559)	20 (508)	15 (381)	14 (356)	26 (660)	10 (254)		0.75 (19.1)
25		1.25 (31.8)	29 (737)	25 (635)	23 (584)	18 (457)		29 (737)			0.75 (19.1)
45		2 (50.8)	35 (889)	31 (787)	29 (737)	24 (610)		35 (889)			
70	4 (102)	2.5 (63.5)	41 (1041)	37 (940)	35 (889)	30 (762)	19 (483)	41 (1041)	16 (406)	6 (152)	1.5 (38.1)
100			47 (1194)	43 (1092)	41 (1041)	36 (914)		47 (1194)			
135		3 (76.2)	46 (1168)	43 (1092)	41 (1041)	36 (914)	25 (635)	47 (1194)	22 (559)		

***Notes**
1. Dimensional drawings available upon request
2. Pump extends additional 3" when the optional isolation valve is added
3. Alternator will replace float switch for duplex units
4. For duplex unit, 2nd pump shown hidden on left

Simplex and Duplex Tank/Pump Selection Guide

All Simplex and Duplex Condensate Return Units include 304SS tank, SS vertical flange mounted centrifugal pumps, NEMA 1 float switch (simplex) or mechanical alternator (duplex) and SS gauge glass assembly.

Note: Pumps and tanks can be interchanged. Contact Spirax Sarco for custom systems.

Tank size GAL (litres)	EDR	GPM Pump dishcharge flow	Pump discharge pressure psi g (bar g)	HP	Simplex model		Duplex model	
					number three phase	number single phase	number three phase	number single phase
12 (45 liters)	6000	6	15 (1 bar)	⅓	12150503SXS0063S	12150303SXS0061S	12150503SXS0063D	12150303SXS0061D
			20 (1.4 bar)	⅓	12200503SXS0063S	12200303SXS0061S	12200503SXS0063D	12200303SXS0061D
			25 (1.7 bar)	½	12250505SXS0063S	12250505SXS0061S	12250505SXS0063D	12250505SXS0061D
			30 (2.1 bar)	¾	12300707SXS0063S	12300707SXS0061S	12300707SXS0063D	12300707SXS0061D
			40 (2.8 bar)	1½	12401515SXS0063S	12401515SXS0061S	12401515SXS0063D	12401515SXS0061D
			50 (3.4 bar)	1½	12501515SXS0063S	12501515SXS0061S	12501515SXS0063D	12501515SXS0061D
	9000	9	15 (1 bar)	⅓	12150503SXS0093S	12150303SXS0091S	12150503SXS0093D	12150303SXS0091D
			20 (1.4 bar)	⅓	12200503SXS0093S	12200303SXS0091S	12200503SXS0093D	12200303SXS0091D
			25 (1.7 bar)	¾	12250707SXS0093S	12250707SXS0091S	12250707SXS0093D	12250707SXS0091D
			30 (2.1 bar)	¾	12300707SXS0093S	12300707SXS0093S	12300707SXS0093D	12300707SXS0091D
			40 (2.8 bar)	1½	12401515SXS0093S	12401515SXS0091S	12401515SXS0093D	12401515SXS0091D
			50 (3.4 bar)	1½	12501515SXS0093S	12501515SXS0091S	12501515SXS0093D	12501515SXS0091D
	12000	12	15 (1 bar)	⅓	12150503SXS0123S	12150503SXS0121S	12150503SXS0123D	12150503SXS0121D
			20 (1.4 bar)	⅓	12200503SXS0123S	12200303SXS0121S	12200503SXS0123D	12200303SXS0121D
			25 (1.7 bar)	¾	12250707SXS0123S	12250707SXS0121S	12250707SXS0123D	12250707SXS0121D
			30 (2.1 bar)	¾	12300707SXS0123S	12300707SXS0121S	12300707SXS0123D	12300707SXS0121D
			40 (2.8 bar)	1½	12401515SXS0123S	12401515SXS0121S	12401515SXS0123D	12401515SXS0121D
			50 (3.4 bar)	1½	12501515SXS0123S	12501515SXS0121S	12501515SXS0123D	12501515SXS0121D
25 (95 liters)	15000	15	15 (1 bar)	⅓	25150503SXS0153S	25150503SXS0151S	25150503SXS0153D	25150503SXS0151D
			20 (1.4 bar)	⅓	25200503SXS0153S	25200503SXS0151S	25200503SXS0153D	25200503SXS0151D
			25 (1.7 bar)	1	25251010SXS0153S	25251010SXS0151S	25251010SXS0153D	25251010SXS0151D
			30 (2.1 bar)	1	25301010SXS0153S	25301010SXS0151S	25301010SXS0153D	25301010SXS0151D
			40 (2.8 bar)	1½	25401515SXS0153S	25401515SXS0151S	25401515SXS0153D	25401515SXS0151D
			50 (3.4 bar)	2	25502020SXS0153S	25502020SXS0151S	25502020SXS0153D	25502020SXS0151D
	22000	22	15 (1 bar)	⅓	25150503SXS0223S	25150503SXS0221S	25150503SXS0223D	25150503SXS0221D
			20 (1.4 bar)	½	25200505SXS0223S	25200505SXS0221S	25200505SXS0223D	25200505SXS0221D
			25 (1.7 bar)	1	25251010SXS0223S	25251010SXS0221S	25251010SXS0223D	25251010SXS0221D
			30 (2.1 bar)	1	25301010SXS0223S	25301010SXS0221S	25301010SXS0223D	25301010SXS0223D
			40 (2.8 bar)	2	25401515SXS0223S	25401515SXS0221S	25401515SXS0223D	25401515SXS0221D
			50 (3.4 bar)	3	25503030SXS0223S		25503030SXS0223D	

Simplex and Duplex Tank/Pump Selection Guide, continued on next page

Simplex and Duplex Tank/Pump Selection Guide (continued)

Tank size GAL (litres)	EDR	GPM Pump dishcharge flow	Pump discharge pressure psi g (bar g)	HP	Simplex model		Duplex model	
					number three phase	number single phase	number three phase	number single phase
45 (170 liters)	30000	30	15 (1 bar)	½	45150505SXS0303S	45150505SXS0301S	45150505SXS0303D	45150505SXS0301D
			20 (1.4 bar)	½	45200505SXS0303S	45200505SXS0301S	45200505SXS0303D	45200505SXS0301D
			25 (1.7 bar)	1	45250101SXS0303S	45250101SXS0301S	45250101SXS0303D	45250101SXS0301D
			30 (2.1 bar)	1½	45301515SXS0303S	45301515SXS0301S	45301515SXS0303D	45301515SXS0301D
			40 (2.8 bar)	2	45400202SXS0303S	45400202SXS0301S	45400202SXS0303D	45400202SXS0301D
			50 (3.4 bar)	3	45503030SXS0303S		45503030SXS0303D	
	37500	38	15 (1 bar)	½	45150505SXS0383S	45150505SXS0381S	45150505SXS0383D	45150505SXS0381D
			20 (1.4 bar)	¾	45200707SXS0383S	45200707SXS0381S	45200707SXS0383D	45200707SXS0381D
			25 (1.7 bar)	1½	45251515SXS0383S	45251515SXS0381S	45251515SXS0383D	45251515SXS0381D
			30 (2.1 bar)	1½	45301515SXS0383S	45301515SXS0381S	45301515SXS0383D	45301515SXS0381D
			40 (2.8 bar)	3	45403030SXS0383S		45403030SXS0383D	
			50 (3.4 bar)	3	45503030SXS0383S		45503030SXS0383D	
	45000	45	15 (1 bar)	½	45150505SXS0453S	45150505SXS0451S	45150505SXS0453D	45150505SXS0451D
			20 (1.4 bar)	¾	45200707SXS0453S	45200707SXS0451S	45200707SXS0453D	45200707SXS0451D
			25 (1.7 bar)	1½	45251515SXS0453S	45251515SXS0451S	45251515SXS0453D	45251515SXS0451D
			30 (2.1 bar)	2	45302020SXS0453S	45302020SXS0451S	45302020SXS0453D	45302020SXS0451D
			40 (2.8 bar)	3	45403030SXS0453S		45403030SXS0453D	
			50 (3.4 bar)	3	45503030SXS0453S		45503030SXS0453D	
70 (265 liters)	60000	60	15 (1 bar)	¾	70150707SXS0603S	70150707SXS0601S	70150707SXS0603D	70150707SXS0601D
			20 (1.4 bar)	1	70201010SXS0603S	70201010SXS0601S	70201010SXS0603D	70201010SXS0601D
			25 (1.7 bar)	2	70252020SXS0603S	70252020SXS0601S	70252020SXS0603D	70252020SXS0601D
			30 (2.1 bar)	2	70302020SXS0603S	70302020SXS0601S	70302020SXS0603D	70302020SXS0601D
			40 (2.8 bar)	3	70403030SXS0603S		70403030SXS0603D	
			50 (3.4 bar)	3	705030SXS0603S		70503SXS0603D	
	75000	75	15 (1 bar)	1	70151010SXS0753S	70151010SXS0751S	70151010SXS0753D	70151010SXS0751D
			20 (1.4 bar)	1½	70201515SXS0753S	70201515SXS0751S	70201515SXS0753D	70201515SXS0751D
			25 (1.7 bar)	2	702520SXS0753S		702520SXS0753D	
			30 (2.1 bar)	3	703030SXS0753S		703030SXS0753D	
			40 (2.8 bar)	3	704030SXS0753S		704030SXS0753D	
			50 (3.4 bar)	5	705050SXS0753S		705050SXS0753D	

Simplex and Duplex Tank/Pump Selection Guide, continued on next page

Simplex and Duplex Tank/Pump Selection Guide (continued)

Tank size GAL (litres)	EDR	GPM Pump dishcharge flow	Pump discharge pressure psi g (bar g)	HP	Simplex model		Duplex model	
					number three phase	number single phase	number three phase	number single phase
100 (379 liters)	90000	90	15 (1 bar)	1 ½	100151510SXS0903S	100151510SXS0901S	1001515SXS0903D	100151510SXS0901D
			20 (1.4 bar)	2	1002020SXS0903S	100202SXS0901S	1002020SXS0903D	1002020SXS0901D
			25 (1.7 bar)	2	1002520SXS0903S	100252SXS0901S	1002520SXS0903D	1002520SXS0901D
			30 (2.1 bar)	3	1003030SXS0903S		1003030SXS0903D	
			40 (2.8 bar)	5	1004050SXS0903S		1004050SXS0903D	
			50 (3.4 bar)	5	1005050SXS0903S		1005050SXS0903D	
	112000	112	15 (1 bar)	3	1001530SXS1123S		1001530SXS1123D	
			20 (1.4 bar)	3	1002030SXS1123S		1002030SXS1123D	
			25 (1.7 bar)	3	1002530SXS1123S		1002530SXS1123D	
			30 (2.1 bar)	5	1003050SXS1123S		1003050SXS1123D	
			40 (2.8 bar)	5	1004050SXS1123S		1004050SXS1123D	
			50 (3.4 bar)	5	1005050SXS1123S		1005050SXS1123D	
135 (511 liters)	150000	150	15 (1 bar)	5	1351550SXS1503S		1351550SXS1503D	
			20 (1.4 bar)	5	1352050SXS1503S		1352050SXS1503D	
			25 (1.7 bar)	5	1352550SXS1503S		1352550SXS1503D	
			30 (2.1 bar)	5	1353075SXS1503S		1353075SXS1503D	
			40 (2.8 bar)	7 ½	1354075SXS1503S		1354075SXS1503D	
			50 (3.4 bar)	7 ½	1355075SXS1503S		1355075SXS1503D	

Spares Available:

- Pump and Motor Assembly
- Mechanical Seal Assembly
- Float Switch Assembly
- Mechanical Alternator Assembly
- Gasket Kit (Pump Housing to Motor and Receiver to Pump Housing)
- Mechanical Seal Kits

TI-P216-01-US
Issue 2

Control Panels
SSCRU Series

Available configurations

Panel type	Simplex Condensate Panel
	Duplex Condensate Panel – Mechanical Alternator
	Duplex Condensate Panel – Electric Alternator
Electric voltage	115V, 208V, 230V, 460V, 575V
Enclosure	NEMA N3R, NEMA N4, NEMA N4XFG, NAME N4XSS, NEMA N12
Shipment	Mounted and Wired or Shipped Loose for Remote Mounting
Standard components	Motor Starters & Overloads (Duplex)
	Pump Circuit Breaker(s)
	HOA Selector Switch(es)
	Pump Run Indicator Light(s)
	Control Circuit Transformer
Panel options	Fused or Non-Fused Disconnects
	High/Low Level Alarm Circuits
	Elapsed Run Time Meter
	Resettable Elapsed Run Time Meter
	Cycle Counter
	Push to Test Button
	Lead Pump Selector/Transfer Switch
	Dry Contact(s) for Building Management System (BMS) Compatibility

NEMA Enclosure Ratings

Enclosure Rating	Definition	
NEMA Type 1	**General-purpose**	Protects against dust, light, and indirect splashing but is not dust-tight; primarily prevents contact with live parts; used indoors and under normal atmospheric conditions.
NEMA Type 3R	**Intended for outdoor use**	Provides a degree of protection against falling rain and ice formation. Meets rod entry, rain, external icing, and rust-resistance design tests.
NEMA Type 4, 4X	**Watertight (weatherproof)**	Designed for indoor or outdoor use, provides a degree of protection against corrosion, windblown dust & rain, splashing water, and damage from external ice formation.
NEMA Type 12	**General-purpose**	Intended for indoor use, provides some protection against dust, falling dirt, and dripping noncorrosive liquids. Meets drip, dust, and rust resistance tests.

HIGH PURITY CLEAN STEAM SOLUTIONS



Section contents

spirax sarco

6

SECTION 6 CONTENTS

BT6-B Sanitary Balanced Pressure Thermostatic Steam Trap	TI-P180-30-EN
BT6B Horizontal Sanitary Balanced Pressure Thermostatic Steam Trap	TI-P180-49-EN
BTM7 Stainless Steel Thermostatic Clean Steam Trap	TI-P180-11-EN
BTS7 Balanced Pressure Thermostatic Steam Trap	TI-P180-03-EN
BTS7.1 Sanitary Balanced Pressure Thermostatic Steam Trap	TI-P180-40-EN
BTD52L Thermodynamic Steam Trap	TI-P181-01-EN
Stainless Steel Balanced Pressure Thermostatic Air Vent AVM7	TI-P123-22-EN
SRV66 Sanitary Pressure Reducing Valve	TI-P186-08-EN
SSC20 Sanitary Sample Cooler	TI-P403-82-EN
CS10-1 Stainless Steel Clean Steam Separator	TI-P023-59-EN
Sanitary Pressure Gauge	TI-P112-02-US
STERI-TROL Clean Service ‘S’ series Two-port and Three-Port Control Valves - DN15 (½”) to DN100 (4”)	TI-P183-02-EN

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SECTION 6 CONTENTS (CONTINUED)

Clean Steam Generation System for Healthcare	TI-P663-01-EN
CSG-FB Clean steam generation system for Food & Beverage	TI-P664-01-EN
SVL488 SVL488 Stainless Steel Sanitary Safety Valve	TI-P315-03-EN
CVS10M Maintainable Sanitary Check Valve	TI-P154-08-US
CVS10 Sanitary Check Valve with Soft Seat	TI-P029-10-EN
CVS10 Sanitary Check Valve with Metal Seat	TI-P029-21-EN
M70i ISO Forged Stainless Steel Ball Valve for Sanitary Applications (up to 2")	TI-P182-05-EN
M80i ISO Stainless Steel Ball Valve for Sanitary Applications (2½" to 4")	TI-P182-06-EN
CSF16 and CSF16T Stainless Steel Steam Filters	TI-P180-43-EN
CSF16 and CSF16T Stainless Steel Sterile Air Filters	TI-P180-44-EN
Steam Filter Station FS Series	TI-P185-12-US
Steam Filter Stations for Sterilization FS-HC Series	TI-P180-41-US
VLS 1935 Needle Valve Food+	TI-P179-17-EN

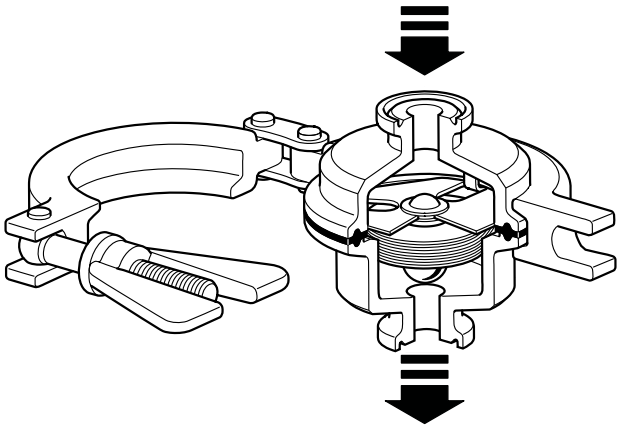
TI-P180-30
CMGT Issue 18

BT6-B and BT6-B Food+ Sanitary Balanced Pressure Thermostatic Steam Trap

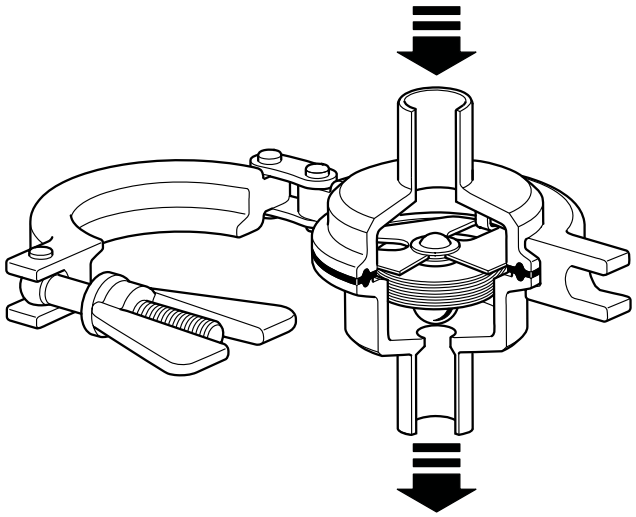
Description

The Spirax Sarco BT6-B sanitary balanced pressure thermostatic steam trap is designed to remove condensate from clean (Chemical-Free) 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 within 2 °C (4 °F) nominal sub-cooling of steam saturation temperature at 50 mm (2") above the trap and at pressures below 2.4 bar g (35 psi g) for typical operating conditions. Exact operating performance may be affected by operating pressure, installation and ambient conditions. Each trap is individually packaged within an ISO CLASS 7 'clean' environment with protective end caps and sealed in a protective plastic bag.

BT6-B Food+
Designed, manufactured and approved for Steam and Condensate applications. This product complies with EC1935:2004 Food Contact Materials. It also complies with regulation EC2023:2006 on good manufacturing practice for materials and articles intended to come into contact with food. A list of the materials that could come directly or indirectly into contact with foodstuffs can be found in the Declaration of Compliance available for this product.



Sanitary clamp ended variant



Tube ended variant

Available types

BT6-BL Low capacity and **BT6-BH** High capacity. **Body surface finish (measured to ISO 4287-1997 and ISO 4288-1997):**

- Internal surfaces have a finish of 0.6 µm Ra (25 µin Ra, ASME BPE SF2).
- External surfaces have a finish of 1.0 µm Ra (40 µin Ra).

Options

- Fixed bleed to ensure 'FAIL OPEN' operation.
- Mechanical and electropolishing to 0.375 µm Ra (15 µin Ra, ASME BPE SF4).

Standards

- The BT6-B has been designed and built in general accordance with ASME BPE.
- The unit also complies with the requirements of the European Pressure Equipment Directive 2014/68/EU.

The seal part is compliant with:

- FDA CFR Title 21. Paragraph 177. 1550.
- USP Class VI Biological Reactivity Cytotoxicity Testing In-Vitro <87> & In-Vivo <88> extracted at 121 °C (250 °F) for 1 hour.
- ADI Free (Animal Derived Ingredients) for materials used, manufacturing processes involved in producing the part.
- TSE/BSE Free as Certified
- Designed and manufactured in accordance with ASME-BPE standards
- Full material lot number product traceability

Certification

This product is available with the following certification:

- EN 10204 3.1 Full Validation Pack - Chargeable
- EN 10204 3.1 Material Certification Pressure Retaining Parts - Chargeable
- EN 10204 3.1 Material Certification Wetted Parts (including a WFI element fill) available for element spares (included in Full Validation Pack) - Chargeable
- Specific Internal Surface Finish - Chargeable
- Typical Internal Surface Finish - F.O.C
- Certificate of Compliance for FDA, USP Class VI Testing Statement, and ADI Free Statement - F.O.C
- TSE-BSE Statement - F.O.C
- EC1935:2004 Declaration of Compliance - F.O.C (Food+ range only)
- Declaration of Conformity BS EN ISO 14644-1:2015 Class 7 Clean Room
- Passivation Certificate - F.O.C
- Typical Test Report - F.O.C

Note: All certification/inspection requirements must be stated at the time of order placement, and may be subject to additional cost as detailed above.

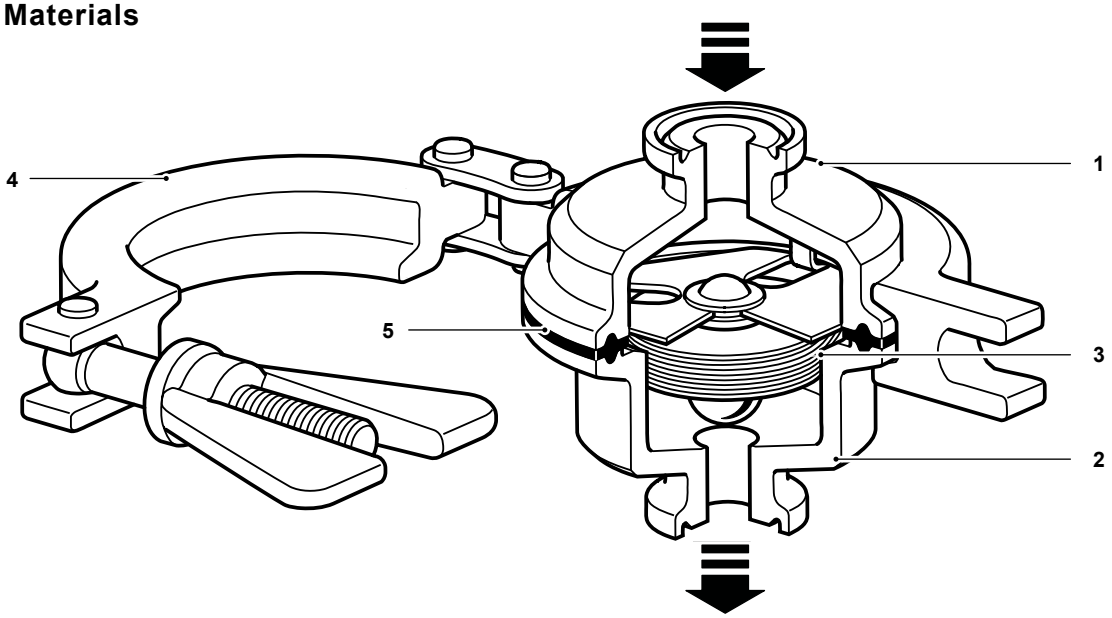
Sizes and pipe connections

	Standard	Issue	Type	Sizes						
Sanitary clamp ended variants	ASME BPE		Type A			½"	¾"			
			Type B					1"		1½"
	ISO1127	1997	Series 1					DN25		DN40
	ISO1127	1997	Variations			DN15	DN20			
	DIN32676	2001-02	Series 2			DN15	DN20	DN25		DN40
	DIN32676	2009-05	Series A			DN15	DN20	DN25		DN40
	DIN32676	2009-05	Series B	DN8	DN10	DN15	DN20	DN25	DN32	DN40
	DIN32676	2009-05	Series C			½"	¾"	1"		1½"
Tube ended variants	DIN11866	2016-11	Series A			DN15	DN20	DN25		DN40
	DIN11850	1999-01	Series-2			DN15	DN20	DN25		DN40
	ISO1127	1997	Series 1			DN15	DN20	DN25		DN40

Notes:

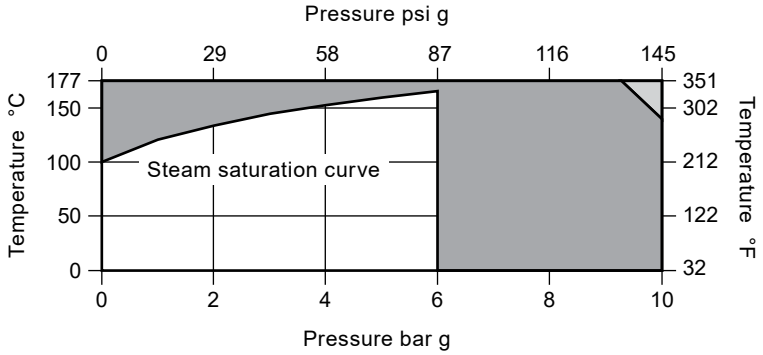
1. Consult SSP list for available types. For other connections please consult Spirax Sarco.
2. BT6-B Food+ available with ASME BPE connections

Materials



No.	Part	Material	
1	Body (inlet)	Stainless steel	
2	Body (outlet)	Stainless steel	316L (1.4404)
3	Capsule element	Stainless steel	
4	Safety clamp	Stainless steel	316 (1.4401)
5	Seal	PTFE/Stainless Steel Composite gasket	PTFE + 316L (1.4404)

Pressure/temperature limits (ISO 6552)



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

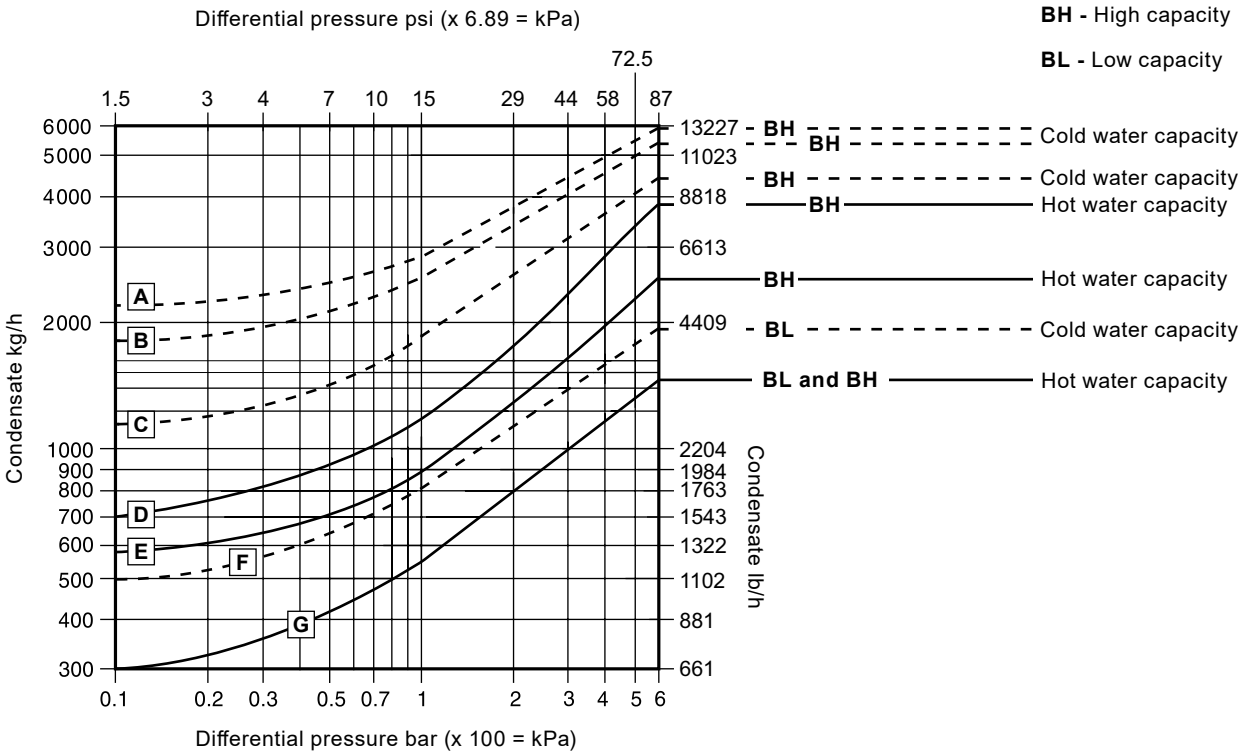
The product should not be used in this region as damage to the internals may occur.

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	10 bar g @ 140 °C	145 psi g @ 284 °F
TMA	Maximum allowable temperature	177 °C @ 9.2 bar g	351 °F @ 139 psi g
Minimum allowable temperature		-10 °C	14 °F
PMO	Maximum operating pressure for saturated steam service	6 bar g	87 psi g
TMO	Maximum operating temperature	165 °C @ 6 bar g	329 °F @ 87 psi g
Minimum operating temperature		0 °C	32 °F
Product is suitable for use under full vacuum conditions			
Designed for a maximum cold hydraulic test pressure of:		15 bar g	218 psi g

Note: Refer to IM-P180-31 for instruction on how to perform hydraulic testing.

Capacities (in accordance with ISO 7842)



A DN25 (1"), DN32 and DN40 (1½")

B DN20 (¾")

C DN8, DN10 and DN15 (½")

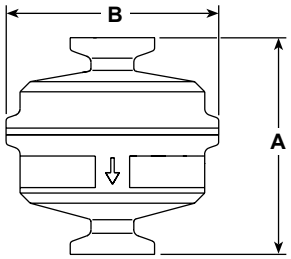
D DN25 (1"), DN32 and DN40 (1½")

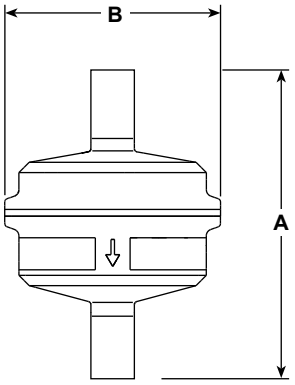
E DN20 (¾")

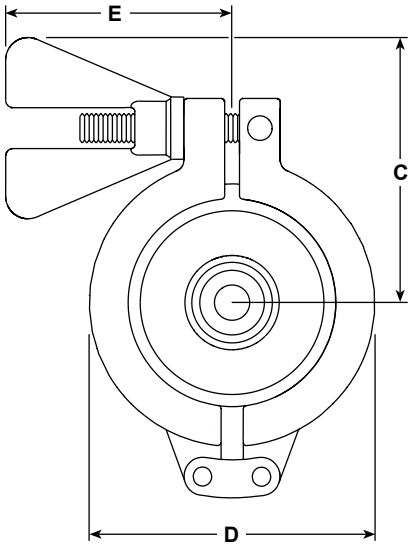
F DN8, DN10, DN15 (½"), DN20 (¾"), DN25 (1"), DN32 and DN40 (1½")

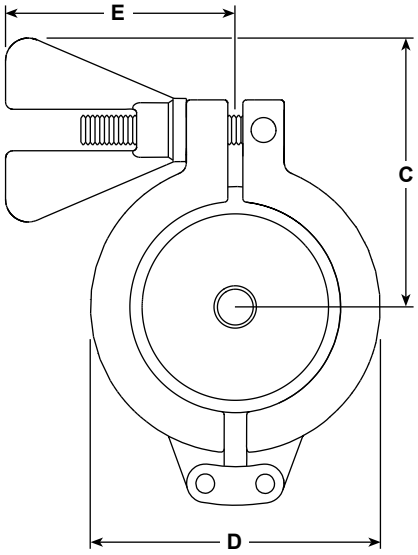
G DN8-BL, DN10-BL, DN15-BL (½"), DN20-BL (¾"), DN25-BL (1") , DN32-BL, DN40-BL (1½"), DN8-BH, DN10-BH and DN15-BH (½")

Dimensions (approximate) in mm (in). Products each weigh 1 kg (2.2 lb) maximum.









Sanitary clamp ended variants
in ASME BPE, ISO 1127 and DIN32676 standards

Tube ended variants
in DIN11866, DIN11850 and ISO1127 standards

	Standard	Sizes	A	B	C	D	E	Weight
Sanitary clamp ended variants	ASME BPE Types A & B, ISO1127, DIN32676 Series 2 + A & C Variants	½" (DN15) + ¾" (DN20) + 1" (DN25) + 1½" (DN40)	65 (2.6)	64 (2.5)	71.5 (2.8)	77 (3)	61 (2.4)	1 kg (2.2 lb) maximum
	DIN32676 Series B	DN8 + DN10 + DN15 + DN20 + DN25 + DN32 + DN40						
Tube ended variants	DIN11866 Series A, DIN11850 Series 2, ISO1127 Series 1	DN15 + DN20 + DN25 + DN40	92 (3.6)	64 (2.5)	71.5 (2.8)	77 (3)	61 (2.4)	

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 WFI 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.

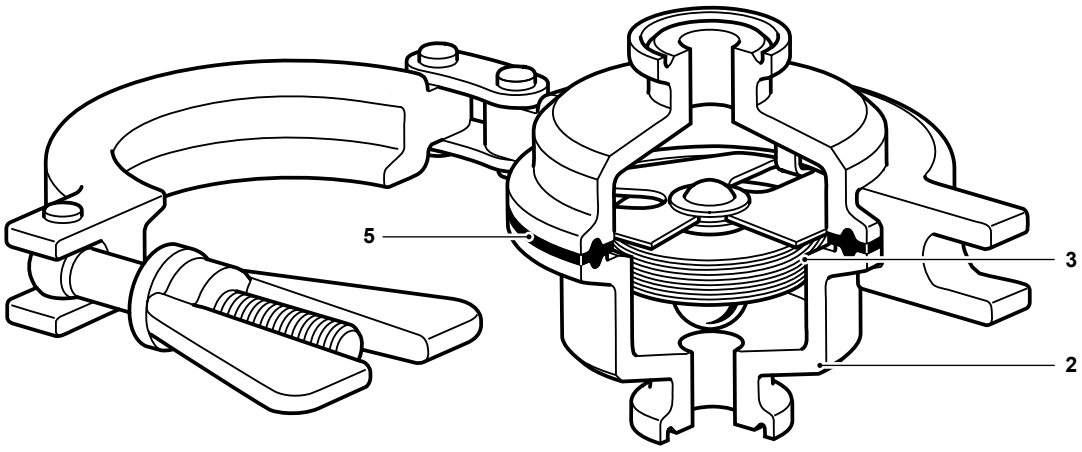
How to order
Example: 1 off Spirax Sarco ½" BT6-BH sanitary balanced pressure thermostatic steam trap with self-draining body. Connections to be sanitary clamp ends to meet the requirements of ASME BPE. Suitable for pressure up to 6 bar g. Internal surface finish to be electropolished to 0.375 µm (15 µin Ra, ASME BPE SF4). Material certification to EN 10204 3.1 for pressure containing parts.

Spare parts
The available spare parts are detailed below. No other parts are supplied as spares.

Available spares

Capsule element assembly	**3, 5**
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.



TI-P180-49
CMGT Issue 3

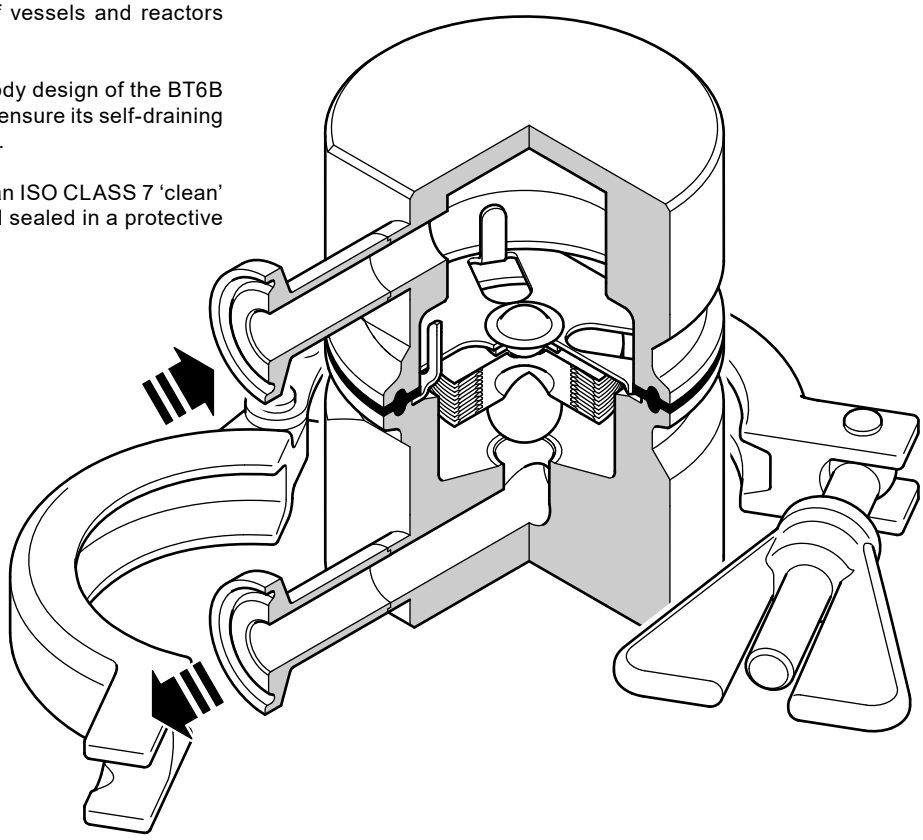
BT6B
Horizontal Sanitary Balanced Pressure Thermostatic Steam Trap

Description
The Spirax Sarco BT6B Horizontal Sanitary balanced pressure 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, CIP/SIP of vessels and reactors and process lines.

Manufactured in 316L, the crevice free body design of the BT6B Horizontal incorporates an angled seat to ensure its self-draining and operates close to steam temperature.

Each trap is individually packaged within an ISO CLASS 7 'clean' environment with protective end caps and sealed in a protective plastic bag.



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9

Body surface finish (measured to ISO-4287-1997 and ISO 4288-1997)
Internal surfaces to have a finish of 0.5 µm Ra, (20 µin Ra,).
External surfaces to have a finish of 1.2 µm Ra, (48 µin Ra).

Options
Fixed bleed to ensure 'FAIL OPEN' operation.

Standards
The BT6B Horizontal has been designed and built in general accordance with ASME BPE. The unit also complies with the requirements of the Pressure Equipment Directive (PED) and UKCA safety regulations. The seal part is Compliant with:

- FDA CFR Title 21. Paragraph 177. 1550.
- USP Class VI Biological Reactivity Cytotoxicity Testing In-Vitro <87> & In-Vivo <88> extracted at 121 °C for 1 hour.
- ADI Free (Animal Derived Ingredients) for materials used, manufacturing processes involved in producing the part.

Certification

This product is available with the following certification:

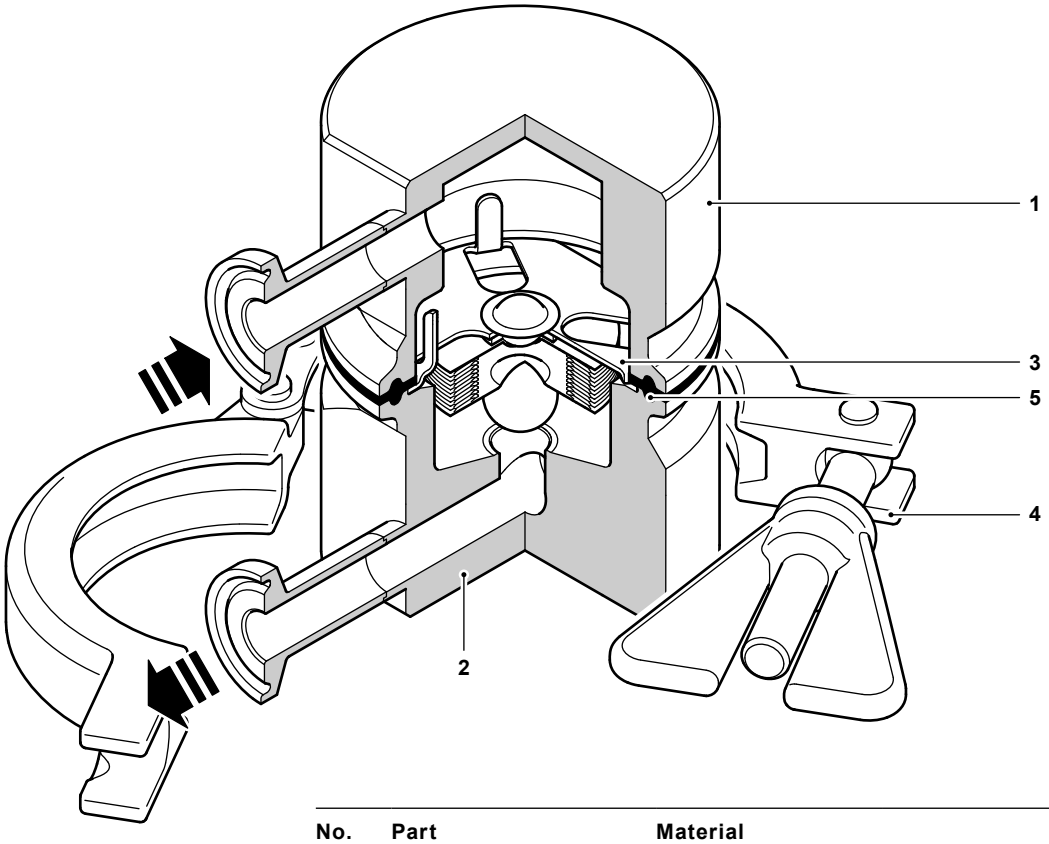
- EN 10204 3.1 material certificates (pressure containing parts).
- EN 10204 3.1 material certificates (wetted parts, including element fill) subject to additional cost.
- Typical Internal surface finish certificates.
- Specific internal surface finish certificates available at point of order request, and may be subject to additional cost.
- Certificate of compliance (trap & element fill) for FDA and ADI free.
- TSE/BSE Free Statement.
- Certificate of compliance EC1935:2004 Food Contact Materials.
- Declaration of conformity BS EN ISO 14644-1:2015 Class 7 Clean Room.

Note: All certification/inspection requirements must be stated at the time of order placement, and may be subject to additional cost.

Sizes and pipe connections – BT6B Horizontal

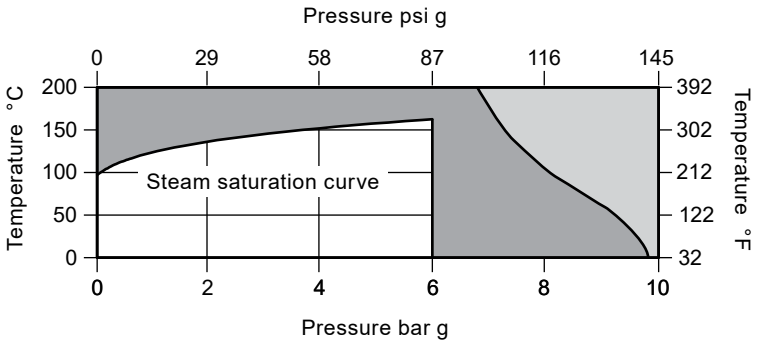
½" sanitary clamp ends to ASME BPE Type A.

Materials



No.	Part	Material	
1	Body (inlet)	Stainless steel	ASTM A 276 316L (1.4404)
2	Body (outlet)	Stainless steel	ASTM A276 316L (1.4404)
3	Capsule element	Stainless steel	AISI 316L (1.4404)
4	Body clamp	Stainless steel	AISI 316
5	Seal	Tuf - steel	PTFE + AISI 316L (1.4404)

Pressure/temperature limits (ISO 6552) – BT6B Horizontal



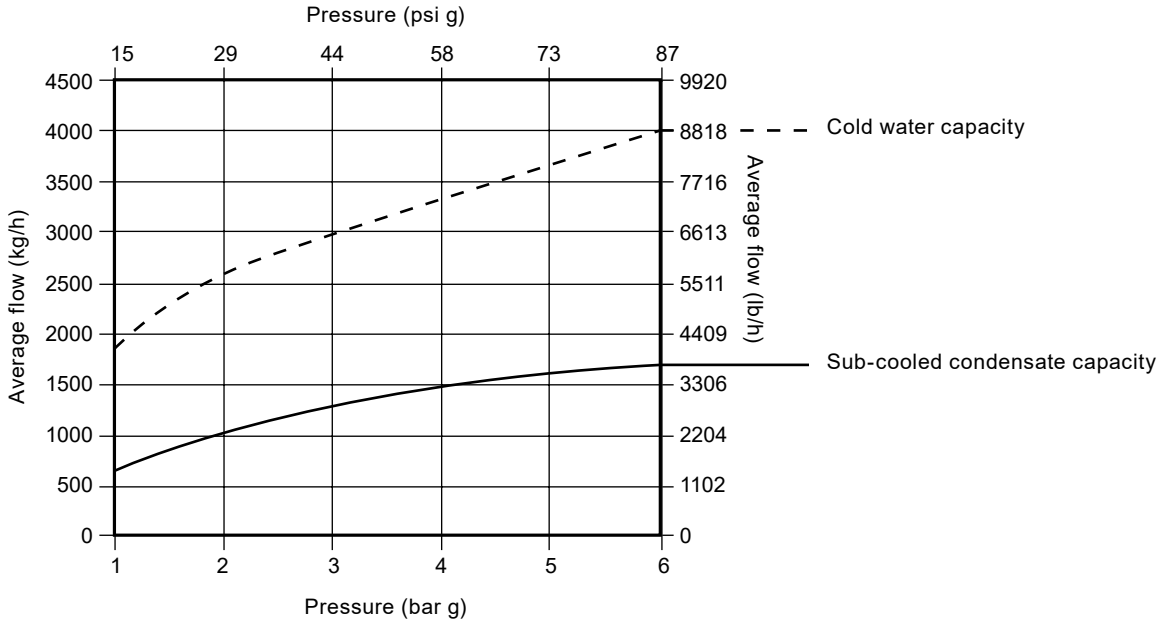
The product **must not** be used in this region.

The product should not be used in this region or beyond its operating range as damage to the internals may occur.

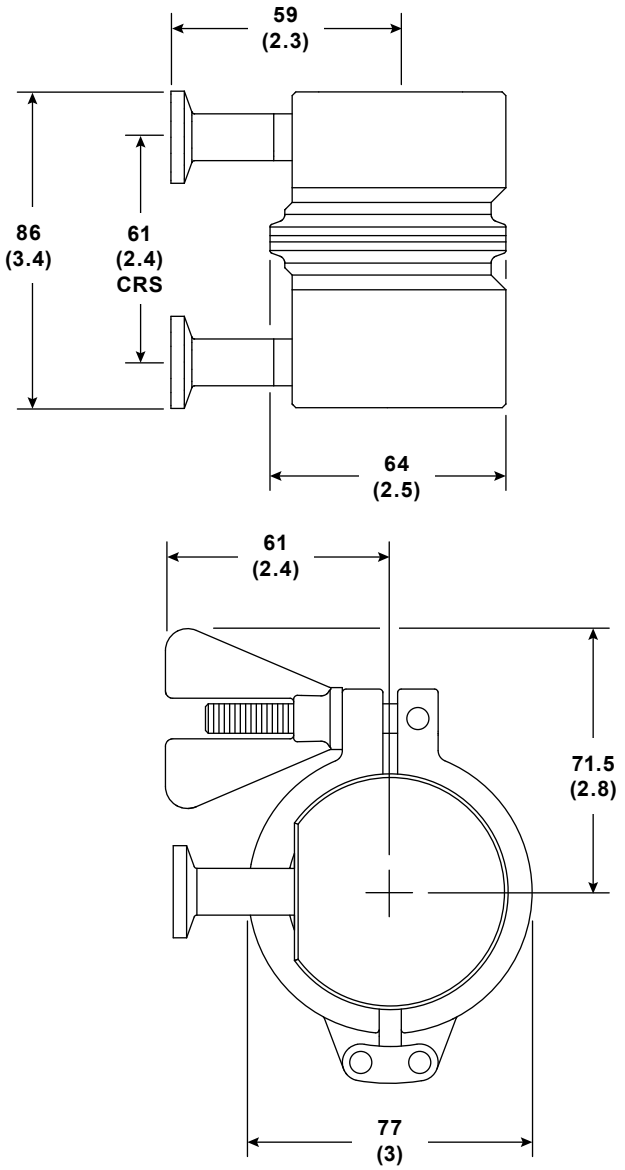
Note: For hygienic/sanitary clamp ends the maximum pressure /temperature may be restricted by the gasket or sanitary clamp used. Please consult Spirax Sarco.

Body design conditions			PN10
Suitable for use			Indoor only
PMA	Maximum allowable pressure	9.7 bar g @ 38 °C	141 psi g @ 100 °F
TMA	Maximum allowable temperature	171 °C @ 7.1 bar g	340 °F @ 103 psi g
PMO	Maximum operating pressure for saturated steam service	6 bar g	87 psi g
TMO	Maximum operating temperature	165 °C @ 6 bar g	329 °F @ 87 psi g
Minimum operating temperature		0 °C	32 °F
Designed for a maximum cold hydraulic test pressure of		15 bar g	218 psi g
Minimum allowable temperature		10 °C	14 °F

Capacities (in accordance with ISO 7842)



Dimensions (approximate in mm (in)



Weight
(approximate)

0.95 kg
(2.1 lb)

Orifice size

The BT6B-Horizontal Sanitary Balanced Pressure Steam Trap has a 9.4 mm (0.37") diameter orifice.

Safety information, installation and maintenance

For full details see the Installation and Maintenance Instructions (IM-P180-50) supplied with the product.

Installation note

The trap is designed to be fitted in horizontal lines with the flow predominantly downwards so that it can be completely self-draining. The length of horizontal pipe should be kept to a minimum to avoid pooling of condensate or collection of debris. Check flow arrow for correct orientation. Fittings, clamps and gaskets for pipe end connections are not supplied.
Do not expose the element to superheat conditions as over expansion may result.
Note: Handle all components carefully to avoid damage to surfaces.

How to order

Example: 1 off Spirax Sarco ½" BT6B Horizontal sanitary balanced pressure thermostatic steam trap. Connection to be sanitary clamp. Suitable for pressures up to 6.0 bar g.

Internal surface finish to be electro-polished to 0.8 µm.

Material certification to be EN 10204 3.1 for pressure containing parts.

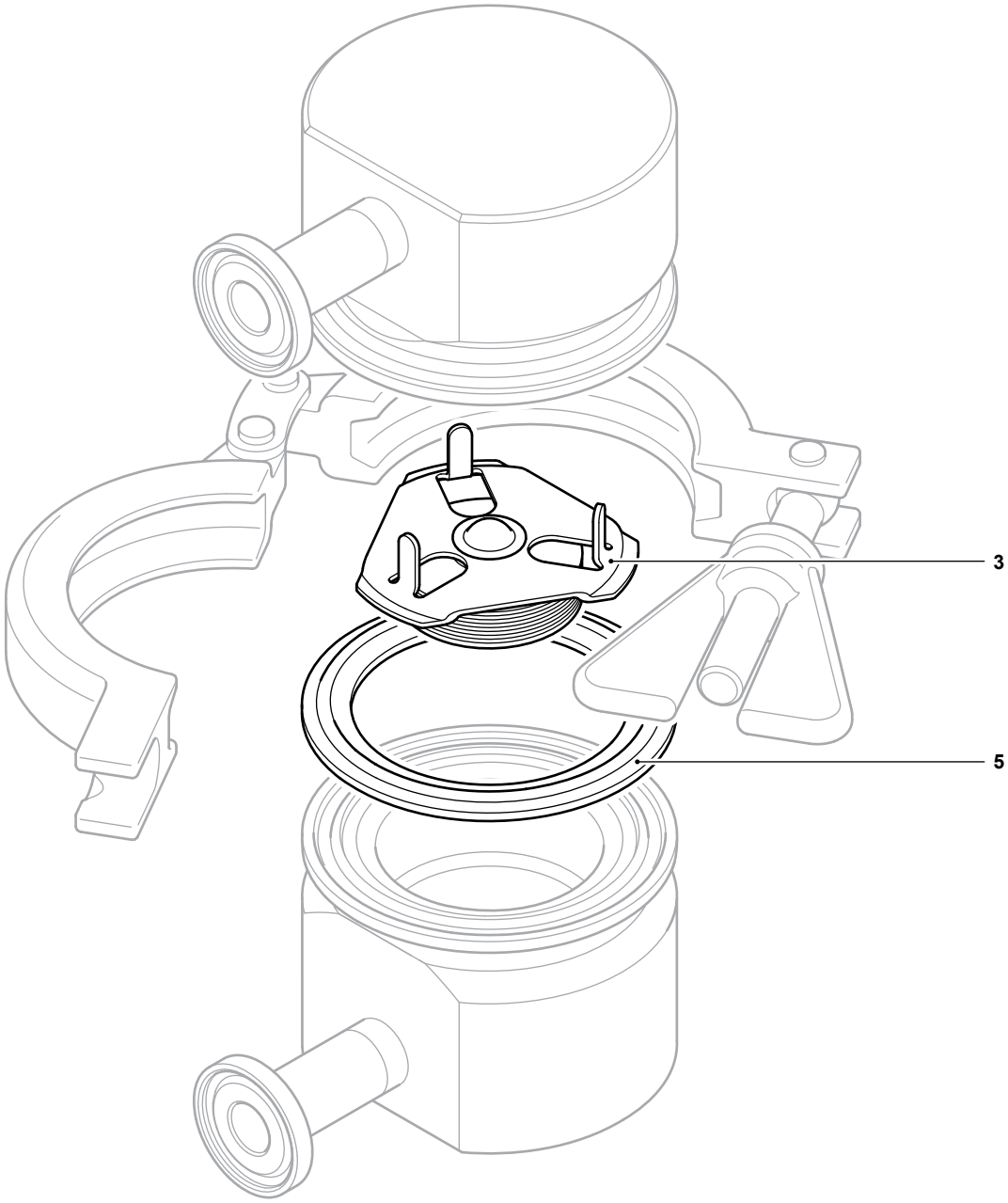
Spare parts
The spare parts are shown in heavy outline. Parts drawn in a grey line are not supplied as spares.

Available spares

Element assembly	**3**
Gasket (set of 3)	**5**

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 BT6B Horizontal sanitary balanced pressure thermostatic steam trap.



Disposal
Please visit the Spirax Sarco product compliance web pages https://www.spiraxsarco.com/product-compliance for up to date information on any substances of concern that may be contained within this product. Where no additional information is provided on the Spirax Sarco product compliance web page, this product may be safely recycled and/or disposed providing due care is taken. Always check your local recycling and disposal regulations.

TI-P180-11
CMGT Issue 22

BTM7 and BTM7 Food+ Balanced Pressure Thermostatic Clean Steam Trap

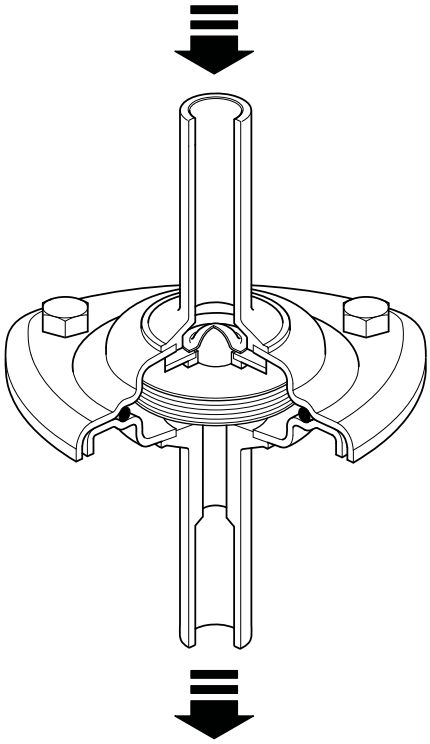
Description

BTM7

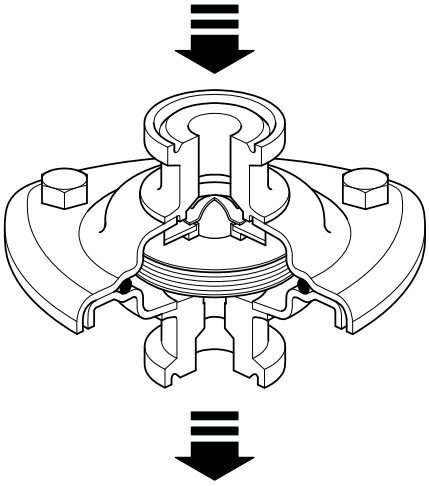
The Spirax Sarco BTM7 is a maintainable thermostatic steam trap designed to remove condensate from clean (chemical free) steam systems with minimal condensate retention. Applications include steam barriers, block and bleed installations, mains drainage and CIP/SIP of vessels and reactors and process lines. Manufactured in 316L stainless steel with minimal crevises and a typical internal surface finish of 1.6 - 3.2 µm Ra, it is self-draining and operates close to steam temperature. Each trap is individually packaged within an "ISO CLASS 7" clean environment with protective end caps and sealed in a protective plastic bag.

BTM7 Food+

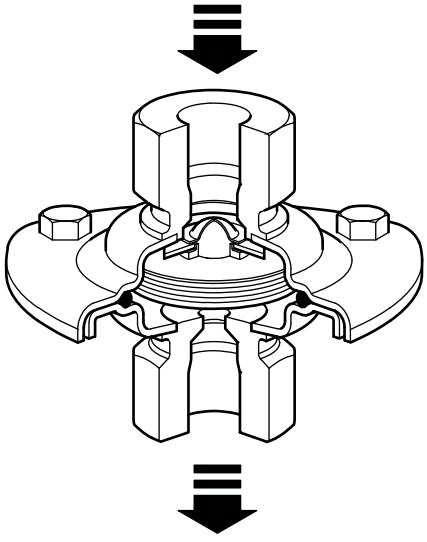
Designed, manufactured and approved for Steam and Condensate applications. The BTM7 Food+ range complies with EC1935:2004 Food Contact Materials. It also complies with regulation EC2023:2006 on good manufacturing practice for materials and articles intended to come into contact with food. A list of the materials that could come directly or indirectly into contact with foodstuffs can be found in the Declaration of Compliance available for this product.



Tube ended variant



Sanitary clamp ended variant



Screwed ended variant

Options and available types

Contact Spirax Sarco for further information

Fixed bleed to ensure **fail open** operation.

Special connections to suit most piping systems.

Standards

- The BTM7 has been designed and manufactured in general accordance with ASME BPE standards.
- The unit also complies with the requirements of the European Pressure Equipment Directive 2014/68/EU.
- FDA CFR Title 21. Paragraph 177.2600.
- USP Class VI Biological Reactivity Cytotoxicity Testing In-Vivo <88> extracted at 121 °C for 1 hour.
  ADI Free (Animal Derived Ingredients) for materials used, manufacturing processes involved in producing the part.
- TSE/BSE Free as Certified.
- Full material lot number product traceability.

Sizes and pipe connections

	Standard	Issue	Type	Sizes						
Sanitary clamp ended variants	ASME BPE		Type A			½"	¾"			
			Type B					1"		
	DIN32676	2001-02	Series 2			DN15				
		2009-05	Series A			DN15				
			Series B	DN8	DN10	DN15	DN20	DN25	DN32	DN40
			Series C			½"	¾"	1"		
Tube ended variants	DIN11866	2016-11	Series A			DN15				
			Series C			DN15	DN20	DN25		
	DIN11850	1999-01	Series 1		DN10	DN15				
			Series 2			DN15				
	ISO1127	1997	Series 1	DN8	DN10	DN15				
Screw ended variants	Socket BSP T Rp (ISO 7-1) Socket NPT				¼"	½"	¾"	1"		

Notes:

1. On request other connection options are available at extra cost. Please note that seat end spares for specially requested connections will require a minimum order quantity - Please consult Spirax Sarco for further information.
2. BTM7 Food+ available as tabulated above for ASME BPE and BSP connections. NPT available in ¼" ONLY.

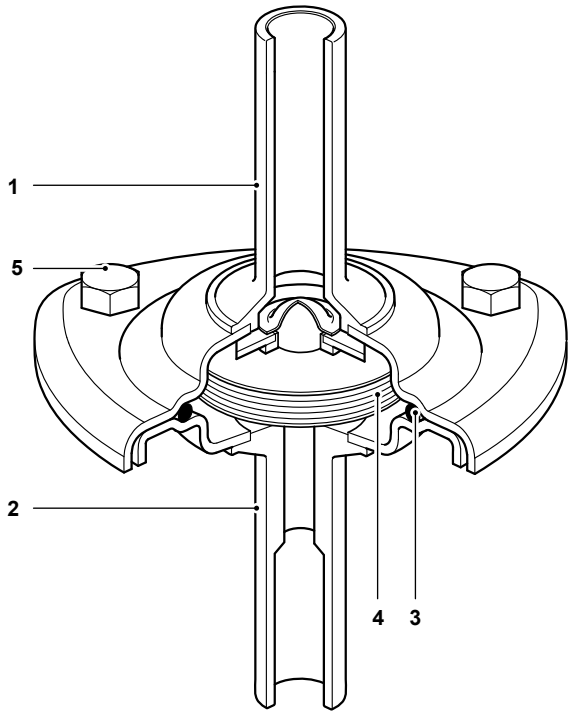
Certification

This product is available with the following certification:

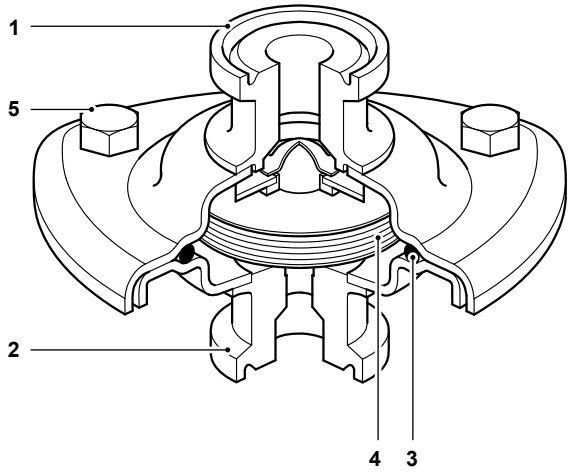
- EN 10204 3.1 Material Certification Pressure Retaining Parts - Chargeable
- EN 10204 3.1 Material Certification for Wetted Parts including the WFI element fill (also available for element spares) - Chargeable.
- Typical Internal Surface Finish - F.O.C.
- Certificate of Compliance for FDA, USP Class VI Testing Statement, and ADI Free Statement - F.O.C.
- TSE-BSE Statement - F.O.C.
- EC1935:2004 Declaration of Compliance F.O.C. (Food+ range only)
- (EC)2023:2006 Good Manufacturing Practice for Materials and Articles Intended to come into Contact with Food.
- Declaration of Conformity BS EN ISO 14644-1:2015 Class 7 Clean Room - F.O.C.
- Typical Test Report - F.O.C.

Note: All certification/inspection requirements must be stated at the time of order placement, and may be subject to additional cost as detailed above.

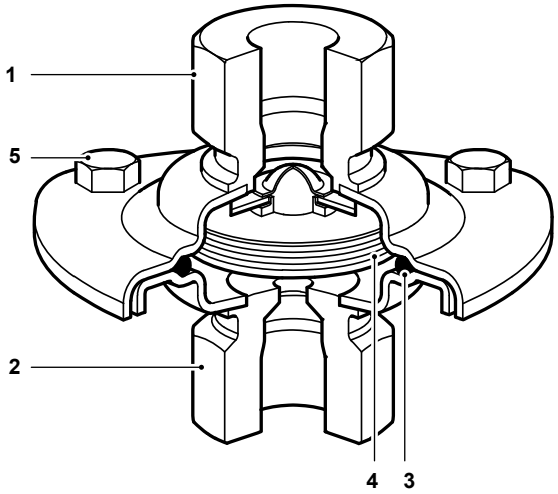
Materials



Tube ended variant



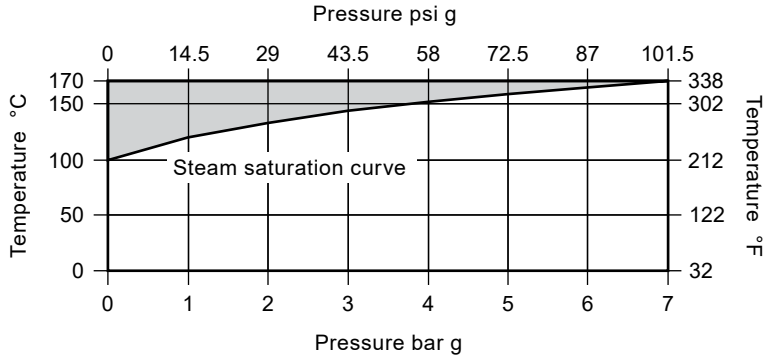
Sanitary clamp ended variant



Screwed ended variant

No.	Part	Material	
1	Body (inlet)	Stainless steel	316L (1.4404)
2	Body with seal (outlet)	Stainless steel	316L (1.4404)
3	'O' ring	FKM	
4	Capsule element	Stainless steel	316L (1.4404)
5	Nuts and bolts	Stainless steel	BS 6105 Gr. A4 80
	Washers	Austenitic stainless steel	

Pressure/temperature limits

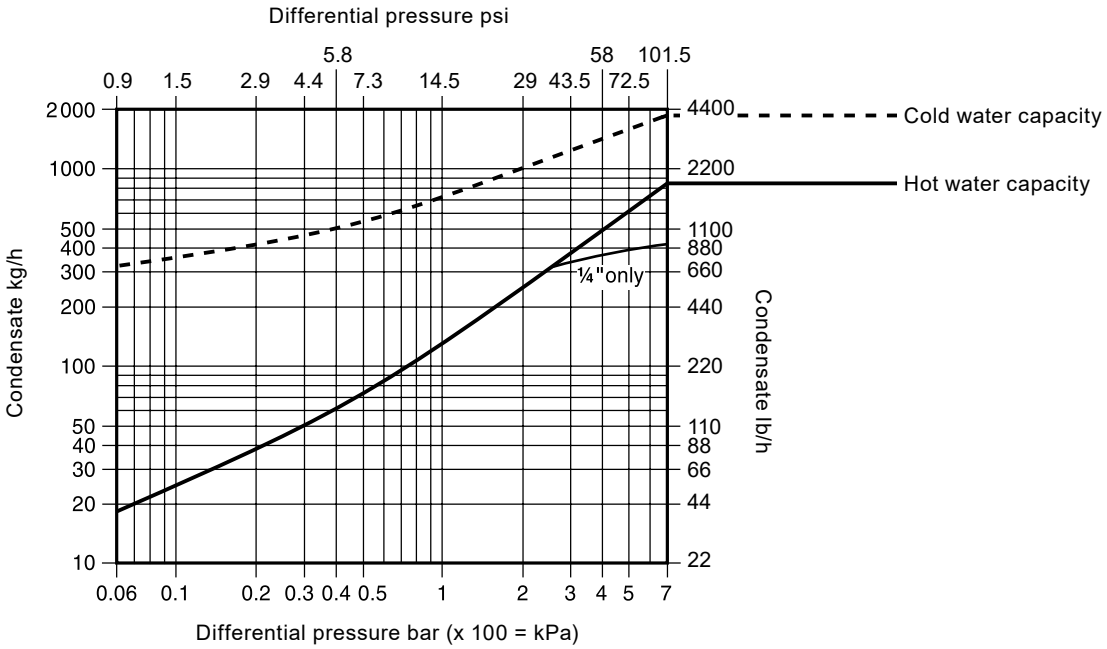


The product should not be used in this region as damage to the internals may occur.

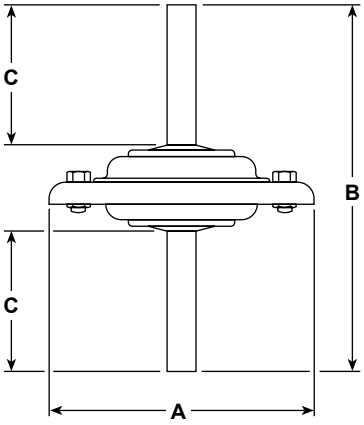
Body design conditions			PN7
PMA	Maximum allowable pressure	7 bar g @ 170 °C	101.5 psi g @ 338 °F
TMA	Maximum allowable temperature	170 °C @ 7 bar g	338 °F @
Minimum allowable temperature		-10 °C	14 °F
PMO	Maximum operating pressure for saturated steam service	7 bar g	101.5 psi g
TMO	Maximum operating temperature	170 °C	338 °F
Minimum operating temperature		0 °C	32 °F
Designed for a maximum cold hydraulic test pressure of:		10.7 bar g	155.1 psi g

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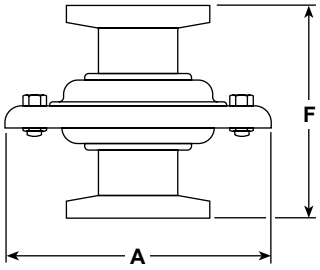
Capacities



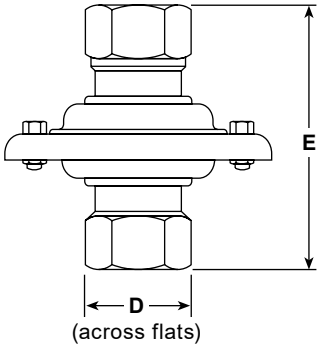
Dimensions/weights (approximate) in mm (inches) and kg (lbs)



Tube ended variant



Sanitary clamp ended variant



Screwed ended variant

Products each weigh 1 kg (2.2 lbs) maximum *

Standard	Sizes	A	B Tube	C	D Screwed	E Screwed	F Sanitary Clamp	Weight
Sanitary Clamp ended variants								
ASME BPE Types A and B, DIN32676 Series 2 + A, B, and C Variants	See Sizes and pipe connections table	71 (2.8)					49 (1.9) for DN8 to DN20, and 53 (2.0) for DN25 to DN40	1 kg * (2.2)
Tube ended variants								
DIN11866 Series A and C, DIN11850 Series 1 and 2, ISO1127 Series 1	See Sizes and pipe connections table	71 (2.8)	107 (4.2)	38 (1.5)				1 kg * (2.2)
Screw ended variants								
Socket BSP + NPT	See Sizes and pipe connections table	71 (2.8)			27 (1.0) 27 (1.0) 32 (1.2) 41 (1.6)	58 (2.3) 74 (2.9) 81 (3.2) 95 (3.7)		1 kg * (2.2)

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.

How to order

Example: 1 off Spirax Sarco DN15 BTM7 maintainable thermostatic clean steam trap with tube ends to ISO 1127, Series 1. (21.3 mm O/D x 1.6 mm wall thickness). Tangent length of tube ends to be 40 mm for ease of orbital welding. Body to be self-draining. Suitable for pressures up to 7 bar g.

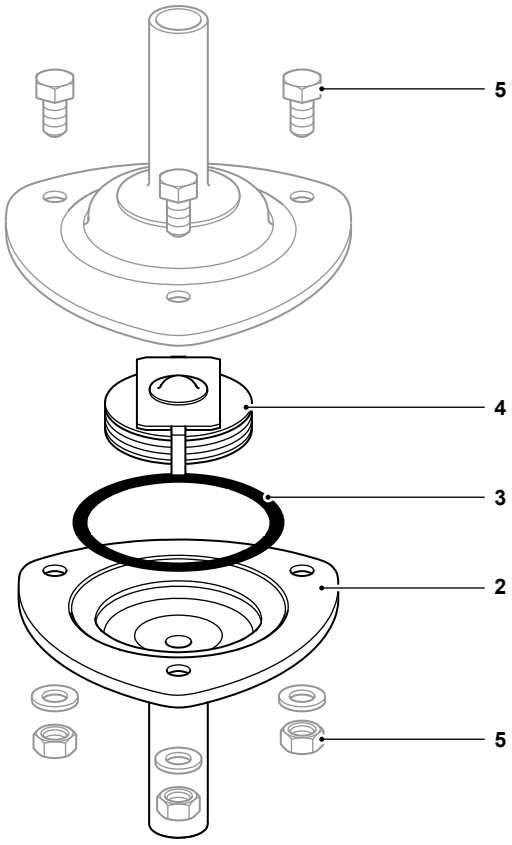
Spare parts

Available parts are shown in solid outline. Parts drawn in a grey line are not available as spares.

Available spares	
Capsule 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	Part	or mm		N m	(ft lbs)
5	Nuts and bolts	8 A/F	M5	3-4	(2.2-3)

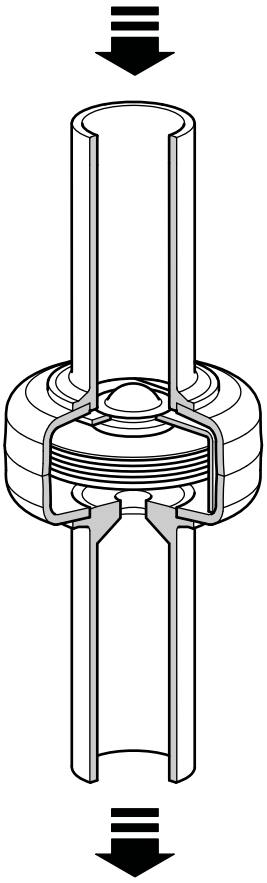
TI-P180-03
CMGT issue 13

BTS7
Balanced Pressure Thermostatic Steam Trap

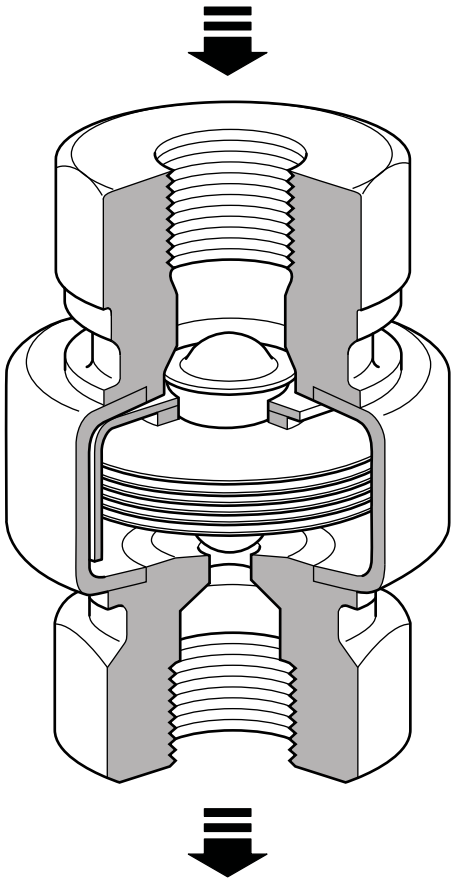
Description
The Spirax Sarco BTS7 is a sealed thermostatic steam trap designed to remove condensate from clean (chemical free) steam systems with minimal condensate retention. Applications include steam barriers, block and bleed installations, mains drainage and CIP/SIP of vessels and reactors and process lines.
Manufactured in 316L stainless steel with minimal crevises, it is self-draining and operates close to steam temperature. Each trap is individually packaged within an "ISO CLASS 7" clean environment with protective end caps and sealed in a protective plastic bag.

Options
Fixed bleed to ensure 'Fail Open' operation. Special connections to suit most piping systems.

Standards
- The BTS7 has been designed and manufactured in general accordance with ASME BPE standards.
- The unit also complies with the requirements of the EU Pressure Equipment Directive/UK Pressure Equipment (Safety) Regulations.



BTS7
Tube ended variant



BTS7
Screwed ended variant

Certification

This product is available with the following certification:

- Certificate of Compliance for FDA and ADI Free Statement - F.O.C
- TSE-BSE Statement - F.O.C.
- Declaration of Conformity BS EN ISO 14644-1:2015 Class 7 Clean Room - F.O.C.
- Typical Test Report - F.O.C.

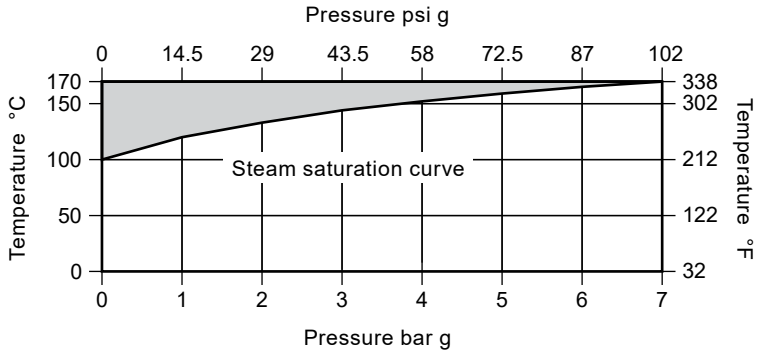
Note: All certification/inspection requirements must be stated at the time of order placement, and may be subject to additional cost as detailed above.

Sizes and pipe connections

	Standard	Issue	Type	Sizes				
Tube Ended Variants	**Imperial O/D**		16swg wall			½"	¾"	1"
	DIN 11850		Series 1		DN10	DN15		
	ISO 1127		Series 1	DN8	DN10	DN15		

	Standard	Issue	Type	Sizes				
Screwed Ended Variants	**BSP**				¼"	½"	¾"	1"
	NPT				¼"	½"	¾"	1"

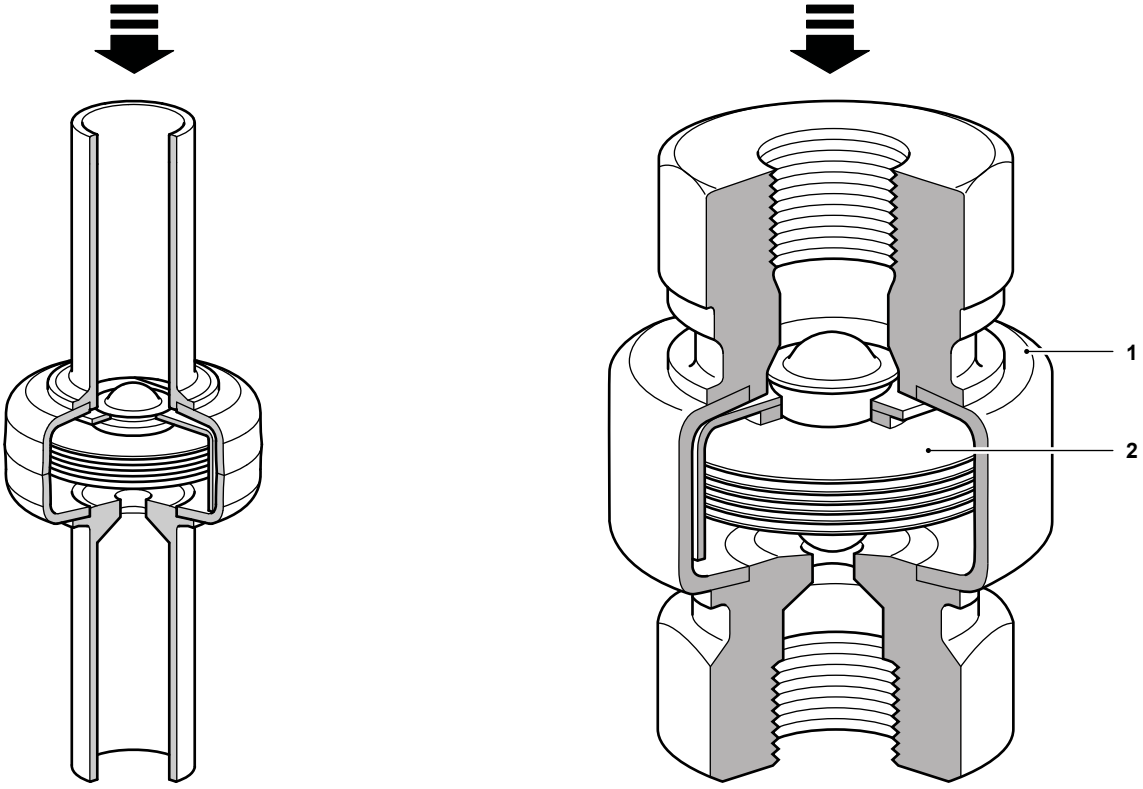
Pressure/temperature limits



The product should not be used in this region as damage to the internals may occur.

Body design conditions			PN7
PMA	Maximum allowable pressure	7 bar g @ 170 °C	102 psi g @ 338 °F
TMA	Maximum allowable temperature	170 °C @ 7 bar g	338 °F @ 102 psi g
Minimum allowable temperature		-254 °C	-425 °F
PMO	Maximum operating pressure for saturated steam service	7 bar g @ 170 °C	102 psi g @ 338 °F
TMO	Maximum operating temperature	170 °C @ 7 bar g	338 °F @ 102 psi g
Minimum operating temperature		0 °C	32 °F
Designed for a maximum cold hydraulic test pressure of:		10.5 bar g	152 psi g

Materials

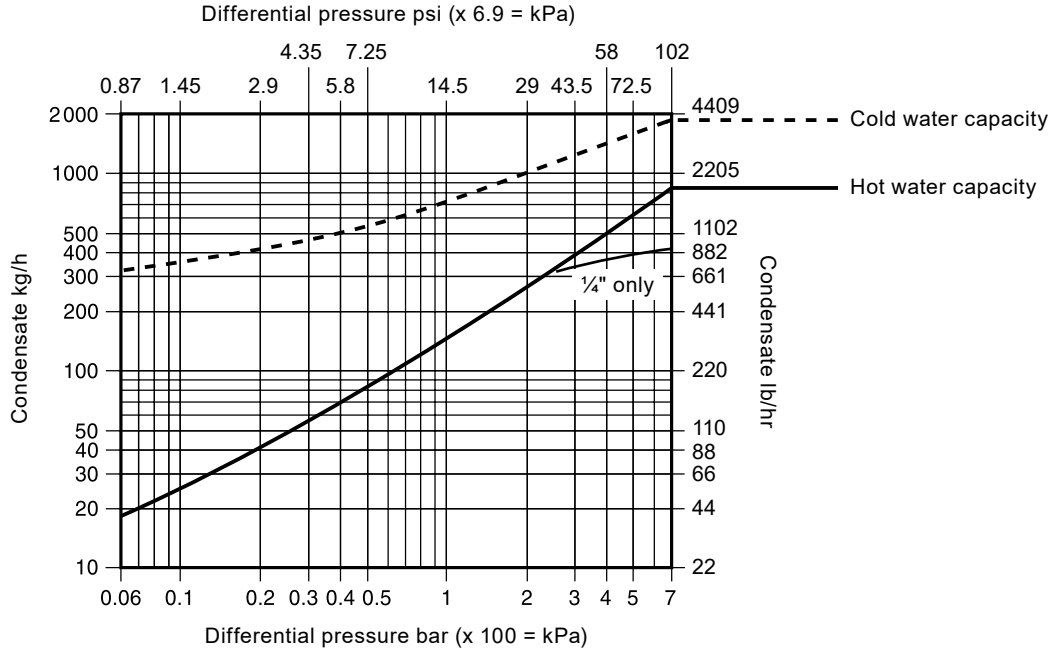


BTS7
Tube ended variant

BTS7
Screwed ended variant

No.	Part	Material	
1	Body	Stainless steel	316L (1.4404)
2	Capsule element	Stainless steel	316L (1.4404)

Capacities

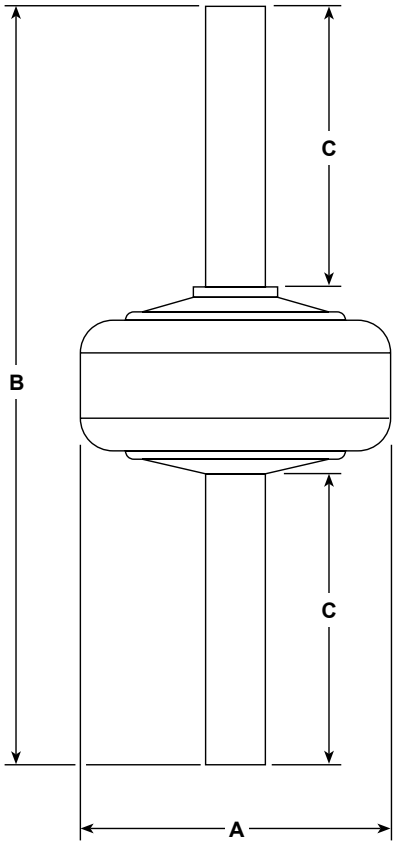


Dimensions/weights (approximate) in mm (inches) and kg (lbs)

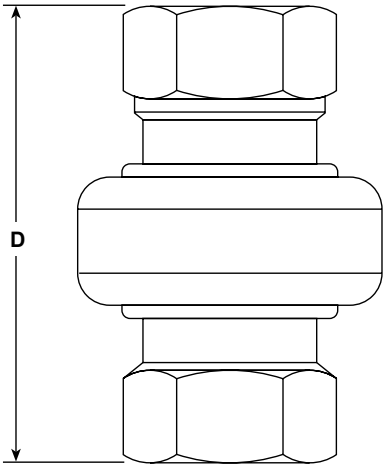
Size	A	B	C	D	Weight	
	Tube			Screwed	Tube	Screwed
¼"	40 (1.57)			58 (2.28)		0.53 (1.17)
½"		106 (4.17)	40 (1.57)	74 (2.91)	0.44 (0.97)	0.49 (1.08)
¾"				81 (3.19)	0.51 (1.12)	0.60 (1.32)
1"				95 (3.74)	0.60 (1.32)	0.73 (1.61)
DN8*					0.35 (0.77)	
DN10						
DN15					0.42 (0.93)	

*DN8 only available for ISO 1127 tube ends.

Tube



Screwed



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 DN15 BTS7 clean steam trap with tube ends to ISO 1127, Series 1. (21.3 mm O/D x 1.6 mm wall thickness). Tangent length of tube ends to be 40 mm for ease of orbital welding. Body to be self-draining. Suitable for pressures up to 7 bar g.

Spare parts

There are no spare parts for the BTS7.

TI-P180-40
CMGT Issue 11

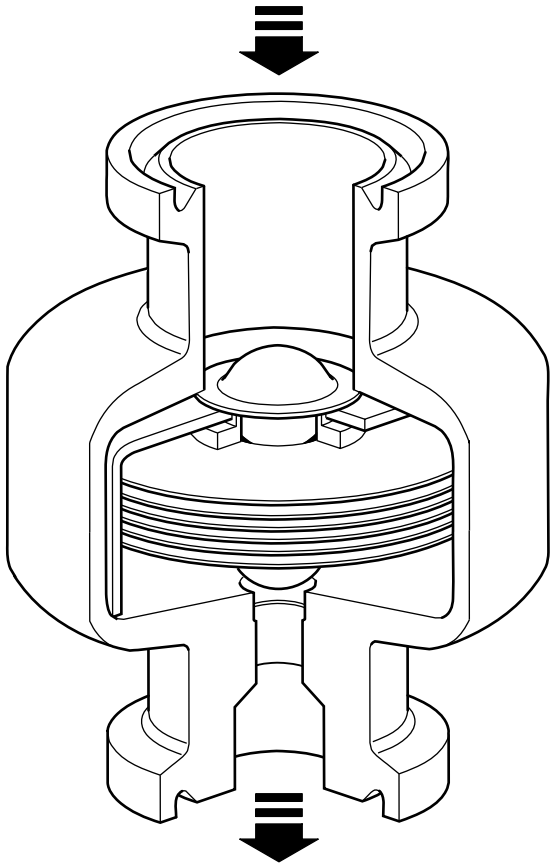
BTS7.1
Sanitary Balanced Pressure Thermostatic Steam Trap

Description

The Spirax Sarco BTS7.1 is a sealed sanitary balanced pressure thermostatic steam trap designed to remove condensate from clean (Chemical Free) 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 stainless steel with minimal crevices, it is self-draining and operates close to steam temperature.

The BTS7.1 has an internal finish of 0.5 µm Ra (20 µin Ra) whilst the external finish is 0.75 µm Ra (30 µin Ra). Each trap is individually packaged within an "ISO CLASS 7" clean environment with protective end caps and sealed in a protective plastic bag.

Designed, manufactured and approved for Steam and Condensate applications. This product complies with EC1935:2004 Food Contact Materials. It also complies with regulation EC2023:2006 on good manufacturing practice for materials and articles intended to come into contact with food.



BTS7.1
Sanitary clamp ended variant

Options

Fixed bleed to ensure 'Fail Open' operation.

Standards

- The BTS7.1 has been designed and manufactured in general accordance with ASME BPE standards.
- The unit also complies with the requirements of the EU Pressure Equipment Directive/UK Pressure Equipment (Safety) Regulations.

Certification

This product is available with the following certification:

- EN 10204 3.1 Material Certification Pressure Retaining Parts - Chargeable.
- EN 10204 3.1 Material Certification for Wetted Parts including the WFI element fill - Chargeable.
- Specific Internal Surface Finish - Chargeable.
- Typical Internal Surface Finish - F.O.C.
- Certificate of Compliance for FDA and ADI Free Statement - F.O.C
- TSE-BSE Statement - F.O.C.
- EC1935:2004 Declaration of Compliance - F.O.C.
- Declaration of Conformity BS EN ISO 14644-1:2015 Class 7 Clean Room - F.O.C.
- Typical Test Report - F.O.C.

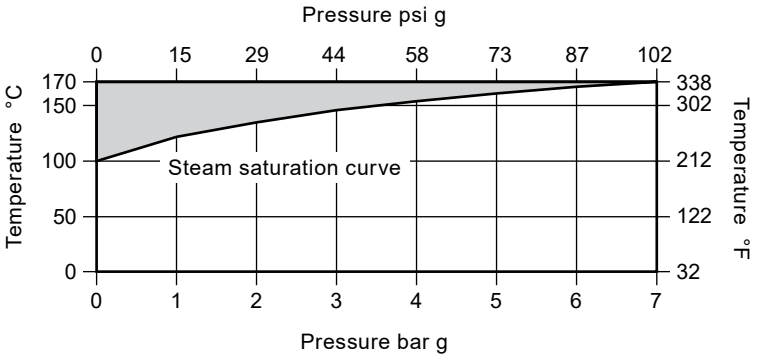
Note: All certification/inspection requirements must be stated at the time of order placement, and may be subject to additional cost as detailed above.

Sizes and pipe connections

¾" inlet and ½" outlet to ASME BPE Type A sanitary clamp connections.

The BTS7.1 trap is designed to be self draining for vertical installation (discharge down) ½" - ¾" trap should be fitted with a ¾" gasket at the inlet.

Pressure/temperature limits

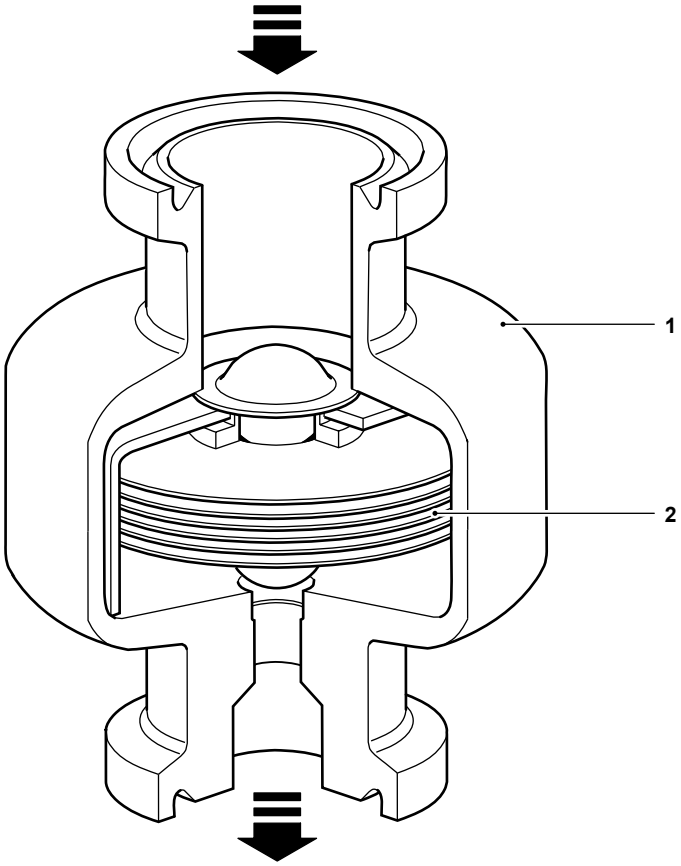


The product should not be used in this region as damage to the internals may occur.

Body design conditions			PN7
PMA	Maximum allowable pressure	7 bar g @ 170 °C	102 psi g @ 338 °F
TMA	Maximum allowable temperature	170 °C @ 7 bar g	338 °F @ 102 psi g
Minimum allowable temperature		-254 °C	-425 °F
PMO	Maximum operating pressure for saturated steam service	7 bar g @ 170 °C	102 psi g @ 338 °F
TMO	Maximum operating temperature	170 °C @ 7 bar g	338 °F @ 102 psi g
Minimum operating temperature		0 °C	32 °F
Designed for a maximum cold hydraulic test pressure of:		10.7 bar g	155 psi g

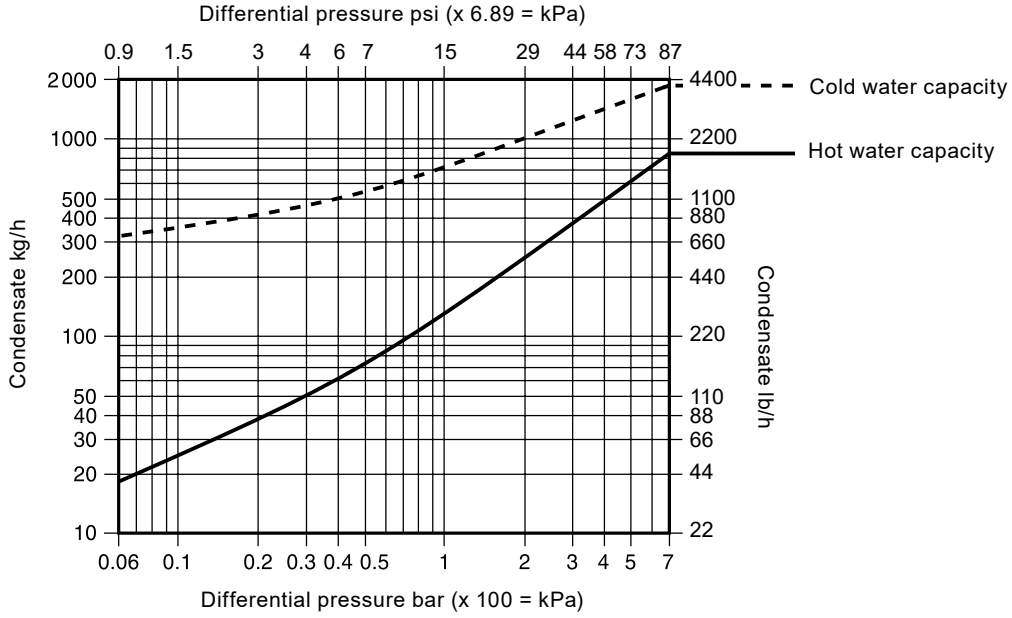
Materials

BTS7.1
Sanitary clamp ended variant

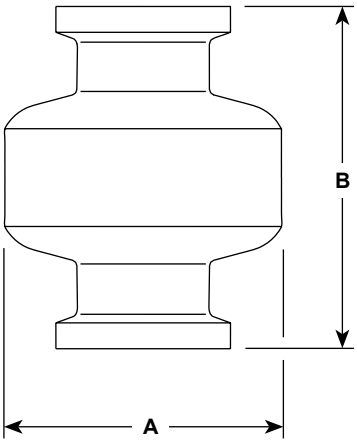


No.	Part	Material	
1	Body	Stainless steel	316L (1.4404)
2	Capsule element	Stainless steel	316L (1.4404)

Capacities



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



Size	A	B	Weight
¾" x ½"	40 (1.6)	49 (1.9)	0.15 (0.3)

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 ½" - ¾" BTS7.1 clean steam trap suitable for pressures up to 7 bar g with a body that is self-draining.

Spare parts
There are no spare parts for the BTS7.1.

TI-P181-01
CMGT Issue 10

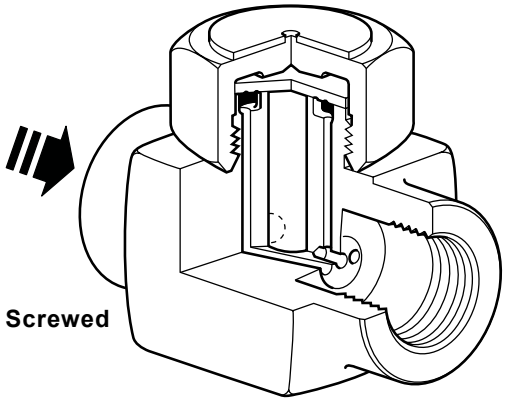
BTD52L and BTD52L Food+ Thermodynamic Steam Trap

Description

The BTD52L is manufactured from 316L stainless steel specifically for mains drainage applications in clean steam systems.

BTD52L Food+

Designed, manufactured and approved for Steam and Condensate applications. This product complies with EC1935:2004 Food Contact Materials. It also complies with regulation EC2023:2006 on good manufacturing practice for materials and articles intended to come into contact with food. A list of the materials that could come directly or indirectly into contact with foodstuffs can be found in the Declaration of Compliance available for this product.



Standards

These products fully comply with the requirements of the EU Pressure Equipment Directive/UK Pressure Equipment (Safety) Regulations.

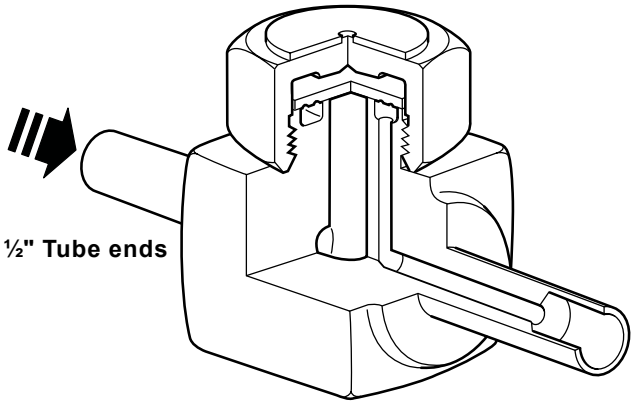
Certification

- 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

- The BTD52L Food+ is available with an EC1935:2004 Declaration of Compliance.

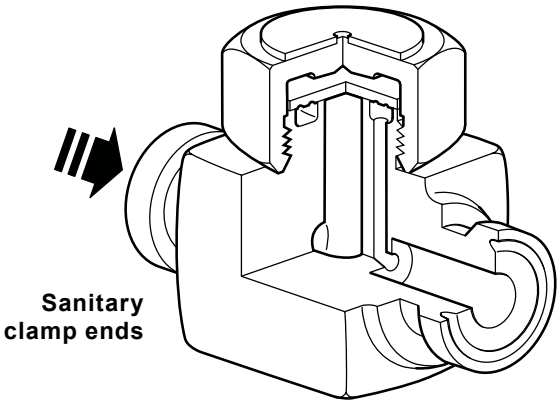
Note: All certification/inspection requirements must be stated at the time of order placement



BTD52L Food+ ½" range available with a food contact regulation Declaration of Compliance

Designed, manufactured and approved for Steam and Condensate applications, the BTD52L Food+ product complies with:

- (EC)1935:2004 Materials and Articles Intended to come into Contact with Food
- (EC)2023:2006 Good Manufacturing Practice for Materials and Articles Intended to come into Contact with Food
- (EU)10/2011 Plastic Materials and Articles Intended to come into Contact with Food
- FDA Code of Federal Regulations - title 21 - Food and Drugs



Optional extras

An insulating cover is available at extra cost to prevent the trap being unduly influenced by excessive heat loss when subjected to low ambient temperature, wind and rain etc.

Sizes and pipe connections

BTD52L Food+ is available with ½" Sanitary Clamps and ½" BSP.

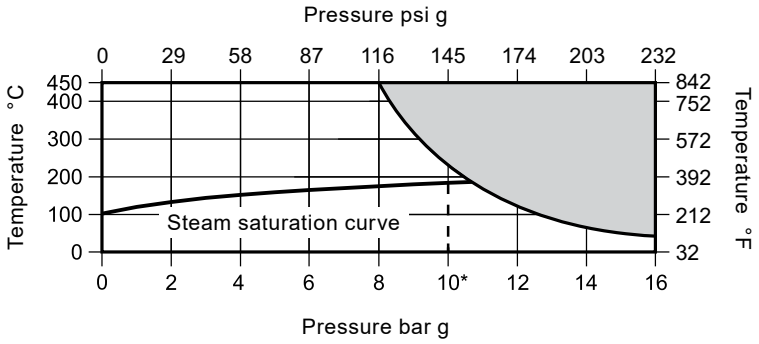
¼", ⅜", ½" screwed BSP or NPT.
½" O/D x 16 swg (0.065") wall thickness tube end.

DN 11850 (Series 1) tube ends
12 mm O/D x 1.0 mm wall thickness (DN10) / (⅜")
18 mm O/D x 1.0 mm wall thickness (DN15) / (½")

ISO 1127 (Series 1) tube ends
17.2 mm O/D x 1.6 mm wall thickness (DN10) / (⅜")
21.3 mm O/D x 1.6 mm wall thickness (DN15) / (½")

½" **Sanitary clamp compatible connections** (DN15)

Pressure / temperature limits

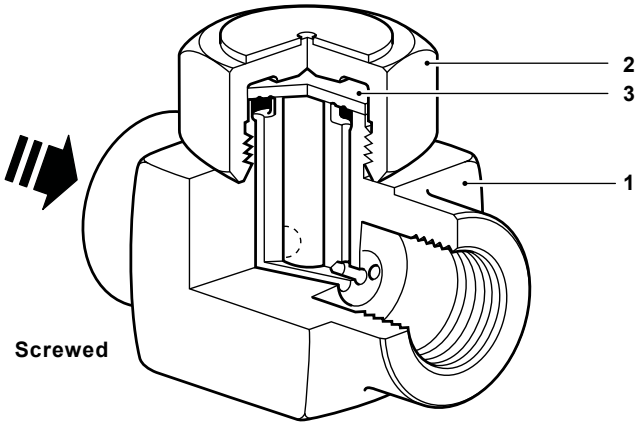


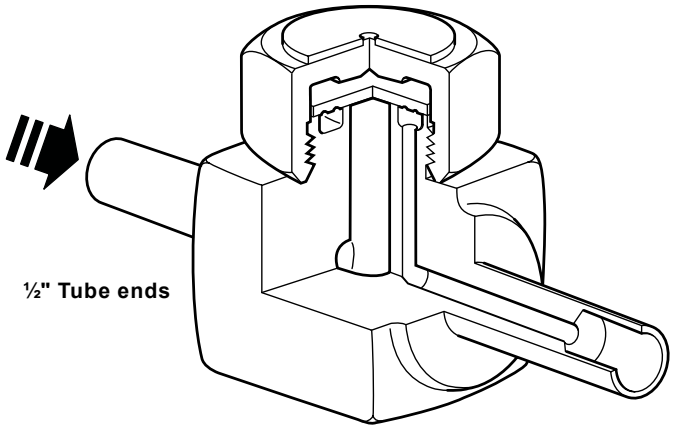
The product **must not** be used in this region.

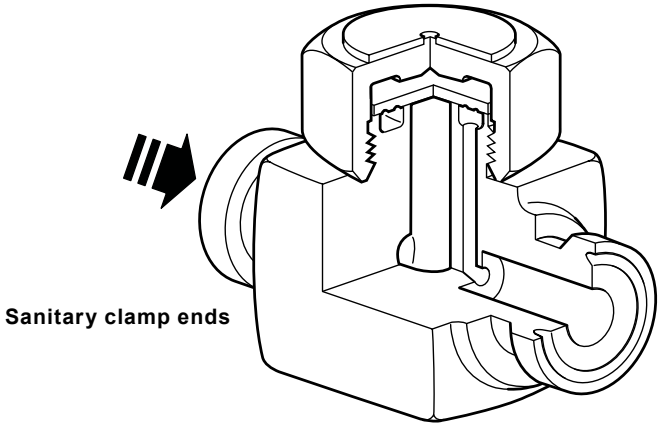
6.1
30

Body design conditions			PN16
PMA	Maximum allowable pressure	16 bar g @ 50 °C	232 psi g @ 122 °F
TMA	Maximum allowable temperature	450 °C @ 8 bar g	842 °F @ 116 psi g
Minimum allowable temperature		0 °C	32 °F
PMO *	Maximum operating pressure recommended for steam service	10 bar g @ 220 °C	145 psi g @ 428 °F
TMO	Maximum operating temperature	450 °C @ 8 bar g	842 °F @ 116 psi g
Minimum operating temperature		0 °C	32 °F
Note: For lower operating temperatures consult Spirax Sarco			
PMOB	Maximum operating backpressure should not exceed 80% of the upstream pressure		
Minimum operating differential pressure for satisfactory operation		0.25 bar g	3.63 psi g
Designed for a maximum cold hydraulic test pressure of:		24 bar g	348 psi g

Materials





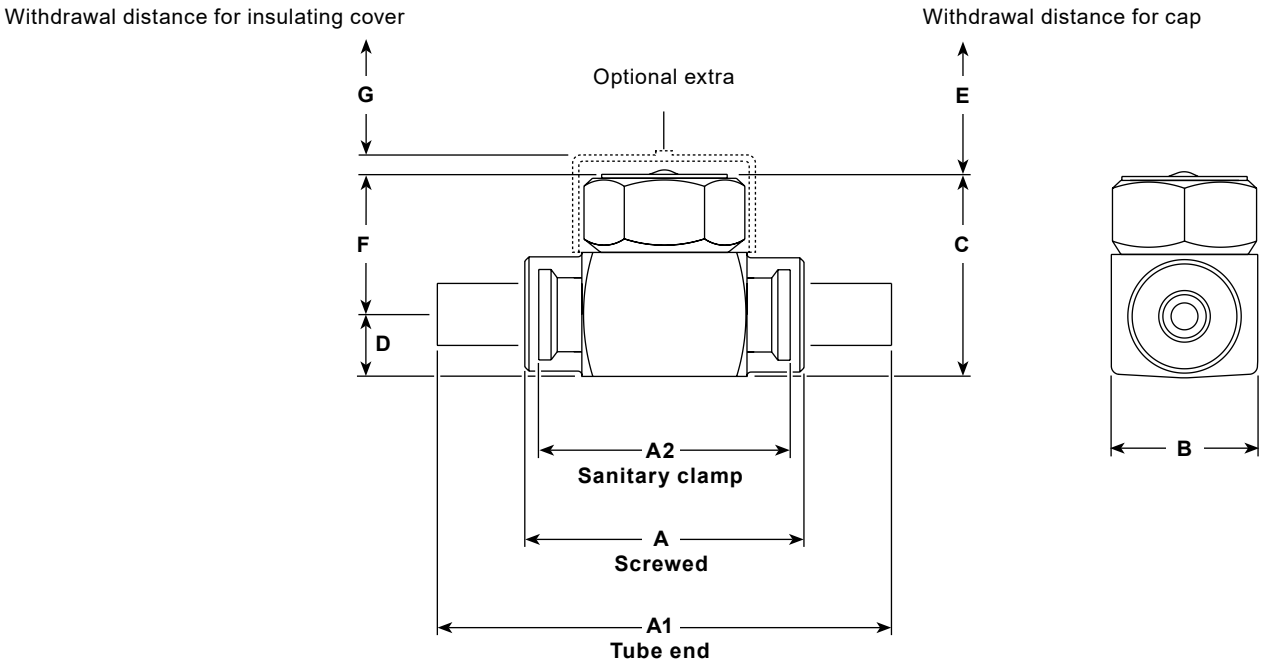


No.	Part	Material	
1	Body	Austenitic stainless steel	AISI 316L
2	Cap	Austenitic stainless steel	AISI 316L
3	Disc	Austenitic stainless steel	AISI 316L
4 **	Insulating cover (optional extra)	Aluminium	

** **Note:** For clarity item **4** is shown page 5.

Note: The BTD52L Food+ version comes with a Laser Marked cap, not a nameplate.

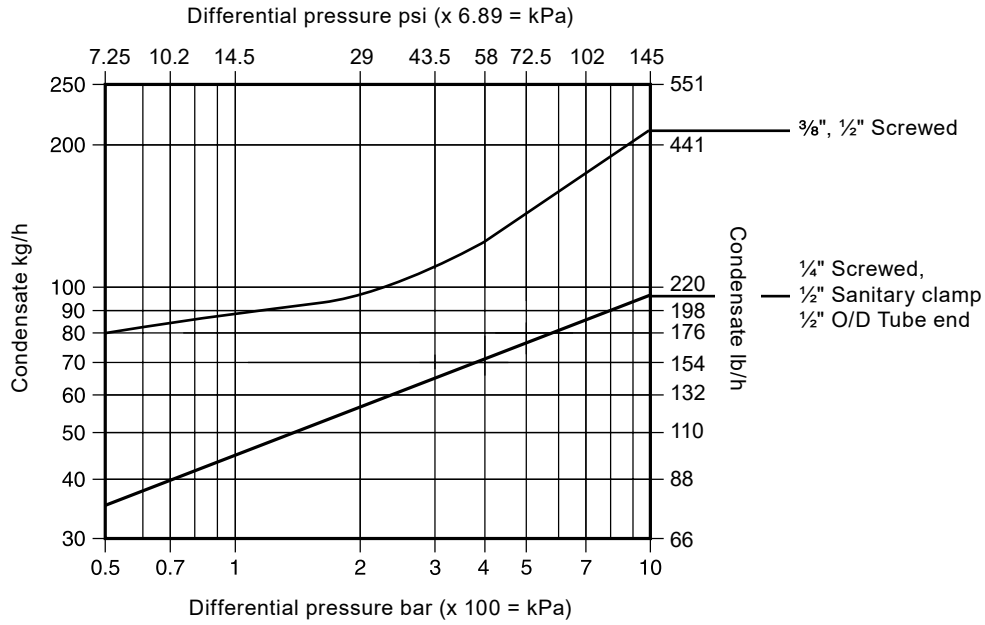
Dimensions/weights (approximate) in mm (inches) and kg (lbs)



Size		Dimensions								
		A	A1	A2	B	C	D	E	F	G
All sizes	Sanitary clamp BSP or NPT	65 (2.56)		65 (2.56)	36 (1.42)	53 (2.09)	15 (0.59)	40 (1.57)	38 (1.50)	38 (1.50)
	Tube ends		123 (4.84)			51 (2.01)	14 (0.55)		37 (1.46)	

Size		Weights		
		Screwed	Tube Ends	Sanitary clamp
All sizes	Sanitary clamp BSP or NPT	0.45 (0.99)		0.55 (1.21)
	Tube ends		0.45 (0.99)	

Capacities



Safety information, installation and maintenance

For full details see the Installation and Maintenance Instructions (IM-P181-03) supplied with the product.
The trap should preferably be installed in the horizontal plane, with a small drop leg preceding it. For freeze proof installation, or where horizontal fitting is not possible, the BTD52L may be installed vertically, but the service life may be affected. Suitable isolation valves must be installed to allow for safe maintenance and trap replacement.
When the trap discharges into a closed return system, a non-return valve should be fitted downstream to prevent return flow.

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 BTD52L thermodynamic steam trap in 316L stainless steel with tube ends 17.2 mm O/D x 1.6 mm wall thickness (ISO 1127, Series 1).

Spare parts

The spare parts available are shown in heavy outline. Parts drawn in a grey line are not supplied as spares.

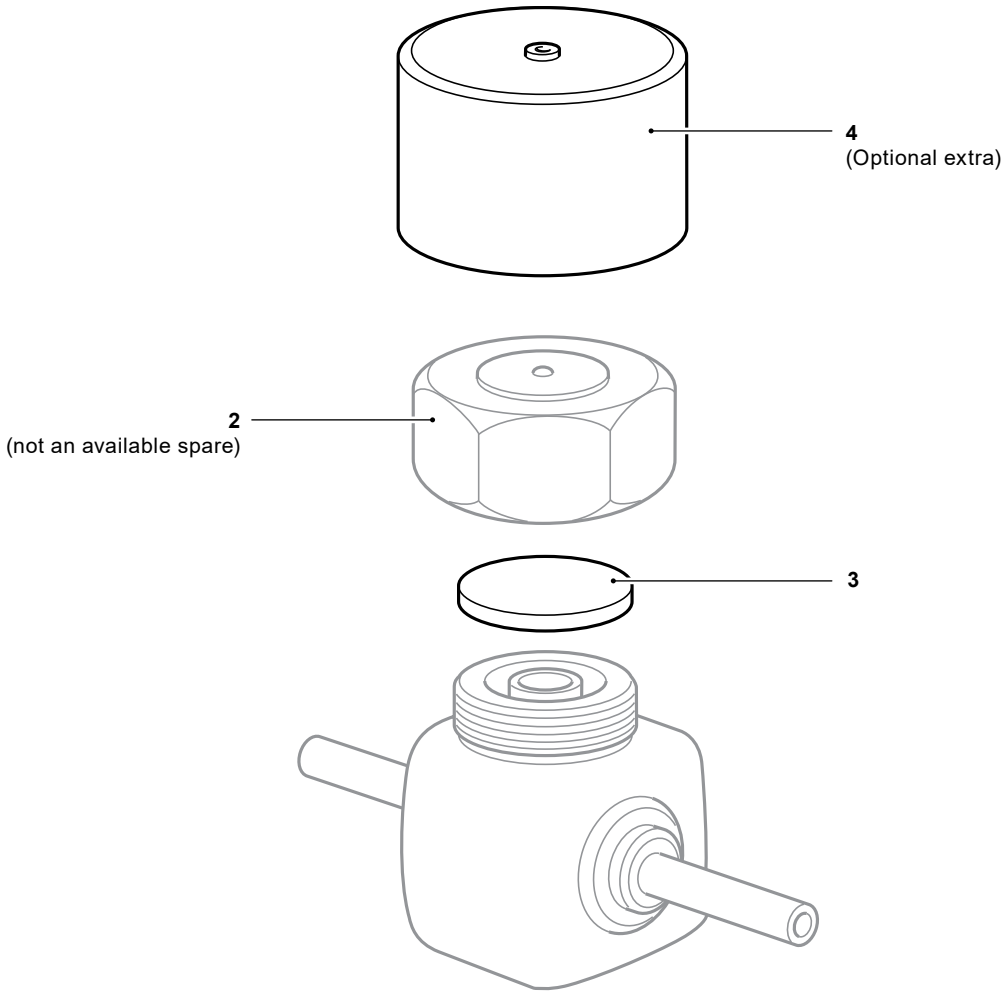
Available spares	
Disc	3
Insulating cover	4

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 trap.

Example:

1 - Disc for a ½" BSP Spirax Sarco BTD52L thermodynamic steam trap.



Recommended tightening torques

Warning: When torquing or untorquing the cap, some support should be given to the body of the trap to prevent over stressing and/or distortion of the end connections and system pipework.

Item	or mm	N m	ft lbf
2	36 A/F	115 - 130	85 - 96

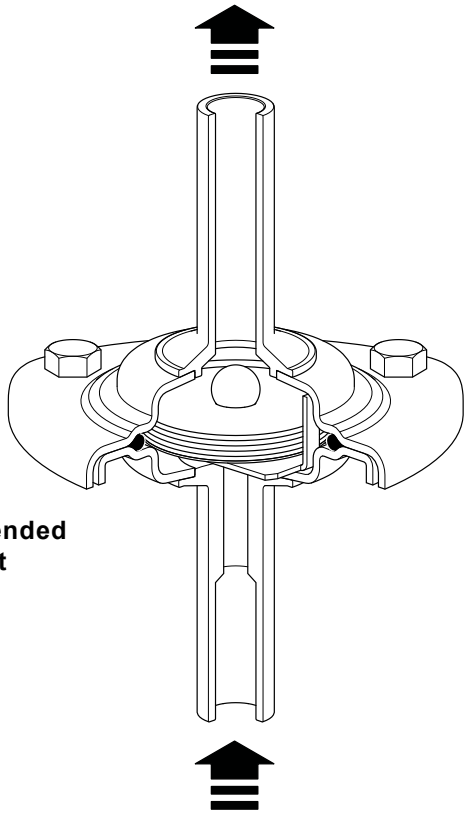
TI-P123-22
CMGT Issue 14

AVM7 and AVM7 Food+ Balanced Pressure Thermostatic Air Vent

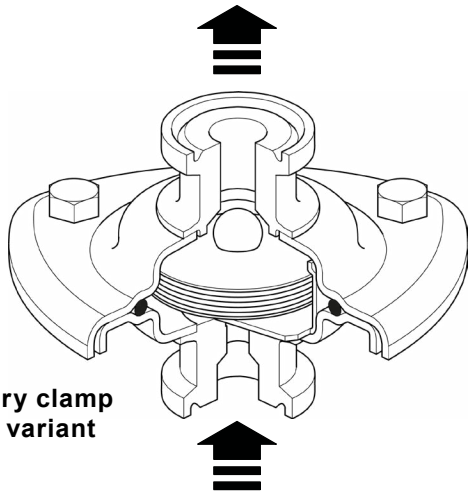
Description

AVM7
The AVM7 is a clean (chemical-free) maintainable thermostatic air vent designed to remove air and other non-condensible gases from clean steam systems. Manufactured in 316L stainless steel with minimal crevices, and a typical internal surface finish of 1.6 - 3.2 µm (63 - 126 µin) Ra the AVM7 operates close to steam temperature. Each trap is individually packaged within an 'ISO CLASS 7' clean environment with protective end caps and sealed in a protective plastic bag.

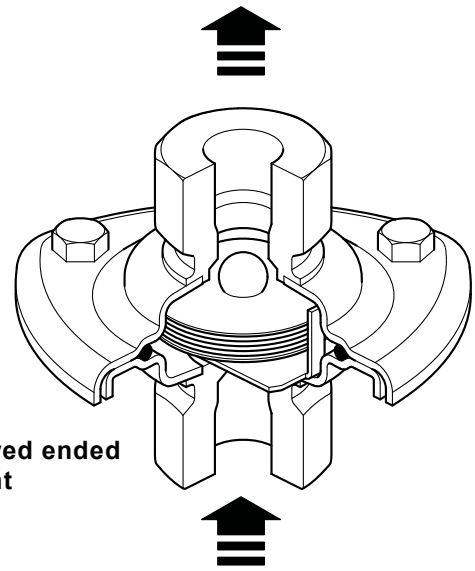
AVM7 Food+
Designed, manufactured and approved for Steam and Condensate applications. This product complies with EC1935:2004 Food Contact Materials. It also complies with regulation EC2023:2006 on good manufacturing practice for materials and articles intended to come into contact with food. A list of the materials that could come directly or indirectly into contact with foodstuffs can be found in the Declaration of Compliance available for this product.



Tube ended variant



Sanitary clamp ended variant



Screwed ended variant

Options and available types
Special connections to suit most piping systems.

Standards

- The AVM7 has been designed and manufactured general accordance with ASME BPE standards.
- The unit also complies with the requirements of the EU Pressure Equipment Directive / UK Pressure Equipment (Safety) Regulations.
- FDA CFR Title 21. Paragraph 177. 2600.
- USP Class VI Biological Reactivity Cytotoxicity Testing In-Vivo <88> extracted at 121 °C (250 °F) for 1 hour.
- ADI Free (Animal Derived Ingredients) for materials used, manufacturing processes involved in producing the part.
- TSE/BSE Free as Certified.
- Full material lot number product traceability.

Certification

This product is available with the following certification:

- EN 10204 3.1 Material Certification Pressure Retaining Parts - Chargeable.
- EN 10204 3.1 Material Certification for Wetted Parts including the WFI element fill (also available for element spares) - Chargeable.
- Typical Internal Surface Finish - F.O.C.
- Certificate of Compliance for FDA, USP Class VI Testing Statement, and ADI Free Statement - F.O.C.
- TSE-BSE Statement - F.O.C.
- EC1935:2004 Declaration of Compliance - F.O.C. (Food+ range only)
- (EC)2023:2006 Good Manufacturing Practice for Materials and Articles Intended to come into Contact with Food.
- Declaration of Conformity BS EN ISO 14644-1:2015 Class 7 Clean Room - F.O.C.
- Typical Test Report - F.O.C.

Note: All certification/inspection requirements must be stated at the time of order placement, and may be subject to additional cost as detailed above.

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Sizes and pipe connections

Sanitary Clamp Ended Variants

Standard	Issue	Type	Sizes				
ASME BPE		Type A			½"	¾"	
ASME BPE		Type B					1"

Tube Ended Variants

Standard	Issue	Type	Sizes				
Imperial		Wall 16 swg			½"	¾"	1"
DIN11850	1999-01	Series-2		DN10	DN15		DN25
ISO1127	1997	Series 1	DN8	DN10	DN15		

Screwed Ended Variants

Standard	Issue	Type	Sizes				
Socket BSP Socket NPT				¼"	½"	¾"	1"

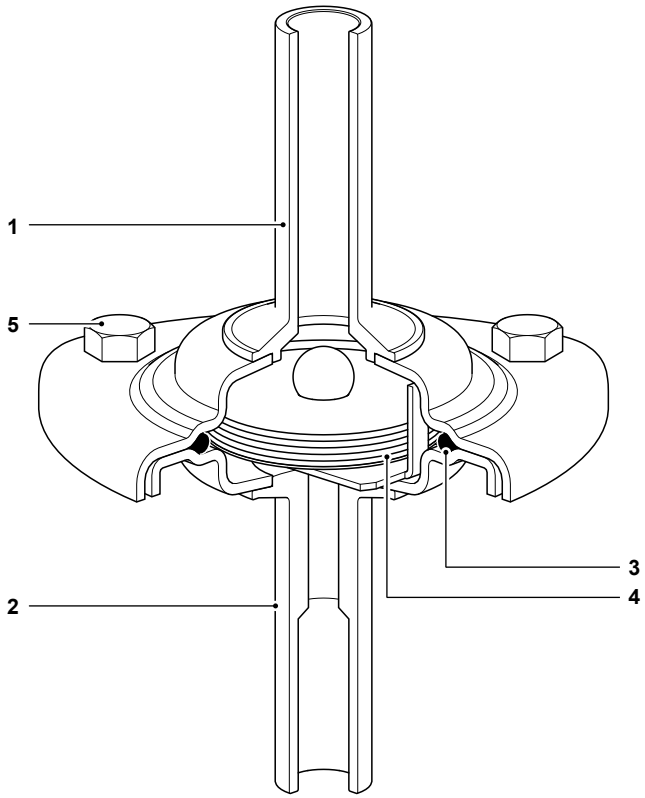
Notes

1. On request other connection options are available at extra cost.
2. Please note that seat end spares for specially requested connections will require a minimum order quantity - Please consult Spirax Sarco for further information.
3. AVM7 Food+ is available with ½" BSP and ¾" BSP connections.

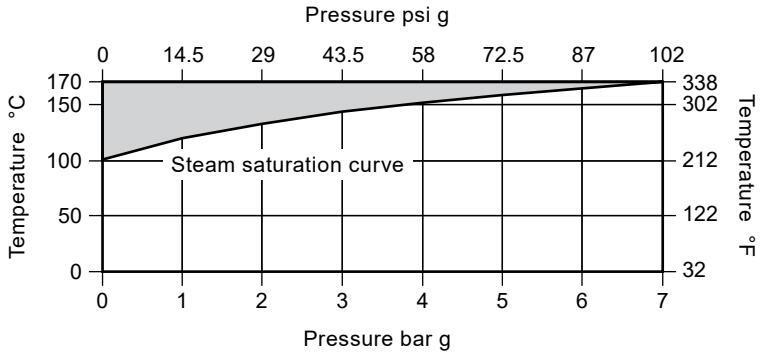
Materials

No.	Part	Material	
1	Body (outlet)	Stainless steel	316L (1.4404)
2	Body with seal (inlet)	Stainless steel	316L (1.4404)
3	'O' ring	FKM	
4	Capsule element	Stainless steel	316L (1.4404)
5	Nuts and bolts	Stainless steel	BS 6105 Gr. A4 80
	Washers	Austenitic stainless steel	

Tube Ended Variant



Pressure/temperature limits (ISO 6552)

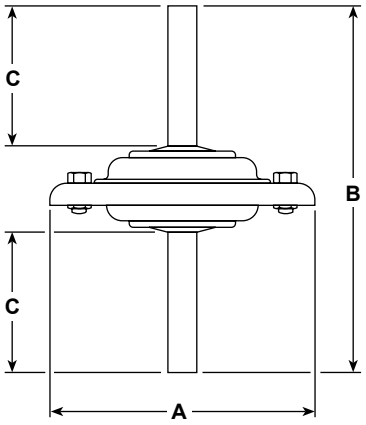


The product should not be used in this region as damage to the internals may occur.

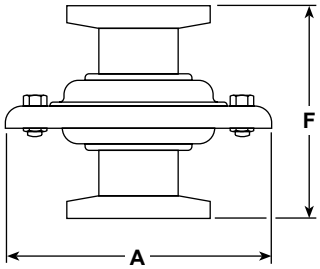
Body design conditions			PN7
PMA	Maximum allowable pressure	7 bar g @ 170 °C	102 psi g @ 338 °F
TMA	Maximum allowable temperature	170 °C @ 7 bar g	338 °F @ 102 psi g
Minimum allowable temperature		-10 °C	14 °F
PMO	Maximum operating pressure for saturated steam service	7 bar g	102 psi g
TMO	Maximum operating temperature	170 °C	338 °F
Minimum operating temperature		0 °C	32 °F
Designed for a maximum cold hydraulic test pressure of		10.7 bar g	155 psi g

Dimensions/weights (approximate) in mm (inches) and kg (lbs)

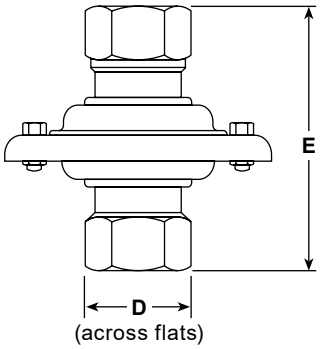
Products each weigh 1kg (2.20 lb) maximum



Tube ended variant



Sanitary clamp ended variant



Screwed ended variant

Standard	Sizes	A	B Tube	C Tube	D Screwed	E Screwed	F Sanitary Clamp
Sanitary Clamp ended variants							
ASME BPE Types A & B	½", ¾" and 1"	70 (2.76)					49 (1.93) for ½" and ¾", 53 (2.09) for 1"
Tube ended variants							
Imperial 16 swg, DIN11850 Series 2, ISO1127 Series 1	Imperial = ½", ¾" and 1" DIN/ISO = DN8 ISO (1127 only), DN10, DN15	70 (2.76)	106 (4.17)	40 (1.57)			
Screw ended variants							
Socket BSP + NPT	¼", ½", ¾" and 1"	70 (2.76)			27, 27, 32, 41 (1.06, 1.06, 1.26, 1.61)	58, 74, 81, 95 (2.28, 2.91, 3.19, 3.74)	

Safety information, installation and maintenance

For full details see the Installation and Maintenance Instructions (IM-P123-23) supplied with the product.

Installation note:

The unit is designed for installation in vertical lines with the flow upwards 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.

How to order

Example: 1 off Spirax Sarco DN15 AVM7 maintainable thermostatic clean steam air vent with tube ends to ISO 1127, Series 1. (21.3 mm O/D x 1.6 mm wall thickness). Tangent length of tube ends to be 40 mm for ease of orbital welding. Body to be self-draining. Suitable for pressures up to 7 bar g (101 psi g).
Material certification to EN 10204 3.1.

Spare parts

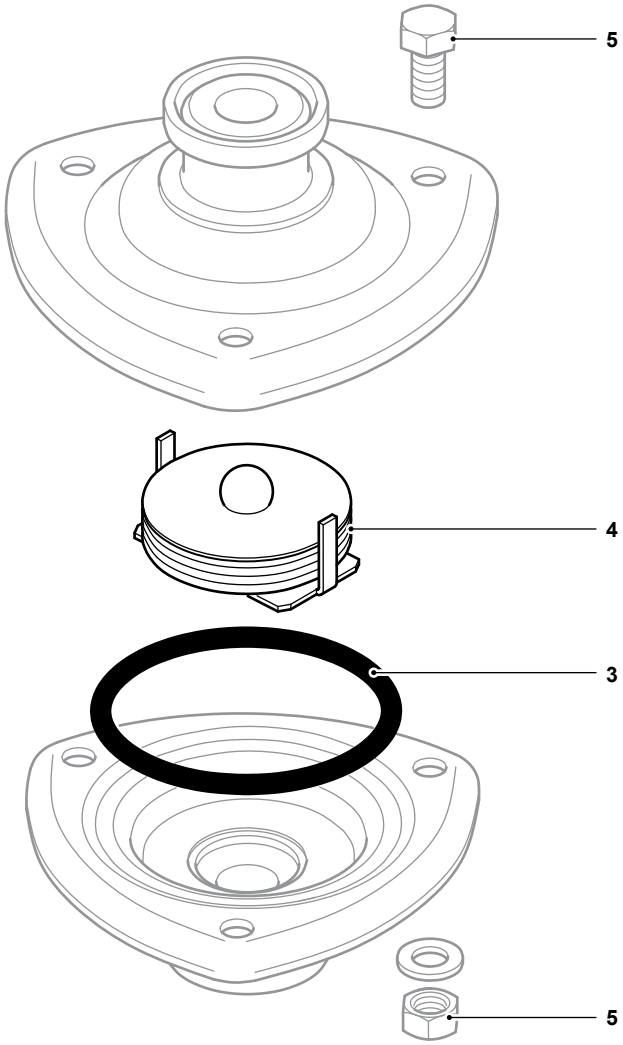
Available parts are shown in solid outline. Parts drawn in a grey line are not available as spares.

Available spares

Element assembly	**4**
'O' ring (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, type and end connection of the trap.
Example: 1 off Element assembly for a Spirax Sarco ½" AVM7 thermostatic clean steam air vent having screwed NPT connections.



Recommended tightening torques

Item	Part	or mm		N m	ft lbf
5	Nuts and bolts	8 A/F	M5	3 - 4	2 - 3

TI-P186-08
CTLS Issue 19

SRV66
Sanitary Pressure Reducing Valve

Description
The SRV66 is an angle pattern self-draining sanitary pressure regulating valve of all 316L type stainless steel construction suitable for use on steam, water and inert industrial gases. It is available with sanitary clamp compatible connections, requires no external pressure sensing line and has clean in place (CIP) and sterilise in place (SIP) capability.
Typical applications include: Clean steam, gas and liquid supplies to bioreactors, centrifuges, freeze dryers, sterilisers, autoclaves, process tanks, humidifiers and culinary equipment.

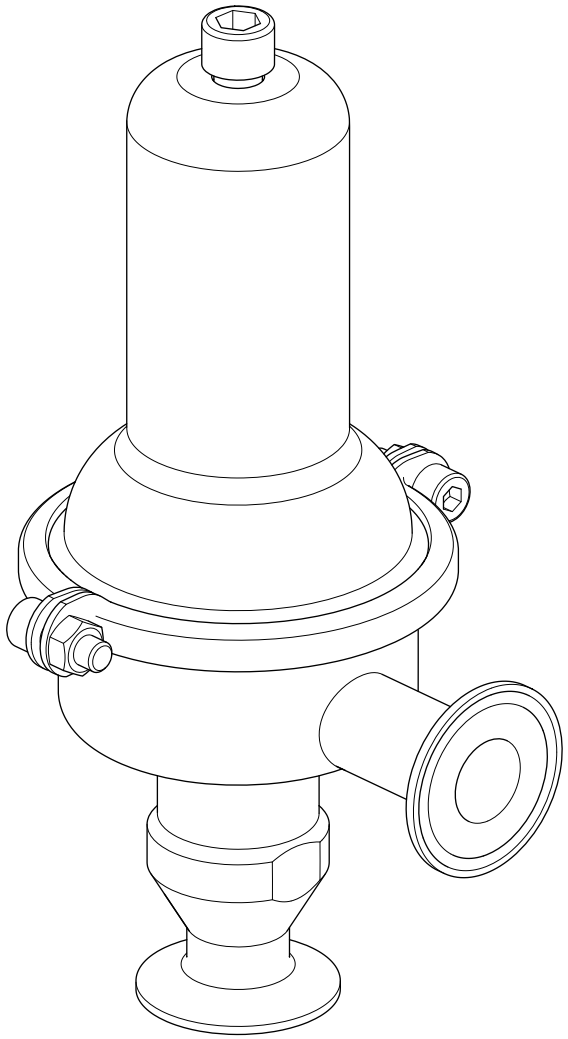
Valve tightness
Valve tightness is in accordance with EN 60534-4 (leakage rate III for metal sealing and leakage rate V for soft sealing).

Standard surface finish
Internal wetted parts - Ra < 3.2 µm (126 µin).

Available options, supplied on request at extra cost:

Polished version	For food, pharmaceutical and superclean applications with surface roughness: Ra ≤ 0.25, 0.4 or 0.8 µm (9.8, 15.7, or 31.4 µin)
Viton (FEPM)	Elastomer soft seat
Special connections	Aseptic
	ASME BPE clamps
	ASME or JIS flanges
	DIN32676 clamps

Note: Other connections / constructions available upon request and media wetted metal parts made of 1.4435 for higher resistance to corrosion



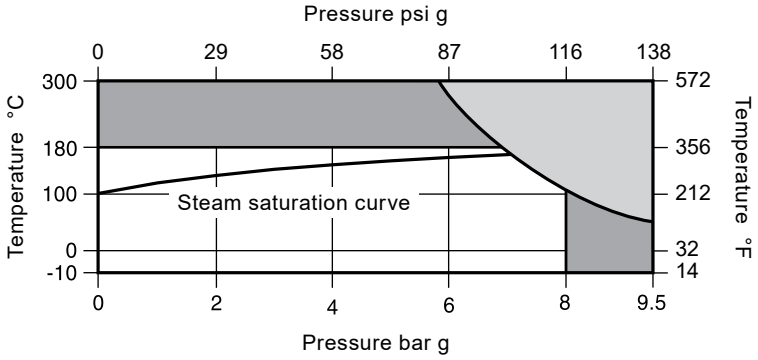
Certification options
The following are available at an additional cost:

- EN10204 3.1 Documentation Pack
- Approvals for FDA USP Class VI 121°C, silicone free, oil and grease free, ADI free
- Surface roughness certificate for wetted metal surfaces

Note: All certification/inspection requirements must be stated at the time of order placement.

Sizes and connections
DN15, DN20, DN25, DN32, DN40, and DN50 (½", ¾", 1", 1¼", 1½", and 2")

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.

Body design conditions	Inlet	PN10
	Outlet	see 'Pressure setting range' below
Maximum design pressure	9.5 bar @ 50 °C	(138 psi g @ 122 °F)
Maximum design temperature	300 °C @ 5.8 bar	(572 °F @ 84 psi g)
Minimum design temperature	-10 °C	(14 °F)
Maximum operating temperature	180 °C	(356 °F)
Maximum operating pressure (inlet)	8 bar g	(116 psi g)
Minimum operating temperature	-10 °C	(14 °F)
Designed for a maximum cold hydraulic test pressure of:	15.2 bar g	(220 psi g)

6.1

42

Pressure setting range

Size		**DN15 - DN50 (½" - 2")**	
Inlet/outlet rating	PN10/PN2.5	PN10/PN6	PN10/PN10
Spring range	0.3 - 1.1 bar g (4.4 - 16.0 psi g)	0.8 - 2.5 bar g (11.6 - 36.3 psi g)	1.0 - 5.0 bar g (14.5 - 72.5 psi g)
Maximum permitted outlet pressure = 1.5 times maximum set pressure			

Kv values

To maximise the control accuracy (especially for large load variations) use the Kv values given at 20% offset. For safety valve sizing use the maximum Kv values.

Valve Size	**DN15**		**DN20**		**DN25**		**DN32**		**DN40**		**DN50**	
	Standard	**Reduced**	**Standard**	**Reduced**	**Standard**	**Reduced**	**Standard**	**Reduced**	**Standard**	**Reduced**	**Standard**	**Reduced**
Kv at 20% offset	1.6	0.7	2.4	0.7	3.2	0.7	4		4.8		5.6	
Maximum Kv	2	0.9	2	0.9	4	0.9	5		6		7	

For conversions:
CV (UK) = KV x 0.963
CV (US) = KV x 1.156

Sizing

The required K_V can be calculated from the following formulae:

where:

$\dot{m}_s$ = Steam mass flow (kg/h)

$\dot{V}$ = Liquid volume flow (m^3/h)

$\dot{V}_g$ = Gas flow at standard conditions: 0 °C @ 1.013 bar a (m^3/h)

P_1 = Upstream pressure (bar absolute)

P_2 = Downstream pressure (bar absolute)

$\chi = \frac{P_1 - P_2}{P_1}$ (pressure drop factor)

S = Specific gravity

T = Absolute average gas temperature (Kelvin = °C + 273)

Steam	Critical pressure drop: $P_2 \leq 0.58\ P_1$ $Kv = \frac{\dot{m}_s}{12\ P_1}$
	Non-critical pressure drop: $P_2 \geq 0.58\ P_1$ $Kv = \frac{\dot{m}_s}{12\ P_1 \sqrt{1 - 5.67\ (0.42 - \chi)^2}}$
Gas	$Kv = \frac{\dot{V}_g}{287} \sqrt{\frac{ST}{(P_1 - P_2)(P_1 + P_2)}}$
Liquid	$Kv = \dot{V} \sqrt{\frac{S}{P_1 - P_2}}$

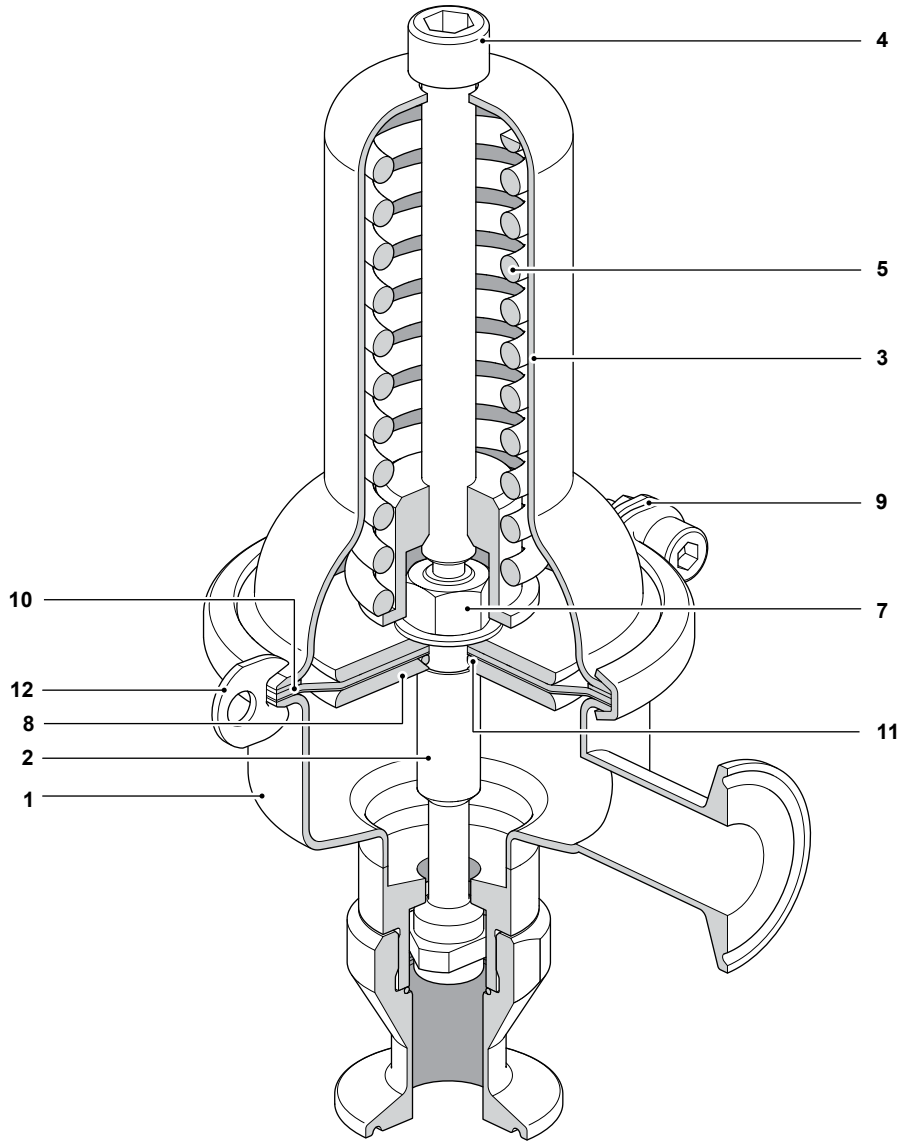
Calculating the Kv and selecting a suitable valve

Using your maximum flowrate and smallest differential pressure ($P_1 - P_2$), calculate the required Kv from one of the above formulae. Select a valve Kv that is 30% greater than the calculated Kv. The optimum working range of the selected valve should ideally be within the range of 10 to 70% of its Kv value.

Recommended fluid velocities

Steam	Saturated	10 to 40 m/s (32.8 to 131.2 ft/s)
	Superheated	15 to 60 m/s (49.2 to 196.9 ft/s)
Gas	up to 2 bar g (29 psi g)	2 to 10 m/s (6.6 to 32.8 ft/s)
	above 2 bar g (29 psi g)	5 to 40 m/s (16.4 to 131.2 ft/s)
Liquids		1 to 5 m/s (3.28 to 16.4 ft/s)

Materials



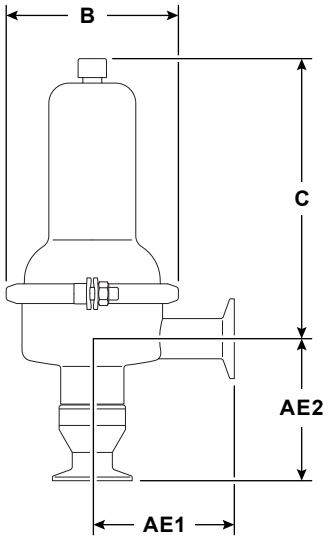
No.	Part	Material	
1 *	Body (integral seat)	Stainless steel	1.4404 (316L)
2 *	Main valve	Stainless steel	1.4404 (316L)
3	Spring housing	Stainless steel	1.4404 (316L)
4	Adjustment screw	Stainless steel	BS 6105 A4 70
5	Spring	Stainless steel	1.4301 (304)
6	Spring clip (not listed)	Stainless steel	1.4301 (304)
7	Diaphragm nut	Stainless steel	BS 6105 A4 70
8 *	Diaphragm plate	Stainless steel	1.4404 (316L)
9	'V' band clamp	Stainless steel	1.4404 (316L)
10	Diaphragm	FPM (Viton)/ PTFE	
11	'O' ring	PTFE	
12	'V' band clamp screw	Stainless steel	BS 6105 A4 70

* **Note**: Material can be optionally ordered with 1.4435 on No. 1, 2 and 8.

Dimensions (approximate) in mm

Setting bar range	Size	Nominal diameter DN					
		15	20	25	32	40	50
0.8 - 2.5 1 - 5	AE1*	90	90	90	120	120	120
	AE2*	90/100/110 **		90	120	120	120
	C	200	200	200	200	200	200
	D	138	138	138	138	138	138
0.3 - 11	AE1*	120	120	120	120	120	120
	AE2*	120/140 **			120	120	120
	C	200	200	200	200	200	200
	D	200	200	200	200	200	200

* Overall length tolerances in accordance with DIN EN 558
** Dimensions can vary according to type of connection, please enquire



Safety information, installation and maintenance

For full details see the Installation and Maintenance Instructions (IM-P186-09) supplied with the product.

Installation note:

The SRV66 should always be fitted with the inlet vertical and the spring housing directly above the valve.

Warning
The pressure reducing valve should not be insulated as this may lead to over heating and destroy the elastomer seals.

How to order example

1 off Spirax Sarco DN25 SRV66 direct acting sanitary pressure reducing valve having a pressure range of 1 – 5 bar g a PN10/PN6 rating, FPM diaphragm and sanitary clamp compatible connections according to ASME BPE.

Spare parts

The spare parts available are detailed below. No other parts are supplied as spares.

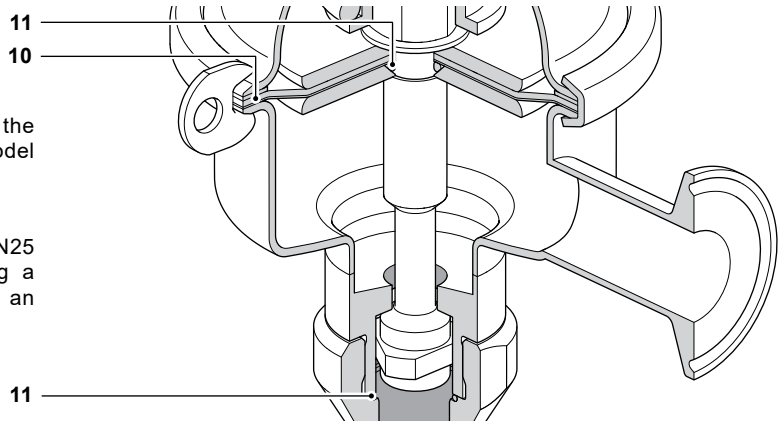
Available spares

Maintenance kit consisting of diaphragm and 'O' ring	**10, 11**

How to order spares

Always order spares by using the description given in the column headed 'Available spares' and state the size, model and pressure range.

Example:
1 - Diaphragm and 'O' ring for a Spirax Sarco DN25 SRV66 direct acting pressure reducing valve having a pressure range of 1 - 5 bar, a PN10/PN6 rating and an FPM diaphragm.

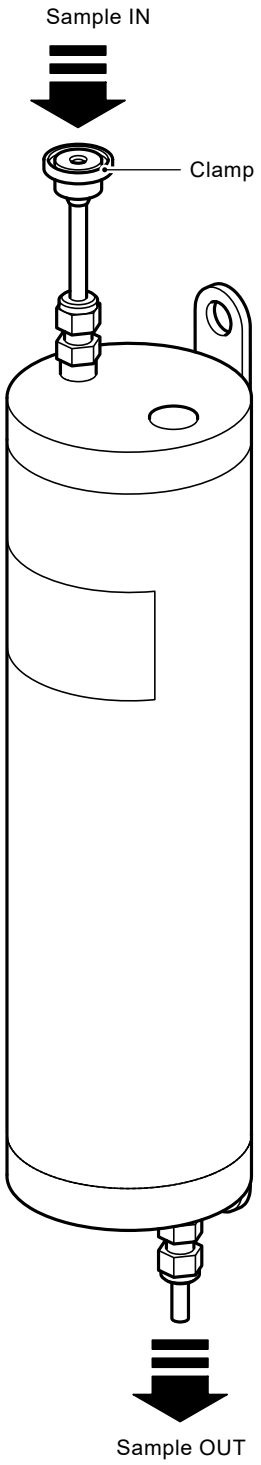


TI-P403-82
EMM Issue 13

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 utilises a counter current flow to maximise cooler efficiency, resulting in a compact, space saving design.
The unit is provided with separate mounting brackets and screws to allow simple installation at point of use.
Designed, manufactured and approved for Steam and Condensate applications. This product complies with EC1935:2004 Food Contact Materials. It also complies with regulation EC2023:2006 on good manufacturing practice for materials and articles intended to come into contact with food.



Surface finish

Sample contact surfaces are compliant to current ASME BPE requirements.
Ra Maximum 0.5 µm Ra (20 µin Ra).

Principal features:

- Internal surface finish of coil better than 0.5 µm Ra (20 µin Ra) to ensure high sterility.
- Coil manufactured from fully traceable 316L stainless steel.
- Self-draining design to eliminate sample retention.
- Fully sterilisable /autoclavable - to ensure integrity of unit between samples.
- Separate mounting brackets and screws to facilitate simple installation.

WARNING: The SSC20 is not sterile as supplied.

Sterilisation in Place (SIP) prior to testing or at periodic intervals. It may be appropriate to sterilise the SSC20 to ensure that sample integrity is maintained during testing.
For further details on SIP, to include recommended installation, refer to Spirax Sarco.
Example of Customer sterilization process (recommendation) - Expose to saturated steam for 20 minutes at 122 °C (252 °F), or 5 minutes at 134 °C (273 °F).
The inlet temperature should be high enough so that the outlet too can be fully sterilised.

Packaging

All packaging of the SSC20 sanitary sample cooler is conducted in an environment segregated from other non stainless steel manufacture and is in accordance with ASME BPE.

- Sample inlet and outlet connections are capped.
- Each Sample Cooler is individually packaged within an "ISO CLASS 7" clean environment with cooling water ends and sampling ends fitted with protective end cap. The product is then sealed in a protective plastic bag.

Standards

The SSC20 has been manufactured and built in general accordance with ASME BPE standards.

Certification

The SSC20 can be supplied with the following certification if requested at the time of ordering:

- Full EN 10204 3.1 Validation Pack - Chargeable.
- Typical Internal Coil Bore and Adaptor Face Surface Finish - F.O.C.
- Certificate of Compliance for FDA, and ADI Free Statement - F.O.C.
- TSE-BSE Statement - F.O.C.
- EC1935:2004 Declaration of Compliance - F.O.C.
- Declaration of Conformity BS EN ISO 14644-1:2015 Class 7 Clean Room - F.O.C.
- Typical Test Report - F.O.C.

Sizes and pipe connections

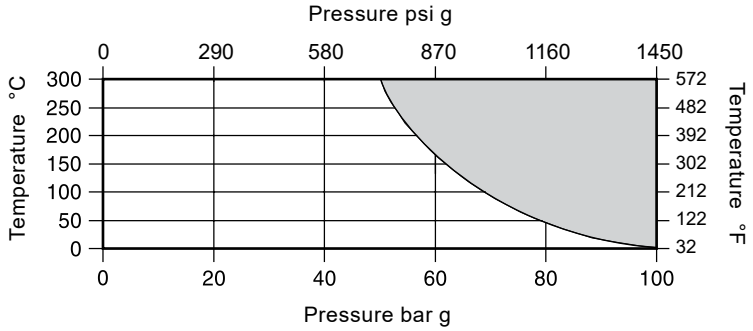
Cooling water inlet and outlet connections	BSP to BSP T Rp (ISO 7-1) version	½" BSP
	NPT version	½" NPT
Sample tube inlet and outlet connections	½" ASME BPE compatible adaptor for clamp fitting (clamp not supplied) on sample inlet. 6 mm O/D on sample outlet.	

Materials

Body and coil	Stainless steel 316L (1.4404)

Pressure/temperature limits

Coil



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

Body

Maximum design pressure	10 bar g @ 100 °C	145 psi g @ 212 °F
Maximum design temperature	100 °C @ 10 bar g	212 °F @ 145 psi g
Designed for a maximum cold hydraulic test pressure of	16 bar g	232 psi g

Note: The pressure/temperature limits for the clamp adaptor are dependant on the manufacturer's recommendations

Performance

Tables below show typical sample outlet temperatures above cooling water inlet temperatures for several pressures and cooling water flowrates.

Example

A sample flowrate of 30 l/h (0.13 GPM) is required from a boiler operating at 10 bar g (145 psi g). For a cooling water flowrate of 0.3 l/s (4.8 GPM) from Table 1 the sample outlet temperature would be 4 °C (7 °F) above the cooling water inlet temperature. If the cooling water is at 15 °C (59 °F), the sample temperature would be 19 °C (66 °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 Water Temperature °C (°F) (e.g. WFI - water for injection)

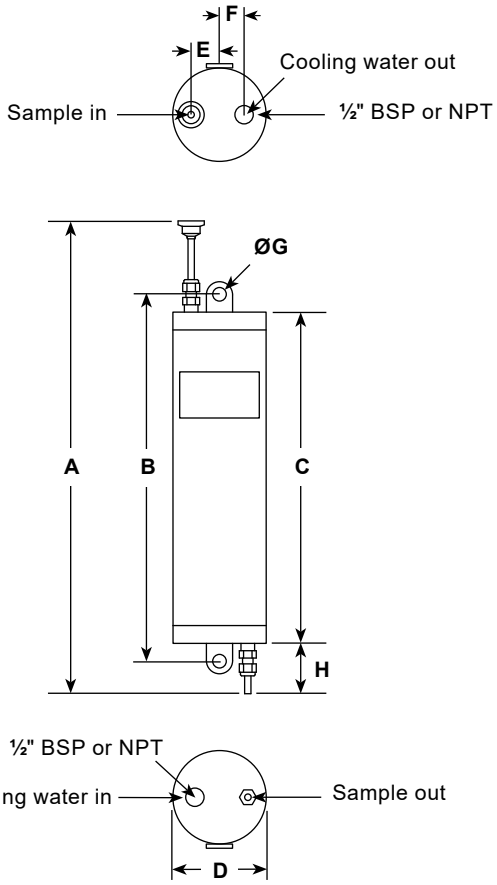
Sample flowrate l/h (GPM)	Cooling water flowrate 0.1 l/s (1.6 GPM)					Cooling water flowrate 0.3 l/s (4.8 GPM)					Cooling water flow 0.6 l/s (9.5 GPM)				
	Boiler pressure bar g (psi g)														
	1 (15)	3 (43)	7 (101)	10 (145)	20 (290)	1 (15)	3 (43)	7 (101)	10 (145)	20 (290)	1 (15)	3 (43)	7 (101)	10 (145)	20 (290)
10 (0.04)	1 (2)	1 (2)	3 (5)	6 (11)	6 (11)	0 (0)	0 (0)	1 (2)	1 (2)	4 (7)	0 (0)	0 (0)	0 (0)	0 (0)	2 (4)
20 (0.09)	2 (4)	2 (4)	6 (11)	8 (14)	8 (14)	1 (2)	1 (2)	2 (4)	2 (4)	6 (11)	0 (0)	0 (0)	0 (0)	1 (2)	4 (7)
30 (0.13)	5 (9)	5 (9)	8 (14)	11 (20)	11 (20)	3 (5)	3 (5)	4 (7)	4 (7)	8 (14)	0 (0)	0 (0)	2 (4)	3 (5)	6 (11)
40 (0.18)	7 (13)	7 (13)	11 (20)	13 (23)	13 (23)	5 (9)	5 (9)	6 (11)	6 (11)	10 (18)	1 (2)	1 (2)	2 (4)	3 (5)	8 (14)
50 (0.22)	10 (18)	10 (18)	13 (23)	15 (27)	15 (27)	6 (11)	6 (11)	8 (14)	8 (14)	12 (22)	3 (5)	3 (5)	4 (7)	5 (9)	9 (16)
60 (0.26)	14 (25)	14 (25)	16 (29)	18 (32)	18 (32)	9 (16)	9 (16)	10 (18)	10 (18)	14 (25)	4 (7)	5 (9)	5 (9)	6 (11)	11 (20)
80 (0.35)	16 (29)	18 (32)	20 (36)	22 (40)	22 (40)	11 (20)	12 (22)	13 (23)	14 (25)	18 (32)	6 (11)	7 (13)	8 (14)	9 (16)	15 (27)
100 (0.44)	18 (32)	20 (36)	24 (43)	26 (47)	27 (49)	15 (27)	16 (29)	16 (29)	18 (32)	22 (40)	10 (18)	11 (20)	12 (22)	13 (23)	18 (32)
120 (0.53)	22 (40)	23 (41)	29 (52)	30 (54)	31 (56)	17 (31)	18 (32)	20 (36)	23 (41)	26 (47)	11 (20)	13 (23)	15 (27)	17 (31)	22 (40)

Table 2 Saturated steam Temperature °C (°F), is on next page

Table 2 Saturated steam Temperature °C (°F)

Sample flowrate kg/h	Cooling water flowrate 0.1 l/sec (1.6 GPM)						Cooling water flowrate 0.3 l/sec (4.8 GPM)						Cooling water flowrate 0.6 l/sec (9.5 GPM)					
	Boiler pressure bar g (psi g)																	
	0.5 (7)	**2 (29)**	**5 (73)**	**7 (101)**	**10 (145)**	**20 (290)**	**0.5 (7)**	**2 (29)**	**5 (73)**	**7 (101)**	**10 (145)**	**20 (290)**	**0.5 (7)**	**2 (29)**	**5 (73)**	**7 (101)**	**10 (145)**	**20 (290)**
5 (11)	3 (5)	3 (5)	4 (7)	5 (9)	6 (11)	6 (11)	2 (4)	2 (4)	3 (5)	3 (5)	4 (7)	4 (7)	1 (2)	1 (2)	1 (2)	2 (4)	2 (4)	2 (4)
10 (22)		7 (13)	8 (14)	8 (14)	8 (14)	9 (16)		4 (7)	4 (7)	4 (7)	4 (7)	5 (9)		1 (2)	2 (4)	2 (4)	2 (4)	2 (4)
15 (33)			9 (16)	10 (18)	10 (18)	11 (20)			5 (9)	6 (11)	6 (11)	7 (13)			2 (4)	2 (4)	3 (5)	4 (7)
20 (44)				12 (22)	13 (23)	14 (25)				8 (14)	9 (16)	9 (16)				4 (7)	5 (9)	6 (11)
30 (66)					21 (38)	21 (38)					14 (25)	14 (25)					9 (16)	10 (18)
40 (88)						28 (51)						20 (36)						13 (23)
50 (110)						35 (63)						25 (45)						17 (31)
60 (132)						42 (76)						30 (54)						21 (38)
70 (154)																		

Dimensions (approximate) in mm (inches)



A	B	C	D	E	F	G	H
450 (17.7)	350 (13.8)	316 (12.4)	90 (3.5)	27 (1.1)	23.5 (0.9)	13 (0.5)	47 (1.9)

Weight (approximate) in kg (lbs)

Cooler	3.6 (8)

How to order

Example: 1 off Spirax Sarco type SSC20 sanitary sample cooler with ½" sanitary clamp sample inlet connection and maximum coil internal surface finish of 0.5 µm Ra. The cooling water connections are to be BSP.

TI-P023-59
CMGT Issue 7

CS10-1
Stainless Steel
Clean Steam Separator

Description
The CS10-1 clean steam separator has been designed in full accordance with the ASME BPE guide to overcome the issues of removing entrained moisture from clean and pure steam systems. It has also been designed with the feature of a removable baffle plate, allowing the unit to be fully inspected prior to installation and to facilitate system internal inspection.

Standard surface finish

Internal	0.5 µm (20 µin) Ra maximum/SF5 - as outlined in ASME BPE, with all welds ground and electropolished.
External	1.6 µm (63 µin) Ra maximum, with a satin bead blast finish.

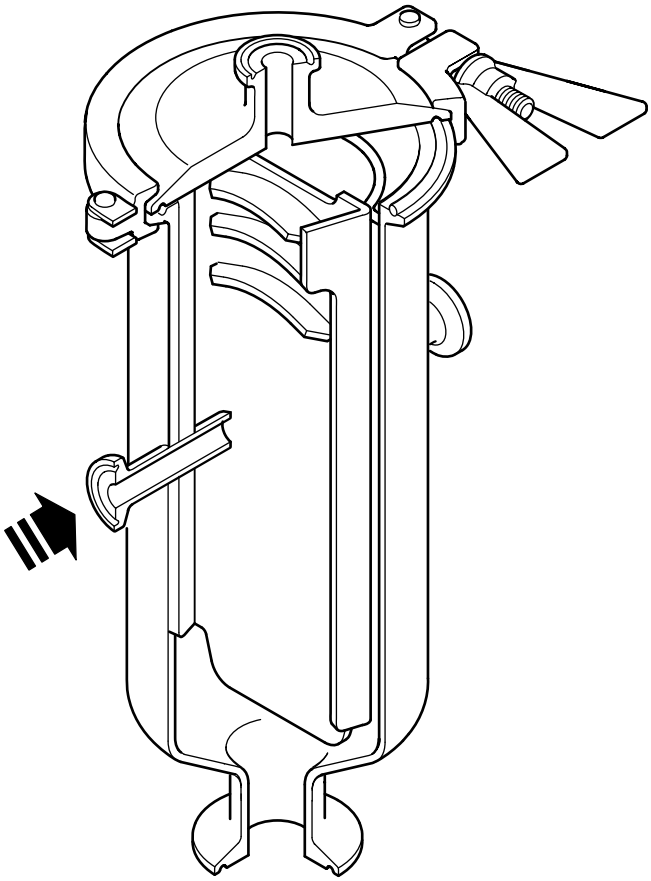
Standards
This product has been designed in accordance with the ASME BPE guide.
It also complies with the requirements of the EU Pressure Equipment Directive/UK Pressure Equipment (Safety) Regulations.
All polymers used comply with FDA regulation CFR 21 part 177 section 2600.
½", ¾" and 1" sizes are available with USP class VI.

Certification
This product is available with the following certification:

- EN 10204 3.1 material certifications.
- Certificates 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; Connections of the product are fitted with protective caps before being sealed in a plastic bag.

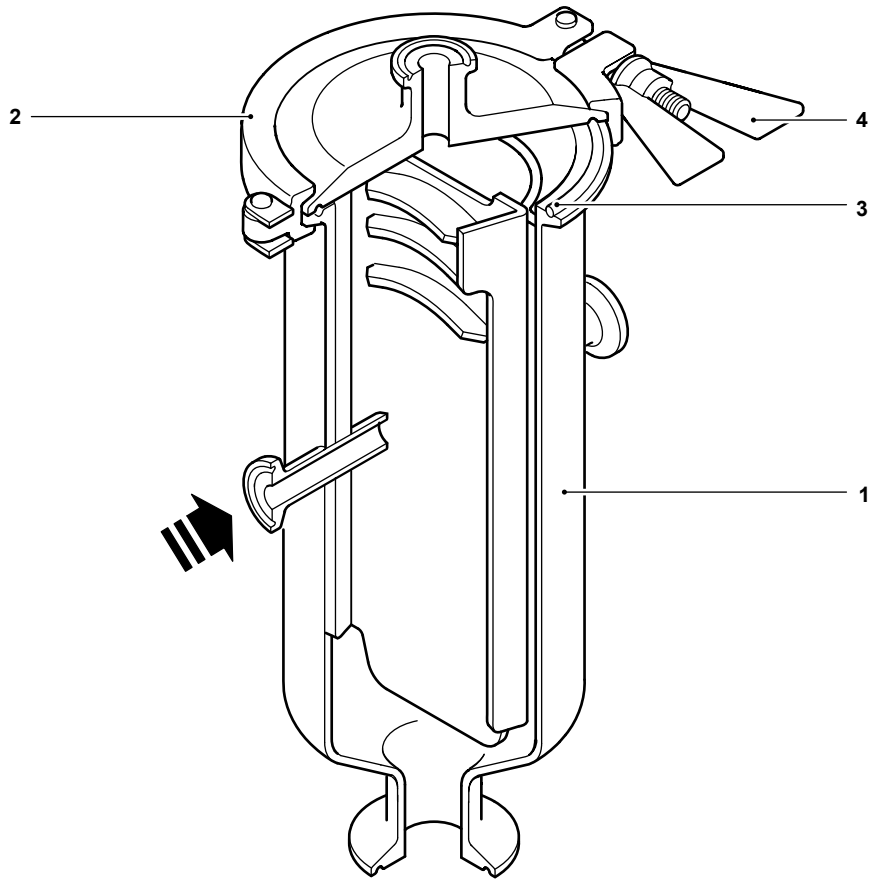


Sizes and pipe connections

	Sanitary clamp ends		
	ASME BPE	**DIN32676 A**	**DIN32676 B**
Steam inlet and outlet pipe	½"	DN15	DN15
	¾"	DN20	DN20
	1"	DN25	DN25
	1½"	DN40	DN40
	2"	DN50	DN50
Drain	1"	DN25	DN25
Vent	1½"	DN15	DN15

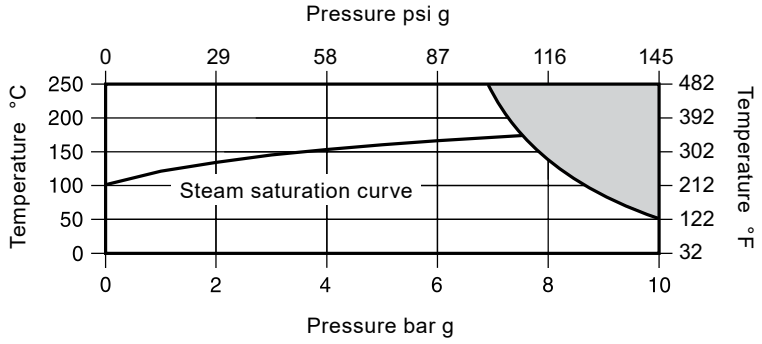
Note: Other connections are available upon request.

Materials



No.	Part	Material	
1	Body	Fabricated stainless steel	1.4404 316L
			1.4404 316L
			1.4404 316L
2	Cover + Baffle	Fabricated stainless steel	1.4404 316L
			1.4404 316L
3	Seal	Viton	
4	Clamp	Stainless steel	AISI 316

Pressure/temperature limits (ISO 6552)



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

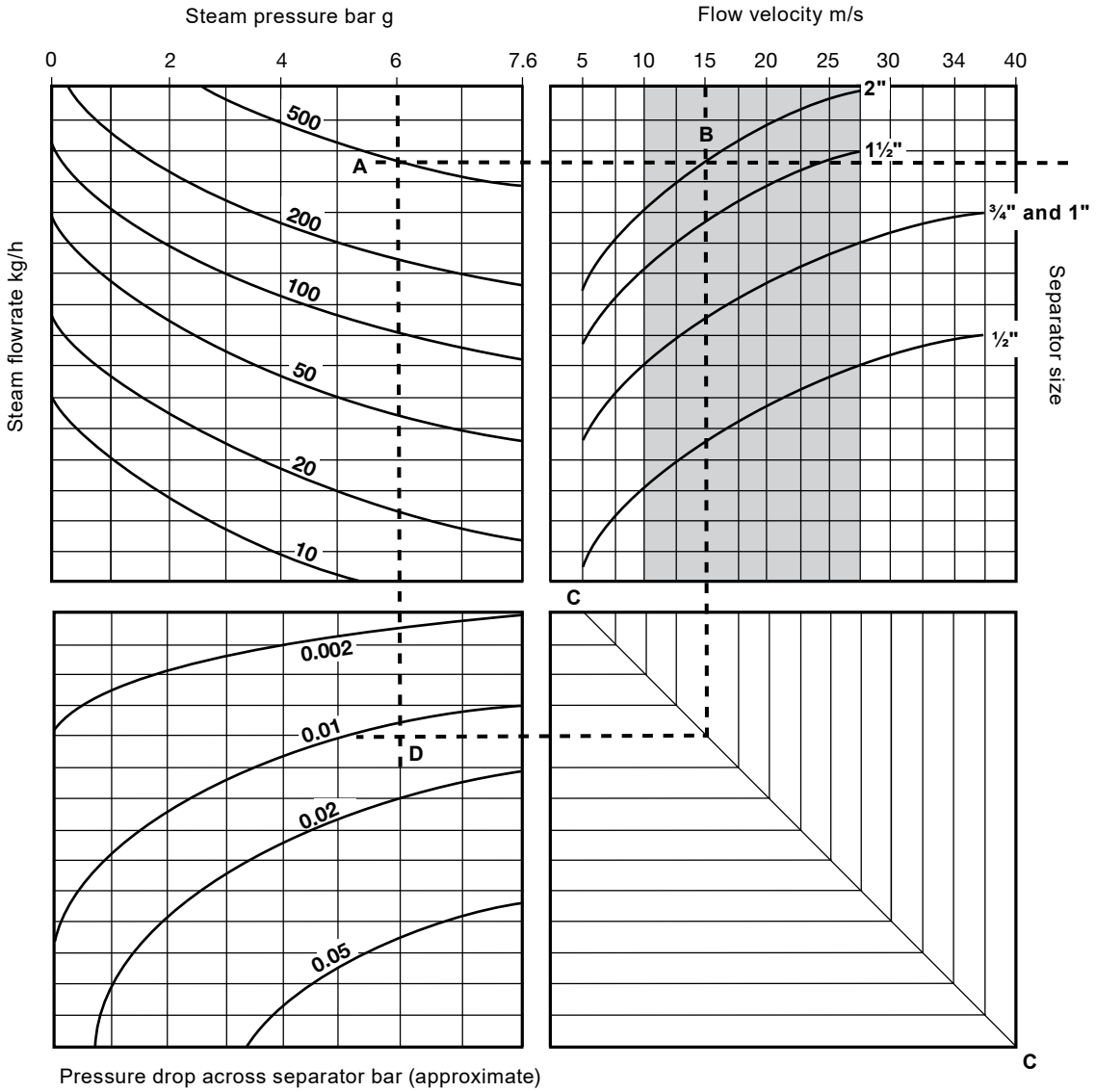
Note: For hygienic/sanitary clamp ends the maximum pressure /temperature may be restricted by the gasket or sanitary clamp used. Please consult Spirax Sarco.

Body design conditions			PN10
PMA	Maximum allowable pressure	10 bar g @ 50 °C	145 psi g @ 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	482 °F @ 99 psi g
Minimum operating temperature		0 °C	32 °F
Designed for a maximum cold hydraulic test pressure of		15 bar g	218 psi g

Steam sizing example - kg/h, bar g and m/s

The steam sizing example below has been based on imperial O/D tubing delivering 500 kg/h of steam at 6 bar g.

1. **Plot point A** where the steam pressure and flowrate cross, e.g. 6 bar g @ 500 kg/h: Draw a horizontal line.
2. **Select line size**. Any separator curve that is bisected by this line at a velocity **below 27 m/s** will operate at near 100% efficiency. For this example choose a 2" (DN50) separator, point **B**.
3. **Ascertain velocity**. Line velocity for any size can be determined by drawing a vertical line upwards from the point of intersection. From point **B** in this example the line crosses the velocity axis at 15 m/s.
   Note: a velocity correction factor needs to be applied - Please refer to the correction factor table below.
   For this example the velocity correction factor is 1.22 for a 2" imperial O/D tube therefore the velocity in this example would be 18.3 m/s.
4. **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. approximately 0.012 bar.
5. **Separators should be selected on the basis of the best compromise between line size, velocity and pressure drop for each application.**



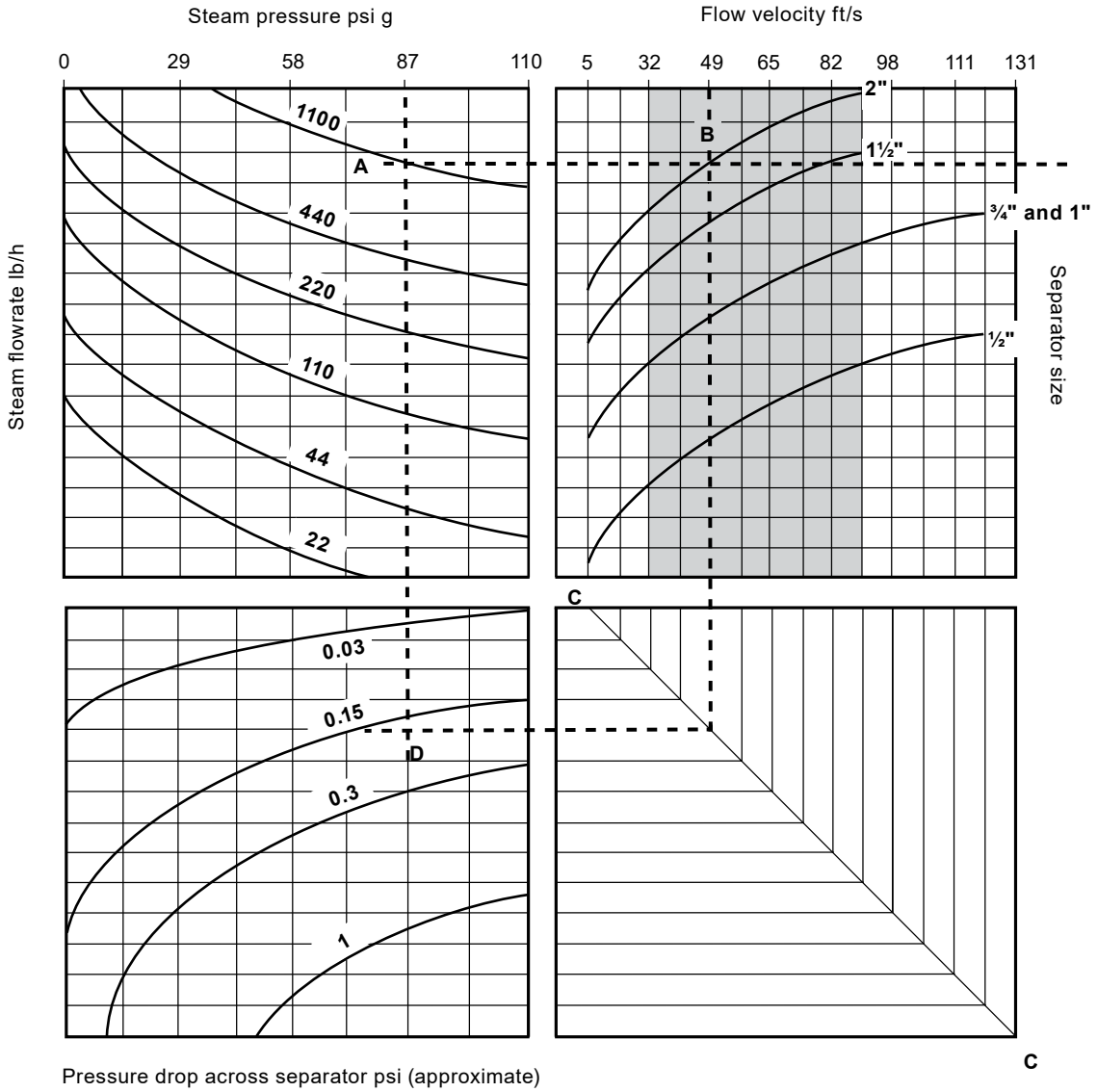
Velocity correction factor table

Separator size		½"	¾"	1"	1½"	2"
Schedule 40 pipe	I/D (mm)	15.80	21.00	26.60	40.90	52.50
	Factor	1.00	1.00	1.00	1.00	1.00
Imperial O/D tubing	I/D (mm)	9.40	15.75	22.10	34.80	47.50
	Factor	2.83	1.45	1.45	1.38	1.22
Hybrid DIN 11850 pipe	I/D (mm)	15.00	19.00	25.00	37.00	49.00
	Factor	1.11	1.13	1.13	1.22	1.15

Steam sizing example - lb/h, psi g and ft/s

The steam sizing example below has been based on imperial O/D tubing delivering 1100 lb/h of steam at 87 psi g.

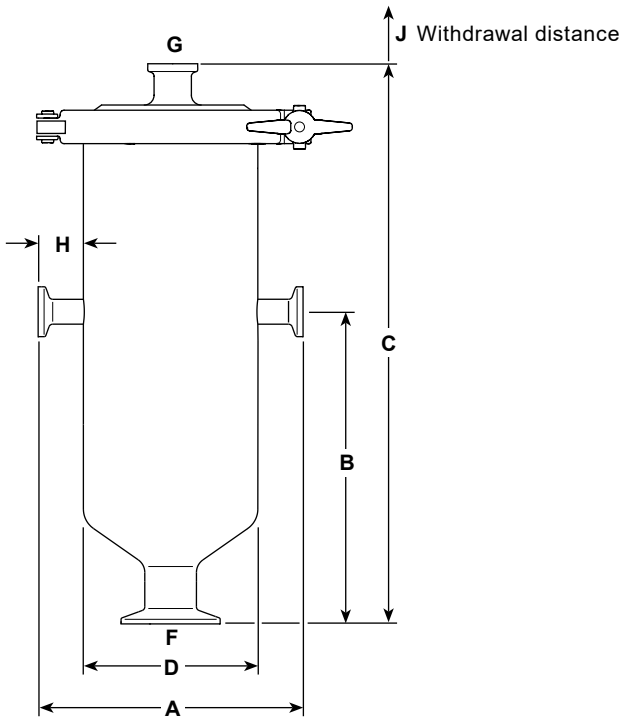
1. **Plot point A** where the steam pressure and flowrate cross, e.g. 87 psi g @ 1100 lb/h: Draw a horizontal line.
2. **Select line size**. Any separator curve that is bisected by this line at a velocity **below 27 m/s** will operate at near 100% efficiency. For this example choose a 2" (DN50) separator, point **B**.
3. **Ascertain velocity**. Line velocity for any size can be determined by drawing a vertical line upwards from the point of intersection. From point **B** in this example the line crosses the velocity axis at 49 ft/s.
   Note: a velocity correction factor needs to be applied - Please refer to the correction factor table below.
   For this example the velocity correction factor is 1.22 for a 2" imperial O/D tube therefore the velocity in this example would be 18.3 m/s.
4. **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. approximately 0.17 psi.
5. **Separators should be selected on the basis of the best compromise between line size, velocity and pressure drop for each application.**



Velocity correction factor table

Separator size		½"	¾"	1"	1½"	2"
Schedule 40 pipe	I/D (in)	0.62	0.83	1.05	1.61	2.07
	Factor	1.00	1.00	1.00	1.00	1.00
Imperial O/D tubing	I/D (in)	0.37	0.62	0.87	1.37	1.87
	Factor	2.83	1.45	1.45	1.38	1.22
Hybrid DIN 11850 pipe	I/D (in)	0.59	0.75	0.98	1.46	1.93
	Factor	1.11	1.13	1.13	1.22	1.15

Dimensions, weights and volume (approximate) mm (inches), kg (lb) and litres (gallons)



Steam inlet/outlet size	A	B	C	D	F (drain)	G (vent)	H	J	Weights	Volume
½"	135 (5.3)	158 (6.2)	287 (11.3)	88.9 (3.5)	1"	½"	23 (0.9)	215 (8.5)	3.0 (6.6)	1.2 (0.3)
¾"	160 (6.3)	177 (7.0)	370 (14.6)	114.3 (4.5)				290 (11.4)	5.0 (11.0)	2.5 (0.7)
1"										
1½"	195 (7.7)	210 (8.3)	482 (19.0)	141.3 (5.6)			27 (1.1)	400 (15.7)	9.2 (20.3)	5.5 (1.5)
2"			532 (21.0)					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 0.5 µm complete with material certification to EN 10204 3.1.

Spare parts

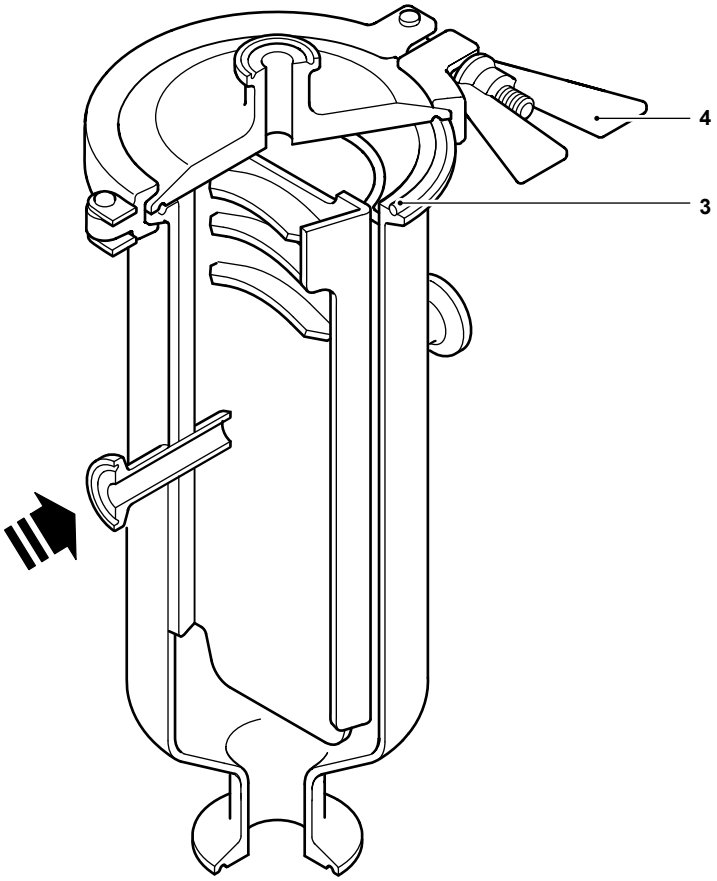
Available spares

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 off Seal for a Spirax Sarco 1½" CS10-1 stainless steel clean steam separator.



TI-P112-02-US
Issue 1

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
2½"	0 - 30 psi (0 - 2.1 bar)	0 - 60 psi (0 - 4.1 bar)	0 - 100 psi (0 - 6.9 bar)	0 - 160 psi (0 - 11.0 bar)
4"				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		392 °F (200 °C)
Minimum allowable temperature			-4 °F (-20 °C)
PMO	Maximum operating pressure	Range 1	87.0 psi (6 bar)
		Range 2	145 psi (10 bar)
TMO	Maximum operating temperature		363 °F (184 °C)

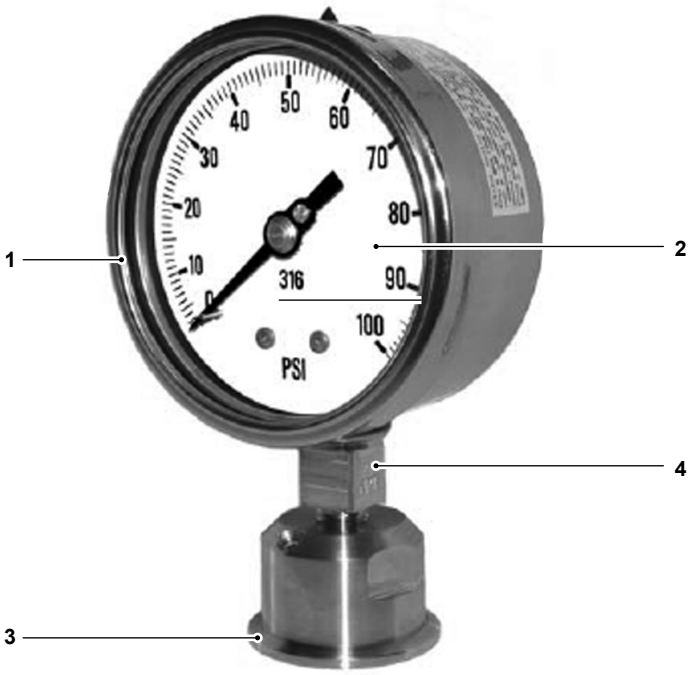
Accuracy

4" Dial = 0.5% Full Scale (ANSI Grade 2A)
2-½" Dial = 1.0% Full Scale (ANSI Grade 1A)

When the temperature of the pressure element rises above 68 °F (20 °C) add the accuracy error and when it falls below 68 °F (20 °C) subtract the accuracy error.

Note: These errors are computer generated and for guidance only.

Materials

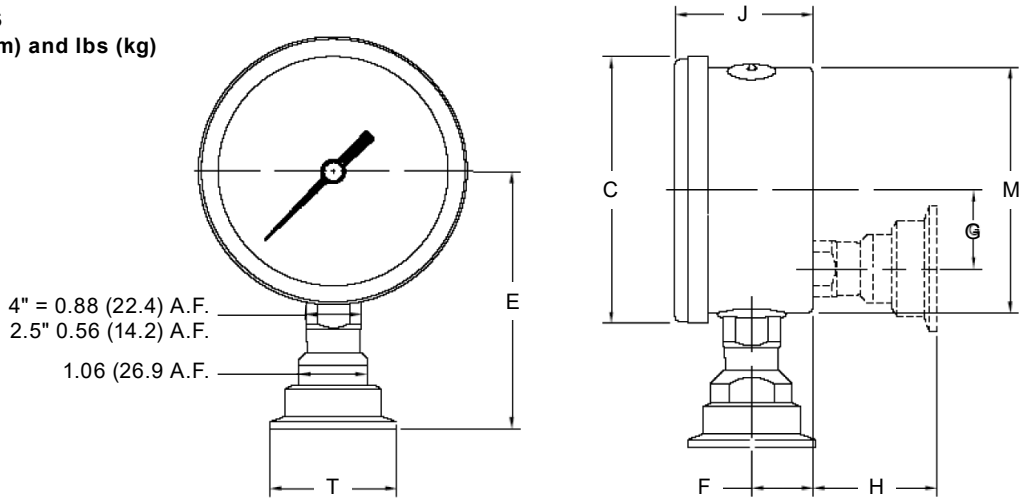


No.	Part	Material
1	Gauge case	Stainless steel
2	Gauge window	Laminated Safety Glass
3	Diaphragm	316 Stainless steel
4	Process Housing	316 Stainless Steel

Hermetically Sealed/Weather Proof

Dimensions/weights

(approximate) in inches (mm) and lbs (kg)



Dial Size	Tri-Clamp Size	C	E	F	G	H	J	M	T
2½"	1½"	2.72 (69.1)	2.87 (73)	0.39 (10)	CENTER	1.63 (41.4)	1.14 (29)	2.48 (63)	1.98 (50)
	2"		3.07 (78)			1.83 (46.5)			2.51 (64)
4"	1½"	4.18 (106.2)	4.02 (102)	0.96 (24.4)	1.24 (31.5)	1.93 (49)	2.15 (54.6)	3.85 (97.8)	1.98 (50)
	2"		4.21 (107)			2.12 (54)			2.51 (64)

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.

TI-P183-02
CTLS Issue 10

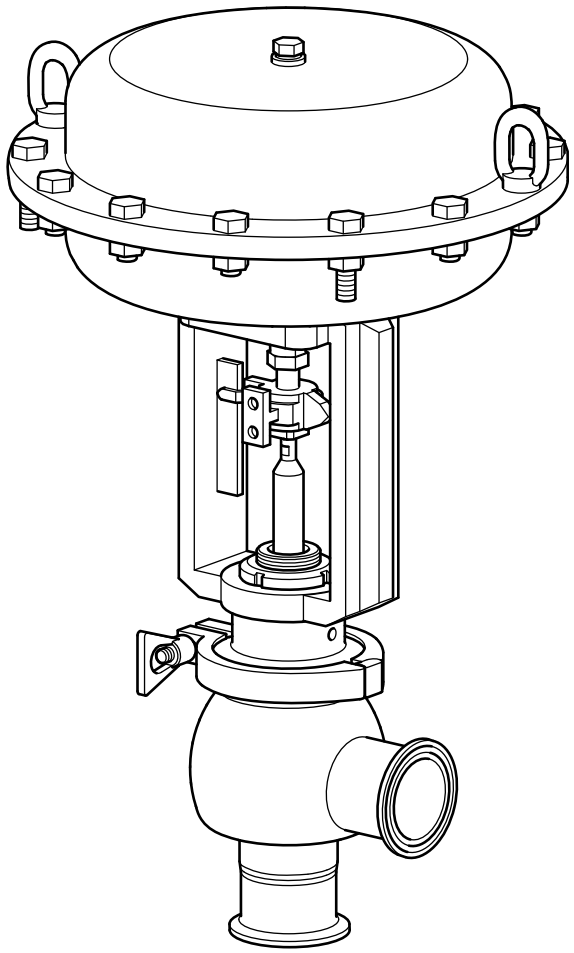
Steri-trol Aseptic Service
'S' series Two-port Pneumatic Control Valves - DN15 (½") to DN100 (4")

Description

Steri-trol 'S' series are two-port control valves manufactured using 316L stainless steel. They are designed for 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

SB	Two-port angle pattern design with aseptic steam sanitized bonnet
SA	Two port angle pattern design (for chemical free steam)



Valve characteristics - options:

SBE **SAE**	**Equal percentage (E) -** Suitable for most modulating process control applications good control providing at low flowrates.
SBL **SAL**	**Linear (L) -** Primarily for liquid flow control where the differential pressure across the valve is constant.

Approvals and certification

Compliant to ASME BPE SF4 2019, internal surface finish 0.375 µm, FDA, and USP 26 Class VI approved sealing materials.
EN 10204 type 3.1 certificates supplied as standard. Surface finish certificate supplied as standard.

Valve seating - options

S	**Metal-to-metal (as standard) -** Stainless steel
V	**Soft seal -** White Viton to provide a tight shut-off

Valve stem sealing - options

V	**White Viton -** USP 26 Class VI approved

The Steri-trol can be used with the following actuators

Pneumatic	PNS3000, PNS4000, PN9000E and PN9000R series

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

Technical data

Plug design	DN15 to DN100 (½" to 4")	Parabolic
Leakage	Metal-to-metal	(0.01% of Kv)
	Soft seal	IEC 534-4 Class VI
Rangeability	Equal percentage	50:1
	Linear	30:1
Travel	DN15 to DN50 (½" to 2")	20 mm (0.79 in)
	DN65 to DN100 (2½" to 4")	30 mm (1.2 in)
Surface finish	Internal (Mechanical or electro polished)	< 0.375 µ m
	External	< 0.6 µ m

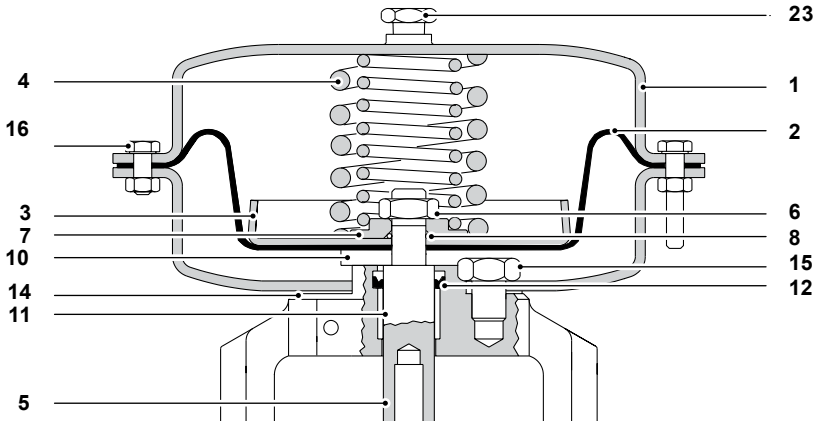
Sizes and end connections

Connections	**Size range**
Butt weld/tube weld, screwed, flanged and sanitary clamp	DN15, DN20, DN25, DN32, DN40, DN50, DN65, DN80 and DN100
	½", ¾", 1", 1¼", 1½", 2", 2½", 3" and 4"

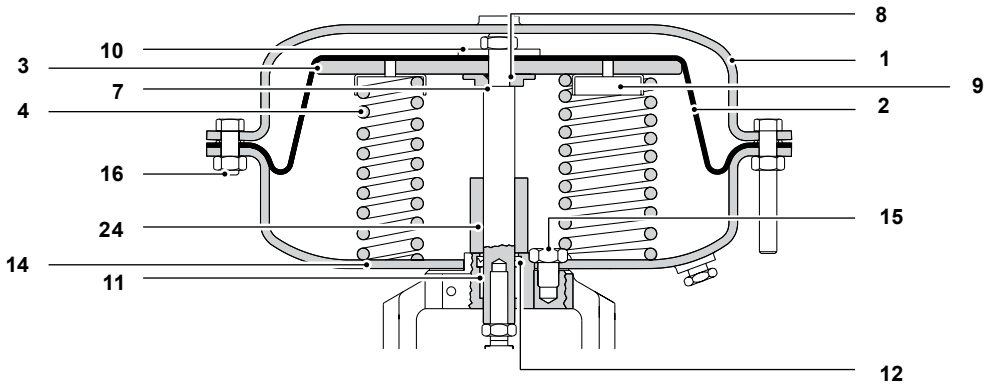
Notes:

- DN15, DN20 and DN32 is not available for certain end connections - see page 13.
- 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.

Materials



PNS3000 series



PNS4000 series

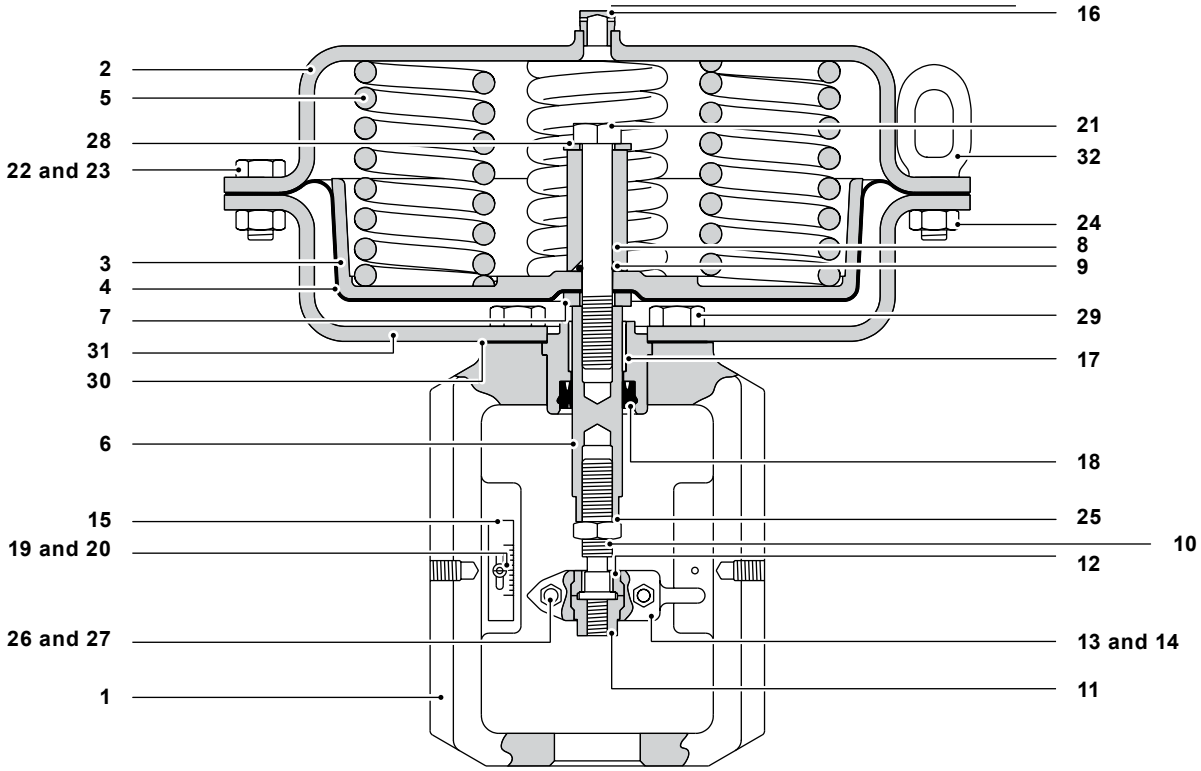
PNS3000 and PNS4000 series actuators

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

Materials (continued)

PN9000



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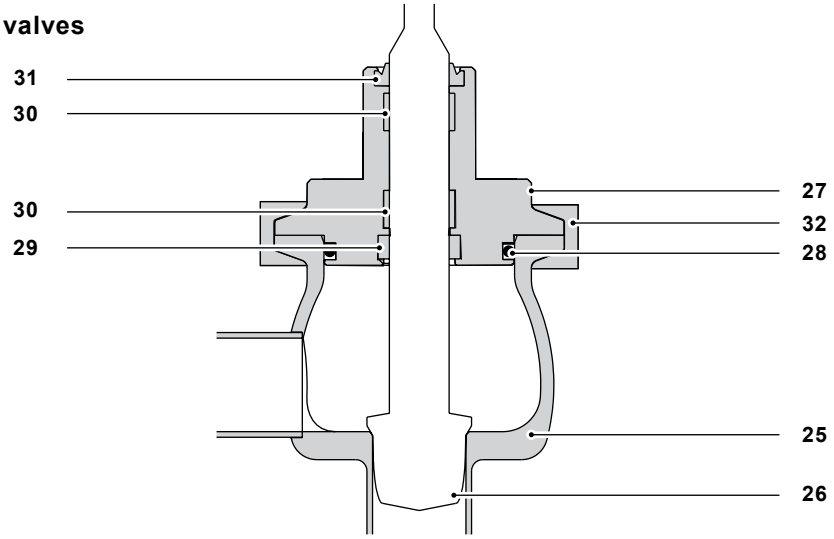
PN 9000 series actuators

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

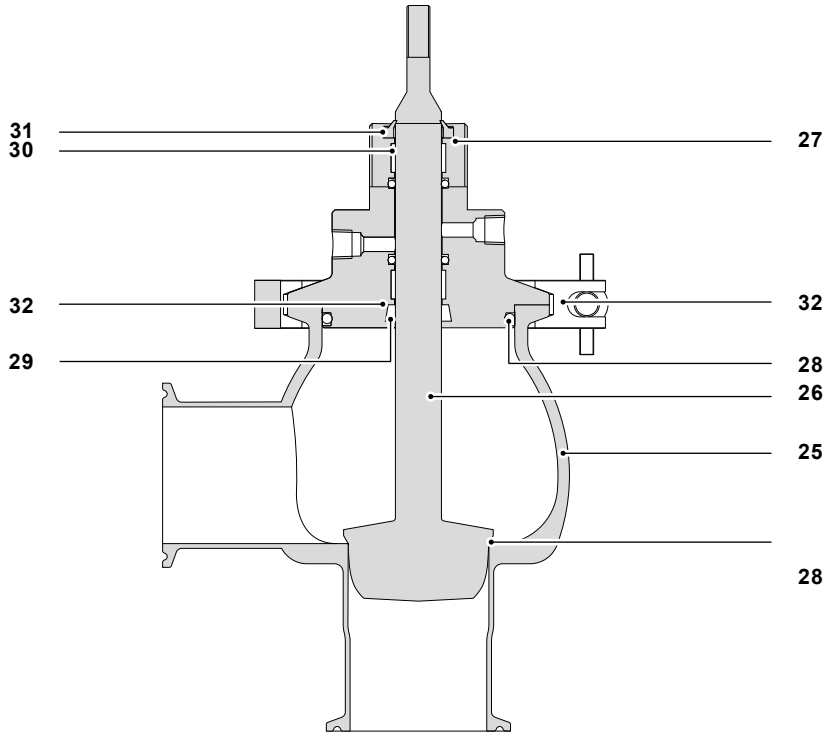
No.	Part	Material	
18	Seal	Polyurethane	
19	Pan head screw	Carbon steel (plated)	
20	Nyloc nut	Carbon steel (plated)	
21	Bolt	Carbon steel (plated)	Gr. 8.8
22	Hex. head screw (short)	Carbon steel (plated)	Gr. 8.8
23	Hex. head screw (long)	Carbon steel (plated)	Gr. 8.8
24	Nut	Carbon steel (plated)	Gr. 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	

Materials (continued)

SA and SB control valves



SA 2-port control valve

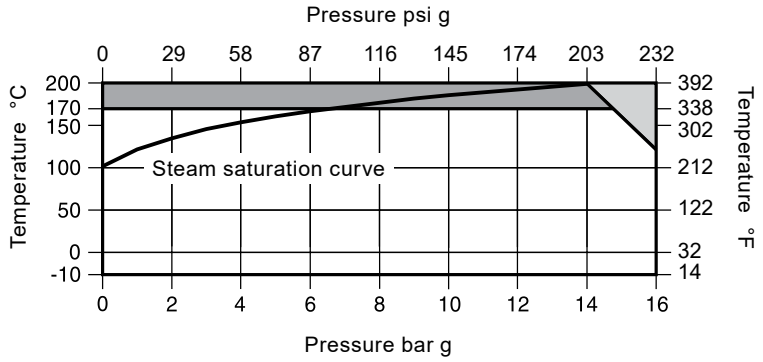


SB 2-Port control valve with aseptic steam sanitized bonnet (Provided as standard)

No.	Part	Material
25	Body	Stainless steel ASTM A479-316L
26	Valve plug, stem and soft seal	Stainless steel ASTM A479-316L
		Stainless steel 316L
27	Bonnet	Stainless steel ASTM A479-316L
28	Body seal	Viton (FKM)

No.	Part	Material
29	Stem seal	Viton (FKM)
30	Stem bushes	PTFE-FC
31	Seal washer	White Viton or EPDM
32	Body clamp	Stainless steel 304

Pressure/temperature limits



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

Viton (V) stem seals must be selected for use in this region.

Body design conditions			PN16
Maximum design pressure		16 bar g @ 120 °C	232 psi g @248 °F
Maximum design temperature		200 °C @ 14 bar g	392 °F @ 203 psi g
Minimum design temperature		-20 °C	-4 °F
Maximum operating temperature	Viton (FKM) (V)	170 °C	338 °F
Minimum operating temperature **Note:** For lower operating temperatures consult Spirax Sarco.		-10 °C	14 °F
Maximum differential pressure			See pages 7 to 9
Designed for a maximum cold hydraulic test pressure of:		24 bar g	348 psi g

6.1

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Kv values (SB and SA models)

Flow characteristic	Valve size	K_v by valve size and trim reduction								
		DN15 (½")	DN20 (¾")	DN25 (1")	DN32 (1¼")	DN40 (1½")	DN50 (2")	DN65 (2½")	DN80 (3")	DN100 (4")
	Travel	20 mm (0.79")						30 mm (1.2")		
Equal percentage and linear	Standard	4	6.3	10	16	25	36	63	100	160
	Reduction 1	-	4	6.3	10	16	25	36	63	100
	Reduction 2	-	-	4	6.3	10	16	25	36	63
	Reduction 3	-	-	-	4	6.3	10	16	25	36

Micro-flow trim for all valves ≤ DN25 (1")

Micro-flow trim	Travel	20 mm (0.79")				
	Trim size	⅛" (3.2 mm)	3/16" (4.8 mm)	¼" (6.4 mm)	¼" (6.4 mm)	⅜" (9.5 mm)
Linear characteristic	Kv	0.4	0.63	1.0	1.6	2.5

For conversion:
Kv = Cv (US) x 0.855
Cv(UK) = Cv (US) x 0.833

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

PNS3000 spring-to-extend actuators

Valve size			DN15 (½")	DN20 (¾")	DN25 (1")	DN32 (1¼")	DN40 (1½")	DN50 (2")	DN65 (2½")	DN80 (3")	DN100 (4")
Kv			4.0	6.3	10	16	25	36	63	100	160
Travel mm			20 mm (0.79")						30 mm (1.2")		
Actuator	Spring range	Positioner required	Maximum differential pressure Class IV bar (psi)								
PNS3220	0.2 - 1.0	Optional	8.3 (120)	4.1 (59)	1.4 (20)						
	0.4 - 1.2	Optional	16.0 (232)	14.0 (203)	7.1 (103)	4.0 (58.0)	2.4 (34.8)				
PNS3320	0.2 - 1.0	Optional			16.0 (232)						
	0.4 - 1.2	Optional				11.4 (165)	7.6 (110)	3.8 (55.1)			
PNS3326	1.0 - 3.0	Yes			12.8 (186)	16.0 (232)	16.0 (232)	12.7 (184)			
PNS3420	0.2 - 1.0	Optional			16.0 (232)	7.7 (112)	5.0 (72.5)	2.3 (33.4)			
	0.4 - 1.2	Optional				16.0 (232)	12.8 (186)	6.8 (98.6)			
PNS3426	1.0 - 3.0	Yes					16.0 (232)	16.0 (232)			
PNS3430	0.4 - 1.2	Optional							3.4 (49.3)	2.0 (29.0)	1.2 (17.4)
PNS3436	1.0 - 3.0	Yes							10.7 (155)	6.9 (100)	4.6 (66.7)

Maximum differential pressures for Class IV shut-off SB and SA valves (continued)

PN9000 spring-to-extend actuators

Valve size			DN15 (½")	DN20 (¾")	DN25 (1")	DN32 (1¼")	DN40 (1½")	DN50 (2")	DN65 (2½")	DN80 (3")	DN100 (4")
Kv			4.0	6.3	10	16	25	36	63	100	160
Travel mm			20 mm (0.79")						30 mm (1.2")		
Actuator	Spring range	Positioner required	Maximum differential pressure Class IV bar (psi)								
PN9120E	0.4 - 1.2	Optional	14.0 (203)	8.0 (116)	4.0 (58.0)	2.0 (29.0)	1.0 (14.5)	-			
PN9126E	1.0 - 2.0	Yes	16.0 (232)	16.0 (232)	15.0 (218)	9.0 (131)	6.0 (87.0)	3.0 (43.5)			
PN9123E	2.0 - 4.0	Yes			16.0 (232)	16.0 (232)	15.0 (218)	8.0 (116)			
PN9220E	0.2 - 1.0	Optional			10.0 (145)	6.0 (87.0)	3.0 (43.5)	1.0 (14.5)			
	0.4 - 1.2	Optional			16.0 (232)	15.0 (218)	10.0 (145)	5.0 (72.5)			
PN9226E	1.0 - 2.0	Yes				16.0 (232)	16.0 (232)	16.0 (232)			
PN9223E	2.0 - 4.0	Yes									
PN9320E	0.2 - 1.0	Optional				14.0 (203)	10.0 (145)	5.0 (72.5)			
	0.4 - 1.2	Optional				16.0 (232)	16.0 (232)	12.0 (174)			
PN9330E	0.4 - 1.2	Yes							6.0 (87.0)	4.0 (58.0)	3.0 (43.5)
PN9336E	1.0 - 2.0	Yes							16.0 (232)	12.0 (174)	8.0 (116)
PN9337E	2.5 - 3.5	Yes								16.0 (232)	16.0 (232)

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

PNS4000 spring-to-retract actuators

Valve size				DN15 (½")	DN20 (¾")	DN25 (1")	DN32 (1¼")	DN40 (1½")	DN50 (2")	DN65 (2½")	DN80 (3")	DN100 (4")
Kv				4.0	6.3	10	16	25	36	63	100	160
Travel mm				20 mm (0.79")						30 mm (1.2")		
Actuator	Spring range	Positioner required	Minimum air pressure	Maximum differential pressure Class IV bar (psi)								
PNS4220	0.2 - 1.0	Optional	1.4	16.0 (232)	14.0 (203)	7.1 (203)	4.0 (103)	2.4 (34.8)				
	0.2 - 1.0	Yes	2.0		16.0 (232)	16.0 (232)	15.1 (219)	10.2 (148)	5.3 (76.9)			
	0.2 - 1.0	Yes	3.0				16.0 (232)	16.0 (232)	12.7 (184)			
	0.2 - 1.0	Yes	4.0						16.0 (232)			
PNS4320	0.2 - 1.0	Optional	1.4				11.4 (165)	7.6 (110)	3.8 (55.1)			
	0.2 - 1.0	Yes	2.0				16.0 (232)	16.0 (232)	12.7 (184)			
	0.2 - 1.0	Yes	3.0						16.0 (232)			
PNS4420	0.2 - 1.0	Optional	1.4						6.8 (98.6)			
	0.2 - 1.0	Yes	2.0						16.0 (232)			
	0.2 - 1.0	Yes	3.0									
PNS4430	0.2 - 1.0	Optional	1.4							3.4 (49.3)	2.0 (29.0)	1.2 (17.4)
	0.2 - 1.0	Yes	2.0							10.7 (155)	6.9 (100)	4.6 (66.7)
	0.2 - 1.0	Yes	3.0							16.0 (232)	15.0 (218)	10.2 (148)
	0.2 - 1.0	Yes	4.0								16.0 (232)	15.8 229)

Maximum differential pressures for Class IV shut-off SB and SA valves (continued)

PN9000 spring-to-retract actuators

Valve size			DN15 (½")	DN20 (¾")	DN25 (1")	DN32 (1¼")	DN40 (1½")	DN50 (2")	DN65 (2½")	DN80 (3")	DN100 (4")
Kv			4.0	6.3	10	16	25	36	63	100	160
Travel mm			20 mm (0.79")						30 mm (1.2")		
Actuator	Spring range	Positioner required	Maximum differential pressure Class IV bar (psi)								
PN9120R	0.2 - 1.0	Optional	16.0 (232)	16.0 (232)	16.0 (232)	16.0 (232)	16.0 (232)	16.0 (232)			
	0.4 - 1.2	Optional									
PN9126R	1.0 - 2.0	Yes									
PN9123R	2.0 - 4.0	Yes						8.0 (116)			
PN9220R	0.2 - 1.0	Optional						16.0 (232)			
	0.4 - 1.2	Optional									
PN9226R	1.0 - 2.0	Yes									
PN9223R	2.0 - 4.0	Yes									
PN9320R	0.2 - 1.0	Optional									
	0.4 - 1.2	Optional									
PN9330R	0.4 - 1.2	Yes							16.0 (232)	16.0 (232)	16.0 (232)
PN9336R	1.0 - 2.0	Yes									
PN9337R	2.5 - 3.5	Yes							8.0 (116)	5.0 (72.5)	3.0 (43.5)

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

PNS3000 spring-to-extend actuators

Valve size			DN15 (½")	DN20 (¾")	DN25 (1")	DN32 (1¼")	DN40 (1½")	DN50 (2")	DN65 (2½")	DN80 (3")	DN100 (4")
K_V			4.0	6.3	10	16	25	36	63	100	160
Travel mm			20 mm (0.79")						30 mm (1.2")		
Actuator	Spring range	Positioner required	Maximum differential pressure Class IV bar (psi)								
PNS3220	0.4 - 1.2	Optional	12.1 (175)	8.4 (122)	3.0 (43.5)	2.3 (33.4)	1.3 (18.9)	-	-	-	-
PNS3320	0.2 - 1.0	Optional						-	-	-	-
	0.4 - 1.2	Optional	16.0 (232)	16.0 (232)	9.1 (132)	7.4 (107)	5.1 (74.0)	2.3 (33.4)	-	-	-
PNS3326	1.0 - 3.0	Yes			16.0 (232)	16.0 (232)	16.0 (232)	8.4 (122)	-	-	-
PNS3420	0.2 - 1.0	Optional		14.9 (216)	6.0 (87.0)	4.8 (69.6)	3.2 (46.4)	1.3 (18.9)	-	-	-
	0.4 - 1.2	Optional		16.0 (232)	15.1 (219)	12.4 (180)	8.8 (128)	4.4 (63.8)	-	-	-
PNS3426	1.0 - 3.0	Yes	-	-	16.0 (232)	16.0 (232)	16.0 (232)	13.5 (196)	-	-	-
PNS3430	0.4 - 1.2	Optional	-	-	-	-	-	-	2.2 (31.9)	1.7 (24.7)	-
PNS3436	1.0 - 3.0	Yes	-	-	-	-	-	-	7.4 (107)	5.9 (85.6)	3.7 (53.7)

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

PN9000 spring-to-extend actuators

Valve size			DN15 (½")	DN20 (¾")	DN25 (1")	DN32 (1¼")	DN40 (1½")	DN50 (2")	DN65 (2½")	DN80 (3")	DN100 (4")
Kv			4.0	6.3	10	16	25	36	63	100	160
Travel mm			20 mm (0.79")						30 mm (1.2")		
Actuator	Spring range	Positioner required	Maximum differential pressure Class IV bar (psi)								
PN9120E	0.4 - 1.2	Optional	7.0 (102)	4.0 (58.0)	1.0 (14.5)	1.0 (14.5)	-	-	-	-	-
PN9126E	1.0 - 2.0	Yes	16.0 (232)	16.0 (232)	7.0 (102)	6.0 (87.0)	4.0 (58.0)	2.0 (29.0)	-	-	-
PN9123E	2.0 - 4.0	Yes			16.0 (232)	15.0 (218)	10.0 (145)	5.0 (72.5)	-	-	-
PN9220E	0.2 - 1.0	Optional			4.0 (58.0)	3.0 (43.5)	2.0 (29.0)	1.0 (14.5)	-	-	-
	0.4 - 1.2	Optional			12.0 (174)	10.0 (145)	7.0 (102)	3.0 (43.5)	-	-	-
PN9226E	1.0 - 2.0	Yes			16.0 (232)	16.0 (232)	16.0 (232)	11.0 (160)	-	-	-
PN9223E	2.0 - 4.0	Yes						16.0 (232)	-	-	-
PN9320E	0.2 - 1.0	Optional			11.0 (160)	9.0 (131)	7.0 (102)	3.0 (43.5)	-	-	-
	0.4 - 1.2	Optional			16.0 (232)	16.0 (232)	15.0 (218)	8.0 (116)	-	-	-
PN9330E	0.4 - 1.2	Yes	-	-	-	-	-	-	4.0 (58.0)	3.0 (43.5)	2.0 (29.0)
PN9336E	1.0 - 2.0	Yes	-	-	-	-	-	-	13.0 (189)	10.0 (145)	6.0 (87.0)
PN9337E	2.5 - 3.5	Yes	-	-	-	-	-	-	16.0 (232)	16.0 (232)	16.0 (232)
PN9337E	2.5 - 3.5	Yes	-	-	-	-	-	-			

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

PNS4000 spring-to-retract actuators

Valve size				DN15 (½")	DN20 (¾")	DN25 (1")	DN32 (1¼")	DN40 (1½")	DN50 (2")	DN65 (2½")	DN80 (3")	DN100 (4")
Kv				4.0	6.3	10	16	25	36	63	100	160
Travel mm				20 mm (0.79")						30 mm (1.2")		
Actuator	Spring range	Positioner required	Minimum air pressure	Maximum differential pressure Class IV bar (psi)								
PNS4220	0.2 - 1.0	Optional	1.4 (20.3)	12.1 (175)	8.4 (122)	3.0 (43.5)	2.3 (33.4)	1.3 (18.9)	-	-	-	-
	0.2 - 1.0	Yes	2.0 (29.0)	16.0 (232)	16.0 (232)	12.1 (175)	9.9 (144)	6.9 (100)	3.3 (47.9)	-	-	-
	0.2 - 1.0	Yes	3.0 (43.5)			16.0 (232)	16.0 (232)	16.0 (232)	8.4 (122)	-	-	-
	0.2 - 1.0	Yes	4.0 (58.0)						13.5 (196)	-	-	-
PNS4320	0.2 - 1.0	Optional	1.4 (20.3)			9.1 (132)	7.4 (107)	5.1 (74.0)	2.3 (33.4)	-	-	-
	0.2 - 1.0	Yes	2.0 (29.0)			16.0 (232)	16.0 (232)	16.0 (232)	8.4 (122)	-	-	-
	0.2 - 1.0	Yes	3.0 (43.5)						16.0 (232)	-	-	-
PNS4420	0.2 - 1.0	Optional	1.4 (20.3)	-	-	15.1 (219)	12.4 (180)	8.8 (128)	4.4 (63.8)	-	-	-
	0.2 - 1.0	Yes	2.0 (29.0)	-	-	16.0 (232)	16.0 (232)	16.0 (232)	13.5 (196)	-	-	-
	0.2 - 1.0	Yes	3.0 (43.5)	-	-				16.0 (232)	-	-	-
PNS4430	0.2 - 1.0	Optional	1.4 (20.3)	-	-	-	-	-	-	2.2 (31.9)	1.7 (24.7)	-
	0.2 - 1.0	Yes	2.0 (29.0)	-	-	-	-	-	-	7.4 (107)	5.9 (85.6)	3.7 (53.7)
	0.2 - 1.0	Yes	3.0 (43.5)	-	-	-	-	-	-	16.0 (232)	13.1 (190)	8.4 (122)
	0.2 - 1.0	Yes	4.0 (58.0)	-	-	-	-	-	-		16.0 (232)	13.1 (190)

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

PN9000 spring-to-retract actuators

Valve size			DN15 (½")	DN20 (¾")	DN25 (1")	DN32 (1¼")	DN40 (1½")	DN50 (2")	DN65 (2½")	DN80 (3")	DN100 (4")
Kv			4.0	6.3	10	16	25	36	63	100	160
Travel mm			20 mm (0.79")						30 mm (1.2")		
Actuator	Spring range	Positioner required	Maximum differential pressure Class IV bar (psi)								
PN9120R	0.2 - 1.0	Optional	16.0 (232)	16.0 (232)	16.0 (232)	16.0 (232)	16.0 (232)	16.0 (232)	-	-	-
	0.4 - 1.2	Optional						15.0 (218)	-	-	-
PN9126R	1.0 - 2.0	Yes						12.0 (174)	-	-	-
PN9123R	2.0 - 4.0	Yes						5.0 (72.5)	-	-	-
PN9220R	0.2 - 1.0	Optional						16.0 (232)	-	-	-
	0.4 - 1.2	Optional							-	-	-
PN9226R	1.0 - 2.0	Yes							-	-	-
PN9223R	2.0 - 4.0	Yes							-	-	-
PN9320R	0.2 - 1.0	Optional							-	-	-
	0.4 - 1.2	Optional							-	-	-
PN9330R	0.4 - 1.2	Yes	-	-	-	-	-	-	16.0 (232)	16.0 (232)	16.0 (232)
PN9336R	1.0 - 2.0	Yes	-	-	-	-	-	-			14.0 (203)
PN9337R	2.5 - 3.5	Yes	-	-	-	-	-	-	6.0 (87.0)	4.0 (58.0)	3.0 (43.5)

Valve dimensions (approximate) in mm (inches)

Valve Size		Connection and Dimensions											
		Tube end				Threaded		Sanitary clamp		Dimensions common to all connections			
		A		B		A and B		A and B		C		D	
		mm	inches	mm	inches	mm	inches	mm	inches	mm	inches	mm	inches
DN15	½"	70	2.76	24	0.94	-		42.0	1.65	64	2.52	43	1.69
DN20	¾"			26	1.02	-		44.0	1.73				
DN25	1"			40	1.57	55	2.17	60.3	2.37	73	2.87	57	2.24
DN32	1¼"			43	1.69	66	2.60	64.5	25.4	75	2.95		
DN40	1½"			49	1.93	70	2.76	69.9	2.75	80	3.15		
DN50	2"	85	3.35	54	2.13	82	3.23	88.9	3.5	91	3.58	65	2.56
DN65	2½"	105	4.13	68	2.68	105	4.13			95	3.74	85	8.35
DN80	3"			83	3.27	110	4.33	95.3	3.75	121	4.76		
DN100	4"	130	5.12	96	3.78	150	5.91	114.3	232	133	5.24	97	3.82

Valve weights approximate in kg (lbs)

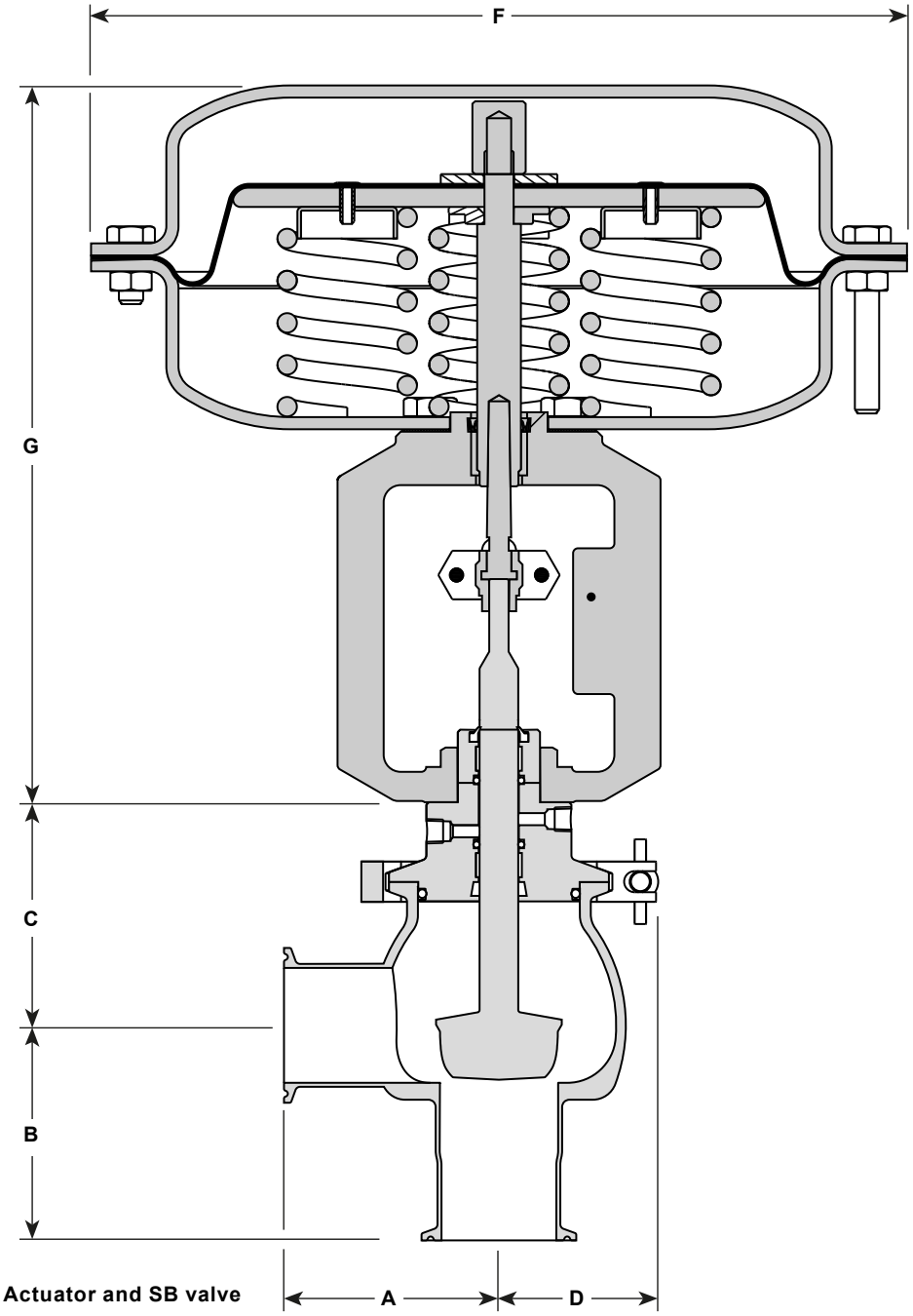
Valve size		Model SB, SA			
		Sanitary clamp and screwed		Tube end	
		kg	lbs	kg	lbs
DN15	½"	1.5	3.31	1.0	2.20
DN20	¾"				
DN25	1"	2.5	5.51	2.0	4.41
DN32	1¼"	3.0	6.61		
DN40	1½"			2.5	5.51
DN50	2"	4.0	8.82	3.0	6.61
DN65	2½"	6.5	14.3	5.5	12.1
DN80	3"	8.0	17.6	7.0	15.4
DN100	4"	11.0	24.3	10.0	22.0

Actuator dimensions and weights (approximate) in mm (inches) and kg (lbs)

Actuator type	F		G		Weight	
	mm	inches	mm	inches	kh	lbs
PNS3200 and PNS4200 series	209	8.23	240	9.45	7.2	15.9
PNS3300 and PNS4300 series	285	11.2	264	10.4	11.2	24.7
PNS3420 and PNS4420 series	336	13.2	263	10.4	20.0	44.1
PNS3430 and PNS4430 series			328	12.9		
PNS3530 series	405	15.9	367	14.4	22.6	49.8
PNS3630 series	465	18.3	400	15.7	38.0	83.8

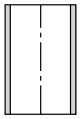
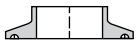
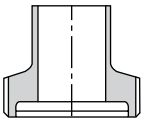
Dimensions/weights (approximate) in mm (inches) and kg (lbs)

Actuator range	F		G		Weight	
	mm	inches	mm	inches	kg	lbs
PN9100E and variants	275	10.8	170	6.69	6	0.24
PN9100R and variants						
PN9200E and variants	300	11.8	300	11.8	17	0.67
PN9200R and variants						
PN9320E and variants	325	12.8	390	15.4	27	1.1
PN9320R and variants						
PN9330E and variants						
PN9330R and variants						



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.
Note: All sizes are available for each connection/specification unless otherwise stated.

Connection		Specification	Code
Butt weld and Tube weld		DIN 11850 (Series 2)	OO
		ASME BPE (Not available for size DN32)	OD
Sanitary clamp		ASME BPE (Tri-clamp®) (Not available for size DN32)	AO
		DIN 32676 A	SO
		DIN 32676 B	BO
Aseptic-thread (fitted on pipe)		DIN 11864 T1 Form A	GS
		DIN 11864 TI Form B	GT
		DIN 11887 (11851)	GU
		SMS 1146 (Not available for the DN15 and DN20 (½" and ¾") sizes)	GV

How to order

Ordering a control valve

Valve size	DN15, DN20, DN25, DN32, DN40, DN50, DN65, DN80 and DN100		**DN15**
	Note: DN15, DN20 and DN32 is not available for certain end connections - see page 13		
Valve series	SB = Two-port angle pattern design with Aseptic Steam Sanitized Bonnet		**SB**
	SA = Two-port angle pattern design		
Valve characteristic	E = Equal percentage		**E**
	L = Linear		
Body material	6 = 316L stainless steel		**6**
Connection standard	To be specified - See page 13		**OO**
Seating option	S = Stainless steel		**S**
Stem and body sealing option	V = White Viton (FDA, USP 26 Class VI approved)		**V**
Internal surface finish	0 = Standard 0.375 µm mechanical polishing (ASME BPE SFV4)		**0**
Kv	To be specified		**4**

Ordering a PNS, PN or PNP pneumatic actuator

Type	**PNS pneumatic actuator**	PNS = Pneumatic stainless steel	**PN**
	PN or PNP pneumatic actuator	PN = Pneumatic epoxy coated	
		PNP = Pneumatic electroless nickel plated (ENP)	
Series and action	**PNS pneumatic actuator**	3 = 3000 multi-spring (spring-to-extend)	**3**
		4 = 4000 multi-spring (spring-to-retract)	
	PN or PNP pneumatic actuator	9 = 9000 series	
Diaphragm area	**PNS pneumatic actuator**	2 = 310 cm^2 (48.1 in^2)	**1**
		3 = 490 cm^2 (76.0 in^2)	
		4 = 710 cm^2 (110 in^2)	
	PN or PNP pneumatic actuator	1 = 100 cm^2 (15.5 in^2)	
		2 = 340 cm^2 (52.7 in^2)	
		3 = 670 cm^2 (104 in^2)	
Travel	**PNS pneumatic actuator**	2 = 20mm (0.79")	**2**
		3 = 30 mm (1.2")	
	PN or PNP pneumatic actuator	2 = 20 mm (0.79")	
		3 = 30 mm (1.2")	
Spring range	**PNS pneumatic actuator**	0 = 0.2 to 1.0 bar (0.4 to 1.2 bar) (2.90 to 14.5 psi (5.80 to 17.4 psi))	**0**
		6 = 1.0 to 3.0 bar (14.5 to 43.5 psi)	
	PN or PNP pneumatic actuator	0 = 0.2 to 1.0 bar (0.4 to 1.2 bar) (2.90 to 14.5 psi (5.80 to 17.4 psi))	
		3 = 2.0 to 4.0 bar (29.0 to 58.0 psi)	
		6 = 1.0 to 2.0 bar (14.5 to 29.0 psi)	
		7 = 2.5 to 3.5 bar (36.3 to 50.8 psi)	
Travel	E = Spring to extend		**E**
	R = Spring to retract		

Ordering example:

1 off Spirax Sarco Steri-trol type DN15 SBE6OOSV04 and 1 pneumatic actuator type PNS3320. Having a spring range of 0.4 to 1.2 bar.

Spare parts

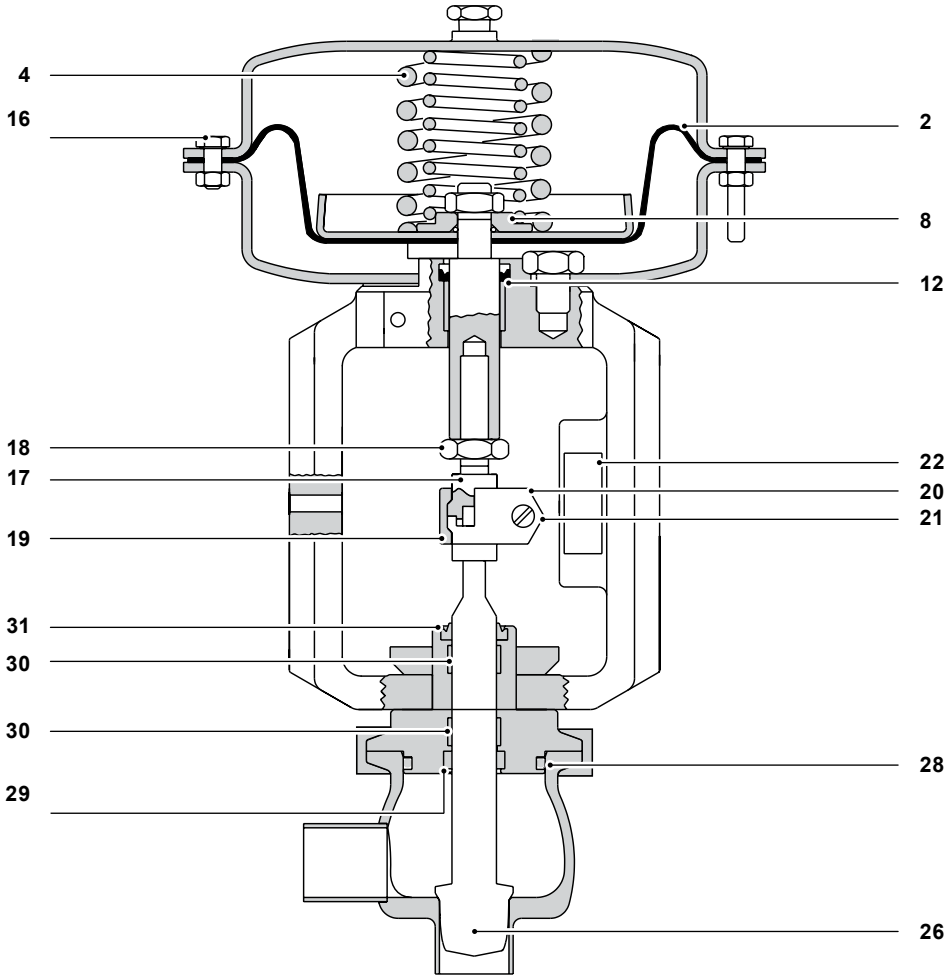
The available spares are identified by the part numbers listed below. When placing an order for spare parts, always specify the actuator or the valve model (shown on the data plate) and the name of the part as described below.

Available spares for the SA and SB 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	SA and SB models	Valve stem seal set	(excluding bonnet seal)			29, 30 and 31
		Bonnet seal	Viton	(packet of 3)		28
		Plug and stem	(Equal percentage or Linear)			26

Spare parts ordering example:

1 off Valve stem seal set for a Steri-trol DN15 SBE6OOSV04 two-port control valve.
1 off Stem seal kit for a type PNS3320 pneumatic actuator having a spring range 0.4 to 1.2 bar.

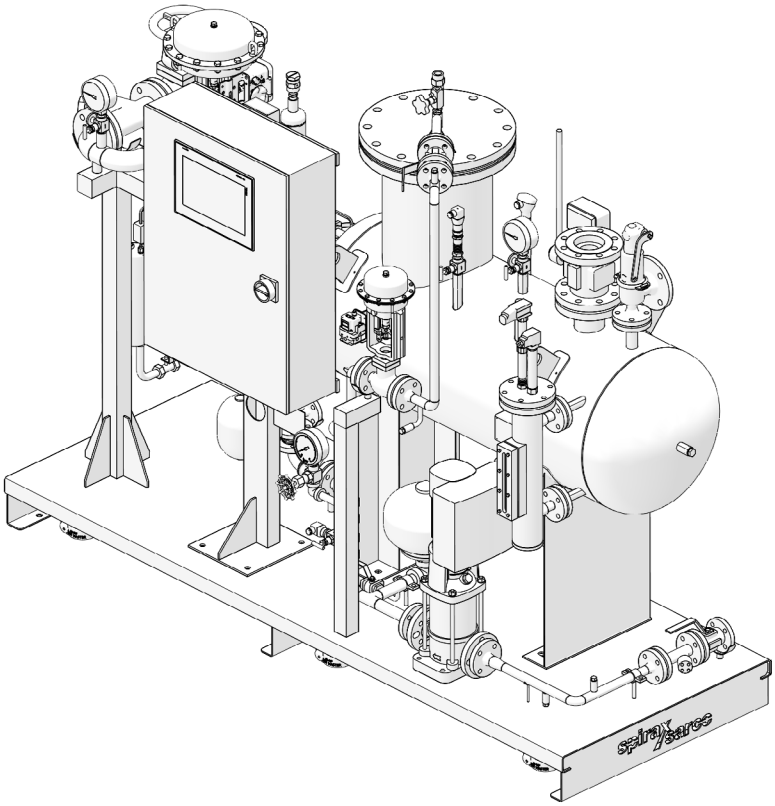


Actuator and SA valve

Note: For PN9000 actuator spares please refer to TI-P357-30

TI-P663-01
TES Issue 12

CSG-HS
Clean steam generation system for Healthcare



Description

The Spirax Sarco CSG-HS Clean Steam Generator range has been specifically designed for sterilisation applications within the Healthcare sector and to produce high quality steam under a wide variety of operating conditions. The system operates using plant steam as the primary heating medium. All Systems are supplied packaged and ready to install with simple commissioning.

Product range

Size:	**CSG-HS - 020**	nominal production capacity 200 kg/h (441 lbs/hr)*
	CSG-HS - 055	nominal production capacity 550 kg/h (1213 lbs/hr)*
	CSG-HS - 125	nominal production capacity 1250 kg/h (2756 lbs/hr)*
	CSG-HS - 180	nominal production capacity 1800 kg/h (3968 lbs/hr)*
Versions/Applications:	**HS**	Healthcare sterilisation.

(*) max steam production at reference operating conditions: primary steam at 9 bar g (131 psi g), production at 4 bar g (58 psi g), feed water at 20 °C (68 °F).

Construction and main features

- System complete, functional and safe
- Compact design
- Modulating pressure and level control: pressure stability and steam quality improvement
- Intelligent PLC with SIMS technology, easy maintenance
- Packaged system with on board wired control panel: easy installation
- Automated start up/commissioning sequence
- High quality dryness exceeds EN285 and ST79 on performance
- Configurable options to suit individual needs
- System diagnostics
- Preventive maintenance
- Spirax Sarco's worldwide service

Compliances available **but not standard** in all geographies

	EMEA		Americas		Asia Pacific	
	STD	On request	STD	On request	STD	On request
- CE mark with EU declaration of conformity according to the following directives:	●					●
- 2014/68/EU (PED)	●					●
- 2014/35/EU (LVD)	●					●
- 2014/30/EU (EMC)	●					●
- ASME design with U stamp certification			●			
- Chinese GB national standard					●	
- Seismic compliance		●		●		●

Design conditions

Primary side	Design pressure		12.8 bar g	(186 psi g)
	Design temperature		194.4 °C	(382 °F)
Secondary side	Design pressure		8 bar g	(116 psi g)
	Design temperature		194.4 °C	(382 °F)
	Safety valve set pressure		7 bar g	(101.5 psi g)
Feedwater	Design pressure		8 bar g	(116 psi g)
	Design temperature	without pump / with pump	110 °C	(230 °F)

For a bespoke design, contact Spirax Sarco

Maximum operating conditions

	Without pump	With pump
Production	Clean saturated steam, up to 6 bar g/165.0 °C (Clean saturated steam, up to 87 psi g/329 °F)	
Primary side	Plant steam, up to 12 bar g/191.7 °C (Plant steam, up to 174 psi g/377 °F)	
Feedwater	P min. ≥ P clean steam + 0.5 bar g (P min. ≥ P clean steam + 7.25 psi g)	Minimum Supply Pressure (see IM)
	P max 8 bar g/T max 110 °C (P max 116 psi g/T max 230 °F)	P max 8 bar g/T max 100 °C (P max 116 psi g/T max 212 °F)

Minimum ambient temperature: 0 °C (32 °F)
Designed for indoor installation only, protect from freezing.

Note: Feedwater is recommended to be demineralised or Reverse Osmosis quality to ensure high performance.

Utilities

	Unit without pump	Unit with pump
Electrical supply (cabinets)	1 x 90-132 V AC or 1 x 180-264 V AC 50/60 Hz 0.4 kW (inst.)	3 x 200-460 V AC* 50/60 Hz 1 kW (sizes 020-055) (inst.) 1.5 kW (size 125) (inst.) 2 kW (size 180) (inst.)
Air supply (filters)	Minimum 5 bar g (72.5 psi g) to maximum 7 bar g (101.5 psi g) (only for the unit with pneumatic actuators)	

***Note:** A single leg is taken from the three phase supply to power the PSU, ensure the single leg will have a voltage in the range required for single phase.

Energy Efficiency

Insulation:

- Different options are available to avoid radiation losses – see product nomenclature and selection guide.

Flash heat recovery options are available to optimise your system efficiency:

- Localised CSG heat recovery – bespoke feed water preheating solution
- EVC – Exhaust Vent Condenser from a Condensate Receiver/Hot well
- FREME - Flash Recovery Energy Management Equipment
- Flash Vessel with Steam Jet Thermocompressor (SJT)

Please contact Spirax Sarco who can propose an optimised solution with consideration to your wider system.

The generator and hot piping should be insulated to prevent thermal losses. Where insulation options don't provide complete coverage, additional insulation should be applied as needed.

Option (see nomenclature)	Generator Body Thickness (mm)	Hot Piping Thickness (mm)
O - Not Insulated	none	none
1 - Steam Generator body only	50 mm	none
2 - Steam Generator and hot piping only	50 mm	50 mm
3 - Steam Generator body to EnEV specification + hot piping	100 mm	50 mm

Insulation material: Rockwool

Cladding material: For carbon steel frame and cabinet option - Aluminium
For stainess steel frame and cabinet option - Stainless steel 304

Performance of the units

Max clean steam production (kg/h), with feedwater at 20 °C:	Plant steam pressure/bar g	Clean steam pressure/bar g		
		4.5	4.0	3.5
CSG-HS - 020	10.0	220	254	292
	9.5	200	234	271
	9.0	180	214	250
	8.5	159	192	229
	8.0	137	170	207
CSG-HS - 055	10.0	583	677	788
	9.5	531	620	727
	9.0	480	566	666
	8.5	426	511	606
	8.0	370	456	548
CSG-HS - 125	10.0	1,292	1,516	1,627
	9.5	1,171	1,385	1,490
	9.0	1,044	1,254	1,490
	8.5	930	1,126	1,350
	8.0	823	996	1,213
CSG-HS - 180	10.0	1,884	2,210	2,542
	9.5	1,692	2,016	2,361
	9.0	1,501	1,818	2,162
	8.5	1,313	1,619	1,959
	8.0	1,134	1,417	1,750

Max clean steam production (lbs/hr), with feedwater at 68 °F:	Plant steam pressure/psi g	Clean steam pressure/psi g		
		65.3	58.0	50.8
CSG-HS - 020	145.0	485	559	643
	137.8	441	515	598
	130.5	396	471	551
	123.3	350	424	504
	116.0	303	376	456
CSG-HS - 055	145.0	1285	1,492	1,736
	137.8	1170	1,368	1,602
	130.5	1058	1,248	1,468
	123.3	940	1,127	1,336
	116.0	815	1,006	1,208
CSG-HS - 125	145.0	2,849	3,341	3,587
	137.8	2,581	3,052	3,285
	130.5	2,302	2,764	3,285
	123.3	2,051	2,483	2,977
	116.0	1,814	2,195	2,673
CSG-HS - 180	145.0	4,153	4,872	5,603
	137.8	3,731	4,445	5,206
	130.5	3,309	4,009	4,767
	123.3	2,894	3,569	4,319
	116.0	2,500	3,124	3,858

Dimensions approximate in mm and weights kg of a standard unit

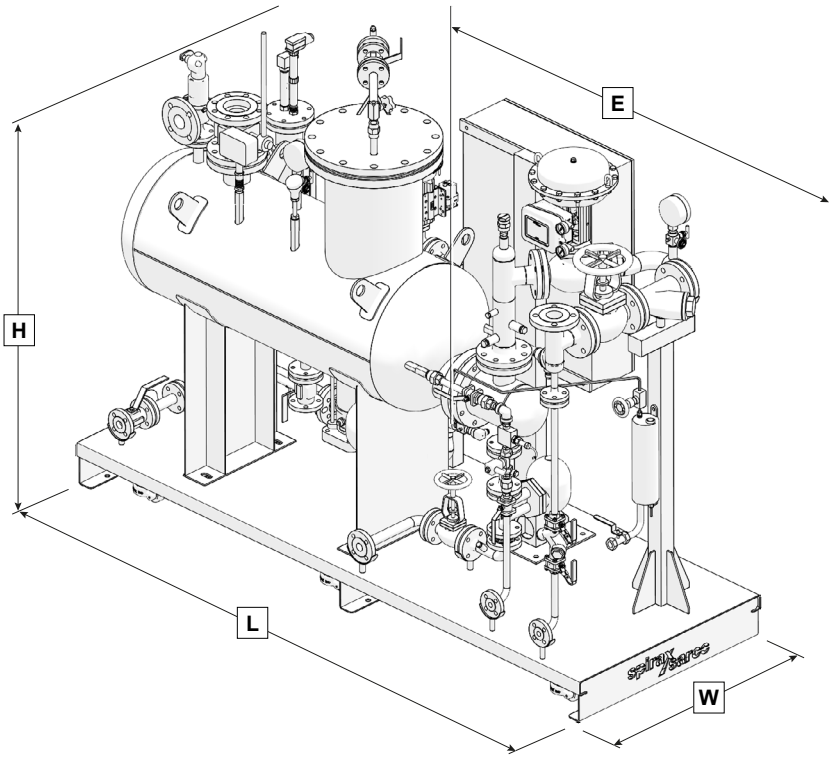
	Dimensions					Weights		
	L Length	**W** Width	**H** Height	**E** Clearance for tube bundle extraction	xxx Clearance height for de-aerator extraction	Empty	In operation	Maximum
CSG-HS 020	2000	850	1850	1250	485	730	830	980
CSG-HS 055	2350	850	1850	1300	520	940	1140	1340
CSG-HS 125	2450	1450	2060	1600	630	1300	1650	1900
CSG-HS 180	2950	1450	2065	2000	630	1550	2050	2450

Dimensions and weights of the units with EnEV option - insulation 100 mm

	Dimensions					Weights		
	L Length	**W** Width	**H** Height	**E** Clearance for tube bundle extraction	xxx Clearance height for de-aerator extraction	Empty	In operation	Maximum
CSG-HS 020	2500	950	1975	1250	485	920	1000	1200
CSG-HS 055	2750	1100	2050	1300	520	1090	1300	1500
CSG-HS 125	2550	1450	2200	1600	630	1520	1850	2100
CSG-HS 180	3100	1500	2240	2000	630	1700	2150	2500

Indicated dimensions are the maximum dimensions for a specific configuration of the package.

For detailed dimensions of the unit, size and position of the connections, clearance for the tube bundle extraction, weights and other constructive information, refer to the specific general arrangement drawing of the product.



For dimensions and weights in inches and lbs, please go the next page

Dimensions approximate in inches and weights lbs of a standard unit

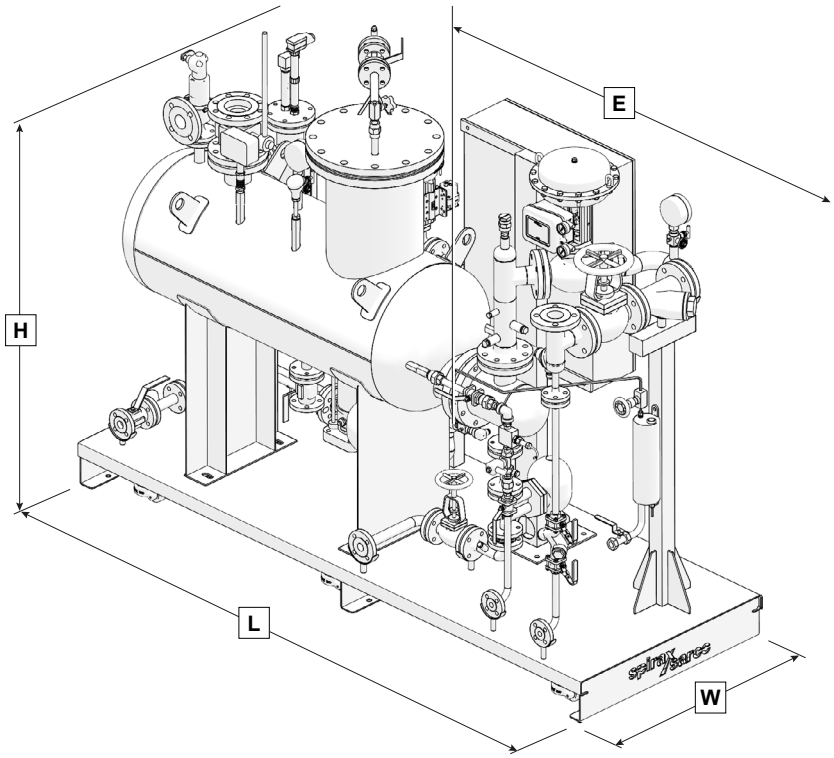
	Dimensions					Weights		
	L Length	**W** Width	**H** Height	**E** Clearance for tube bundle extraction	xxx Clearance height for de-aerator extraction	Empty	In operation	Maximum
CSG-HS 020	79	33	73	49	19	1610	1830	2161
CSG-HS 055	93	33	73	51	20	2073	2514	2955
CSG-HS 125	96	57	81	63	25	2867	3638	4190
CSG-HS 180	116	57	81	79	25	3418	4520	5402

Dimensions and weights of the units with EnEV option - insulation 100 mm

	Dimensions					Weights		
	L Length	**W** Width	**H** Height	**E** Clearance for tube bundle extraction	xxx Clearance height for de-aerator extraction	Empty	In operation	Maximum
CSG-HS 020	98	37	78	49	19	2029	2205	2646
CSG-HS 055	108	43	81	51	20	2403	2867	3308
CSG-HS 125	100	57	87	63	25	3352	4079	4631
CSG-HS 180	122	59	88	79	25	3749	4741	5513

Indicated dimensions are the maximum dimensions for a specific configuration of the package.

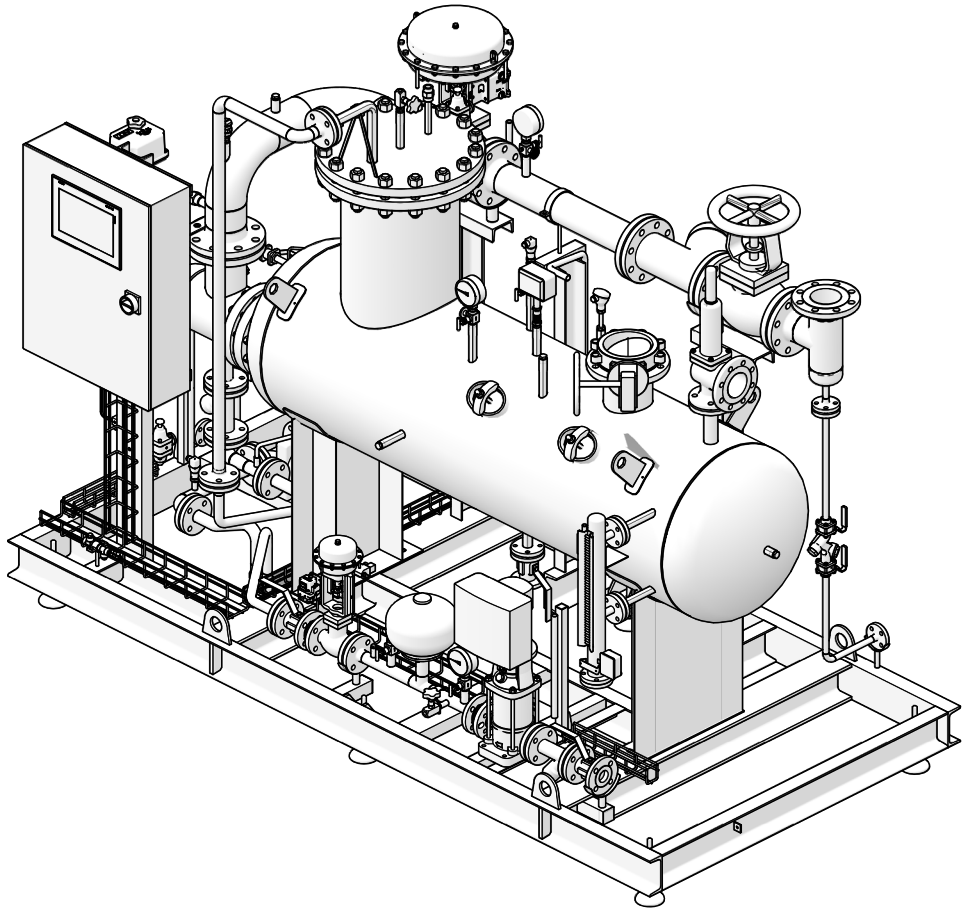
For detailed dimensions of the unit, size and position of the connections, clearance for the tube bundle extraction, weights and other constructive information, refer to the specific general arrangement drawing of the product.



For dimensions and weights in mm and kg, please go the previous page

Connections

	Metric				Imperial			
	020	**055**	**125**	**180**	**020**	**055**	**125**	**180**
Plant steam inlet connection	DN32 PN16	DN50 PN16	DN80 PN16	DN100 PN16	1¼" ANSI 150	2" ANSI 150	3" ANSI 150	4" ANSI 150
Condensate outlet connection	DN25 PN16	DN25 PN16	DN40 PN16	DN40 PN16	1" ANSI 300	1" ANSI 300	1½" ANSI 300	1½" ANSI 300
Clean steam outlet connection	DN50 PN40	DN80 PN40	DN125 PN16	DN150 PN16	2" ANSI 300	3" ANSI 300	5" ANSI 300	6" ANSI 300
Feedwater inlet connection	DN15 PN40	DN20 PN40	DN25 PN40	DN32 PN40	½" ANSI 300	¾" ANSI 300	1" ANSI 300	1¼" ANSI 300
Safety valve discharge	1" G-f	DN50 PN16	DN80 PN16	DN80 PN16	1" NPT	1¼" NPT*	3" NPT	3" NPT
Not condensable vent connection	¼" G-f	¼" G-f	¼" G-f	¼" G-f	¼" NPT	½" NPT	¼" NPT	¼" NPT
Drain connection	DN25 PN40	DN25 PN40	DN25 PN40	DN25 PN40	1" ANSI 300	¾" ANSI 300	1" ANSI 300	1" ANSI 300
Plant steam condensate drain connection	DN15 PN40	DN15 PN40	DN15 PN40	DN15 PN40	½" ANSI 150	½" ANSI 150	½" ANSI 150	½" ANSI 150
TDS Blowdown connection	DN15 PN40	DN15 PN40	DN15 PN40	DN15 PN40	½" ANSI 150	½" ANSI 150	½" ANSI 150	½" ANSI 150
Sampling system (cooling water in/ out - sample out)	½" BSP - 6 mm	½" BSP - 6 mm	½" BSP - 6 mm	½" BSP - 6 mm	½" BSP	½" BSP	½" BSP	½" BSP
Options								



Product nomenclature and selection guide

The product nomenclature is based on the characteristics of the main elements and options, identified as follows:

Basic configuration				
Design code	E	EN		
	A	ASME		
	G	GB		
	J	JBA		
Shell type	F	Flanged openable		
Unit size:	020	Up to 200 kg/h	(441 lbs/hr)	(at the reference operating conditions ^)
	055	Up to 550 kg/h	(1213 lbs/hr)	
	125	Up to 1250 kg/h	(2756 lbs/hr)	
	180	Up to 1800 kg/h	(3968 lbs/hr)	
Valve actuation type	PN	Pneumatic (fail-safe)		
	EL	Electric (fail-safe)		
Control	P1	ABB AC500 series + 7" display		
	P2	Allen-Bradley CompactLogix 1700 series + 7" display		
	P3	Siemens S7.1200 series + 7" display		
	P4	Selective Control Panel (with PLC ABB AC500 series + 7" display)		
Communication interface	C0	None		
	C1	BACnet IP		
	C2	Profinet		
	C3	Modbus TCP/IP		
	C4	BACnet MSTP		
	C5	Profibus		
	C6	Modbus RTU		
	C7	BACnet (BTL cert.) IP		
	C8	BACnet (BTL cert.) MSTP		
Unit frame/Electrical cabinet	0	Base and cabinet made of carbon steel, painted		
	1	Open frame and cabinet made of carbon steel, painted		
	2	Frame w. side panels and cabinet made of carb. steel, painted		
	3	Base and cabinet made of stainless steel (304) *, **		
	4	Open frame and cabinet made of stainless steel (304) *, **		
	5	Frame with side panels and cabinet made of stainless steel (304) *, **		
	7	Seismic, Base and cabinet made of carb. steel, painted		
Control Panel location	S	Side		
Insulation	1	Steam generator body only		
	2	Steam generator and hot piping		
	3	Steam generator body to EnEV and hot piping		
	0	Not insulated		

* This configuration will include pressure safety valve on CSG with body and internals made of stainless steel
** This option/configuration is not allowed with P4 control (Selective Control Panel)

Product nomenclature and selection guide continued on next page

Product nomenclature and selection guide (continued)

Handling wheels and feet	N	None (only plates with anchor holes are provided)
	F	Adjustable feet
	W	Pivoting wheels, lockable, with feet
Plant steam inlet shut-off valve	M	Manual stop valve
	AE	Automatic electric isolation valve**
Plant steam line trapping	N	None
	T	Plant steam line trapping station
TDS control system	1	Timed TDS blowdown
	2	TDS control with external probe (discontinuous metering) **
	3	TDS control system w. internal probe (continuous metering) **
Sampling cooler	N	None
	S	Sample-cooler and sampling valve
Feedwater pressurisation system	N	None (water P > clean steam P + 0,5 bar g)
	P	Pump with VFD **
Independent downstream plant protection	N	None
	L	Self-monitoring low level probe LP30 (available only with LP20) **
	T	Temperature limiter **
Feedwater pre-heating	N	None ***
Intelligent diagnostics	N	None
	I1	System diagnostics **
	I3	Integrity test **
	I4	System diagnostics + Integrity test **
Clean steam outlet shut-off valve	N	None
	M	Manual stop valve
	AE	Automatic electric isolation valve**
Test and certifications	S	EU PED test and CE marking of the assembly
	U	ASME U stamp
	M	MOM compliance
	K	KGS compliance
	D	DOSH compliance
	GC	GB standard in Chinese language
	GE	GB standard in English language
	SF	None (as assembly)
Level indicator	V	Viscorol (Magnetic Level Indicator)
	L	LP20 (Capacitance Level Probe)

** This option/configuration is not allowed with P4 control (Selective Control Panel)

*** Bespoke energy recovery options can be developed tailored to specific operating conditions (e.g. condensate subcooling or flash recovery)

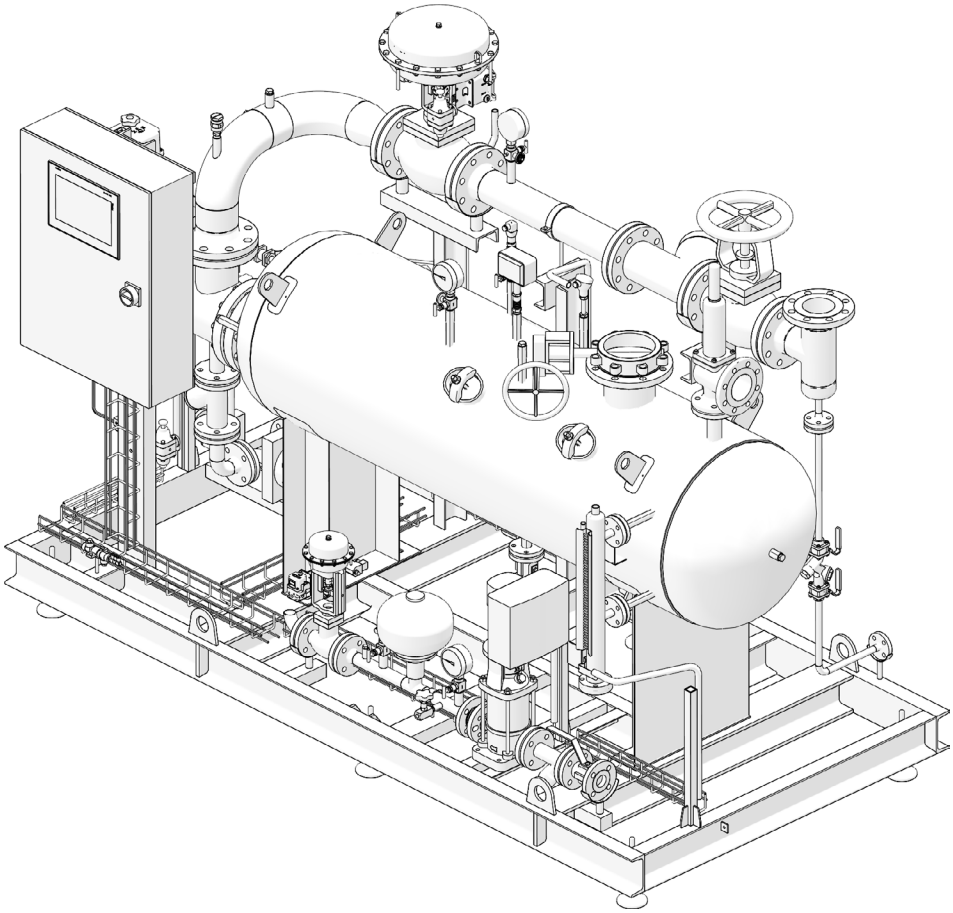
Product nomenclature example

CSG-HS E F 020 - PN P3 C1 - 1 F 2 F - AE T - 3 S P L N I7 - AE S L

Not all configurations are available in every country. Please contact your local Spirax Sarco representative for more details.

TI-P664-01
TES Issue 12

CSG-FB
Clean steam generation system for Food & Beverage



Description

Spirax Sarco has created a new range of steam generators for food and beverage applications to deliver food quality steam, specifically for direct injection processes within the food & beverage industry sector, where steam is considered as an ingredient. Primary heating medium is plant steam and the secondary steam should be generated from either de-mineralised or reverse osmosis quality water. All generators are supplied as packaged solutions ready to install and commission.

Designed, manufactured and approved for Steam and Condensate applications. This product complies with EC1935:2004 Food Contact Materials. It also complies with regulation EC2023:2006 on good manufacturing practice for materials and articles intended to come into contact with food.

Product range

Size:	**CSG-FB-020**	nominal production capacity 200 kg/h (441 lbs/hr)*	(*) max steam production at reference operating conditions: primary steam at 10 bar g (145 psi g), production at 5 bar g (73 psi g), feed water at 20 °C (68 °F).
	CSG-FB-050	nominal production capacity 500 kg/h (1102 lbs/hr)*	
	CSG-FB-110	nominal production capacity 1100 kg/h (2425 lbs/hr)*	
	CSG-FB-160	nominal production capacity 1600 kg/h (3527 lbs/hr)*	
Versions/Applications:	**FB**	Food and Beverage steam injection	

Construction and main features

- System complete, functional and safe
- Compact design
- Modulating pressure and level control: pressure stability and steam quality improvement
- Intelligent PLC with SIMS technology, easy maintenance
- Packaged system with on board wired control panel: easy installation
- Automated start up/commissioning sequence
- Configurable options to suit individual needs
- System diagnostics
- Preventive maintenance
- Spirax Sarco's worldwide service

Compliances available **but not standard** in all geographies

	EMEA		Americas		Asia Pacific	
	STD	On request	STD	On request	STD	On request
- CE mark with EU declaration of conformity according to the following directives:	●					●
- 2014/68/EU (PED)	●					●
- 2014/35/EU (LVD)	●					●
- 2014/30/EU (EMC)	●					●
- EC1935/2004 requirements as products intended to come into contact with food.	●					
- ASME design with U stamp certification			●			
- Chinese GB national standard					●	
- GB4806 requirements as products intended to come into contact with food.						●
- Seismic compliance		●		●		●

Design conditions

Primary side	Design pressure		12.8 bar g	(186 psi g)
	Design temperature		194.4 °C	(382 °F)
Secondary side	Design pressure		8 bar g	(116 psi g)
	Design temperature		194.4 °C	(382 °F)
	Safety valve set pressure		7 bar g	(101.5 psi g)
Feedwater	Design pressure		8 bar g	(116 psi g)
	Design temperature	without pump	110 °C	(230 °F)
		with pump		

For a bespoke design, contact Spirax Sarco

Maximum operating conditions

	Without pump	With pump	
Production	Clean saturated steam, up to 6 bar g/165.0 °C (Clean saturated steam, up to 87 psi g/329 °F)		
Primary side	Plant steam, up to 12 bar g/191.7 °C (Plant steam, up to 174 psi g/377 °F)		
Feedwater	P min. ≥ (P clean steam*1.1) + 0.5 bar g (P min. ≥ (P clean steam*1.1) + 7.3 psi g) Note, If pre-heater option selected, up to an additional 0.5 bar (7.3 psi) of feedwater pressure may be needed in excess of the calculation above depending upon system size and process conditions.	Minimum Supply Pressure (see IM)	Minimum ambient temperature: 32 °F (0 °C) Designed for indoor installation only, protect from freezing.
	P-target. ≥ (P clean steam*1.1) + 1 bar g * (P-target. ≥ (P clean steam*1.1) + 14.5 psi g) *This pressure may need to be varied on commissioning, see IM. Note, If pre-heater option selected, up to an additional 0.5 bar (7.3 psi) of feedwater pressure may be needed in excess of the calculation above depending upon system size and process conditions.		
	P max 8 bar g/T max 110 °C (P max 116 psi g/T max 230 °F)	P max 8 bar g/T max 100 °C (P max 116 psi g/T max 212 °F)	

Note: Feedwater is recommended to be demineralised or Reverse Osmosis quality to ensure high performance.

Energy Efficiency

Insulation:

- Different options are available to avoid radiation losses – see product nomenclature and selection guide.

Flash heat recovery options are available to optimise your system efficiency:

- Localised CSG heat recovery – bespoke feed water preheating solution
- EVC – Exhaust Vent Condenser from a Condensate Receiver/Hot well
- FREME - Flash Recovery Energy Management Equipment
- Flash Vessel with Steam Jet Thermocompressor (SJT)

Please contact Spirax Sarco who can propose an optimised solution with consideration to your wider system.

The generator and hot piping should be insulated to prevent thermal losses. Where insulation options don't provide complete coverage, additional insulation should be applied as needed.

Option (see nomenclature)	Generator Body Thickness (mm)	Hot Piping Thickness (mm)
0 - Not Insulated	none	none
1 - Steam Generator body only	50 mm	none
2 - Steam Generator and hot piping only	50 mm	50 mm
3 - Steam Generator body to EnEV specification + hot piping	100 mm	50 mm

Insulation material
Rockwool

Cladding material
Stainless steel 304

Performance of the units

Max clean steam production (kg/h), with feedwater at 20 °C:			Clean steam pressure/bar g		
			4.5	4.0	3.5
CSG-FB-020	Plant steam pressure/bar g	10.0	225	259	297
		9.5	205	239	276
		9.0	185	219	255
		8.5	164	197	236
		8.0	142	175	212
CSG-FB-050		10.0	588	682	783
		9.5	536	625	732
		9.0	485	571	671
		8.5	431	516	611
		8.0	375	461	553
CSG-FB-110		10.0	1,302	1,526	1,637
		9.5	1,181	1,395	1,500
		9.0	1,054	1,264	1,500
		8.5	940	1,136	1,360
		8.0	833	1,006	1,223
CSG-FB-160		10.0	1,894	2,220	2,552
		9.5	1,702	2,026	2,371
		9.0	1,511	1,828	2,172
		8.5	1,323	1,629	1,969
		8.0	1,144	1,427	1,760

Max clean steam production (lbs/hr), with feedwater at 68 °F:			Clean steam pressure/psi g		
			65.3	58.0	50.8
CSG-FB-020	Plant steam pressure/psi g	145.0	496	570	654
		137.8	452	526	609
		130.5	407	482	562
		123.3	361	435	515
		116.0	314	387	467
CSG-FB-050		145.0	1296	1,503	1,747
		137.8	1181	1,379	1,613
		130.5	1069	1,259	1,479
		123.3	951	1,138	1,347
		116.0	826	1,017	1,219
CSG-FB-110		145.0	2,871	3,363	3,599
		137.8	2,603	3,074	3,307
		130.5	2,324	2,786	3,307
		123.3	2,073	2,503	2,999
		116.0	1,836	2,217	2,695
CSG-FB-160		145.0	4,175	4,894	5,625
		137.8	3,753	4,467	5,228
		130.5	3,331	4,031	4,789
		123.3	2,916	3,581	4,341
		116.0	2,522	3,146	3,880

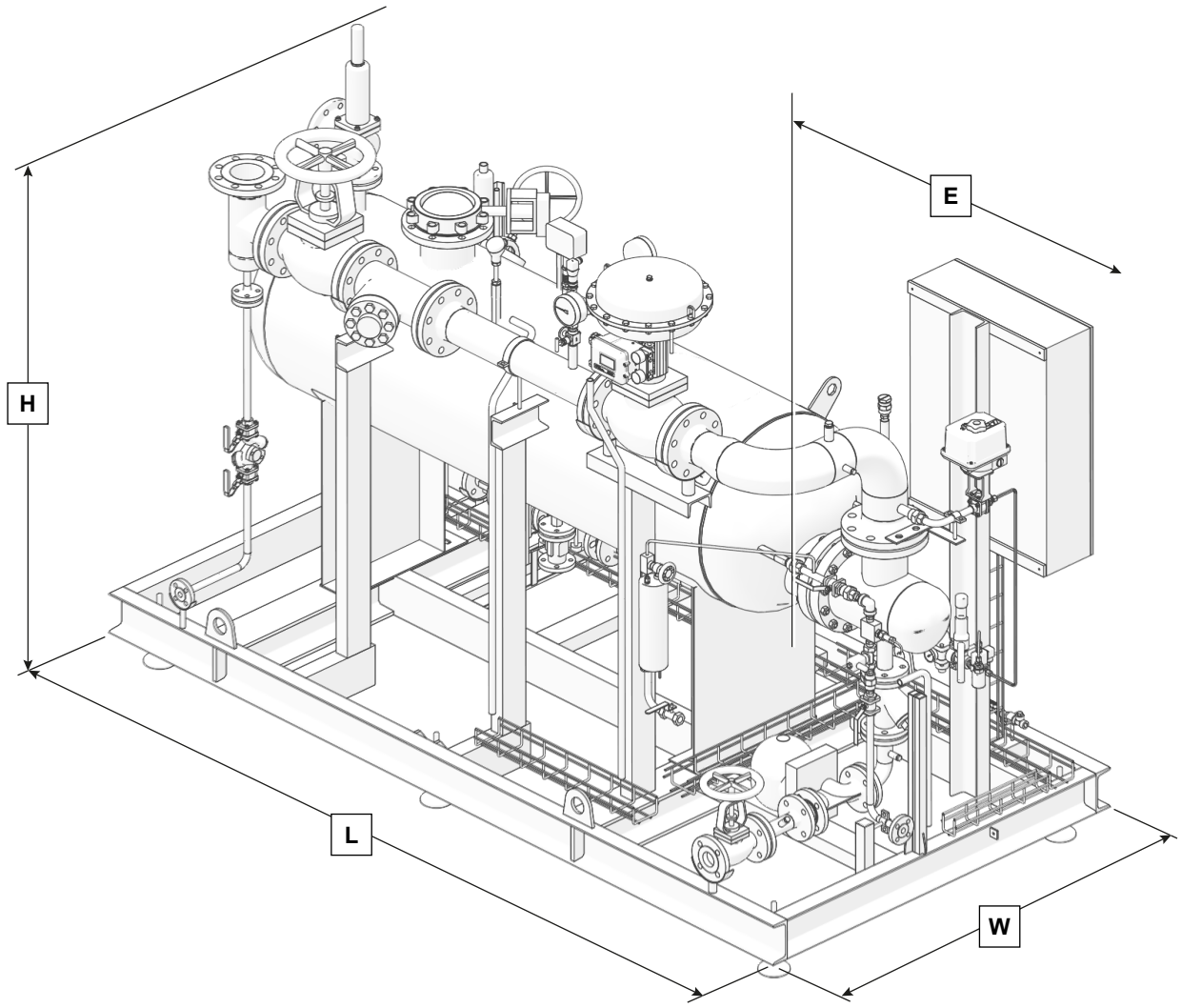
Clean steam pressure shown 3.5 bar g - 4.5 bar g (50.8 psi g - 65.3 psi g) illustrative only, full clean steam pressure range is 1 to 6 bar g (14.5 - 87 psi g).

Contact your Spirax Sarco representative for correct performance.

Dimensions and weights of the units with EnEV option - insulation 100 mm (3.94 in)

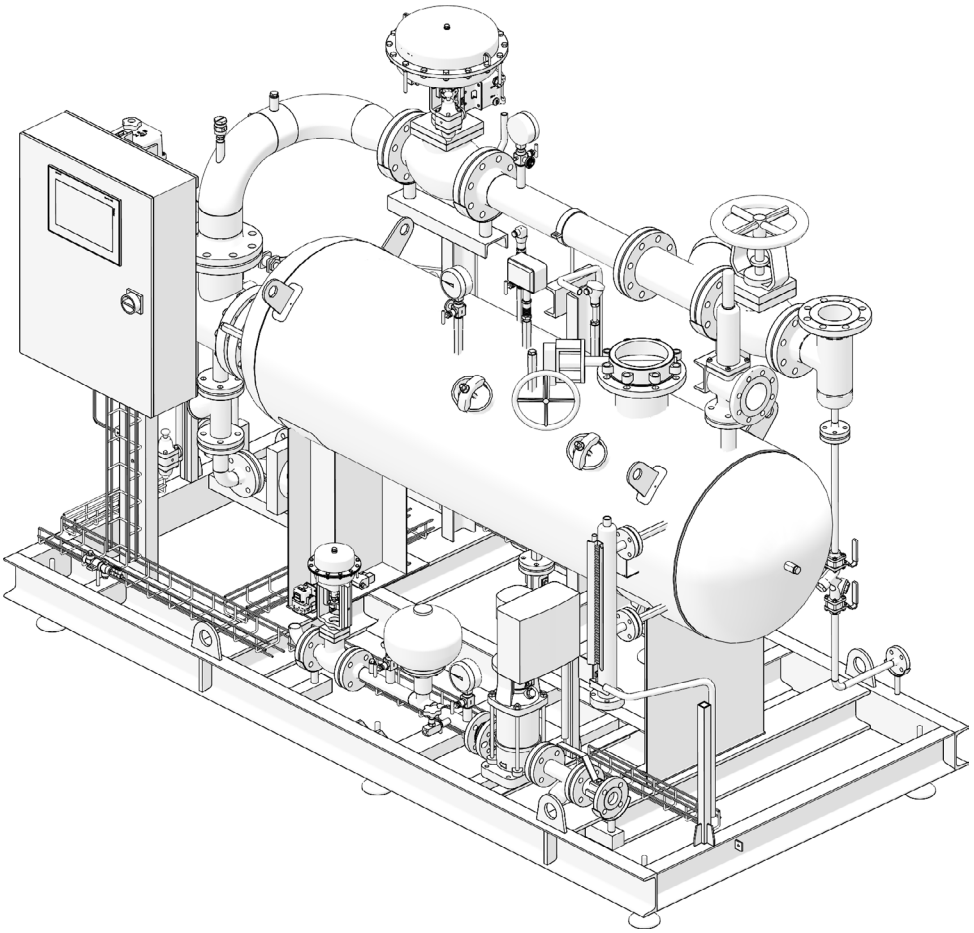
approximate in mm (inches) and kg (lbs)

	Dimensions mm (inches)				Weights kg (lbs)		
	L Length	W Width	H Height	E Clearance for tube bundle extraction	Empty	In operation	Maximum
CSG-FB 020	2100 (83)	950 (37)	1950 (77)	1250 (49)	700 (1543)	800 (1764)	950 (2094)
CSG-FB 050	2500 (98)	1100 (43)	2000 (79)	1300 (51)	1000 (2205)	1200 (2646)	1400 (3086)
CSG-FB 110	2550 (100)	1450 (57)	2250 (89)	1600 (63)	1300 (2866)	1600 (3527)	1850 (4079)
CSG-FB 160	3100 (122)	1500 (59)	2250 (89)	2000 (79)	1650 (3638)	2200 (4850)	2550 (5622)



Connections

	Metric				Imperial			
	020	050	110	160	020	050	110	160
Plant steam inlet connection	DN32 PN16	DN50 PN16	DN80 PN16	DN100 PN16	1¼" ANSI 150	2" ANSI 150	3" ANSI 150	4" ANSI 150
Condensate outlet connection	DN25 PN16	DN25 PN16	DN40 PN16	DN40 PN160	1" ANSI 300	1" ANSI 300	1½" ANSI 300	1½" ANSI 300
Clean steam outlet connection	DN50 PN40	DN80 PN40	DN125 PN16	DN150 PN16	2" ANSI 300	3" ANSI 300	5" ANSI 300	6" ANSI 300
Feedwater inlet connection	DN15 PN40	DN20 PN40	DN25 PN40	DN32 PN40	½" ANSI 300	¾" ANSI 300	1" ANSI 300	1¼" ANSI 300
Safety valve discharge	1" G-f	DN50 PN16	DN80 PN16	DN80 PN16	1" NPT	2" NPT*	3" NPT	3" NPT
Drain connection	DN25 PN40	DN25 PN40	DN25 PN40	DN25 PN40	1" ANSI 300	1" ANSI 300	1" ANSI 300	1" ANSI 300
Plant steam condensate drain connection	DN15 PN40	DN15 PN40	DN15 PN40	DN15 PN40	½" ANSI 150	½" ANSI 150	½" ANSI 150	½" ANSI 150
TDS Blowdown connection	DN15 PN40	DN15 PN40	DN15 PN40	DN15 PN40	½" ANSI 150	½" ANSI 150	½" ANSI 150	½" ANSI 150
Sampling system (cooling water in/ out-sample out)	½" BSP-6 mm	½" BSP-6 mm	½" BSP-6 mm	½" BSP-6 mm	½" BSP	½" BSP	½" BSP	½" BSP
Options								



Product nomenclature and selection guide

The product nomenclature is based on the characteristics of the main elements and options, identified as follows:

Basic configuration				Selection
Design code	E	EN		**E**
	A	ASME		
	G	GB		
	J	JBA		
Shell type	S	Flanged openable-shell and tube, flanged openable without integrated deaerator		**S**
Unit size	020	Up to 200 kg/h	(441 lbs/hr)	**020**
	050	Up to 500 kg/h	(1002 lbs/hr)	
	110	Up to 1100 kg/h	(2425 lbs/hr)	
	160	Up to 1600 kg/h	(3527 lbs/hr)	
		(at the reference operating conditions)		
Valve actuation type	PN	Pneumatic (fail-safe)		**PN**
	EL	Electric (fail-safe)		
Control	P1	ABB AC500 series + 7" display		**P3**
	P2	Allen-Bradley CompactLogix 1700 series + 7" display		
	P3	Siemens S7.1200 series + 7" display		
	P4	Selective Control Panel (with PLC ABB AC500 series + 7" display)		
Communication interface	C0	None		**C1**
	C1	BACnet IP		
	C2	Profinet		
	C3	Modbus TCP/IP		
	C4	BACnet MSTP		
	C5	Profibus		
	C6	Modbus RTU		
	C7	BACnet (BTL cert.) IP		
	C8	BACnet (BTL cert.) MSTP		
Unit frame/Electrical cabinet	0	Base and cabinet made of carbon steel, painted		**1**
	1	Open frame and cabinet made of carbon steel, painted		
	2	Frame w. side panels and cabinet made of carb. steel, painted		
	3	Base and cabinet made of stainless steel (304) *		
	4	Open frame and cabinet made of stainless steel (304) *		
	5	Frame with side panels and cabinet made of stainless steel (304) *		
	7	Seismic, Base and cabinet made of carb. steel, painted		
Control Panel location	S	Side		**S**
Insulation	1	Steam generator body only		**2**
	2	Steam generator and hot piping		
	3	Steam generator body to EnEV and hot piping		
	0	Not insulated		

* This option/configuration is not allowed with P4 control (Selective Control Panel)

Product nomenclature and selection guide continued on next page

Product nomenclature and selection guide (continued)

Handling wheels and feet	N	None (only plates with anchor holes are provided)	**F**
	F	Adjustable feet	
	W	Pivoting wheels, lockable, with feet	
Plant steam inlet shut-off valve	M	Manual stop valve	**M**
	AE	Automatic electric isolation valve *	
Plant steam line trapping	N	None	**T**
	T	Plant steam line trapping station	
TDS control system	1	Timed TDS blowdown	**2**
	2	TDS control with external probe (discontinuous metering) *	
Sampling cooler	N	None	**S**
	S	Sample-cooler and sampling valve	
Feedwater pressurisation system	N	None (water P > clean steam P + 0.5 bar g (7.25 psi g))	**P**
	P	Pump with VFD *	
Independent downstream plant protection	N	None	**T**
	T	Temperature limiter *	
Feedwater pre-heating	N	None ***	**N**
Intelligent diagnostics	N	None	**I1**
	I1	System diagnostics *	
	I3	Integrity test *	
	I4	System diagnostics + Integrity test *	
Clean steam outlet shut-off valve	N	None	**N**
	M	Manual stop valve	
	AE	Automatic electric isolation valve *	
Test and certifications	S	EU PED test and CE marking of the assembly	**S**
	U	ASME U stamp	
	M	MOM compliance	
	K	KGS compliance	
	D	DOSH compliance	
	GC	GB standard in Chinese language	
	GE	GB standard in English language	
	SF	None (as assembly)	
Level indicator	V	Viscorol (Magnetic Level Indicator)	**V**

** This option/configuration is not allowed with P4 control (Selective Control Panel)

*** Bespoke energy recovery options can be developed tailored to specific operating conditions (e.g. condensate subcooling or flash recovery)

Product nomenclature example

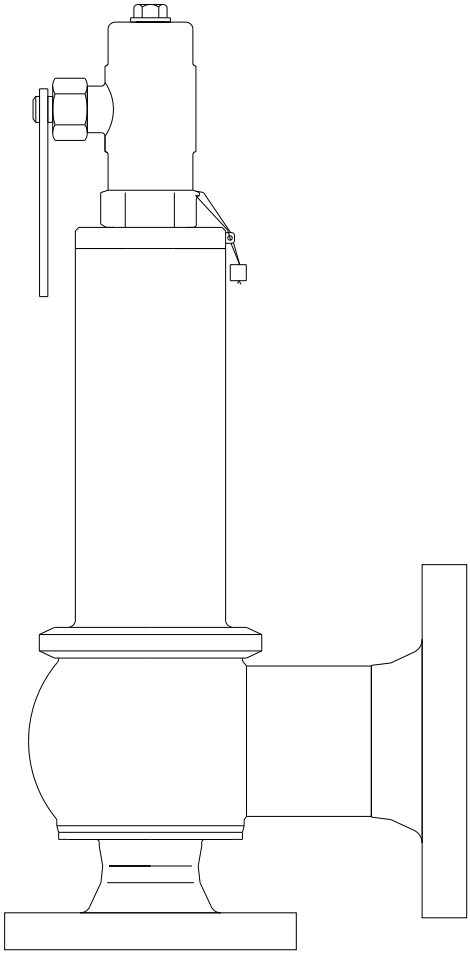
CSG-FB E S 020-PN P3 C1-1 S 2 F-M T-2 S P T N I1-N S V

Not all configurations are available in every country. Please contact your local Spirax Sarco representative for more details.

TI-P315-03
CTLS Issue 15

SVL488
Stainless Steel
Sanitary Safety Valve

Description
The SVL488 is a soft seated stainless steel, full lift, TÜV approved safety valve suitable for steam, gas and liquid applications.



Applications
The SVL488 is suitable for the overpressure protection of low pressure steam equipment, pipelines and pressure vessels, particularly within the brewing and beverage industries where extremely high standards of hygiene and cleanliness are required to maintain product quality and to minimise contamination of the process media.

Available types
Two main variations of the valve are available:
SVL488-B with a sealed cap for liquid service.
SVL488-C with a packed easing lever for steam (or other services where a lever is specified).

Note: Both designs have a closed bonnet and EPDM soft seat seal and bellows as standard.

Certification
A manufactures' Typical Test Report is provided as standard for each valve including valve set and hydraulic pressure. Also available on request is material certification in accordance with EN 10204 3.1.

Standards and approvals
- Approved by the TÜV to AD Merkblatt A2, TRD 421 and Vd TÜV SV100.
- EU Pressure Equipment Directive/UK Pressure Equipment (Safety) Regulations have been satisfied.
- The valve belongs to Category 4, having been designed for use with fluids in Group 1 and 2 (gases and liquids).

Always consult Spirax Sarco for fluid compatibility.

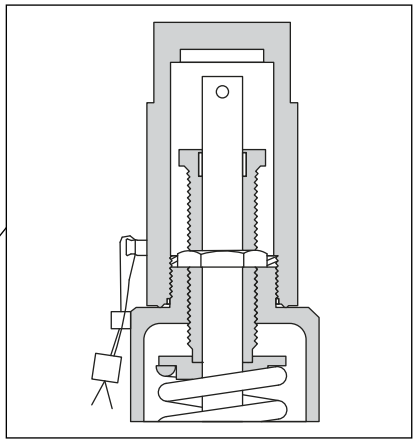
Sizes and end connections

Nominal inlet size	**DN**	25 (1")	40 (1½")	50 (2")	65 (2½")	80 (3")	100 (4")
Nominal outlet size	**DN**	40 (1½")	65 (2½")	80 (3")	100 (4")	125 (5")	150 (6")
Inlet clamp	**inch**	1½	2	2½	3	4	4½
Outlet clamp	**inch**	2	3	4	4½	5	6

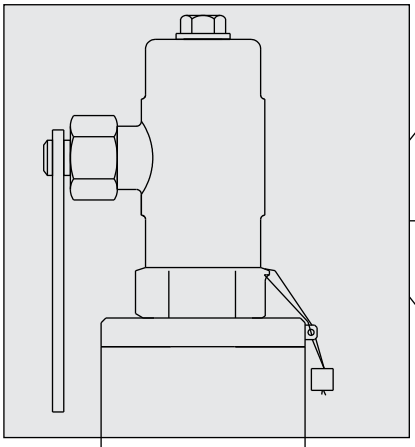
Pipe connections: Valves are available with flanged DIN 2633 PN16 or sanitary clamp ISO 2852 (ISO 2037 pipe standard) connections. Please state connection required when placing an order.

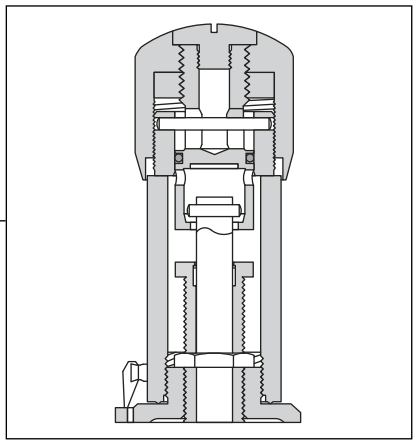
Optional extras
The standard inlet wetted surface finish is 0.75 µm (30 µin) Ra. Other finishes are available on request - Please contact Spirax Sarco.

Cap/lifting lever types

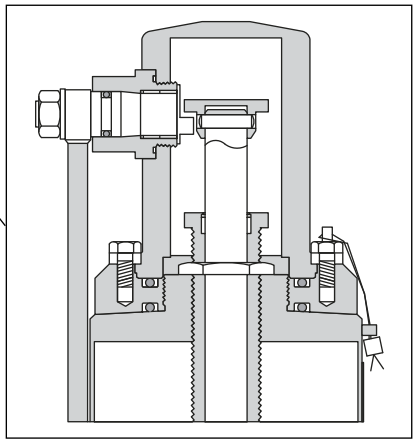


Gastight cap
All sizes

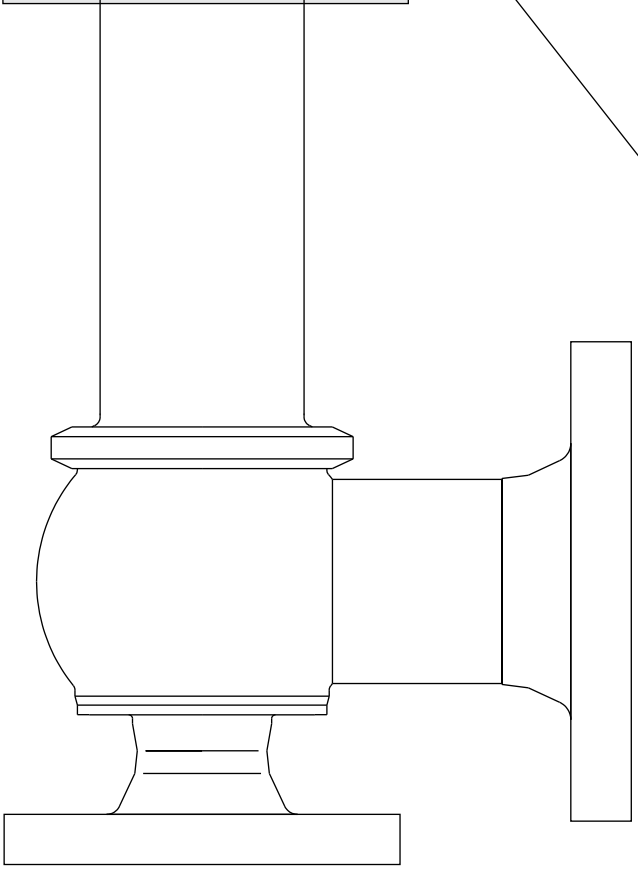




Gastight lifting device
DN25 (1") only

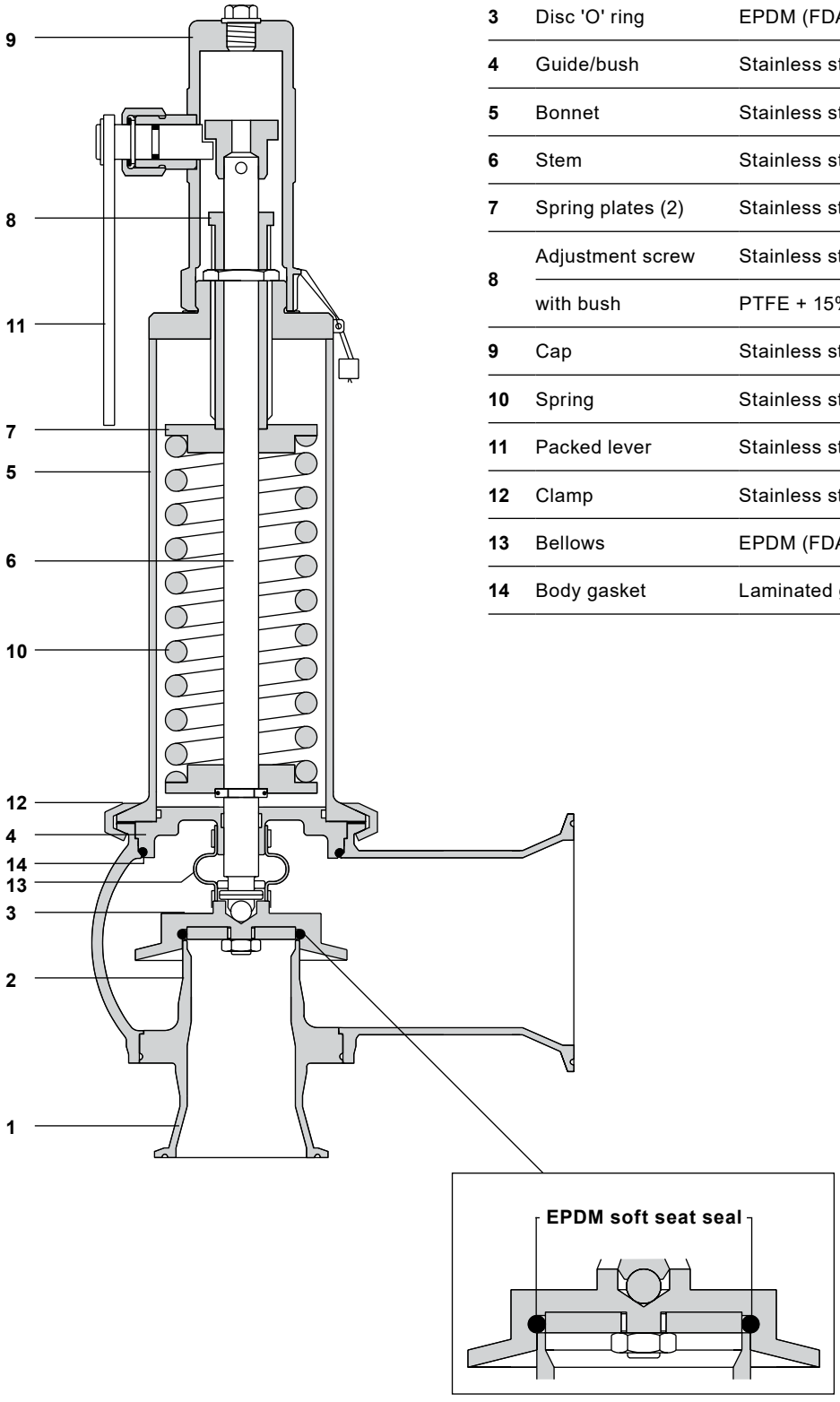


Packed lever
DN40 (1½") and larger

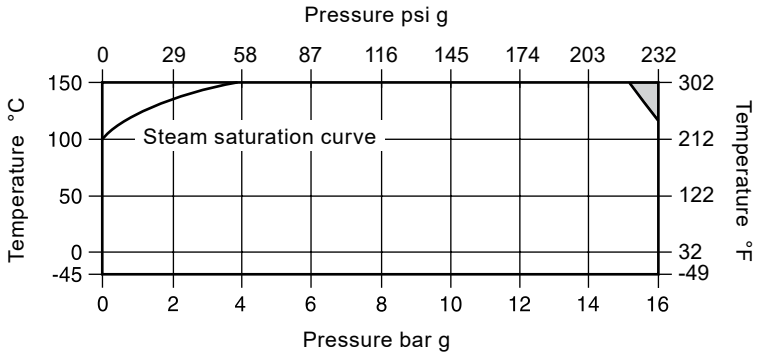


Materials

No.	Part	Material	
1	Body	Stainless steel	1.4404 316L
2	Seat	Stainless steel	1.4404 316L
	Disc	Stainless steel	1.4404 316L
3	Disc 'O' ring	EPDM (FDA approved)	
4	Guide/bush	Stainless steel	1.4404 316L/PTFE + 15% Glass
5	Bonnet	Stainless steel	1.4404 316L
6	Stem	Stainless steel	1.4404 316L
7	Spring plates (2)	Stainless steel	1.4404 316L
8	Adjustment screw	Stainless steel	1.4404 316L
	with bush	PTFE + 15% glass	
9	Cap	Stainless steel	1.4404 316L
10	Spring	Stainless steel	1.4310 301
11	Packed lever	Stainless steel	1.4404 316L
12	Clamp	Stainless steel	1.4401 316
13	Bellows	EPDM (FDA approved)	
14	Body gasket	Laminated graphite	



Pressure/temperature limits



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

Body design conditions					PN16
Set pressure range	DN25 and DN40 (1" and 1½")		Maximum	16 bar g	232 psi g
			Minimum	0.1 bar g	1.45 psi g
	DN50 (2")		Maximum	15 bar g	218 psi g
			Minimum	0.2 bar g	2.9 psi g
	DN65 and DN80 (2½" and 3")		Maximum	10.34 bar g	150 psi g
			Minimum	0.1 bar g	1.45 psi g
	DN100 (4")		Maximum	8.2 bar g	119 psi g
			Minimum	0.1 bar g	1.45 psi g
Temperature	With EPDM soft seat		Maximum	150 °C	302 °F
	All versions		Minimum	-45 °C	-49 °F
Performance data	Overpressure	Steam, gas	Maximum		10%
		Liquid	Maximum		10%
	Blowdown limits	Steam, gas	Maximum		10%
		Liquids	Maximum		20%
	Derated coefficient of discharge values αd	Steam, gas			0.70
		Liquid			0.45
Maximum permitted backpressure					10% of set pressure
Designed for a maximum inlet cold hydraulic test pressure of:				24 bar g	348 psi g

Table 1

SVL488 flow capacity for dry saturated steam in kilogrammes per hour (kg/h) and pounds per hour (lb/h)

(calculated at 10% overpressure. In accordance with EN ISO 4126)

Valve size DN in/out	DN25/40 (1"/1½")	DN40/65 (1½"/2½")	DN50/80 (2"/3")	DN65/100 (2½"/4")	DN80/125 (3"/5")	DN100/150 (4"/6")
Flow diameter (mm)	23 (0.91)	37 (1.46)	46 (1.81)	60 (2.36)	74 (2.91)	92 (3.62)
Flow area (mm²)	416 (0.64 in²)	1 075 (1.67 in²)	1 662 (2.58 in²)	2 827 (4.38 in²)	4 301 (6.67 in²)	6 648 (10.3 in²)

Set pressure (bar g)	Dry saturated steam, kg/h					
0.2 (2.9)	151 (333)	390 (860)	604 (1332)	1027 (2264)	1562 (3444)	2415 (5324)
0.5 (7.25)	214 (472)	554 (1221)	857 (1889)	1457 (3212)	2217 (4888)	3427 (7555)
1.0 (14.5)	319 (703)	825 (1819)	1 275 (2811)	2 169 (4782)	3 300 (7275)	5 100 (11244)
2.0 (29)	504 (1111)	1 303 (2873)	2 015 (4442)	3 427 (7555)	5 213 (11493)	8 058 (17765)
3.0 (43.5)	678 (1495)	1 751 (3860)	2 707 (5968)	4 605 (10152)	7 006 (15446)	10 829 (23874)
4.0 (58)	843 (1858)	2 177 (4799)	3 366 (7421)	5 726 (12617)	8 711 (19204)	13 465 (29685)

Table 2

SVL488 flow capacity for air or normal cubic meters per hour (Nm^3/h) at 0 °C and 1013 mbar and standard cubic feet per minute (SCFM) at 32 °F and 14.7 psi.

(calculated in accordance with AD-MERKBLATT A2 and TRD 421)

Valve size DN in/out	DN25/40 (1"/1½")	DN40/65 (1½"/2½")	DN50/80 (2"/3")	DN65/100 (2½"/4")	DN80/125 (3"/5")	DN100/150 (4"/6")
Flow area (mm^2)	416 (0.64 in^2)	1 075 (1.67 in^2)	1 662 (2.58 in^2)	2 827 (4.38 in^2)	4 301 (6.67 in^2)	6 648 (10.3 in^2)

Set pressure (bar g)	Flow capacity for air Nm^3/h (SCFM)					
1.0 (14.5)	386 (245)	999 (633)	1545 (980)	2628 (1666)	3998 (2535)	6179 (3917)
2.0 (29)	625 (396)	1617 (1025)	2499 (1584)	4251 (2695)	6467 (4100)	9995 (6337)
3.0 (43.5)	852 (540)	2204 (1397)	3406 (2159)	5795 (3674)	8816 (5589)	13626 (8639)
4.0 (58)	1069 (678)	2768 (1755)	4278 (2712)	7278 (6414)	11071 (7019)	17111 (10848)
5.0 (72.5)	1287 (816)	3331 (2112)	5149 (3264)	8761 (5554)	13326 (8449)	20597 (13058)
6.0 (87.0)	1505 (954)	3895 (2469)	6021 (3817)	10243 (6494)	15581 (9878)	24083 (15268)
7.0 (102)	1723 (1092)	4459 (2827)	6892 (4369)	11726 (7434)	17836 (11308)	27568 (17478)
8.0 (116)	1941 (1231)	5023 (3185)	7763 (4922)	13208 (8374)	20091 (12738)	31054 (19688)
8.2 (119)	1985 (1258)	5136 (3256)	7937 (5032)	13505 (8562)	20542 (13024)	31752 (20131)
9.0 (131)	2159 (1369)	5587 (3542)	8635 (5475)	14691 (9314)	22346 (14167)	
10.0 (145)	2377 (1507)	6150 (3899)	9506 (6027)	16173 (10254)	24601 (15597)	
10.34 (150)	2451 (1554)	6334 (4016)	9793 (6209)	16658 (10561)	25343 (16067)	
12.0 (174)	2812 (1783)	7278 (4614)	11249 (7132)	The product **must not** be used in this region.		
14.0 (203)	3248 (2059)	8405 (5329)	12992 (8237)			
15.0 (218)	3466 (2197)	8957 (5679)	14735 (9342)			
16.0 (232)	3684 (2336)	9533 (6044)				

Table 3

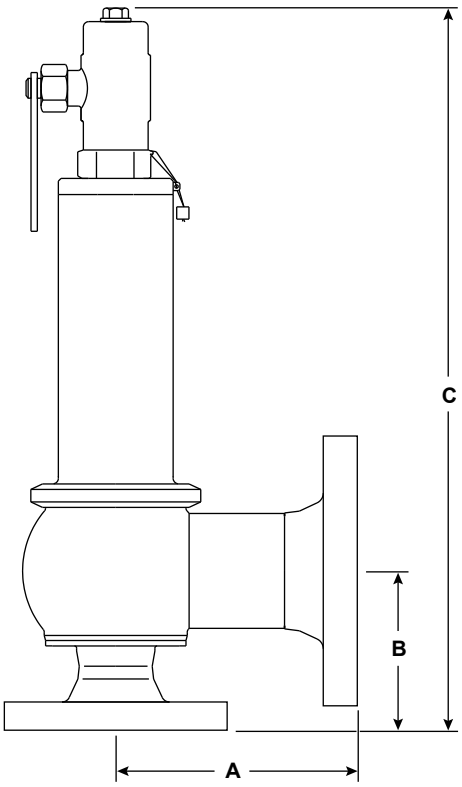
SVL488 flow capacity for water in kilogrammes per hour (kg/h) at 20 °C and pounds per hour (lb/h) at 68 °F.

(calcualted in accordance with AD-MERKBLATT A2 and TRD 421 at 10% overpressure)
Derated coefficient of discharge (Kdr) = 0.52

Valve size DN in/out	DN25/40 (1"/1½")	DN40/65 (1½"/2½")	DN50/80 (2"/3")	DN65/100 (2½"/4")	DN80/125 (3"/5")	DN100/150 (4"/6")
Flow area (mm²)	416 (0.64 in²)	1 075 (1.67 in²)	1 662 (2.58 in²)	2 827 (4.38 in²)	4 301 (6.67 in²)	6 648 (10.3 in²)

Set pressure (bar g)	Flow capacity for water kg/h (lb/h)					
1.0 (14.5)	9970 (21980)	25800 (56879)	39900 (87964)	67900 (149694)	103000 (227076)	160000 (352740)
2.0 (29)	14100 (31085)	36500 (80469)	56400 (124341)	96000 (211644)	126000 (277782)	226000 (498245)
3.0 (43.5)	17300 (38140)	44700 (98547)	69100 (152339)	118000 (260145)	179000 (394627)	276000 (608476)
4.0 (58)	19900 (43872)	51600 (113759)	79800 (175929)	136000 (299829)	206000 (454152)	319000 (703275)
5.0 (72.5)	22300 (49163)	57700 (127207)	89200 (196652)	152000 (335103)	231000 (509268)	357000 (787050)
6.0 (87.0)	24400 (53793)	63200 (139332)	97700 (215392)	166000 (365967)	253000 (557770)	391000 (862007)
7.0 (102)	26400 (58202)	68300 (150576)	106000 (233690)	180000 (369832)	273000 (601862)	422000 (930351)
8.0 (116)	28200 (62170)	73000 (160937)	113000 (249122)	192000 (423288)	292000 (643750)	451000 (994285)
8.2 (119)	28500 (62832)	73900 (162922)	114000 (251327)	194000 (427697)	292000 (643750)	458000 (1009717)
9.0 (131)	29900 (65918)	77400 (170638)	120000 (264555)	204000 (449743)	310000 (683433)	
10.0 (145)	31500 (69446)	81600 (179897)	126000 (277782)	215000 (473994)	326000 (718707)	
10.34 (150)	32000 (70548)	82700 (182322)	128000 (282192)	218000 (480608)	334000 (736343)	
12.0 (174)	34600 (76280)	89400 (197093)	138000 (304238)	The product **must not** be used in this region.		
14.0 (203)	37300 (82232)	96600 (212967)	149000 (328489)			
15.0 (218)	38600 (85098)	99700 (219801)	154000 (339512)			
16.0 (232)	39900 (87964)	103000 (227076)				

Dimensions/weights (approximate) in mm (inches) and kg (lbs)



Valve size Inlet/Outlet	A DIN 2633 Flanged PN16	A ISO 2852 Sanitary clamp	B DIN 2633 Flanged PN16	B ISO 2852 Sanitary clamp	C SVL488B sealed cap design	C SVL488C Packed lever design	Weight
DN25/40 (1"/1½")	134 (5.28)	112 (4.41)	99 (3.90)	75 (2.95)	264 (10.4)	332 (13.1)	9.0 (19.8)
DN40/65 (1½"/2½")	170 (6.69)	147 (5.79)	114 (4.49)	92 (3.62)	398 (15.7)	518 (20.4)	20.0 (44.1)
DN50/80 (2"/3")			123 (4.84)	99 (3.90)	406 (16.0)	534 (21.0)	21.7 (47.8)
DN65/100 (2½"/4")		153 (6.02)	132 (5.20)	109 (4.29)	415 (16.3)	552 (21.7)	26.5 (58.4)
DN80/125 (3"/5")	195 (7.68)	178 (7.01)	148 (5.83)	124 (4.88)	496 (19.5)	640 (25.2)	47.0 (104)
DN100/150 (4"/6")	198 (7.80)	181 (7.13)	166 (6.54)	149 (5.87)	514 (20.2)	684 (26.9)	56.0 (123)

Safety information, installation and maintenance

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

Installation note:

The safety valve should always be fitted with the centre line of the housing vertically above the line.

SVL488 safety valve selection guide

Model type	SVL488	**SVL488**
Configuration	A = Closed bonnet/pneumatic Lever	**B**
	B = Closed bonnet/sealed cap	
	C = Closed bonnet/packed easing lever	
Seal material	E = EPDM (FDA) 'O' Ring and bellows	**E**
	V = FKM 'O' ring and bellows	
Inlet connection	PN16 = Flanged PN16	**PN16**
	N = ANSI #150 RF ASME Flanged	
	T = ISO2852/ISO2037 Clamp Ends	
	S = ASME BPE Clamp Ends	
	D = DIN32676/DIN11850 Clamp Ends	

SVL488	-	**B**	-	**E**	-	**PN16**

How to order

Example: 1 off Spirax Sarco DN50 SVL488-B-E-PN16 safety valve with a set pressure of 10 bar g. (If the bellows is not required, please add 'without bellows').

TI-P154-08-US
Issue 2

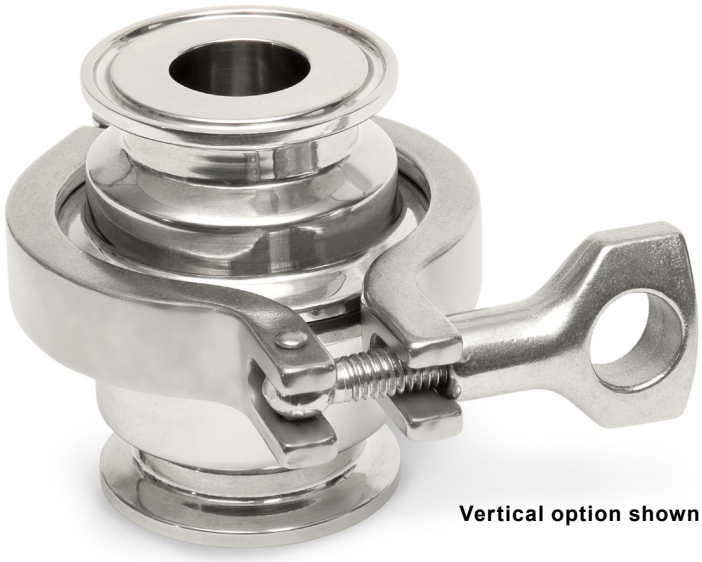
CVS10M
Maintainable Sanitary Check Valve

Description

The CVS10M Maintainable Sanitary Check Valve is a non-slam spring-assisted check valve designed to prevent flow reversal in industries with strict cleanliness codes.

To accommodate various piping arrangements, the CVS10M check valve is available for both vertical installation and horizontal installation when self draining is not required.

The CVS10M Check Valve, with a 316L stainless steel body and seat, is fastened with a quick release clamp and elastomeric gasket body seal to permit fast and easy access to the internals for maintenance. The disc and seat are lapped to provide excellent shutoff.



Vertical option shown

Features

- Meets 3A Standard 58-01
- Spring-assisted silent closing
- Horizontal or vertical installation
- Sizes ½" thru 4"
- 150 CWP, 108 ANSI Pressure Class
- 316L body and seat (A351 CF3M)
- 316 disc, spring and guide assembly
- Edge-guided disc: ½" thru 2"
- Edge/center-guided disc 2½", 3", 4"
- Lapped “metal" seat and disc
- Springs:
  - Low cracking pressures
  - 0.16 psi g to 0.66 psi g (2.32 bar g to 9.57 bar g)
  - Conical design
  - Electropolished finish
- Standard gasket body seal:
  - EPDM (300°F max temperature)
- Optional gasket body seal:
  - Tuf-Flex® (1) (300 °F (149 °C) maximum temperature)
  - Viton® (400 °F (204 °C) max temperature)
- CIP (Clean in Place)
- Clamped ends
- Seat leakage per MSS SP-61
- Options:
  - 15 Ra Internal Finish

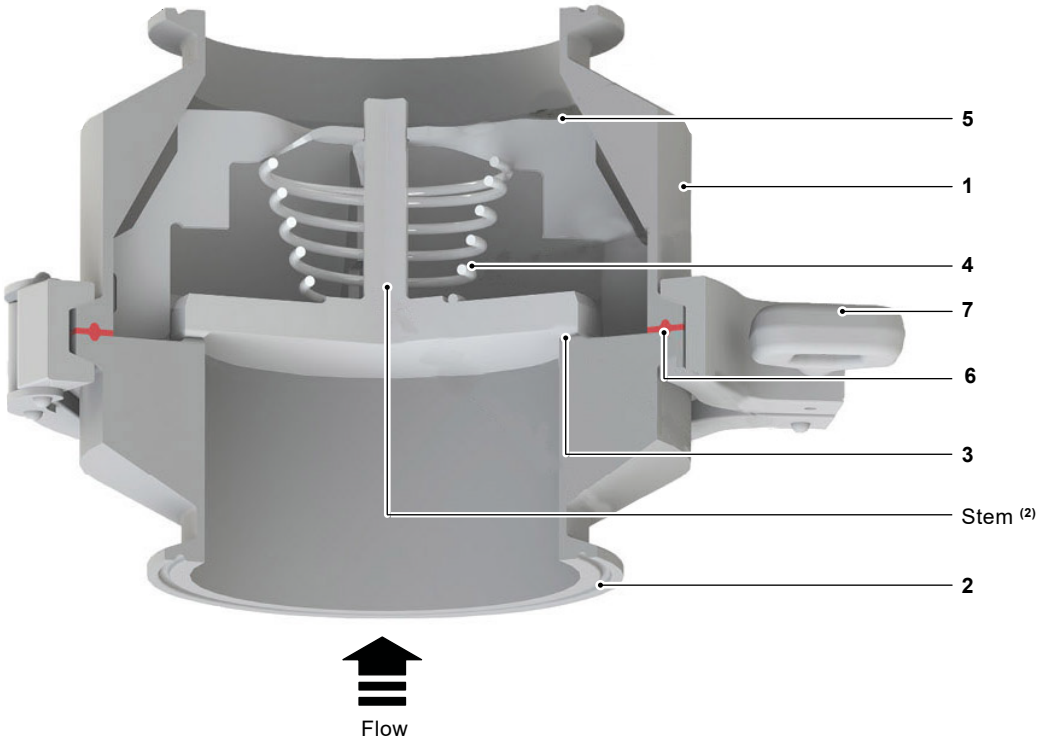
Pressure/temperature rating

Temperature		Pressure		Material Temperature Limit
°F	°C	psi g	bar g	
100	**38**	150	10.3	
200	**93**	125	8.6	
300	**149**	115	7.93	EPDM, TufFlex® (1)
400	**204**	105	7.24	Viton®

Note:

(1) PTFE grafted to an EPDM rubber inner core. Good for steam applications. Meets USDA, FDA and 3A Sanitary Standards and U.S. Pharmacopeia Class VI Certification.

Materials



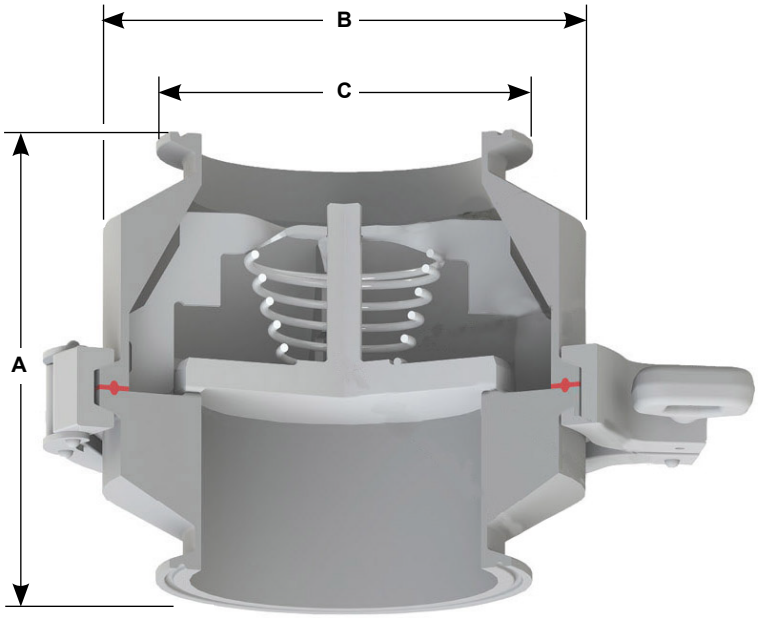
No.	Part	
1	Body	A351 CF3M
2	Seat	A351 CF3M
3	Disc	316 SS
4	Spring	316 SS (electropolished)
5	Guide assembly	316 SS
6	Gasket body seal	EPDM -75 °F to 300 °F (-59 °C to 149 °C)
7	Clamp	304 SS

Notes

** Other gasket body seal materials available upon request

(2) Sizes 2½", 3", 4"

Dimensions/weight (approximate) in inches (mm) and lbs (kg)



		½"	¾"	1"	1½"	2"	2½"*	3"*	4"*
Dimensions	A	2.5 (63.5)	2.25 (57.2)	2.92 (74.2)	3.29 (83.6)	4.03 (102)	5.56 (141)	4.38 (111)	5.5 (140)
	B	0.98 (24.9)		2.00 (50.8)	2.5 (63.5)	3.00 (76.2)	4.00 (102)		6.00 (152)
	C	0.98 (24.9)		1.98 (50.3)		2.52 (64.0)	3.05 (77.5)	3.58 (90.9)	4.68 (119)
Weight		1.4 (0.64)	1.3 (0.59)	2.3 (1.0)	2.8 (1.3)	3.9 (1.8)	9.9 (4.5)	6.1 (2.8)	14.9 (6.8)

* Edge/Center Guided Disc

	½"	¾"	1"	1½"	2"	2½"*	3"*	4"*
Cv	2.4	7	18	38	53	81	109	174
CP Flow Down	0.26	0.26	0.31	0.23	0.16	0.42	0.42	0.40
Flow Up	0.33	0.33	0.41	0.33	0.31	0.66	0.66	0.60

Available spares

Repair kit (includes spring, EPDM body seal, disc and disc guide)

TI-P029-10
CMGT Issue 9

CVS10
Sanitary Check Valve with Soft 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 soft-seated versions are available with either EPDM, FEP-Silicone or Viton seats for tight shut-off and are intended for use in water, process fluid and gas applications within the food, medical and pharmaceutical industries.

For steam applications a metal-seated version is available - See Technical Information sheet TI-P029-21 for further data.

The soft seat versions are suitable for SIP (Sterilisation-In-Place), where steam is used for sterilisation for short periods of time.

Available types and surface finish

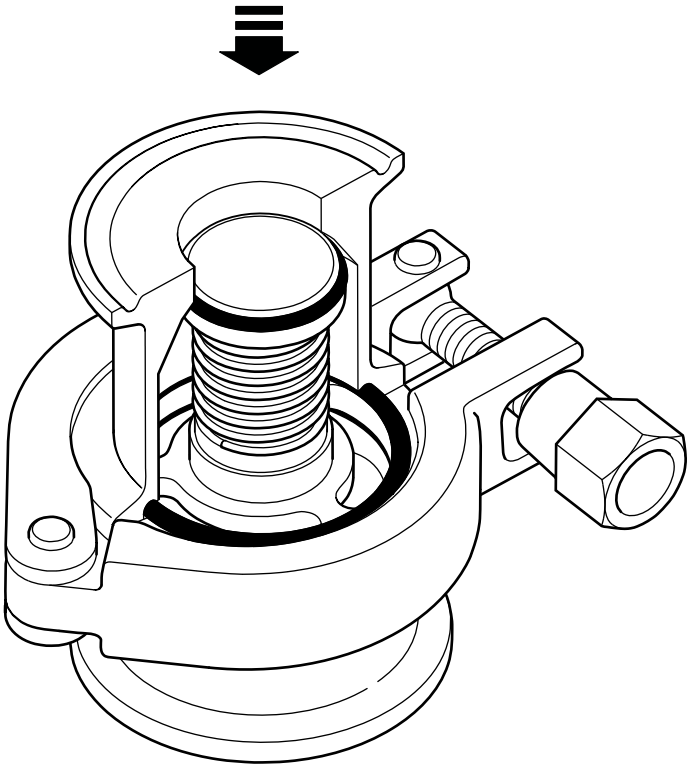
CVS10-1_ has an internal surface finish of 0.5 µm Ra (20 µin Ra) (within ASME BPE SF1), and external surface finish of 0.8 µm Ra (31 µin Ra).

CVS10-2_ has an electropolished internal surface finish of 0.38 µm RA (15 µin Ra) (within ASME BPE SF4), and external surface finish of 0.8 µm Ra (31 µin Ra).

In addition both the **CVS10-1** and **CVS10-2** are available with either **E**PDM, **V**iton or **F**EP-Silicone soft seats.

The model references have a suffix to denote which soft seat is fitted: '**E**' for EPDM, '**V**' for Viton or '**F**' for FEP-Silicone

For example, the model reference **CVS10-2E** denotes a **CVS10** with electropolished internal finish and EPDM soft seat.



1" valve shown

Standards:

- The CVS10 fully complies with the European Pressure Equipment Directive 2014/68/EU.
- The CVS10 is designed in accordance with ASME-BPE.
- All wetted elastomers/polymers comply with FDA regulation CFR 21, paragraph 177, section 2600 for EPDM and Viton, and section 1550 for FEP-Silicone and TFM PTFE.
- All elastomers/polymers are also USP Class VI compliant, and Animal Derived Ingredient (ADI) free.

Standard shut-off

The standard shut-off of the CVS10 check valve with soft seat conforms to EN 12266-1: 2003 Rate A.

Certification:

- EN 10204 3.1 material certification as standard.
- Typical surface finish certificates.
- FDA approval certificates for elastomers.
- USP class VI approval certificates.
- ADI free certificate.

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.

Sizes and pipe connections

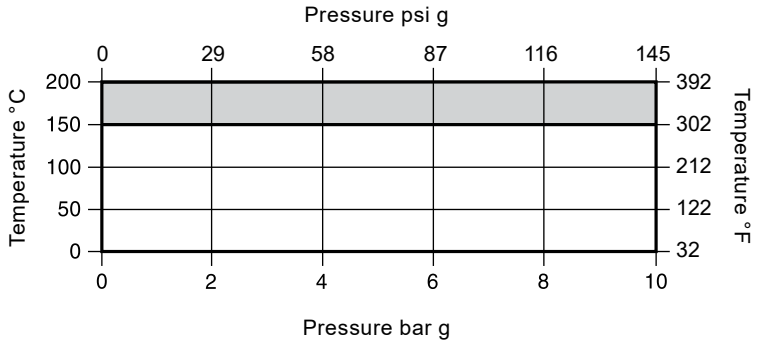
½", ¾", 1", 1½" and 2" to ASME BPE available as standard.
DN15 to DN50 to DIN 32676 available as standard.

Sanitary clamp	- ASME BPE clamp to Type A (½" and ¾")/Type B (1", 1½ and 2"). - Sanitary clamp to DIN 32676 Series A/Series 2.

	Standard	Issue	Type	Sizes				
Sanitary clamp ended variants	ASME BPE		Type A	½"	¾"			
			Type B			1"	1½"	2"
	DIN32676	2001-02	Series 2	DN15	DN20	DN25	DN40	DN50
		2009-05	Series A	DN15	DN20	DN25	DN40	DN50

Note: Alternative connections and sizes are available on request.

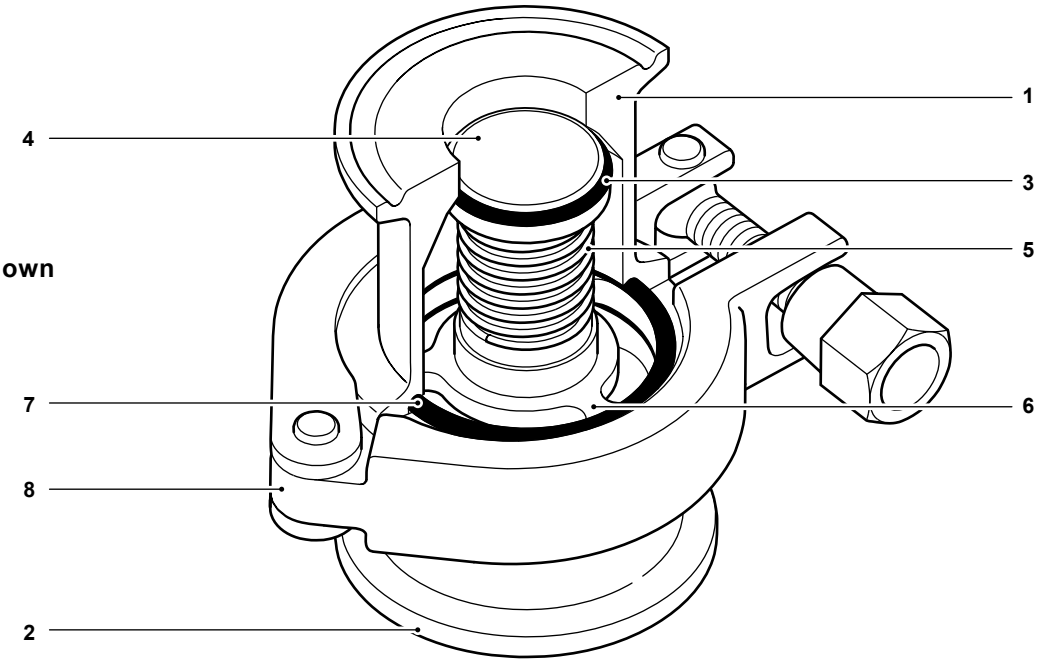
Pressure/temperature limits



The CVS10 with EPDM seats **must not** be used in this region.

Body design conditions				PN10
PMA	Maximum allowable pressure	Viton	10 bar g @ 200 °C	145 psi g @ 392 °F
		FEP-Silicone	10 bar g @ 200 °C	145 psi g @ 392 °F
		EPDM	10 bar g @ 150 °C	145 psi g @ 302 °F
TMA	Maximum allowable temperature	Viton	200 °C @ 10 bar g	392 °F @ 145 psi g
		FEP-Silicone	200 °C @ 10 bar g	392 °F @ 145 psi g
		EPDM	150° C @ 10 bar g	302 °F @ 145 psi g
Minimum allowable temperature			-20 °C	14 °F
PMO	Maximum operating pressure for saturated steam service		10 bar g	145 psi g
TMO	Maximum operating temperature	Viton	200 °C @ 10 bar g	392 °F @ 145 psi g
		FEP-Silicone	200 °C @ 10 bar g	392 °F @ 145 psi g
		EPDM	150 °C @ 10 bar g	302 °F @ 145 psi g
Minimum operating temperature			0 °C	32 °F
Designed for a maximum cold hydraulic test pressure of:			15 bar g	218 psi g

Materials



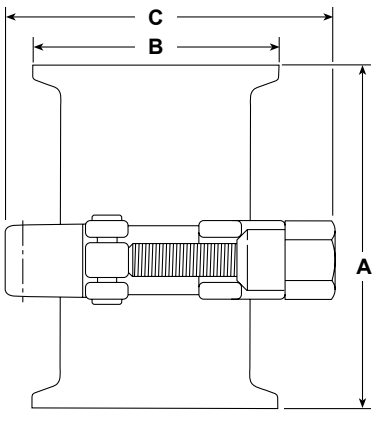
1" valve shown

No.	Part	Material
1	Body (inlet)	Stainless steel 316L
2	Body (outlet)	Stainless steel 316L
3	Valve head	Stainless steel 316L
4	Valve seat	EPDM, Viton or FEP-Silicone
5	Spring	Stainless steel 316
6	Valve guide and Bush	Stainless steel 316L and TFM-PTFE
7	Body seal (2 off)	EPDM, Viton or FEP-Silicone
8	Body clamp	Stainless steel 304

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

Sanitary clamp

Size		A	B		C	Weight
ASME	DIN		ASME	DIN		
½"	DN15	80 (3.1)	25.0 (0.9)	34.0 (1.3)	60 (2.4)	0.5 (1.1)
¾"	DN20					
1"	DN25	70 (2.8)	50.39 (1.9)	50.5 (2.0)		0.6 (1.3)
1½"	DN40	80 (3.1)			78 (3.1)	0.9 (1.9)
2"	DN50		63.91 (2.5)	64.0 (2.5)	90 (3.5)	1.2 (2.6)



Kv values

Size	½"	¾"	1"	1½"	2"
Kv	8.2	8.2	17.3	27.3	40.5

For conversion:
Cv (UK) = Kv x 0.963
Cv (US) = Kv x 1.156

Opening pressures

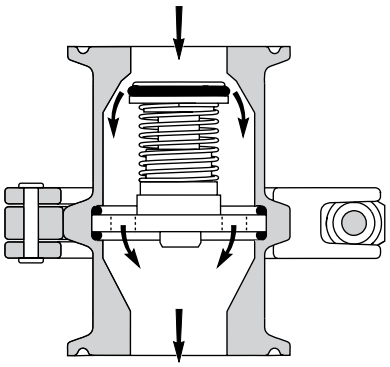
Differential pressure with zero flow in mbar (psi).
→ Flow direction

Size	½"	¾"	1"	1½"	2"
→	35 (0.51)				
↑	39 (0.56)		41 (0.59)	43 (0.62)	
↓	31 (0.44)		29 (0.42)	27 (0.39)	

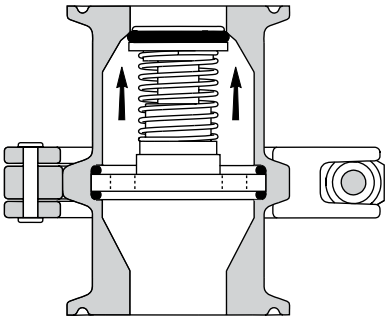
Operation

The valve is opened by the pressure of the fluid. When fluid flow stops the spring closes the valve before reverse flow can occur.

Valve open



Valve closed



Safety information, installation and maintenance

For full details see the Installation and Maintenance Instructions (IM-P029-11) supplied with the product.

Installation note

The standard soft seat versions of the CVS10 are intended for use in a vertical position, as they will not be self-draining in a horizontal line.

Self-draining versions are available to special order. They are dimensionally different with an offset outlet.

How to order

Example: 1 off Spirax Sarco 1" CVS10-1E sanitary check valve with EPDM seat, ASME BPE sanitary clamp connections, and having an internal surface finish of 0.5 µm Ra (20 µin).
Complete with certification dossier.

Spare parts

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

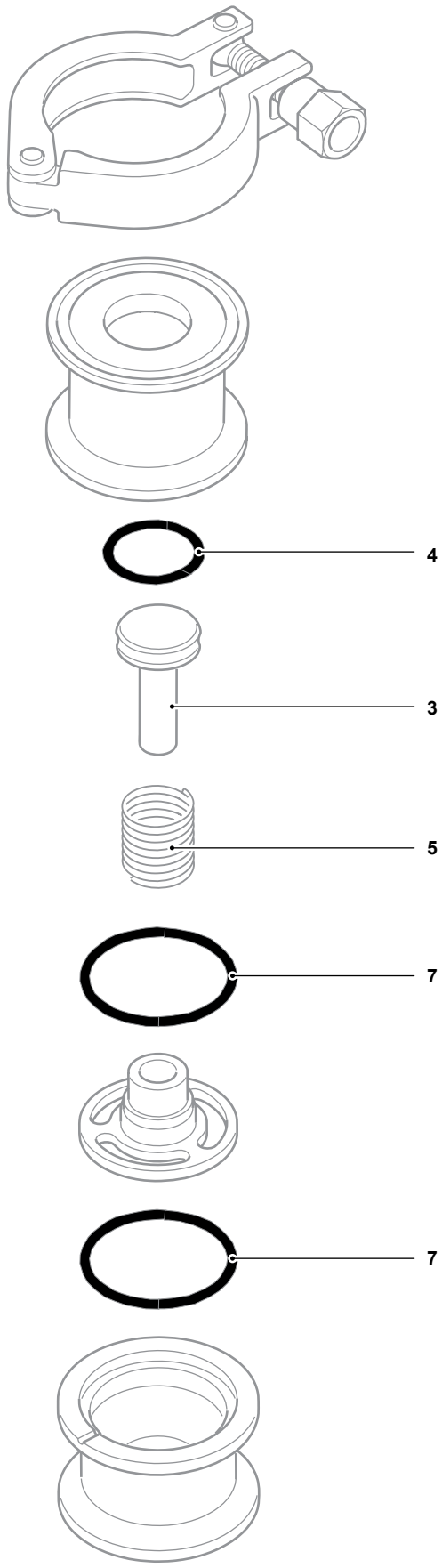
Available spares

Seal kit	**4** and **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 check valve.

Example: 1 off Seal kit for a 1" Spirax Sarco CVS10-1E sanitary check valve with EPDM seat having ASME BPE clamp ends.



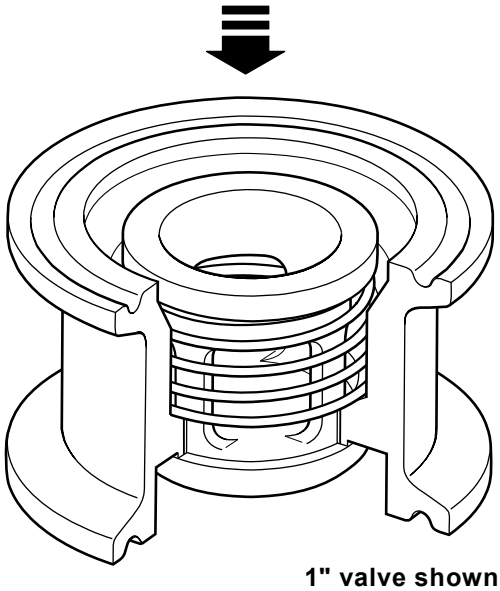
TI-P029-21
CMGT Issue 5

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.

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 for further data.



1" valve shown

Available types and surface finish

CVS10-1 has an internal surface finish of 0.5 µm (20 µin) Ra (within ASME BPE SF1), and external surface finish of 0.8 µm (31 µin) Ra and a metal seat.
CVS10-2 has an electropolished internal surface finish of 0.38 µm (15 µin) Ra (within ASME BPE SF4), and external surface finish of 0.8 µm (20 µin) Ra and a metal seat.

Both the CVS10-1 and CVS10-2 have a suffix 'M' to denote metal valve head/seats. For example, CVS10-2M denotes a CVS10 with electropolished internal finish and metal valve head/seat.

Standards

- The CVS10 fully complies with the European Pressure Equipment Directive 2014/68/EU.
- 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.

Sizes and pipe connections

Type A (½" and ¾")/Type B (1" and 1½"). DN15 to DN50 to DIN 32676 available as standard.Sanitary clamp:

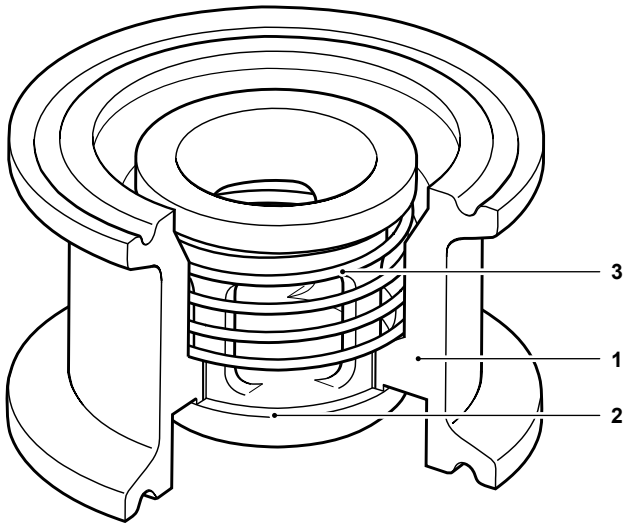
- ASME BPE clamp to Type A (½" and ¾")/Type B (1" and 1½").
- Sanitary clamp to DIN 32676 Series A/Series 2.

Note: Alternative connections and sizes are available on request.

Sizes and pipe connections

	Standard	Issue	Type	Sizes				
	ASME BPE		Type A	½"	¾"			
			Type B			1"	1½"	2"
Sanitary clamp ended variants	**DIN32676**	2001-02	Series 2	DN15	DN20	DN25	DN40	DN50
	DIN32676	2009-05	Series A	DN15	DN20	DN25	DN40	DN50

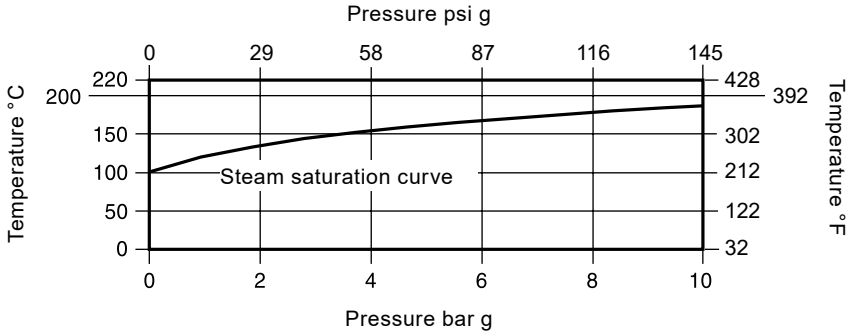
Materials



1" valve shown

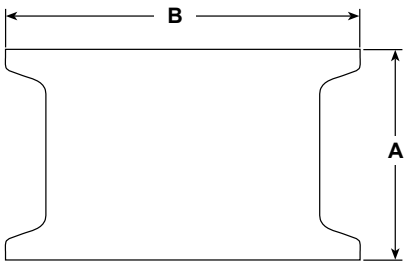
No.	Part	Material
1	Body	Stainless steel 316L
2	Valve head	Stainless steel 316L
3	Spring	Stainless steel 316

Pressure/temperature limits



Body design conditions			PN10
PMA	Maximum allowable pressure	10 bar g @ 220 °C	145 psi g @ 428 °F
TMA	Maximum allowable temperature	220 °C @ 10 bar g	428 °F @ 145 psi g
Minimum allowable temperature		-254 °C	-425 °F
PMO	Maximum operating pressure for saturated steam service	10 bar g	145 psi g
TMO	Maximum operating temperature	220 °C @ 10 bar g	428 °F @ 145 psi g
Minimum operating temperature		0 °C	32 °F
Designed for a maximum cold hydraulic test pressure of:		15 bar g	217 psi g

Dimensions/weights (approximate) in mm (inches) and kg (lbs)



Sanitary clamp

Size	SIZE	A	B		Weight
ASME	DIN	ASME	ASME	DIN	
½"	DN15	40 (1.6)	25.0 (0.98)	34.0 (1.34)	0.5 (1.10)
¾"	DN20				
1"	DN25	25 (0.98)	50.39 (1.98)	50.5 (1.99)	0.6 (1.32)
1½"	DN40	30 (1.2)			0.9 (1.98)
2"	DN50	35 (1.4)	63.91 (2.51)	64.0 (2.52)	1.2 (2.65)

Kv values

Size	½"	¾"	1"	1½"	2"
Kv	2	2	4	8	18

For conversion:
Cv (UK) = Kv x 0.963
Cv (US) = Kv x 1.156

Opening pressures

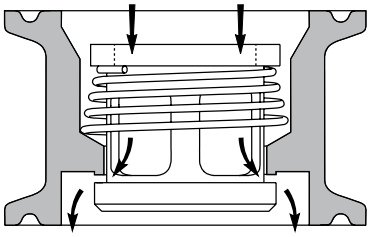
Differential pressure with zero flow in mbar (psi)..
→ Flow direction

Size	½"	¾"	1"	1½"	2"
→	35 (0.51)				
↑	39 (0.57)				
↓	31 (0.45)				

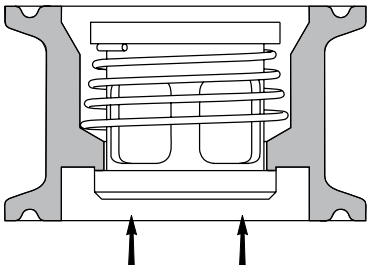
Operation

The valve is opened by the pressure of the fluid. When fluid flow stops the spring closes the valve before reverse flow can occur.

Valve open



Valve closed



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 0.5 micron Ra (20 micro inch).
Complete with certification dossier.

Spare parts

There are no spare parts available for this product

TI-P182-05
CMGT Issue 11

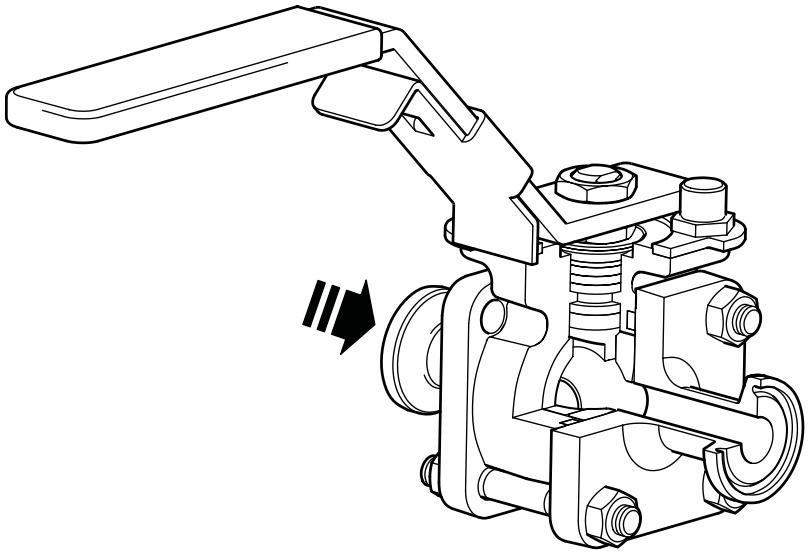
M70i ISO
Forged Stainless Steel Ball Valve for Sanitary Applications

Description

The M70i forged 316L stainless steel, three-piece body ball valve has ISO mounting as standard. It has been designed and built in general accordance with ASME BPE for use on applications like liquid and gas utility and process support applications, such as clean steam*.
The M70i should be used as an isolation valve, not a control valve.

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 3% to 5% ferrite content to help prevent rouge.
- **Designed with orbital welding in mind -** Extended tube weld end connections means that automatic orbital welding can be performed without valve disassembly.
- **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), ASME BPE SF1 compliant.
Electropolishing to 0.375 micron Ra (15 micro inch), ASME BPE SF4 compliant, is available to special order. External surface finishes are as forged/machined.

Available types

M70iV ISO	Virgin PTFE TFM 1600
M70iVEP ISO	Virgin PTFE TFM 1600 electropolished to 0.375 micron Ra
M70iG ISO	Mineral filled PTFE
M70iGEP ISO	Mineral filled PTFE electropolished to 0.375 micron Ra
M70iV CF ISO	Virgin PTFE TFM 1600, with Cavity Fillers
M70iVEP CF ISO	Virgin PTFE TFM 1600 electropolished to 0.375 micron Ra, with Cavity Fillers
M70iG CF ISO	Mineral filled PTFE, with Cavity Fillers
M70iGEP CF ISO	Mineral filled PTFE electropolished to 0.375 micron Ra, with Cavity Fillers

Optional extras:

- Extended stem 100 mm (4") to allow for insulation.
- Cavity fillers are not provided as standard and are not recommended for steam service. If cavity fillers are required please specify when placing an order.
- Low ferrite < 1% under special request.

Standards
This product fully complies with the requirements of the Pressure Equipment Directive (PED).

Certification
This product is available with the following certification:

- EN 10204 3.1 material certificates (body and caps)
- EN 10204 3.1 material certificates (wetted parts, seat and seals) subject to additional cost.
- Typical Internal surface finish certificates.
- Specific internal surface finish certificates available at point of order request, and may be subject to additional cost.
- Certificate of compliance for ADI free (seats and seals)
- TSE/BSE Free Statement.
- Declaration of compliance EC1935:2004 Food Contact Materials.

The seal part is Compliant with:

- FDA CFR Title 21. Paragraph 177. 1550.
- USP Class VI.
- ADI Free (Animal Derived Ingredients) for materials used, manufacturing processes involved in producing the part.

Note: All certification/inspection requirements must be stated at the time of order placement, and may be subject to additional cost.

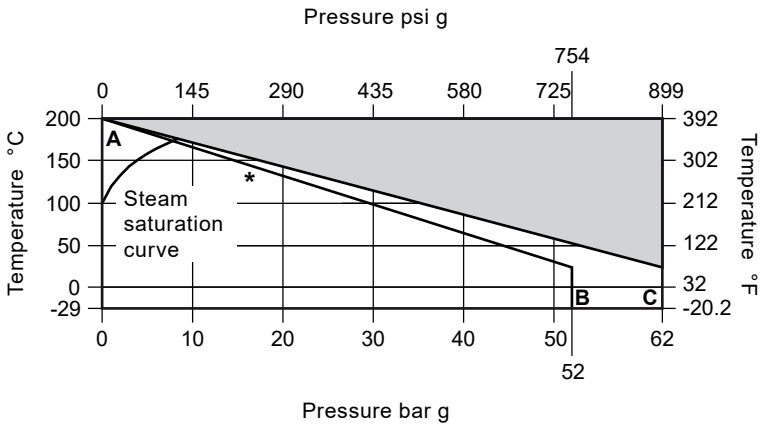
Packaging
Each valve is end capped and sealed in a plastic bag to avoid the ingress of dirt and other contaminants.

Sizes and pipe connections
½", ¾", 1", 1½", 2" sanitary clamp (ASME BPE/BS 4825/DIN 32676-C).
½", ¾", 1", 1½", 2" extended O/D tube weld ends (ETO) (ASME BPE).
Sanitary clamp/ETO combinations are also available.
Alternatively: 2½", 3" and 4" investment cast sanitary ball valves are available through our M80i range - see TI-P172-01-EN-ISS1.

Note: Other connection options are available on request. Please consult Spirax Sarco.

***Steam Service:** For steam applications cavity filler is not recommended.

Pressure/temperature limits



* **Steam Service:** For steam applications cavity filler is not recommended.

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

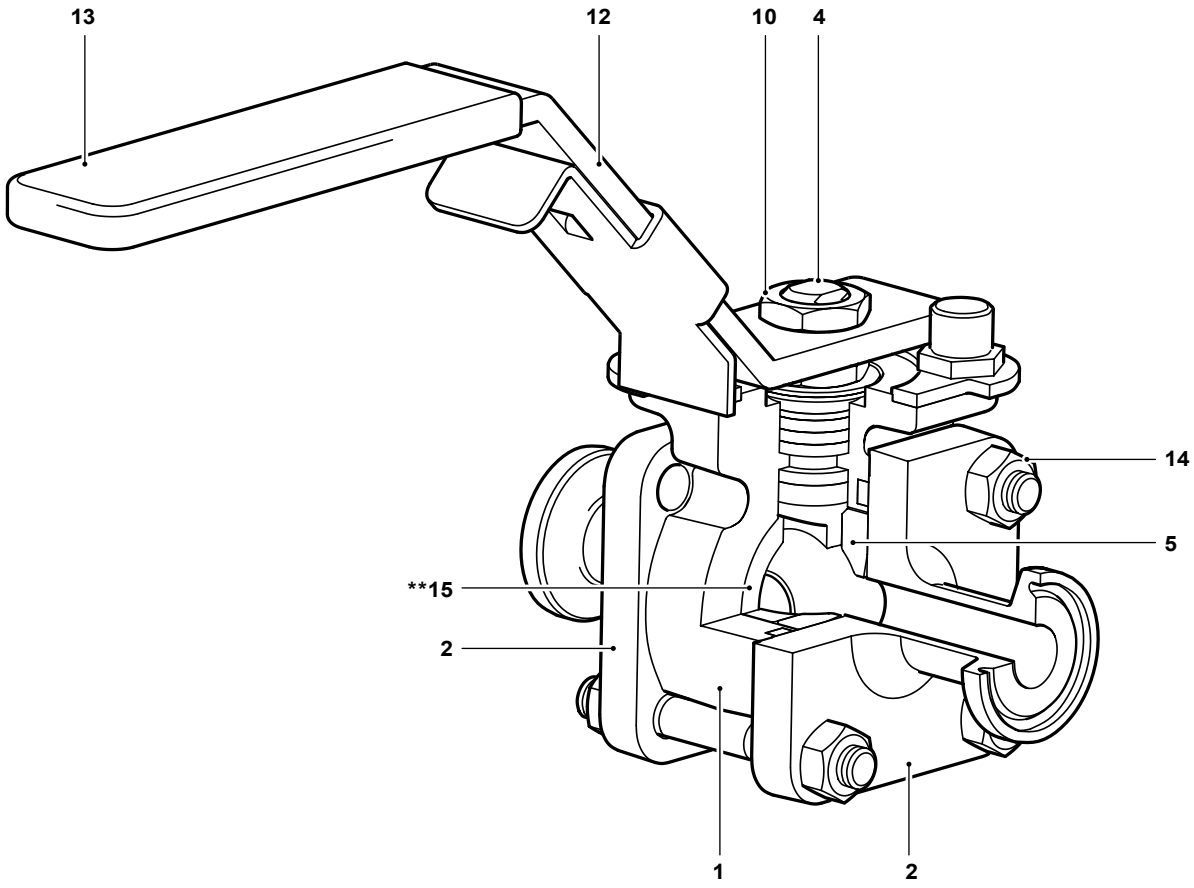
A - B Virgin PTFE TFM 1600.

A - C Mineral filled PTFE.

For valves with clamp connections, the maximum operating conditions could be limited by the type of clamp selected. For further information, consult Spirax Sarco.

Body design conditions				PN63
PMA	Maximum allowable pressure		62 bar g @ 20 °C	899 psi g @ 68 °F
TMA	Maximum allowable temperature		200 °C @ 0 bar g	392 °F @ 0 psi g
Minimum allowable temperature			-29 °C	-20.2 °F
PMO	Maximum operating pressure for saturated steam service *	TFM 1600	7.0 bar g	102 psi g
		Mineral filled PTFE	8.5 bar g	123 psi g
TMO	Maximum operating temperature		200 °C @ 0 bar g	392 °F @ 0 psi g
Minimum operating temperature **Note:** For lower operating temperatures consult Spirax Sarco			-29 °C	-20.2 °F
ΔPMX	Maximum differential pressure is limited to the PMO			
Designed for a maximum cold hydraulic test pressure of			93 bar g	1349 psi g

Materials

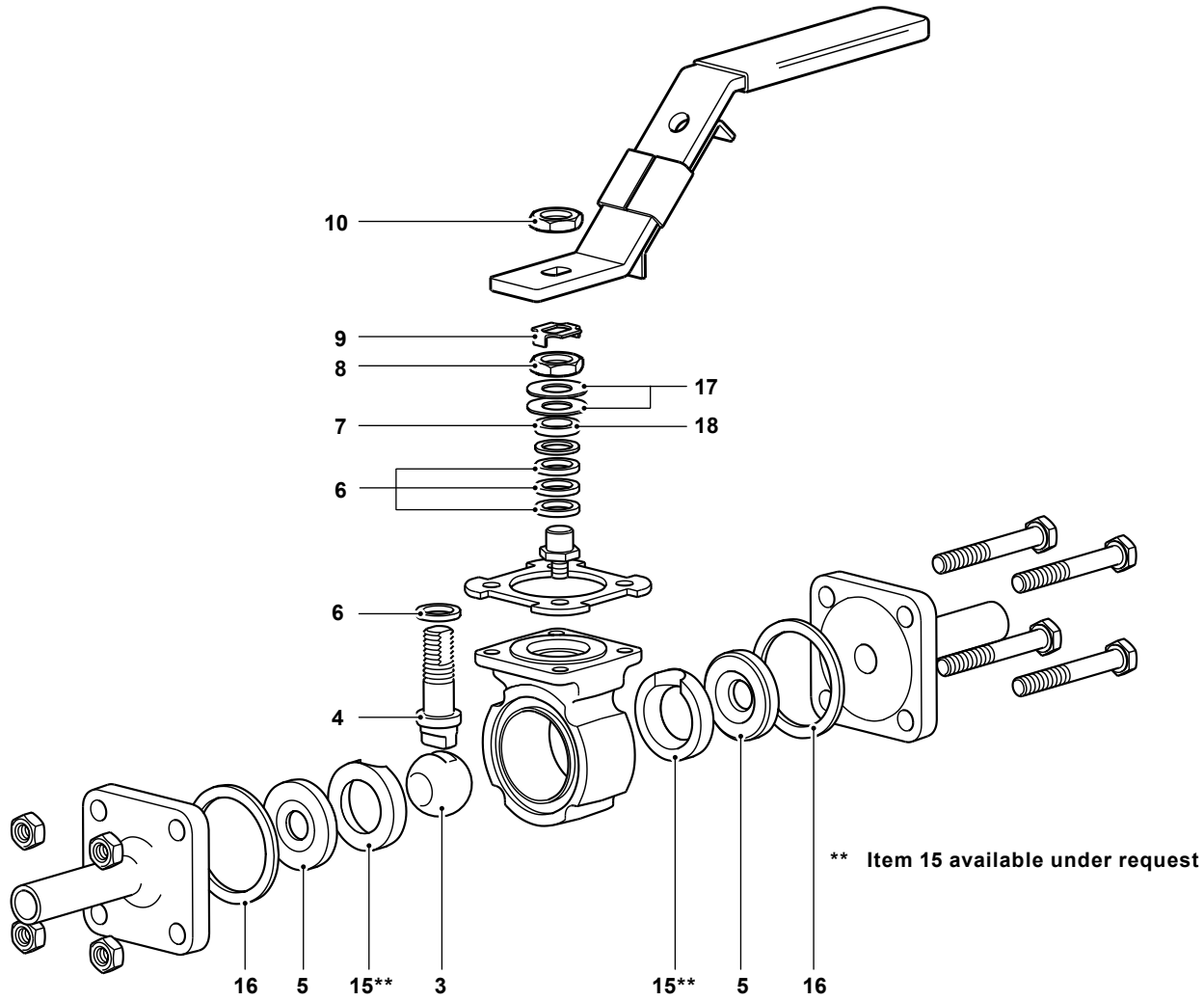


6.1
130

No.	Part	Material	
1	Body	Stainless steel	ASTM A 182 F 316L
2	End connection	Stainless steel	ASTM A 182 F 316L
11	Nameplate (not shown)	Stainless steel	AISI 430
12	Handle	Stainless steel	AISI 316
13	Cover	Vinyl	
14	Stud and nut	Stainless steel	AISI 316

Materials - exploded internals

The internals have been exploded below to help identify the position of some of the parts in the materials list.



No.	Part		Material	
3	Ball		Stainless steel	AISI 316L
4	Stem		Stainless steel	AISI 316L
5	Seat	M70iG	Mineral filled PTFE	
		M70iV	Virgin PTFE TFM 1600	
6	Stem seal		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
15	Cavity filler (on request)		Virgin PTFE TFM 1600	
16	Body cap gasket		Virgin PTFE TFM 1600	
17	Belleville washer		Stainless steel	AISI 316
18	Stem seal		Stainless steel	

Technical data

Leakage test procedure to ISO 5208 (Rate A)/EN 12266-1 (Rate A)	
Stem seal and seat	Materials comply with: - FDA CFR title 21 part 177, section 1550. - USP23 Class VI
Flow characteristic	Modified linear
Port	True port design

Kv values

Size	½"	¾"	1"	1½"	2"
Kv	7	25	56	164	360

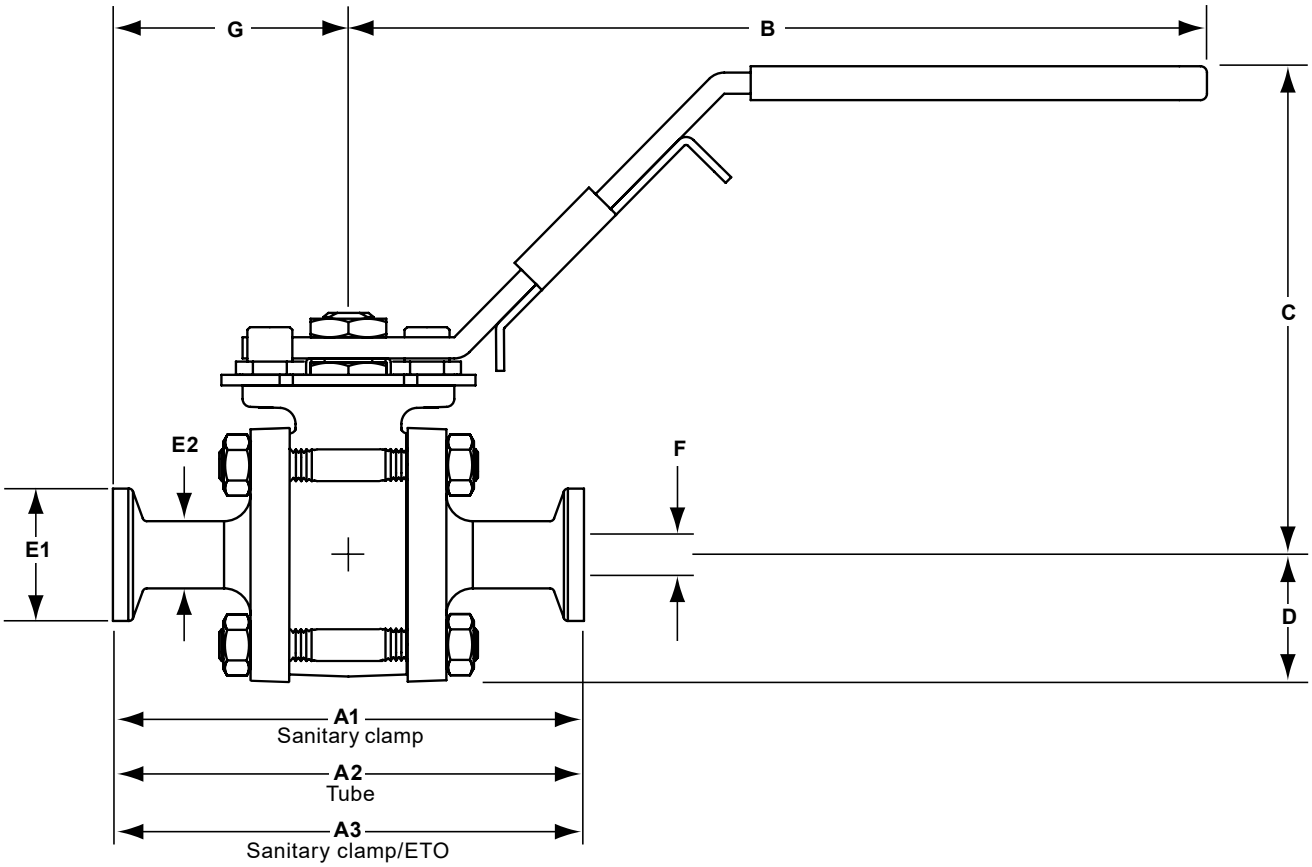
For conversion
Cv (UK) = Kv x 0.963
Cv (US) = Kv x 1.156

Torque value

Size	½"	¾"	1"	1½"	2"
N m (lbf ft)	13 (10)	15 (11)	19 (14)	70 (52)	100 (74)

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.

Dimensions/weights (approximate) in mm (inches) and kg (lbs)



Size	A1	A2	A3	B	C	D	E1	E2	F	G (Clamp)	G (ETO)	Weight
½"	89.0 (3.50)	140.0 (5.51)	114.5 (4.51)	161 (6.34)	92 (3.62)	24 (0.94)	25.0 (0.98)	12.70 (0.50)	9.4 (0.37)	44.5 (1.75)	70.0 (2.76)	0.80 (1.76)
¾"	101.6 (4.00)	152.4 (6.00)	127.0 (5.00)		94 (3.70)	26 (1.02)		19.05 (0.75)	15.8 (0.62)	50.8 (2.00)	76.2 (3.00)	1.00 (2.20)
1"	114.2 (4.50)	165.0 (6.50)	139.6 (5.50)		101 (3.98)	31 (1.22)	50.5 (1.99)	25.40 (1.00)	22.2 (0.87)	57.1 (2.25)	82.5 (3.25)	1.55 (3.42)
1½"	139.6 (5.50)	190.4 (7.50)	165.0 (6.50)	185 (7.28)	126 (4.96)	48 (1.89)		38.10 (1.50)	34.8 (1.37)	69.8 (2.75)	95.2 (3.75)	4.50 (9.92)
2"	158.7 (6.25)	203.1 (8.00)	180.9 (7.12)	250 (9.84)	141 (5.55)	57 (2.24)	64.0 (2.52)	50.80 (2.00)	47.5 (1.87)	79.4 (3.13)	101.6 (4.00)	7.70 (17.0)

Safety information, installation and maintenance
For full details see the Installation and Maintenance Instructions supplied with the product.

Welding
Only the models that have connections designed for welding (ETO) should be welded. Valves with clamp connections must not be welded to avoid damage to soft parts.

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 not provided as standard. If cavity fillers are required please specify so at the time of order placement.

Example: 1 off Spirax Sarco ½" 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.

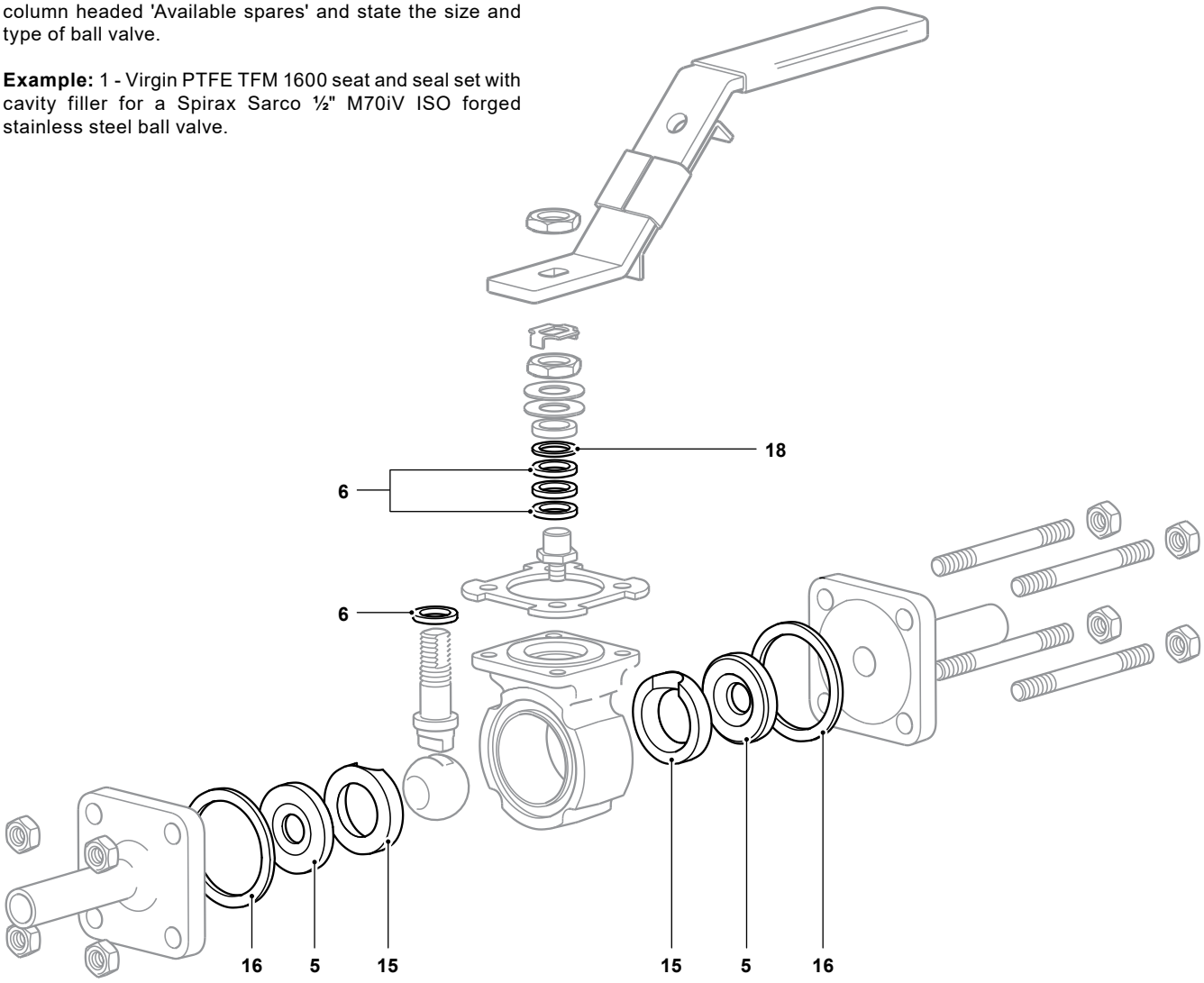
Spare parts
The spare parts available are shown in solid outline.
Parts drawn in a grey line are not supplied as spares.

Available spares

Seat and seal set	**5, 6, 16, 18**
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 ½" M70iV ISO forged stainless steel ball valve.

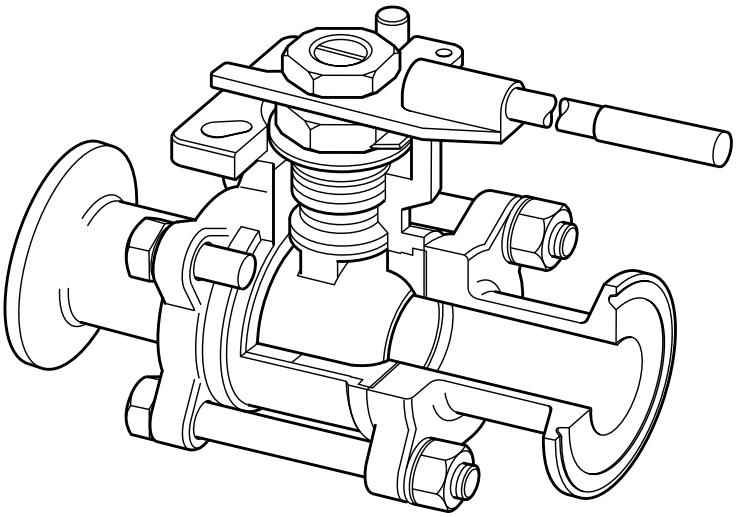


TI-P182-06
CMGT Issue 8

M80i ISO
Stainless Steel Ball Valve for Sanitary Applications

Description
The M80i investment 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 on applications like liquid and gas utility and process support applications, such as clean steam*. The M80i should be used as an isolation valve, not a control valve.

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 -** The 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 lockable handle allows the valve to be locked in the open or closed position – ensuring system integrity.



Surface finish
The M80i standard internal surface finish is electropolished to 0.375 micron Ra (15 micro inch), ASME BPE SF4 compliant. External surface finishes are as cast/machined.

Available types

M80iVEP ISO	Virgin PTFE TFM 1600 electropolished to 0.375 micron Ra
M80iVEP CF ISO	Virgin PTFE TFM 1600 electropolished to 0.375 micron Ra with **Cavity Fillers**

Standards
This product fully complies with the requirements of the Pressure Equipment Directive (PED).

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
Each valve is end capped and sealed in a plastic bag, to avoid the ingress of dirt and other contaminants.

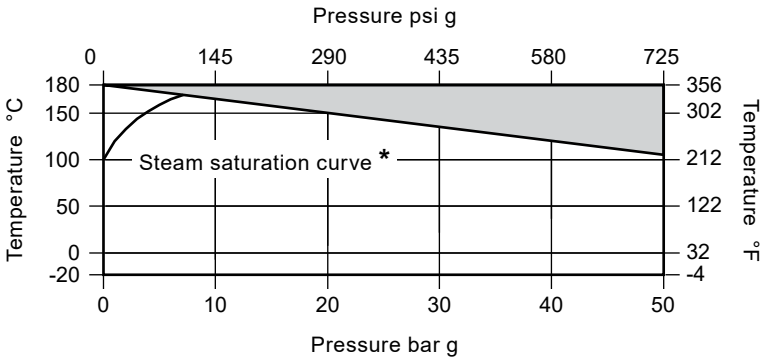
Sizes and pipe connections
2½", 3" and 4" Sanitary clamp (ASME BPE)
2½", 3" and 4" extended O/D tube weld ends (ETO) (ASME BPE).
Alternatively: ½", ¾", 1", 1½" and 2" sanitary ball valves are available through our M70i range - see TI-P182-05.

Note: Other connection options are available on request. Please consult Spirax Sarco.

Optional extras:
- Extended stem 100 mm (4") to allow for insulation.
- Cavity fillers are not provided as standard. If cavity fillers are required please specify when placing an order.

***Steam Service:** For steam applications cavity filler is not recommended.

Pressure/temperature limits



* **Steam Service:** For steam applications cavity filler is not recommended.

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

A - B Virgin PTFE TFM 1600

For valves with clamp connections, the maximum operating conditions could be limited by the type of clamp selected. For further information, consult Spirax Sarco.

Body design conditions		49.6 bar	720 psi
PMA	Maximum allowable pressure	50 bar g @ 109 °C	725 psi g @ 228 °F
TMA	Maximum allowable temperature	180 °C @ 0 bar g	356 °F @ 0 psi g
Minimum allowable temperature		-20 °C	-4 °F
PMO	Maximum operating pressure for saturated steam service *	7 bar g	102 psi
TMO	Maximum operating temperature	180 °C @ 0 bar g	356 °F @ 0 psi g
Minimum operating temperature		-20 °C	-4 °F
ΔPMX	Maximum differential pressure is limited to the PMO		
Designed for a maximum cold hydraulic test pressure of		75 bar g	1088 psi g

Technical data

Leakage test procedure to ISO 5208 (Rate A)/EN 12266-1 (Rate A)	
Stem seal and seat	Materials comply with:
	- FDA CFR title 21 paragraph 177, section 1550.
	- USP23 Class VI
Flow characteristic	Modified linear
Port	True port design

Kv values

Size	2½"	3"	4"
Kv	680	860	1950

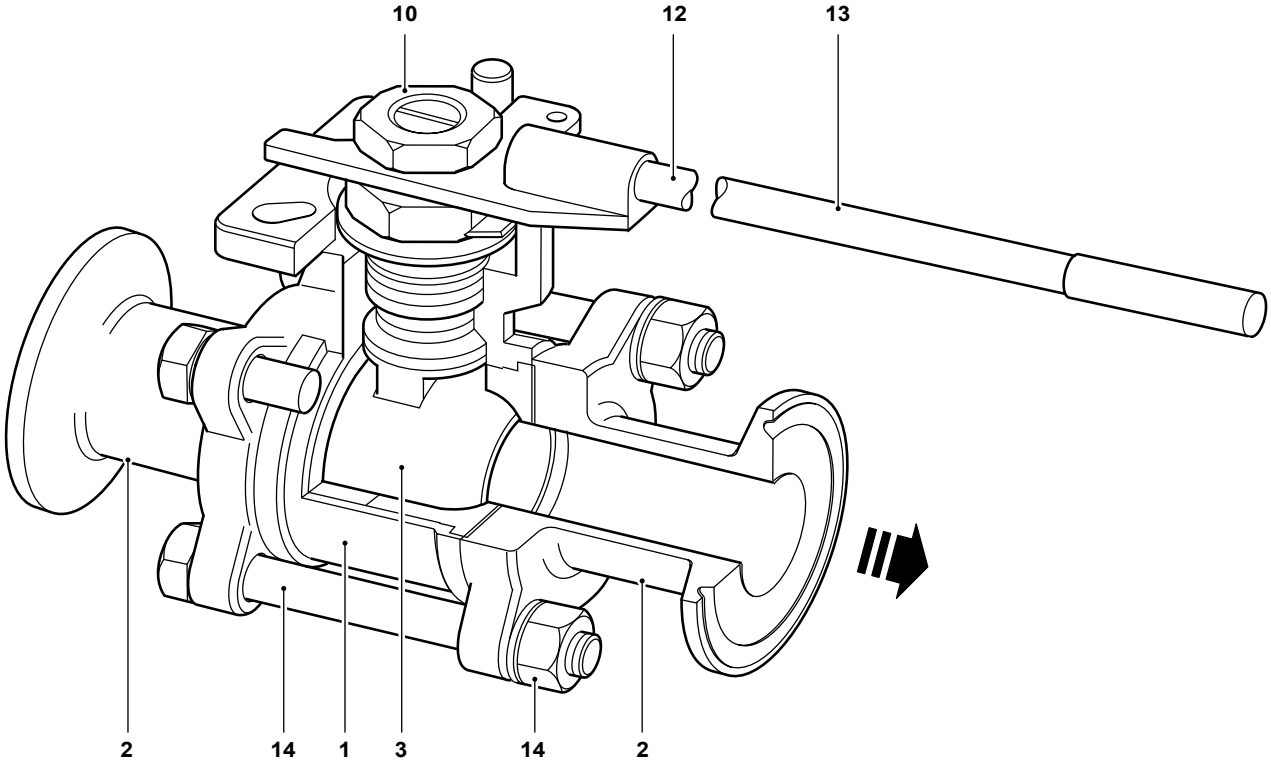
For conversion:
Cv (UK) = Kv x 0.963
Cv (US) = Kv x 1.156

Torque value

Size	2½"	3"	4"
N m	110	130	145

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.

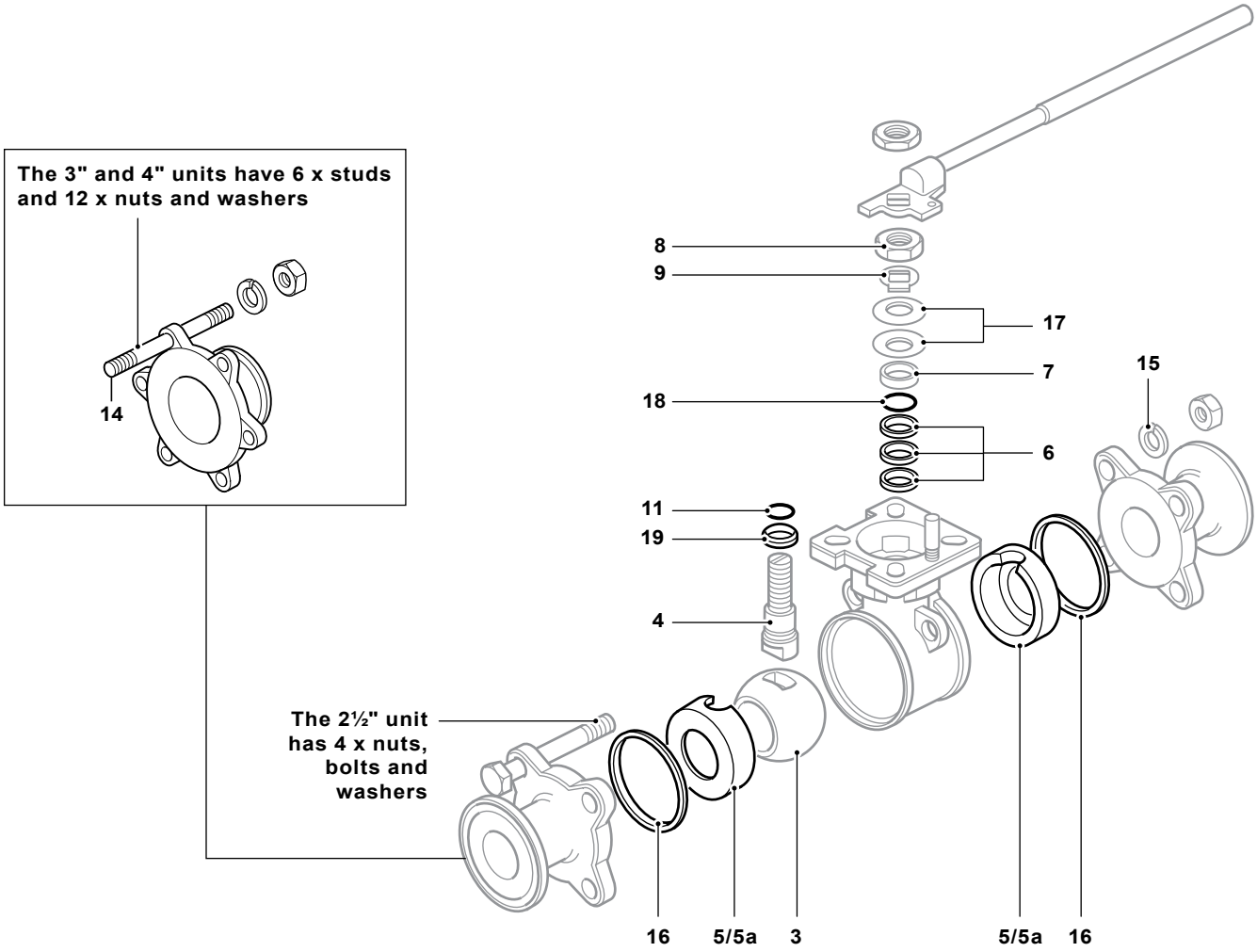
Materials



No.	Part	Material	
1	Body	Stainless steel	ASTM A351 Gr. CF3M (316L)
2	End connections	Stainless steel	
3	Ball	Stainless steel	
10	Stem nut	Stainless steel	AISI 304
12	Handle	Stainless steel	AISI 304
13	Cover	Vinyl	
14	Nuts and bolts	Stainless steel	AISI 304

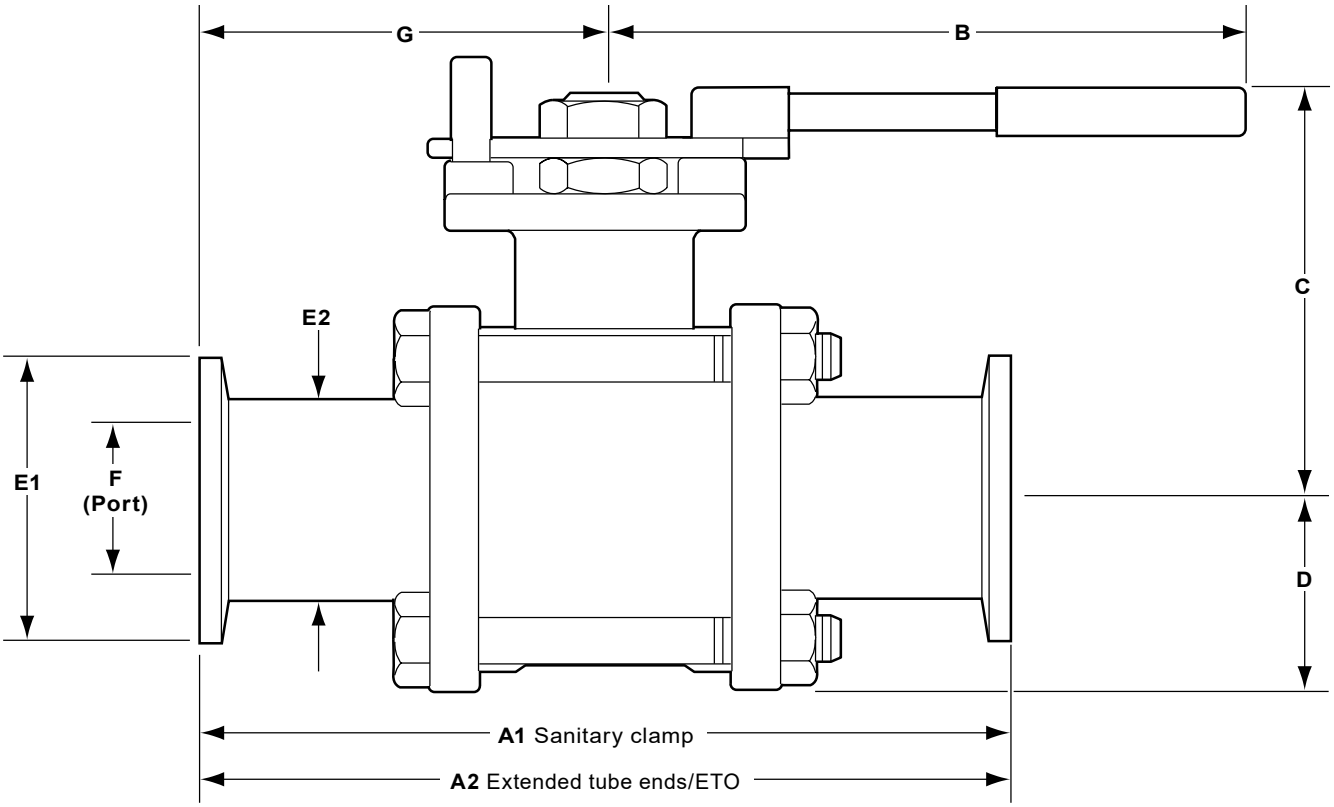
Materials (continued)

The internals have been exploded below to help identify the position of some of the parts in the materials list.



No.	Part	Material	
3	Ball	Stainless steel	
4	Stem	Stainless steel	AISI 316L
5	Seat	Virgin PTFE TFM 1600	
5a	Seat and cavity filler	Virgin PTFE TFM 1600	
6	Stem seals	Virgin PTFE TFM 1600	
7	Spacer	Stainless steel	AISI 304
8	Compression nut	Stainless steel	AISI 304
9	Lock washer	Stainless steel	AISI 304
11	Stem 'O'ring	Viton	
15	Bolt washer		AISI 304
16	Body seal	Virgin PTFE TFM 1600	
17	Beleville washer		AISI 301
18	Packing follower	Virgin PTFE TFM 1600	
19	Thrust washer	Virgin PTFE TFM 1600	

Dimensions/weights (approximate) in mm (inches) and kg (lbs)



Size	A1	A2	B	C	D	E1 (Clamp)	E2 (ETO)	F	G (Clamp)	G (ETO)	Weight
2½"	203.0 (7.99)	222.0 (8.74)	363.5 (14.3)	145.0 (5.71)	62.0 (2.44)	77.5 (3.05)	63.4 (2.50)	60.3 (2.37)	101.5 (4.0)	111.0 (4.37)	9.0 (19.8)
3"	232.8 (9.17)	234.2 (9.22)		153.0 (6.02)	82.0 (3.23)	90.9 (3.58)	76.2 (3)	73.0 (2.87)	116.4 (4.58)	117.1 (4.61)	12.2 (26.9)
4"	259.5 (10.2)	258.9 (10.2)	399.0 (15.7)	194.6 (7.66)	102.0 (4.02)	118.9 (4.68)	101.6 (4)	97.4 (3.83)	129.2 (5.09)	129.4 (5.09)	23.0 (50.7)

Safety information, installation and maintenance

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

Welding

Only the models that have connections designed for welding (ETO) should be welded. Valves with clamp connections must not be welded to avoid damages to the soft parts.

How to order

The size, end connections and certification requirements must be specified at the time of order placement.

Note: Cavity fillers are not provided as standard. If cavity fillers are required please specify so at the time of order placement.

Example: 1 off Spirax Sarco 4" M80iV ISO sanitary ball valve complete with, sanitary clamp (ASME BPE) end connections, electropolished to 0.375 micron Ra (15 micro inch).
The unit is to be supplied complete with EN 10204 3.1 material certification.

Spare parts

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

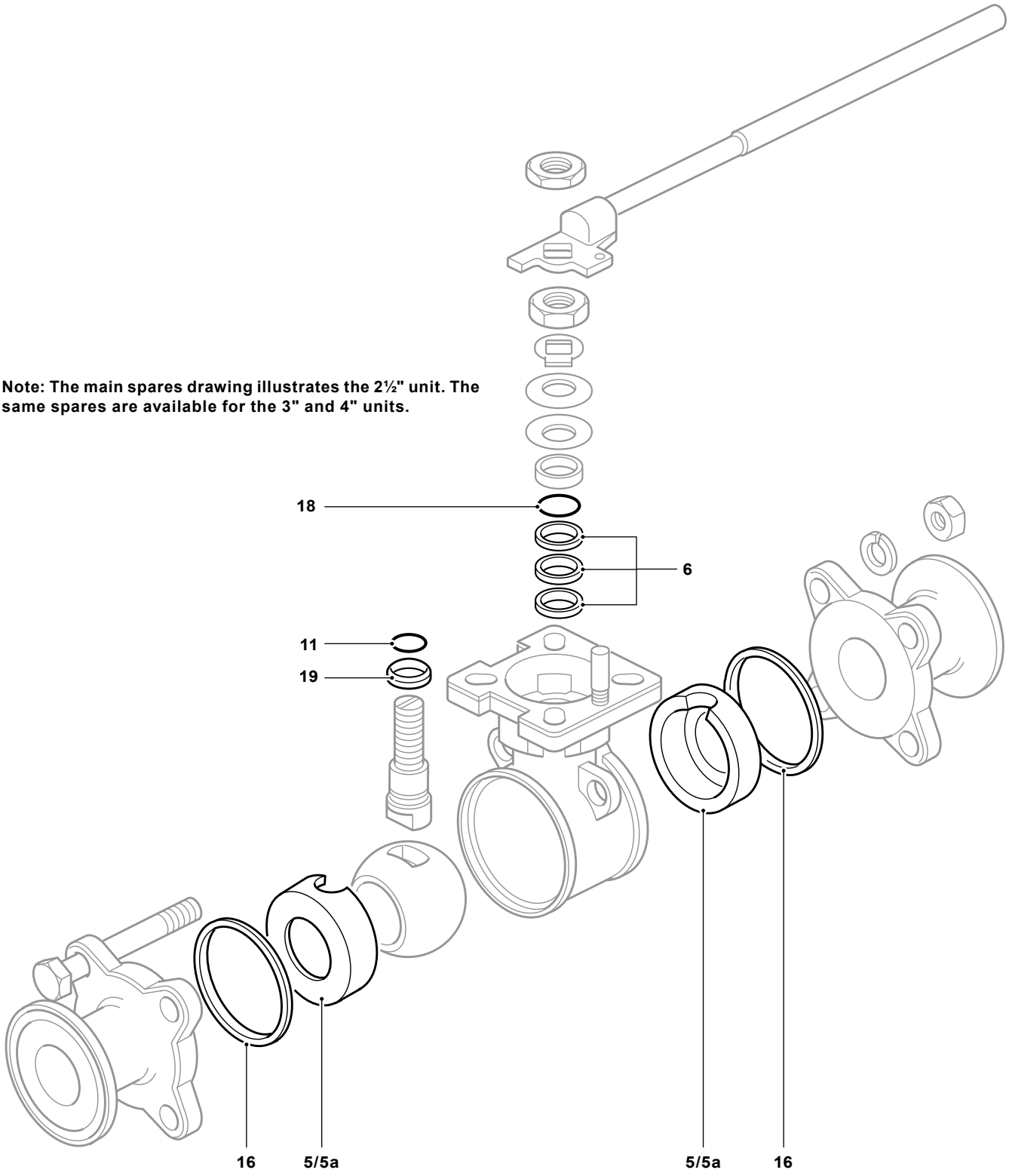
Available spares

Seats, stem seals, stem 'O' ring, body seals kit, packing follower and thrust washer	**5, 6, 11, 16, 18, 19**
Integrated seat and cavity filler, stem seals, stem 'O' ring, body seals kit, packing follower and thrust washer	**5a, 6, 11, 16, 18, 19**

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, body seals kit, packing follower and thrust washer for a Spirax Sarco 4" M80iV ISO cast stainless steel ball valve.

Note: The main spares drawing illustrates the 2½" unit. The same spares are available for the 3" and 4" units.



TI-P180-43
CMGT Issue 5

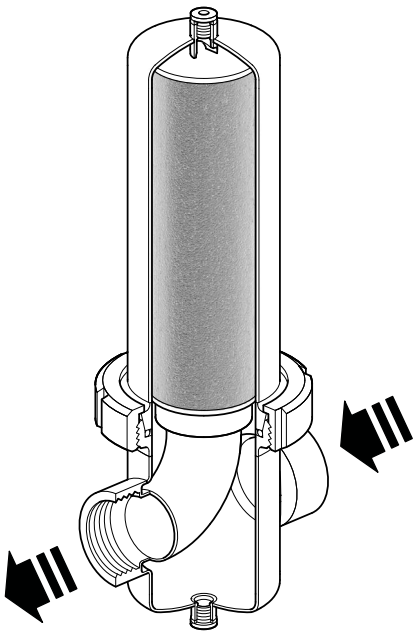
CSF16 and CSF16T
Stainless Steel Steam Filters

Description

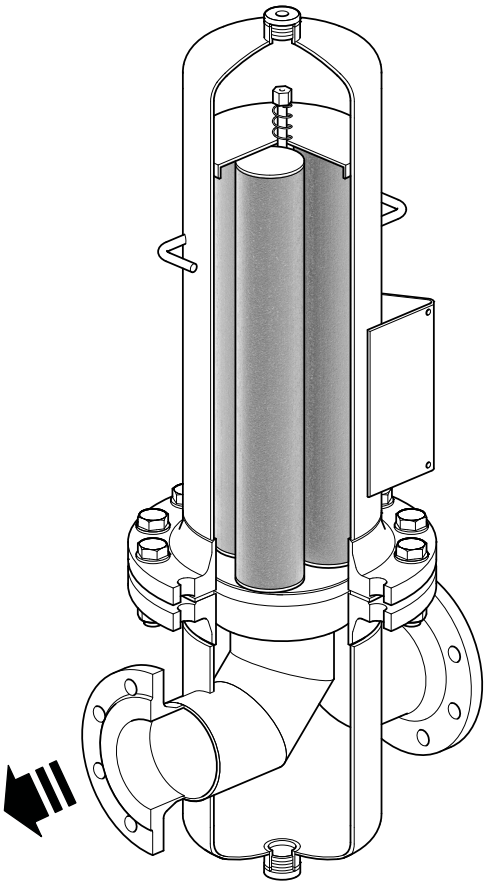
The CSF16 and CSF16T are horizontal, in-line, high efficiency separators and are designed and manufactured to remove particulate contamination from steam systems. This product complies with EC1935:2004 Food Contact Materials. It also complies with regulation EC2023:2006 on good manufacturing practice for materials and articles intended to come into contact with food.

Industry	Steam In CSF16/CSF16T	Steam Out CSF16/CSF16T
Pharmaceutical	Plant Steam	Filtered Plant Steam
Healthcare		
Other industries		
Food and Beverage		Culinary Steam* *when 5µm filter element or finer is selected

The filter housings are available in a choice of austenitic stainless steel and the material grades are defined in the table below. Also referenced is the surface finish and connection type that differ depending on the size of the housing.



DN8 to DN80



DN100 and DN150

Filter Housing model	Sizes	Material of Filter Housing (Bowl and Head)	Connection type (Bowl and Head)	Internal surface finish	External surface finish
CSF16, CF16L*, CSF16H*	DN8 (¼") to DN80 (3")	1.4301 (304 stainless steel)	Food industry fitting to DIN 11851	Etched, Passivated and Polished Ra 0.8µm	Etched, Passivated and Polished Ra 1.6µm
	DN100 (4") and DN150 (6")		Nuts and Bolts		Etched and Passivated, Ra 5.8 micron
CSF16T, CF16LT*, CSF16HT*	DN8 (¼") to DN80 (3")	1.4404 (316L stainless steel)	Food industry fitting to DIN 11851	Etched, Passivated and Polished Ra 0.8µm	Etched, Passivated and Polished Ra 1.6µm
	DN100 (4") and DN150 (6")		Nuts and Bolts		Etched and Passivated, Ra 5.8 micron.

*In some pipe sizes the housing is available in a choice of low capacity designated 'L' and high capacity designated 'H'.

Replaceable elements in sintered austenitic stainless steel are available with either 1, 5 or 25 micron absolute rating.
These are ordered separately to the Filter Housing.

Standards

These products fully comply with the requirements of the EU Pressure Equipment Directive 2014/68/EU and carry the CE mark when so required.

Product variants that are PED Category 1 (Cat.1) are also compliant to PE(S)R and carry the UKCA mark.

The CSF16/CSF16T steam filters also comply with other country specific approvals:
When fitted with a 5 micron filter element, they are capable of removing 95% of particles 2 microns and larger in size, in accordance with the requirements for the production of culinary steam to 3A accepted practice number 609-03 (accepted in the US). This is subject to the installation being in accordance with 3A best practice guidelines (See installation section in IM-P180-42).

Department of Agriculture for use in federally inspected meat and poultry plants. All materials meet the requirements as stipulated by the US FDA Title 21 of Code of Federal Regulations.

All constituent materials and the finished product comply with EC1935:2004 and EC2023:2006

The complete product and component parts are, manufactured, assembled, tested and packaged in a facility verified and approved by an accredited registered body to ISO 9001:2015.

Certification

The CSF16/CSF16T can be supplied with material certification as per the table below. Note: All certification/inspection requirements must be stated at the time of order placement.

Housing PED Category (SEP, Category I, Category II)	EN10204 Inspection Documents
SEP	No certification supplied
Cat. I	No certification supplied
Cat. II	Type 3.1 (Inspection Certificate)

If type 3.1 certification is required for SEP or Cat. I Filter Housings, this must be ordered separately.

If type 3.1 certification is required for the filter elements, this must be ordered separately.

Filter Housings options matrix

CSF16 Filter Housing Options, PED Classification and Design Refererence (PT Curve)

			Screwed Filter Housings (Design reference/PED Category)		Flanged Filter Housings (Design reference/PED Category)		
Filter Housing Size	**Filter Housing code**	**Filter Housing Seal Material**	**BSP/NPT (PN10 Rating)**	**BSP/NPT (PN16 Rating)**	**EN 1092 (PN10 Rating)**	**EN 1092 (PN16 Rating)**	**EN 1735-1 (Class 150 Rating)**
DN8 (¼")	CSF 16	EPM		Design Ref. 1/SEP			
DN10 (⅜")	CSF 16			Design Ref. 1/SEP		Design Ref. 1/SEP	
DN15 (½")	CSF 16			Design Ref. 1/SEP		Design Ref. 1/SEP	Design Ref. 3/SEP
DN20 (¾")	CSF 16			Design Ref. 1/SEP		Design Ref. 1/SEP	Design Ref. 3/SEP
DN25 (1")	CSF 16			Design Ref. 1/SEP		Design Ref. 1/SEP	Design Ref. 3/SEP
DN32 (1¼")	CSF 16			Design Ref. 1/SEP		Design Ref. 1/SEP	Design Ref. 3/SEP
DN40 (1½")	CSF 16			Design Ref. 1/SEP		Design Ref. 1/SEP	Design Ref. 3/Cat. I
DN50 (2")	CSF16L			Design Ref. 1/Cat. I		Design Ref. 1/Cat. I	Design Ref. 3/Cat. I
	CSF16H			Design Ref. 1/Cat. I		Design Ref. 1/Cat. I	Design Ref. 3/Cat. I
DN65 (2½")	CSF16			Design Ref. 1/Cat. I		Design Ref. 1/Cat. I	Design Ref. 3/Cat. I
DN80 (3")	CSF16L			Design Ref. 1/Cat. II		Design Ref. 1/Cat. II	Design Ref. 3/Cat. II
	CSF16H		Design Ref. 2/Cat. I		Design Ref. 2/Cat. I		Design Ref. 3/Cat. II
DN8 (¼")	CSF16	Fluoraz		Design Ref. 4/SEP			
DN10 (⅜")	CSF16			Design Ref. 4/SEP		Design Ref. 4/SEP	
DN15 (½")	CSF16			Design Ref. 4/SEP		Design Ref. 4/SEP	Design Ref. 5/SEP
DN20 (¾")	CSF16			Design Ref. 4/SEP		Design Ref. 4/SEP	Design Ref. 5/SEP
DN25 (1")	CSF16			Design Ref. 4/SEP		Design Ref. 4/SEP	Design Ref. 5/SEP
DN32 (1¼")	CSF16			Design Ref. 4/SEP		Design Ref. 4/SEP	Design Ref. 5/SEP
DN40 (1½")	CSF16			Design Ref. 4/SEP		Design Ref. 4/SEP	Design Ref. 5/Cat. I
DN50 (2")	CSF16L			Design Ref. 4/Cat. I		Design Ref. 4/Cat. I	Design Ref. 5/Cat. I
	CSF16H			Design Ref. 4/Cat. I		Design Ref. 4/Cat. I	Design Ref. 5/Cat. I
DN65 (2½")	CSF16			Design Ref. 4/Cat. I		Design Ref. 4/Cat. I	Design Ref. 5/Cat. I
DN80 (3")	CSF16L			Design Ref. 4/Cat. II		Design Ref. 4/Cat. II	Design Ref. 5/Cat. II
	CSF16H		Design Ref. 6/Cat. I	Design Ref. 4/Cat. II	Design Ref. 6/Cat. I	Design Ref. 4/Cat. II	Design Ref. 5/Cat. II
DN100 (4")	CSF16L	Stainless steel Steel/ PTFE Spiral Wound Gasket			Design Ref. 6/Cat. II	Design Ref. 4/Cat. II	Design Ref. 5/Cat. II
	CSF16H				Design Ref. 6/Cat. II	Design Ref. 4/Cat. II	Design Ref. 5/Cat. II
DN150 (6")	CSF16L				Design Ref. 6/Cat. II		
	CSF16H						

Not available

Filter Housings options matrix (continued)

CSF16T Filter Housing Options, PED Classification and Design Refererence (PT Curve)

			Screwed Filter Housings (Design reference/PED Category)		Flanged Filter Housings (Design reference/PED Category)		
Filter Housing Size	**Filter Housing code**	**Filter Housing Seal Material**	**BSP/NPT (PN10 Rating)**	**BSP/NPT (PN16 Rating)**	**EN 1092 (PN10 Rating)**	**EN 1092 (PN16 Rating)**	**EN 1735-1 (Class 150 Rating)**
DN8 (¼")	CSF16T	EPM		Design Ref. 7/SEP			
DN10 (⅜")	CSF16T			Design Ref. 7/SEP		Design Ref. 7/SEP	
DN15 (½")	CSF16T			Design Ref. 7/SEP		Design Ref. 7/SEP	Design Ref. 9/SEP
DN20 (¾")	CSF16T			Design Ref. 7/SEP		Design Ref. 7/SEP	Design Ref. 9/SEP
DN25 (1")	CSF16T			Design Ref. 7/SEP		Design Ref. 7/SEP	Design Ref. 9/SEP
DN32 (1¼")	CSF16T			Design Ref. 7/SEP		Design Ref. 7/SEP	Design Ref. 9/SEP
DN40 (1½")	CSF16T			Design Ref. 7/SEP		Design Ref. 7/SEP	Design Ref. 9/Cat. I
DN50 (2")	CSF16LT			Design Ref. 7/Cat. I		Design Ref. 7/Cat. I	Design Ref. 9/Cat. I
	CSF16HT			Design Ref. 7/Cat. I		Design Ref. 7/Cat. I	Design Ref. 9/Cat. I
DN65 (2½")	CSF16T			Design Ref. 7/Cat. I		Design Ref. 7/Cat. I	Design Ref. 9/Cat. I
DN80 (3")	CSF16LT			Design Ref. 7/Cat. II		Design Ref. 7/Cat. II	Design Ref. 9/Cat. II
	CSF16HT		Design Ref. 8/Cat. I		Design Ref. 8/Cat. I		Design Ref. 9/Cat. II
DN8 (¼")	CSF16T	Fluoraz		Design Ref. 10/SEP			
DN10 (⅜")	CSF16T			Design Ref. 10/SEP		Design Ref. 10/SEP	
DN15 (½")	CSF16T			Design Ref. 10/SEP		Design Ref. 10/SEP	Design Ref. 11/SEP
DN20 (¾")	CSF16T			Design Ref. 10/SEP		Design Ref. 10/SEP	Design Ref. 11/SEP
DN25 (1")	CSF16T			Design Ref. 10/SEP		Design Ref. 10/SEP	Design Ref. 11/SEP
DN32 (1¼")	CSF16T			Design Ref. 10/SEP		Design Ref. 10/SEP	Design Ref. 11/SEP
DN40 (1½")	CSF16T			Design Ref. 10/SEP		Design Ref. 10/SEP	Design Ref. 11/Cat. I
DN50 (2")	CSF16LT			Design Ref. 10/Cat. I		Design Ref. 10/Cat. I	Design Ref. 11/Cat. I
	CSF16HT			Design Ref. 10/Cat. I		Design Ref. 10/Cat. I	Design Ref. 11/Cat. I
DN65 (2½")	CSF16T			Design Ref. 10/Cat. I		Design Ref. 10/Cat. I	Design Ref. 11/Cat. I
DN80 (3")	CSF16LT			Design Ref. 10/Cat. II		Design Ref. 10/Cat. II	Design Ref. 11/Cat. II
	CSF16HT		Design Ref. 12/Cat. I	Design Ref. 10/Cat. II	Design Ref. 12/Cat. I	Design Ref. 10/Cat. II	Design Ref. 11/Cat. II
DN100 (4")	CSF16LT	Stainless steel Steel/ PTFE Spiral Wound Gasket			Design Ref. 12/Cat. II	Design Ref. 10/Cat. II	Design Ref. 11/Cat. II
	CSF16HT				Design Ref. 12/Cat. II	Design Ref. 10/Cat. II	Design Ref. 11/Cat. II
DN150 (6")	CSF16LT				Design Ref. 12/Cat. II		
	CSF16HT						

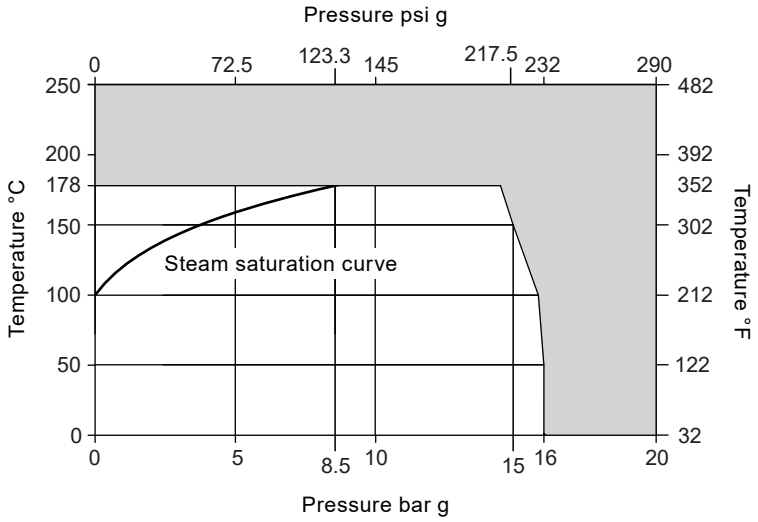
Not available

Pressure/temperature limits

CSF16

Product Design Reference 1

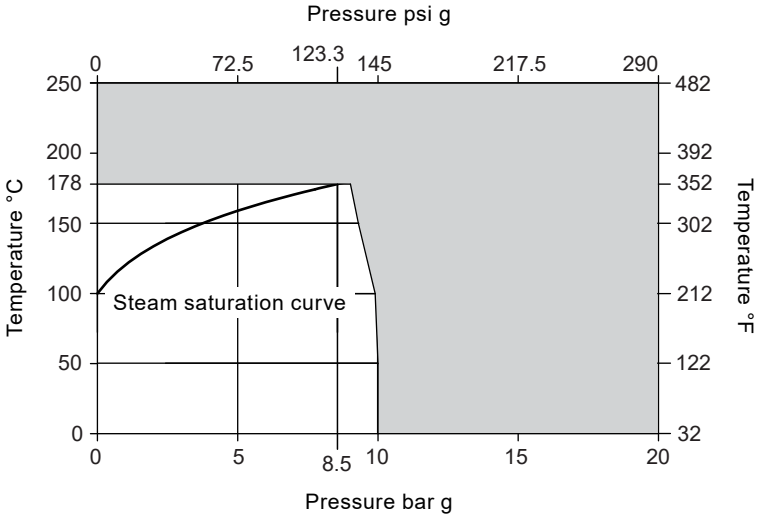
Pressure/temperature rating			PN16
PMA	Maximum allowable pressure	16 bar g	232 psi g
TMA	Maximum allowable temperature	178 °C	352 °F
PMO	Maximum operating pressure for saturated steam service	8.5 bar g	123.3 psi g
TMO	Maximum operating temperature for saturated steam service	178 °C	352 °F
Minimum allowable temperature		-5 °C	23 °F
Minimum operating temperature		0 °C	32 °F
Product is safe for use under full vacuum conditions			
Cold hydraulic test pressure		26.1 bar g	379 psi g



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

Product Design Reference 2

Pressure/temperature rating			PN10
PMA	Maximum allowable pressure	10 bar g	145 psi g
TMA	Maximum allowable temperature	178 °C	352 °F
PMO	Maximum operating pressure for saturated steam service	8.5 bar g	123.3 psi g
TMO	Maximum operating temperature for saturated steam service	178 °C	352 °F
Minimum allowable temperature		-5 °C	23 °F
Minimum operating temperature		0 °C	32 °F
Product is safe for use under full vacuum conditions			
Cold hydraulic test pressure		16.3 bar g	236 psi g



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

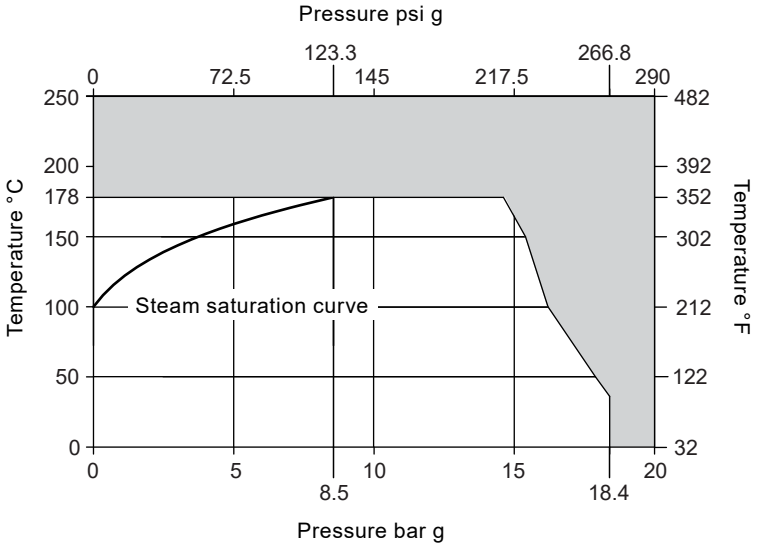
CSF16 Pressure/temperature limits continued on next page

Pressure/temperature limits

CSF16 (continued)

Product Design Reference 3

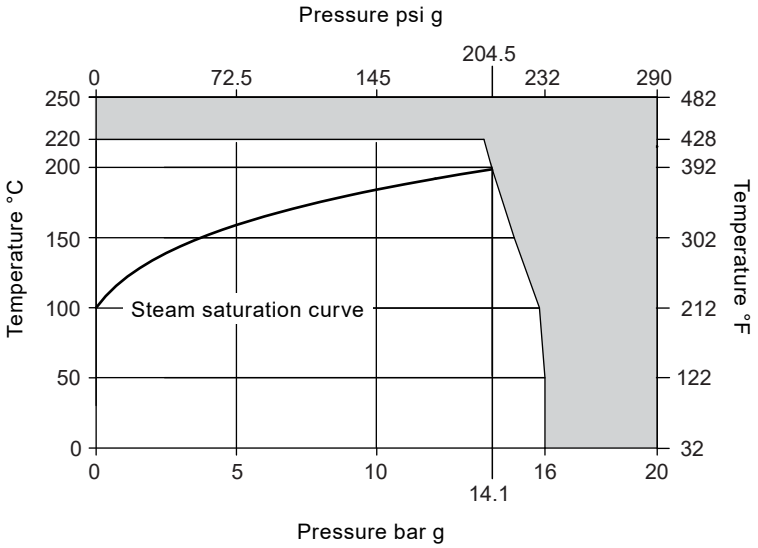
Pressure/temperature rating			Class 150
PMA	Maximum allowable pressure	18.4 bar g	266.8 psi g
TMA	Maximum allowable temperature	178 °C	352 °F
PMO	Maximum operating pressure for saturated steam service	8.5 bar g	123.3 psi g
TMO	Maximum operating temperature for saturated steam service	178 °C	352 °F
Minimum allowable temperature		-5 °C	23 °F
Minimum operating temperature		0 °C	32 °F
Product is safe for use under full vacuum conditions			
Cold hydraulic test pressure		28 bar g	406 psi g



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

Product Design Reference 4

Pressure/temperature rating			PN16
PMA	Maximum allowable pressure	16 bar g	232 psi g
TMA	Maximum allowable temperature	220 °C	428 °F
PMO	Maximum operating pressure for saturated steam service	14.1 bar g	204.5 psi g
TMO	Maximum operating temperature for saturated steam service	198.6 °C	389.4 °F
Minimum allowable temperature		-5 °C	23 °F
Minimum operating temperature		0 °C	32 °F
Product is safe for use under full vacuum conditions			
Cold hydraulic test pressure		26.1 bar g	379 psi g



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

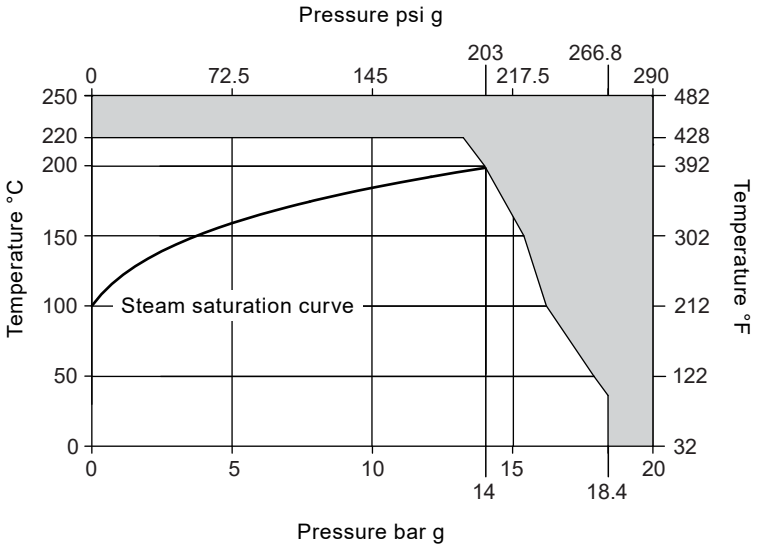
CSF16 Pressure/temperature limits continued on next page

Pressure/temperature limits

CSF16 (continued)

Product Design Reference 5

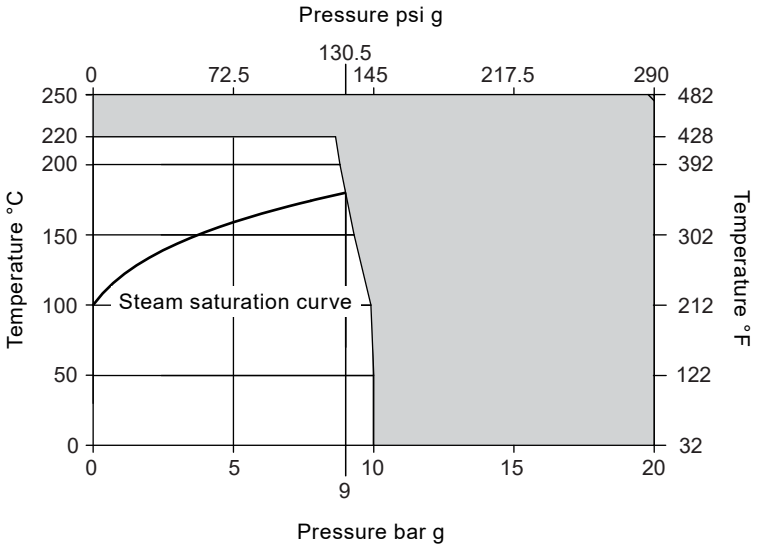
Pressure/temperature rating			Class 150
PMA	Maximum allowable pressure	18.4 bar g	266.8 psi g
TMA	Maximum allowable temperature	220 °C	428 °F
PMO	Maximum operating pressure for saturated steam service	14 bar g	203 psi g
TMO	Maximum operating temperature for saturated steam service	198.3 °C	388.9 °F
Minimum allowable temperature		-5 °C	23 °F
Minimum operating temperature		0 °C	32 °F
Product is safe for use under full vacuum conditions			
Cold hydraulic test pressure		28 bar g	406 psi g



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

Product Design Reference 6

Pressure/temperature rating			PN10
PMA	Maximum allowable pressure	10 bar g	145 psi g
TMA	Maximum allowable temperature	220 °C	428 °F
PMO	Maximum operating pressure for saturated steam service	9 bar g	130.5 psi g
TMO	Maximum operating temperature for saturated steam service	180 °C	356 °F
Minimum allowable temperature		-5 °C	23 °F
Minimum operating temperature		0 °C	32 °F
Product is safe for use under full vacuum conditions			
Cold hydraulic test pressure		16.3 bar g	236 psi g



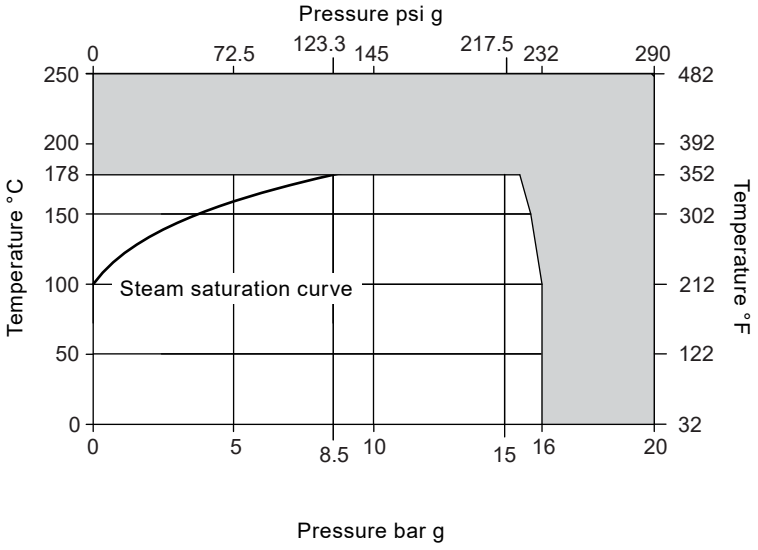
The product **must not** be used in this region.

Pressure/temperature limits

CSF16T

Product Design Reference 7

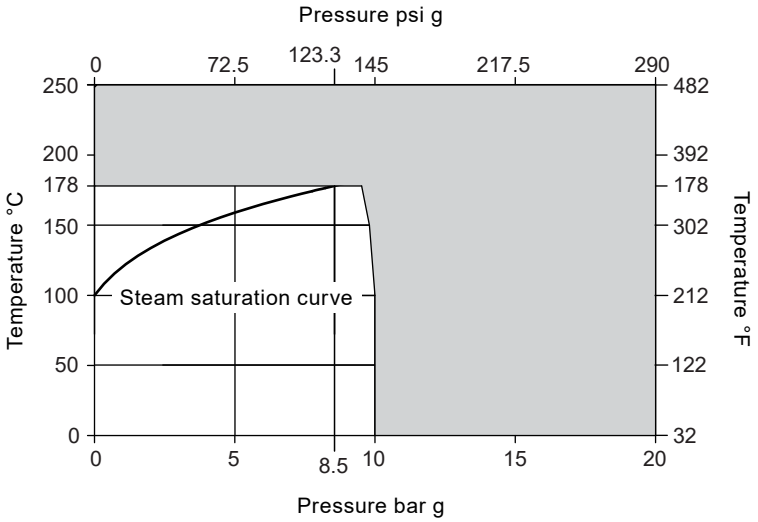
Pressure/temperature rating			PN16
PMA	Maximum allowable pressure	16 bar g	232 psi g
TMA	Maximum allowable temperature	178 °C	352 °F
PMO	Maximum operating pressure for saturated steam service	8.5 bar g	123.3 psi g
TMO	Maximum operating temperature for saturated steam service	178 °C	352 °F
Minimum allowable temperature		-5 °C	23 °F
Minimum operating temperature		0 °C	32 °F
Product is safe for use under full vacuum conditions			
Cold hydraulic test pressure		25.5 bar g	370 psi g



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

Product Design Reference 8

Pressure/temperature rating			PN10
PMA	Maximum allowable pressure	10 bar g	145 psi g
TMA	Maximum allowable temperature	178 °C	352 °F
PMO	Maximum operating pressure for saturated steam service	8.5 bar g	123.3 psi g
TMO	Maximum operating temperature for saturated steam service	178 °C	352 °F
Minimum allowable temperature		-5 °C	23 °F
Minimum operating temperature		0 °C	32 °F
Product is safe for use under full vacuum conditions			
Cold hydraulic test pressure		15.9 bar g	231 psi g



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

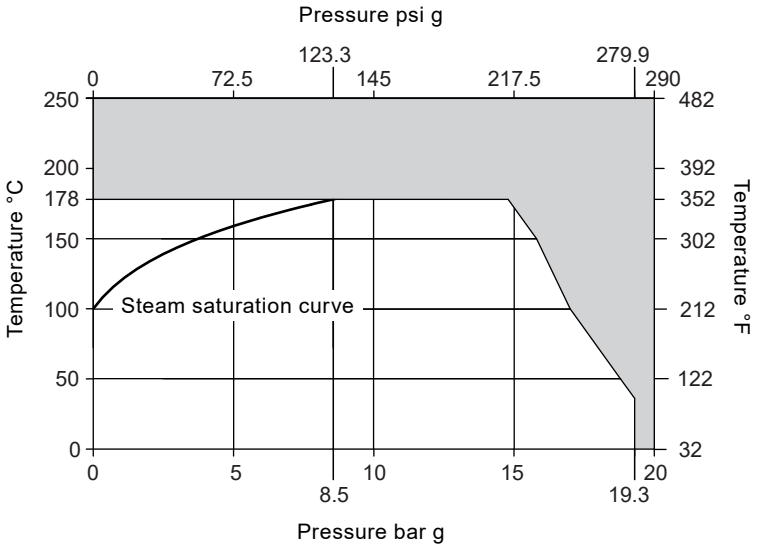
CSF16T Pressure/temperature limits continued on next page

Pressure/temperature limits

CSF16T (continued)

Product Design Reference 9

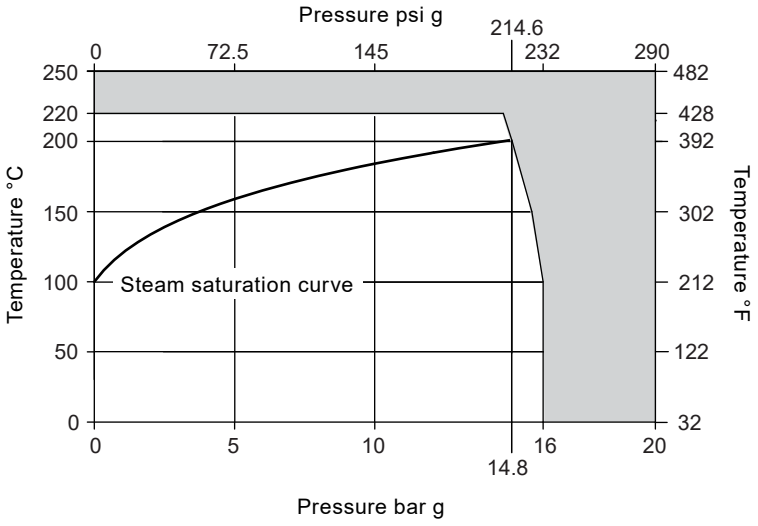
Pressure/temperature rating			Class 150
PMA	Maximum allowable pressure	19.3 bar g	279.9 psi g
TMA	Maximum allowable temperature	178 °C	352 °F
PMO	Maximum operating pressure for saturated steam service	8.5 bar g	123.3 psi g
TMO	Maximum operating temperature for saturated steam service	178 °C	352 °F
Minimum allowable temperature		-5 °C	23 °F
Minimum operating temperature		0 °C	32 °F
Product is safe for use under full vacuum conditions			
Cold hydraulic test pressure		29 bar g	421 psi g



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

Product Design Reference 10

Pressure/temperature rating			PN16
PMA	Maximum allowable pressure	16 bar g	232 psi g
TMA	Maximum allowable temperature	220 °C	428 °F
PMO	Maximum operating pressure for saturated steam service	14.8 bar g	214.6 psi g
TMO	Maximum operating temperature for saturated steam service	200.8 °C	393.4 °F
Minimum allowable temperature		-5 °C	23 °F
Minimum operating temperature		0 °C	32 °F
Product is safe for use under full vacuum conditions			
Cold hydraulic test pressure		25.5 bar g	370 psi g



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

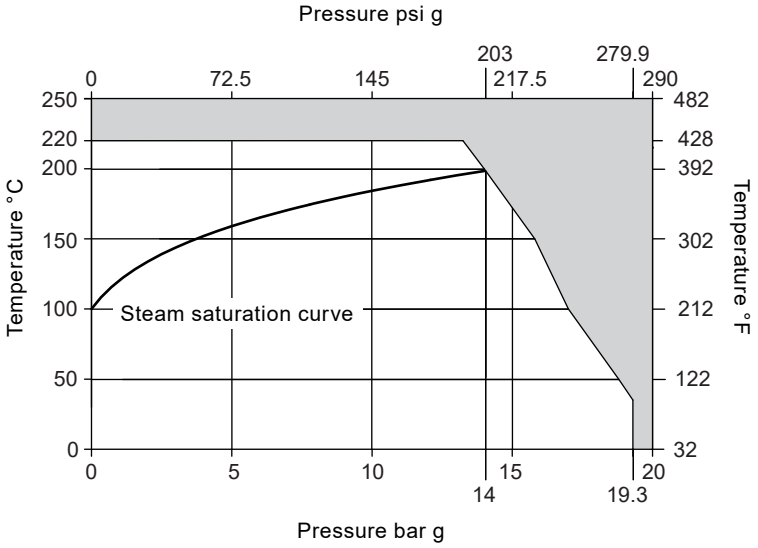
CSF16T Pressure/temperature limits continued on next page

Pressure/temperature limits

CSF16T (continued)

Product Design Reference 11

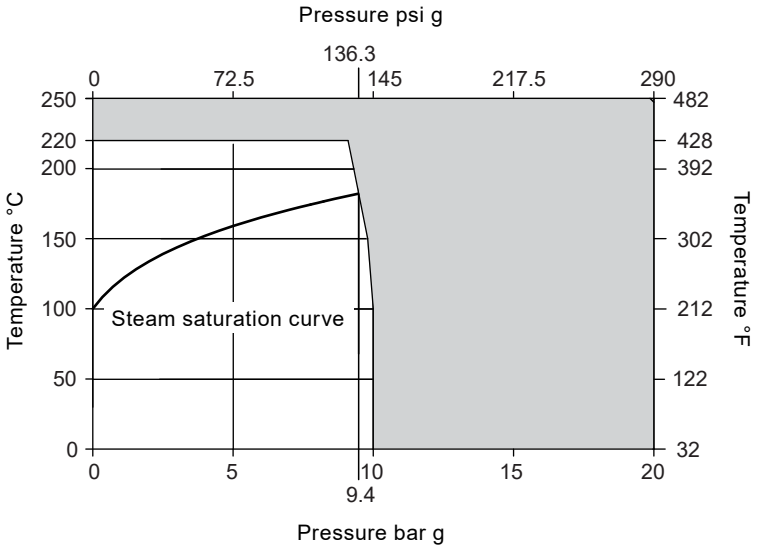
Pressure/temperature rating			Class 150
PMA	Maximum allowable pressure	19.3 bar g	279.9 psi g
TMA	Maximum allowable temperature	220 °C	428 °F
PMO	Maximum operating pressure for saturated steam service	14 bar g	203 psi g
TMO	Maximum operating temperature for saturated steam service	198.3 °C	388.9 °F
Minimum allowable temperature		-5 °C	23 °F
Minimum operating temperature		0 °C	32 °F
Product is safe for use under full vacuum conditions			
Cold hydraulic test pressure		29 bar g	421 psi g



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

Product Design Reference 12

Pressure/temperature rating			PN10
PMA	Maximum allowable pressure	10 bar g	145 psi g
TMA	Maximum allowable temperature	220 °C	428 °F
PMO	Maximum operating pressure for saturated steam service	9.4 bar g	136.3 psi g
TMO	Maximum operating temperature for saturated steam service	181.7 °C	359.1 °F
Minimum allowable temperature		-5 °C	23 °F
Minimum operating temperature		0 °C	32 °F
Product is safe for use under full vacuum conditions			
Cold hydraulic test pressure		15.9 bar g	231 psi g

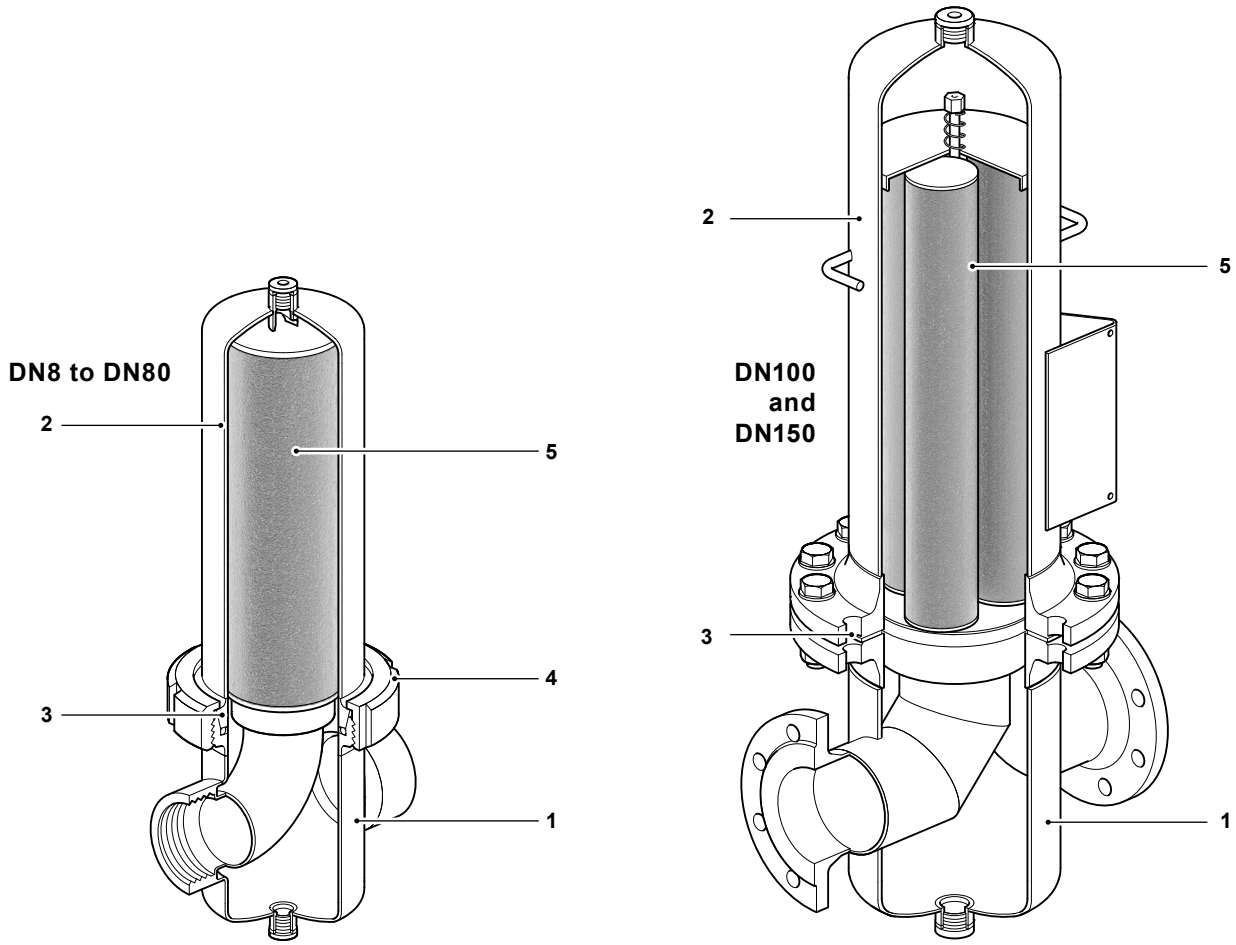


The product **must not** be used in this region.

CSF16 and CSF16T filter housing options and corresponding filter elements

Filter housing			Filter Element		
Filter Housing Size	Filter Housing code	Filter Housing Seal Material	1µm/ 5µm/ 25µm O-ring seal type	Filter element code	No. of elements per housing
DN8 (¼")	CSF16/ CSF16T	EPM	EPM	CSF16-SE 03/10	1
DN10 (⅜")	CSF16/ CSF16T			CSF16-SE 04/10	1
DN15 (½")	CSF16/ CSF16T			CSF16-SE 04/20	1
DN20 (¾")	CSF16/ CSF16T			CSF16-SE 05/20	1
DN25 (1")	CSF16/ CSF16T			CSF16-SE 05/25	1
DN32 (1¼")	CSF16/ CSF16T			CSF16-SE 07/25	1
DN40 (1½")	CSF16/ CSF16T			CSF16-SE 07/30	1
DN50 (2")	CSF16L/ CSF16LT			CSF16-SE 10/30	1
	CSF16H/ CSF16HT			CSF16-SE 15/30	1
DN65 (2½")	CSF16/ CSF16T			CSF16-SE 20/30	1
DN80 (3")	CSF16L/ CSF16LT			CSF16-SE 30/30	1
	CSF16H/ CSF16HT			CSF16-SE 30/50	1
DN8 (¼")	CSF16/ CSF16T	Fluoraz	Fluoraz	CSF16-SF 03/10	1
DN10 (⅜")	CSF16/ CSF16T			CSF16-SF 04/10	1
DN15 (½")	CSF16/ CSF16T			CSF16-SF 04/20	1
DN20 (¾")	CSF16/ CSF16T			CSF16-SF 05/20	1
DN25 (1")	CSF16/ CSF16T			CSF16-SF 05/25	1
DN32 (1¼")	CSF16/ CSF16T			CSF16-SF 07/25	1
DN40 (1½")	CSF16/ CSF16T			CSF16-SF 07/30	1
DN50 (2")	CSF16L/ CSF16LT			CSF16-SF 10/30	1
	CSF16H/ CSF16HT			CSF16-SF 15/30	1
DN65 (2½")	CSF16/ CSF16T			CSF16-SF 20/30	1
DN80 (3")	CSF16L/ CSF16LT			CSF16-SF 30/30	1
	CSF16H/ CSF16HT			CSF16-SF 30/50	1
DN100 (4")	CSF16L/ CSF16LT	Stainless steel Steel/ PTFE Spiral Wound Gasket	Fluoraz	CSF16-SF 20/30	3
	CSF16H/ CSF16HT			CSF16-SF 30/30	3
DN150 (6")	CSF16L/ CSF16LT			CSF16-SF 30/30	4

Materials



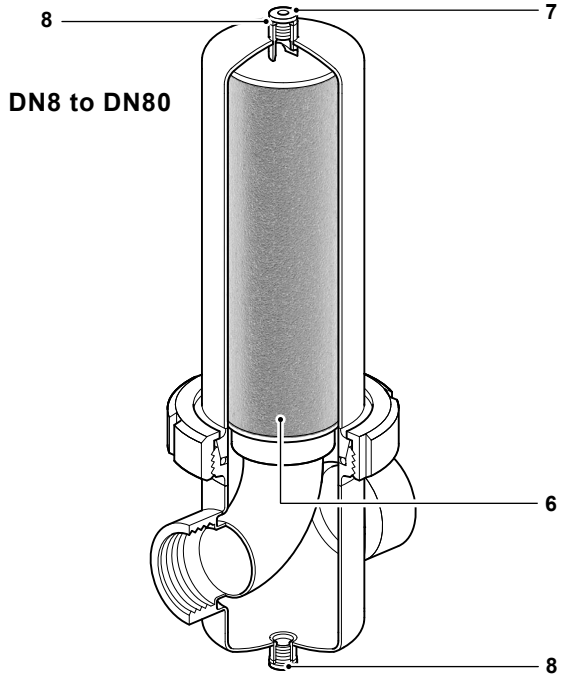
No.	Part	Materials		
1	Filter housing bowl	Stainless steel	CSF16	1.4301*
			CSF16T	1.4404**
2	Filter housing head	Stainless steel	CSF16	1.4301*
			CSF16T	1.4404**
3	Housing seal	For sizes DN8 to DN80 EPM or Fluoraz (see filter housing options matrix).		EP380 Fluoraz 890
		For sizes DN100 and DN150.		Stainless steel grade 1.4541 spiral wound gasket with PTFE filler
4	Housing lockring (DN8 - DN80)	Stainless steel	CSF16	1.4301*
			CSF16T	1.4404**
5	CSF16-S filter element	Stainless steel	Outer core	1.4404
			End cap	1.4301
			Weld filler	1.4576

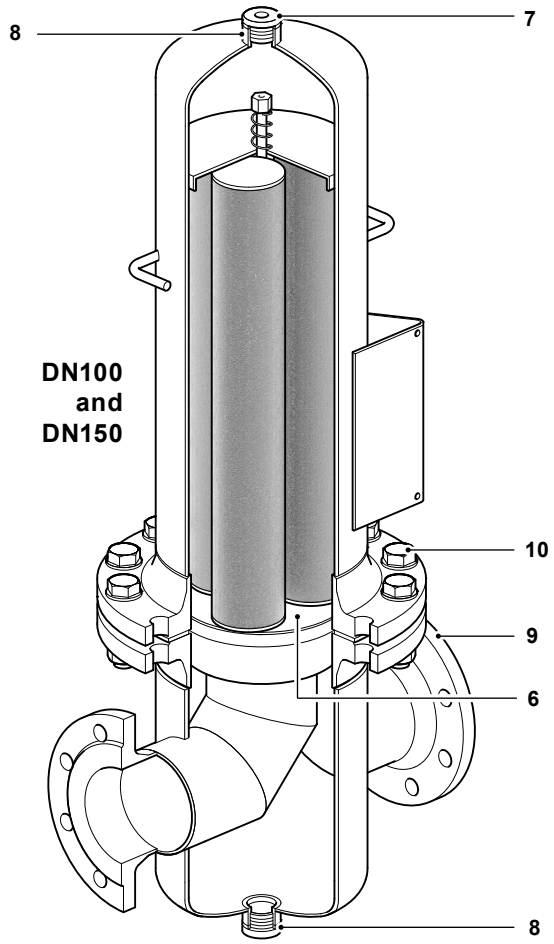
***1.4301 -**
Material may also include grades 1.4307, 1.4404, 1.4432, 1.4435, 1.4541 and 1.4571 for manufacturing purposes. Weld filler will be 1.4430.

**** 1.4404 -**
Material may also include grades 1.4432, 1.4435 and 1.4571 for manufacturing purposes. Weld filler will be 1.4430.

Materials continued on next page

Materials (continued)





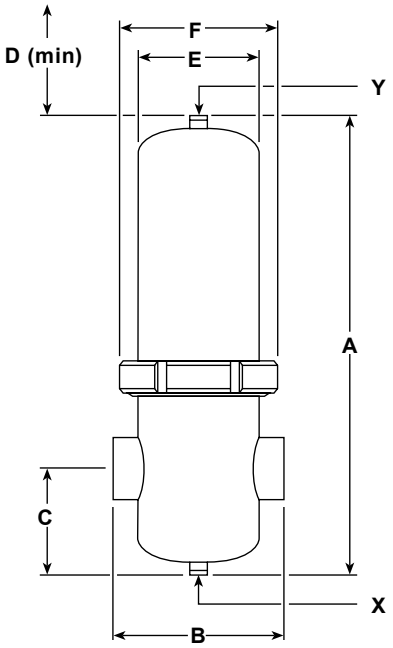
No.	Part	Materials		
6	Filter element seal (2 off per element)	EPM or Fluoraz (see filter element options matrix)		EP380 Fluoraz 890
7	Plug	Stainless steel	For sizes DN8 to DN80 CSF16/CSF16T	A4 - 70
			For sizes DN100 and DN150 CSF16/CSF16T	ASTM A276 316L
8	Gasket	Stainless steel	For sizes DN8 to DN80 CSF16/CSF16T	1.4571
			For sizes DN100 and DN150 CSF16/CSF16T	1.4301
9	Flange	Stainless steel	CSF16	1.4541
			CSF16T	1.4571
10	Bolts and nuts (DN100 and DN150)	Stainless steel		A2 - 70

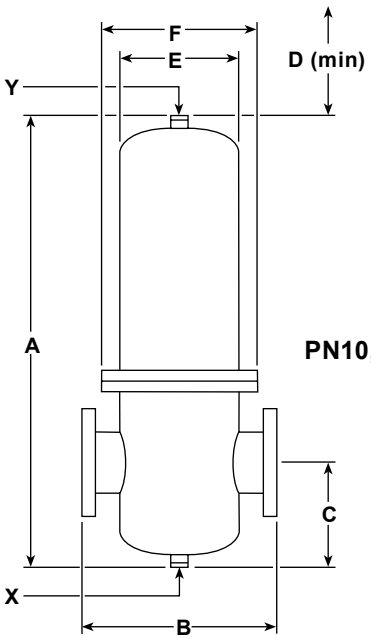
***1.4301 -**
Material may also include grades 1.4307, 1.4404, 1.4432, 1.4435, 1.4541 and 1.4571 for manufacturing purposes. Weld filler will be 1.4430.

**** 1.4404 -**
Material may also include grades 1.4432, 1.4435 and 1.4571 for manufacturing purposes. Weld filler will be 1.4430.

Dimensions/volume and weights (approximate) in mm, litres and kg

Screwed BSP and NPT





Flanged PN10, PN16 and Class 150

Filter	Size		Dimensions A	B Screwed	B Flanged PN	B Flanged Class 150	C	D	E Ø	F Ø	Thread ***X	Thread Y
CSF16 and CSF16T	¼"	DN8	217	108			54	90	70	112	¼"	G¼"
	⅜"	DN10	245	108	180		54	120	70	112	¼"	G¼"
	½"	DN15	245	108	180	203	54	120	70	112	¼"	G¼"
	¾"	DN20	269	125	202	230	54	150	70	112	¼"	G¼"
	1"	DN25	295	125	212	247	73	150	85	127	¼"	G¼"
	1¼"	DN32	347	140	220	254	73	200	85	127	¼"	G¼"
	1½"	DN40	386	170	254	294	92	200	104	148	¼"	G¼"
	2½"	DN65	737	216	306	356	106	580	129	178	¼"	G¼"
CSF16L and CSF16LT	2"	DN50	460	170	260	297	92	280	104	148	¼"	G¼"
	3"	DN80	999	220	316	356	110	850	129	178	¼"	G¼"
	4"	DN100	1042		410	500	195	850	219	340	1"	G1"
	6"	DN150	1420		480		267	850	273	395	1"	G1"
CSF16H and CSF16HT	2"	DN50	587	170	260	297	92	450	104	148	¼"	G¼"
	3"	DN80	1024	240	340	380	113	850	154	210	¼"	G¼"
	4"	DN100	1296		410	500	195	850	219	340	1"	G1"

Screwed BSP and NPT and flanged PN10, PN16 and Class 150

*** for PN10, PN16 and BSP versions bottom connection is G thread with a plug and seal.
*** for Class 150 and NPT versions bottom connection is NPT thread without a plug.

Volume and weights (approximate) in litres and kg

Filter	Size		Vol. Litres		Weight (kg) without element		
			Screwed	Flanged	Screwed	Flanged	
						PN	Class 150
CSF16 and CSF16T	¼"	DN8	0.6		2.0		
	⅜"	DN10	0.7	0.7	2.1	3.4	
	½"	DN15	0.7	0.7	2.2	3.6	3.6
	¾"	DN20	0.8	0.85	2.4	4.4	4.4
	1"	DN25	1.3	1.4	3.2	5.7	5.7
	1¼"	DN32	1.6	1.8	3.7	7.2	7.2
	1½"	DN40	2.8	3	5.2	8.9	8.9
	2½"	DN65	9	9.4	8.1	14.6	15.9
CSF16L and CSF16LT	2"	DN50	3.2	3.75	5.2	10.6	10.6
	3"	DN80	12.6	13	9.6	17.2	19.2
	4"	DN100		36		60.0	60.0
	6"	DN150		75		85.0	
CSF16H and CSF16HT	2"	DN50	4.5	4.7	5.8	11.2	11.2
	3"	DN80	17.8	18.3	13.2	20.9	22.2
	4"	DN100		45		65.0	65.0

Steam filter elements (weight in kg)

With EPM seals

Filter housing size	Filter housing code	Filter element code (EPM)	Number of elements per housing	Filter element (individual)
DN8 (¼")	CSF16/CSF16T	CSF16-SE 03/10	1	0.2
DN10 (⅜")	CSF16/CSF16T	CSF16-SE 04/10	1	0.26
DN15 (½")	CSF16/CSF16T	CSF16-SE 04/20	1	0.37
DN20 (¾")	CSF16/CSF16T	CSF16-SE 05/20	1	0.45
DN25 (1")	CSF16/CSF16T	CSF16-SE 05/25	1	0.47
DN32 (1¼")	CSF16/CSF16T	CSF16-SE 07/25	1	0.57
DN40 (1½")	CSF16/CSF16T	CSF16-SE 07/30	1	1.27
DN50 (2")	CSF16L/CSF16LT	CSF16-SE 10/30	1	1.6
DN50 (2")	CSF16H/CSF16HT	CSF16-SE 15/30	1	2.25
DN65 (2½")	CSF16/CSF16T	CSF16-SE 20/30	1	2.77
DN80 (3")	CSF16L/CSF16LT	CSF16-SE 30/30	1	3.81
DN80 (3")	CSF16H/CSF16HT	CSF16-SE 30/50	1	4.98

With Fluoraz seals

Filter housing size	Filter housing code	Filter element code (Fluoraz)	Number of elements per housing	Filter element (individual)
DN8 (¼")	CSF16/CSF16T	CSF16-SF 03/10	1	0.2
DN10 (⅜")	CSF16/CSF16T	CSF16-SF 04/10	1	0.26
DN15 (½")	CSF16/CSF16T	CSF16-SF 04/20	1	0.37
DN20 (¾")	CSF16/CSF16T	CSF16-SF 05/20	1	0.45
DN25 (1")	CSF16/CSF16T	CSF16-SF 05/25	1	0.47
DN32 (1¼")	CSF16/CSF16T	CSF16-SF 07/25	1	0.57
DN40 (1½")	CSF16/CSF16T	CSF16-SF 07/30	1	1.27
DN50 (2")	CSF16L/CSF16LT	CSF16-SF 10/30	1	1.6
DN50 (2")	CSF16H/CSF16HT	CSF16-SF 15/30	1	2.25
DN65 (2½")	CSF16/CSF16T	CSF16-SF 20/30	1	2.77
DN80 (3")	CSF16L/CSF16LT	CSF16-SF 30/30	1	3.81
DN80 (3")	CSF16H/CSF16HT	CSF16-SF 30/50	1	4.98
DN100 (4")	CSF16L/CSF16LT	CSF16-SF 20/30	3	2.77
DN100 (4")	CSF16H/CSF16HT	CSF16-SF 30/30	3	3.81
DN150 (6")	CSF16L/CSF16LT	CSF16-SF 30/30	4	3.81

Capacities

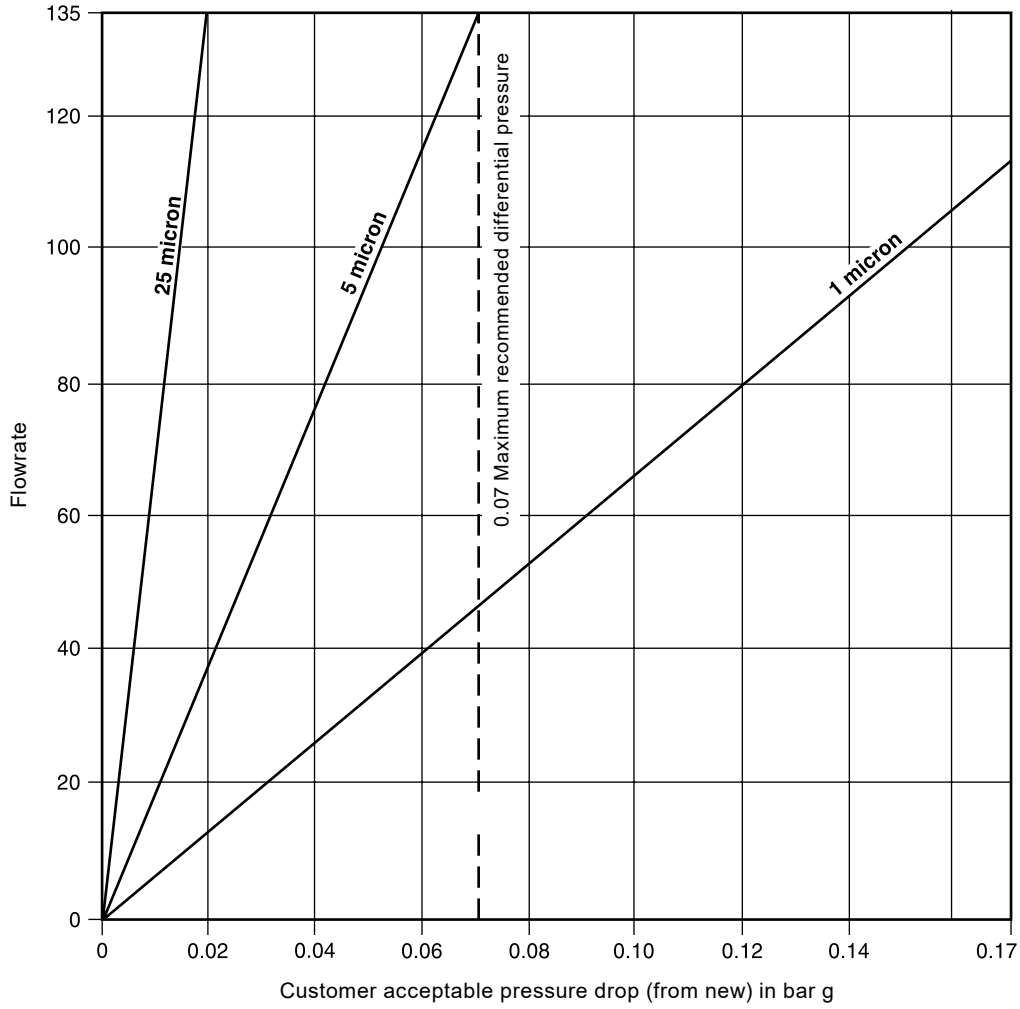
Saturated steam 1.0 bar g; DN50 CSF16 and CSF16T

Note: This sizing method will estimate the housing size for a given set of conditions. Contact Spirax Sarco for more accurate sizing if required.

25 micron element Flowrate look-up table*

Customer acceptable pressure drop in bar g	Flowrate value (Selection sizing step 2)
0.02	135
0.03	203
0.04	270
0.05	338
0.06	405
0.07	473

*where not visible on the chart



Capacity correction factors for steam pressure

A minimum of 1 bar g positive pressure must be available

Steam pressure bar g	1	2	3	4	5	6	7	8	9	10	11	12	13	14	14.8
Correction factor	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5	5.5	6	6.5	7	7.5	7.9

Element size correction factors for filter element

	DN8	DN10	DN15	DN20	DN25	DN32	DN40	DN50L
Size of unit	¼"	⅜"	½"	¾"	1"	1¼"	1½"	2"L
Capacity correction factor	0.08	0.13	0.17	0.25	0.39	0.50	0.67	1.00

	DN50H	DN65	DN80L	DN80H	DN100L	DN100H	DN150L
Size of unit	2"H	2½"	3"L	3"H	4"L	4"H	6"
Capacity correction factor	1.50	2.00	2.70	4.00	6.00	8.00	10.67

Selection example

Select a steam filter for a flowrate of 850 kg/h with saturated steam pressure at 4 bar g.
A 5 micron rating is required with maximum 0.05 bar pressure drop allowed.

Step 1: Divide the flowrate required by the capacity correction factor for the operating steam pressure. In this case, 850 kg/h is divided by 2.5 for a flowrate value of 340.

Step 2: From the capacity graph, select the micron rating required. Note where this line intersects the maximum pressure drop and go horizontally to read off the flowrate. In this case, the 5 micron line meets the 0.05 bar pressure drop allowed at a flowrate of 100.
Note: For higher pressure drops when selecting a 25 micron filter element, use the flowrate lookup table above.

Step 3: Divide the equivalent flow calculated in step (1) by the maximum flowrate in step (2).
Hence in this example, we have 340/100 = 3.4 factor.

Step 4: From the element size correction factor table, select the nearest suitable conversion factor obtained in step (3) and select the appropriate element size. In the example DN80H CSF16 and CSF16T has a factor of 4.00. Note that if pressure drop must be minimized, always select the element based on a higher correction factor than that calculated.

Filter element

In steam/gas service, 100% of particles larger than the pore size chosen will be retained by the element. Selecting a pore size smaller than required will result in reduced service life and higher pressure drop.

Filter Element Efficiencies

	Particle Size (Micron)	Particle Count Before Filter (Per Minute)	Particle Count After Filter (Per Minute)	Efficiency - Air (%)	Efficiency - Steam (%)
Particle Retention Efficiency For CSF16-SE and CSF16-SF Steam Filter Elements - 1 Micron Rating	**0.15**	2288	343	85	82
	0.25	4522	180	99.96	96
	0.5	8634	43	99.995	97
	1	1533	0	100	98
Particle Retention Efficiency For CSF16-SE and CSF16-SF Steam Filter Elements - 5 Micron Rating	**0.5**	7288	1337	82	78
	1	8244	329	99.96	96
	2	20250	101	99.995	97
	5	1736	0	100	98
Particle Retention Efficiency For CSF16-SE and CSF16-SF Steam Filter Elements - 25 Micron Rating	**10**	8421	1515	82	78
	15	3592	144	99.96	96
	20	6489	32	99.995	97
	25	5440	0	100	98

Steam filter element life service guidelines

Filter Element type	Application	Service life	Additional notes
CSF16-SE or CSF16-SF	Steam	Replace when **0.7 barg pressure drop** is measured across the filter housing. Alternatively, where pressure drop cannot be accurately measured: **after 12 months** from installation (lowest risk) up to a **maximum of 36 months***	Filter Housings should be Installed, Commissioned and Operated in accordance with Sections 3, 4 and 5 of the Installation and Maintenance Instruction document IM-P180-42. Clean Steam Filter Housings and Filter elements are manufactured in accordance with EC1935:2004 (Materials and articles intended to come into contact with food). **Therefore, it is recommended that Filter elements are replaced to maintain this compliance, and not cleaned.** Cleaning of Filter Elements is not recommended because of the increased risk of introducing contamination to the process. Cleaning will only provide a short-term improvement in dirt holding capacity and will never return to 'as new' condition.

*Service life durations are based upon Steam Systems being regularly maintained and best practice followed.

Safety information, installation and maintenance

For full details see the Installation and Maintenance Instructions (IM-P180-42) which is supplied with the product.

Warning

The steam filter elements CSF16 -SE and CSF16 - SF must never be subjected to more than 5 bar g differential pressure.

How to order

The following information must be specified when ordering a Spirax Sarco CSF filter:

Maximum steam flowrate	kg/h
Maximum steam pressure	bar g
Customer allowable pressure drop in bar g (from new)	0.07 bar g maximum recommended
Housing material	1.4301 or 1.4404
Size *	DN or NPS (") and 'H' or 'L' where applicable
Pipe connections	PN10, PN16, Class 150, BSP or NPT
Element rating	1, 5 or 25 micron
Filter housing seal or gasket material.	EPM, Fluoraz or Spiral wound stainless steel 1.4541/PTFE filler
3.1 Certification for SEP and Category I filter housings	Yes/No
3.1 Certification for filter element(s)	Yes/No

***** Note: For DN50, DN80 and DN100 the high capacity version is denoted by 'H' and low capacity by 'L'. For a 1.4404 housing version, the suffix 'T' must be added to the nomenclature e.g. CSF16T.
DN150 size is only available in low capacity "L" housing.

Supply

The CSF16 and CSF16T filter housings are supplied separately to the filter elements.

1. The filter housing head and bowl with housing seal or gasket are packed in one carton, complete with EN 10204 3.1 certification where applicable documentation and installation and maintenance instructions.
2. The filter element complete with two seals.
   Note: DN100 and DN150 CSF16 and CSF16T require multiple elements – See filter element selection table on page 9.

Note: The purpose of the filter is to remove (and retain) unwanted contamination. In time, the filter element will become saturated. To ensure a minimum downtime, we recommend that a spare filter element set is ordered at the same time as the CSF16 and CSF16T filter housing.

Example:

1 off Spirax Sarco DN20 CSF16 to pass 100 kg/h saturated steam at 9.0 bar g. Housing to be 1.4301 having NPT connections with Fluoraz seals.

1 off CSF16-SF 15/20 filter element having a 5 micron rating.

1 off CSF16-SF 15/20 spare filter element set having a 5 micron rating.

1 off 3.1 Certification (for filter housing)

Spare parts

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

Available spares

CSF16-SE or SF filter element kit	**5, 6** (2 off)
Seal kit	**3**, **6** (please see table below for quantities)

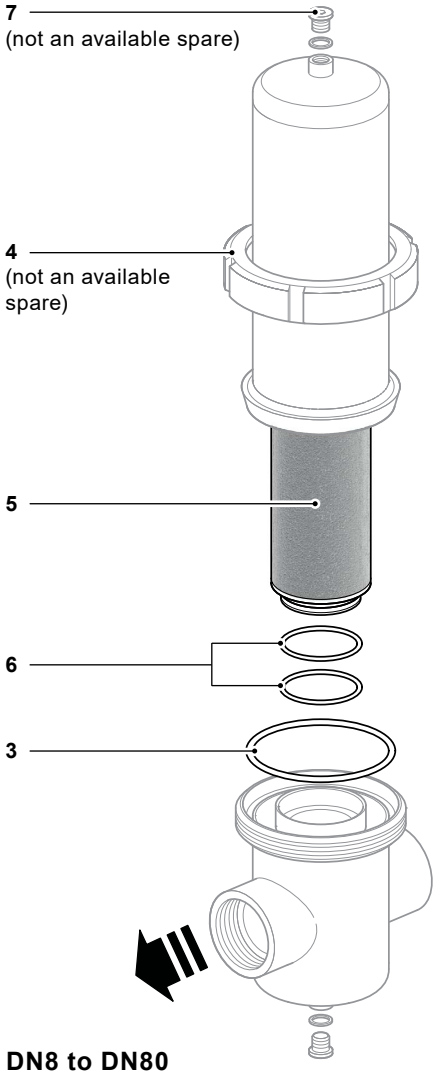
Seal kit contents

Unit size	Housing seal (Part number 3)	Element seals (Part number 6)
DN8 - DN80	1	2
DN100	1	6
DN150L	1	8

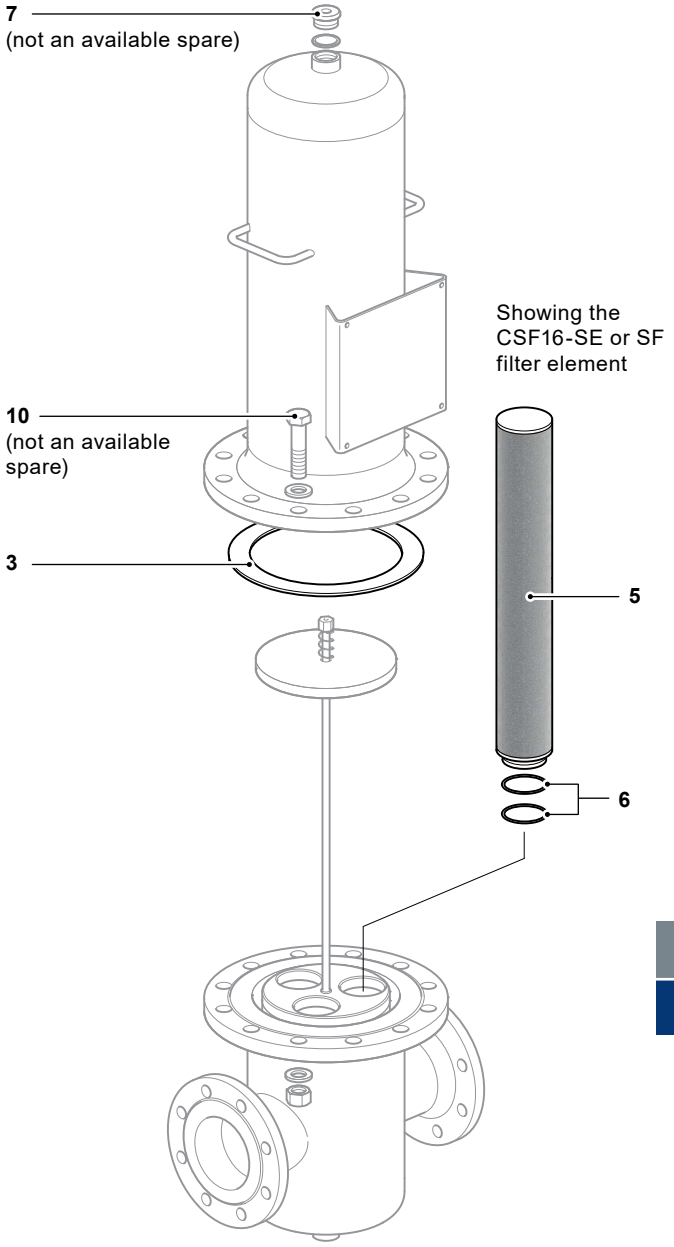
How to order spares

Always order spares by using the description given in the column headed 'Available spares' and state the size and type of filter housing, filter element rating and housing/filter element seal material required.

Example: 1 off 5 micron CSF16 SE filter element kit for a Spirax Sarco DN25 CSF16 clean steam filter, with EPM filter element seals.



DN8 to DN80



DN100 and DN150L
(image shows DN100L)

Table 1 Recommended tightening torques

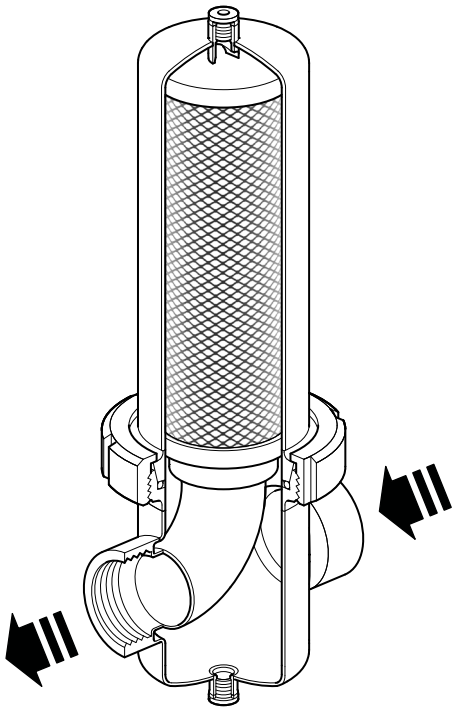
Item	Part	or mm		N m
4		use C spanner		As required
7	DN8 - DN80	6 mm Hex	G¼"	55
	DN100 and DN150L	A/F 42	G1"	138
10	DN100	A/F 30	M20	180
	DN150L	A/F 30	M20	260

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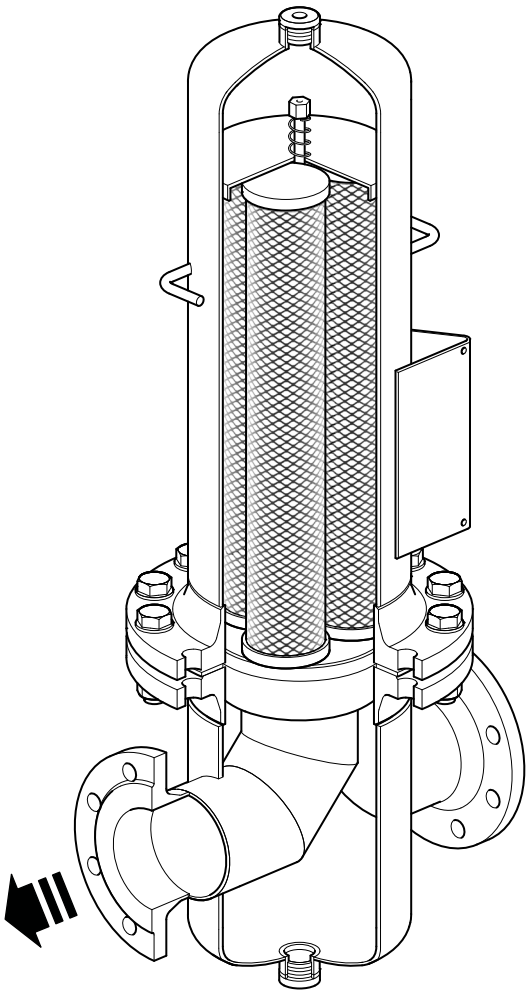
CSF16 and CSF16T
Stainless Steel Sterile Air Filters

Description

The CSF16 and CSF16T are horizontal, in-line high efficiency filters used to remove contaminate particles and bacteria from compressed air systems.



DN8 to DN80



DN100 and DN150

The filter housings are available in a choice of austenitic stainless steel and the material grades are defined in the table below. Also referenced is the surface finish and connection type that differ depending on the size of the housing.

Filter Housing model	Sizes	Material of Filter Housing (Bowl and Head)	Connection type (Bowl and Head)	Internal surface finish	External surface finish
CSF16, CF16L*, CSF16H*	DN8 (¼") to DN80 (3")	1.4301 (304 stainless steel)	Food industry fitting to DIN 11851	Etched, Passivated and Polished Ra 0.8µm	Etched, Passivated and Polished Ra 1.6µm
	DN100 (4") and DN150 (6")		Nuts and Bolts		Etched and Passivated, Ra 5.8 micron
CSF16T, CF16LT*, CSF16HT*	DN8 (¼") to DN80 (3")	1.4404 (316L stainless steel)	Food industry fitting to DIN 11851	Etched, Passivated and Polished Ra 0.8µm	Etched, Passivated and Polished Ra 1.6µm
	DN100 (4") and DN150 (6")		Nuts and Bolts		Etched and Passivated, Ra 5.8 micron.

*In some pipe sizes the housing is available in a choice of low capacity designated 'L' and high capacity designated 'H'.

Replaceable borosilicate depth filter elements are available with a retention rate of >than 99.9998% related to 0.2 µm. For bacterial retention, Log Reduction Value (LRV) > 7/cm^2 for viruses and phages.
These must be ordered separately to the filter housing.

Standards

These products fully comply with the requirements of the EU Pressure Equipment Directive 2014/68/EU and carry the CE mark when so required.

Please note that all materials meet the requirements as stipulated by the US FDA Regulations.

Product variants that are PED Category 1 (Cat.1) are also compliant to PE(S)R and carry the UKCA mark.

The complete product and component parts are, manufactured, assembled, tested and packaged in a facility verified and approved by an accredited registered body to ISO 9001:2015.

Certification

The CSF16/CSF16T can be supplied with material certification as per the table below.
Note: All certification/inspection requirements must be stated at the time of order placement.

Housing PED Category (SEP, Category I, Category II)	EN10204 Inspection Documents
SEP	No certification supplied
Cat. I	No certification supplied
Cat. II	Type 3.1 (Inspection Certificate) is supplied as standard

If type 3.1 certification is required for SEP or Cat. I Filter Housings, this must be ordered separately.

Filter Housings options matrix

CSF16 Filter Housing Options, PED Classification and Design Refererence (PT Curve)

			Screwed Filter Housings (Design reference/PED Category)		Flanged Filter Housings (Design reference/PED Category)		
Filter Housing Size	**Filter Housing code**	**Filter Housing Seal Material**	**BSP/NPT (PN10 Rating)**	**BSP/NPT (PN16 Rating)**	**EN 1092 (PN10 Rating)**	**EN 1092 (PN16 Rating)**	**EN 1735-1 (Class 150 Rating)**
DN8 (¼")	CSF 16	EPM		Design Ref. 1/SEP			
DN10 (⅜")	CSF 16			Design Ref. 1/SEP		Design Ref. 1/SEP	
DN15 (½")	CSF 16			Design Ref. 1/SEP		Design Ref. 1/SEP	Design Ref. 3/SEP
DN20 (¾")	CSF 16			Design Ref. 1/SEP		Design Ref. 1/SEP	Design Ref. 3/SEP
DN25 (1")	CSF 16			Design Ref. 1/SEP		Design Ref. 1/SEP	Design Ref. 3/SEP
DN32 (1¼")	CSF 16			Design Ref. 1/SEP		Design Ref. 1/SEP	Design Ref. 3/SEP
DN40 (1½")	CSF 16			Design Ref. 1/SEP		Design Ref. 1/SEP	Design Ref. 3/Cat. I
DN50 (2")	CSF16L			Design Ref. 1/Cat. I		Design Ref. 1/Cat. I	Design Ref. 3/Cat. I
	CSF16H			Design Ref. 1/Cat. I		Design Ref. 1/Cat. I	Design Ref. 3/Cat. I
DN65 (2½")	CSF16			Design Ref. 1/Cat. I		Design Ref. 1/Cat. I	Design Ref. 3/Cat. I
DN80 (3")	CSF16L			Design Ref,4/Cat. II		Design Ref. 1/Cat. II	Design Ref. 3/Cat. II
	CSF16H		Design Ref. 2/Cat. I		Design Ref. 2/Cat. I		Design Ref. 3/Cat. II
DN8 (¼")	CSF16	Fluoraz		Design Ref. 4/SEP			
DN10 (⅜")	CSF16			Design Ref. 4/SEP		Design Ref. 4/SEP	
DN15 (½")	CSF16			Design Ref. 4/SEP		Design Ref. 4/SEP	Design Ref. 5/SEP
DN20 (¾")	CSF16			Design Ref. 4/SEP		Design Ref. 4/SEP	Design Ref. 5/SEP
DN25 (1")	CSF16			Design Ref. 4/SEP		Design Ref. 4/SEP	Design Ref. 5/SEP
DN32 (1¼")	CSF16			Design Ref. 4/SEP		Design Ref. 4/SEP	Design Ref. 5/SEP
DN40 (1½")	CSF16			Design Ref. 4/SEP		Design Ref. 4/SEP	Design Ref. 5/Cat. I
DN50 (2")	CSF16L			Design Ref. 4/Cat. I		Design Ref. 4/Cat. I	Design Ref. 5/Cat. I
	CSF16H			Design Ref. 4/Cat. I		Design Ref. 4/Cat. I	Design Ref. 5/Cat. I
DN65 (2½")	CSF16			Design Ref. 4/Cat. I		Design Ref. 4/Cat. I	Design Ref. 5/Cat. I
DN80 (3")	CSF16L			Design Ref,4/Cat. II		Design Ref. 4/Cat. II	Design Ref. 5/Cat. II
	CSF16H		Design Ref. 6/Cat. I	Design Ref. 4/Cat. II	Design Ref. 6/Cat. I	Design Ref. 4/Cat. II	Design Ref. 5/Cat. II
DN100 (4")	CSF16L	Stainless Steel/ PTFE Spiral Wound Gasket			Design Ref. 6/Cat. II	Design Ref. 4/Cat. II	Design Ref. 5/Cat. II
	CSF16H				Design Ref. 6/Cat. II	Design Ref. 4/Cat. II	Design Ref. 5/Cat. II
DN150 (6")	CSF16L				Design Ref. 6/Cat. II		
	CSF16H						

Not available

Filter Housings options matrix (continued)

CSF16T Filter Housing Options, PED Classification and Design Refererence (PT Curve)

			Screwed Filter Housings (Design reference/PED Category)		Flanged Filter Housings (Design reference/PED Category)		
Filter Housing Size	**Filter Housing code**	**Filter Housing Seal Material**	**BSP/NPT (PN10 Rating)**	**BSP/NPT (PN16 Rating)**	**EN 1092 (PN10 Rating)**	**EN 1092 (PN16 Rating)**	**EN 1735-1 (Class 150 Rating)**
DN8 (¼")	CSF16T	EPM		Design Ref. 7/SEP			
DN10 (⅜")	CSF16T			Design Ref. 7/SEP		Design Ref. 7/SEP	
DN15 (½")	CSF16T			Design Ref. 7/SEP		Design Ref. 7/SEP	Design Ref. 9/SEP
DN20 (¾")	CSF16T			Design Ref. 7/SEP		Design Ref. 7/SEP	Design Ref. 9/SEP
DN25 (1")	CSF16T			Design Ref. 7/SEP		Design Ref. 7/SEP	Design Ref. 9/SEP
DN32 (1¼")	CSF16T			Design Ref. 7/SEP		Design Ref. 7/SEP	Design Ref. 9/SEP
DN40 (1½")	CSF16T			Design Ref. 7/SEP		Design Ref. 7/SEP	Design Ref. 9/Cat. I
DN50 (2")	CSF16LT			Design Ref. 7/Cat. I		Design Ref. 7/Cat. I	Design Ref. 9/Cat. I
	CSF16HT			Design Ref. 7/Cat. I		Design Ref. 7/Cat. I	Design Ref. 9/Cat. I
DN65 (2½")	CSF16T			Design Ref. 7/Cat. I		Design Ref. 7/Cat. I	Design Ref. 9/Cat. I
DN80 (3")	CSF16LT			Design Ref,7/Cat. II		Design Ref. 7/Cat. II	Design Ref. 9/Cat. II
	CSF16HT		Design Ref. 8/Cat. I		Design Ref. 8/Cat. I		Design Ref. 9/Cat. II
DN8 (¼")	CSF16T	Fluoraz		Design Ref. 10/SEP			
DN10 (⅜")	CSF16T			Design Ref. 10/SEP		Design Ref. 10/SEP	
DN15 (½")	CSF16T			Design Ref. 10/SEP		Design Ref. 10/SEP	Design Ref. 11/SEP
DN20 (¾")	CSF16T			Design Ref. 10/SEP		Design Ref. 10/SEP	Design Ref. 11/SEP
DN25 (1")	CSF16T			Design Ref. 10/SEP		Design Ref. 10/SEP	Design Ref. 11/SEP
DN32 (1¼")	CSF16T			Design Ref. 10/SEP		Design Ref. 10/SEP	Design Ref. 11/SEP
DN40 (1½")	CSF16T			Design Ref. 10/SEP		Design Ref. 10/SEP	Design Ref. 11/Cat. I
DN50 (2")	CSF16LT			Design Ref. 10/Cat. I		Design Ref. 10/Cat. I	Design Ref. 11/Cat. I
	CSF16HT			Design Ref. 10/Cat. I		Design Ref. 10/Cat. I	Design Ref. 11/Cat. I
DN65 (2½")	CSF16T			Design Ref. 10/Cat. I		Design Ref. 10/Cat. I	Design Ref. 11/Cat. I
DN80 (3")	CSF16LT			Design Ref. 10/Cat. II		Design Ref. 10/Cat. II	Design Ref. 11/Cat. II
	CSF16HT		Design Ref. 12/Cat. I	Design Ref. 10/Cat. II	Design Ref. 12/Cat. I	Design Ref. 10/Cat. II	Design Ref. 11/Cat. II
DN100 (4")	CSF16LT	Stainless Steel/ PTFE Spiral Wound Gasket			Design Ref. 12/Cat. II	Design Ref. 10/Cat. II	Design Ref. 11/Cat. II
	CSF16HT				Design Ref. 12/Cat. II	Design Ref. 10/Cat. II	Design Ref. 11/Cat. II
DN150 (6")	CSF16LT				Design Ref. 12/Cat. II		
	CSF16HT						

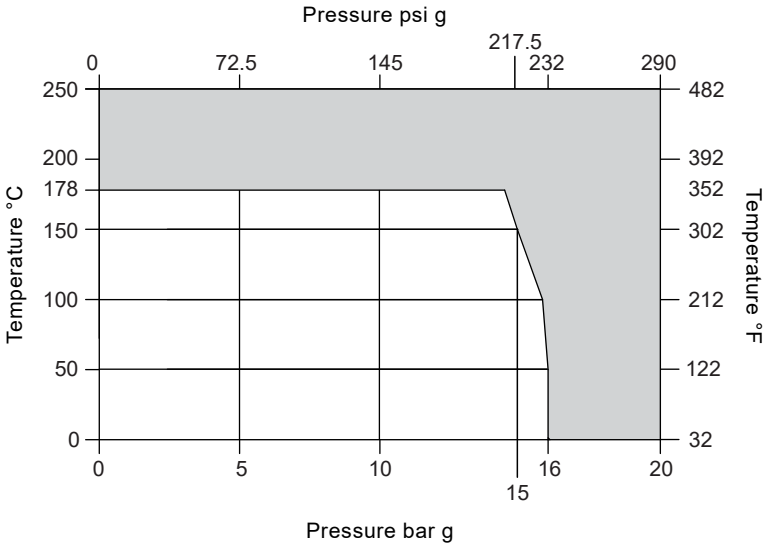
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Pressure/temperature limits

CSF16

Product Design Reference 1

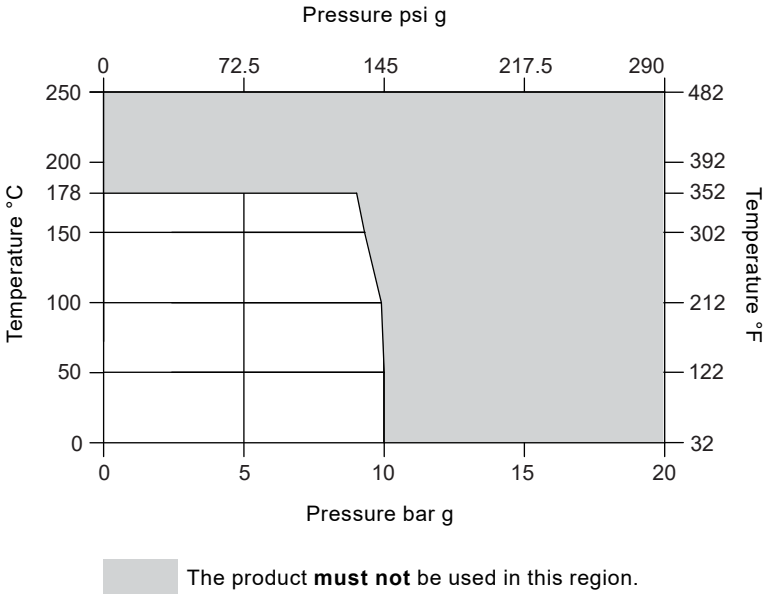
Pressure/temperature rating			PN16
PMA	Maximum allowable pressure	16 bar g	232 psi g
TMA	Maximum allowable temperature	178 °C	352 °F
PMO	Maximum operating pressure	16 bar g	232 psi g
TMO	Maximum operating temperature	178 °C	352 °F
Minimum allowable temperature		-5 °C	23 °F
Minimum operating temperature		0 °C	32 °F
Product is safe for use under full vacuum conditions			
Cold hydraulic test pressure		26.1 bar g	379 psi g



6.1
167

Product Design Reference 2

Pressure/temperature rating			PN10
PMA	Maximum allowable pressure	10 bar g	145 psi g
TMA	Maximum allowable temperature	178 °C	352 °F
PMO	Maximum operating pressure	10 bar g	145 psi g
TMO	Maximum operating temperature	178 °C	352 °F
Minimum allowable temperature		-5 °C	23 °F
Minimum operating temperature		0 °C	32 °F
Product is safe for use under full vacuum conditions			
Cold hydraulic test pressure		16.3 bar g	236 psi g



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

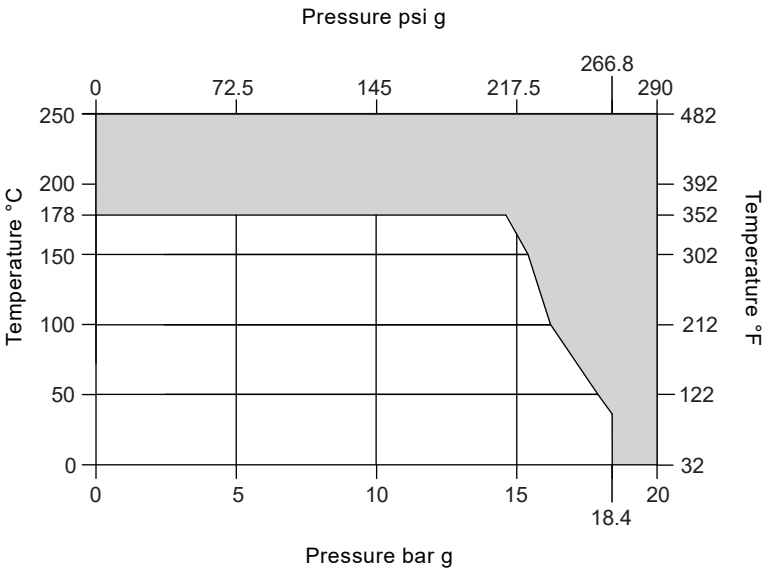
CSF16 Pressure/temperature limits continued on next page

Pressure/temperature limits

CSF16 (continued)

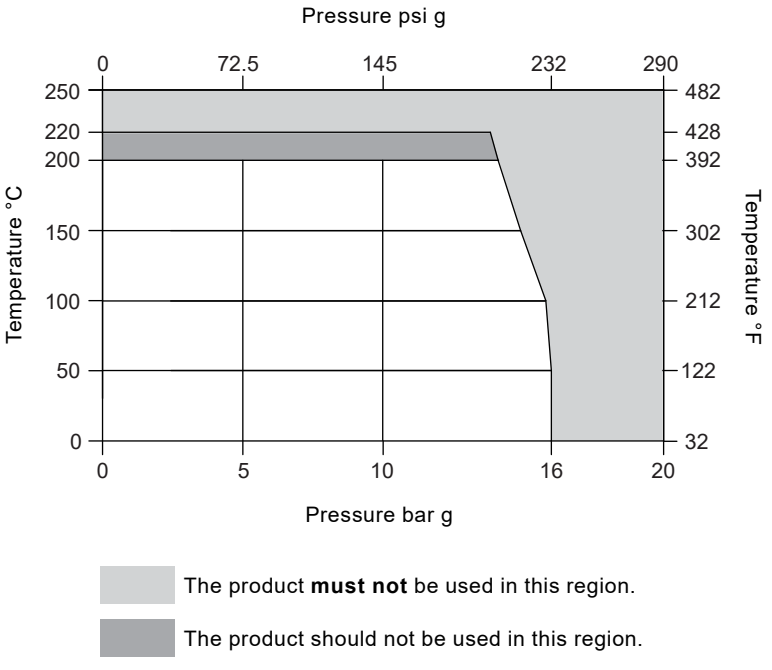
Product Design Reference 3

Pressure/temperature rating			Class 150
PMA	Maximum allowable pressure	18.4 bar g	266.8 psi g
TMA	Maximum allowable temperature	178 °C	352 °F
PMO	Maximum operating pressure	18.4 bar g	266.8 psi g
TMO	Maximum operating temperature	178 °C	352 °F
Minimum allowable temperature		-5 °C	23 °F
Minimum operating temperature		0 °C	32 °F
Product is safe for use under full vacuum conditions			
Cold hydraulic test pressure		28 bar g	406 psi g



Product Design Reference 4

Pressure/temperature rating			PN16
PMA	Maximum allowable pressure	16 bar g	232 psi g
TMA	Maximum allowable temperature	220 °C	428 °F
PMO	Maximum operating pressure	16 bar g	232 psi g
TMO	Maximum operating temperature	200 °C	392 °F
Minimum allowable temperature		-5 °C	23 °F
Minimum operating temperature		0 °C	32 °F
Product is safe for use under full vacuum conditions			
Cold hydraulic test pressure		26.1 bar g	379 psi g



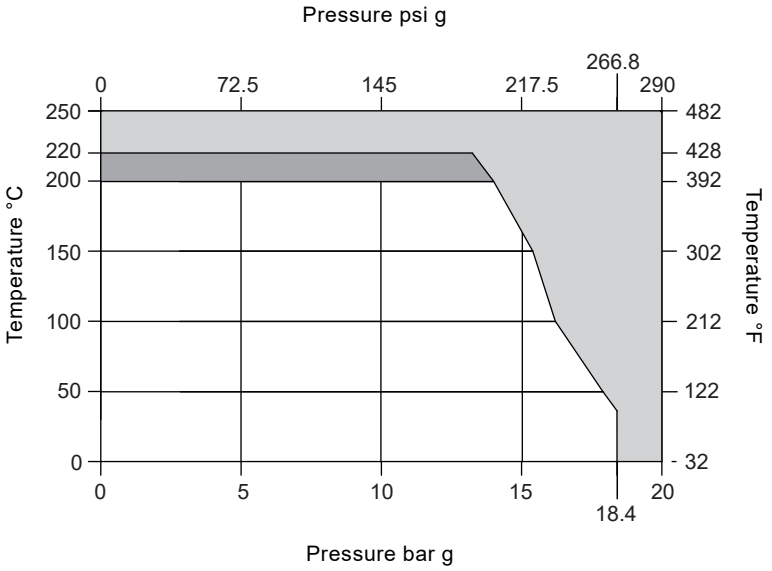
CSF16 Pressure/temperature limits continued on next page

Pressure/temperature limits

CSF16 (continued)

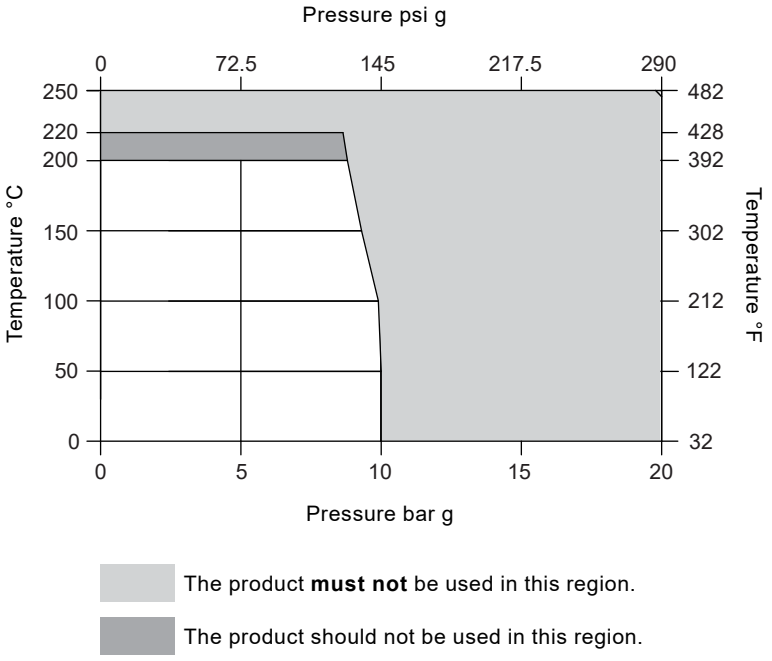
Product Design Reference 5

Pressure/temperature rating			Class 150
PMA	Maximum allowable pressure	18.4 bar g	266.8 psi g
TMA	Maximum allowable temperature	220 °C	428 °F
PMO	Maximum operating pressure	18.4 bar g	266.8 psi g
TMO	Maximum operating temperature	200 °C	392 °F
Minimum allowable temperature		-5 °C	23 °F
Minimum operating temperature		0 °C	32 °F
Product is safe for use under full vacuum conditions			
Cold hydraulic test pressure		28 bar g	406 psi g



Product Design Reference 6

Pressure/temperature rating			PN10
PMA	Maximum allowable pressure	10 bar g	145 psi g
TMA	Maximum allowable temperature	220 °C	428 °F
PMO	Maximum operating pressure	10 bar g	145 psi g
TMO	Maximum operating temperature	200 °C	392 °F
Minimum allowable temperature		-5 °C	23 °F
Minimum operating temperature		0 °C	32 °F
Product is safe for use under full vacuum conditions			
Cold hydraulic test pressure		16.3 bar g	236 psi g

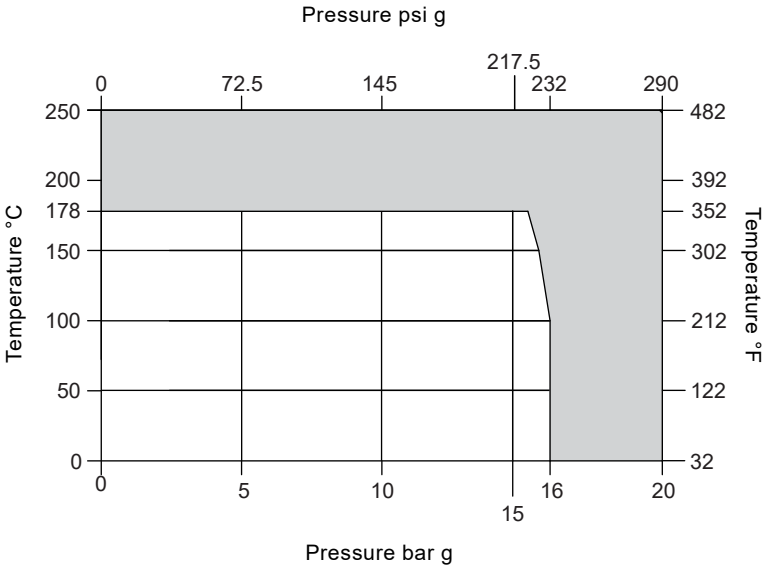


Pressure/temperature limits

CSF16T

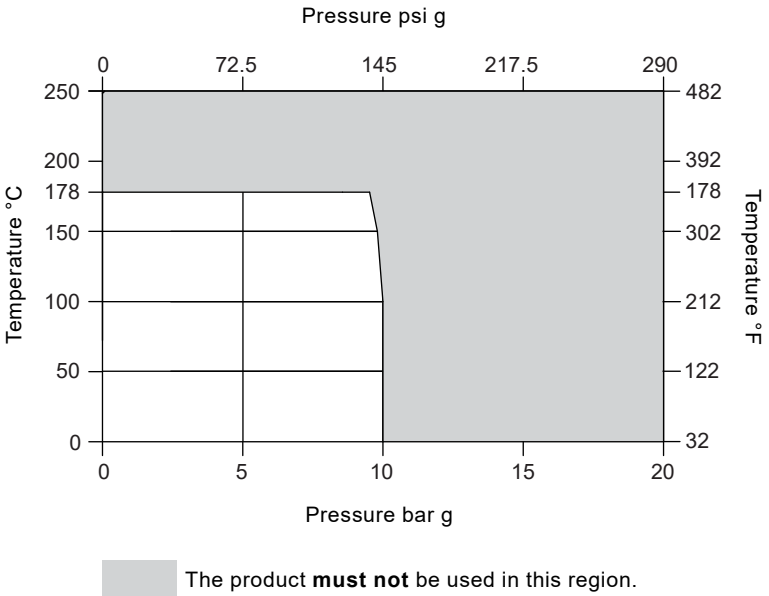
Product Design Reference 7

Pressure/temperature rating			PN16
PMA	Maximum allowable pressure	16 bar g	232 psi g
TMA	Maximum allowable temperature	178 °C	352 °F
PMO	Maximum operating pressure	16 bar g	232 psi g
TMO	Maximum operating temperature	178 °C	352 °F
Minimum allowable temperature		-5 °C	23 °F
Minimum operating temperature		0 °C	32 °F
Product is safe for use under full vacuum conditions			
Cold hydraulic test pressure		25.5 bar g	370 psi g



Product Design Reference 8

Pressure/temperature rating			PN10
PMA	Maximum allowable pressure	10 bar g	145 psi g
TMA	Maximum allowable temperature	178 °C	352 °F
PMO	Maximum operating pressure	10 bar g	145 psi g
TMO	Maximum operating temperature	178 °C	352 °F
Minimum allowable temperature		-5 °C	23 °F
Minimum operating temperature		0 °C	32 °F
Product is safe for use under full vacuum conditions			
Cold hydraulic test pressure		15.9 bar g	231 psi g



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

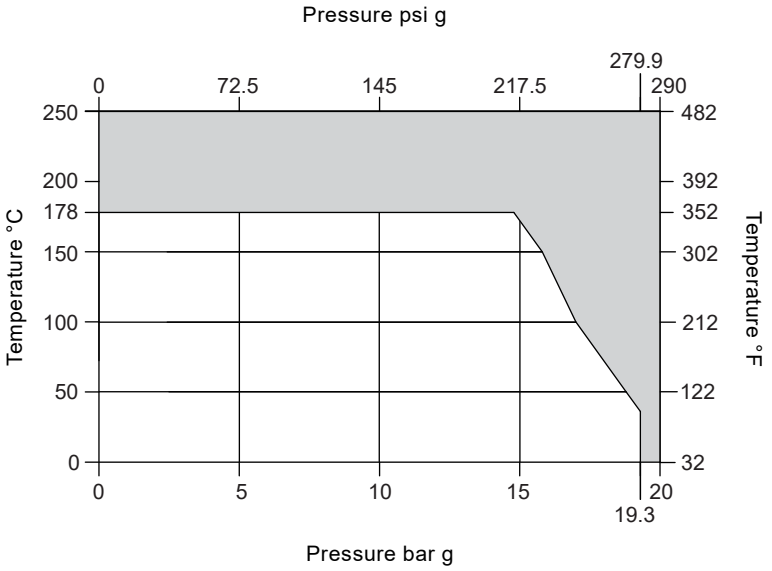
CSF16T Pressure/temperature limits continued on next page

Pressure/temperature limits

CSF16T (continued)

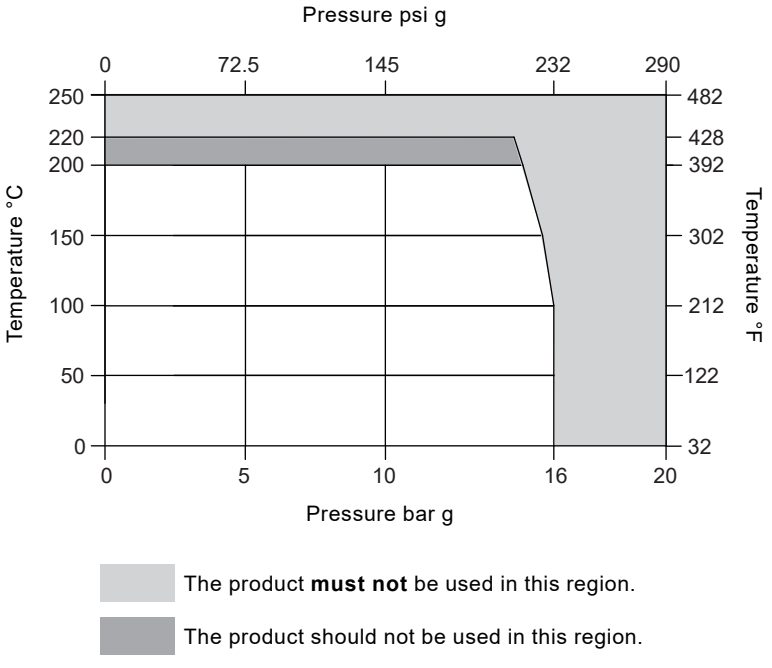
Product Design Reference 9

Pressure/temperature rating			Class 150
PMA	Maximum allowable pressure	19.3 bar g	279.9 psi g
TMA	Maximum allowable temperature	178 °C	352 °F
PMO	Maximum operating pressure	19.3 bar g	279.9 psi g
TMO	Maximum operating temperature	178 °C	352 °F
Minimum allowable temperature		-5 °C	23 °F
Minimum operating temperature		0 °C	32 °F
Product is safe for use under full vacuum conditions			
Cold hydraulic test pressure		29 bar g	421 psi g



Product Design Reference 10

Pressure/temperature rating			PN16
PMA	Maximum allowable pressure	16 bar g	232 psi g
TMA	Maximum allowable temperature	220 °C	428 °F
PMO	Maximum operating pressure	16 bar g	232 psi g
TMO	Maximum operating temperature	200 °C	392 °F
Minimum allowable temperature		-5 °C	23 °F
Minimum operating temperature		0 °C	32 °F
Product is safe for use under full vacuum conditions			
Cold hydraulic test pressure		25.5 bar g	370 psi g



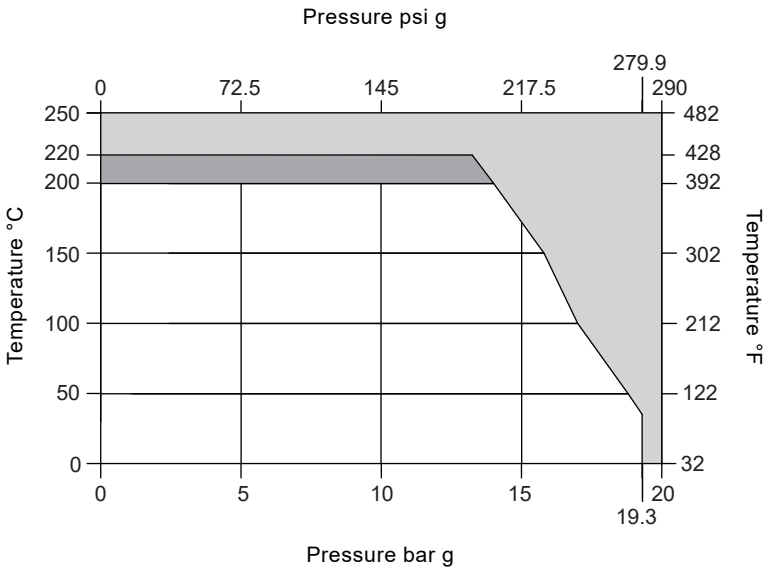
CSF16T Pressure/temperature limits continued on next page

Pressure/temperature limits

CSF16T (continued)

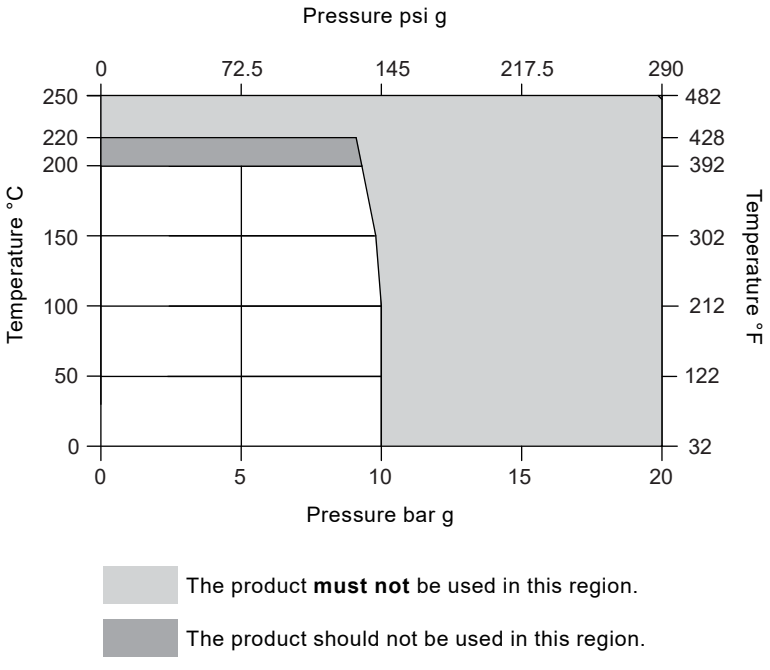
Product Design Reference 11

Pressure/temperature rating			Class 150
PMA	Maximum allowable pressure	19.3 bar g	279.9 psi g
TMA	Maximum allowable temperature	220 °C	428 °F
PMO	Maximum operating pressure	19.3 bar g	279.9 psi g
TMO	Maximum operating temperature	200 °C	392 °F
Minimum allowable temperature		-5 °C	23 °F
Minimum operating temperature		0 °C	32 °F
Product is safe for use under full vacuum conditions			
Cold hydraulic test pressure		29 bar g	421 psi g



Product Design Reference 12

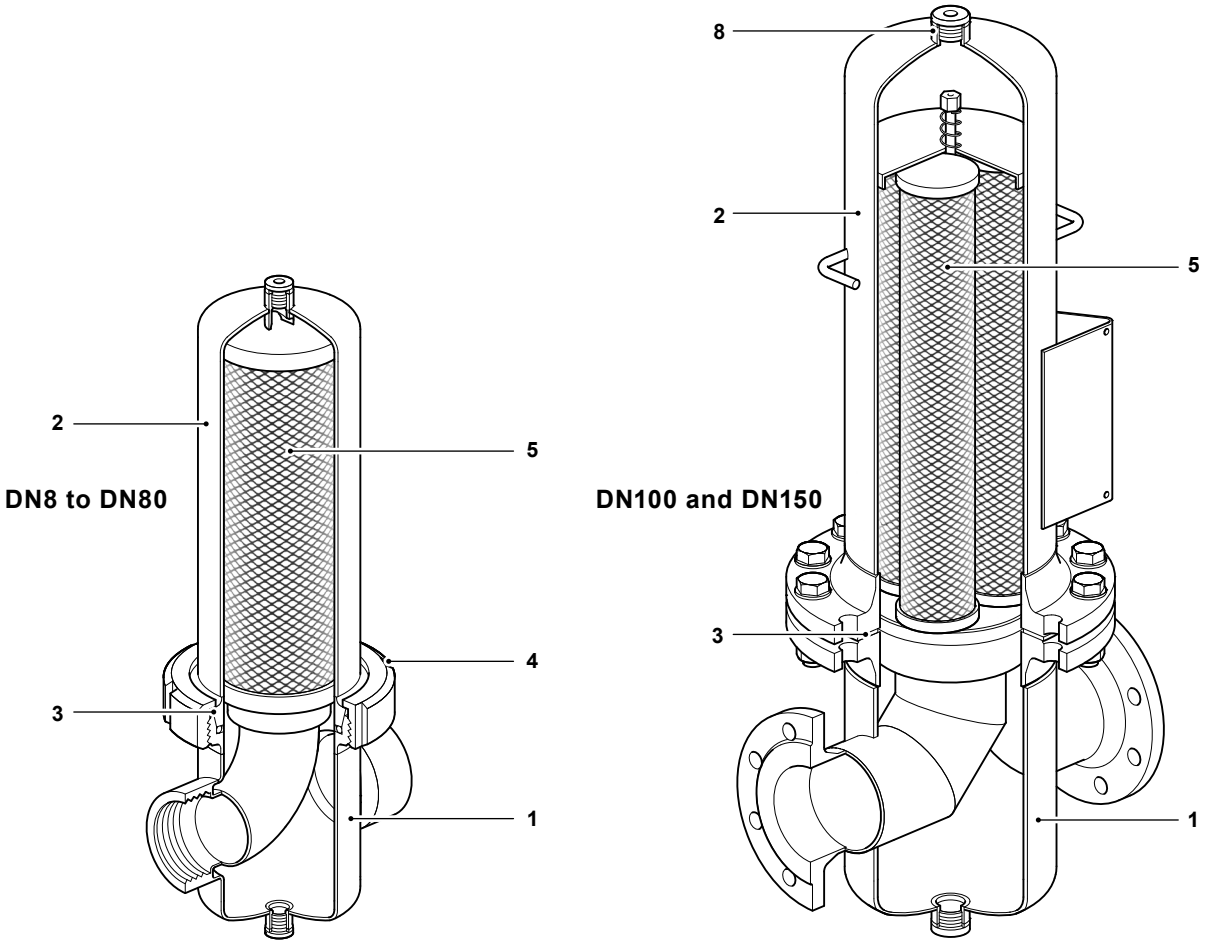
Pressure/temperature rating			PN10
PMA	Maximum allowable pressure	10 bar g	145 psi g
TMA	Maximum allowable temperature	220 °C	428 °F
PMO	Maximum operating pressure	10 bar g	145 psi g
TMO	Maximum operating temperature	200 °C	392 °F
Minimum allowable temperature		-5 °C	23 °F
Minimum operating temperature		0 °C	32 °F
Product is safe for use under full vacuum conditions			
Cold hydraulic test pressure		15.9 bar g	231 psi g



CSF16 and CSF16T filter housing options and corresponding filter elements

Filter housing			Filter Element		
Filter Housing Size	Filter Housing code	Filter Housing Seal Material	0.2 micron O-ring seal type	Filter element code	No. of elements per housing
DN8 (¼")	CSF16/CSF16T	EPM	EPM	CSF16-A 03/10	1
DN10 (⅜")	CSF16/CSF16T			CSF16-A 04/10	1
DN15 (½")	CSF16/CSF16T			CSF16-A 04/20	1
DN20 (¾")	CSF16/CSF16T			CSF16-A 05/20	1
DN25 (1")	CSF16/CSF16T			CSF16-A 05/25	1
DN32 (1¼")	CSF16/CSF16T			CSF16-A 07/25	1
DN40 (1½")	CSF16/CSF16T			CSF16-A 07/30	1
DN50 (2")	CSF16L/CSF16LT			CSF16-A 10/30	1
	CSF16H/CSF16HT			CSF16-A 15/30	1
DN65 (2½")	CSF16/CSF16T			CSF16-A 20/30	1
DN80 (3")	CSF16L/CSF16LT			CSF16-A 30/30	1
	CSF16H/CSF16HT			CSF16-A 30/50	1
DN100 (4")	CSF16L/CSF16LT	Stainless Steel/PTFE Spiral Wound Gasket	EPM	CSF16-A 20/30	3
	CSF16H/CSF16HT			CSF16-A 30/30	3
DN150 (6")	CSF16L/CSF16LT			CSF16-A 30/30	4

Materials

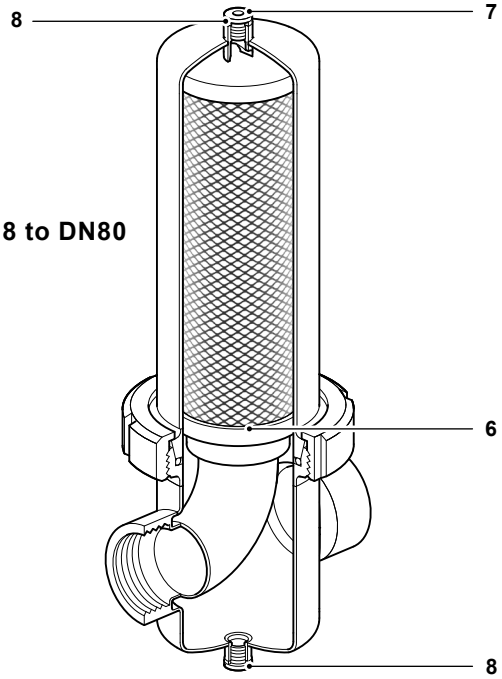


No.	Part	Materials		
1	Filter housing bowl	Stainless steel	CSF16	1.4301*
			CSF16T	1.4404**
2	Filter housing head	Stainless steel	CSF16	1.4301*
			CSF16T	1.4404**
3	Housing seal	For sizes DN8 to DN80 EPM		EP380
		For sizes DN100 and DN150		Stainless steel grade 1.4541 spiral wound gasket with PTFE filler
4	Housing lockring (DN8 - DN80)	Stainless steel	CSF16	1.4301*
			CSF16T	1.4404**
5	CSF16-A filter element		Outer core, inner core and end caps	1.4401
			Filter media	Borosilicate
			Bonding compound	Silicon

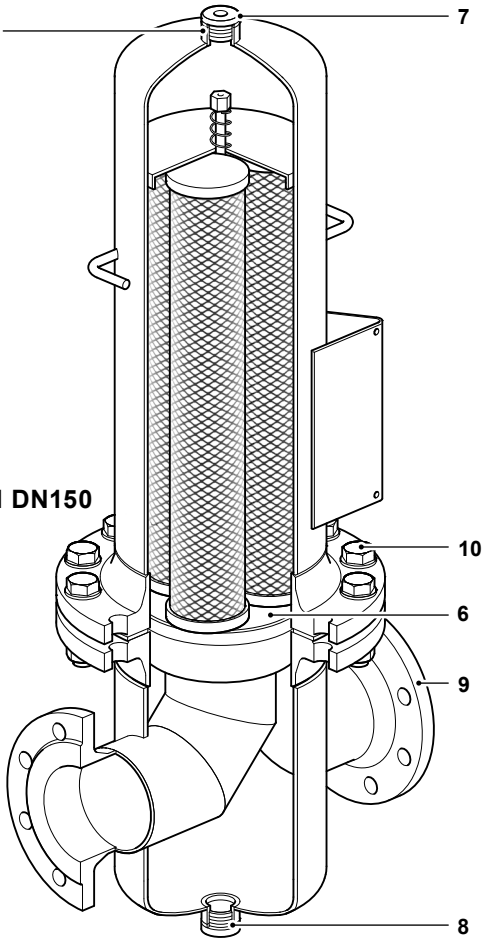
Materials continued on next page

Materials (continued)

DN8 to DN80



DN100 and DN150



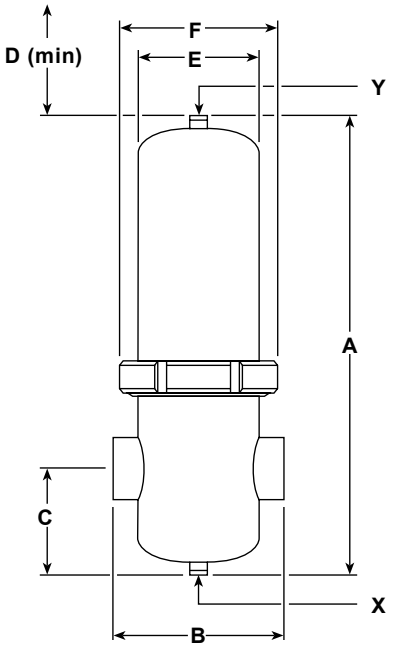
No.	Part	Materials		
6	Filter element seal (2 off per element)	EPM		EP380
7	Plug	Stainless steel	For sizes DN8 to DN80 CSF16/CSF16T	A4-70
			For sizes DN100 and DN150 CSF16/CSF16T	ASTM A276 316L
8	Gasket	Stainless Steel	For sizes DN8 to DN80 CSF16/CSF16T	1.4571
			For sizes DN100 and DN150 CSF16/CSF16T	1.4301
9	Flange	Stainless steel	CSF16	1.4541
			CSF16T	1.4571
10	Bolts and nuts (DN100 and DN150)	Stainless steel		A2 - 70

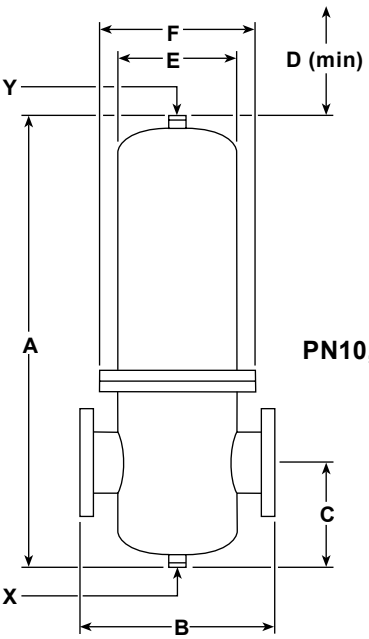
***1.4301 -**
Material may also include grades 1.4307, 1.4404, 1.4432, 1.4435, 1.4541, 1.4571 for manufacturing purposes. Weld filler will be 1.4430.

**** 1.4404 -**
Material may also include grades 1.4432, 1.4435 and 1.4571 for manufacturing purposes. Weld filler will be 1.4430.

Dimensions/volume and weights (approximate) in mm, litres and kg

Screwed BSP and NPT





Flanged PN10, PN16 and Class 150

Filter	Size		Dimensions A	B Screwed	B Flanged PN	B Flanged Class 150	C	D	E Ø	F Ø	Thread ***X	Thread Y
CSF16 and CSF16T	¼"	DN8	217	108			54	90	70	112	¼"	G¼"
	⅜"	DN10	245	108	180		54	120	70	112	¼"	G¼"
	½"	DN15	245	108	180	203	54	120	70	112	¼"	G¼"
	¾"	DN20	269	125	202	230	54	150	70	112	¼"	G¼"
	1"	DN25	295	125	212	247	73	150	85	127	¼"	G¼"
	1¼"	DN32	347	140	220	254	73	200	85	127	¼"	G¼"
	1½"	DN40	386	170	254	294	92	200	104	148	¼"	G¼"
	2½"	DN65	737	216	306	356	106	580	129	178	¼"	G¼"
CSF16L and CSF16LT	2"	DN50	460	170	260	297	92	280	104	148	¼"	G¼"
	3"	DN80	999	220	316	356	110	850	129	178	¼"	G¼"
	4"	DN100	1042		410	500	195	850	219	340	1"	G1"
	6"	DN150	1420		480		267	850	273	395	1"	G1"
CSF16H and CSF16HT	2"	DN50	587	170	260	297	92	450	104	148	¼"	G¼"
	3"	DN80	1024	240	340	380	113	850	154	210	¼"	G¼"
	4"	DN100	1296		410	500	195	850	219	340	1"	G1"

Screwed BSP and NPT and flanged PN10, PN16 and Class 150

*** for PN10, PN16 and BSP versions bottom connection is G thread with a plug and seal.
*** for Class 150 and NPT versions bottom connection is NPT thread without a plug.

Volume and weights (approximate) in litres and kg

Filter	Size		Vol. Litres		Weight (kg) without element		
			Screwed	Flanged	Screwed	Flanged	
						PN	Class 150
CSF16 and CSF16T	¼"	DN8	0.6		2.0		
	⅜"	DN10	0.7	0.7	2.1	3.4	
	½"	DN15	0.7	0.7	2.2	3.6	3.6
	¾"	DN20	0.8	0.85	2.4	4.4	4.4
	1"	DN25	1.3	1.4	3.2	5.7	5.7
	1¼"	DN32	1.6	1.8	3.7	7.2	7.2
	1½"	DN40	2.8	3	5.2	8.9	8.9
	2½"	DN65	9	9.4	8.1	14.6	15.9
CSF16L and CSF16LT	2"	DN50	3.2	3.75	5.2	10.6	10.6
	3"	DN80	12.6	13	9.6	17.2	19.2
	4"	DN100		36		60	60
	6"	DN150		75		85	
CSF16H and CSF16HT	2"	DN50	4.5	4.7	5.8	11.2	11.2
	3"	DN80	17.8	18.3	13.2	20.9	22.2
	4"	DN100		45		65	65

Sterile air filter elements (weight in kg)

Filter element code (EPM)	Filter element (individual) Weight
CSF16-A 03/10	0.2
CSF16-A 04/10	0.26
CSF16-A 04/20	0.37
CSF16-A 05/20	0.45
CSF16-A 05/25	0.47
CSF16-A 07/25	0.57
CSF16-A 07/30	1.27
CSF16-A 10/30	1.6
CSF16-A 15/30	2.25
CSF16-A 20/30	2.77
CSF16-A 30/30	3.81
CSF16-A 30/50	4.98

CSF16 and CSF16T air sizing:

The correction and sizing tables above are based upon compressed air in Nm^3/h.
Nm^3/h refers to the flow at normal conditions. Therefore, the calculated flow rate needs to be quantified before a selection can be made. The sizing scenarios below show how we calculate Nm^3/h taking into consideration the operating air pressure and temperature and how this deviates from 'Normal conditions' which are defined as 1 bar abs and 20 ºC.

CSF16 and CSF16T air sizing table

Please note that the flowrates displayed on the CSF16 and CSF16T air sizing table are based on an air pressure of 7 bar g.

	DN8	DN10	DN15	DN20	DN25	DN32	DN40	DN50L	DN50H	DN65	DN80L	DN80H
Size of unit	¼"	⅜"	½"	¾"	1"	1¼"	1½"	2"L	2"H	2½"	3"L	3"H
Maximum flowrate Nm^3/h	60	90	120	180	270	360	480	720	1080	1440	1920	2880

Capacity correction factors for air pressure

Air pressure	**bar g**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**
Correction factor		0.25	0.375	0.5	0.625	0.75	0.875	1.0	1.125	1.25	1.375	1.5	1.625	1.75	1.875	2.0	2.125

Sizing scenario 1:
Customer provides flow rate in m^3/h (room temperature but at a given pressure)

Example conditions:

- Flowrate of air = 200 m^3/h
- Air operating pressure = 4 bar (g)
- Air operating temperature = 20 ºC (ambient)

Step 1:
Convert m^3/h to Nm^3/h

Nm^3/h = Pressure (Abs) x Volumetric Flow (m^3/h)

Nm^3/h = 5 bar (Abs) x 200 m^3/h

Nm^3/h = 1,000

Step 2:
Identify the Capacity Correction Factor for a given operating air pressure using the Capacity Correction Factors for air pressure table
For 4 bar (g), correction factor is 0.625

Step 3:
Divide the calculated Nm^3/h by the Capacity Correction Factor and select the housing size using the calculated flow value.
1,000 Nm^3/h/0.625 = Calculated Flow value = 1600 Nm^3/h
Select 3"L (DN80L) with a maximum flow capacity of 1920 Nm^3/h

Sizing scenario 2:
Customer provides flow rate in m³/h (air temperature above room temperature, >20 ºC, and at a given pressure)

Example conditions:

- Flowrate of air = 200 m³/h
- Air operating pressure = 4 bar (g)
- Air operating temperature = 50 °C (elevated above ambient)

Step 1:
Convert m³/h to Nm³/h

V_1 = Volumetric flow (m³/h) = 200

V_2 = Volumetric flow (Nm³/h) = to be determined

T_1 = Ambient temperature of air (Kelvin) = 20 ºC + 273 = 293

T_2 = Elevated operating temperature of air (Kelvin) = 50 ºC + 273 = 323

P_1 = Elevated operating pressure of air (Abs) = 4 bar g + 1 = 5

P_2 = Atmospheric pressure of air (Abs) = 0 bar g + 1 = 1

Solve to find V_2 (Nm³/h):

$V_2 = (P_1 * V_1 * T_1) / (T_2 * P_2)$

$V_2 = (5 * 200 * 293)/(323 * 1)$

V_2 = 907 Nm³/h

Step 2:
Identify the Capacity Correction Factor for a given operating air pressure using the Capacity Correction Factors for air pressure table
For 4 bar (g), correction factor is 0.625

Step 3:
Divide the calculated Nm³/h by the Capacity Correction Factor and select the housing size using the calculated flow value.
907 Nm³/h/0.625 = Calculated Flow value = 1451 Nm³/h
Select 3"L (DN80L) with a maximum flow capacity of 1920 Nm³/h

Safety information, installation and maintenance

For full details see the Installation and Maintenance Instructions (IM-P180-42) which is supplied with the product.

How to order

The following information must be specified when ordering a Spirax Sarco CSF filter:

Maximum sterile air flowrate	m^3/h
Maximum sterile air pressure	bar g
Allowable pressure drop bar	0.07 bar g maximum recommended
Housing material	1.4301 or 1.4404
Size *	DN or NPS (") and 'H' or 'L' where applicable
Pipe connections	PN10, PN16, Class 150, BSP or NPT
Element rating	0.2 micron
Filter housing seal or gasket material.	EPM for DN8 (¼") to DN80 (3")
	Stainless steel/PTFE filler for DN100 (4") to DN150 (6")
3.1 Certification for SEP and Category I filter housings	Yes/No

*** Note**:
For DN50, DN80 and DN100 the high capacity version is denoted by 'H' and low capacity by 'L'. For a 1.4404 housing version, the suffix 'T' must be added to the nomenclature e.g. CSF16T. DN150 size is only available in low capacity "L" housing.

Supply

The CSF16 and CSF16T filter housings are supplied separately to the filter elements.

1. The filter housing head and bowl with housing seal or gasket are packed in one carton, complete with EN 10204 3.1 certification where applicable documentation and installation and maintenance instructions.
2. The filter element complete with two seals.
   Note: DN100 and DN150 CSF16 and CSF16T require multiple elements – See filter element selection table on page 9.

Note: The purpose of the filter is to remove (and retain) unwanted contamination. In time, the filter element will become saturated. To ensure a minimum downtime, we recommend that a spare filter element set is ordered at the same time as the CSF16 and CSF16T filter housing.

Example:

1 off Spirax Sarco DN20 CSF16 to pass sterile air at 4.0 bar g. Housing to be 1.4301 having NPT connections with EPM seals.

1 off CSF16-A 5/20 filter element

1 off CSF16-A 5/20 spare filter element set

1 off 3.1 Certification (for filter housing)

Spare parts

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

Available spares

CSF16-A filter element kit	**5, 6** (2 off)
Seal kit	**3**, **6** (please see table below for quantities)

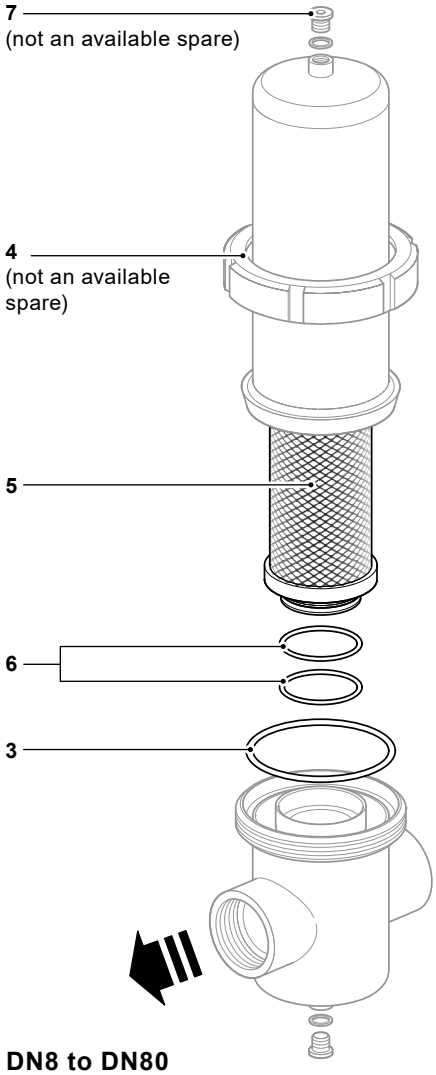
Seal kit contents

Unit size	Housing seal (Part number 3)	Element seals (Part number 6)
DN8 - DN80	1	2
DN100	1	6
DN150L	1	8

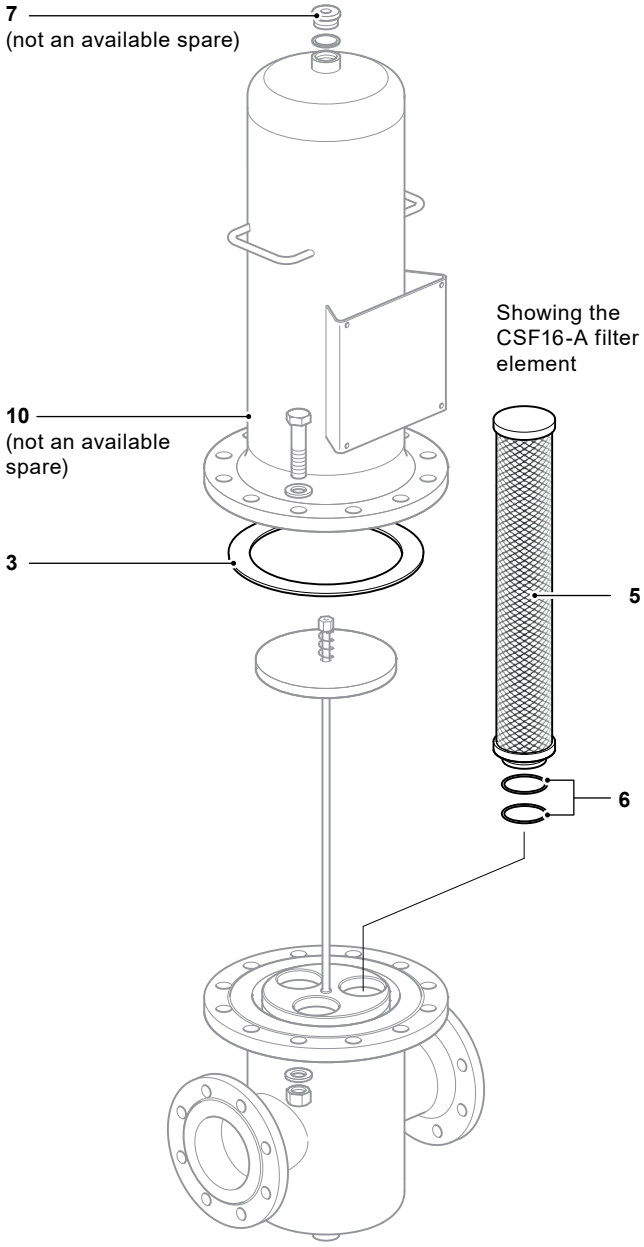
How to order spares

Always order spares by using the description given in the column headed 'Available spares' and state the size and type of filter housing, filter element rating and housing/filter element seal material required.

Example: 1 off CSF16 A filter element kit for a Spirax Sarco DN25 CSF16 sterile air, with EPM filter element seals.



DN8 to DN80



DN100 and DN150L
(image shows DN100L)

Table 1 Recommended tightening torques

Item	Part	or mm		N m
4		use C spanner		As required
7	DN8 - DN80	6 mm Hex	G¼"	55
	DN100 and DN150L	A/F 42	G1"	138
10	DN100	A/F 30	M20	180
	DN150L	A/F 30	M20	260

TI-P185-12-US
Issue 2

Steam Filter Station
FS Series

Description

- Line size separator and associated trap kit (Mod S1 or S12)
- 3A certified steam filter (Mod CSF16 w/ 5 micron element)
- Pressure gauge assemblies up and downstream of the filter to provide visual indication of when elements need to be cleaned and replaced
- Sample cooler for sampling steam downstream of the filter
- Stainless steel pipe downstream of the filter
- Sanitary check valve and sanitary components downstream
- Isolation valves at key points to enable ease of maintenance of the separator, trap, and steam filter

Sizes and pipe connections

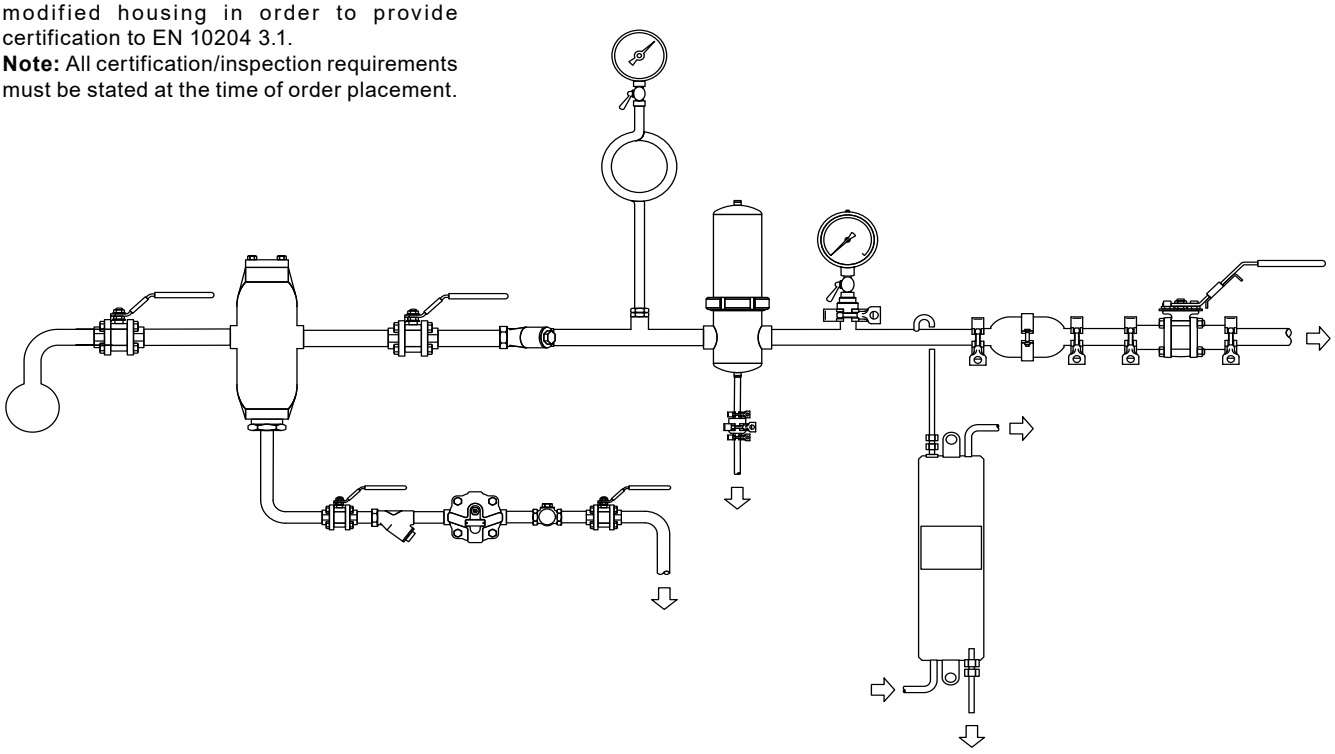
NPT: ½", ¾", 1", 1½", and 2"
Note: Other sizes and connections available on request. Filter Station Compliant to 3A Accepted Practice 609-03.

Standards

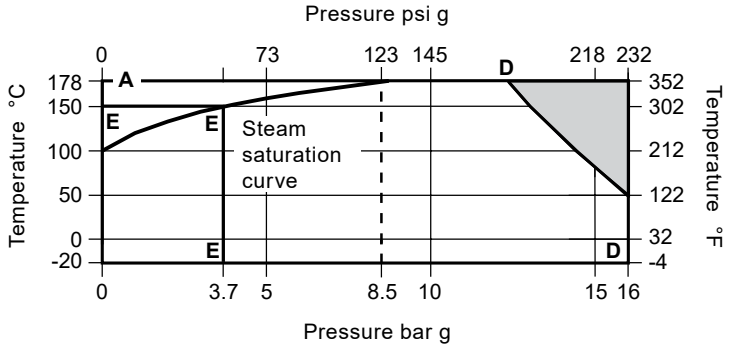
The CSF16, when fitted with a 5 micron element are capable of removing 95% of particles 2 microns and larger in size, in accordance with the requirements for the production of culinary steam to 3A accepted practice number 609-03. Accepted in the U.S. Department of Agriculture for use in federally inspected meat and poultry plants.
All materials meet the requirements as stipulated by the US FDA Regulations.

Certification

These products can be supplied with a modified housing in order to provide certification to EN 10204 3.1.
Note: All certification/inspection requirements must be stated at the time of order placement.



Pressure/temperature limits



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

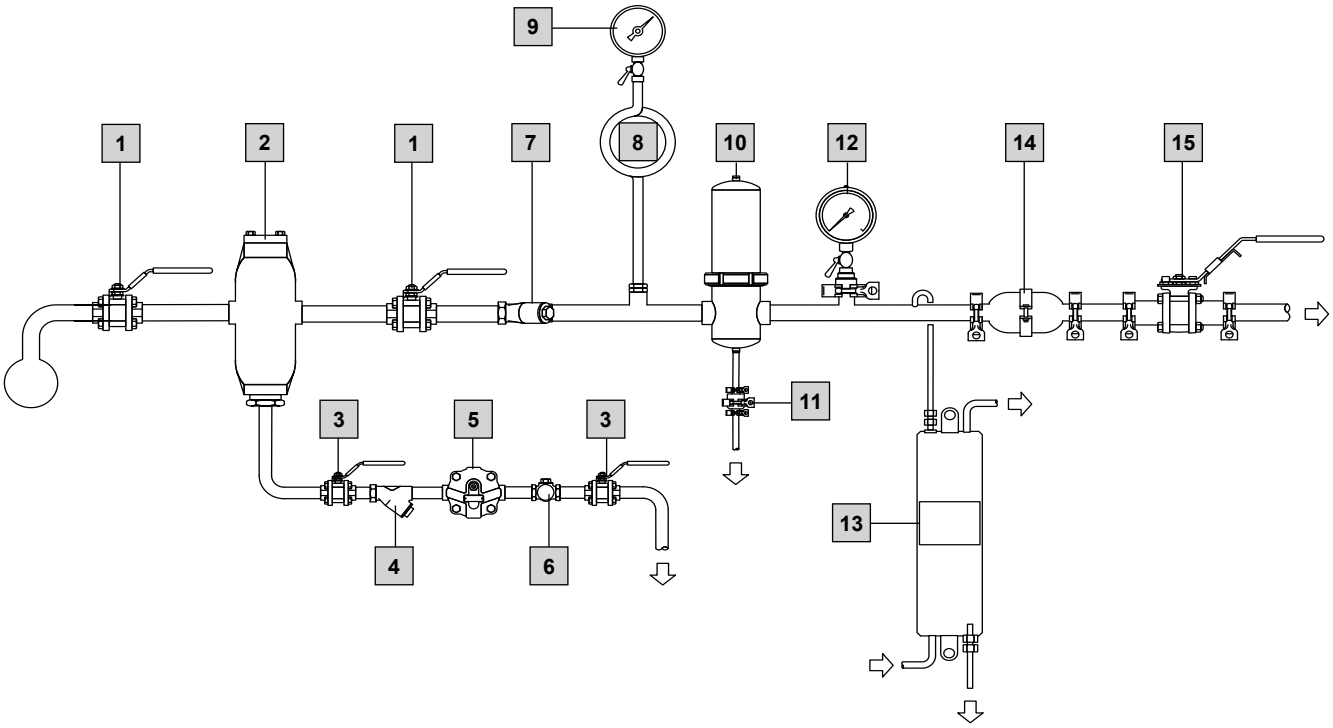
Steam Filter Station	FS-½	FS-¾	FS-1	FS-1½	FS-2
Line Size	½"	¾"	1"	1½"	2"
Steam Supply Pressure (psi g)	**Saturated Steam Capacity (lb/hr)**				
10	35	65	110	270	445
20	50	90	150	370	615
30	60	110	190	470	780
40	75	135	230	565	945
50	90	160	270	660	1105
60	100	185	310	755	1265
70	115	210	350	850	1420
80	125	230	385	950	1580
90	140	255	425	1040	1740
100	150	280	460	1130	1895
110	165	300	500	1230	2050
120	175	325	540	1320	2210

The use of any steam filter without adequate preconditioning of the steam will reduce performance, resulting in frequent element cleanings or replacement, and subsequent high maintenance costs. Spirax Sarco steam filter station kits include a line size separator with an associated strainer and steam trap. These components will remove residual condensate and water droplets carried in suspension within the steam. Installed prior to the CSF16 steam filter, a line size pipeline strainer will remove larger solid particles, thus prolonging periods between filter cleaning. Each steam filter station kit also includes an isolating ball valve and a thermostatic steam trap for the steam filter drain.

The selection table gives a description of the included components. If pressure regulation is required, product information is available upon request.

Note: Interconnecting pipework is not supplied. All system components are threaded NPT. Full technical details for each product contained in a Steam Filter Station Kit are available upon request.

Materials



No.	Part	½" line size item	¾" line size item	1" line size item	1½" line size item	2" line size item
1	Ball valves	½" M10S2FB (QTY 2)	¾" M10S2FB (QTY 2)	1" M10S2FB (QTY 2)	1½" M10S2FB (QTY 2)	2" M10S2FB (QTY 2)
2	Separator	½" S1	¾" S1	1" S1	1½" S12	2" S12
3	Ball valves	½" M10S2RB (QTY 2)				
4	Separator strainer	½" IT				
5	Separator trap	½" FTI-125				
6	Separator check valve	½" LCV1				
7	Main line strainer	½" IT 100 mesh	¾" IT 100 MESH	1" IT 100 MESH	1½" IT 100 MESH	2" IT 100 MESH
8	PG syphon	Pigtail black syphon				
9	Pressure gauges	SS Singlescale PG 0-100 psi g				
10	Filter	½" CSF16	¾" CSF16	1" CSF16	1½" CSF16	2" CSF16
10	Filter element	½" 5 MICRON ELEMENT	¾" 5 MICRON ELEMENT	1" 5 MICRON ELEMENT	1½" 5 MICRON ELEMENT	2" 5 MICRON ELEMENT
11	Filter trap	¼" MST21				
12	Pressure gauges	Sanitary PG, 0-100 PSI				
13	Sample cooler	SC20				
14	Sanitary check valve	½" CVS10	¾" CVS10	1" CVS10	1½" CVS10	2" CVS10
15	Ball valves	½" M70i	¾" M70i	1" M70i	1½" M70i	2" M70i

Safety information, installation and maintenance

For full details of the M10S Ball Valves see the Installation and Maintenance Instructions (IM-P133-16) supplied with the product.

For full details of the S1 and S12 SG Iron Separators see the Installation and Maintenance Instructions (IM-P023-55) supplied with the product.

For full details of the IT Cast Iron Strainer see the Installation and Maintenance Instructions (IM-7-436-US) supplied with the product.

For full details of the Cast Iron FTI-125 Float and Thermostatic Steam Trap see the Installation and Maintenance Instructions (IM-P038-06-US) supplied with the product.

For full details of the LCV1 Bronze Lift Check Valve see the Installation and Maintenance Instructions (IM-P029-06) supplied with the product.

For full details of the Stainless Steel Pressure Gauge see the Installation and Maintenance Instructions (IM-P027-02-US) supplied with the product.

For full details of the CSF16T Stainless Steel Steam Filters see the Installation and Maintenance Instructions (IM-P180-42) which is supplied with the product.

For full details of the MST21 Stainless Steel Balanced Pressure Thermostatic Steam Traps see the Installation and Maintenance

Instructions (IM-P125-07) supplied with the product.

For full details of the SC20 Sample Cooler see the Installation and Maintenance Instructions (IM-P403-14) supplied with the product.

For full details of the CVS10 Sanitary Check Valve see the Installation and Maintenance Instructions (IM-P029-11) supplied with the product.

For full details of the M70i ISO Stainless Steel Ball Valve see the Installation and Maintenance Instructions (IM-P182-07-US) supplied with the product.

Installation note

Install the S1 or S12 Separator in a horizontal pipeline with the drain directly below.
Note: To ensure that any separated liquid is drained away quickly, a suitable liquid drainer/steam trap must be connected to the drain connection - consult Spirax Sarco for further details.
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.
Always install the LCV1 Bronze Lift Check Valve horizontally with the flow in the direction indicated on the body.
The Spirax Sarco pressure gauge must be protected from heat by the use of a syphon tube and ball valve. To protect live steam from entering the bourdon tube, the provided syphon is to be filled with water and 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 22 mm A/F spanner not by twisting the gauge case.
The MST21 is designed for installation with the capsule in a vertical line with the inlet at the top and the outlet at the bottom. This will ensure it is self-draining.

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 FS-1 Clean Steam Filter Station Kit, Assembly Required

Spare parts

For available spare parts, refer to the corresponding Technical Information sheets.

For the M10S Ball Valves, refer to TI-P133-06.

For the S1 and S12 SG Iron Separators, there are no available spare parts.

For the IT Cast Iron Strainer, refer to TI-P201-05-US.

For the Cast Iron FTI-125 Float and Thermostatic Steam Trap, refer to TI-P021-02-US.

For the LCV1 Bronze Lift Check Valve, refer to TI-P029-01.

For the Stainless Steel Pressure Gauge, refer to TI-P112-03-US.

For the CSF16T Stainless Steel Steam Filter, refer to TI-P180-43.

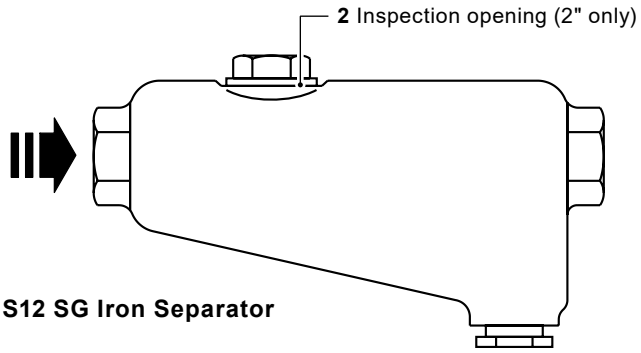
For the MST21 Stainless Steel Balanced Pressure Thermostatic Steam Traps, refer to TI-P125-08.

For the SC20 Sample Cooler, there are no available spare parts.

For the CVS10 Sanitary Check Valve, there are no available spare parts.

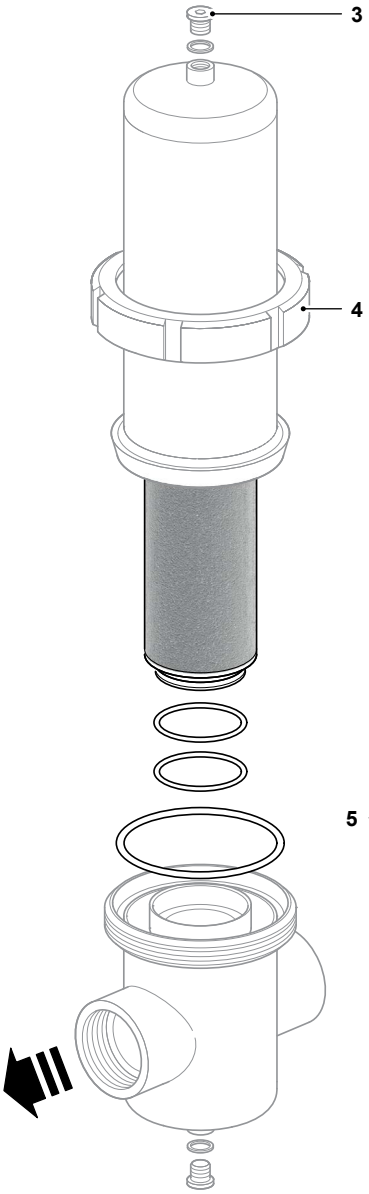
For the M70i Forged Stainless Steel Ball Valve, refer to TI-P182-05.

Recommended tightening torques



S12 SG Iron Separator

CSF16T Stainless Steel Steam Filter



MST21 Stainless Steel Balanced Pressure Thermostatic Steam Trap

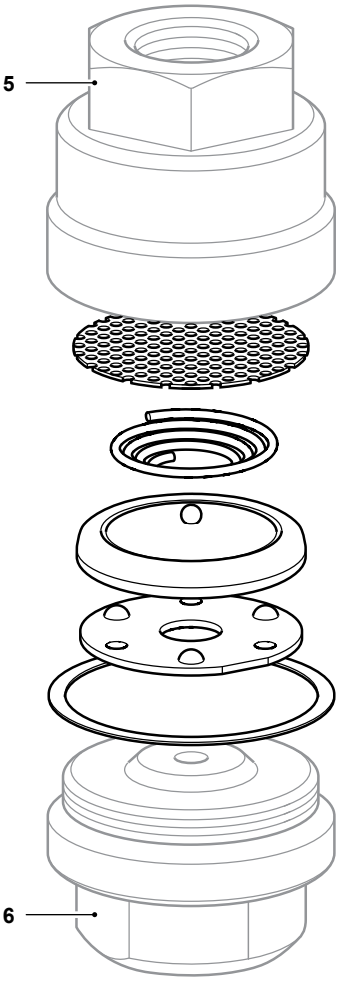


Table 1 Recommended tightening torques

Item	Part	or mm		N m	(lbf ft)
2	S12	46 A/F	M56	150 - 165	(110 - 121)
3	CSF16T	6 mm Hex	G¼"	55	(40)
4	CSF16T	use C spanner		as required	
5 and 6	MST21	22		100 - 110	(74 - 81)

TI-P180-41-US
Issue 3

Steam Filter Stations for Sterilization
FS-HC Series

Description

The installation of a filter station going into sterilizers will ensure the quality and purity of steam provided are appropriate for effective sterile processing. Unmonitored steam going into sterilizers can cause suboptimal steam sterilization conditions and lead to wet packs after sterilization, compromising sterility.

- Line size separator and associated trap kit (Mod S1 and S12)
- 3A certified steam filter (Mod CSF16 w/ 5 micron element)
- Pressure gauge assemblies up and downstream of the filter to provide visual indication of when elements need to be cleaned and replaced

Sizes and pipe connections

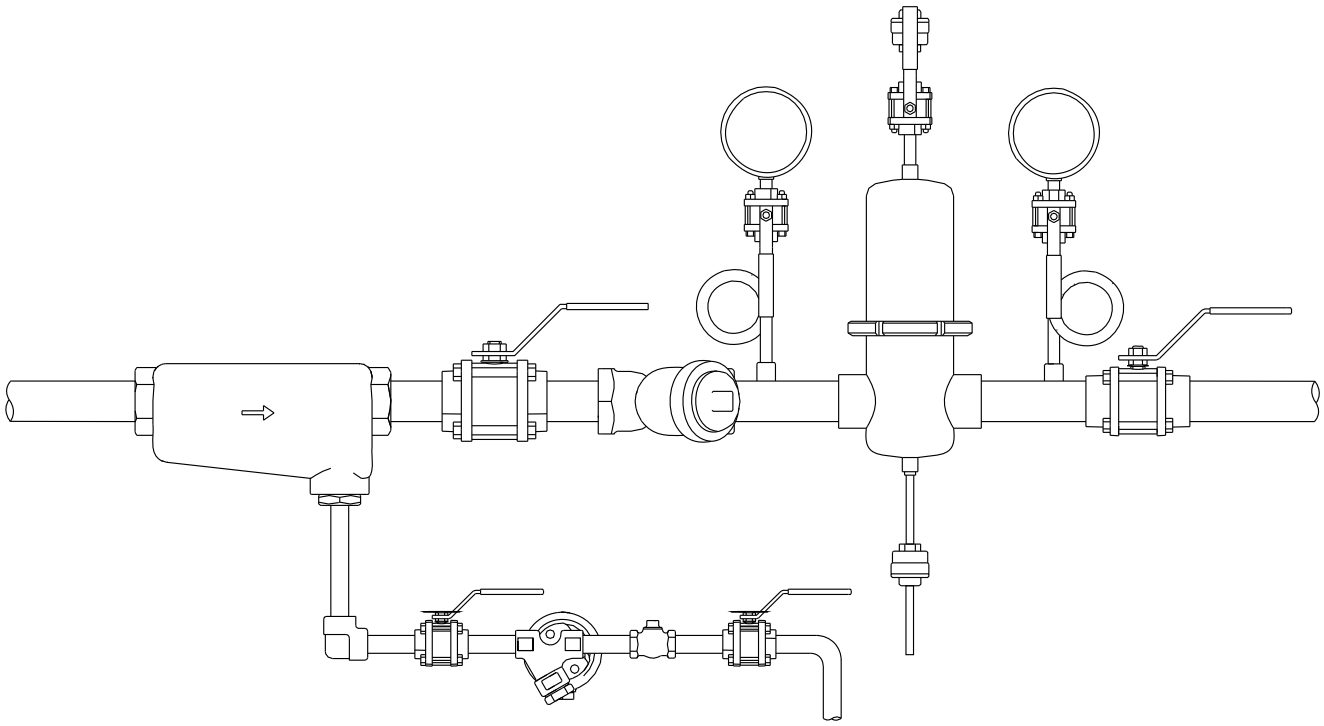
NPT: 1", 1½", and 2"
Note: Other sizes and connections available on request.

Standards

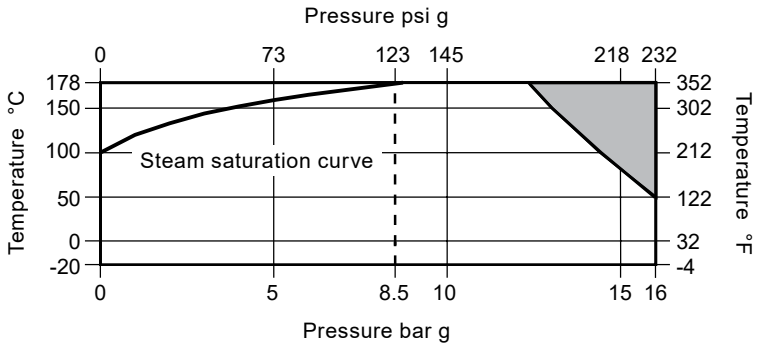
The CSF16, when fitted with a 5 micron element are capable of removing 95% of particles 2 microns and larger in size. FS-HC is specifically designed for sterilization, including all necessary components to comply with AAMI ST79 Section 3.3.3 "Steam for Sterile Processing"

Certification

These products can be supplied with a modified housing in order to provide certification to EN 10204 3.1.
Note: All certification/inspection requirements must be stated at the time of order placement.



Pressure/temperature limits



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

A-D-D Screwed NPT.

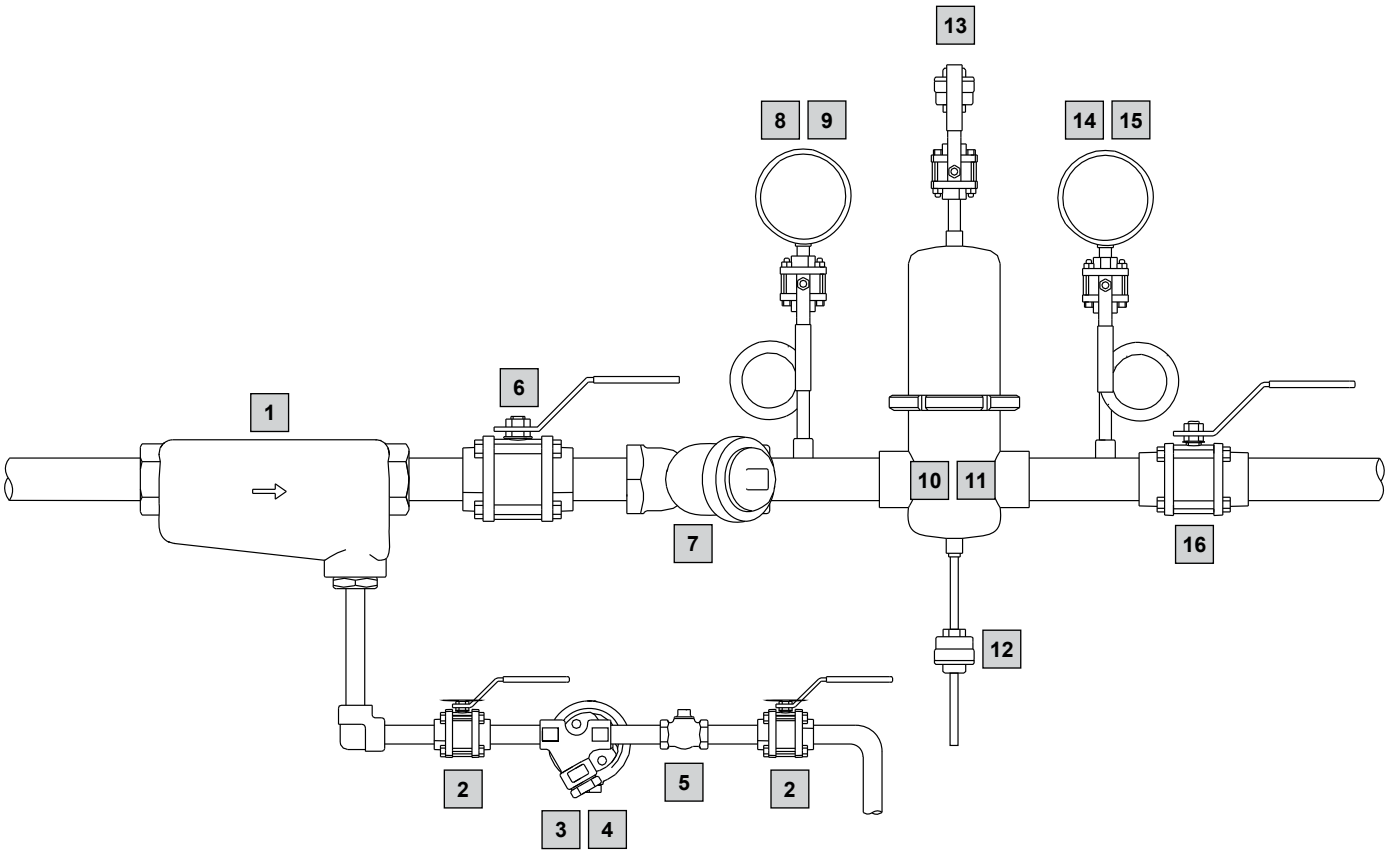
Steam filter station	FS-HC-1	FS-HC-1 1/2	FS-HC-2
Line size	**1"**	**1½"**	**2"**
Steam supply pressure (psi g)	**Saturated Steam Capacity (lb/hr)**		
10	96	165	370
20	135	233	521
30	175	300	673
40	214	368	824
50	253	435	975
60	293	503	1126
70	332	570	1278
80	371	638	1429
90	410	706	1580
100	450	773	1731
110	489	841	1883
120	528	908	2034

The use of any steam filter without adequate preconditioning of the steam will reduce performance, resulting in frequent element cleanings or replacement, and subsequent high maintenance costs. Spirax Sarco steam filter station kits include a line size separator with an associated strainer and steam trap. These components will remove residual condensate and water droplets carried in suspension within the steam. Installed prior to the CSF16 steam filter, a line size pipeline strainer will remove larger solid particles, thus prolonging periods between filter cleaning. Each steam filter station kit also includes an isolating ball valve and a thermostatic steam trap for the steam filter drain.

The selection table gives a description of the included components. If pressure regulation is required, product information is available upon request.

Note: All system components are threaded NPT. The FS-HC can be supplied as individual components or as a fully assembled station. Full technical details for each product contained in a Steam Filter Station Kit are available upon request.

Materials



No.	Part	1" line size	1½" line size	2" line size
1	Separator	1" S1	1½" S12	2" S12
2	Ball valves	½" M10S2RB (Quantity 2)		
3	Universal connector	½" SS Strainer Connector		
4	Trap	UFT32-4.5		
5	Check valve	½" LCV1		
6	Ball valve	1" M10S2FB	1½" M10S2FB	2" M10S2FB
7	Strainer	1" IT	1½" IT	2" IT
8	Pressure gauge	SS Singlescale PG 0-100 psi g		
9	Pressure gauge syphon	Pigtail black syphon with ¼" M10S4RB		
10	Filter	1" CSF16	1½" CSF16	2" CSF16
11	Filter element	1" 5 Micron Element (Quantity 2)	1½" 5 Micron Element (Quantity 2)	2" 5 Micron Element (Quantity 2)
12	Filter drain trap *	¼" MST21		
13	Filter air vent	¼" MST21 (Inverted) with ¼" M10S4RB		
14	Pressure gauge	SS Singlescale PG 0-100 psi g		
15	Pressure gauge syphon	Stainless steel pigtail syphon with ¼" M10S4RB		
16	Ball valve	1" M10S4FB	1½" M10S4FB	2" M10S4FB

*Item 12 shipped loose on assembled stations, install on drain line from CSF16 filter a minimum of 3 ft below filter.

Safety information, installation and maintenance

For full details of the S1 and S12 SG Iron Separators see the Installation and Maintenance Instructions (IM-P023-55) supplied with the product.

For full details of the M10S Ball Valves see the Installation and Maintenance Instructions (IM-P133-16) supplied with the product.

For full details of the PC20 Stainless Steel Universal Strainer Connector see Installation and Maintenance Instructions (IM-P229-01-US) supplied with the product.

For full details of the UFT32 Sealed Stainless Steel Ball Float Steam Trap see the Installation and Maintenance Instructions (IM-P146-01) supplied with the product.

For full details of the LCV1 Bronze Lift Check Valve see the Installation and Maintenance Instructions (IM-P029-06) supplied with the product.

For full details of the IT Cast Iron Strainer see the Installation and Maintenance Instructions (IM-7-436-US) supplied with the product.

For full details of the Stainless Steel Pressure Gauge see the Installation and Maintenance Instructions (IM-P027-02-US) supplied with the product.

For full details of the CSF16T Stainless Steel Steam Filters see the Installation and Maintenance Instructions (IM-P180-42) which is supplied with the product.

For full details of the MST21 Stainless Steel Balanced Pressure Thermostatic Steam Traps see the Installation and Maintenance Instructions (IM-P125-07) supplied with the product.

Installation note

Install the S1 or S12 Separator in a horizontal pipeline with the drain directly below.
Note: To ensure that any separated liquid is drained away quickly, a suitable liquid drainer/steam trap must be connected to the drain connection - consult Spirax Sarco for further details.
The PC20 Stainless Steel Universal Strainer Connector shall be installed with flow in the direction of the arrow. Flow can be horizontal (either direction), vertical or inclined. The connection face for the swivel connector steam trap must always be in the vertical plane unless stated on relevant steam trap Installation and Maintenance Instructions.
The UFT32 can be installed on any pipeline connector, but must be installed in a horizontal plane with the 'TOP' label facing upwards. See separate Installation and Maintenance Instructions for Spirax Sarco pipeline connectors (IM-P229-01-US).
Always install the LCV1 Bronze Lift Check Valve horizontally with the flow in the direction indicated on the body.
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.
The Spirax Sarco pressure gauge must be protected from heat by the use of a syphon tube and ball valve. To protect live steam from entering the bourdon tube, the provided syphon is to be filled with water and 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.
The MST21 is designed for installation with the capsule in a vertical line with the inlet at the top and the outlet at the bottom. This will ensure it is self-draining.

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 FS-HC-1 Clean Steam Filter Station Kit, Assembly Required

Spare parts

For available spare parts, refer to the corresponding Technical Information sheets.

For the S1 and S12 SG Iron Separators, there are no available spare parts.

For the M10S Ball Valves, refer to TI-P133-06.

For the PC20 Stainless Steel Universal Strainer Connector the refer to TI-P127-03-US.

For the UFT32 Sealed Stainless Steel Ball Float Steam Trap, refer to TI-P146-05.

For the LCV1 Bronze Lift Check Valve, refer to TI-P029-01.

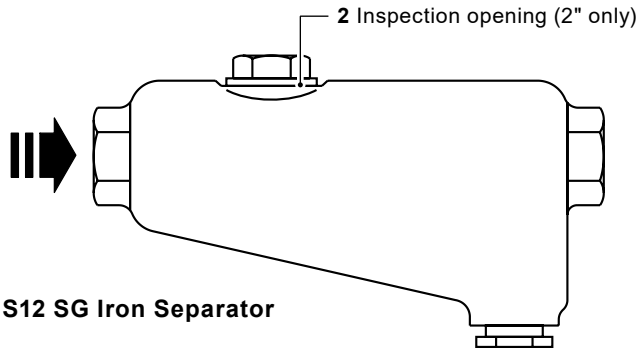
For the IT Cast Iron Strainer, refer to TI-P201-05-US.

For the Stainless Steel Pressure Gauge, refer to TI-P112-03-US.

For the CSF16T Stainless Steel Steam Filter, refer to TI-P180-43.

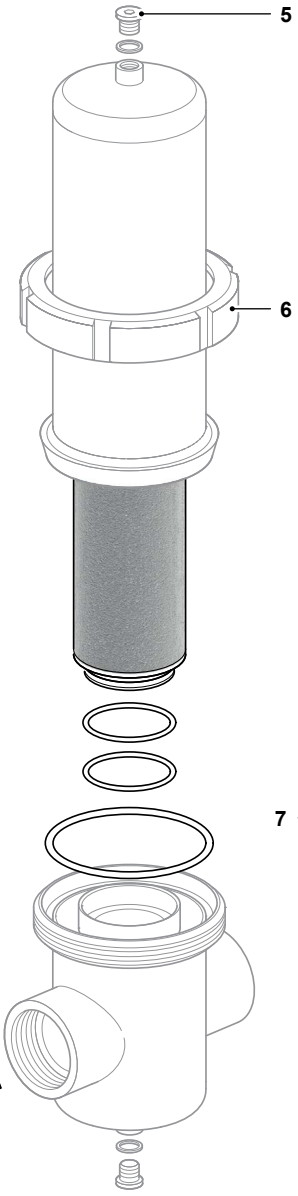
For the MST21 Stainless Steel Balanced Pressure Thermostatic Steam Traps, refer to TI-P125-08.

Recommended tightening torques

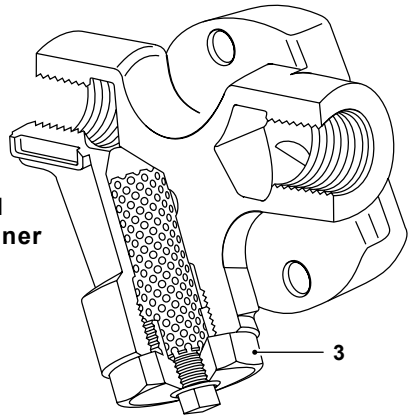


S12 SG Iron Separator

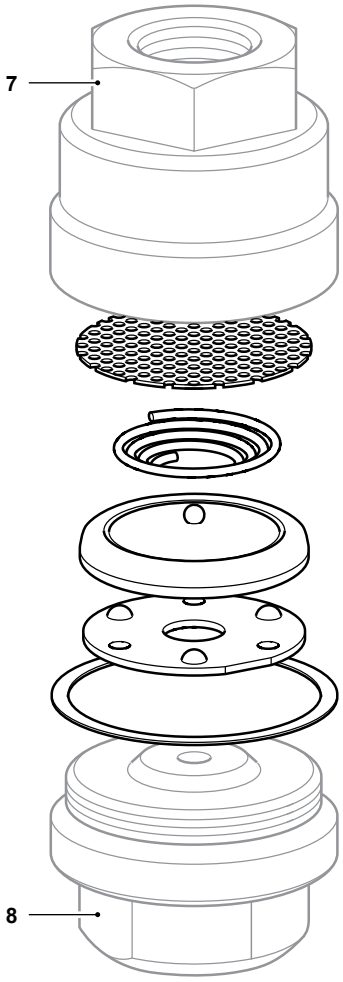
CSF16T Stainless Steel Steam Filter

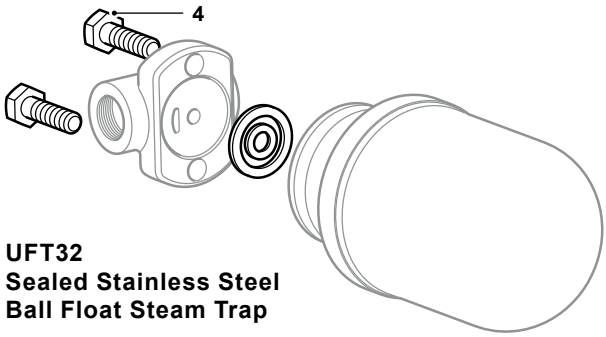


PC20 Stainless Steel Universal Strainer Connector



MST21 Stainless Steel Balanced Pressure Thermostatic Steam Trap





UFT32 Sealed Stainless Steel Ball Float Steam Trap

Table 1 Recommended tightening torques

Item	Part	or mm		N m	(lbf ft)
2	S12	46 A/F	M56	150 - 165	(110 - 121)
3	PC20	32 A/F	M28 x 1.5P	170 - 190	(125 - 140)
4	UFT32	9/16" A/F		33	(24)
5	CSF16T	6 mm Hex	G¼"	55	(40)
6	CSF16T	use C spanner		as required	
7 and 8	MST21	22		100 - 110	(74 - 81)

TI-P179-17
CMGT Issue 2

VLS 1935 Food+
Needle Valve

Description

VLS 1935 needle valves separate the process medium from the measuring instrument such as a pressure gauge, pressure switch or pressure transmitter. By closing this valve, the instrument can be safely disassembled for operations such as recalibration or replacement. Thanks to the pin that does not rotate during its vertical movement, wear on the sealing elements is reduced. This feature is particularly important in the case of frequent valve manoeuvres, significantly increasing valve life. In addition, the burst-tight design of the valves increases safety especially in applications with high operating pressures. These valves are used for separating measuring instruments from the process by means of closing, venting and pressure compensation. They are designed for use in applications with clean liquid and gaseous fluids that are not highly viscous or crystallising. The product must only be used with fluids that are not to be regarded as harmful to the parts in contact with the fluid throughout the operating range of the instrument. Any change in the state of matter or decomposition of unstable fluids is prohibited.

The product may only be used for applications within its technical performance limits (e.g. max. ambient temperature, material compatibility,...).

In case of misuse or operation of the product outside the technical specifications, the instrument must be taken out of service immediately and inspected by an authorised service technician. These valves do not have their own potential source of ignition. The operator is responsible for safe use in hazardous areas in accordance with recognised technological standards. For the reasons mentioned above, these valves are not marked and do not have their own certification. The product was designed and manufactured exclusively for its intended use and may only be used for this purpose. The manufacturer is not liable for claims of any kind when the instrument is used outside its intended purpose.

Main features

Valve seat tested for tightness to BS6755/ISO 5208 leak rate A

Food+ : EC1935.2004
Food+ : FDA



Available versions

2 way ½" BSPP male/½" BSPP female
2 way ½" BSPP male/½" BSPP female with vent screw
3 way ½" BSPP male/½" BSPP female/Test flange Ø 40 mm with vent screw

Options on request:

2 way ¾" BSPP male/¾" BSPP female
2 way ¾" BSPP male/¾" BSPP female with vent screw
3 way ¾"BSPP male/¾" BSPP female/Test flange Ø 40 mm with vent screw
2 way ½" NPT male/½" NPT female
2 way ½" NPT male/½" NPT female with vent screw
3 way ½" NPT male/½" NPT female/Test flange Ø 40 mm with vent screw

Technical data

Designed, built and approved for applications in the presence of condensate and steam. This product complies with EC1935:2004 for materials in contact with food. In addition complies with the EC2023:2006 standard on good practice for manufacture for materials produced that will come into contact with food.

Certifications

On request, these valves can be supplied with a material certificate according to EN10204 3.1.
Note: The options on request are supplied mounted on the valve and must be defined when placing the order.

Food + EC1935

Available with a food contact regulation Declaration of Compliance.

Designed, manufactured and approved for Steam and Condensate applications, Food+ product complies with:

- (EC)1935:2004 Materials and Articles Intended to come into Contact with Food.
- (EC)2023:2006 Good Manufacturing Practice for Materials and Articles Intended to come into Contact with Food.
- (EU)10/2011 Plastic Materials and Articles Intended to come into Contact with Food.

This product is intended to be connected into a system that can operate a food contact compliant process.

A list of the materials that could come directly or indirectly into contact with foodstuffs can be found in the Declaration of Compliance available for this product.

Food + FDA

- FDA Code of Federal Regulations - tittle 21 - Food and Drugs

Pressure/temperature limits

Design conditions of the body		PN40
PMA	Maximum permissible pressure	40 bar
TMA	Maximum permissible temperature	250 °C
PMO	Maximum operating pressure with saturated steam	12 bar
TMO	Maximum operating temperature with saturated steam	200 °C
Minimum operating temperature		-20 °C
Kv		0.2

Materials



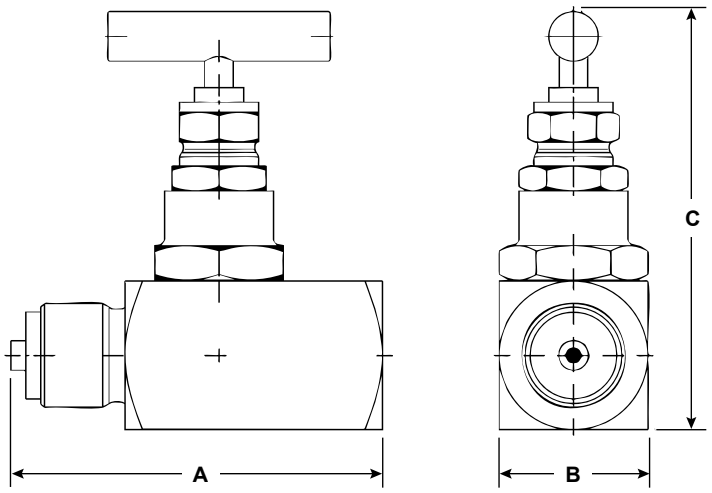
Contact with the fluid

No.	Part	Material	Designation
1	Valve body	Stainless steel	316L
2	Bonnet body	Stainless steel	
3	Pin tip	Stainless steel	
4	Gasket set (internal)		PTFE

Parts not in contact with the fluid

5	Bushing press	Stainless steel	316L
6	Valve stem	Stainless steel	316L
7	Seal bushing (internal)	Stainless steel	316L
8	Lock nut	Stainless steel	316L
9	Locking pin	Stainless steel	316L
10	Handle	Stainless steel	316L

Dimensions/weights (approximate) in mm and kg



DN	A	B	C	Weight
½"	75	30	90	0.460

Safety, installation and maintenance information

For detailed instructions, please refer to the Installation and Maintenance Instructions manual supplied with the equipment.

Note for installation:

The valve must be installed in accordance with the fluid direction indicated on the valve body.

Disposal:

This product is recyclable. No ecological hazard is considered to exist from its disposal, provided that appropriate precautions are taken.

How to specify

VLS 1935 2 way ½"
VLS 1935 2 way ½" with vent
VLS 1935 3 way ½"

How to order

VLS 1935 2 way ½"
VLS 1935 2 way ½" with vent
VLS 1935 3 way ½"

PIPELINE ANCILLARIES SOLUTIONS



Section contents

SECTION 7 CONTENTS

Air Vents, Eliminators and Vacuum Breakers	Air Eliminators 13WS, WHS	TI-P087-44-US
	Air Eliminators AE30, AE30A	TI-P017-07-EN
	AE36 and AE36A Automatic Air Eliminators/Air Vents for Liquid Systems	TI-P017-02-EN
	AE50S Automatic Air and Gas Vent for Liquid Systems	TI-P017-10-EN
	Air Vent 6A	TI-P080-06-US
	Balanced Pressure Thermostatic Air Vent T202	TI-P080-05-US
	Balanced Pressure Thermostatic Air Vent VS204, VS206	TI-P080-04-US
	Thermo-matic Air Vent TM600 and TM600L	TI-P080-03-US
	Vacuum Breaker VB14, VB21	TI-P019-02-EN
	Combination Vacuum Breaker/Balanced Pressure Thermostatic Air Vent VB-VS	TI-S96-01-US
Check Valves	LCV1 Bronze Lift Check Valve	TI-P029-01-EN
	LCV3, LCV4, LCV6 and LCV7 Lift Check Valves	TI-P029-16-EN
	DCV4 Wafer Check Valve	TI-P134-04-EN
	DCV10 Stainless Steel Disc Check Valve for use with Automatic Pump Trap	TI-P601-32-US
	DCV41 Austenitic Stainless Steel Disc Check Valve	TI-P601-18-EN
	SDCV44 Austenitic Stainless Steel Split Disc Check Valve	TI-P154-10-US

Section 7 contents continued on next page

SECTION 7 CONTENTS (CONTINUED)

Separators	S1 SG Iron Separator	TI-P023-02-EN
	Steel Separator ½" to 6" S4A	TI-P139-02-US
	Steel Separator 8" to 18" S4A	TI-P139-03-US
	S12 SG Iron Separator (Screwed)	TI-P023-25-EN
	S13 SG Iron Separator (Flanged)	TI-P023-26-EN
	S5 Carbon Steel Separator	TI-P023-11-EN
	S6 Austenitic Stainless Steel Separator	TI-P023-12-EN
	Sizing Chart for S5 & S6 Separators	TI-S99-10-US
Insulation Jackets	IJ-UFT14HC Insulation Jackets	TI-P712-04-EN
	IJ-STS17.2 and IJ-STS17.2D Insulation Jackets for the STS17.2 Steam Trapping Station	TI-P128-27-EN
	Spirax Sarco Insulation Jackets	TI-P225-07-EN
Other	Sight Glass	TI-P022-05-EN
	Sight Check (Combined Sight Glass & Check Valve)	TI-P022-01-EN
	Steel Pressure Gauge	TI-P027-04-EN
	Stainless Steel Pressure Gauge	TI-P112-03-US
	Steam Water Washdown Unit	TI-P098-01-US
	Hot & Cold Water Washdown Unit	TI-P098-02-US
	Trap Diffuser DF1, DF3 and Three Way Test Valve	TI-P107-02-US
	Packless Radiator Supply Valve RV Series	TI-P179-01-US

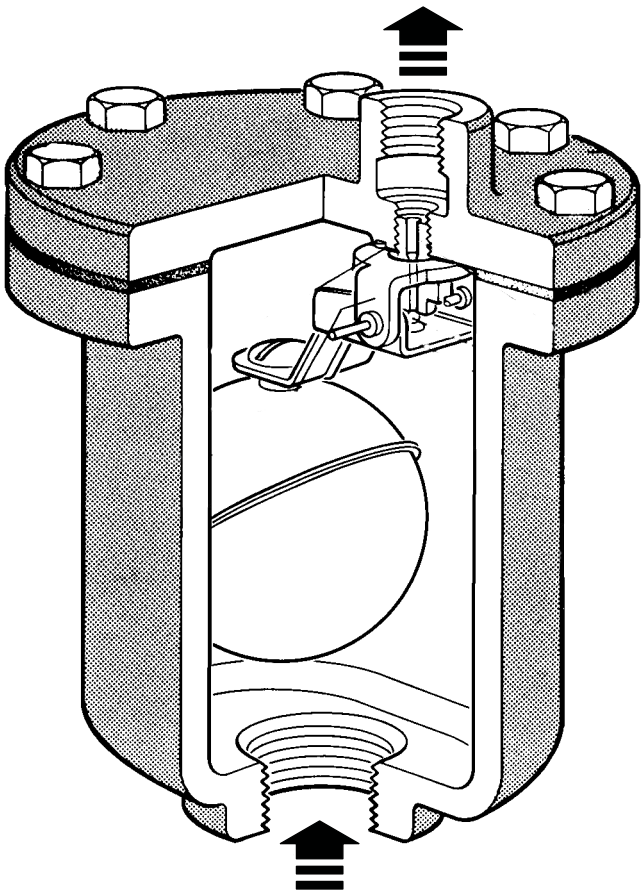
TI-P087-44-US
Issue 1

Air Eliminators
13WS, 13WHS

Description

13WS and 13WHS Air Eliminators improve the circulation of pressurized liquids by eliminating air and other non-condensible gases which may collect at high points in the system. The EPDM valve head ensures tight shut-off.

Model	13WS	13WHS
PMO	150 psi g (10 bar g)	300 psi g (21 bar g)
Sizes	¾" x ⅜", 1" x ⅜"	¾" x ⅜"
Connections	NPT	
Construction	Cast Iron Body	
	Stainless Steel internals with EPDM valve head	
Options	Brass Body; 13WS only	



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.

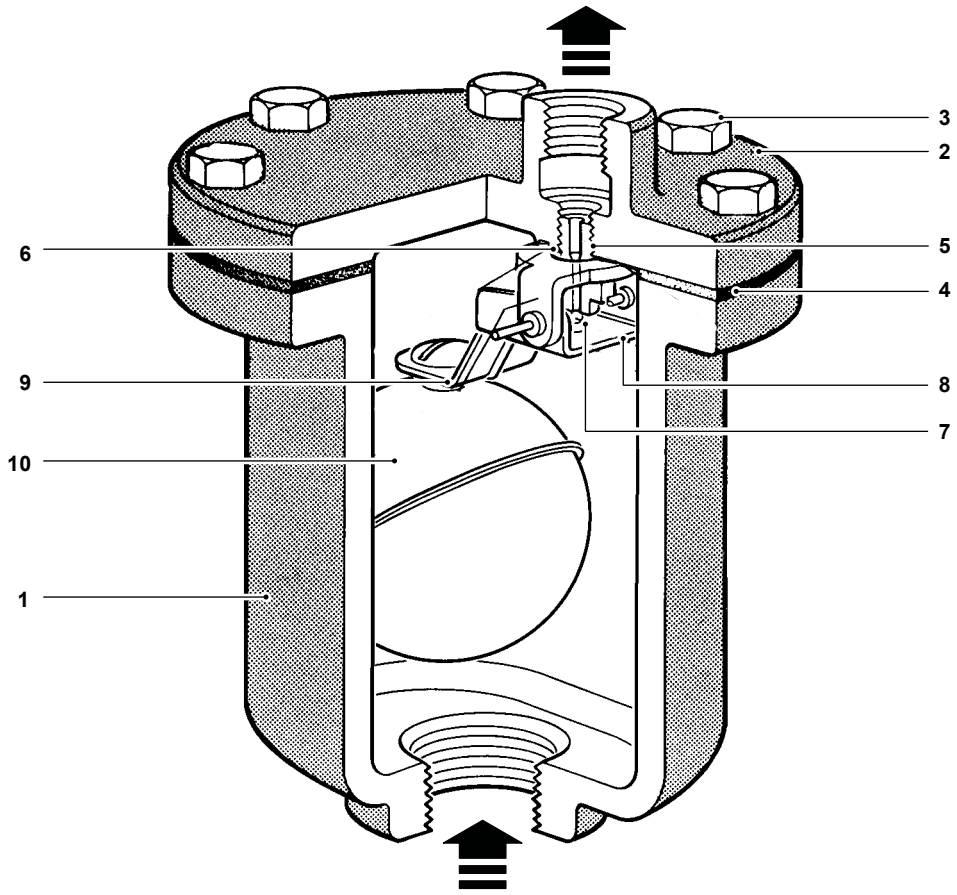
Limiting operating conditions

PMO	Maximum Operating Pressure (PMO)	13WS:	150 psi g	10 bar g
		13WHS:	300 psi g	21 bar g
Maximum Operating Temperature		13WS and 13WHS:	338 °F	170 °C

Pressure shell design conditions

PMA	Maximum allowable pressure	13WS:	150 psi g and up to 353 °F	10 bar g and up to 178 °C
		13WHS:	300 psi g and up to 317 °F	21 bar g and up to 158 °C
TMA	Maximum allowable temperature	13WS:	450 °F and up to 125 psi g	232 °C and up to 9 bar g
		13WHS:	450 °F and up to 250 psi g	232 °C and up to 17 bar g

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

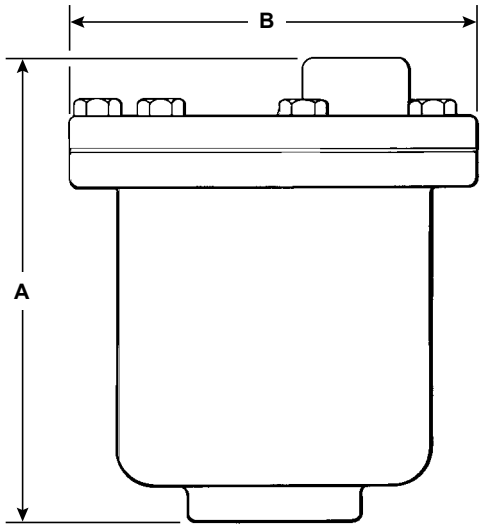
Air Capacity (discharge to atmosphere)

SCFM cubic feet per minute at standard conditions of 14.7 psi a (1.0 bar a) at 60˚F (16 °C). For dm^3/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/weights (approximate) in inches (mm) and lbs (kg)

Size		A	B	Weight
¾"	13WS	5.1 (130)	4.4 (112)	4.75 (2.2)
1"	13WS			
¾"	13WHS	6.0 (152)	4.75 (121)	5.0 (2.3)



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.

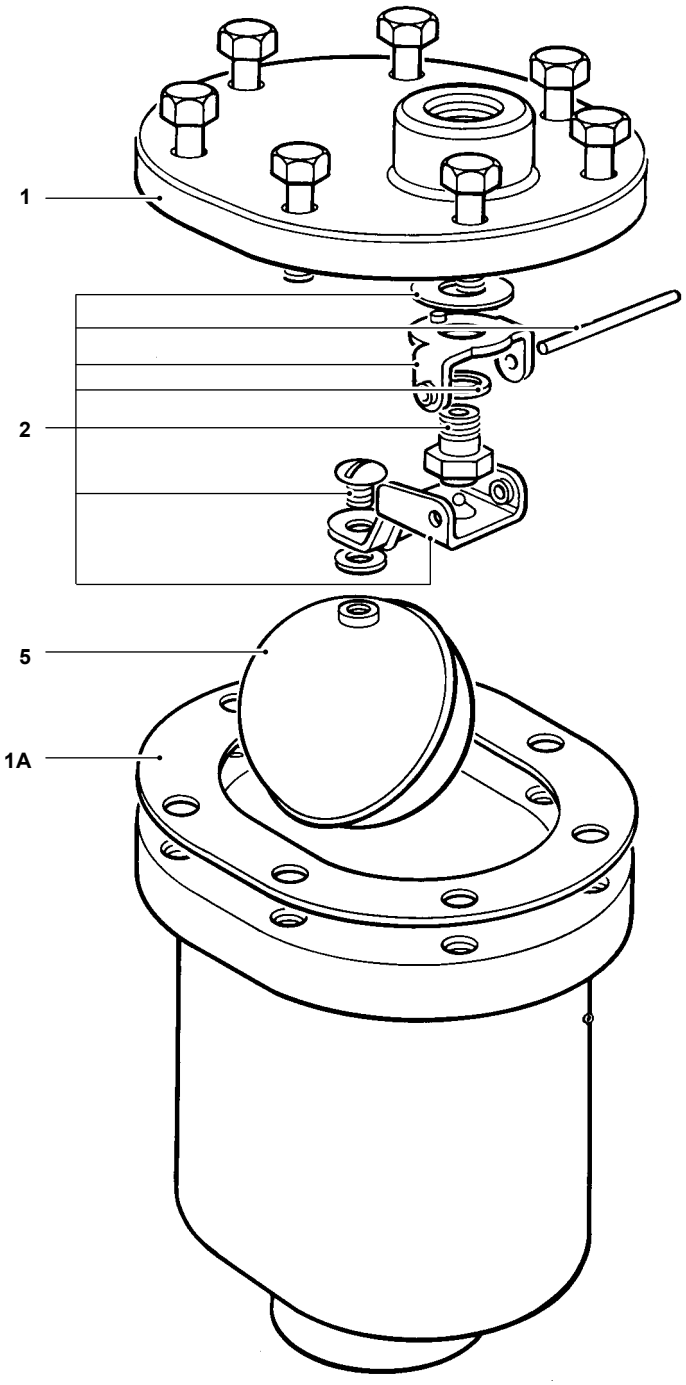
Complete installation and maintenance instructions are given in IM-4-006, which accompanies the product.

Sample specification

Automatic Air Eliminators shall be mounted at high points to provide for immediate removal of contained air or other non-condensible 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 psi g. Spirax Sarco model 13WS for 150 psi g service and model 13WHS for 300 psi g service.

Spare parts

Cover w/Gasket	1
Gasket Kit (set of 3)	1A
Valve Mechanism Kit	2
Float Kit	5



TI-P017-07
CMGT Issue 15

AE30, AE30A, AE30B and AE30C Automatic Air Eliminators/ Air and Gas Vents for Liquid Systems

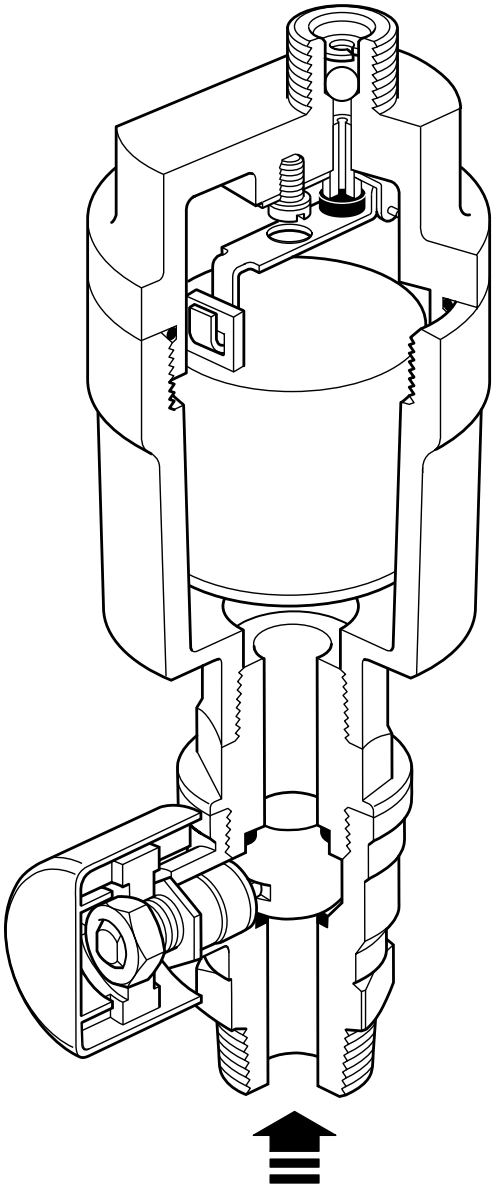
Description

The AE30 range of automatic air eliminators/air and gas vents are designed for use on liquid installations.The body and the cap are made from a special brass alloy, which is dezincification resistant (DZR).

Available options

AE30	Air eliminator/air vent
AE30A	Air eliminator/air vent with check valve
AE30B	Air eliminator/air vent with lockshield
AE30C	Air eliminator/air vent with check valve and lockshield

The fitted lockshield valve (versions AE30B and AE30C) has a unique 3 way locking system enabling the valve to be either locked open, locked closed or be used as conventional ball valve. You will need to use a standard socket set (not included with the product) to operate the valve.



Standards

This product fully complies with the requirements of the European Pressure Equipment Directive.

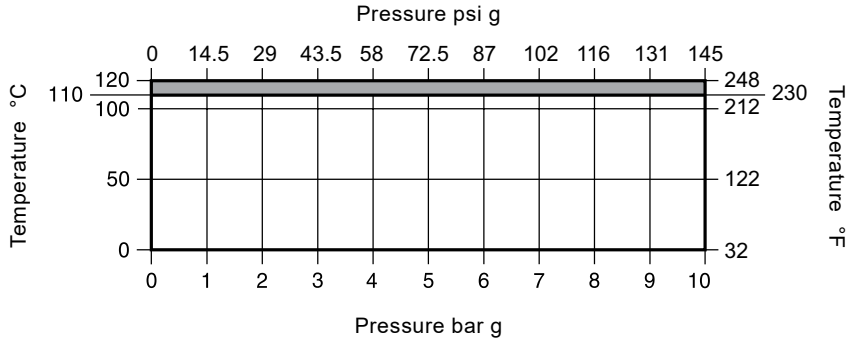
Certification

This product is available with a manufacturer's Typical Test Report.
Note: All certification/inspection requirements must be stated at the time of order placement.

Sizes and pipe connections

AE30, AE30A: Inlet ½" female, outlet ¼" male both BSP or NPT.
AE30B, AE30C: Inlet ½" male, outlet ¼" male both BSP.

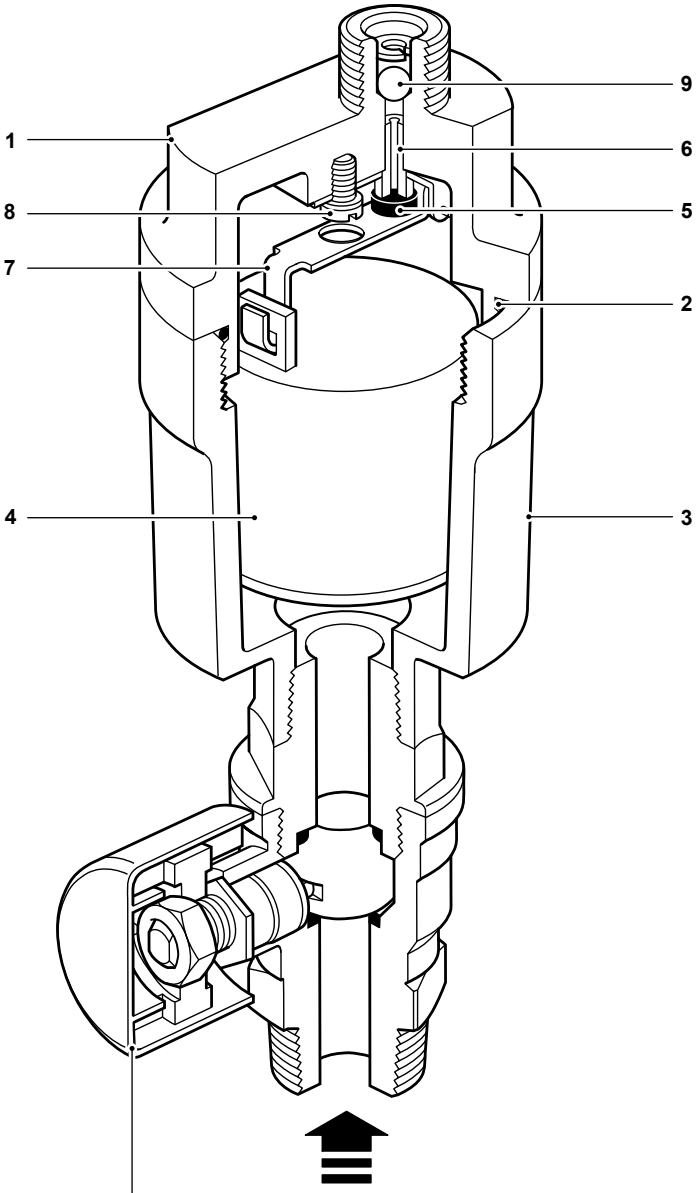
Pressure/temperature limits



The product **should not** be used in this region as damage to the internals may occur.

Body design conditions			PN10
PMA	Maximum allowable pressure	10 bar g @ 120 °C	145 psi g @ 248 °F
TMA	Maximum allowable temperature	120 °C @ 10 bar g	248 °F @ 145 psi g
Minimum allowable temperature		-10 °C	14 °F
PMO	Maximum operating pressure	10 bar g @ 110 °C	145 psi g @ 230 °F
TMO	Maximum operating temperature (at all pressures)	110 °C	230 °F
ΔPMX	Maximum differential pressure	8 bar g @ 110 °C	116 psi g @ 230 °F
Minimum operating temperature		0 °C	32 °F
Designed for a maximum cold hydraulic test pressure of		15 bar g	218 psi g
Minimum specific gravity of liquid		0.926	

Materials



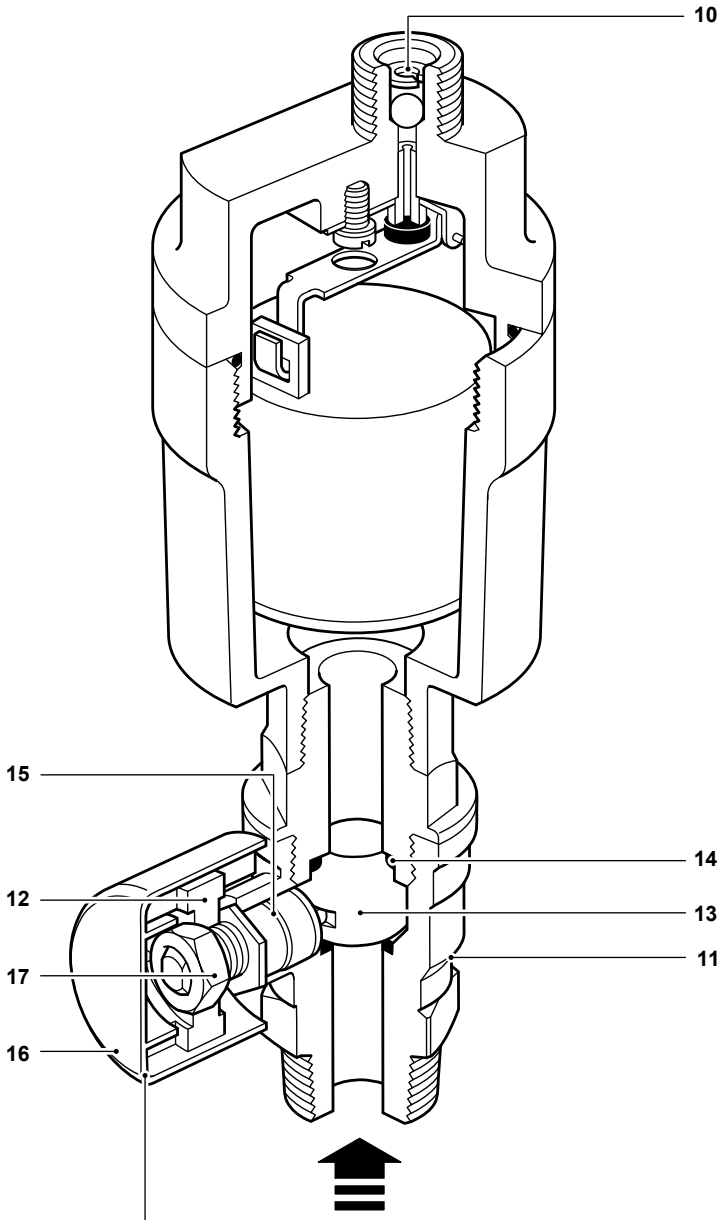
The **AE30B** and **AE30C** have a lockshield valve fitted as standard

A **standard socket set** is required to operate the lockshield valve - Not included with the product

No.	Part	Material		
1	Cap	DZR brass alloy		BS 2872 CZ 132
2	Cap 'O' ring	Green Viton 75		
3	Body	DZR brass alloy		BS 2872 CZ 132
4	Float	Acetal co hostaform/stainless steel		
5	Valve cone	EPDM or Green Viton (IRHD 50-55)		
6	Valve seat		Stainless steel	BS 970 431 S29
7	Bracket/lever assembly		Stainless steel	BS 1449 304 S11
8	Screw		Stainless steel	BS 4183 18/8
9	Check valve ball	(AE30A and C)	Stainless steel	AISI 440 B

Materials continued on next page

Materials (continued)



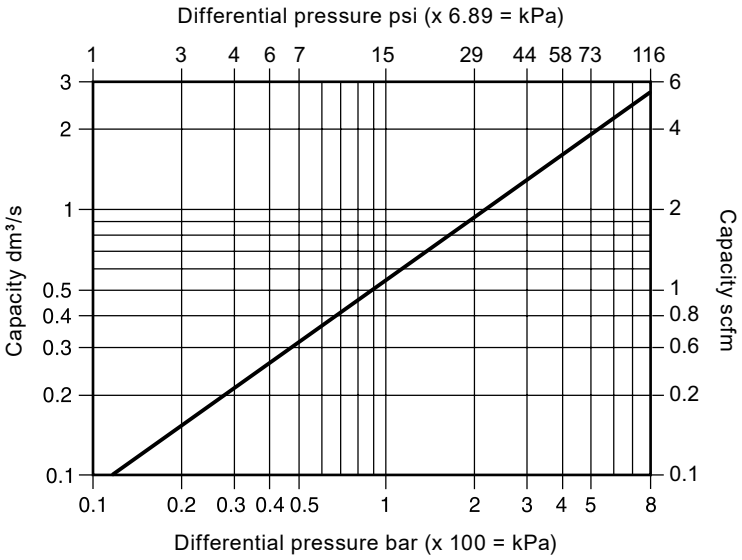
The **AE30B** and **AE30C** have a lockshield valve fitted as standard

A **standard socket set** is required to operate the lockshield valve - Not included with the product

No.	Part	Material		
10	Circlip	(AE30A and C)	Stainless steel	BS 970 302 S25
11	Lockshield valve body	(AE30B and C)	DZR brass alloy	EN 12165 CW 602N
12	Lockshield valve		Hard Cr. DZR alloy	EN 12165 CW 602N
13	Ball	(AE30B and C)	Hard Cr. DZR alloy	EN 12165 CW 602N
14	Seal	(AE30B and C)	Virgin PTFE	
15	Stem seal	(AE30B and C)	Virgin PTFE	
16	Cover	(AE30B and C)	Polypropylene	
17	Hex-nut	(AE30B and C)	Zinc plated steel	

Free discharge capacity

For air at 16 °C (61 °F)



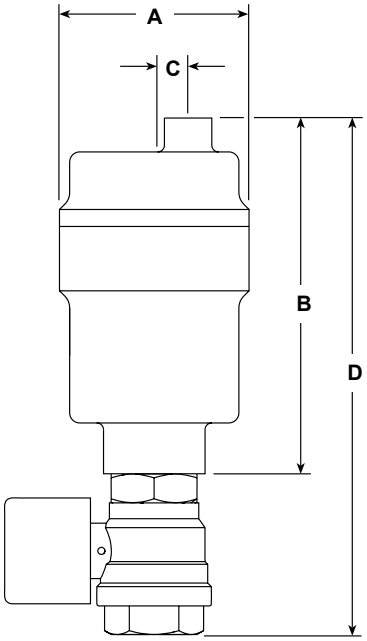
If the temperature of the air differs from 16 °C (61 °F), the discharge capacity from the graph can be corrected by multiplying it by the following equation:

$$\frac{289}{273 + T \text{ (T is the actual temperature in °C)}}$$

It may be assumed that the temperature of the air is equal to the temperature of the water.

Dimensions/weights (approximate) in mm (inches) and kg (lbs)

Version	A	B	C	D	Weight
AE30, AE30A	56 (2.2)	105 (4.13)	10 (0.39)		0.7 (1.54)
AE30B, AE30C				155 (6.10)	0.9 (1.98)



Safety information, installation and maintenance

For full details see the Installation and Maintenance Instructions (IM-P017-08) supplied with the product.

Installation note:

The automatic air eliminator/air vent should be installed vertically with the inlet at the bottom. We recommend piping the discharge from the air eliminator/air vent to a suitable drainpoint.

How to order

Example: 1 off Spirax Sarco ½" AE30C automatic air eliminator with check valve and lockshield valve screwed BSP.

Spare parts

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

Available spares

Maintenance kit comprising: Valve cone, float, cap 'O' ring, check valve ball and check valve circlip	**2**, **4**, **5**, **9**, **10**

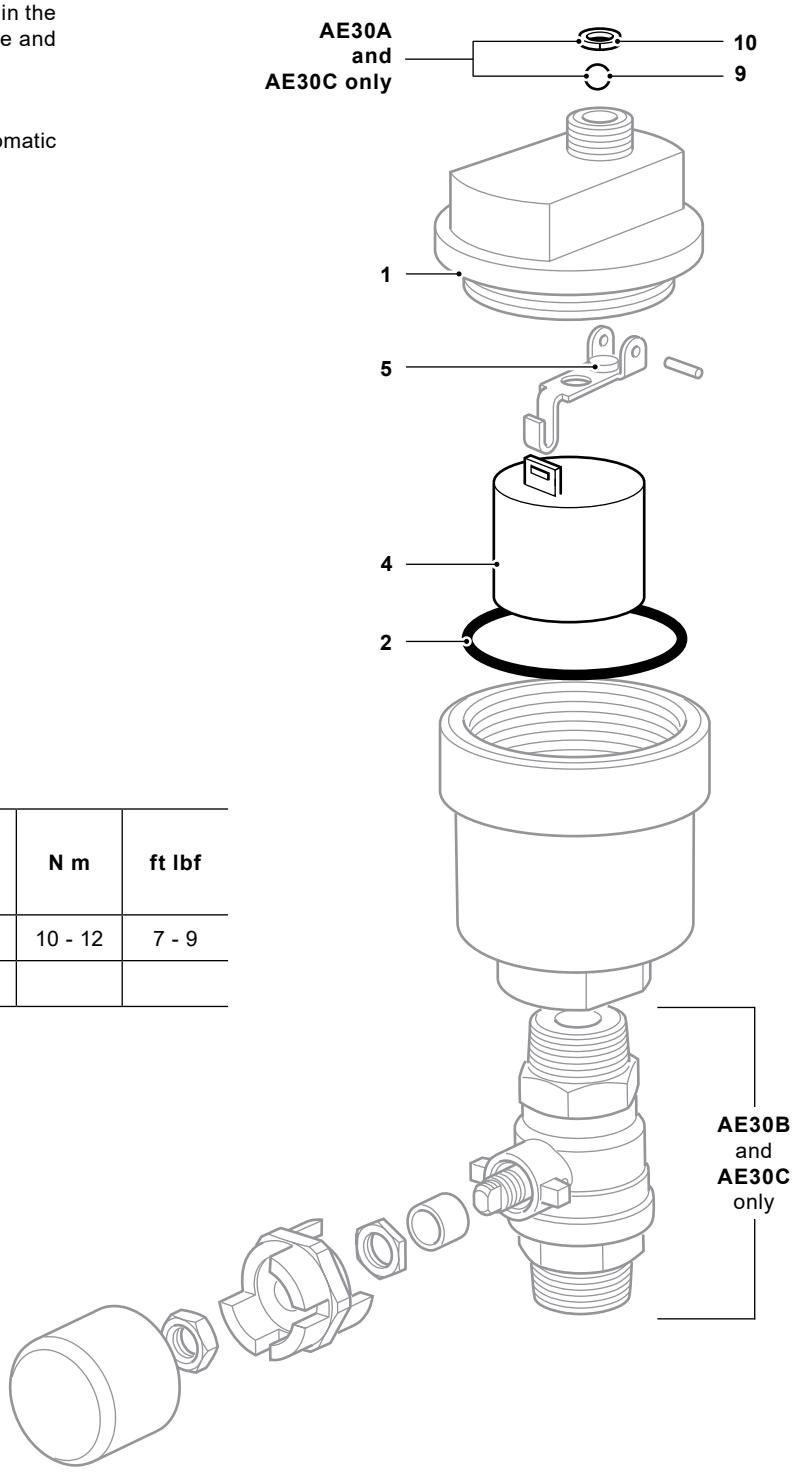
Important note

If you have earlier versions of the AE30 designated AE30 and AE30CV which operate over the range 0 - 30 bar then the spares set for the AE30, A, B and C can be used (but this will not convert it to operate over the range 0 - 8 bar).
However if you have the AE30H and AE30HCV which operate over the range 3 - 8 bar then the earlier spares set should be used.

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 automatic air eliminator/air vent.

Example:
1 - Maintenance kit for a Spirax Sarco ½" AE30A automatic air eliminator with check valve.



Recommended tightening torques

Item	or mm	N m	ft lbf
1	30	10 - 12	7 - 9
8	Cheesehead M4 x 6		

TI-P017-02
CMGT Issue 12

AE36 and AE36A Automatic Air Eliminators/ Air Vents for Liquid Systems

Description

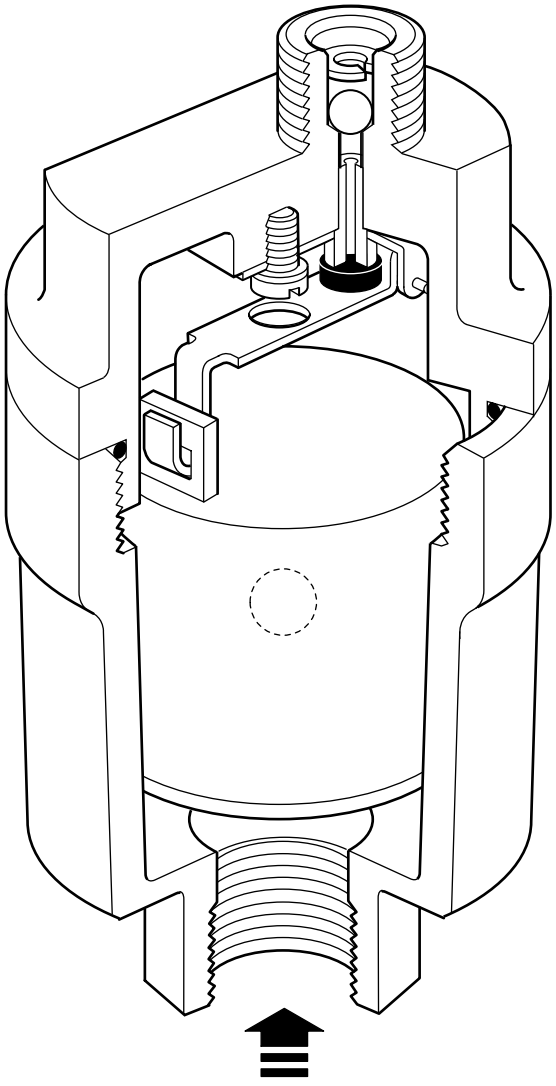
The AE36 range of automatic air eliminators/air vents is designed for use on hot and cold water installations. The body and cap are of austenitic stainless steel type 316L. It is available as a standard air vent designated AE36, with check valve the designation becomes AE36A.

Standards

This product fully complies with the requirements of the European Pressure Equipment Directive 2014/68/EU.

Certification

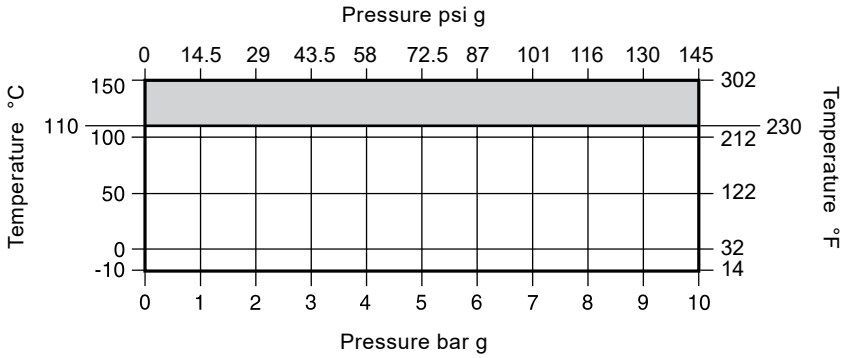
This product is avaliable with Manufacturers' Typical Test Report.
Note: All certification/inspection requiements must be stated at the time of order placement.



Sizes and pipe connections

Inlet	½" female	BSP or NPT
Outlet	¼" male	BSP or NPT

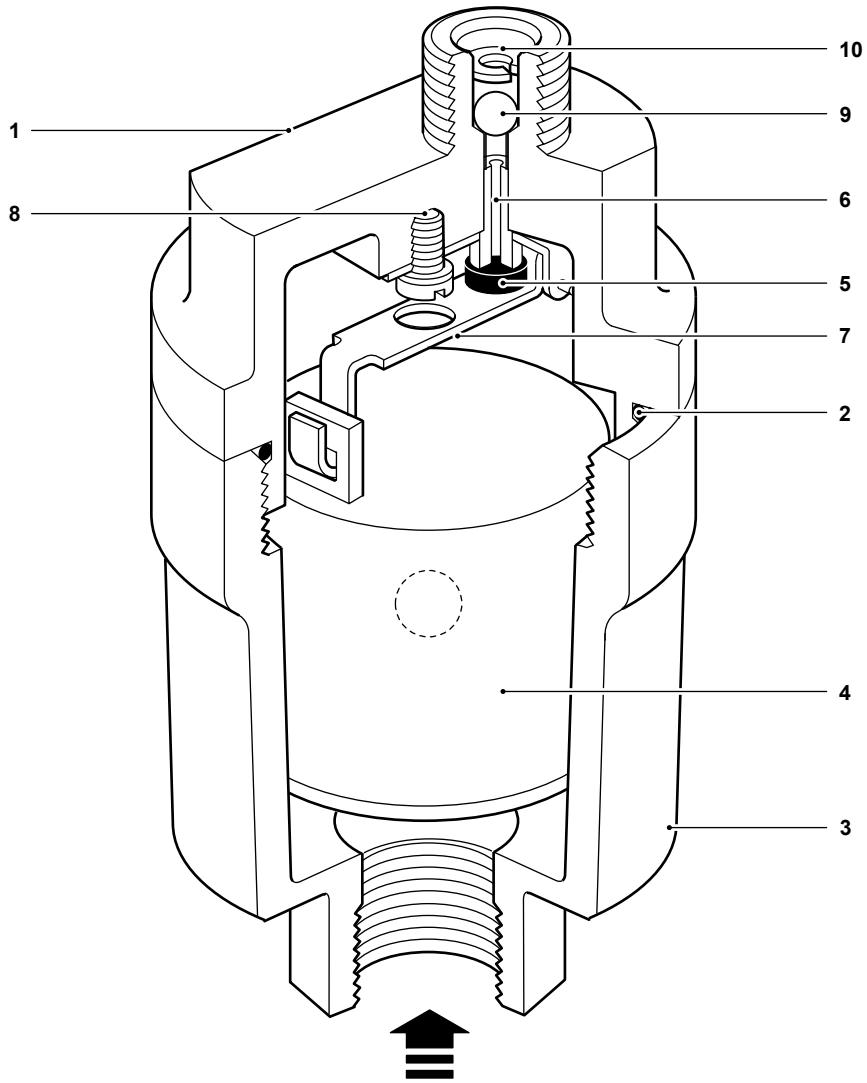
Pressure/temperature limits



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

Body design conditions			PN10
PMA	Maximum allowable pressure	10 bar g @ 150 °C	145 psi g @ 302 °F
TMA	Maximum allowable temperature	150 °C @ 10 bar g	302 °F @ 145 psi g
Minimum allowable temperature		-10 °C	14 °F
PMO	Maximum operating pressure	10 bar g @ 110 °C	145 psi g @ 230 °F
TMO	Maximum operating temperature	110 °C @ 10 bar g	230 °F @ 145 psi g
Minimum operating temperature		-10 °C	14 °F
ΔPMX	Maximum differential pressure	8 bar g	116 psi g
Designed for a maximum cold hydraulic test pressure of:		15 bar g	218 psi g
Minimum specific gravity of liquid			0.926

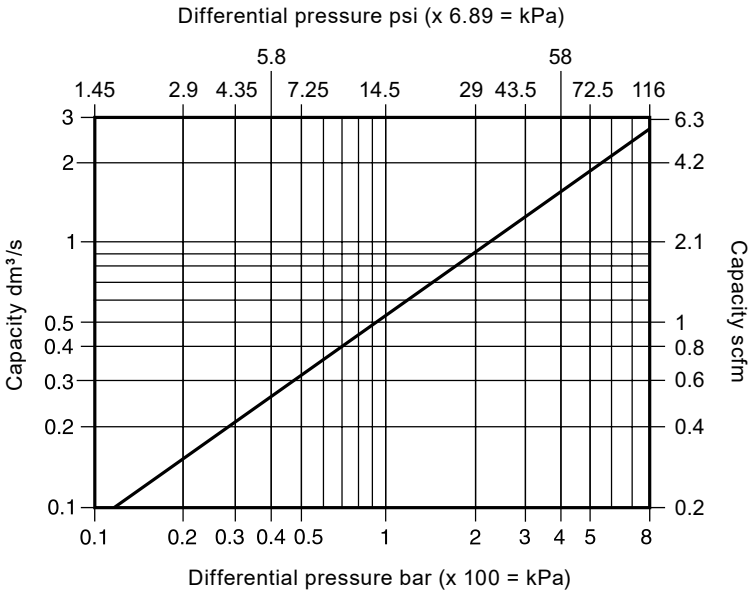
Materials



No.	Description	Material	
1	Cap	Austenitic stainless steel type 316L	ASTM A351 CF3M
2	Cap 'O' ring	Green Viton 75	
3	Body	Austenitic stainless steel type 316L	ASTM A351 CF3M
4	Float	Acetal co hostaform/stainless steel	
5	Valve head	EPDM	
6	Valve seat	Stainless steel	BS 970 431 S29
7	Bracket/lever assembly	Stainless steel	BS 1449 304 S11
8	Screw	Stainless steel	BS 4183 18/8
9	Check valve ball (AE36A only)	Stainless steel	AISI 440 B
10	Circlip	Stainless steel	BS 970 302 S25

Free discharge capacity

For air at 16 °C

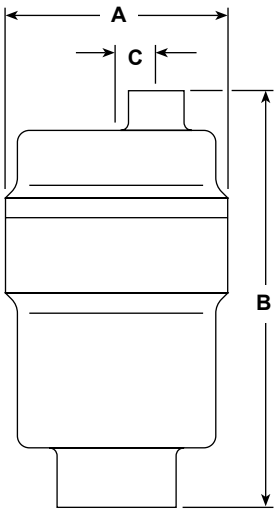


If the temperature of the air differs from 16 °C, the discharge capacity from the graph can be corrected by multiplying it by the following equation:

$$\frac{289}{273 + T \text{ (T is the actual temperature in °C)}}$$

It may be assumed that the temperature of the air is equal to the temperature of the water.

Dimensions/weight (approximate) in mm (inches) and kg (lbs



Version	A	B	C	Weight
AE36	56 (2.20)	105 (4.13)	10 (0.39)	0.7 (1.54)
AE36A				

Safety information, installation and maintenance

For full details see the Installation and Maintenance Instructions (IM-P017-03) supplied with the product.

Installation note:

The automatic air eliminator/air vent should be installed vertically with the inlet at the bottom. We recommend piping the discharge from the air eliminator/air vent to a suitable drain point.

How to order

Example: 1 off Spirax Sarco ½" AE36A automatic air eliminator/air vent with check valve having screwed BSP connections.

Spare parts

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

Available spares

Maintenance kit comprising: Valve cone, float, cap 'O' ring, check valve ball and check valve circlip	2, 4, 5, 9, 10

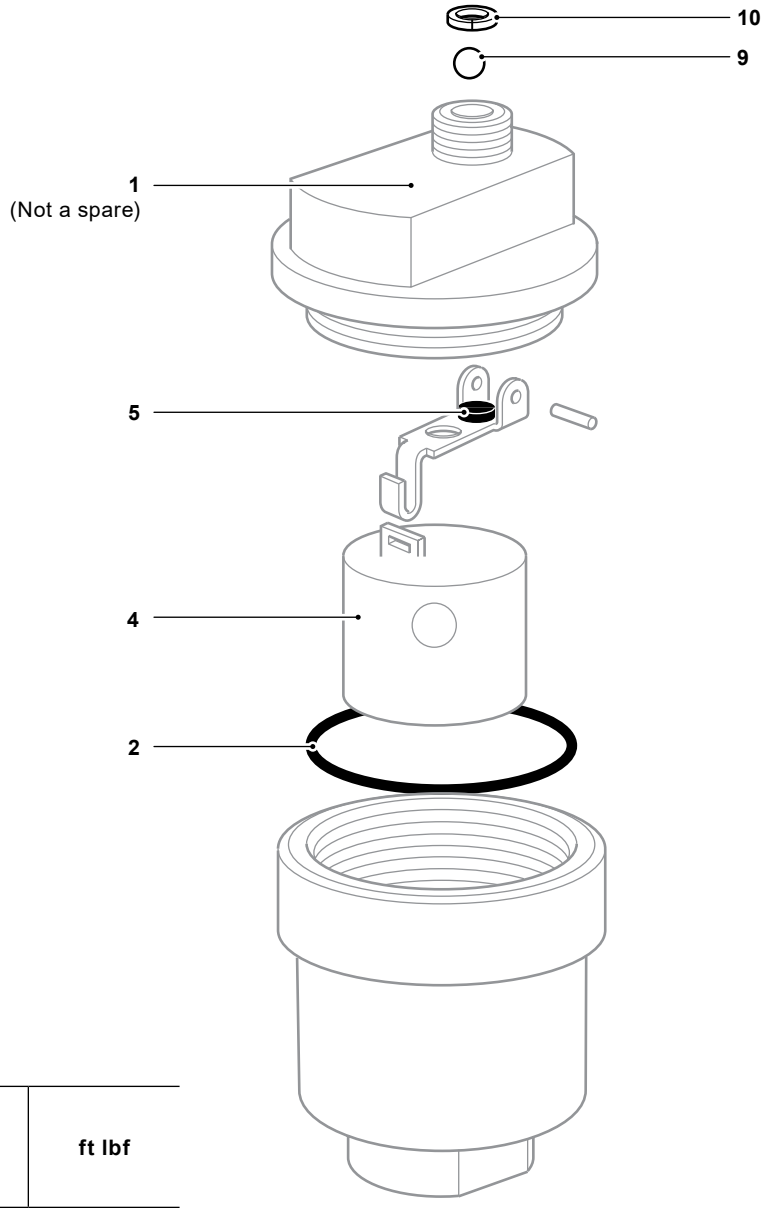
Important note

If you have earlier versions of the AE36 designated AE36CV which operate over the range 3 - 8 bar (43.5 - 116 psi g) then the spares set for the AE36A can not be used.
Spares for the AE36CV are no longer available.

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 automatic air eliminator/air vent.

Example: 1 - Maintenance kit for a Spirax Sarco ½" AE36A automatic air eliminator/air vent with check valve.



Recommended tightening torques

Item	or mm		N m	ft lbf
1	30		10 - 12	7 - 9
8	Cheesehead	M4 x 6	2.5 - 2.8	1.8 - 2.0

TI-P017-10
CMGT Issue 8

AE50S
Automatic Air and Gas Vent for Liquid Systems

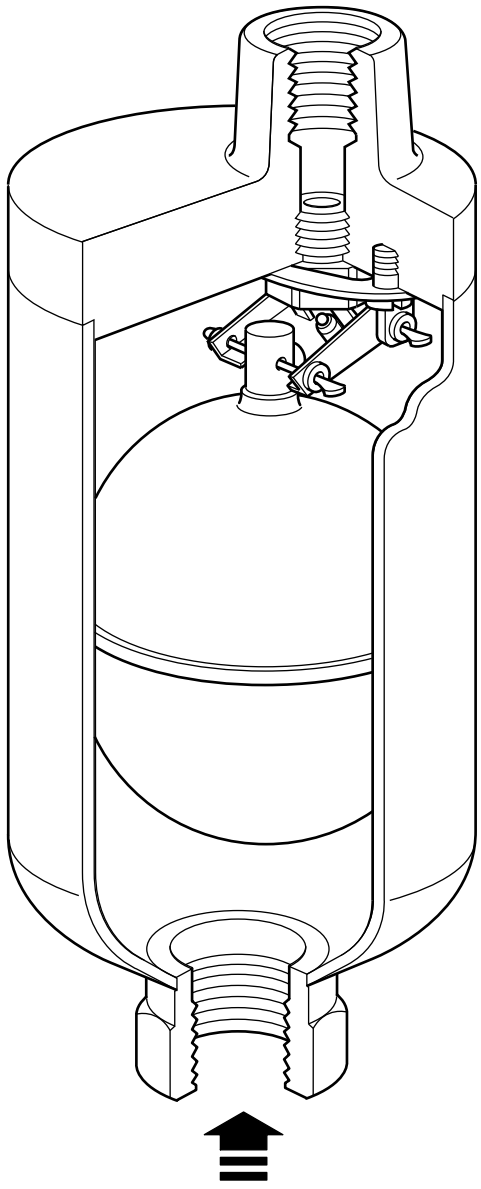
Description
The AE50S automatic air and gas vent is designed for use on liquid systems. It has a welded construction and the body is manufactured in 304L austenitic stainless steel.

Standards
This product fully complies with the requirements of the European Pressure Equipment Directive 2014/68/EU and carries the CE mark when so required.

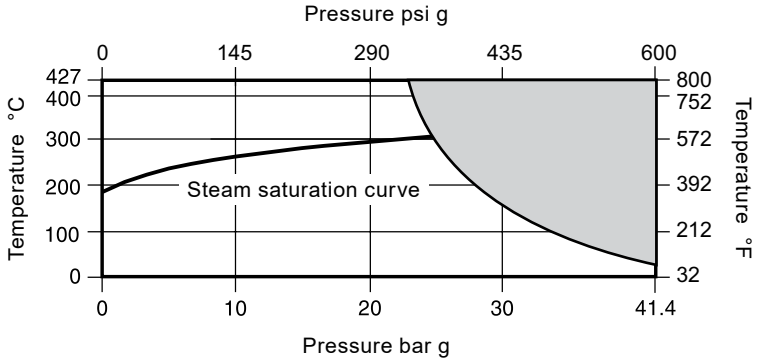
Certification
The product is available with material certification EN 10204 3.1 for bowl, cover and inlet connection as standard.

Sizes and pipe connections

Inlet	¾" female	BSP T Rp (ISO 7-1) or NPT
Outlet	½" female	BSP T Rp (ISO 7-1) or NPT



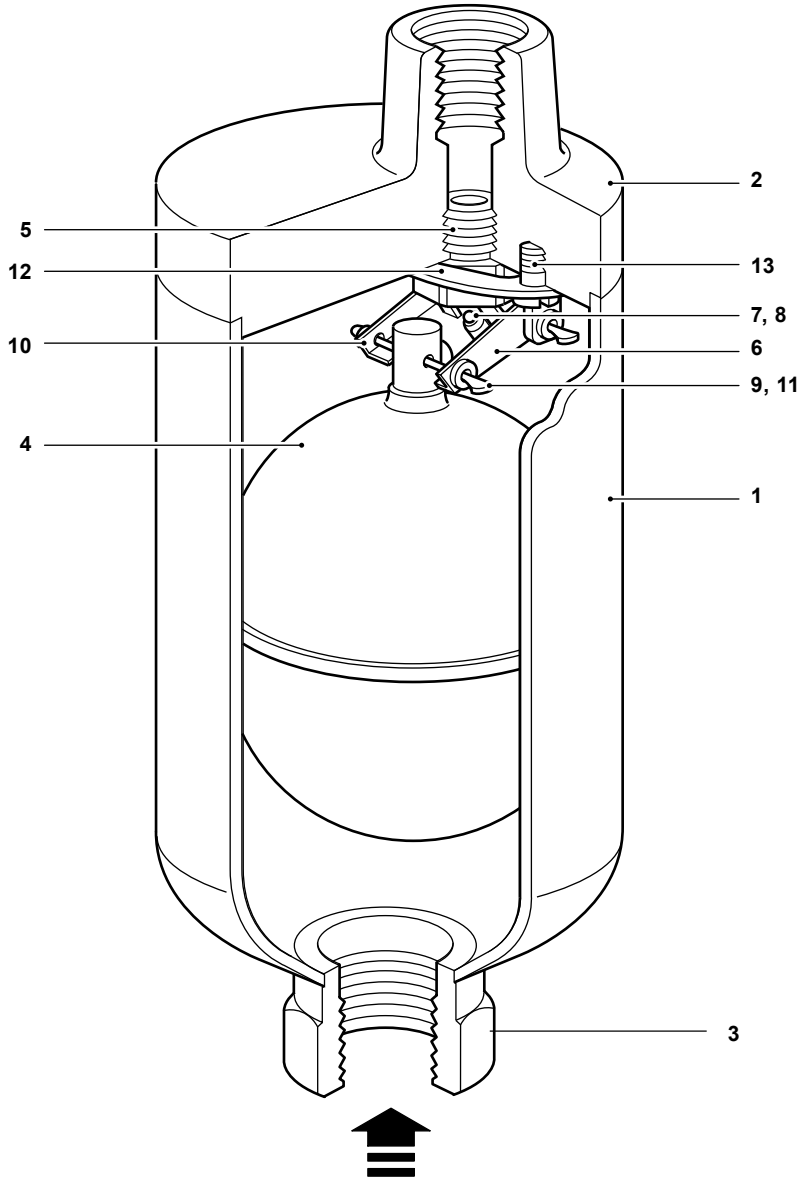
Pressure/temperature limits



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

Body design conditions			ANSI 300
PMA	Maximum allowable pressure	41.4 bar g @ 30 °C	600 psi g @ 86 °F
TMA	Maximum allowable temperature	427 °C	801 °F
Minimum allowable temperature		-254 °C	-425 °F
PMO	Maximum operating pressure	41.4 bar g @ 30 °C	600 psi g @ 86 °F
TMO	Maximum operating temperature	427 °C @ 23.6 bar g	801 °F @ 342 psi g
Minimum operating temperature		-60 °C	-76 °F
ΔPMX	Maximum differential pressure	30 bar g	435 psi g
Designed for a maximum cold hydraulic test pressure of		63 bar g	914 psi g
Minimum specific gravity of liquid			0.65

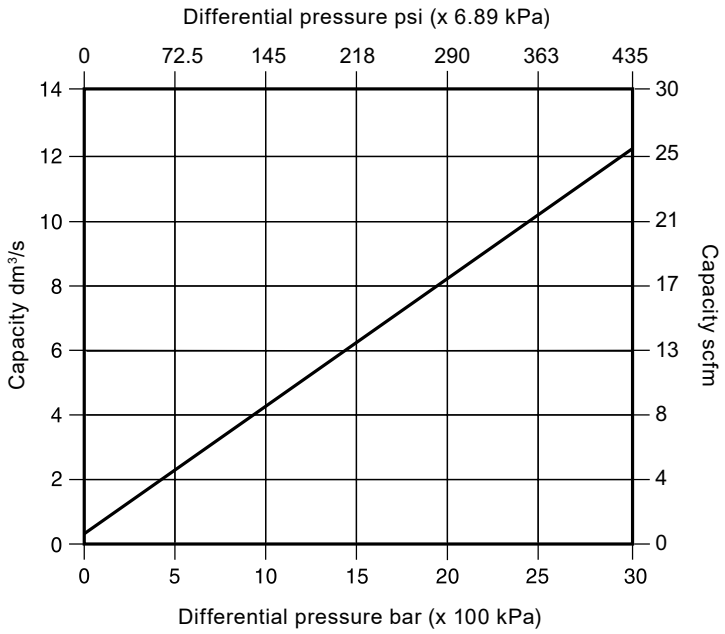
Materials



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
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

Free air discharge capacity

For air at 15 °C



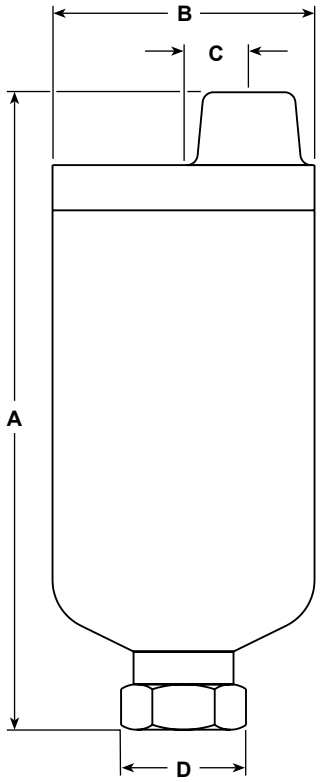
If the temperature of the air differs from 15 °C, the discharge capacity from the graph can be corrected by multiplying it by the following equation:

$$\frac{289}{273 + T \text{ (T is the actual temperature in °C)}}$$

It may be assumed that the temperature of the air is equal to the temperature of the water.

Dimensions/weight

(approximate) in mm (inches) and kg (lbs)



A	B	C	D	Weight
175 (6.89)	79 (3.11)	18.5 (0.73)	32 A/F (1.26 A/F)	1 (2.20)

7.1

20

How to order

Example: 1 off Spirax Sarco ¾" AE50S automatic air and gas vent manufactured in austenitic stainless steel having screwed BSP T Rp (ISO 7-1) 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 1 m to 2 m (3.28 to 6.56 f)tof ¾" vertical pipeline be fitted prior to the inlet of the vent.
On superheated water systems the outlet pipework must be sized to accomodate 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.

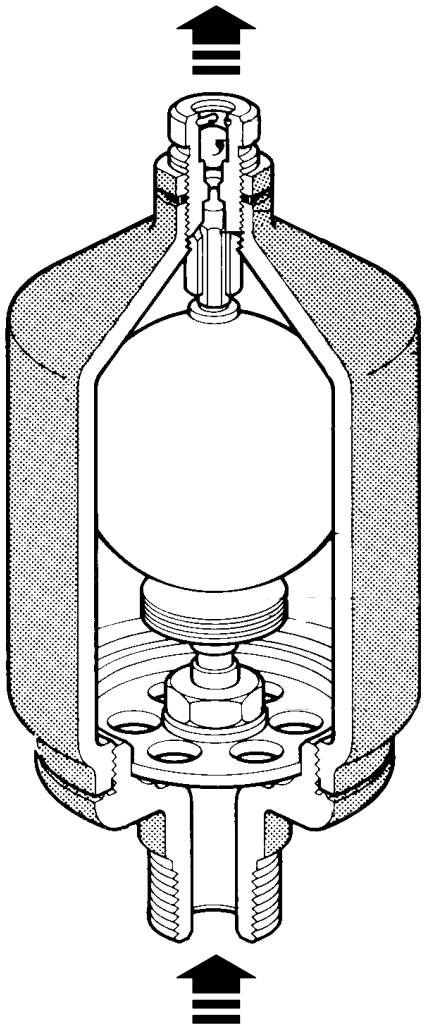
TI-P080-06-US
Issue 1

Air Vent
6A

Description

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.

Model	6A
PMO	15 psi g (1 bar g)
Sizes	¾"
Connections	NPT
Construction	Cast Iron Body
	Stainless Steel Internals
	Nylon Check Valve



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.

Limiting operating conditions

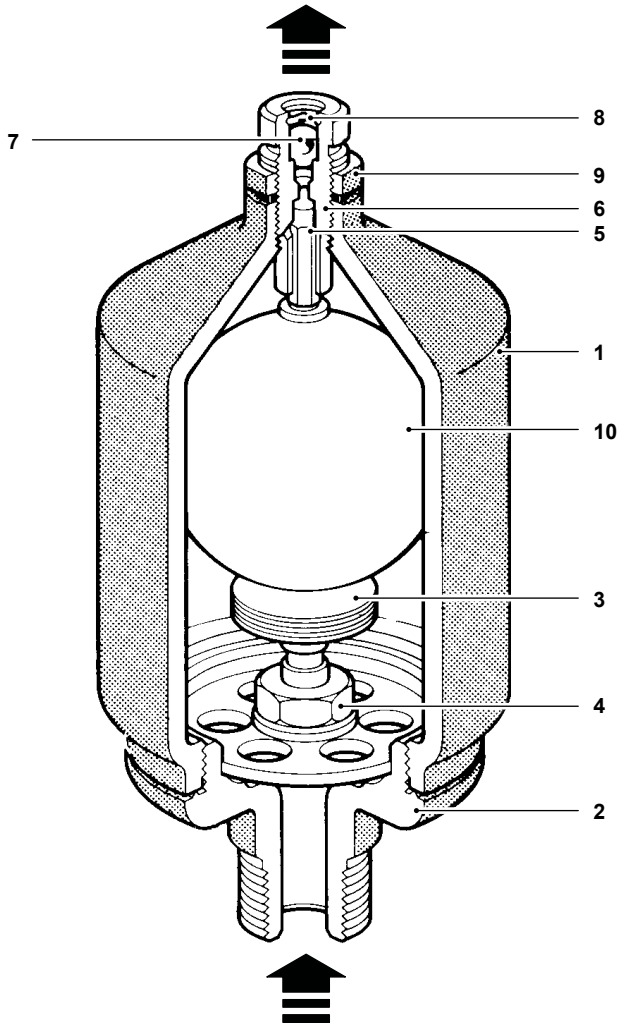
PMO	Maximum operating pressure	15 psi g	(1 bar g)
TMO	Maximum operating temperature		Saturated steam temperature

Pressure shell design conditions

PMA	Maximum allowable pressure	125 psi g @ up to 450 °F	(8.6 bar g @ up to 232 °C)
TMA	Maximum allowable temperature	450 °F @ up to 125 psi g	(232 °C @ up to 8.6 bar g)

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 and 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 cadium plated steel with Teflon seat
10	Float	Stainless Steel	AISI 304

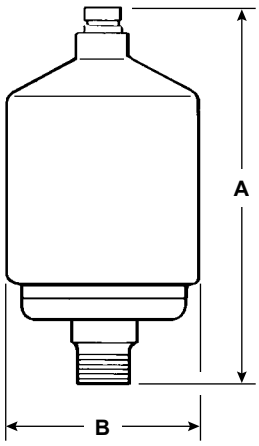


Air capacity (discharge to atmosphere)

SCFM cubic feet per minute at standard conditions of 14.7 psi a (1.01 bar g) at 60 °F (16 °C).
For dm^3/s multiply by .4719.

	Inlet Pressure					
psi (bar)	2.5 (.17)	5.0 (.34)	7.5 (.52)	10 (.69)	12.5 (.86)	15 (1.0)
Capacity	2.5	4.0	5.0	6.0	6.5	7.2

Dimensions/weights
(approximate) in inches (mm) and lbs (kg)



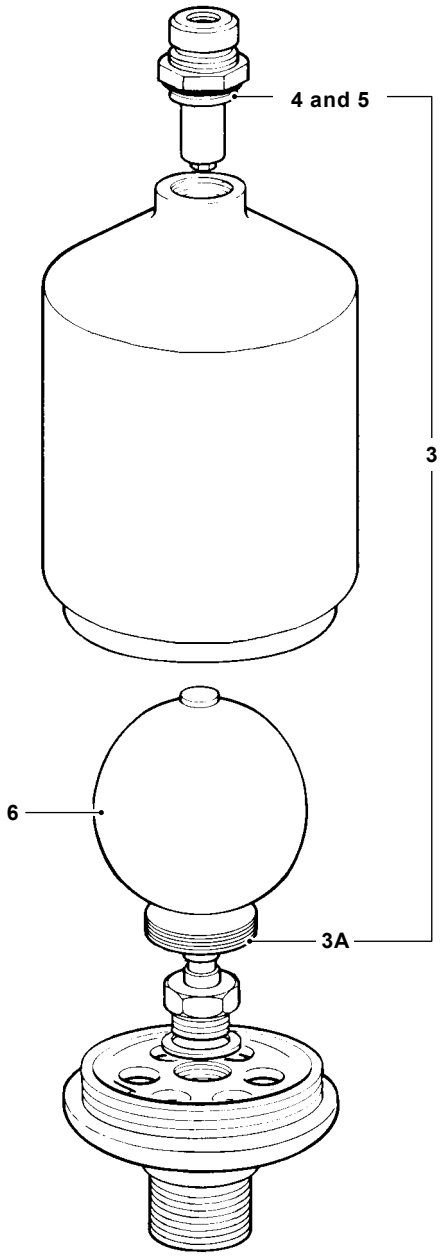
Size	A	B	Weight
¾"	7.25 (184)	3.6 (91)	4.5 lb (2.0 kg)

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 and 5**
Float	**6**

* Part No. 3 Element Set converts Type 6T Air Vent to current Type 6A design.

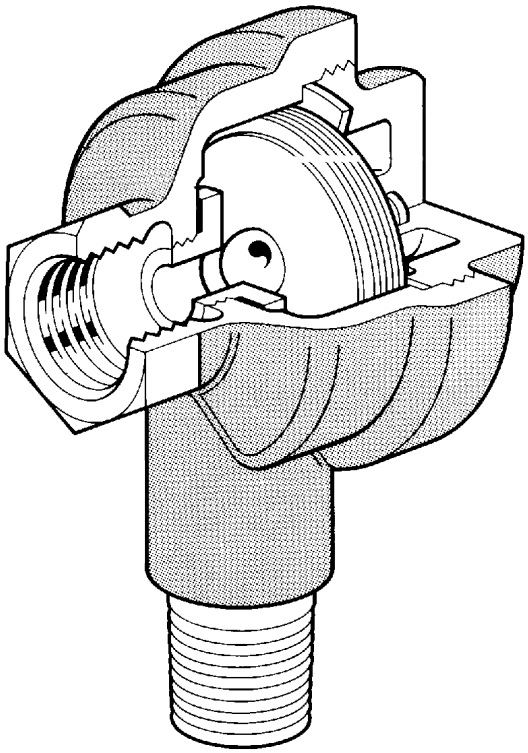
TI-P080-05-US
Issue 2

Balanced Pressure Thermostatic Air Vent T202

Description

The T202 air vent is designed for use on steam systems to remove air and other non-condensible gases, which may impair heat transfer during start-up and normal operation.

Model	T202
PMO	125 psi g
Sizes	⅜" x ¼"
Connections	NPT
Construction	Brass Body with Stainless Steel Internals



Limiting operating conditions

PMO	Maximum operating pressure	125 psi g (8.6 bar g)
Maximum operating temperature		Saturated Steam Temperature

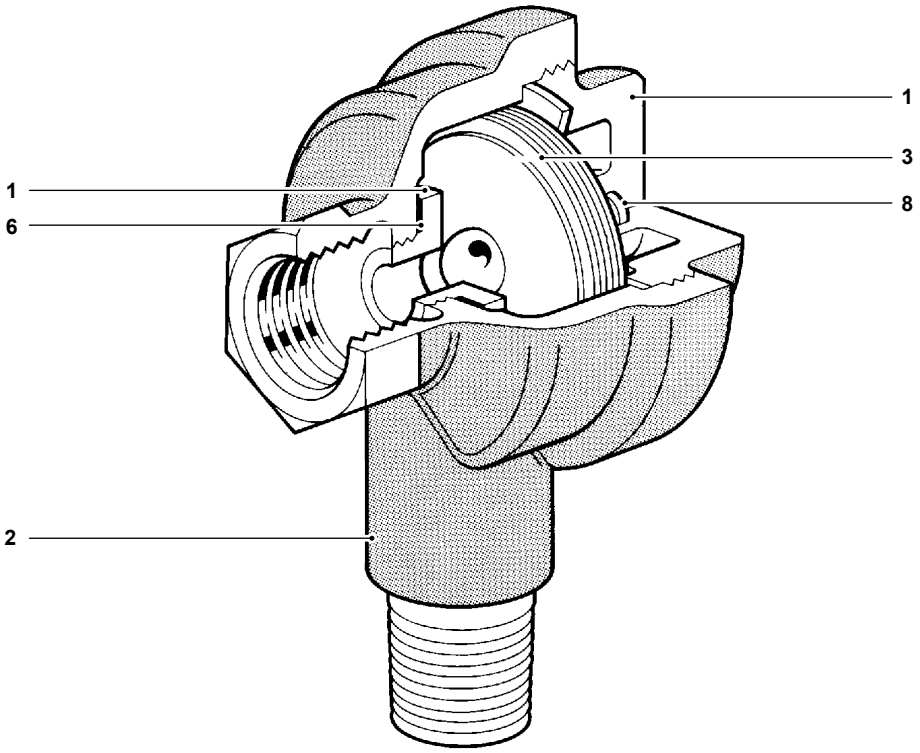
Pressure shell design conditions

PMA	Maximum allowable pressure	125 psi g and up to 353 ˚F	(9 bar g and up to 178 ˚C)
TMA	Maximum allowable temperature	353 ˚F and 0-125 psi g	(178 ˚C and 0-9 bar g)

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.

Materials

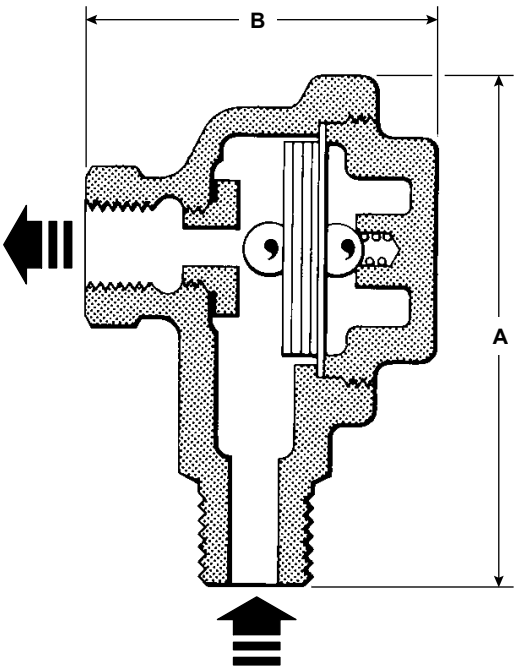


No.	Part	Material	
1	Cap	Brass	ASTM B124 Class 2
2	Body	Brass	ASTM B62
3	Thermostatic bellows	Stainless Steel	
5	Seat	Stainless Steel	
6	Seat gasket	Brass	
8	Spring	Stainless Steel	

Dimensions/weights

(approximate) in inches (mm) and lbs (kg)

Size	Outlet	A	B	Weight
⅜"	¼"	2.9 (75)	2.1 (54)	1 lb (.045 kg)



Air Capacity (discharge to atmosphere)

SCFM cubic feet per minute at standard conditions of 14.7 psig at 60˚F. For dm^3/s multiply by .4719.

	Inlet pressure					
psi (bar)	5 (.34)	10 (.68)	25 (1.7)	50 (3.4)	100 (6.9)	125 (8.6)
SCFM	8	13	25	40	70	80

Orifice Size = .25

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.

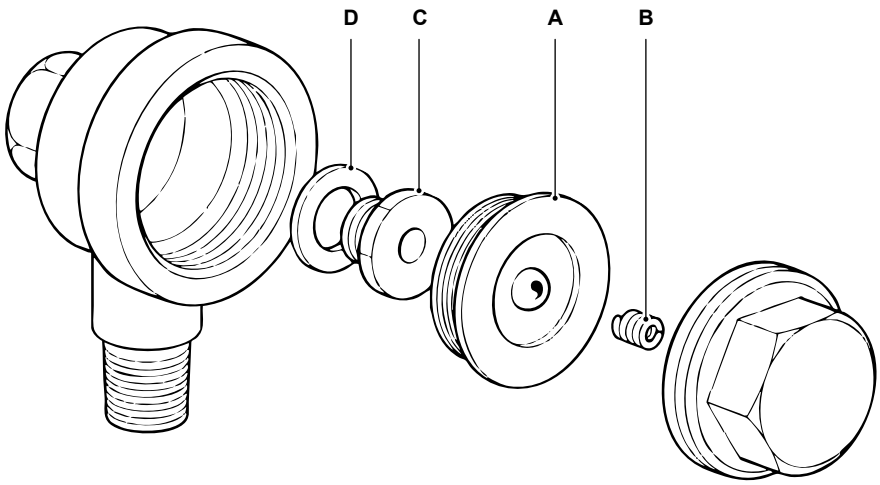
Worn or damaged parts should be replaced using a complete element set.

Complete installation and maintenance instructions are given in IM-4-101, which accompanies the product.

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.

Spare parts



Element Set	**A, B, C, D**

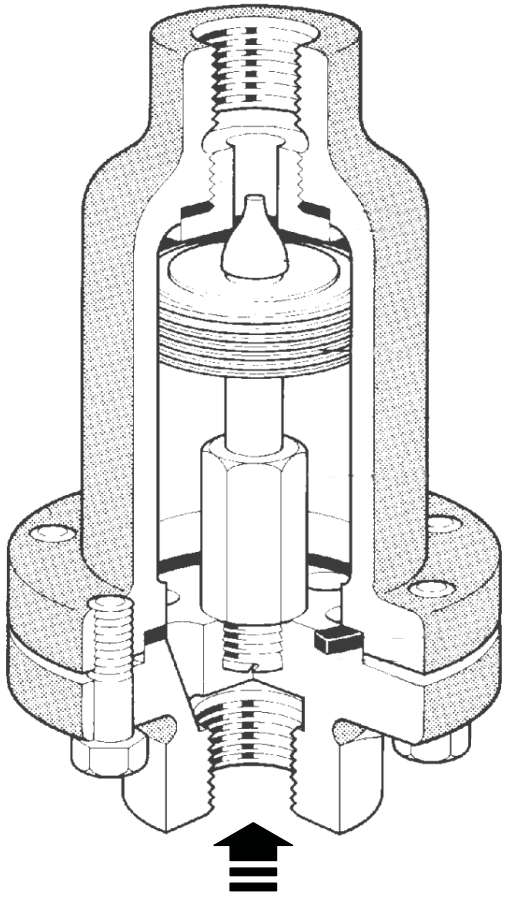
TI-P080-04-US
Issue 1

Balanced Pressure Thermostatic Air Vent VS204, VS206

Description

The VS204 and VS206 air vents are designed for use on steam systems to remove air and other non-condensible gases, which may impair heat transfer during start-up and normal operation.

Model	VS204	VS206
PMO	250 psi g (17 bar g)	
Sizes	½"	¾"
Connections	NPT	
Construction	Cast Iron Body with Stainless Steel Internals	



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.

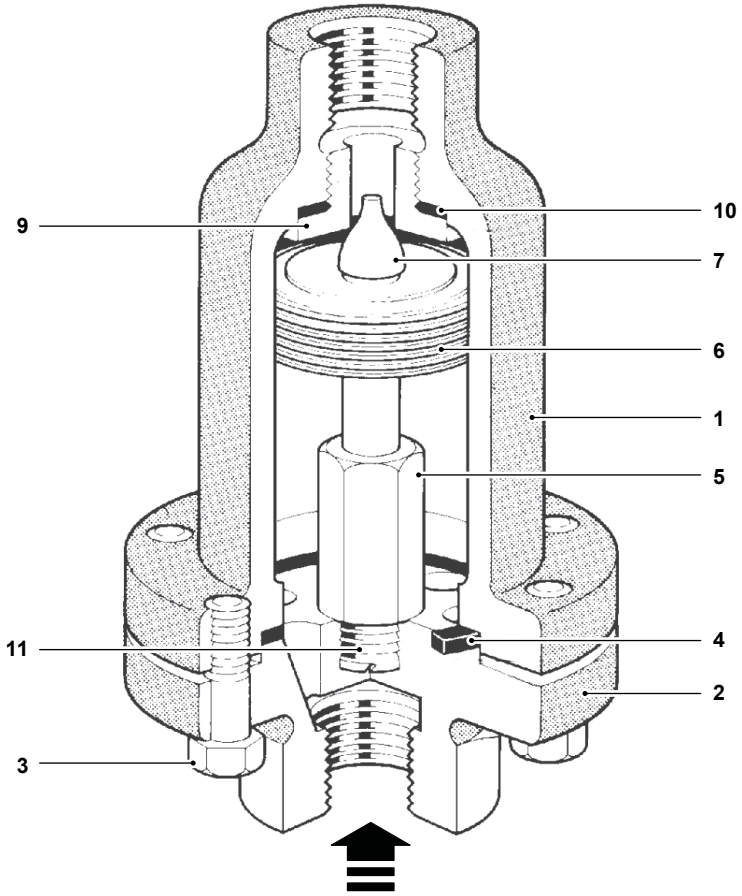
Limiting operating conditions

PMO	Maximum Operating Pressure	250 psi g	17 bar g
	Maximum Operating Temperature		Saturated Steam

Pressure shell design conditions

PMA	Maximum allowable pressure	250 psi g and up to 450 °F	17 bar g and up to 232 °C
TMA	Maximum allowable temperature	450 °F and up to 250 psi g	232 °C and up to 17 bar g

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	

Air capacity (discharge to atmosphere)

SCFM cubic feet per minute at standard conditions of 14.7 psi a (1.0 bar a) at 60˚F (16 °C). For dm^3/s multiply by .4719.

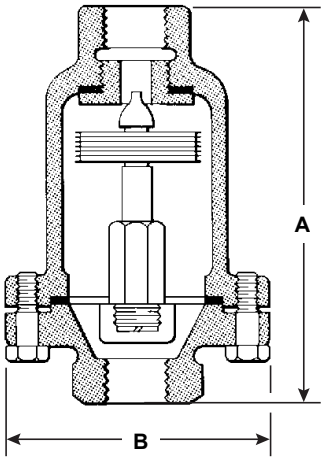
		Inlet Pressure							
Type	psi	10	25	50	100	125	150	200	250
	bar	.69	1.7	3.4	6.9	8.6	10.3	13.8	17.2
VS204		34	54	88	160	196	232	304	380
VS206		44	68	112	208	250	298	392	485

Orifice size:

VS204 =.44" VS206 = .50"

Dimensions/weights

(approximate) in inches (mm) and lbs (kg)



Size	A	B	Weight
½"	4.9 (124)	3.1 (79)	3.25 (1.5)
¾"	5.5 (140)	3.9 (99)	5.0 (2.3)

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.

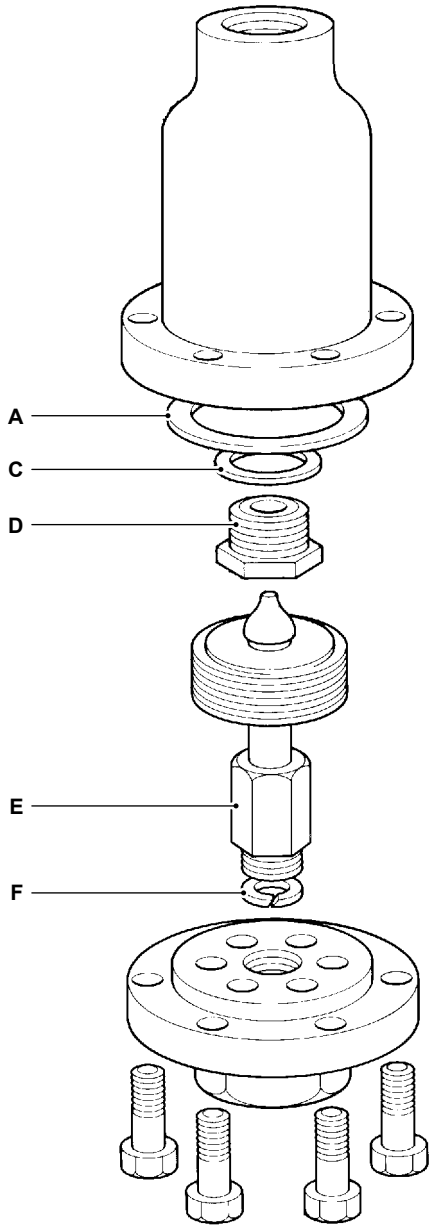
The air vent should be disassembled periodically for inspection and cleaning of the valve head and seat.

Worn or damaged parts should be replaced using a complete element set.

Complete installation and maintenance instructions are given in IM-4-105-US, which accompanies the product.

Spare parts

Cap gasket	**A**
Element Set	**C, D, E, F**



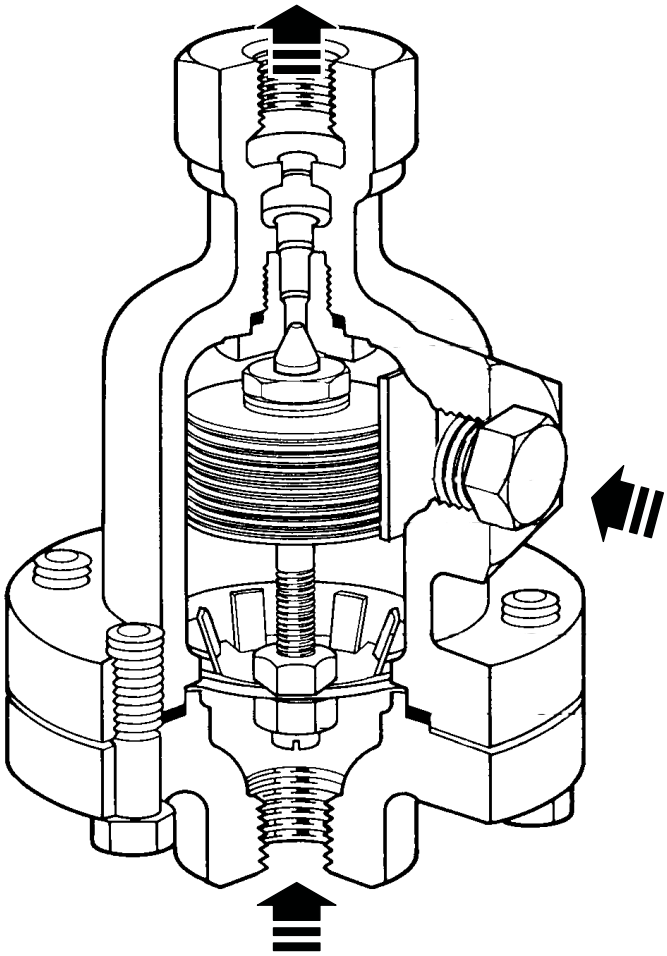
TI-P080-03-US
Issue 1

Thermo-matic Air Vent
TM600, TM600L

Description

The TM600 and TM600L air vents are designed for use on steam systems to remove air and other non-condensible 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
PMO	600 psi g (41 bar g)
Sizes	½", ¾"
Connections	NPT
Construction	Ductile Iron Body with Stainless Steel Internals
Options	BSP Connections



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.

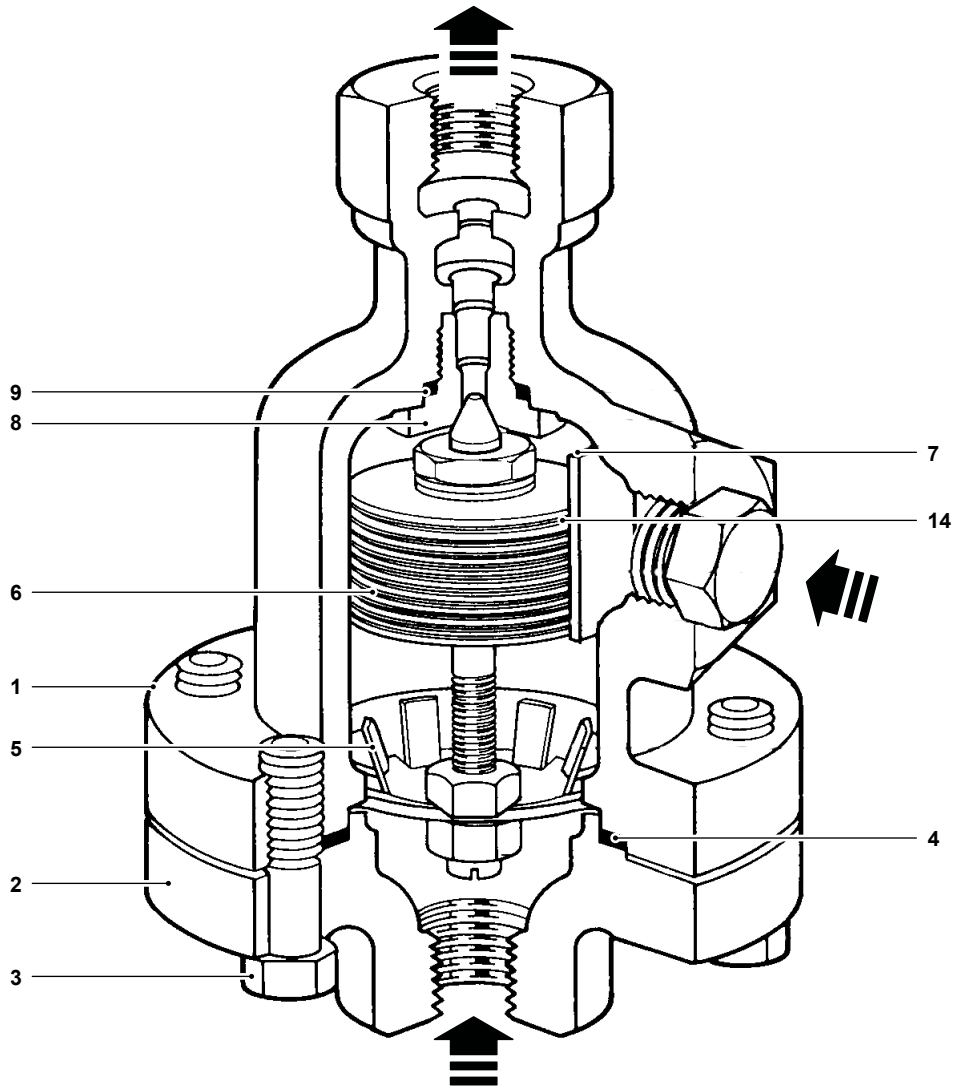
Limiting operating conditions

PMO	Maximum operating pressure	600 psi g	41 bar g
	Maximum operating temperature	489 °F	254 °C

Pressure shell design conditions

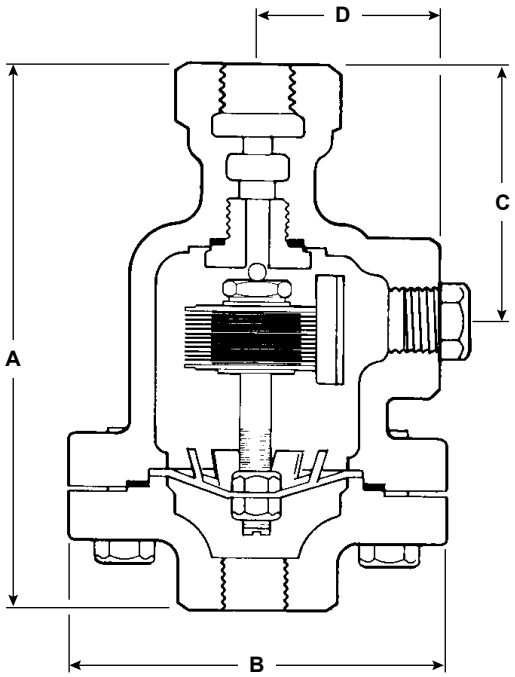
PMA	Maximum allowable pressure	600 psi g and up to 650 °F	41 bar g and up to 343 °C
TMA	Maximum allowable temperature	650 °F and 0-600 psig	343 °C and 0-41 bar g

Materials



No.	Part	Material	
1	Body	Ductile Iron	ASTM A395
2	Cover	Ductile Iron	ASTM A395
3	Cover Screws	Steel ⅜" - 16 x 1¼"	ASTM A 449 Type 1
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	

Dimensions/weights (approximate) in mm (inches) and kg (lbs)



Size	A	B	C	D	Weight
½", ¾"	6.25 (159)	4.2 (107)	2.8 (71)	2.0 (51)	6.75 lb (3.1 kg)

Air capacity (discharge to atmosphere)

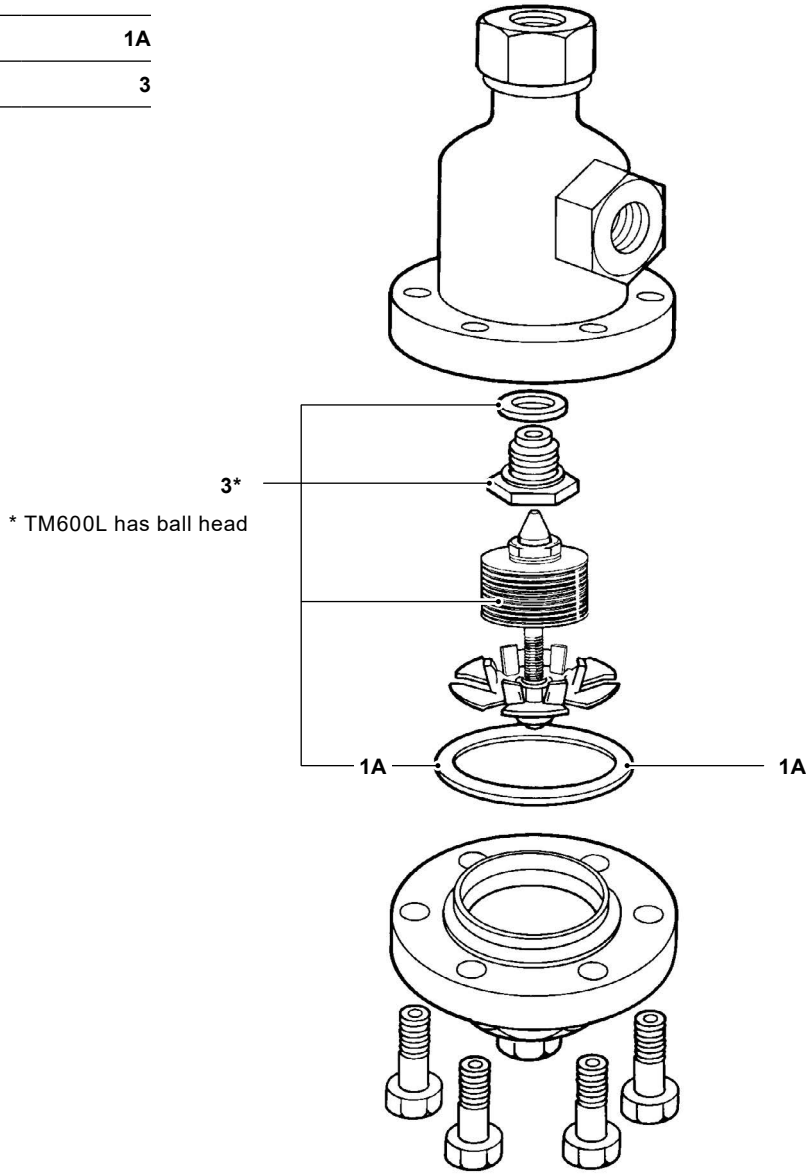
SCFM cubic feet per minute at standard conditions of 14.7 psi a (1.01 bar a) at 60 °F (16 °C). For dm^3/s multiply by .4719.

		Inlet Pressure											
Type	psi	10	25	50	100	125	150	200	250	300	400	500	600
	bar	.69	1.7	3.4	6.9	8.6	10.3	13.8	17.2	20.7	27.6	34.5	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"

Spare parts

Cover Gasket	1A
Element Set (Specify TM600 or TM600L)	3



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.

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.

TI-P019-02
CMGT Issue 12

VB14, VB21 and VB21 Food+ Vacuum Breakers

VB14

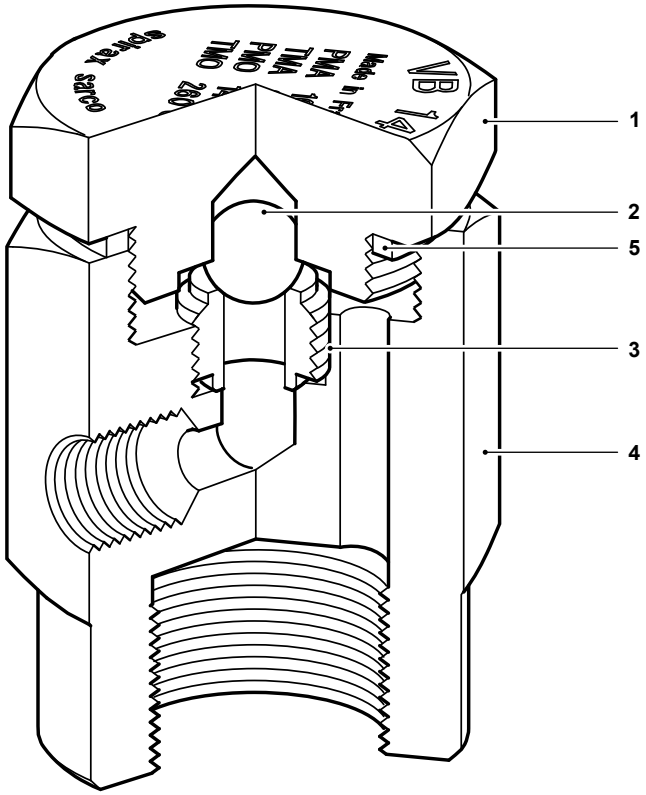
Description
The VB14 is a small purpose designed vacuum breaker for general purpose applications on condensing vapour (steam) or liquid systems.

Standards
This product fully complies with the requirements of the EU Pressure Equipment Directive/UK Pressure Equipment (Safety) Regulations.
Shut-off conforms to EN 12266-1 Rate E

Certification
This product is available with a manufacturer's Typical Test Report.
Note: All certification/inspection requirements must be stated at the time of order placement.

Materials

No.	Part	Material	
1	Cap	Brass	Cu Zn 39 Pb3
2	Valve	Stainless steel	Z 100 CD 17
3	Valve seat	Stainless steel	Z15 CN 16 02
4	Body	Brass	Cu Zn 39 Pb3
5	Gasket	Stainless steel	AISI 304



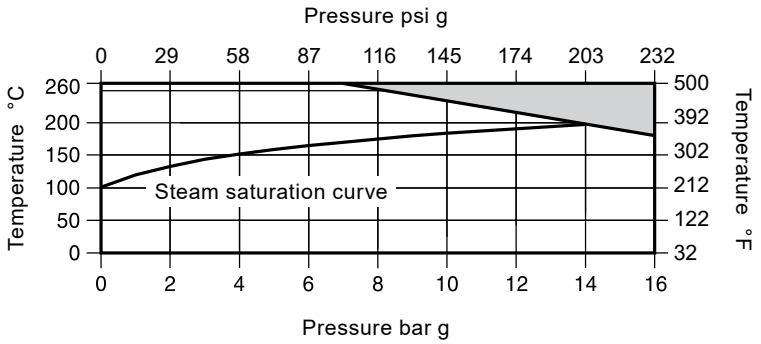
For VB21 and VB21 Food+, please go to page 4

VB14

Sizes and pipe connections

½"	(system connection)	screwed BSP or NPT.
⅛"	(air inlet connection)	screwed BSP or NPT.

Pressure/temperature limits

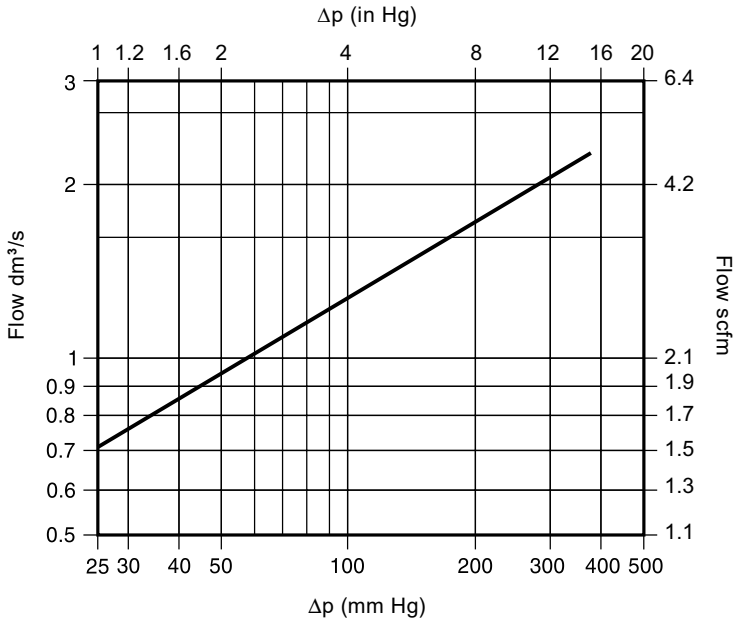


The product **must not** be used in this region.

Body design conditions			PN16
PMA	Maximum allowable pressure	16 bar g @ 180 °C	232 psi g @ 356 °F
TMA	Maximum allowable temperature	260 °C @ 7 bar g	500 °F @ 102 psi g
Minimum allowable temperature		-196 °C	-321 °F
PMO	Maximum operating pressure for saturated steam service	14 bar g	203 psi g
TMO	Maximum operating temperature	260 °C @ 7 bar g	500 °F @ 102 psi g
Minimum operating temperature **Note:** For lower operating temperatures consult Spirax Sarco		0 °C	32 °F
Designed for a maximum cold hydraulic test pressure of :		24 bar g	348 psi g

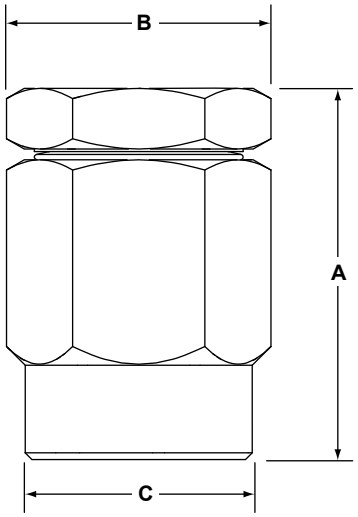
Capacity

Δp required to open vacuum breaker 4.6 mm Hg (0.2 in Hg)



VB14

Dimensions/weights (approximate) in mm (inches) and kg (lbs)



Size	A	B (A/F)	C	Kv	Weight
½"	55 (2.2)	34 (1.3)	34 (1.3)	0.52	0.35 (0.77)

Safety information, installation and maintenance

For full details see the Installation and Maintenance Instructions (IM-P019-05) supplied with the product.

Installation note

The VB14 vacuum breaker must be installed in a vertical position with the system connection at the bottom. On steam systems, the vacuum breaker should be installed at the highest point in the system where it will not be flooded with condensate.

How to order

Example: 1 off Spirax Sarco VB14 vacuum breaker having ½" screwed BSP connections.

VB21 and VB21 Food+

Description

The VB21 is a small purpose designed vacuum breaker for general purpose applications on condensing vapour (steam) or liquid systems.

VB21 Food+ ½" available with a food contact regulation Declaration of Compliance

Designed, manufactured and approved for Steam and Condensate applications, the VB21 Food+ product complies with:

- (EC)1935:2004 Materials and Articles Intended to come into Contact with Food
- (EC)2023:2006 Good Manufacturing Practice for Materials and Articles Intended to come into Contact with Food
- (EU)10/2011 Plastic Materials and Articles Intended to come into Contact with Food
- FDA Code of Federal Regulations - title 21 - Food and Drugs

This product is intended to be connected into a system that can operate a food contact compliant process.

A list of the materials that could come directly or indirectly into contact with foodstuffs can be found in the Declaration of Compliance available for this product.

Standards

This product fully complies with the requirements of the EU Pressure Equipment Directive/UK Pressure Equipment (Safety) Regulations.
Shut-off conforms to EN 12266-1 Rate E

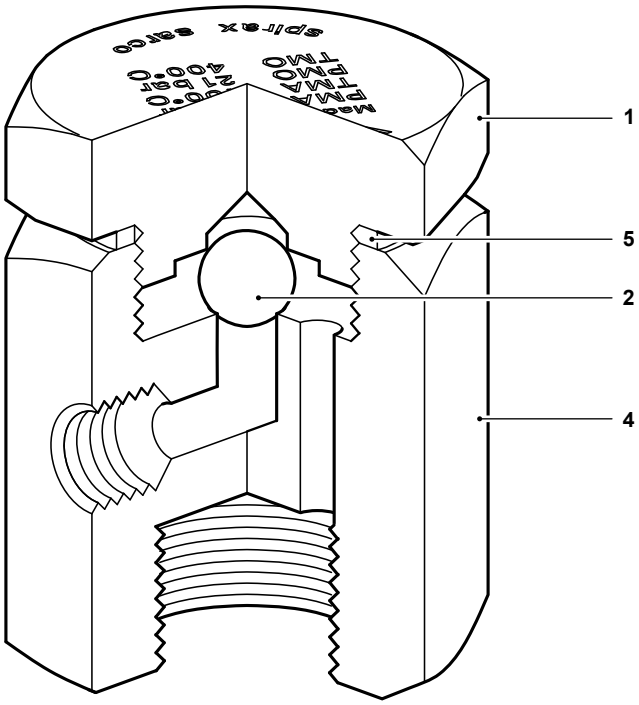
Certification

This product is available with a manufacturer's Typical Test Report.
Note: All certification/inspection requirements must be stated at the time of order placement.

Food+ can be supplied with material Certification for all wetted parts at extra cost.
Note: All certification/inspection requirements must be stated at the time of order placement.

Materials

No.	Part	Material	
1	Cap	Stainless steel	AISI 303
2	Valve	Stainless steel	AISI 440 C
4	Body	Stainless steel	AISI 303
5	Gasket	Stainless steel	AISI 304

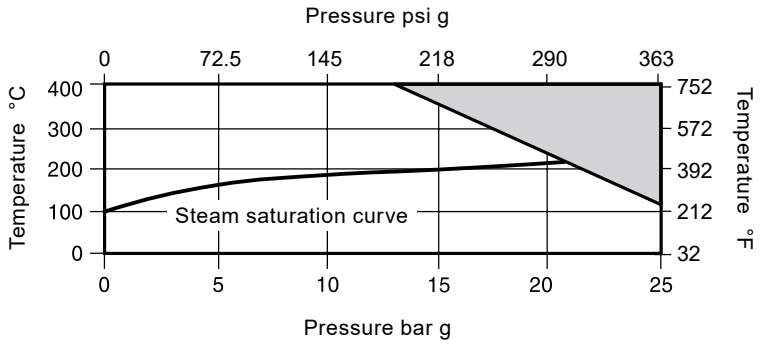


VB21 and VB21 Food+

Sizes and pipe connections

½"	(system connection)	screwed BSP or NPT.
⅛"	(air inlet connection)	screwed BSP or NPT.

Pressure/temperature limits

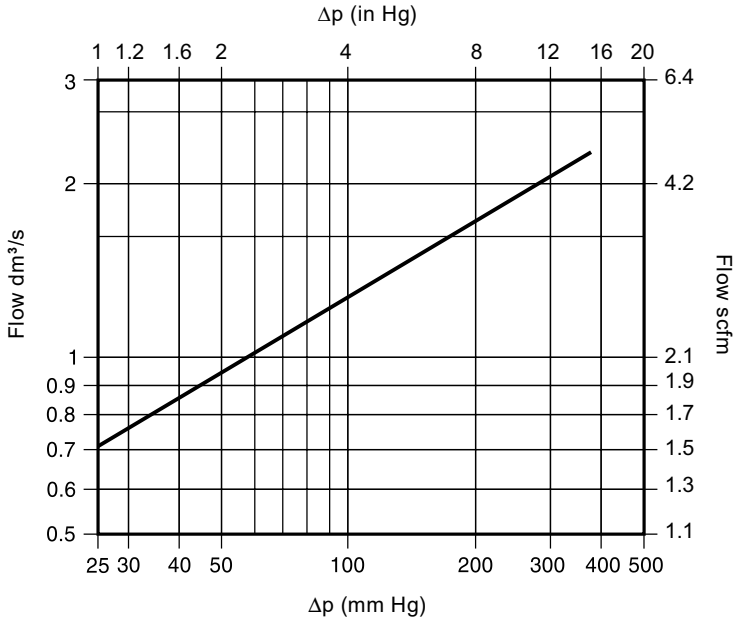


The product **must not** be used in this region.

Body design conditions			PN25
PMA	Maximum allowable pressure	25 bar g @ 120 °C	363 psi g @ 248 °F
TMA	Maximum allowable temperature	400 °C @13 bar g	752 °F @ 189 psi g
Minimum allowable temperature		-48 °C	-54.4 °F
PMO	Maximum operating pressure for saturated steam service	21 bar g	305 psi g
TMO	Maximum operating temperature	400 °C @ 13 bar g	752 °F @ 189 psi g
Minimum operating temperature		0 °C	32 °F
Note: For lower operating temperatures consult Spirax Sarco			
Designed for a maximum cold hydraulic test pressure of:		38 bar g	551 psi g

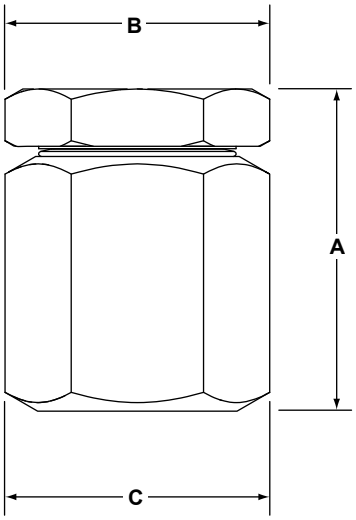
Capacity

Δp required to open vacuum breaker 4.6 mm Hg (0.2 in Hg)



VB21 and VB21 Food+

Dimensions/weights (approximate) in mm (inches) and kg (lbs)



Size	A	B (A/F)	C	Kv	Weight
½"	52 (2)	36 (1.4)	36 (1.4)	0.52	0.33 (0.73)

Safety information, installation and maintenance

For full details see the Installation and Maintenance Instructions (IM-P019-05) supplied with the product.

Installation note

The VB21 vacuum breaker must be installed in a vertical position with the system connection at the bottom. On steam systems, the vacuum breaker should be installed at the highest point in the system where it will not be flooded with condensate.

How to order

Example: 1 off Spirax Sarco VB21 vacuum breaker having ½" screwed BSP connections.

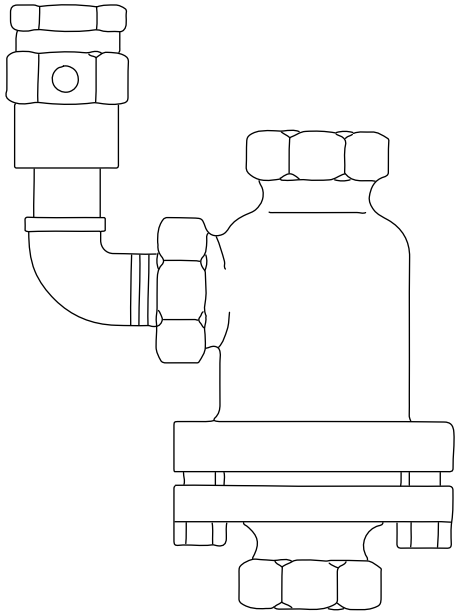
TI-S96-01-US
Issue 1

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-condensible 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 psi g (14 bar g)
Sizes	½"
Connections	NPT
Construction	Cast Iron Body with Stainless Steel Internals Brass VB-14



Typical applications

For installation at end of all steam mains and headers, on all steam equipment such as air coils, heat exhangers, autoclaves, sterilizers, platen presses, rotating cylingers, jacketed kettles, laundry equipment and reboilers.

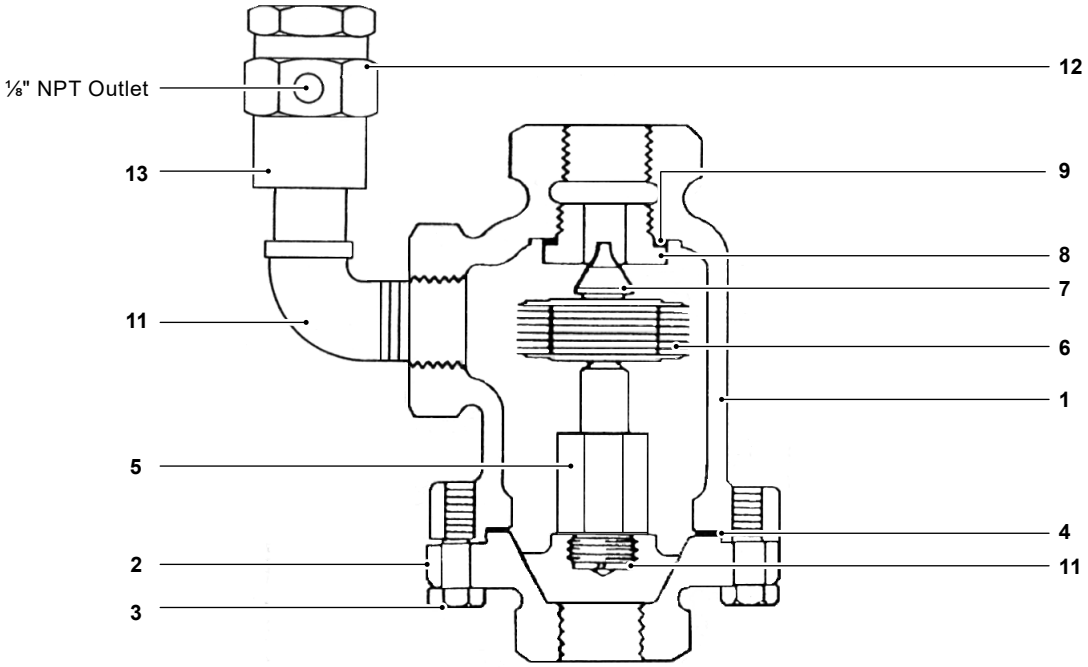
Limiting operation conditions

Maximum Operating Presure (PMO)	200 psi g	(14 bar g)
Maximum. Operating Temperature		Saturated Steam

Pressure shell design conditions

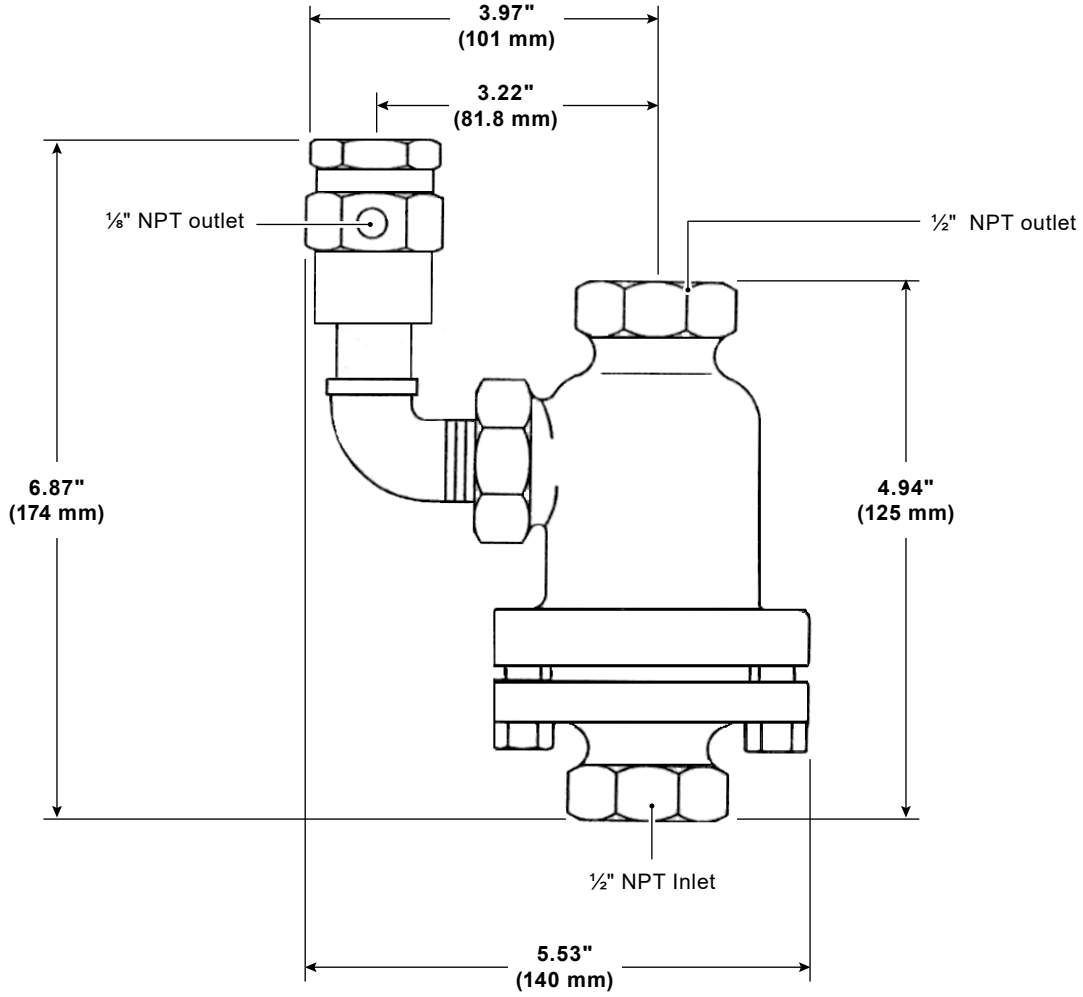
PMA	Maximum allowable pressure	200 psi g @ up to 450 °F	(14 bar g @ up to 232 °C)
TMA	Maximum allowable temperature	450 °F @ up to 200 psi g	(232 °C @ up to 14 bar g)

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	

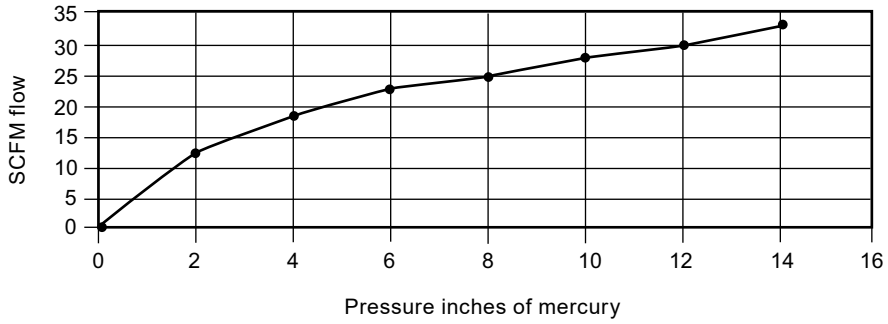
Dimensions/weights (approximate) in inches (mm)



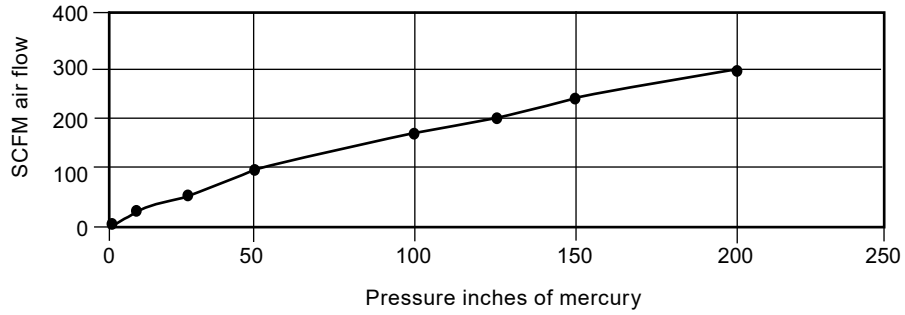
Air Capacity (discharge to atmosphere)

SCFM cubic feet per minute at standard conditions of 14.7 psi a (1.01 bar a) at 60 °F (16 °C).
For dm^3/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 surrround 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

7.1
46

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.

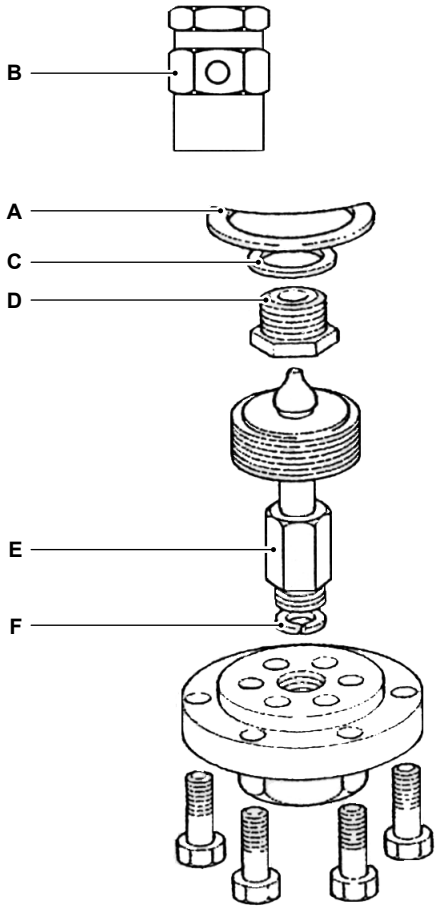
The VB-VS should be disassembled periodically for inspection and cleaning of the valve head and seat. Worn or damaged parts should be replaced.

Complete Installation and Maintenance Instructions are given in IM-4-107.

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.



TI-P029-01
CTLS Issue 12

LCV1
Bronze
Lift Check Valve

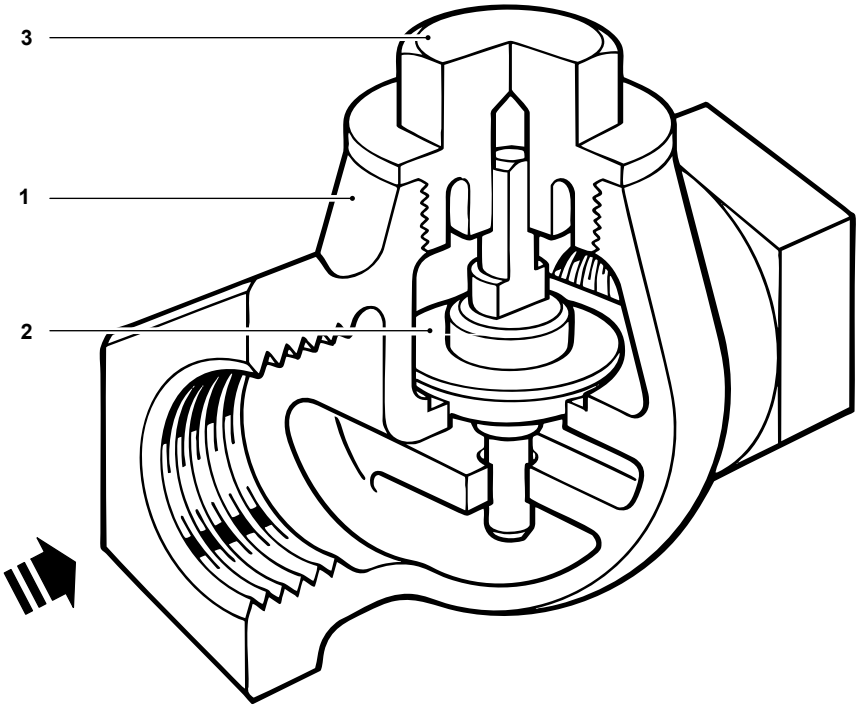
Description
The LCV1 is a bronze lift check valve which is installed in horizontal lines to prevent reverse flow.

Standards
This product fully complies with the requirements of the European Pressure Equipment Directive 2014/68/EU.

Certification
This product is available with certification to EN 10204 2.2.
Note: All certification/inspection requirements must be stated at the time of order placement.

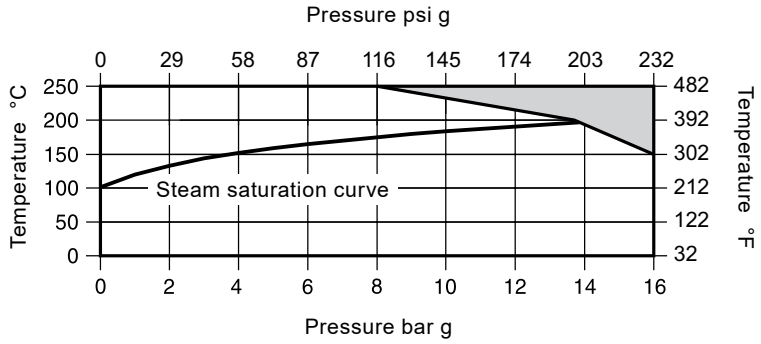
Sizes and pipe connections
½", ¾", 1", 1¼", 1½" and 2". Screwed BSP T Rp (ISO 7-1) or NPT

Materials



No.	Part	Material	
1	Body	Bronze	EN 1982 CC491K
2	Cone	Brass	BS 2874 CZ 114
3	Cap	Brass	EN 12165 CW617N

Pressure/temperature limits



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

Body design conditions			PN16
PMA	Maximum allowable pressure	16 bar g @ 180 °C	232 psi g @ 356 °F
TMA	Maximum allowable temperature	250 °C @ 8 bar g	482 °F @ 116 psi g
Minimum allowable temperature		-29 °C	-20.2 °F
PMO	Maximum operating pressure for saturated steam service	14 bar g	203 psi g
TMO	Maximum operating temperature	250 °C @ 8 bar g	482 °F @ 116 psi g
Minimum operating temperature **Note:** For lower operating temperatures consult Spirax Sarco.		0 °C	32 °F
Designed for a maximum cold hydraulic test pressure of		28 bar g	406 psi g

Kv values

Size	½"	¾"	1"	1¼"	1½"	2"
Kv	1.9	4.3	8.5	11.9	18.8	30.8

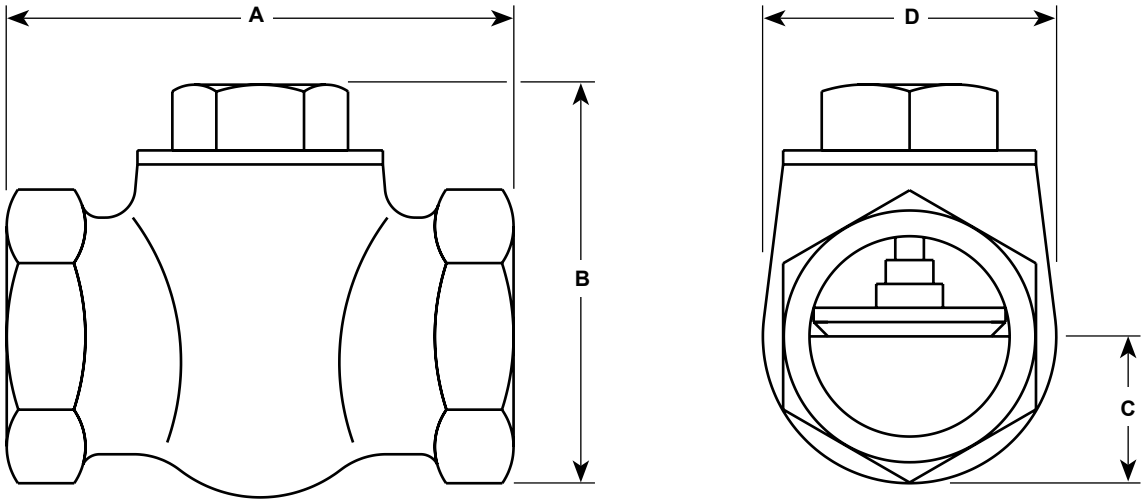
For conversion:
Cv (UK) = Kv x 0.963
Cv (US) = Kv x 1.156

Opening pressures in mbar (psi g)

→ Flow pressures

Size	½"	¾"	1"	1¼"	1½	2"
→	6.2 (0.090)	7.4 (0.107)	6.5 (0.094)	7.1 (0.103)	7.1 (0.103)	6.9 (0.10)

Dimensions/weights (approximate) in mm (inches) and kg (lbs)



Size	A	B	C	D	Weight
½"	52 (2.0)	46 (1.8)	18 (0.71)	36 (1.4)	0.2 (0.44)
¾"	71 (2.8)	58 (2.3)	20 (0.79)	41 (1.6)	0.5 (1.1)
1"	86 (3.4)	71 (2.8)	28 (1.1)	56 (2.2)	0.8 (1.8)
1¼"	108 (4.3)				
1½"	106 (4.2)	91 (3.6)	36 (1.4)	71 (2.8)	1.9 (4.2)
2"	131 (5.2)	104 (4.1)	43 (1.7)	86 (3.4)	2.7 (6.0)

Safety information, installation and maintenance

For full details see the Installation and Maintenance Instructions (IM-P029-06) supplied with the product.

Installation note:

Always install the LCV1 horizontally with the flow in the direction indicated on the body.

Disposal

This 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 this product.

How to order

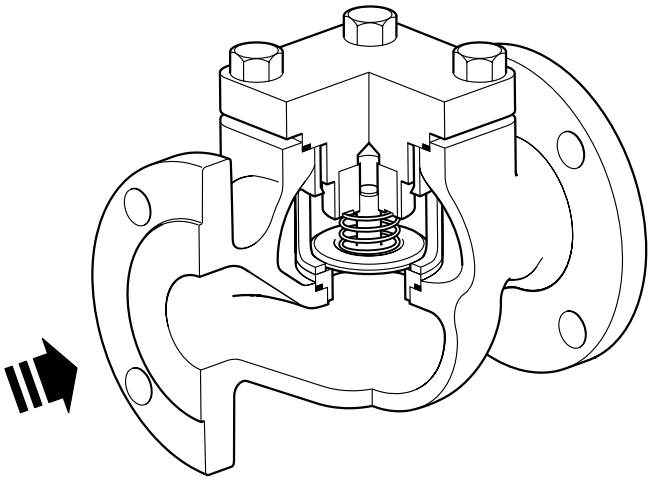
Example: 1 off Spirax Sarco 1¼" LCV1 lift check valve having screwed BSP connections.

TI-P029-16
CMGT Issue 9

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 the installations. The design of these valves allows them to be easily serviced without removing the valve from the pipeline - See Spare parts, page 8.



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 A2-80).

Standards

These products fully comply with the requirements of the EU Pressure Equipment Directive/UK Pressure Equipment (Safety) Regulations 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.

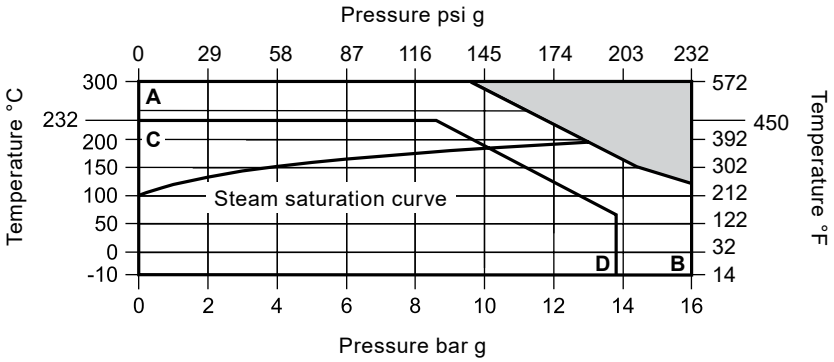
Certification

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	ASME 125	BSP NPT	PN40 JIS/KS 20	ASME 150 ASME 300	NPT SW	PN40 JIS/KS20	ASME 150 ASME 300	BSP NPT SW	PN16 PN25 JIS/KS10	ASME 125 ASME 250	BSP NPT
DN15	½"	•		•	•	•	•	•	•	•	•		•
DN20	¾"	•		•	•	•	•	•	•	•	•		•
DN25	1"	•	•	•	•	•	•	•	•	•	•	•	•
DN32	1¼"	•		•	•		•	•		•	•		•
DN40	1½"	•	•	•	•	•	•	•	•	•	•	•	•
DN50	2"	•	•	•	•	•	•	•	•	•	•	•	•
DN65	2½"	•	•		•	•		•	•		•	•	
DN80	3"	•	•		•	•		•	•		•	•	
DN100	4"	•	•		•	•		•	•		•	•	

LCV3 pressure/temperature limits



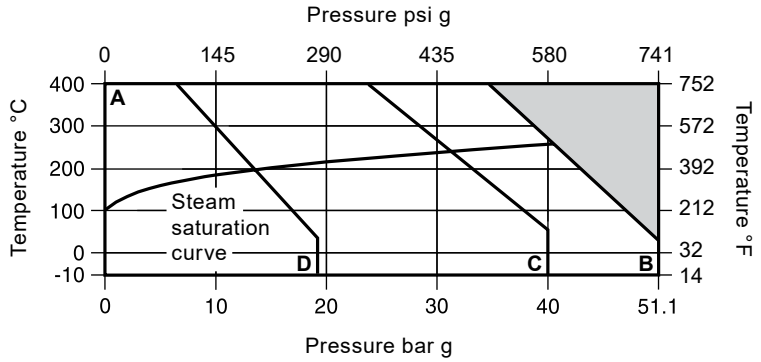
The product **must not** be used in this region.

A - B Screwed BSP and flanged EN 1092 PN16.

C - D Screwed NPT, socket weld and flanged ASME 125.

Screwed and Flanged EN 1092 PN16	Body design conditions			PN16
	PMA	Maximum allowable pressure	16 bar g @ 120 °C	232 psi g @ 248 °F
	TMA	Maximum allowable temperature	300 °C @ 9.6 bar g	572 °F @ 139 psi g
	Minimum allowable temperature		-10 °C	14 °F
	PMO	Maximum operating pressure for saturated steam service	13 bar g	189 psi g
	TMO	Maximum operating temperature	300 °C @ 9.6 bar g	572 °F @ 139 psi g
	Minimum operating temperature **Note:** For lower operating temperatures consult Spirax Sarco.		-10 °C	14 °F
	Designed for a maximum cold hydraulic test pressure of:		24 bar g	348 psi g
Flanged ASME 125	Body design conditions			ASME 125
	PMA	Maximum allowable pressure	13.8 bar g @ 65 °C	200 psi g @ 149 °F
	TMA	Maximum allowable temperature	232 °C @ 8.6 bar g	450 °F @ 125 psi g
	Minimum allowable temperature		-10 °C	14 °F
	PMO	Maximum operating pressure for saturated steam service	10 bar g	145 psi g
	TMO	Maximum operating temperature	232 °C @ 8.6 bar g	450 °F @ 125 psi g
	Minimum operating temperature **Note:** For lower operating temperatures consult Spirax Sarco.		-10 °C	14 °F
	Designed for a maximum cold hydraulic test pressure of:		20.5 bar g	297 psi g

LCV4 pressure/temperature limits



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

A - B Screwed NPT, socket weld and flanged ASME 300.

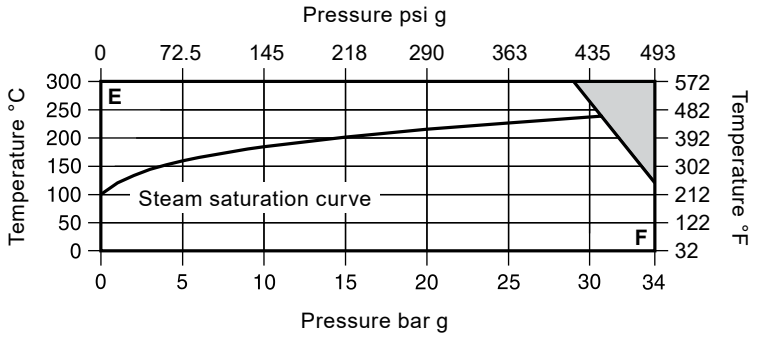
A - C Flanged EN 1092 PN40.

A - D Flanged ASME 150.

Flanged JIS/KS 20 shown on next page

Flanged EN 1092 PN40	Body design conditions			PN40
	PMA	Maximum allowable pressure	40 bar g @ 50 °C	580 psi g @ 122 °F
	TMA	Maximum allowable temperature	300 °C @ 27.6 bar g	572 °F @ 400 psi g
		Maximum allowable temperature with high temperature bolting	400 °C @ 23.8 bar g	752 °F @ 345 psi g
	Minimum allowable temperature		-10 °C	14 °F
	PMO	Maximum operating pressure for saturated steam service	31.1 bar g	451 psi g
	TMO	Maximum operating temperature	300 °C @ 27.6 bar g	572 °F @ 400 psi g
		Maximum operating temperature with high temperature bolting	400 °C @ 23.8 bar g	752 °F @ 345 psi g
	Minimum operating temperature **Note:**For lower operating temperatures consult Spirax Sarco.		-10 °C	14 °F
	Designed for a maximum cold hydraulic test pressure of:		60 bar g	870 psi g
Flanged ASME 150	Body design conditions			ASME 150
	PMA	Maximum allowable pressure	19.3 bar g @ 38 °C	280 psi g @ 100 °F
	TMA	Maximum allowable temperature	300 °C @ 10.2 bar g	572 °F @ 148 psi g
		Maximum allowable temperature with high temperature bolting	400 °C @ 6.5 bar g	752 °F @ 94.3 psi g
	Minimum allowable temperature		-10 °C	14 °F
	PMO	Maximum operating pressure for saturated steam service	13.9 bar g	202 psi g
	TMO	Maximum operating temperature	300 °C @ 10.2 bar g	572 °F @ 148 psi g
		Maximum operating temperature with high temperature bolting	400 °C @ 6.5 bar g	752 °F @ 94.3 psi g
	Minimum operating temperature **Note:**For lower operating temperatures consult Spirax Sarco.		-10 °C	14 °F
	Designed for a maximum cold hydraulic test pressure of:		30 bar g	435 psi g
Screwed NPT Socket weld and Flanged ASME 300	Body design conditions			ASME 300
	PMA	Maximum allowable pressure	51.1 bar g @ 38 °C	741 psi g @ 100 °F
	TMA	Maximum allowable temperature	300 °C @ 39.8 bar g	572 °F @ 577 psi g
		Maximum allowable temperature with high temperature bolting	400 °C @ 34.7 bar g	752 °F @ 503 psi g
	Minimum allowable temperature		-10 °C	14 °F
	PMO	Maximum operating pressure for saturated steam service	41.8 bar g	606 psi g
	TMO	Maximum operating temperature	300 °C @ 39.8 bar g	572 °F @ 577 psi g
		Maximum operating temperature with high temperature bolting	400 °C @ 34.7 bar g	752 °F @ 503 psi g
	Minimum operating temperature **Note:** For lower operating temperatures consult Spirax Sarco.		-10 °C	14 °F
	Designed for a maximum cold hydraulic test pressure of:		77 bar g	1117 psi g

LCV4 pressure/temperature limits (continued)

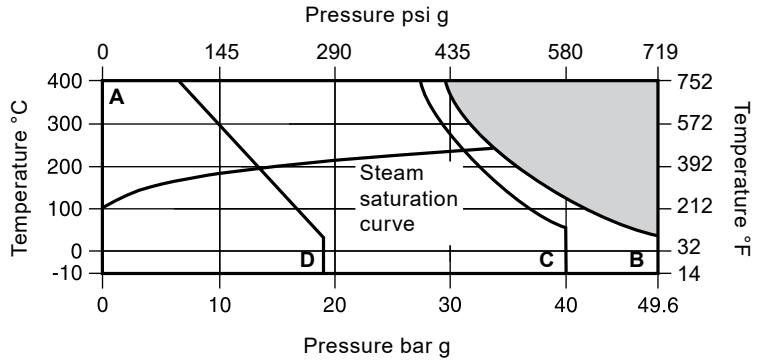


The product **must not** be used in this region.

E - F Flanged JIS/KS 20.

Flanged JIS/KS 20	Body design conditions			JIS/KS 20
	PMA	Maximum allowable pressure	34 bar g @ 120 °C	493 psi g @ 248 °F
	TMA	Maximum allowable temperature	300 °C @ 32 bar g	572 °F @ 464 psi g
		Minimum allowable temperature	0 °C	32 °F
	PMO	Maximum operating pressure for saturated steam service	30 bar g	435 psi g
	TMO	Maximum operating temperature	300 °C @ 32 bar g	572 °F @ 464 psi g
	Minimum operating temperature **Note:** For lower operating temperatures consult Spirax Sarco.		0 °C	32 °F
	Designed for a maximum cold hydraulic test pressure of:		51 bar g	740 psi g

LCV6 pressure/temperature limits



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

A - B Screwed NPT, socket weld and flanged ASME 300.

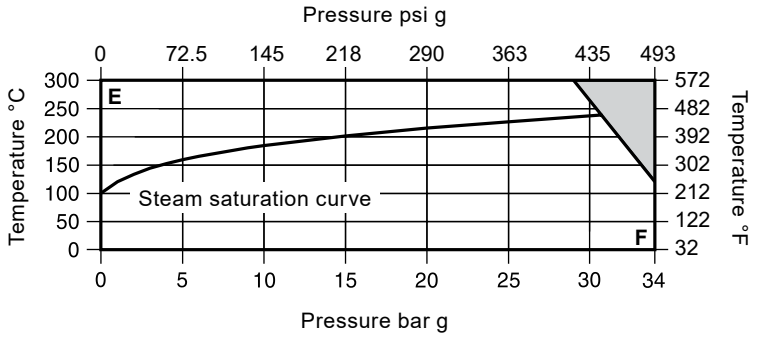
A - C Screwed BSP and flanged EN 1092 PN40.

A - D Flanged ASME 150.

Flanged JIS/KS 10 shown on next page

Screwed BSP and Flanged EN 1092 PN40	Body design conditions			PN40
	PMA	Maximum allowable pressure	40 bar g @ 50 °C	580 psi g @ 122 °F
	TMA	Maximum allowable temperature	400 °C @ 27.4 bar g	752 °F @ 397 psi g
	Minimum allowable temperature		-10 °C	14 °F
	PMO	Maximum operating pressure for saturated steam service	32.3 bar g	468 psi g
	TMO	Maximum operating temperature	400 °C @ 27.4 bar g	752 °F @ 397 psi g
	Minimum operating temperature **Note:**For lower operating temperatures consult Spirax Sarco.		-10 °C	14 °F
	Designed for a maximum cold hydraulic test pressure of:		60 bar g	870 psi g
Screwed NPT Socket weld and Flanged ASME 300	Body design conditions			ASME 300
	PMA	Maximum allowable pressure	49.6 bar g @ 38 °C	719 psi g @ 100 °F
	TMA	Maximum allowable temperature	400 °C @ 29.4 bar g	752 °F @ 426 psi g
	Minimum allowable temperature		-10 °C	14 °F
	PMO	Maximum operating pressure for saturated steam service	34 bar g	493 psi g
	TMO	Maximum operating temperature	400 °C @ 29.4 bar g	752 °F @ 426 psi g
	Minimum operating temperature **Note:** For lower operating temperatures consult Spirax Sarco.		-10 °C	14 °F
	Designed for a maximum cold hydraulic test pressure of:		76 bar g	1102 psi g
Flanged ASME 150	Body design conditions			ASME 150
	PMA	Maximum allowable pressure	19 bar g @ 38 °C	276 psi g @ 100 °F
	TMA	Maximum allowable temperature	400 °C @ 6.5 bar g	752 °F @ 94.3 psi g
	Minimum allowable temperature		-10 °C	14 °F
	PMO	Maximum operating pressure for saturated steam service	13.8 bar g	200 psi g
	TMO	Maximum operating temperature	400 °C @ 6.5 bar g	752 °F @ 94.3 psi g
	Minimum operating temperature **Note:** For lower operating temperatures consult Spirax Sarco.		-10 °C	14 °F
	Designed for a maximum cold hydraulic test pressure of:		30 bar g	435 psi g

LCV6 pressure/temperature limits (continued)

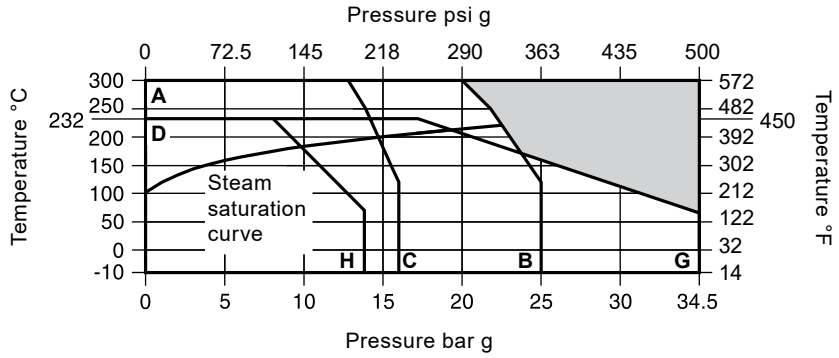


The product **must not** be used in this region.

E - F Flanged JIS/KS 20.

Flanged JIS/KS 20	Body design conditions			JIS/KS 20
	PMA	Maximum allowable pressure	34 bar g @ 120 °C	493 psi g @ 248 °F
	TMA	Maximum allowable temperature	300 °C @ 32 bar g	572 °F @ 464 psi g
	Minimum allowable temperature		0 °C	32 °F
	PMO	Maximum operating pressure for saturated steam service	23.5 bar g	341 psi g
	TMO	Maximum operating temperature	300 °C @ 32 bar g	572 °F @ 464 psi g
	Minimum operating temperature **Note:** For lower operating temperatures consult Spirax Sarco.		0 °C	32 °F
	Designed for a maximum cold hydraulic test pressure of:		51 bar g	740 psi g

LCV7 pressure/temperature limits



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.

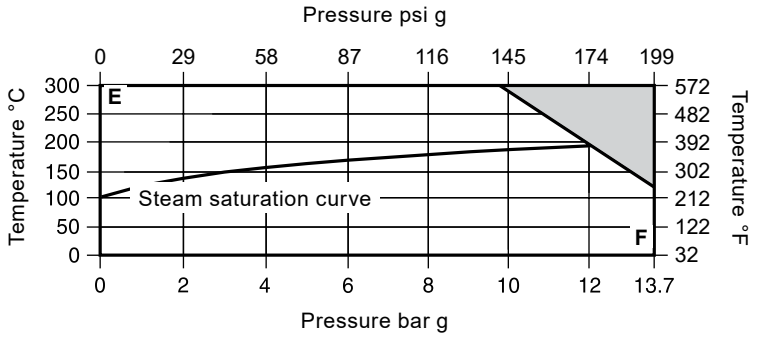
D - G Flanged ASME 250.

D - H Flanged ASME 125.

Flanged JIS/KS 10 shown on next page

Flanged EN 1092 PN16	Body design conditions			PN16
	PMA	Maximum allowable pressure	16 bar g @ 120 °C	232 psi g @ 248 °F
	TMA	Maximum allowable temperature	300 °C @ 12.8 bar g	572 °F @ 186 psi g
	Minimum allowable temperature		-10 °C	14 °F
	PMO	Maximum operating pressure for saturated steam service	14.7 bar g	213 psi g
	TMO	Maximum operating temperature	300 °C @ 12.8 bar g	572 °F @ 186 psi g
	Minimum operating temperature **Note:** For lower operating temperatures consult Spirax Sarco.		-10 °C	14 °F
	Designed for a maximum cold hydraulic test pressure of:		24 bar g	348 psi g
Screwed BSP and Flanged EN 1092 PN25	Body design conditions			PN25
	PMA	Maximum allowable pressure	25 bar g @ 120 °C	363 psi g @ 248 °F
	TMA	Maximum allowable temperature	300 °C @ 20 bar g	572 °F @ 290 psi g
	Minimum allowable temperature		-10 °C	14 °F
	PMO	Maximum operating pressure for saturated steam service	22.5 bar g	326 psi g
	TMO	Maximum operating temperature	300 °C @ 20 bar g	572 °F @ 290 psi g
	Minimum operating temperature **Note:** For lower operating temperatures consult Spirax Sarco.		-10 °C	14 °F
	Designed for a maximum cold hydraulic test pressure of:		38 bar g	551 psi g
Flanged ASME 125	Body design conditions			ASME 125
	PMA	Maximum allowable pressure	13.8 bar g @ 65 °C	200 psi g @ 149 °F
	TMA	Maximum allowable temperature	232 °C @ 8.6 bar g	450 °F @ 125 psi g
	Minimum allowable temperature		-10 °C	14 °F
	PMO	Maximum operating pressure for saturated steam service	10 bar g	145 psi g
	TMO	Maximum operating temperature	232 °C @ 8.6 bar g	450 °F @ 125 psi g
	Minimum operating temperature Note: For lower operating temperatures consult Spirax Sarco.		-10 °C	14 °F
	Designed for a maximum cold hydraulic test pressure of:		20.5 bar g	297 psi g
Screwed NPT and Flanged ASME 250	Body design conditions			ASME 250
	PMA	Maximum allowable pressure	34.5 bar g @ 65 °C	500 psi g @ 149 °F
	TMA	Maximum allowable temperature	232 °C @ 17.2 bar g	450 °F @ 249 psi g
	Minimum allowable temperature		-10 °C	14 °F
	PMO	Maximum operating pressure for saturated steam service	19.4 bar g	281 psi g
	TMO	Maximum operating temperature	232 °C @ 17.2 bar g	450 °F @ 249 psi g
	Minimum operating temperature **Note:** For lower operating temperatures consult Spirax Sarco.		-10 °C	14 °F
	Designed for a maximum cold hydraulic test pressure of:		52 bar g	754 psi g

LCV7 pressure/temperature limits (continued)

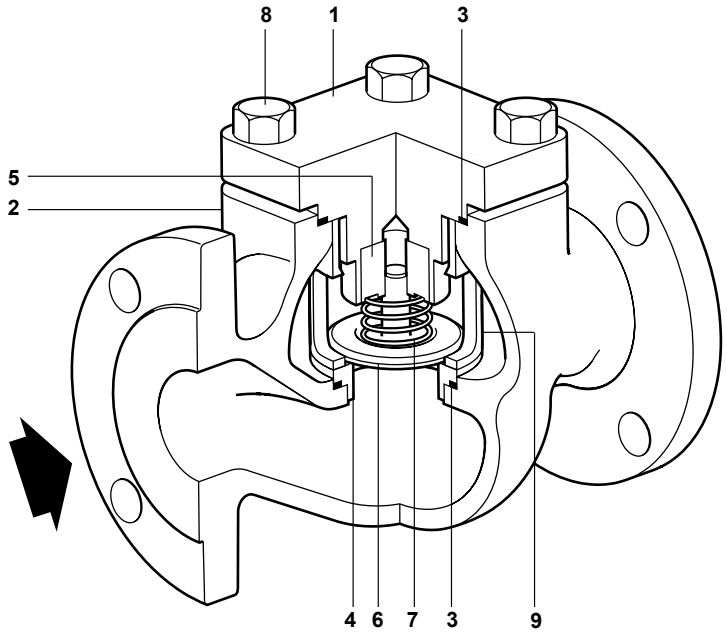


The product **must not** be used in this region.

E - F Flanged JIS/KS 10.

Flanged JIS/KS 10	Body design conditions			JIS/KS 10
	PMA	Maximum allowable pressure	13.7 bar g @ 120 °C	199 psi g @ 248 °F
	TMA	Maximum allowable temperature	300 °C @ 9.8 bar g	572 °F @ 142 psi g
	Minimum allowable temperature		0 °C	32 °F
	PMO	Maximum operating pressure for saturated steam service	12.3 bar g	178 psi g
	TMO	Maximum operating temperature	300 °C @ 9.8 bar g	572 °F @ 142 psi g
	Minimum operating temperature **Note:** For lower operating temperatures consult Spirax Sarco.		0 °C	32 °F
	Designed for a maximum cold hydraulic test pressure of:		20 bar g	290 psi g

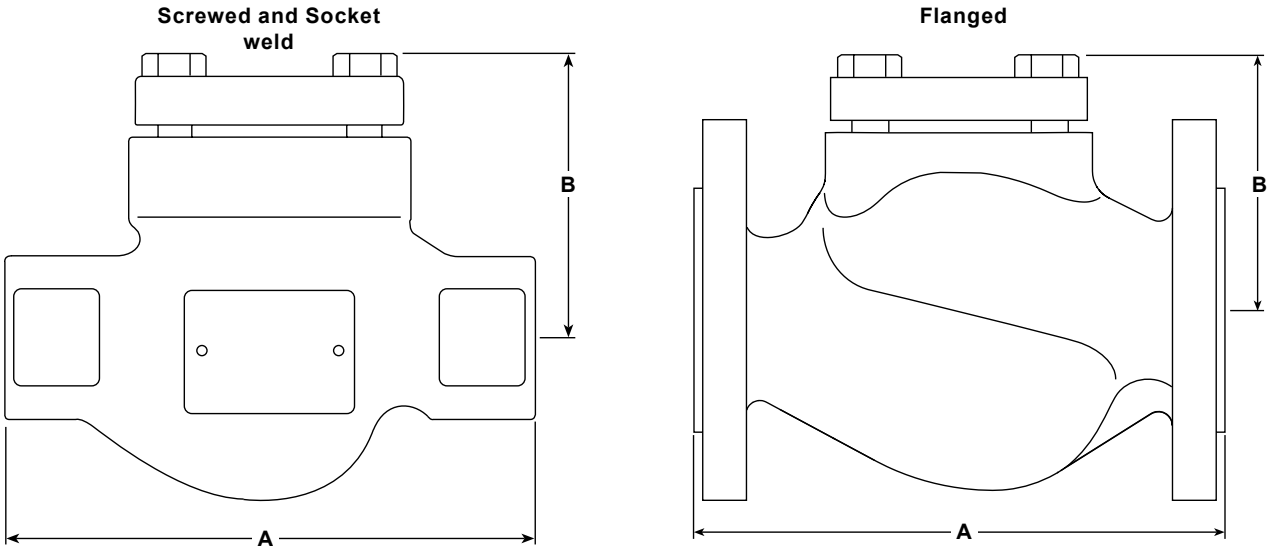
Materials



No.	Part			Material	Standard	
					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	ASTM A126 Class B
		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	A2-80	A2-80
		LCV7		Cast steel	Grade 8.8	Grade 8.8
9	Seat retainer			Stainless steel	316L	316L

Dimensions (approximate) in mm (inches)

Please note: Flanged ASME versions are (approximate) in inches



Dimension	Connection	Screwed BSP		Flanged PN40 PN16 PN25 JIS 10/KS 10 JIS 20/KS 20		Screwed NPT Socket weld		Flanged ASME 125 LCV3		Flanged ASME 125 LCV7		Flanged ASME 150		Flanged ASME 250 ASME 300	
		mm	inches	mm	inches	inches	mm	inches	mm			inches	mm	inches	mm
A	DN15 ½"	130	5.12	130	5.12	6½"	165	7¼"	184			7¼"	184	7½"	191
	DN20 ¾"	155	6.10	150	5.91										
	DN25 1"	160	6.30	160	6.30	7¾"	197			7¼"	184			7¾"	197
	DN32 1¼"	185	7.28	180	7.09	8½"	216								
	DN40 1½"	205	8.07	200	7.87	9¼"	235	8¾"	222	8¾"	222	8¾"	222	9¼"	235
	DN50 2"	230	9.06	230	9.06	10½"	267	10"	254	10"	254	10"	254	10½"	267
	DN65 2½"			290				10½"	267	10½"	267	10⅞"	276	11½"	292
	DN80 3"			310				11¾"	298	11¾"	298	11¾"	298	12½"	318
	DN100 4"			350				13¾"	349	13¾"	349	13⅞"	352	14½"	368
B	DN15 ½"	88	3.46	88	3.46	4"	102	4"	102	4"	102	4"	102	4"	102
	DN20 ¾"														
	DN25 1"														
	DN32 1¼"	117	4.61	117	4.61	5⅜16"	132								
	DN40 1½"							5⅜16"	132	5⅜16"	132	5⅜16"	132	5⅜16"	132
	DN50 2"														
	DN65 2½"			166	6.54			7⅞"	200	7⅞"	200	7⅞"	200	7⅞"	200
	DN80 3"														
	DN100 4"			180	7.09			8½"	216	8½"	216	8½"	216	8½"	216

Weights (approximate) in kg and lbs

Unit		LCV3				LCV4			
		Flanged		Screwed		Flanged		Screwed / Socket weld	
		kg	lbs	kg	lbs	kg	lbs	kg	lbs
DN15	½"	4.30	9.48 lb	3.10	6.83 lb	5.05	11.1 lb	3.65	8.05 lb
DN20	¾"	5.50	12.1 lb	4.10	9.04 lb	6.43	14.2 lb	5.33	11.8 lb
DN25	1"	5.82	12.8 lb	4.10	9.04 lb	6.58	14.5 lb	4.18	9.22 lb
DN32	1¼"	10.23	22.6 lb	7.20	15.9 lb	12.89	28.4 lb	9.59	21.1 lb
DN40	1½"	11.43	25.2 lb	8.00	17.6 lb	14.35	31.6 lb	9.55	21.1 lb
DN50	2"	14.96	33.0 lb	10.50	23.1 lb	16.86	37.2 lb	12.06	26.6 lb
DN65	2½"	27.04	59.6 lb			32.25	71.1 lb		
DN80	3"	29.47	65.0 lb			36.02	79.4 lb		
DN100	4"	48.93	108 lb			52.06	115 lb		

Unit		LCV6				LCV7			
		Flanged		Screwed / Socket weld		Flanged		Screwed	
		kg	lbs	kg	lbs	kg	lbs	kg	lbs
DN15	½"	5.19	11.4	3.79	8.36	4.64	10.2	3.24	7.14
DN20	¾"	6.60	14.6	5.50	12.1	5.89	13.0	4.29	9.46
DN25	1"	6.77	14.9	4.37	9.63	6.04	13.3	3.74	8.25
DN32	1¼"	13.37	29.5	10.07	22.2	11.99	26.4	8.69	19.2
DN40	1½"	14.77	32.6	9.97	22.0	13.18	29.1	9.28	20.5
DN50	2"	17.51	38.6	12.71	28.0	15.65	34.5	10.65	23.5
DN65	2½"	33.13	73.0			29.53	65.1		
DN80	3"	37.00	81.6			33.00	72.8		
DN100	4"	53.47	118			48.82	108		

Capacities

Capacity	DN15 ½"	DN20 ¾"	DN25 1"	DN32 1¼"	DN40 1½"	DN50 2"	DN65 2½"	DN80 3"	DN100 4"
Kv	5	8.3	11	18	34	42	87	113	135

For conversion:
Cv (UK) = Kv x 0.963
Cv (US) = Kv x 1.156

Opening pressures in mbar (mpsi)

Differential pressures with zero flow

Flow direction	DN15 to DN25 ½" to 1"	DN32 to DN50 1¼" to 2"	DN65 to DN100 2½" to 4"
Horizontal	22.5 (0.33 psi)	24.5 (0.36 psi)	25.5 (0.37 psi)
Vertical	20 (0.37 psi)	20 (0.37 psi)	20 (0.37 psi)

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 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

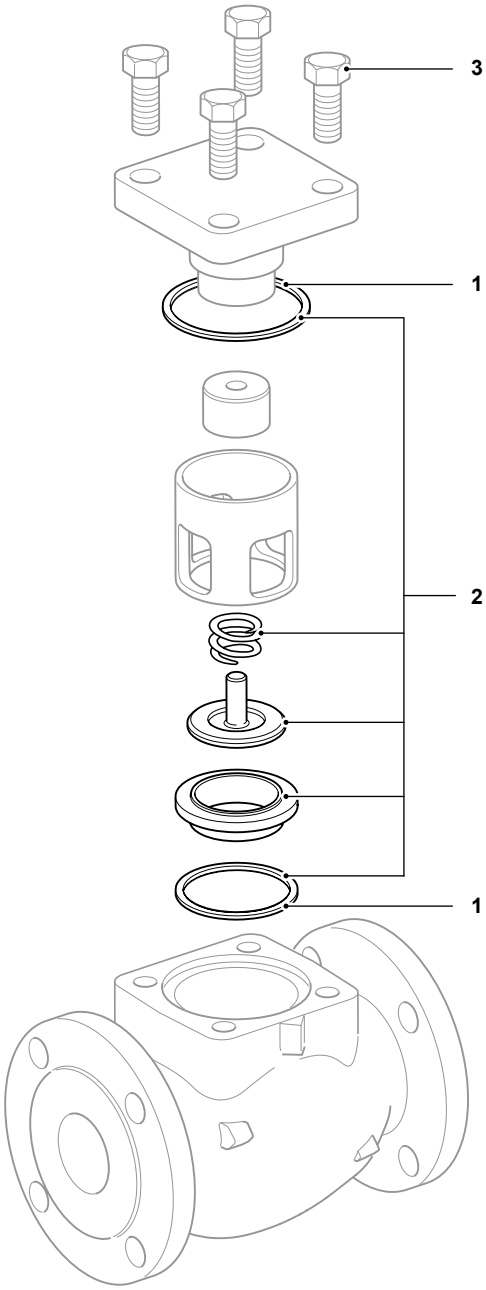
The spare parts available are shown in solid outline. Parts drawn in a grey line are not supplied as spares.

Available spares

LCV Gaskets kit (Cover gasket and seat gasket)	**Spare 1**
LCV Internals kit (Cover gasket, seat gasket, spring, disc and seat)	**Spare 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. 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		EN	ASME	EN	ASME	N m	lbf ft
3	DN15 to DN25 (½" to 1")	LCV3	17 A/F	⅞" A/F	LCV3 M10	½" - 13 UNC	40 - 50	30 - 37
		Others	19 A/F		Others M12			
	DN32 to DN50 (1¼" to 2")	LCV3	19 A/F	1 1/16" A/F	LCV3 M12	⅝" - 11 UNC	80 - 90	59 - 66
		Others	24 A/F		Others M16			
	DN65 to DN80 (2½" to 3")		24 A/F	1¼" A/F	M16	¾" - 9 UNC	90 - 100	66 - 74
	DN100 (4")		24 A/F	1 1/16" A/F	M16	⅝" - 11 UNC	70 - 80	52 - 66

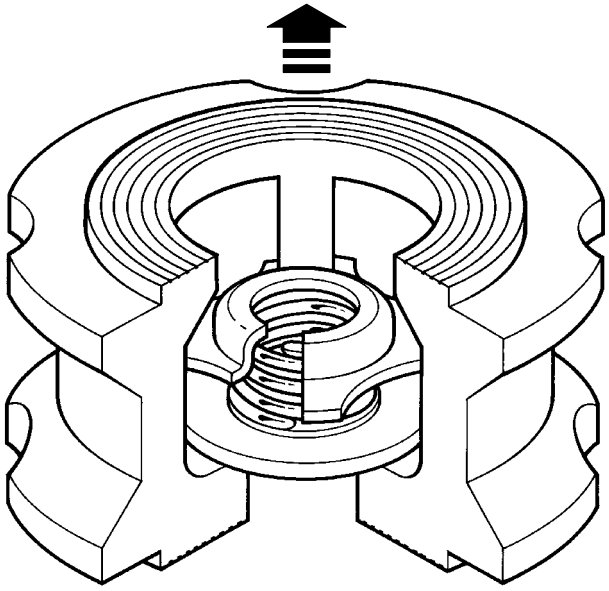
TI-P134-04
CMGT Issue 16

DCV4
Disc Check Valve

Description
The DCV4 stainless steel disc check valve is of the wafer pattern designed to be sandwiched between ASME flanges. It is suitable for use on a wide range of fluids for applications in process lines, hot water systems, steam and condensate systems etc.

Face-to-face dimensions conform to EN 558 part 2, series 52.

As standard it will be supplied with a metal-to-metal seat for use on steam applications. Where it will be used on oil, air, gas and water applications, alternative seat material is available - see 'Optional extras'.



Optional extras
High temperature springs for temperatures up to 400 °C (752 °F).

Viton soft seats for oils, air and gas applications.

EPM soft seats for water applications.

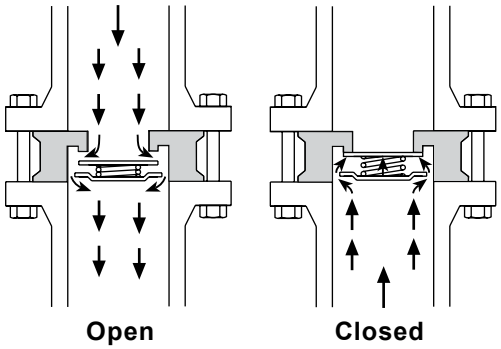
Standards
This product fully complies with the requirements of the European Pressure Equipment Directive 2014/68/EU.

Standard shut-off
Standard valves conform to EN 12266-1 rate E.
Valves conforming to EN 12266-1 rate D are available on request.
Soft seated versions meet EN 12266-1 rate A, providing a differential pressure exists.

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.

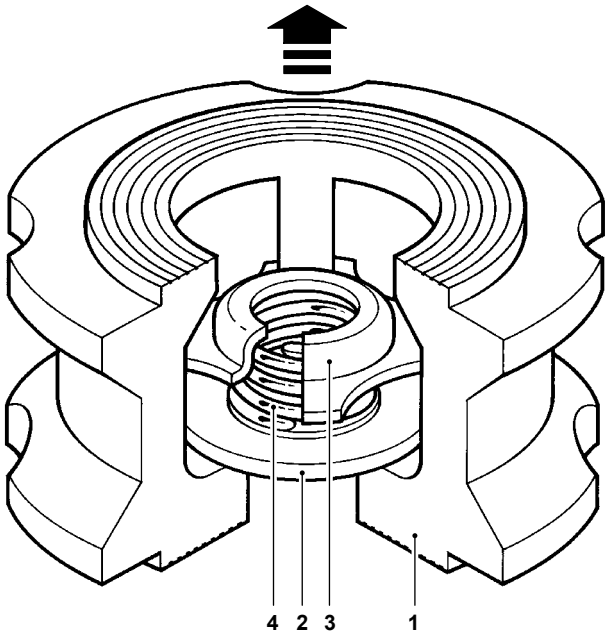
Sizes and pipe connections
DN15, DN20, DN25, DN40, DN50, DN80 and DN100
(½", ¾", 1", 1½", 2", 3", and 4")
Suitable for installation between ASME 150 or ASME 300 flanges.

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.

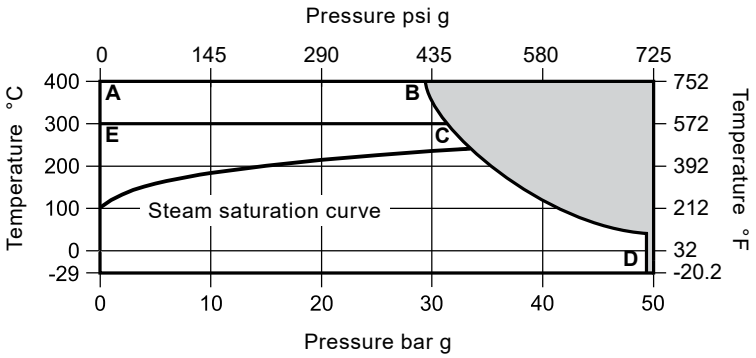


Materials

No.	Part	Material	
1	Body	Austenitic stainless steel	ASTM A351 CF3M
2	Disc	Austenitic stainless steel	ASTM A276 316
3	Spring retainer	Austenitic stainless steel	BS 1449 316 S11
4	Standard spring	Austenitic stainless steel	BS 2056 316 S42
	High temperature spring	Nickel alloy	Nimonic 90



Pressure/temperature limits



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

A-B-D High temperature spring and without spring.

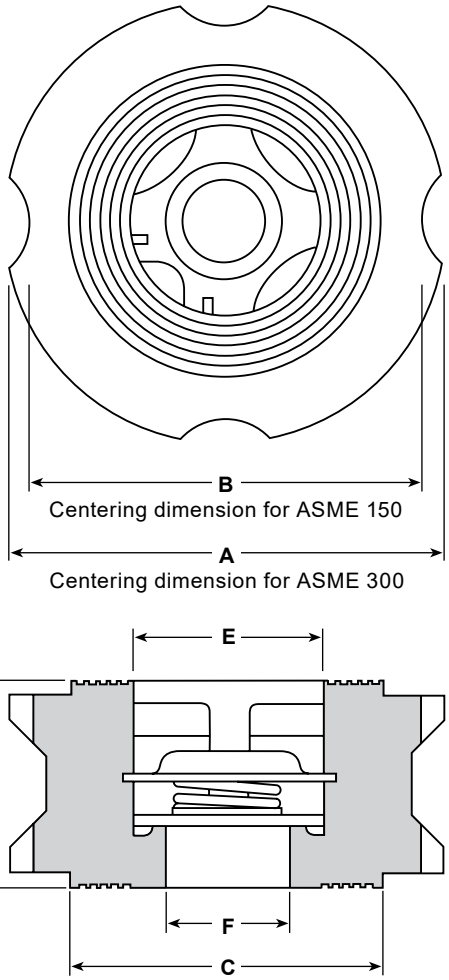
E-C-D Standard spring.

Please note: The figures displayed are only relevant when a metal-to-metal seat is used. If Viton or EPDM seats are used the product is restricted to the limits of the seat material chosen.

7.2
18

Body design conditions for saturated steam service				ASME 300
PMA	Maximum allowable pressure		49 bar g @ 37 °C	711 psi g @ 98.6 °F
TMA	Maximum allowable temperature		400 °C @ 29 bar g	752 °F @ 421 psi g
Minimum allowable temperature			-29 °C	-20.2 °F
PMO	Maximum operating pressure for saturated steam service		34 bar g @ 243 °C	493 psi g @ 469 °F
TMO	Maximum operating temperature	Standard spring	300 °C @ 31.5 bar g	572 °F @ 457 psi g
		High temperature spring Without spring	400 °C @ 29 bar g	752 °F @ 421 psi g
Minimum operating temperature **Note:** For lower operating temperatures consult Spirax Sarco			-29 °C	-20.2 °F
Temperature limits		Viton seat	-25 °C to +205 °C	-13 °F to +401 °F
		EPDM seat	-40 °C to +120 °C	-40 °F to +248 °F
Product is safe for use under full vacuum conditions				
Designed for a maximum cold hydraulic test pressure of			76 bar g	1102 psi g

Dimensions/weights (approximate) in mm and kg



	ASME 300	ASME 150					
Size	**A**	**B**	**C**	**D**	**E**	**F**	**Weight**
DN15	54 (2.13)	47 (1.85)	38 (1.50)	25 (0.98)	22.35 (0.88)	15 (0.59)	0.24 (0.53)
DN20	67 (2.64)	57 (2.24)	46 (1.81)	31 (1.22)	27.35 (1.08)	20 (0.79)	0.41 (0.90)
DN25	73 (2.87)	67 (2.64)	54 (2.13)	35 (1.38)	33.15 (1.31)	25 (0.98)	0.54 (1.19)
DN40	95 (3.74)	86 (3.39)	76 (2.99)	45 (1.77)	49.15 (1.94)	40 (1.57)	1.15 (2.54)
DN50	111 (4.37)	105 (4.13)	95 (3.74)	56 (2.20)	59.15 (2.33)	50 (1.97)	1.84 (4.06)
DN80	149 (5.87)	136 (5.35)	130 (5.12)	71 (2.80)	90.15 (3.55)	80 (3.15)	3.69 (8.14)
DN100	181 (7.13)	174 (6.85)	160 (6.30)	80 (3.15)	111.15 (4.38)	100 (3.94)	5.70 (12.6)

Kv values

DN	15	20	25	40	50	80	100
Kv	4.4	7.5	12	26	39	84	150

For conversion:
Cv (UK) = Kv x 0.963
Cv (US) = Kv x 1.156

Opening pressures in mbar

Differential pressures with zero flow for standard and high temperature springs.

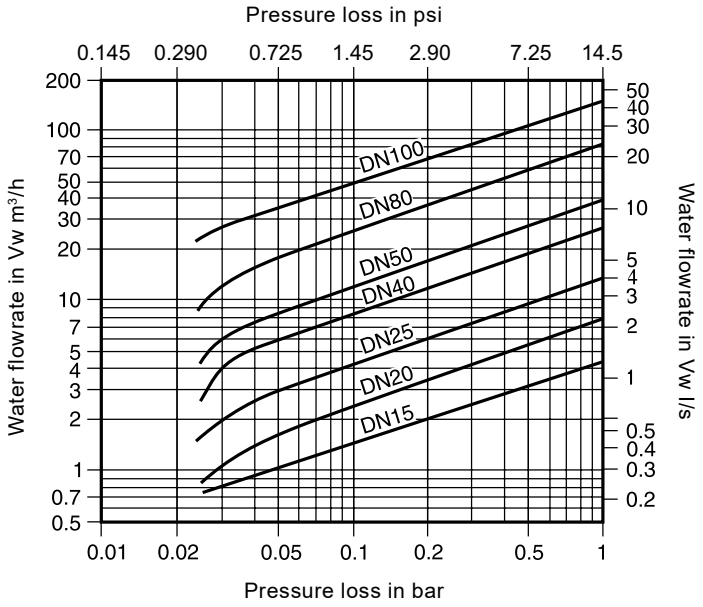
➔ Flow direction

DN	15 (½")	20 (¾")	25 (1")	40 (1½")	50 (2")	80 (3")	100 (4")
↑	25 (0.36 psi)	25 (0.36 psi)	25 (0.36 psi)	28 (0.41 psi)	29 (0.42 psi)	31 (0.45 psi)	33 (0.48 psi)
➔	22.5 (0.33 psi)	22.5 (0.33 psi)	22.5 (0.33 psi)	24 (0.35 psi)	24.5 (0.36 psi)	25.5 (0.37 psi)	26.5 (0.38 psi)
↓	20 (0.29 psi)	20 (0.29 psi)	20 (0.29 psi)	20 (0.29 psi)	20 (0.29 psi)	20 (0.29 psi)	20 (0.29 psi)

Where lowest opening pressures are required, valves without springs can be installed in vertical pipes with bottom-to-top flow.

Without spring							
↑	2.5 (0.036 psi)	2.5 (0.036 psi)	2.5 (0.036 psi)	4.0 (0.058 psi)	4.5 (0.065 psi)	5.5 (0.080 psi)	6.5 (0.094 psi)

Pressure loss diagram



Pressure loss diagram with open valve at 20 °C (68 °F). 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 20 °C (68 °F). To determine the pressure for other fluids the equivalent water volume flowrate must be calculated and used in the graph.

$$\dot{V}w = \sqrt{\frac{\rho}{1000}} \times \dot{V}$$

Where: $\dot{V}w$ = Equivalent water volume flow in l/s or m³/h
ρ = Density of fluid kg/m³
$\dot{V}$ = Volume of fluid l/s or m³/h

Pressure loss information for steam, compressed air and gases is available from Spirax Sarco.

How to order

Example: 1 off Spirax Sarco DN40, DCV4 stainless steel disc check valve for fitting between ASME 300 flanges.

Safety information, installation and maintenance

For full details see the Installation and Maintenance Instructions supplied with the product.
DCV4 disc 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 they must be fitted in a vertical flow line with the flow from bottom-to-top.

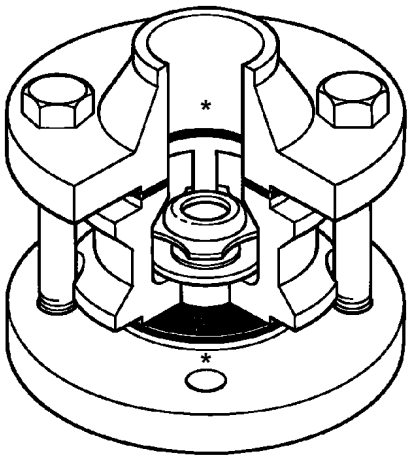
* **Note:** Flanges, bolts (or studs), nuts and joint gaskets are to be provided by the installer. Disc check valves are non-maintainable (no spares are available). Disc check valves are not suitable for use where heavily pulsating flow exists, such as close to a compressor.

Various options are denoted by a marking on the valve body:

'N'	- High temperature spring	- Standard metal disc
'W'	- Without spring	- Standard metal disc
'V'	- Standard spring	- Viton soft faced disc
'E'	- Standard spring	- EPDM soft faced disc
'WV'	- Without spring	- Viton soft faced disc
'WE'	- Without spring	- EPDM soft faced disc

'T' - Valves tested to EN 12266-1 Rate D

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 315 °C (599 °F) 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 recognised manner as stated in the Installation and Maintenance Instructions. No other ecological hazard is anticipated with the disposal of this product providing due care is taken.

TI-P601-32
CMGT Issue 11

DCV10 Stainless Steel and DCV10C Carbon Steel Centrally Guided Disc Check Valves

Description

The **DCV10** (cast stainless steel) and **DCV10C** (zinc plated cast carbon steel) are wafer pattern disc check valves that have been designed to be sandwiched between flanges for use with pumps and general cycling applications. 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 centrally guided design ensures improved life span of the unit plus more reliability when compared to traditional disc check valves. These disc check valves will ensure correct flow of condensate and other suitable fluids whilst also preventing reverse flow - maintaining production and profit at all times.

Standards

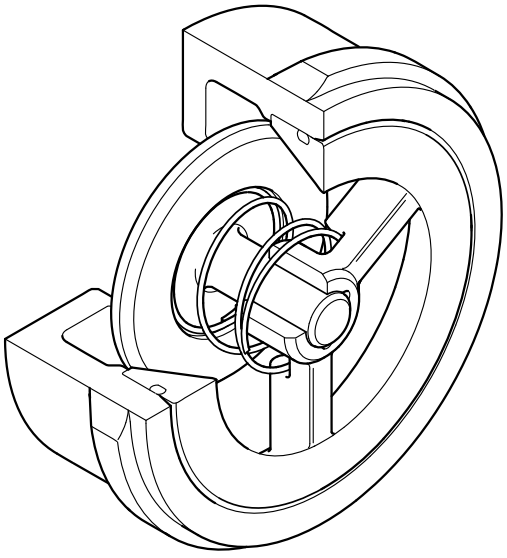
Designed in accordance with BS EN 14341:2006.
This product fully complies with the requirements of the European Pressure Equipment Directive 2014/68/EU and carries the CE mark when so required.

Shut-off

Shut-off conforms to EN 12266-1:2003 Rate F.

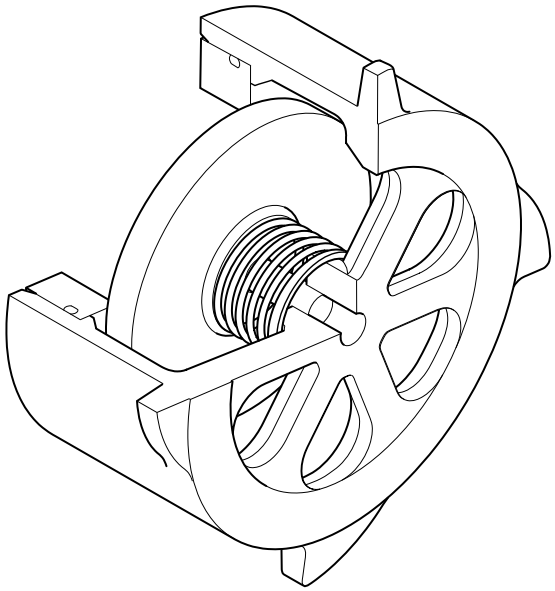
Certification

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.



DCV10

DN25 - DN100
(1" - 4")



DCV10 and DCV10C

DN125 - DN250
(5" - 10")

Sizes and pipe connections

Sizes

DN25, DN32, DN40, DN50, DN65, DN80, DN100, DN125, DN150, DN200 and DN250
(1", 1¼", 1½", 2", 2½", 3", 4", 5", 6", 8", and 10")

PN rated design fits between the following flanges:

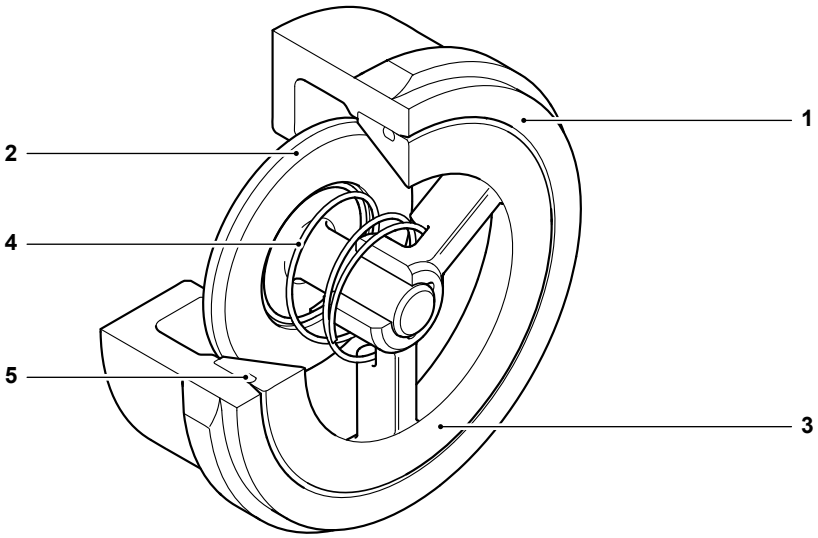
DN25 - DN80 (1" - 3")	EN 1092 PN25, PN16, PN40, JIS/KS 10K and JIS/KS 20K
DN100 - DN250 (4" - 10")	EN 1092 PN25, PN16, PN40 and JIS/KS 20K

The ASME rated design fits between the following flanges:

DN25 - DN80 (1" - 3") (ASME version)	ASME B16.5 Class 150 and Class 300
DN32 and DN65 (1¼" and 2½") DN100 - DN250 (4" - 10")	

Face-to-face dimensions are in accordance with EN 558 Series 49 for the DN125 - DN200 (5" - 8") size range and EN 558 Series 52 for the DN250 (10").

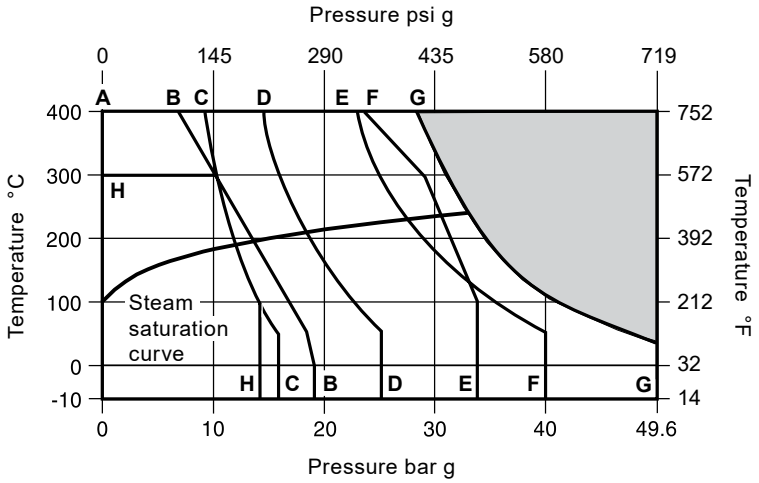
Materials - DCV10 - DN25 - DN100 (1" - 4")



No.	Part		Material	
1	Body *	PN	Austenitic stainless steel	1.4308
		ASME	Austenitic stainless steel	A351 CF8
2	Disc		Austenitic stainless steel	A276 316L
			Austenitic stainless steel	AISI 316L
3	Spider		Martensitic stainless steel	BS 3146-2 ANC2
4	Spring		Stainless steel	BS 2056 316 S42
5	Gaskets		Reinforced exfoliated graphite	
* For DN32 and DN65 Material Austenitic stainless steel				1.4401 - 316L

Pressure/temperature limits

DCV10
DN25 - DN100 (1" - 4")



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

A - B Flanged ASME Class 150.

A - C Flanged EN 1092 PN16.

A - D Flanged EN 1092 PN25.

A - E Flanged JIS/KS 20K.

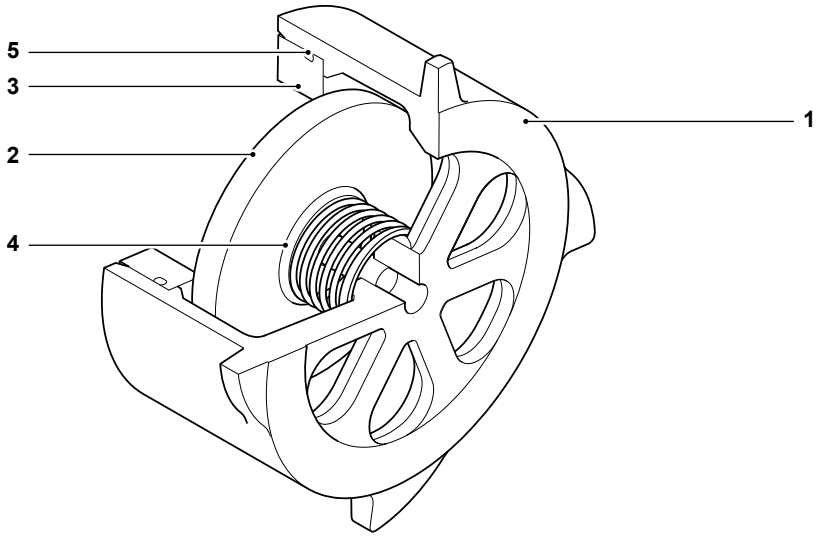
A - F Flanged EN 1092 PN40.

A - G Flanged ASME Class 300.

H - H Flanged JIS/KS 10K.

Body design condition			PN40 or ASME Class 300
PMA Maximum allowable pressure	PN40	40 bar g @ 50 °C	580 psi g @ 122 °F
	ASME Class 300	49.5 bar g @ 38 °C	718 psi g @ 100 °F
TMA Maximum allowable temperature	PN40	400 °C @ 23.8 bar g	752 °F @ 345 psi g
	ASME Class 300	400 °C @ 28.4 bar g	752 °F @ 412 psi g
Minimum allowable temperature		-10 °C	14 °F
PMO Maximum operating pressure	PN40	40 bar g @ 50 °C	580 psi g @ 122 °F
	ASME Class 300	49.5 bar g @ 38 °C	718 psi g @ 100 °F
TMO Maximum operating temperature	PN40	400 °C @ 23.8 bar g	752 °F @ 345 psi g
	ASME Class 300	400 °C @ 28.4 bar g	752 °F @ 412 psi g
Temperature limits		-10 °C to +400 °C	+14 °F to +752 °F
Minimum operating temperature		-10 °C	14 °F
Product is safe for use under full vacuum conditions			
Designed for a maximum cold hydraulic test pressure of:	PN40	60 bar g	870 psi g
	ASME Class 300	74.4 bar g	1079 psi g

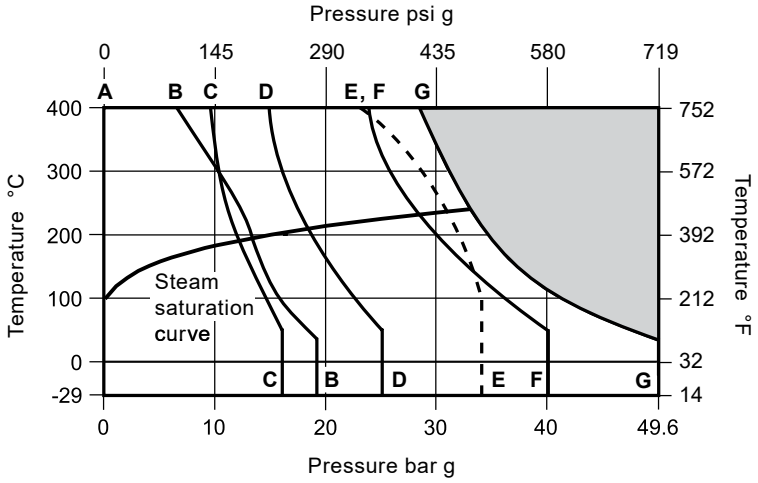
Materials - DCV10 and DCV10C - DN125 - DN250 (5" - 10")



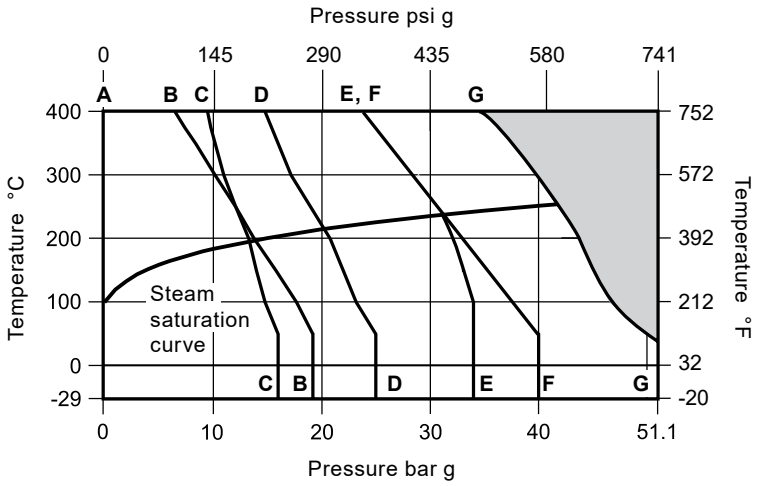
No.	Part			Material	
1	Body	DCV10	PN	Austenitic stainless steel	1.4308
			ASME	Austenitic stainless steel	A351 CF8
		DCV10C	PN	Carbon steel	1.0619+N
			ASME	Carbon steel	A216 WCB
2	Disc		PN	Austenitic stainless steel	1.4308
			ASME	Austenitic stainless steel	A351 CF8
3	Seat		PN	Austenitic stainless steel	1.4308
			ASME	Austenitic stainless steel	A351 CF8
4	Spring			Stainless steel	316L
5	Gaskets		Reinforced exfoliated graphite		

Pressure/temperature limits

DCV10
DN125 - DN250 (5" - 10")



DCV10C
DN125 - DN250 (5" - 10")



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

A - B Flanged ASME Class 150.
A - C Flanged EN 1092 PN16.
A - D Flanged EN 1092 PN25.
A - E Flanged JIS/KS 20K.
A - F Flanged EN 1092 PN40.
A - G Flanged ASME Class 300.

Body design condition			PN40 or ASME Class 300
PMA Maximum allowable pressure	DCV10	49.6 bar g @ 38 °C	719 psi g @ 100 °F
	DCV10C	51.1 bar g @ 38 °C	741 psi g @ 100 °F
TMA Maximum allowable temperature	DCV10	400 °C @ 28.4 bar g	752 °F @ 412 psi g
	DCV10C	400 °C @ 34.7 bar g	752 °F @ 503 psi g
Minimum allowable temperature		-29 °C	-20.2 °F
PMO Maximum operating pressure for saturated steam service	DCV10	33 bar g @ 241 °C	479 psi g @ 466 °F
	DCV10C	42 bar g @ 255 °C	609 psi g @ 491 °F
TMO Maximum operating temperature	DCV10	400 °C @ 28.4 bar g	752 °F @ 412 psi g
	DCV10C	400 °C @ 34.7 bar g	752 °F @ 503 psi g
Temperature limits		-29 °C to +400 °C	-20.2 °F to +752 °F
Minimum operating temperature		-29 °C	-20.2 °F
Product is safe for use under full vacuum conditions			
Designed for a maximum cold hydraulic test pressure of:		77 bar g	1117 psi g

Kv values

Size	DN25	DN32	DN40	DN50	DN65	DN80	DN100	DN125	DN150	DN200	DN250
	1"	1¼"	1½"	2"	2½"	3"	4"	5"	6"	8"	10"
Kv	10.8	10.8	26	43	43	80	130	188	213	432	735

For conversion:
Cv (UK) = Kv x 0.963
Cv (US) = Kv x 1.156

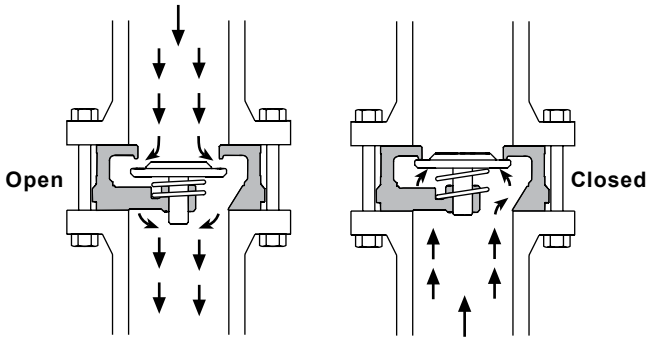
Opening pressures

Differential pressures with zero flow.
➔ Flow direction

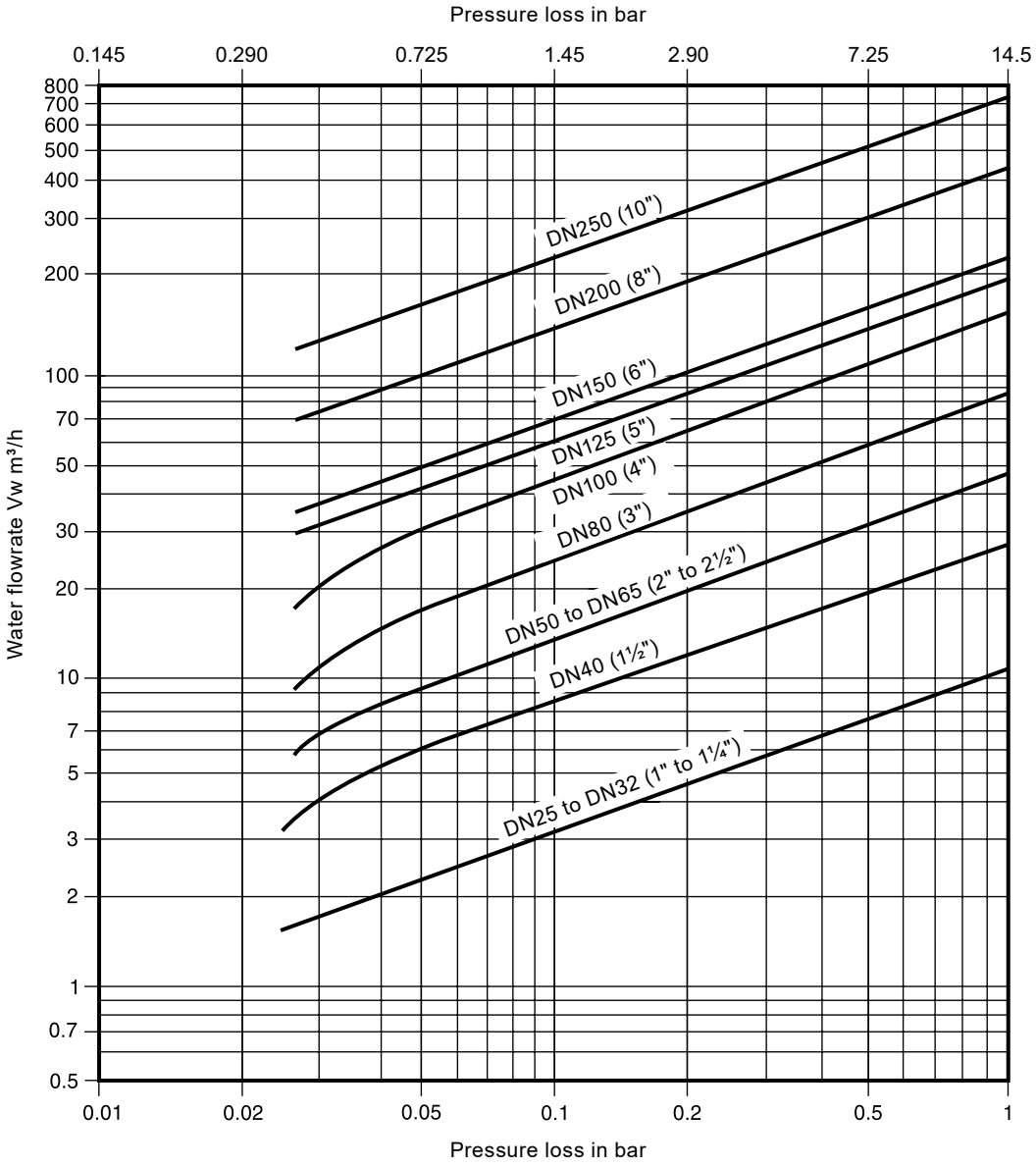
Size		DN25	DN32	DN40	DN50	DN65	DN80	DN100	DN125	DN150	DN200	DN250
		1"	1¼"	1½"	2"	2½"	3"	4"	5"	6"	8"	10"
↑	mbar	25	25	28	29	29	31	33	44	46	48.5	54
	mpsi	0.363	0.363	0.406	0.421	0.421	0.450	0.479	0.638	0.667	0.703	0.783
➔	mbar	22.5	22.5	24.5	24.5	24.5	25.5	27	32	33	34	37
	mpsi	0.326	0.326	0.355	0.355	0.355	0.370	0.392	0.464	0.479	0.493	0.537
↓	mbar	20	20	20	20	20	30	20	20	20	20	20
	mpsi	0.290	0.290	0.290	0.290	0.290	0.435	0.290	0.290	0.290	0.290	0.290

Principle of operation

The DCV10 and DCV10C are opened by the pressure and flow of condensate and are closed by the pressure of the spring when the flow ceases and before reverse flow occurs.



Pressure loss diagram



Pressure loss diagram with open valve at 20 °C (68 °F). The values indicated are applicable 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 20 °C (68 °F). To determine the pressure for other fluids the equivalent water volume flowrate must be calculated and used in the graph.

$$\dot{V}w = \sqrt{\frac{\rho}{1000}} \times \dot{V}$$

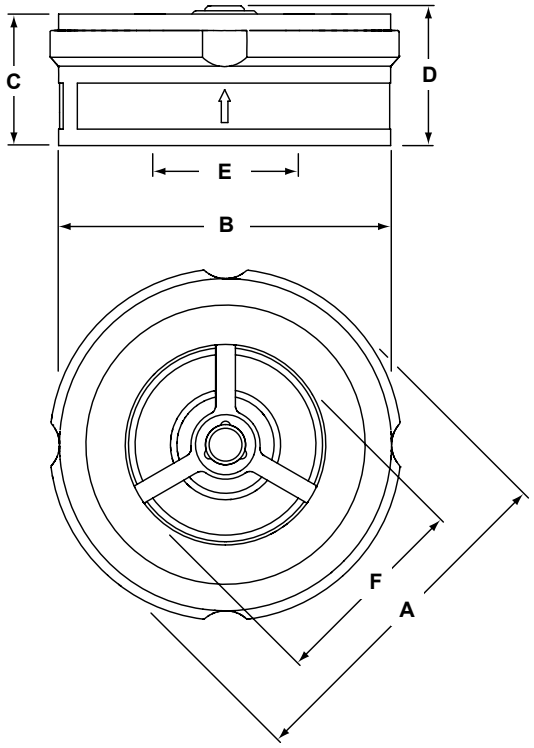
Where: $\dot{V}w$ = Equivalent water volume flow in l/s or m³/h

ρ = Density of fluid kg/m³

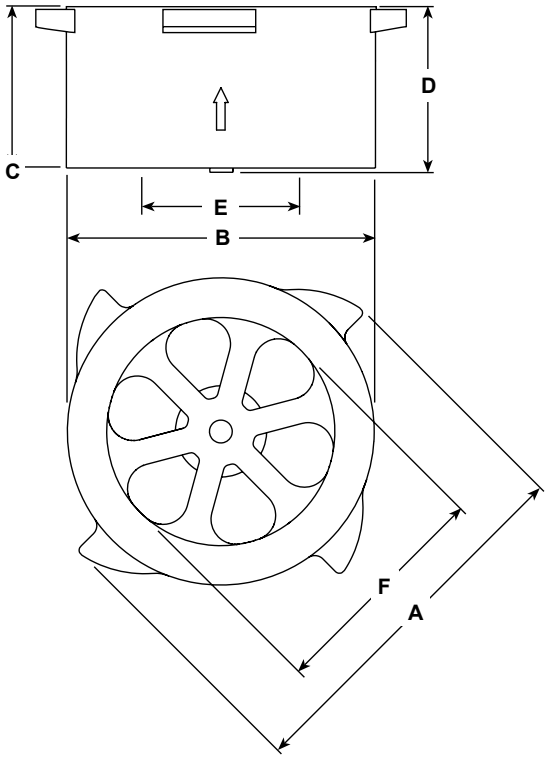
$\dot{V}$ = Volume of fluid l/s or m³/h

Dimensions/weights (approximate) in mm (inches) and kg (lbs)

DN25 - DN100 (1" - 4")



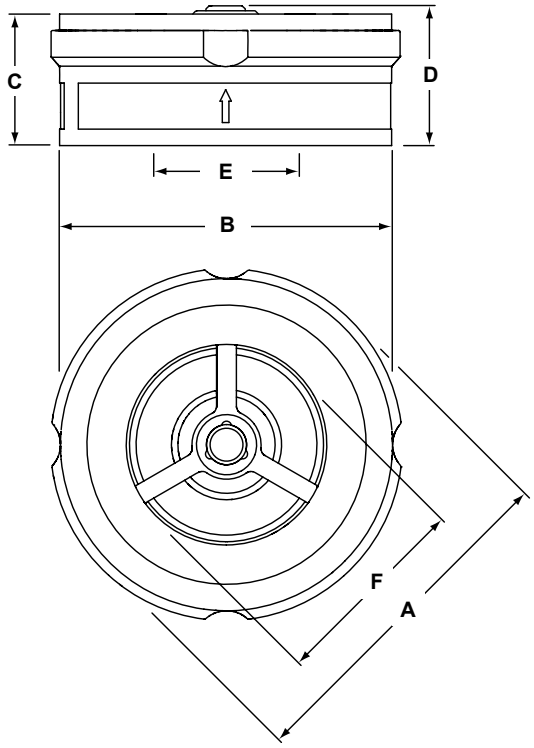
DN125 - DN250 (5" - 10")



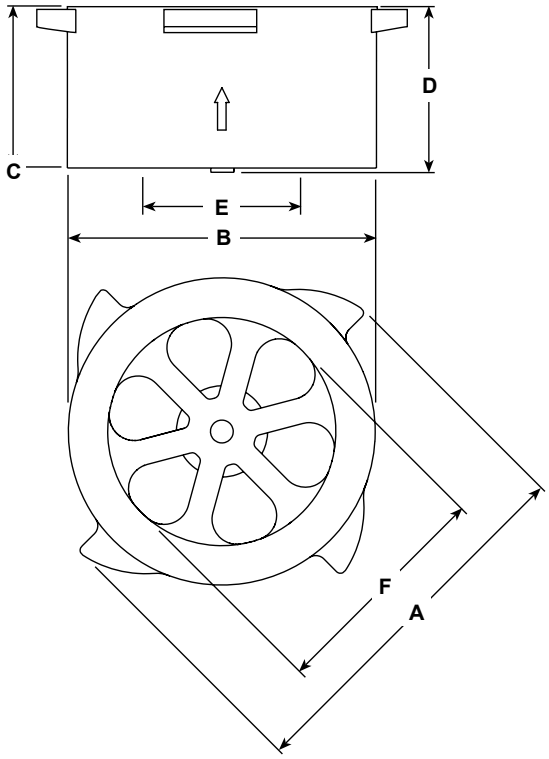
	Size	A		B		C		D Open		D Closed		E		F	
		mm	inches	mm	inches	mm	inches	mm	inches	mm	inches	mm	inches	mm	inches
PN40, PN25 and PN16	DN25 1"	71	2.80	71	2.80	22	0.87	31	1.22	24	0.94	25	0.98	34	1.34
	DN32 1¼"	75	2.95	75	2.95	28	1.10	37	1.46	30	1.18	32	1.26	34	1.34
	DN40 1½"	92	3.62	86	3.39	31.5	1.24	44	1.73	34	1.34	40	1.57	49	1.93
	DN50 2"	107	4.21	101	3.98	40	1.57	55	2.17	42.5	1.67	50	1.97	61	2.40
	DN65 2½"	115	4.53	115	4.53	46	1.81	61	2.40	48.5	1.91	65	2.56	61	2.40
	DN80 3"	142	5.59	131	5.16	50	1.97	69	2.72	53	2.09	80	3.15	89	3.50
	DN100 4"	178	7.01	162	6.38	60	2.36	81	3.19	60	2.36	100	3.94	100	3.94
	DN125 5"	219	8.62	188	7.40	90	3.54			91	3.58	117	4.61	125	4.92
	DN150 6"	253	9.96	214	8.43	106	4.17			106	4.17	146	5.75	150	5.91
	DN200 8"	325	12.8	269	10.6	140	5.51			142.3	5.60	183	7.20	200	7.88
	DN250 10"	376.5	14.8	322	12.7	200	7.87			204	8.03	230	9.06	250	9.84
JIS/KS 10K	DN25 1"	71	2.80	71	2.80	22	0.87	31	1.22	24	0.94	25	0.98	34	1.34
	DN32 1¼"	75	2.95	75	2.95	28	1.10	37	1.46	30	1.18	32	1.26	34	1.34
	DN40 1½"	92	3.62	86	3.39	31.5	1.24	44	1.73	34	1.34	40	1.57	49	1.93
	DN50 2"	107	4.21	101	3.98	40	1.57	55	2.17	42.5	1.67	50	1.97	61	2.40
	DN65 2½"	115	4.53	115	4.53	46	1.81	61	2.40	48.5	1.91	65	2.56	61	2.40
	DN80 3"	142	5.59	131	5.16	50	1.97	69	2.72	53	2.09	80	3.15	89	3.50

Dimensions/weights (approximate) in mm (inches) and kg (lbs)

DN25 - DN100 (1" - 4")



DN125 - DN250 (5" - 10")



	Size	A		B		C		D Open		D Closed		E		F	
		mm	inches	mm	inches	mm	inches	mm	inches	mm	inches	mm	inches	mm	inches
JIS/KS 20K	DN100 4"	178	7.01	162	6.38	60	2.36	81	3.19	60	2.36	100	3.94	100	3.94
	DN125 5"	219	8.62	188	7.40	90	3.54			91	3.58	117	4.61	125	4.92
	DN150 6"	253	9.96	214	8.43	106	4.17			106	4.17	146	5.75	150	5.91
	DN200 8"	325	12.8	269	10.6	140	5.51			142.3	5.60	183	7.20	200	7.88
	DN250 10"	376.5	14.8	322	12.7	200	7.87			204	8.03	230	9.06	250	9.84
ASME Class 150 and ASME Class 300	DN25 1"	70	2.76	63	2.48	35.5	1.40	37.0	1.46	35	1.38	25	0.98	30	1.18
	DN40 1½"	95	3.74	85.5	3.37	45	1.77	47.0	1.85	45	1.77	40	1.57	48	1.89
	DN32 1¼"	75	2.95	75	2.95	28	1.10	37	1.46	30	1.18	32	1.26	34	1.34
	DN50 2"	108	4.25	101.5	4.00	56	2.20	57.5	2.26	56	2.20	50	1.97	61	2.40
	DN65 2½"	115	4.35	115	4.53	46	1.81	61	2.40	48.5	1.91	65	2.56	61	2.40
	DN80 3"	146	5.75	133	5.24	71	2.80	71.0	2.80	71	2.80	80	3.15	89	3.50
	DN100 4"	178	7.01	162	6.38	60	2.36	81	3.19	60	2.36	100	3.94	100	3.94
	DN125 5"	219	8.62	188	7.40	90	3.54			91	3.58	117	4.61	125	4.92
	DN150 6"	253	9.96	214	8.43	106	4.17			106	4.17	146	5.75	150	5.91
	DN200 8"	325	12.8	269	10.6	140	5.51			142.3	5.60	183	7.20	200	7.88
	DN250 10"	376.5	14.8	322	12.7	200	7.87			204	8.03	230	9.06	250	9.84

Weights are shown on the next page

Weights (approximate) in kg (lbs)

	Size		Weight	
			kg	lbs
PN40, PN25 and PN16	DN25	1"	0.40	0.88
	DN32	1¼"	0.7	1.54
	DN40	1½"	0.82	1.81
	DN50	2"	1.34	2.92
	DN65	2½"	2.34	5.16
	DN80	3"	2.56	5.64
	DN100	4"	5.30	11.7
	DN125	5"	11.00	24.3
	DN150	6"	16.00	35.3
	DN200	8"	32.00	70.5
	DN250	10"	60.00	132
JIS/KS 10K	DN25	1"	0.40	0.88
	DN32	1¼"	0.7	1.54
	DN40	1½"	0.82	1.81
	DN50	2"	1.34	2.92
	DN65	2½"	2.34	5.16
	DN80	3"	2.56	5.64

	Size		Weight	
			kg	lbs
JIS/KS 20K	DN100	4"	5.30	11.7
	DN125	5"	11.00	24.3
	DN150	6"	16.00	35.3
	DN200	8"	32.00	70.5
	DN250	10"	60.00	132
ASME Class 150 and ASME Class 300	DN25	1"	0.50	1.10
	DN32	1¼"	0.7	1.54
	DN40	1½"	0.82	1.81
	DN50	2"	1.85	4.08
	DN65	2½"	2.34	5.16
	DN80	3"	3.50	7.72
	DN100	4"	5.30	11.7
	DN125	5"	11.00	24.3
	DN150	6"	16.00	35.3
	DN200	8"	32.00	70.5
	DN250	10"	60.00	132

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 and DCV10C 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 are to be supplied by the installer.

Disposal:

These products are recyclable. No ecological hazard is anticipated with the disposal of these products providing due care is taken.

How to order

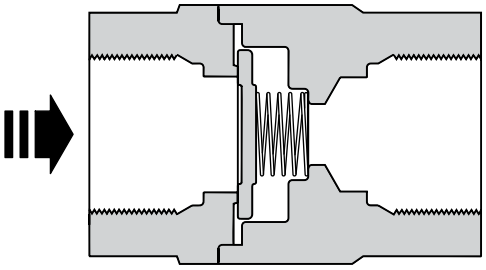
Example: 1 off Spirax Sarco DN80 DCV10 stainless steel check valve to fit between PN16 flanges.

Spare parts

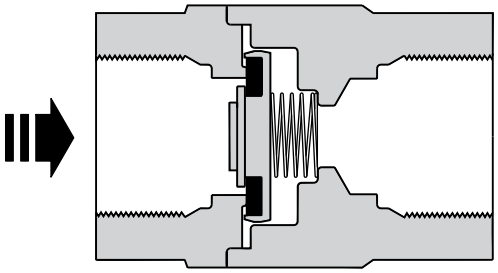
The DCV10 and DCV10C are non-maintainable disc check valves - There are no available spares.

TI-P601-18
CMGT Issue 14

DCV41,
DCV41 Food+
Austenitic Stainless Steel Disc Check Valve



Standard DCV41 with metal seat



Soft seat option (screwed connections only)

Description

The DCV41 is an austenitic stainless steel disc check valve available with either 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 oil and gas applications, a Viton seat is available.
For water applications an EPDM seat is available.
Soft seat versions provide a zero leakage rate or bubble tight shut-off, i.e. they meet EN 12266-1 Rate A, providing a differential pressure exists. Please note that the soft seat options are not available with socket weld ends.
The shut-off of the standard valve conforms to EN 12266-1 Rate E.
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 400 °C (752 °F).

Optional extras

Heavy duty springs (700 mbar (10.2 psi) opening pressure) for boiler feed applications

High temperature springs

Viton soft seats for oils and gas applications - screwed only

EPDM soft seats for water applications - screwed only

Standards

This product fully complies with the requirements of the European Pressure Equipment Directive 2014/68/EU.

Standard shut-off

Standard valves conform to EN 12266-1 rate E.
Soft seated versions meet EN 2266-1 rate A, providing a differential pressure exists.

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.

Food+ can be supplied with material Certification for all wetted parts at extra cost.
Note: All certification/inspection requirements must be stated at the time of order placement.

DCV41 Food+ ½" to 2" metal seat and EPDM seat range available with a food contact regulation Declaration of Compliance

Designed, manufactured and approved for Steam and Condensate applications, the DCV41 metal seat and EPDM seat range Food+ product complies with:

- (EC)1935:2004 Materials and Articles Intended to come into Contact with Food
- (EC)2023:2006 Good Manufacturing Practice for Materials and Articles Intended to come into Contact with Food
- (EU)10/2011 Plastic Materials and Articles Intended to come into Contact with Food
- FDA Code of Federal Regulations - title 21 - Food and Drugs

This product is intended to be connected into a system that can operate a food contact compliant process.

A list of the materials that could come directly or indirectly into contact with foodstuffs can be found in the Declaration of Compliance available for this product.

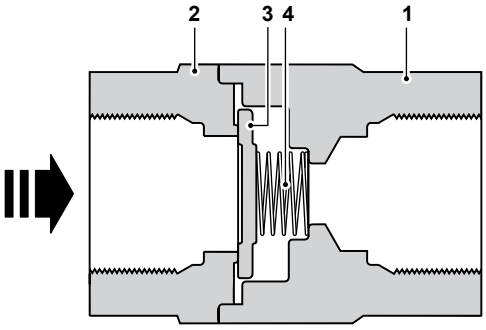
Sizes and pipe connections

½", ¾", 1", 1¼", 1½" and 2"
Screwed BSP T Rp (ISO 7-1) to BS 21 female parallel,
Screwed NPT to ASME B 1.20.1 and
Socket weld to ASME B 16.11 Class 3000.

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.

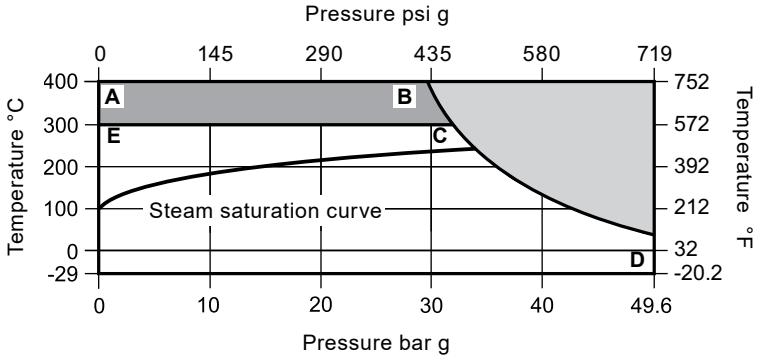
Materials



Standard DCV41 with metal seat

No.	Part	Material	
1	Body	Austenitic stainless steel	ASTM A351 CF3M
2	Seat	Austenitic stainless steel	ASTM A351 CF3M
3	Disc	Austenitic stainless steel	ASTM A276 316
4	Standard spring	Austenitic stainless steel	BS 2056 316 S42
	Heavy duty spring	Austenitic stainless steel	BS 2056 316 S42
	High temperature spring	Nickel alloy	Nimonic 90

Pressure/temperature limits



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

For use in this area use a DCV41 with high temperature spring or DCV41 without spring.

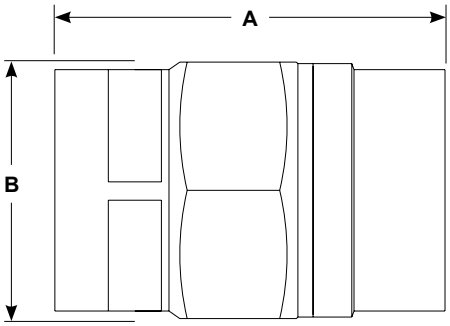
A-B-D High temperature spring and without spring.

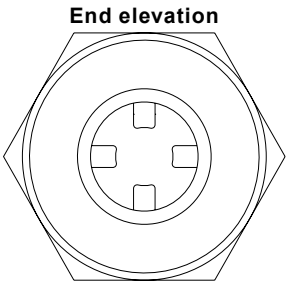
E-C-D Standard spring.

Please note: Special testing to allow lower temperature operation can be provided at extra cost. Consult Spirax Sarco.

Body design conditions				PN50
PMA	Maximum allowable pressure		49.6 bar g @ 38 °C	719 psi g @ 100 °F
TMA	Maximum allowable temperature		400 °C @ 29.4 bar g	752 °F @ 426 psi g
Minimum allowable temperature			-29 °C	-20.2 °F
PMO	Maximum operating pressure (bar g)		49.6 bar g @ 38 °C	719 psi g @ 100 °F
TMO	Maximum operating temperature	With metal seat and standard spring (including Food+ metal seat)	300 °C	572 °F
		With metal seat and high temperature spring (including Food+ metal seat)	400 °C	752 °F
		Without spring (including Food+ metal seat)	400 °C	752 °F
		Viton seat	205 °C	401 °F
		EPDM seat (including Food+ EPDM seat)	120 °C	248 °F
Minimum operating temperature (**Note:** Special testing to allow lower temperature operation can be provided at extra cost. Consult Spirax Sarco).		With metal seat (including Food+ metal seat)	-29 °C	-20.2 °F
		With viton seat	-25 °C to +205 °C	-13 °F to 401 °F
		With EPDM seat (including Food+ EPDM seat)	-40 °C to +120 °C	-40 °F to 248 °F
Product is safe for use under full vacuum conditions				
Designed for a maximum cold hydraulic test pressure of			76 bar g	1102 psi g

Dimensions/weight (approximate) in mm (inches) and kg (lbs)





Size	A Socket weld	A Screwed	B A/F	Weight
½"	50 (1.97)	51 (2.01)	34 (1.34)	0.2 (0.44)
¾"	55 (2.17)	57 (2.24)	41 (1.61)	0.3 (0.66)
1"	67 (2.64)	68 (2.68)	50 (1.97)	0.5 (1.1)
1¼" to 2"	100 (3.94)	100 (3.94)	80 (3.15)	2.0 (4.4)

Kv values

Size	½"	¾"	1"	1¼"	1½"	2"
Kv	4.4	7.5	12	30	35	35

For conversion:
Cv (UK) = Kv x 0.963
Cv (US) = Kv x 1.156

7.2
36

Opening pressures in mbar (mpsi)

Differential pressures with zero flow for standard and high temperature springs.

➔ Flow direction

	↑	➔	↓
All sizes	25 (0.36 psi)	22.5 (0.33 psi)	20 (0.29 psi)

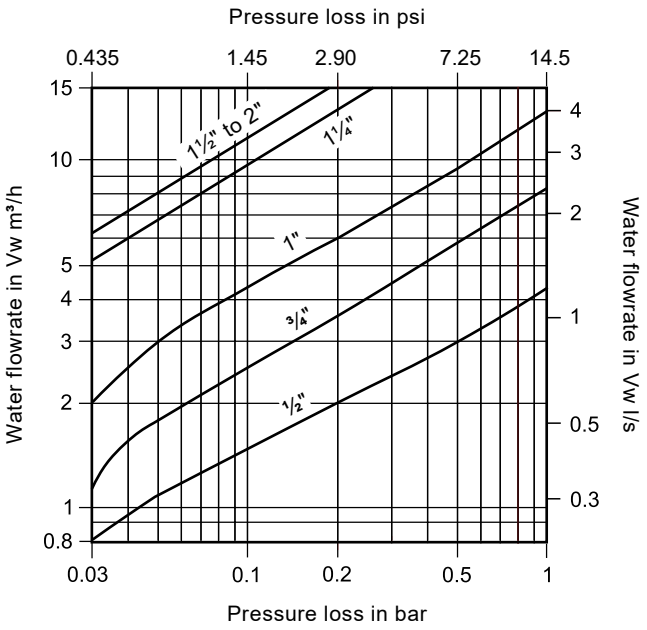
Where lower opening pressures are required, valves without springs can be installed in vertical pipes with bottom-to-top flow.

Without spring and ↑ flow direction

Size	½"	¾"	1"	1¼" to 2"
mbar	3.0 (0.044)	2.5 (0.036)	4.0 (0.058)	6.5 (0.094)

Heavy duty springs approximately 700 mbar (10.2)

Pressure loss diagram



Pressure loss diagram with open valve at 20 °C (68 °F). 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 20 °C (68 °F). To determine the pressure for other fluids the equivalent water volume flowrate must be calculated and used in the graph.

$$\dot{V}w = \sqrt{\frac{\rho}{1000}} \times \dot{V}$$

$\dot{V}w$ = Equivalent water volume flow in l/s or m³/h

Where: ρ = Density of fluid kg/m³

$\dot{V}$ = Volume of fluid l/s or m³/h

Pressure loss information for steam, compressed air and gases is available from Spirax Sarco.

How to order

Example: 1 off Spirax Sarco DCV41 austenitic stainless steel bodied disc check valve having ½" screwed BSP connections supplied fitted with a Viton soft seat and certification to EN 10204 3.1 for the body.

Safety information, installation and maintenance

For full details see the Installation and Maintenance Instructions (IM-P601-19) supplied with the product.
The DCV41 disc check valve 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
'WV'	- Without spring	- Viton seat
'WE'	- Without spring	- EPDM seat
'H'	- Heavy duty spring	- Standard metal seat
'HV'	- Heavy duty spring	- Viton seat
'HE'	- Heavy duty spring	- EPDM 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 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 recognised 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.

TI-P154-10-US
Issue 3

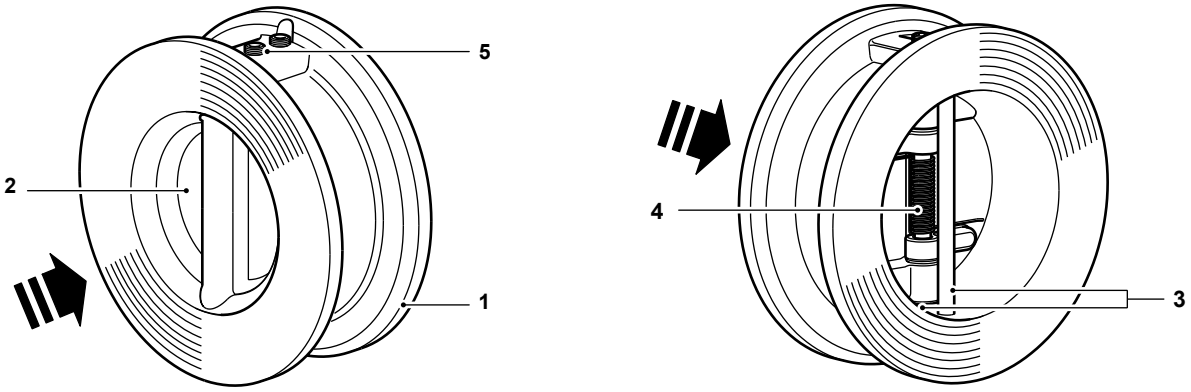
SDCV44
Austenitic Stainless Steel Split Disc Check Valve

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.

Certification
The product is available with certification to EN 10204 3.1 for the body at extra cost. Certification must be specified at the time of order placement.

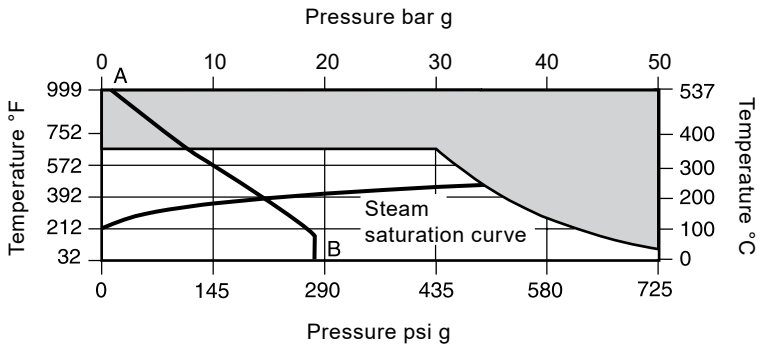
Materials



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

Standard shut-off
Valve shut off to API 598 available on request.

Pressure/temperature limits



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

A - B ANSI 150 flanges

A - C ANSI 300 flanges

Maximum body design condition			
PMA	Maximum allowable pressure	720 psi g	(49.6 bar g)
TMA	Maximum allowable temperature	650 °F	(343.3 °C)
PMO	Maximum operating pressure	720 psi g	(49.6 bar g)
TMO	Maximum metal seat operating temperature	650 °F	(343.5 °C)
Minimum operating metal seat temperature		-20 °F	(-28.89 °C)
Product is safe for use under full vacuum conditions.			
Designed for a maximum cold hydraulic test pressure		1475 psi g	(101.7 bar g)

Note: Limited to flange rating

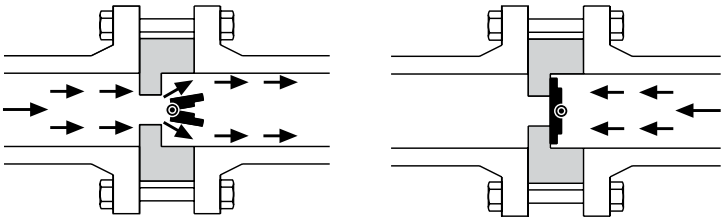
Product is safe for use under full vacuum conditions.

7.2

40

Operation

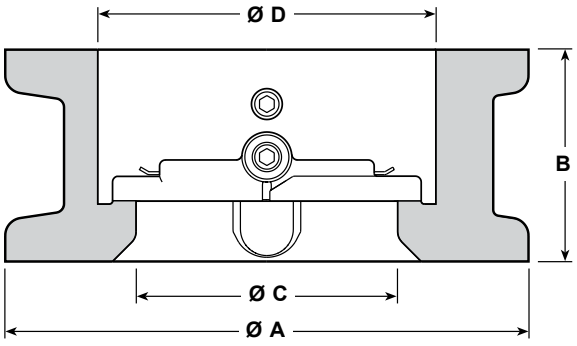
A split disc check valve is opened by the pressure of the fluid and closed by the spring as soon as the flow ceases and before the reverse flow occurs.



Dimensions/weights

(approximate) in inches (mm) and lbs (kg)

	Ø A	B	Ø C	Ø D	Weight
2" DN50	4.1" (104.1)	2.2" (55.9)	1.7" (43.2)	2.7" (69)	5.5 (2.5)
3" DN80	5.3" (134.6)	2.9" (73.7)	2.6" (66)	3.7" (94)	11.5 (5.2)
4" DN100	7.1" (180)	3.0" (76)	3.5" (89)	4.75" (121)	15.2 (6.9)



Kv values

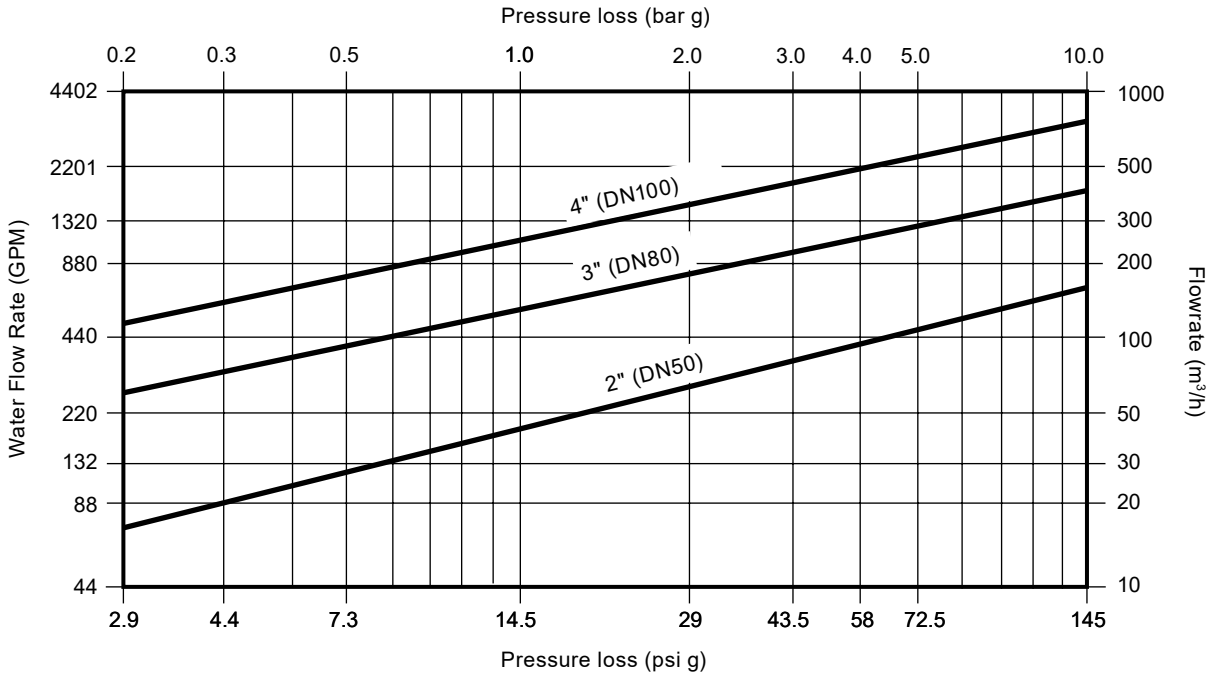
Size	2" (DN50)	3" (DN80)	4" (DN100)
Kv	40	111	226

For conversion:
Cv (US) = Kv x 1.17
Cv (UK) = Kv x 0.97

Opening pressures in psi (mbar)

Differential pressures with zero flow. → Flow direction	2" (DN50)	3" (DN80)	4" (DN100)
→	0.44 (30)	0.44 (30.0)	0.38 (26)
↑	0.7 (48)	0.65 (44.8)	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.

$Vw = \sqrt{S.G. \times V}$

Vw = 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-P154-11-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-P023-02
CMGT Issue 11

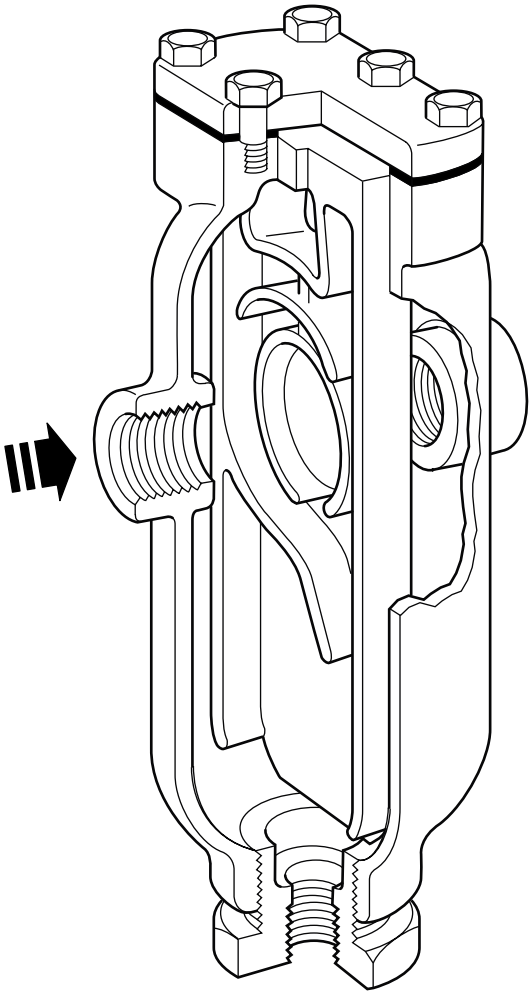
S1
SG Iron
Separator

Description
The S1 is a cast SG iron baffle type separator used for the removal of entrained liquids in steam, compressed air and gas systems. The fitting of insulation jackets will increase the performance of the separator.

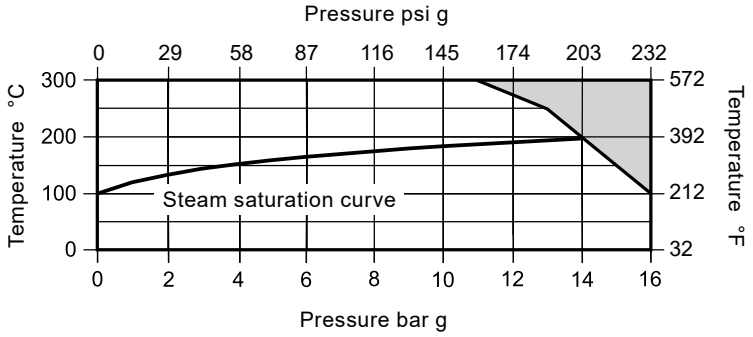
Standards
This product fully complies with the requirements of the Pressure Equipment Directive (PED).

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
½", ¾" and 1" screwed BSP or NPT



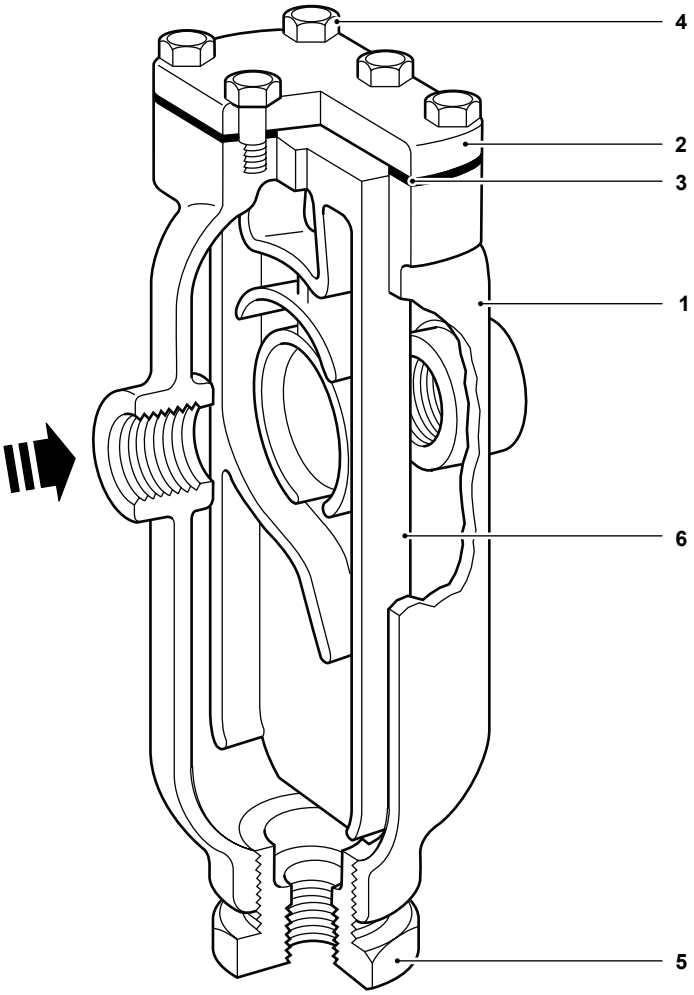
Pressure/temperature limits (ISO 6552)



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

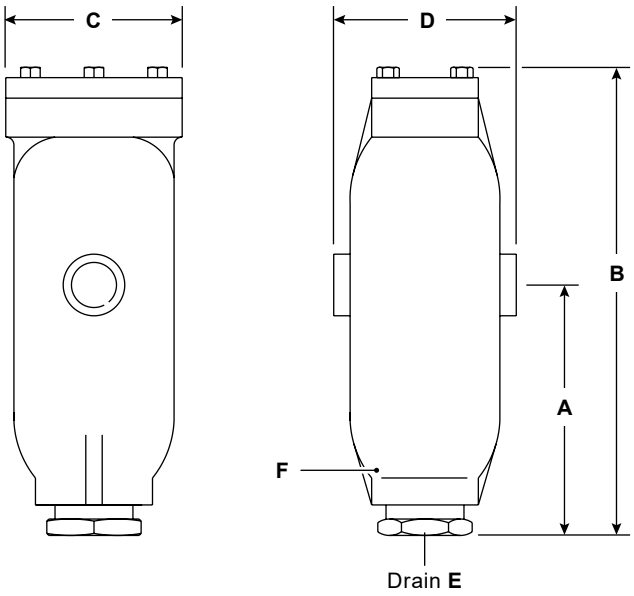
Body design conditions			PN16
PMA	Maximum allowable pressure	16 bar g @ 100 °C	232 psi g @ 212 °F
TMA	Maximum allowable temperature	300 °C @ 11 bar g	572 °F @ 160 psi g
Minimum allowable temperature		0 °C	32 °F
PMO	Maximum operating pressure for saturated steam service	13.8 bar g	200 psi g
TMO	Maximum operating temperature	200 °C @ 13.8 bar g	392 °F @ 200 psi g
Minimum operating temperature. **Note:** For lower operating temperatures consult Spirax Sarco		0 °C	32 °F
Designed for a maximum cold hydraulic test pressure of:		24 bar g	348 psi g

Materials



No.	Part		Material	
1	Body		SG iron	DIN 1693 Gr. GGG 40
2	Cover		SG iron	DIN1693 Gr. GGG 40
3	Gasket		Semi-rigid graphite laminate	
4	Bolts		Steel	BS 1768 Gr. 5
5	Bush	½" ¾"	Steel	
		1"	Steel	ASTM A105
6	Baffle		Cast iron	DIN 1691 Gr. GG20

Dimensions/weights (approximate) in mm (inches), kg (lbs) and litres (gallons)



Size	A	B	C	D	E	F	Weight	Volume
½"	124 (4.9)	225 (8.9)	86 (3.4)	88 (3.5)	½"	1"	2.7 (6.0)	0.53 (0.14)
¾"	156 (6.1)	260 (10.2)	110 (4.3)	113 (4.4)		½"	4.2 (9.3)	1.13 (0.29)
1"	222 (8.7)	377 (14.8)	143 (5.6)	152 (6.0)		2"	8.1 (17.9)	3.15 (0.83)

Safety information, installation and maintenance

7.3

For full details see the Installation and Maintenance Instructions (IM-P023-55) supplied with the product.

4

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/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 ¾" Spirax Sarco S1 separator with SG iron body having screwed BSP connections.

TI-P139-02-US
Issue 2

Steel Separator
S4A

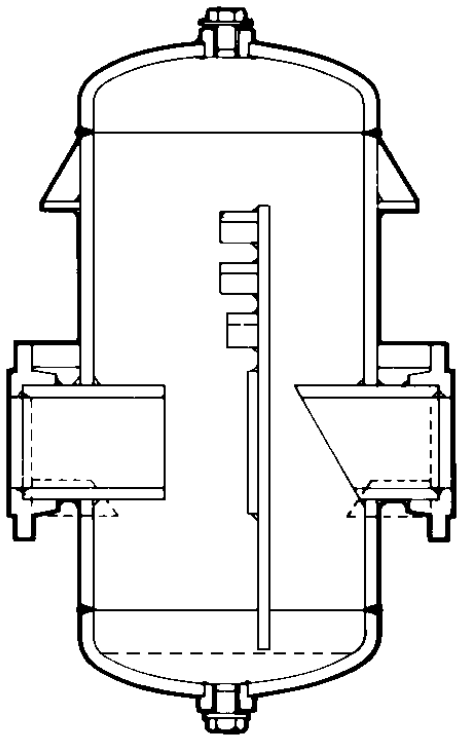
Description

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 psi g	150/300 psi g
Sizes	½" to 2"	2½" to 6"
Connections	NPT, SW	ANSI 150, ANSI 300
Construction	Fabricated steel body	
ASME code stamped	600 psi g	150 psi g/300psi g
Options stamped	2½" to 6" to 600 psi g ASME code Gauge Glass Assembly 2½" to 6"	

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.



Pressure shell design conditions

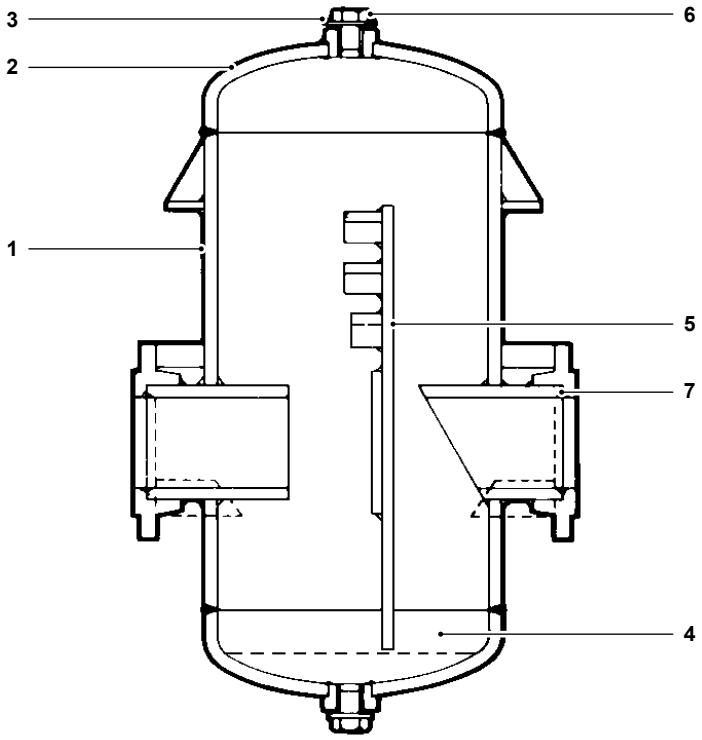
(½" to 2")

PMA	Maximum allowable pressure	NPT and Socket Weld	600 psi g @ 650 °F	41.4 bar g @ 344 °C

(2½" to 6")

PMA	Maximum allowable pressure	ANSI 150 flanged	150 psi g @ 560 °F	10.4 bar g @ 293 °C
		ANSI 300 flanged	300 psi g @ 650 °F	20.7 bar g @ 344 °C
TMA	Maximum allowable temperature	NPT and SW	650 °F @ 600 psi g	344 °C @ 41.4 bar g
		ANSI 150	650 °F @ 125 psi g	344 °C @ 8.6 bar g
		ANSI 300	650 °F @ 300 psi g	344 °C @ 20.7 bar g
		ANSI 600	650 °F @ 600 psi g	344 °C @ 41.4 bar g
		Minimum allowable temperature	-20 °F	-28 °C

Materials

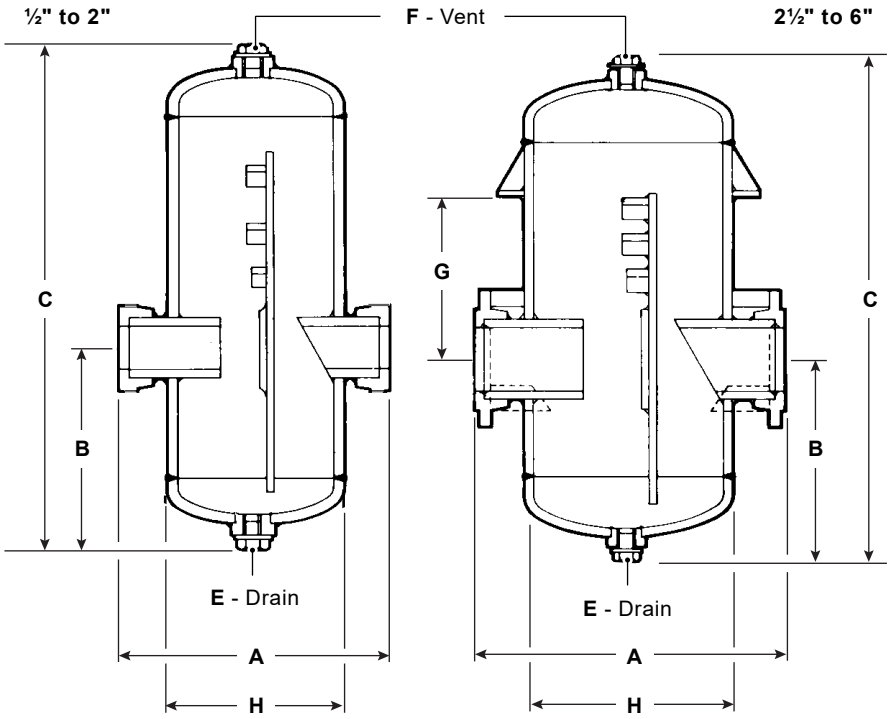


No.	Part		Material	
1	Body	(½" to 2")	Steel	SA-106 GRB
		(2½" to 6")		ASTM A 53 GRB
2	End Caps	(½" to 6")		SA-234 WPB
3	Coupling			
4	Screen	(4" & 6")		ASTM A 569
5	Baffle			ASTM A 569
6	Plug			ASTM A105
7	End connections	(½" to 2")		SA-105
		(2½" to 6")		ASTM A105

Designed to Section VIII Division I of the ASME Boiler & Pressure Vessel Code.

Dimensions/weight (nominal) in inches (millimeters) and lbs (kg)

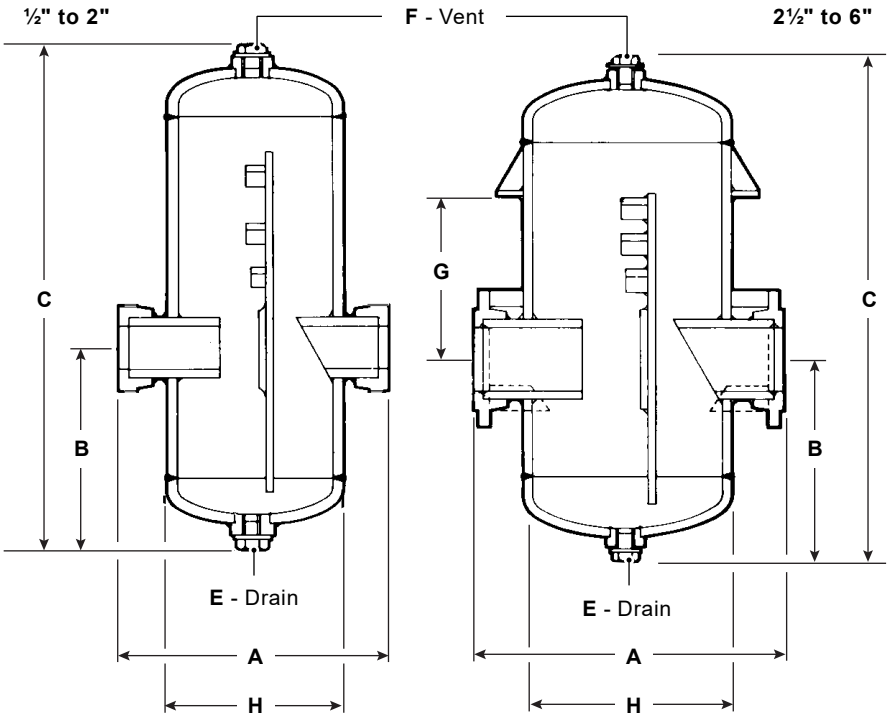
Screwed/socket weld connections



Size	Connection	A	B	C	E	F	G	H	Weight
½" DN15	Scr/SW	9.0 (229)	5.2 (132)	10.6 (269)	¾"	¾"	—	2.5"	9.0 lb (4.1 kg)
¾" DN20		9.3 (236)	5.9 (150)	12.1 (307)					10.0 lb (4.5 kg)
1" DN25		11.8 (300)	6.0 (152)	14.1 (358)				4"	19.0 lb (8.6 kg)
1¼" DN32		13.3 (338)	7.1 (180)	16.3 (414)				5"	30.0 lb (13.6 kg)
1½" DN40		15.4 (391)	7.6 (193)	19.0 (483)	1"			6"	43.0 lb (19.5 kg)
2" DN50		15.9 (404)	8.1 (206)	20.6 (523)					50.0 lb (22.7 kg)

Dimensions/weight (nominal) in inches (millimeters) and lbs (kg)

ANSI connections



Size		Connection	A	B	C	E	F	G	H	Weight
2½"	DN65	ANSI 150	22.5 (572)	9.4 (239)	24.5 (622)	1"	¾"	7.1 (180)	8.7"	109.0 lb (49.4 kg)
		ANSI 300								112.0 lb (50.8 kg)
		ANSI 600		9.9 (251)	25.6 (650)					113.0 lb (51.3 kg)
3"	DN80	ANSI 150	25.3 (643)	12.0 (305)	28.6 (726)	2"		7.9 (201)	10.8"	163.0 lb (73.9 kg)
		ANSI 300		12.0 (305)	28.8 (732)					169.0 lb (76.7 kg)
		ANSI 600		12.7 (323)	29.9 (759)					189.0 lb (85.7 kg)
4"	DN100	ANSI 150	29.0 (737)	12.6 (320)	31.2 (792)	2"	1½"	8.8 (224)	12.8"	237.0 lb (107.5 kg)
		ANSI 300								256.0 lb (116.1 kg)
		ANSI 600		13.2 (335)	32.1 (815)			9.0 (229)		297.0 lb (134.7 kg)
6"	DN150	ANSI 150	35.8 (909)	12.3 (312)	36.7 (932)			11.4 (290)	16.0"	365.0 lb (165.6 kg)
		ANSI 300		12.4 (315)	36.9 (937)			11.4 (290)		401.0 lb (181.9 kg)
		ANSI 600		3.0 (330)	37.8 (960)			11.4 (290)		551.0 lb (249.9 kg)

S4A Steam Sizing Chart

Sizing Example for Model S4A

1. Taking a steam pressure of 180 psi g and flow rate of 1100 lb/h draw line A-A.

2. Draw horizontal line A-B.

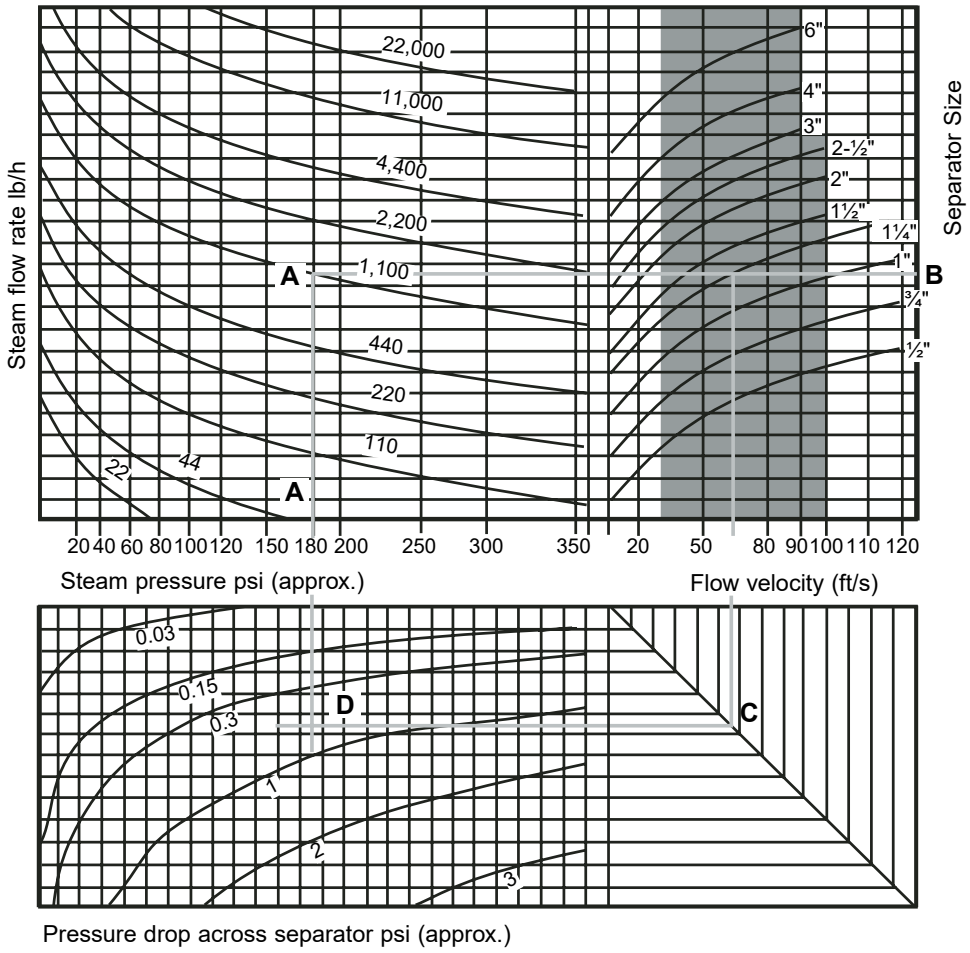
3. Any separator curve that is bisected by line A-B within the shaded area will operate at near 100% efficiency.

4. Line velocity for any size can be determined by dropping a vertical line B-C (eg. 60 ft/s for 1¼" unit).

5. Pressure drop is determined by plotting lines CD 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.

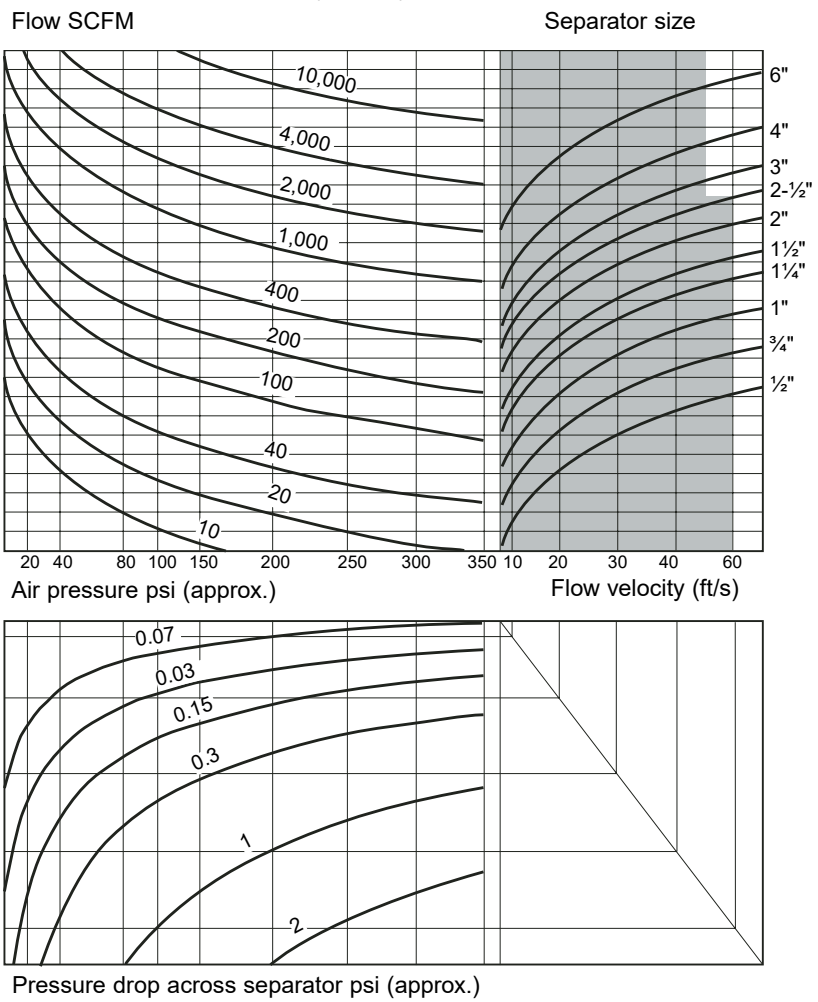
The shaded area denotes recommended selection for better than 99% separation efficiency.



S4A Separator Flow Velocity and 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-P139-03-US
Issue 3

Steel Separator
8" to 18"
S4A

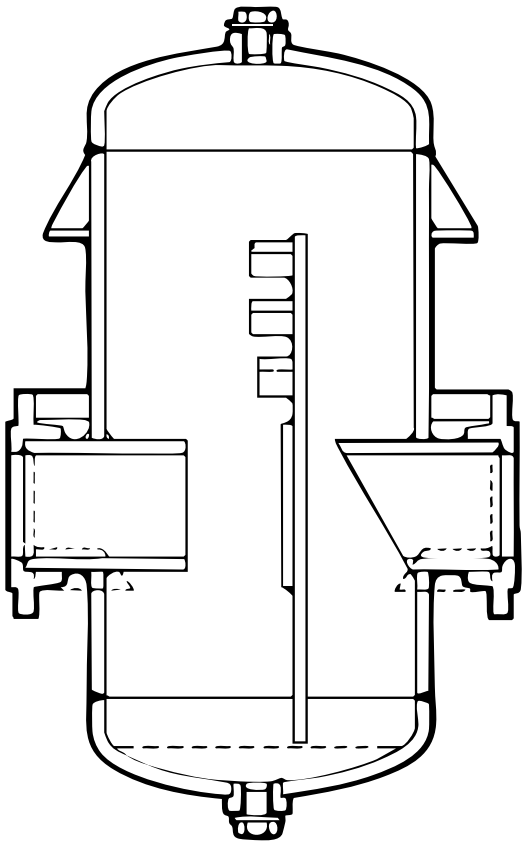
Description

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 psi g	300 psi g	600 psi g
Sizes	8" to 18"		
Connections	ANSI 150	ANSI 300	ANSI 600
Construction	Fabricated steel body		
ASME code stamped	150 psi g	300 psi g	600 psi g
Options	Gauge glass assembly		

Typical applications

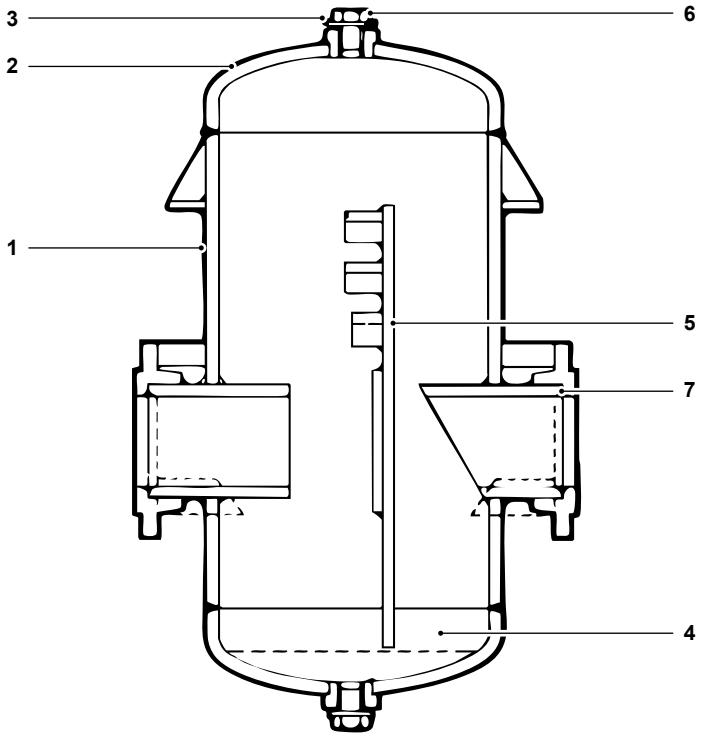
On steam mains, compressed air lines, steam turbines, heat transfer processes, meter protection, steam distribution systems, protection of equipment requiring dry saturated steam, removal of moisture from steam, air, or gas systems



Pressure shell design conditions

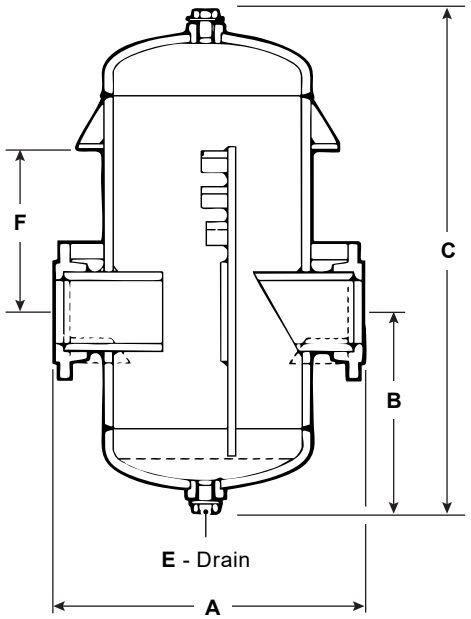
PMA	Maximum allowable pressure	ANSI 150	150 psi g @ 560 °F	10.3 bar g @ 293 °C
		ANSI 300	300 psi g @ 650 °F	20.7 bar g @ 343 °C
		ANSI 600	600 psi g @ 650 °F	41.4 bar g @ 343 °C
TMA	Maximum allowable temperature	ANSI 150	650 °F @ 125 psi g	343 °C @ 8.6 bar g
		ANSI 300	650 °F @ 300 psi g	343 °C @ 20.7 bar g
		ANSI 600	650 °F @ 600 psi g	343 °C @ 41.4 bar g
		Minimum allowable temperature	-20 °F	-29 °C

Materials



No.	Part	Material
1	Body	Steel
2	End caps	
3	Coupling	
4	Screen	
5	Baffle	
6	Plug	
7	End connections	

Dimensions/weight
(nominal) in inches (millimeters) and lbs (kg)



Size		Connection	A	B	C	E	F	Weight
8"	DN200	ANSI 150	41.9 (1064)	15.3 (389)	48.1 (1222)	2"	15.0 (381)	445 (202)
		ANSI 300		15.5 (394)	48.3 (1227)			601 (273)
		ANSI 600		15.7 (399)	48.8 (1240)			972 (441)
10"	DN250	ANSI 150	48.7 (1237)	27.0 (686)	63.2 (1605)		16.4 (417)	805 (365)
		ANSI 300		27.1 (688)	63.5 (1613)			969 (440)
		ANSI 600		27.4 (696)	64.1 (1628)			1740 (789)
12"	DN300	ANSI 150	49.5 (1257)	29.8 (757)	68.0 (1727)		19.0 (483)	828 (376)
		ANSI 300		29.9 (759)	68.3 (1735)			1145 (519)
		ANSI 600		30.3 (770)	68.9 (1750)			2008 (911)
14"	DN350	ANSI 150	54.8 (1392)	30.8 (782)	72.1 (1831)		20.1 (511)	1282 (582)
		ANSI 300			72.2 (1834)			1634 (741)
		ANSI 600		31.1 (790)	72.8 (1849)			2851 (1293)
16"	DN400	ANSI 150	59.0 (1499)	32.8 (833)	77.6 (1971)			1509 (684)
		ANSI 300		32.9 (836)	77.9 (1979)			1953 (886)
		ANSI 600		33.5 (851)	79.0 (2007)			3578 (1623)
18"	DN450	ANSI 150	67.2 (1707)	35.2 (894)	83.9 (2131)			2186 (992)
		ANSI 300		35.2 (894)	84.0 (2134)			2858 (1296)
		ANSI 600		36.3 (922)	86.2 (2189)			5155 (2338)

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		Separator size					
psi g	bar g	8"	10"	12"	14"	16"	18"
5	**0.34**	5,754	8,871	12,576	15,153	19,812	25,190
10	**0.69**	7,020	10,822	15,342	18,487	24,171	30,733
25	**1.7**	10,933	16,855	23,894	28,791	37,643	47,862
50	**3.4**	17,262	26,613	37,728	45,460	59,437	75,573
100	**6.9**	29,576	45,597	64,640	77,888	101,836	129,481
150	**10.3**	42,005	64,759	91,805	110,620	144,631	183,894
200	**13.8**	53,744	82,856	117,460	141,533	185,049	235,283
250	**17.2**	65,713	101,308	143,618	173,052	226,259	287,681
300	**20.7**	78,257	120,647	171,034	206,087	269,451	342,597
325	**22.4**	84,587	130,405	184,868	222,756	291,245	370,307
350	**24.1**	89,881	138,566	196,438	236,697	309,472	393,483
375	**25.9**	96,671	149,034	211,277	254,578	332,851	423,208
400	**27.6**	102,770	158,438	224,608	270,641	353,853	449,911
450	**31.0**	115,084	177,422	251,521	303,069	396,252	503,819
500	**34.4**	129,355	199,422	282,709	340,650	445,387	566,293
550	**37.9**	140,403	216,455	306,855	369,744	483,427	614,640
600	**41.4**	153,062	239,971	334,523	403,082	527,015	670,080

Capacities for air and other gases available upon request.

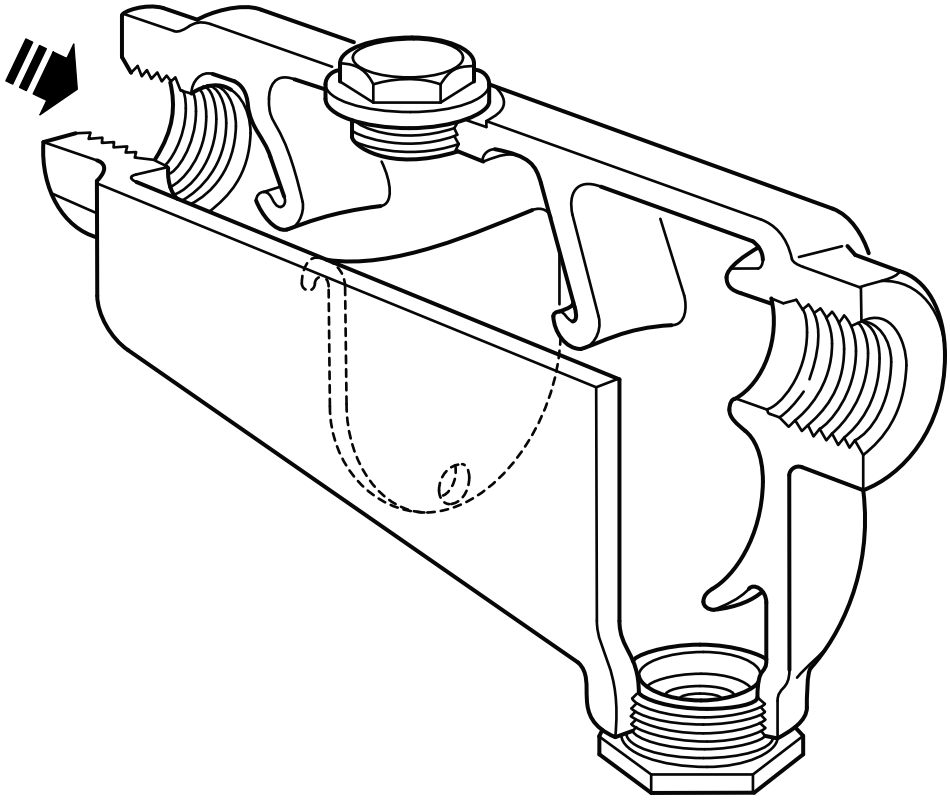
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Sample specification

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 psi g (10.3, 20.7, 41.4 bar g). 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-P023-25
CMGT Issue 5

S12
SG Iron
Separator (Screwed)



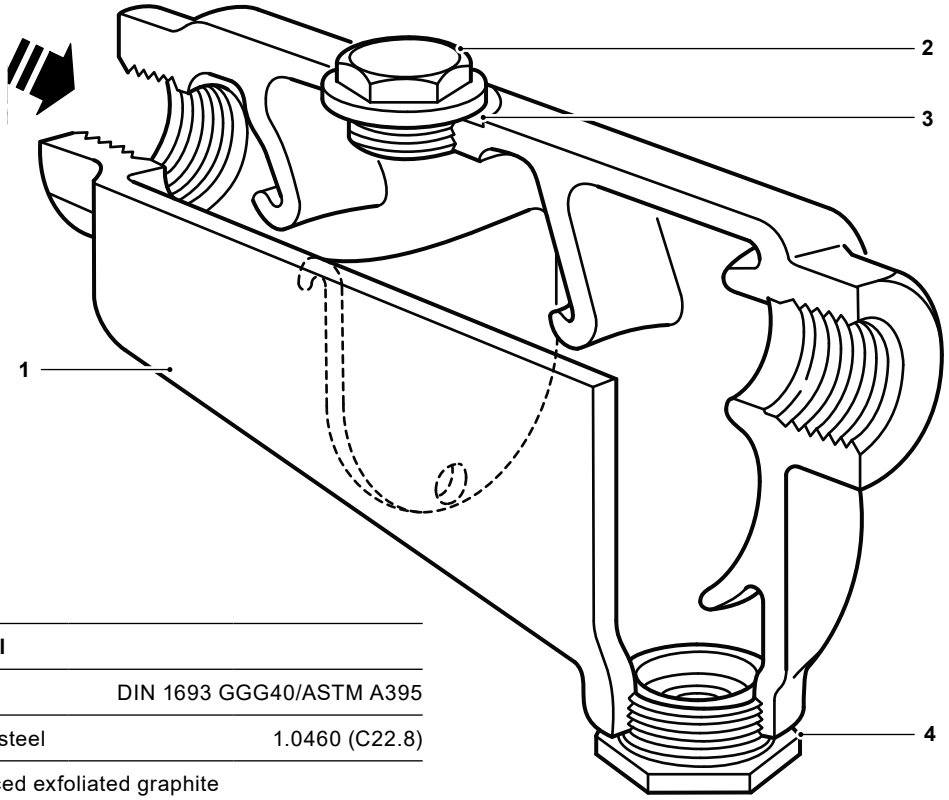
Description
The S12 separator is an SG iron baffle type separator used for the removal of entrained liquids in steam, compressed air or gas systems. The fitting of insulation jackets will increase the performance of the separator.

Standards
This product fully complies with the requirements of the Pressure Equipment Directive (PED).

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.

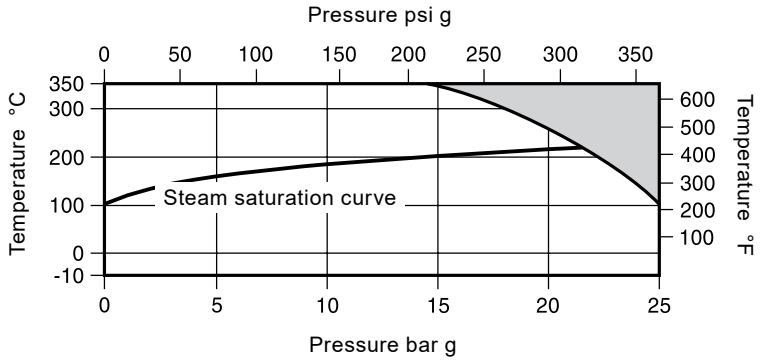
Sizes and pipe connections
1¼", 1½" and 2" screwed BSP with screwed BSP drain or
1¼", 1½" and 2" screwed NPT with screwed NPT drain.

Materials



No.	Part	Material	
1	Body	SG iron	DIN 1693 GGG40/ASTM A395
2	Plug (2" only)	Carbon steel	1.0460 (C22.8)
3	Gasket (2" only)	Reinforced exfoliated graphite	
4	Drain reducing bush	Forged carbon steel	ASTM A105

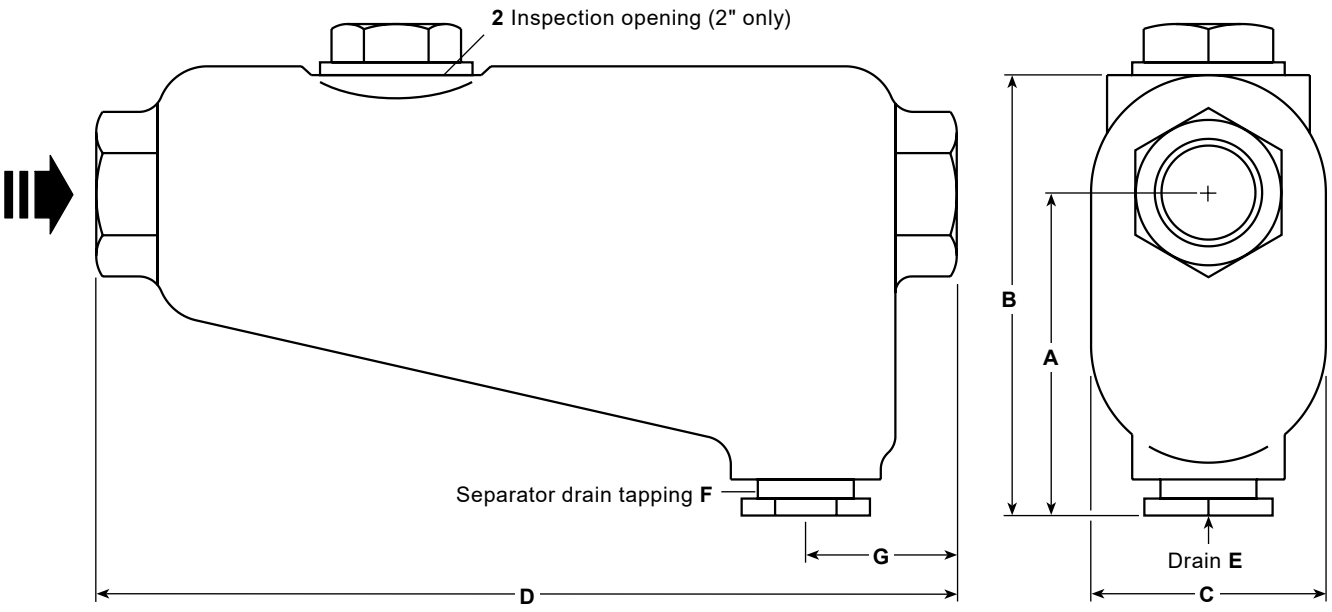
Pressure/temperature limits (ISO 6552)



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

Body design conditions			PN25
PMA	Maximum allowable pressure	25 bar g @ 100 °C	(363 psi g @ 212 °F)
TMA	Maximum allowable temperature	350 °C @ 14 bar g	(662 °F @ 203 psi g)
Minimum allowable temperature		-10 °C	(14 °F)
PMO	Maximum operating pressure for saturated steam service	21.3 bar g	(309 psi g)
TMO	Maximum operating temperature	350 °C @ 14 bar g	(662 °F @ 203 psi g)
Minimum operating temperature **Note:** For lower operating temperatures consult Spirax Sarco.		-10 °C	(14 °F)
Designed for a maximum cold hydraulic test pressure of:		38 bar g	(551 psi g)

Dimensions, weights and volumes approximate in mm (inches), kg (lbs) and litres (gallons)



	Size	A	B	C	D	E	F	G	Weight	Volume
mm, kg and litres	1¼" 1½"	111	156	89	304	12.7	25.4	60	9.0	1.5
	2"	146	205	117	397	12.7	25.4	71	17.0	3.2

	Size	A	B	C	D	E	F	G	Weight	Volume
inches, lbs and gallons	1¼" 1½"	4.37	6.14	3.5	12	½"	1"	2.36	19.8	0.40
	2"	5.75	8.07	4.61	15.6	½"	1"	2.80	37.5	0.85

Recommended tightening torques

Item	Size	or mm		N m	(lbf ft)
2	2"	46 A/F	M56	150 - 165	(110 - 121)

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

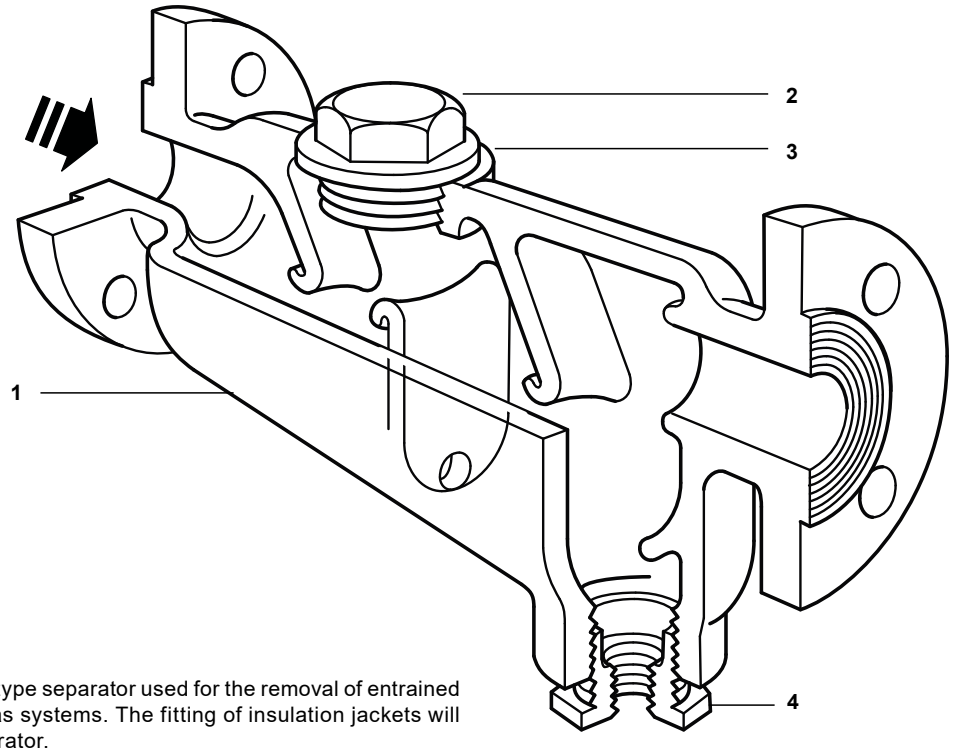
This product is recyclable. No ecological hazard is anticipated with the disposal of this product, providing due care is taken.

How to order

Example: 1 off 2" Spirax Sarco S12 separator with SG iron body having screwed BSP connections.

TI-P023-26
CMGT Issue 13

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 EU Pressure Equipment Directive / UK Pressure Equipment (Safety) Regulations and is designed in accordance with ASME B31.3.

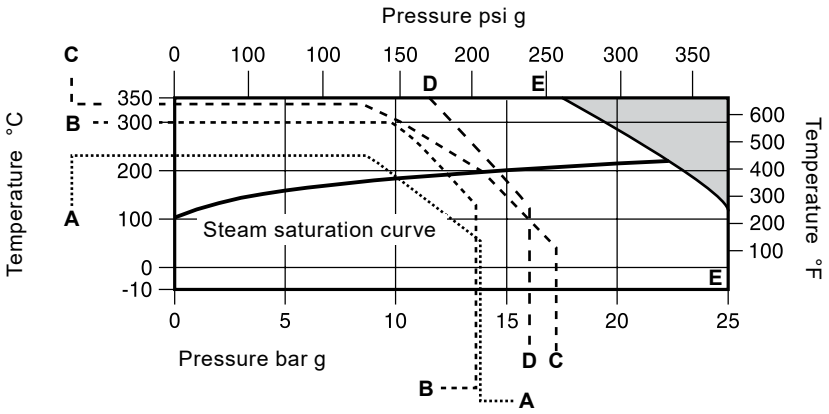
Certification
This product is available with a manufacturers' Typical Test Report.
Note: All certification/inspection requirements must be stated at the time of order placement.

Sizes and pipe connections
DN40, DN50, DN65, DN80, DN100, DN125, DN150 and DN200 (1½", 2", 2½", 3", 4", 5", 6", and 8").
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 ASME125/150 with screwed NPT drain

Materials

No.	Part	Material	
1	Body	SG iron	BS EN 1563/EN-JS1030/A395
2	Plug	Carbon steel	1.0460 (C22.8)/A105N
3	Gasket	Reinforced exfoliated graphite	
4	Drain reducing bush	Forged carbon steel	ASTM A105

Pressure/temperature limits (ISO 6552)



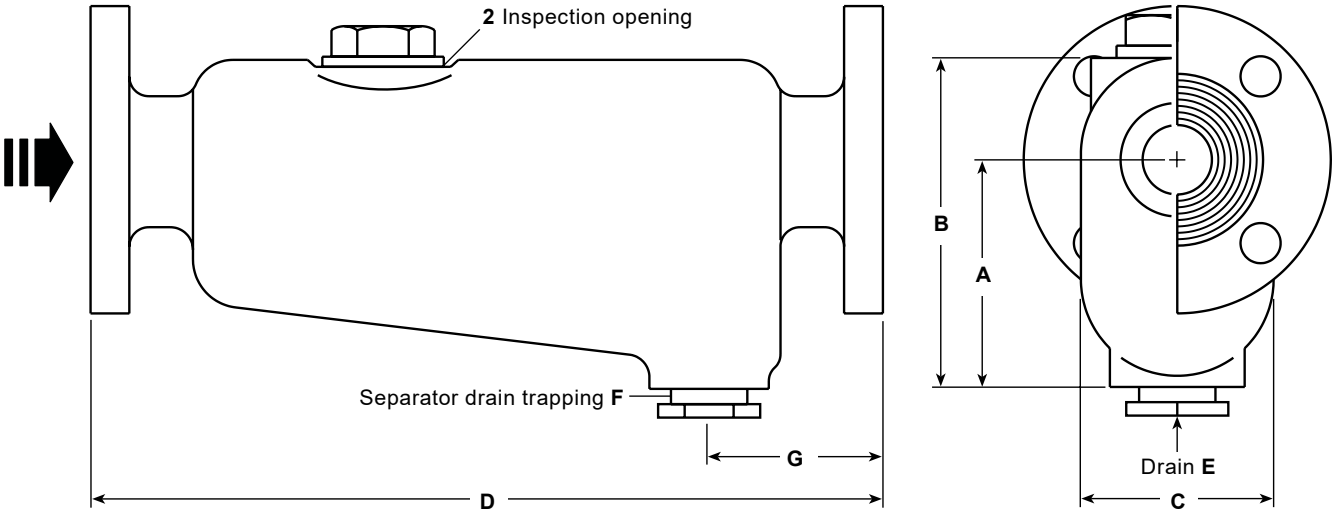
The product **must not** be used in this region.

A - A	.....	ASME 125
B - B	-------	Flanged JIS/KIS 10K
C - C	- - - - -	ASME 150
D - D	- - - -	Flanged EN 1092 PN16
C - D - E	———	Flanged EN 1092 PN25 and JIS 20K

Body design conditions			PN25
PMA Maximum allowable pressure	JIS/KS10	14 bar g @ 120 °C	(203 psi g @ 248 °F)
	PN16	16 bar g @ 120 °C	(232 psi g @ 248 °F)
	PN25 and JIS/KS20	25 bar g @ 120 °C	(363 psi g @ 248 °F)
	ASME125	13.8 bar g @ 65 °C	(200 psi g @ 149 °F)
	ASME150	17.2 bar g @ 38 °C	(250 psi g @ 100 °F)
TMA Maximum allowable temperature	JIS/KS10	300 °C @ 10 bar g	(572 °F @ 145 psi g)
	PN16	350 °C @ 11.2 bar g	(662 °F @ 162 psi g)
	PN25 and JIS/KS20	350 °C @ 17.5 bar g	(662 °F @ 254 psi g)
	ASME125	232 °C @ 8.6 bar g	(450 °F @ 125 psi g)
	ASME150	343 °C @ 8.6 bar g	(650 °F @ 125 psi g)
Minimum allowable temperature		-10 °C	(14 °F)
PMO Maximum operating pressure for saturated steam service	JIS / KS 10K	12.3 bar g	(178 psi g)
	PN16	13.7 bar g	(198 psi g)
	PN25 and JIS/KS20	21.3 bar g	(309 psi g)
	ASME125	10.1 bar g	(146 psi g)
	ASME150	13.9 bar g	(202 psi g)
TMO Maximum operating temperature	JIS/KS10	300 °C @ 10 bar g	(572 °F @ 145 psi g)
	PN16	350 °C @ 11.2 bar g	(662 °F @ 162 psi g)
	PN25 and JIS/KS20	350 °C @ 17.5 bar g	(662 °F @ 254 psi g)
	ASME125	232 °C @ 8.6 bar g	(450 °F @ 125 psi g)
	ASME150	343 °C @ 8.6 bar g	(650 °F @ 125 psi g)
Minimum operating temperature **Note:** For lower operating temperatures consult Spirax Sarco.		-10 °C	(14 °F)
Designed for a maximum cold hydraulic test pressure of:	JIS / KS 10K	20.4 bar g	(296 psi g)
	PN16	24.0 bar g	(348 psi g)
	PN25 and JIS/KS20	37.5 bar g	(544 psi g)
	ASME125	20.7 bar g	(300 psi g)
	ASME150	25.8 bar g	(374 psi g)

Note: Flanged separators (S13) 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.

Dimensions, weight and volumes (approximate)



	Size		A	B	C	D	E	F	G	Weight	Volume
mm, kg and litres	DN40	1½"	111	156	89	365	12.7	25.4	94	14	1.6
	DN50	2"	146	205	117	456			98	25	3.2
	DN65	2½"	178	249	146	406	19.0	38.1		28	4.6
	DN80	3"		252	152	483	25.4			36	6.5
	DN100	4"	223	315	197	692			118	60	13.5
	DN125	5"	226	397	381	706			121	128	38.5
	DN150	6"								130	42.5
	DN200	8"	308	502	426	762	38.1		140	190	68.0

	Size		A	B	C	D	E	F	G	Weight	Volume
inches, lbs and gallons	DN40	1½"	4.37	6.14	3.50	14.4	½"	1"	3.70	30.9	0.42
	DN50	2"	5.75	8.07	4.61	18.0			3.86	55.1	0.84
	DN65	2½"	7.00	9.80	5.75	16.0	¾"	1½"		61.7	1.21
	DN80	3"		9.92	5.98	19.0	1"			79.4	1.72
	DN100	4"	8.78	12.4	7.76	27.2			4.64	132.3	3.57
	DN125	5"	8.90	15.6	15.0	27.8			4.76	282.2	10.2
	DN150	6"								286.6	11.2
	DN200	8"	12.1	19.8	16.8	30.0	1½"		5.51	418.9	18.0

Recommended tightening torques

Item	Size		or mm		N m	(lbf ft)
2	DN40	1½"	46 A/F	M56	150 - 165	(110 - 121)
	DN50	2"	46 A/F	M56	150 - 165	(110 - 121)
	DN65	2½"	46 A/F	M56	150 - 165	(110 - 121)
	DN80	3"	60 A/F	M72	190 - 210	(140 - 155)
	DN100	4"	60 A/F	M72	190 - 210	(140 - 155)
	DN125	5"	60 A/F	M72	190 - 210	(140 - 155)
	DN150	6"	60 A/F	M72	190 - 210	(140 - 155)
	DN200	8"	60 A/F	M72	190 - 210	(140 - 155)

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.

TI-P023-11
CMGT Issue 16

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 EU Pressure Equipment Directive/UK Pressure Equipment (Safety) Regulations and carries the CE / UKCA 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.

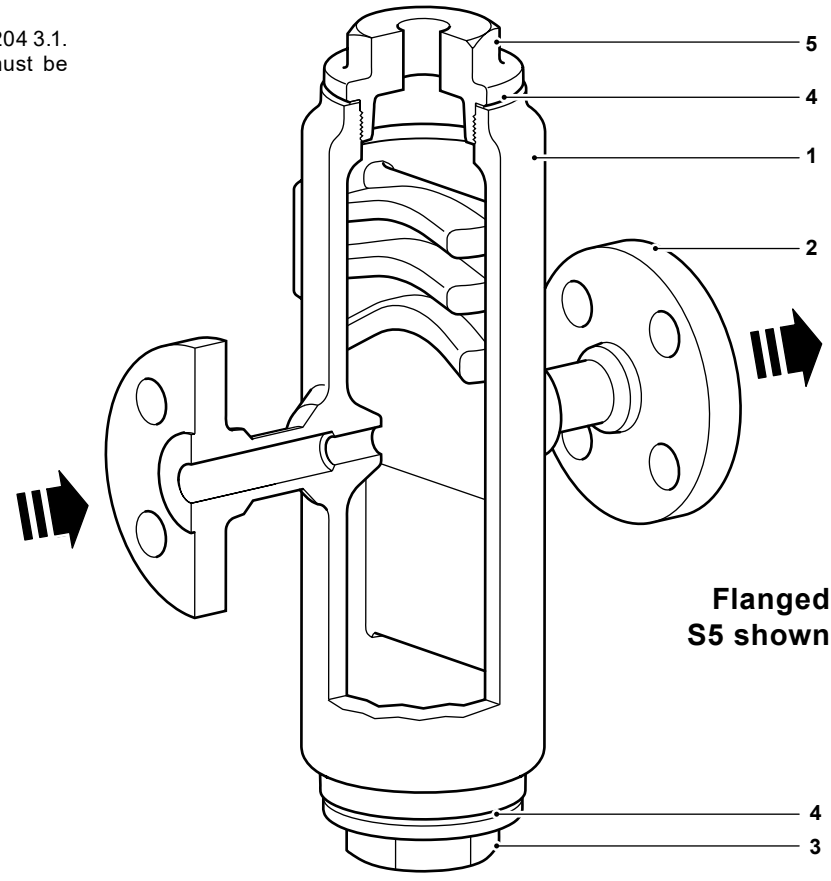
Sizes and pipe connections
½", ¾", 1", 1¼", 1½" and 2"
Screwed BSP or NPT, butt weld, socket weld.

DN15, DN20, DN25, DN32, DN40 and DN50.
Flanged EN 1092 PN40 with screwed BSP drain and air vent.

Flanged BS 1560 (ASME) Class 150 or 300 with screwed NPT drain and air vent.

Flanged JIS/KS 10K and 20K with screwed BSP drain and air vent.

Note: For larger sizes use an S7 separator. See TI-P138-03.

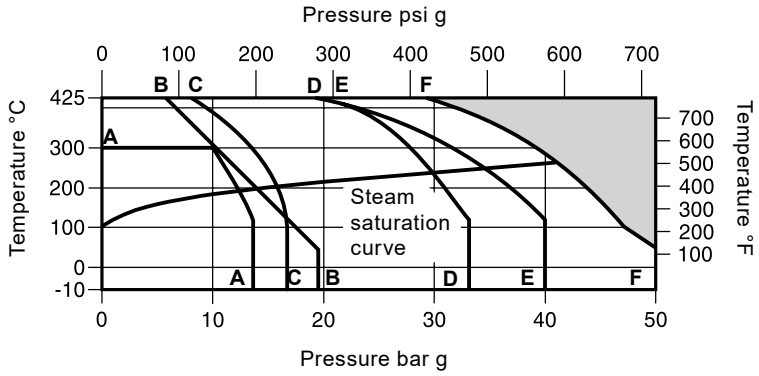


Flanged S5 shown

Materials

No.	Part	Material	
1	Body	Carbon steel	1.0619 +N/ASTM A216 WCB
2	Flange	Carbon steel	DIN 17243 C22.8/ASTM A105N
3	Cap	Carbon steel	1.0460
4	Cap gasket	Tanged graphite	
5	Cap	Carbon steel	1.0460

Pressure/temperature limits



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

A - A Flanged JIS/KS 10K.

B - B Flanged ASME Class 150.

C - C Flanged EN 1092 PN16.

D - D Flanged JIS/KS 20K.

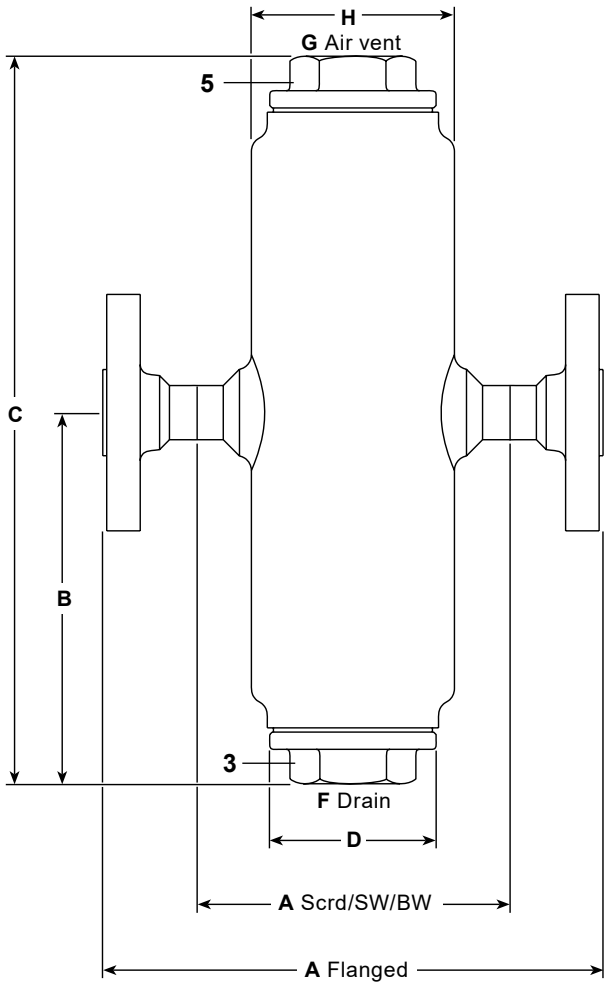
E - E Flanged EN 1092 PN40.

F - F Screwed BSP, NPT, socket weld and butt weld.

Body design conditions			PN50 or ASME 300
PMA Maximum allowable pressure		50 bar g @ 50 °C	725 psi g @ 122 °F
TMA Maximum allowable temperature		425 °C @ 28 bar g	797 °F @ 406 psi g
Minimum allowable temperature		-10 °C	14 °F
PMO Maximum operating pressure for saturated steam service	JIS/KS 10K	12.5 bar g	181 psi g
	PN16	13.8 bar g	200 psi g
	ASME 150	15.0 bar g	218 psi g
	JIS/KS 20K	30.0 bar g	435 psi g
	PN40	35.9 bar g	521 psi g
	ASME 300	41.4 bar g	600 psi g
	Scrd/SW/BW	41.4 bar g	600 psi g
TMO Maximum operating temperature		425 °C @ 28 bar g	797 °F @ 406 psi g
Minimum operating temperature **Note:** For lower operating temperatures consult Spirax Sarco.		-10 °C	14 °F
Designed for a maximum cold hydraulic test pressure of:	JIS/KS 10K	20.6 bar g	299 psi g
	PN16	24.0 bar g	348 psi g
	ASME 150	30.0 bar g	435 psi g
	JIS/KS 20K	50.0 bar g	725 psi g
	PN40	60.0 bar g	870 psi g
	ASME 300	76.6 bar g	1 111 psi g
	Scrd/SW/BW	76.6 bar g	1 111 psi g

Note: Flanged separators (S5) 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.

Dimensions (approximate) in mm and inches



	Size	Screwed SW, BW A	PN16 A	PN40 A	ASME 150 A	ASME 300 A	JIS/KS 10K & 20K A	B	C	D	F	G	H
mm	DN15 - ½"	130	-	204	204	204	204	150	294	68	25.4	12.7	83
	DN20 - ¾"			212	212	212	212	146	347				
	DN25 - 1"	178		260	260	260	260	170.5	386				130
	DN32 - 1¼"	190		277	277	277	277	195	440				144
	DN40 - 1½"	220		314	314	314	314	208	508			25.4	168
	DN50 - 2"	214							558				

	Size	Screwed SW, BW A	PN16 A	PN40 A	ASME 150 A	ASME 300 A	JIS/KS 10K & 20K A	B	C	D	F	G	H
inches	DN15 - ½"	5.12	-	8.03	8.03	8.03	8.03	5.91	11.57	2.68	1"	½"	3.27
	DN20 - ¾"			8.35	8.35	8.35	8.35	5.75	13.66				
	DN25 - 1"	7.01		10.24	10.24	10.24	10.24	6.71	15.20				5.12
	DN32 - 1¼"	7.48		10.91	10.91	10.91	10.91	7.68	17.32				5.67
	DN40 - 1½"	8.66		12.36	12.36	12.36	12.36	8.19	20.00			1"	6.61
	DN50 - 2"	8.42							21.97				

Weights/volume (approximate) in kg and litres / lbs and gallons

	Size	Weight		Volume	
		Scrd/SW/BW	Flanged	Scrd/SW/BW	Flanged
kg and litres	DN15 - ½"	5.8	7.4	0.71	0.72
	DN20 - ¾"	6.75	9.1	0.90	0.92
	DN25 - 1"	12	14.8	2.83	2.86
	DN32 - 1¼"	15.9	20	4.15	4.19
	DN40 - 1½"	22.0	26.6	6.93	7.00
	DN50 - 2"	23.9	30.1	7.74	7.88

	Size	Weight		Volume	
		Scrd/SW/BW	Flanged	Scrd/SW/BW	Flanged
lbs and gallons	DN15 - ½"	12.79	16.31	0.19	0.19
	DN20 - ¾"	14.88	20.06	0.24	0.24
	DN25 - 1"	26.46	32.63	0.75	0.76
	DN32 - 1¼"	35.05	44.09	1.10	1.11
	DN40 - 1½"	48.50	58.64	1.83	1.85
	DN50 - 2"	52.69	66.36	2.04	2.08

Recommended tightening torques

Item	Size		N m	(lbf ft)
3 and 5	DN15 - DN50	46 A/F	300	(222)

7.3
26

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 DN20 S5 separator with a carbon steel body flanged to EN 1092 PN40.

TI-P023-12
CMGT Issue 18

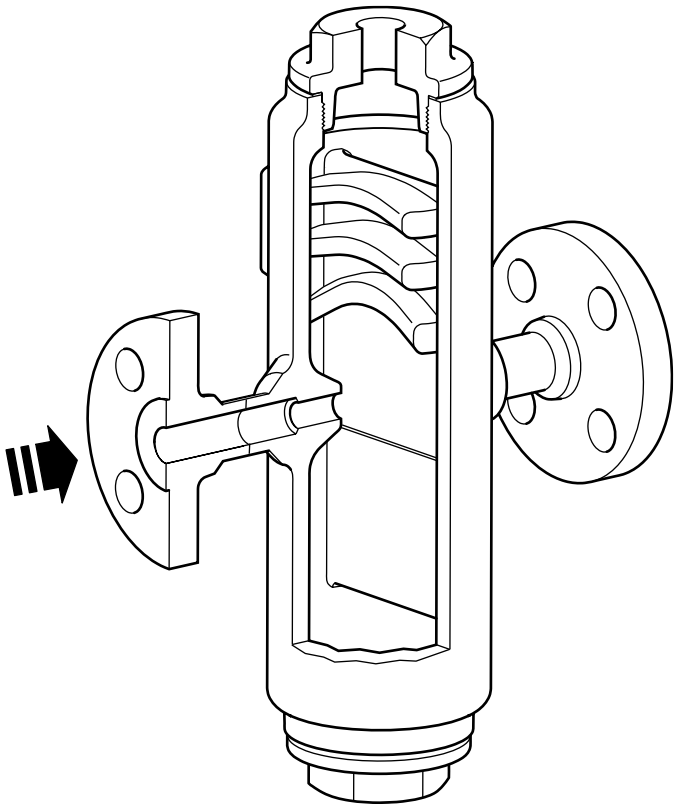
S6
Austenitic Stainless Steel Separator

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 2014/68/EU 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
½", ¾", 1", 1¼", 1½" and 2"
Screwed BSP T Rp (ISO 7-1) or NPT, butt weld, socket weld.

DN15, DN20, DN25, DN32, DN40 and DN50.
Flanged EN 1092 PN40 with screwed BSP drain and air vent.

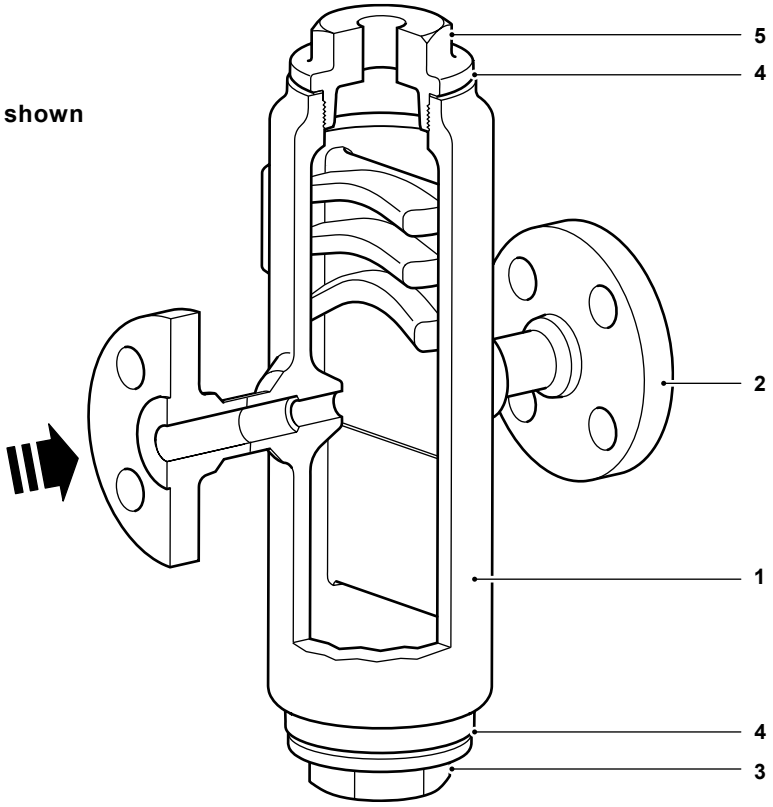
Flanged BS 1560 (ASME B 16.5) Class 150 or 300 with screwed NPT drain and air vent.

Flanged JIS/KS 10K and 20K with screwed BSP drain and air vent.

Note: For larger sizes use an S8 separator. See TI-P138-10.

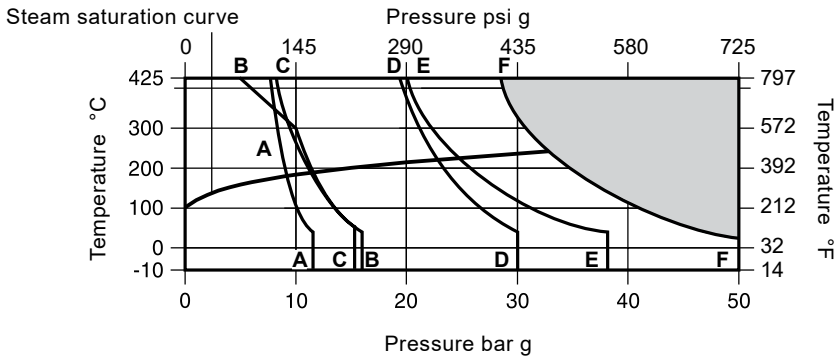
Materials

Flanged S6 shown



No.	Part	Material	
1	Body	Austenitic stainless steel 316L	1.4409/ASTM A351CF3M
2	Flange	Austenitic stainless steel	1.4404 ASTM A182 F316L
3	Cap	Austenitic stainless steel	ASTM A351 Gr.CF3M (316L)
4	Cap gasket	Tanged graphite	
5	Cap	Austenitic stainless steel	ASTM A351 Gr.CF3M (316L)

Pressure/temperature limits (ISO 6552)



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

A - A Flanged JIS/KS 10K.

B - B Flanged ASME Class 150.

C - C Flanged EN 1092 PN16.

D - D Flanged JIS/KS 20K.

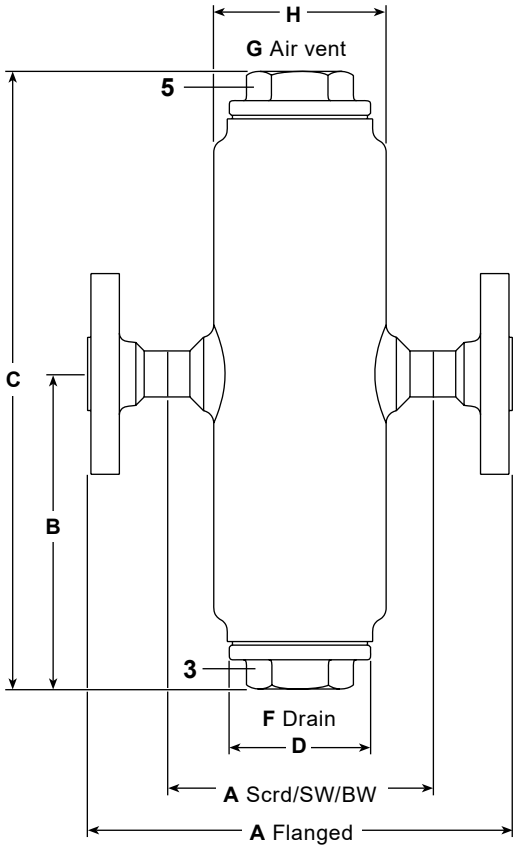
E - E Flanged EN 1092 PN40.

F - F Flanged ASME Class 300 screwed BSP, NPT, socket weld and butt weld.

Body design conditions				PN50 or ASME 300
PMA	Maximum allowable pressure		50 bar g @ 50 °C	725 psi g @ 122 °F
TMA	Maximum allowable temperature		425 °C @ 28 bar g	797 °F @ 406 psi g
Minimum allowable temperature			-10 °C	14 °F
PMO	Maximum operating pressure for saturated steam service	JIS/KS 10K	9.9 bar g	144 psi g
		PN16	11.4 bar g	165 psi g
		ASME 150	11.4 bar g	165 psi g
		JIS/KS 10K	23.5 bar g	341 psi g
		PN40	25.8 bar g	374 psi g
		ASME 300	34.1 bar g	495 psi g
		Scrd/SW/BW	34.1 bar g	495 psi g
TMO	Maximum operating temperature		425 °C @ 28 bar g	797 °F @ 406 psi g
Minimum operating temperature **Note:** For lower operating temperatures consult Spirax Sarco.			-10 °C	14 °F
Designed for a maximum cold hydraulic test pressure of:		JIS/KS 10K	20.6 bar g	299 psi g
		PN16	24.0 bar g	348 psi g
		ASME 150	30.0 bar g	435 psi g
		JIS/KS 10K	50.0 bar g	725 psi g
		PN40	60.0 bar g	870 psi g
		ASME 300	76.6 bar g	1111 psi g
		Scrd/SW/BW	76.6 bar g	1111 psi g

Note: Flanged separators (S6) 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.

Dimensions (approximate) in mm (inches)



Recommended tightening torques

Item	Size		N m	(ft lbf)
3 and **5**	DN15 - DN50	46 A/F	300	(221)

Size	Screwed SW, BW A	PN16 A	PN40 A	ASME 150 A	ASME 300 A	JIS/KS 10K & 20K A	B	C	D	F	G	H
DN15 - ½"	130 (5.12)	-	204 (8.03)	204 (8.03)	204 (8.03)	204 (8.03)	150 (5.91)	294 (11.6)	68 (2.68)	1" (25.4)	½" (12.7)	83 (3.27)
DN20 - ¾"		-	212 (8.35)	212 (8.35)	212 (8.35)	212 (8.35)	146 (5.75)	347 (13.7)				
DN25 - 1"	178 (7.01)	-	260 (10.2)	260 (10.2)	260 (10.2)	260 (10.2)	170.5 (6.71)	386 (15.2)				130 (5.12)
DN32 - 1¼"	190 (7.48)	-	277 (10.9)	277 (10.9)	277 (10.9)	277 (10.9)	195	440				144 (5.67)
DN40 - 1½"	220 (8.66)	-	314 (12.4)	314 (12.4)	314 (12.4)	314 (12.4)	208 (8.19)	508 (20.0)			1" (25.4)	168 (6.61)
DN50 - 2"	214 (8.43)	-						558 (22.0)				

Weights/volume (approximate) kg (lbs) and litres (gallons)

Size	Weight		Volume	
	Screwed Socket weld Butt weld	Flanged	Screwed Socket weld Butt weld	Flanged
DN15 - ½"	6.0 (13.2)	7.5 (16.5)	0.71 (0.188)	0.72 (0.19)
DN20 - ¾"	6.9 (15.2)	9.2 (20.3)	0.90 (0.24)	0.92 (0.24)
DN25 - 1"	12.2 (26.9)	15.1 (33.3)	2.83 (0.75)	2.86 (0.76)
DN32 - 1¼"	16.2 (35.7)	20.4 (45.0)	4.15 (1.10)	4.19 (1.11)
DN40 - 1½"	22.5 (49.6)	27.3 (60.2)	6.93 (1.83)	7.00 (1.85)
DN50 - 2"	24.4 (53.8)	30.8 (37.9)	7.74 (2.04)	7.88 (2.08)

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 DN20 S6 separator with an austenitic stainless steel body flanged to EN 1092 PN40.

TI-S99-10-US
Issue 1

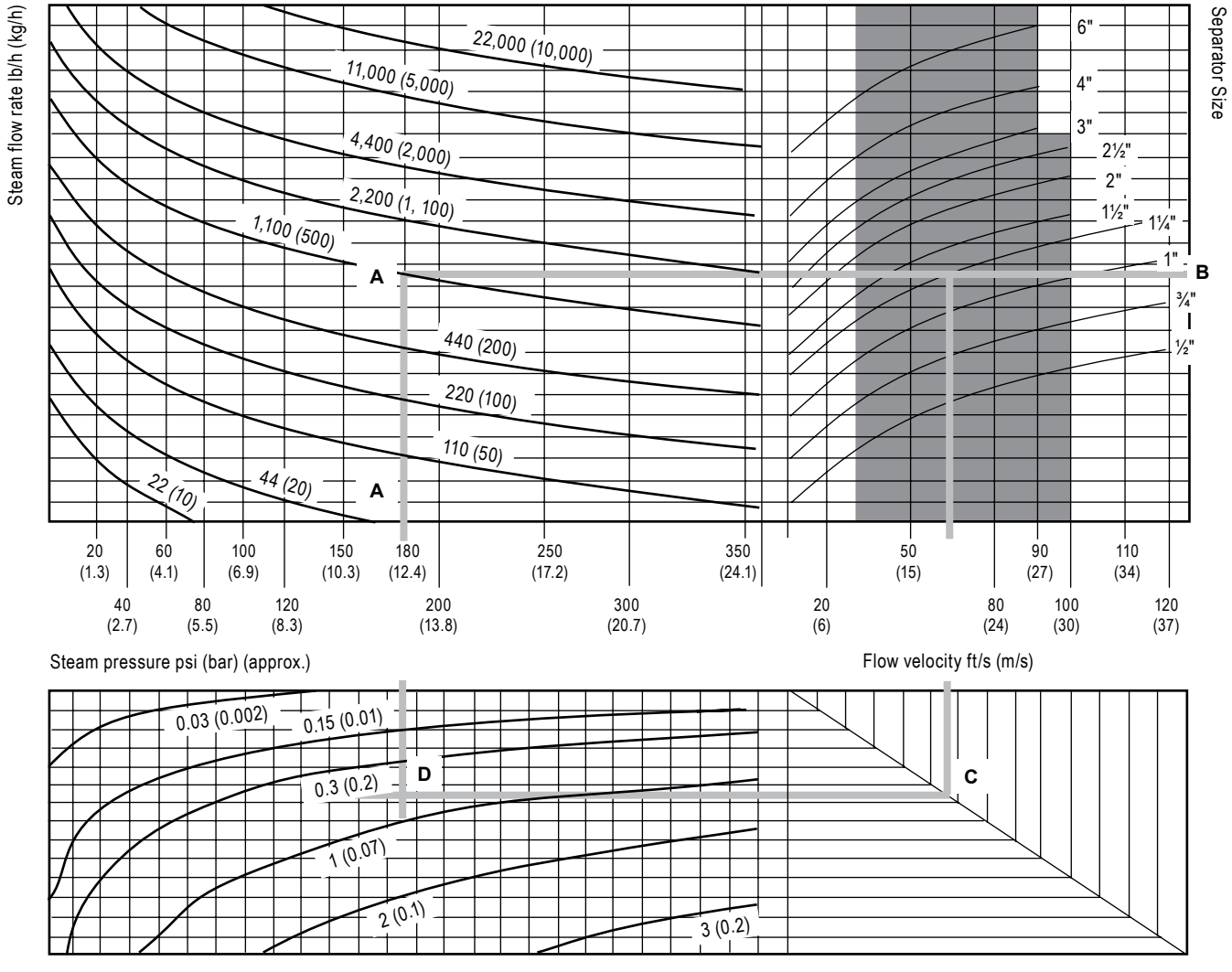
Sizing Chart for S5 and S6 Separators

Steam Sizing Chart

Sizing example

1. Taking a steam pressure of 180 psi g (12.4 bar g) and flow rate of 1100 lb/h (500 kg/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 (18 m/s) for 1¼" (DN32) 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 (0.03 bar).
6. Separators should be selected on the basis of the best compromise between line size, velocity and pressure drop for each application.

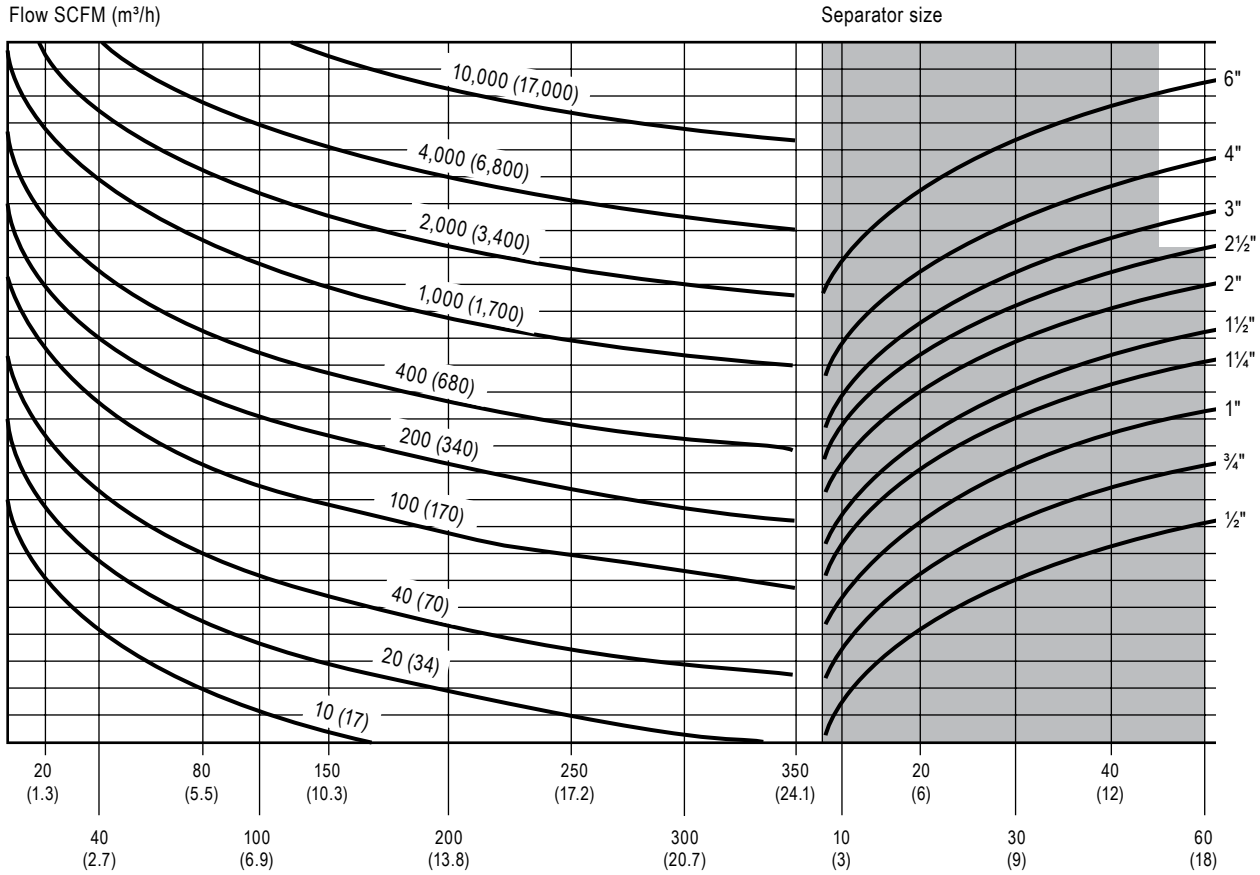
The shaded area denotes recommended selection for better than 99% separation efficiency.

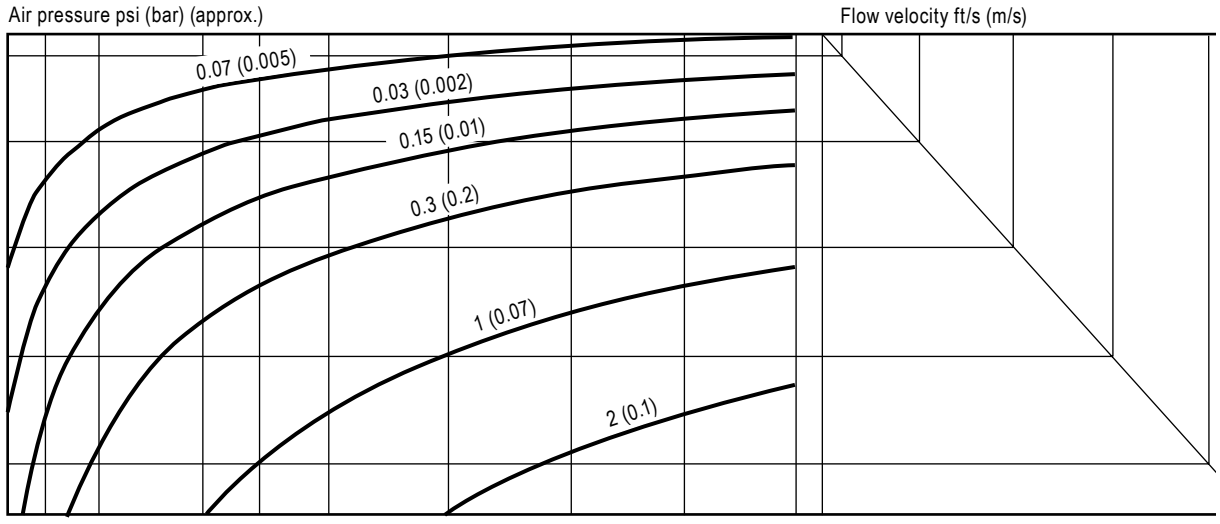


Note: Any Separator curve that is bisected within the shaded area will operate at near 100% efficiency.

First for Steam Solutions
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Separator Flow Velocity and Pressure Drop for compressed Air





Note: Any Separator curve that is bisected within the shaded area will operate at near 100% efficiency.

TI-P712-04
CMGT Issue 1

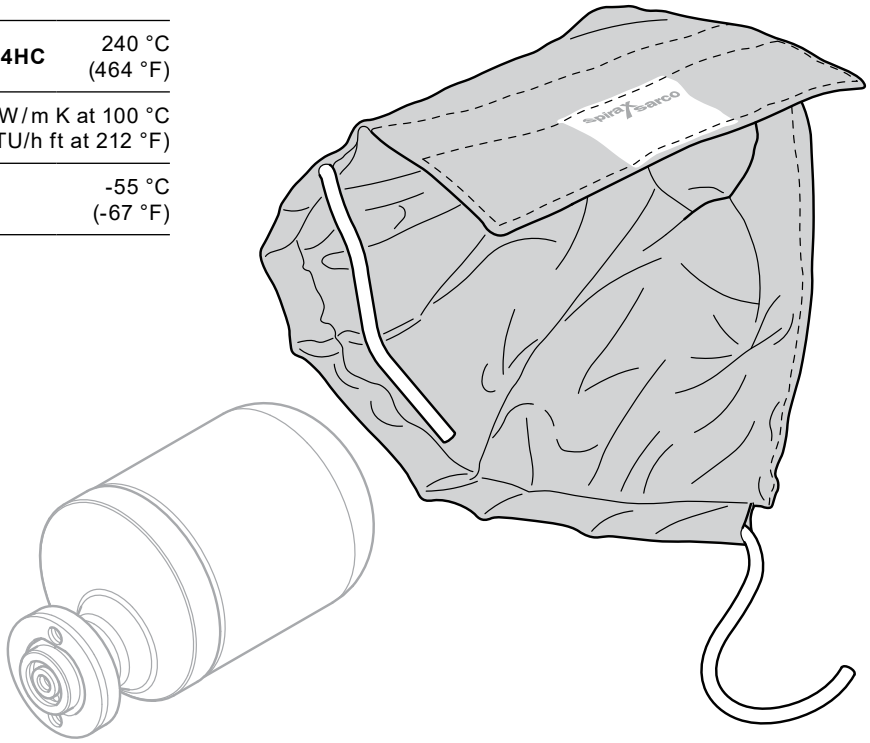
IJ-UFT14HC
Insulation Jackets

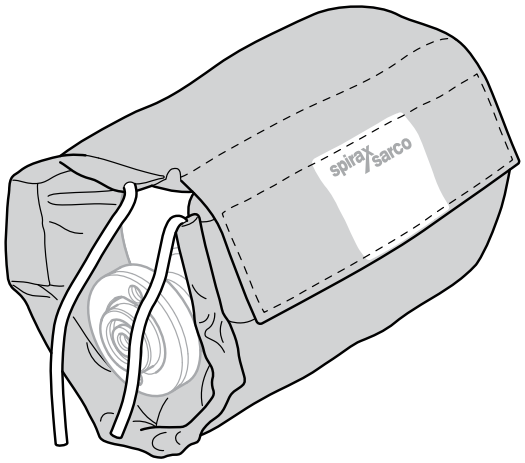
Description

The IJ-UFT14HC is an insulation jacket for fitting to the UFT14HC, when fitted to a pipeline connector or STS17.2 trapping station. It is constructed from a silicone coated E-Glass fabric with a mineral fibre insulation, suitable for both indoor and outdoor installations.

Limiting conditions

Maximum service temperature of the UFT14HC	240 °C (464 °F)
Thermal conductivity	0.042 W/m K at 100 °C (0.0243 BTU/h ft at 212 °F)
Minimum ambient temperature	-55 °C (-67 °F)

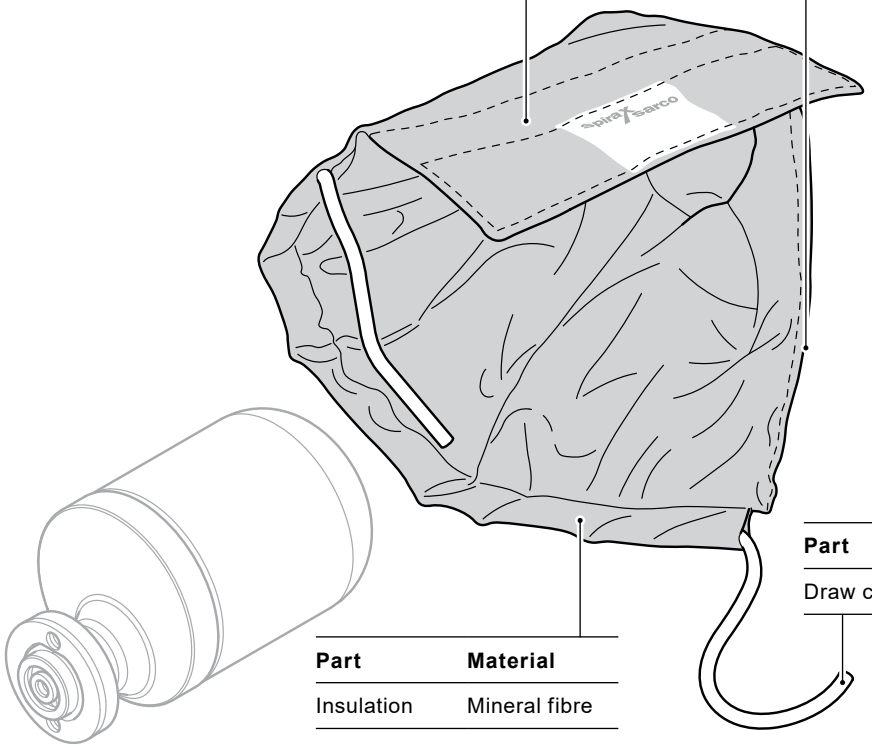




IJ-UFT14HC insulation jacket shown fitted to a UFT14HC sealed steam trap.

Materials

Part	Material
Inner and outer cover surface	Silicone coated E-Glass fabric

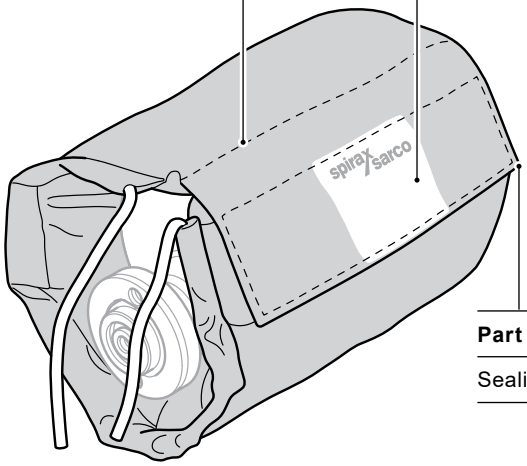


Part	Material
Draw cords	Braided Para-Aramid

Part	Material
Insulation	Mineral fibre

Part	Material
Stitching	Polyester cotton

Part	Material
Label	Nylon



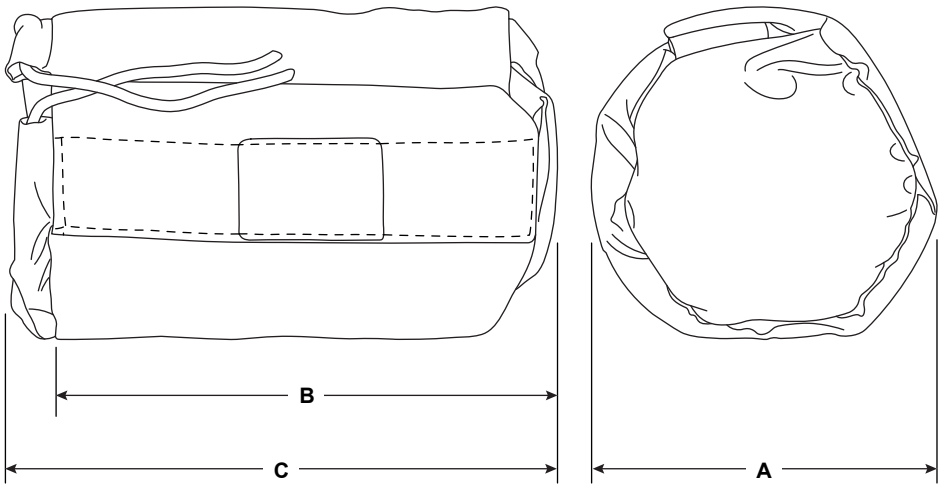
Part	Material
Sealing	Hook and loop tape fastener

How to order
Example: 1 off IJ-UFT14HC insulation jacket to fit a UFT14HC steam trapping station.

Spare parts
There are no spare parts available for the IJ-UFT14HC insulation jackets.

Dimensions/weights (approximate) in mm and kgs (inches and lbs)

Size	A	B	C	Insulation thickness	Weight
IJ-UFT14HC	235	480	555	50	0.59
	(9.25)	(18.89)	(21.85)	(1.96)	(1.30)



Safety information, installation and maintenance

Installation
Extra care must be taken if the UFT14HC is in operation as it is likely to be operating at steam temperature. Ensure that adequate personal protection equipment is used to avoid injury.
Once the UFT14HC has been installed, the insulation jacket can be fitted. Slide the insulating jacket over the UFT14HC and press the hook and loop strips together to close the jacket. Pull and securely tie the draw cords.

Removal
Before removing the jacket, check if the UFT14HC is in service. If it is the surface of the UFT14HC will be hot enough to burn and suitable protective clothing (gloves) should be worn. Removal is the reverse procedure to the above.

Maintenance
There are no spare parts available for the IJ-UFT14HC insulation jackets.

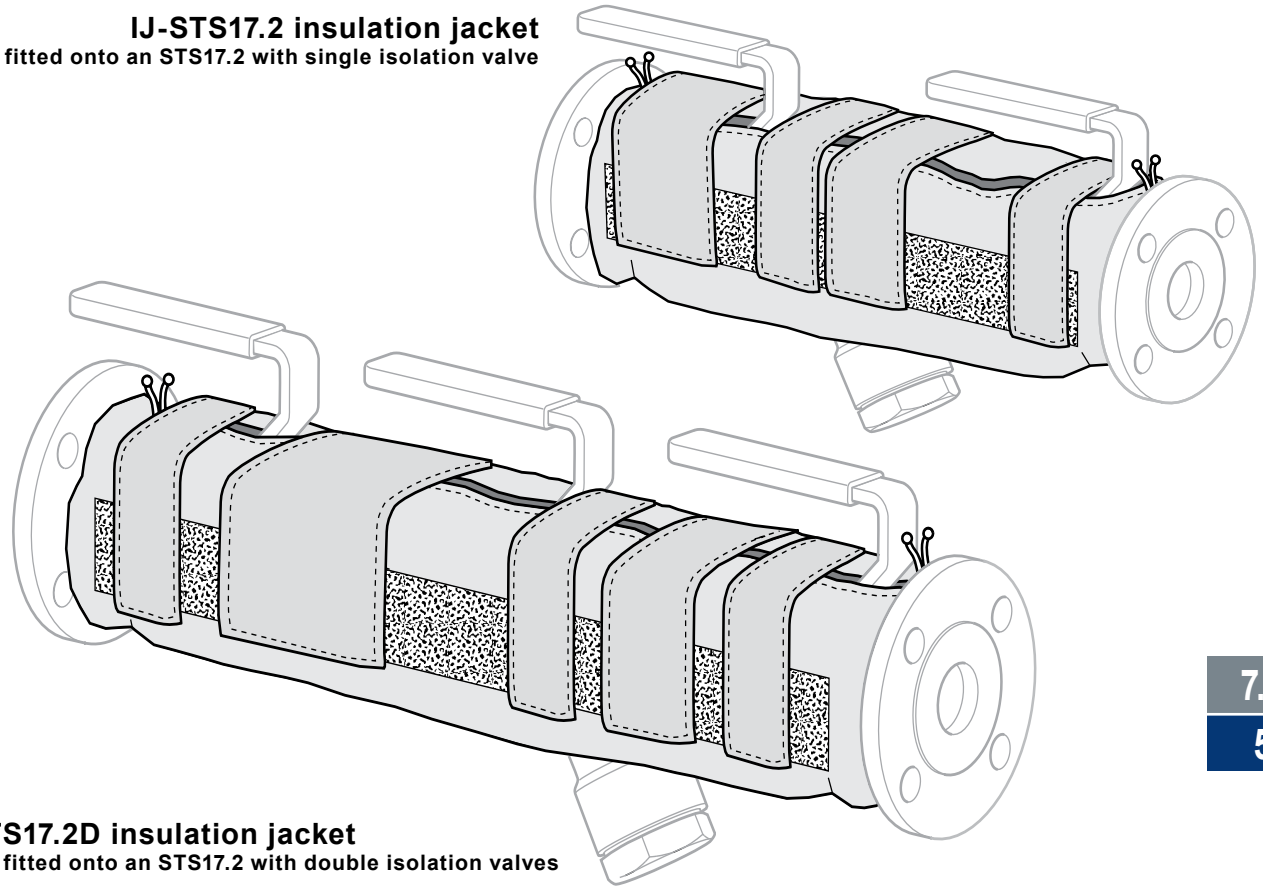
Handling
When the jacket is new, the insulation material is fully enclosed within the inner and outer face and retained by the stitching. In this condition, for handling, no special protective clothing is required.
However, if the inner or outer faces have become damaged or unstitched, so as to expose the insulation material, suitable protective clothing (e.g. gloves, safety glasses, face mask and overalls) should be worn.

Disposal
This product is not recyclable and is non-combustible. For disposal purposes consider the product to be mineral fibre and dispose of in accordance with local regulations.

TI-P128-27
CMGT Issue 3

IJ-STS17.2 and IJ-STS17.2D Insulation Jackets for the STS17.2 Steam Trapping Station

IJ-STS17.2 insulation jacket
shown fitted onto an STS17.2 with single isolation valve



IJ-STS17.2D insulation jacket
shown fitted onto an STS17.2 with double isolation valves

Description

The IJ-STS17.2 and IJ-STS17.2D are a range of insulation jackets for fitting to STS17.2 steam trapping stations. They are a one piece design that insulates all parts of the STS17.2 accept for the operating handles and steam trap connection. They are constructed from a silicone rubber class fibre with a mineral fibre insulation, suitable for both indoor and outdoor installations.

Available types

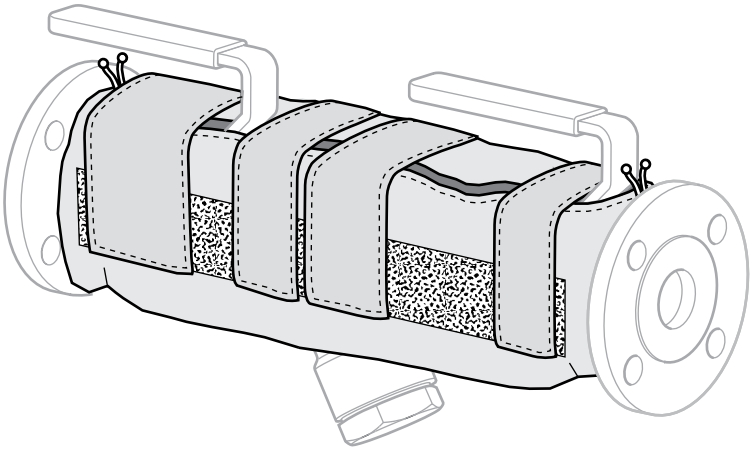
There are two types of insulation jacket available for the STS17.2 steam trapping station sizes ½" to 1". They are both of a one piece design with velcro and draw cord fastenings for easy installation.
IJ-STS17.2 to fit onto an STS17.2 with single isolation valve.
IJ-STS17.2D to fit onto an STS17.2 with double isolation valves.

Limiting conditions

Maximum surface temperature of the STS17.2	220 °C	(428 °F)
Thermal conductivity	0.044 W/m K at 100 °C	(0.025 BTU/h ft at 212 °F)

Materials

IJ-STS17.2 insulation jacket shown fitted onto an STS17.2 with single isolation valve



No.	Part	Material
1	Inner and outer cover surface	Silicone rubber coated glass fibre
2	Insulation	Mineral fibre
3	Stitching	Polyester cotton
4	Sealing	Velcro
5	Draw cords	Nylon
6	Label	Nylon

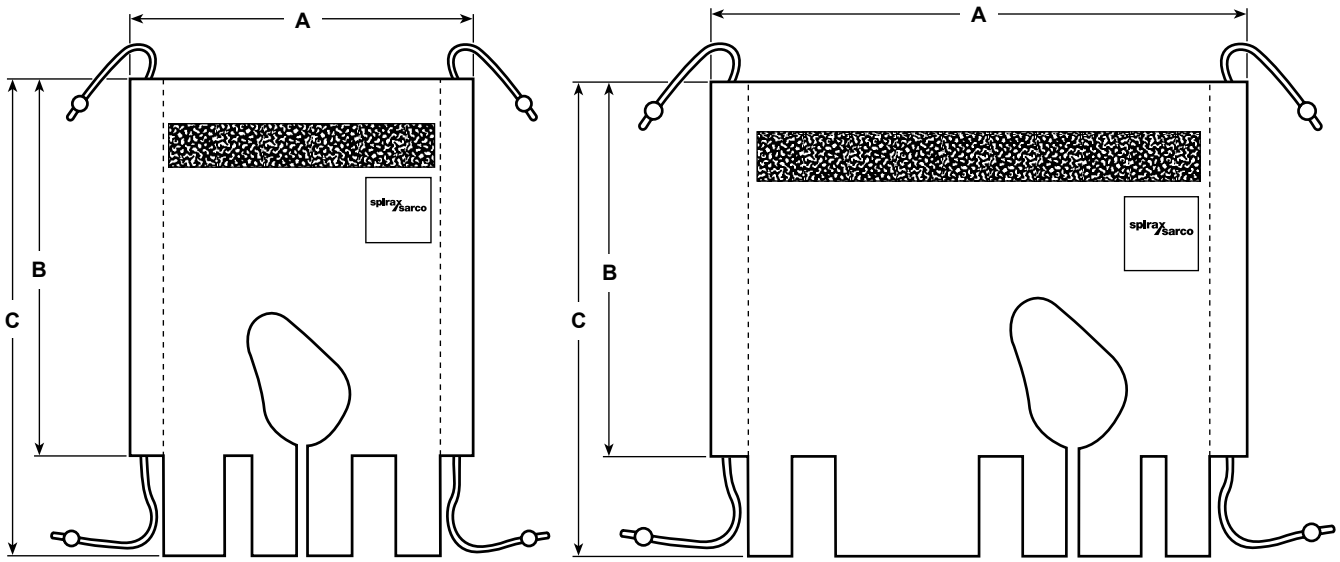
How to order

Example: 1 off IJ-STS17.2 insulation jacket to fit a ½" STS17.2 steam trapping station.

Spare parts

There are no spare parts available for the IJ-STS17.2 insulation jackets.

Dimensions/weights (approximate) in mm (in) and kg (lbs)



Size		A	B	C	Insulation thickness	Weight
IJ-STS17.2	½", ¾" and 1"	340 (13.3)	350 (13.8)	450 (17.7)	30 (1.2)	0.68 kg (1.5)
IJ-STS17.2D	½", ¾" and 1"	440 (17.2)	290 (11.4)	370 (14.6)		

Safety information, installation and maintenance

Installation

Extra care must be taken if the STS17.2 is in operation as it is likely to be operating at steam temperature. Ensure that adequate personal protection equipment is used to avoid injury.
Once the STS17.2 steam trap station has been installed, the insulation jacket can be fitted. Disconnect the Spiratec sensor cable (if fitted, using the product instructions) and wrap the jacket around the STS17.2 steam trap station, from the bottom, with the steam trap universal mounting port passing through the access hole in the jacket. Whilst supporting it's weight secure in position with the Velcro flaps A and B. Ensuring the jacket is centralised and is covering all of the STS17.2 pull and securely tie the draw cords.
If a spiratec sensor or blowdown valve is fitted ensure that the access hole in the bottom of the jacket is inline. Reconnect the spiratec sensor cable. The cable must not be tread along the inside of the jacket touching the STS17.2, as the heat at operating temperature may cause damage.

Removal

Before removing the jacket, check if the STS17.2 is in service. If it is the surface of the STS17.2 will be hot enough to burn and suitable protective clothing (gloves) should be worn. Removal is the reverse procedure to the above.

Maintenance

There are no spare parts available for the IJ-STS17.2 insulation jackets.

Handling

When the jacket is new, the insulation, material is fully enclosed within the inner and outer face and retained by the stitching. In this condition, for handling, no special protective clothing is required.
However, if the inner or outer faces have become damaged or unstitched, so as to expose the insulation material, suitable protective clothing (e.g. gloves, safety glasses, face mask and overalls) should be worn.

Disposal

This product is not recyclable and is non-combustible. For disposal purposes consider the product to be mineral fibre and dispose of in accordance with local regulations.

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TI-P225-07
CMGT Issue 2

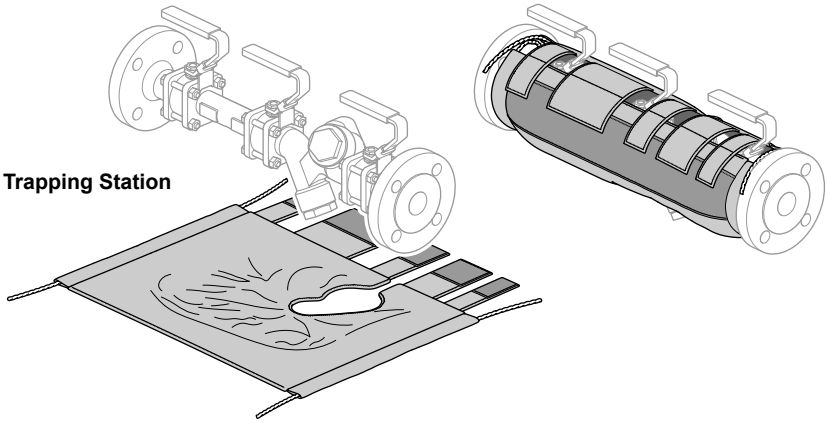
Spirax Sarco
Insulation Jackets

Description

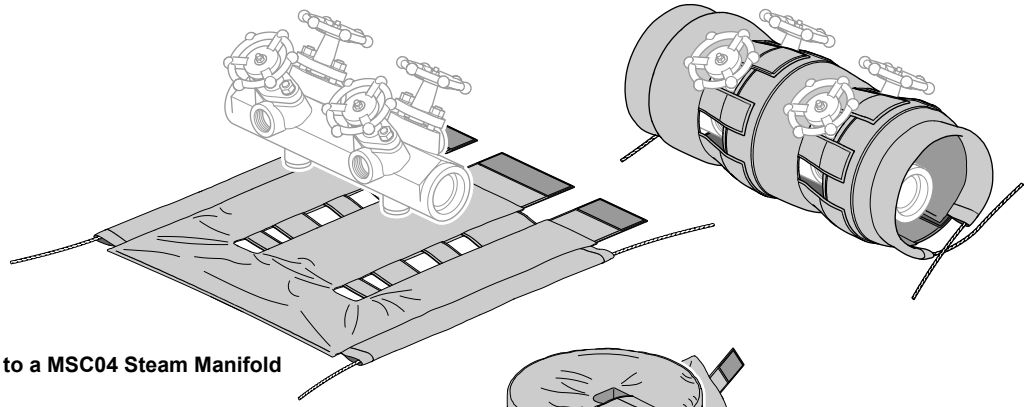
Spirax Sarco Insulation Jackets are designed to fit select products within the steam and condensate loop. They are engineered to conform tightly to various body geometries, providing high heat retention and low external touch temperatures, helping to contribute to sustainability goals.

Additional benefits include potential financial savings and a reduction in condensate volume, resulting in improved steam delivery to the point of use, thus reducing steam generation requirements.

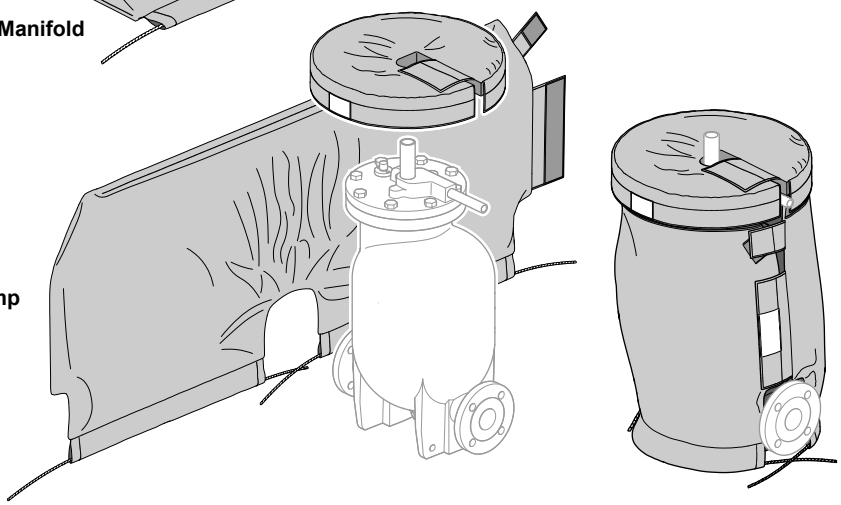
The Insulation Jackets are highly water-resistant, making them suitable for both indoor and outdoor installations. They are easy to fit and remove, allowing quick access to the insulated products.



Insulation Jacket shown fitted to a STS17.2 Steam Trapping Station



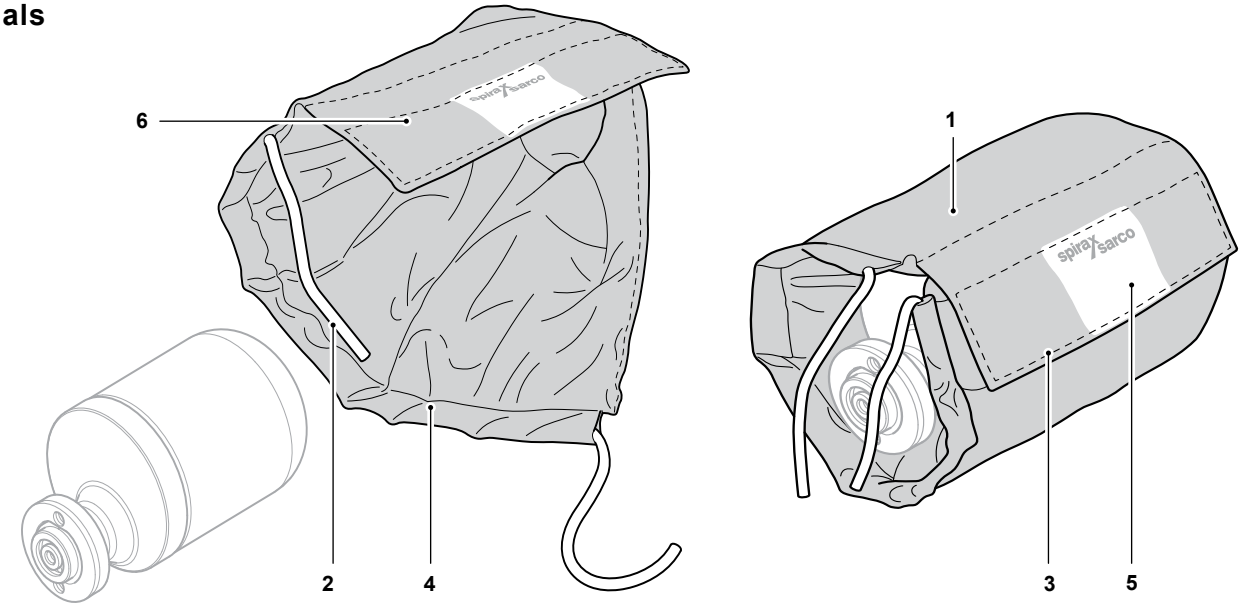
Insulation Jacket shown fitted to a MSC04 Steam Manifold



Insulation Jacket fitted to a MFP14 Automatic Pump

7.4
9

Materials



No.	Part	Material
1	Inner and outer cover surface	Silicone rubber coated glass fibre
2	Draw cords	Kevlar
3	Stitching	Polyester cotton
4	Insulation	Mineral fibre
5	Label	Nylon
6	Sealing	Hook and loop tape fastener

Limiting conditions

	Standard	High Temperature
Maximum product surface temperature	240 °C	425 °C

Product variants (Non exclusive)

	Standard	High Temperature
Separators	S1, S3, S13, S12, S5, S6, S7, S8	S5, S6
Steam traps	STS17.2, FT14, FT43/44/46/47, UFT14HC, UFT32	-
Pressure reducing valves	DRV, DEP, BRV, DP, SRV2S, BRV2S	-
Condensate pumps and packages	MFP14, APT10, MFP PPU, APT PPU, CRU	-
Isolation and control valves	HV3, A3S/A3SS, BSA, DBB3, QLM/D, Spira-Trol KE/KEA, NS, NSRA	BSA, DBB3, Spira-Trol KE 4/6/7
Flanges	DN15 - DN400	DN15 - DN400
Manifolds	MSC04, MSC08, MSC12	MSC04, MSC08, MSC12
Strainers	FIG 12/14/16/34/36/37/3616/3716	FIG 18/34/36
Ball valves	M10S, M21S	-
Flash vessel	FV6, FV8, FV12, FV15, FV18	-
Culinary steam	CSF16	-
Self acting valves	SB/BX, NS, KA3, KB3, KA4, KA5, KA6, KX, KY	-
Check valves	DCV	-
Humidification	Humidifiers	-

Safety information
Safe operation of this product can only be guaranteed if it is properly installed and maintained by qualified personnel. General installation and safety instructions for pipeline and plant construction, as well as the proper use of tools and safety equipment must also be complied with.

For further information please refer to IM-GCM-10 for general steam system safety information.

Installation
Extra care must be taken if the jacketed product is in operation as it is likely to be operating at steam temperature. Ensure that adequate personal protection equipment is used to avoid injury.

Once the product has been installed, the insulation jacket can be fitted. Whilst supporting its weight secure the jacket in position with the Velcro flaps, ensuring the jacket is centralised and is correctly covering the product. Finally pull and securely tie the draw cords.

If a Spiratec sensor or blowdown valve is fitted, ensure that the access hole in the bottom of the jacket is aligned. Reconnect any cables, being careful not to lead it on the inside of the jacket as the heat from the product may cause damage.

Spare parts
There are no spare parts available for the insulation jackets. If a jacket is damaged it is recommended to replace.

Handling
When the jacket is new, the insulation material is fully enclosed between the inner and outer layers, secured by stitching. In this condition, no special protective clothing is required for handling.

However, if the inner or outer faces have become damaged or unstitched, exposing the insulation material, suitable protective clothing (e.g. gloves, safety glasses, face mask and overalls) should be worn.

Disposal
This product is not recyclable and is non-combustible. For disposal purposes, consider the product to be mineral fibre and dispose of in accordance with local regulations.

How to order
When ordering an insulation jacket please specify the product model and size for correct jacket selection as per example below :
Example: 1 off STS17.2 insulation jacket to fit a DN25 STS17.2 Steam Trapping Station.

For product variants not identified in this Technical Information Sheet, please contact your local Spirax Sarco Representative

TI-P022-05
CMGT Issue 8

Single Window and Double Window Sight Glasses

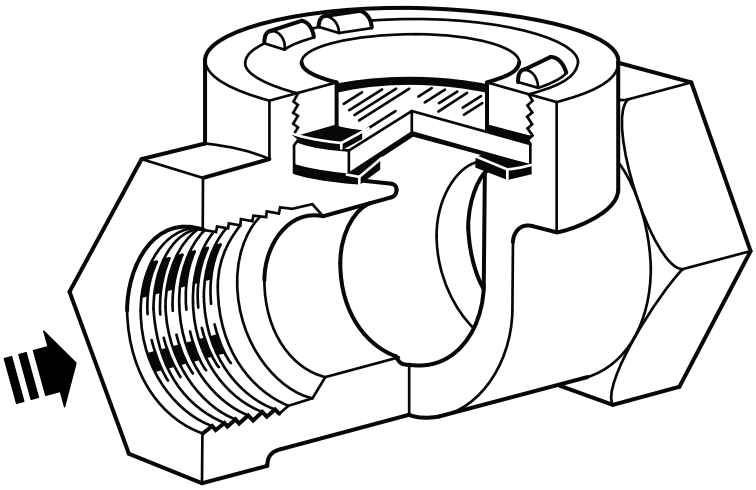
Description
A range of single and double window sight glasses available in either brass or bronze depending on size with screwed connections.

Standards
This product fully complies with the requirements of the EU Pressure Equipment Directive/UK Pressure Equipment (Safety) Regulations.

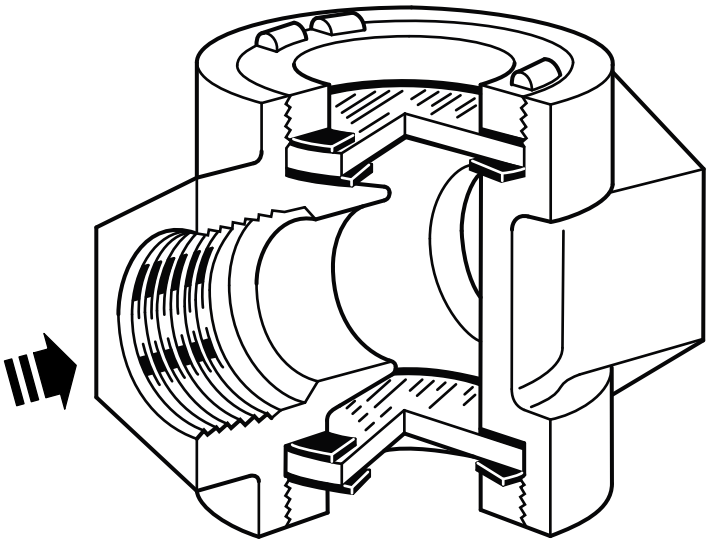
Certification
These products are available with certification to EN 10204 2.2.
Note: All certification/inspection requirements must be stated at the time of order placement.

Sizes and pipe connections
Single window ½", ¾" and 1" screwed BSP or NPT.
Double window ½", ¾", 1", 1¼", 1½" and 2" screwed BSP or NPT.

Single window

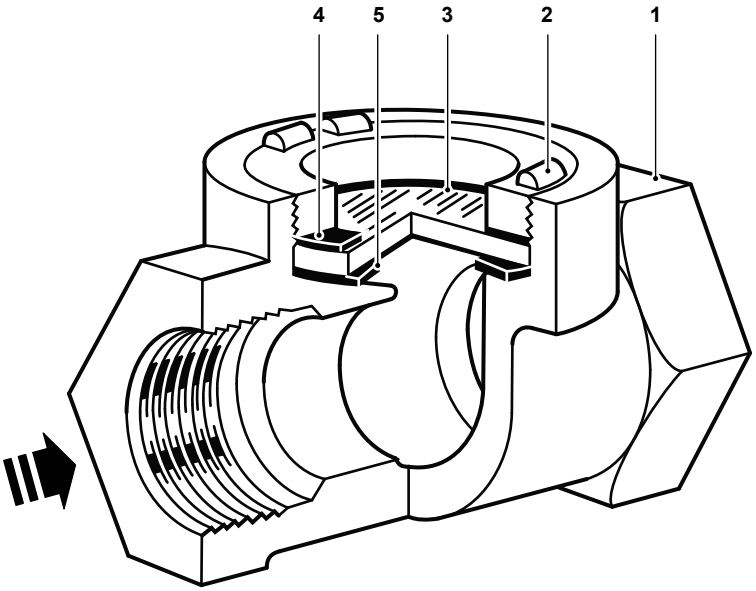


Double window

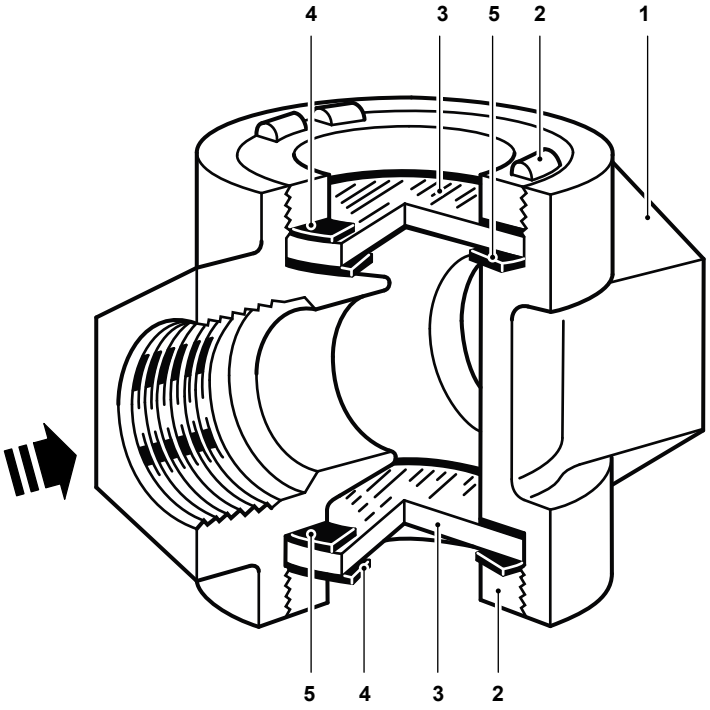


Material

Single window

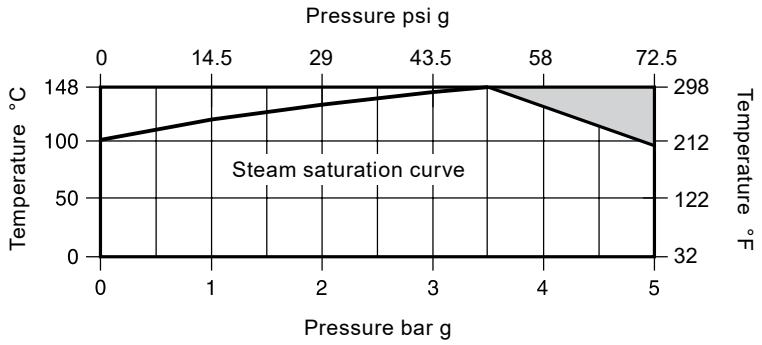


Double window



No.	Part		Material	
1	Body	½" to 1"	Brass	EN 12165 CW617N
		1¼" to 2"	Bronze	BS EN CC491K
2	Bezel		Brass	EN 12165 CW617N
3	Window		Toughened soda lime glass	BS 3463
4	Top gasket		Reinforced exfoliated graphite	
5	Bottom gasket		Reinforced exfoliated graphite	

Pressure/temperature limits

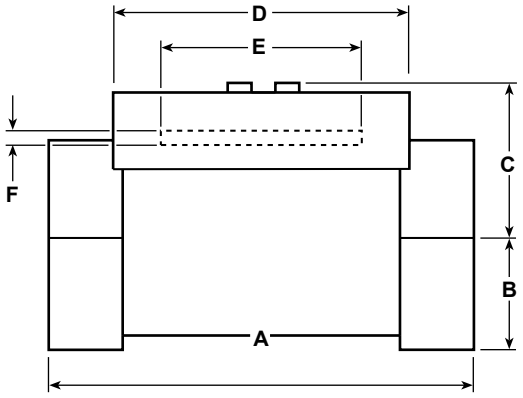


The product **must not** be used in this region.

Body design conditions			PN5
PMA	Maximum allowable pressure @ 90 °C (194 °F)	5 bar g	72.5 psi g
TMA	Maximum allowable temperature @ 3.5 bar g (50.8 psi g)	148 °C	298 °F
Minimum allowable temperature		-29 °C	-20.2 °F
PMO	Maximum operating pressure for saturated steam service	3.5 bar g	50.8 psi g
TMO	Maximum operating temperature	148 °C	298 °F
Minimum operating temperature. **Note:** For lower temperatures consult Spirax Sarco.		0 °C	32 °F
Designed for a maximum cold hydraulic test pressure of:		7 bar g	102 psi g
PTMX	Maximum test pressure (steam service)	3.5 bar g	50.8 psi g

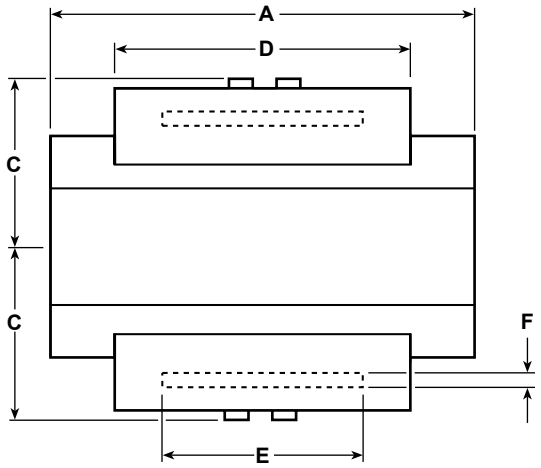
Dimensions/weights (approximate) in mm (inches) and kg (lbs)

Single window



Size	A	B	C	D	E	F	Weight
½"	89 (3.50)	16 (0.63)	32 (1.26)	64 (2.52)	50 (1.97)	4.8 (0.19)	0.6 (1.32)
¾"		19 (0.75)	35 (1.38)				0.7 (1.54)
1"	87.5 (3.44)	24 (0.94)	38 (1.50)				0.9 (1.98)

Double window



Size	A	B	C	D	E	F	Weight
½"	89 (3.50)		32 (1.26)	64 (2.52)	50 (1.97)	4.8 (0.19)	0.9 (1.98)
¾"							
1"			35 (1.38)				1.2 (2.65)
1¼"	108 (4.25)		51 (2.01)	73 (2.87)			1.9 (4.19)
1½"							1.8 (3.97)
2"	114 (4.49)		57 (2.24)	76 (2.99)			2.5 (5.51)

Safety information, installation and maintenance

For full details see the Installation and Maintenance Instructions (IM-S32-04) supplied with the product.

Warning:

Under certain conditions corrosive elements in condensate can affect the inside face of the window(s), particularly where caustic alkali and hydrofluoric acid are present. It is recommended that the sight glass is periodically checked for thinning of the window(s). If there is evidence of thinning or erosion damage then the window(s) should be replaced immediately. Always wear eye protection when viewing the contents of the sight glass.

Installation and maintenance note:

Sight glasses should have stop valves fitted on both the inlet and outlet. It is imperative that the upstream stop valve is closed first in order to prevent overpressurisation.
Sight glasses can be fitted in either a horizontal or vertical line on the outlet side of a steam trap. Where the trap is a blast discharge type e.g. thermodynamic, the sight glass must be fitted at least 1 m (3.28 ft) from the trap. This is to ensure that the glass is not subjected to thermal shock or pressure. Reasonable steps should be taken to protect personnel from injury in the unlikely event that the glass breaks.
Ensure access is available for maintenance purposes.

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" BSP double window sight glass with brass body and removable toughened soda lime glass.

Spare parts

The spare parts available are shown in heavy outline. Parts drawn in a grey line are not supplied as spares.

Available spares

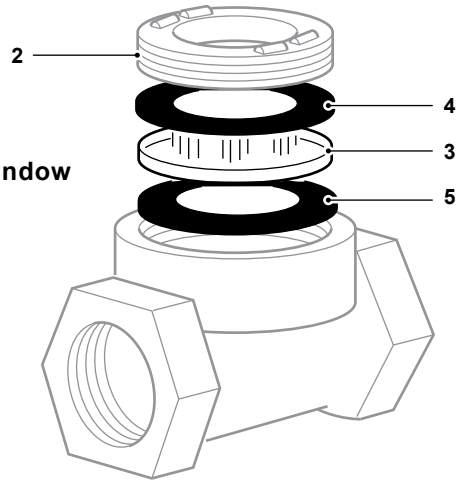
Set of windows and gaskets	**3, 4, 5**
Set of gaskets	**4, 5**

How to order spares

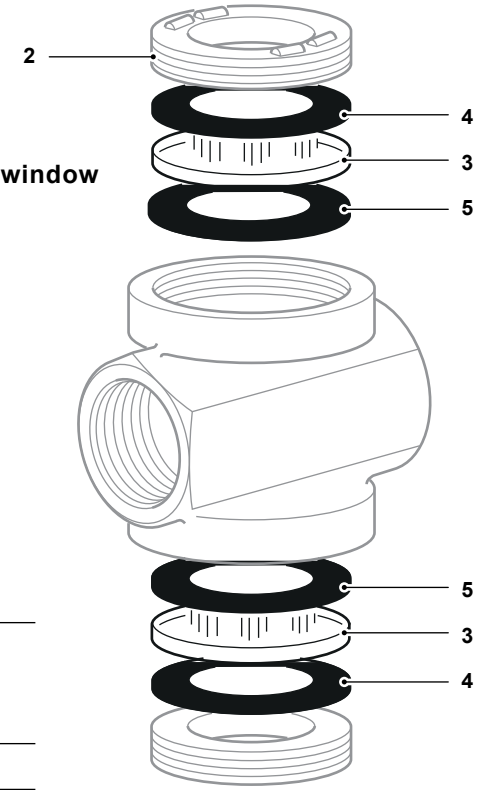
Always order spares by using the description given in the column headed 'Available spares' and state the size and type of sight glass.

Example: 1 off Set of windows and gaskets for a 1" Spirax Sarco double window sight glass.

Single window



Double window



Recommended tightening torques

Item	Part	or mm	N m	ft lbf
2	Bezel		60 - 65	44 - 48

TI-P022-01
CMGT Issue 10

Sight Check (Combined Sight Glass and Check Valve)

Description

A sight check is a combined sight glass and check valve. It is used to observe discharges from steam traps. The position of the ball check indicates whether or not condensate is flowing. Where condensate rises after the trap it eliminates the need for a separate check valve thus simplifying installation.
The sight check is particularly useful for commissioning a steam trap fitted with an adjustable needle valve/steam lock release (SLR). It can also be used on other liquid lines where the materials of construction are compatible.

Standards

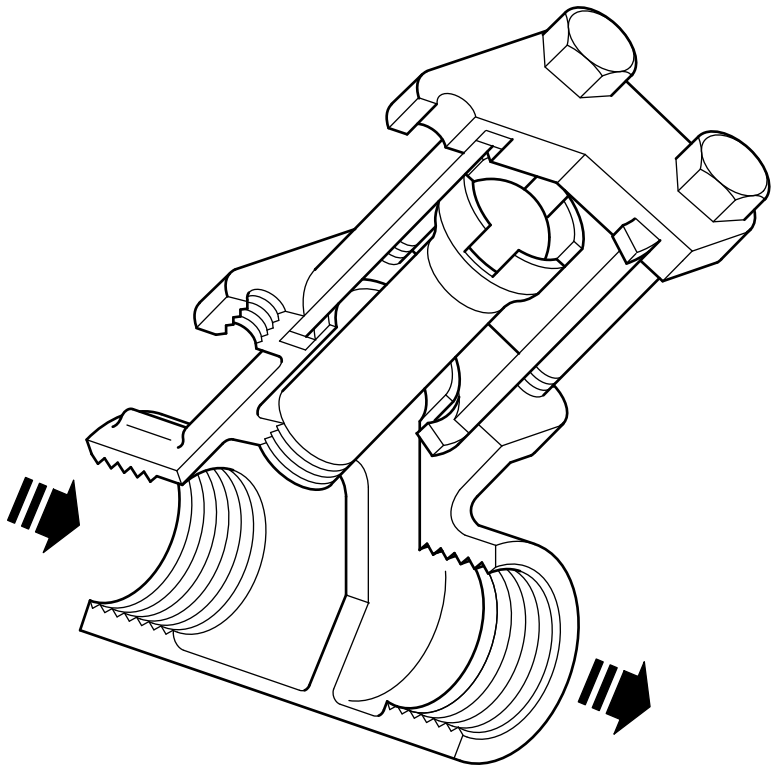
This product fully complies with the requirements of the Pressure Equipment Directive (PED).

Certification

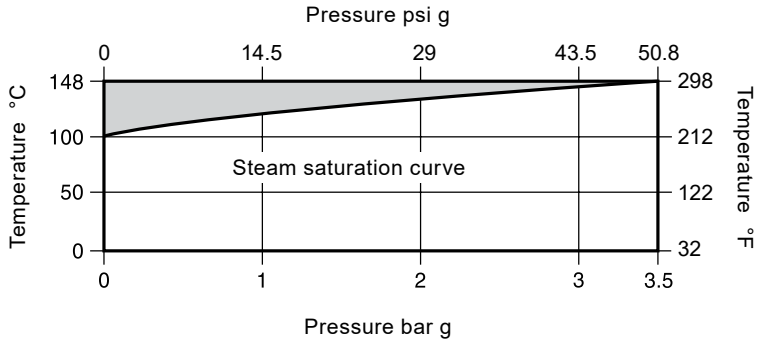
This product is available with a manufacturers' Typical Test Report.
Note: All certification/inspection requirements must be stated at the time of order placement.

Sizes and pipe connections

½", ¾" and 1" screwed BSP or NPT.



Pressure/temperature limits



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

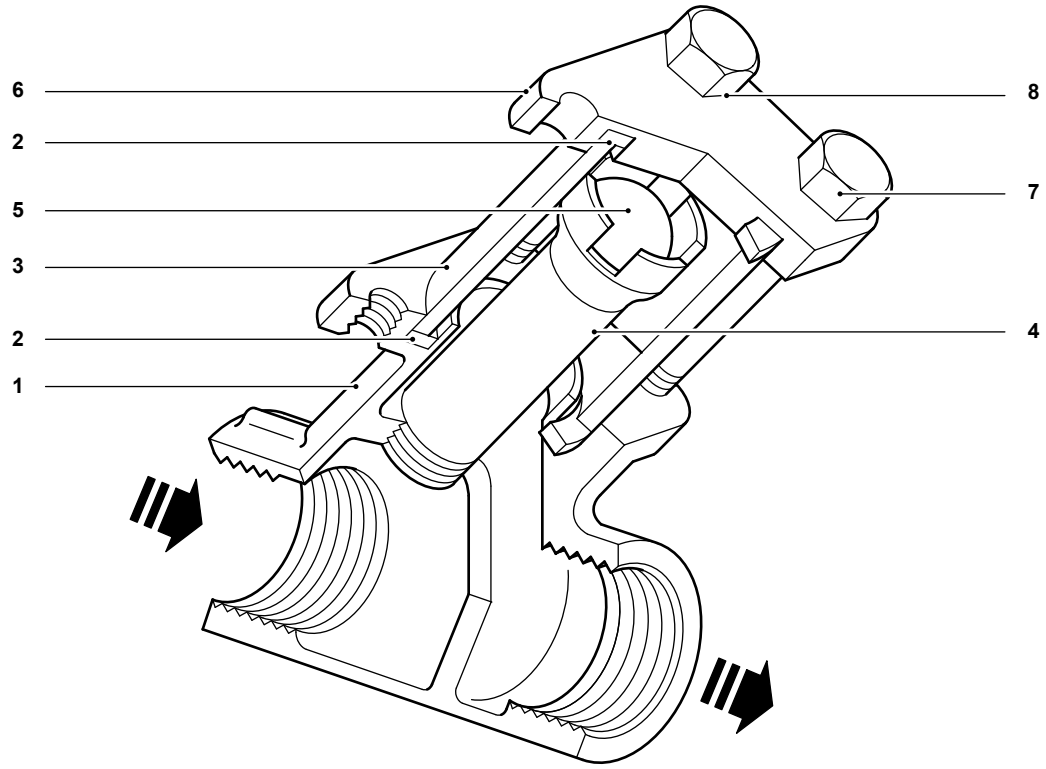
Body design conditions			PN3.6
PMA	Maximum allowable pressure	3.5 bar g @ 148 °C	50.8 psi g @ 298 °F
TMA	Maximum allowable temperature	148 °C @ 3.5 bar g	298 °F @ 50.8 psi g
Minimum allowable temperature		-10 °C	14 °F
PMO	Maximum operating pressure	3.5 bar g @ 148 °C	50.8 psi g @ 298 °F
TMO	Maximum operating temperature	148 °C @ 3.5 bar g	298 °F @ 50.8 psi g
Minimum operating temperature **Note:** For lower operating temperatures consult Spirax Sarco		0 °C	32 °F
Designed for a maximum cold hydraulic test pressure of		7 bar g	102 psi g
PTMX	Maximum test pressure (steam service)	3.5 bar g	50.8 psi g

Kv values

Size	½"	¾"	1"
Kv	2.6	2.81	4.59

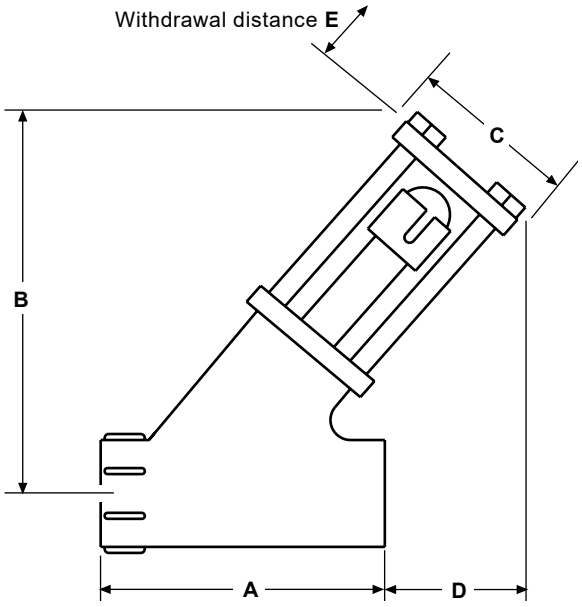
For conversion:
Cv (UK) = Kv x 0.963
Cv (US) = Kv x 1.156

Materials



No.	Part	Material	
1	Body	Bronze	EN 1982 CC491K
2	Gasket	Glass reinforced graphite 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	EN 12165 CW617N
7	Cover bolts	Steel zinc plated	BS 3692 Gr. 8.8
8	Shakeproof washers	Steel zinc plated	

Dimensions/weights (approximate) in mm (inches) and kg (lbs)



Size	A	B	C	D	E	Weight
½"	76 (2.99)	95 (3.74)	44 (1.73)	38 (1.50)	64 (2.52)	0.6 (1.32)
¾"						
1"	89 (3.50)	108 (4.25)	54 (2.13)			1.2 (2.65)

Safety information, installation and maintenance

For full details see the Installation and Maintenance Instructions (IM-S32-04) supplied with the product.

7.5
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Warning

Under certain conditions corrosive elements in condensate can affect the inside face of the sight tube, particularly where caustic alkali and hydrofluoric acid are present. It is recommended that the sight check is periodically checked for thinning of the sight tube. If there is evidence of thinning or erosion damage then the sight tube should be replaced immediately. Always wear eye protection when viewing the contents of the sight check.

Installation and maintenance note:

The sight check should have stop valves fitted on both the inlet and outlet. It is imperative that the upstream stop valve is closed first in order to prevent over pressurisation.
Sight checks can be fitted in either a horizontal or a vertical line on the outlet side of the steam trap. Where the trap is a blast discharge type e.g. thermodynamic, the sight check must be fitted at least 1 m (3.28 ft) from the trap. This is to ensure that the glass tube is not subjected to thermal shock or pressure. Reasonable steps should be taken to protect personnel from injury in the unlikely event that the glass breaks.
Ensure access is available to enable the withdrawal of the discharge tube.

Disposal

This 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 ½" BSP sight check having a bronze body and borosillicate glass tube.

Spare parts

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

Available spares

Sight tube assembly	**2 (2 off), 3 (1 off)**
Discharge tube assembly	**4, 5**
Fastener set (set of 4*)	**7, 8**
Gasket set (packet of 6†)	**2**

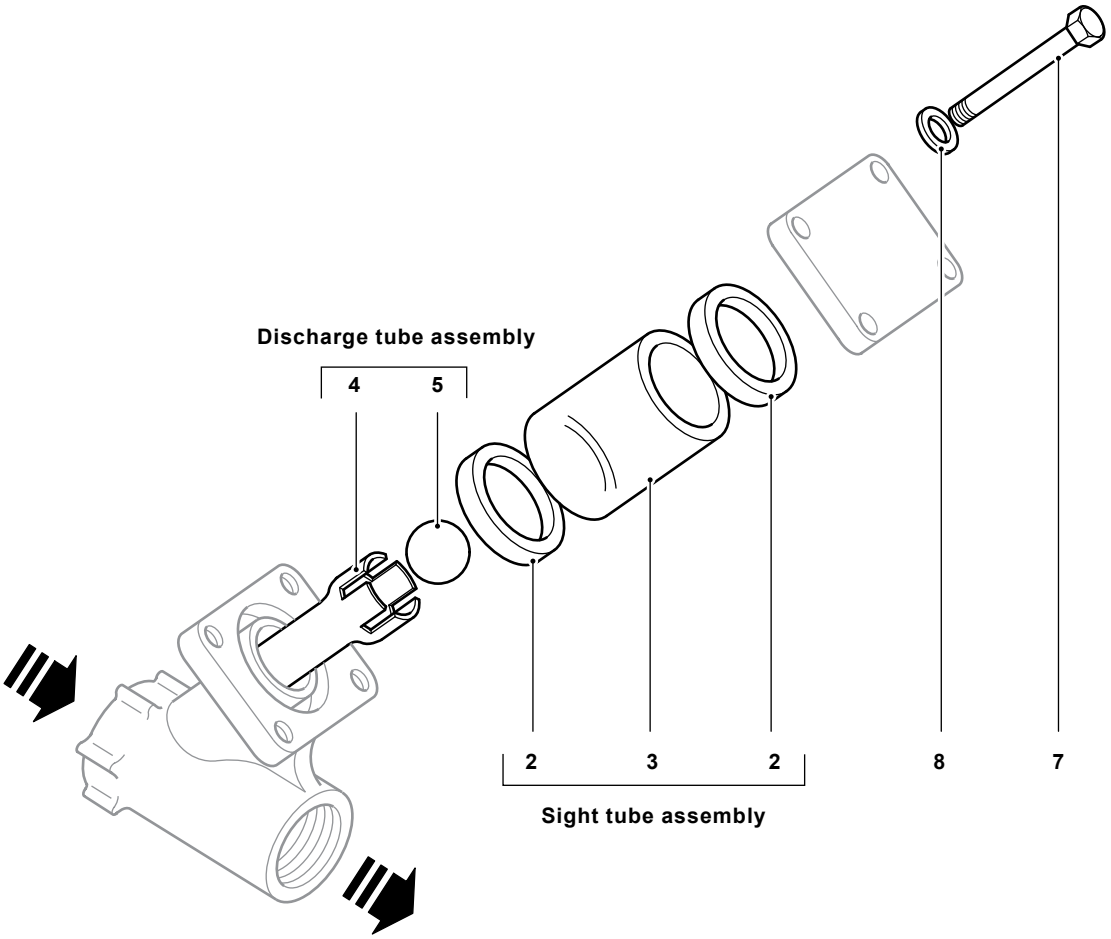
Available spares are common to ½" and ¾" sizes, but not 1".

* Earlier models used studs, nuts and washers.

† Earlier models used ethylene propylene gaskets which were considerably thicker than graphite laminate.

How to order spares

Always order spares by using the description given in the column headed 'Available spares' and state the size of the sight check.
Example: 1 off sight tube assembly for a ½" Spirax Sarco sight check.



Recommended tightening torques

Item	Size	or mm		N m	ft lbf
7	½", ¾" and 1"	10 A/F	M6 x 65	1.8 - 2.2	1.3 - 1.6
4				5.0 - 6.0	3.7 - 4.4

TI-P027-04
CMGT Issue 7

Pressure Gauge with Integral Restrictor

Description

Pressure gauge with 100 mm (3.94") diameter dial with units marked in bar and psi. The gauge is supplied with either:

- Ring type syphon tube and cock or a 'U' type syphon tube and cock.
- Bourdon tube gauge, constructed in accordance with DIN 16005.

Suitable for pump applications.

Available pressure range

Range 1	0 - 1.6 bar	0 - 23 psi
Range 2	0 - 4 bar	0 - 58 psi
Range 3	0 - 6 bar	0 - 87 psi
Range 4	0 - 10 bar	0 - 145 psi
Range 5	0 - 16 bar	0 - 232 psi
Range 6	0 - 25 bar	0 - 363 psi

Options

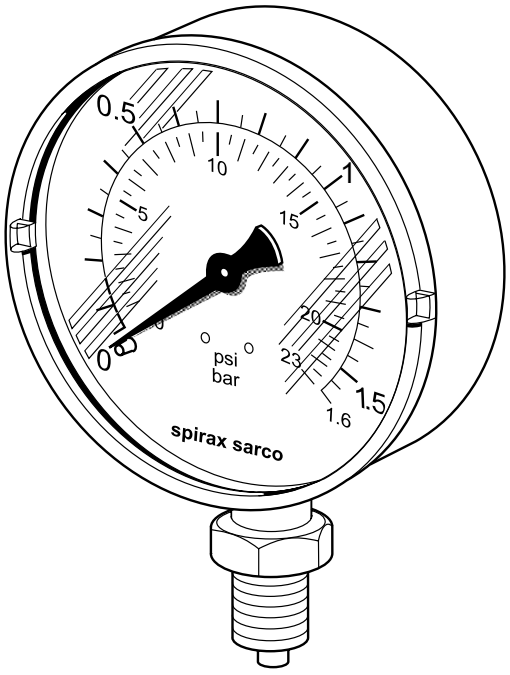
The range 1 to 6 is also available with an MPa scale

Standards

The product fully complies with the requirements of the Pressure Equipment Directive (PED).

Certification

A certificate of conformity is available as standard for this product. A calibration certificate is available by special order at extra cost.
Note: All certification/inspection requirements must be specified at the time of order placements.



Sizes and pipe connections

Pressure gauge		⅜" BSP male	(BS 2779)
Gauge cock	Gauge end	⅜" BSP female	(BS 2779)
	Syphon end	⅜" BSP female parallel	(BS 21)
Ring/'U' syphon	Cock end	⅜" BSP male taper	(BS 21)
	Process end	⅜" male parallel	(BS 21)

Pressure/temperature limits

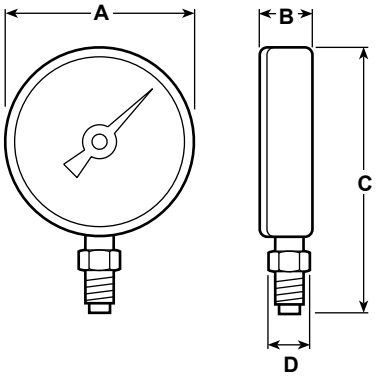
Maximum design conditions				PN25
PMA	Maximum allowable pressure			Full scale reading
TMA	Maximum allowable temperature		217 °C	(423 °F)
Note: Either a 'U' or a ring syphon must be fitted to achieve this.				
Minimum allowable temperature			-40 °C	(-40 °F)
PMO	Maximum operating pressure	Range 1	1.6 bar	(23 psi)
		Range 2	4 bar	(58 psi)
		Range 3	6 bar	(87 psi)
		Range 4	10 bar	(145 psi)
		Range 5	16 bar	(232 psi)
		Range 6	25 bar	(363 psi)
Please note: For compressed air and steam services the maximum operating pressure for this product is			21 bar g	(305 psi g)
TMO	Maximum operating temperature		200 °C	(392 °F)

Materials

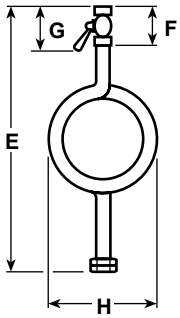
Part		Material
Gauge	Case	Pressed steel black finish
	Window	Glass
	Bourdon tube	Cu Sh 8 (92% Cu 8% Zn)
Ring and 'U' syphon		Mild steel tube BS 1387 heavy grade
Gauge cock	Body	Brass
	Handle	Phenolic

7.5
14

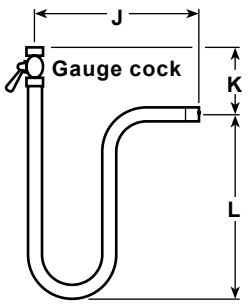
Dimensions/weights (approximate) in in mm (inches) and kg (pounds)



Gauge



Ring syphon



'U' syphon

Gauge					Ring syphon						'U' syphon				
									Weight						Weight
A	B	C	D A/F	Weight	E	F	G	H	Syphon	Cock	J	K	L	Syphon	Cock
100 (3.94)	29 (1.14)	137 (5.93)	22 (0.87)	0.43 (0.95)	321 (12.6)	35 (1.38)	80 (3.15)	116 (4.57)	0.94 (2.1)	0.21 (0.46)	167.5 (6.59)	61.5 (2.42)	136.5 (5.37)	0.59 (1.30)	0.21 (0.46)

Safety information, installation and maintenance
For full details see the Installation and Maintenance Instructions (IM-P027-02) supplied with the product.

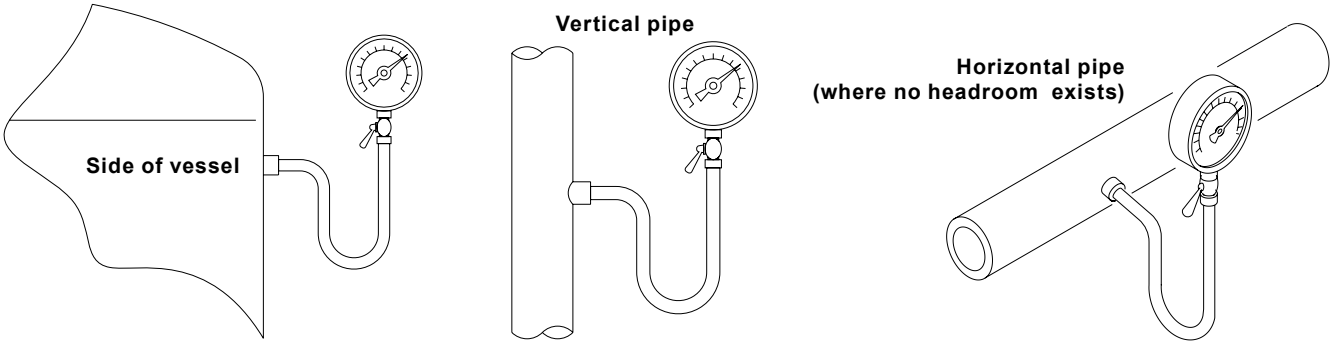
Installation note:
As with all instrumentation, the Spirax Sarco pressure gauge is a delicate measuring device and care has to be taken in its installation and use if it is to remain reliable.
It is recommended that all gauges are fitted with a gauge cock to assist when calibration or maintenance is 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.

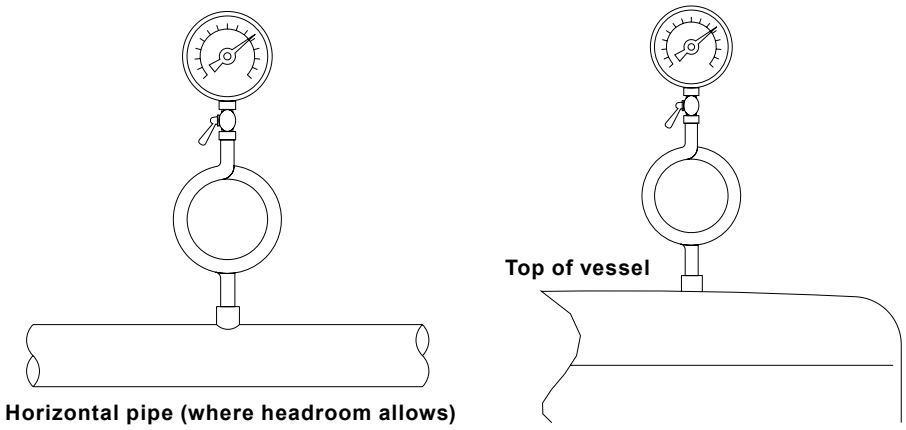
How to order
Example: 1 off Spirax Sarco ⅜" pressure gauge with restrictor. Pressure range 6 (0 - 25 bar) and having screwed BSP connections.

Spare parts
There are no spare parts available for Spirax Sarco pressure gauges.

Typical uses of a 'U' syphon and gauge



Typical uses of a ring syphon and gauge



TI-P112-03-US
Issue 1

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 1½% accuracy.

Sizes and pipe connections

Pressure Gauge:	¼" NPT	
***Ball Valve**	¼" NPT x ¼" NPT	*Valve for use w/syphon and pressure gauge. Not to be used as a stand-alone isolation valve.
Syphon:	¼" NPT x ¼" NPT	

Limiting conditions

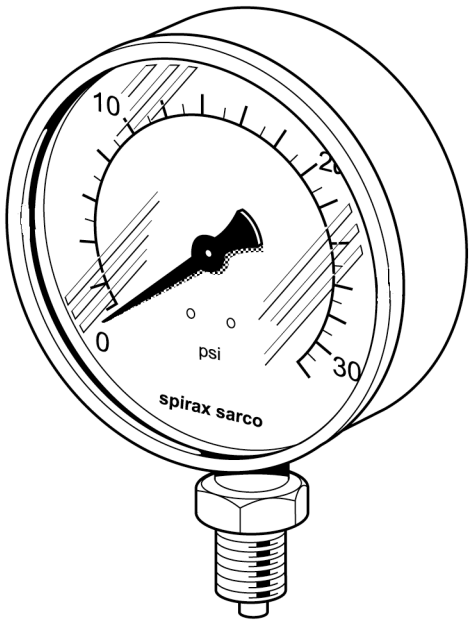
Maximum design conditions = full scale reading.

Maximum design temperature 400 °F (204 °C)

(Coil syphon must be fitted to achieve this)

Maximum service temperature, if the syphon tube is not fitted is 150°F (66 °C). On applications with a service temperature above 150°F (66 °C) 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 hermeticallly sealed.



Pressure ranges

Range	psi g
1	0 - 30
2	0 - 60
3	0 - 100
4	0 - 160
5	0 - 200
6	0 - 30/0 Hg
7	30" Hg - 15 psi g
8	30" Hg - 30 psi g
9	30" Hg - 60 psi g

First for Steam Solutions
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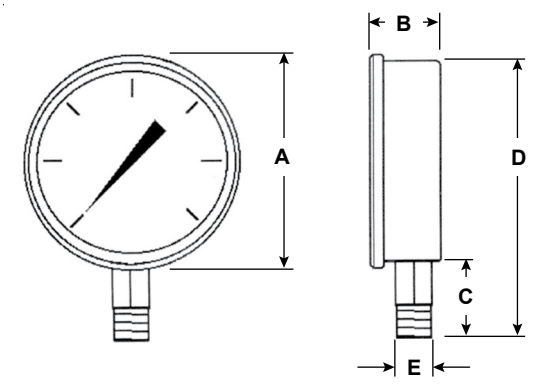
Materials

Gauge	Case	304 Stainless Steel
	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 (mm) and lbs (kg)



A	B	C	D	Weight
4.2 (107)	1.5 (38.1)	1.6 (41)	5.48 (139)	.50 (0.23)

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 iclude: isolation of vents, protective devices or alarms. Ensure isolation valves are turned on and off in a gradual way to avoid system shocks.

TI-P098-01-US
Issue 2

Steam-Water Washdown Unit

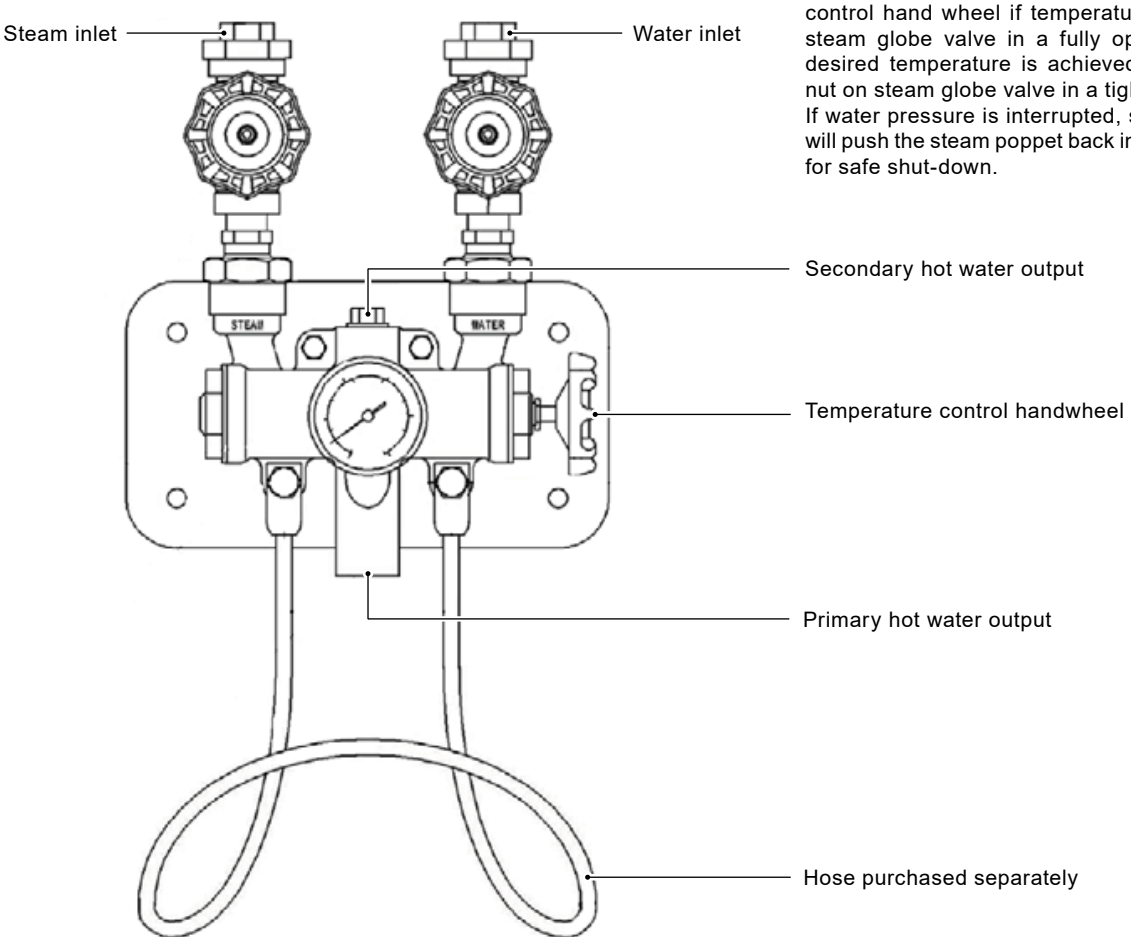
Description

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 pipe fittings
- Hose
- Nozzle
- 5 liter Sanitizer Bottle Kit
- 3ft Nozzle Stainless Steel Nozzle wand
  *Does not include High Flow Nozzle
- Sanitary Fittings

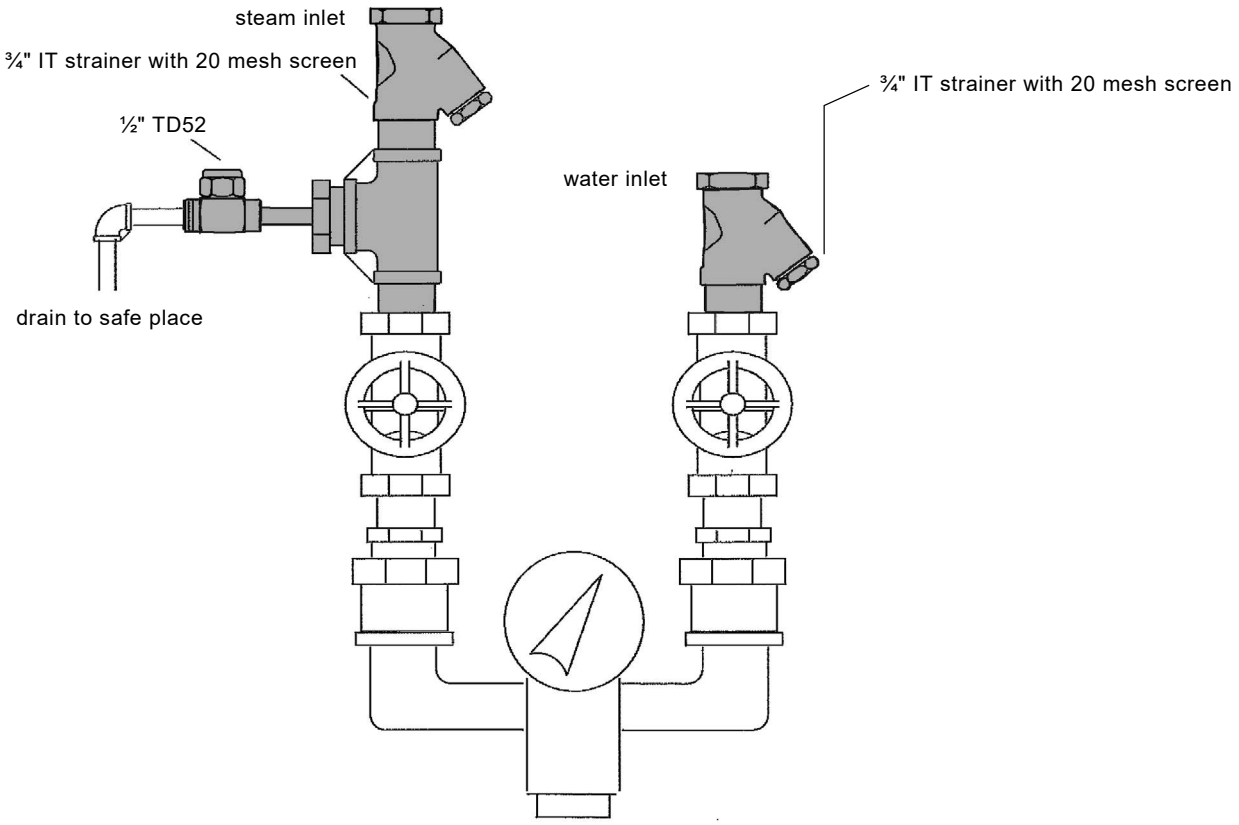
Operation

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)

Installation Kit: Shaded Area



Sizes and pipe connections

Washdown Unit	¾" NPT inlets and outlet (primary and secondary)
Hose	¾" NPT (male) x ½" NPT (male)
Nozzle	½" NPT (female)

Materials

Item	Bronze	Stainless Steel
Steam-Water Washdown Unit	Bronze	Stainless Steel
Globe Valves	Bronze	Stainless Steel
Check Valves	Bronze	Stainless Steel
Temperature Gauge (Dual Scale °F/°C)	Stainless Steel/Polycarbonate (Face)	Stainless Steel/Polycarbonate (Face)
Mounting Bracket	Epoxy Coated Aluminum	Stainless Steel
Pipe Fittings	Bronze	Stainless Steel
Hose Rack	Stainless Steel	Stainless Steel

Technical data

	Bronze	Stainless Steel
*Steam Pressure (min)	30 psi (2.1 bar)	30 psi (2.1 bar)
*Steam Pressure (max)	150 psi (10.3 bar)	150 psi (10.3 bar)
Water Pressure (min)	30 psi (2.0 bar)	30 psi (2.1 bar)
Water Pressure (max)	150 psi (10.0 bar)	150 psi (10.3 bar)
Maximum Water Output Temperature	200 °F (93 °C)	200 °F (93 °C)

Temperature rise vs. GPM (for reference only)

Input		Output	
*Steam	Water	Temperature Rise	GPM
100 psi g (6.9 bar)	60 psi g (4.1 bar)	55 °F (12°C)	14.0 (53 litres)
100 psi g (6.9 bar)	60 psi g (4.1 bar)	100 °F (37°C)	9.0 (34 litres)
100 psi g (6.9 bar)	60 psi g (4.1 bar)	134 °F (57°C)	7.8 (30 litres)

*Saturated Steam Only

Nozzles

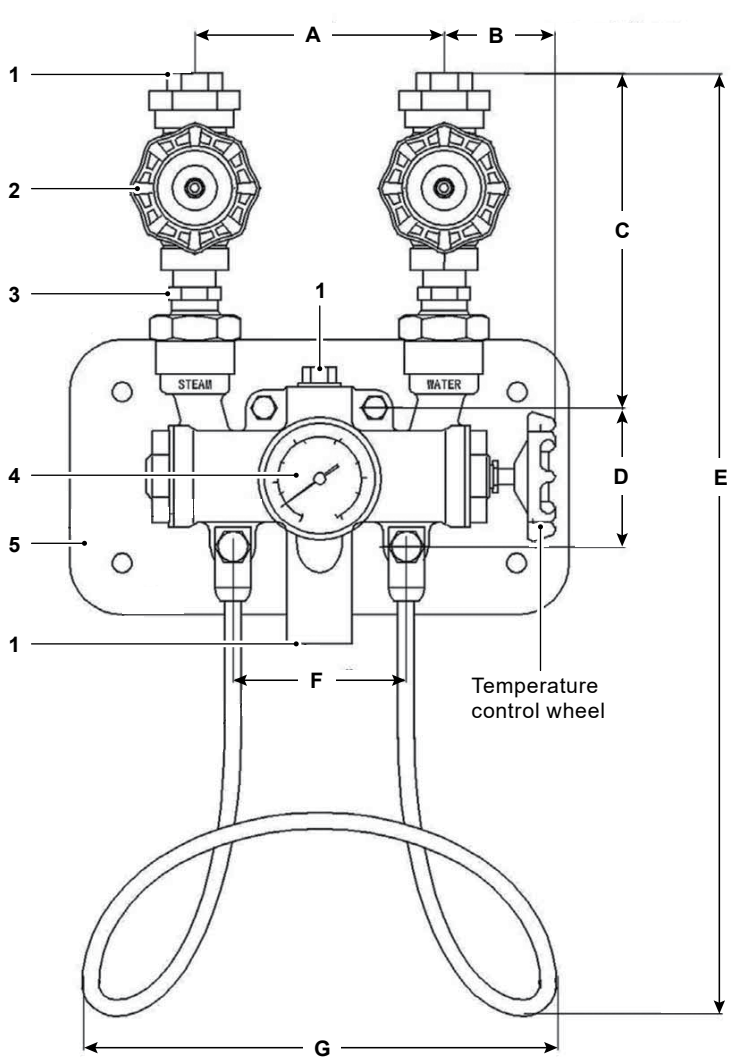


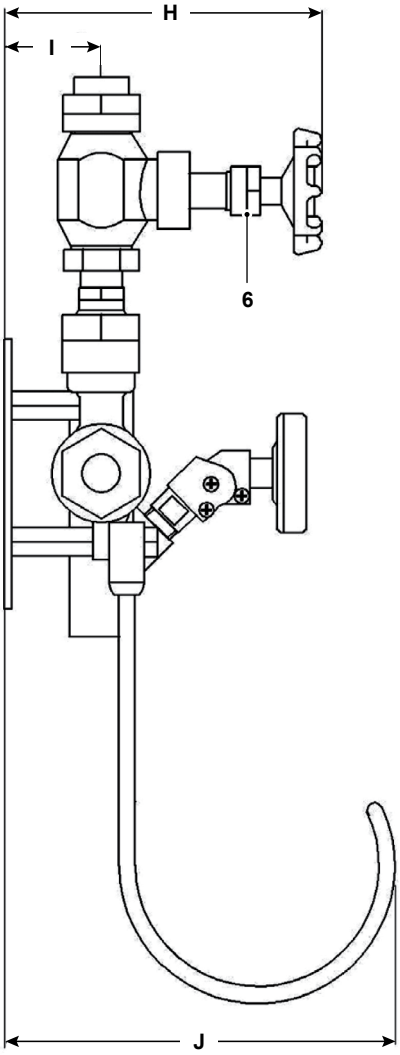
The standard flow nozzles we offer are durable with variable spray patterns, adjustable from fan spray to solid stream. Standard nozzles are aluminum material. Aluminum and brass nozzle material is available upon request. Cover colors available in Blue, Red and White.

Optional nozzles

Temperature indicating nozzles are also available. Nozzle provides accurate water temperature reading at the nozzle output.
Rating: 150 psi @ 200 °F (10.3 bar @ 93 °C)
Note: Not for use with steam

Dimensions (approximate) in inches (mm)





1	¾" NPT
2	Globe valve
3	Check valve
4	Temperature gauge
5	Wall bracket
6	Locking Nut (Steam Globe Valve)

A	B open	C	D	E approx.	F approx.	G open	H approx.	I	J
6	2⅞	8	3⅝	22⅝	4.173	11⅜	8¼"	2⅜"	9½"
(152)	(73)	(203)	(92)	(575)	(106)	(289)	(210)	(60)	(541)

Weight approximate in lbs (kg)

Bronze	Stainless Steel
20 lbs (9.1 kg)	

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' (7.6 m), (15.2 m), (22.9 m), (30.4 m). Colors available in white, black, yellow and red.



Inner diameter	Maximum pressure	Cover colour	Cover material	Tube material	Reinforcement
¾"	250 psi (17.2 bar)	White	Smooth EPDM	EPDM	4 Polyester Yarn Spirals
¾"	250 psi (17.2 bar)	Black	Smooth EPDM	EPDM	4 Polyester Yarn Spirals
¾"	300 psi (20.7 bar)	Red	Smooth Nitrile	Nitrile	2 Polyester Yarn Spirals
¾"	400 psi (27.6 bar)	Yellow	Smooth Nitrile	Nitrile	2 Polyester Yarn Spirals

TI-P098-02-US
Issue 1

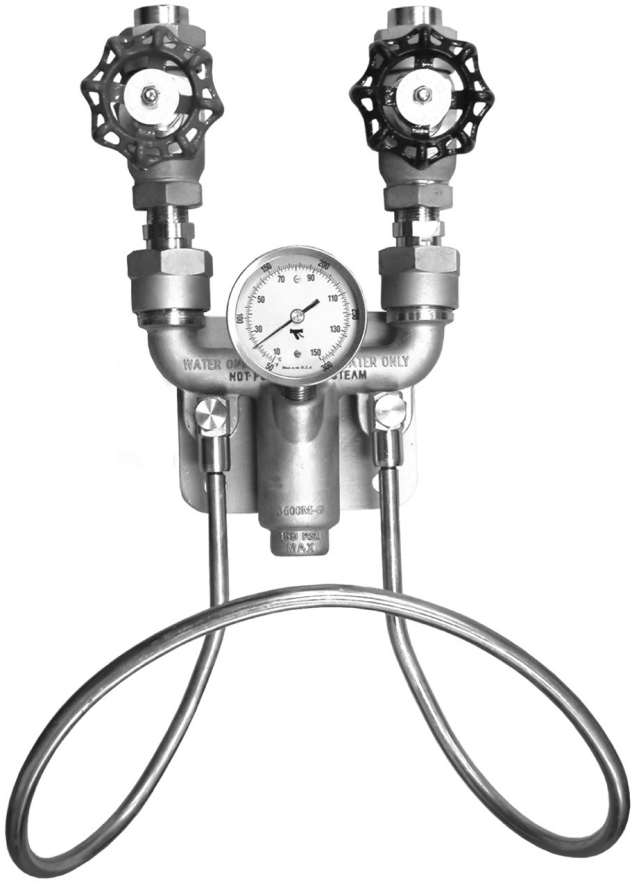
Hot and Cold Water Washdown Unit

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	¾" NPT inlets and outlet (primary and secondary)
Hose	¾" NPT (male) x ½" NPT (male)
Nozzle	½" NPT (female)

Materials

Item	Bronze	Stainless steel
Steam-Water Washdown Unit	Bronze	Stainless steel
Globe Valves	Bronze	Stainless steel
Check Valves	Bronze	Stainless steel
Temperature Gauge (Dual Scale °F/°C)	Stainless steel/Polycarbonate (Face)	Stainless steel/Polycarbonate (Face)
Mounting Bracket	Epoxy Coated Aluminum	Stainless steel
Pipe Fittings	Bronze	Stainless steel
Hose Rack	Stainless steel	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

Technical data

	Brass	Stainless steel
Water Pressure (min)	30 psi (2.1 bar)	30 psi (2.1 bar)
Water Pressure (max)	150 psi (10.3 bar)	150 psi (10.3 bar)
Maximum Water Output Temperature	200 °F (93 °C)	200 °F (93 °C)

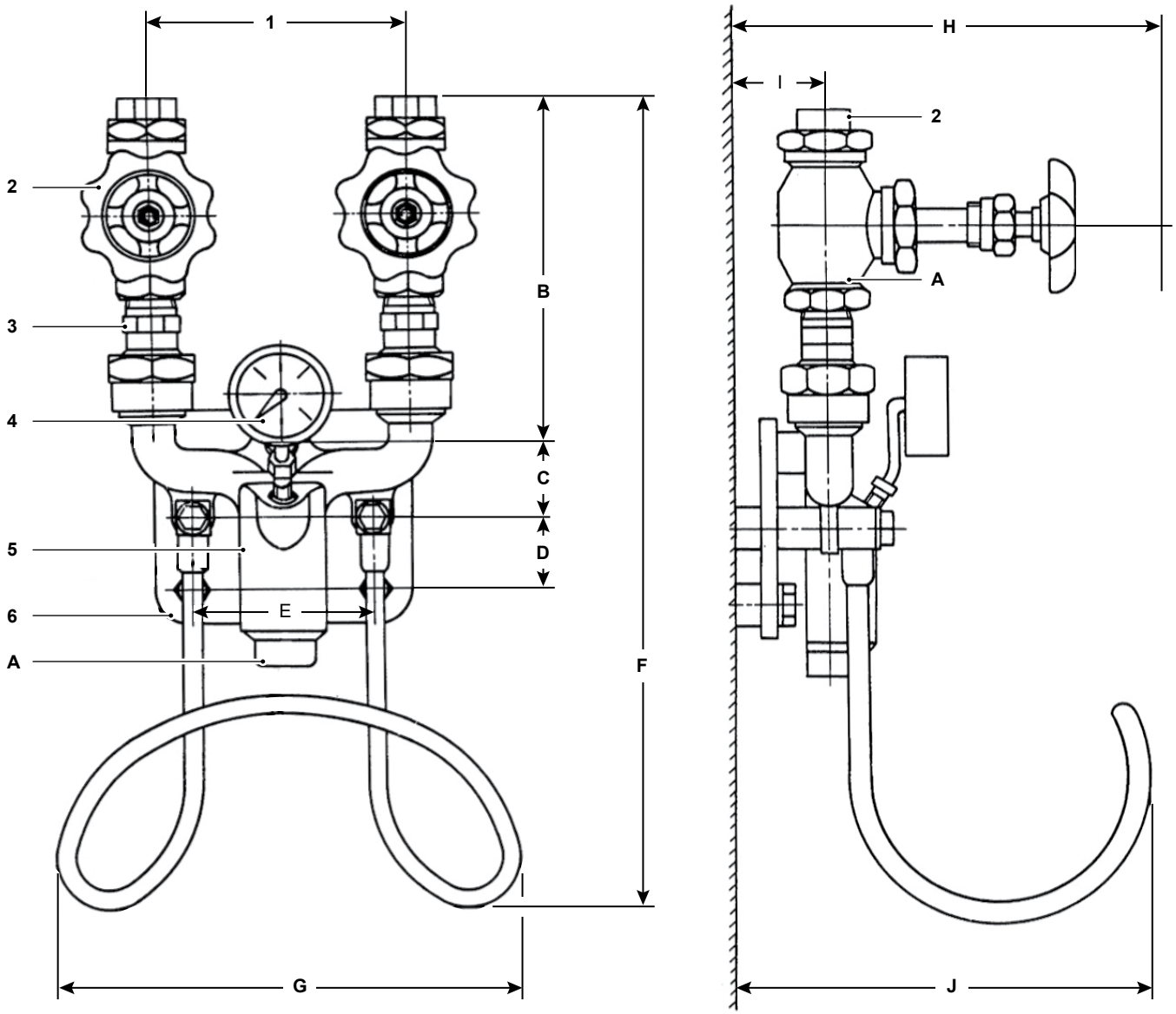
Weight

Bronze	Stainless steel
20lbs (9.1 kg)	20lbs (9.1 kg)

Pressure and flow rate

Inlet pressure	Flow rate
30 psi (2.1 bar g)	5.3 gpm (24 lpm)
40 psi (2.8 bar g)	6.2 gpm (28 lpm)
50 psi (3.4 bar g)	6.9 gpm (31 lpm)
60 psi (4.1 bar g)	7.5 gpm (34 lpm)
70 psi (4.8 bar g)	8.1 gpm (37 lpm)
80 psi (5.5 bar g)	8.7 gpm (40 lpm)
90 psi (6.2 bar g)	9.2 gpm (42 lpm)
100 psi (6.9 bar g)	9.8 gpm (45 lpm)

Unit items and dimensions (approximate in inches)



Front view **Side view**

1	6 piece centers
2	Globe valves
3	Check valves
4	Temperature gauge (optional)
5	Mixing chamber
6	Wall bracket

A	¾" NPT
B	8¼" (210 mm)approximate
C	1¾" (44.5 mm)
D	1¾" (44.5 mm)
E	4³⁄₁₆" (106 mm)
F	19⅞" (505 mm) approximate
G	10¾" (273 mm) approximate
H	9" (229) open
I	2⁵⁄₃₂" (54.8 mm) approximate
J	9½" (241 mm) approximate

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 (10.3 bar g)/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	Maximum pressure	Cover color	Cover material	Tube material	Reinforcement
¾"	250 psi (17.2 bar)	White	Smooth EPDM	EPDM	4 Polyester Yarn Spirals
¾"	250 psi (17.2 bar)	Black	Smooth EPDM	EPDM	4 Polyester Yarn Spirals
¾"	300 psi (20.7 bar)	Red	Smooth EPDM	EPDM	2 Polyester Yarn Spirals
¾"	400 psi (27.6 bar)	Yellow	Smooth Nitrile	Nitrile	2 Polyester Yarn Spirals

TI-P107-02-US
Issue 1

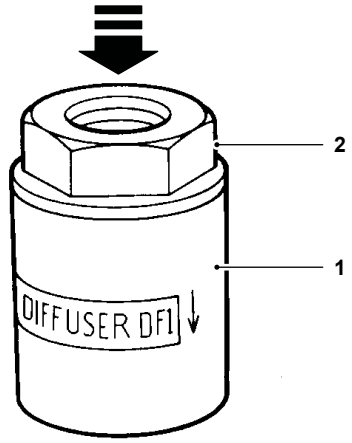
Trap Diffuser DF1, DF3 and Three Way Test Valve

Trap Diffuser DF1, DF3

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.

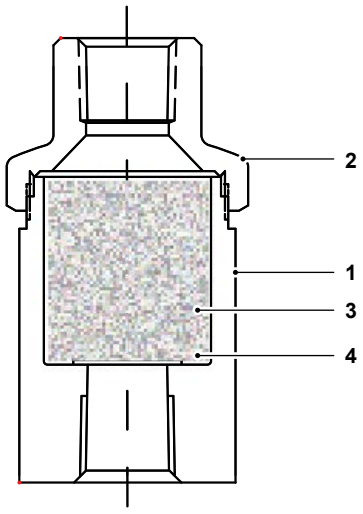
Model	DF1 and DF3
Sizes	½" and ¾"
Connections	NPT
Construction	Stainless Steel
Options	BSP Connection DF1
	SW Inlet only DF1



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 Thermodynamic traps.



DF3

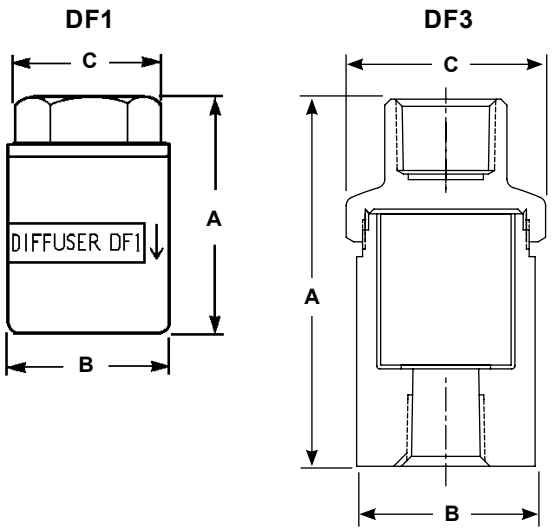
Limiting operating conditions

DF1	PMO	Maximum operating pressure	915 psi g (63 bar g)
DF3	PMO	Maximum operating pressure	300 psi g (21 bar g)

Materials

No.	Part	Material
1	Case	Stainless Steel
2	End Boss Screwed	Stainless Steel
	Socket Weld	Stainless Steel
3	Internals	Stainless Steel
4	Screen	Stainless Steel

Dimensions/weights (approximate) in inches (mm) and lbs (kg)



Size	A	B	C	Weight (DF1)
DF1 ½"	2.3 (58)	1.5 (38)	1.1 (28)	.51 lb . (0.23 kg)
DF1 ¾"	2.3 (58)	1.5 (38)	1.3 (32)	.51 lb . (0.23 kg)
DF3 ½" **DF3 ¾"**	3.8 (97)	1.8 (46)	2.1 (53)	1.4 lb (.63 kg)

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

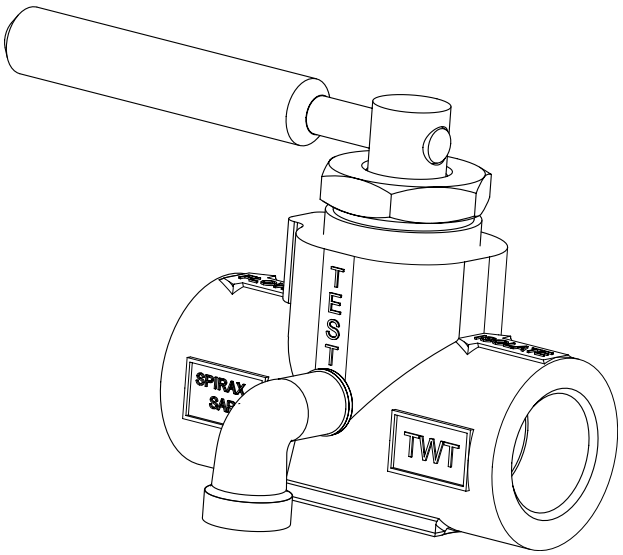
The trap diffuser shall be all stainless steel with a knitted and compacted wire mesh diffusing element.

Three Way Test Valve

Description

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.

Model	TWT
PMO	300 psi g
Sizes	½" ¾"
Connections	NPT
Construction	Stainless Steel



Limiting operating conditions

PMO	Maximum operating pressure	300 psi g (21 bar g)
TMO	Maximum operating temperature	421 °F (216 °C)

Pressure shell design conditions

PMA : 300 psi g (21 bar g)

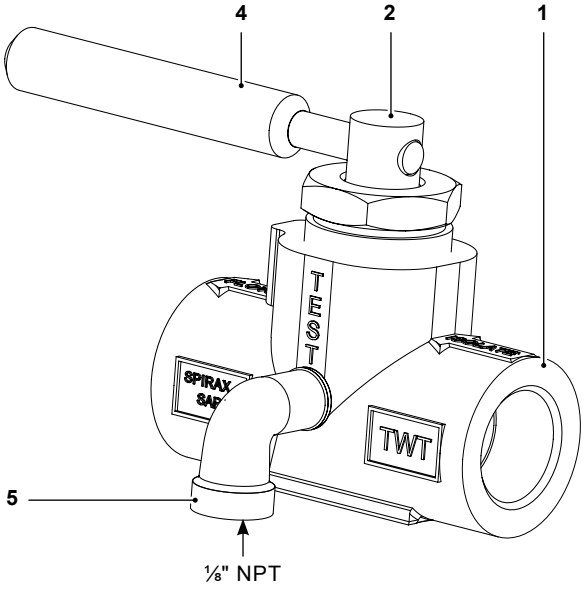
Two valves, one upstream and downstream of trap

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)

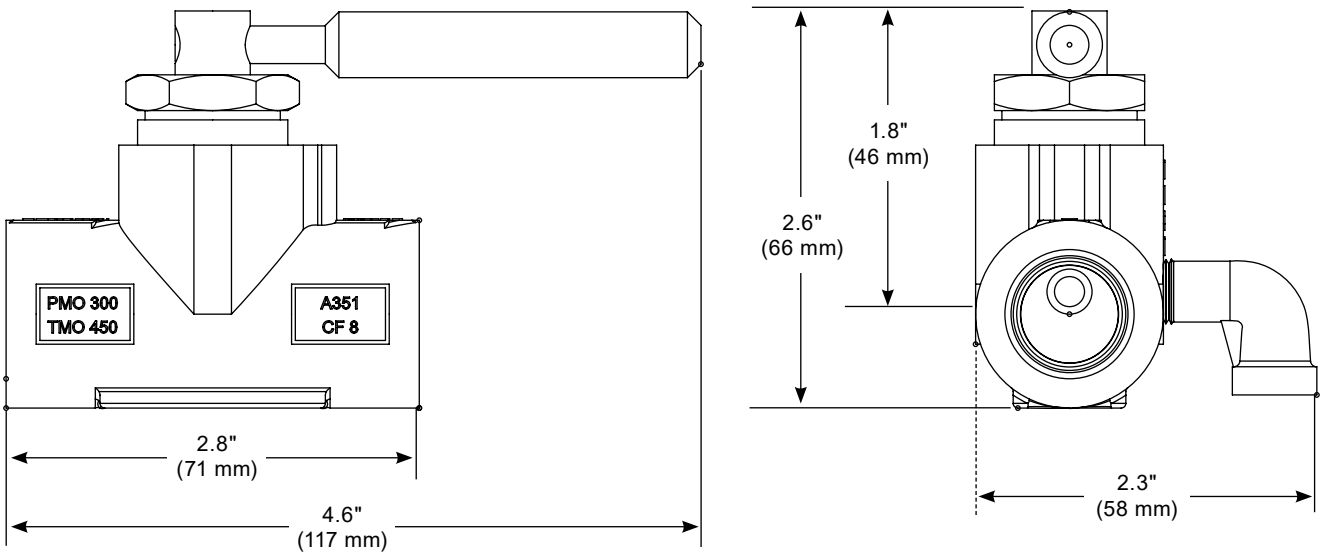
Function	Direction of flow handle position
Normal operation	→
Visual testing of trap	↓
Shut down drainage steam upstream isolated by other means	↓
Return line isolation	↑

Materials



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

Dimensions (approximate) in inches (mm)



Spares

Valve internal assembly

TI-P179-01-US
Issue 3

Packless Radiator Supply Valve
RV Series

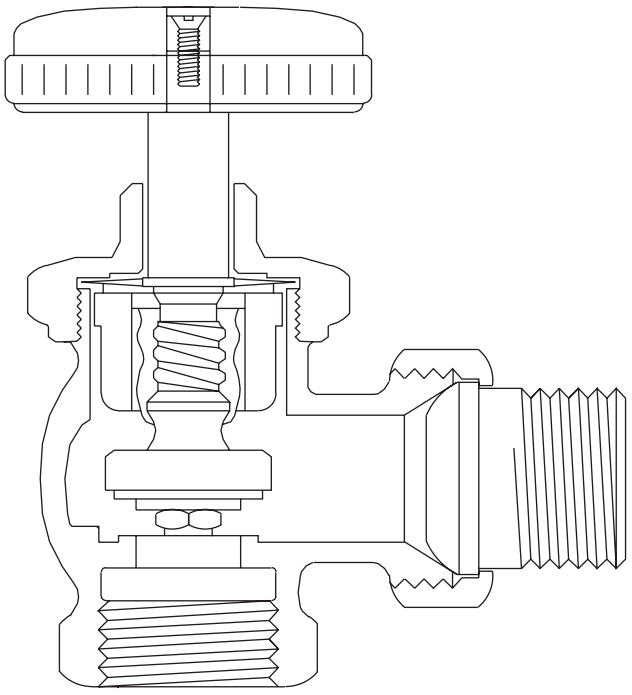
Description

The RV Series are packless, non-rising stem series brass radiator valves for steam and liquid services, available in angle pattern and straight connections.

Model	RV
Sizes	½" to 1"
Connections	Union/Threaded
Construction	Brass
Options	Extension Stem Assembly

Limiting conditions

Steam	150 psi g (10.3 bar) 366 °F (186 °C)
Liquid	200 psi g (13.8 bar)



Sizes and pipe connections

Model	Pattern	Connection	Size
RV-AP	Angle	Pipe to Male Union	½", ¾", 1"
RV-ST	Straightway	Pipe to Male Union	

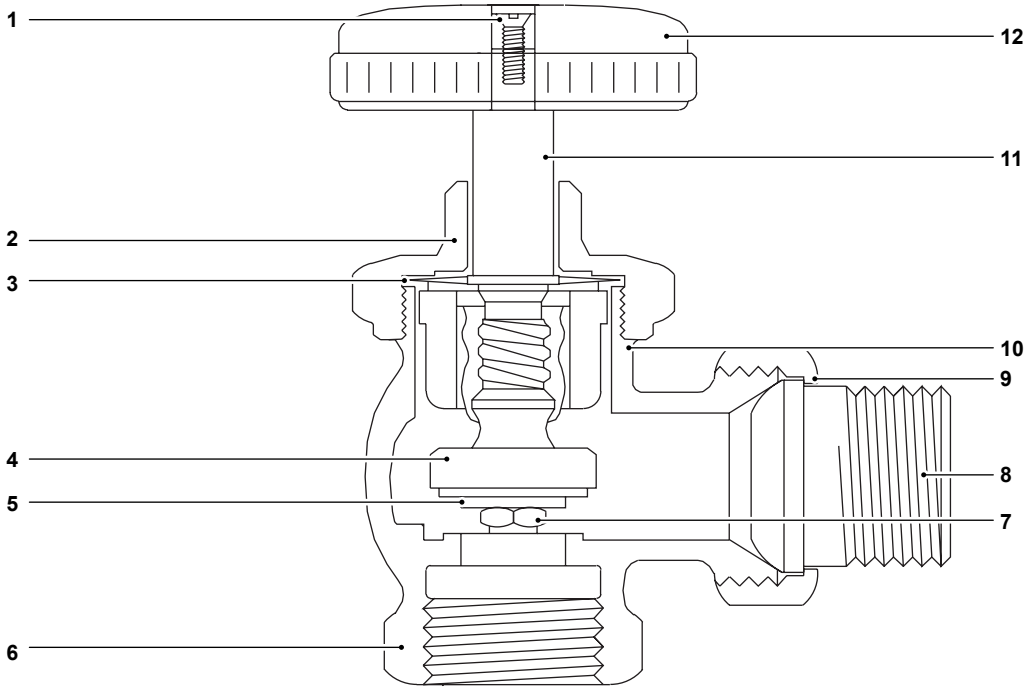
RV-AP Series meets Mil. Spec. WWV-160B, Section 3.1.1, Style A
RV-ST Series meets Mil. Spec. WWV-160B, Section 3.1.1, Style A

Sample specification

Low profile non-rising stem packless radiator valve.
All brass construction with pipe to male connections.

Materials

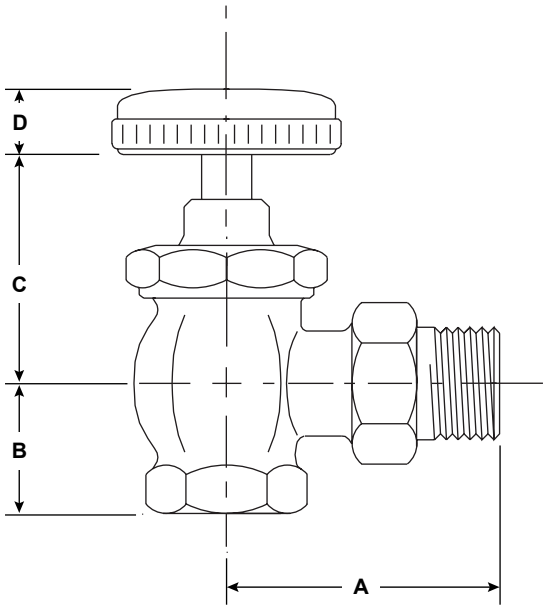
RV-AP shown



No.	Part	Material	
1	Handle Screw	Yellow Brass	ASTM B-16
2	Valve Bonnet	Red Brass	ASTM B-62
3	Metalflex 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

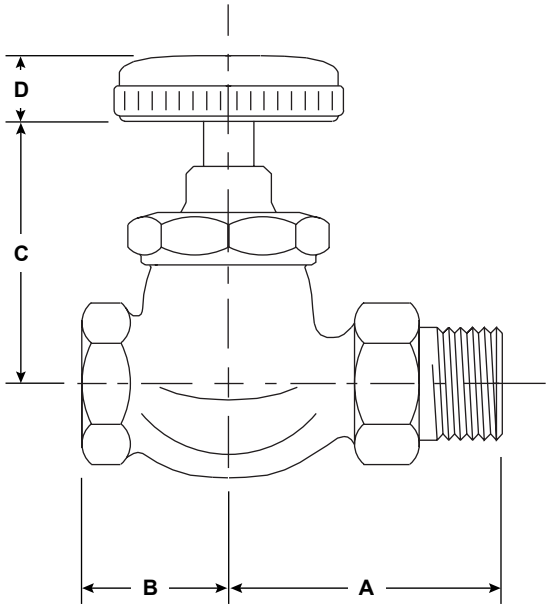
Dimensions/weight nominal in inches (mm) and lbs (kg)

MODEL AP
Angle Pattern
(Typical)



No	Size	A	B	C	D	Weight
AP-1	½"	2.375 (60)	1.187 (30)	2.187 (56)	0.625 (16)	1.15 (0.52)
	¾"	2.875 (73)	1.187 (30)	2.187 (56)	0.625 (16)	1.5 (0.68)
	1"	3.125 (79)	1.5 (38)	2.313 (59)	0.75 (19)	2.25 (1.02)

MODEL ST
Straightaway Pattern
(Typical)



No	Size	A	B	C	D	lbs/kg
ST-1	½"	2.375 (60)	1.375 (35)	2.688 (68)	0.625 (16)	1.25 (0.567)
	¾"	2.875 (73)	1.375 (35)	2.813 71	0.625 (16)	1.65 (0.75)
	1"	3.125 (79)	1.688 (43)	3.062 (78)	0.75 (19)	2.75 (1.25)

ISOLATION VALVE SOLUTIONS



Section contents ⟩

spirax sarco

8

SECTION 8 CONTENTS

M10V Manual Ball Valve ¼" to 2½" (Low Pressure Applications)	TI-P133-08-EN
M10Hi ISO Ball Valve ¼" to 2½" (High Pressure Applications)	TI-P133-70-EN
M10HPi ISO Ball Valve ¼" to 2½" (High Pressure Applications)	TI-P133-71-EN
M10Ti ISO "Teflon Free" Ball Valve ¼" to 2½" (Not Suitable for Steam)	TI-P133-68-EN
M10HTi ISO "Teflon Free" Ball Valve ¼" to 2½" (Medium Pressure Applications)	TI-P133-67-EN
M10Pi ISO Ball Valve ¼" to 2½" (High Static Pressure Applications)	TI-P133-69-EN
M33S ISO Full Bore Ball Valve API 6D 2" to 8" ASME 150 and ASME 300 (Medium Pressure Applications)	TI-P133-63-EN
M33V ISO Full Bore Ball Valve API 6D 2" to 8" ASME 150 and 300 (Low Pressure Application)	TI-P133-62-EN
M33F ISO Full Bore Ball Valve API 6D Firesafe API 607 2" to 8" ASME 150 and 300	TI-P133-64-EN
M40Si ISO (Medium Pressure Application) and M40Vi ISO (Low Pressure Application) Reduced Bore Ball Valves 1" to 6" ASME 150 and 300	TI-P133-78-EN
M10MS and M10MV FB and RB Ball Valves ¼" to 2" - DN8 to DN50	TI-P711-02-EN

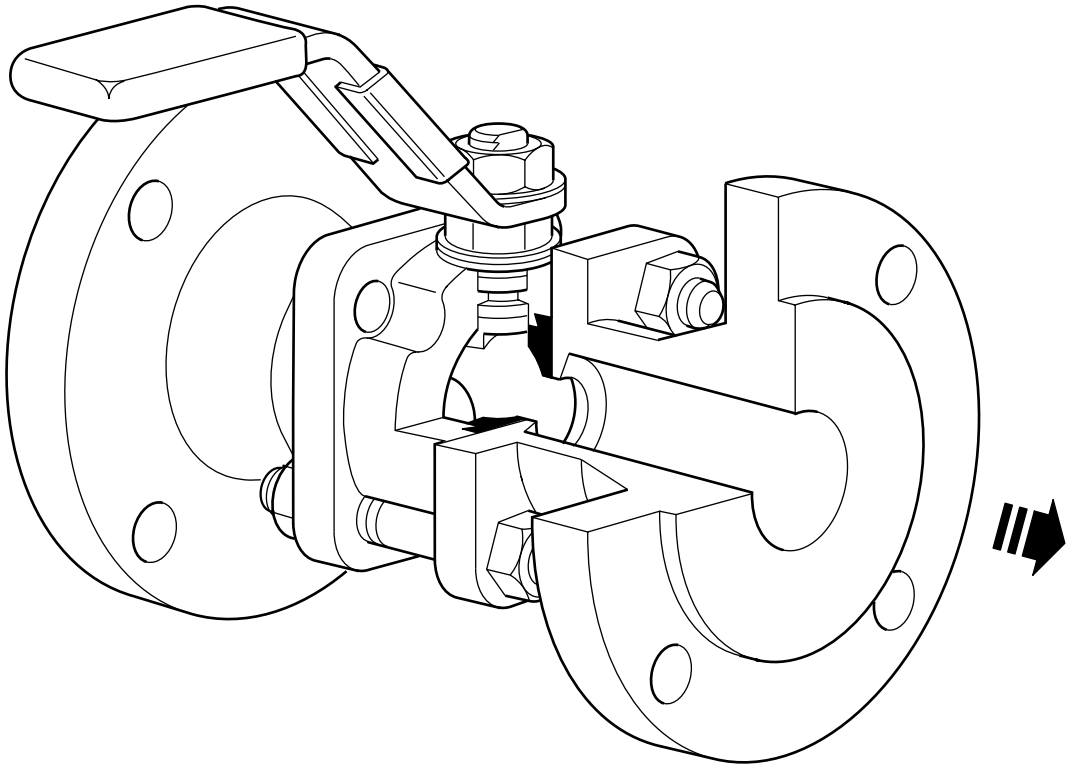
Section 8 contents continued on next page

SECTION 8 CONTENTS
(CONTINUED)

BVA300 Series Pneumatic Actuators for Spirax Sarco Ball Valves	TI-P372-23-EN
URPA Series Pneumatic Rack and Pinion Actuators for Spirax Sarco Ball Valves (M10Si, M10Vi, M10Ti, M33, & M40)	TI-P426-01-US
BSA3T Bellows Sealed Stop Valve	TI-P137-18-EN
A3S Bellows Sealed Stop Valve	TI-P132-09-EN
Spirax SafeBloc™ DBB3 Double Block and Bleed Bellows Sealed Stop Valve	TI-P184-08-EN

TI-P133-08
CMGT Issue 16

M10V
Ball Valve
DN¼" to 2½"



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.
M10V3_ _	Stainless 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 Pressure Equipment Directive (PED) 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
¼", ⅜", ½", ¾", 1", 1¼", 1½" and 2"
Screwed and welded
BSP, BSPT, API/NPT, BW, SW

Flanged
DN15 to DN50
ASME Class 150, ASME Class 300, and EN 1092 PN40.

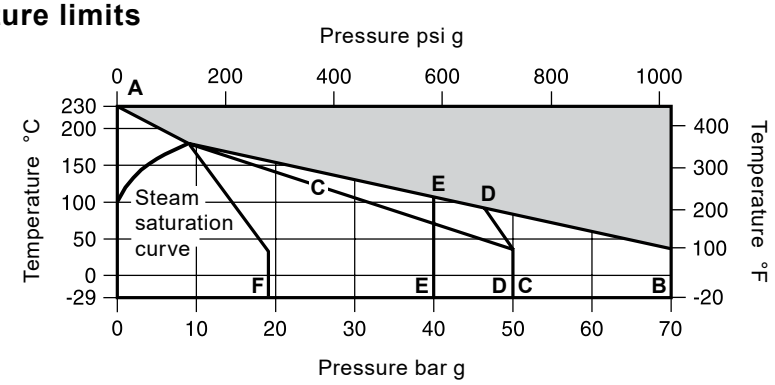
Reduced bore
¼", ⅜", ½", ¾", 1", 1¼", 1½", 2" and 2½"
Screwed and welded
BSP, BSPT, API/NPT, BW, SW

Flanged
DN15 to DN65
ASME Class 150, ASME Class 300, and EN 1092 PN40.

Technical data

Flow characteristic	Modified linear
Port	Full and reduced port versions
Leakage test procedure to ISO 5208 (Rate A)/EN 12266-1 (Rate A)	
Antistatic device	Complies with ISO 7121 and BS 5351

Pressure/temperature limits



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

A - B Screwed, BW and SW ¼" - 1½" FB, RB and 2" RB

A - C Screwed, SW and BW 2" FB and 2½" RB only

A - D Flanged ASME (ANSI) 300

A - E Flanged EN 1092 PN40

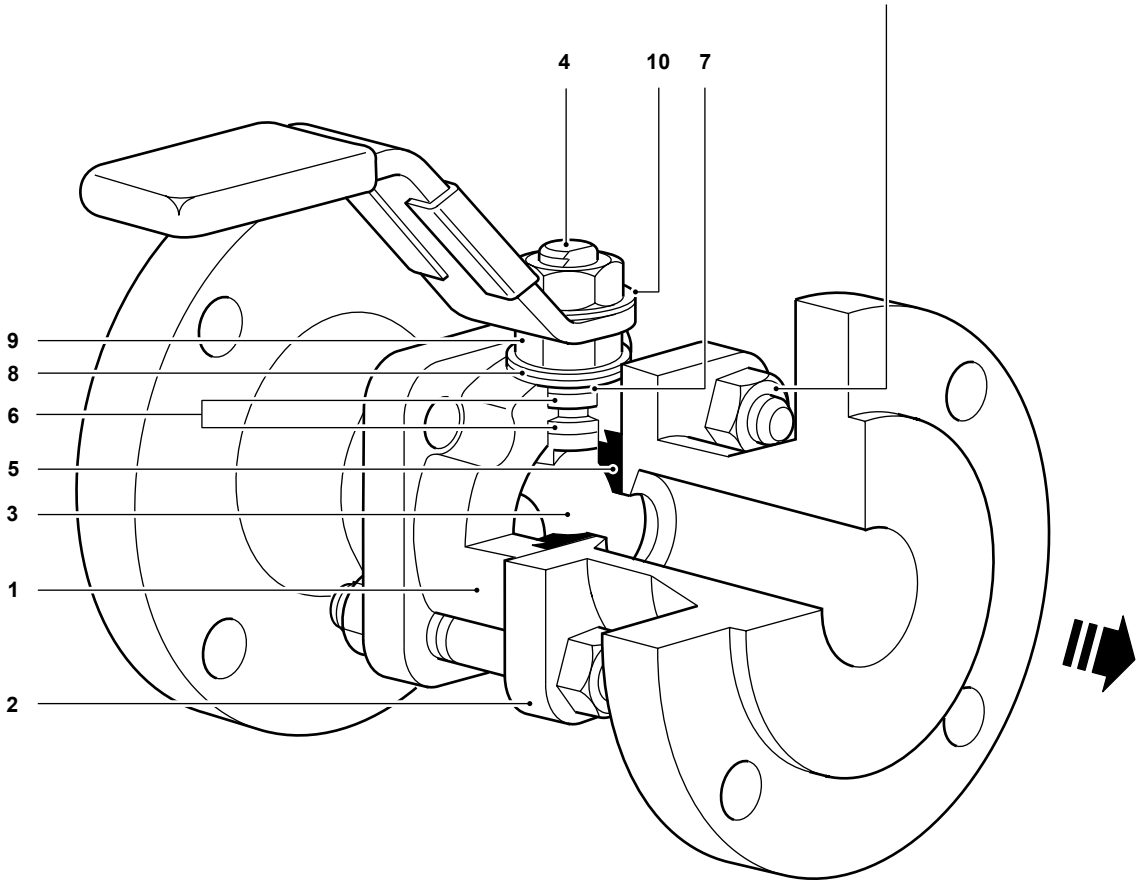
A - F Flanged ASME (ANSI) 150

Note 1: On the 2" FB and 2½" 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.
Note 3: In gases applications, the maximum operating pressure is restricted to 40 bar g.

Body design conditions			PN100
PMA	Maximum allowable pressure	70 bar g @ 40 °C	(1 015 psi g @ 104 °F)
TMA	Maximum allowable temperature	230 °C @ 0 bar g	(446 °F @ 0 psi g)
Minimum allowable temperature		-29 °C	(-20 °F)
PMO	Maximum operating pressure for saturated steam service	10 bar g	(145 psi g)
TMO	Maximum operating temperature	230 °C @ 0 bar g	(446 °F @ 0 psi g)
Minimum operating temperature **Note:** For lower operating temperatures consult Spirax Sarco		-29 °C	(-20 °F)
ΔPMX	Maximum differential pressure is limited to the PMO		
Designed for a maximum cold hydraulic test pressure of:		105 bar g	(1 523 psi g)

Materials

Please note:
Screwed, butt weld and socket weld M10V ball valves have bolts and nuts.
Flanged M10V ball valves have studs and nuts.

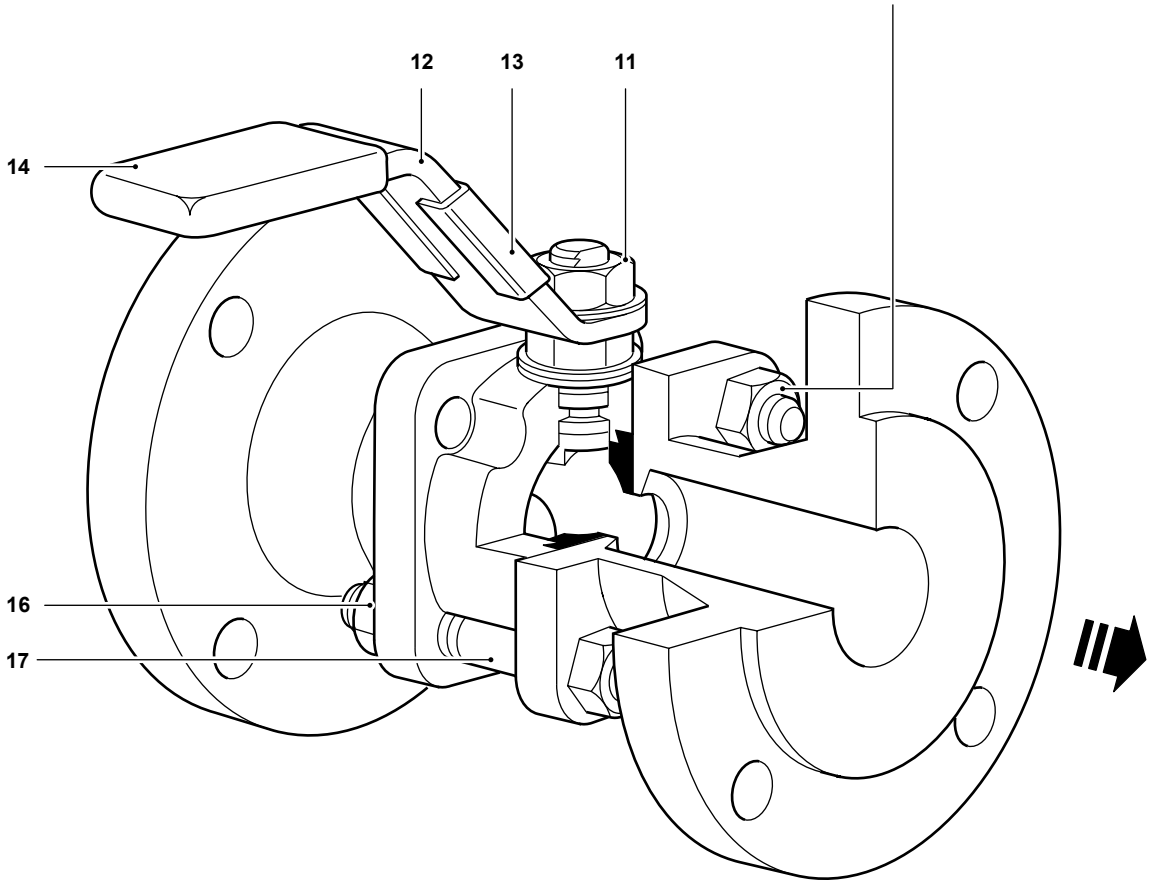


No.	Part				Material	
1	Body	**M10V2**			Zinc plated carbon steel	ASTM A105
			M10V3	**M10V4**	Stainless steel	ASTM A 182 F 316L
2	Cap	**M10V2**			Zinc plated carbon steel	ASTM A105
			M10V3	**M10V4**	Stainless steel	ASTM A 182 F 316L
3	Ball				Stainless steel	AISI 316
4	Stem				Stainless steel	AISI 316
5	Seat				Virgin PTFE	
6	Stem seal				Reinforced PTFE antistatic	
7	Separator	**M10V2**	**M10V3**		Zinc plated carbon steel	ASTM A105
				M10V4	Stainless steel	AISI 316
8	Spring washers				Stainless steel	AISI 301
9	Nut	**M10V2**	**M10V3**		Zinc plated carbon steel	SAE 12L14
				M10V4	Stainless steel	AISI 304
10	Name-plate (DN)				Stainless steel	AISI 430

Materials are continued on the next page

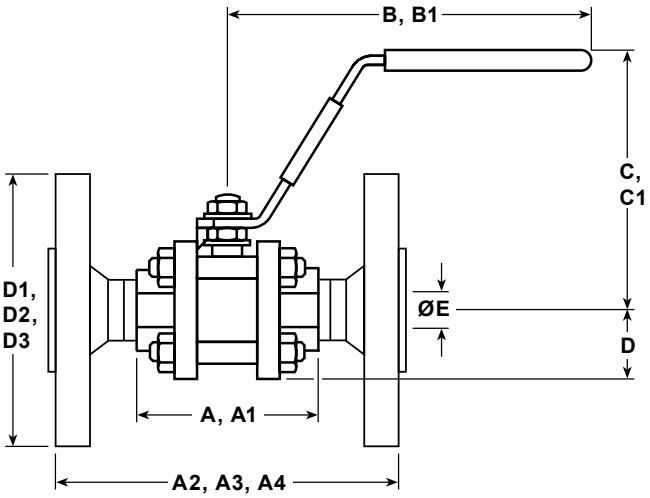
Materials (continued)

Please note:
Screwed, butt weld and socket weld M10V ball valves have bolts and nuts.
Flanged M10V ball valves have studs and nuts.



No.	Part				Material	
11	Stem nut	M10V2	M10V3		Zinc plated carbon steel	SAE 12L14
				M10V4	Stainless steel	AISI 304
12	Lever	M10V2	M10V3		Zinc plated carbon steel	SAE 1010
				M10V4	Stainless steel	AISI 316
13	Name-plate				Stainless steel	AISI 430
14	Grip				Vinyl	
15*	Bolts (Item 15 not shown - Screwed, butt weld and socket weld versions only)	M10V2	M10V3		Zinc plated carbon steel	A 193 B7
				M10V4	Stainless steel	AISI 304
16	Nuts	M10V2	M10V3		Zinc plated carbon steel	SAE 1010
				M10V4	Stainless steel	AISI 304
17	Studs	M10V2	M10V3		Zinc plated carbon steel	Grade 5
				M10V4	Stainless steel	AISI 316

Dimensions (approximate) in mm (inches)



A: Screwed and Butt weld

A1: Socket weld

A2: Flanged ASME 150

A3: Flanged PN40

A4: Flanged ASME 300

B: Screwed, Butt weld and Socket weld

B1: Flanged ASME 150, PN40

C: Screwed, Butt weld and Socket weld

C1: Flanged ASME 150, Flanged PN40

D: Screwed, Butt weld and Socket weld

D1: Flanged ASME 150

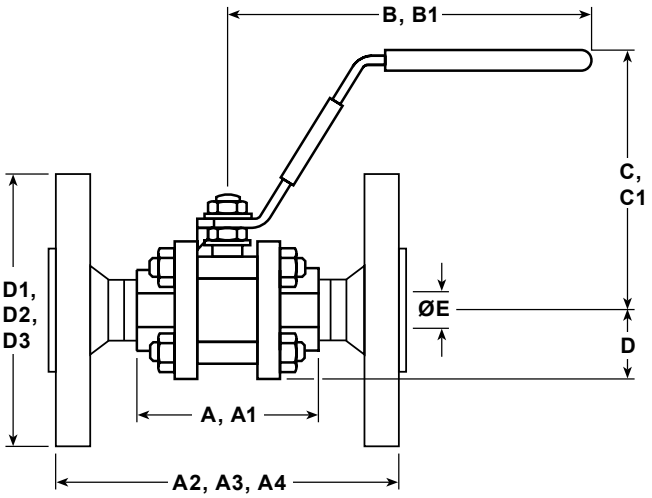
D2: Flanged PN40

D3: Flanged ASME 300

Reduced bore

Size	A	A1	A2	A3	A4	B	B1	C	C1	D	D1	D2	D3	E
¼"	63 (2.5)	60 (2.4)				120 (4.7)		61 (2.4)		22 (0.9)				11 (0.4)
⅜"		63 (2.5)												
½"		51 (2.0)	108 (4.3)	130 (5.11)	140 (5.5)		120 (4.7)		87 (3.4)	24 (0.9)	89 (3.5)	95 (3.7)	95 (3.7)	
¾"	68 (2.7)	59 (2.3)	117 (4.6)	150 (5.9)	152 (5.9)			63 (2.5)	89 (3.5)	26 (1.0)	98 (3.8)	105 (4.13)	117 (4.6)	14 (0.6)
1"	86 (3.4)	84 (3.3)	127 (5.0)	160 (6.29)	165 (6.5)	157 (6.2)	157 (6.2)	91 (3.6)	91 (3.6)	31 (1.2)	108 (4.3)	115 (4.52)	124 (4.9)	21 (0.8)
1¼"	97 (3.8)	93 (3.6)	140 (5.5)	180 (7.08)	178 (7.0)			95 (3.7)	95 (3.7)	37 (1.4)	118 (4.6)	140 (5.51)	133 (5.2)	25 (0.9)
1½"	106 (4.2)	102 (4.0)	165 (6.5)	200 (7.87)	190 (7.5)	180 (7.1)	180 (7.1)	109 (4.3)	109 (4.3)	41 (1.6)	127 (5.0)	150 (5.9)	156 (6.1)	31 (1.2)
2"	124 (4.9)	118 (4.6)	178 (7.0)	230 (9)	216 (8.5)			115 (4.5)	115 (4.5)	48 (1.8)	152 (5.9)	165 (6.49)	165 (6.5)	38 (1.5)
2½"	152 (6.0)	152 (6.0)	191 (7.5)		241 (9.5)	245 (9.6)		132 (5.2)	132 (5.2)	57 (2.2)			190 (7.5)	51 (2.0)

Dimensions (approximate) in mm (inches)



A: Screwed and Butt weld

A1: Socket weld

A2: Flanged ASME 150

A3: Flanged PN40

A4: Flanged ASME 300

B: Screwed, Butt weld and Socket weld

B1: Flanged ASME 150, PN40

C: Screwed, Butt weld and Socket weld

C1: Flanged ASME 150, Flanged PN40

D: Screwed, Butt weld and Socket weld

D1: Flanged ASME 150

D2: Flanged PN40

D3: Flanged ASME 300

Full bore

Size	A	A1	A2	A3	A4	B	B1	C	C1	D	D1	D2	D3	E
¼"	63 (2.5)	60 (2.4)				120 (4.7)		61 (2.4)		24 (0.9)				11 (0.4)
⅜"		63 (2.5)												
½"	68 (2.7)	68 (2.7)		130 (5.11)	140 (5.5)	120 (4.7)	120 (4.7)	63 (2.5)	89 (3.5)	26 (1.0)		95 (3.7)	95 (3.7)	14 (0.6)
¾"	86 (3.4)	86 (3.4)		150 (5.9)	152 (6.0)	157 (6.2)	157 (6.2)	91 (3.6)	91 (3.6)	31 (1.2)		105 (4.13)	117 (4.6)	21 (0.8)
1"	97 (3.8)	97 (3.8)		160 (6.29)	165 (6.5)	157 (6.2)	157 (6.2)	95 (3.7)	95 (3.7)	37 (1.5)		115 (4.52)	124 (4.9)	25 (0.9)
1¼"	106 (4.2)	106 (4.2)		180 (7.08)	178 (7.0)	180 (7.1)	180 (7.1)	109 (4.3)	109 (4.3)	41 (1.6)		140 (5.51)	133 (5.2)	31 (1.2)
1½"	124 (4.9)	124 (4.9)		200 (7.87)	190 (7.5)	180 (7.1)	180 (7.1)	115 (4.5)	115 (4.5)	48 (1.9)		150 (5.9)	156 (6.1)	38 (1.5)
2"	152 (6.0)	152 (6.0)		230 (9)	216 (8.5)	245 (9.6)	245 (9.6)	132 (5.2)	132 (5.2)	57 (2.2)		165 (6.5)	165 (6.5)	51 (2.0)

Weights (approximate) in kg (lbs)

Size	Reduced bore				Full bore		
	Scrd/BW/SW	PN40	ASME 150	ASME 300	Scrd/BW/SW	PN40	ASME 300
¼"	0.61 (1.3)				0.61 (1.3)		
⅜"							
½"		2.2 (4.85)	1.65 (3.6)	2.2 (4.8)	0.70 (1.5)	2.3 (5.07)	2.5 (5.5)
¾"	0.70 (1.5)	2.9 (6.39)	2.20 (4.8)	2.9 (6.3)	1.27 (2.8)	3.5 (7.71)	4.2 (9.2)
1"	1.27 (2.8)	3.9 (8.59)	3.38 (7.5)	4.5 (9.9)	1.77 (3.9)	4.4 (9.7)	5.1 (11.2)
1¼"	1.77 (3.9)	5.4 (11.9)	4.44 (9.8)	7.0 (15.4)	2.50 (5.5)	6.2 (13.6)	7.5 (16.5)
1½"	2.50 (5.5)	6.5 (14.3)	5.84 (12.8)	8.36 (18.4)	3.50 (7.7)	7.5 (16.5)	10.0 (22.0)
2"	3.50 (7.7)	8.8 (19.4)	8.99 (19.8)	11.2 (24.7)	6.90 (15.2)	12.2 (26.8)	13.4 (29.5)
2½"	6.90 (15.2)			17.5 (38.6)			

Kv values

Size	¼"	⅜"	½"	¾"	1"	1¼"	1½"	2"	2½"
Reduced bore	2.5	6.8	6	10	27	49	70	103	168
Full bore	2.5	6.8	17	36	58	89	153	205	

For conversion:
C**v** (UK) = K**v** x 0.963
C**v** (US) = K**v** x 1.156

Operating torque

Size		¼"	⅜"	½"	¾"	1"	1¼"	1½"	2"	2½"
Reduced bore	Nm (lbf ft)	2 (1.5)	2 (1.5)	2 (1.5)	3.5 (2.6)	13 (9.6)	21 (15.5)	30 (21.2)	40 (29.5)	45 (33.1)
Full bore	Nm (lbf ft)	2 (1.5)	2 (1.5)	3.5 (2.6)	13 (9.6)	21 (15.5)	30 (21.2)	40 (29.5)	45 (33.1)	

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 supplied with the product.

Welding
Only the models that have connections designed for welding (SW, BW, Imperial Tube connections) should be welded. Valves with SW or BW welding connections must be disassembled before welding onto the pipeline, the ends should be welded separately and the valve should be reassembled when the ends are cool. Carbon steel valves with threaded (BSPT, BSP, NPT) or flanged connections must not be welded to avoid damages to the valve and/or injury to personnel.

How to order example:
1 off Spirax Sarco ½" screwed BSP M10V2FB ball valve.

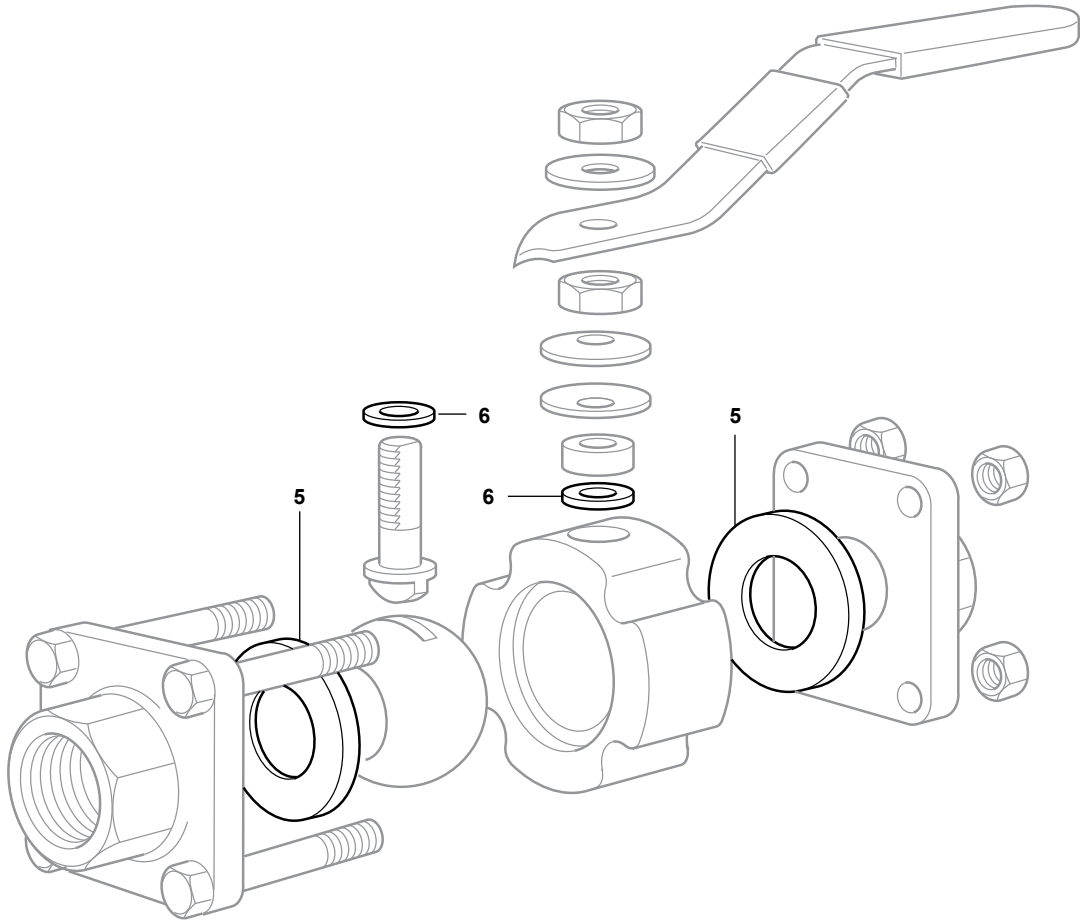
Optional extras:
- Self-venting ball.
- Extended stems 50 mm (2") and 100 mm (4") to allow full insulation.
- Lockable handle.
- Fully degreased under request (ie: oxygen application).

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

Available spares

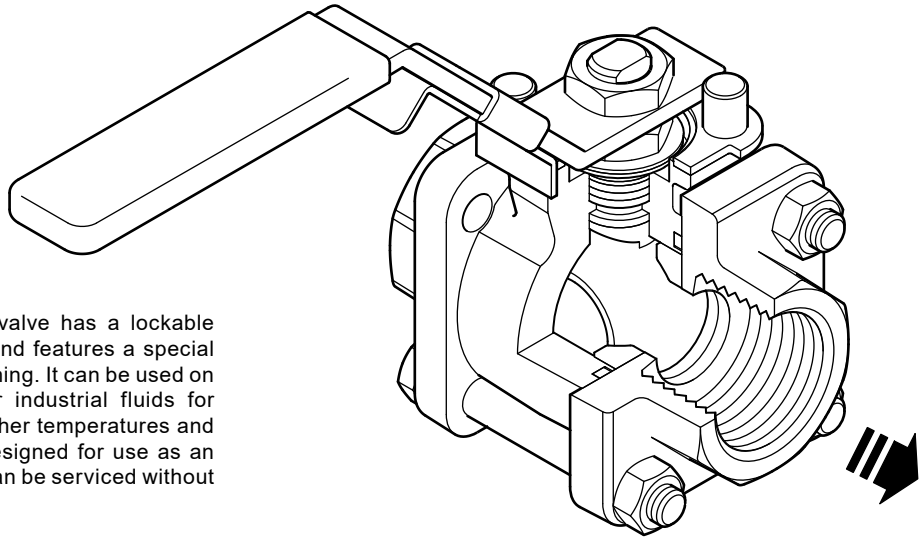
Seat and stem seal set	**5, 6**

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 ½" M10V2FB ball valve.



TI-P133-70
CMGT Issue 5

M10Hi ISO
Ball Valve
DN¼" to DN2½"



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

M10Hi2 ISO	Zinc plated carbon steel body and caps.
M10Hi3 ISO	Stainless steel body and caps.
M10Hi4 ISO	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 Pressure Equipment Directive (PED) 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 100 mm (4") to allow full insulation.
- Fully degreased under request (i.e: Oxygen application).

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

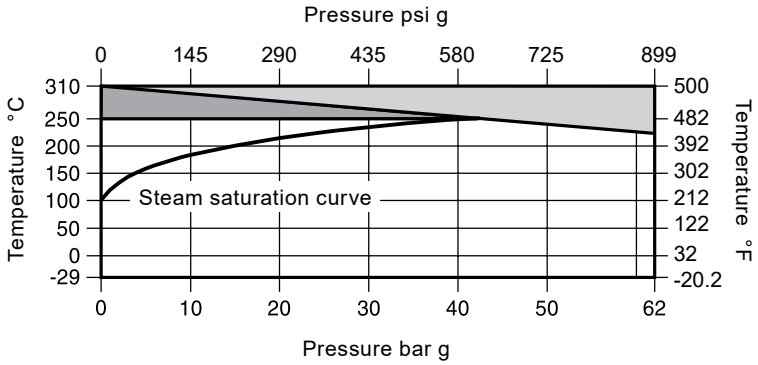
Full bore
¼", ⅜", ½", ¾", 1", 1¼", 1½" and 2"
Screwed BSP, BSPT, NPT, BW, SW

Flanged
DN15 to DN50
ASME (ANSI) Class 150,300 and EN 1092 PN40

Reduced bore
¼", ⅜", ½", ¾", 1", 1¼", 1½", 2" and 2½"
Screwed BSP, BSPT, NPT, BW, SW

Flanged
DN15 to DN65
ASME (ANSI) Class 150,300 and EN 1092 PN40

Pressure/temperature limits

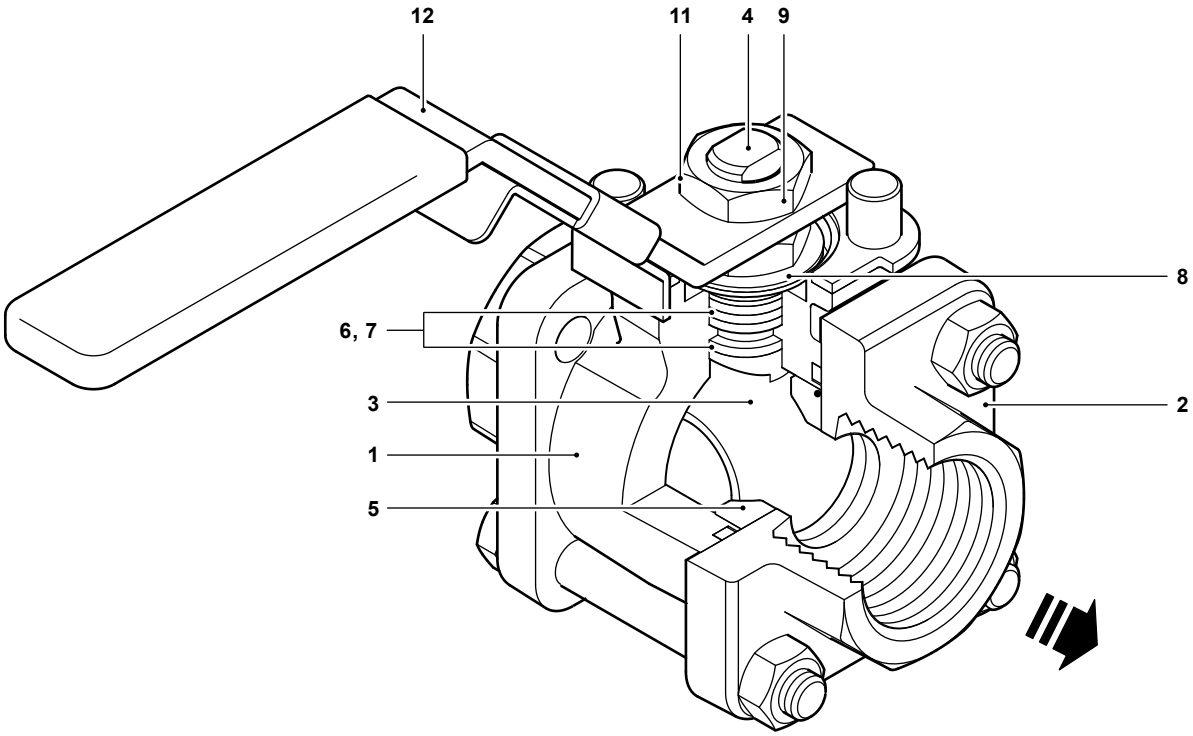


The product **must not** be used in this region.

The product can only be used in this region for short periods of time.

Body design conditions				PN63
PMA	Maximum allowable pressure		62 bar g @ 215 °C	899 psi g @ 419 °F
TMA	Maximum allowable temperature		310 °C @ 0 bar g	590 °F @ 0 psi g
Minimum allowable temperature			-29 °C	-20.2 °F
PMO	Maximum operating pressure for saturated steam service		39 bar g	566 psi g
TMO	Maximum operating temperatures	For short periods	310 °C @ 0 bar g	590 °F @ 0 psi g
		For continuous operation	250 °C @ 39 bar g	482 °F @ 566 psi g
Minimum operating temperature **Note:** For lower operating temperatures consult Spirax Sarco			-29 °C	-20.2 °F
ΔPMX	Maximum differential pressure is limited to the PMO			
Designed for a maximum cold hydraulic test pressure of			93 bar g	1349 psi g

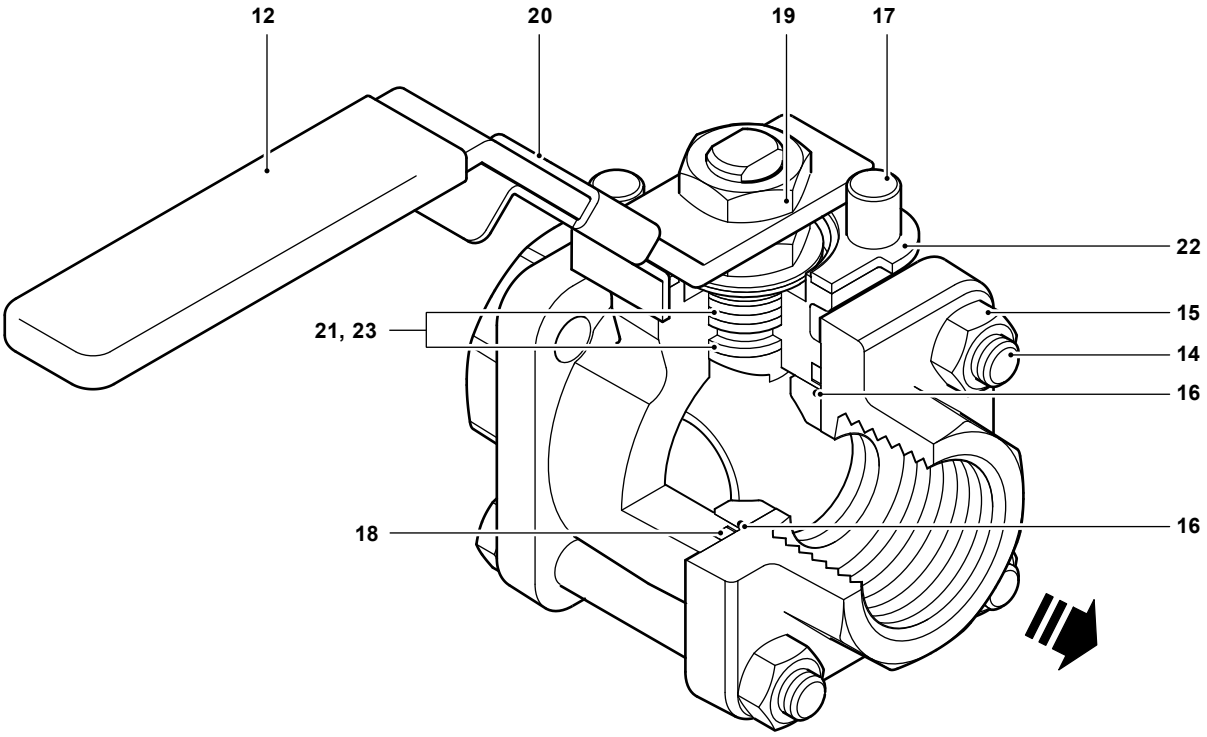
Materials



No.	Part		Material	
1	Body	**M10Hi2 ISO**	Zinc plated carbon steel	ASTM A105
		M10Hi3 ISO **M10Hi4 ISO**	Stainless steel	ASTM A 182 F 316L
2	Cap	**M10Hi2 ISO**	Zinc plated carbon steel	ASTM A105
		M10Hi3 ISO **M10Hi4 ISO**	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	**M10Hi2 ISO** **M10Hi3 ISO**	Zinc plated carbon steel	SAE 1010
		M10Hi4 ISO	Stainless steel	AISI 316
8	Belleville washer		Stainless steel	AISI 301
9	Lower stem nut	**M10Hi2 ISO** **M10Hi3 ISO**	Zinc plated carbon steel	SAE 1010
		M10Hi4 ISO	Stainless steel	AISI 304
10	Name-plate (Not shown)		Stainless steel	AISI 430
11	Upper stem nut	**M10Hi2 ISO** **M10Hi3 ISO**	Zinc plated carbon steel	SAE 1010
		M10Hi4 ISO	Stainless steel	AISI 304

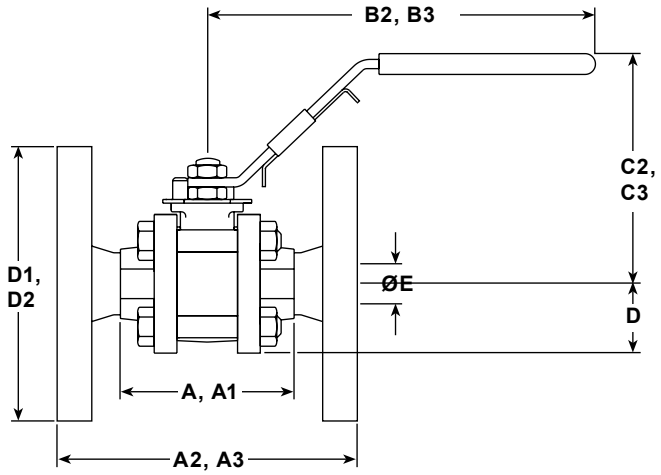
Materials continued on next page

Materials (continued)



No.	Part		Material	
12	Lever	**M10Hi2 ISO** **M10Hi3 ISO**	Zinc plated carbon steel	SAE 1010
		M10Hi4 ISO	Stainless steel	AISI 316
13	Grip		Vinyl yellow	
14	Studs	**M10Hi2 ISO** **M10Hi3 ISO**	Zinc plated carbon steel	A193 B7
		M10Hi4 ISO	Stainless steel	AISI 316
15	Nuts	**M10Hi2 ISO** **M10Hi3 ISO**	Zinc plated carbon steel	A194 2H
		M10Hi4 ISO	Stainless steel	AISI 304
16	Seat 'O' ring		Geothermal	
17	Stop screw	**M10Hi2 ISO** **M10Hi3 ISO**	Zinc plated carbon steel	SAE 12L 14
		M10Hi4 ISO	Stainless steel	AISI 304
18	Body/cap 'O' ring		Geothermal	
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

Dimensions (approximate) in mm (inches)



A: Scrd and BW
A1: SW
A2: Flanged ASME 150
A3: Flanged PN40
B2: Scrd, BW and SW
B3: Flanged PN40 and ASME 150
C2: Scrd, BW and SW
C3: Flanged PN40 and ASME 150
D: Scrd, BW and SW
D1: Flanged ASME 150
D2: Flanged PN40
E: All versions

Reduced bore

Size	A	A1	A2	A3	B2	B3	C2	C3	D	D1	D2	E
¼"	66 (2.60)	66 (2.60)			162 (6.38)		93 (3.66)		24 (0.94)			11 (0.43)
⅜"												
½"			108 (4.25)	130 (5.12)		162 (6.38)		93 (3.66)		89 (3.50)	95 (3.74)	
¾"	72 (2.83)	72 (2.83)	117 (4.61)	150 (5.91)			95 (3.74)	95 (3.74)	26 (1.02)	98 (3.86)	105 (4.13)	14 (0.55)
1"	87 (3.43)	87 (3.43)	127 (5.00)	160 (6.30)			101 (3.98)	101 (3.98)	31 (1.22)	108 (4.25)	115 (4.53)	21 (0.83)
1¼"	104 (4.09)	104 (4.09)	140 (5.51)	180 (7.09)			106 (4.17)	106 (4.17)	37 (1.46)	118 (4.65)	140 (5.51)	25 (0.98)
1½"	111 (4.37)	111 (4.37)	165 (6.50)	200 (7.87)	186 (7.32)	186 (7.32)	118 (4.65)	118 (4.65)	41 (1.61)	127 (5.00)	150 (5.91)	31 (1.22)
2"	125 (4.92)	119 (4.69)	178 (7.01)	230 (9.06)			123 (4.84)	123 (4.84)	48 (1.89)	152 (5.98)	165 (6.50)	38 (1.50)
2½"	153 (6.02)	153 (6.02)			251 (9.88)	251 (9.88)	140 (5.51)	140 (5.51)	57 (2.24)			50 (1.97)

Full bore

Size	A	A1	A2	A3	B2	B3	C2	C3	D	D1	D2	E
¼"	66 (2.60)	66 (2.60)			162 (6.38)		93 (3.66)		24 (0.94)			11 (0.43)
⅜"												
½"	72 (2.83)	72 (2.83)		130 (5.12)		162 (6.38)	95 (3.74)	95 (3.74)	26 (1.02)		95 (3.74)	14 (0.55)
¾"	87 (3.43)	87 (3.43)		150 (5.91)			101 (3.98)	101 (3.98)	31 (1.22)		105 (4.13)	21 (0.83)
1"	104 (4.09)	104 (4.09)		160 (6.30)			106 (4.17)	106 (4.17)	37 (1.46)		115 (4.53)	25 (0.98)
1¼"	111 (4.37)	111 (4.37)		180 (7.09)	186 (7.32)	186 (7.32)	118 (4.65)	118 (4.65)	41 (1.61)		140 (5.51)	31 (1.22)
1½"	125 (4.92)	119 (4.69)		200 (7.87)			123 (4.84)	123 (4.84)	48 (1.89)		150 (5.91)	38 (1.50)
2"	153 (6.02)	153 (6.02)		230 (9.06)	251 (9.88)	251 (9.88)	140 (5.51)	140 (5.51)	57 (2.24)		165 (6.50)	50 (1.97)

Weights (approximate) in kg (lbs)

Size	Reduced bore			Full bore	
	Scrd /BW/SW	PN40	ASME 150	Scrd /BW/SW	PN40
¼"	0.86 (1.90)			0.86 (1.90)	
⅜"	0.84 (1.85)			0.84 (1.85)	
½"	0.81 (1.79)	2.35 (5.18)	1.70 (3.75)	1.02 (2.25)	2.59 (5.71)
¾"	1.02 (2.25)	3.20 (7.05)	2.25 (4.96)	1.56 (3.44)	3.76 (8.29)
1"	1.56 (3.44)	4.30 (9.48)	2.92 (6.44)	2.35 (5.18)	5.02 (11.1)
1¼"	2.35 (5.18)	6.40 (14.1)	4.15 (9.15)	3.08 (6.79)	6.92 (15.3)
1½"	3.08 (6.79)	7.20 (15.9)	6.40 (14.1)	4.41 (9.72)	9.09 (20.0)
2"	4.41 (9.72)	10.72 (23.6)	8.35 (18.4)	9.05 (20.0)	13.96 (30.8)
2½"	8.17 (18.0)				

Kv values

Size	¼"	⅜"	½"	¾"	1"	1¼"	1½"	2"	2½"
Reduced bore	2.5	6.8	6	10	27	49	70	103	168
Full bore	2.5	6.8	17	36	58	89	153	205	

For conversion:
Cv (UK) = Kv x 0.963
Cv (US) = Kv x 1.156

8.1
14

Operating torque

Size		¼"	⅜"	½"	¾"	1"	1¼"	1½"	2"	2½"
Reduced bore	Nm (lbf ft)	10 (7)	10 (7)	10 (7)	14 (10)	24 (18)	45 (33)	55 (41)	65 (48)	80 (59)
Full bore	Nm (lbf ft)	10 (7)	10 (7)	14 (10)	24 (18)	45 (33)	55 (41)	65 (48)	80 (59)	

The indicated torque values are for valves frequently operated, that are submitted to a maximum differential pressure of 40 bar (580 psi).

Valves that are subject to long static periods, may require greater break-out torque.

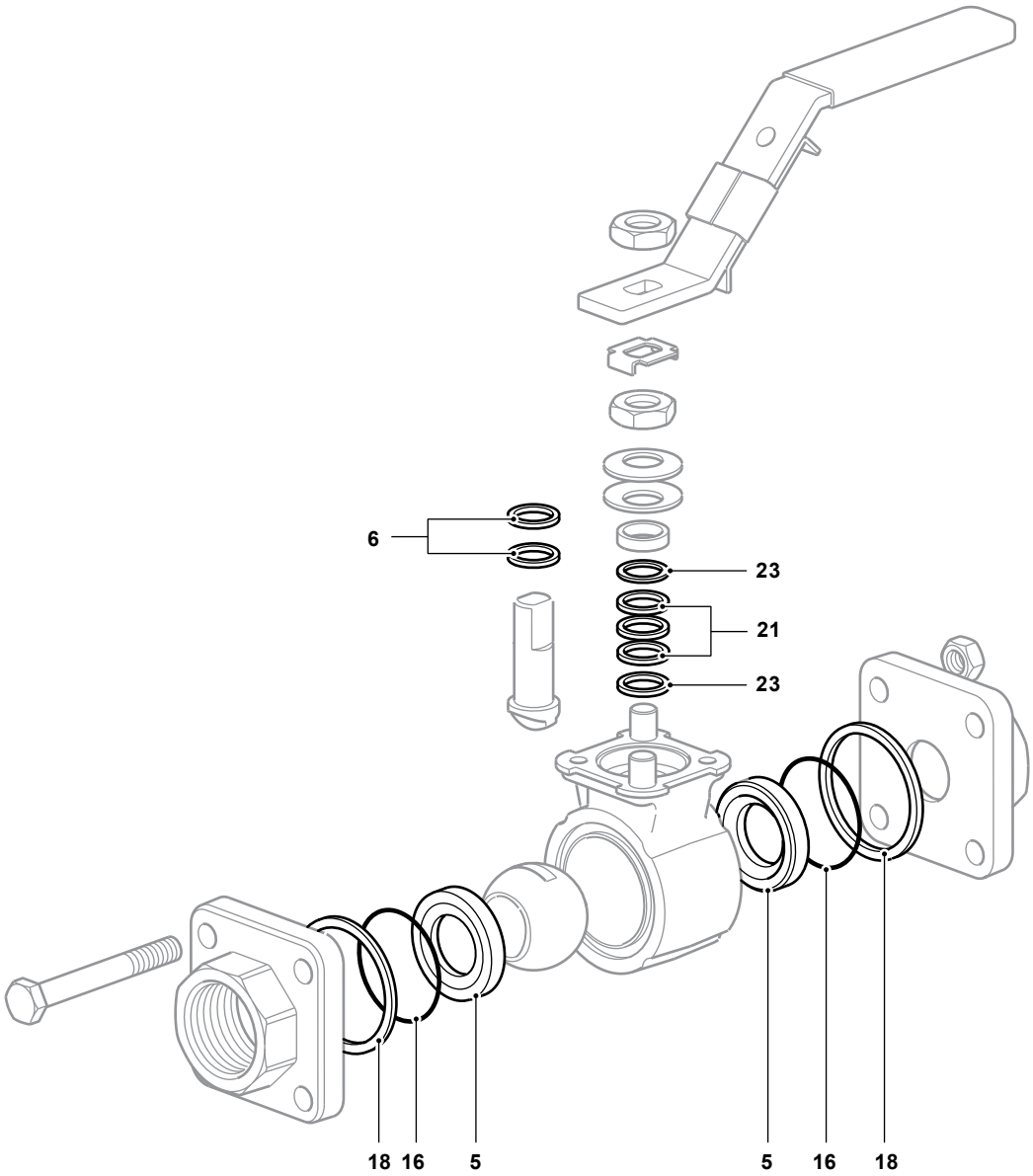
Safety information, installation and maintenance
For full details see the Installation and Maintenance Instructions supplied with the product.

How to order example:
1 off Spirax Sarco ½" screwed BSP M10Hi2FB ISO ball valve.

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

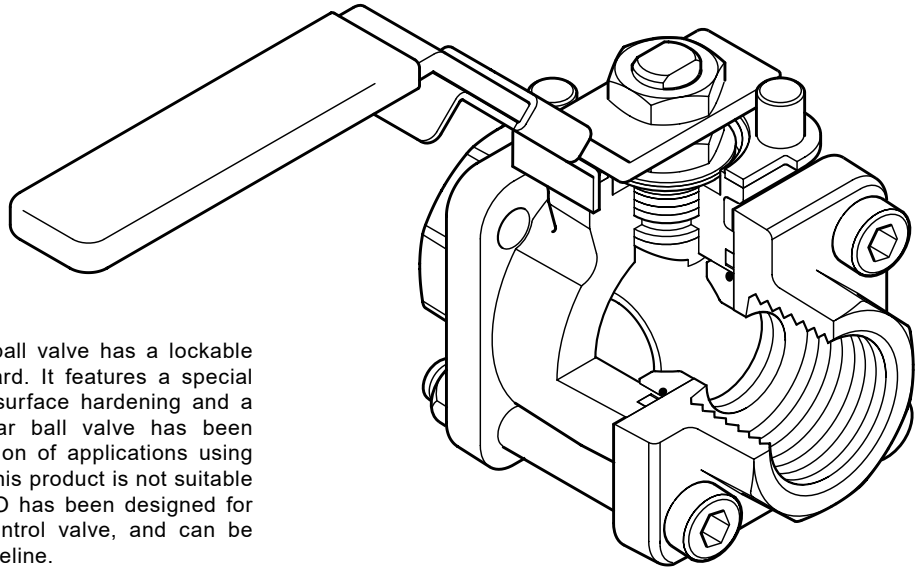
Available spares	
Seat, seals, body/cap 'O' ring and seat 'O' ring set	**5, 6, 16, 18, 21, 23**

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 ½" M10Hi2FB ISO ball valve.



TI-P133-71
CMGT Issue 6

M10HPi ISO Ball Valve DN¼" to DN2"



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 (please note that this product is not suitable for oxygen service). The M10HPi 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 EU Pressure Equipment Directive/UK Pressure Equipment (Safety) Regulations 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 100 mm (4") to allow full insulation.
- Fully degreased under request.

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

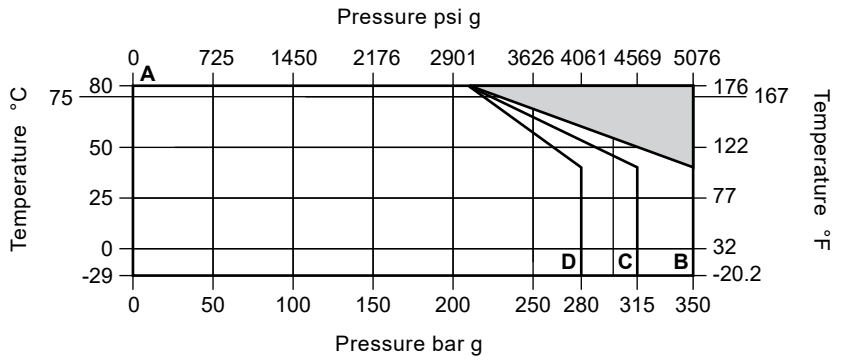
Full bore

¼", ⅜", ½", ¾", 1", 1¼" and 1½"
Screwed BSP, BSPT, NPT, BW, SW

Reduced bore

¼", ⅜", ½", ¾", 1", 1¼", 1½" and 2"
Screwed BSP, BSPT, NPT, BW, SW

Pressure/temperature limits



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

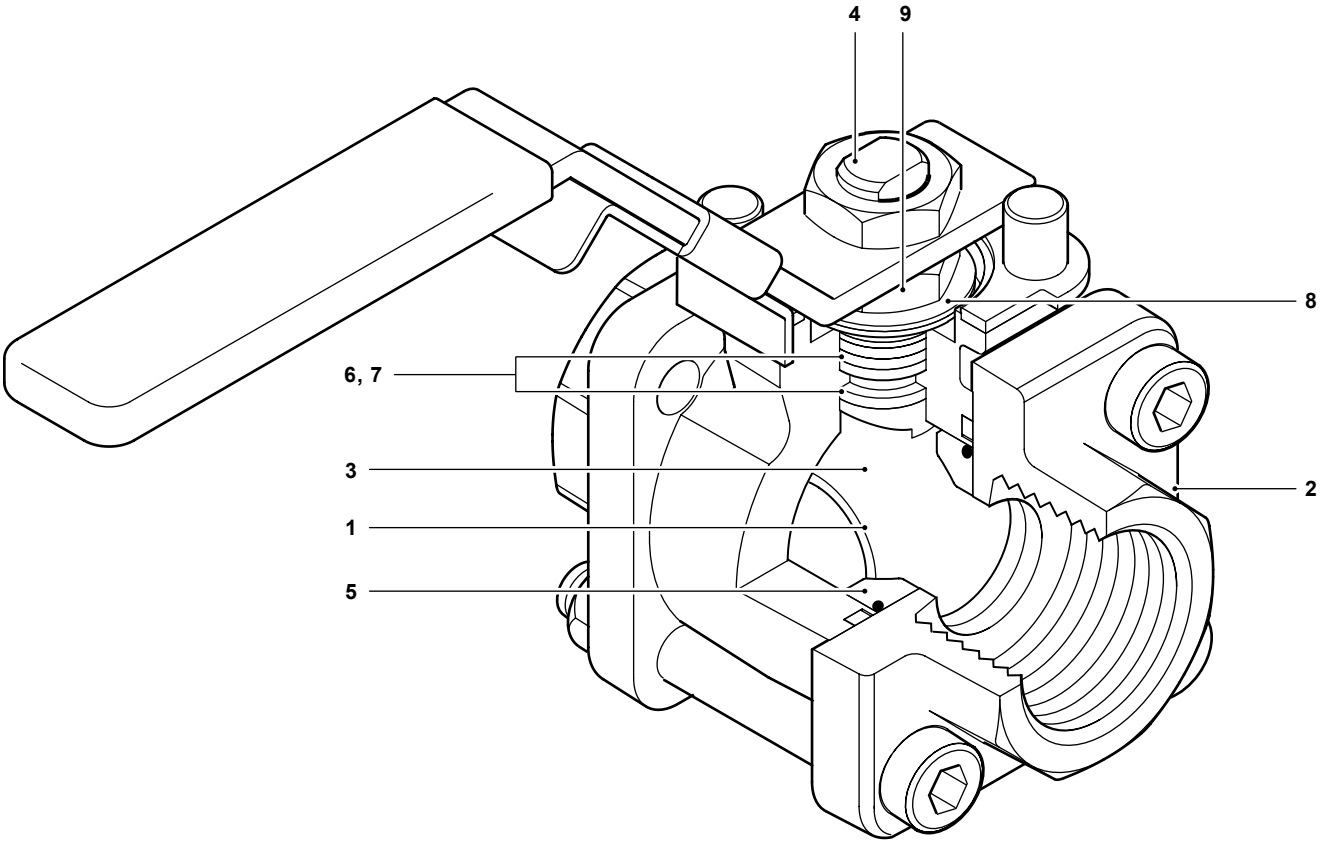
A - B ¼, ⅜" and ½" RB

A - C ½" FB; ¾" and 1" RB

A - D 1" FB; 1¼", 1½" and 2" RB

PMA	Maximum allowable pressure	¼", ⅜" and ½" RB	350 bar	5076 psi
		½" FB; ¾" and 1" RB	315 bar	4569 psi
		1" FB; 1¼", 1½" and 2" RB	280 bar	4061 psi
TMA	Maximum allowable temperature		80 °C	176 °F
Minimum allowable temperature			-29 °C	-20.2 °F
TMO	Maximum operating temperature		80°C @ 210 bar g	176 °F @ 3046 psi g
Minimum operating temperature **Note:** For lower operating temperatures consult Spirax Sarco.			-29 °C	-20.2 °F
ΔPMX	Maximum differential pressure is limited to the PMO			
Designed for a maximum cold hydraulic test pressure of 1.5 x PMO				

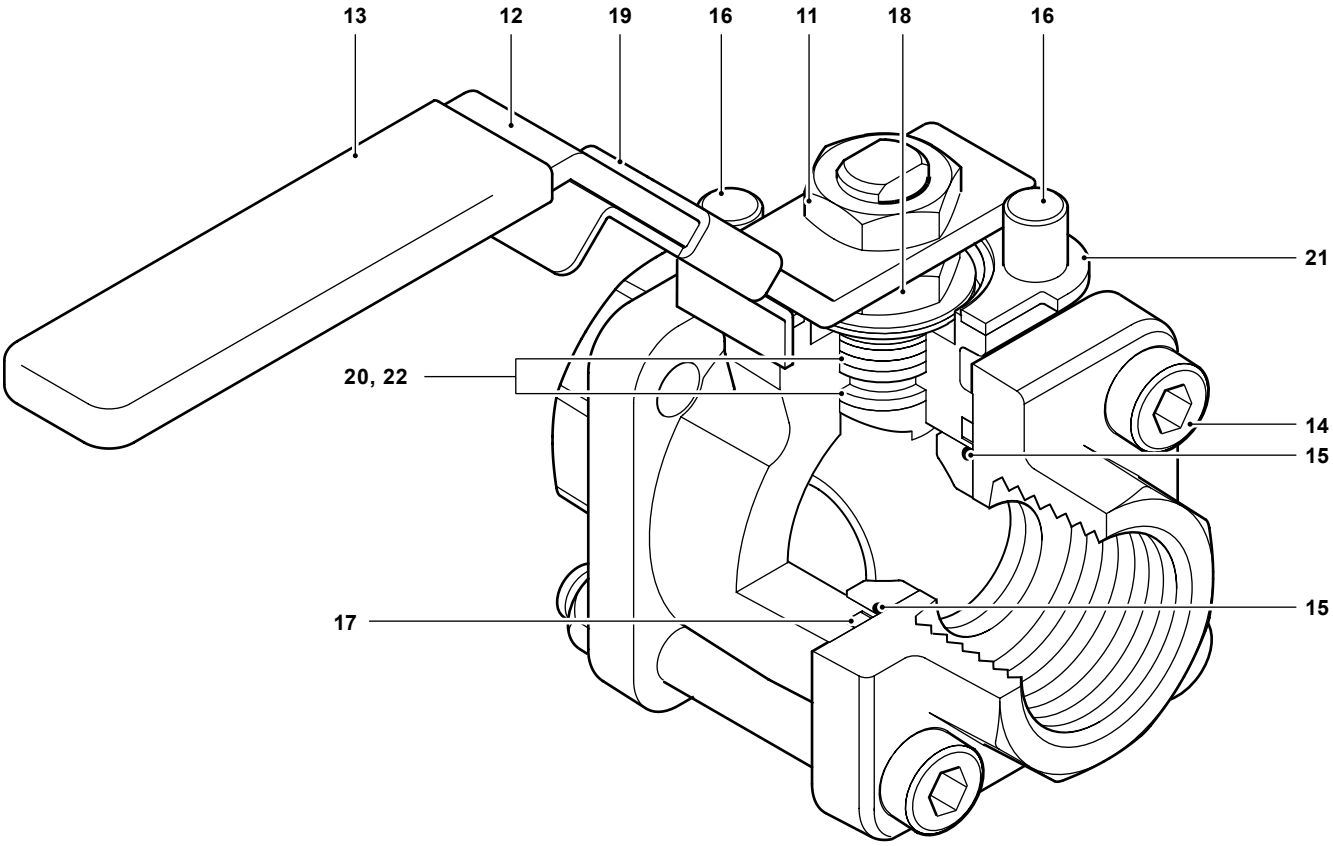
Materials



No.	Part		Material	
1	Body	**M10HPi2 ISO**	Zinc plated carbon steel	ASTM A105
		M10HPi3 ISO	Stainless steel	ASTM A 182 F 316L
2	Cap	**M10HPi2 ISO**	Zinc plated carbon steel	SAE 1040
		M10HPi3 ISO	Stainless steel	AISI 316
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

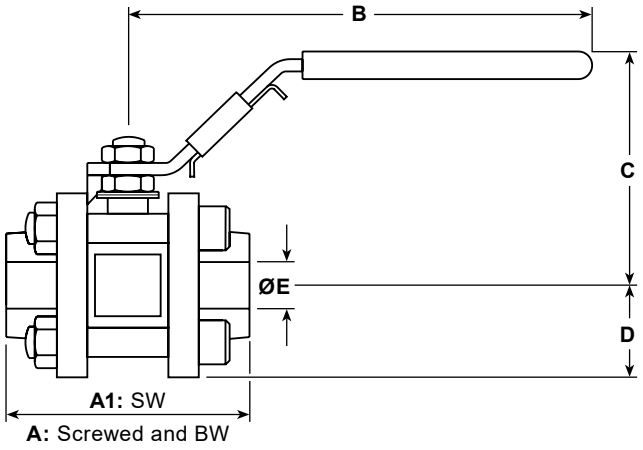
Materials continued on next page

Materials (continued)



No.	Part	Material	
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	Socket head cap screw	Carbon steel	ASTM A 574
15	Seat 'O' ring (2" RB and 1½" FB only)	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	Reinforced PTFE	
21	Lock-plate	Stainless steel	AISI 304L
22	Stem seal	Stainless steel	AISI 316

Dimensions/weights (approximate) in mm (inches) and kg (lbs)



Reduced bore

Size	A A1	B	C	D	E	Weight
¼"	82 (3.23)	162 (6.38)	93 (3.66)	28 (1.10)	11 (0.43)	1.46 (3.22)
⅜"	84 (3.31)					1.49 (3.28)
½"						1.46 (3.22)
¾"	92 (3.62)		95 (3.74)	29 (1.14)	14 (0.55)	1.71 (3.77)
1"	114 (4.49)		101 (3.98)	34 (1.39)	21 (0.83)	2.54 (5.60)
1¼"	132 (5.20)	182 (7.17)	106 (4.17)	40 (1.57)	25 (0.98)	3.92 (8.64)
1½"	146 (5.75)	186 (7.32)	116 (4.57)	46 (1.81)	31 (1.22)	5.56 (12.3)
2"	154 (6.06)		123 (4.84)	51 (2.01)	38 (1.50)	6.95 (15.3)

Full bore

Size	A A1	B	C	D	E	Weight
¼"	82 (3.23)	162 (6.38)	93 (3.66)	28 (1.10)	11 (0.43)	1.46 (3.22)
⅜"	84 (3.31)					1.49 (3.28)
½"	92 (3.62)		95 (3.74)	29 (1.14)	14 (0.55)	1.71 (3.77)
¾"	114 (4.49)		101 (3.98)	34 (1.39)	21 (0.83)	2.54 (5.60)
1"	132 (5.20)	182 (7.17)	106 (4.17)	40 (1.57)	25 (0.98)	3.92 (8.64)
1¼"	146 (5.75)	186 (7.32)	116 (4.57)	46 (1.81)	31 (1.22)	5.56 (12.3)
1½"	154 (6.06)		123 (4.84)	51 (2.01)	38 (1.50)	6.95 (15.3)

Kv values

Size	¼"	⅜"	½"	¾"	1"	1¼"	1½"	2"	For conversion Cv (UK) = Kv x 0.963 Cv (US) = Kv x 1.156
Reduced bore	5	6.8	6	10	27	49	70	103	
Full bore	5	6.8	17	36	58	89	153	-	

Operating torque

Size		¼"	⅜"	½"	¾"	1"	1¼"	1½"	2"
Reduced bore	Nm (lbf ft)	10 (7.4)	10 (7.4)	10 (7.4)	15 (11.1)	25 (18.4)	40 (29.5)	55 (40.6)	100 (73.8)
Full bore	Nm (lbf ft)	10 (7.4)	10 (7.4)	15 (11.1)	25 (18.4)	40 (29.5)	55 (40.6)	100 (73.8)	

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.

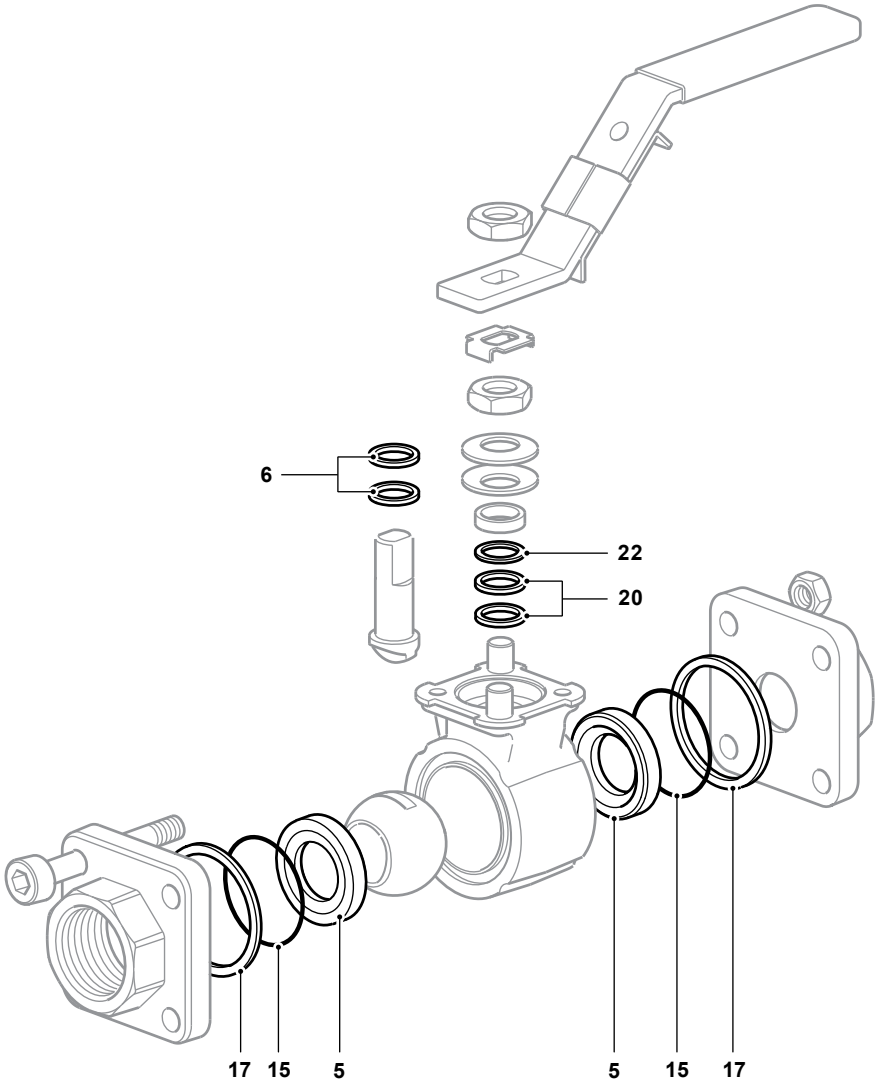
Safety information, installation and maintenance
For full details see the Installation and Maintenance Instructions supplied with the product.

How to order example:
1 off Spirax Sarco ½" screwed BSP M10HPi2FB ISO ball valve.

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

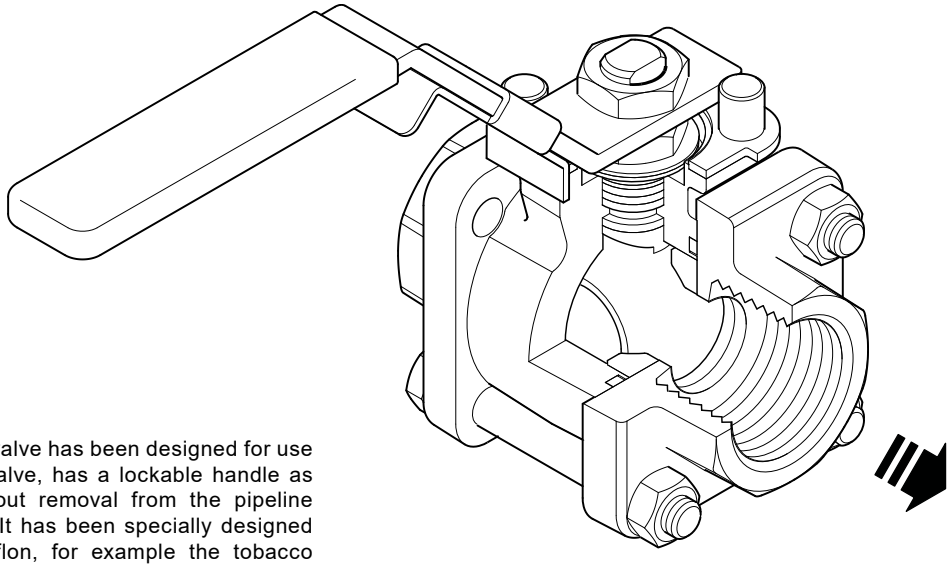
Available spares	
Seat, seals, body/cap 'O' ring and seat 'O' ring set	**5, 6, 15, 17, 20, 22**

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 ½" M10HPi2FB ISO ball valve.



TI-P133-68
CMGT Issue 5

M10Ti ISO
Ball Valve
DN¼" to DN2½"



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

M10Ti2 ISO	Zinc plated carbon steel body and caps.
M10Ti3 ISO	Stainless steel body and caps.
M10Ti4 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 Pressure Equipment Directive (PED) and carries the CE mark when 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 100 mm (4") to allow full insulation.
- Fully degrased under request (ie: Oxygen application)

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

Full bore

¼", ⅜", ½", ¾", 1", 1¼", 1½" and 2"

Screwed

BSP, BSPT, NPT, BW, SW

Flanged

DN15 to DN50

ASME (ANSI) Class 150, ASME (ANSI) Class 300 and EN 1092 PN40

Reduced bore

¼", ⅜", ½", ¾", 1", 1¼", 1½", 2" and 2½"

Screwed

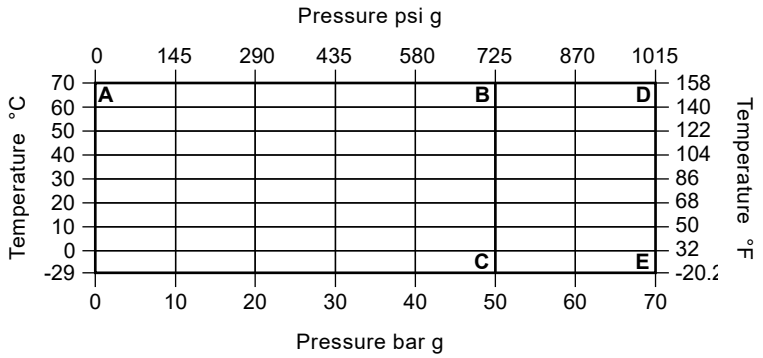
BSP, BSPT, NPT, BW, SW

Flanged

DN15 to DN65

ASME (ANSI) Class 150, ASME (ANSI) Class 300 and EN 1092 PN40

Pressure/temperature limits

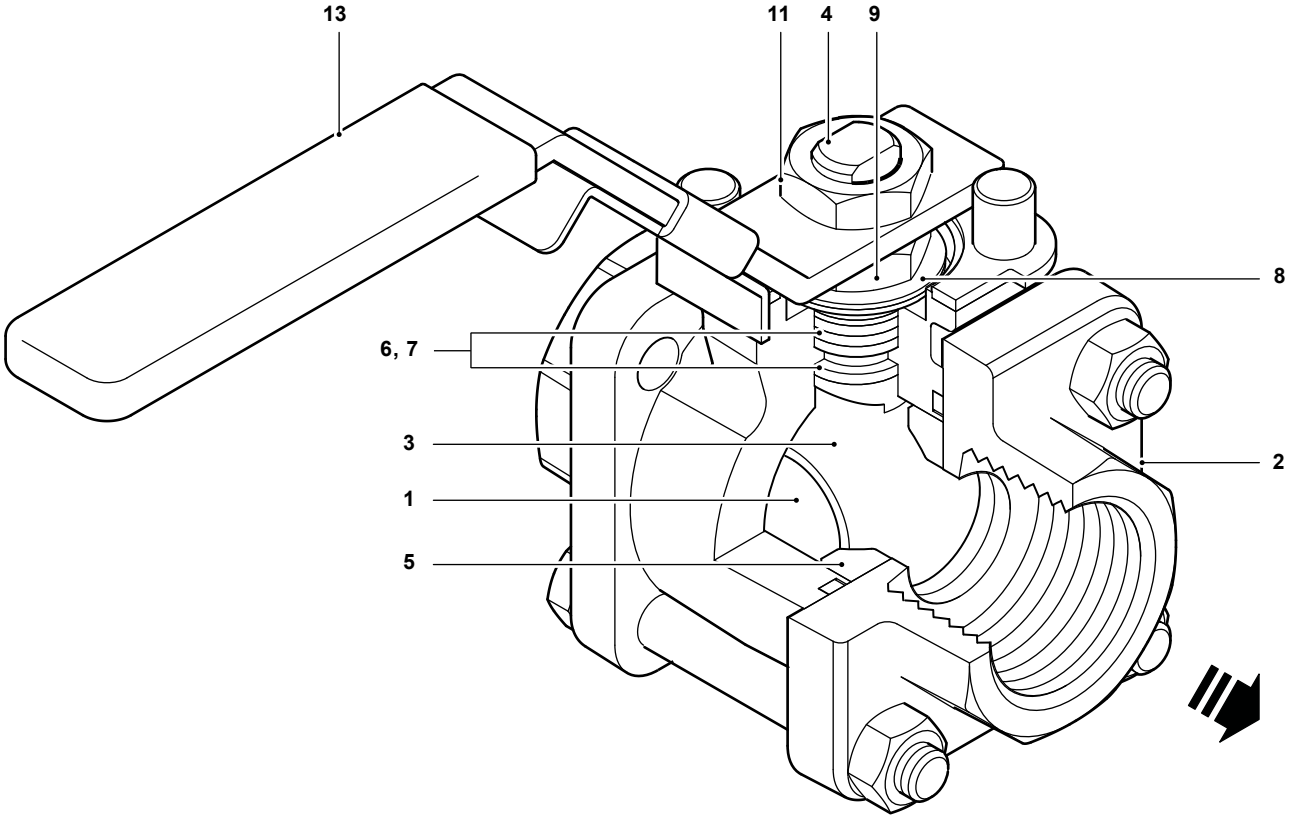


A-D-E ¼" to 1½" FB and RB, and 2" RB

A-B-C 2" FB and 2½" RB

PMA	Maximum allowable pressure	70 bar g @ 70 °C	1015 psi g @ 158 °F
TMA	Maximum allowable temperature	70 °C @ 70 bar g	158 °F @ 1015 psi g
Minimum allowable temperature		-29 °C	-20.2 °F
PMO	Maximum operating pressure for saturated steam service	70 bar g	1015 psi g
TMO	Maximum operating temperature	70 °C @ 70 bar g	158 °F @ 1015 psi g
Minimum operating temperature **Note:** For lower operating temperatures consult Spirax Sarco.		-29 °C	-20.2 °F
ΔPMX	Maximum differential pressure	70 bar	1015 psi g
Designed for a maximum cold hydraulic test pressure of:		105 bar g	1523 psi g

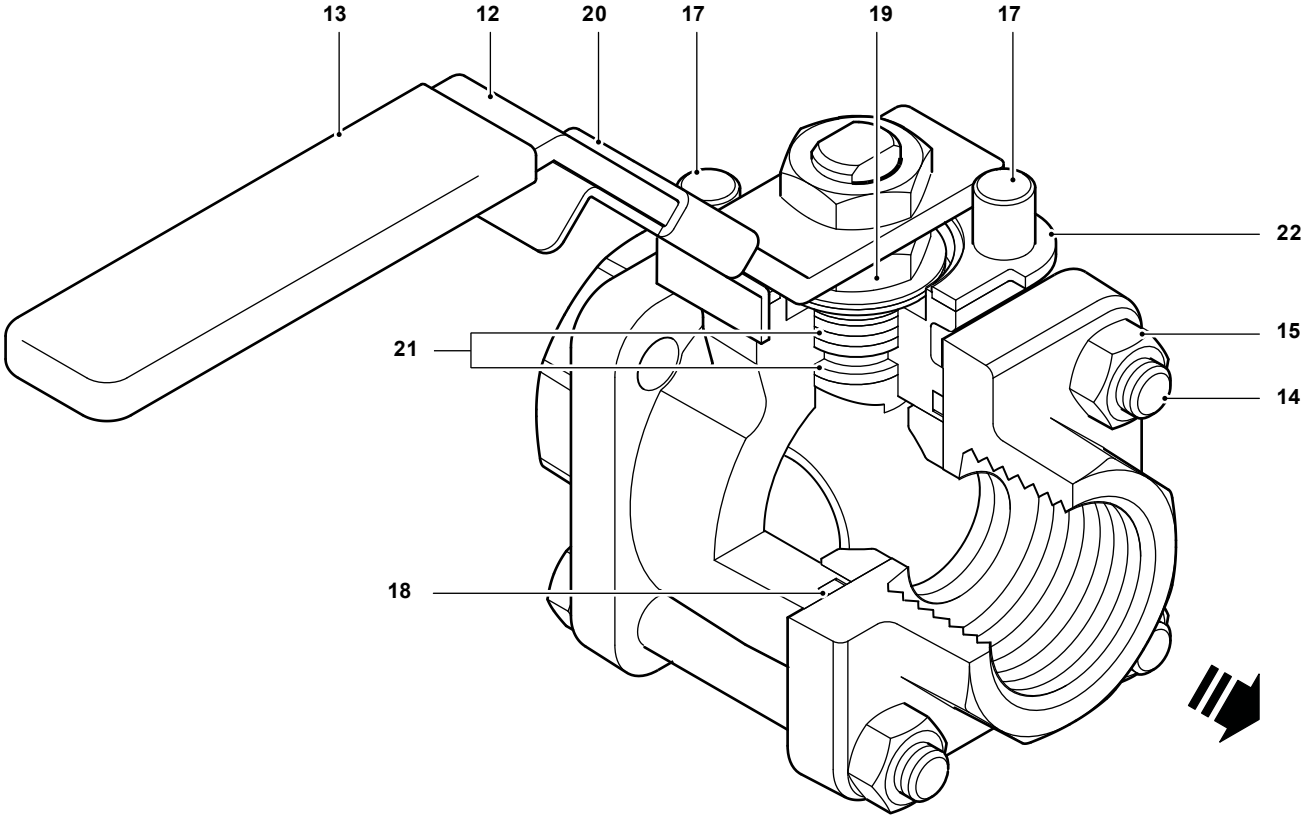
Materials



No.	Part		Material	
1	Body	**M10Ti2 ISO**	Zinc plated carbon steel	ASTM A105
		M10Ti3 ISO **M10Ti4 ISO**	Stainless steel	ASTM A 182 F 316L
2	Cap	**M10Ti2 ISO**	Zinc plated carbon steel	ASTM A105
		M10Ti3 ISO **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** **M10Ti3 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** **M10Ti3 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** **M10Ti3 ISO**	Zinc plated carbon steel	SAE 1010
		M10Ti4 ISO	Stainless steel	AISI 304

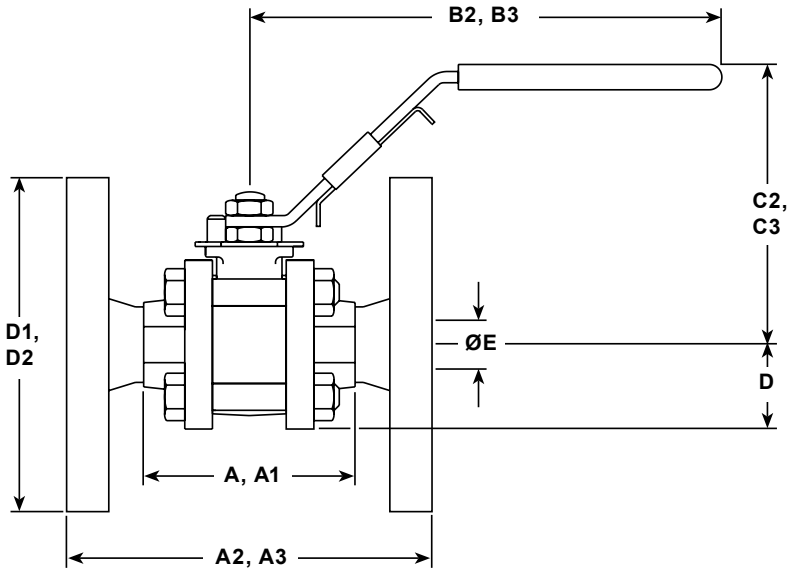
Materials continued on next page

Materials (continued)



No.	Part		Material	
12	Lever	**M10Ti2 ISO** **M10Ti3 ISO**	Zinc plated carbon steel	SAE 1010
		M10Ti4 ISO	Stainless steel	AISI 316
13	Grip		Vinyl light blue	
14	Bolts	**M10Ti2 ISO** **M10Ti3 ISO**	Zinc plated carbon steel	Grade 5
		M10Ti4 ISO	Stainless steel	AISI 304
15	Nuts	**M10Ti2 ISO** **M10Ti3 ISO**	Zinc plated carbon steel	SAE 1010
		M10Ti4 ISO	Stainless steel	AISI 304
16	Studs	**M10Ti4 ISO**	Stainless steel	AISI 316
	Note: Item **16** can not be shown as it is only applicable to welded versions			
17	Stop screw	**M10Ti2 ISO** **M10Ti3 ISO**	Zinc plated carbon steel	SAE 12L 14
		M10Ti4 ISO	Stainless steel	AISI 304
18	Body/cap 'O' ring		Geothermal	
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

Dimensions (approximate) in mm



A: Scrd and BW

A1: SW

A2: Flanged ASME 150

A3: Flanged PN40

B2: Scrd, BW and SW

B3: Flanged PN40 and ASME 150

C2: Scrd, BW and SW

C3: Flanged PN40 and ASME 150

D: Scrd, BW and SW

D1: Flanged ASME 150

D2: Flanged PN40

E: All versions

Reduced bore

Size	A	A1	A2	A3	B2	B3	C2	C3	D	D1	D2	E
¼"	66 (2.60)	66 (2.60)			162 (6.38)		93 (3.66)		24 (0.94)			11 (0.43)
⅜"												
½"			108 (4.25)	130 (5.12)		162 (6.38)		93 (3.66)		89 (3.50)	95 (3.74)	
¾"	72 (2.83)	72 (2.83)	117 (4.61)	150 (5.91)			95 (3.74)	95 (3.74)	26 (1.02)	98 (3.86)	105 (4.13)	14 (0.55)
1"	87 (3.43)	87 (3.43)	127 (5.00)	160 (6.30)			101 (3.98)	101 (3.98)	31 (1.22)	108 (4.25)	115 (4.53)	21 (0.83)
1¼"	104 (4.09)	104 (4.09)	140 (5.51)	180 (7.09)			106 (4.17)	106 (4.17)	37 (1.46)	118 (4.65)	140 (5.51)	25 (0.98)
1½"	111 (4.37)	111 (4.37)	165 (6.50)	200 (7.87)	186 (7.32)	186 (7.32)	118 (4.65)	118 (4.65)	41 (1.61)	127 (5.00)	150 (5.91)	31 (1.22)
2"	125 (4.92)	119 (4.69)	178 (7.01)	230 (9.06)			123 (4.84)	123 (4.84)	48 (1.89)	152 (5.98)	165 (6.50)	38 (1.50)
2½"	153 (6.02)	153 (6.02)			251 (9.88)	251 (9.88)	140 (5.51)	140 (5.51)	57 (2.24)			50 (1.97)

Full bore

Size	A	A1	A2	A3	B2	B3	C2	C3	D	D1	D2	E
¼"	66 (2.60)	66 (2.60)			162 (6.38)		93 (3.66)		24 (0.94)			11 (0.43)
2"												
½"	72 (2.83)	72 (2.83)		130 (5.12)		162 (6.38)	95 (3.74)	95 (3.74)	26 (1.02)		95 (3.74)	14 (0.55)
¾"	87 (3.43)	87 (3.43)		150 (5.91)			101 (3.98)	101 (3.98)	31 (1.22)		105 (4.13)	21 (0.83)
1"	104 (4.09)	104 (4.09)		160 (6.30)			106 (4.17)	106 (4.17)	37 (1.46)		115 (4.53)	25 (0.98)
1¼"	111 (4.37)	111 (4.37)		180 (7.09)	186 (7.32)	186 (7.32)	118 (4.65)	118 (4.65)	41 (1.61)		140 (5.51)	31 (1.22)
1½"	125 (4.92)	119 (4.69)		200 (7.87)			123 (4.84)	123 (4.84)	48 (1.89)		150 (5.91)	38 (1.50)
2"	153 (6.02)	153 (6.02)		230 (9.06)	251 (9.88)	251 (9.88)	140 (5.51)	140 (5.51)	57 (2.24)		165 (6.50)	50 (1.97)

Weights (approximate) in kg

Size	Reduced bore			Full bore	
	Scrd /BW/SW	PN40	ASME 150	Scrd /BW/SW	PN40
¼"	0.86 (1.90)			0.86 (1.90)	
⅜"	0.84 (1.85)			0.84 (1.85)	
½"	0.81 (1.79)	2.35 (5.18)	1.70 (3.75)	1.02 (2.25)	2.59 (5.71)
¾"	1.02 (2.25)	3.20 (7.05)	2.25 (4.96)	1.56 (3.44)	3.76 (8.29)
1"	1.56 (3.44)	4.30 (9.48)	2.92 (6.44)	2.35 (5.18)	5.02 (11.1)
1¼"	2.35 (5.18)	6.40 (14.1)	4.15 (9.15)	3.08 (6.79)	6.92 (15.3)
1½"	3.08 (6.79)	7.20 (15.9)	6.40 (14.1)	4.41 (9.72)	9.09 (20.0)
2"	4.41 (9.72)	10.72 (23.6)	8.35 (18.4)	9.05 (20.0)	13.96 (30.8)
2½"	8.17 (18.0)				

Kv values

Size	¼"	⅜"	½"	¾"	1"	1¼"	1½"	2"	2½"
Reduced bore	5	6.8	6	10	27	49	70	103	168
Full bore	5	6.8	17	36	58	89	153	205	

For conversion
Cv (UK) = Kv x 0.963
Cv (US) = Kv x 1.156

8.1
28

Operating torque

Size		¼"	2"	½"	¾"	1"	1¼"	1½"	2"	2½"
Reduced bore	Nm (lbf ft)	3.25 (2)	3.25 (2)	3.25 (2)	5.50 (4)	13.25 (10)	20 (15)	50 (37)	60 (44)	75 (55)
Full bore	Nm (lbf ft)	3.25 (2)	3.25 (2)	5.50 (4)	13.25 (10)	20 (15)	50 (37)	60 (44)	75 (55)	

The indicated torque values are for valves frequently operated, that are submitted to a maximum differential pressure of 40 bar (580 psi). Valves that are subject to long static periods, may require greater break-out torque.

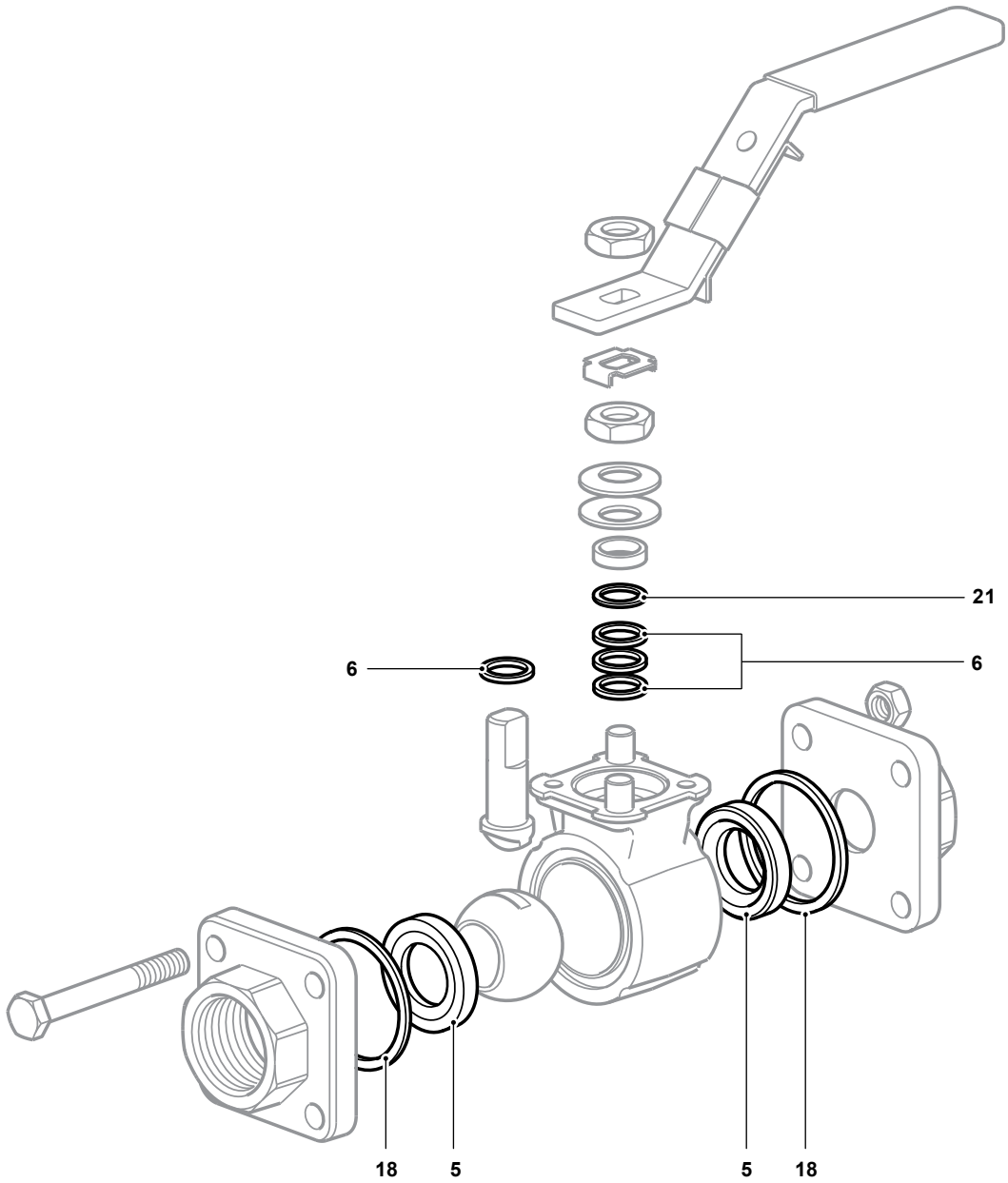
Safety information, installation and maintenance
For full details see the Installation and Maintenance Instructions supplied with the product.

How to order example:
1 off Spirax Sarco ½" screwed BSP M10Ti2FB ISO ball valve.

Spare parts
The spare parts available are shown in solid outline. Parts drawn in a grey 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 ½" M10Ti2FB ISO ball valve.

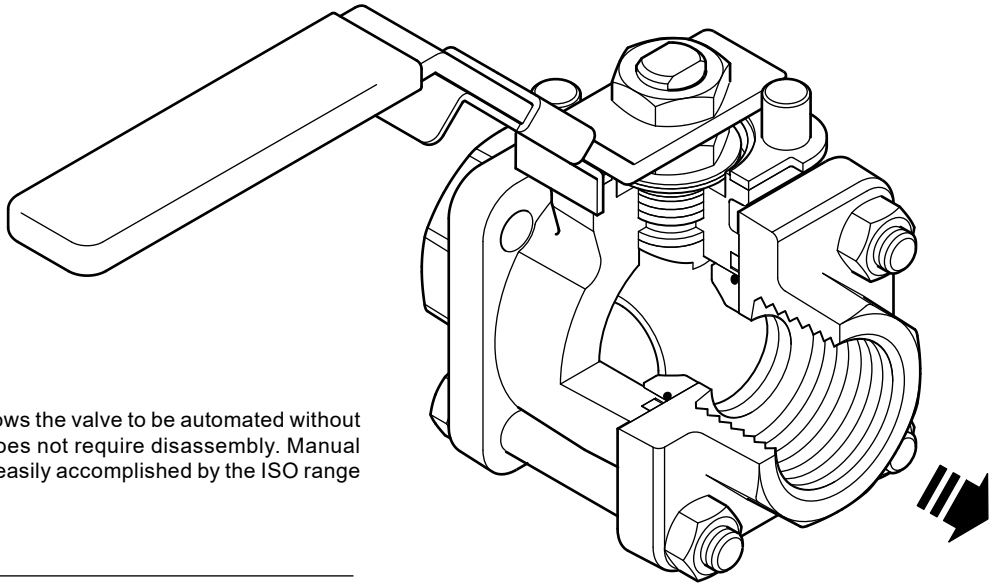


TI-P133-67
CMGT Issue 7

M10HTi ISO Tobacco Ball Valve DN¼" to DN2½"

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

M10HTi2 ISO	Zinc plated carbon steel body and caps.
M10HTi3 ISO	Stainless steel body and caps.
M10HTi4 ISO	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 Pressure Equipment Directive (PED) 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 100 mm (4") to allow full insulation.
- Fully degrased under request (i.e: Oxygen application).

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

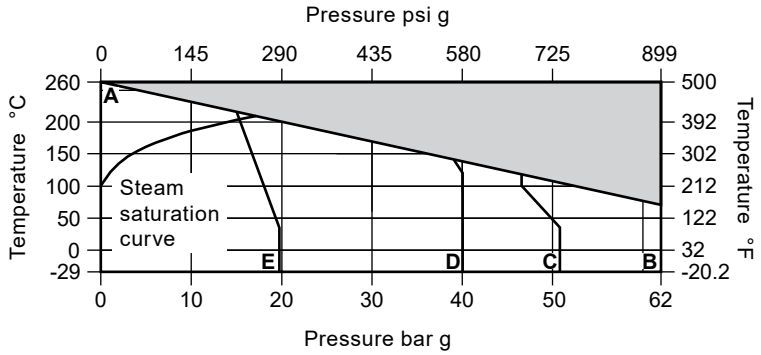
Full bore
¼", ⅜", ½", ¾", 1", 1¼", 1½" and 2"
Screwed BSP, BSPT, NPT, BW, SW

Flanged
DN15 to DN50
ASME Class 150, 300 and EN 1092 PN40

Reduced bore
¼", ⅜", ½", ¾", 1", 1¼", 1½", 2" and 2½"
Screwed BSP, BSPT, NPT, BW, SW

Flanged
DN15 to DN65
ASME Class 150, 300 and EN 1092 PN40

Pressure/temperature limits



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

A - B Screwed, socket weld and but weld.

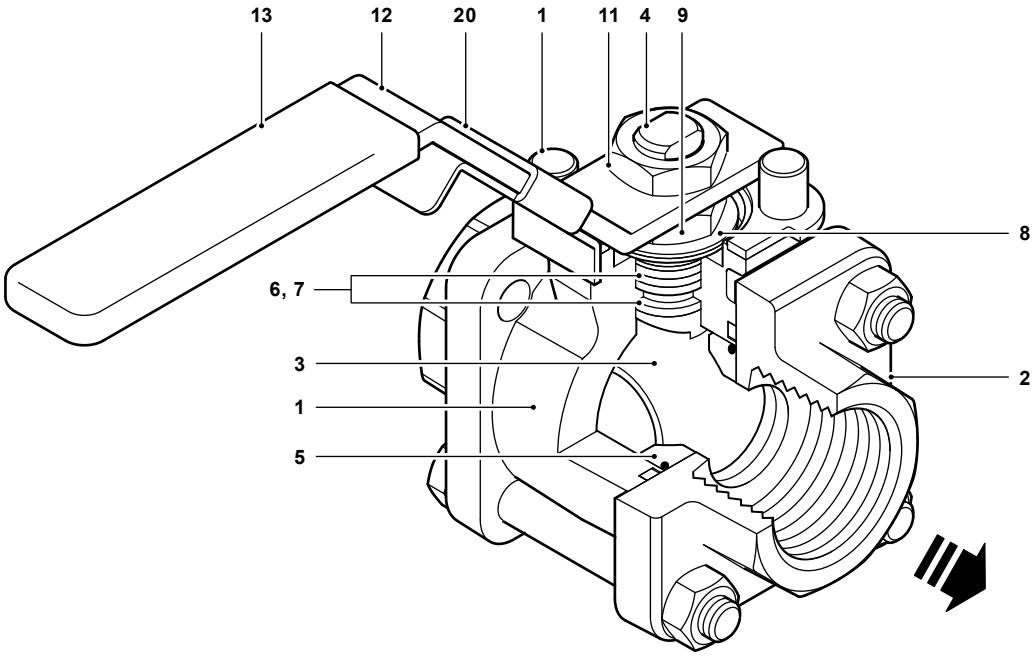
A - C Flanged ASME 300.

A - D Flanged EN 1092 PN40.

A - E Flanged ASME 150.

Body design conditions			PN63
PMA	Maximum allowable pressure	62 bar g @ 60 °C	899 psi g @ 140 °F
TMA	Maximum allowable temperature	260 °C @ 0 bar g	500 °F @ 0 bar g
Minimum allowable temperature		-29 °C	-20.2 °F
PMO	Maximum operating pressure for saturated steam service	17.5 bar g	254 psi g
TMO	Maximum operating temperature	260 °C @ 0 bar g	500 °F @ 0 bar g
Minimum operating temperature **Note:** For lower operating temperatures consult Spirax Sarco.		-29 °C	-20.2 °F
ΔPMX	Maximum differential pressure is limited to the PMO		
Designed for a maximum cold hydraulic test pressure of:		93 bar g	1349 psi g

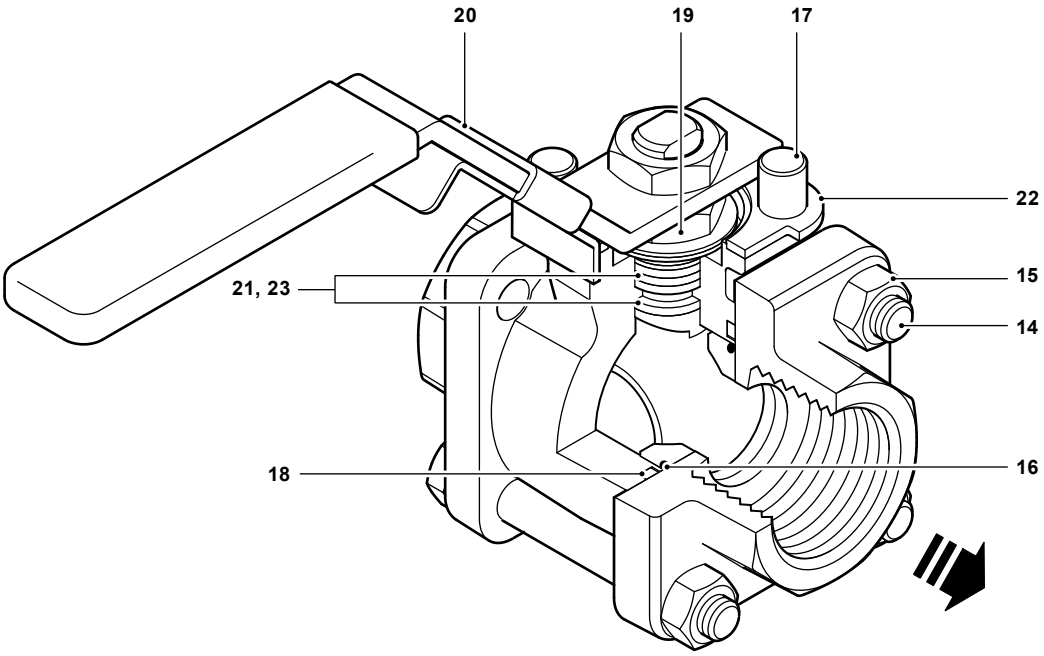
Materials



No.	Part		Material	
1	Body	**M10HTi2 ISO**	Zinc plated carbon steel	ASTM A105
		M10HTi3 ISO **M10HTi4 ISO**	Stainless steel	ASTM A 182 F 316L
2	Cap	**M10HTi2 ISO**	Zinc plated carbon steel	ASTM A105
		M10HTi3 ISO **M10HTi4 ISO**	Stainless steel	ASTM A 182 F 316L
3	Ball		Stainless steel (hardened)	AISI 316
4	Stem		Stainless steel	AISI 316
5	Seat		Virgin PEEK	
6	Lower stem seal		Virgin PEEK	
7	Separator	**M10HTi2 ISO** **M10HTi3 ISO**	Zinc plated carbon steel	SAE 1010
		M10HTi4 ISO	Stainless steel	AISI 316
8	Belleville washer		Stainless steel	AISI 301
9	Lower stem nut	**M10HTi2 ISO** **M10HTi3 ISO**	Zinc plated carbon steel	SAE 1010
		M10HTi4 ISO	Stainless steel	AISI 304
10	Name-plate (Not shown)		Stainless steel	AISI 430
11	Upper stem nut	**M10HTi2 ISO** **M10HTi3 ISO**	Zinc plated carbon steel	SAE 1010
		M10HTi4 ISO	Stainless steel	AISI 304
12	Lever	**M10HTi2 ISO** **M10HTi3 ISO**	Zinc plated carbon steel	SAE 1010
		M10HTi4 ISO	Stainless steel	AISI 316
13	Grip		Vinyl yellow	

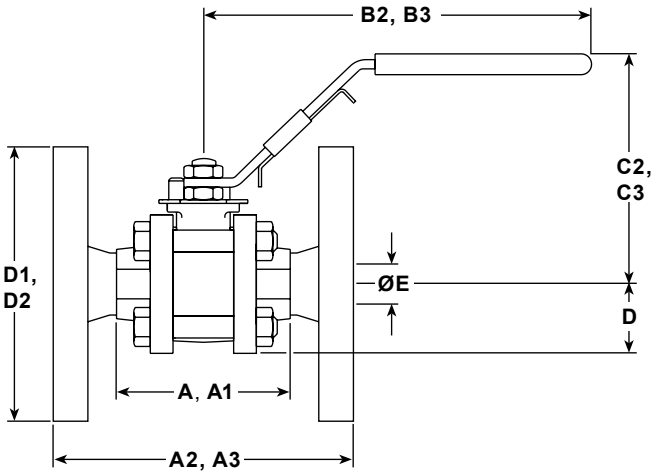
Materials continued on next page

Materials (continued)



No.	Part		Material	
14	Studs	**M10HTi2 ISO** **M10HTi3 ISO**	Zinc plated carbon steel	A193 B7
		M10HTi4 ISO	Stainless steel	AISI 316
15	Nuts	**M10HTi2 ISO** **M10HTi3 ISO**	Zinc plated carbon steel	A194 2H
		M10HTi4 ISO	Stainless steel	AISI 304
16	Seat 'O' ring		Geothermal	
17	Stop screw	**M10HTi2 ISO** **M10HTi3 ISO**	Zinc plated carbon steel	SAE 12L 14
		M10HTi4 ISO	Stainless steel	AISI 304
18	Body/cap 'O' ring		Geothermal	
19	Nut locker		Stainless steel	AISI 316
20	Lockable handle		Stainless steel	
21	Stem seal		Graphite	
22	Lock-plate		Stainless steel	AISI 316
23	Stem seal		Stainless steel	

Dimensions (approximate) in mm (inches)



A: Scrd and BW

A1: SW

A2: Flanged ASME 150

A3: Flanged PN40

B2: Scrd, BW and SW

B3: Flanged PN40 and ASME 150

C2: Scrd, BW and SW

C3: Flanged PN40 and ASME 150

D: Scrd, BW and SW

D1: Flanged ASME 150

D2: Flanged PN40

E: All versions

Reduced bore

Size	A	A1	A2	A3	B2	B3	C2	C3	D	D1	D2	E
¼"	66 (2.60)	66 (2.60)			162 (6.38)		93 (3.66)		24 (0.94)			11 (0.43)
⅜"												
½"			108 (4.25)	130 (5.12)		162 (6.38)				89 (3.50)	95 (3.74)	
¾"	72 (2.83)	72 (2.83)	117 (4.61)	150 (5.91)			95 (3.74)	95 (3.74)	26 (1.02)	98 (3.86)	105 (4.13)	14 (0.55)
1"	87 (3.43)	87 (3.43)	127 (5.00)	160 (6.30)			101 (3.98)	101 (3.98)	31 (1.22)	108 (4.25)	115 (4.53)	21 (0.83)
1¼"	104 (4.09)	104 (4.09)	140 (5.51)	180 (7.09)			106 (4.17)	106 (4.17)	37 (1.46)	118 (4.65)	140 (5.51)	25 (0.98)
1½"	111 (4.37)	111 (4.37)	165 (6.50)	200 (7.87)	186 (7.32)	186 (7.32)	118 (4.65)	118 (4.65)	41 (1.61)	127 (5.00)	150 (5.91)	31 (1.22)
2"	125 (4.92)	119 (4.69)	178 (7.01)	230 (9.06)			123 (4.84)	123 (4.84)	48 (1.89)	152 (5.98)	165 (6.50)	38 (1.50)
2½"	153 (6.02)	153 (6.02)			251 (9.88)	251 (9.88)	140 (5.51)	140 (5.51)	57 (2.24)			50 (1.97)

Full bore

Size	A	A1	A2	A3	B2	B3	C2	C3	D	D1	D2	E
¼"	66 (2.60)	66 (2.60)			162 (6.38)		93 (3.66)		24 (0.94)			11 (0.43)
⅜"												
½"	72 (2.83)	72 (2.83)		130 (5.12)		162 (6.38)	95 (3.74)	95 (3.74)	26 (1.02)		95 (3.74)	14 (0.55)
¾"	87 (3.43)	87 (3.43)		150 (5.91)			101 (3.98)	101 (3.98)	31 (1.22)		105 (4.13)	21 (0.83)
1"	104 (4.09)	104 (4.09)		160 (6.30)			106 (4.17)	106 (4.17)	37 (1.46)		115 (4.53)	25 (0.98)
1¼"	111 (4.37)	111 (4.37)		180 (7.09)	186 (7.32)	186 (7.32)	118 (4.65)	118 (4.65)	41 (1.61)		140 (5.51)	31 (1.22)
1½"	125 (4.92)	119 (4.69)		200 (7.87)			123 (4.84)	123 (4.84)	48 (1.89)		150 (5.91)	38 (1.50)
2"	153 (6.02)	153 (6.02)		230 (9.06)	251 (9.88)	251 (9.88)	140 (5.51)	140 (5.51)	57 (2.24)		165 (6.50)	50 (1.97)

Weights (approximate) in kg (lbs)

Size	Reduced bore			Full bore	
	Scrd /BW/SW	PN40	ASME 150	Scrd /BW/SW	PN40
¼"	0.86 (1.90)			0.86 (1.90)	
⅜"	0.84 (1.85)			0.84 (1.85)	
½"	0.81 (1.79)	2.35 (5.18)	1.70 (3.75)	1.02 (2.25)	2.59 (5.71)
¾"	1.02 (2.25)	3.20 (7.05)	2.25 (4.96)	1.56 (3.44)	3.76 (8.29)
1"	1.56 (3.44)	4.30 (9.48)	2.92 (6.44)	2.35 (5.18)	5.02 (11.1)
1¼"	2.35 (5.18)	6.40 (14.1)	4.15 (9.15)	3.08 (6.79)	6.92 (15.3)
1½"	3.08 (6.79)	7.20 (15.9)	6.40 (14.1)	4.41 (9.72)	9.09 (20.0)
2"	4.41 (9.72)	10.72 (23.6)	8.35 (18.4)	9.05 (20.0)	13.96 (30.8)
2½"	8.17 (18.0)				

Kv values

Size	¼"	⅜"	½"	¾"	1"	1¼"	1½"	2"	2½"
Reduced bore	5	6.8	6	10	27	49	70	103	168
Full bore	5	6.8	17	36	58	89	153	205	

For conversion
Cv (UK) = Kv x 0.963
Cv (US) = Kv x 1.156

8.1
36

Operating torque (N m)

Size		¼"	2"	½"	¾"	1"	1¼"	1½"	2"	2½"
Reduced bore	Nm (lbf ft)	3.25 (2)	3.25 (2)	3.25 (2)	5.50 (4)	13.25 (10)	20 (15)	50 (37)	60 (44)	75 (55)
Full bore	Nm (lbf ft)	3.25 (2)	3.25 (2)	5.50 (4)	13.25 (10)	20 (15)	50 (37)	60 (44)	75 (55)	

The indicated torque values are for valves frequently operated, that are submitted to a maximum differential pressure of 40 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 supplied with the product.

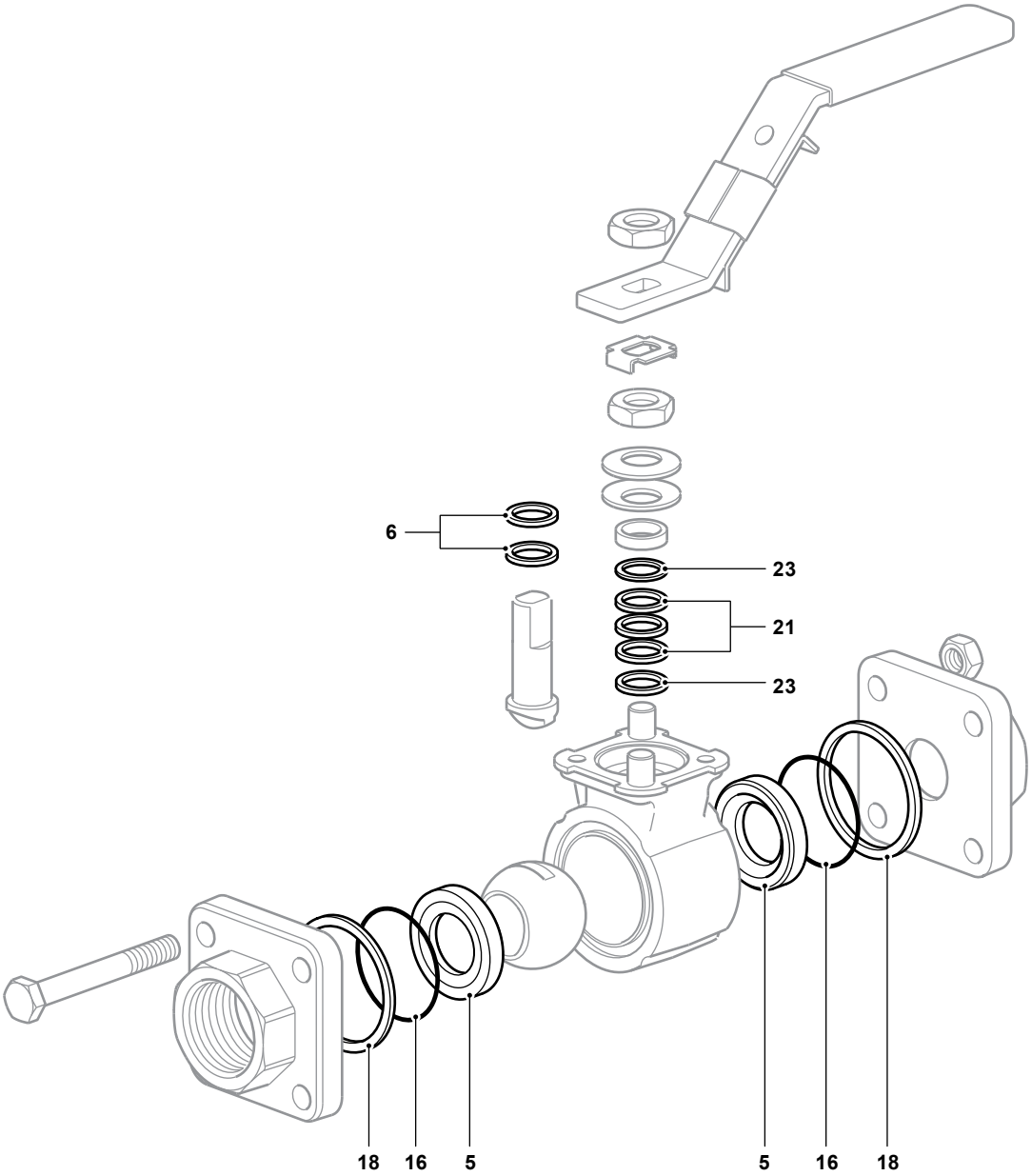
How to order example:
1 off Spirax Sarco ½" screwed BSP M10HTi2FB ISO ball valve.

Spare parts
The spare parts available are shown in solid outline. Parts drawn in a grey 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**

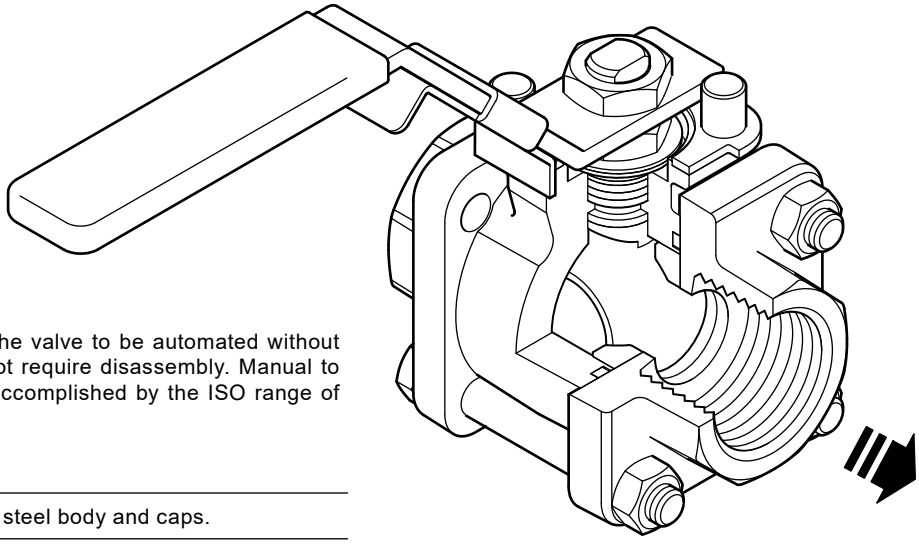
How to order spares
Always order spares by using the description given in the column headed 'Available spares' and state the size and type of ball valve.
Example: 1 - Seat, seals, body/cap 'O' ring and seat 'O' ring set for a Spirax Sarco ½" M10HTi2FB ISO ball valve.



TI-P133-69
CMGT Issue 5

M10Pi ISO
Ball Valve
DN¼" to DN2½"

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.
M10Pi3 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 Pressure Equipment Directive (PED) 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 100 mm (4") to allow full insulation.
- Fully degreased under request (ie: Oxygen application).

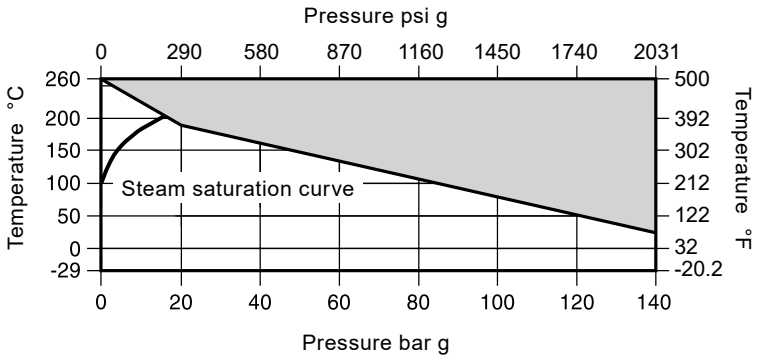
Technical data

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	¼", ⅜", ½", ¾", 1", 1¼", 1½" and 2" **Screwed** BSP, BSPT, NPT, BW, SW
Reduced bore	¼", ⅜", ½", ¾", 1", 1¼", 1½", 2" and 2½" **Screwed** BSP, BSPT, NPT, BW, SW

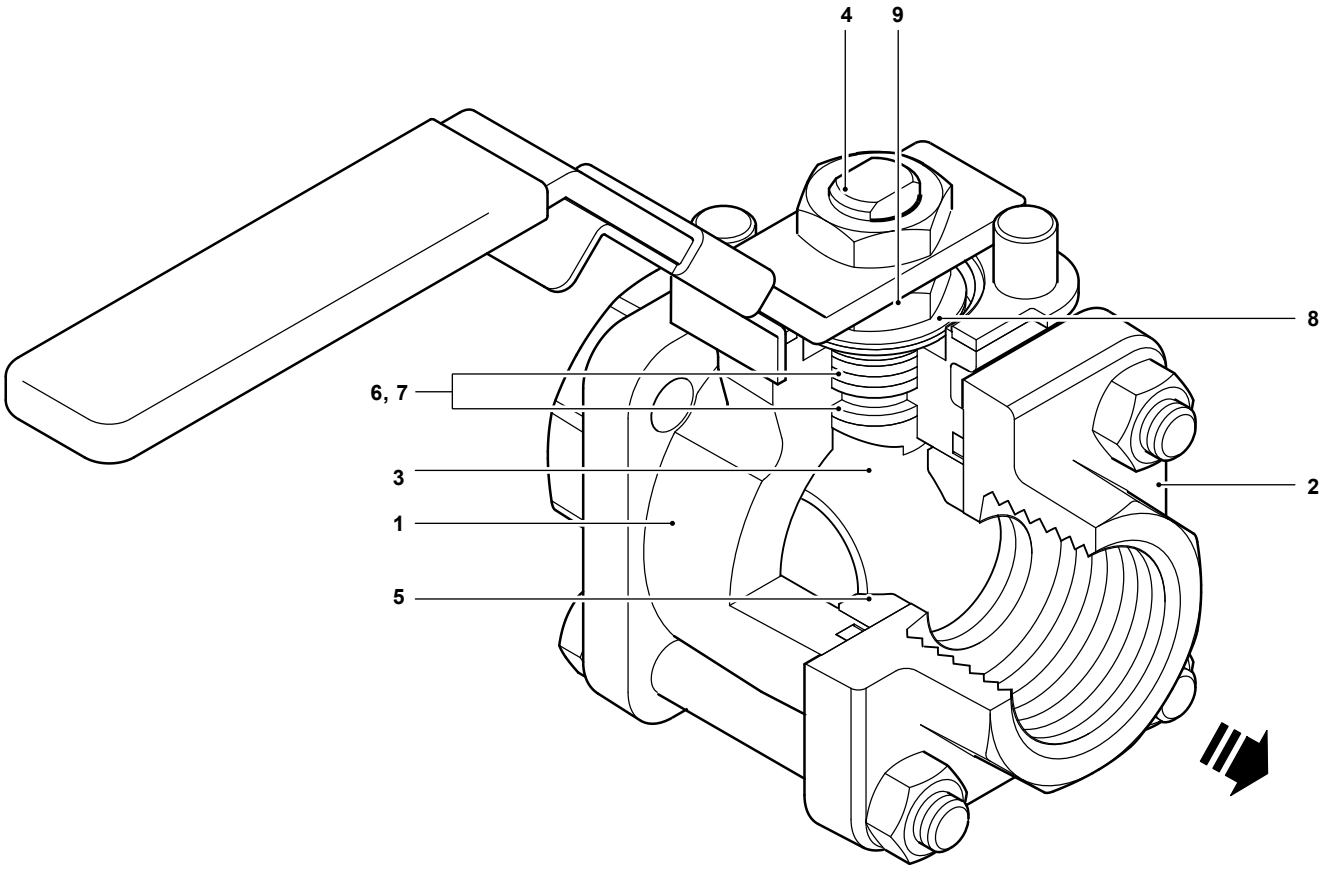
Pressure/temperature limits



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

PMA	Maximum allowable pressure	140 bar g @ 32 °C	2031 psi g @ 89.6 °F
TMA	Maximum allowable temperature	260 °C @ 0 bar g	500 °F @ 0 psi g
Minimum allowable temperature		-29 °C	-20.2 °F
PMO	Maximum operating pressure for saturated steam service	17.5 bar g	254 psi g
TMO	Maximum operating temperature	260 °C @ 0 bar g	500 °F @ 0 psi g
Minimum operating temperature **Note:** For lower operating temperatures consult Spirax Sarco		-29 °C	-20.2 °F
ΔPMX	Maximum differential pressure is limited to the PMO		
Designed for a maximum cold hydraulic test pressure of:		210 bar g	3046 psi g

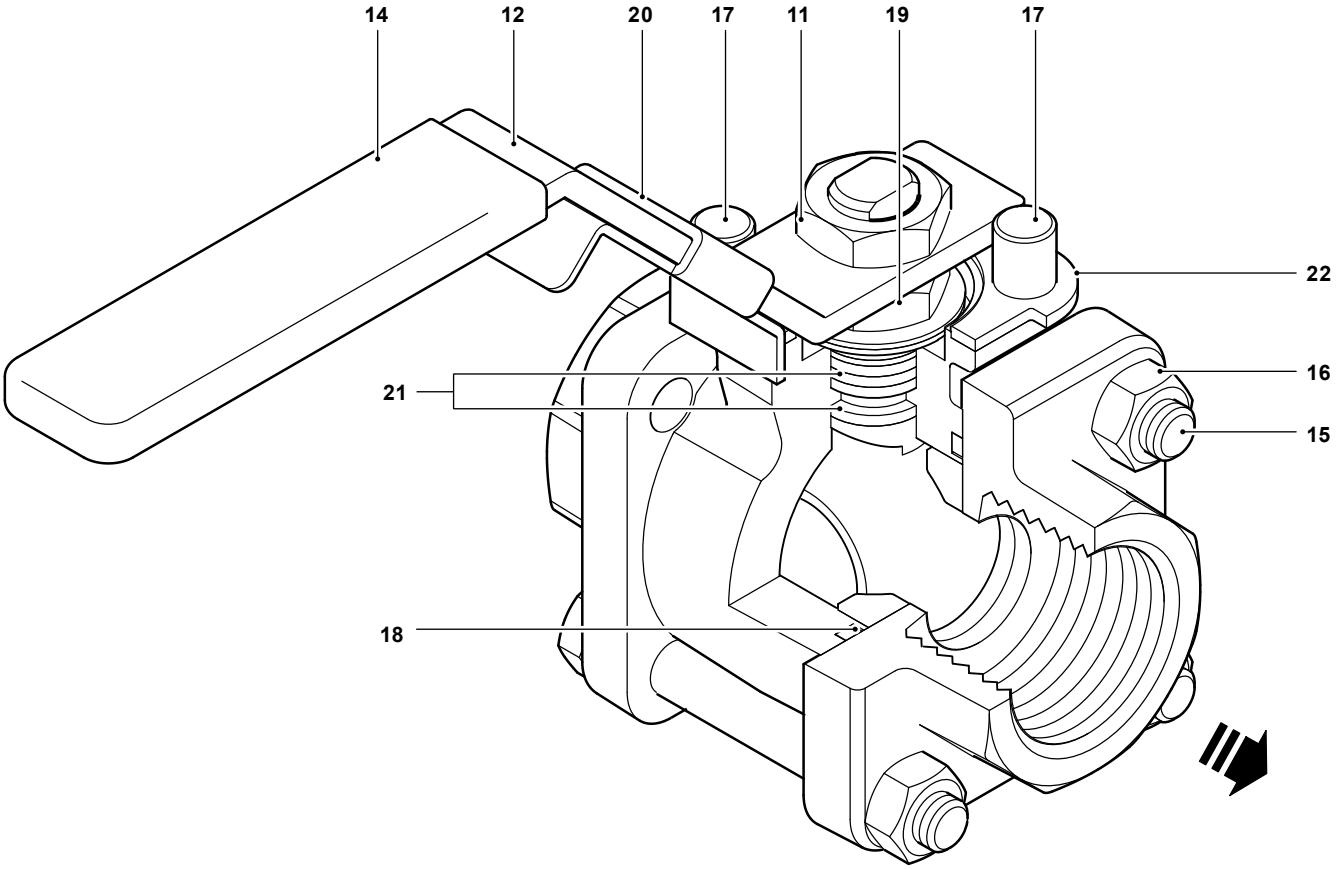
Materials



No.	Part		Material	
1	Body	**M10Pi2 ISO**	Zinc plated carbon steel	ASTM A105
		M10Pi3 ISO	Stainless steel	ASTM A 182 F 316L
2	Cap	**M10Pi2 ISO**	Zinc plated carbon steel	ASTM A105
		M10Pi3 ISO	Stainless steel	ASTM A 182 F 316L
3	Ball		Stainless steel	AISI 316
4	Stem		Stainless steel	AISI 316
5	Seat		Reinforced PTFE	
6	Stem seal		Reinforced PTFE antistatic	
7	Separator		Zinc plated carbon steel	SAE 1010
8	Belleville washer		Stainless steel	AISI 301
9	Lower stem nut		Zinc plated carbon steel	SAE 1010
10	Name-plate - DN (Not shown)		Stainless steel	AISI 430

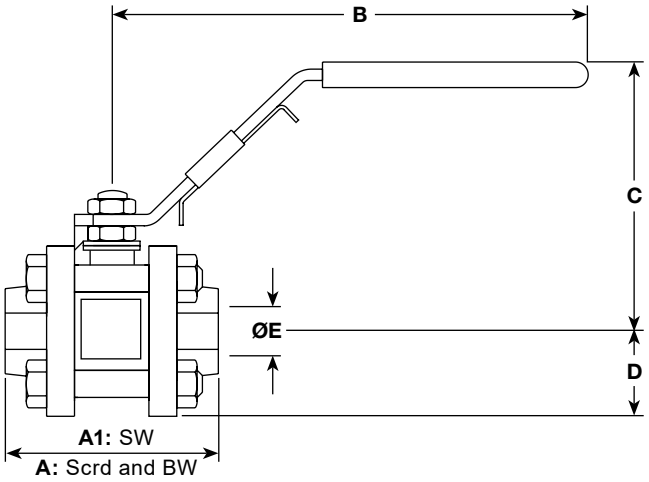
Materials continued on next page

Materials (continued)



No.	Part	Material	
11	Upper stem nut	Zinc plated carbon steel	SAE 1010
12	Lever	Zinc plated carbon steel	SAE 1010
13	Name-plate (Not shown)	Stainless steel	AISI 430
14	Grip	Vinyl black	
15	Studs	Zinc plated carbon steel	B7
16	Nuts	Zinc plated carbon steel	2H
17	Stop screw	Zinc plated carbon steel	SAE 12L 14
18	Body/cap 'O' ring	Viton	
19	Nut locker	Stainless steel	AISI 304
20	Lockable handle	Stainless steel	AISI 304L
21	Stem seal	Stainless steel	AISI 316
22	Lock-plate	Stainless steel	AISI 304L

Dimensions/weights (approximate) in mm and kg



Reduced bore

Size	A	A1	B	C	D	E	Weight
¼"	66 (2.60)	66 (2.60)	162 (6.38)	93 (3.66)	24 (0.94)	11 (0.43)	0.86 (1.90)
⅜"							0.84 (1.85)
½"							0.81 (1.79)
¾"	72 (2.83)	72 (2.83)		95 (3.74)	26 (1.02)	14 (0.55)	1.02 (2.25)
1"	87 (3.43)	87 (3.43)		101 (3.98)	31 (1.22)	21 (0.83)	1.56 (3.44)
1¼"	104 (4.09)	104 (4.09)		106 (4.17)	37 (1.46)	25 (0.98)	2.35 (5.18)
1½"	111 (4.37)	111 (4.37)	186 (7.32)	118 (4.65)	41 (1.61)	31 (1.22)	3.08 (6.79)
2"	125 (4.92)	119 (4.69)		123 (4.84)	48 (1.89)	38 (1.50)	4.41 (9.72)
2½"	153 (6.02)	153 (6.02)	251 (9.88)	140 (5.51)	57 (2.24)	50 (1.97)	8.17 (18.0)

Full bore

Size	A	A1	B	C	D	E	Weight
¼"	66 (2.60)	66 (2.60)	162 (6.38)	93 (3.66)	24 (0.94)	11 (0.43)	0.86 (1.90)
⅜"							0.84 (1.85)
½"	72 (2.83)	72 (2.83)		95 (3.74)	26 (1.02)	14 (0.55)	1.02 (2.25)
¾"	87 (3.43)	87 (3.43)		101 (3.98)	31 (1.22)	21 (0.83)	1.56 (3.44)
1"	104 (4.09)	104 (4.09)		106 (4.17)	37 (1.46)	25 (0.98)	2.35 (5.18)
1¼"	111 (4.37)	111 (4.37)	186 (7.32)	118 (4.65)	41 (1.61)	31 (1.22)	3.08 (6.79)
1½"	125 (4.92)	119 (4.69)		123 (4.84)	48 (1.89)	38 (1.50)	4.41 (9.72)
2"	153 (6.02)	153 (6.02)	251 (9.88)	140 (5.51)	57 (2.24)	50 (1.97)	8.17 (18.0)

Kv values

Size	¼"	⅜"	½"	¾"	1"	1¼"	1½"	2"	2½"	For conversion
Reduced bore	5	6.8	6	10	27	49	70	103	168	Cv (UK) = Kv x 0.963 Cv (US) = Kv x 1.156
Full bore	5	6.8	17	36	58	89	153	205	-	

Operating torque

Size		¼"	⅜"	½"	¾"	1"	1¼"	1½"	2"	2½"
Reduced bore	Nm (lbf ft)	3.5 (3)	3.5 (3)	3.5 (3)	6 (4)	14 (10)	21 (16)	50 (37)	60 (44)	75 (52)
Full bore	Nm (lbf ft)	3.5 (3)	3.5 (3)	6 (4)	14 (10)	21 (16)	50 (37)	60 (44)	75 (52)	

The indicated torque values are for valves frequently operated, that are submitted to a maximum differential pressure of 140 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 supplied with the product.

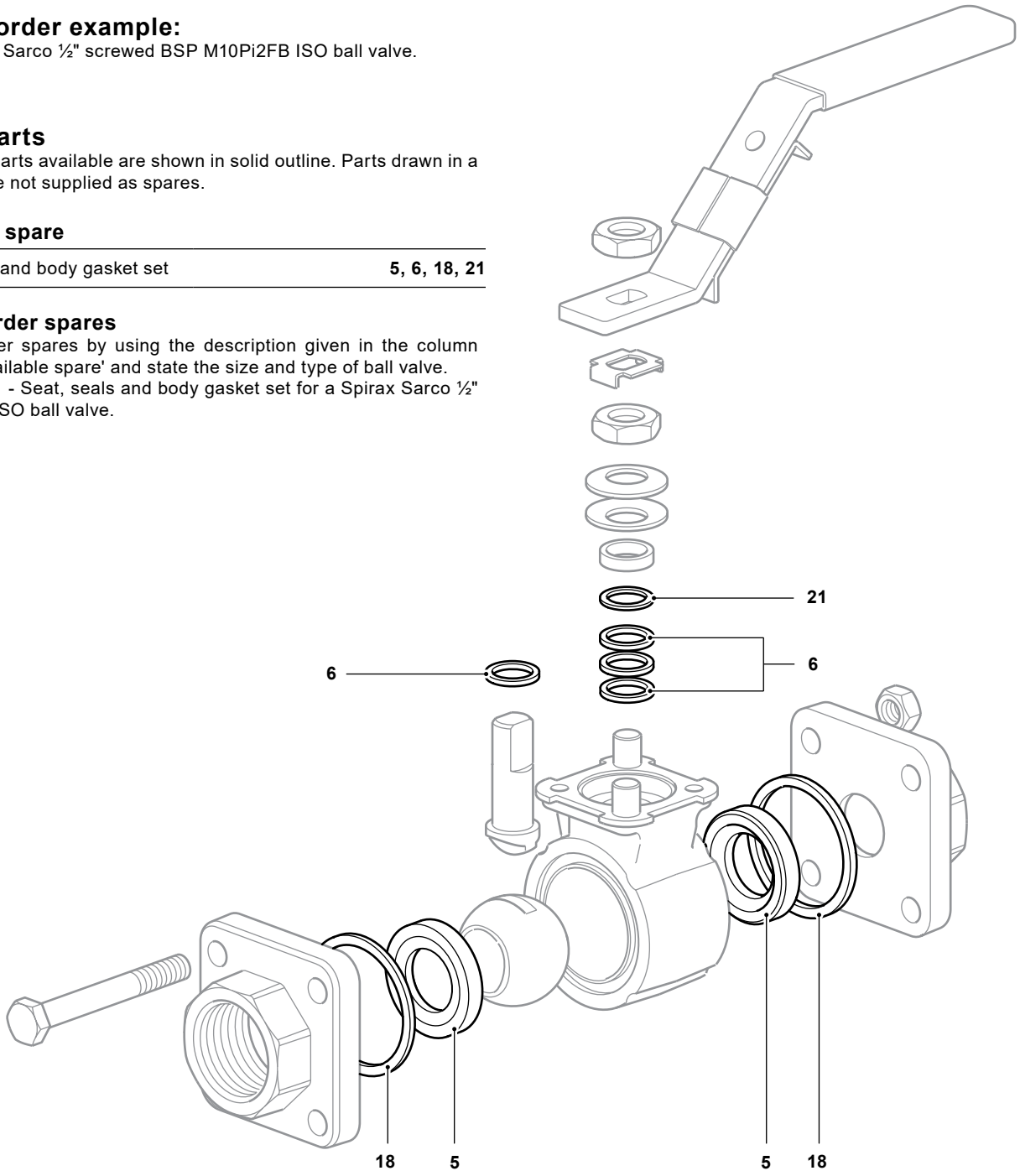
How to order example:
1 off Spirax Sarco ½" screwed BSP M10Pi2FB ISO ball valve.

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

Available spare

Seat, seals and body gasket set	**5, 6, 18, 21**

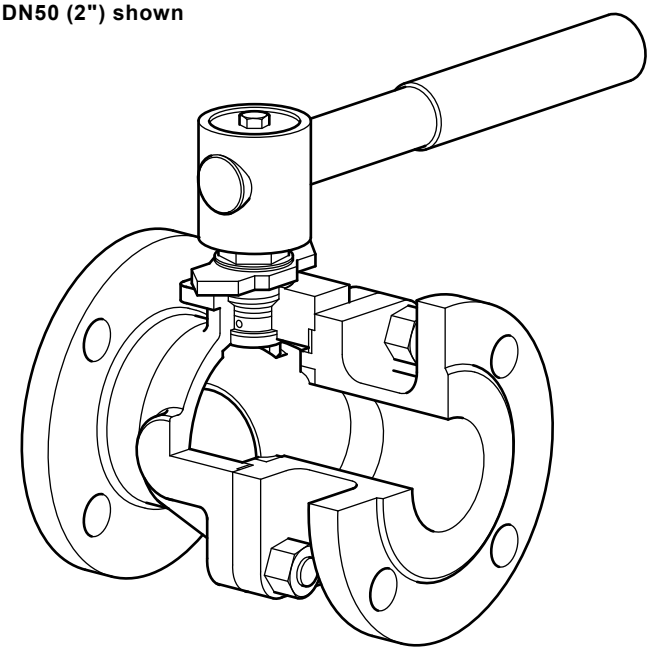
How to order spares
Always order spares by using the description given in the column headed 'Available spare' and state the size and type of ball valve.
Example: 1 - Seat, seals and body gasket set for a Spirax Sarco ½" M10Pi2FB ISO ball valve.



TI-P133-63
CMGT Issue 4

M33S ISO
Full Bore Ball Valve API 6D DN50 (2") to DN200 (8") Flanged ASME 150 and ASME 300

DN50 (2") shown



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, and other fluids within its operating range. It is not recommended for gases applications. The M33S ISO ANSI has as standard an ISO mounting pad in accordance with ISO 5211.

Available types

M33S2 ISO	Zinc plated carbon steel body, PDR 0.8 seats (for high temperatures) and ISO mounting.
M33S3 ISO	Stainless steel body, PDR 0.8 seats (for high temperatures) and ISO mounting.

Standards
This product fully complies with the requirements of the Pressure Equipment Directive (PED) 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 DN150 and DN200 sizes - Not API 6D rated.
- Self-venting ball.
- Ring joint flanges.
- Extended stems to allow full insulation.
- Operation by pneumatic actuator BVA300 series for all sizes.
- Operation by pneumatic actuator BVA300 series and declutchable gearbox.
- Operation by gearbox
- Lockable handle.
- Relief valve.
- Drain plug.

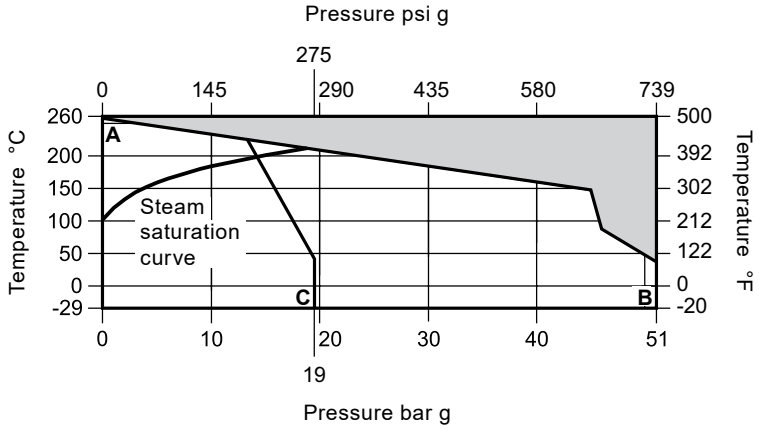
Sizes and pipe connections

DN50, DN65, DN80, DN100, DN150, DN200 (2", 2½", 3", 4", 6" and 8").
Standard flange ASME B 16.5 Class 150 and 300 with face-to-face dimensions according to ASME 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

Pressure/temperature limits



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

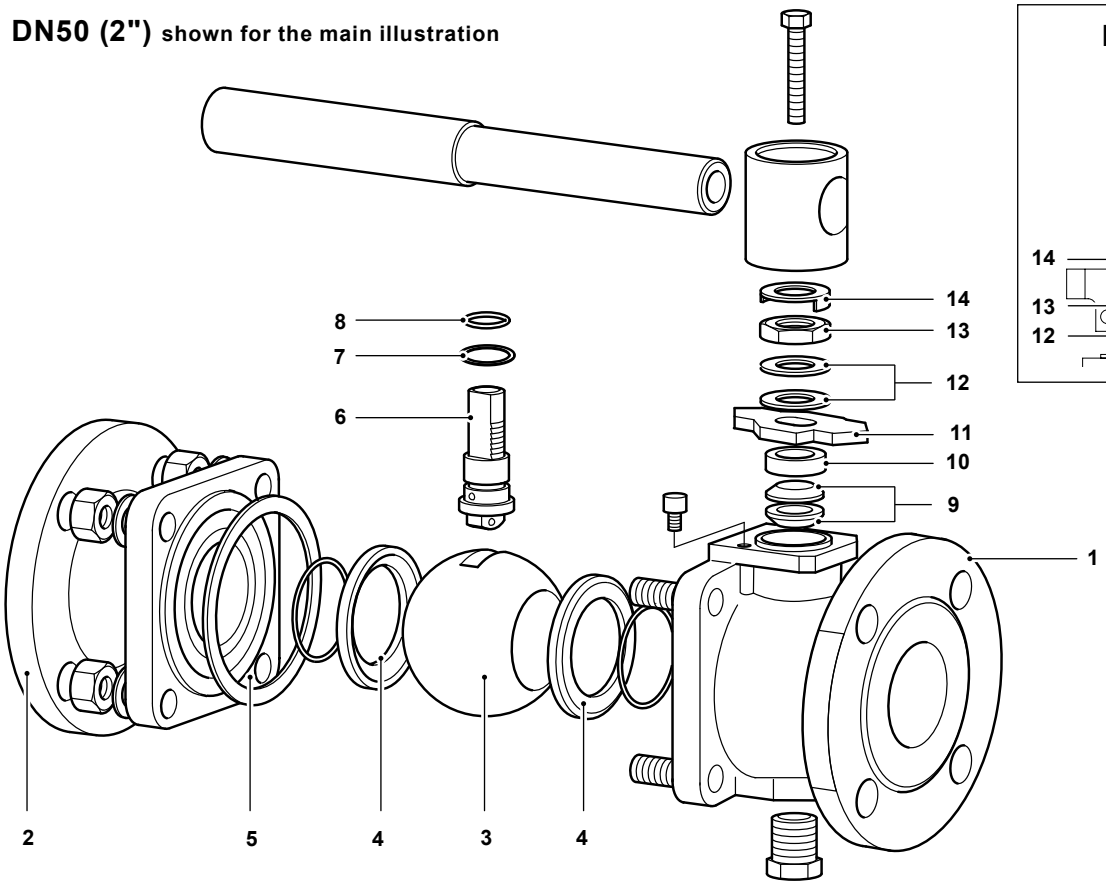
A - B Flanged ANSI 300.

A - C Flanged ANSI 150.

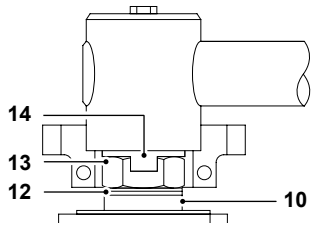
Body design conditions				ANSI B 16.34
PMA	Maximum allowable pressure	ANSI 150	19 bar g @ 38 °C	276 psi g @ 100 °F
		ANSI 300	51 bar g @ 38 °C	739 psi g @ 100 °F
TMA	Maximum allowable temperature		260 °C @ 0 bar g	500 °F @ 0 psi g
Minimum allowable temperature			-29 °C	-20 °F
PMO	Maximum operating pressure for saturated steam service		17.5 bar g	253 psi g
TMO	Maximum operating temperature		260 °C @ 0 bar g	500 °F @ 0 psi g
Minimum operating temperature **Note:** For lower operating temperatures consult Spirax Sarco			-29 °C	-20 °F
ΔPMX	Maximum differential pressure is limited to the PMO			
Designed for a maximum cold hydraulic test pressure of:		ASME 150	28.5 bar g	413 psi g
		ASME 300	76.5 bar g	1109 psi g

Materials

DN50 (2") shown for the main illustration



DN65 (2½") to DN200 (8")

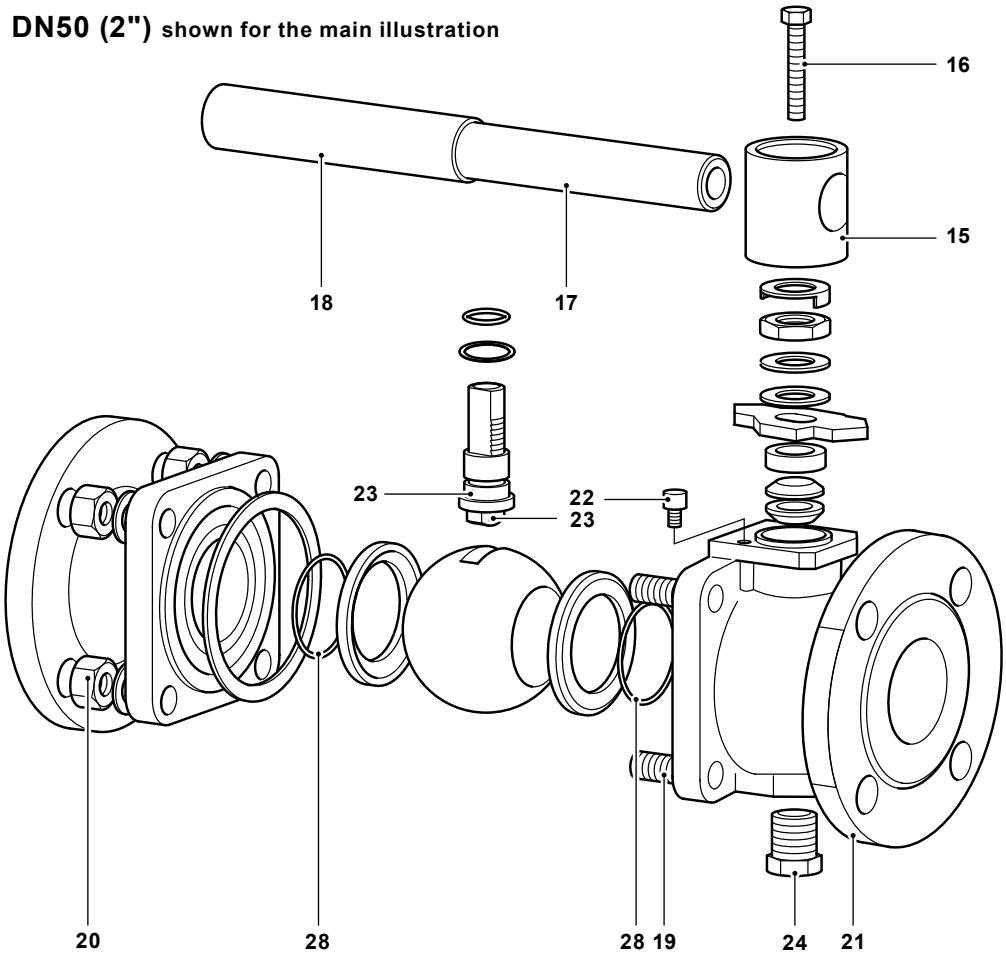


No.	Part		Material	
1	Body	**M33S2 ISO**	Zinc plated carbon steel	ASTM A 216 WCB
		M33S3 ISO	Stainless steel	ASTM A 351 CF8M
2	Insert	**M33S2 ISO**	Zinc plated carbon steel	ASTM A 21 6 WCB
		M33S3 ISO	Stainless steel	ASTM A 351 CF8M
3	Solid ball		Stainless steel	AISI 316
4	Seats		Carbon and graphite 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 DN50		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

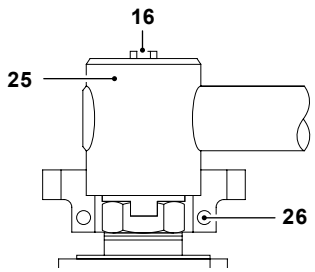
Materials continued on page 4

Materials (continued from page 3)

DN50 (2") shown for the main illustration

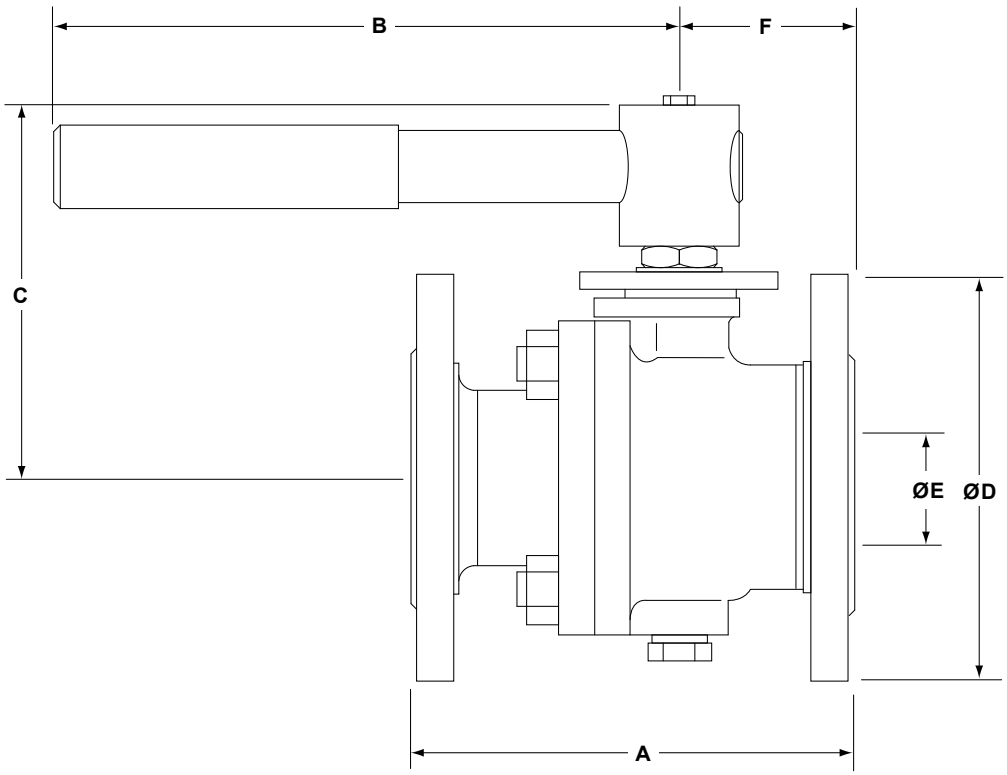


DN65 (2½") to DN200 (8")



No.	Part		Material	
15	Adaptor DN50		Zinc plated SG iron	
16	Screw		Carbon steel	Grade 5
17	Handle		Zinc plated carbon steel	SAE 1010
18	Grip		Vinyl	Blue
19	Stud		Zinc plated alloy	A193-B7
20	Nut		Zinc plated carbon steel	A194-2H
21	Nameplate		Stainless steel	AISI 430
22	Stop screw		Zinc plated carbon steel	SAE 12L14
23	Antistatic device ball		Stainless steel	AISI 302
24	Plug	**M33S2 ISO**	Carbon steel	
		M33S3 ISO	Stainless steel	
25	Adaptor with indicator for DN65 to DN200		Zinc plated SG iron	
26	Stop screw for DN65 to DN200		Carbon steel	
27	Lifting eye (DN200 only) - not shown		Zinc plated carbon steel	SAE 1010
28	'O' ring		EPDM	

Dimensions/weights (approximate) in mm (inches) and kg (lbs)



Flanged ANSI 150

Size	A	B	C	D	E	F	Weight
DN50 (2")	178 (7.0)	275 (10.8)	140 (5.5)	152 (6.0)	50 (2.0)	70 (2.8)	10.8 (24)
DN65 (2½")	190 (7.5)	415 (16.3)	160 (6.3)	178 (7.0)	63 (2.5)	82.5 (3.2)	16.2 (36)
DN80 (3")	203 (8.0)	515 (20.3)	168 (6.6)	191 (7.5)	74 (2.9)	87 (3.4)	20.0 (44)
DN100 (4")	229 (9.0)	700 (27.5)	202 (8.0)	229 (9.0)	100 (3.9)	106 (4.2)	35.3 (78)
DN150 (6")	394 (15.5)	850 (33.5)	283 (11.1)	279 (10.9)	150 (5.9)	197 (7.8)	80.2 (177)
DN200 (8")	457 (18.0)	950 (37.4)	317 (12.5)	343 (13.5	201 (7.9)	228 (9.0)	140.0 (309)

Flanged ANSI 300

Size	A	B	C	D	E	F	Weight
DN50 (2")	216 (8.5)	275 (10.8)	140 (5.5)	165 (6.5)	50 (2.0)	85.5 (3.4)	14.8 (33)
DN65 (2½")	241 (9.5)	415 (16.3)	160 (6.3)	191 (7.5)	63 (2.5)	90.5 (3.6)	22.8 (50)
DN80 (3")	283 (11.1)	515 (20.3)	168 (6.6)	210 (8.3)	74 (2.9)	99 (3.9)	30.0 (66)
DN100 (4")	305 (12.0)	700 (27.5)	202 (8.0)	254 (10.0)	100 (3.9)	122 (4.8)	50.0 (110)
DN150 (6")	403 (15.8)	850 (33.5)	283 (11.1)	318 (12.5)	150 (5.9)	179 (7.0)	111.2 (245)
DN200 (8")	502 (19.7)	950 (37.4)	317 (12.5)	381 (15.0)	201 (7.9)	213 (8.4)	185.3 (409)

Kv values

DN	50	65	80	100	150	200
Kv	300	430	750	1030	2410	4800

For conversion:
Cv (UK) = Kv x 0.963
Cv (US) = Kv x 1.156

Operating torque

DN	50 (2")	65 (2½")	80 (3")	100 (4")	150 (5")	200 (6")
N m	75	120	190	250	720	1150
ft lbf	55	89	140	184	531	848

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

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

Welding: Only the models that have connections designed for welding (SW, BW, Imperial Tube connections) should be welded. Carbon steel valves with flanged connections must not be welded to avoid damages to the valve and/or injury to personnel.

How to order

Specify:	**Size**	DN50, DN65, DN80, DN100, DN150, DN200 (2", 2½", 3", 4", 6" and 8").
	Model	M33S_ISO
	Body material	2 = Carbon steel
		3 = Stainless steel
	Flanges	ANSI 150 or ANSI 300

Example: 1 off Spirax Sarco DN50 flanged ANSI 150 M33S2 ISO ball valve.

Spare parts

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

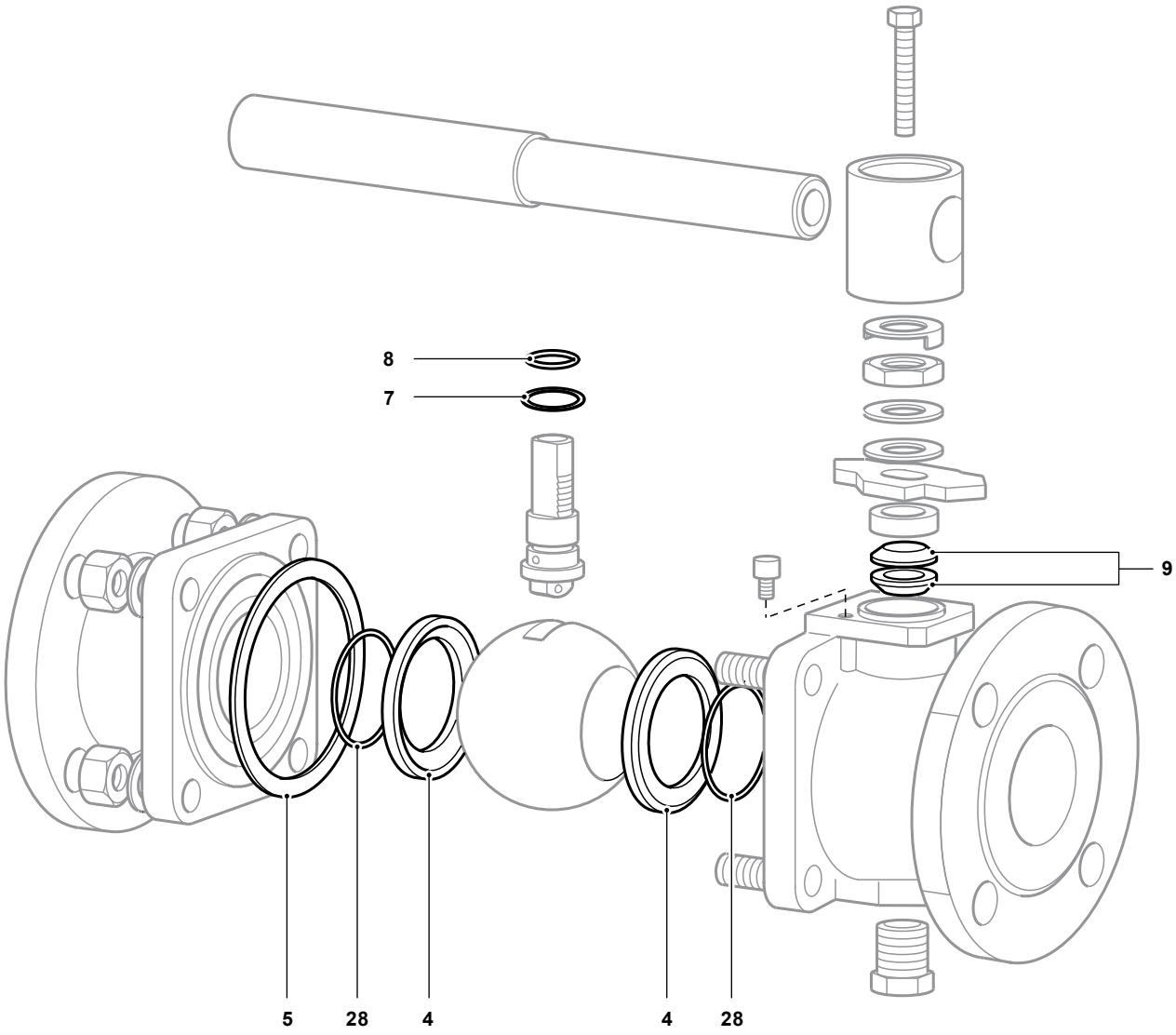
Available spares

Seats, body gasket, steam seals, stem 'O' ring 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 'O' ring set for a Spirax Sarco DN80 flanged ANSI M33S2 ISO ball valve



TI-P133-62
CMGT Issue 6

M33V ISO
Full Bore Ball Valve API 6D
DN50 (2") to DN200 (8") ASME (ANSI) 150 and 300

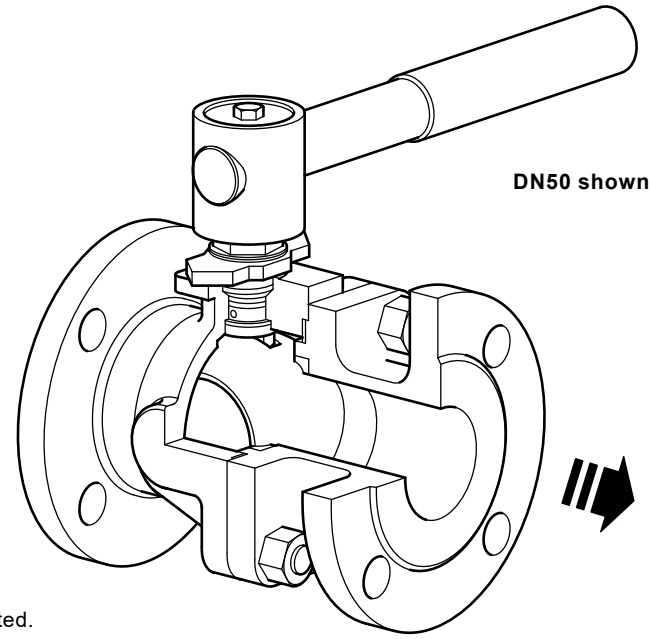
Description

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. It can be used with the majority of industrial fluids on applications, which include steam, condensate, water, oil, and other fluids within its operating range. It is not recommended for gases applications.

The M33V ISO ANSI has as standard an ISO mounting pad in accordance with ISO 5211.

Available types

M33V2 ISO	Zinc plated carbon steel body, PTFE seats and ISO mounting.
M33V3 ISO	Stainless steel body, PTFE seats and ISO mounting.



DN50 shown

Standards

This product fully complies with the requirements of the Pressure Equipment Directive (PED) 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 DN150 (6") and DN200 (8") sizes - Not API 6D rated.
- Self-venting ball.
- Ring joint flanges.
- Extended stems to allow full insulation.
- Operation by mechanical or pneumatic actuator BVA300 series for all sizes.
- Operation by pneumatic actuator BVA300 series and mechanical declutchable actuator.
- Lockable handle.
- Materials according to NACE MR 0175.
- Surge valve.
- Drain plug.

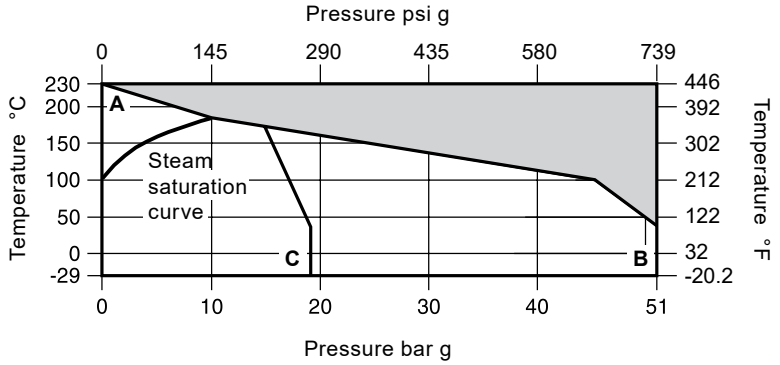
Sizes and pipe connections

DN50 (2"), DN65 (2½"), DN80 (3"), DN100 (4"), DN150 (6") and DN200 (8")
Standard flange ASME (ANSI) B 16.5 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

Pressure/temperature limits



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

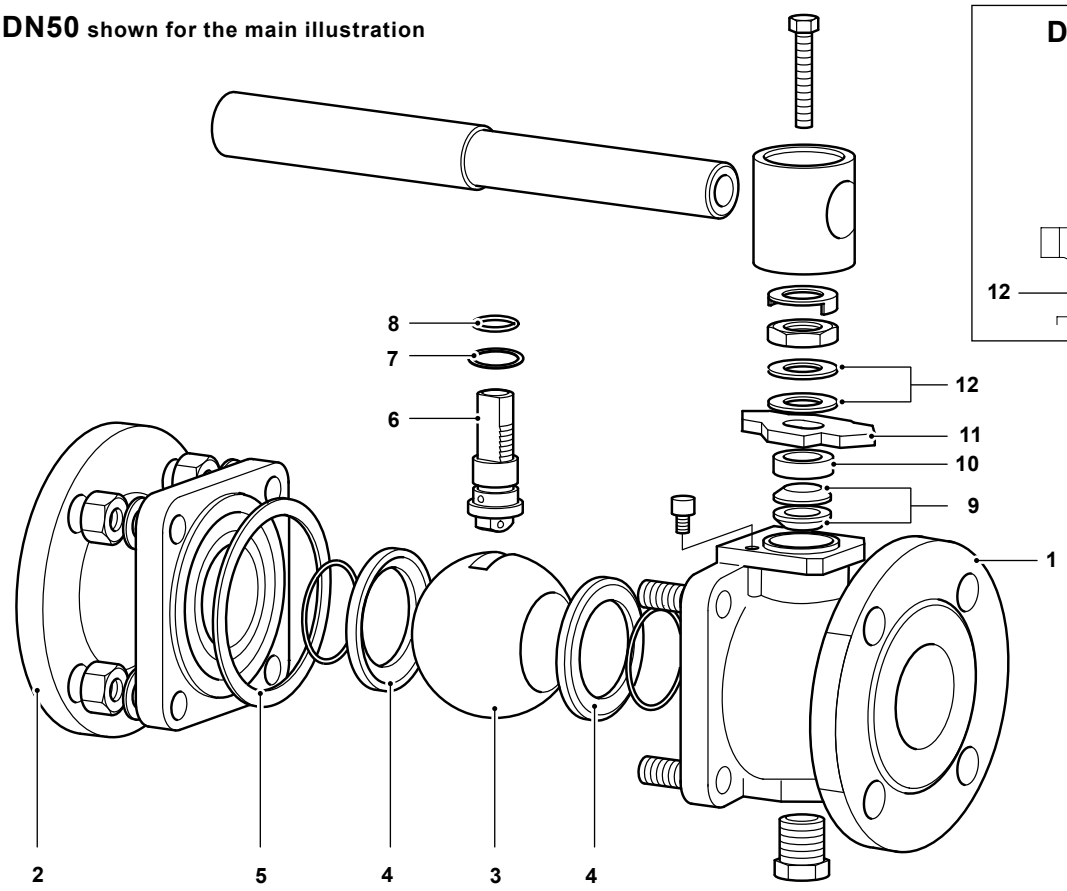
A - B Flanged ASME (ANSI) 300.

A - C Flanged EN 1092 PN40.

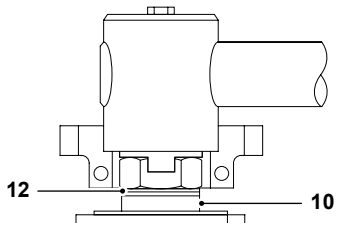
Body design conditions				ASME B 16.34
PMA	Maximum allowable pressure	ASME 150	19 bar g @ 38 °C	276 psi g @ 100 °F
		ASME 300	51 bar g @ 38 °C	740 psi g @ 100 °F
TMA	Maximum allowable temperature		230 °C @ 0 bar g	446 °F @ 0 psi g
Minimum allowable temperature			-29 °C	-20.2 °F
PMO	Maximum operating pressure for saturated steam service		10 bar g	145 psi g
TMO	Maximum operating temperature		230 °C @ 0 bar g	446 °F @ 0 psi g
Minimum operating temperature **Note:** For lower operating temperatures consult Spirax Sarco			-29 °C	-20.2 °F
ΔPMX	Maximum differential pressure is limited to the PMO			
Designed for a maximum cold hydraulic test pressure of:		ASME 150	28.5 bar g	413 psi g
		ASME 300	76.5 bar g	1110 psi g

Materials

DN50 shown for the main illustration



DN65 to DN200 (2½" to 8")

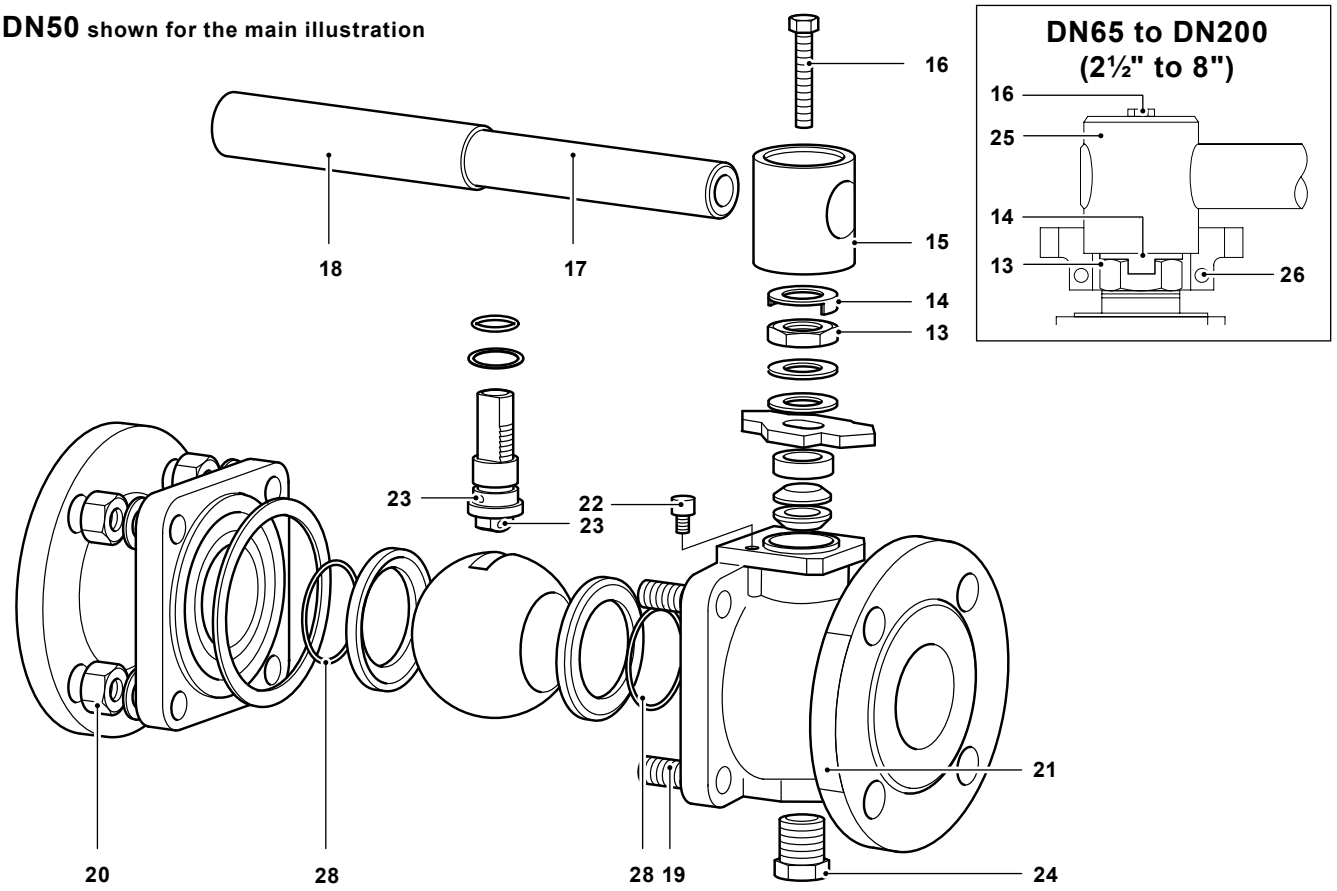


No.	Part		Material	
1	Body	**M33V2 ISO**	Zinc plated carbon steel	ASTM A 216 WCB
		M33V3 ISO	Stainless steel	ASTM A 351 CF8M
2	Insert	**M33V2 ISO**	Zinc plated carbon steel	ASTM A 21 6 WCB
		M33V3 ISO	Stainless steel	ASTM A 351 CF8M
3	Solid ball		Stainless steel	AISI 316
4	Seats		PTFE	
5	Body gasket		Grafoil 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 DN50		Zinc plated carbon steel	SAE 1010
12	Belleville stem washer		Carbon steel/stainless steel	

For parts 13 to 28, go to page 4

Materials

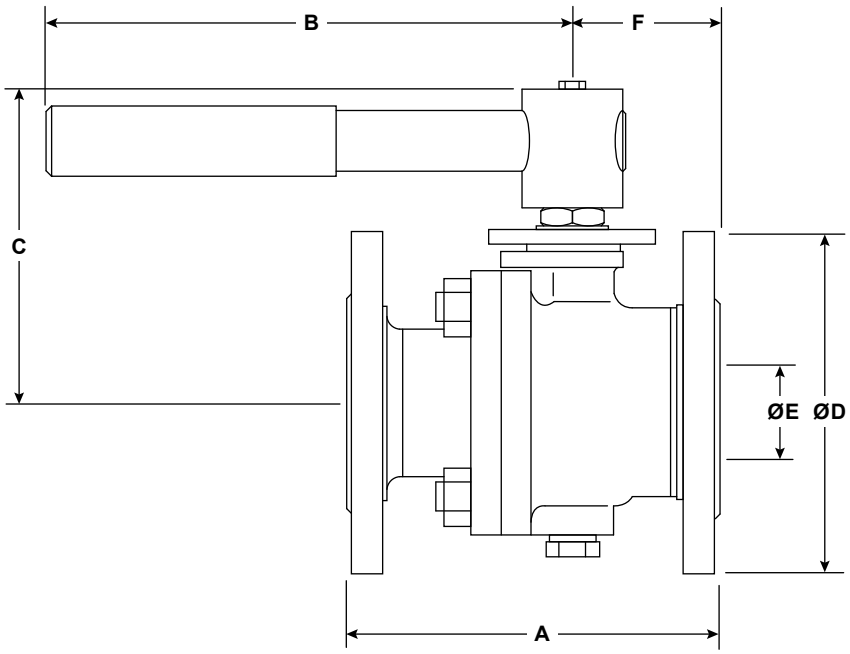
DN50 shown for the main illustration



No.	Part	Material	
13	Gland nut	Carbon steel	SAE 12L14
14	Locking plate	Stainless steel	AISI 304
15	Adaptor DN50	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 DN65 to DN200	Zinc plated SG iron	
26	Stop screw for DN65 to DN200	Carbon steel	
27	Lifting eye (DN200 only) - not shown	Zinc plated carbon steel	SAE 1010
28	'O' ring	Viton	

For parts 1 to 12, go to page 3

Dimensions/weights (approximate) in mm (inches) and kg (lbs)



Flanged ASME (ANSI) 150							
Size	**A**	**B**	**C**	**D**	**E**	**F**	**Weight**
DN50 (2")	178 (7)	275 (10.8)	140 (5.5)	152 (6)	50 (2)	70 (2.8)	10.8 (24)
DN65 (2½")	190 (7.5)	415 (16.3)	160 (6.3)	178 (7)	63 (2.5)	82.5 (3.2)	16.2 (36)
DN80 (3")	203 (8)	515 (20.3)	168 (6.6)	191 (7.5)	74 (2.9)	87 (3.4)	20 (44)
DN100 (4")	229 (9)	700 (27.5)	202 (8)	229 (9)	100 (3.9)	106 (4.2)	35.3 (78)
DN150 (6")	394 (15.5)	850 (33.5)	283 (11.1)	279 (10.9)	150 (5.9)	197 (7.8)	80.2 (177)
DN200 (8")	457 (18)	950 (37.4)	317 (12.5)	343 (13.5)	201 (7.9)	228 (9)	140 (309)
Flanged ASME (ANSI) 300							
Size	**A**	**B**	**C**	**D**	**E**	**F**	**Weight**
DN50 (2")	216 (8.5)	275 (10.8)	140 (5.5)	165 (6.5)	50 (2)	85.5 (3.4)	14.8 (33)
DN65 (2½")	241 (9.5)	415 (16.3)	160 (6.3)	191 (7.5)	63 (2.5)	90.5 (3.6)	22.8 (50)
DN80 (3")	283 (11.1)	515 (20.3)	168 (6.6)	210 (8.3)	74 (2.9)	99 (3.9)	30 (66)
DN100 (4")	305 (12)	700 (27.5)	202 (8)	254 (10)	100 (3.9)	122 (4.8)	50 (110)
DN150 (6")	403 (15.8)	850 (33.5)	283 (11.1)	318 (12.5)	150 (5.9)	179 (7)	111.2 (245)
DN200 (8")	502 (19.7)	950 (37.4)	317 (12.5)	381 (15)	201 (7.9)	213 (8.4)	185.3 (409)

Kv values

DN	**50**	**65**	**80**	**100**	**150**	**200**
Kv	300	430	750	1030	2410	4800

For conversion:
Cv (UK) = Kv x 0.963
Cv (US) = Kv x 1.156

Operating torque

DN	**50**	**65**	**80**	**100**	**150**	**200**
Nm (lbf ft)	75 (55)	120 (89)	190 (140)	250 (184)	720 (531)	1150 (848)

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

How to order

Specify:	**Size**	DN50, DN65, DN80, DN100, DN150, DN200
	Model	M33V_ISO
	Body material	2 = Carbon steel
		3 = Stainless steel
	Flanges	ASME 150 or ASME 300

Example: 1 off Spirax Sarco DN50 flanged ASME 150 M33V2 ISO ball valve.

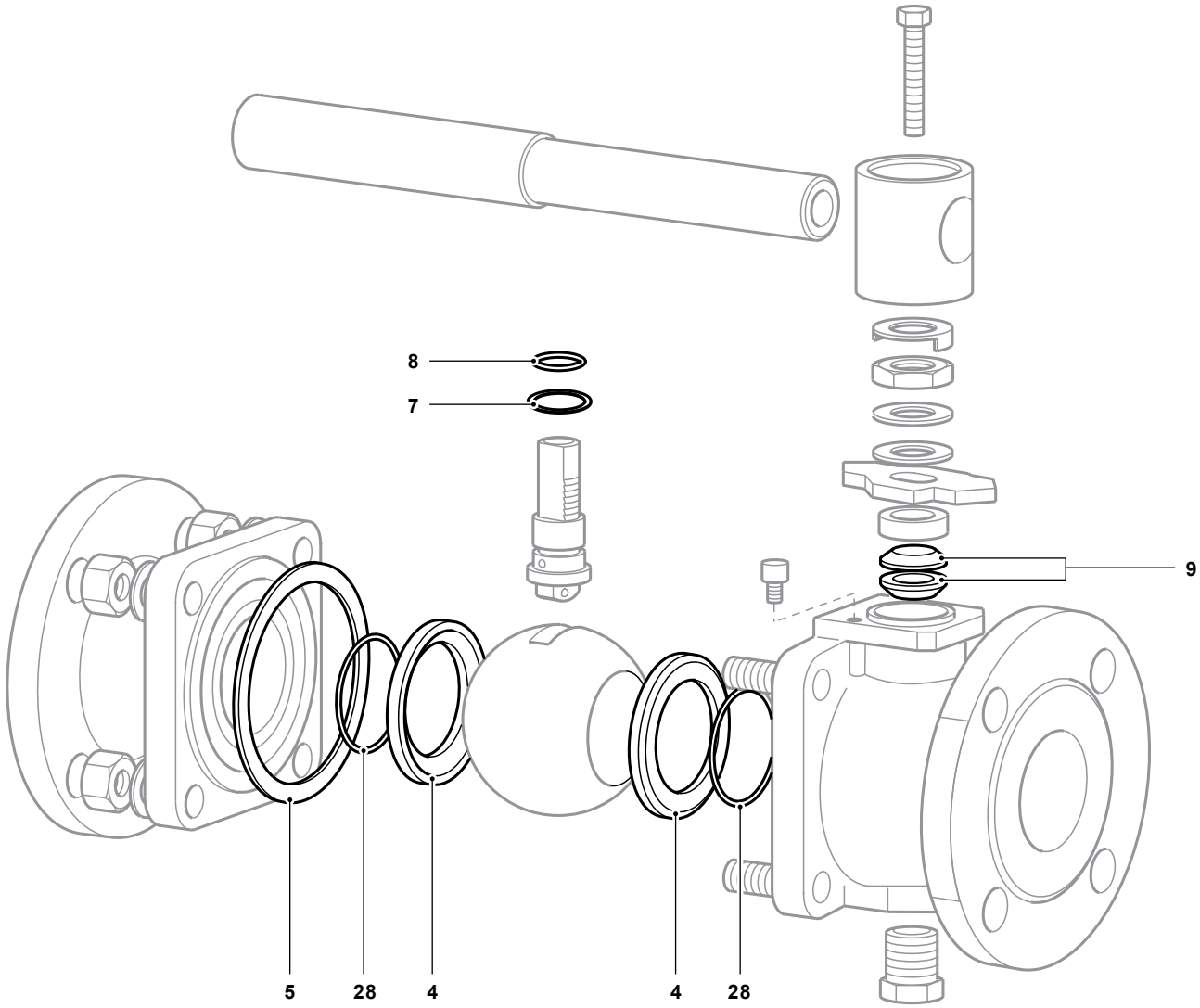
Spare parts
The spare parts available are shown in solid outline. Parts drawn in a grey line are not supplied as spares.

Available spares

Seats, body gasket, steam seals, stem 'O' ring 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 'O' ring set for a Spirax Sarco DN80 flanged ASME M33V2 ISO ball valve.



TI-P133-64
CMGT Issue 5

M33F ISO Full Bore Ball Valve API 6D Firesafe API 607 DN50 to DN200 ANSI 150 and ANSI 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. It can be used with the majority of industrial fluids on applications, which include steam, condensate, water, oil, and other fluids within its operating range. It is not recommended for gases applications. The M33F ISO ANSI has as standard an ISO mounting pad in accordance with ISO 5211.

Firesafe design

In normal working conditions, the ball rests against two PDR 0.8 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

M33F2 ISO	Zinc plated carbon steel body, PDR 0.8 seats (for high temperatures) and ISO mounting.
M33F3 ISO	Stainless steel body, PDR 0.8 seats (for high temperatures) and ISO mounting.

Standards

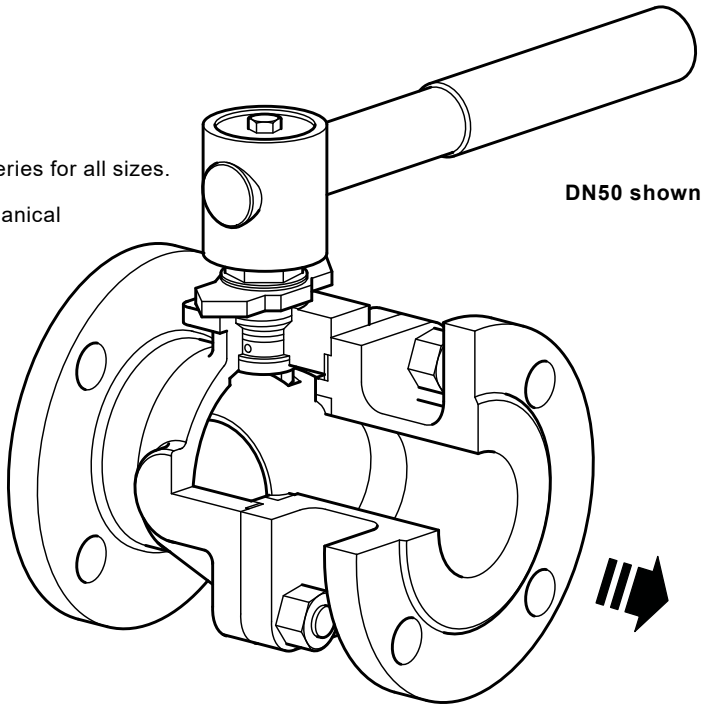
This product fully complies with the requirements of the Pressure Equipment Directive (PED) and carries the CE mark when so required.

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 DN150 (6") and DN200 (8") sizes - Not API 6D rated.
- Self-venting ball.
- Ring joint flanges.
- Extended stems to allow full insulation.
- Operation by mechanical or pneumatic actuator BVA300 series for all sizes.
- Operation by pneumatic actuator BVA300 series and mechanical declutchable actuator.
- Lockable handle.
- Materials according to NACE MR 0175.
- Surge valve.
- Drain plug.



DN50 shown

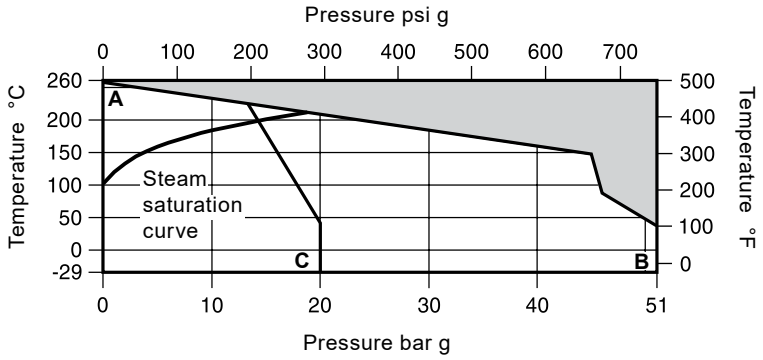
Sizes and pipe connections

DN50, DN65, DN80, DN100, DN150 and DN200 (2", 2½", 3", 4", 6", and 8").
Standard flange ANSI B 16.5 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 and BS 5351	
Antistatic device	Complies with ISO 7121 and BS 5351

Pressure/temperature limits



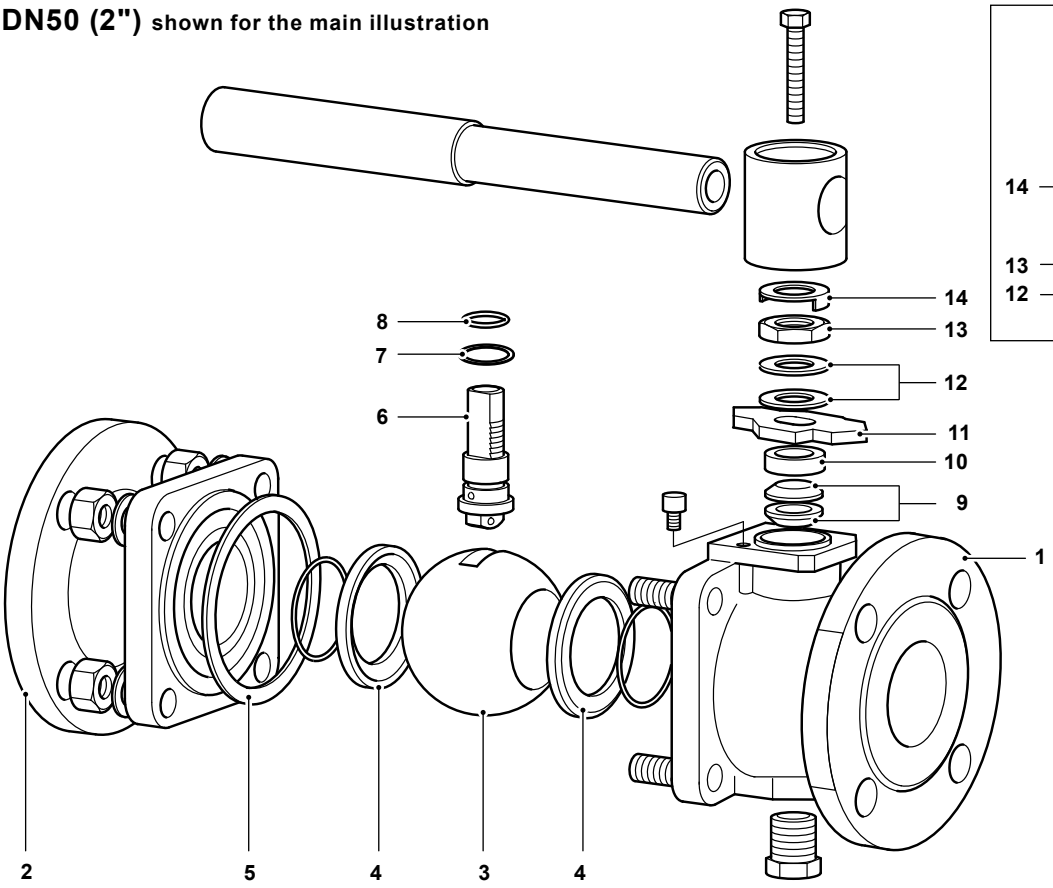
The product **must not** be used in this region.

A - B Flanged ASME 300.

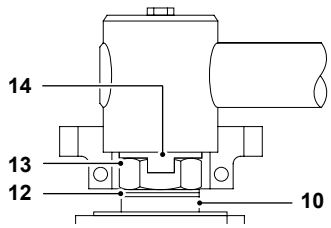
A - C Flanged ASME 150.

Body design conditions				ASME B 16.34
PMA	Maximum allowable pressure	**ASME 150**	20 bar g @ 38 °C	290 psi g @ 100 °F
		ASME 300	51 bar g @ 38 °C	740 psi g @ 100 °F
TMA	Maximum allowable temperature		260 °C @ 0 bar g	500 °F @ 0 psi g
Minimum allowable temperature			-29 °C	-20 °F
PMO	Maximum operating pressure for saturated steam service		17.5 bar g	254 psi g
TMO	Maximum operating temperature		260 °C @ 0 bar g	500 °F @ 0 psi g
Minimum operating temperature **Note:** For lower operating temperatures consult Spirax Sarco			-29 °C	-20 °F
ΔPMX	Maximum differential pressure is limited to the PMO			
Designed for a maximum cold hydraulic test pressure of:		**ASME 150**	28.5 bar g	413 psi g
		ASME 300	76.5 bar g	1110 psi g

DN50 (2") shown for the main illustration



DN65 to DN200 (2½" to 8")

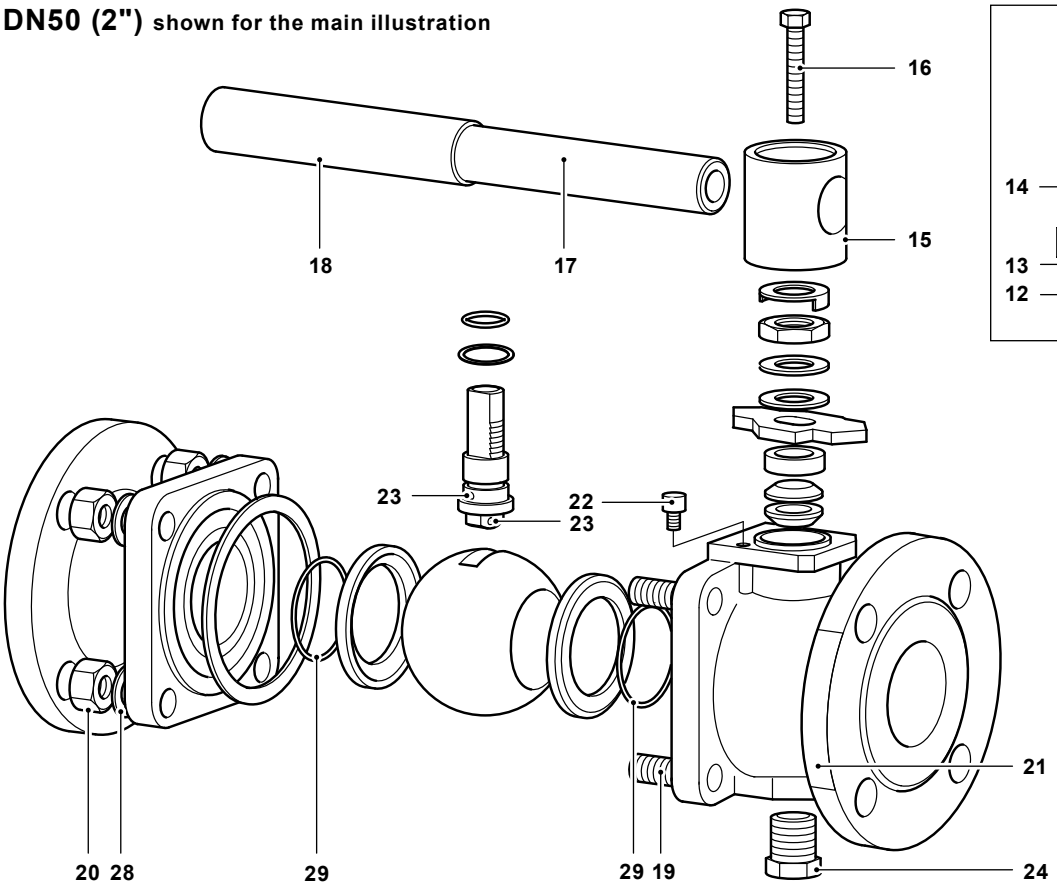


Materials

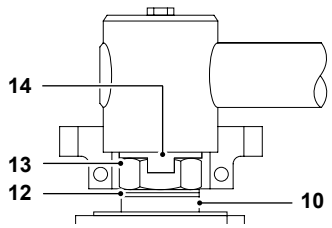
No.	Part		Material	
1	Body	**M33F2 ISO**	Zinc plated carbon steel	ASTM A 216 WCB
		M33F3 ISO	Stainless steel	ASTM A 351 CF8M
2	Insert	**M33F2 ISO**	Zinc plated carbon steel	ASTM A 21 6 WCB
		M33F3 ISO	Stainless steel	ASTM A 351 CF8M
3	Solid ball		Stainless steel	AISI 316
4	Seats		Carbon and graphite 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		Graphoil	
10	Separator		Zinc plated carbon steel	SAE 1010
11	Stop plate with indicator for DN50		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

For parts 15 to 29 see page 4

DN50 (2") shown for the main illustration



DN65 to DN200 (2½" to 8")

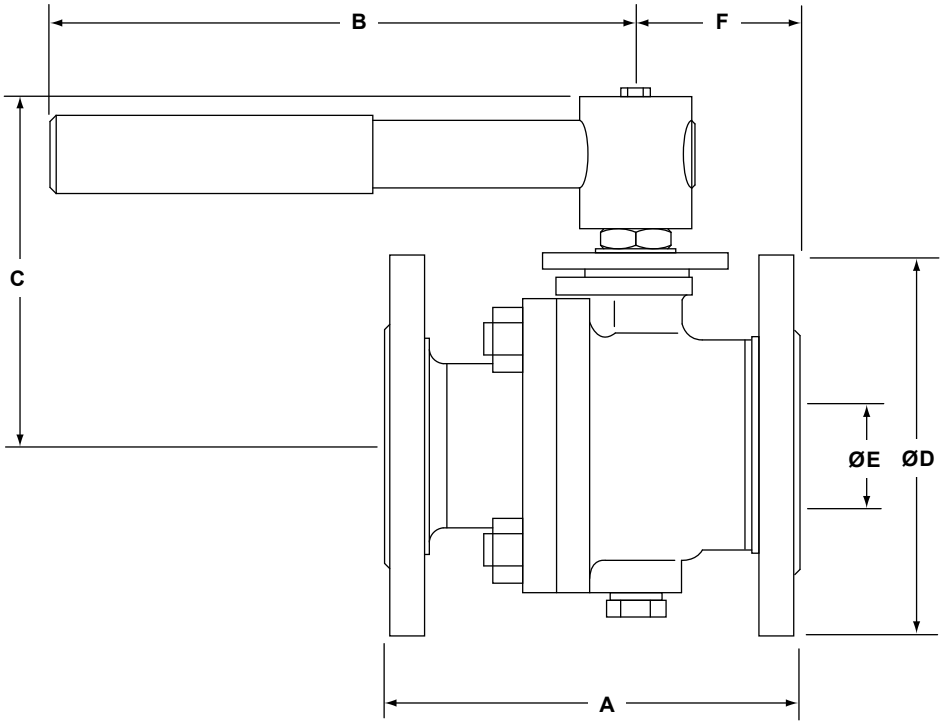


No.	Part	Material	
15	Adaptor DN50	Zinc plated SG iron	
16	Screw	Carbon steel	Grade 5
17	Handle	Zinc plated carbon steel	SAE 1010
18	Grip	Vinyl (Red)	
19	Stud	Stainless steel	A193-B8
20	Nut	Stainless steel	A194-8MA
21	Photochemical name-plate	Stainless steel	AISI 304
22	Stop screw	Zinc plated carbon 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	Zinc plated SG iron	
26	Stop screw for DN65 to DN200	Carbon steel	
27	Lifting eye (DN200 only) - not shown	Zinc plated carbon steel	SAE 1010
28	Belleville stud washer	Stainless steel	
29	'O' ring	Viton	

8.1
62

For parts 1 to 14 see page 3

Dimensions/weights (approximate) in mm (inches) and kg (lbs)



Flanged ANSI 150							
Size	A	B	C	D	E	F	Weight
DN50 2"	178 (7)	275 (10.8)	140 (5.5)	152 (6)	50 (2)	70 (2.8)	10.8 (24)
DN65 2½"	190 (7.5)	415 (16.3)	160 (6.3)	178 (7)	63 (2.5)	82.5 (3.2)	16.2 (36)
DN80 3"	203 (8)	515 (20.3)	168 (6.6)	191 (7.5)	74 (2.9)	87 (3.4)	20 (44)
DN100 4"	229 (9)	700 (27.5)	202 (8)	229 (9)	100 (3.9)	106 (4.2)	35.3 (78)
DN150 6"	394 (15.5)	850 (33.5)	283 (11.1)	279 (10.9)	150 (5.9)	197 (7.8)	80.2 (177)
DN200 8"	457 (18)	950 (37.4)	317 (12.5)	343 (13.5)	201 (7.9)	228 (9)	140 (309)
Flanged ANSI 300							
Size	A	B	C	D	E	F	Weight
DN50 2"	216 (8.5)	275 (10.8)	140 (5.5)	165 (6.5)	50 (2)	85.5 (3.4)	14.8 (33)
DN65 2½"	241 (9.5)	415 (16.3)	160 (6.3)	191 (7.5)	63 (2.5)	90.5 (3.6)	22.8 (50)
DN80 3"	283 (11.1)	515 (20.3)	168 (6.6)	210 (8.3)	74 (2.9)	99 (3.9)	30 (66)
DN100 4"	305 (12)	700 (27.5)	202 (8)	254 (10)	100 (3.9)	122 (4.8)	50 (110)
DN150 6"	403 (15.8)	850 (33.5)	283 (11.1)	318 (12.5)	150 (5.9)	179 (7)	111.2 (245)
DN200 8"	502 (19.7)	950 (37.4)	317 (12.5)	381 (15)	201 (7.9)	213 (8.4)	185.3 (409)

Kv values

DN	50	65	80	100	150	200
Kv	300	430	750	1030	2410	4800

For conversion:
Cv (UK) = Kv x 0.963
Cv (US) = Kv x 1.156

Operating torque (N m)

DN	50	65	80	100	150	200
Nm (lbf ft)	75 (55)	120 (89)	190 (140)	250 (184)	720 (531)	1150 (848)

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

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

How to order

Specify:	**Size**	DN50, DN65, DN80, DN100, DN150, DN200
	Model	M33F_ISO
	Body material	2 = Carbon steel
		3 = Stainless steel
	Flanges	ANSI 150 or ANSI 300

Example: 1 off Spirax Sarco DN50 flanged ANSI 150 M33F2 ISO ball valve

Spare parts

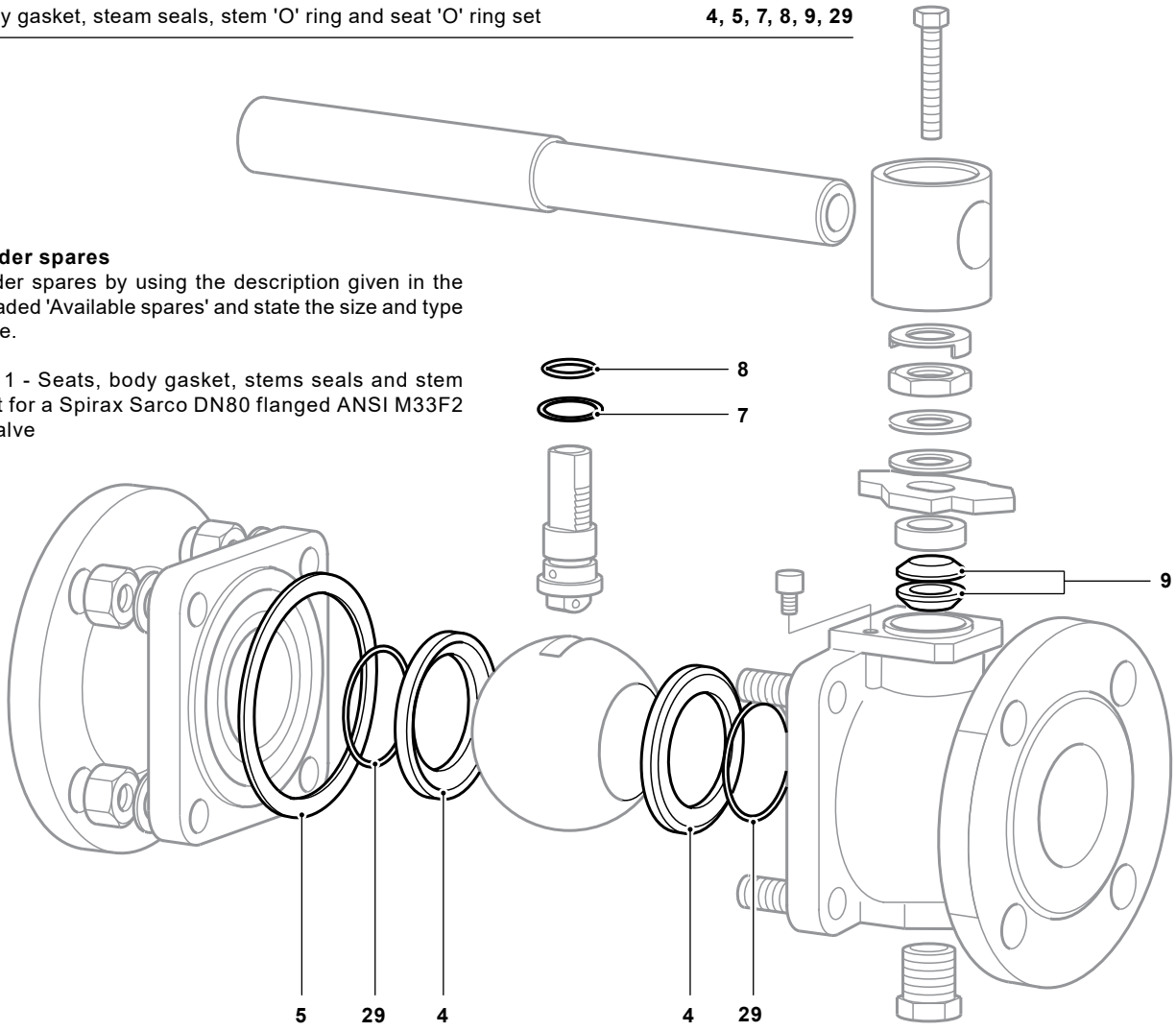
The spare parts available are shown in solid outline. Parts drawn in a grey line are not supplied as spares.

Available spares	
Seats, body gasket, steam seals, stem 'O' ring 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 'O' ring set for a Spirax Sarco DN80 flanged ANSI M33F2 ISO ball valve



TI-P133-78
CMGT Issue 8

M40Si ISO and M40Vi ISO Reduced Bore Ball Valves DN25 to DN200 Flanged ASME 150 and ASME 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

M40Si2 ISO	Zinc plated carbon steel body, PDR 0.8 seats.	**M40Vi2 ISO**	Zinc plated carbon steel body, PTFE seats.
M40Si3 ISO	Stainless steel body, PDR 0.8 seats.	**M40Vi3 ISO**	Stainless steel body, PTFE seats.

Standards

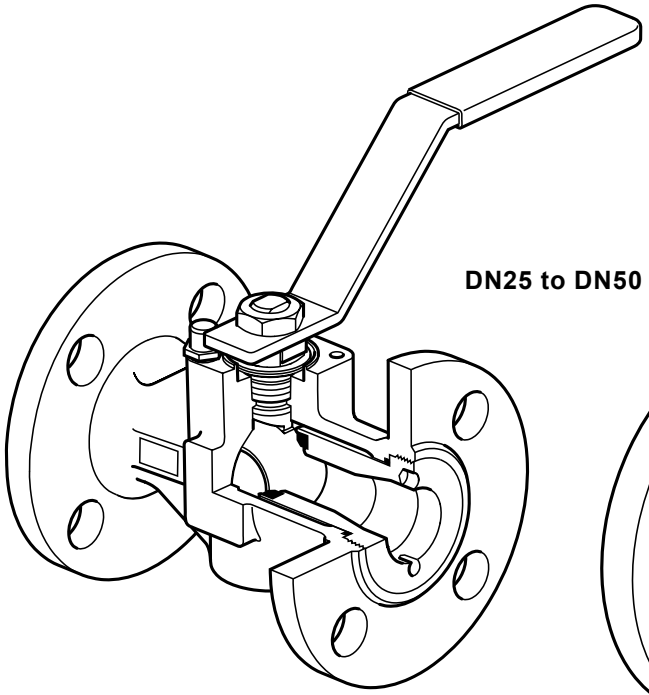
These products fully comply with the requirements of the Pressure Equipment Directive (PED) and carry the CE mark when so required.

Certification

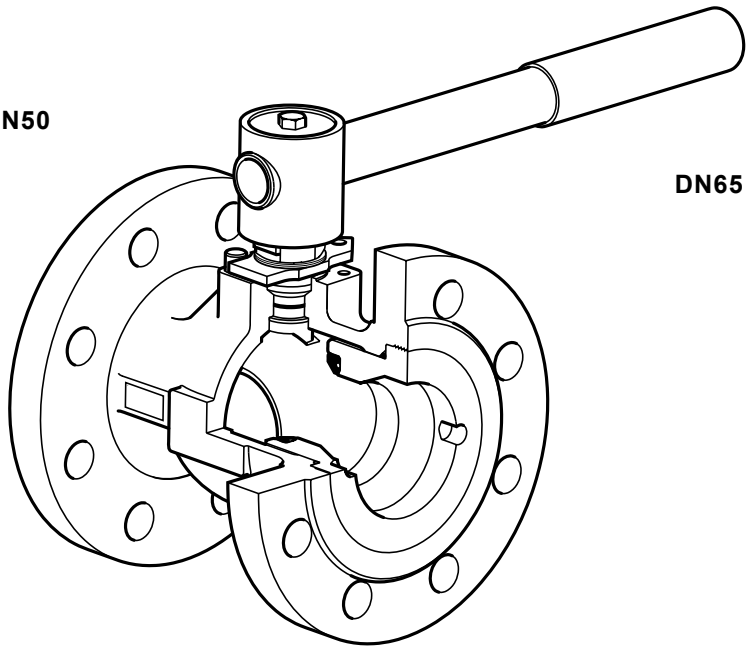
These products are available with certification to EN 10204 3.1.
Note: All certification/inspection requirements must be stated at the time of order placement.

Sizes and pipe connections

DN25, DN32, DN40, DN50, DN65, DN80, DN100, DN150 and DN200
(1", 1¼", 1½", 2", 2½", 3", 4", 6" and 8").
Standard flanges ASME 150 and ASME 300 with face-to-face dimensions according to ASME B16.10.



DN25 to DN50



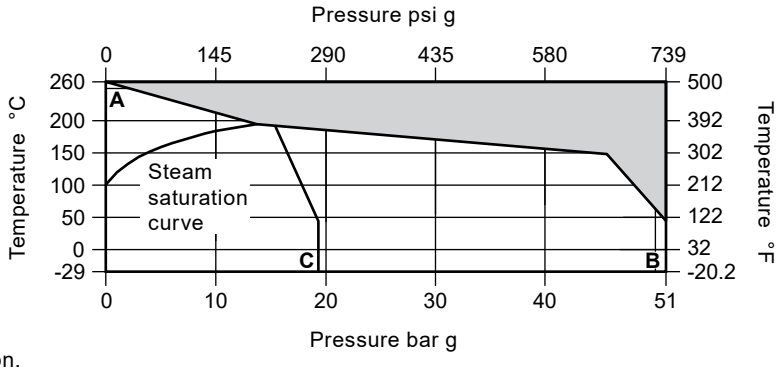
DN65

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	

Pressure/temperature limits

M40Si2 ISO and M40Si3 ISO - PDR 0.8 seats

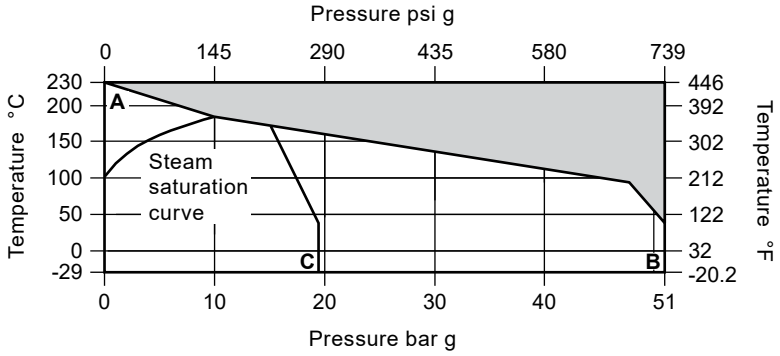


The product **must not** be used in this region.

A - B Flanged ASME 300

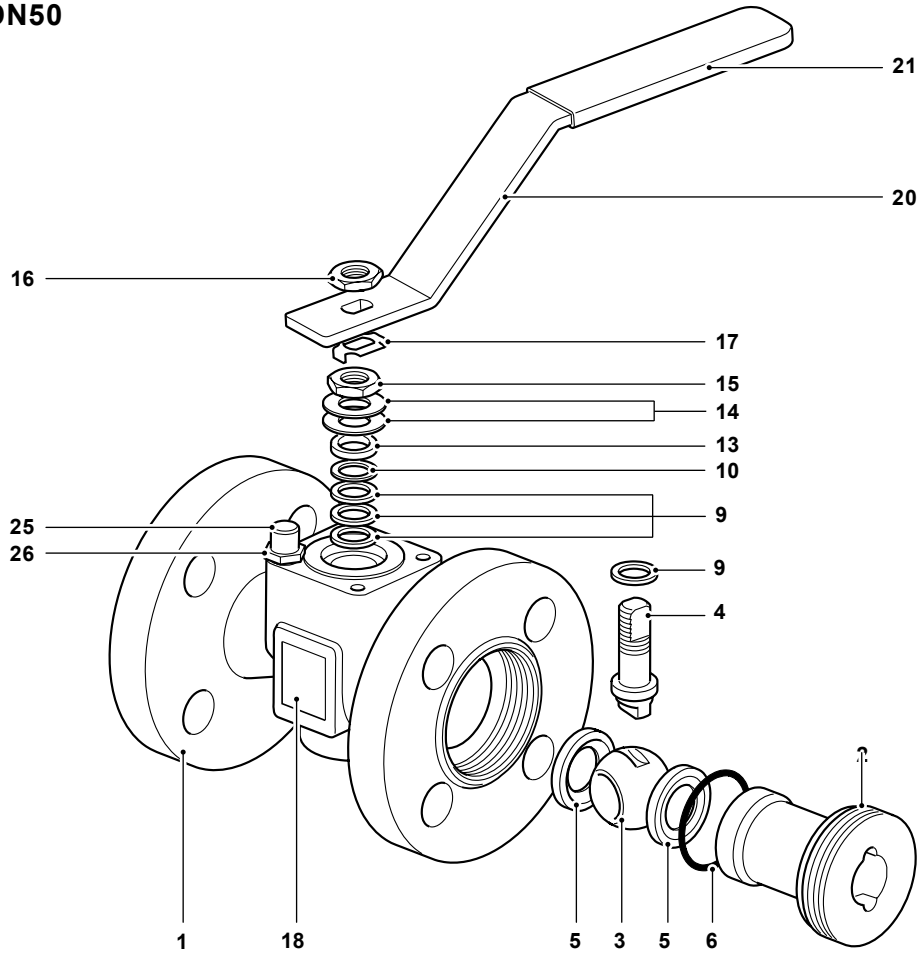
A - C Flanged ASME 150

M40Vi2 ISO and M40Vi3 ISO - PTFE seats



Body design conditions					ASME 150 and ASME 300
PMA	Maximum allowable pressure		ASME 150	19 bar g @ 38 °C	276 psi g @ 100 °F
			ASME 300	51 bar g @ 38 °C	740 psi g @ 100 °F
TMA	Maximum allowable temperature	**M40Si**		260 °C @ 0 bar g	500 °F @ 0 psi g
		M40Vi		230 °C @ 0 bar g	446 °F @ 0 psi g
Minimum allowable temperature				-29 °C	-20.2 °F
PMO	Maximum operating pressure for saturated steam service	**M40Si**	ASME 150	13.8 bar g	200 psi g
			ASME 300	17.5 bar g	254 psi g
		M40Vi		10 bar g	145 psi g
TMO	Maximum operating temperature	**M40Si**		260 °C @ 0 bar g	500 °F @ 0 psi g
		M40Vi		230 °C @ 0 bar g	446 °F @ 0 psi g
Minimum operating temperature. **Note:** For lower operating temperatures consult Spirax Sarco				-29 °C	-20.2 °F
ΔPMX	Maximum differential pressure is limited to the PMO				
Designed for a maximum cold hydraulic test pressure of:			ASME 150	28.5 bar g	413 psi g
			ASME 300	76.5 bar g	1110 psi g

Materials - DN25 to DN50



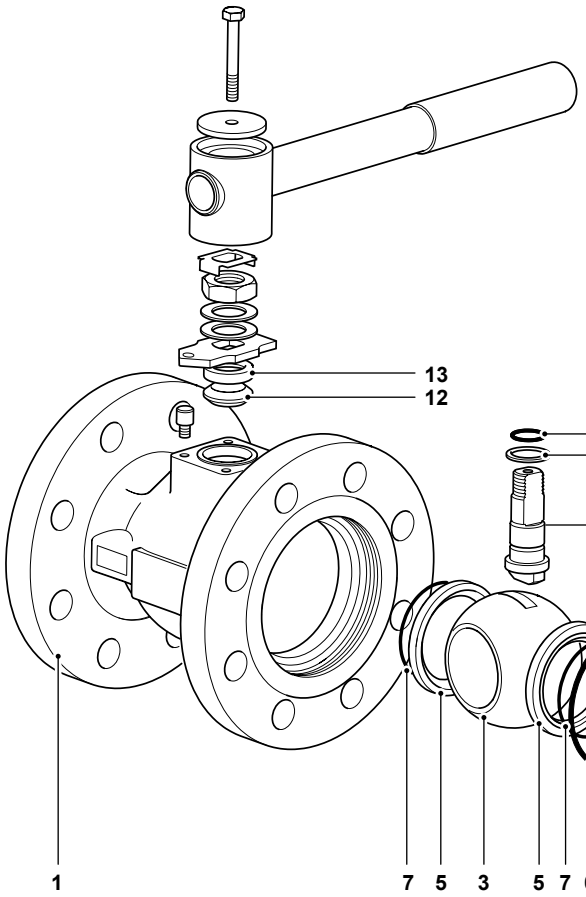
No.	Part		Material	
1	Body	M40Si2 ISO and M40Vi2 ISO	Zinc plated carbon steel	ASTM A216 WCB
		M40Si3 ISO and M40Vi3 ISO	Stainless steel	ASTM A351 CF8M
2	Insert	M40Si2 ISO and M40Vi2 ISO	Zinc plated carbon steel	SAE 1040
		M40Si3 ISO and M40Vi3 ISO	Stainless steel	AISI 316
3	Ball		Stainless steel	AISI 316
4	Stem		Stainless steel	AISI 316
5	Seat	M40Si2 ISO and M40Vi2 ISO	Carbon and graphite reinforced PTFE	PDR 0.8
		M40Si3 ISO and M40Vi3 ISO	Virgin PTFE	
6	Insert 'O' ring		EPDM	Geothermal

No.	Part	Material	
9	Stem seal	Antistatic R-PTFE	
10	Stem seal	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

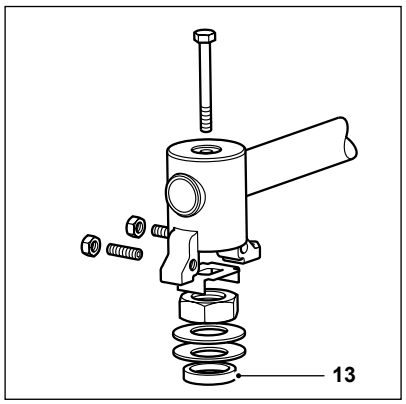
No.	Part	Material	
17	Locking plate	Stainless steel	AISI 304
18	Nameplate	Stainless steel	AISI 430
20	Lever	Zinc plated carbon steel	SAE 1010
21	Grip	Vinyl	
25	Stop screw	Zinc plated carbon steel	SAE 12L14
26	Split lock washer	Stainless steel	AISI 304

Materials

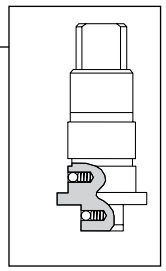
DN65



DN80 to DN200



DN65 to DN200

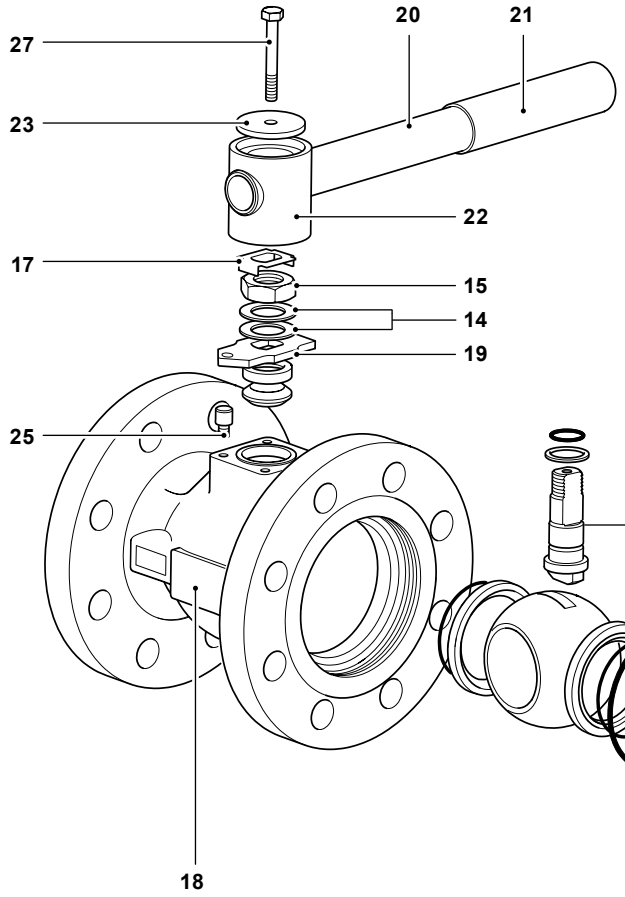


No.	Part		Material	
1	Body	M40Si2 ISO and M40Vi2 ISO	Zinc plated carbon steel	ASTM A216 WCB
		M40Si3 ISO and M40Vi3 ISO	Stainless steel	ASTM A351 CF8M
2	Insert	M40Si2 ISO and M40Vi2 ISO	Zinc plated carbon steel	SAE 1040
		M40Si3 ISO and M40Vi3 ISO	Stainless steel	AISI 316
3	Ball		Stainless steel	AISI 316
4	Stem		Stainless steel	AISI 316/AISI 420
5	Seat	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
7	Seat 'O' ring		EPDM	Geothermal
8	Stem 'O' ring		EPDM	Geothermal
11	Lower stem seal		Antistatic R-PTFE	
12	Upper stem packing		Virgin PTFE	
13	Separator		Zinc plated carbon steel	SAE 1010

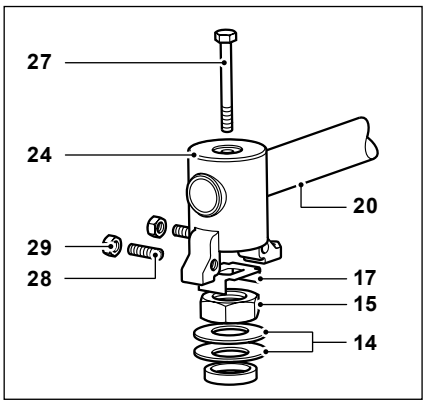
Materials continued on the next page

Materials (continued)

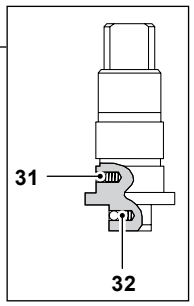
DN65



DN80 to DN200

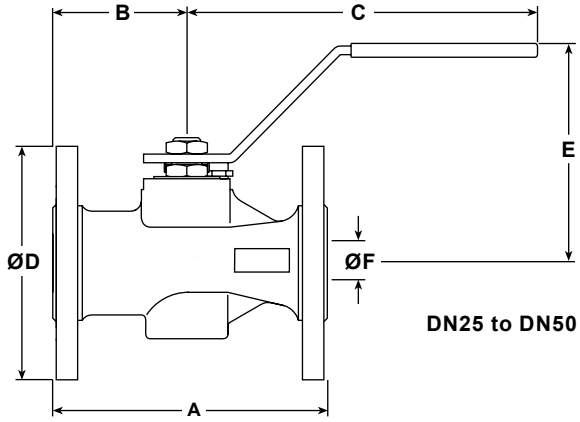


DN65 to DN200

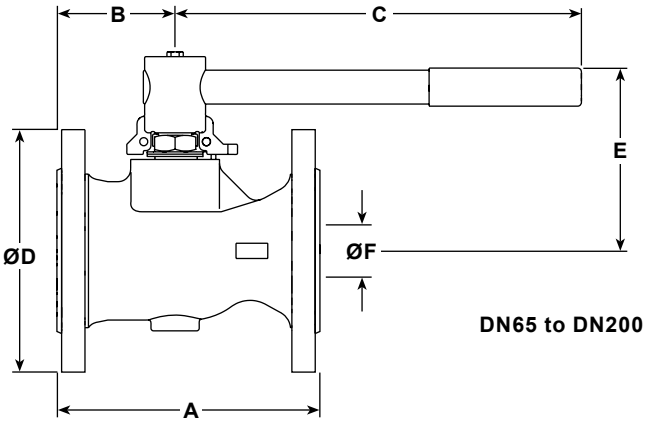


No.	Part		Material	
14	Belleville washer		Carbon steel/stainless steel	
15	Gland nut		Zinc plated carbon steel	SAE 1010/SAE 12L14
17	Locking plate		Stainless steel	AISI 304
18	Nameplate		Stainless steel	AISI 430
19	Stop plate with indicator	DN65 only	Zinc plated carbon steel	SAE 1010
20	Lever		Zinc plated 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	DN80 to DN200	Zinc plated SG iron	
25	Stop screw	DN80 to DN200	Zinc plated carbon steel	SAE 12L14
27	Adaptor screw		Zinc plated carbon steel	Grade 5
28	Stop screw	DN80 to DN200	Carbon steel	
29	Adaptor hex. nut	DN80 to DN200	Zinc plated carbon steel	
31	Antistatic device ball		Stainless steel	AISI 302
32	Antistatic device spring		Stainless steel	AISI 301

Dimensions/weights (approximate) in mm (inches) and kg (lbs)



DN25 to DN50



DN65 to DN200

Flanged ASME 150

Size	A	B	C	D	E	F	Weight
DN25	127 (5)	62 (2.44)	162 (6.38)	108 (4.25)	101 (3.98)	19 (0.7)	2.9 (6.3)
DN32	140 (5.5)	65 (2.6)	182 (7.2)	118 (4.6)	106 (4.2)	25 (0.9)	3.8 (8.3)
DN40	165 (6.5)	70 (2.7)	186 (7.3)	127 (5)	118 (4.6)	30 (1.2)	5.4 (11.9)
DN50	178 (7)	75 (3)	186 (7.3)	152 (5.9)	123 (4.8)	37 (1.5)	7.9 (17.4)
DN65	190 (7.5)	79 (3.1)	278 (10.9)	178 (7)	144 (5.7)	50 (2)	12 (26.4)
DN80	203 (7.9)	91 (3.6)	417 (16.4)	191 (7.5)	157 (6.2)	57 (2.2)	15.8 (34.8)
DN100	229 (9)	98 (3.9)	517 (20.3)	229 (9)	172 (6.8)	75 (3)	24.8 (54.6)
DN150	267 (10.5)	130 (5.1)	700 (27.5)	279 (10.9)	205 (8.1)	100 (3.9)	43.8 (96.6)
DN200	292 (11.4)	146 (5.74)	850 (33.4)	343 (13.5)	286 (11.25)	200 (7.87)	82.6 (182.1)

Flanged ASME 300

Size	A	B	C	D	E	F	Weight
DN25	165 (6.5)	62 (2.4)	162 (6.4)	124 (4.9)	101 (3.9)	19 (0.7)	4.5 (9.9)
DN32	178 (7)	65 (2.6)	182 (7.2)	134 (5.3)	106 (4.2)	25 (0.9)	5.7 (12.5)
DN40	190 (7.5)	70 (2.7)	186 (7.3)	156 (6.1)	118 (4.6)	30 (1.2)	8.2 (18.1)
DN50	216 (8.5)	75 (3)	186 (7.3)	165 (6.5)	123 (4.8)	37 (1.5)	10.3 (22.7)
DN65	241 (9.5)	79 (3.1)	278 (10.9)	190 (7.5)	144 (5.7)	50 (2)	16 (35.2)
DN80	283 (11.1)	91 (3.6)	417 (16.4)	210 (8.3)	157 (6.2)	57 (2.2)	22.3 (49.1)
DN100	305 (12)	98 (3.9)	517 (20.3)	254 (10)	172 (6.8)	75 (3)	36.1 (79.6)
DN150	403 (15.9)	130 (5.1)	700 (27.5)	318 (12.5)	205 (8.1)	100 (3.9)	66.6 (146.8)
DN200	419 (16.4)	146 (5.74)	850 (33.4)	381 (15)	286 (11.25)	200 (7.87)	117.5 (259)

Kv values

DN	25	32	40	50	65	80	100	150	200
Kv	30	40	81	103	197	248	581	735	1 600

For conversion:
Cv (UK) = Kv x 0.963
Cv (US) = Kv x 1.156

Safety information, installation and maintenance

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

Welding

Only the models that have connections designed for welding (SW, BW, Imperial Tube connections) should be welded. Valves with flanged connections must not be welded to avoid damages to the valve and/or injury to personnel.

How to order

Specify	**Model**	Seat material	S = Carbon and graphite reinforced PTFE - PDR 0.8
			V = Virgin PTFE
	Material	Body material	2 = Carbon steel
			3 = Stainless steel

Example: 1 off Spirax Sarco DN50 M40Vi2 ISO ball valve having flanged ASME 150 connections.

Operating torques

DN	**25**	**32**	**40**	**50**	**65**	**80**	**100**	**150**	**200**
Nm **(lbf ft)**	10 (7.4)	15 (11)	20 (14.8)	25 (18.4)	50 (36.9)	70 (51.6)	100 (73.8)	155 (114.3)	720 (531)

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.

Optional extras:

- Self-venting ball.
- Extended stems to allow full insulation:
  50 mm (2") for DN25 (1") and DN50 (2") sizes and 100 mm (4") for DN25 (1") to DN200 (8") sizes.
- Lockable handle.
- 100 mm extended stem with lockable handle.

DN25 to DN50 - Spare parts (see page 9 for sizes DN65 - DN200)

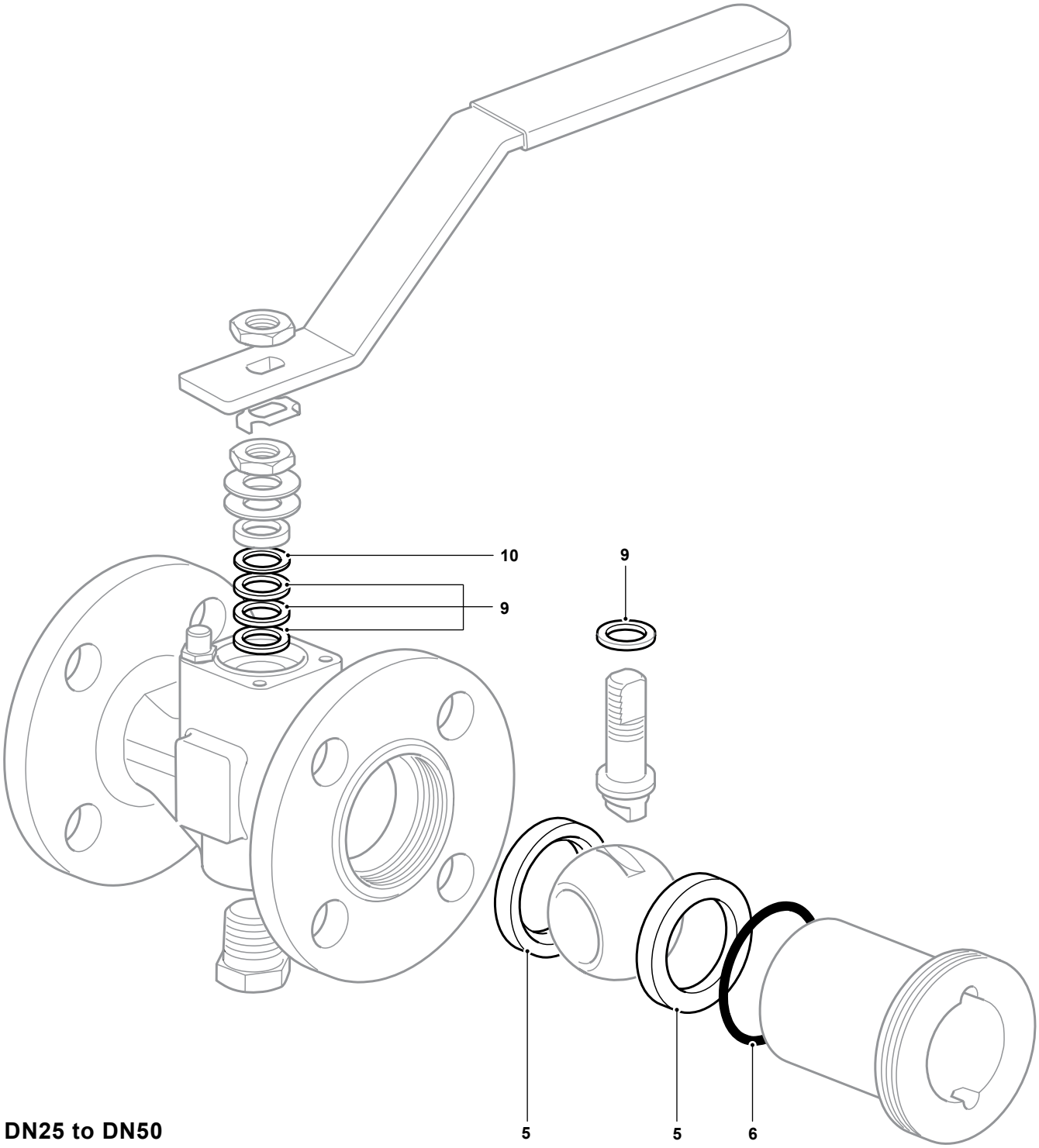
The spare parts available are shown in solid outline. Parts drawn in a grey line are not supplied as spares.

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 DN50 flanged ASME 150 M40Si2 ball valve.



DN25 to DN50

DN65 to DN200 - Spare parts (see page 8 for sizes DN25 - DN50)

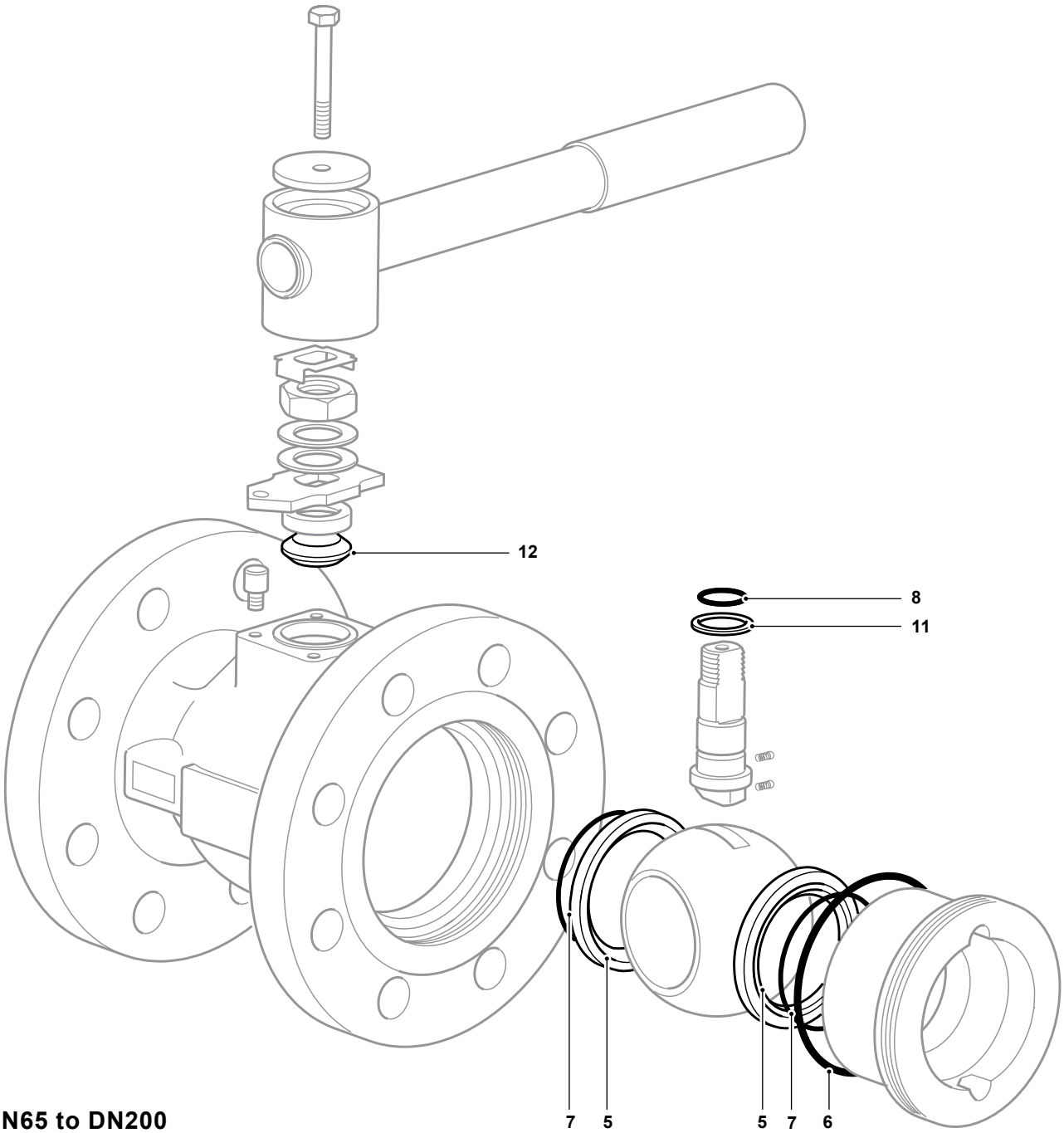
The spare parts available are shown in solid outline. Parts drawn in a grey line are not supplied as spares.

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**

How to order spares

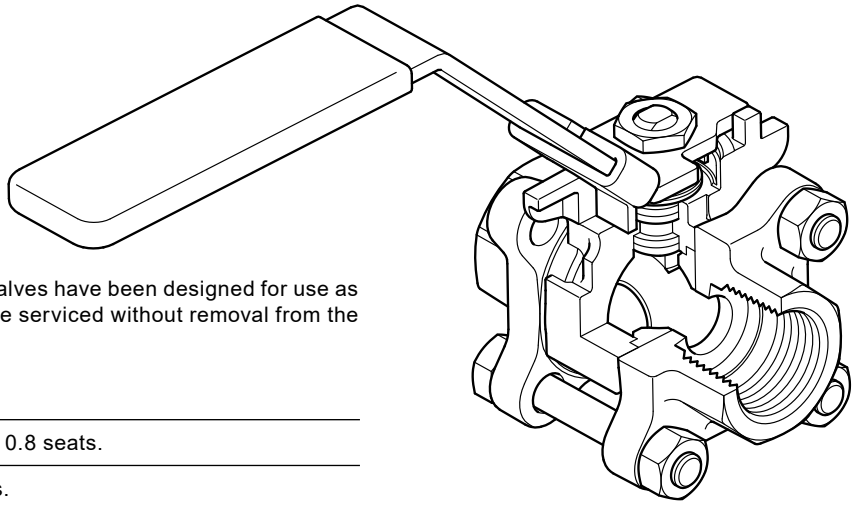
Always order spares by using the description given in the column headed 'Available spares' and state the size and type of ball valve.
Example: 1 set of seats, insert 'O' ring, seat 'O' ring, stem 'O' ring, lower stem seals and upper stem packaging for a Spirax Sarco DN80 flanged ASME 150 M40Si2 ball valve.



DN65 to DN200

TI-P711-02
CMGT Issue 4

M10MS and M10MV FB and RB Ball Valves ¼" to 2" - DN8 to DN50



Description

The M10MS and M10MV three-piece body ball valves have 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).

Available types

M10MS2_ _ Zinc plated carbon steel body, PDR 0.8 seats.
M10MS3_ _ Stainless steel body, PDR 0.8 seats.
M10MS4_ _ Complete stainless steel, PDR 0.8 seats.
M10MV2_ _ Zinc plated carbon steel body, PTFE seats.
M10MV3_ _ Stainless steel body, PTFE seats.
M10MV4_ _ Complete stainless steel, PTFE seats.

Note: The nomenclature will be followed with either FB (full bore) or RB (reduced bore).

Standards

This product has been designed according to ASME B16.34, ASME B16.10 (for all ASME flanged versions, with exception of ASME 150 FB) and EN 558.
This product complies with the requirements of the EU Pressure Equipment Directive 2014/68/EU/UK Pressure Equipment (Safety) Regulations and carries the CE / UKCA mark when so required.

Certification

This product is available with certification to EN 10204 2.2 and EN 10204 3.1.
Note: All certification/inspection requirements must be stated at the time of order placement.

Sizes and pipe connections

Full bore

¼", ⅜", ½", ¾", 1", 1¼" and 1½"

Screwed and welded	Flanged
BSP T Rp (ISO 7-1), BSP (ISO 228 G), BSPT (BS21 Rc), NPT (ASME B1.20.1), BW Sch40/40S (ASME B16.25), SW (ASME B16.11)	DN15, DN20, DN25, DN32 and DN40 ASME Class 150, ASME Class 300 and EN 1092 PN40.

Reduced bore

½", ¾", 1", 1¼", 1½" and 2"

Screwed and welded	Flanged
BSP T Rp (ISO 7-1), BSP (ISO 228 G), BSPT (BS21 Rc), NPT (ASME B1.20.1), BW Sch40/40S (ASME B16.25), SW (ASME B16.11)	DN15, DN20, DN25, DN32, DN40 and DN50 ASME Class 150, ASME Class 300 and EN 1092 PN40.

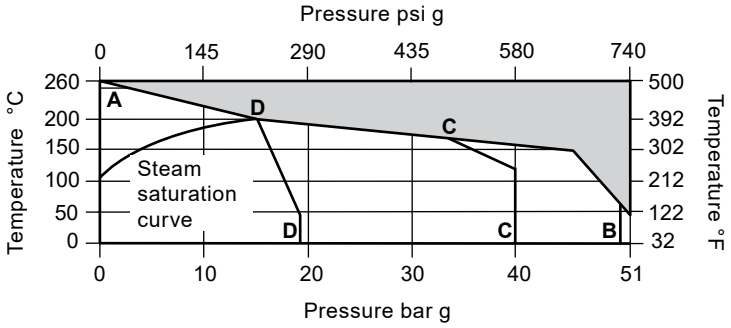
Note: For special connections, please contact Spirax Sarco.

Technical data

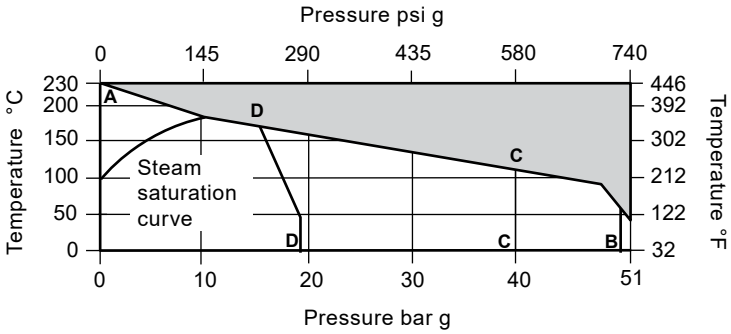
Flow characteristic	Modified linear	Leakage test procedure to ISO 5208 (Rate A)/EN 12266-1 (Rate A)	
Port	Full and reduced port versions	Antistatic device	Complies with ISO 7121 and BS 5351

Pressure/temperature limits

M10MS2, M10MS3 and M10MS4 - PDR 0.8 seats



M10MV2, M10MV3 and M10MV4 - PTFE seats



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

A - B Screwed, SW, BW and Flanged ASME 300.

A - C Flanged EN 1092 PN40.

A - D Flanged ASME 150.

Note 1: The flange standard may restrict the maximum operating pressure. Please check with Spirax Sarco.
Note 2: In gases applications, the maximum operating pressure if restricted to 40 bar g (580 psi g).

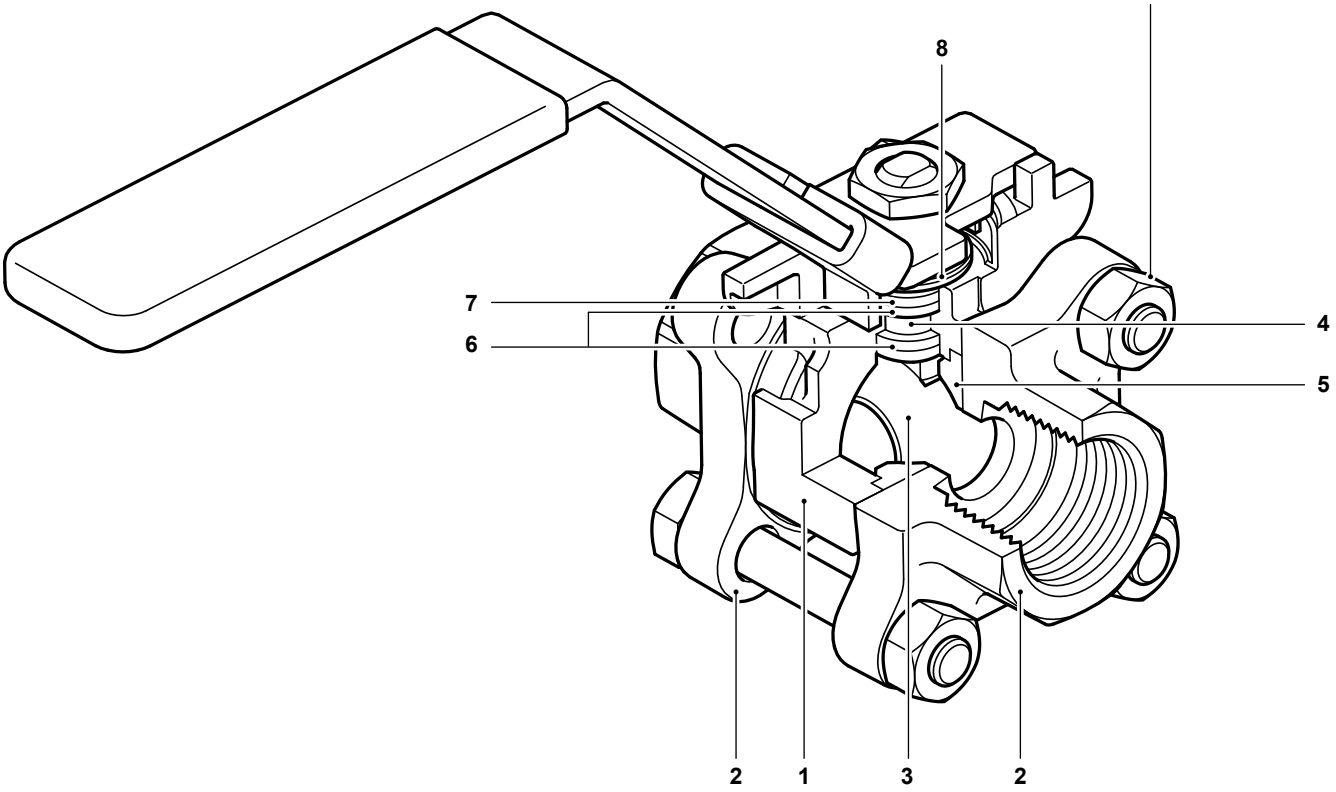
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Body design conditions				ASME 300
PMA	Maximum allowable pressure	Zinc plated carbon steel	51 bar g @ 38 °C	740 psi g @ 100 °F
		Stainless steel	49.6 bar g @ 38 °C	719 psi g @ 100 °F
TMA	Maximum allowable temperature	M10MS	260 °C @ 0 bar g	500 °F @ 0 psi g
		M10MV	230 °C @ 0 bar g	446 °F @ 0 psi g
Minimum allowable temperature **Note:** For lower temperatures consult Spirax Sarco			0 °C	32 °F
PMO	Maximum operating pressure for saturated steam service	M10MS	17.5 bar g	254 psi g
		M10MV	10 bar g	145 psi g
TMO	Maximum operating temperature	M10MS	260 °C @ 0 bar g	500 °F @ 0 psi g
		M10MV	230 °C @ 0 bar g	446 °F @ 0 psi g
Minimum operating temperature **Note:** For lower operating temperatures consult Spirax Sarco			0 °C	32 °F
PMX	Maximum differential pressure is limited to the PMO			
Designed for a maximum cold hydrostatic test pressure of:			76.5 bar g	1110 psi g

Materials

Please note:
Screwed, butt weld and socket weld M10MS and M10MV ball valves have bolts and nuts.
Flanged M10MS and M10MV ball valves have studs and nuts.

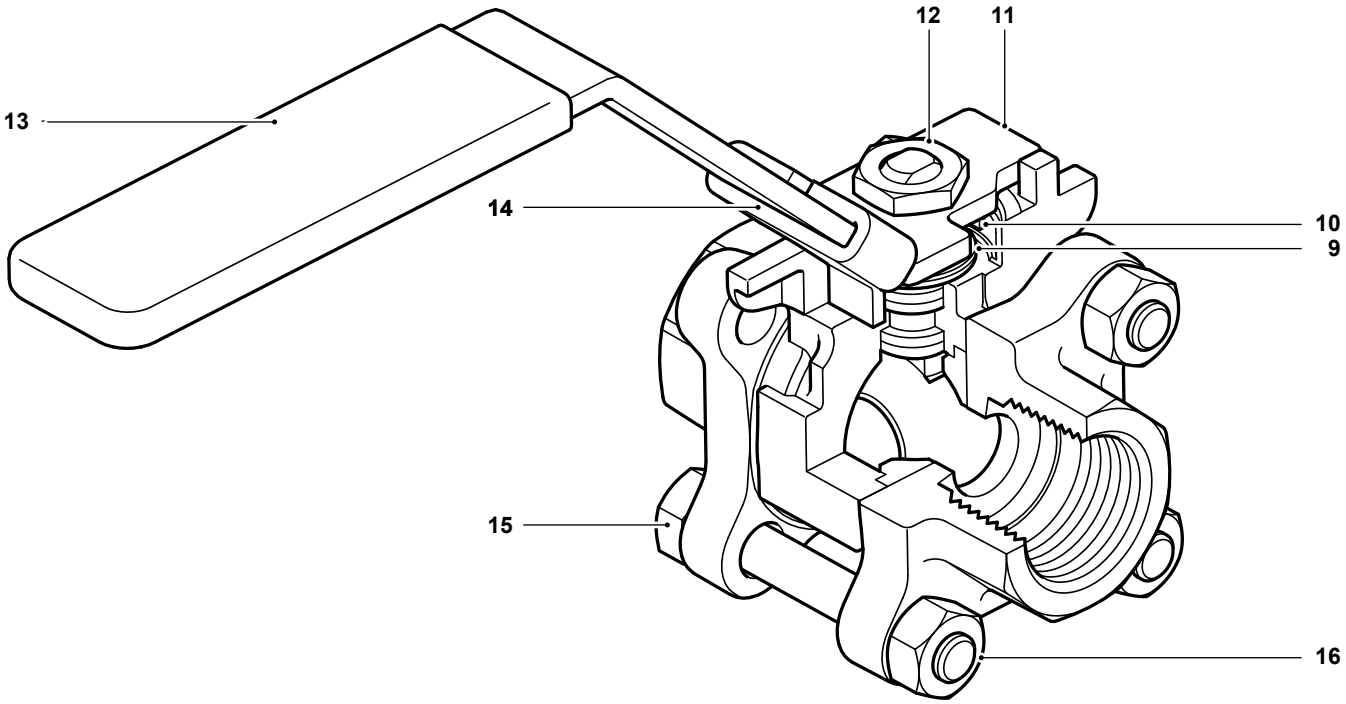


No.	Part		Material	
1	Body	**M10MS2 M10MV2**	Zinc plated carbon steel	ASTM A216 WCB
		M10MS3 M10MV3 M10MS4 M10MV4	Stainless steel	ASTM A351 CF8M
2	Cap	**M10MS2 M10MV2**	Zinc plated carbon steel *	ASTM A216 WCB
		M10MS3 M10MV3 M10MS4 M10MV4	Stainless steel	ASTM A351 CF8M
3	Ball		Stainless steel	AISI 316
4	Stem		Stainless steel	AISI 316
5	Seat	**M10MS2 M10MS3 M10MS4**	Carbon/graphite reinforced PTFE	PDR 0.8
		M10MV2 M10MV3 M10MV4	Virgin PTFE	
6	Stem seal		Reinforced PTFE antistatic	
7	Separator	**M10MS2 M10MV2 M10MS3 M10MV3**	Zinc plated carbon steel	SAE 1010
		M10MS4 M10MV4	Stainless steel	AISI 316
8	Spring washers		Stainless steel	AISI 301

(*) Note: When the connections are butt weld or socket weld, item 2 is phosphatized and aluminium painted instead of zinc plated.

Materials continues on next page

Materials (continued)



No.	Part		Material	
9	Nut	M10MS2 M10MV2 M10MS3 M10MV3	Zinc plated carbon steel	SAE 12L14
		M10MS4 M10MV4	Stainless steel	AISI 304
10	Lock nut		Stainless steel	AISI 304
11	Stem nut	M10MS2 M10MV2 M10MS3 M10MV3	Zinc plated carbon steel	SAE 12L14
		M10MS4 M10MV4	Stainless steel	AISI 304
12	Lever	M10MS2 M10MV2 M10MS3 M10MV3	Zinc plated carbon steel	SAE 1010
		M10MS4 M10MV4	Stainless steel	AISI 316
13	Grip	M10MS2 M10MS3 M10MS4	Blue vinyl	
		M10MV2 M10MV3 M10MV4	Orange vinyl	
14	Lever lock		Stainless steel	AISI 304
15	Bolts	M10MS2 M10MV2 M10MS3 M10MV3	Zinc plated carbon steel	Grade 8.8
		M10MS4 M10MV4	Stainless steel	A2 70
16	Nuts	M10MS2 M10MV2 M10MS3 M10MV3	Zinc plated carbon steel	SAE 1010
		M10MS4 M10MV4	Stainless steel	AISI 304

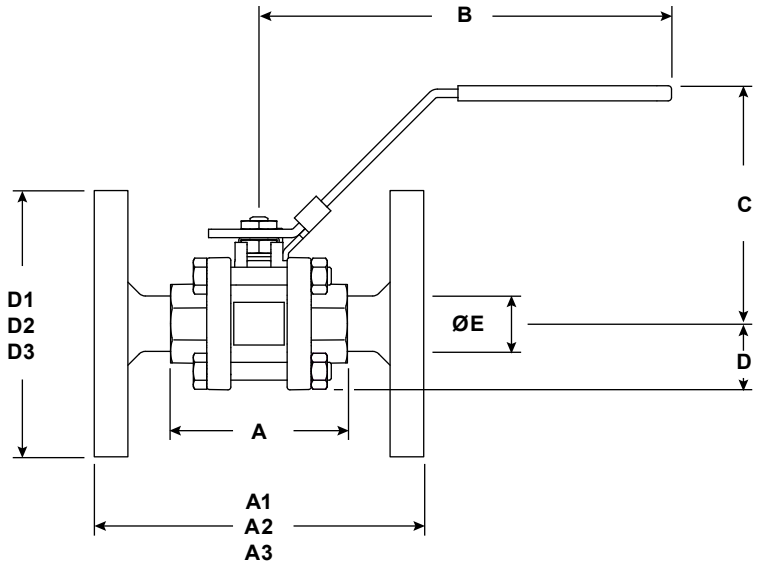
Dimensions (approximate) in mm

Reduced bore

Size	A	A1	A2	A3	B	C	D	D1	D2	D3	E
½"	63	108	130	140	145	85	24	89	95	95	11
¾"	68	117	150	152	145	87	26	98	105	117	14
1"	86	127	160	165	162	94	31	108	115	124	21
1¼"	97	140	180	178	185	103	37	118	140	133	25
1½"	106	165	200	190	185	106	41	127	150	156	31
2"	124	178	230	216	200	112	48	152	165	165	38

Full bore

Size	A	A1	A2	A3	B	C	D	D1	D2	D3	E
¼"	63				145	85	24				11
⅜"	63				145	85	24				11
½"	68	114	130	140	145	87	26	89	95	95	14
¾"	86	135	150	152	162	94	31	98	105	117	21
1"	97	148	160	165	185	103	37	108	115	124	25
1¼"	106	160	180	178	185	106	41	118	140	133	31
1½"	124	183	200	190	200	112	48	127	150	156	38



A: Screwed and welded
A1: Flanged ASME 150
A2: Flanged PN40
A3: Flanged ASME 300
B: All connections
C: All connections
D: Screwed and welded
D1: Flanged ASME 150
D2: Flanged PN40
D3: Flanged ASME 300
E : All connections

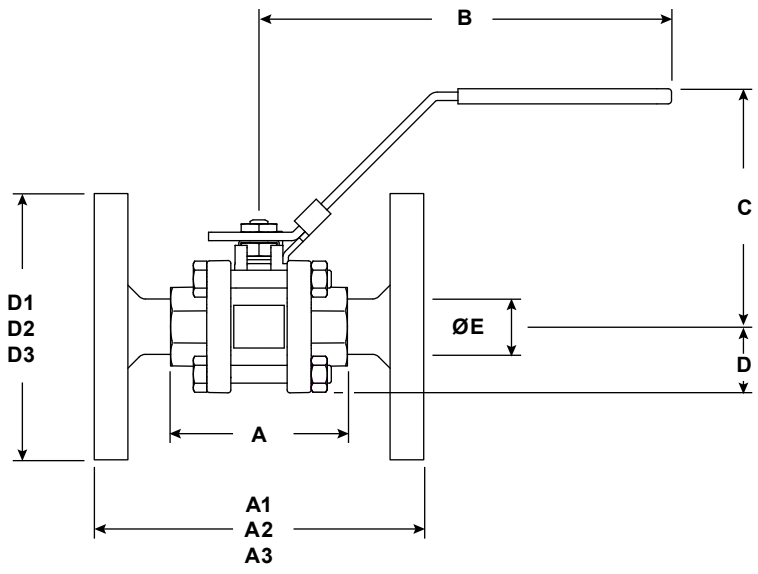
Dimensions (approximate) in inches

Reduced bore

Size	A	A1	A2	A3	B	C	D	D1	D2	D3	E
½"	2.48	4.25	5.12	5.51	5.71	3.35	0.94	3.50	3.74	3.74	0.43
¾"	2.68	4.61	5.91	5.98	5.71	3.43	1.02	3.86	4.13	4.61	0.55
1"	3.39	5.00	6.30	6.50	6.38	3.70	1.22	4.25	4.53	4.88	0.83
1¼"	3.82	5.51	7.09	7.01	7.28	4.06	1.46	4.65	5.51	5.24	0.98
1½"	4.17	6.50	7.87	7.48	7.28	4.17	1.61	5.00	5.91	6.14	1.22
2"	4.88	7.01	9.06	8.50	7.87	4.41	1.89	5.98	6.50	6.50	1.50

Full bore

Size	A	A1	A2	A3	B	C	D	D1	D2	D3	E
¼"	2.48				5.71	3.35	0.94				0.43
⅜"	2.48				5.71	3.35	0.94				0.43
½"	2.68	4.49	5.12	5.51	5.71	3.43	1.02	3.50	3.74	3.74	0.55
¾"	3.39	5.31	5.91	5.91	6.38	3.70	1.46	4.25	4.53	4.88	0.83
1"	3.82	5.83	6.30	6.30	7.28	4.06	1.61	4.65	5.51	5.24	0.98
1¼"	4.17	6.30	7.09	7.09	7.28	4.17	1.61	5.00	5.91	6.14	1.22
1½"	4.88	7.20	7.87	7.87	7.87	4.41	1.89	5.00	5.91	6.14	1.50



A: Screwed and welded
A1: Flanged ASME 150
A2: Flanged PN40
A3: Flanged ASME 300
B: All connections
C: All connections
D: Screwed and welded
D1: Flanged ASME 150
D2: Flanged PN40
D3: Flanged ASME 300
E : All connections

Weights (approximate) in kg and lbs

Size	Reduced bore								Full bore							
	Scrd/BW/SW		PN40		ASME 150		ASME 300		Scrd/BW/SW		PN40		ASME 150		ASME 300	
	kg	lbs	kg	lbs	kg	lbs	kg	lbs	kg	lbs	kg	lbs	kg	lbs	kg	lbs
¼"									0.55	1.2						
⅜"									0.55	1.2						
½"	0.55	1.2	2.2	4.8	1.5	3.3	2.2	4.8	0.7	1.5	2.4	5.3	1.7	3.7	2.6	5.7
¾"	0.7	1.5	3.1	6.8	2.0	4.4	3.2	7.0	1.1	2.4	3.5	7.7	2.6	5.7	4.2	9.3
1"	1.1	2.4	4.2	9.3	2.7	5.9	4.5	9.9	1.8	4.0	4.6	10.1	3.5	7.7	5.3	11.7
1¼"	1.8	4.0	6.1	13.4	3.8	8.4	7.2	15.9	2.3	5.1	6.1	13.4	4.2	9.3	7.4	16.3
1½"	2.3	5.1	7.2	15.9	5.2	11.5	8.2	18.1	3.8	8.4	7.8	17.2	6.3	13.9	10.3	22.7
2"	3.8	8.4	10.7	23.6	7.5	16.5	11.5	25.3								

Kv values

Size	¼"	⅜"	½"	¾"	1"	1¼"	1½"	2"
Reduced bore			6	10	27	49	70	103
Full bore	2.5	6.8	17	36	58	89	153	

For conversion:
Cv (UK) = Kv x 0.963
Cv (US) = Kv x 1.156

Operating torque in N m and lbf ft

Size	¼"		⅜"		½"		¾"		1"		1¼"		1½"		2"	
	N m	lbf ft	N m	lbf ft	N m	lbf ft	N m	lbf ft	N m	lbf ft	N m	lbf ft	N m	lbf ft	N m	lbf ft
Reduced bore					2	1.5	3.5	2.6	13	9.6	21	15.5	30	22.1	40	29.5
Full bore	2	1.5	2	1.5	3.5	2.6	13	9.6	21	15.5	30	22.1	40	29.5		

The indicated torque values are for valves frequently operated, that are submitted to a maximum differential pressure of 51 bar (740 psi g). Valves that are subject to long static periods, may require greater break-out torque.

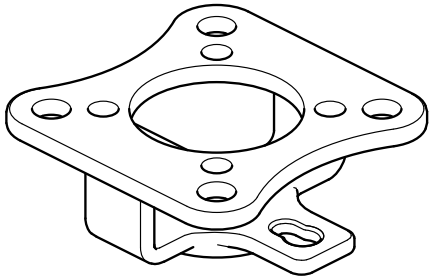
Welding
Only the models that have connections designed for welding (SW, BW, Imperial Tube connections) should be welded. Valves with SW or BW welding connections must be disassembled before welding onto the pipeline, the ends should be welded separately and the valve should be reassembled when the ends are cool. Carbon steel valves with threaded (BSPT, BSP T Rp (ISO 7-1), NPT) or flanged connections must not be welded to avoid damages to the valve and/or injury to personnel.

Automation
To automate the M10M ball valves, BVL kits are used.
Spirax Sarco offers two height options. A low bracket (40mm high), for applications below 100° C (212° F) and a high temperature bracket (90 mm high), which is recommended for high temperature applications.

Offered in two different materials:
With Carbon steel (WCB) frame and Carbon steel (12L14) stem adapter or Stainless steel (CF8M) frame and Stainless steel (304) stem adapter. All other components are made of Stainless steel.

For selection and sizing data, see TI sheet TI-P372-23.

Fig. 1 Short bracket for applications below 100 °C
Frame available in Carbon steel (WCB) and Stainless steel (CF8M)



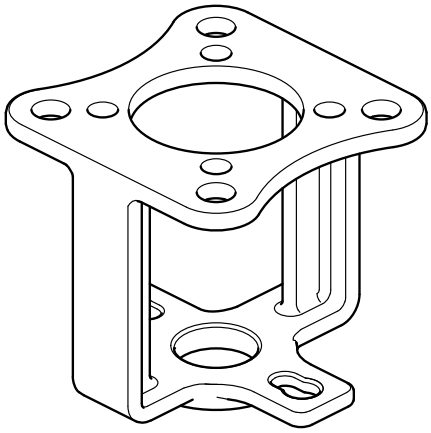


Fig. 2 High bracket for applications with insulated pipe
Frame available in Carbon steel (WCB) and Stainless steel (CF8M)

Safety information, installation and maintenance
For full details see the Installation and Maintenance Instructions supplied with the product.

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How to order

Specify	Model	M10M	3 piece M10M ball valve
	Seat material	S:	Carbon/graphite reinforced PTFE
		V:	Virgin PTFE
	Body material	2:	Carbon steel body
		3:	Stainless steel body
		4:	Complete stainless steel
	Bore	FB:	Full bore
		RB:	Reduced bore
	Size NB		¼" to 2"
	End connections		Scrd/BW/SW/Flanged

How to order example:
1 off Spirax Sarco 1" screwed NPT M10M S2 RB ball valve.

Optional extras:
- Self-venting ball.

Spare parts

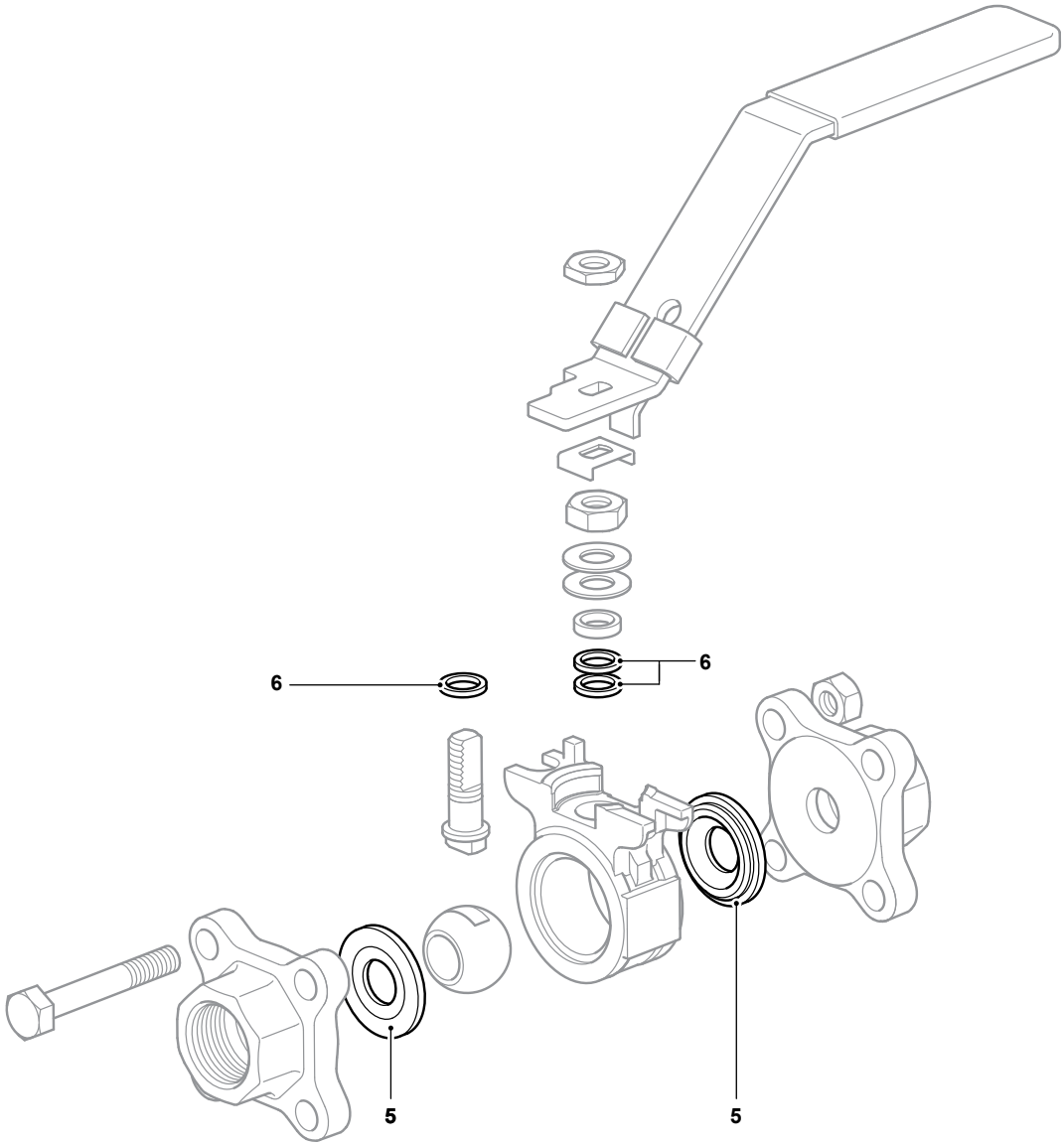
The spare parts available are shown in solid outline. Parts drawn in a grey line are not supplied as spares.

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 ½" Spirax Sarco M10MS2 FB ball valve with NPT connections.



TI-P372-23
CTLS Issue 15

BVA300 Series
Pneumatic Actuators
for use with 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 stops that allow a rotation of 90°±5°. Linkage is made with the new BVL_X kits with extended stem (not available for M10MVi and M10MSi models. For more details, see page 7).

Pneumatic actuated ball valve range:

			Page
Actuators combined with:	Three-piece ball valves:	M10Vi; M10Si; M10Ti; M10ECFi4; M10Hi; M10HTi	5
		M10HPi; M10Pi	6
		M10MVi; M10MSi	7
		M70i; M80i	8
	Two-piece ball valves:	M31V ISO; M31S ISO; M33V ISO; M33S ISO; M33F ISO; M33T ISO	9
		M33H ISO; M33HT ISO	10
	One-piece ball valves:	M21Hi; M21HTi; M40Hi; M40HTi	11
		M45i	12
		M21Ti; M21Vi; M21Si; M21Fi; M40Ti; M40Vi; M40Si; M40Fi	13
		M21ViJ; M21SiJ; M40ViJ; M40SiJ	14
		M21ECFi4; M40ECFi4	15

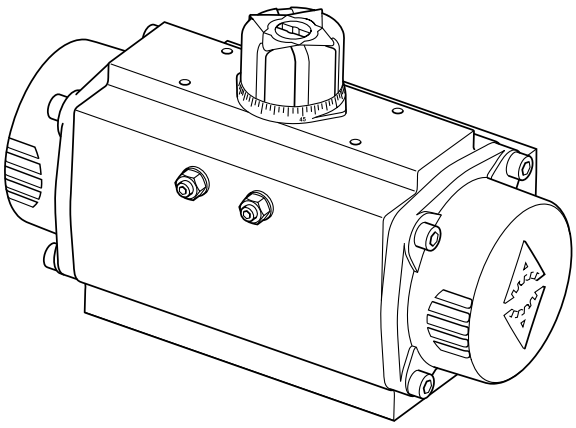
BVA300 pnematic actuator range:

For optimum actuator performance use the selection tables on pages 5 to 15.

Double acting:	310D, 315D, 320D, 325D, 330D, 335D, 340D, 345D, 350D, 355D, 357D, 360D, 365D.
Single acting (spring return):	310S, 315S, 320S, 325S, 330S, 335S, 340S, 345S, 350S, 355S, 357S, 360S, 365S.

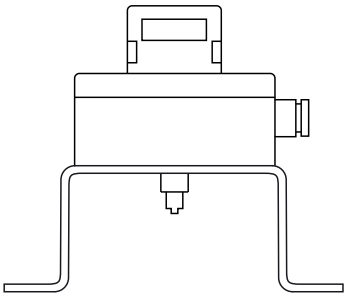
Technical data

Maximum pressure	8 bar g
Minimal pressure	3 bar g
Operating temperature range	-30 °C to 100 °C (-22 °F to 212 °F)
Note: 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 ±5°	Anticlockwise with port 'A' pressurised
Air pressure for standard selection tables	3,4,5 and 6 bar g (44, 58, 73 and 87 psi g)



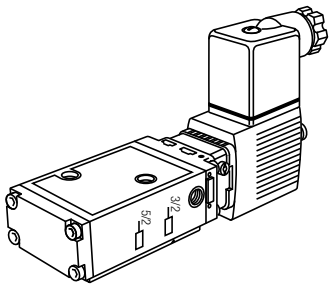
Optional extras:

Limit switch box:
For more details, see TI-P372-26



Solenoid valve: a range of Namur electrical valves with an encapsulation rating to IP65 is available for use with BVA actuators. These can be used to drive actuators with compressed air or non-corrosive gas.

Note: Explosion proof solenoid valves are available on request.

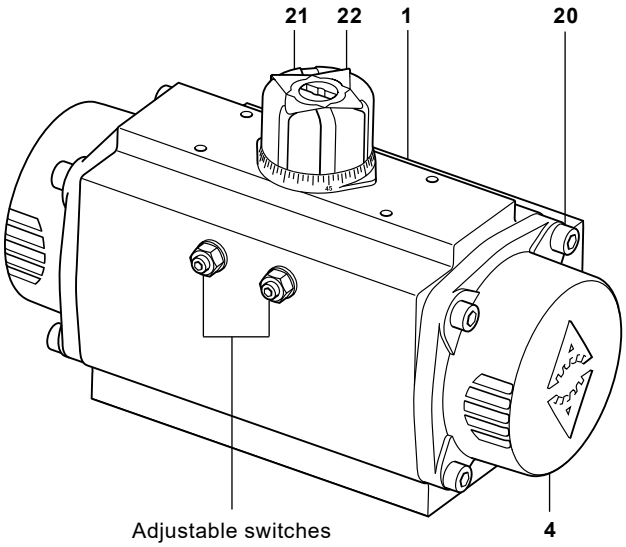


Solenoid	Coil voltage
3/2 NAMUR for BVAS	220 Vac
	110 Vac
	24 Vac/dc
5/2 NAMUR for BVAD	220 Vac
	110 Vac
	24 Vac/dc

Materials

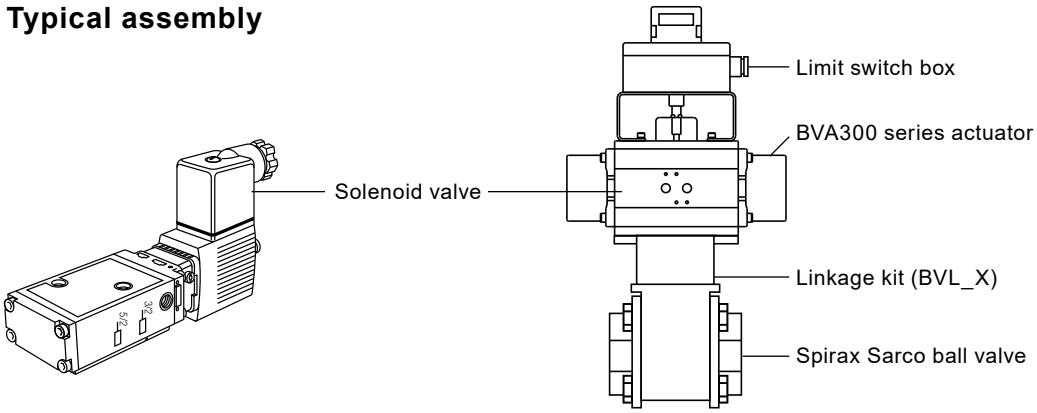
No	Part	Material
1	Body	Aluminium hard anodized
3	Pinion*	Nickel plated carbon steel
4	End caps	Aluminium epoxy coated
20	Bolt	Stainless steel
21	Indicator cap	Polyamide
22	Coloured indicator	Polyamide

*shown clearly in the spares drawing on page 4



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86

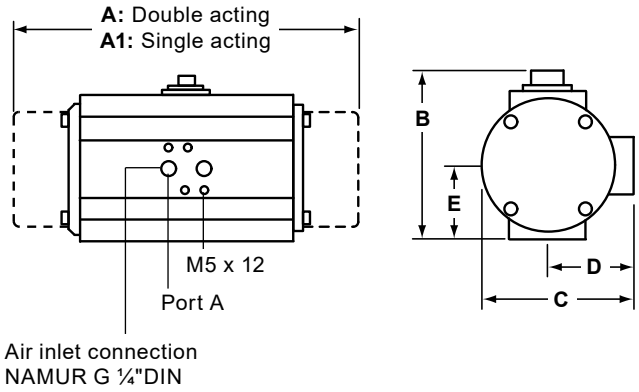
Typical assembly



BVL_X linkage kit components and materials

Frame Stem adapter	Stainless steel AISI 304/Carbon steel CF8M and Stainless steel WCB (only for M10MVi and M10MSi)
Frame-to-actuator screws	Stainless steel
Washers	Stainless steel
Frame-to-valve screws	Stainless steel
Stem nut	Stainless steel

Dimensions/weights
(approximate) in mm (inches) and kg (lbs)



Type	A1	A	B	C	D	E	Weights	
							Single	Double
BVA310	163 (6.4)	145 (5.7)	96 (3.8)	76 (3.0)	48 (1.9)	34 (1.3)	1.6 (4)	1.4 (3)
BVA315	195 (7.7)	158 (6.2)	115 (4.5)	91 (3.6)	56 (2.2)	45 (1.8)	2.3 (5)	2.1 (5)
BVA320	217 (8.5)	177 (7.0)	137 (5.4)	111 (4.4)	66 (2.6)	55 (2.2)	3.7 (8)	3.0 (7)
BVA325	258 (10.2)	196 (7.7)	147 (5.8)	122 (4.8)	71 (2.8)	60 (2.4)	4.8 (11)	3.8 (8)
BVA330	299 (11.8)	225 (8.9)	165 (6.5)	136 (5.4)	78 (3.1)	70 (2.8)	7.3 (16)	5.6 (12)
BVA335	349 (13.7)	273 (10.7)	182 (7.2)	153 (6.0)	86 (3.4)	80 (3.1)	10.8 (24)	8.5 (19)
BVA340	397 (15.6)	304 (12.0)	199 (7.8)	173 (6.8)	96 (3.8)	85 (3.3)	15.4 (34)	11.2 (25)
BVA345	473 (18.6)	372 (14.6)	221 (8.7)	192 (7.6)	106 (4.2)	98 (3.9)	22.2 (49)	16.9 (37)
BVA350	560 (22.0)	439 (17.3)	249 (9.8)	213 (8.4)	116 (4.6)	114 (4.5)	34.3 (76)	25.8 (57)
BVA355	601 (23.7)	461 (18.1)	280 (11.0)	243 (9.6)	131 (5.2)	130 (5.1)	46.0 (101)	32.5 (72)
BVA357	698 (27.5)	504 (19.8)	313 (12.3)	276 (10.9)	148 (5.8)	147 (5.8)	66.0 (146)	49.1 (110)
BVA360	738 (29.1)	518 (20.4)	383 (15.1)	356 (14.0)	178 (7.0)	177 (7.0)	99.9 (220)	69.6 (153)
BVA365	940 (37.0)	630 (24.8)	434 (17.1)	415 (16.3)	213 (8.4)	201 (7.9)	183 (403)	129.4 (285)

How to order
Note: You will need to refer to the selection tables (pages 5 to 14) before placing an order.

How to order example:
1 - Spirax Sarco BVA320S/8 actuator
1 - 3/2 NAMUR solenoid 24 Vac
1 - 303X linkage kit
1 - LSB72 limit switch box

Note: Actuated ball valves may be supplied completely assembled to suit the application.

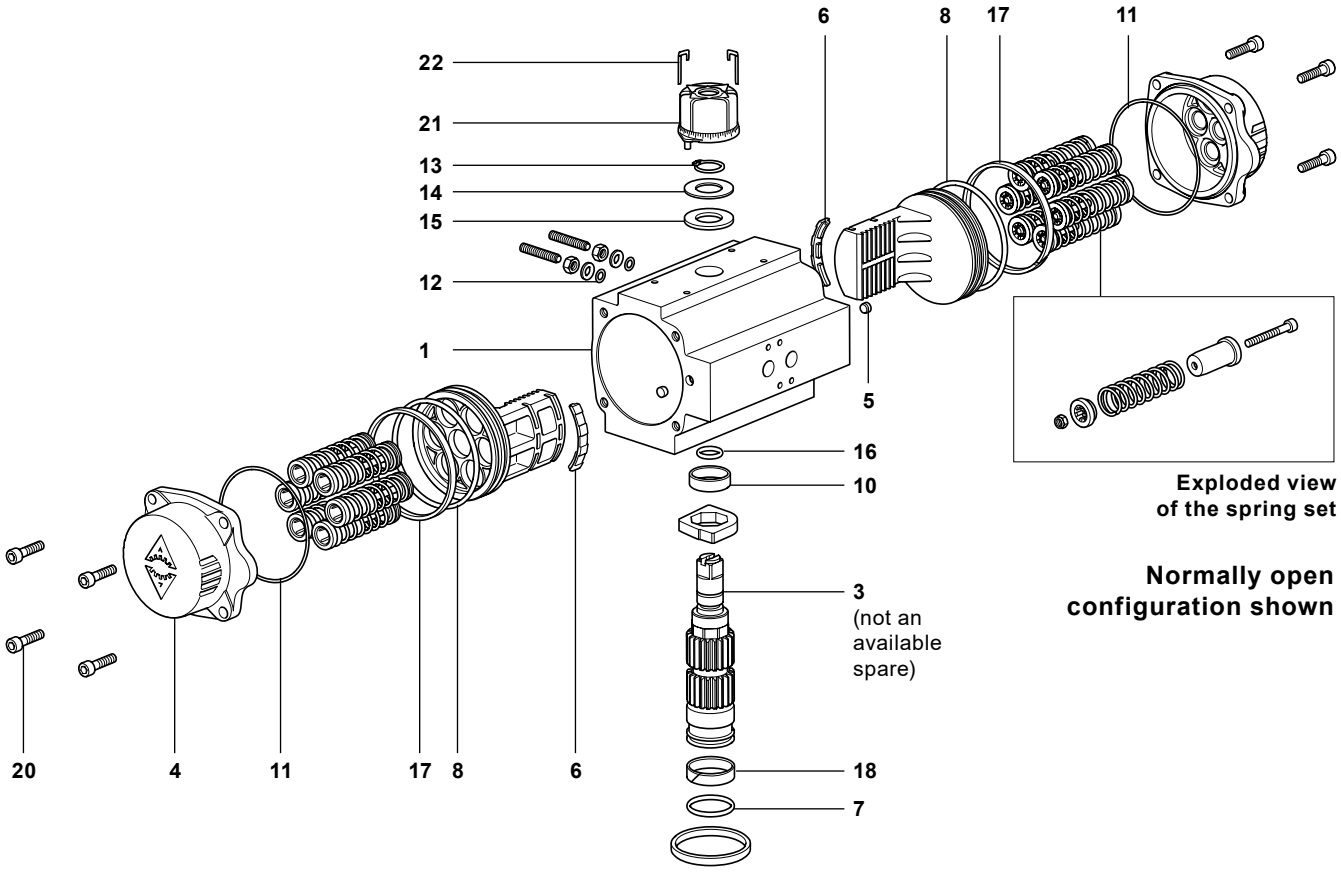
Spare parts
The spare parts available are detailed below. No other parts are supplied as spares.

Available spares

BVA300 series maintenance kit	'O' rings set (available either in NBR, Viton or Silicon)	**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/08 pneumatic actuator.



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.

Selection tables

Pages 5 to 15 contain all necessary information to select the correct actuator for relevant Spirax Sarco ball valves. For valves not appearing in these tables please contact Spirax Sarco for advice.

Pneumatic actuator selection tables for three-piece ball valves

M10Vi; M10Si; M10Ti and M10ECFi4 ball valves

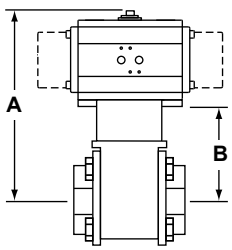
DN	Double acting		Single acting	
	BVA	BVL	BVA	BVL
Actuator operating pressure 3 bar g (44 psi g)				
¼" RB - ⅜" RB	310D	300X	310S/4	300X
½" RB - ⅜" FB	310D	300X	310S/4	300X
¾" RB - ½" FB	310D	300X	315S/8	300X
1" RB - ¾" FB	315D	302X	320S/8	303X
1¼" RB - 1" FB	320D	311X	325S/8	311X
1½" RB - 1¼" FB	330D	305X	340S/8	316X
2" RB - 1½" FB	330D	306X	340S/8	307X
2½" RB - 2" FB	335D	309X	340S/8	309X
Actuator operating pressure 4 bar g (58 psi g)				
¼" RB - ⅜" RB	310D	300X	310S/6	300X
½" RB - ⅜" FB	310D	300X	310S/6	300X
¾" RB - ½" FB	310D	300X	315S/10	300X
1" RB - ¾" FB	315D	302X	320S/10	303X
1¼" RB - 1" FB	315D	310X	320S/10	311X
1½" RB - 1¼" FB	325D	305X	335S/10	316X
2" RB - 1½" FB	325D	306X	335S/10	307X
2½" RB - 2" FB	330D	308X	340S/10	309X
Actuator operating pressure 5 bar g (73 psi g)				
¼" RB - ⅜" RB	310D	300X	310S/6	300X
½" RB - ⅜" FB	310D	300X	310S/6	300X
¾" RB - ½" FB	310D	300X	310S/6	300X
1" RB - ¾" FB	315D	302X	320S/12	303X
1¼" RB - 1" FB	315D	310X	320S/12	311X
1½" RB - 1¼" FB	320D	305X	330S/12	305X
2" RB - 1½" FB	325D	306X	335S/12	307X
2½" RB - 2" FB	325D	308X	335S/12	309X
Actuator operating pressure 6 bar g (87 psi g)				
¼" RB - ⅜" RB	310D	300X	310S/8	300X
½" RB - ⅜" FB	310D	300X	310S/8	300X
¾" RB - ½" FB	310D	300X	310S/8	300X
1" RB - ¾" FB	310D	302X	315S/14	302X
1¼" RB - 1" FB	315D	310X	320S/14	311X
1½" RB - 1¼" FB	320D	305X	330S/14	305X
2" RB - 1½" FB	320D	306X	330S/14	306X
2½" RB - 2" FB	325D	308X	335S/14	309X

M10Hi and M10HTi ball valves

DN	Double acting		Single acting	
	BVA	BVL	BVA	BVL
Actuator operating pressure 3 bar g (44 psi g)				
¼" RB - ⅜" RB	315D	490X	320S/8	491X
½" RB - ⅜" FB	315D	490X	320S/8	491X
¾" RB - ½" FB	315D	490X	325S/8	491X
1" RB - ¾" FB	320D	493X	330S/8	493X
1¼" RB - 1" FB	325D	494X	340S/8	495X
1½" RB - 1¼" FB	330D	496X	340S/8	497X
2" RB - 1½" FB	330D	498X	340S/8	499X
2½" RB - 2" FB	335D	502X	345S/8	503X
Actuator operating pressure 4 bar g (58 psi g)				
¼" RB - ⅜" RB	310D	490X	320S/10	491X
½" RB - ⅜" FB	310D	490X	320S/10	491X
¾" RB - ½" FB	315D	490X	320S/10	491X
1" RB - ¾" FB	320D	493X	325S/10	493X
1¼" RB - 1" FB	325D	494X	335S/10	495X
1½" RB - 1¼" FB	325D	496X	335S/10	497X
2" RB - 1½" FB	330D	498X	340S/10	499X
2½" RB - 2" FB	335D	502X	340S/10	502X
Actuator operating pressure 5 bar g (73 psi g)				
¼" RB - ⅜" RB	310D	490X	315S/12	490X
½" RB - ⅜" FB	310D	490X	315S/12	490X
¾" RB - ½" FB	315D	490X	320S/12	491X
1" RB - ¾" FB	315D	492X	325S/12	493X
1¼" RB - 1" FB	320D	494X	330S/12	494X
1½" RB - 1¼" FB	325D	496X	335S/12	497X
2" RB - 1½" FB	325D	498X	335S/12	499X
2½" RB - 2" FB	330D	505X	335S/12	502X
Actuator operating pressure 6 bar g (87 psi g)				
¼" RB - ⅜" RB	310D	490X	315S/14	490X
½" RB - ⅜" FB	310D	490X	315S/14	490X
¾" RB - ½" FB	310D	490X	320S/14	491X
1" RB - ¾" FB	315D	492X	320S/14	493X
1¼" RB - 1" FB	320D	494X	330S/14	494X
1½" RB - 1¼" FB	320D	496X	330S/14	496X
2" RB - 1½" FB	325D	498X	335S/14	499X
2½" RB - 2" FB	325D	505X	335S/14	502X

DN	A	B
¼"	218 (8.6)	122 (4.8)
⅜"	218 (8.6)	122 (4.8)
½"	218 (8.6)	122 (4.8)
¾"	239 (9.4)	124 (4.9)
1"	266 (10.5)	129 (5.1)
1¼"	281 (11.1)	134 (5.3)
1½"	336 (13.2)	137 (5.4)
2"	342 (13.5)	143 (5.6)
2½"	356 (14.0)	157 (6.2)

Dimensions * mm (inches)



DN	A	B
¼"	259 (10.2)	122 (4.8)
⅜"	259 (10.2)	122 (4.8)
½"	259 (10.2)	122 (4.8)
¾"	271 (10.7)	124 (4.9)
1"	294 (11.6)	129 (5.1)
1¼"	347 (13.7)	134 (5.3)
1½"	336 (13.2)	137 (5.4)
2"	342 (13.4)	143 (5.6)
2½"	378 (14.9)	157 (6.2)

* **Note:** The dimensions **A** and **B** represent the maximum size (mm) for the biggest recommended actuator according to each valve.

Selection tables

Pages 5 to 15 contain all necessary information to select the correct actuator for relevant Spirax Sarco ball valves. For valves not appearing in these tables please contact Spirax Sarco for advice.

Pneumatic actuator selection tables for three-piece ball valves

M10HPi ball valves

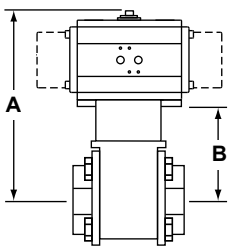
DN	Double acting		Single acting	
	BVA	BVL	BVA	BVL
Actuator operating pressure 3 bar g (44 psi g)				
¼" RB - ⅜" RB	315D	490X	320S/8	491X
½" RB - ⅜" FB	315D	490X	320S/8	491X
¾" RB - ½" FB	315D	490X	325S/8	491X
1" RB - ¾" FB	320D	493X	330S/8	493X
1¼" RB - 1" FB	325D	494X	340S/8	495X
1½" RB - 1¼" FB	330D	496X	340S/8	497X
2" RB - 1½" FB	335D	499X	345S/8	500X
Actuator operating pressure 4 bar g (58 psi g)				
¼" RB - ⅜" RB	310D	490X	320S/10	491X
½" RB - ⅜" FB	310D	490X	320S/10	491X
¾" RB - ½" FB	315D	490X	320S/10	491X
1" RB - ¾" FB	320D	493X	325S/10	493X
1¼" RB - 1" FB	325D	494X	335S/10	495X
1½" RB - 1¼" FB	325D	496X	335S/10	497X
2" RB - 1½" FB	335D	499X	340S/10	499X
Actuator operating pressure 5 bar g (73 psi g)				
¼" RB - ⅜" RB	310D	490X	315S/12	490X
½" RB - ⅜" FB	310D	490X	315S/12	490X
¾" RB - ½" FB	315D	490X	320S/12	491X
1" RB - ¾" FB	315D	492X	325S/12	493X
1¼" RB - 1" FB	320D	494X	330S/12	494X
1½" RB - 1¼" FB	325D	496X	335S/12	497X
2" RB - 1½" FB	330D	498X	340S/12	499X
Actuator operating pressure 6 bar g (87 psi g)				
¼" RB - ⅜" RB	310D	490X	315S/14	490X
½" RB - ⅜" FB	310D	490X	315S/14	490X
¾" RB - ½" FB	310D	490X	320S/14	491X
1" RB - ¾" FB	315D	492X	320S/14	493X
1¼" RB - 1" FB	320D	494X	330S/14	494X
1½" RB - 1¼" FB	320D	496X	330S/14	496X
2" RB - 1½" FB	330D	498X	340S/14	499X

M10Pi ball valves

DN	Double acting		Single acting	
	BVA	BVL	BVA	BVL
Actuator operating pressure 3 bar g (44 psi g)				
¼" RB - ⅜" RB	310D	490X	310S/4	490X
½" RB - ⅜" FB	310D	490X	310S/4	490X
¾" RB - ½" FB	310D	490X	315S/8	490X
1" RB - ¾" FB	315D	492X	320S/8	493X
1¼" RB - 1" FB	320D	494X	325S/8	494X
1½" RB - 1¼" FB	330D	496X	340S/8	497X
2" RB - 1½" FB	330D	498X	340S/8	499X
2½" RB - 2" FB	330D	505X	340S/8	502X
Actuator operating pressure 4 bar g (58 psi g)				
¼" RB - ⅜" RB	310D	490X	310S/6	490X
½" RB - ⅜" FB	310D	490X	310S/6	490X
¾" RB - ½" FB	310D	490X	315S/10	490X
1" RB - ¾" FB	315D	492X	320S/10	493X
1¼" RB - 1" FB	315D	504X	320S/10	494X
1½" RB - 1¼" FB	325D	496X	335S/10	497X
2" RB - 1½" FB	325D	498X	335S/10	499X
2½" RB - 2" FB	330D	505X	340S/10	502X
Actuator operating pressure 5 bar g (73 psi g)				
¼" RB - ⅜" RB	310D	490X	310S/6	490X
½" RB - ⅜" FB	310D	490X	310S/6	490X
¾" RB - ½" FB	310D	490X	310S/6	490X
1" RB - ¾" FB	315D	492X	320S/12	493X
1¼" RB - 1" FB	315D	504X	320S/12	494X
1½" RB - 1¼" FB	320D	496X	330S/12	496X
2" RB - 1½" FB	325D	498X	335S/12	499X
2½" RB - 2" FB	325D	505X	335S/12	502X
Actuator operating pressure 6 bar g (87 psi g)				
¼" RB - ⅜" RB	310D	490X	310S/8	490X
½" RB - ⅜" FB	310D	490X	310S/8	490X
¾" RB - ½" FB	310D	490X	310S/8	490X
1" RB - ¾" FB	310D	492X	315S/14	492X
1¼" RB - 1" FB	315D	504X	320S/14	494X
1½" RB - 1¼" FB	320D	496X	330S/14	496X
2" RB - 1½" FB	320D	498X	330S/14	498X
2½" RB - 2" FB	325D	505X	335S/14	502X

DN	A	B
¼"	259 (10.2)	122 (4.8)
⅜"	259 (10.2)	122 (4.8)
½"	259 (10.2)	122 (4.8)
¾"	259 (10.2)	124 (4.9)
1"	294 (11.6)	129 (5.1)
1¼"	347 (13.7)	134 (5.3)
1½"	336 (13.2)	137 (5.4)
2"	381 (15.0)	143 (5.6)

Dimensions *
mm (inches)



DN	A	B
¼"	218 (8.8)	122 (4.8)
⅜"	218 (8.8)	122 (4.8)
½"	218 (8.8)	122 (4.8)
¾"	239 (9.4)	124 (4.9)
1"	266 (10.5)	129 (5.1)
1¼"	281 (11.1)	134 (5.3)
1½"	336 (13.2)	137 (5.4)
2"	342 (13.5)	143 (5.6)
2½"	356 (14.0)	157 (6.2)

* **Note:** The dimensions **A** and **B** represent the maximum size for the biggest recommended actuator according to each valve.

Selection tables

Pages 5 to 15 contain all necessary information to select the correct actuator for relevant Spirax Sarco ball valves. For valves not appearing in these tables please contact Spirax Sarco for advice.

Pneumatic actuator selection tables for three-piece ball valves

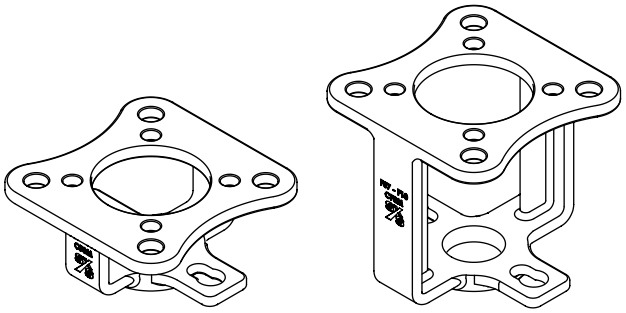
M10MVi and M10MSi ball valves

DN	Double acting		Single acting	
	BVA	BVL	BVA	BVL
Actuator operating pressure 3 bar g (44 psi g)				
¼" RB - ⅜" RB	310D	560	310S/4	560
½" RB - ⅜" FB	310D	560	310S/4	560
¾" RB - ½" FB	310D	560	315S/8	560
1" RB - ¾" FB	315D	562	320S/8	563
1¼" RB - 1" FB	320D	564	325S/8	564
1½" RB - 1¼" FB	330D	564	340S/8	565
2" RB - 1½" FB	330D	566	340S/8	567
Actuator operating pressure 4 bar g (58 psi g)				
¼" RB - ⅜" RB	310D	560	310S/6	560
½" RB - ⅜" FB	310D	560	310S/6	560
¾" RB - ½" FB	310D	560	315S/10	560
1" RB - ¾" FB	315D	562	320S/10	563
1¼" RB - 1" FB	320D	564	320S/10	564
1½" RB - 1¼" FB	325D	564	335S/10	565
2" RB - 1½" FB	325D	566	335S/10	567

DN	Double acting		Single acting	
	BVA	BVL	BVA	BVL
Actuator operating pressure 5 bar g (73 psi g)				
¼" RB - ⅜" RB	310D	560	310S/6	560
½" RB - ⅜" FB	310D	560	310S/6	560
¾" RB - ½" FB	310D	560	310S/6	560
1" RB - ¾" FB	315D	562	320S/12	563
1¼" RB - 1" FB	320D	564	320S/12	564
1½" RB - 1¼" FB	320D	564	330S/12	564
2" RB - 1½" FB	325D	566	335S/12	567
Actuator operating pressure 6 bar g (87 psi g)				
¼" RB - ⅜" RB	310D	560	310S/8	560
½" RB - ⅜" FB	310D	560	310S/8	560
¾" RB - ½" FB	310D	560	310S/8	560
1" RB - ¾" FB	310D	562	315S/14	562
1¼" RB - 1" FB	320D	564	320S/14	564
1½" RB - 1¼" FB	320D	564	330S/14	564
2" RB - 1½" FB	320D	566	330S/14	566

Automation

Spirax Sarco offers two height options, on the one hand low bracket (40 mm) for applications below 100 °C (212 °F). For higher temperature applications the use of high temperature bracket of about 90 mm height is recommended.



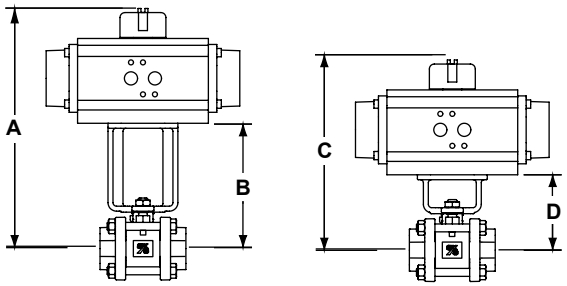
Kit BVA for M10M selection guide:

Bracket height	Blank	= Short bracket (40mm)	X
	X	= Tall bracket (90mm)	
Kit material	Blank	Stainless steel	C
	C	Carbon steel	

Example: 1 off Spirax Sarco Kit BVL 560 - CX.

Dimensions in mm (inches)

DN	A	B	C	D
¼"	214 (8.4)	118 (4.6)	164 (6.5)	68 (2.7)
⅜"				
½"				
¾"	235 (9.3)	120 (4.7)	185 (7.3)	70 (2.8)
1"	265.5 (10.5)	125.5 (4.9)	212.5 (8.4)	75.5 (3.0)
1¼"	278 (11.0)	131 (5.3)	228 (9.0)	81 (3.2)
1½"	333.5 (13.1)	134.5 (5.3)	283.5 (11.2)	84.5 (3.3)
2"	341 (13.4)	142 (5.6)	291 (11.5)	92 (3.6)



* **Note:** The dimensions **A, B, C** and **D** represent the maximum size for the biggest recommended actuator according to each valve.

Selection tables

Pages 5 to 15 contain all necessary information to select the correct actuator for relevant Spirax Sarco ball valves. For valves not appearing in these tables please contact Spirax Sarco for advice.

Pneumatic actuator selection tables for three-piece ball valves

M70i ball valves

DN	Double acting		Single acting	
	BVA	BVL	BVA	BVL
Actuator operating pressure 3 bar g (44 psi g)				
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 4 bar g (58 psi g)				
½"	315D	300X	320S/10	301X
¾"	315D	300X	320S/10	301X
1"	315D	302X	325S/10	303X
1½"	330D	306X	340S/10	307X
2"	335D	309X	340S/10	309X
Actuator operating pressure 5 bar g (73 psi g)				
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 6 bar g (87 psi g)				
½"	310D	300X	315S/14	300X
¾"	310D	300X	320S/14	301X
1"	315D	302X	320S/14	303X
1½"	325D	306X	335S/14	307X
2"	330D	308X	335S/14	309X

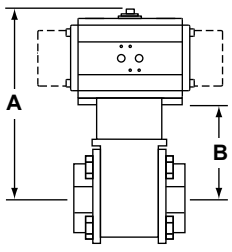
DN	A	B
½"	259 (10.2)	122 (4.8)
¾"	271 (10.7)	124 (4.9)
1"	276 (10.9)	129 (5.1)
1½"	342 (13.5)	143 (5.6)
2"	378 (14.9)	157 (6.2)

M80i ball valves

DN	Double acting		Single acting	
	BVA	BVL	BVA	BVL
Actuator operating pressure 3 bar g (44 psi g)				
2½"	335D	481X	345S/8	482X
3"	340D	481X	345S/8	482X
4"	340D	484X	350S/8	486X
Actuator operating pressure 4 bar g (58 psi g)				
2½"	335D	481X	340S/10	481X
3"	335D	481X	345S/10	482X
4"	335D	484X	345S/10	485X
Actuator operating pressure 5 bar g (73 psi g)				
2½"	330D	480X	340S/12	481X
3"	335D	481X	340S/12	481X
4"	335D	484X	345S/12	485X
Actuator operating pressure 6 bar g (87 psi g)				
2½"	330D	480X	340S/14	481X
3"	330D	480X	340S/14	481X
4"	335D	484X	340S/14	484X

DN	A	B
2½"	407 (16.0)	186 (7.3)
3"	434 (17.1)	213 (8.4)
4"	499 (19.6)	250 (9.8)

Dimensions * mm (inches)



*** Note:** The dimensions **A** and **B** represent the maximum size for the biggest recommended actuator according to each valve.

Selection tables

Pages 5 to 15 contain all necessary information to select the correct actuator for relevant Spirax Sarco ball valves. For valves not appearing in these tables please contact Spirax Sarco for advice.

Pneumatic actuator selection tables for two-piece ball valves

M31V ISO and M31S ISO ball valves

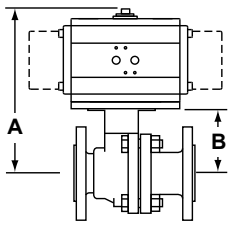
DN	Double acting		Single acting	
	BVA	BVL	BVA	BVL
Actuator operating pressure 3 bar g (44 psi g)				
2"	325D	400X	335S/8	401X
2½"	330D	402X	340S/8	403X
3"	330D	402X	345S/8	404X
4"	345D	406X	355S/8	407X
6"	355D	409X	365S/8	414X
8"	360D	413X	-	-
Actuator operating pressure 4 bar g (58 psi g)				
2"	320D	400X	330S/10	400X
2½"	325D	402X	335S/10	403X
3"	330D	402X	340S/10	403X
4"	340D	405X	350S/10	407X
6"	355D	409X	360S/10	410X
8"	355D	412X	360S/12	413X
Actuator operating pressure 5 bar g (73 psi g)				
2"	320D	400X	330S/12	400X
2½"	320D	402X	330S/12	402X
3"	325D	402X	335S/12	403X
4"	335D	405X	350S/12	407X
6"	350D	409X	360S/12	410X
8"	355D	412X	360S/12	413X
Actuator operating pressure 6 bar g (87 psi g)				
2"	320D	400X	330S/14	400X
2½"	320D	402X	330S/14	402X
3"	325D	402X	335S/14	403X
4"	335D	405X	345S/14	406X
6"	350D	409X	360S/14	410X
8"	350D	412X	360S/14	413X

M33V ISO, M33S ISO, M33F and M33T ISO ball valves

DN	Double acting		Single acting	
	BVA	BVL	BVA	BVL
Actuator operating pressure 3 bar g (44 psi g)				
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 (58 psi g)				
2"	330D	510X	335S/10	511X
2½"	335D	513X	340S/10	513X
3"	335D	513X	345S/10	514X
4"	345D	516X	355S/10	517X
6"	355D	519X	360S/10	520X
8"	360D	524X	365S/10	525X
Actuator operating pressure 5 bar g (73 psi g)				
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 (87 psi g)				
2"	325D	510X	335S/14	511X
2½"	330D	512X	335S/14	513X
3"	335D	513X	340S/14	513X
4"	345D	516X	350S/14	517X
6"	350D	519X	360S/14	520X
8"	360D	524X	365S/14	525X

DN	A	B
2"	340 (13.4)	158 (6.2)
2½"	371 (14.6)	172 (6.8)
3"	400 (15.7)	179 (7.0)
4"	488 (19.2)	208 (8.2)
6"	747 (29.4)	313 (12.3)
8"	731(28.8)	348 (13.7)

Dimensions * mm (inches)



DN	A	B
2"	356 (14.0)	157 (6.2)
2½"	390 (15.4)	169 (6.7)
3"	426 (16.8)	177 (7.0)
4"	647 (25.4)	264 (10.4)
6"	750 (29.5)	316 (12.4)
8"	785 (31.0)	351 (13.8)

* **Note:** The dimensions **A** and **B** represent the maximum size for the biggest recommended actuator according to each valve.

Selection tables

Pages 5 to 15 contain all necessary information to select the correct actuator for relevant Spirax Sarco ball valves. For valves not appearing in these tables please contact Spirax Sarco for advice.

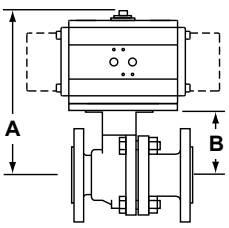
Pneumatic actuator selection tables for two-piece ball valves

M33H ISO and M33HT ISO ball valves

DN	Double acting		Single acting	
	BVA	BVL	BVA	BVL
Actuator operating pressure 3 bar g (44 psi g)				
2"	335D	511X	345S/8	528X
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 (58 psi g)				
2"	330D	510X	340S/10	511X
2½"	335D	513X	340S/10	513X
3"	335D	513X	345S/10	514X
4"	345D	516X	355S/10	517X
6"	357D	520X	360S/10	520X
8"	360D	524X	365S/10	525X
Actuator operating pressure 5 bar g (73 psi g)				
2"	330D	510X	340S/12	511X
2½"	330D	512X	340S/12	513X
3"	335D	513X	345S/12	514X
4"	345D	516X	355S/12	517X
6"	355D	519X	360S/12	520X
8"	360D	524X	365S/12	525X
Actuator operating pressure 6 bar g (87 psi g)				
2"	325D	510X	335S/14	511X
2½"	325D	512X	340S/14	513X
3"	335D	513X	340S/14	513X
4"	345D	516X	350S/14	517X
6"	350D	519X	360S/14	520X
8"	360D	524X	365S/14	525X

DN	A	B
2"	395 (15.6)	174 (6.9)
2½"	390 (15.4)	169 (6.7)
3"	426 (16.8)	177 (7.0)
4"	647 (25.5)	264 (10.4)
6"	750 (29.5)	316 (12.4)
8"	785 (31.0)	351 (13.8)

Dimensions * mm (inches)



*** Note:** The dimensions **A** and **B** represent the maximum size for the biggest recommended actuator according to each valve.

Selection tables

Pages 5 to 15 contain all necessary information to select the correct actuator for relevant Spirax Sarco ball valves. For valves not appearing in these tables please contact Spirax Sarco for advice.

Pneumatic actuator selection tables for one-piece ball valves

M21Hi and M21HTi ball valves

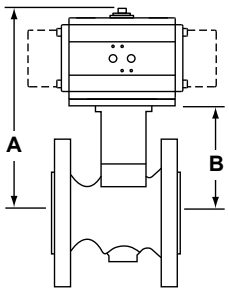
M40Hi and M40HTi ball valves

DN	Double acting		Single acting	
	BVA	BVL	BVA	BVL
Actuator operating pressure 3 bar g (44 psi g)				
½" **	315D	300X	325S/8	301X
¾" **	315D	300X	325S/8	301X
1"	320D	303X	325S/8	303X
1¼"	320D	494X	330S/8	494X
1½"	325D	306X	340S/8	307X
2"	330D	306X	340S/8	307X
2½"	335D	511X	345S/8	528X
3"	335D	513X	345S/8	514X
4"	340D	513X	350S/8	526X
6"	350D	517X	360S/8	527X
Actuator operating pressure 4 bar g (58 psi g)				
½" **	315D	300X	320S/10	301X
¾" **	315D	300X	320S/10	301X
1"	315D	302X	325S/10	303X
1¼"	320D	494X	325S/10	494X
1½"	325D	306X	335S/10	307X
2"	325D	306X	335S/10	307X
2½"	335D	511X	345S/10	528X
3"	335D	513X	345S/10	514X
4"	340D	513X	350S/10	526X
6"	350D	517X	357S/10	527X

DN	Double acting		Single acting	
	BVA	BVL	BVA	BVL
Actuator operating pressure 5 bar g (73 psi g)				
½" **	315D	300X	320S/12	301X
¾" **	315D	300X	320S/12	301X
1"	315D	302X	320S/12	303X
1¼"	315D	504X	325S/12	494X
1½"	320D	306X	330S/12	306X
2"	325D	306X	335S/12	307X
2½"	330D	510X	340S/12	511X
3"	330D	512X	345S/12	514X
4"	335D	513X	345S/12	514X
6"	345D	516X	357S/12	527X
Actuator operating pressure 6 bar g (87 psi g)				
½" **	310D	300X	320S/14	301X
¾" **	310D	300X	320S/14	301X
1"	315D	302X	320S/14	303X
1¼"	315D	504X	325S/14	494X
1½"	320D	306X	330S/14	306X
2"	320D	306X	330S/14	306X
2½"	330D	510X	340S/14	511X
3"	330D	512X	340S/14	513X
4"	335D	513X	345S/14	514X
6"	345D	516X	355S/14	517X

DN	A	B
½" **	271 (10.7)	124 (4.9)
¾" **	271 (10.7)	124 (4.9)
1"	276 (10.9)	129 (4.9)
1¼"	299 (11.8)	134 (5.3)
1½"	337 (13.3)	138 (5.4)
2"	342 (13.5)	143 (5.6)
2½"	395 (15.6)	174 (6.9)
3"	383 (15.1)	162 (6.4)
4"	426 (16.8)	177 (7.0)
6"	647 (25.5)	264 (10.4)

Dimensions * mm (inches)



*** Note:** The dimensions A and B represent the maximum size for the biggest recommended actuator according to each valve.

**** Note:** ½" and ¾" just for M21i

Selection tables

Pages 5 to 15 contain all necessary information to select the correct actuator for relevant Spirax Sarco ball valves. For valves not appearing in these tables please contact Spirax Sarco for advice.

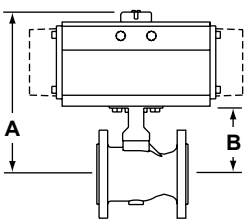
Pneumatic actuator selection tables for one-piece ball valves

M45i ball valves

DN	Double acting		Single acting	
	BVA	BVL	BVA	BVL
Actuator operating pressure 3 bar g (44 psi g)				
1"	320D	303X	325S/8	303X
1¼"	320D	494X	330S/8	494X
1½"	325D	306X	340S/8	307X
2"	330D	306X	340S/8	307X
2½"	335D	511X	345S/8	528X
3"	340D	513X	345S/8	514X
4"	345D	514X	355S/8	526X
6"	345D	516X	360S/8	527X
Actuator operating pressure 4 bar g (58 psi g)				
1"	315D	302X	325S/10	303X
1¼"	320D	494X	330S/10	494X
1½"	325D	306X	330S/10	306X
2"	325D	306X	335S/10	307X
2½"	330D	510X	340S/10	511X
3"	335D	513X	345S/10	514X
4"	340D	513X	350S/10	526X
6"	345D	516X	355S/10	517X
Actuator operating pressure 5 bar g (73 psi g)				
1"	315D	302X	320S/12	303X
1¼"	320D	494X	325S/12	494X
1½"	320D	306X	330S/12	306X
2"	325D	306X	335S/12	307X
2½"	330D	510X	340S/12	511X
3"	335D	513X	340S/12	513X
4"	335D	513X	345S/12	514X
6"	340D	515X	355S/12	517X
Actuator operating pressure 6 bar g (87 psi g)				
1"	315D	302X	320S/14	303X
1¼"	315D	504X	325S/14	494X
1½"	320D	306X	330S/14	306X
2"	320D	306X	330S/14	306X
2½"	325D	510X	335S/14	511X
3"	330D	512X	340S/14	513X
4"	335D	513X	345S/14	514X
6"	340D	515X	350S/14	517X

DN	A	B
1"	276 (10.9)	129 (5.1)
1¼"	299 (11.8)	134 (5.3)
1½"	337 (13.3)	138 (5.4)
2"	342 (13.5)	143 (5.6)
2½"	378 (14.9)	157 (6.2)
3"	383 (15.1)	162 (6.4)
4"	457 (18.0)	177 (7.0)
6"	650 (25.6)	264 (10.4)

Dimensions * mm (inches)



* **Note:** The dimensions **A** and **B** represent the maximum size for the biggest recommended actuator according to each valve.

Selection tables

Pages 5 to 15 contain all necessary information to select the correct actuator for relevant Spirax Sarco ball valves. For valves not appearing in these tables please contact Spirax Sarco for advice.

Pneumatic actuator selection tables for one-piece ball valves

M21Ti, M21Vi, M21Si and M21Fi ball valves

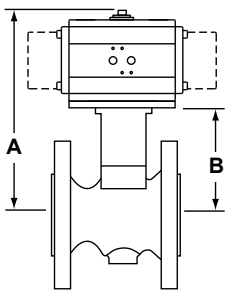
M40Ti, M40Vi, M40Si and M40Fi ball valves

DN	Double acting		Single acting	
	BVA	BVL	BVA	BVL
Actuator operating pressure 3 bar g (44 psi g)				
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"	340D	515X	350S/8	517X
8" ***	360D	520X	365S/8	521X
Actuator operating pressure 4 bar g (58 psi g)				
½" **	310D	300X	315S/10	300X
¾"**	310D	300X	315S/10	300X
1"	315D	302X	320S/10	303X
1¼"	315D	504X	320S/10	494X
1½"	320D	306X	325S/10	306X
2"	320D	306X	330S/10	306X
2½"	325D	510X	335S/10	511X
3"	335D	513X	340S/10	513X
4"	335D	513X	345S/10	514X
6"	335D	515X	345S/10	516X
8" ***	355D	519X	360S/10	520X

DN	Double acting		Single acting	
	BVA	BVL	BVA	BVL
Actuator operating pressure 5 bar g (73 psi g)				
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"	335D	515X	345S/12	516X
8" ***	350D	519X	360S/12	520X
Actuator operating pressure 6 bar g (87 psi g)				
½" **	310D	300X	315S/14	300X
¾"**	310D	300X	315S/14	300X
1"	310D	302X	315S/14	302X
1¼"	315D	504X	320S/14	494X
1½"	315D	506X	325S/14	306X
2"	315D	506X	325S/14	306X
2½"	320D	510X	330S/14	510X
3"	330D	512X	335S/14	513X
4"	330D	512X	340S/14	513X
6"	335D	515X	345S/14	516X
8" ***	350D	519X	360S/14	520 X

DN	A	B
½"	271 (10.7)	124 (4.9)
¾"	271 (10.7)	124 (4.9)
1"	276 (10.9)	129 (5.1)
1¼"	299 (11.8)	134 (5.3)
1½"	337 (13.3)	138 (5.4)
2"	342 (13.5)	143 (5.6)
2½"	356 (14.0)	157 (6.2)
3"	383 (15.1)	162 (6.4)
4"	398 (15.7)	177 (7.0)
6"	513 (20.2)	264 (10.4)
8"	750 (29.5)	316 (12.4)

Dimensions * mm (inches)



*** Note:** The dimensions A and B represent the maximum size for the biggest recommended actuator according to each valve.

**** Note:** ½" and ¾" just for M21i

***** Note:** 8" just for M40i

Selection tables

Pages 5 to 15 contain all necessary information to select the correct actuator for relevant Spirax Sarco ball valves. For valves not appearing in these tables please contact Spirax Sarco for advice.

Pneumatic actuator selection tables for one-piece ball valves

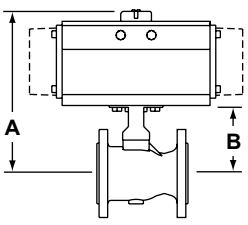
M21ViJ and M21SiJ ball valves

M40ViJ and M40SiJ ball valves

DN	Double acting		Single acting	
	BVA	BVL	BVA	BVL
Actuator operating pressure 3 bar g (44 psi g)				
1½"	320D	306X	330S/8	306X
2"	325D	306X	330S/8	306X
2½"	330D	510X	340S/8	511X
3"	335D	513X	345S/8	514X
4"	340D	513X	350S/8	526X
Actuator operating pressure 4 bar g (58 psi g)				
1½"	320D	306X	325S/10	306X
2"	320D	306X	330S/10	306X
2½"	330D	510X	335S/10	511X
3"	335D	513X	345S/10	514X
4"	340D	513X	345S/10	514X
Actuator operating pressure 5 bar g (73 psi g)				
1½"	320D	306X	325S/12	306X
2"	320D	306X	325S/12	306X
2½"	325D	510X	335S/12	511X
3"	335D	513X	340S/12	513X
4"	335D	513X	345S/12	514X
Actuator operating pressure 6 bar g (87 psi g)				
1½"	320D	306X	325S/14	306X
2"	320D	306X	325S/14	306X
2½"	325D	510X	335S/14	511X
3"	330D	512X	340S/14	513X
4"	335D	513X	340S/14	513X

DN	A	B
1½"	303 (12.0)	138 (5.4)
2"	308 (12.1)	143 (5.6)
2½"	373 (14.7)	174 (6.9)
3"	383 (15.1)	162 (6.4)
4"	426 (16.8)	177 (7.0)

Dimensions * mm (inches)



* **Note:** The dimensions **A** and **B** represent the maximum size for the biggest recommended actuator according to each valve.

Selection tables

Pages 5 to 15 contain all necessary information to select the correct actuator for relevant Spirax Sarco ball valves. For valves not appearing in these tables please contact Spirax Sarco for advice.

Pneumatic actuator selection tables for one-piece ball valves

M21ECFi4 ball valves

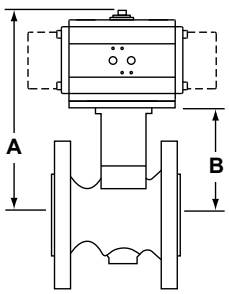
M40ECFi4 ball valves

DN	Double acting		Single acting	
	BVA	BVL	BVA	BVL
Actuator operating pressure 3 bar g (44 bar g)				
½" **	315D	300X	320S/8	301X
¾"**	315D	300X	320S/8	301X
1"	315D	302X	320S/8	303X
1¼"	320D	494X	325S/8	494X
1½"	320D	306X	330S/8	306X
2"	325D	306X	330S/8	306X
2½"	330D	510X	335S/8	511X
3"	335D	513X	340S/8	513X
4"	340D	513X	345S/8	514X
Actuator operating pressure 4 bar g (58 psi g)				
½" **	310D	300X	315S/10	300X
¾"**	310D	300X	315S/10	300X
1"	315D	302X	320S/10	303X
1¼"	315D	504X	320S/10	494X
1½"	320D	306X	325S/10	306X
2"	320D	306X	330S/10	306X
2½"	325D	510X	330S/10	510X
3"	330D	512X	340S/10	513X
4"	335D	513X	340S/10	513X

DN	Double acting		Single acting	
	BVA	BVL	BVA	BVL
Actuator operating pressure 5 bar g (73 psi g)				
½" **	310D	300X	315S/10	300X
¾"**	310D	300X	315S/10	300X
1"	315D	302X	320S/12	303X
1¼"	315D	504X	320S/12	494X
1½"	320D	306X	325S/12	306X
2"	320D	306X	325S/12	306X
2½"	320D	510X	330S/12	510X
3"	330D	512X	335S/12	513X
4"	335D	513X	340S/12	513X
Actuator operating pressure 6 bar g (87 psi g)				
½" **	310D	300X	315S/14	300X
¾"**	310D	300X	315S/14	300X
1"	310D	302X	315S/14	302X
1¼"	315D	504X	320S/14	494X
1½"	315D	506X	320S/14	306X
2"	320D	506X	325S/14	306X
2½"	320D	510X	330S/14	510X
3"	325D	512X	335S/14	513X
4"	330D	512X	340S/14	513X

DN	A	B
½"	255 (10.0)	118 (4.6)
¾"	255 (10.0)	118 (4.6)
1"	266 (10.5)	129 (5.1)
1¼"	281 (11.1)	134 (5.3)
1½"	307 (12.0)	138 (5.4)
2"	308 (12.1)	143 (5.6)
2½"	339 (13.3)	157 (6.2)
3"	365 (14.3)	162 (6.4)
4"	403 (15.9)	177 (7.0)

Dimensions * mm (inches)



*** Note:** The dimensions A and B represent the maximum size for the biggest recommended actuator according to each valve.

**** Note:** ½" and ¾" just for M21ECFi4

TI-P426-01-US
Issue 1

URPA Series
Pneumatic Rack and Pinion Actuators for Spirax Sarco Ball Valves (M10Si, M10Vi, M10Ti, M33 and 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:

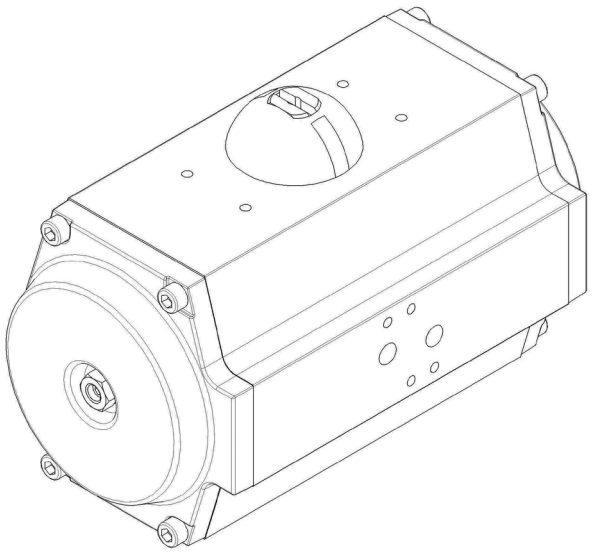
- UL & CSA approved
- Safety Integrity Level (SIL) 3 certified under IEC Standards 61508 and 61511
- ISO 9001:2008
- ATEX certified under Directive 94/9/CE

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

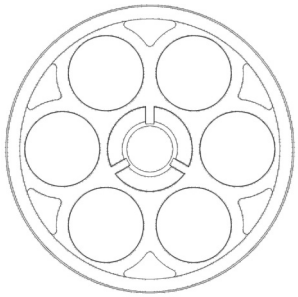
For all other ranges to be mounted with URPA actuators, please contact Spirax Sarco, Inc, Blythewood, SC



Spring cartridges

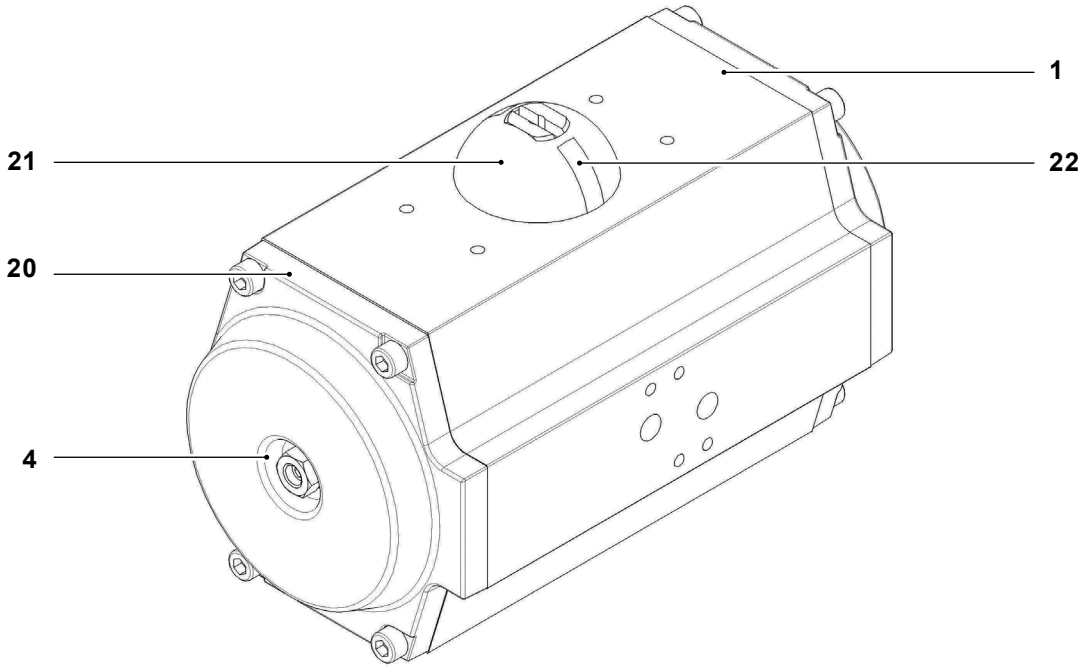
The patented spring cartridges are preloaded and uniquely designed to remain self-contained. The actuators can easily be changed in the field from double acting to spring return by simply inserting the required number of our spring cartridges into the actuator body.

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

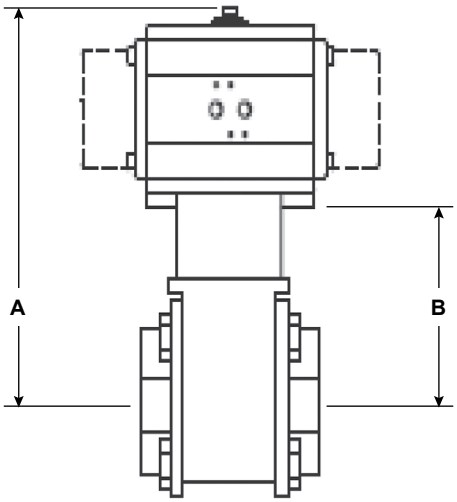


No	Part	Material
1	Body	Extruded Aluminium Alloy ASTM 6063 Anodized 10681
	Pinion	Steel IISMNP337 Electroless Nickle plated
4	End caps	Die Cast Aluminium Alloy EN AC-46100 UNII EN 1706:1999
20	Bolt	Stainless steel
21	Indicator cap	Polyamide
22	Colored indicator	Polyamide

URPA linkage kit components and materials

Frame	Stainless steel AISI 304	Washers	Stainless steel
Stem adapter	Stainless steel AISI 304	Frame-to-valve screws	Stainless steel Gr. 5
Frame-to-actuator screws	Stainless steel Gr. 5	Stem nut	Stainless steel

Pneumatic actuator selection tables for three-piece ball valves



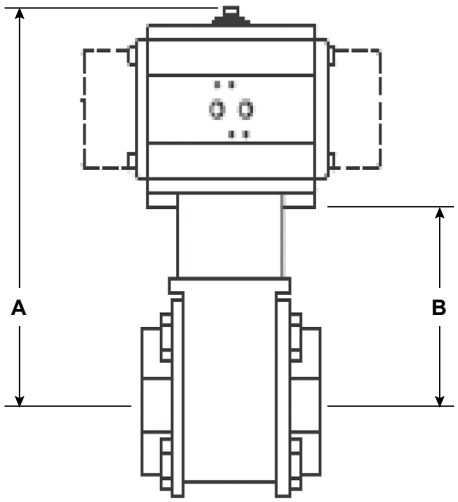
M10Si ISO and M10Ti ISO ball valves

Actuator operating pressure 80 psig

Size	Torque [N.m]	Light Service	
		Actuator	Linkage Kit
½"RB	3	URPA-K20K33	A/2
¾"RB & ½"FB	4	URPA-K20K33	A/2
1"RB & ¾"FB	8	URPA-K34K44	A/3
1 ¼"RB & 1"FB	15	URPA-K48K55	A/1
1 ½"RB & 1¼"FB	28	URPA-K105K44	B/6
2"RB & 1½"FB	35	URPA-K105K55	B/8
2 ½"RB & 2"FB	65	URPA-K237K44	C/10

Size	Torque [N.m]	Heavy Service	
		Actuator	Linkage Kit
½"RB	3	URPA-K20K33	A/2
¾"RB & ½"FB	6	URPA-K20K55	A/2
1"RB & ¾"FB	13	URPA-K48K44	A/3
1 ¼"RB & 1"FB	20	URPA-K75K44	A/5
1 ½"RB & 1¼"FB	50	URPA-K157K55	B/7
2"RB & 1½"FB	60	URPA-K157K55	B/9
2 ½"RB & 2"FB	75	URPA-K237K55	C/10

Pneumatic actuator selection tables for two-piece ball valves



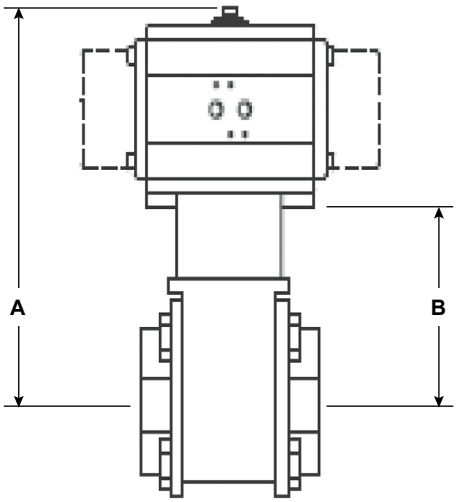
M33V ISO, M33S ISO and M33F ISO

Actuator operating pressure 80 psi g (5.5 bar g)

Size	Torque [N.m]	Light Service		Dimensions (Flanged) inches (mm)		
		Actuator	Linkage Kit	A1	B1	B2
2" ANSI 150	50	URPA-K157K55	B/11	14.2 (361)	8.0 (203)	8.0 (203)
2" ANSI 300	50	URPA-K157K55	B/11			
2 ½" ANSI 150	85	URPA-K331K55	C1/12	15.5 (394)	8.4 (213)	8.4 (213)
3" ANSI 150	120	URPA-K406K55	C1/13	17.3 (439)	8.7 (221)	8.7 (221)
4" ANSI 150	200	URPA-K633K55	D/14	18.8 (478)	9.8 (249)	9.8 (249)
6" ANSI 150	500	URPA-K1831K44	E/17	25.8 (655)	12.8 (325)	12.8 (325)
6" ANSI 300	500	URPA-K1831K44	E/17			
8" ANSI 150	800	URPA-K2928K55	F/17	27.2 (691)	14.1 (358)	14.1 (358)
8" ANSI 300	800	URPA-K2928K55	F/17			

Size	Torque [N.m]	Heavy Service		Dimensions (Flanged) inches (mm)		
		Actuator	Linkage Kit	A1	B1	B2
2" ANSI 150	70	URPA-K237K55	B/11	14.2 (361)	8.0 (203)	8.0 (203)
2" ANSI 300	70	URPA-K237K55	B/11			
2 ½" ANSI 150	180	URPA-K633K55	C1/13	17.4 (442)	8.4 (213)	8.4 (213)
3" ANSI 150	180	URPA-K633K55	C1/13			
4" ANSI 150	220	URPA-K633K55	D/14			
6" ANSI 150	500	URPA-K1831K44	E/17	25.8 (655)	12.8 (325)	12.8 (325)
6" ANSI 300	500	URPA-K1831K44	E/17			
8" ANSI 150	750	URPA-K2928K55	F/17	27.2 (691)	14.1 (358)	14.1 (358)
8" ANSI 300	750	URPA-K2928K55	F/17			

Pneumatic actuator selection tables for one-piece ball valves



M40Vi ISO, M40Si ISO and M40Fi ISO

Actuator operating pressure 80 psi g (5.5 bar g)

Size	Torque [N.m]	Light Service		Dimensions (Flanged) inches (mm)		
		Actuator	Linkage Kit	A1	B1	B2
1" ANSI 150	8	URPA-K34K44	A1/3	10.5 (267)	6.3 (160)	6.4 (163)
1" ANSI 300	8	URPA-K34K44	A1/3			
1 ¼" ANSI 150	12	URPA-K48K44	A/16	11.2 (284)	6.5 (165)	6.6 (168)
1 ¼" ANSI 300	12	URPA-K48K44	A/16			
1 ½" ANSI 150	22	URPA-K75K55	B/8	11.9 (302)	6.9 (175)	7.1 (180)
2" ANSI 150	30	URPA-K105K55	B/8	12.4 (315)	7.0 (178)	7.3 (185)
2 ½" ANSI 150	40	URPA-K157K44	B/11	14.2 (361)	8.0 (203)	8.0 (203)
3" ANSI 150	65	URPA-K237K44	C1/12	14.4 (366)	8.1 (206)	8.1 (206)
4" ANSI 150	120	URPA-K406K55	C1/13	17.3 (439)	8.7 (221)	9.0 (229)
6" ANSI 150	160	URPA-K633K44	D/15	18.8 (478)	9.8 (249)	10.3 (262)
6" ANSI 300	160	URPA-K633K44	D/15			

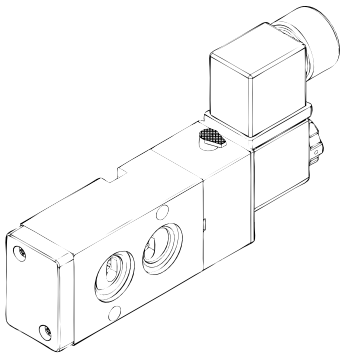
Size	Torque [N.m]	Heavy Service		Dimensions (Flanged) inches (mm)		
		Actuator	Linkage Kit	A1	B1	B2
1" ANSI 150	20	URPA-K75K44	A1/4	11.3	6.3 (160)	6.4 (163)
1" ANSI 300	20	URPA-K75K44	A1/4			
1 ¼" ANSI 150	25	URPA-K75K55	A/18	11.5 (292)	6.5 (165)	6.6 (168)
1 ¼" ANSI 300	25	URPA-K75K55	A/18			
1 ½" ANSI 150	45	URPA-K157K55	B/9	13.1 (333)	6.9 (175)	7.1 (180)
2" ANSI 150	50	URPA-K157K55	B/9	13.3 (338)	7.0 (178)	7.3 (185)
2 ½" ANSI 150	70	URPA-K237K55	B/11	14.2 (361)	8.0 (203)	8.0 (203)
3" ANSI 150	90	URPA-K331K55	C1/12	15.2 (386)	8.1 (206)	8.1 (206)
4" ANSI 150	120	URPA-K406K55	C1/13	17.3 (439)	8.7 (221)	9.0 (229)
6" ANSI 150	160	URPA-K633K44	D/15	18.8 (478)	9.8 (249)	10.3 (262)
6" ANSI 300	160	URPA-K633K44	D/15			

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 ºF - 176 ºF (-5 °C - 80 °C)	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	110/120 VAC
	24 VDC 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.

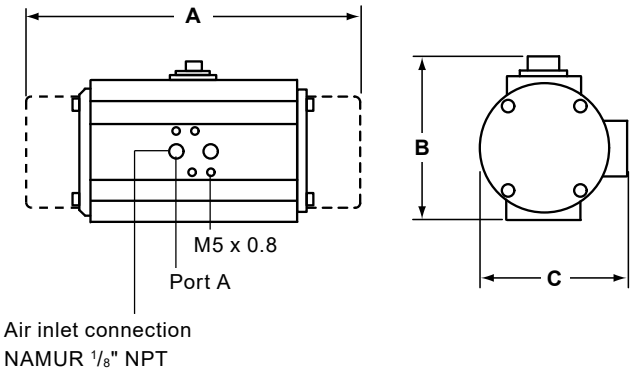
Available types

SENITEC NEMA 4	Copolyester NAMUR

Technical data

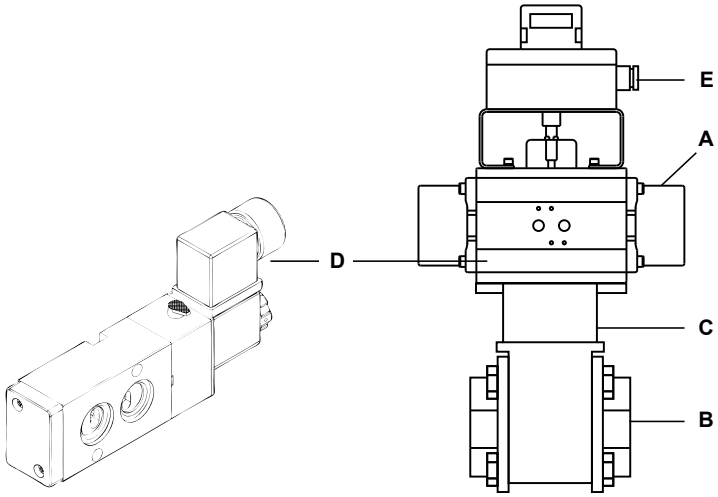
Maximum pressure	120 psi g (8.3 bar g)
Minimal pressure	45 psi g (3.1 bar g)
Operating pressure range	80 psi g (5.5 bar g) (standard)
Note: Other operating pressure ranges available on request	
Operating temperature range	-22 °F to 212 °F (-30 °C - 100 °C)
Operating media	Compressed air (clean and dry)
	Non corrosive gas
	Light hydraulic oil (must be compatible with 'O' rings)
Rotation 90 ±5 °	Anti-clockwise with port 'A' pressurised

Dimensions/weights (approximate) in inches (mm) and lbs (kg)



Actuator	A	B	C	Weight
URPA-K20K33	4.6 (117)	3.4 (86.4)	2.4 (61.0)	4.41 (2.0)
URPA-K34K44	5.4 (137)	4.3 (109)	3.2 (81.3)	6.61 (3.0)
URPA-K48K44	6.3 (160)	4.7 (119)	3.6 (91.4)	9.48 (4.3)
URPA-K48K55				
URPA-K75K44	7.1 (180)	5.0 (127)	3.9 (99.1)	12.1 (5.5)
URPA-K105K44	8.2 (208)	5.4 (137)	4.4 (112)	16.3 (7.4)
URPA-K157K55	8.7 (221)	6.3 (160)	4.7 (119)	23.4 (10.6)
URPA-K237K44	11.5 (292)			33.1 (15.0)
URPA-K331K55	11.9 (302)	7.1 (180)	5.4 (137)	
URPA-K406K55	13.3 (338)	8.6 (218)	6.8 (173)	68.3 (31.0)
URPA-K633K44	14.9 (378)	9.0 (229)		75.0 (34.0)
URPA-K633K55				
URPA-K1831K44	24 (610)	13.1 (333)	10.7 (272)	292 (132.3)
URPA-K2928K55				

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 maintenance kit	'O' rings set
	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 pressue is 80 psi

How to order example:

1 - URPA-K105K44 Actuator
1 - B/6 Linkage Kit

TI-P137-18
CMGT Issue 15

BSAT and BSA
Bellows Sealed Stop Valves

Description
A range of sealed, in-line stop valves having twin ply bellows as standard throughout the range. These valves have been designed for use on steam, gas, liquid, condensate and water systems.

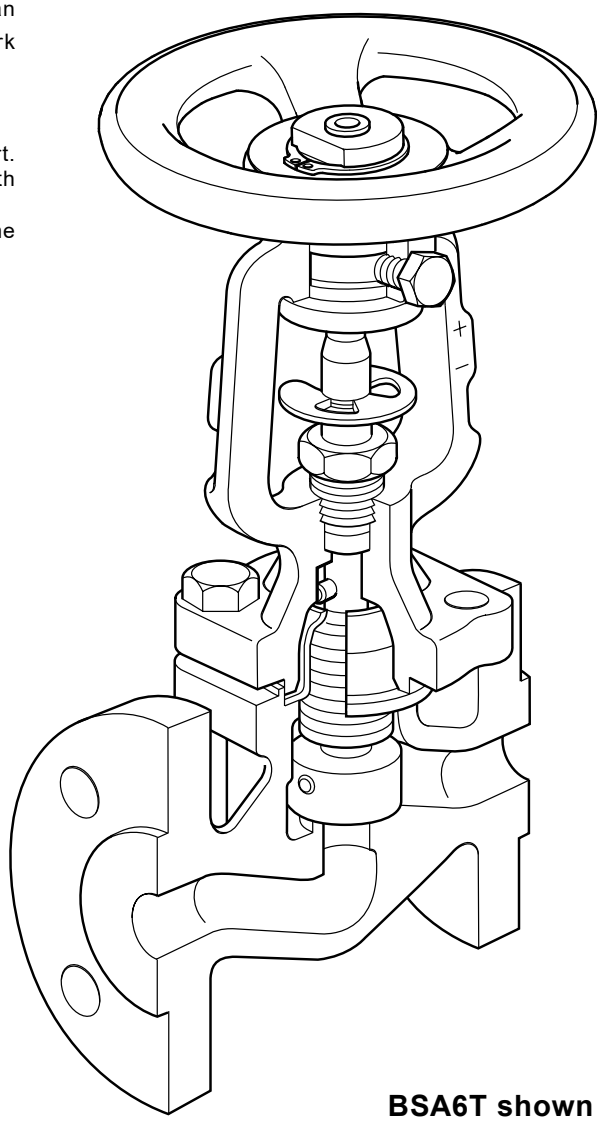
The standard BSAT range comes complete with throttling plug and locking device.

The alternative BSA range has a flat disc.

The Tables on page 2 and 3 clearly display the available sizes, pipeline connections and available options for the standard and alternative ranges.

Standards
The product fully complies with the requirements of the European Pressure Equipment Directive 2014/68/EU and carries the CE mark when so required.

Certification
The BSA1 and BSA1T is available with a manufacturer's Typical Test Report. The BSA2, BSA2T, BSA3, BSA3T, BSA6T and BSA64T is available with certification to EN 10204 3.1.
Note: All certification/inspection requirements must be stated at the time of order placement.



BSA6T shown

Range and options

Standard BSAT range - complete with throttling plug and locking device

Material		Cast iron		SG iron		Cast steel					Stainless steel	Stainless steel/ cast steel
Model and connections		BSA1T		BSA2T		BSA3T					BSA6T	BSA64T
		PN16	KS 10	PN16	PN25	PN25	PN40	ASME 150	ASME 300	KS 20	PN40	PN40
Sizes	DN15 (½")	•	•	•	•		•	•	•	•	•	•
	DN20 (¾")	•	•	•	•		•	•	•	•	•	•
	DN25 (1")	•	•	•	•		•	•	•	•	•	•
	DN32 (1¼")	•	•	•	•		•				•	•
	DN40 (1½")	•	•	•	•		•	•	•	•	•	•
	DN50 (2")	•	•	•	•		•	•	•	•	•	•
	DN65 (2½")	•	•	•	•		•				•	•
	DN80 (3")	•	•	•	•		•	•	•	•	•	•
	DN100 (4")	•	•	•	•		•	•	•	•	•	•
	DN125 (5")	•	•	•	•		•					
	DN150 (6")	•	•	•	•		•		•	•		
	DN200 (8")	•	•	•	•	•			•	•		
	DN250 (10")				•							
Optional R-PTFE soft seat	DN15 (½")	•	•	•	•		•	•	•	•	•	•
	DN20 (¾")	•	•	•	•		•	•	•	•	•	•
	DN25 (1")	•	•	•	•		•	•	•	•	•	•
	DN32 (1¼")	•	•	•	•						•	•
	DN40 (1½")	•	•	•	•		•	•	•	•	•	•
	DN50 (2")	•	•	•	•		•	•	•	•	•	•
	DN65 (2½")	•	•	•	•						•	•
	DN80 (3")	•	•	•	•		•	•	•	•	•	•
	DN100 (4")	•	•	•	•		•	•	•	•	•	•

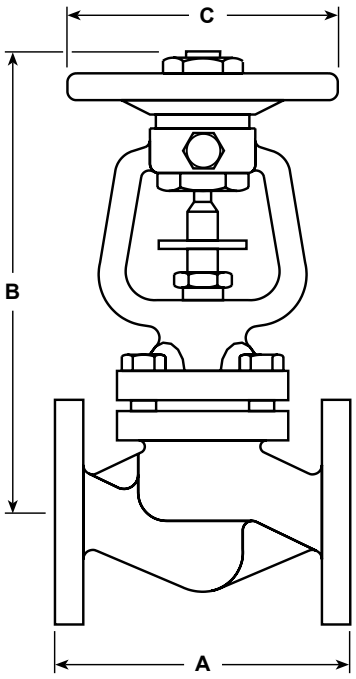
Range and options (continued)

Alternative BSA range - complete with flat disc option

Material		Cast iron		SG iron		Cast steel					Stainless steel	Stainless steel/ cast steel
Model and connections		BSA1		BSA2		BSA3						
		PN16	KS 10	PN16	PN25	PN25	PN40	ASME 150	ASME 300	KS 20		
Sizes	DN125 (5")	•	•	•	•		•					
	DN150 (6")	•	•	•	•		•		•	•		
	DN200 (8")	•	•	•	•	•			•	•		
	DN250 (10")				•							
Optional balancing disc	DN125 (5")				•		•					
	DN150 (6")			•	•		•		•	•		
	DN200 (8")	•	•	•	•	•			•	•		
	DN250 (10")				•							

Dimensions/weights

(approximate) in mm (inches) and kg (lbs)



Size	A					B	C	Weight				
	PN	JIS/KS 10K	JIS/KS 20K	ASME 150	ASME 300			BSA1 BSA1T BSA2 BSA2T	BSA3 (DIN)	BSA3 (ASME) ANSI 150	BSA3 ASME 300 JIS/KS 20K	BSA6T BSA64T PN40
DN15 (½")	130 (5.1)	133 (5.2)	152 (5.9)	108 (4.3)	152 (5.9)	205 (8.1)	125 (4.9)	4 (9)	4 (9)	5 (11)	6 (13)	4 (9)
DN20 (¾")	150 (5.9)	153 (6.0)	178 (7.0)	117 (4.6)	178 (7.0)	205 (8.1)	125 (4.9)	4 (9)	5 (11)	6 (13)	7 (15)	5 (11)
DN25 (1")	160 (6.3)	163 (6.4)	200 (7.9)	127 (5.0)	203 (8.0)	217 (8.5)	125 (4.9)	5 (11)	6 (13)	8 (18)	9 (20)	6 (13)
DN32 (1¼")	180 (7.1)	183 (7.2)				217 (8.5)	125 (4.9)	7 (15)	8 (18)			8 (18)
DN40 (1½")	200 (7.9)	203 (8.0)	224 (8.8)	165 (6.5)	229 (9.0)	243 (9.6)	200 (7.9)	10 (22)	11 (24)	10 (22)	11 (24)	11 (24)
DN50 (2")	230 (9.1)	229 (9.0)	259 (10.2)	203 (8.0)	267 (10.5)	243 (9.6)	200 (7.9)	12 (26)	14 (31)	12 (26)	15 (33)	14 (31)
DN65 (2½")	290 (11.4)	293 (11.5)				263 (10.4)	200 (7.9)	16 (35)	19 (42)			19 (42)
DN80 (3")	310 (12.2)	309 (12.1)	304 (12.0)	241 (9.5)	317 (12.5)	287 (11.3)	200 (7.9)	21 (46)	26 (57)	25 (55)	29 (64)	26 (57)
DN100 (4")	350 (13.8)	349 (13.7)	340 (13.4)	292 (11.5)	356 (14.0)	383 (15.0)	315 (12.4)	36 (79)	44 (97)	41 (90)	49 (108)	44 (97)
DN125 (5")	400 (15.7)	395 (15.6)				416 (16.4)	315 (12.4)	52 (115)	64 (141)			
DN150 (6")	480 (18.9)	479 (14.8)	428 (16.9)		445 (17.5)	450 (17.7)	400 (15.7)	75 (165)	88 (194)		94 (207)	
DN200 (8")	600 (23.6)	592 (23.3)	537 (21.1)		559 (22.0)	622 (24.5)	500 (19.7)	145 (320)	180 (397)		193 (425)	
DN250 (10")	730 (28.7)					(763 (30.0)	500 (19.7)	*180 (397)				

*(BSA2T/BSA2 only)

Seat leakage

Disc to seat shut-off conforms to EN 12266-1 Rate A leakage.

Kv values - all options

Size	DN15 (½")	DN20 (¾")	DN25 (1")	DN32 (1¼")	DN40 (1½")	DN50 (2")	DN65 (2½")	DN80 (3")	DN100 (4")	DN125 (5")	DN150 (6")	DN200 (8")	DN250 (10")
Kv	4	7	12	19	30	47	77	120	193	288	410	725	1 145

For conversion:
Cv (UK) = Kv x 0.963
Cv (US) = Kv x 1.156

Note: For Kv values and flow characteristic values of the **BSA1T, BSA2T** and **BSA3T** see the next section 'BSAT flow data'.

BSAT flow data

Size	BSAT valve												
	DN15 (½")	DN20 (¾")	DN25 (1")	DN32 (1¼")	DN40 (1½")	DN50 (2")	DN65 (2½")	DN80 (3")	DN100 (4")	DN125 (5")	DN150 (6")	DN200 (8")	DN250 (10")
Handwheel rotations	**Kv values for given handwheel rotations tested to EN 60534-2-3 Water at 20 °C (68 °F)**												
0	0	0	0	0	0	0	0	0	0	0	0	0	0
0.5	1.2	1.2	1.4	2.2	4.4	4.1	5.6	10.4	12.0	21	28	66	110
1	1.7	1.7	2.0	3.7	5.0	5.0	7.0	11.5	14.3	23	30	81	140
1.5	2.7	2.9	2.9	5.0	5.5	6.0	9.2	13.6	24.5	26	33	97	150
2	3.6	4.0	4.6	7.9	7.6	7.2	11.6	16.3	34.1	42	46	111	165
2.5	4.4	5.3	6.4	10.6	11.0	9.7	12.4	18.5	59.6	67	65	149	190
3	5.4	6.6	8.5	13.8	14.7	14.1	13.0	21.1	86.2	94	90	199	225
4			10.6	17.0	22.6	24.4	25.2	24.5	123.0	140	152	302	330
4.5			11.2	18.3	24.4	29.4	32.5	29.0	139.0	181	177	355	451
5			11.9	19.6	27.2	37.0	43.6	39.1	164.1	185	216	403	460
6					28.9	46.2	60.2	61.0	179.0	220	264	455	600
6.5					29.1	47.0	63.0	69.0	186.0	230	288	480	641
6.7					29.3	47.2	64.3	73.0		235	293	487	656
7							65.9	78.0		241	305	495	678
8							71.2	90.0		259	337	507	738
8.5							74.6	92.0			348	522	760
9.5								99.0			369		793
10								101.6					805
10.7													827

To convert Kv to volume flowrate in m³/h:

$\dot{Q} = Kv \times \sqrt{\Delta P}$

Where:

$\dot{Q}$ = Volume flow in cubic m/h

ΔP = Pressure drop in bar

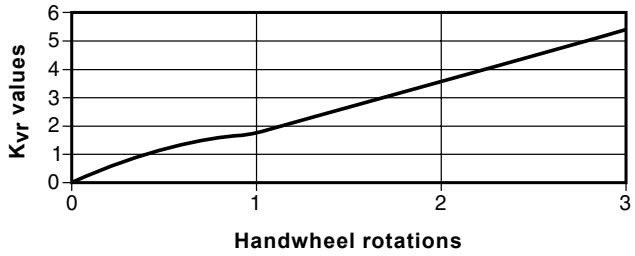
Note: The maximum recommended differential pressure in throttling function:

If the BSAT is used above these quoted figures, increased noise and vibration may be experienced.

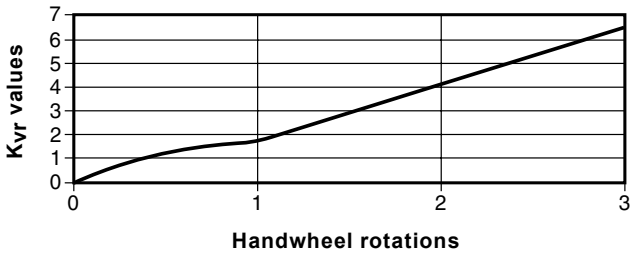
DN15 - DN80	2.0 bar (29 psi)
DN100 - DN125	1.5 bar (22 psi)
DN150	1.0 bar (15 psi)
DN200 - DN250	0.8 bar (12 psi)

The following graphs show handwheel rotation and flow characteristic with water at 20 °C (68 °F):

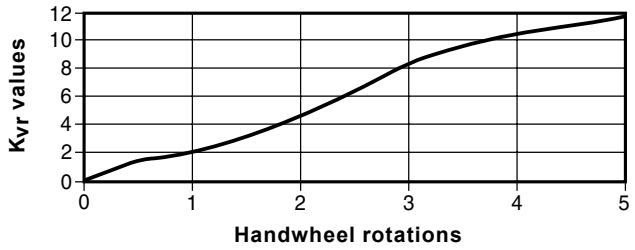
BSAT - DN15 (½")



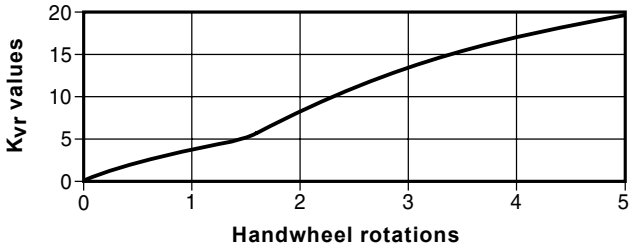
BSAT - DN20 (¾")



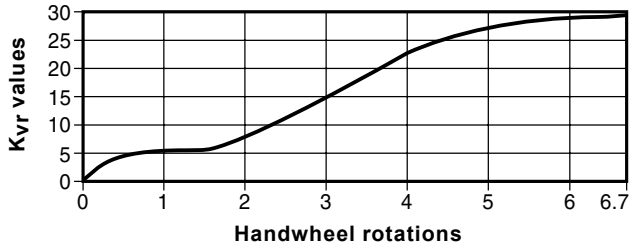
BSAT - DN25 (1")



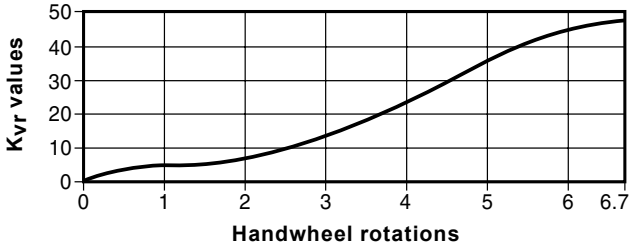
BSAT - DN32 (1¼")



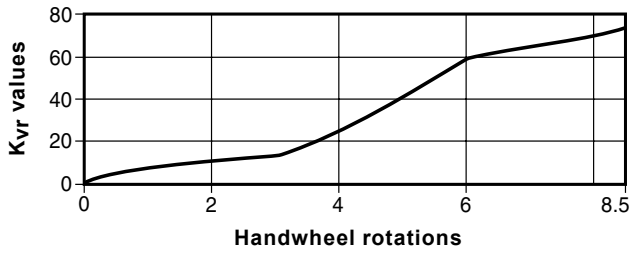
BSAT - DN40 (1½")



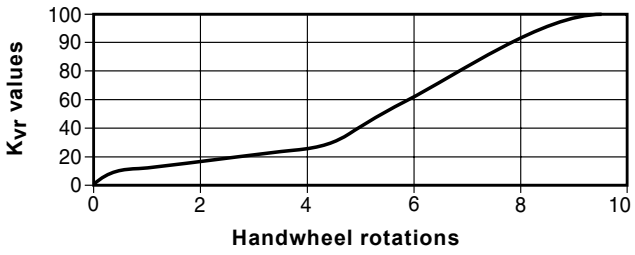
BSAT - DN50 (2")



BSAT - DN65 (2½")



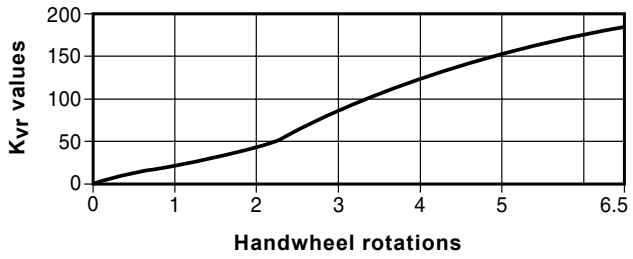
BSAT - DN80 (3")



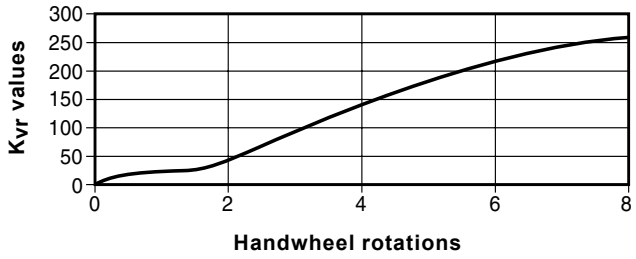
Handwheel rotation and flow characteristics continued on next page

Handwheel rotation and flow characteristics (continued)

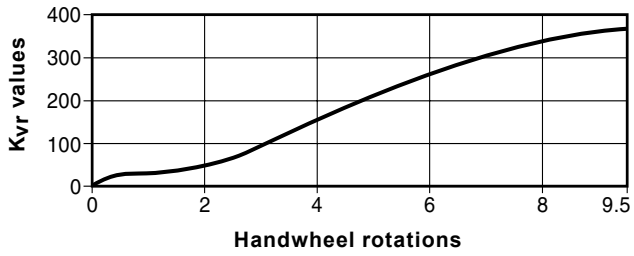
BSAT - DN100 (4")



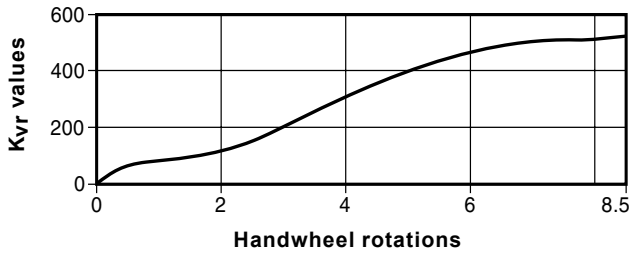
BSAT - DN125 (5")



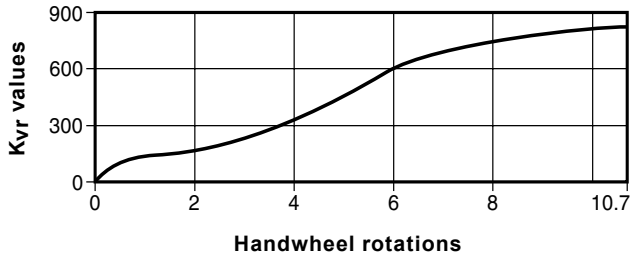
BSAT - DN150 (6")



BSAT - DN200 (8")

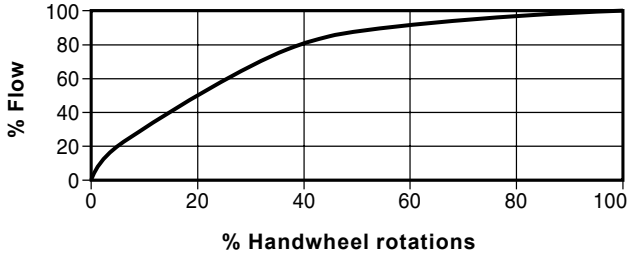


BSAT - DN250 (10")



Typical standard flat disc

for the BSA1, BSA2 and BSA3



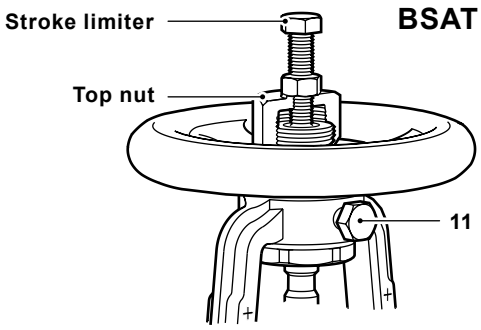
Materials for the BSA1T, BSA2T, BSA3T and BSA1, BSA2, BSA3

No.	Part			BSA1T and BSA1	BSA2T and BSA2	BSA3T and BSA3 DIN	BSA3T and BSA3 ANSI
1	Body			Cast iron EN-GJL-250 (5.1301)	SG iron EN-GJS-400-18-LT (5.3103)	Cast steel 1.0619+N (GSC 25N)	Cast steel ASTM A 216 WCB
2	Bonnet			SG iron EN-GJS-400-18-LT (5.3103)		Steel (DN15 - DN80) DIN 17243 C 22.8	Forged steel (DN15- DN80) ASTM A 105
						Steel (DN100 - DN200) 1.0619+N (GSC 25N)	Cast steel (DN100- DN200) ASTM A 216 WCB
3	Seat			Stainless steel AISI 420			
4	Disc	Metal		Stainless steel DIN 17440 X30 Cr13			
		Soft seat	Disc	Stainless steel DIN 17440 X30 Cr13			
			Insert	R-PTFE 25% carbon filled			
5	Bellows			Stainless steel WS 1.4571 EN10028-7 X6 CrNiMTi 17-12-2			
6	Stem			Stainless steel AISI 420			
7	Handwheel			Pressed steel BS 1449 CR4			
8	Stem packing			Graphite			
	Bonnet studs				Steel DIN 17420 24 Cr Mo 5		Steel ASTM A 193 B7
9	Bonnet nuts				Steel DIN 17420 Ck 35		Steel ASTM A 192 2 H
	Bonnet bolts			Steel DIN 931 Gr. 5.6			
10	Body/bonnet gasket			Graphite laminated with stainless steel insert			
11	Locking screw	DN15 (½") - DN80 (3")		Steel M8 x 14 mm BS 3692 Gr. 8.8			
		DN100 (4") - DN150 (6")		Steel M8 x 20 mm BS 3692 Gr. 8.8			
		DN200 (8") - DN250 (10")		Steel M12 x 20 mm BS 3692 Gr. 8.8			
12	'D' washer			Mild steel			
13	Circlip			Mild steel			
14	Protective cap			Plastic			
15	Top nut			Steel			

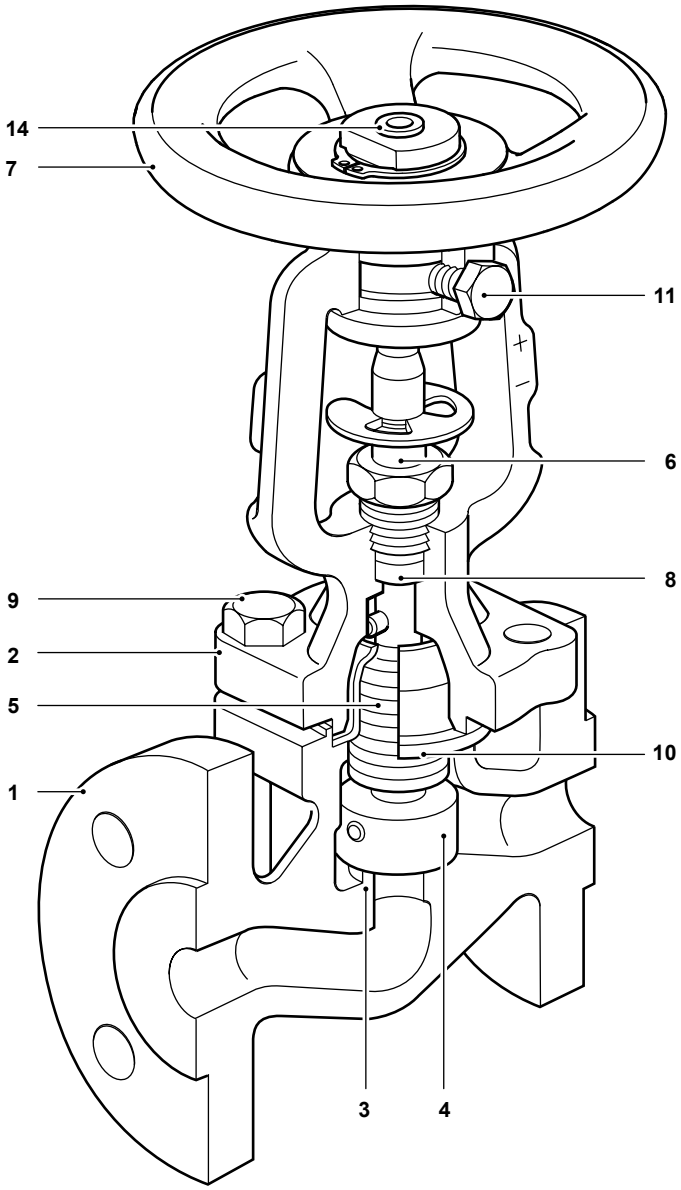
Stroke limiter for throttling versions

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.

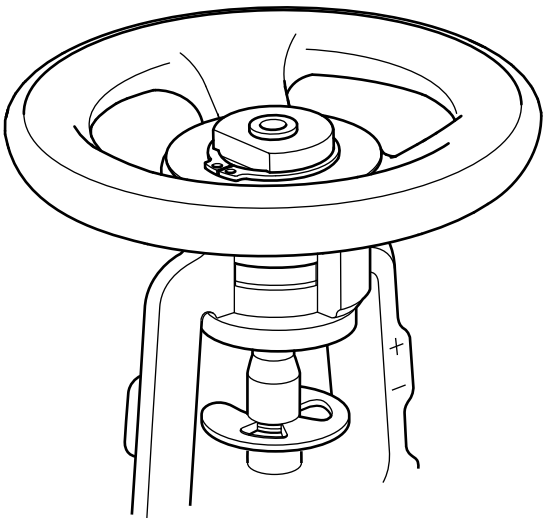
Size	Hexagon bolt
DN15 (½") - DN80 (3")	M8 x 50 mm
DN100 (4") - DN150 (6")	M12 x 75 mm
DN200 (8") - DN250 (10")	M12 x 100 mm

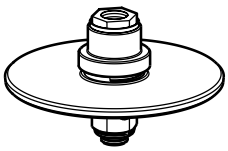


BSAT



BSA





DN150 (6") shown

Optional balancing disc assembly

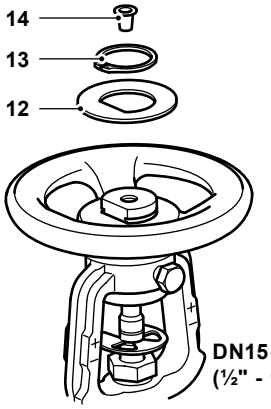
Used above	25 bar (363 psi) ΔP	DN125	5"
	17 bar (247 psi) ΔP	DN150	6"
	10 bar (145 psi) ΔP	DN200	8"
	6 bar (87 psi) ΔP	DN250	10"(BSA2 only)



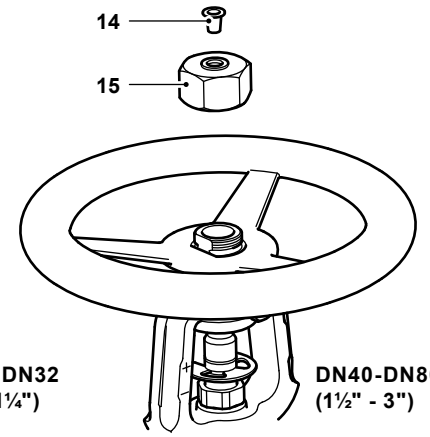
Optional soft sealing disc

Across the size range there are three hand wheel retention methods

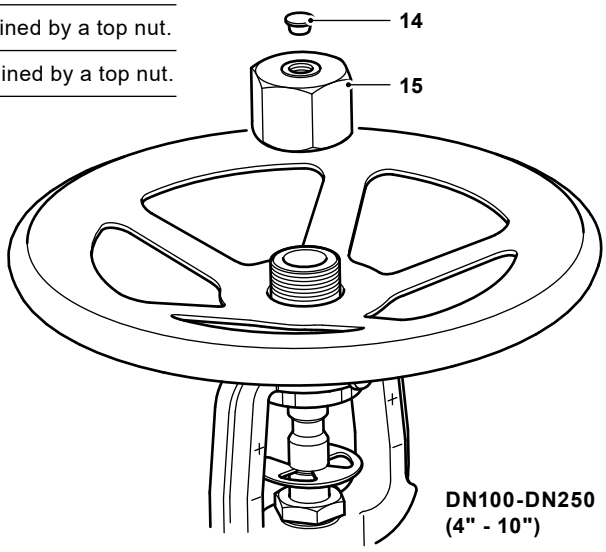
Sizes	DN15 (½") - DN32 (1¼")	have a 'D' drive hand wheel retained by a 'D' washer and circlip.
	DN40 (1½") - DN80 (3")	have a 'D' drive hand wheel retained by a top nut.
	DN100 (4") - DN250 (10")	have a screwed hand wheel retained by a top nut.



DN15-DN32 (½" - 1¼")



DN40-DN80 (1½" - 3")



DN100-DN250 (4" - 10")

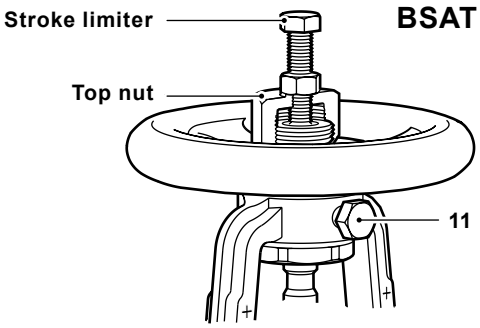
Materials for the BSA6T and BSA64T

No.	Part		BSA6T	BSA64T
1	Body		Stainless steel EN 10213 1.4408 or ASTM A351 CF8M	Stainless steel EN 10213 1.4408 or ASTM A351 CF8M
2	Bonnet		Stainless steel EN 10213 1.4581	Carbon steel DN15 - DN80 DIN 117243 C22.8 Carbon steel DN100 10619+N (GSC 25N)
3	Seat		Stainless steel EN 10213 1.4408 or ASTM A351 CF8M	
4	Disc	DN15 (½") - DN40 (1½")	Stainless steel EN 10088 1.4571	
		DN50 (2") - DN100 (4")	Stainless steel EN 100222 1.4571	
5	Bellows		Stainless steel DIN 17440 1.4571	
6	Stem		Stainless steel EN 10088 1.4571	
7	Handwheel		Pressed steel BS 1449 CR4	
8	Stem packing		Graphite	
9	Bonnet studs		Stainless steel A4-70	
	Bonnet nuts		Stainless steel A4	
10	Body/bonnet gasket		Graphite laminated with stainless steel insert	
11	Locking screw	DN15 (½") - DN80 (3")	Steel M8 x 14 mm A2-70	
		DN100 (4")	Steel M8 x 20 mm A2-70	

Stroke limiter for throttling versions

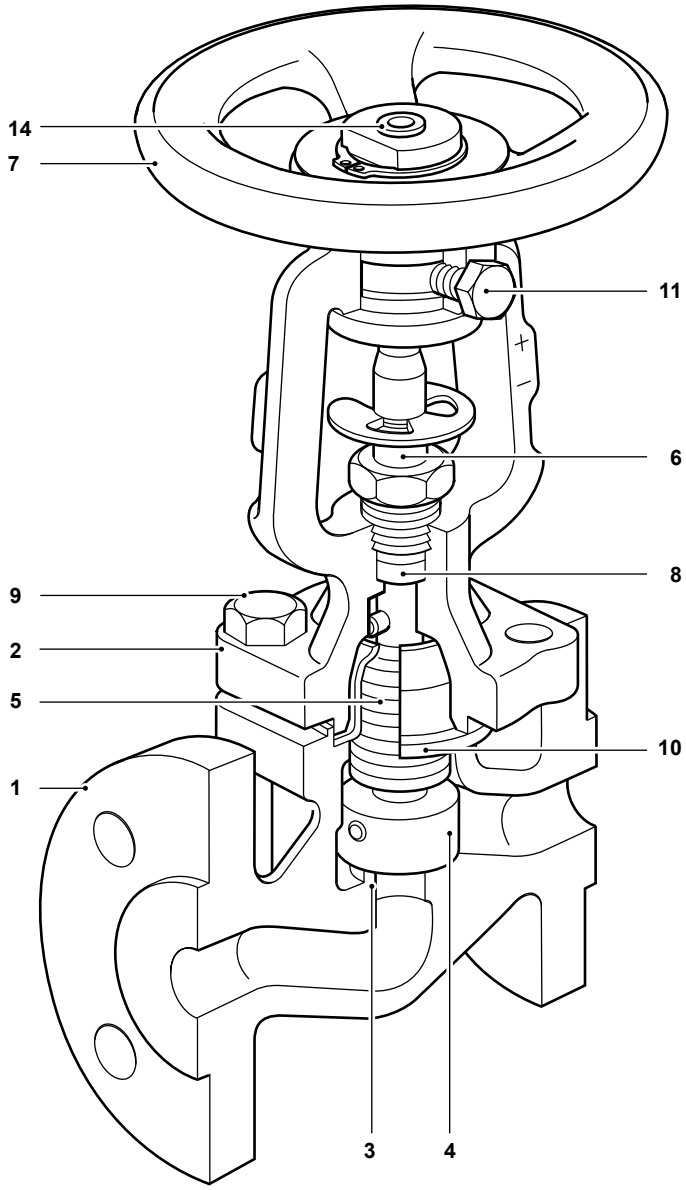
The handwheel nut on the **BSA6T and BSA64T** has a threaded hole for provision of a stroke limiter. Customer to supply standard nuts and bolts as indicated in the table below.

Size	Hexagon bolt
DN15 (½") - DN80 (3")	M8 x 50 mm
DN100 (4")	M12 x 75 mm



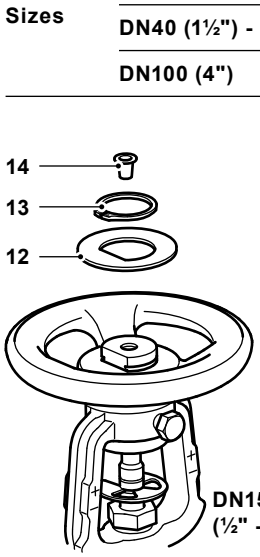
BSAT

DN15-DN32 shown (½"-1¼")

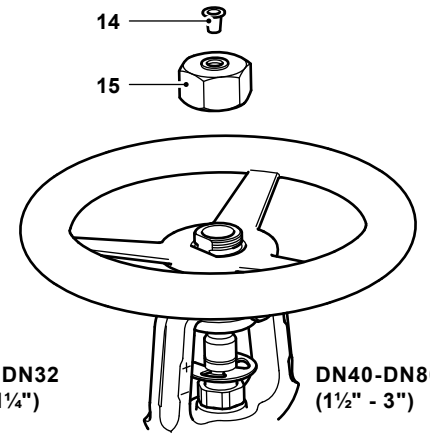


Across the size range there are three hand wheel retention methods

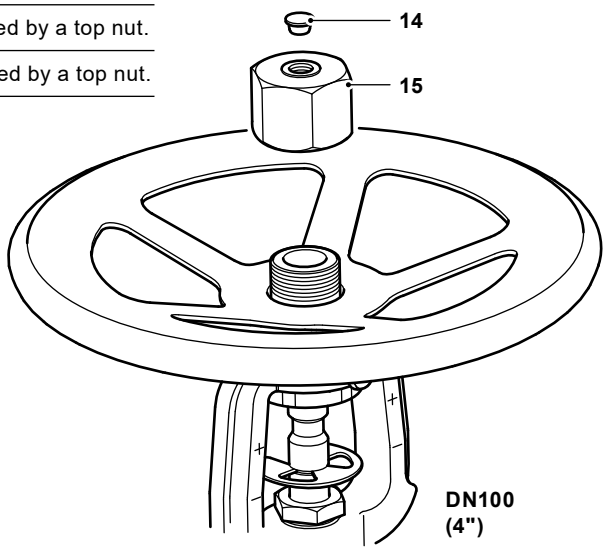
Sizes	**DN15 (½") - DN32 (1¼")**	have a 'D' drive hand wheel retained by a 'D' washer and circlip.
	DN40 (1½") - DN80 (3")	have a 'D' drive hand wheel retained by a top nut.
	DN100 (4")	have a screwed hand wheel retained by a top nut.



DN15-DN32 (½" - 1¼")



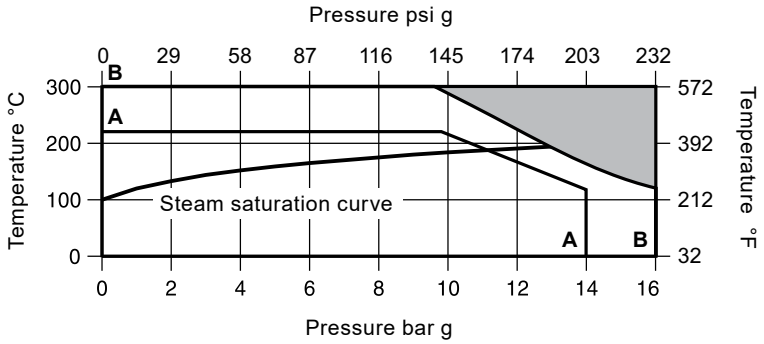
DN40-DN80 (1½" - 3")



DN100 (4")

Product limitations

BSA1T and BSA1



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

A - B Flanged JIS/KS 10K

A - C Flanged PN16

Note: ΔPMX Maximum differential pressure is limited to the PMO.

Body design conditions			PN16	JIS/KS 10K
PMA	Maximum allowable pressure		16 bar g (232 psi g)	14 bar g (203 psi g)
TMA	Maximum allowable temperature		300 °C (572 °F)	220 °C (428 °F)
PMO	Maximum operating pressure for saturated steam service		12.9 bar g (187 psi g)	11 bar g (160 psi g)
TMO	Maximum operating temperature	Soft seat	230 °C (446 °F)	220 °C (428 °F)
		Metal seat	300 °C (572 °F)	220 °C (428 °F)
Minimum operating temperature			-10 °C (14 °F)	-10 °C (14 °F)
Designed for a maximum cold hydraulic test pressure of:			24 bar g (348 psi g)	20 bar g (290 psi g)

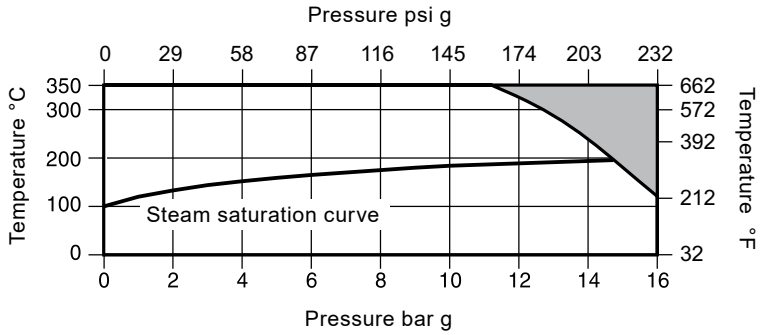
Maximum permissible differential pressure in throttling function:

DN15 - DN80 (½" - 3")	2.0 bar (29 psi)
DN100 - DN125 (4" - 5")	1.5 bar (22 psi)
DN150 (6")	1.0 bar (15 psi)
DN200 - DN250 (8" - 10")	0.8 bar (12 psi)

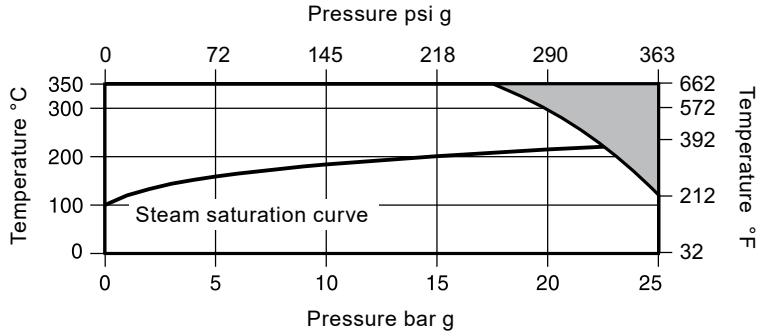
Product limitations (continued)

BSA2T and BSA2

PN16



PN25, DN200 (8")



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

Note: ΔPMX Maximum differential pressure is limited to the PMO.

Body design conditions			PN16	PN25, DN200 (8")
PMA	Maximum allowable pressure		16 bar g (232 psi g)	25 bar g (363 psi g)
TMA	Maximum allowable temperature		350 °C (662 °F)	350 °C (662 °F)
PMO	Maximum operating pressure for saturated steam service		14.7 bar g (213 psi g)	22.3 bar g (323 psi g)
TMO	Maximum operating temperature	Soft seat	230 °C (446 °F)	230 °C (446 °F)
		Metal seat	350 °C (662 °F)	350 °C (662 °F)
Minimum operating temperature			-10 °C (14 °F)	-10 °C (14 °F)
Designed for a maximum cold hydraulic test pressure of:			24 bar g (348 psi g)	38 bar g (551 psi g)

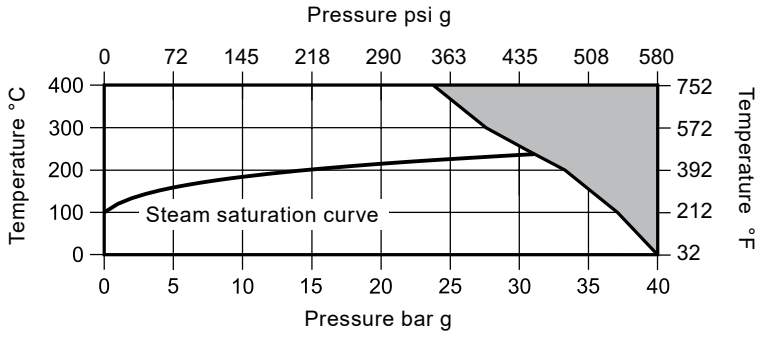
Maximum permissible differential pressure in throttling function:

DN15 - DN80 (½" - 3")	2.0 bar (29 psi)
DN100 - DN125 (4" - 5")	1.5 bar (22 psi)
DN150 (6")	1.0 bar (15 psi)
DN200 - DN250 (8" - 10")	0.8 bar (12 psi)

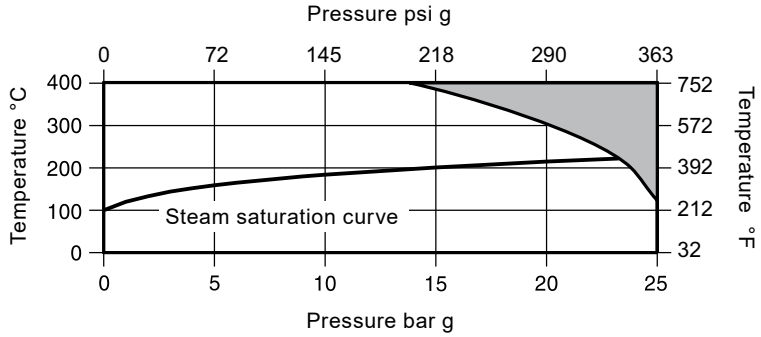
Product limitations (continued)

BSA3T and BSA3 (DIN)

PN40, DN15 - DN150 (½" - 6")



PN25, DN200 (8")



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

Note: ΔPMX Maximum differential pressure is limited to the PMO.

Body design conditions			PN25, DN200 (8")	PN40, DN15 - DN150 (½" - 6")
PMA	Maximum allowable pressure		25 bar g (363 psi g)	40 bar g (580 psi g)
TMA	Maximum allowable temperature		400 °C (752 °F)	400 °C (752 °F)
PMO	Maximum operating pressure for saturated steam service		23.2 bar g (336 psi g)	* 30.4 bar g (441 psi g)
TMO	Maximum operating temperature	Soft seat	230 °C (446 °F)	230 °C (446 °F)
		Metal seat	400 °C (752 °F)	400 °C (752 °F)
Minimum operating temperature			-10 °C (14 °F)	-10 °C (14 °F)
Product is safe for use under full vacuum conditions				
Designed for a maximum cold hydraulic test pressure of:			38 bar g (551 psi g)	60 bar g (870 psi g)

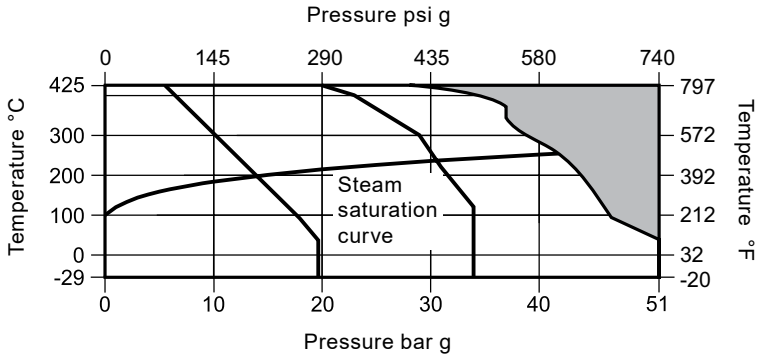
* Maximum operating pressure is limited to 27 bar g (392 psi g) for the soft seat version only

Maximum permissible differential pressure in throttling function:

DN15 - DN80 (½" - 3")	2.0 bar (29 psi)
DN100 - DN125 (4" - 5")	1.5 bar (22 psi)
DN150 (6")	1.0 bar (15 psi)
DN200 - DN250 (8" - 10")	0.8 bar (12 psi)

Product limitations (continued)

BSA3T and BSA3 (ASME)



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

C - D Flanged ASME 150

C - E Flanged JIS/KS 20K

C - F Flanged ASME 300

Note: ΔPMX Maximum differential pressure is limited to the PMO.

Body design conditions			ASME 150	ASME 300	JIS/KS 20K
PMA	Maximum allowable pressure		19.6 bar g (284 psi g)	51 bar g (740 psi g)	34 bar g (493 psi g)
TMA	Maximum allowable temperature		425 °C (797 °F)	425 °C (797 °F)	425 °C (797 °F)
PMO	Maximum operating pressure for saturated steam service		14 bar g (203 psi g)	*41.6 bar g (603 psi g)	*30.7 bar g (445 psi g)
TMO	Maximum operating temperature	Soft seat	230 °C (446 °F)	230 °C (446 °F)	230 °C (446 °F)
		Metal seat	425 °C (797 °F)	425 °C (797 °F)	425 °C (797 °F)
Minimum operating temperature			-29 °C (-20 °F)	-29 °C (-20 °F)	0 °C (32 °F)
Product is safe for use under full vacuum conditions					
Designed for a maximum cold hydraulic test pressure of:			31 bar g (450 psi g)	77 bar g (1117 psi g)	50 bar g (725 psi g)

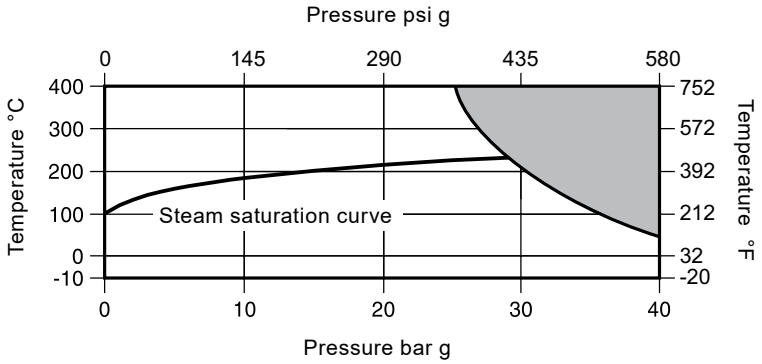
* Maximum operating pressure is limited to 27 bar g (391 psi g)for the soft seat version only

Maximum permissible differential pressure in throttling function:

DN15 - DN80 (½" - 3")	2.0 bar (29 psi)
DN100 - DN125 (4" - 5")	1.5 bar (22 psi)
DN150 (6")	1.0 bar (15 psi)
DN200 - DN250 (8" - 10")	0.8 bar (12 psi)

Product limitations (continued)

BSA6T and BSA64



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

Note: ΔPMX Maximum differential pressure is limited to the PMO.

Body design conditions				**PN40**
PMA	Maximum allowable pressure			40 bar g @ 50 °C (580 psi g @ 122 °F)
TMA	Maximum allowable temperature			400 °C @ 25 bar g (752 °F @ 363 psi g)
Minimum allowable temperature				-10 °C (14 °F)
PMO	Maximum operating pressure for saturated steam service	Metal seat		29.8 bar g @ 236 °C (432 psi g @ 457 °F)
		Soft seat		27.0 bar g @ 230 °C (391 psi g @ 446 °F)
TMO	Maximum operating temperature	Metal seat		400 °C @ 25.6 bar g (752 °F @ 371 psi g)
		Soft seat		230 °C @ 27.0 bar g (446 °F @ 391 psi g)
Minimum operating temperature				-10 °C (14 °F)
ΔPMX	Maximum differential pressure	On/off function		Limited to the PMO
		Throttling function	DN15 - DN80 (½" - 3")	2 bar (29 psi)
			DN100 (4")	1.5 bar (22 psi)
Designed for a maximum cold hydraulic test pressure of:				60 bar g (870 psi)

Maximum permissible differential pressure in throttling function:

DN15 - DN80 (½" - 3")	2.0 bar (29 psi)
DN100 (4")	1.5 bar (22 psi)

Safety information, installation and maintenance

For full details see the Installation and Maintenance Instructions (IM-P137-02) supplied with the product.

Installation note

Install in the direction of flow given by the arrow on the body with the handwheel in a suitable position.

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 DN25 Spirax Sarco type BSA2T bellows sealed stop valve, flanged PN16 or PN25.

Note: Should the differential pressure exceed those listed against the respective sizes in the table opposite, then please ensure balancing discs are specified for use in the valves (see page 9).

Size	DN125 (5")	DN150 (6")	DN200 (8")	DN250 (10")
ΔP in bar (psi)	25 (363)	17 (247)	10 (145)	6 (87)

Spare parts

The spare parts are shown in heavy outline.
Parts drawn in a grey line are not supplied as spares.

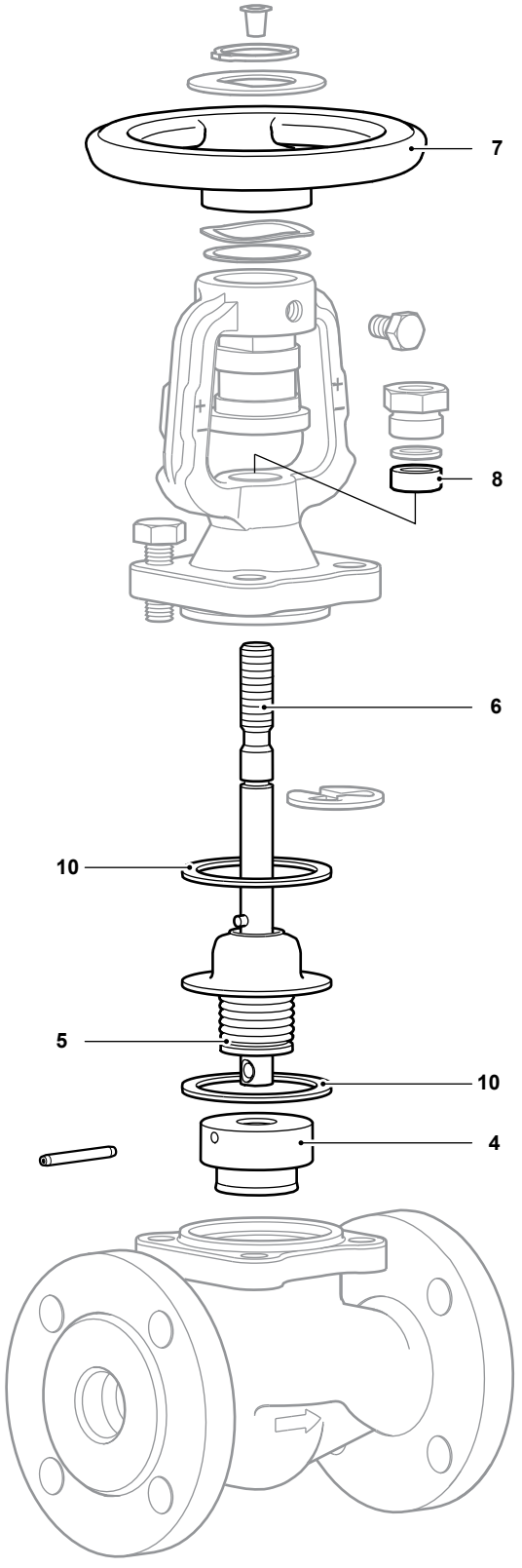
Available spares

Body/bonnet gasket and stem packing	**10, 8 (2 off)**
Stem and bellows assembly (state if BSAT or BSA)	**5, 6, 8, 10**
Disc (and optional disc where fitted) - state full description of the valve	**4, 8, 10**
Handwheel	**7**

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 DN15 Spirax Sarco BSA2T PN16 bellows sealed stop valve.



DN15 - DN32 (½" - 1¼") shown

TI-P132-09
CMGT Issue 8

A3S and A3SS
Bellows Sealed Stop Valve

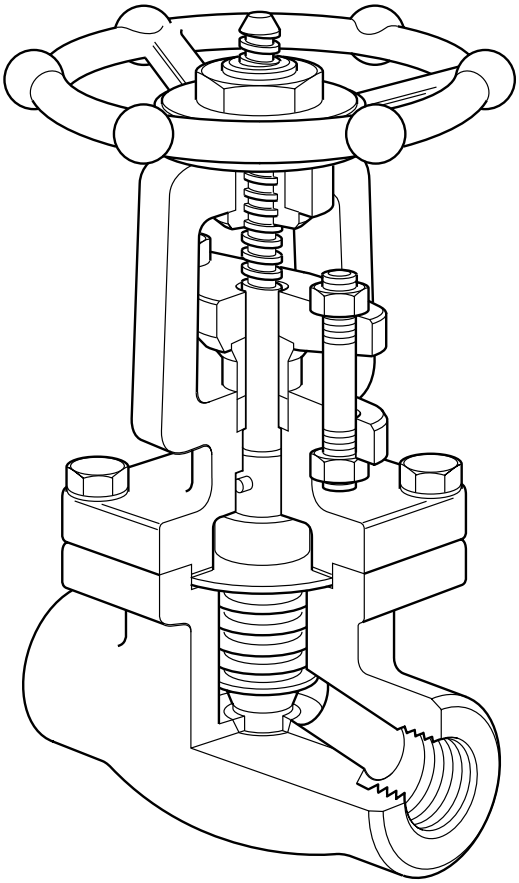
Description
A screwed and socket weld bellows sealed, in-line stop valve for use on steam, gas, liquid, condensate and water systems.

Standards
This product fully complies with the requirements of the Pressure Equipment Directive (PED).
The valve bellows fatigue life conforms to ISO 15761.

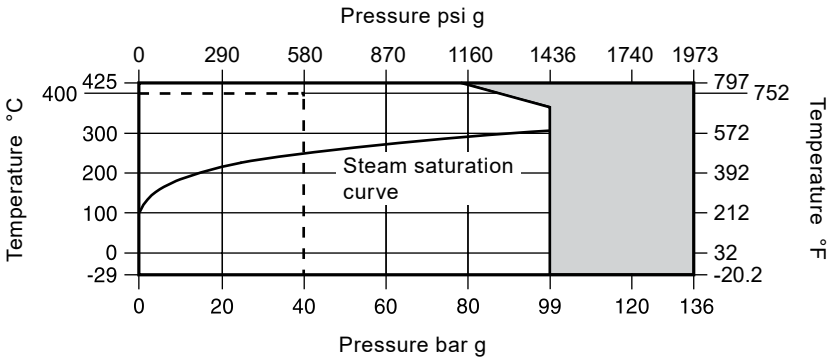
Seat leakage
Disc to seat shut-off conforms to API 598 and DIN 3230 leakage rate B01.

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
½", ¾", 1", 1¼", 1½" and 2"
Screwed BSP (BS 21 parallel), NPT
Socket weld to BS 3799/ANSI B 16.11



Pressure/temperature limits (Class 800)

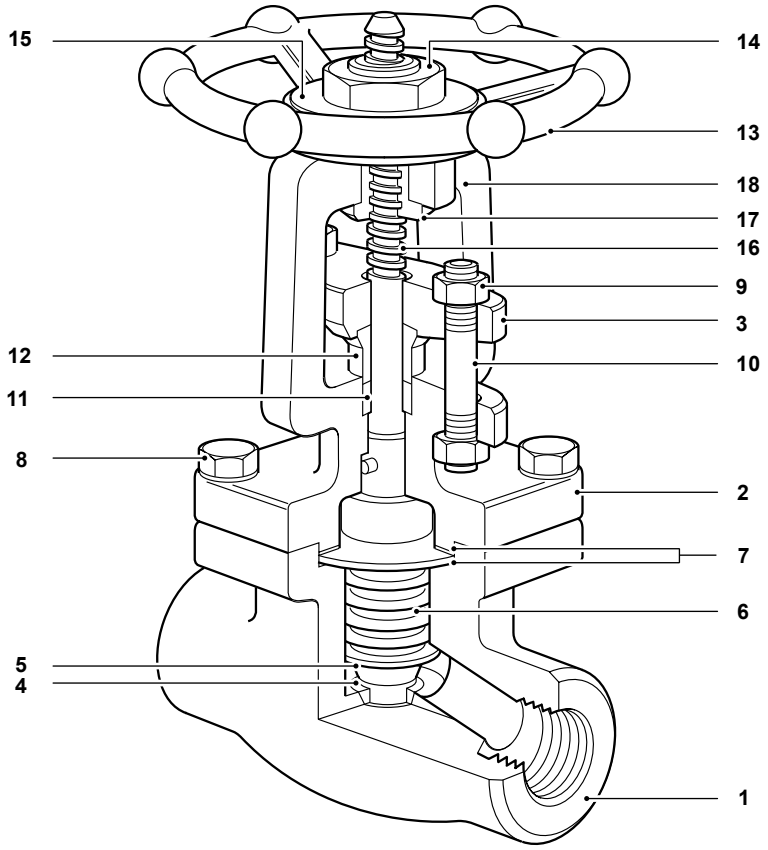


The product **must not** be used in this region.

Operating restrictions to conform to ISO 15761.

Body design conditions		Class 800
PMA Maximum allowable pressure	136 bar g	1973 psi g
TMA Maximum allowable temperature	425 °C	797 °F
Minimum allowable temperature	-29 °C	-20.2 °F
Maximum operating pressure	99 bar g @ 360 °C	1436 psi g @ 680 °F
PMO Maximum operating pressure for extended bellows life	40 bar g @ 400 °C	580 psi g @ 752 °F
Maximum operating temperature	425 °C	797 °F
TMO Maximum operating temperature for extended bellows life	400 °C @ 40 bar g	752 °F @ 580 psi g
Minimum operating temperature	-29 °C	-20.2 °F
Without the bellows fitted the unit is designed for a maximum cold hydraulic test pressure of:	212 bar g	3075 psi g

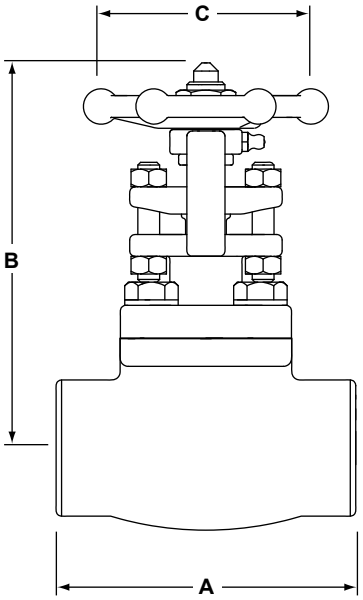
Materials



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	A3S	Stainless steel	ASTM A276 Type 410
		A3SS	Stainless steel	ASTM A276 Type 410 + stellite Gr. 6
6	Bellows		Stainless steel	ASTM A479 Type 321
7	Gaskets		Spirally wound stainless steel and graphite filler/graphite laminate with stainless steel insert.	
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	Gland follower		Stainless steel	ASTM A276 Type 410
13	Handwheel		Carbon steel	
14	Wheel nut		Carbon steel	
15	Name-plate		Stainless steel	
16	Stem		Stainless steel	ASTM A276 Type 410
17	Yoke nut		Stainless steel	ASTM A582 Type 410
18	Grease nipple		Carbon steel	

Dimensions/weights (approximate) in mm (inches) and kg (lbs)

Size	A	B (valve open)	C	Weight
½"	80 (3.15)	136 (5.35)	70 (2.76)	1.7 (3.75)
¾"	90 (3.54)	144 (5.67)	90 (3.54)	2.3 (5.07)
1"	110 (4.33)	167 (6.57)	110 (4.33)	3.6 (7.94)
1¼"	127 (5.00)	194 (7.64)	110 (4.33)	5.9 (13.0)
1½"	155 (6.10)	220 (8.66)	130 (5.12)	8.5 (18.7)
2"	170 (6.69)	230 (9.06)	180 (7.09)	11.6 (25.6)



Kv values

Size	½"	¾"	1"	1¼"	1½"	2"
Kv	1.3	3.2	5.8	9.0	17.0	19.2

For conversion:
Cv (UK) = Kv x 0.963
Cv (US) = Kv x 1.156

Safety information, installation and maintenance

For full details see the Installation and Maintenance Instructions (IM-P132-11) supplied with the product.

Installation note:

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

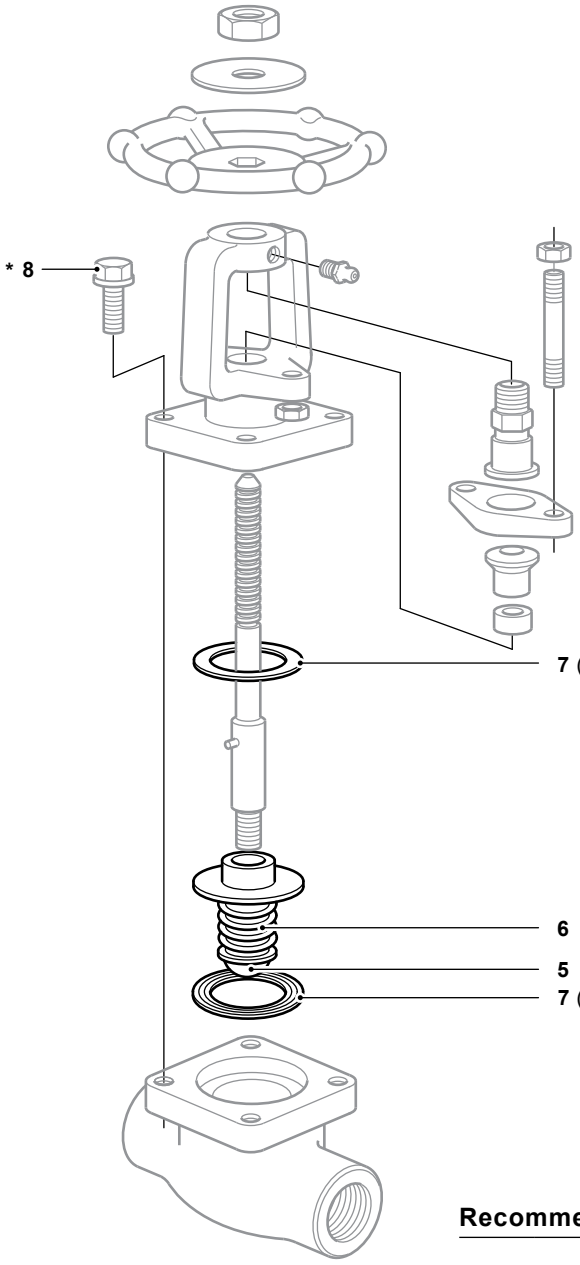
Example: 1 off Spirax Sarco A3S bellows sealed stop valve having screwed BSP connections.

Spare parts

The spare parts available are shown in heavy outline. Parts drawn in a grey line are not supplied as spares.

Available spares

Set of body gaskets	**7**
Maintenance kit (Disc and bellows assembly + body gaskets)	**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 off Maintenance kit plus 1 - Set of body gaskets for a 1" Spirax Sarco type A3S bellows sealed stop valve having screwed BSP connections.

* Please note: Item **8** is not an available spare.

Recommended tightening torques

Item	Part		or mm		N m	(lbf ft)
8	Body bolt	½"		M10	40 - 50	(30 - 37)
		¾"		M10	40 - 50	(30 - 37)
		1"		M12	70 - 90	(52 - 66)
		1¼"		M12	70 - 90	(52 - 66)
		1½"		M14	110 - 130	(82 - 96)
		2"		M16	160 - 190	(118 - 140)

TI-P184-08
CMGT Issue 10

Spirax SafeBloc™ DBB3 Double Block and Bleed Bellows Sealed Stop Valve

Description
The Spirax SafeBlocTM 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 PN40 or ANSI 300 connections.

Seat leakage
Disc to seat shut-off conforms to EN 12266-1 Rate A leakage.

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 DN15 flanged, ½" screwed BSP or NPT or ½" socket weld connection and must be stated at the time of order placement.

Standards
This product fully complies with the requirements of the European Pressure Equipment Directive 2014/68/EU and carries the CE mark when so required.

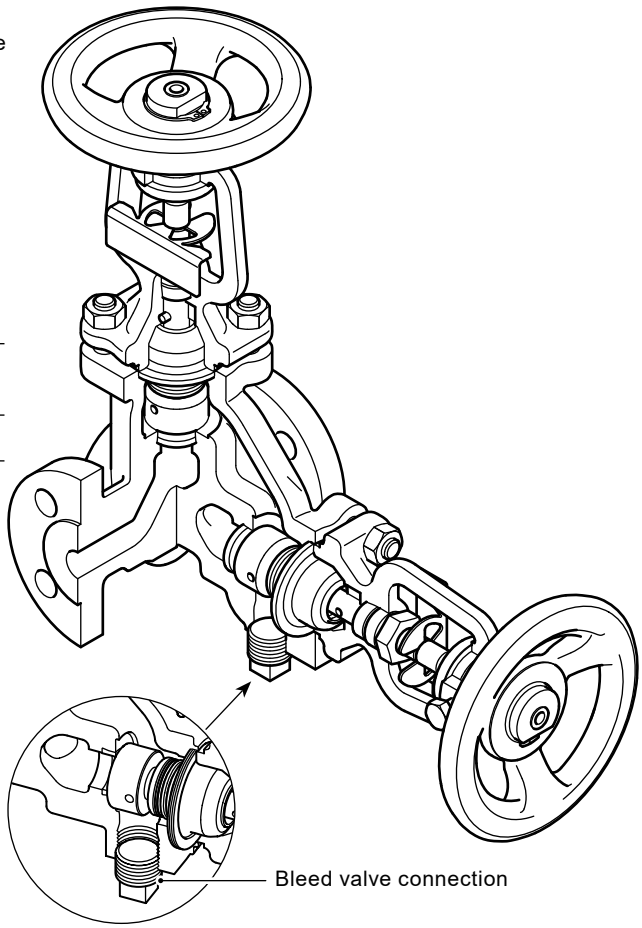
Certification
This product is available with certification to EN 10204 3.1.
Note: All certification/inspection requirements must be stated at the time of order placement.

Size and pipe connections
DN15, DN20, DN25, DN40, DN50, DN65, DN80 and DN100 (½", ¾", 1", 1½", 2", 2½", 3", and 4").
Flanged EN 1092 PN40 or ANSI B 16.5 Class 300.
Face-to-face dimensions conform to BS EN 558:2008.

Kv values

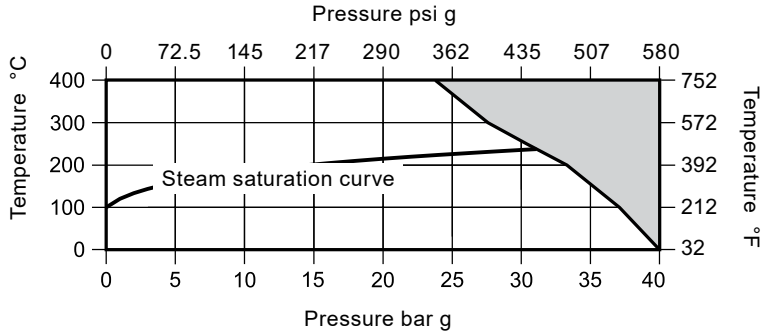
Size	DN15 (½")	DN20 (¾")	DN25 (1")	DN40 (1½")	DN50 (2")	DN65 (2½")	DN80 (3")	DN100 (4")
Kv	4	4.5	8	22	32	70	123	144

For conversion:
Cv (UK) = Kv x 0.963
Cv (US) = Kv x 1.156



Pressure/temperature limits (ISO 6552)

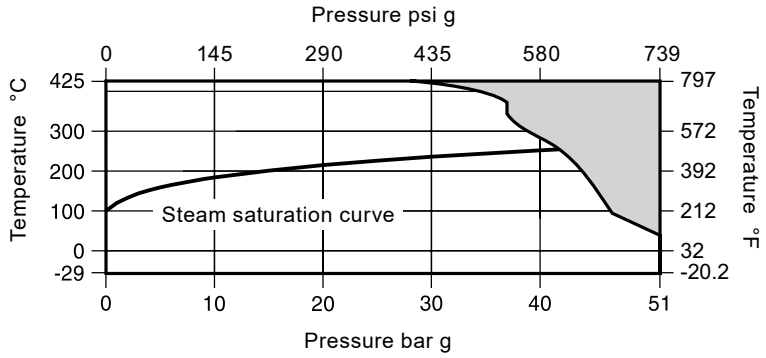
PN40



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

Body design conditions			PN40
PMA	Maximum allowable pressure	40 bar g @ 0 °C	580 psi g @ 32 °F
TMA	Maximum allowable temperature	400 °C @ 24 bar g	752 °F @ 348 psi g
Minimum allowable temperature		-10 °C	14 °F
PMO	Maximum operating pressure for saturated steam service	30.4 bar g	441 psi g
TMO	Maximum operating temperature	400 °C @ 24 bar g	752 °F @ 348 psi g
Minimum operating temperature (**Note:** For lower operating temperatures consult Spirax Sarco)		-10 °C	14 °F
Designed for a maximum cold hydraulic test pressure of:		60 bar g	870 psi g

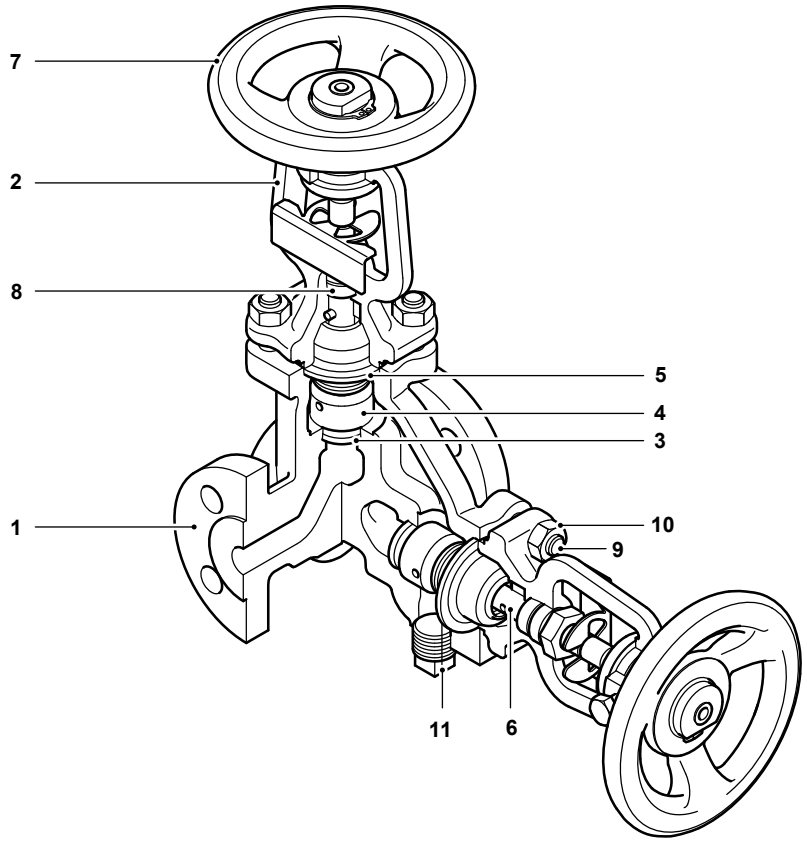
ANSI 300



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

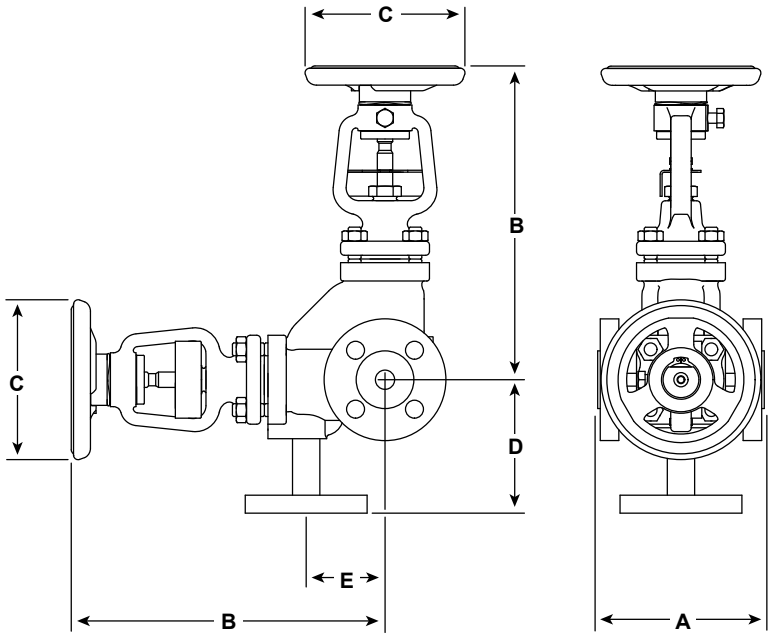
Body design conditions			ANSI 300
PMA	Maximum allowable pressure	51 bar g @ 37.7 °C	740 psi g @ 99.9 °F
TMA	Maximum allowable temperature	425 °C @ 28 bar g	797 °F @ 406 psi g
Minimum allowable temperature		-29 °C	-20.2 °F
PMO	Maximum operating pressure for saturated steam service	41.6 bar g	603 psi g
TMO	Maximum operating temperature	425 °C @ 28 bar g	797 °F @ 406 psi g
Minimum operating temperature (**Note:** For lower operating temperatures consult Spirax Sarco)		-29 °C	-20.2 °F
Designed for a maximum cold hydraulic test pressure of:		77 bar g	1117 psi g

Materials



No.	Part		Material		
1	Body		Cast steel	DIN	EN 10213-2 GP240GH
				ANSI	ASTM A 216 WCB
2	Bonnets	DN15 - DN80	Cast steel	DIN	EN 10213-2 GP240GH
				ANSI	ASTM A 216 WCB
		DN100	Cast steel	DIN	EN 10213-2 GP240 GH
				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	DIN	17240 24 Cr Mo 5
				ANSI	ASTM A 193 B7
10	Bonnet nuts		Steel	DIN	DIN 17240 Ck 35
				ANSI	ASTM A 192 2 H
11	Body/bonnet gaskets		Graphite laminated with stainless steel insert		

Dimensions/weights (approximate) in mm (inches) and kg (lbs)



Size	A		B	C	D	E	Weight
	PN	ANSI 300					
DN15 ½"	130 (5.12)	152 (5.98)	251 (9.88)	125 (4.92)	106 (4.17)	61.5 (2.42)	8.3 (18.3)
DN20 ¾"	150 (5.91)	178 (7.01)	248 (9.76)				9.2 (20.3)
DN25 1"	160 (6..30)	203 (7.99)	260 (10.2)		107 (4.21)	63.0 (2.48)	10.5 (23.1)
DN40 1½"	200 (7.87)	229 (9.02)	295 (11.6)	200 (7.87)	117 (4.61)	73.0 (2.87)	20.8 (45.9)
DN50 2"	230 (9.06)	267 (10.5)	307 (12.1)		121 (4.76)	83.5 (3.29)	25.2 (55.6)
DN65 2½"	290 (11.4)	292 (11.5)	342 (13.5)		129 (5.08)	100.0 (3.94)	37.1 (81.8)
DN80 3"	310 (12.2)	318 (12.5)	375 (14.8)		136 (5.35)	118.0 (4.65)	51.4 (113)
DN100 4"	350 (13.8)	356 (14.0)	503 (19.8)	315 (12.4)	147 (5.79)	147.5 (5.71)	92.0 (203)

Safety information, installation and maintenance

For full details see the Installation and Maintenance Instructions (IM-P165-02) 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 DN25 Spirax SafeBloc™ DBB3 double block and bleed bellows sealed stop valve having flanged PN40 connections. The bleed valve connection is to be DN15 flanged PN40.
Note: The bleed valve is to be ordered separately. For example: 1 off Spirax Sarco DN15 BSA3 bellows sealed stop valve having flanged PN40 connections.

Spare parts

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

Available spares

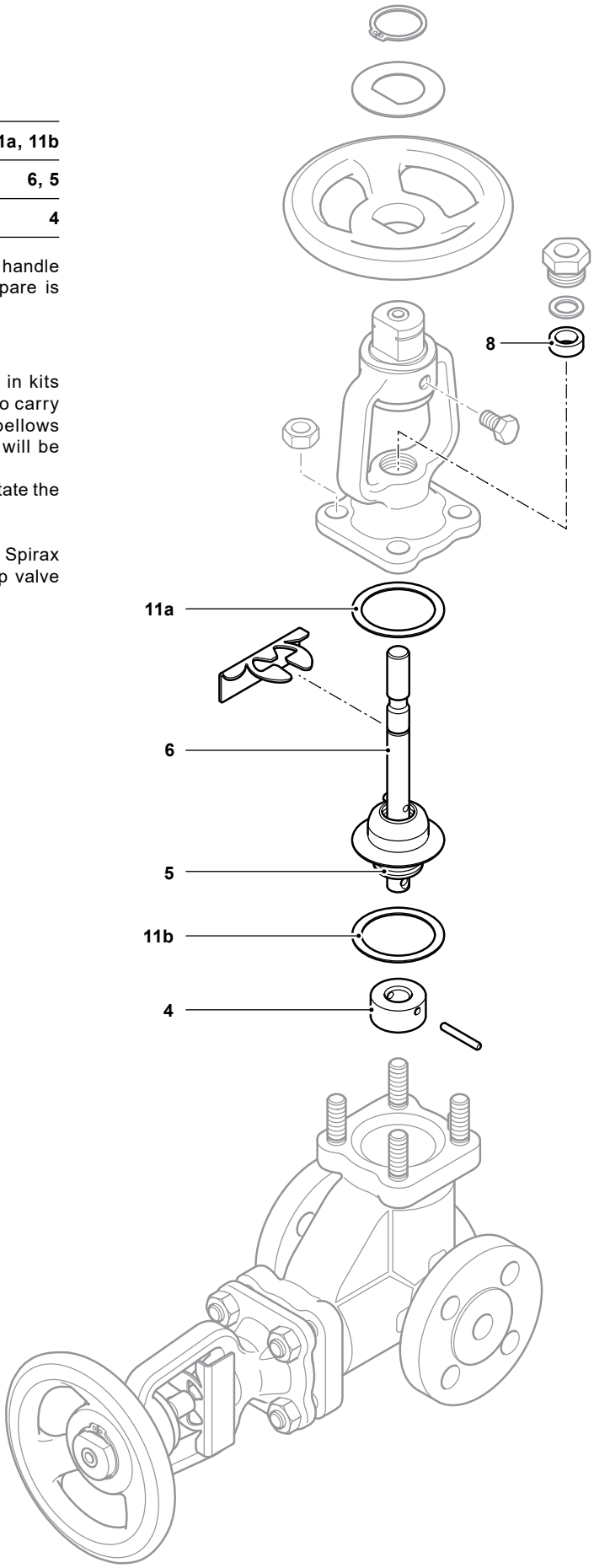
Body/bonnet gasket and stem packing	**8 (2 off), 11a, 11b**
Stem and bellows assembly	**6, 5**
Disc	**4**

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 DN15 Spirax SafeBloc™ DBB3 double block and bleed bellows sealed stop valve having PN40 connections.



STRAINER SOLUTIONS



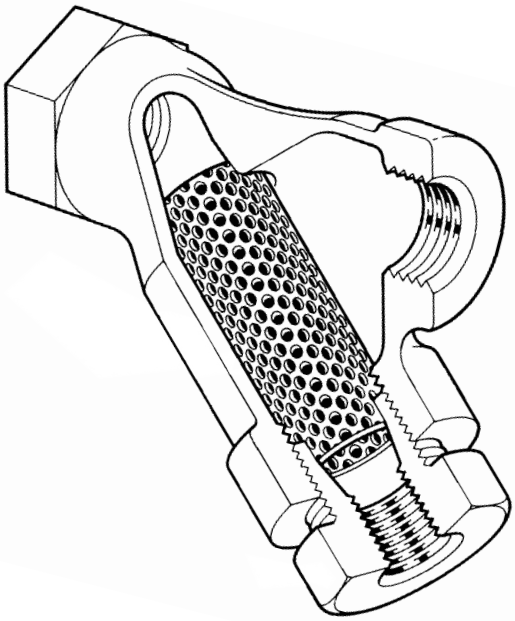
Section contents ⟩

SECTION 9 CONTENTS

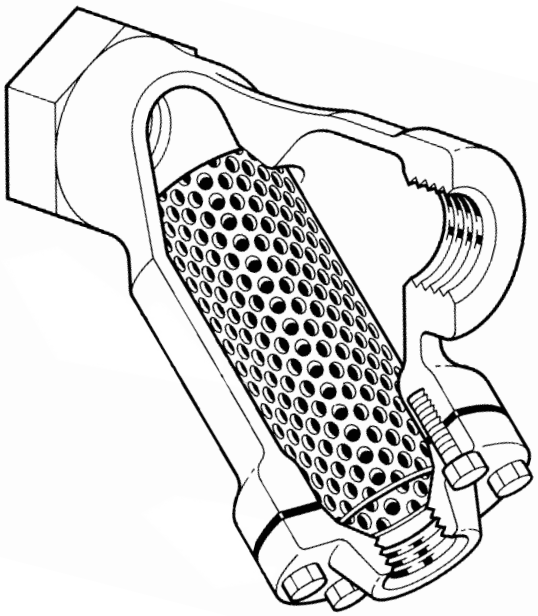
Cast Iron Strainers IT	TI-P201-05-US
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Fig 16HP Stainless Steel Strainer	TI-P169-08-EN
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TI-P201-05-US
Issue 1

Cast Iron Strainers
IT



¼" to 2"



2½"and 3"

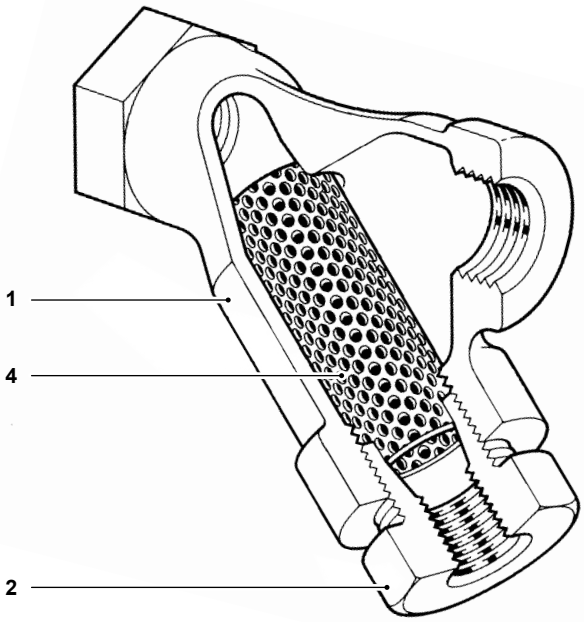
Type	IT
Sizes	¼" to 3"
Connections	NPT
Construction	Cast Iron
Maximum saturated steam pressure	250 psi g (17.2 bar g)
Standard screen	20 Mesh
Options	SW Connections Steel Plug

Note: ⅜" - 3" IT conforms to WW-S-2739 when equipped with an optional brass plug in the blow-off connection.

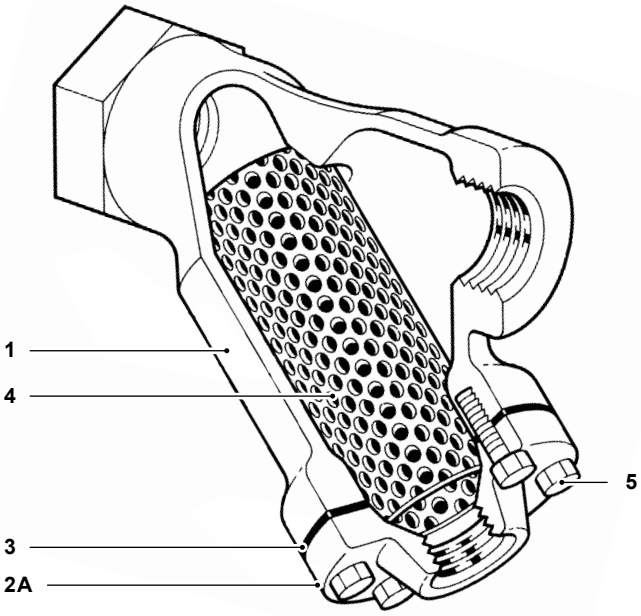
Pressure shell design conditions

Maximum allowable pressure	300 psi g/-20 to +150 °F	(21 bar g/-29 to +66 °C)
Maximum allowable temperature	406 °F/0-250 psi g	(208 °C/0-17 bar g)

Materials



¼" to 2"



2½"and 3"

No.	Part	Material	
1	Body	Cast Iron	ASTM A 126 CL B
2	Bushing (¼"-2")	Malleable Iron	
2A	Cap (2½"-3")	Cast Iron	ASTM A 126 CL B
3	Cap Gasket (2½" and 3")	Graphite	
4	Standard Screen	Stainless Steel Type 304	
5	Cap Screws (2½" and 3")	Steel	ASTM A 449

9.1
2

Cv values and free area (standard Screen)

Size	Cv	Free Area (sq. in.)
¼"	3.5	1.37
⅜"	3.5	1.37
½"	6.5	2.20
¾"	11.5	4.0
1"	20	5.2
1¼"	28	6.8
1½"	38	9.45
2"	70	12.56
2½"	100	19.05
3"	160	25.93

Consult factory for free areas of optional screens.

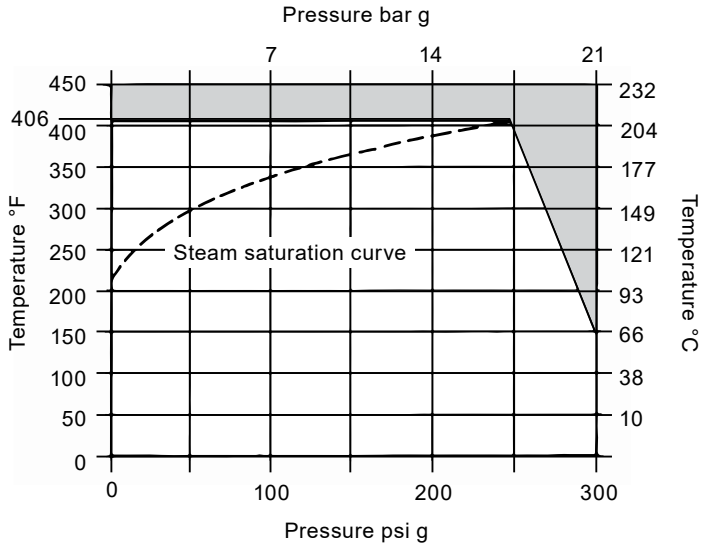
For water:

$$\text{Pressure drop} = \frac{(\text{GPM})^2}{(\text{Cv})^2}$$

Consult factory for other liquids.

See TI-S26-04-US for pressure drops on steam, air and other gases.

Limiting operating conditions (non-shock)

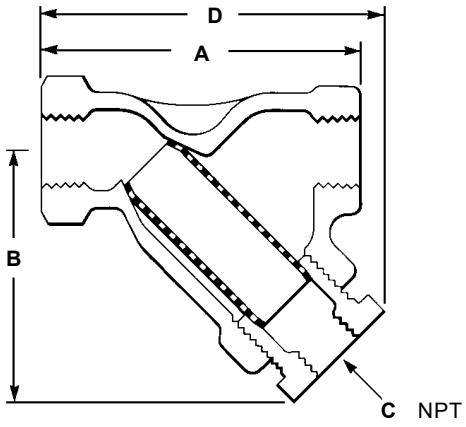


Installation

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.

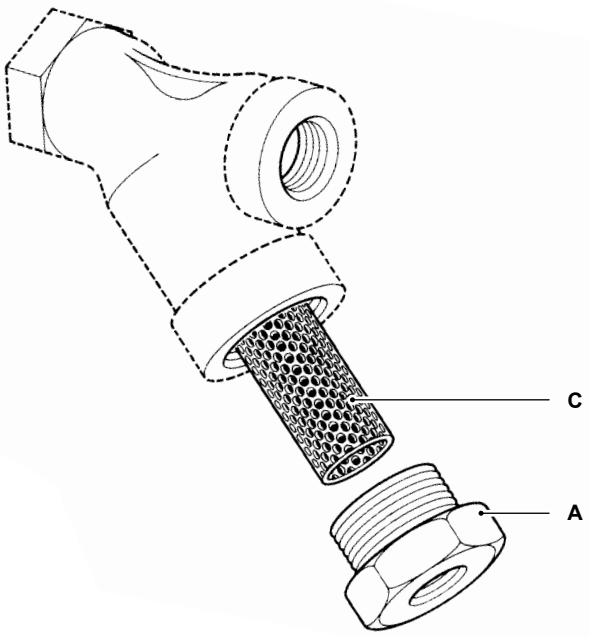
Dimensions/weights

(approximate) in inches (mm) and lbs (kg)

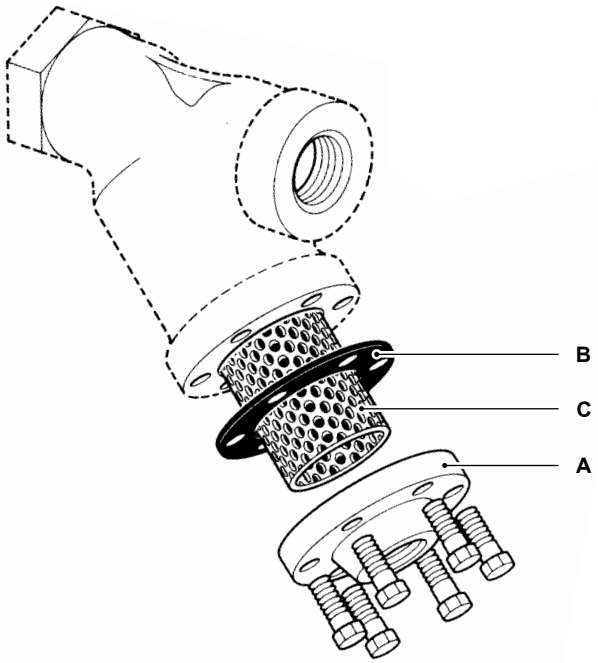


Size	A	B	C	D	Weight
¼" *	3.5	2.2	¼"	3.0	1.0 lb
	(89)	(56)		(76)	(0.5 kg)
⅜"	2.9	2.2	¼"	3.0	1.0 lb
	(74)	(56)		(76)	(0.5 kg)
½"	3.4	2.7	⅜"	3.9	1.2 lb
	(86)	(69)		(99)	(0.6 kg)
¾"	4.4	3.4	½"	4.6	2.9 lb
	(112)	(86)		(117)	(1.3 kg)
1"	4.9	3.5	¾"	5.0	4.3 lb
	(124)	(89)		(127)	(2.0 kg)
1-¼"	5.4	4.1	1"	5.75	6.5 lb
	(137)	(104)		(146)	(2.9 kg)
1½"	6.4	4.7	1¼"	6.6	9.6 lb
	(163)	(119)		(168)	(4.4 kg)
2"	7.5	5.4	1½"	7.75	12.9 lb
	(191)	(137)		(197)	(5.9 kg)
2½"	9.0	6.4	1¼"	8.25	22.0 lb
	(229)	(163)		(210)	(10.0 kg)
3"	10.0	7.6	1¼"	10.25	35.0 lb
	(254)	(193)		(260)	(15.9 kg)

Spare parts



¼" to 2"

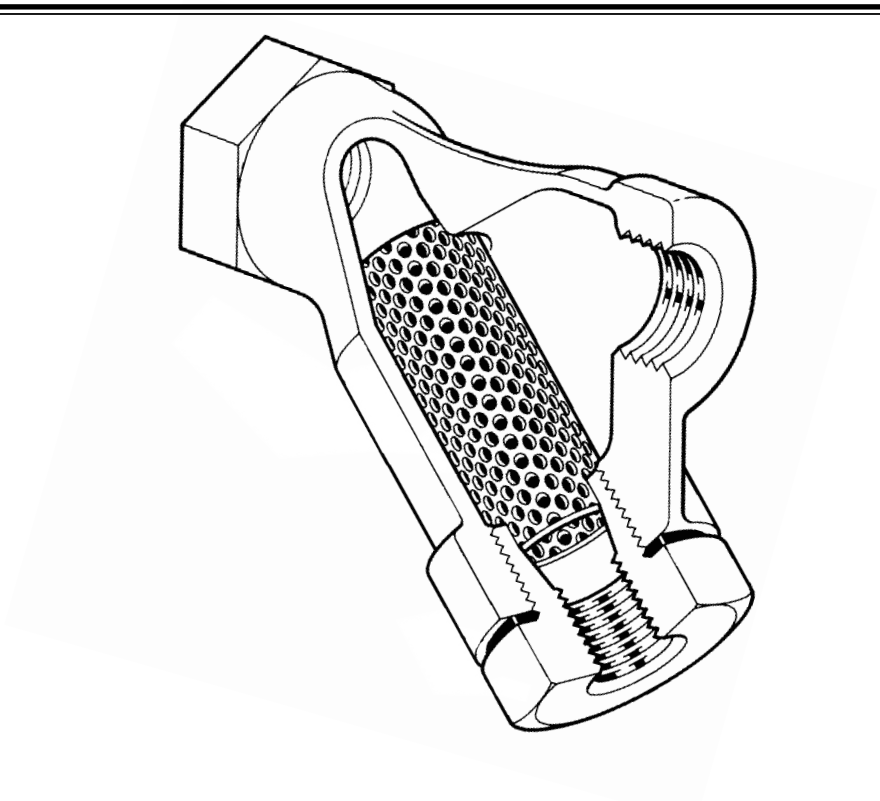


2½"and 3"

Screen (state material, perforations or mesh and size of strainer)		C
Cap Gasket	2½" and 3"	B
Blowoff Bushing	⅜" - 2"	A
Cap	2½" and 3"	A

TI-P199-01-US
Issue 1

Carbon Steel Strainers
CT



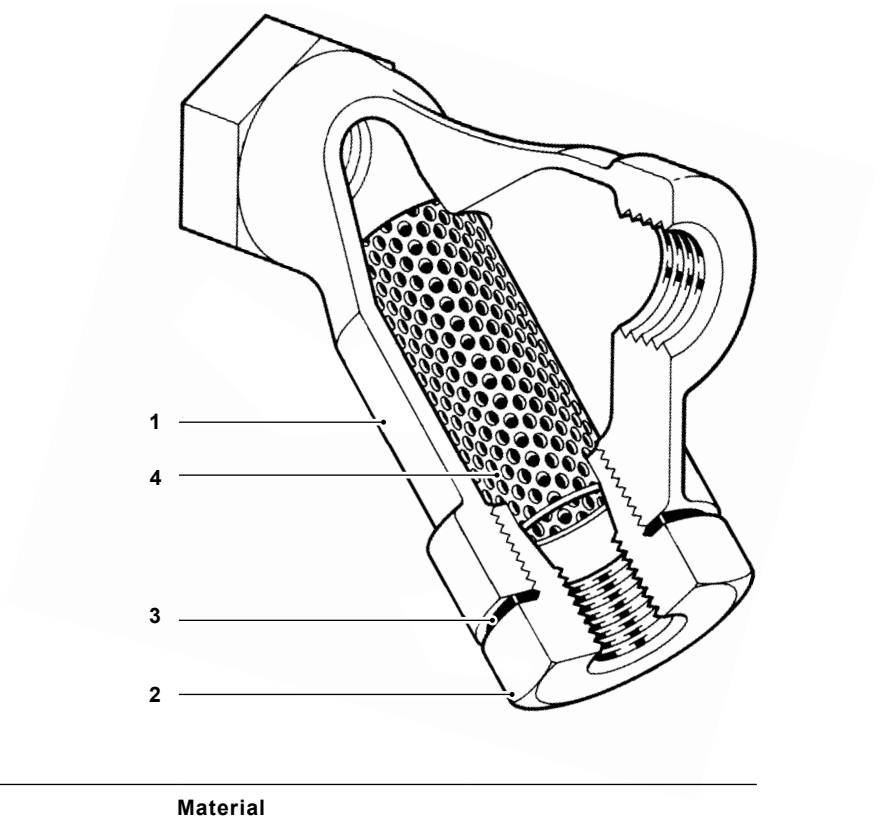
Type	CT
Sizes	½" to 2"
Connections	NPT
Construction	Carbon steel
Maximum saturated steam pressure	984 psi g (67.8 bar g)
Standard screen	20 Mesh
Options	60/100 Mesh Screens SW Connections Steel Plug

Pressure shell design conditions

Maximum allowable pressure	1480 psi g/-20-150 °F	(102 bar g/-29-66 °C)	Designed for a maximum cold hydraulic test pressure of 2,225 psi g (153.4 bar g) Rated to ANSI 600 up to a maximum allowable temperature of 750 °F
Maximum allowable temperature	750 °F/0-1010 psi g	(399 °C/0-70 bar g)	

Complies with ASME B31.3 - Chemical Plant and Refinery Piping.

Materials



No.	Part	Material	
1	Body	Carbon steel	ASTM A216 GR WCB
2	Cap	Carbon steel	ASTM A108
3	Cap gasket	Stainless steel, Type 304	Jacketed Graphite
4	Standard screen	Stainless steel, Type 304	

Cv values and free area
(standard screen)

Size	Cv	Free Area (sq. in.)
½"	6.5	2.20
¾"	11.5	4.0
1"	20	5.2
1¼"	28	6.8
1½"	38	9.45
2"	70	12.56

Consult factory for free areas of optional screens.

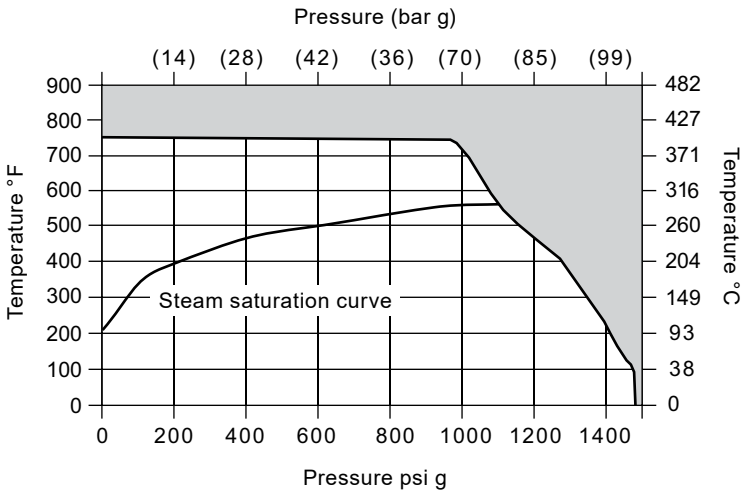
For water:

$$\text{Pressure drop} = \frac{(\text{GPM})^2}{(\text{Cv})^2}$$

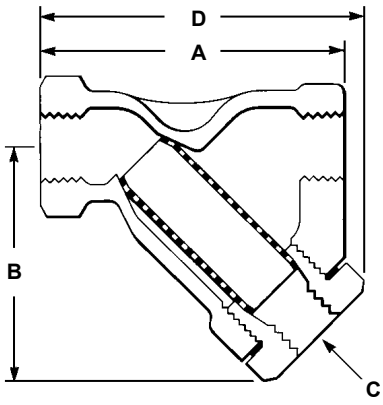
Consult factory for other liquids.

See TI-S26-04-US for pressure drops on steam, air and other gases.

Limiting operating conditions **(non-shock)**

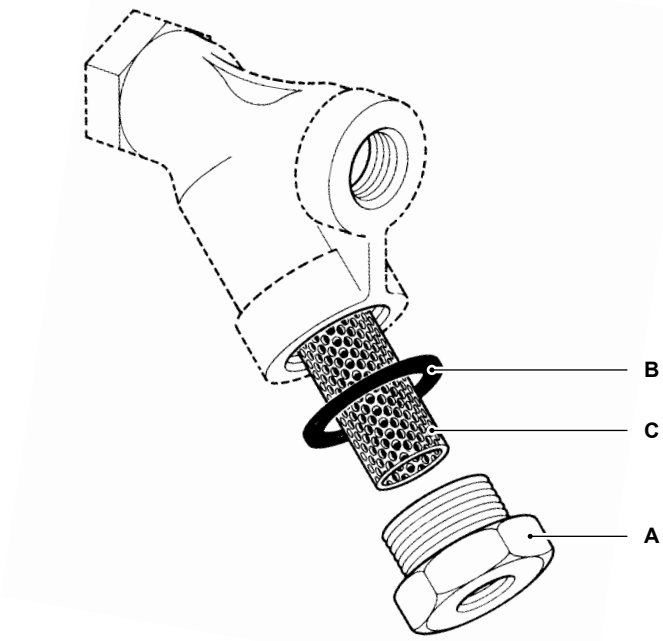


Dimensions/weights
(approximate) in inches (mm) and lbs (kg)



Size	A	B	C	D	Weight
½"	3.4	2.7	⅜"	3.75	1.5 lb
	(86)	(69)		(95)	(.68 kg)
¾"	4.4	3.6	⅜"	4.8	3.2 lb
	(112)	(91)		(122)	(1.5 kg)
1"	4.9	3.8	½"	5.25	3.9 lb
	(124)	(97)		(133)	(1.8 kg)
1-¼"	5.4	4.4	¾"	5.9	5.8 lb
	(137)	(112)		(150)	(2.6 kg)
1½"	6.4	4.9	¾"	6.8	8.5 lb
	(163)	(124)		(173)	(3.9 kg)
2"	7.5	5.9	1"	8.1	14.0 lb
	(191)	(150)		(206)	(6.3 kg)

Spare parts



Screen (state material, perforations or mesh and size of strainer)	C
Cap gasket	B
Blowoff bushing	A

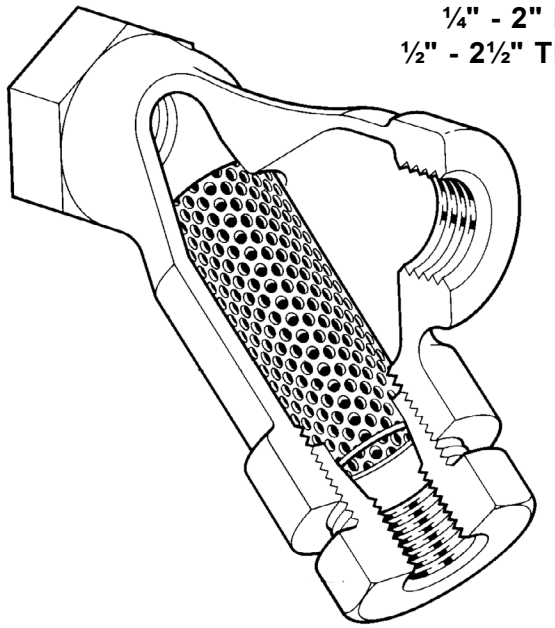
Installation
The strainer should be installed with the flow direction as indicated on the body, in a vertical down or horizontal pipeline. The strainer must be accessible for periodic removal of accumulated debris, by either blowing down or removal and cleaning of the screen.

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 ½" through 2".

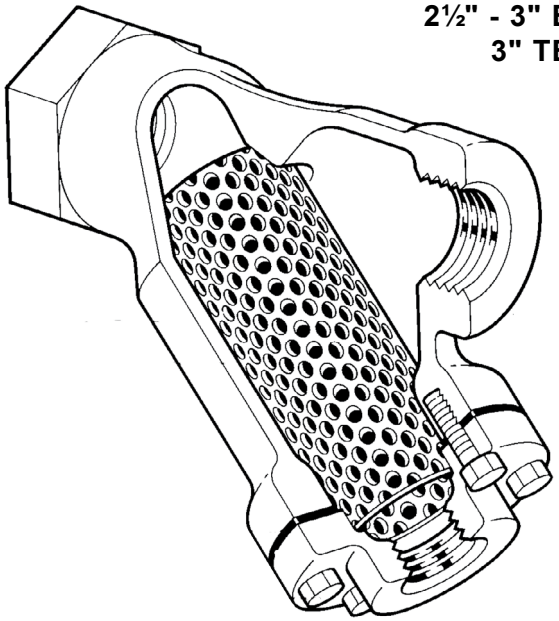
TI-P198-06-US
Issue 1

Bronze Strainers
BT, TBT

¼" - 2" BT
½" - 2½" TBT



2½" - 3" BT
3" TBT

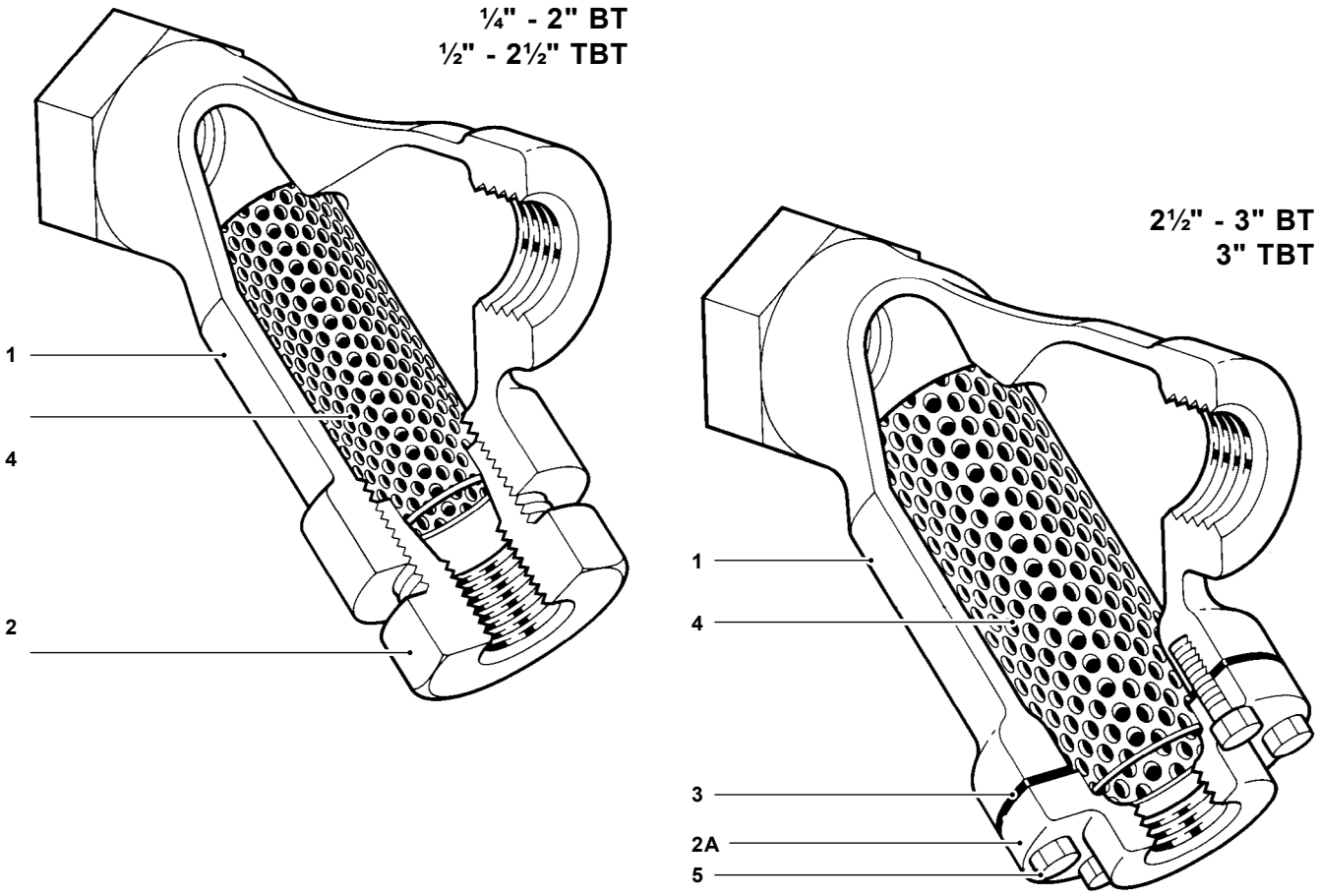


Type	BT	TBT
Sizes	¼" to 3"	½" to3"
Connections	NPT	Sweat tubing
Construction	Bronze	
Maximum Saturated Steam Pressure	250 psi g	
Standard Screen	20 Mesh	
Options	Bronze Plug; 60 Mesh Screens	

Pressure shell design conditions

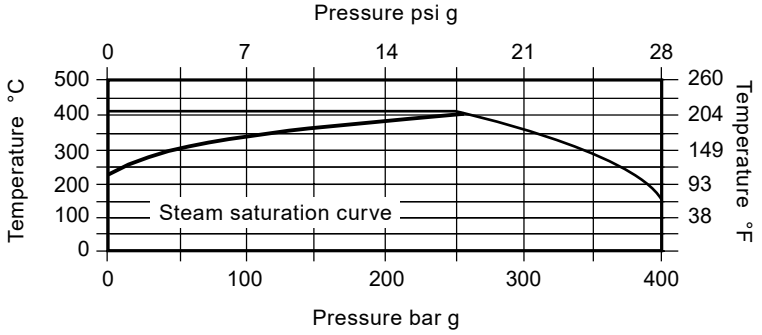
Maximum allowable pressure	400 psi g/-20-150 °F (26 bar g/-66 °C)
Maximum allowable temperature	406 °F/0-250 psi g (208 °C/17 bar g)

Materials



No.	Part	Material	
1	Body	Bronze	ASTM B 62
2	Bushing ⅜" - 2" BT ½" - 2½" TBT	Bronze	ASTM B 62
2A	Cap 2½", 3" BT 3" TBT	Bronze	ASTM B 62
3	Cap gasket 2½", 3" BT 3" TBT	Graphite	
4	Standard screen	Stainless Steel Type 304	
5	Cap screws 2½", 3" BT 3" TBT	Steel	ASTM A 449

Limiting operating conditions (non-shock)



Cv Values and free area
(standard Screen)

Size		Cv	Free Area (sq. in.)
BT	TBT		
¼"	–	3.5	1.37
3/8"	½"	3.5	1.37
½"	¾"	6.5	2.20
¾"	1"	11.5	4.0
1"	1-¼"	20	5.2
1-¼"	1½"	28	6.8
1½"	2"	38	9.45
2"	2½"	70	12.56
2½"	3"	100	19.05
3"	–	160	25.93

Consult factory for free areas of optional screen.

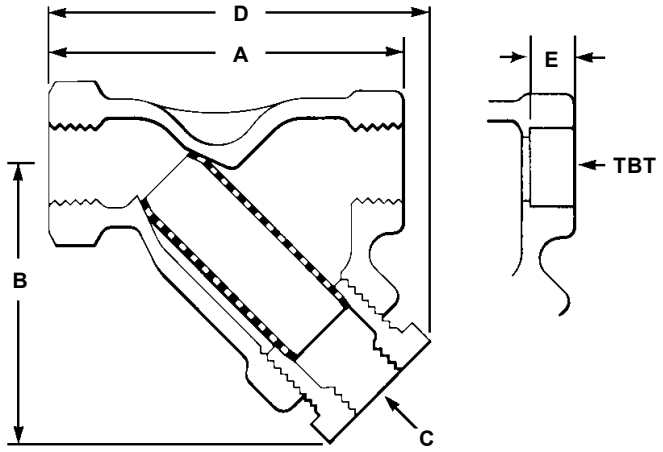
For water:

$$\text{Pressure drop} = \frac{(\text{GPM})^2}{(\text{Cv})^2}$$

Consult factory for other liquids.

See TI-7-429-US for pressure drops on steam, air and other gases.

Dimensions/weights (approx) in inches (mm) and lbs (kg)



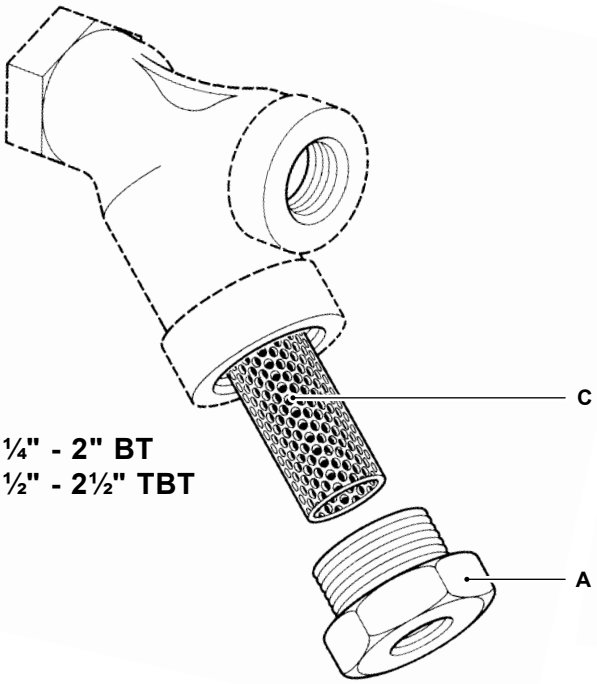
Size		A	B	C	D	E	Weight
BT	TBT						
¼"*	–	3.4	2.2	¼"	3.2		1 lb
		(86)	(56)		(81)		(.45 kg)
⅜"	½"	2.9	2.2	¼"	3.0	.31	1 lb
		(74)	(56)		(76)	(7.9)	(.45 kg)
½"	¾"	3.4	2.7	⅜"	3.9	.44	1.3 lb
		(86)	(69)		(99)	(11.2)	(.59 kg)
¾"	1"	4.4	3.4	½"	4.6	.5	2.7 lb
		(112)	(86)		(117)	(12.7)	(1.2 kg)
1"	1-¼"	4.9	3.5	¾"	5.0	.63	3.5 lb
		(124)	(89)		(127)	(16)	(1.6 kg)
1¼"	1½"	5.4	4.2	¾"	5.4	.63	5.1 lb
		(137)	(107)		(137)	(16)	(2.3 kg)
1½"	2"	6.4	4.75	¾"	6.6	.69	7.6 lb
		(163)	(121)		(168)	(17.5)	(3.5 kg)
2"	2½"	7.5	5.7	1"	7.9	.72	13.0 lb
		(191)	(143)		(201)	(18.3)	(5.9 kg)
2½"	3"	8.6	6.75	1¼"	9.1	.88	21.0 lb
		(218)	(171)		(231)	(22.4)	(9.5 kg)
3"	–	10.1	7.9	1¼"	10.75		32.0 lb
		(257)	(201)		(273)		(14.5 kg)

* ¼" is ⅜" with Bushings

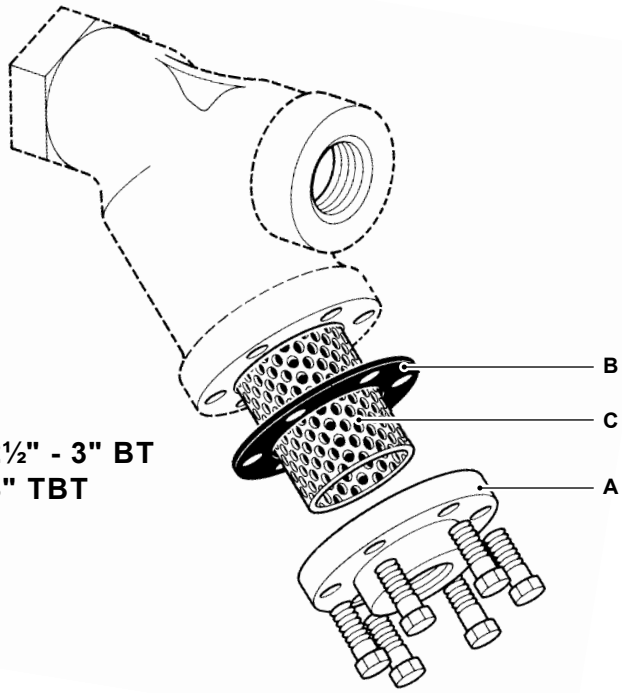
Installation

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



¼" - 2" BT
½" - 2½" TBT



2½" - 3" BT
3" TBT

Screen (state material, size of perf or mesh, and size of strainer)	C
Cap Gasket	B
Blowoff Bushing	A
Cap	A

TI-P169-08
CMGT Issue 7

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 0.8 mm perforations.

Standards
This product fully complies with the requirements of the European Pressure Equipment Directive 2014/68/EU.

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
¼", ⅜", ½", ¾", 1", 1¼" 1½" and 2"
Screwed BSP T Rp (ISO 7-1) or NPT
Socket weld ends to BS 3799 Class 3000 lb

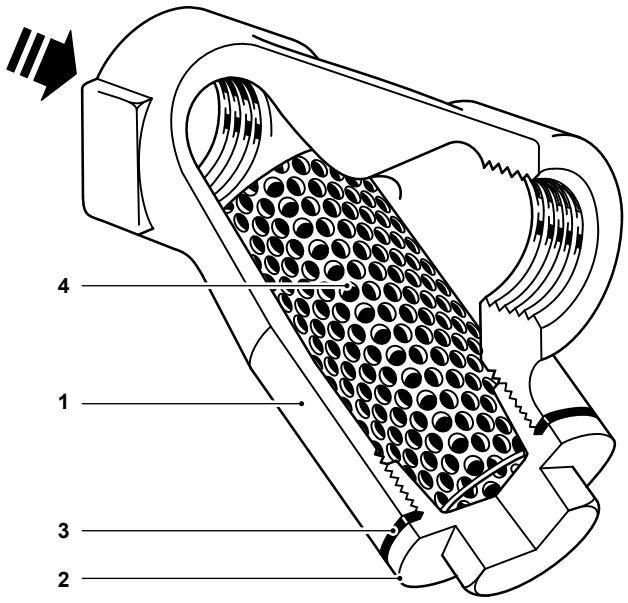
Optional extras

Strainer screens

Stainless steel screen	Perforations	1.6 mm and 3.0 mm
	Mesh	40, 100 and 200
Monel screen	Perforations	0.8 mm and 3.0 mm
	Mesh	100

Blowdown or drain valve connections
The cap can be drilled to the following sizes to enable a blowdown or drain valve to be fitted at extra cost.

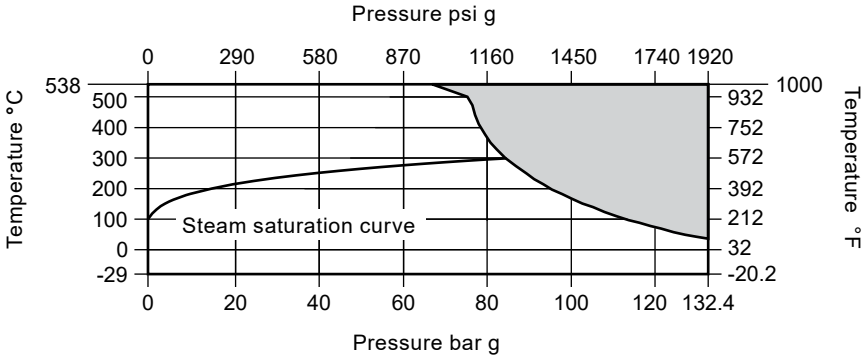
Strainer size	Blowdown valve	Drain valve
¼", ⅜" and ½"	¼"	¼"
¾" and 1"	½"	½"
1¼" and 1½"	1"	¾"
2"	1¼"	¾"



Materials

No.	Part		Material	
1	Body	¼" to ½"	Stainless steel	A182 F316L/1.4404
		¾" to 2"	Stainless steel	ASTM A351 CF8M/1.4408
2	Cap		Stainless steel	ASTM A351 CF3M/1.4409
3	Cap gasket		Reinforced exfoliated graphite	
4	Strainer screen		Stainless steel	A240 316L

Pressure/temperature limits

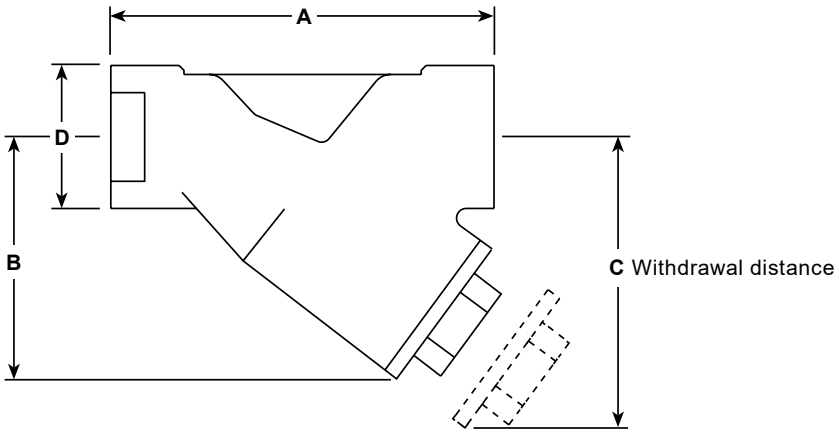


The product **must not** be used in this region.

Body design conditions			ASME Class 800
PMA	Maximum allowable pressure	132.4 bar g @ 38 °C	(1920 psi g @ 100 °F)
TMA	Maximum allowable temperature	538 °C @ 66.8 bar g	(1000 °F @ 969 psi g)
Minimum allowable temperature		-29 °C	(-20 °F)
PMO	Maximum operating pressure for saturated steam service	85 bar g @ 300 °C	(1233 psi g @ 572 °F)
TMO	Maximum operating temperature	538 °C @ 66.8 bar g	(1000 °F @ 969 psi g)
Minimum operating temperature		-29 °C	(-20 °F)
Note: For lower operating temperatures consult Spirax Sarco.			
Product is safe for use under full vacuum conditions			
Designed for a maximum cold hydraulic test pressure of:		200 bar g	(2900 psi g)

Dimensions/weights

(approximate) in mm (inches) and kg (lbs)



Size	A		B		C		D		Screening area cm²		Weight	
¼"	70	(2.76)	51	(2.01)	80	(3.15)	32	(1.26)	27	(1.06)	0.43	(0.95)
⅜"											0.49	(1.08)
½"	73	(2.87)	52	(2.05)	81	(3.19)					0.56	(1.23)
¾"	90	(3.54)	64	(2.52)	100	(3.94)	36	(1.42)	43	(1.69)	0.72	(1.59)
1"	105	(4.13)	74	(2.91)	120	(4.72)	46	(1.81)	73	(2.87)	1.17	(2.58)
1¼"	140	(5.51)	102	(4.02)	164	(6.46)	60	(2.36)	135	(5.31)	2.35	(5.18)
1½"	152	(5.98)	115	(4.53)	184	(7.24)	70	(2.76)	164	(6.46)	3.30	(7.28)
2"	178	(7.01)	138	(5.43)	224	(8.82)	80	(3.15)	251	(9.88)	4.95	(10.9)

Fig 16HP Stainless Steel Strainer

Kv values

Size	¼"	⅜"	½"	¾"	1"	1¼"	1½"	2"
Perforations 0.8, 1.6 and 3 mm	1	2.6	3.6	11	15.5	26	41	68
Mesh 40 and 100	1	2.6	3.6	11	15.5	26	41	68
Mesh 200	1	2.6	2.6	9	13.0	21	35	55

For conversion:
Cv (UK) = Kv x 0.963
Cv (US) = Kv x 1.156

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 1½" Fig 16HP strainer having screwed BSP connections with a stainless steel screen having 0.8 mm perforations.

Spare parts

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

Available spares

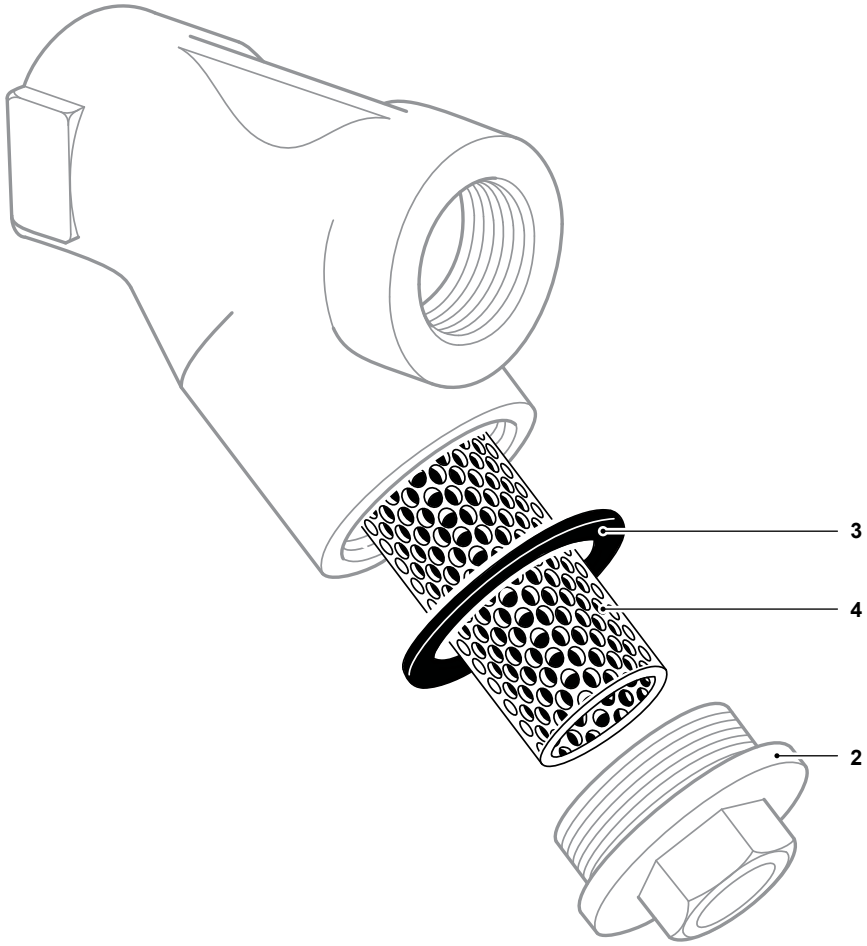
Strainer screen (state material, perforations or mesh and size of strainer)		4
Cap gasket	(packet of 3)	3

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 0.8 mm perforations for a ¾" 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	or mm	N m	ft lbf
2	¼", ⅝" and ½"	22 A/F	70 - 80	52 - 59
	¾"	27 A/F	95 - 115	70 - 85
	1"	32 A/F	230 - 250	170 - 184
	1¼"	46 A/F	330 - 370	243 - 273
	1½"	50 A/F	380 - 420	280 - 310
	2"	60 A/F	600 - 670	443 - 494

Fig 16HP Stainless Steel Strainer

TI-P160-01
CMGT Issue 13

Fig 16L and Fig 16L Food+ Austenitic Stainless Steel Strainers

Description

The Fig 16L are austenitic stainless steel screwed Y-type strainers. The Fig 16L is 316L. The standard stainless steel screen is 0.8 mm perforations.
As options, other perforations and mesh sizes are available as well as monel screens.
The strainer cap can be drilled and tapped for blowdown and drain valves if required.

Standards

This products complies with the requirements of the European Pressure Equipment Directive 2014/68/EU and carries the CE mark when so required.

Certification

The Fig 16L is available with certification to EN 10204 3.1.
Note: All certification/inspection requirements must be stated at the time of order placement.

Food+ can be supplied with material Certification for all wetted parts at extra cost.
Note: All certification/inspection requirements must be stated at the time of order placement.

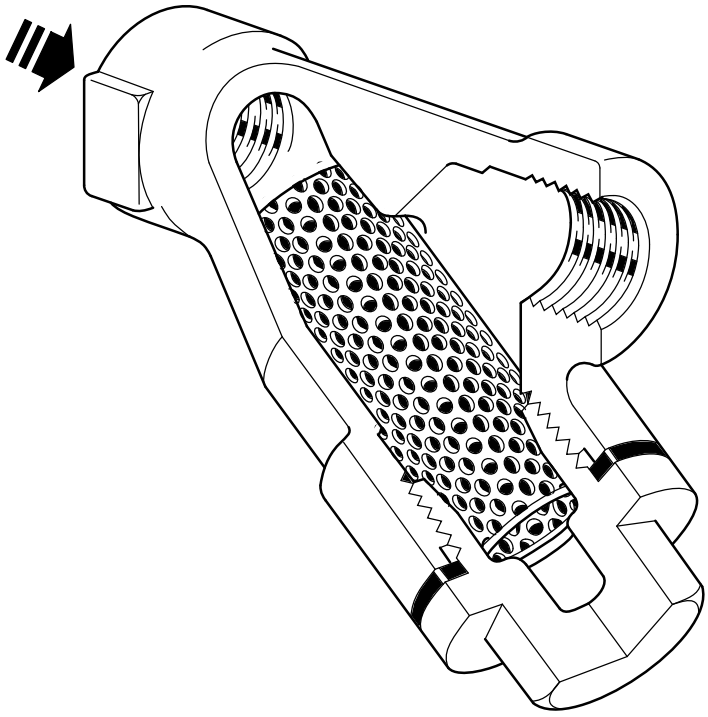


Fig 16L Food+ ½" to 2" is available with a food contact regulation Declaration of Compliance
Designed, manufactured and approved for Steam and Condensate applications, the Fig 16L Food+ product complies with:

- (EC)1935:2004 Materials and Articles Intended to come into Contact with Food
- (EC)2023:2006 Good Manufacturing Practice for Materials and Articles Intended to come into Contact with Food
- (EU)10/2011 Plastic Materials and Articles Intended to come into Contact with Food
- FDA Code of Federal Regulations - title 21 - Food and Drugs

This product is intended to be connected into a system that can operate a food contact compliant process.

A list of the materials that could come directly or indirectly into contact with foodstuffs can be found in the Declaration of Compliance available for this product.

Sizes and pipe connections

⅜", ½", ¾", 1", 1¼", 1½" and 2"
Screwed BSP T Rp (ISO 7-1) or NPT
Socket weld ends to BS 3799 Class 3000 lb.

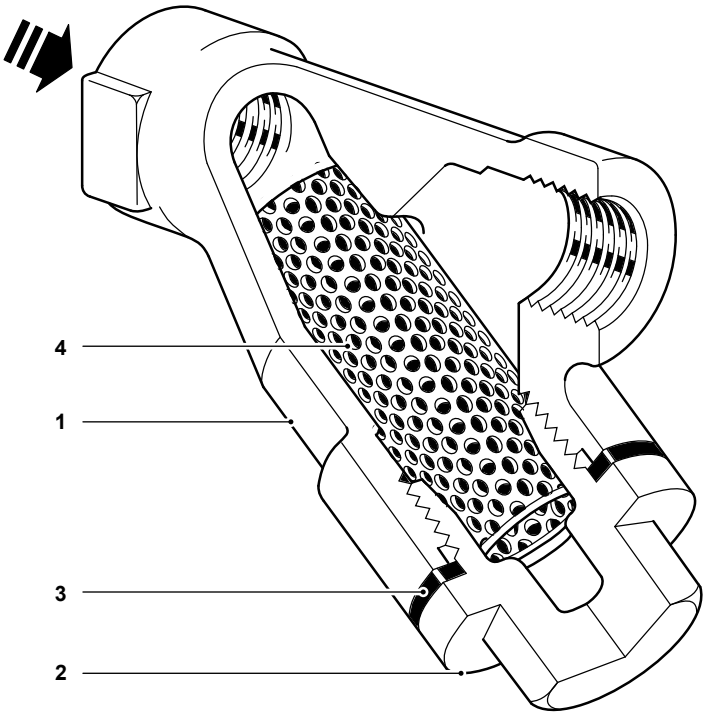
Optional extras

Strainer screens	**Stainless steel screens**	Perforations	1.6 mm and 3 mm
		Mesh	40, 100 and 200
	Monel screens	Perforations	0.8 mm and 3 mm
		Mesh	100

Blowdown or drain valve connections
The cap can be drilled to the following sizes to enable a blowdown or drain valve to be fitted at extra cost.

Strainer size	Blowdown valve	Drain valve
⅜" and ½"	¼"	¼"
¾"	½"	⅜"
1"	½"	½"
1¼" and 1½"	1"	¾"
2"	1¼"	¾"

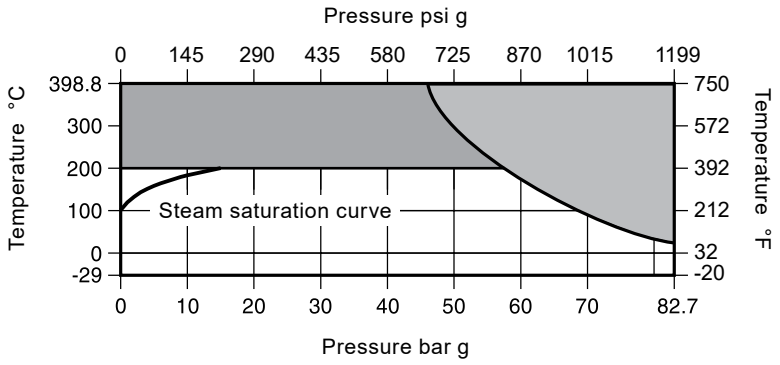
Materials



No.	Part	Material	
1	Body	Austenitic stainless steel	ASTM A351 Gr. CF3M (316L)
2	Cap	Austenitic stainless steel	ASTM A351 Gr. CF3M (316L)
3	Cap gasket	Reinforced exfoliated graphite or PTFE on EC1935/2004 version	
4	Strainer screen	Austenitic stainless steel	316L

Fig 16L and Fig 16L Food+ Austenitic Stainless Steel Strainers

Pressure/temperature limits



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

EC1935/2004 product must not be used in this region.

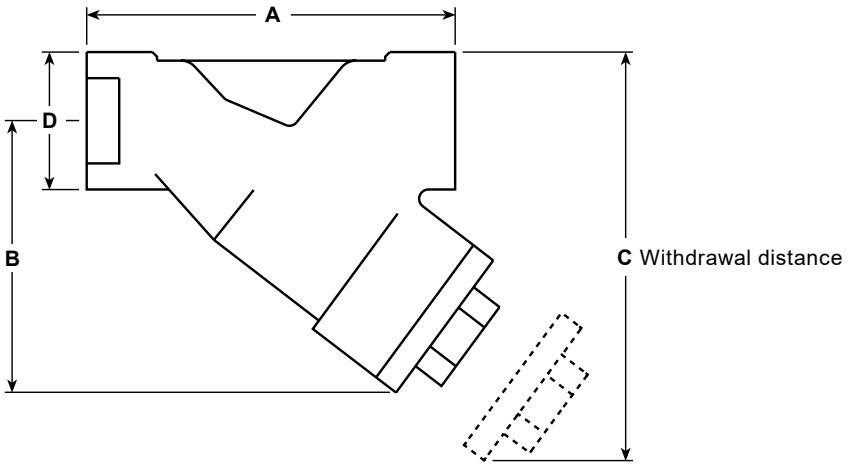
Body design conditions			ANSI 600
PMA	Maximum allowable pressure	82.7 bar g @ 37.7 °C	1199 psi g @ 100 °F
TMA	Maximum allowable temperature	398.8 °C @ 46.2 bar g	750 °F @ 670 psi g
	Maximum EC1935/2004 allowable temperature	200 °C @ 13.7 barg	392 °F @ 199 psi g
Minimum allowable temperature		-29 °C	-20 °F
PMO	Maximum operating pressure	82.7 bar g @ 37.7 °C	1199 psi g @ 100 °F
TMO	Maximum operating temperature	398.8 °C @ 46.2 bar g	750 °F @ 670 psi g
	Maximum EC1935/2004 allowable temperature	200°C @ 13.7 bar g	392 °F @ 199 psi g
Minimum operating temperature **Note:** For lower operating temperatures consult Spirax Sarco		-29 °C	-20 °F
Product is safe for use under full vacuum conditions.			
Designed for a maximum cold hydraulic test pressure of:		125 bar g	1813 psi g

Kv values

Size	¼"	⅜"	½"	¾"	1"	1¼"	1½"	2"
Perforations 0.8, 1.6 and 3 mm	1	2.6	3.6	11	15.5	26	41	68
Mesh 40 and 100	1	2.6	3.6	11	15.5	26	41	68
Mesh 200	1	2.6	2.6	9	13.0	21	33	55

For conversion:
Cv (UK) = Kv x 0.963
Cv (US) = Kv x 1.156

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



Size	A	B	C	D	Screening area cm²	Weight
⅜"	69 (2.7)	55 (2.2)	87 (3.4)	26 (1.0)	25 (3.9)	0.32 (0.7)
½"	76 (3.0)			32 (1.3)		0.38 (0.8)
¾"	88 (3.5)	65 (2.6)	110 (4.3)	38 (1.5)	42 (6.5)	0.51 (1)
1"	106 (4.2)	78 (3.1)	125 (4.9)	46 (1.8)	71 (11.0)	0.87 (2)
1¼"	133 (53.2)	103 (4.1)	155 (6.1)	56 (2.2)	135 (20.9)	1.56 (3)
1½"	146 (5.7)	115 (4.5)	190 (7.5)	62 (2.4)	161 (25.0)	2.10 (5)
2"	172 (6.8)	140 (5.5)	230 (9.1)	76 (3.0)	251 (38.9)	3.46 (7)

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

How to order

Example: 1 off Spirax Sarco 1½" Fig 16L strainer with screwed BSP connections and a stainless steel screen having 0.8 mm perforations.

Spare parts

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

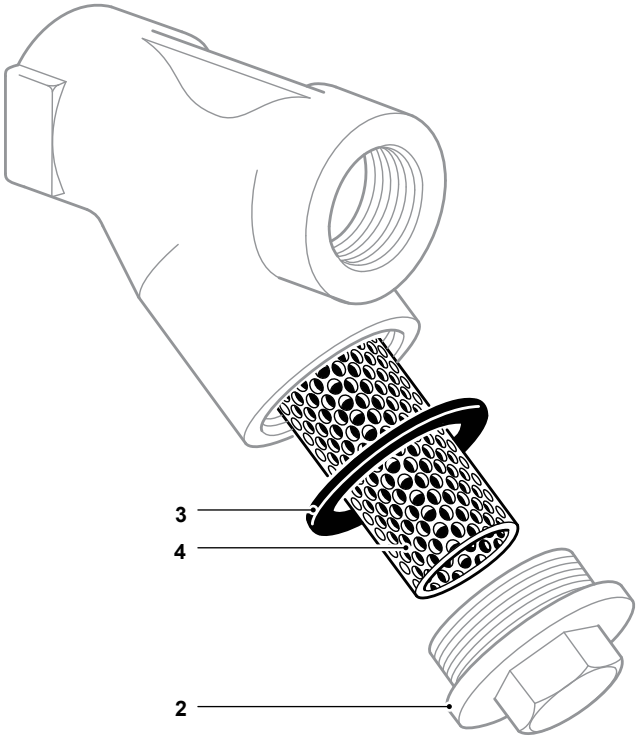
Available spares

Strainer screen (always state material, size of perforation/mesh and size of strainer)	**4**
Cap gasket (packet of 3)	**3**
EC1935/2004 Cap gasket - ½" to 2" (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 1.6 mm perforations, for a ¾" Spirax Sarco Fig 16L strainer with screwed BSP connections.

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	or mm	N m	ft lbf
	⅜"	22 A/F	45 - 50	33 - 37
	½"	22 A/F	45 - 50	33 - 37
	¾"	27 A/F	60 - 66	44 - 49
2	1"	27 A/F	100 - 110	74 - 82
	1¼"	46 A/F	240 - 260	177 -192
	1½"	46 A/F	260 - 280	192 - 207
	2"	60 A/F	310 - 340	229 - 251

TI-S26-02-US
Issue 2

Cast Iron Strainers
CI-125

Description

Type	CI-125	
Sizes	2" to 4"	6"
Connections	ANSI 125	
Construction	Cast Iron	
Maximum saturated steam pressure	147 psi g (10.1 bar g)	125 psi g (9 bar g)
Standard screen	20 Mesh	4" to 8" ⅛" perf
Options	60/100 mesh	100 Mesh 4" to 6" 3/64" perf
	Steel or Brass Plug	

Note: Conforms to WW-S-2739 when equipped with an optional bronze plug in the blow-off connection.

Cv Values

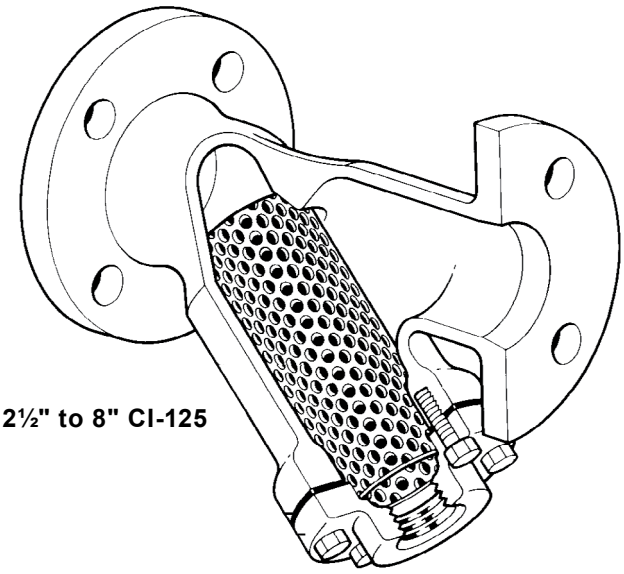
Size	Cv
2"	70
2½"	110
3"	165
4"	280
5"	450
6"	650

For water:

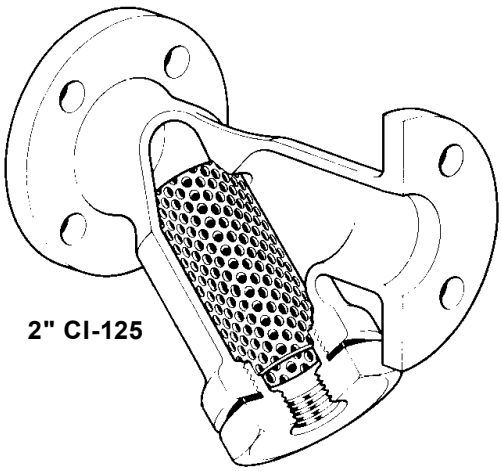
$$\text{Pressure Drop} = \frac{(\text{GPM})^2}{(\text{Cv})^2}$$

Consult factory for other liquids.

See TI-S26-04-US for pressure drops on steam, air and other gases.



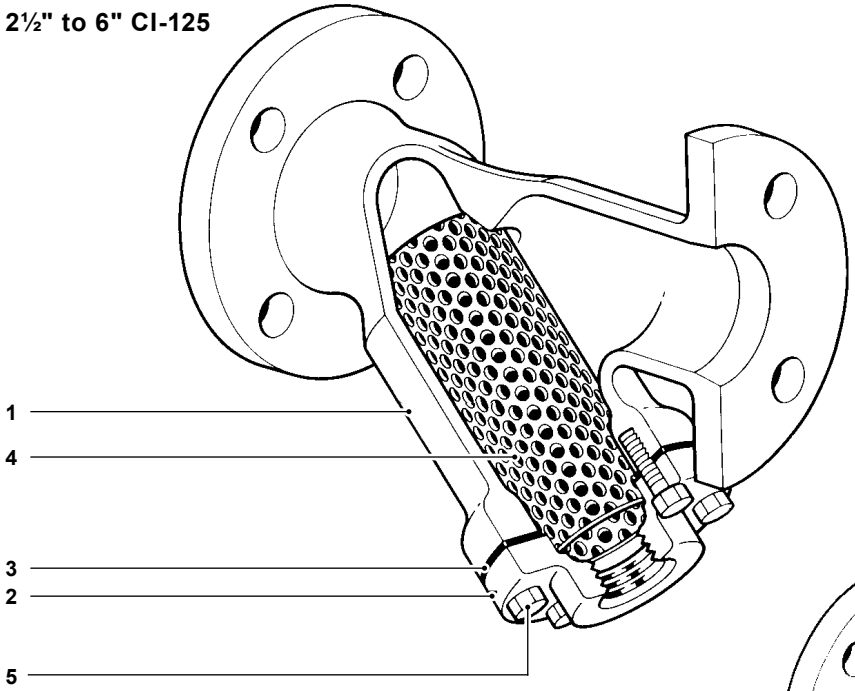
2½" to 8" CI-125



2" CI-125

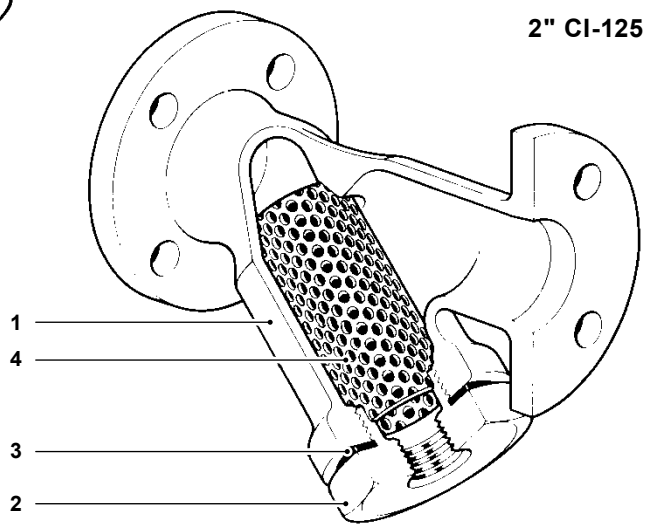
Materials

2½" to 6" CI-125



Blowdown offset on sizes 4" - 6"

2" CI-125



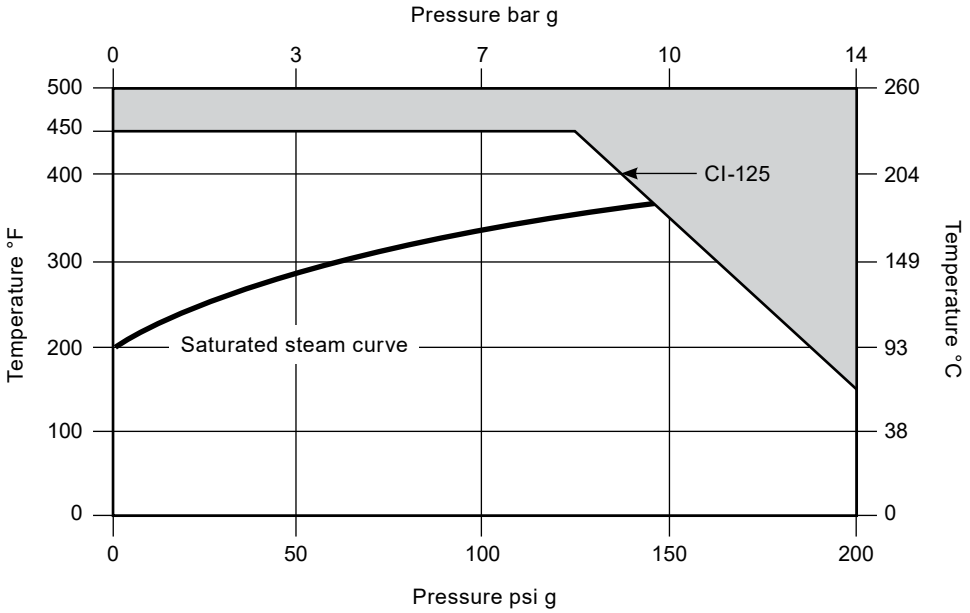
No.	Part	Material	
1	Body	Cast Iron	ASTM A126 CLB
2	Cap/Bushing	Cast Iron	ASTM A126 CLB2
3	Cap Gasket	*Graphite	
4	Strainer Screen	Stainless Steel	
5	Cap Screws	Steel	

*2" – Copper Jacketed Gasket with Non-Asbestos Filler

Pressure shell design conditions

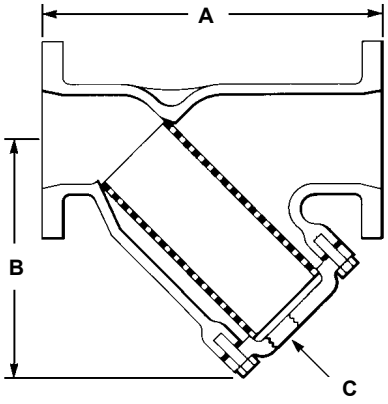
Maximum allowable pressure	200 psi g/-20-150 °F (14 bar g/-29-66 °C)
Maximum allowable temperature	450 °F/0-125 psi g (232 °C/0-9 bar g)

Limiting operating conditions (non-shock)



Dimensions/weights (approximate) in inches (mm) and lbs (kg)

Size		A	B	C (NPT)	Weight
CI-125	2"	8.7 (221)	5.7 (145)	1"	17 lb (7.7 kg)
	2½"	10.5 (267)	6.7 (170)	1¼"	29 lb (13 kg)
	3"	12.0 (305)	7.6 (194)		44 lb (20 kg)
	4"	14.9 (378)	10.6 (269)		82 lb (37 kg)
	5"	17.2 (437)	12.9 (328)	1½"	115 lb (52 kg)
	6"	20.0 (508)	15.4 (391)		160 lb (73 kg)



Blowdown connectors offset on sizes 4" - 6"

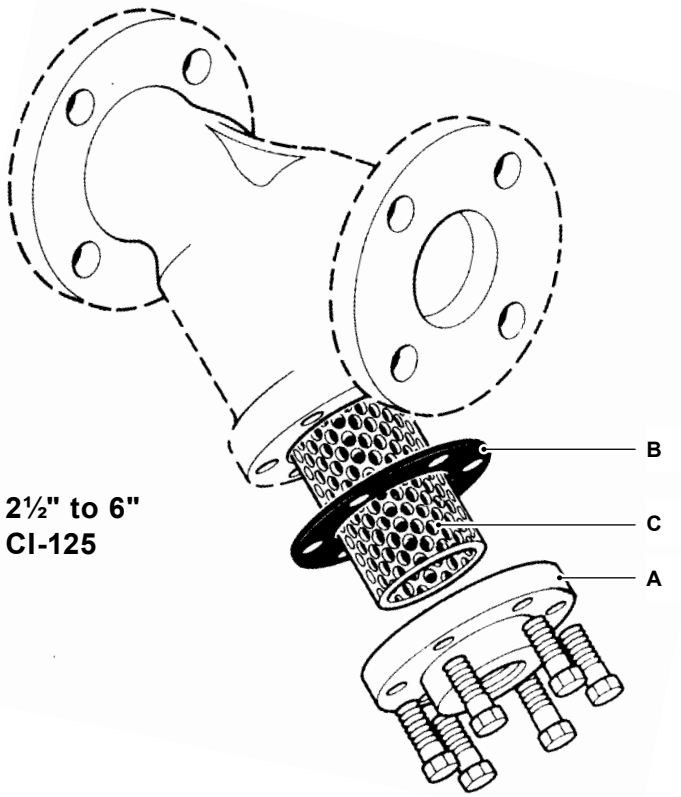
Installation

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.

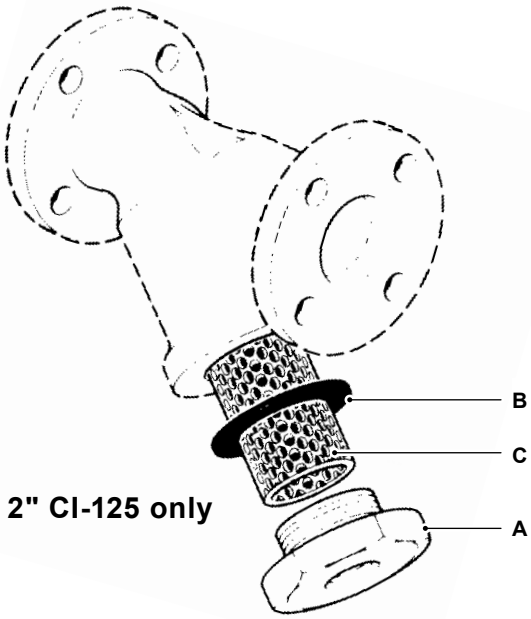
Spare parts

Screen (state material, perforations or mesh and size of strainer)	C
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.



2½" to 6"
CI-125



2" CI-125 only

TI-S26-03-US
Issue 2

Cast Iron Strainers
CI-250

Description

Type	**CI-250**	
Sizes	2½" and 3"	4"
Connections	ANSI 250	
Construction	Cast Iron	
Maximum saturated steam pressure	280 psi g (19.3 bar g)	
Standard screen	20 Mesh	4" ⅛"perf
Optional	60/100	4" 3/64" perf

Cv values

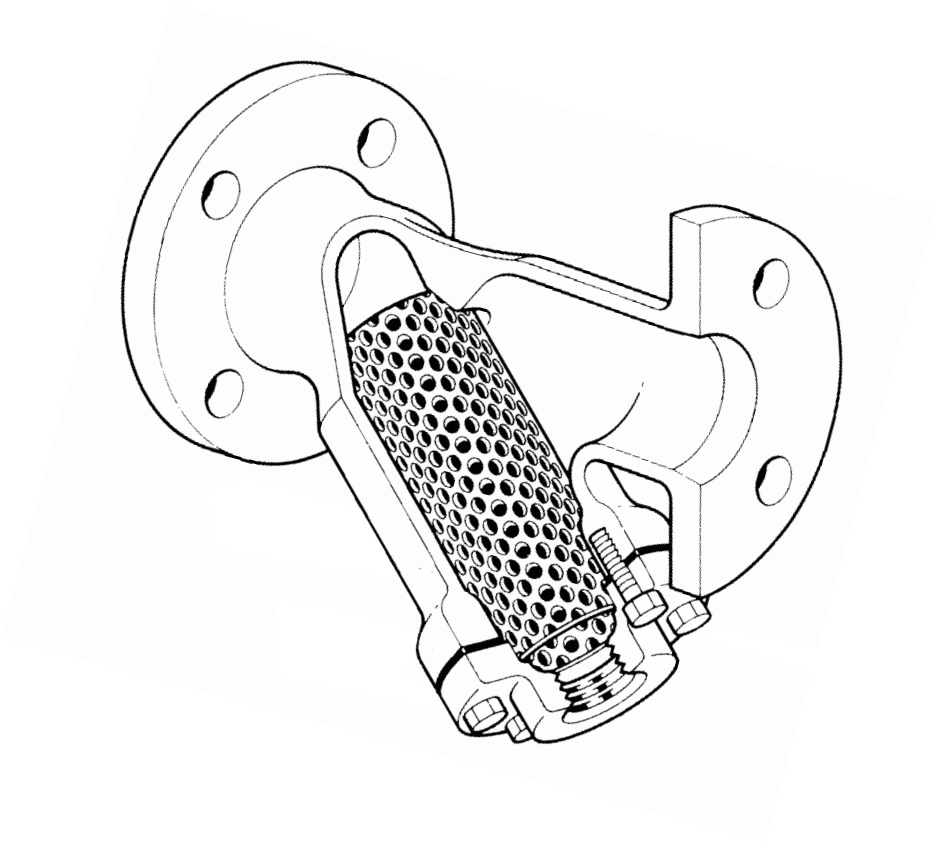
Size	Cv
2½"	110
3"	165
4"	280

For water:

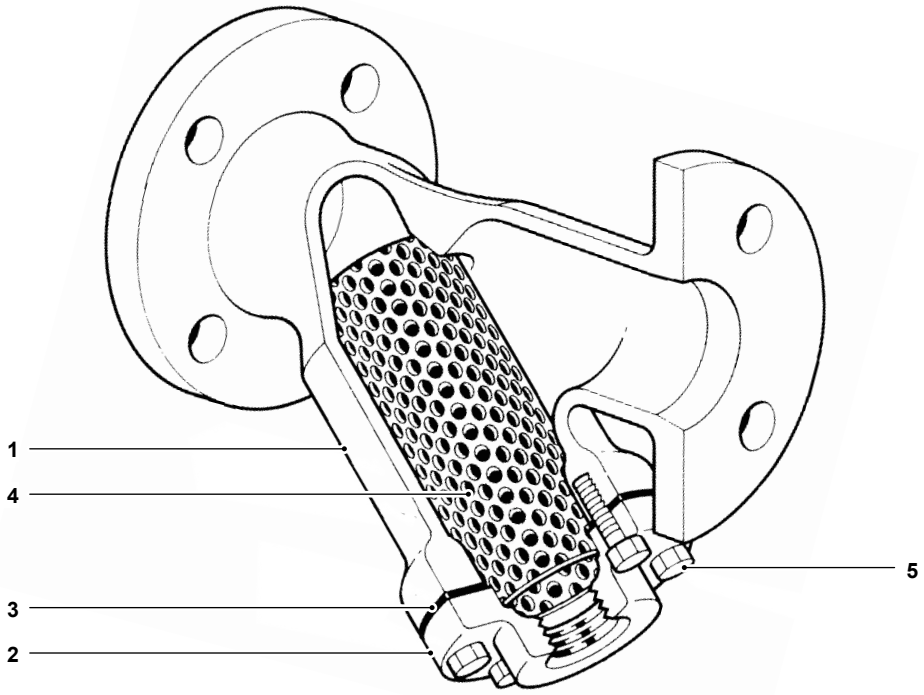
$$\text{Pressure Drop} = \frac{(\text{GPM})^2}{(\text{Cv})^2}$$

Consult factory for other liquids.

See TI-S26-04-US for pressure drops on steam, air and other gases.



Materials

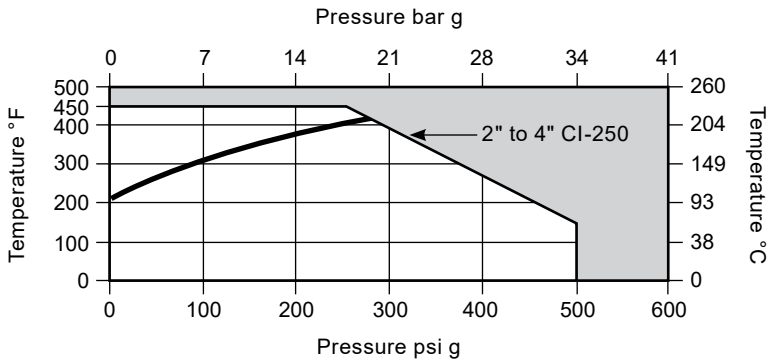


No.	Part	Material	
1	Body	Cast Iron	ASTM A 126 CL B
2	Cap	Cast Iron	ASTM A 126 CL B
3	Cap Gasket	Graphite	
4	Strainer Screen	Stainless Steel	Type 304
5	Cap Screws	Steel	

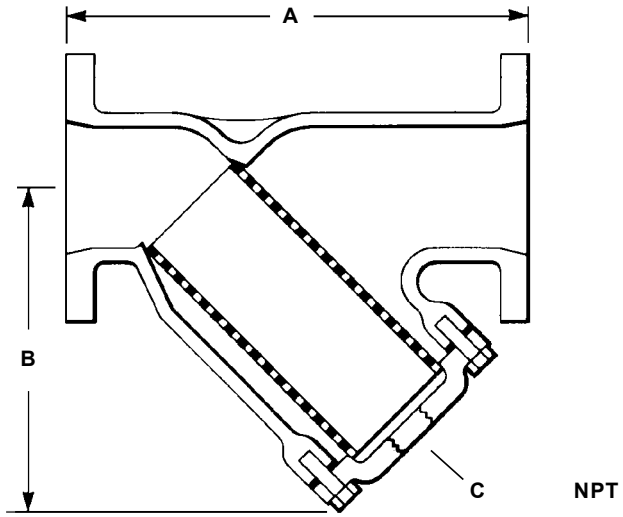
Pressure shell design conditions

Maximum allowable pressure	500 psi g @ -20 - 150 °F (34 bar g @ -29-66 °C)
Maximum allowable temperature	450 °F @ 0 - 250 psi g (232 °C @ 0-17 bar g)

Limiting operating conditions (non-shock)



Dimensions/weights (approximate) in inches (mm) and lbs (kg)



Size		A	B	C (NPT)	Weight
CI-250	2½"	13.0 (330)	7.13 (181)	1¼"	44 lb (20 kg)
	3"	14.0 (356)	8.0 (203)	1¼"	60 lb (27 kg)
	4"	17.06 (433)	11.25 (286)	1¼"	117 lb (53 kg)

Note: Please provide date code when placing order for spare parts. Contact Technical Support for assistance if needed.

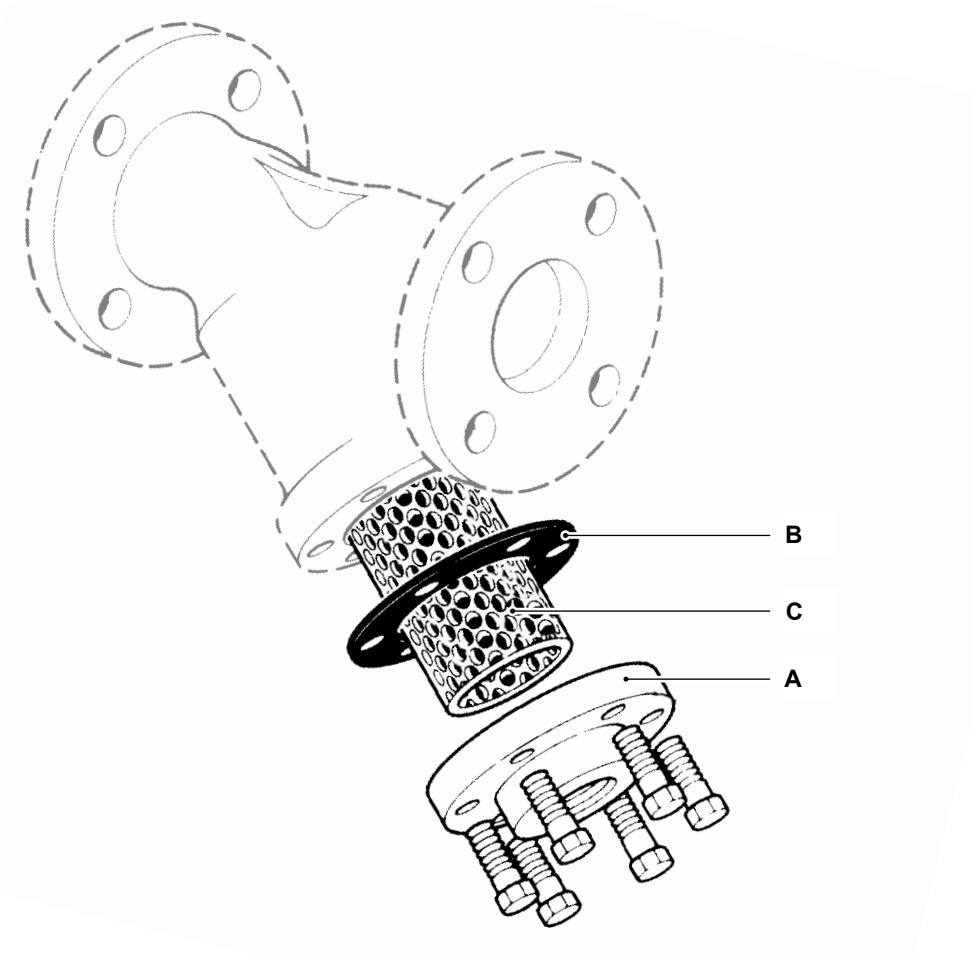
Installation

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.

Spare parts

Screen (state material, perforations or mesh and size of strainer)	C
Cap Gasket	B
Cap	A



TI-P064-02
CMGT Issue 15

Fig 34
Carbon Steel
Strainer - ASTM Material

Description

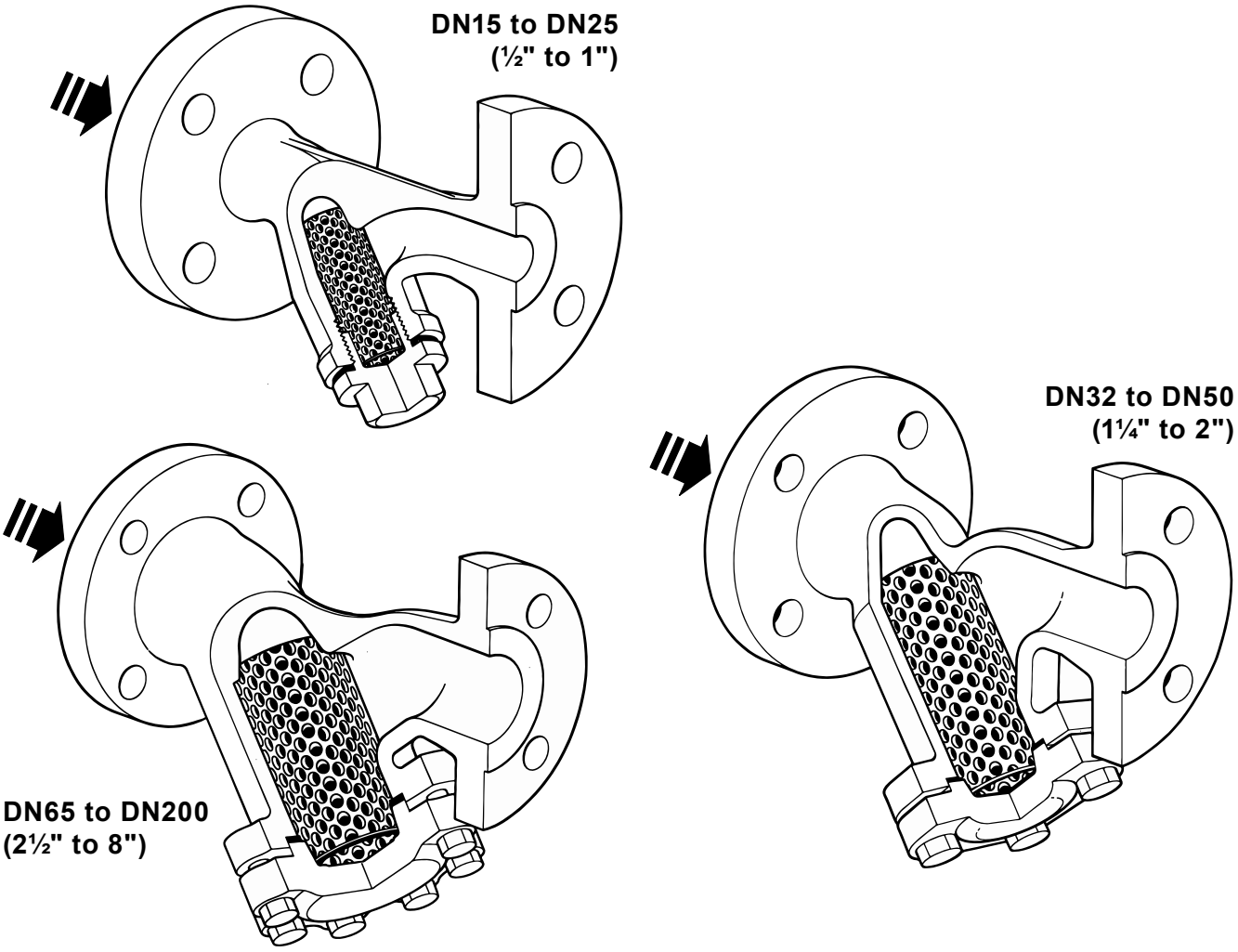
The Fig 34 is an integrally flanged Y-type strainer designed to remove rust, scale and other debris from the pipeline. It is produced from carbon steel, ASTM material.
The standard stainless steel screen in the DN15 to DN80 (½" to 3") is 0.8 mm perforations and in the DN100 to DN200 (4" to 8") it is 1.6 mm perforations.
Note: A low temperature carbon steel strainer is available on request.

Standards

This product fully complies with the requirements of the European Pressure Equipment Directive 2014/68/EU.

Certification

The product is available with a manufacturer's Typical Test Report as standard and certification to EN 10204 3.1 for body and cap by order.
Note: All certification/inspection requirements must be stated at the time of order placement.



Optional extras

Strainer screens

Stainless steel screen	Perforations	1.6 mm	DN15 to DN80	(½" to 3")
		3.0 mm	DN15 to DN200	(½" to 8")
	Mesh	40, 100 and 200		
Monel screen	Perforations	0.8 mm	DN15 to DN80	(½" to 3")
		1.6 mm	DN100 to DN200	(4" to 8")
		3.0 mm	DN15 to DN200	(½" to 8")
	Mesh	100		

Blowdown or drain valve connections

The cap can be drilled to the following sizes to enable a blowdown or drain valve to be fitted.

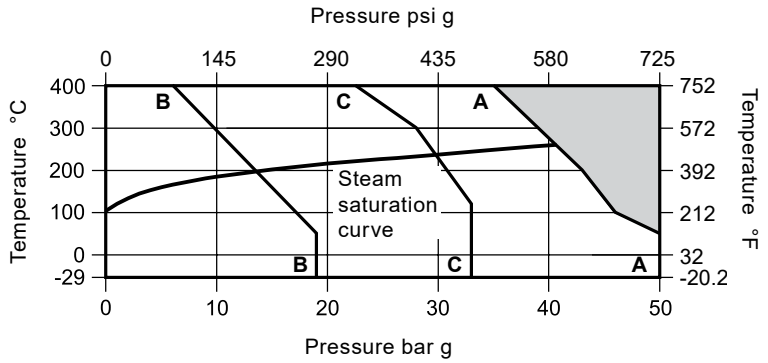
Strainer size	Blowdown valve	Drain valve
DN15 (½")	¼"	¼"
DN20 and DN25 (¾" and 1")	½"	½"
DN32 and DN40 (1¼" and 1½")	1"	1"
DN50 to DN125 (2" to 5")	1¼"	1¼"
DN150 and DN200 (6" and 8")	2"	¾"

Sizes and pipe connections

DN15, DN20, DN25, DN32, DN40, DN50, DN65, DN80, DN100, DN125, DN150 and DN200
(½", ¾", 1", 1¼", 1½", 2", 2½", 3", 4", 5", 6" and 8")
Standard flange ASME Class 150, ASME Class 300 and JIS/KS 20.

Fig 34 Carbon Steel Strainer - ASTM Material

Pressure/temperature limits



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

A - A Flanged ASME 300

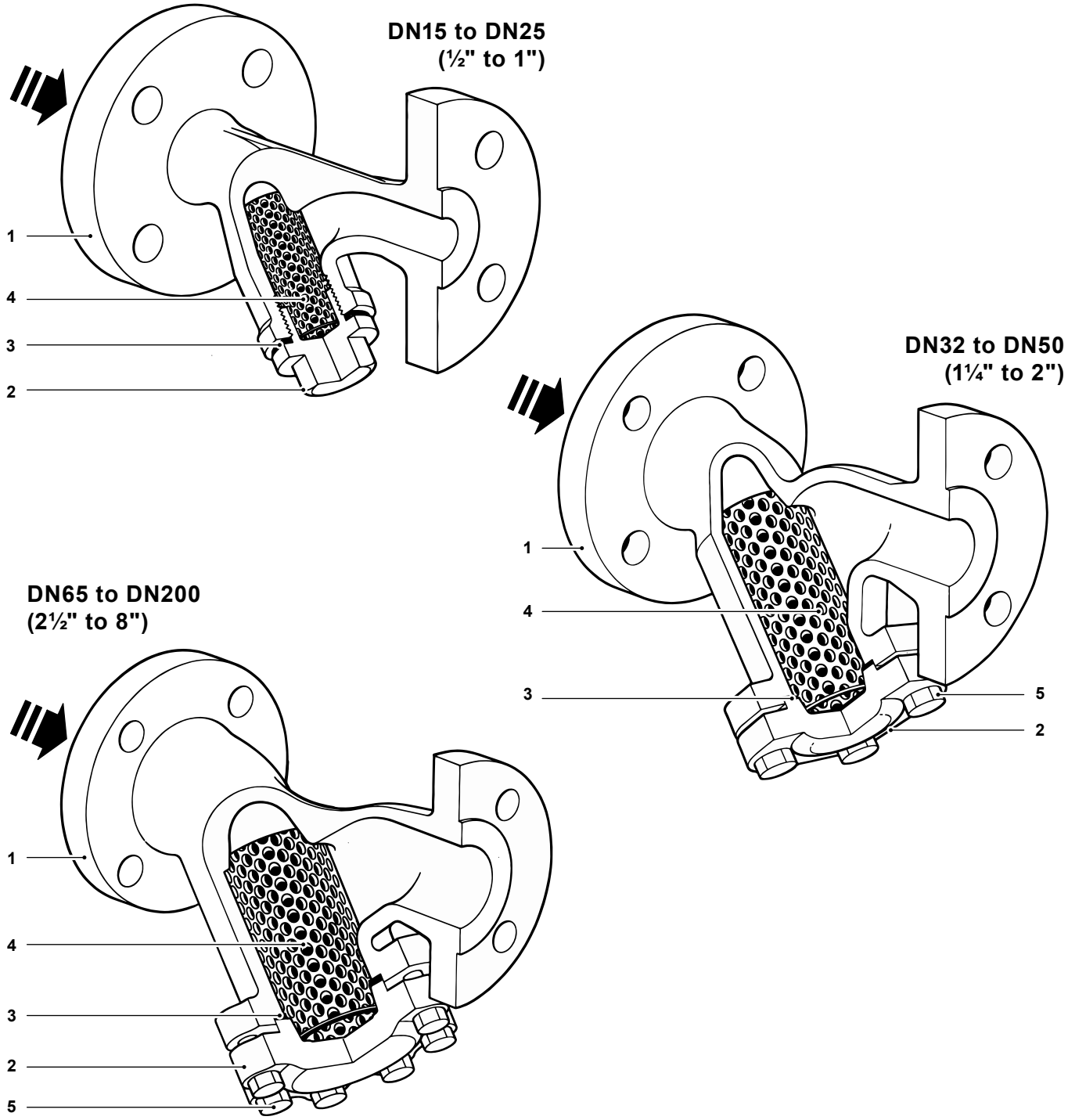
B - B Flanged ASME 150

C - C Flanged JIS/KS 20

Body design conditions		PN50/ASME 300
PMA Maximum allowable pressure	50 bar g @ 37.7 °C	725 psi g @ 100 °F
TMA Maximum allowable temperature	398.8 °C @ 34.8 bar g	750°F @ 505 psi g
Minimum allowable temperature	-29 °C	-20.2 °F
PMO Maximum operating pressure	50 bar g @ 37.7 °C	725 psi g @ 100 °F
TMO Maximum operating temperature	398.8 °C @ 34.8 bar g	750°F @ 505 psi g
Minimum operating temperature **Note:** For lower operating temperatures consult Spirax Sarco.	-29 °C	-20.2 °F
Product is safe for use under full vacuum conditions		
Designed for a maximum cold hydraulic test pressure of	78 bar g	1131 psi g

Fig 34 Carbon Steel Strainer - ASTM Material

Materials

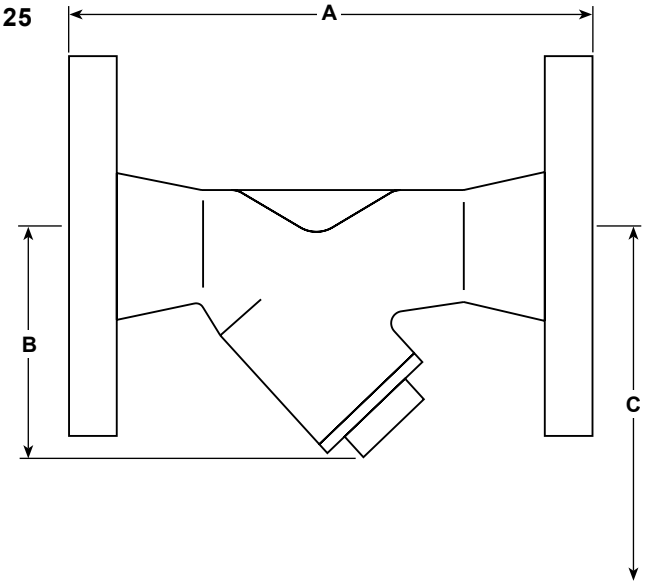


No.	Part		Material	
1	Body		Carbon steel	ASTM A216 WCB
2	Cap	DN15 - DN50	Forged steel	A105N
		DN65 - DN200	Carbon steel	ASTM A216 WCB
3	Cap gasket		Reinforced exfoliated graphite	
4	Strainer screen		Stainless steel	ASTM A240 316L
5	Bolts		Carbon steel	ASTM A193 B7

Fig 34 Carbon Steel Strainer - ASTM Material

Dimensions/weights (approximate) in mm (inches) and kg (lbs)

DN15 to DN25



Size	ASME 150 A	ASME 300 A	JIS/KS 20 A	B	C	Screening area cm² (in²)	Weight
DN15 (½")	120 (4.72)	127 (5)	126 (4.96)	70 (2.76)	110 (4.33)	27 (4.19)	2.1 (4.63)
DN20 (¾")	144 (5.67)	150 (5.91)	150 (5.91)	80 (3.15)	130 (5.12)	43 (6.67)	2.9 (6.39)
DN25 (1")	154 (6.06)	160 (6.30)	159 (6.26)	95 (3.74)	150 (5.91)	73 (11.3)	3.8 (8.38)
DN32 (1¼")	180 (7.09)	180 (7.09)	178 (7.01)	130 (5.12)	235 (9.25)	135 (20.9)	6.5 (14.3)
DN40 (1½")	200 (7.87)	208 (8.19)	202 (7.95)	146 (5.75)	260 (10.2)	164 (25.4)	9.0 (19.8)
DN50 (2")	230 (9.06)	240 (9.45)	232 (9.13)	180 (7.09)	320 (12.6)	251 (38.9)	10.5 (23.1)
DN65 (2½")	290 (11.4)	289 (11.4)	278 (10.9)	200 (7.87)	325 (12.8)	327 (50.7)	17.5 (38.6)
DN80 (3")	310 (12.2)	311 (12.24)	297 (11.7)	205 (8.07)	330 (13.0)	361 (56.0)	24.0 (52.9)
DN100 (4")	351 (13.8)	351 (13.8)	333 (13.1)	255 (10.0)	405 (15.9)	545 (84.5)	30.0 (66.1)
DN125 (5")	401 (15.8)	401 (15.8)	383 (15.1)	315 (12.4)	510 (20.1)	843 (131)	49.0 (108)
DN150 (6")	473 (18.6)	478 (18.8)	461 (18.1)	345 (13.6)	560 (22.0)	1 117 (173)	68.0 (150)
DN200 (8")	593 (23.3)	600 (23.6)	577 (22.7)	440 (17.3)	710 (28.0)	1 909 (296)	128.0 (282)

Fig 34 Carbon Steel Strainer - ASTM Material

Kv values

Size	DN15 (½")	DN20 (¾")	DN25 (1")	DN32 (1¼")	DN40 (1½")	DN50 (2")	DN65 (2½")	DN80 (3")	DN100 (4")	DN125 (5")	DN150 (6")	DN200 (8")
Perforations 0.8, 1.6 and 3 mm	5	8	13	22	29	46	72	103	155	237	340	588
Mesh 40 and 100	5	8	13	22	29	46	72	103	155	237	340	588
Mesh 200	4	6	10	17	23	37	58	83	124	186	268	464

For conversion:
Cv (UK) = Kv x 0.963
Cv (US) = Kv x 1.156

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 DN40 Fig 34 strainer having flanged ASME 300 connections with stainless steel screen having 0.8 mm perforations.

Fig 34 Carbon Steel Strainer - ASTM Material

Spare parts

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

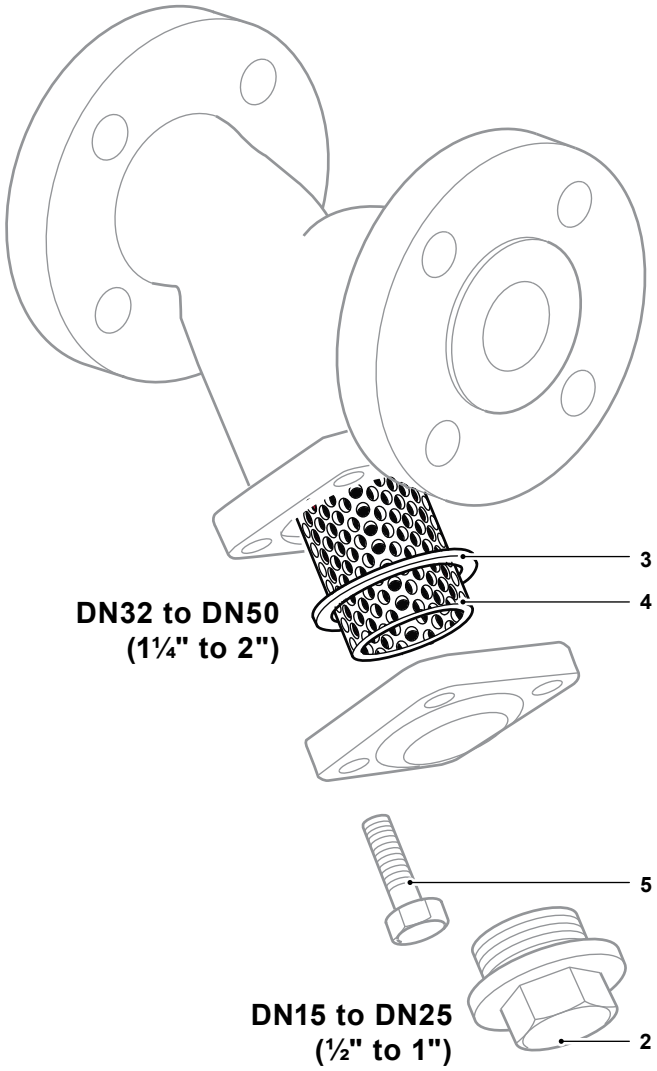
Available spares

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 0.8 mm perforations for a DN50 Spirax Sarco Fig 34 strainer having ASME 300 connections.



Recommended tightening torques

Item	Size		Qty	or mm		N m	ft lbf
2	DN15	(½")	1	22		50 - 55	37 - 41
	DN20	(¾")	1	27		60 - 66	44 - 49
	DN25	(1")	1	27		100 - 110	74 - 81
5	DN32 to DN40	(1¼" to 1½")	4	19	M12 x 30	20 - 24	15 - 18
	DN50	(2")	6	19	M12 x 35	20 - 24	15 - 18
	DN65	(2½")	8	19	M12 x 35	20 - 24	15 - 18
	DN80	(3")	8	19	M12 x 35	30 - 35	22 - 26
	DN100	(4")	8	24	M16 x 45	50 - 55	37 - 41
	DN125	(5")	8	30	M20 x 50	70 - 77	52 - 57
	DN150	(6")	8	30	M20 x 55	80 - 88	59 - 65
	DN200	(8")	12	36	M24 x 65	120 - 230	89 - 170

Fig 34 Carbon Steel Strainer - ASTM Material

TI-P168-01
CMGT Issue 4

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 DN15 to DN80 (½" and 3") size range has 0.8 mm perforations, and 1.6 mm perforations in the DN100 to DN200 (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

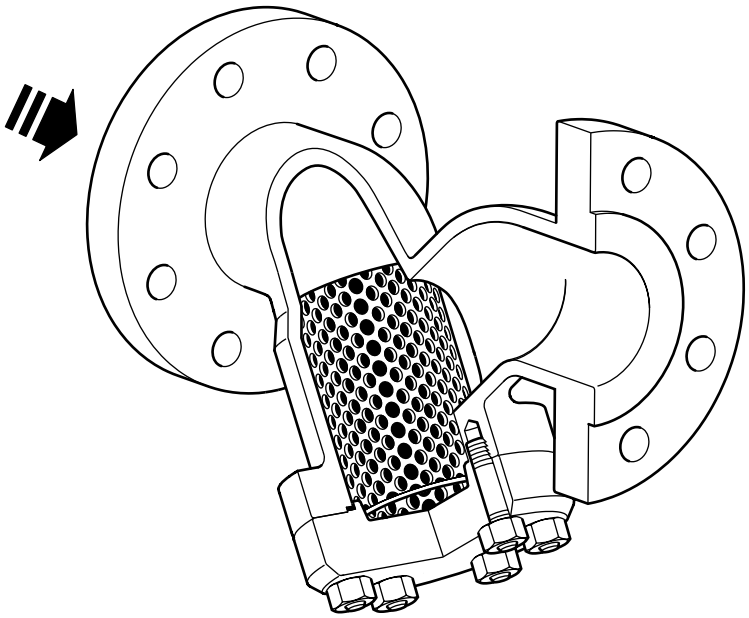
This product fully complies with the requirements of the European Pressure Equipment Directive 2014/68/EU and carries the CE mark when so required.

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	EN 1092 PN100, EN 1092 PN63, ASME (ANSI) B16.5 Class 600 and ASME (ANSI) 600 RTJ - DN15, DN20, DN25, DN40, DN50, DN65, DN80, DN100, DN150 and DN200.
Screwed	BSP T Rp (ISO 7-1) or 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"



DN32 to DN50
(1¼" to 2")

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. 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

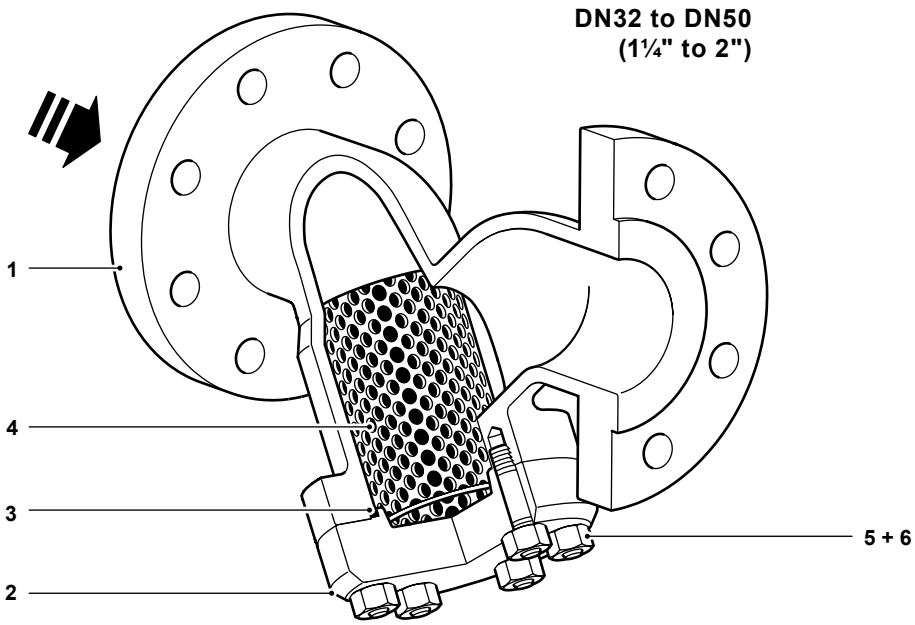
Blowdown/drain valve connection

The cover can be drilled to the following sizes to enable a blowdown or drain valve to be fitted. This option is available at extra cost.

Strainer size	Blowdown valve	Drain valve
DN15	¼"	¼"
DN20 and DN25	½"	½"
DN40	1"	¾"
DN50 to DN100	1¼"	¾"
DN150 to DN200	2"	¾"

Fig 34HP Carbon Steel Strainer

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

Kv values

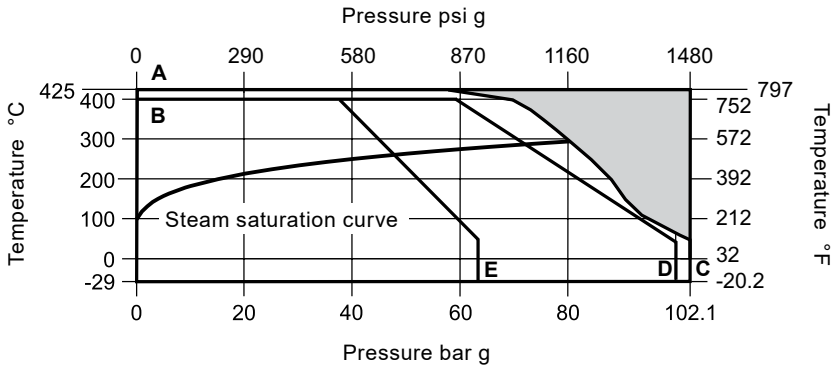
Size	DN15 (½")	DN20 (¾")	DN25 (1")	DN40 (1¼")	DN50 (2")	DN65 (2½")	DN80 (3")	DN100 (4")	DN150 (6")	DN200 (8")
Perforations 0.8, 1.6 and 3 mm	5	8	13	29	46	72	103	155	340	588
Mesh M40 and M100	5	8	13	29	46	72	103	155	340	588
Mesh M200	4	6	10	23	37	58	83	124	268	464

Please consult Spirax Sarco for the Kv values of the following screens: 1 mm, 6 mm, M20, M60 and M400.

For conversion:
Cv (UK) = Kv x 0.963
Cv (US) = Kv x 1.156

Fig 34HP Carbon Steel Strainer

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.

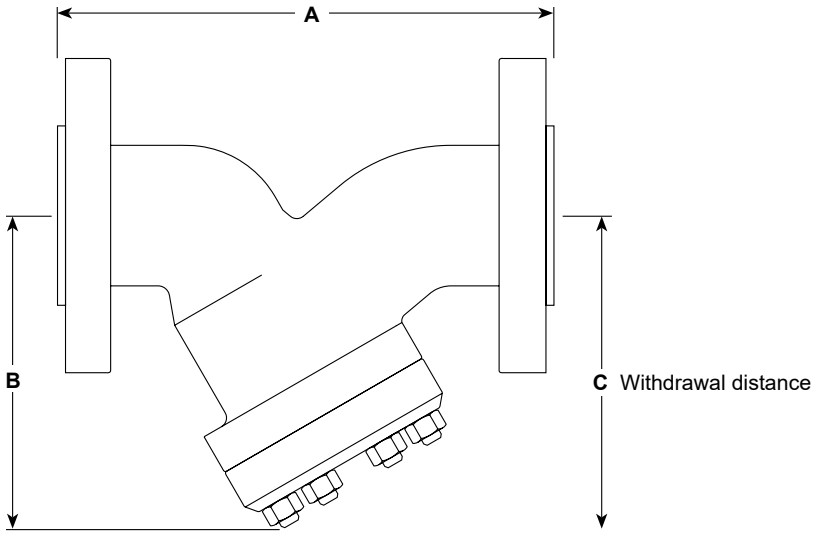
B - D Flanged EN 1092 PN100 and Screwed BSP T Rp (ISO 7-1).

B - E Flanged EN 1092 PN63.

		A - C Flanged ASME 600 and 600 RTJ Screwed NPT Socket weld and Butt weld	**B - D Flanged EN 1092 PN100 and Screwed BSP**	**B - E Flanged EN 1092 PN63**
Body design conditions		ASME 600	PN100	PN63
PMA	Maximum allowable pressure	102.1 bar g @ 38 °C (1481 psi g @ 100 °F)	100 bar g @ 50 °C (1450 psi g @ 122 °F)	63 bar g @ 50 °C (914 psi g @ 122 °F)
TMA	Maximum allowable temperature	425 °C@ 57.5 bar g (797 °F @ 834 psi g)	400 °C@ 59.5 bar g (752 °F @ 863 psi g)	400 °C@ 37.5 bar g (752 °F @ 544 psi g)
Minimum allowable temperature		-29 °C (-20.2 °F)	-29 °C (-20.2 °F)	-29 °C (-20.2 °F)
PMO	Maximum operating pressure	102.1 bar g @ 38 °C (1481 psi g @ 100 °F)	100 bar g @ 50 °C (1450 psi g @ 122 °F)	63 bar g @ 50 °C (914 psi g @ 122 °F)
TMO	Maximum operating temperature	425 °C@ 57.5 bar g (797 °F @ 834 psi g)	400 °C@ 59.5 bar g (752 °F @ 863 psi g)	400 °C@ 37.5 bar g (752 °F @ 544 psi g)
Minimum operating temperature **Note:** For lower operating temperatures consult Spirax Sarco.		-29 °C (-20.2 °F)	-29 °C (-20.2 °F)	-29 °C (-20.2 °F)
Product is safe for use under full vacuum conditions				
Designed for a maximum cold hydraulic test pressure of:		153 bar g (2219 psi g)	150 bar g (2176 psi g)	95 bar g (1378 psi g)

Fig 34HP Carbon Steel Strainer

Dimensions / weights (approximate) in mm (inches) and kg (lb)



Size	A ASME 600	A PN100	A Screwed Socket weld Butt weld	B	C	Weights ASME 600	Weights PN100	Weights Screwed Socket weld Butt weld
DN15 (½")	165 (6.50)	210 (8.27)	165 (6.50)	117 (4.61)	200 (7.87)	3.6 (7.94)	4.0 (8.82)	1.6 (3.52)
DN20 (¾")	190 (7.48)	230 (9.06)	190 (7.48)			4.6 (10.1)	4.9 (10.8)	1.8 (3.97)
DN25 (1")	216 (8.50)		216 (8.50)			5.6 (12.3)	7.6 (16.8)	2.2 (4.85)
DN40 (1½")	241 (9.49)	260 (10.2)	241 (9.49)	195 (7.68)	330 (13.0)	12.2 (26.9)	12.2 (26.9)	7.2 (15.9)
DN50 (2")	292 (11.5)	300 (11.8)	292 (11.5)			17.4 (38.4)	18.0 (39.7)	7.6 (16.8)
DN65 (2½")	330 (13.0)	340 (13.4)	330 (13.0)	222 (8.74)	340 (13.4)	34.0 (75.0)	35.0 (77.2)	16.2 (35.7)
DN80 (3")	356 (14.0)	380 (15.0)	356 (14.0)			35.0 (77.2)	36.0 (79.4)	20.6 (45.4)
DN100 (4")	432 (17.0)	430 (16.9)	432 (17.0)	280 (11.0)	458 (18.0)	60.0 (132)	59.0 (130)	31.9 (70.3)
DN150 (6")	559 (22.0)	550 (21.7)	559 (22.0)	360 (14.2)	610 (24.0)	130.0 (287)	128.0 (282)	74.8 (165)
DN200 (8")	660 (26.0)	650 (25.6)	660 (26.0)	455 (17.9)	775 (30.5)	222.0 (489)	222.0 (489)	143.5 (316)

Fig 34HP Carbon Steel Strainer

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 DN40 Fig 34HP strainer having the standard stainless steel screen with 0.8 mm perforations and flanged EN 1092 PN100 connections.

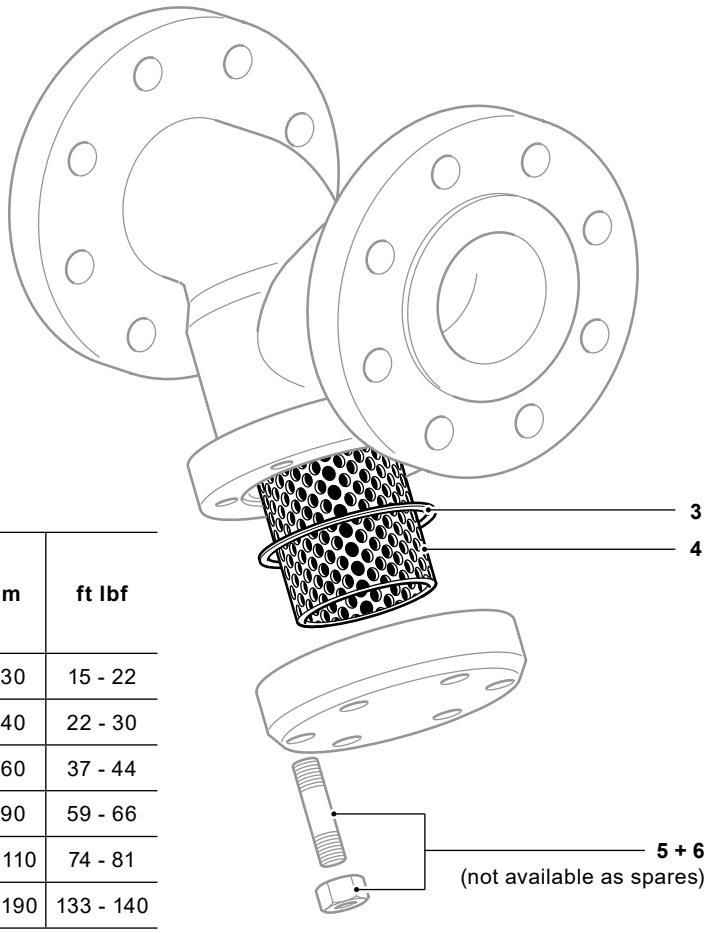
Spare parts
The spare parts available are shown in solid outline. Parts drawn in grey line are not supplied as spares.

Available spares

Cover gasket (packet of 3)		**3**
Strainer screen + Cover gasket	Strainer screen	**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 0.8 mm perforations for a DN50 Spirax Sarco Fig 34HP strainer having EN 1092 PN63 flanged connections.



Recommended tightening torques - Items 5 and 6

Sizes	Qty	mm	or	N m	ft lbf
DN15 - DN25	4	7/16"	½" - 13 UNC	20 - 30	15 - 22
DN40 - DN50	8	7/16"	½" - 13 UNC	30 - 40	22 - 30
DN65 - DN80	8	1 1/16"	⅝" - 11 UNC	50 - 60	37 - 44
DN100	8	1¼"	¾" - 10 UNC	80 - 90	59 - 66
DN150	8	1 7/16"	⅞" - 9 UNC	100 - 110	74 - 81
DN200	12	1 13/16"	1¼" - 7 UNC	180 - 190	133 - 140

TI-P160-02
CMGT Issue 15

Fig 36
Austenitic Stainless Steel Strainer

Description

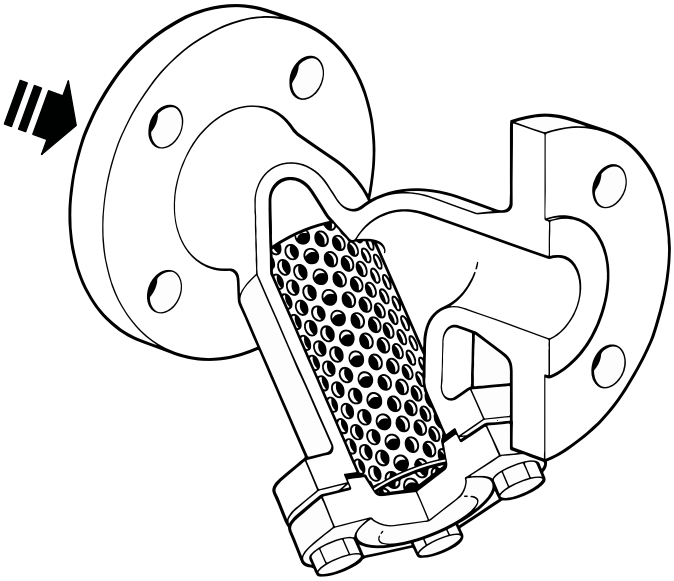
The Fig 36 is an austenitic stainless steel integrally flanged Y-type strainer.
The standard stainless steel screen in the DN15 to DN80 (½" - 3") size range has 0.8 mm perforations, in the DN100 to DN200 (4" to 8") size range it has 1.6 mm perforations. Other perforations, mesh sizes and monel screens 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 2014/68/EU 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.



Sizes and pipe connections

DN15, DN20, DN25, DN32, DN40, DN50, DN65, DN80, DN100, DN125, DN150 and DN200
(½", ¾", 1", 1¼", 2", 1½", 3", 4", 5", 6" and 8")
Standard flange:
EN 1092 PN16, PN25 and PN40 (DN15 to DN50 (½" to 2"))
EN 1092 PN25 and PN40 (DN65 to DN150 (2½" to 6"))
EN 1092 PN40 (DN200 (8"))
ANSI Class 150 and ANSI Class 300 (All sizes)
JIS/KS flanges are available on request.

Optional extras

Strainer screens

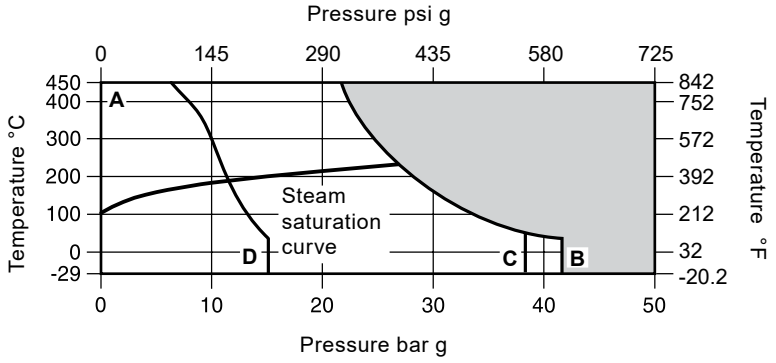
Stainless steel screens	Perforations	1.6 mm (DN15 to DN80 (½" to 3"))
		3.0 mm (DN15 to DN200 (½" to 8"))
	Mesh	40, 100, 200
Monel screens	Perforations	0.8 mm (DN15 to DN80 (½" to 3"))
		1.6 mm (DN100 to DN200 (4" to 8"))
		3.0 mm (DN15 to DN200 (½" to 8"))
	Mesh	100

Blowdown or drain valve connections

The cap can be drilled to the following sizes to enable a blowdown or drain valve to be fitted.

Strainer size	Blowdown valve	Drain valve
DN15 (½")	¼"	¼"
DN20 and DN25 (½" and 1")	½"	½"
DN32 and DN40 (1¼" and 1½")	1"	¾"
DN50 to DN125 (2" and 5")	1¼"	¾"
DN150 and DN200 (6" and 8")	2"	¾"

Pressure/temperature limits



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

A - B Flanged ANSI 300.

A - C Flanged EN 1092 PN40.

Body design conditions				ANSI 300 (PN50)
PMA	Maximum allowable pressure		41 bar g @ 38 °C	595 psi g @ 100 °F
TMA	Maximum allowable temperature		450 °C @ 21 bar g	842 °F @ 305 psi g
Minimum allowable temperature			-29 °C	-20.2 °F
PMO	Maximum operating pressure	ANSI 150	16 bar g	232 psi g
		PN40	38 bar g	551 psi g
		ANSI 300	41 bar g	595 psi g
TMO	Maximum operating temperature		450 °C @ 21 bar g	842 °F @ 305 psi g
Minimum operating temperature **Note:** For lower operating temperatures consult Spirax Sarco.			-29 °C	-20.2 °F
Product is safe for use under full vacuum conditions				
Designed for a maximum cold hydraulic test pressure of:			76 bar g	1102 psi g

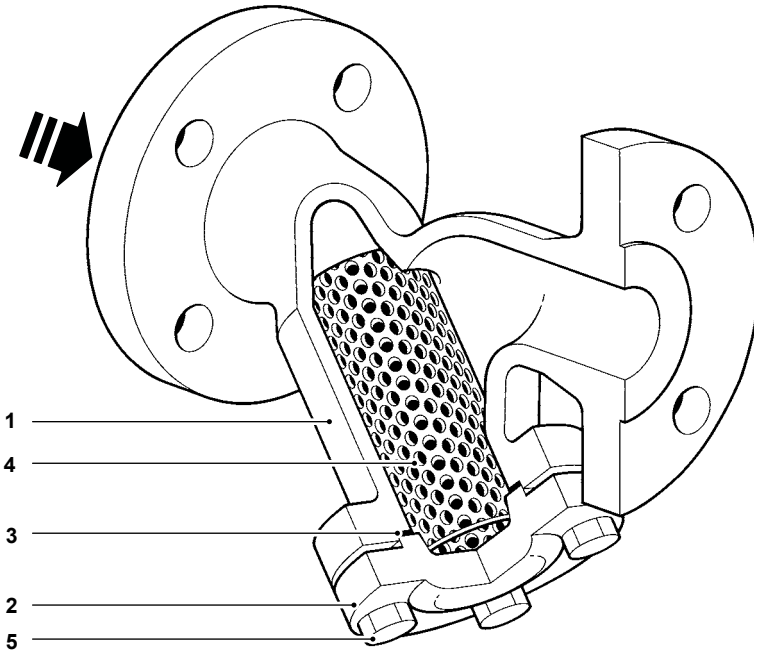
Kv values

Size	DN15 (½")	DN20 (¾")	DN25 (1")	DN32 (1¼")	DN40 (1½")	DN50 (2")	DN65 (2½")	DN80 (3")	DN100 (4")	DN125 (5")	DN150 (6")	DN200 (8")
Perforations 0.8, 1.6 and 3 mm	5	8	13	22	29	46	72	103	155	237	340	588
Mesh 40 and 100	5	8	13	22	29	46	72	103	155	237	340	588
Mesh 200	4	6	10	17	23	37	58	83	124	186	268	464

For conversion:
Cv (UK) = Kv x 0.963
Cv (US) = Kv x 1.156

Fig 36 Austenitic Stainless Steel Strainer

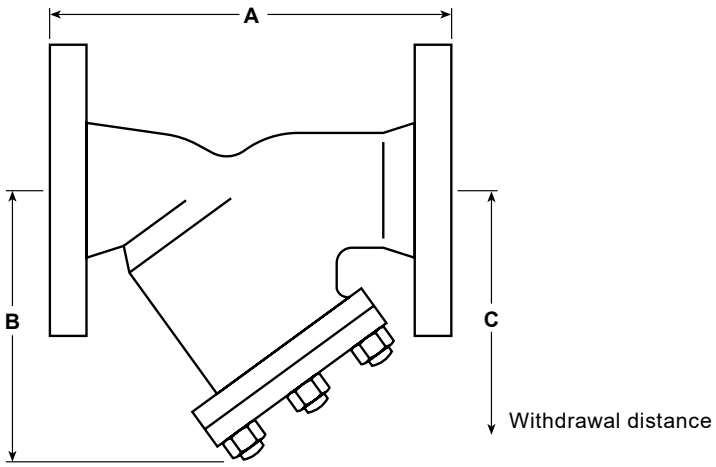
Materials



No.	Part	Size	Material	
1	Body		Austenitic stainless steel	ASTM A351 CF3M
2	Cap	DN15 - DN50 (½" - 2")	Austenitic stainless steel	ASTM A351 CF3M
		DN65 - DN200 (2½" - 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

Fig 36 Austenitic Stainless Steel Strainer

Dimensions/weights (approximate) in mm (inches) and kg (lb)



Size	EN1092 PN16/25/40 A	ANSI 150 A	ANSI 300 A	B	C	Screening area cm²	Weight
DN15	130 (5.12)	124 (4.88)	130 (5.12)	70 (2.76)	120 (4.72)	28 (4.34)	2.5 (5.51)
DN20	150 (5.91)	142 (5.59)	149 (5.87)	80 (3.15)	130 (5.12)	46 (7.13)	4.5 (9.92)
DN25	160 (6.30)	156 (6.14)	163 (6.42)	95 (3.74)	162 (6.38)	79 (12.2)	5.0 (11.0)
DN32	180 (7.09)	180 (7.09)	180 (7.09)	130 (5.12)	235 (9.25)	135 (20.9)	10.0 (22.0)
DN40	200 (7.87)	200 (7.87)	208 (8.19)	146 (5.75)	260 (10.2)	161 (25.0)	12.0 (26.5)
DN50	230 (9.06)	230 (9.06)	241 (9.49)	180 (7.09)	320 (12.6)	251 (38.9)	16.5 (36.4)
DN65	290 (11.4)	290 (11.4)	290 (11.4)	200 (7.87)	325 (12.8)	325 (12.8)	23.0 (50.7)
DN80	310 (12.2)	310 (12.2)	310 (12.2)	205 (8.07)	330 (13.0)	360 (55.8)	35.6 (78.5)
DN100	351 (13.8)	351 (13.8)	351 (13.8)	255 (10.0)	405 (15.9)	540 (83.7)	38.5 (84.9)
DN125	400 (15.7)	400 (15.7)	400 (15.7)	315 (12.4)	510 (20.1)	840 (130)	76.0 (168)
DN150	480 (18.9)	475 (18.7)	480 (18.9)	345 (13.6)	560 (22.0)	1 115 (173)	109.0 (240)
DN200	600 (23.6)	594 (23.4)	600 (23.6)	440 (17.3)	710 (28.0)	1 905 (295)	144.0 (317)

Fig 36 Austenitic Stainless Steel Strainer

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 DN32 Fig 36 strainer having a stainless steel screen with 0.8 mm perforations. The connections are to be flanged EN 1092 PN40.

Fig 36 Austenitic Stainless Steel Strainer

Spare parts

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

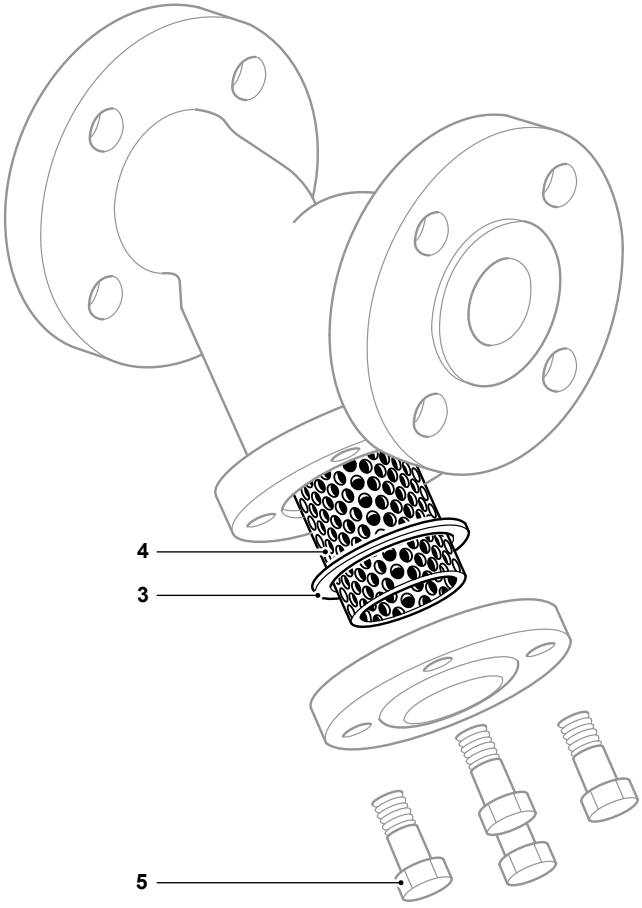
Available spares

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 0.8 mm perforations for a DN50 Spirax Sarco Fig 36 strainer having EN 1092 PN40 connections.



Recommended tightening torques

Item	Size	Qty	or mm		N m	ft lbf
	DN15 - DN25	4	16 A/F	M10 x 30	22 - 25	16 - 18
	DN32 - DN40	4	19 A/F	M12 x 35	40 - 45	30 - 33
	DN50	8	19 A/F	M12 x 35	40 - 45	30 - 33
	DN65	8	19 A/F	M12 x 45	40 - 45	30 - 33
5	DN80	8	19 A/F	M12 x 50	40 - 45	30 - 33
	DN100	8	24 A/F	M16 x 50	100 - 110	74 - 81
	DN125	8	30 A/F	M20 x 60	160 - 170	118 - 125
	DN150	8	30 A/F	M20 x 65	210 - 230	155 - 170
	DN200	8	36 A/F	M20 x 75	210 - 230	155 - 170

Fig 36 Austenitic Stainless Steel Strainer

TI-P160-11
CMGT Issue 6

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 DN15 to DN80 (½" - 3") size range has 0.8 mm perforations, and 1.6 mm perforations in the DN100 to DN200 (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

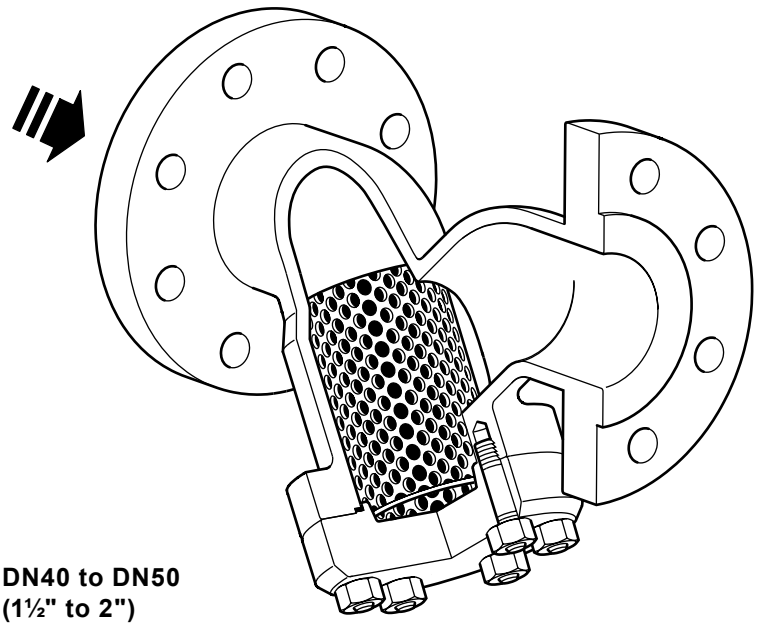
This product fully complies with the requirements of the European Pressure Equipment Directive 2014/68/EU and carries the CE mark when so required.

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:
EN 1092 PN100, EN 1092 PN63, ASME (ANSI) B16.5 Class 600 and ASME (ANSI) 600 RTJ - DN15, DN20, DN25, DN40, DN50, DN65, DN80, DN100, DN150 and DN200.
Screwed: BSP T Rp (ISO 7-1) or 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"



DN40 to DN50 (1½" to 2")

Optional extras

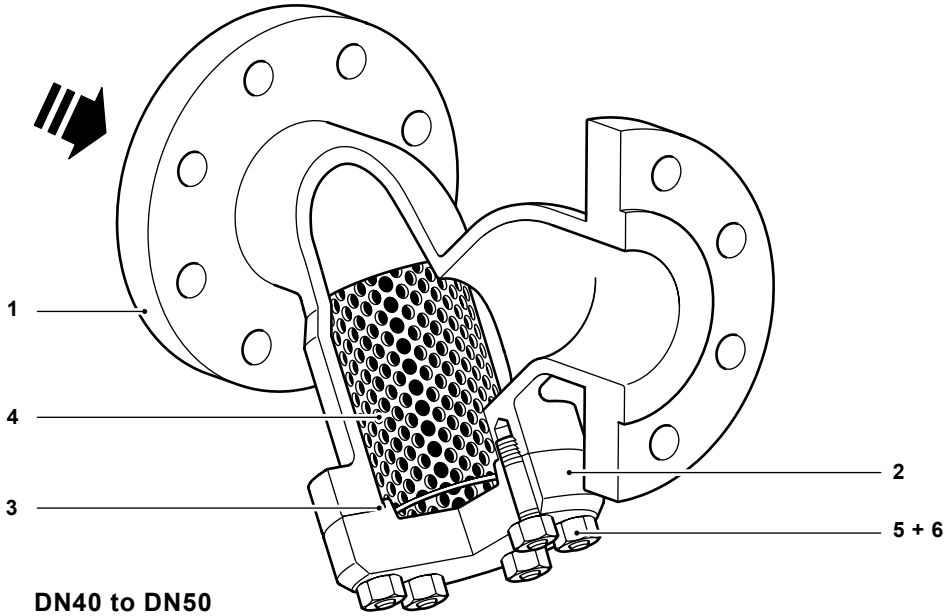
The following optional extras are available for all unit sizes at an extra cost and must be stated at the time of order placement:

Perforations:	0.8 mm (standard), 1 mm, 1.6 mm, 3 mm and 6 mm
	Contact Spirax Sarco for availability of perforations not displayed.
	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/drain valve connection
The cover can be drilled to the following sizes to enable a blowdown or drain valve to be fitted. This option is available at extra cost.

Strainer size	Blowdown valve	Drain valve
DN15 (½")	¼"	¼"
DN20 and DN25 (¾" and 1")	½"	½"
DN40 (1½")	1"	¾"
DN50 to DN100 (2" to 4")	1¼"	¾"
DN150 to DN200 (6" to 8")	2"	¾"

Materials

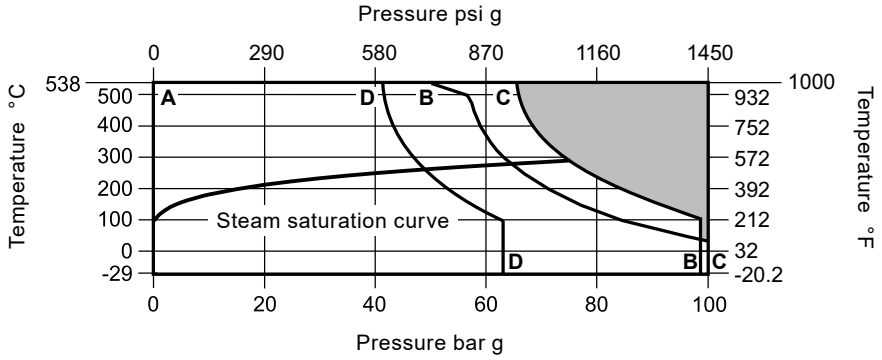


DN40 to DN50 (1½" to 2")

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

Fig 36HP Stainless Steel Strainer

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 - C Flanged EN 1092 PN100 and Screwed BSP T Rp (ISO 7-1).

A - D Flanged EN 1092 PN63.

		A - B **Flanged** **ASME 600 and 600 RTJ** **Screwed NPT** **Socket weld** **and** **Butt weld**	**A - C** **Flanged** **EN 1092 PN100** **and** **Screwed BSP T Rp** **(ISO 7-1)**	**A - D** **Flanged** **EN 1092 PN63**
Body design conditions		ASME 600	PN100	PN63
PMA	Maximum allowable pressure	99.3 bar g @ 38 °C	100 bar g @ 50 °C	63 bar g @ 50 °C
		(1440 psi g @ 100 °F)	(1450 psi g @ 122 °F)	(914 psi g @ 122 °F)
TMA	Maximum allowable temperature	538 °C @ 50 bar g	538 °C @ 65.4 bar g	538 °C @ 41.2 bar g
		(1000 °F @ 725 psi g)	(1000 °F @ 949 psi g)	(1000 °F @ 598 psi g)
Minimum allowable temperature		-29 °C	-29 °C	-29 °C
		(-20.2 °F)	(-20.2 °F)	(-20.2 °F)
PMO	Maximum operating pressure	99.3 bar g @ 38 °C	100 bar g @ 50 °C	63 bar g @ 50 °C
		(1440 psi g @ 100 °F)	(1450 psi g @ 122 °F)	(914 psi g @ 122 °F)
TMO	Maximum operating temperature	538 °C @ 50 bar g	538 °C @ 65.4 bar g	538 °C @ 41.2 bar g
		(1000 °F @ 725 psi g)	(1000 °F @ 949 psi g)	(1000 °F @ 598 psi g)
Minimum operating temperature **Note:** For lower operating temperatures consult Spirax Sarco.		-29 °C	-29 °C	-29 °C
		(-20.2 °F)	(-20.2 °F)	(-20.2 °F)
Product is safe for use under full vacuum conditions				
Designed for a maximum cold hydraulic test pressure of:		153 bar g	150 bar g	95 bar g
		(2219 psi g)	(2176 psi g)	(1378 psi g)

Fig 36HP Stainless Steel Strainer

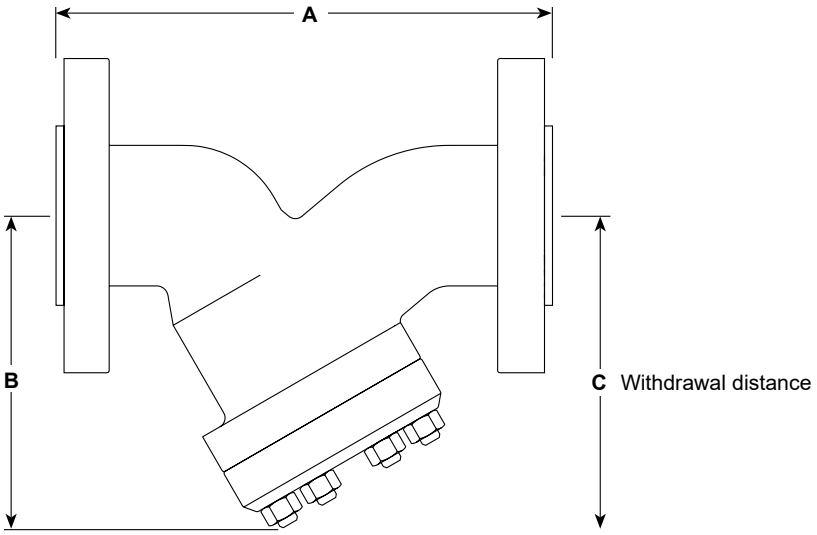
Kv values

Size	DN15	DN20	DN25	DN40	DN50	DN65	DN80	DN100	DN150	DN200
Perforations 0.8, 1.6 and 3 mm	5	8	13	29	46	72	103	155	340	588
Mesh M40 and M100	5	8	13	29	46	72	103	155	340	588
Mesh M200	4	6	10	23	37	58	83	124	268	464

Please consult Spirax Sarco for the Kv values of the following screens: 1 mm, 6 mm, M20, M60 and M400.

For conversion:
Cv (UK) = Kv x 0.963
Cv (US) = Kv x 1.156

Dimensions/weights (approximate) in mm (inches) and kg (lbs)



Size	A ASME 600		A PN100		A Screwed Socket weld Butt weld		B		C		Weights ASME 600		PN100		Screwed Socket weld Butt weld	
	mm	inches	mm	inches	mm	inches	mm	inches	mm	inches	kg	lbs	kg	lbs	kg	lbs
DN15	165	6.50	210	8.27	165	6.50	117	4.61	200	7.87	3.6	7.94	4.0	8.82	1.6	3.52
DN20	190	7.48	230	9.06	190	7.48					4.6	10.1	4.9	10.8	1.8	3.97
DN25	216	8.50			216	8.50					5.6	12.3	7.6	16.8	2.2	4.85
DN40	241	9.49	260	10.2	241	9.49	195	7.68	330	13.0	12.2	26.9	12.2	26.9	7.2	15.9
DN50	292	11.5	300	11.8	292	11.5					17.4	38.4	18.0	39.7	7.6	16.8
DN65	330	13.0	340	13.4	330	13.0	222	8.74	340	13.4	34.0	75.0	35.0	77.2	16.2	35.7
DN80	356	14.0	380	15.0	356	14.0					35.0	77.2	36.0	79.4	20.6	45.4
DN100	432	17.0	430	16.9	432	17.0	280	11.0	458	18.0	60.0	132	59.0	130	31.9	70.3
DN150	559	22.0	550	21.7	559	22.0	360	14.2	610	24.0	130.0	287	128.0	282	74.8	165
DN200	660	26.0	650	25.6	660	26.0	455	17.9	775	30.5	222.0	489	222.0	489	143.5	316

Fig 36HP Stainless Steel Strainer

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 DN40 Fig 36HP strainer having the standard stainless steel screen with 0.8 mm perforations and flanged EN 1092 PN100 connections.

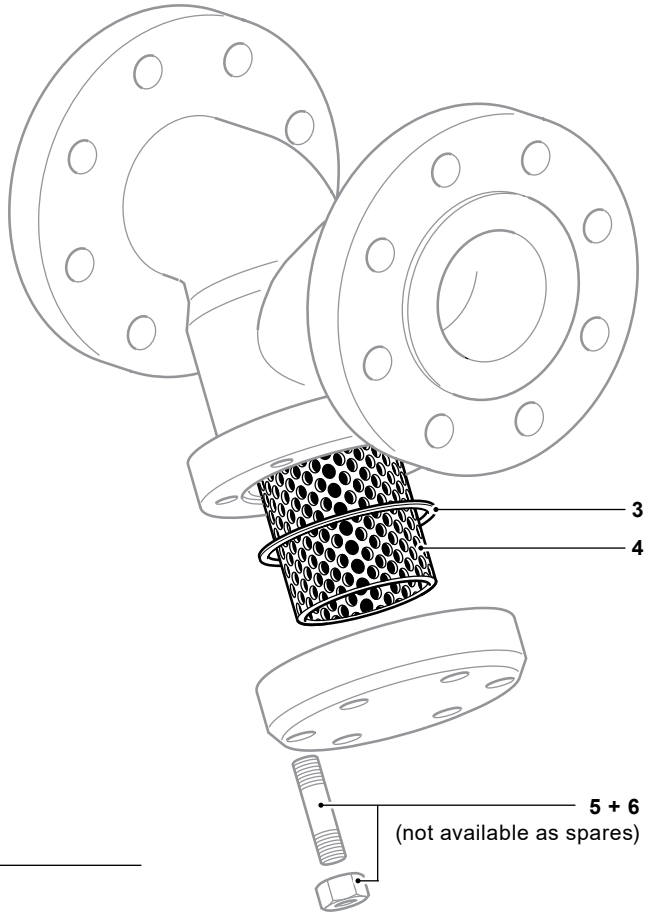
Spare parts
The spare parts available are shown in solid outline.
Parts drawn in a grey line are not supplied as spares.

Available spares

Cover gasket (packet of 3)		**3**
Strainer screen + Cover gasket	Strainer screen	**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 0.8 mm perforations for a DN50 Spirax Sarco Fig 36HP strainer having EN 1092 PN63 flanged connections.



Recommended tightening torques - Items 5 and 6

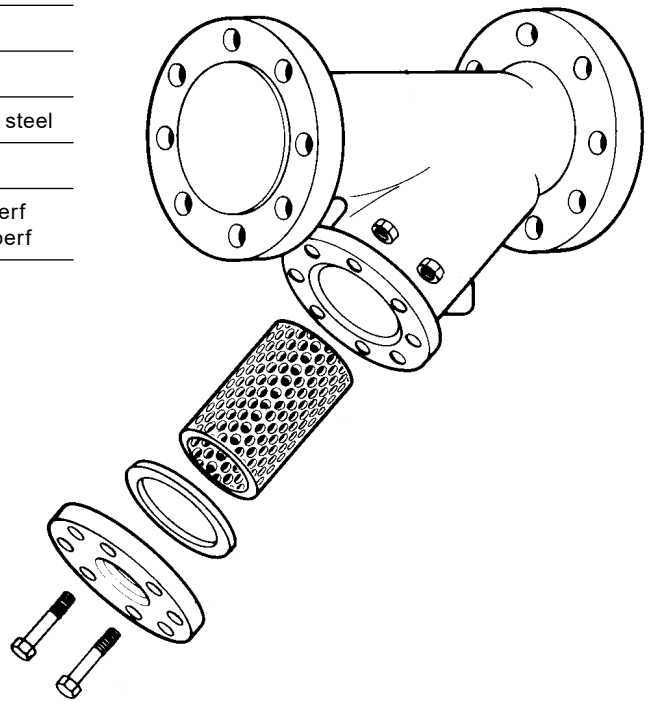
Sizes	Qty	or mm		N m	ft lbf
DN15 - DN25	4	7/16"	½" - 13 UNC	20 - 30	15 - 22
DN40 - DN50	8	7/16"	½" - 13 UNC	30 - 40	22 - 30
DN65 - DN80	8	1 1/16"	⅝" - 11 UNC	50 - 60	37 - 44
DN100	8	1¼"	¾" - 10 UNC	80 - 90	59 - 66
DN150	8	1 7/16"	⅞" - 9 UNC	100 - 110	74 - 81
DN200	12	1 13/16"	1¼" - 7 UNC	180 - 190	133 - 140

TI-P201-06-US
Issue 1

Stainless Steel Strainers
CSS

Description

Type	CSS-150
Connections	ANSI 150
Construction	Cast 316 stainless steel
Maximum Saturated Steam Pressure	197 psi g
Standard Screen	2½" to 8": 3⁄64" perf 10" to 14" : 1⁄16" perf



Cv Values

Size	Cv
10"	1650
12"	2400
14"	3500

For water:

$$\text{Pressure Drop} = \frac{(\text{GPM})^2}{(\text{Cv})^2}$$

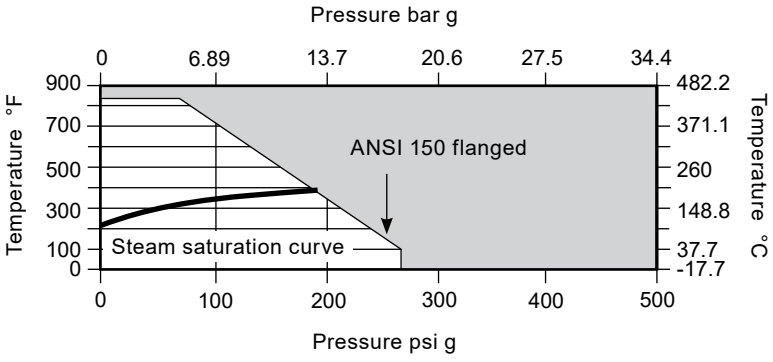
Consult factory for other liquids.

See TI-S26-04-US for pressure drops on steam, air and other gases.

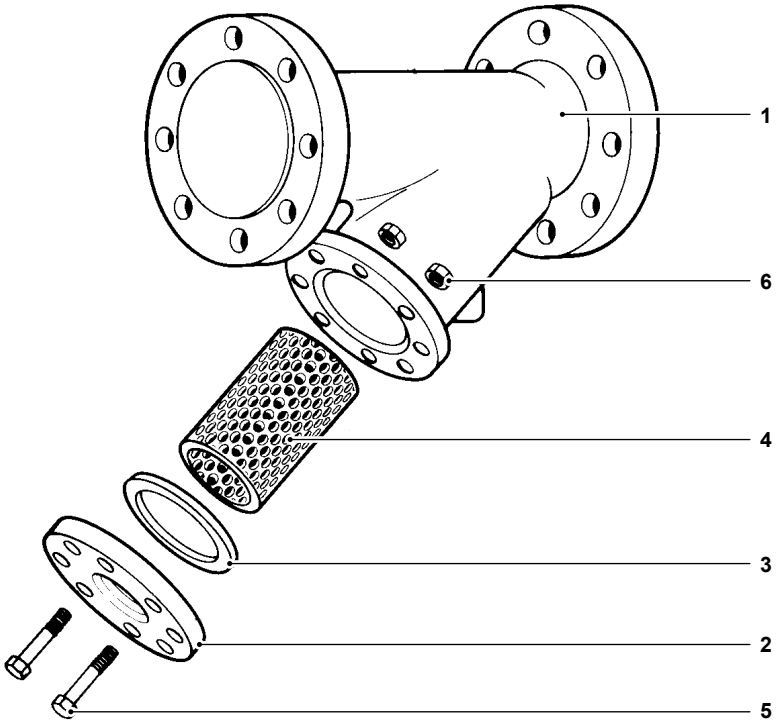
Pressure shell design conditions

Maximum allowable pressure	275 psi g/-20-100 °F (19 bar g/-29-38 °C)
Maximum allowable temperature	850 °F/0-65 psi g (454 °C/0-4.5 bar g)

Limiting operating conditions (non-shock)



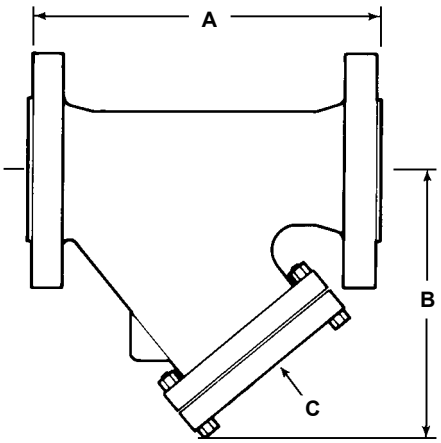
Materials



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

Dimensions/weights (approximate) in inches (mm) and lbs (kg)

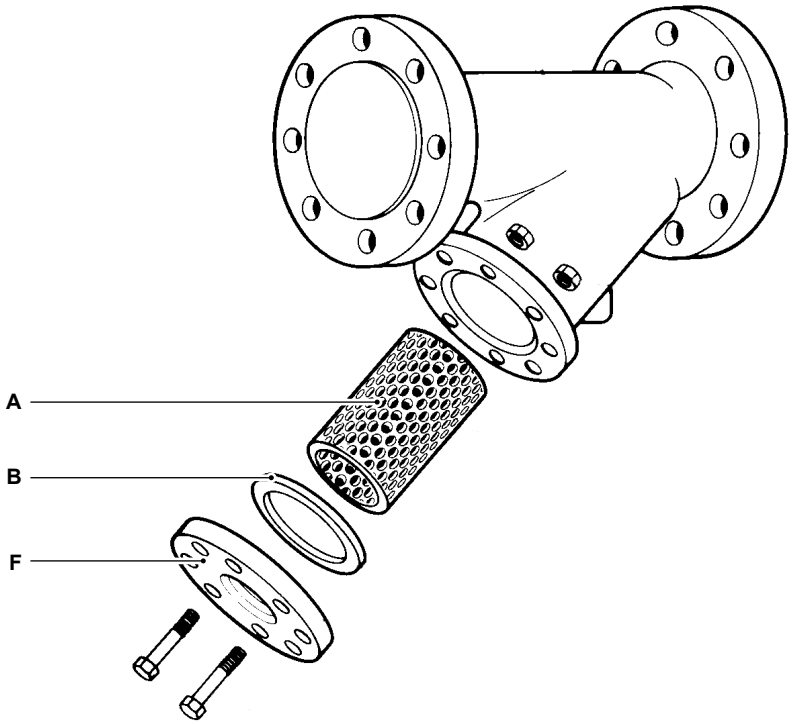
Size	A	B	C	Weight
10"	30.01 (762)	20.5 (521)	2" (NPT)	132 lb (60 kg)
12"	33.5 (851)	24.0 (610)	2" (NPT)	180 lb (82 kg)
14"	38.6 (980)	24.8 (630)	2" (NPT)	1212 lb (550 kg)



Installation

The strainer should be installed with the flow direction as indicated on the body, in a vertical down or horizontal 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



Strainer Screen (state material, size of perf or mesh, and size of strainer)	**A**
Cap Gasket	**B**
Cap	**F**

TI-P169-06
CMGT Issue 5

TP1, TP2, TP3 and Spacer Ring Stainless Steel Temporary Strainers

Description

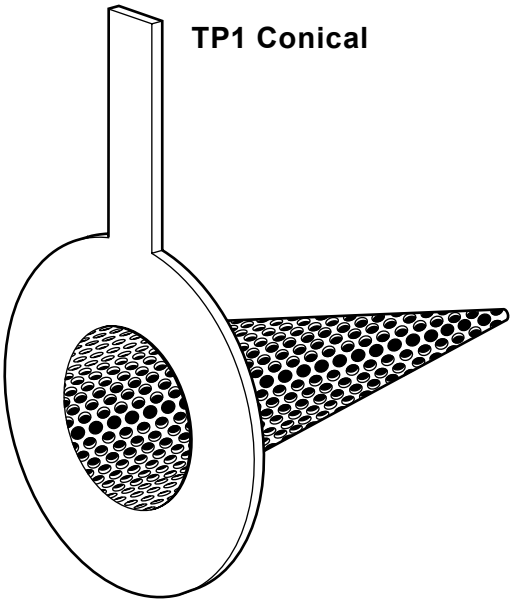
Temporary strainers have been designed to fit between two flanges and are generally used during commissioning and start-up to remove any course debris. They are available in three designs (TP1, TP2 and TP3 as illustated below) to suit a wide range of fluids for applications in process lines, hot water systems, steam and condensate systems etc. The standard screens are manufactured using 304L or 316L stainless steel and have 3 mm perforations. 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. After commissioning and start-up the temporary strainer should be removed from the pipeline and replaced with a spacer ring.

Standards

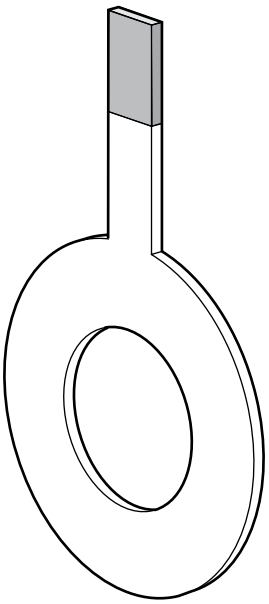
These products fully comply with the requirements of the European Pressure Equipment Directive 2014/68/EU and carry the CE mark when so required.

Certification

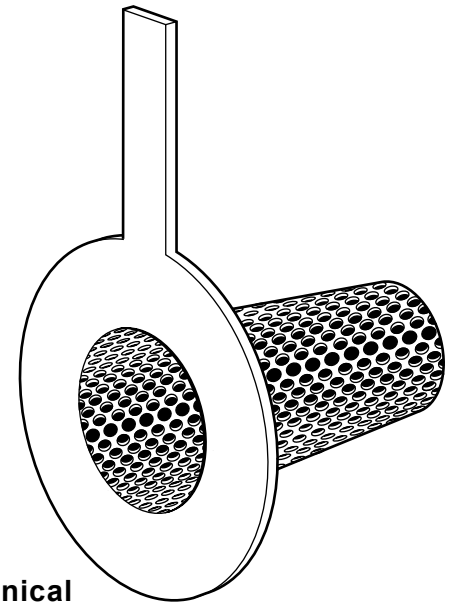
These products are available with certification to EN 10204 3.1 and NACE approval.
Note: All certifications/inspections requirements must be stated at the time of order placement.



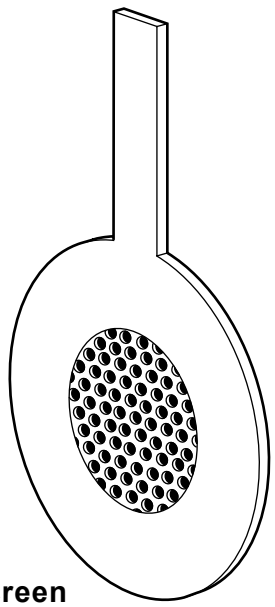
TP1 Conical



Spacer ring



TP2 Truncated conical



TP3 Flat screen

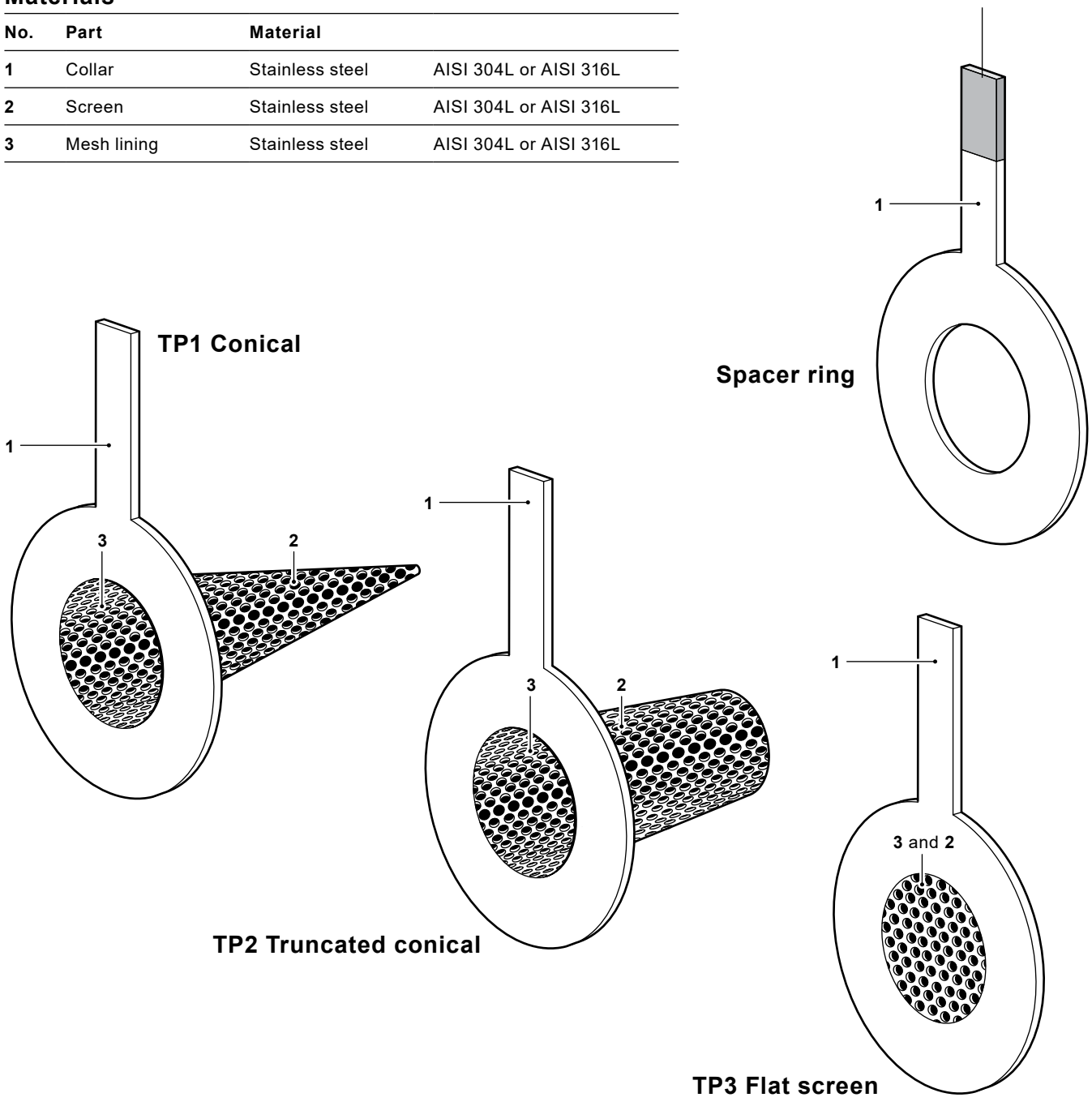
Sizes and pipe connections

DN40 - DN700 (1½" – 28")
Designed for installation between the following flanges:
EN 1092 PN10, PN16, PN25 and PN40 or ASME 150, ASME 300 and ASME 600

Please note
The spacer ring handle is painted blue to differentiate it from a temporary strainer when fitted between the flanges on the pipeline.

Materials

No.	Part	Material	
1	Collar	Stainless steel	AISI 304L or AISI 316L
2	Screen	Stainless steel	AISI 304L or AISI 316L
3	Mesh lining	Stainless steel	AISI 304L or AISI 316L

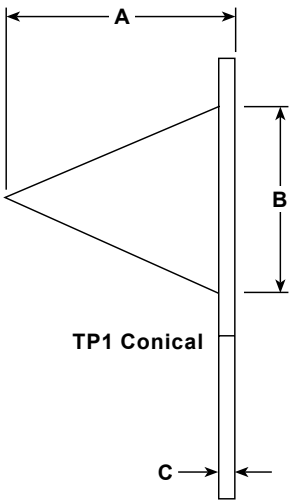


Optional extras

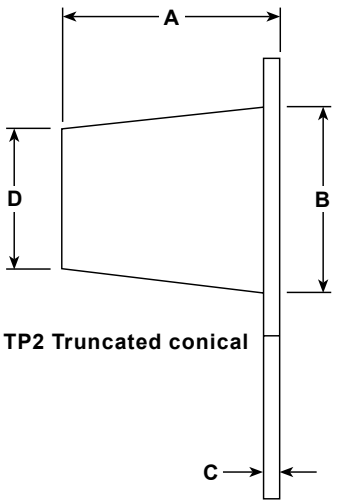
The following optional extras are available for all unit sizes at an extra cost and must be stated at the time of order placement:

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.

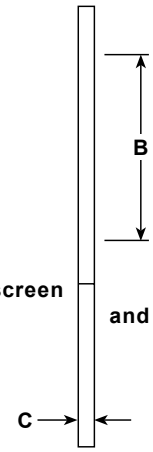
Dimensions/weights (approximate) in mm (inches) and kg (lb)



TP1 Conical



TP2 Truncated conical



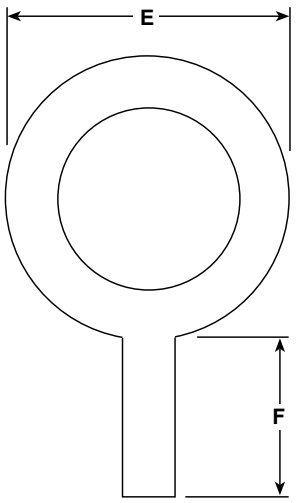
TP3 Flat screen and Spacer ring

Size	A						B		C		D		Weight *			
	100% column = The standard unit												PN		ASME	
	(100%)		(150%)		(200%)											
	mm	inches	mm	inches	mm	inches	mm	inches	mm	inches	mm	inches	kg	lb	kg	lb
DN40 - 1½"	50	1.97	100	3.94	140	5.51	31	1.22	2	0.08	20	0.79	0.30	0.66	0.24	0.53
DN50 - 2"	68	2.68	115	4.53	150	5.91	44	1.73			32	1.26	0.38	0.84	0.30	0.66
DN65 - 2½"	88	3.46	140	5.51	180	7.09	56	2.20			38	1.50	0.45	0.99	0.40	0.88
DN80 - 3"	108	4.25	165	6.50	230	9.06	67	2.64			50	1.97	0.65	1.43	0.60	1.32
DN100 - 4"	140	5.51	215	8.46	290	11.4	88	3.46			65	2.56	1.00	2.20	0.60	1.32
DN125 - 5"	173	6.81	268	10.6	355	14.0	117	4.61			83	3.27	1.30	2.87	1.10	2.43
DN150 - 6"	210	8.27	330	13.0	430	16.9	139	5.47			105	4.13	2.00	4.41	1.60	3.53
DN200 - 8"	282	11.1	430	16.9	585	23.0	181	7.13	3	0.12	145	5.71	3.60	7.94	2.80	6.17
DN250 - 10"	355	14.0	535	21.1	685	27.0	228	8.98			185	7.28	5.00	11.0	3.90	8.60
DN300 - 12"	427	16.8	635	25.0	825	32.5	276	10.9			225	8.86	6.50	14.3	5.30	11.7
DN350 - 14"	477	18.8	660	26.0	890	35.0	320	12.6			260	10.2	8.40	18.5	6.40	14.1
DN400 - 16"	558	22.0	750	29.5	990	39.0	368	14.5	5	0.20	300	11.8	11.80	26.0	9.20	20.3
DN450 - 18"	670	26.4	840	33.1	1 120	44.1	415	16.3			345	13.6	12.40	27.3	11.60	25.6
DN500 - 20"	704	27.7	940	37.0	1 245	49.0	466	18.3			380	15.0	14.60	32.2	13.50	29.8
DN600 - 24"	848	33.4	1 120	44.1	1 475	58.1	568	22.4			460	18.1	20.30	44.8	18.60	41.0
DN700 - 28"	993	39.1	1 538	60.6	2 072	81.6	686	27.0			550	21.7	27.80	61.3	26.00	57.3

*** Please note** that the weights displayed are approximate and **only applicable for the TP1 and TP2**

Dimensions/weights
(approximate) in mm (inches) and kg (lb)

All variants



Size	E														F	
	PN10		PN16		PN25		PN40		ASME 150		ASME 300		ASME 600			
	mm	inches	mm	inches	mm	inches	mm	inches	mm	inches	mm	inches	mm	inches	mm	inches
DN40 - 1½"	88	3.15	88	3.15	88	3.15	88	3.15	80	3.15	90	3.54	90	3.54		
DN50 - 2"	102	4.02	102	4.02	102	4.02	102	4.02	98	3.86	105	4.13	105	4.13		
DN65 - 2½"	122	4.80	122	4.80	122	4.80	122	4.80	117	4.61	124	4.88	124	4.88	102	4.02
DN80 - 3"	138	5.43	138	5.43	138	5.43	138	5.43	130	5.12	143	5.63	143	5.63		
DN100 - 4"	158	6.22	158	6.22	162	6.38	162	6.38	168	6.61	175	6.89	187	7.36		
DN125 - 5"	188	7.40	188	7.40	188	7.40	188	7.40	191	7.52	210	8.27	235	9.25		
DN150 - 6"	212	8.35	212	8.35	218	8.58	218	8.58	216	8.50	245	9.65	260	10.2	127	5
DN200 - 8"	268	10.6	268	10.6	278	10.9	285	11.2	275	10.8	302	11.9	314	12.4		
DN250 - 10"	320	12.6	320	12.6	335	13.2	345	13.6	333	13.1	356	14.0	394	15.5		
DN300 - 12"	370	14.6	378	14.9	395	15.6	410	16.1	403	15.9	416	16.4	450	17.7		
DN350 - 14"	430	16.9	438	17.2	450	17.7	465	18.3	445	17.5	479	18.9	486	19.1	153	6.02
DN400 - 16"	482	19.0	490	19.3	505	19.9	535	21.1	508	20	533	21.0	560	22.0		
DN450 - 18"	532	20.9	550	21.7	555	21.9	560	22.0	543	21.4	591	23.3	605	23.8		
DN500 - 20"	585	23.0	610	24.0	615	24.2	615	24.2	600	23.6	648	25.5	675	26.6		
DN600 - 24"	685	27.0	725	28.5	720	28.3	735	28.9	711	28.0	768	30.2	784	30.9	203	7.99
DN700 - 28"	800	31.5	795	31.3	820	32.3	840	33.1	800	31.5	800	31.5	800	31.5		

Size	Weight *			
	PN		ASME	
	kg	lb	kg	lb
DN40 - 1½"	0.30	0.66	0.24	0.53
DN50 - 2"	0.38	0.84	0.30	0.66
DN65 - 2½"	0.45	0.99	0.40	0.88
DN80 - 3"	0.65	1.43	0.60	1.32
DN100 - 4"	1.00	2.20	0.60	1.32
DN125 - 5"	1.30	2.87	1.10	2.43

Size	Weight *			
	PN		ASME	
	kg	lb	kg	lb
DN150 - 6"	2.00	4.41	1.60	3.53
DN200 - 8"	3.60	7.94	2.80	6.17
DN250 - 10"	5.00	11.0	3.90	8.60
DN300 - 12"	6.50	14.3	5.30	11.7
DN350 - 14"	8.40	18.5	6.40	14.1
DN400 - 16"	11.80	26.0	9.20	20.3

Size	Weight *			
	PN		ASME	
	kg	lb	kg	lb
DN450 - 18"	12.40	27.3	11.60	25.6
DN500 - 20"	14.60	32.2	13.50	29.8
DN600 - 24"	20.30	44.8	18.60	41.0
DN700 - 28"	27.80	61.3	26.00	57.3

* Please note that the weights displayed are approximate and only applicable for the TP1 and TP2

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 DN100 TP1 temporary conical shaped strainer having the standard 100% stainless steel screen with 3 mm perforations, for installation between EN 1092 PN25 flanges.

LIQUID DRAIN TRAP SOLUTIONS



Section contents ⟩

spirax sarco

SECTION 10 CONTENTS

Iron Liquid Drain Traps FA-30, FA-75, FA-150	TI-P105-05-US
Iron Liquid Drain Trap FA-200	TI-P105-06-US
Iron Liquid Drain Traps FAB Super Capacity Series	TI-P105-01-US
Iron Liquid Drain Traps FAI-30, FAI-75, FAI-150, FAI-200	TI-P105-10-US
Ductile Iron Liquid Drain Trap CA14	TI-P148-12-EN
Steel Liquid Drain Trap FA450	TI-P105-07-US
Steel Liquid Drain Trap 3" (DN80) and 4" (DN100) FA450	TI-P105-04-US
Stainless Steel Liquid Drain Trap F-150V, F-300V	TI-P105-08-US
Stainless Steel Liquid Drain Trap FA-150	TI-P105-03-US
Stainless Steel Drain Trap CAS14 and CAS14S	TI-P148-38-EN
Stainless Steel Liquid Drain Trap CA46S	TI-P148-04-EN
CA46S Austenitic Stainless Steel Air and Gas Trap DN40 and DN50	TI-P148-07-EN
Thermo-Dynamic Liquid Drain Trap TDA52	TI-P106-03-US
Liquid Drain Traps Selection & Sizing	TI-P102-04-US

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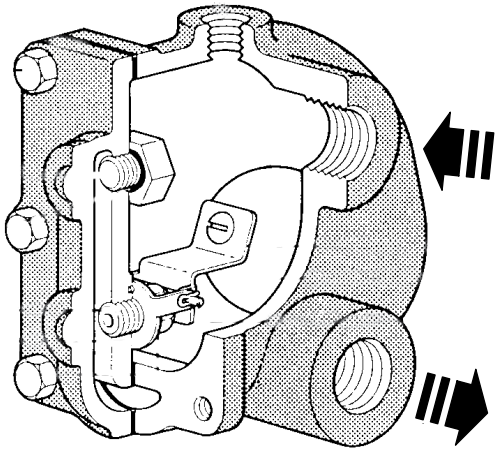
TI-P105-05-US
Issue 1

Iron Liquid Drain Traps
FA-30, FA-75, FA-150

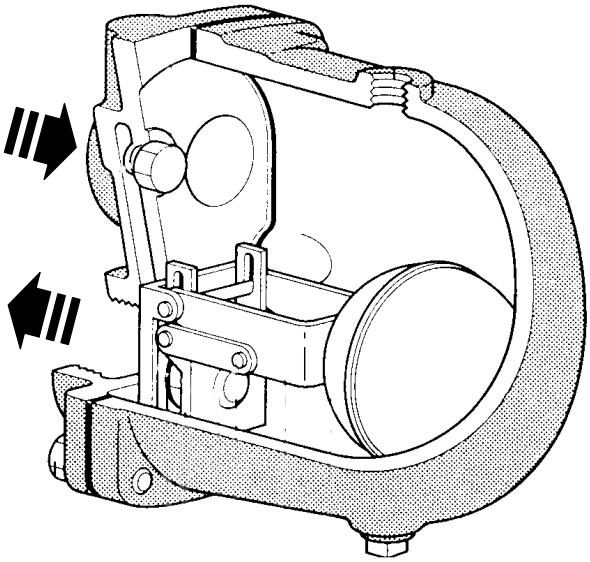
Description
The float-operated liquid drain trap discharges continuously in direct response to variations in liquid flow rate, assuring thorough drainage of the system.

Typical applications
Receiver and air line drainage, draining a liquid from its vapor phase

Model	FA-30	FA-75	FA-150
Sizes	¾", 1", 1½", 2" (DN20, DN25, DN40, DN 50)		
Connections	NPT		
Construction	Cast iron body, Stainless steel internals		



¾" and 1"
(DN20 and DN25)



1½" and 2"
(DN40 and DN 50)

Limiting operating conditions

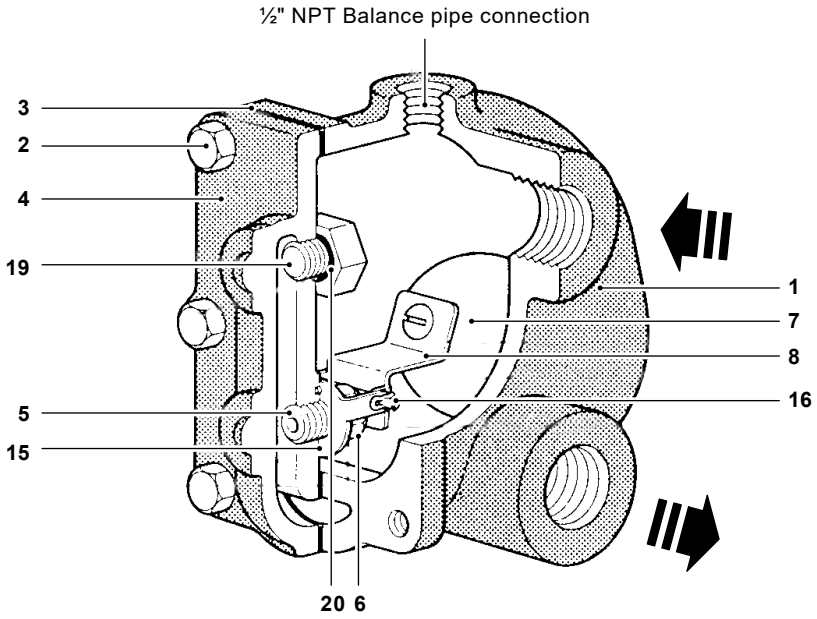
PMO	Maximum operating pressure	Up to 150 psi g (10.3 bar g) The PMO depends on the model selected and the specific gravity of the liquid being drained. See TI-P102-04-US	
Maximum operating temperature		FA-30, 75	450 °F (232 °C)
		FA-150	200 °F (93 °C)

Pressure shell design conditions

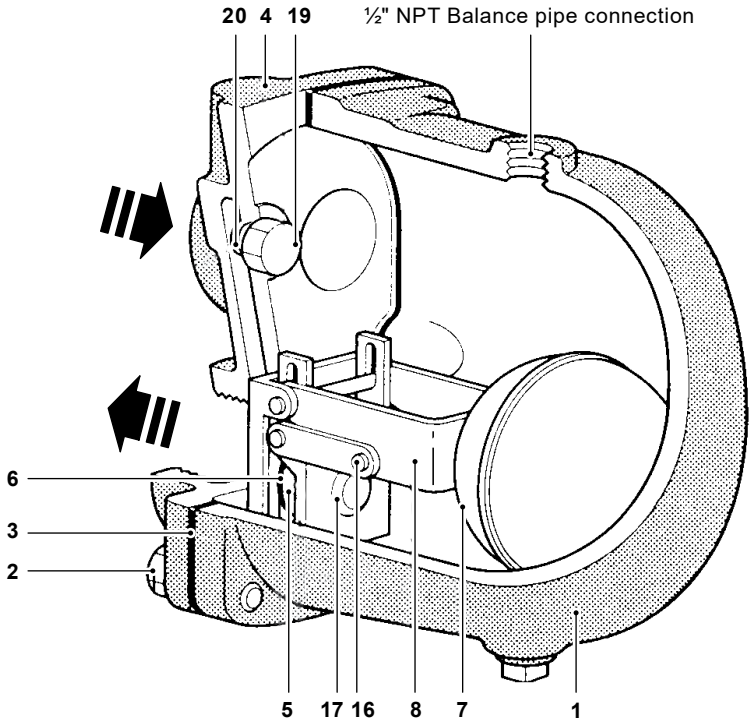
PMA	Maximum allowable pressure	FA-30,75:	125 psi g/0-450 °F (9 bar g/0-232 °C)
		FA-150:	150 psi g/0-200 °F (10 bar g/0-93 °C)
TMA	Maximum allowable temperature	FA-30,75:	450 °F/0-125 psi g (232 °C/0-9 bar g)
		FA-150:	200 °F/0-150 psi g (93 °C/0-10 bar g)

Materials

¾" and 1" (DN20 and DN25)



1½" and 2" (DN40 and DN50)

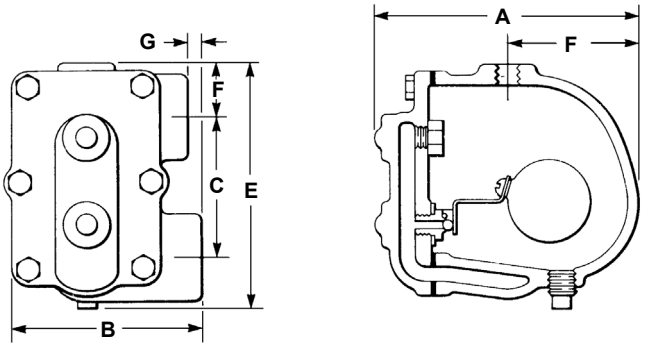


No.	Part	Material	
1	Body	Cast Iron	ASTM A126 CL B
2	Cover Screws	Steel	ASTM A449
3	Cover Gasket	Graphite	
4	Cover	Cast Iron	ASTM A126 CL B
5	Valve Seat	Stainless Steel	AISI 420F
6	Valve Seat Gasket	Stainless Steel	AISI 302
7	Float	Stainless Steel	AISI 304

No.	Part	Material	
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 and Bracket assembly	Stainless Steel	AISI 300/440
19	Plug	Brass	ASTM B16
20	Plug Gasket	Stainless Steel	ASTM A240

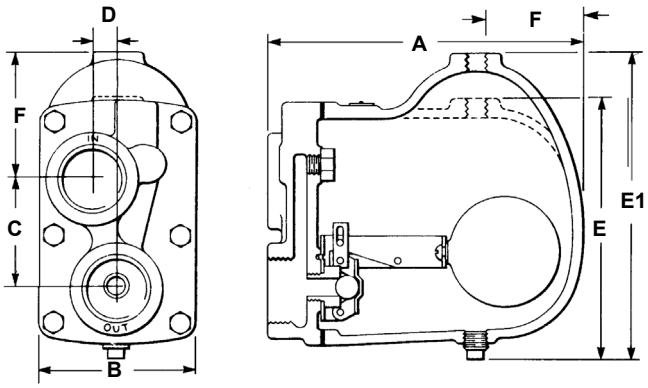
Dimensions/weights (approximate) in inches (mm) and lbs (kg)

¾" and 1" (DN20 and DN25)



Balance Pipe connection (all models) ½" NPT

1½" and 2" (DN40 and DN50)



Size	A	B	C	D	E	E1	F	G	Weight
¾", 1"	6.2	4.6	3.3	-	5.75	–	3.0	0.3	9 lb
	(157)	(117)	(84)	-	(146)	–	(76)	(79)	(4.1 kg)
1½"	8.5	4.25	3	0.7	-	8.4	2.9	–	18 lb
	(216)	(108)	(76)	(18)	-	(213)	(74)		(8.2 kg)
2"	9.8	4.9	4.9	0.12	9.1	–	3.4	–	26 lb
	(249)	(124)	(124)	(3)	(231)	–	(86)		(11.8 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 TI-P102-04-US.

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 ½" NPT tapping shall be provided for a balance pipe. All internals are to be renewable and field serviceable.

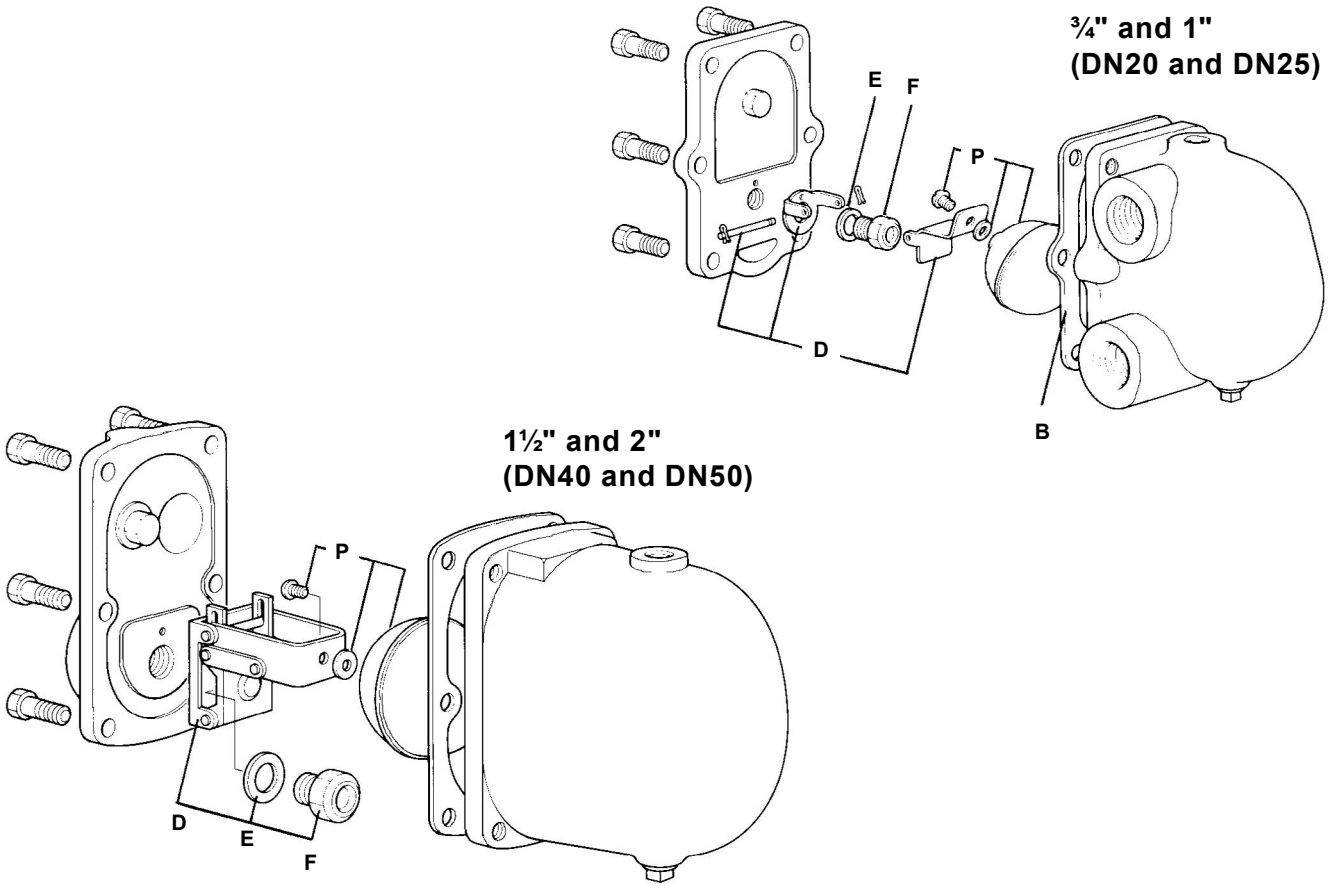
Installation
The trap must be fitted in a horizontal pipe line with direction of flow as indicated and so that the float mechanism is free to rise and fall in a vertical plane. Full-flow isolating valves should be placed to permit servicing.
The high point of the body is provided with a ½" NPT tapping 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 (½", ¾", 1" only)- Consists of: Valve Mechanism (with 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**

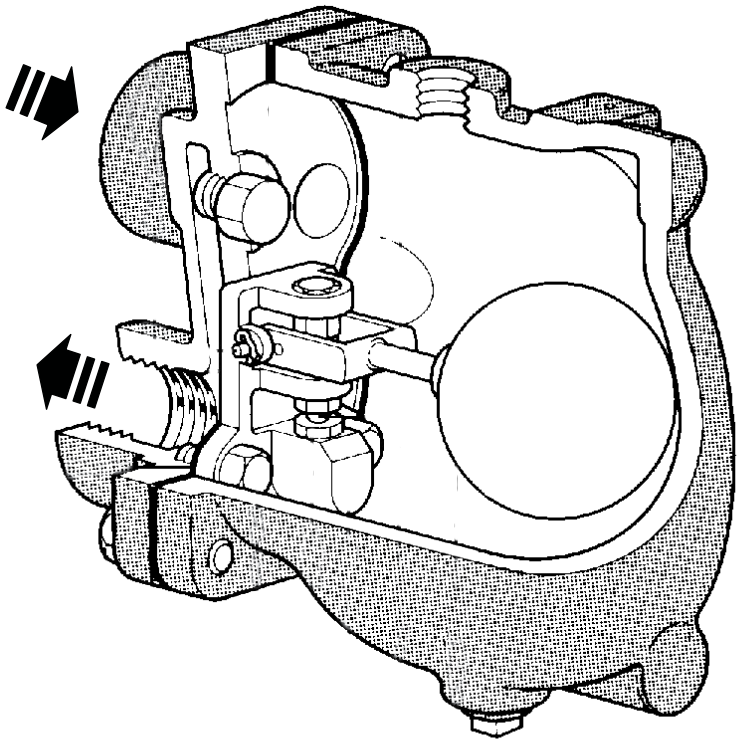
TI-P105-06-US
Issue 1

Iron Liquid Drain Trap
FA-200

Description

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 psi g (14 bar g)
Sizes	1" and 1½"
Connections	NPT
Construction	Cast Iron



Typical applications

Receiver and air line drainage, draining a liquid from its vapor phase.

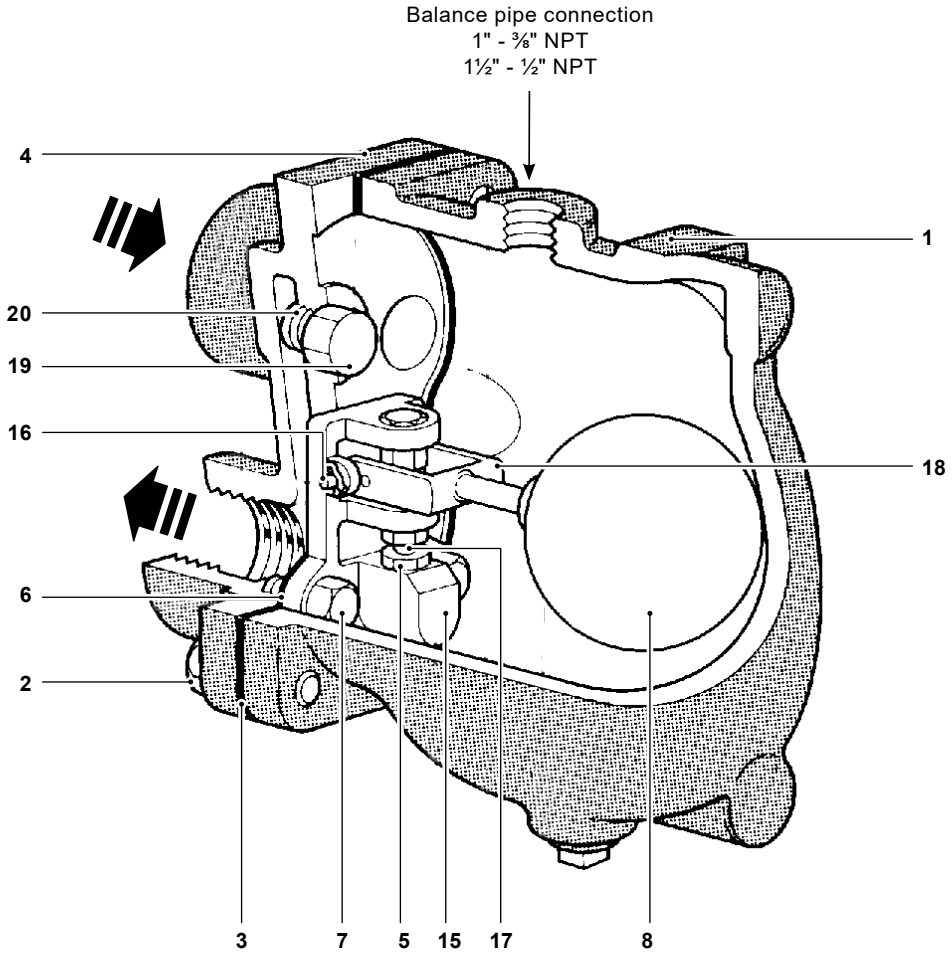
Limiting operating conditions

PMO	Maximum operating pressure	Up to 200 psi g (14 bar g). The PMO depends on the model selected and the specific gravity of the liquid being drained. See TI-P102-04-US	
Maximum operating temperature		450 °F	(232 °C)

Pressure shell design conditions

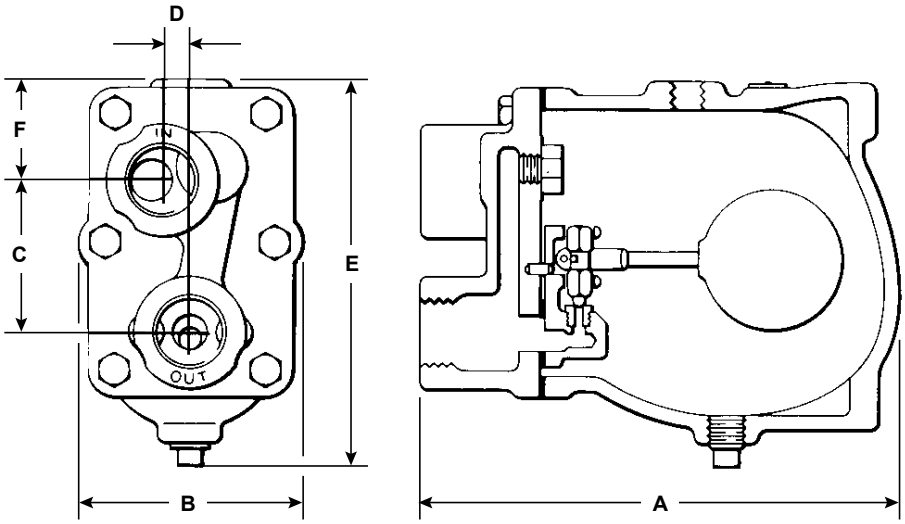
PMA	Maximum allowable pressure	200 psi g @ 450 °F (14 bar g @ 232 °C)
TMA	Maximum allowable temperature	450 °F @ 200 psi g (232 °C @ 14 bar g)

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 (1½") 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 (1½") AISI 303
18	Pivot Rod	Die Forged Brass	(1") ASTM B 124
		Cast Brass	(1½") ASTM B62
19	Plug	Brass	ASTM B16
20	Plug Gasket	Stainless Steel	ASTM A240

Dimensions/weights (approximate) in inches (mm) and lbs (kg)



Size	A	B	C	D	E	F	Weight
1"	8.5 (216)	3.9 (99)	2.6 (66)	0.37 (9)	6.9 (175)	1.8 (46)	15 lb (6.8 kg)
1½"	10.75 (273)	5.75 (146)	3 (76)	0.56 (14)	9.1 (231)	2.5 (64)	30 lb (13.6 kg)

Capacity

The dischrage capacity depends on the differential pressure (inlet pressure minus outlet pressure) and the specific gravity of the liquid being drained. See TI-P102-04-US.

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

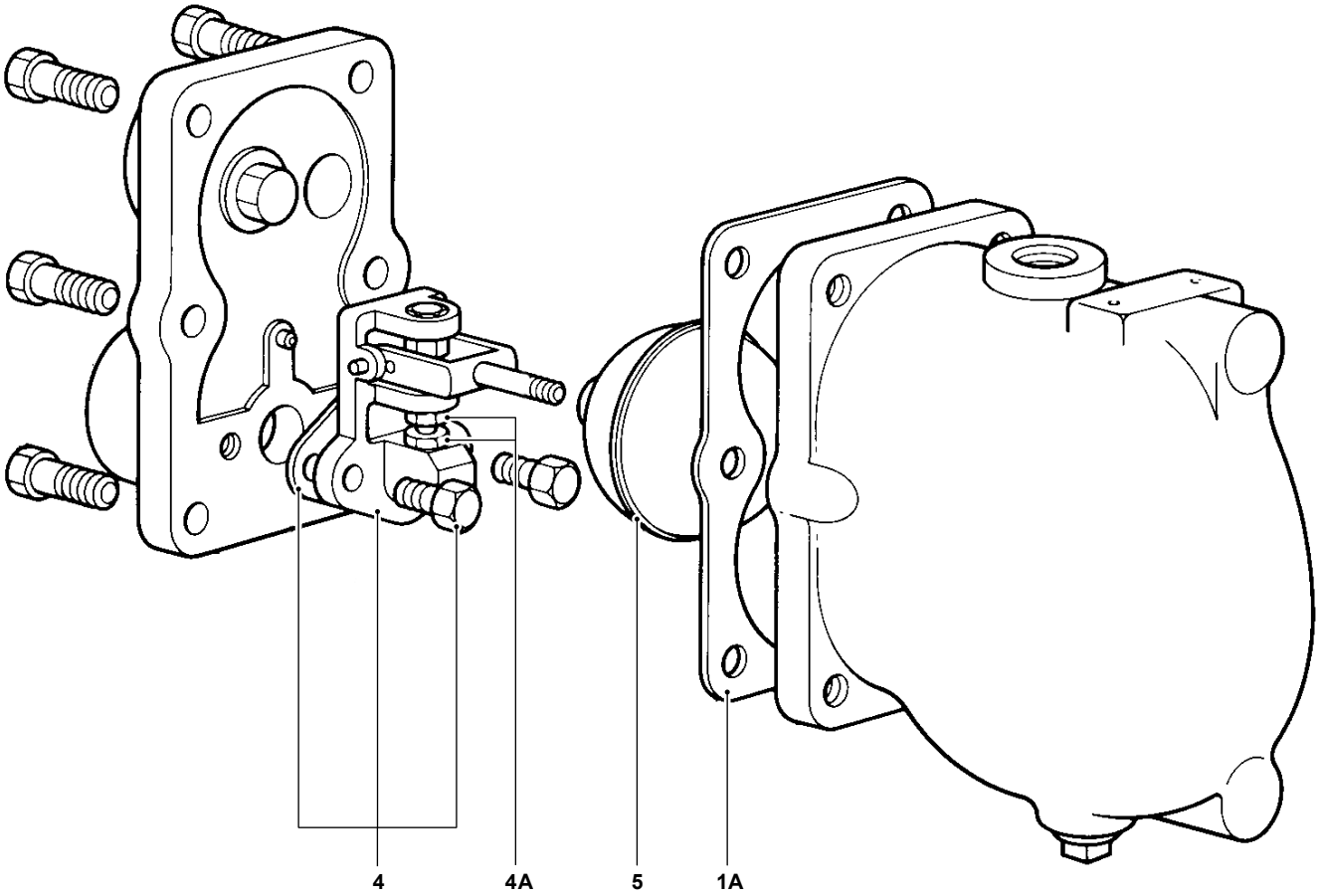
The trap must be fitted in a horizontal pipe line with direction of flow as indicated and so that the float mechanism is free to rise and fall in a vertical plane. Full-flow isolating valves should be placed to permit servicing. The high point of the body is provided with an NPT tapping for a balance 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 IM-7-306-US which accompanies the product.

Spare parts

Gasket kit (set of 3)	**1A**
Valve mechanism kit (less float)	**4, 4A**
Float kit	**5**



TI-P105-01-US
Issue 2

Iron Liquid Drain Traps
FAB Super Capacity Series

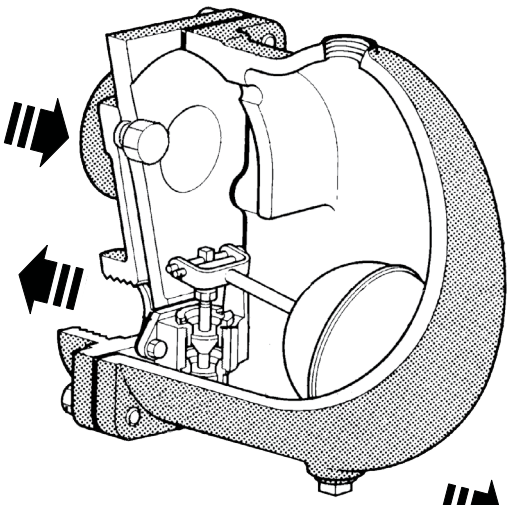
Description

The float-operated liquid drain trap discharges continuously in direct response to variations in liquid flow rate, assuring thorough drainage of the system.

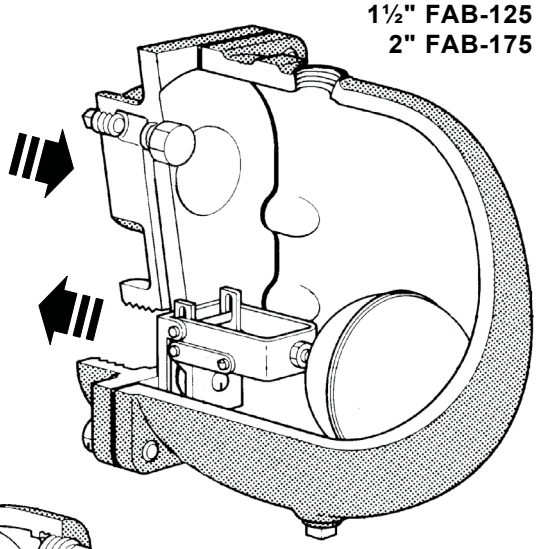
Model	FAB-10	FAB-150	FAB-75	FAB-175
Sizes	2"	1½"	2½"	2"
Connections	NPT			
Construction	Cast Iron Body			
	Stainless Steel Internals	Stainless Steel valve head and seat Brass valve housing		
Options	Gauge glass			

Note:
FAB-75, FAB-150 and FAB-175 valves are double-seated and may not shut tight under no-load conditons. Normally, the liquid load will always be greater than the small residual leakage.

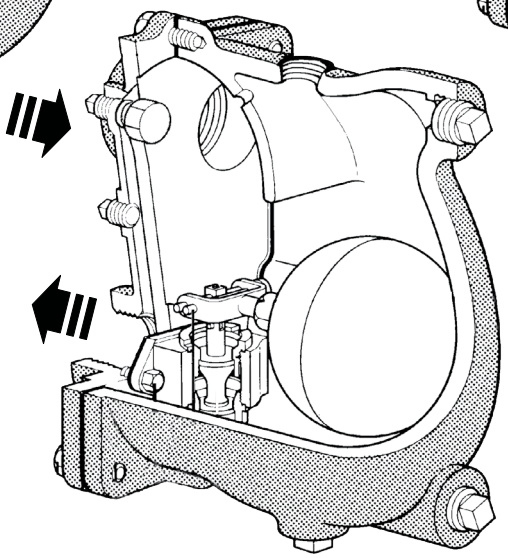
2" FAB-10



1½" FAB-125
2" FAB-175



2½" FAB-75



10.1
11

Typical applications

Receiver and air line drainage, draining a liquid from its vapor phase.

Limiting operating conditions

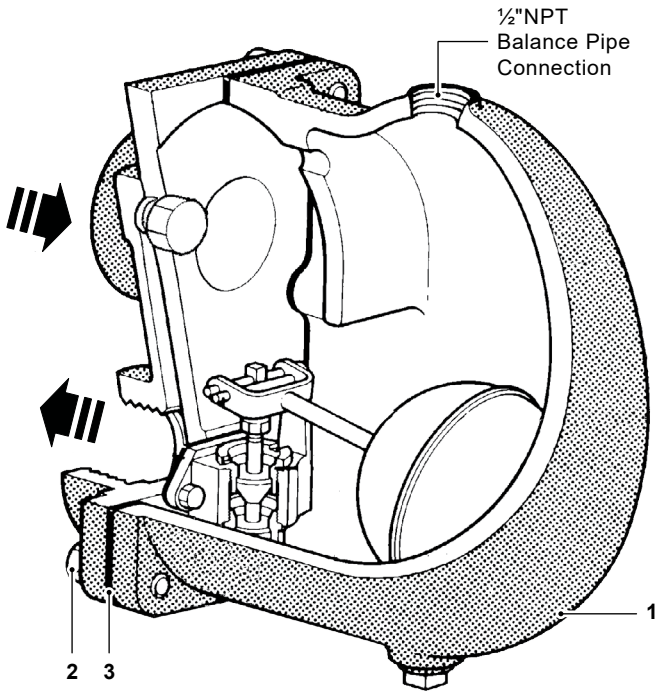
Maximum Operating Pressure (PMO)	Up to 175 psi g.	(12 bar g)
The PMO depends on the model selected and the specific gravity of the liquid being drained. See TI-P102-04-US.		
Maximum Operating Temperature	450 °F	(232 °C)

Pressure shell design conditions

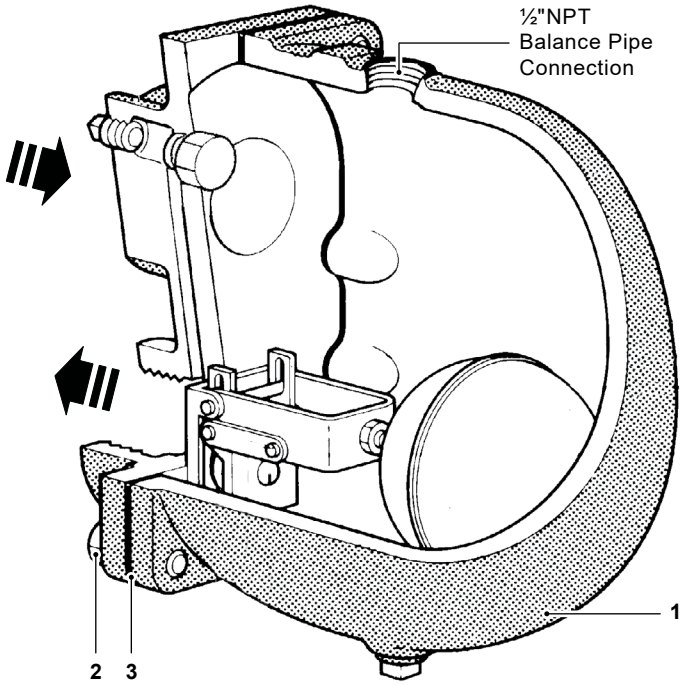
PMA	Maximum allowable pressure	FAB-75, 150, 175	175 psi g @ 450 °F (12 bar g @ 232 °C)
		FAB-10	125 psi g @ 450 °F (9 bar g @ 232 °C)
TMA	Maximum allowable temperature	FAB-75, 150, 175	450 °F @ 175 psi g (232 °C @ 12 bar g)
		FAB-10	450 °F @ 125 psi g (232 °C @ 9 bar g)

Materials

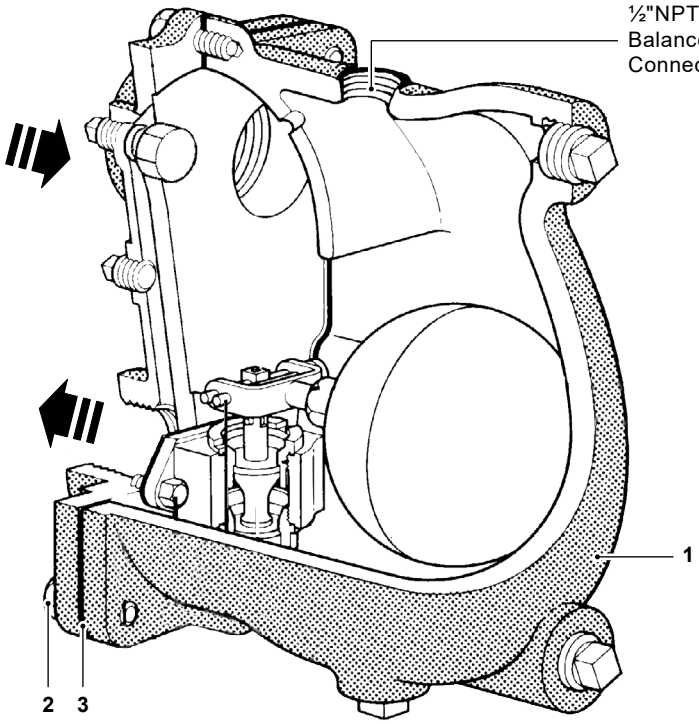
2" FAB-10



1½" FAB-125
2" FAB-175



2½" FAB-75

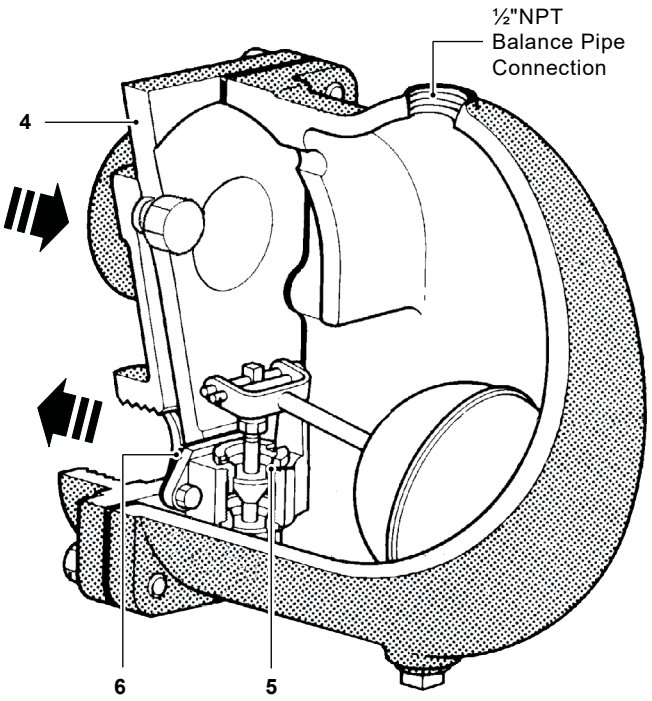


No.	Part	Material	
1	Body	Cast Iron	ASTM A126 CL B
2	Cover Screws	Carbon Steel	ASTM A449
3	Cover Gasket	Graphite	

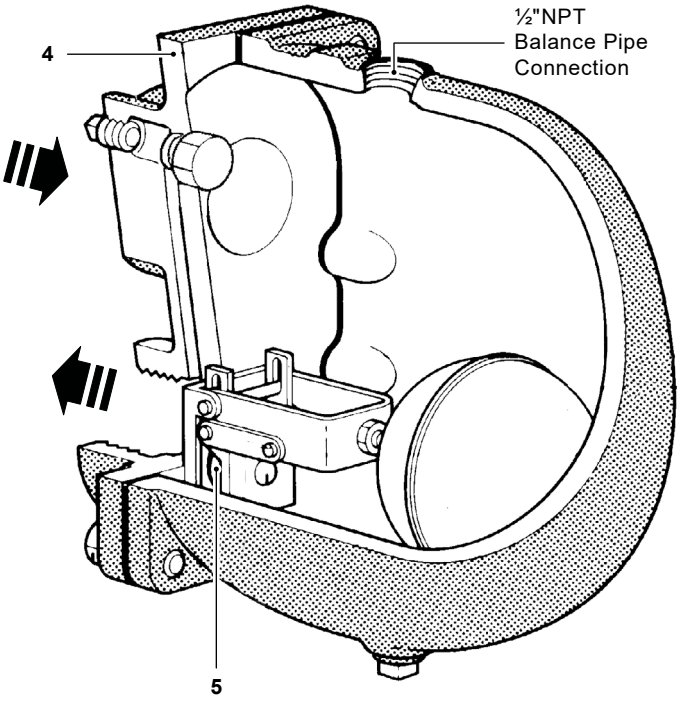
Materials continued on next page

Materials (continued)

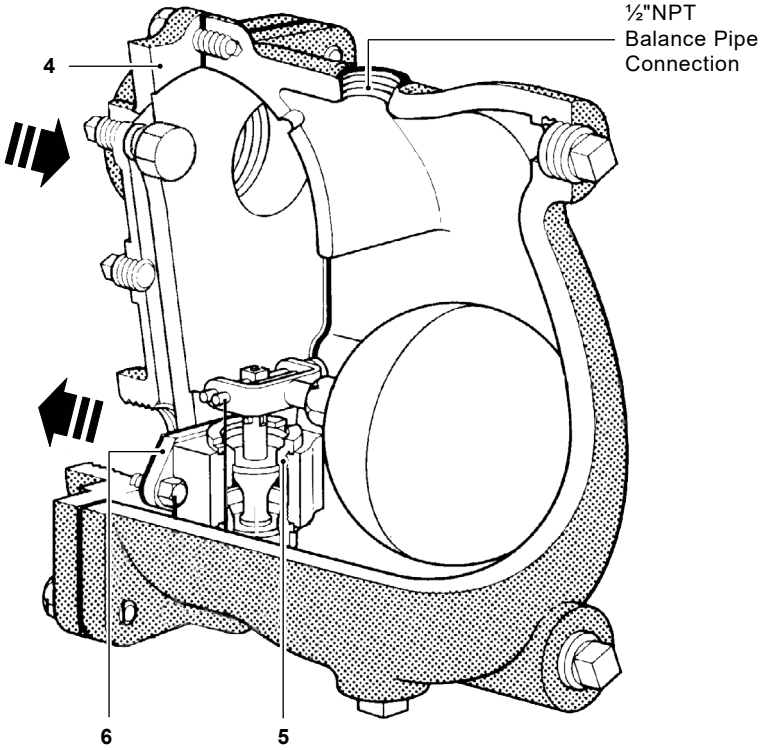
2" FAB-10



1½" FAB-125
2" FAB-175



2½" FAB-75

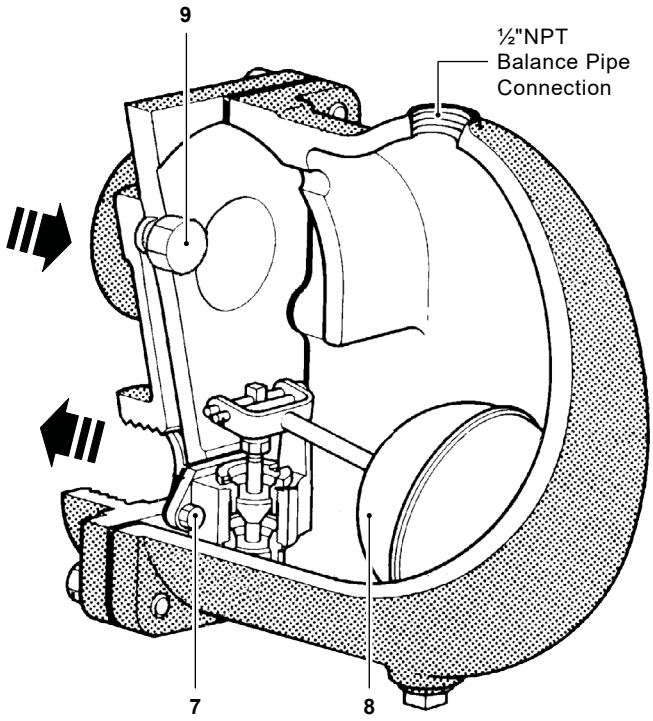


No.	Part	Material	
4	Cover	Cast Iron	ASTM A126 CL B
5	Valve Seat	Stainless Steel	Type 303
6	Valve Seat Gasket	Stainless Steel (FAB-10)	Type 302
	Valve Assembly Gasket	Graphite	

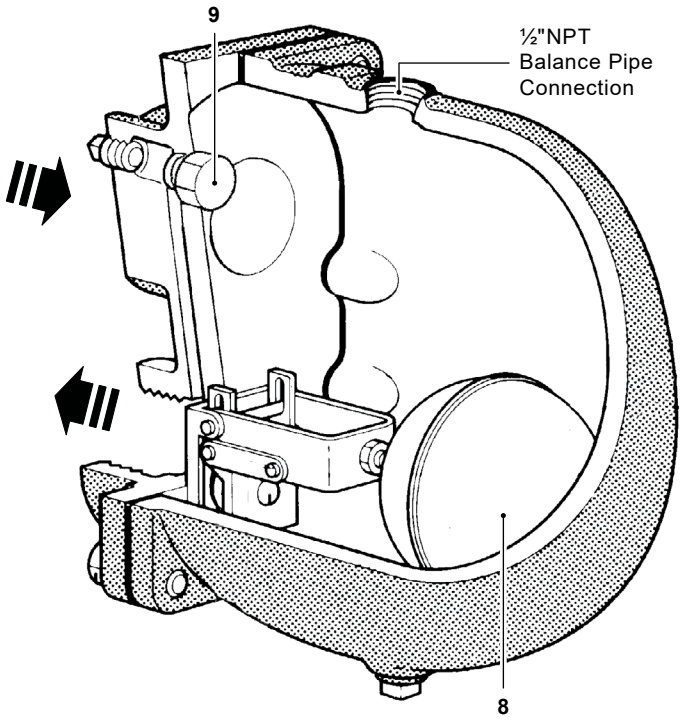
Materials continued on next page

Materials (continued)

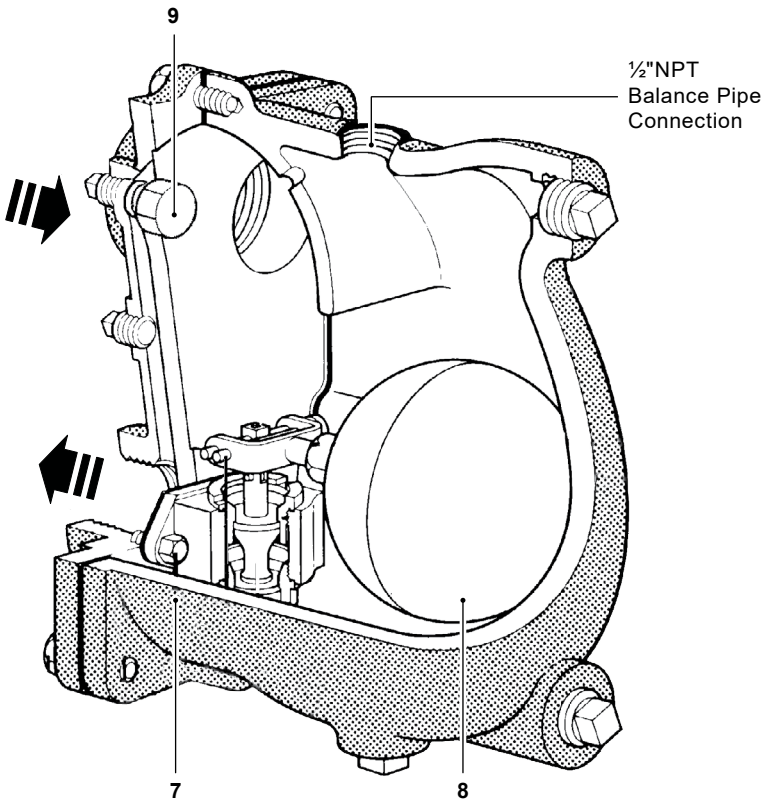
2" FAB-10



1½" FAB-125
2" FAB-175



2½" FAB-75

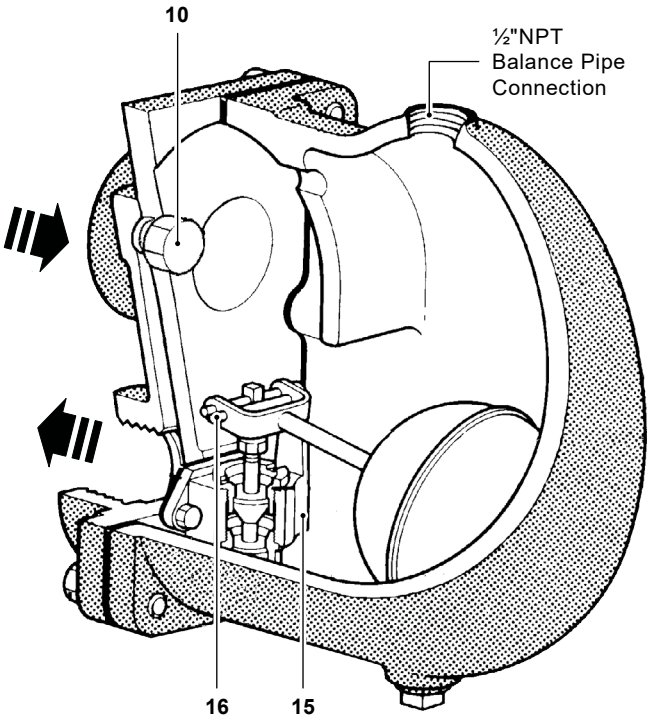


No.	Part	Material	
7	Main Valve Assembly Screws	Copper Alloy Everdur 1015	
8	Float	Stainless Steel	Type 304
9	Plug	Brass	ASTM B16

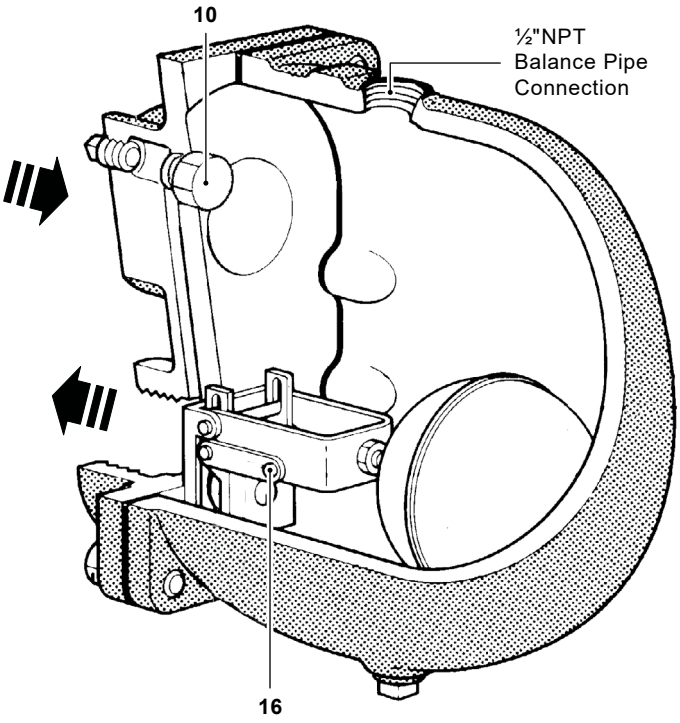
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Materials (continued)

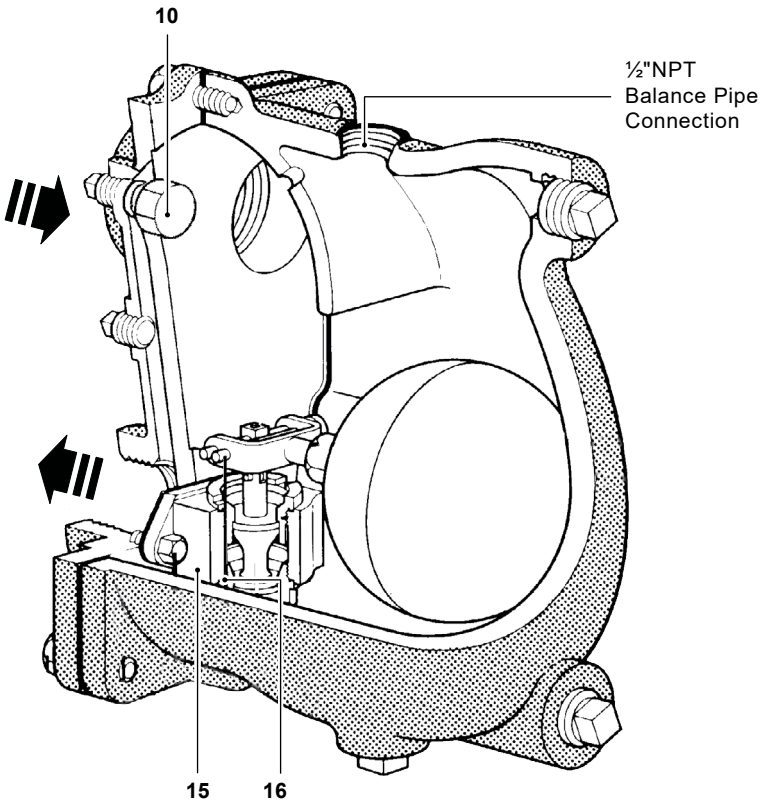
2" FAB-10



1½" FAB-125
2" FAB-175



2½" FAB-75

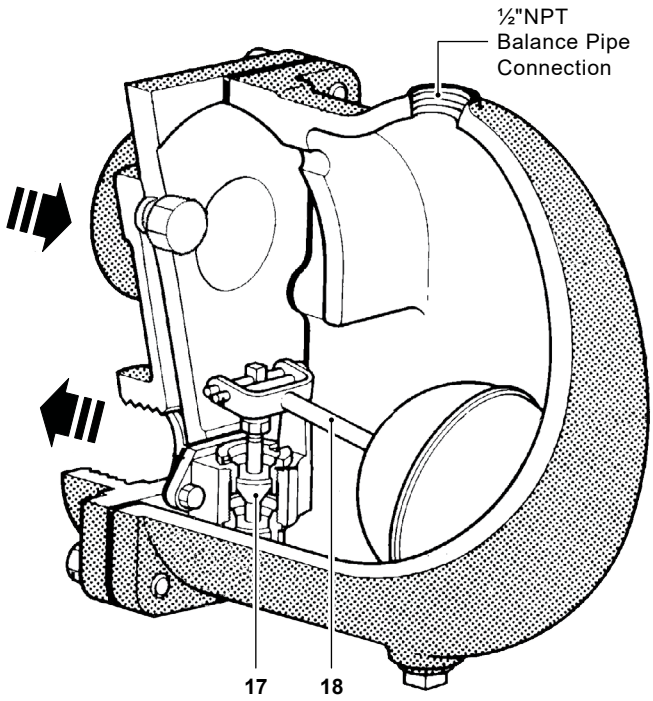


No.	Part	Material	
10	Plug Gasket	Stainless Steel	ASTM A240
15	Main Valve Assy. Housing	Stainless Steel	ASTM A743 CF8M
16	Pivot Pin	Stainless Steel	Type 303

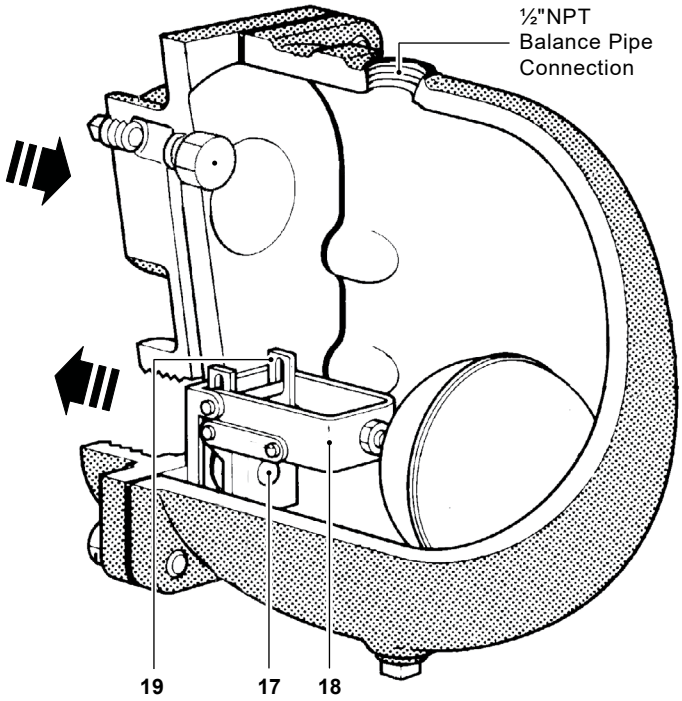
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Materials (continued)

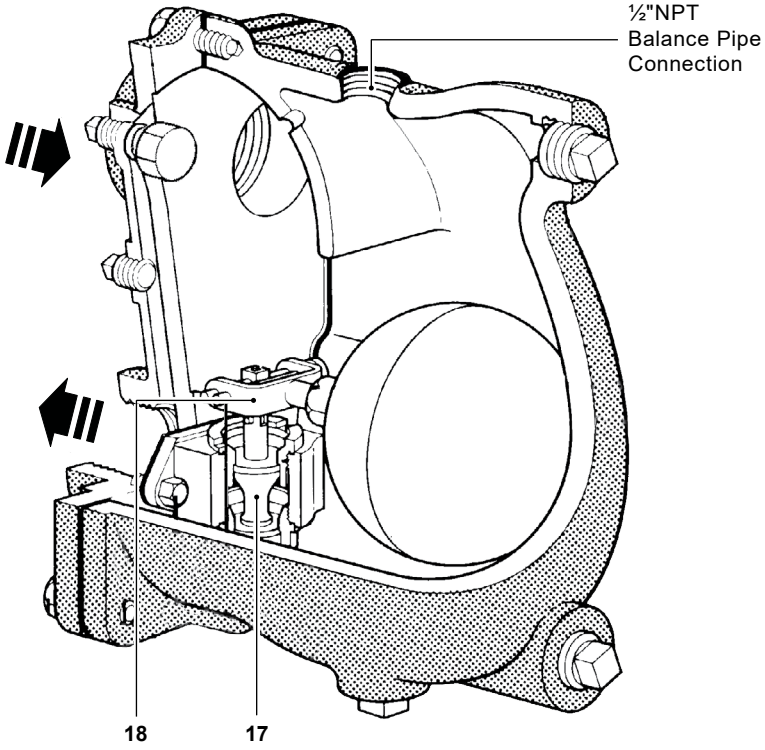
2" FAB-10



1½" FAB-125
2" FAB-175



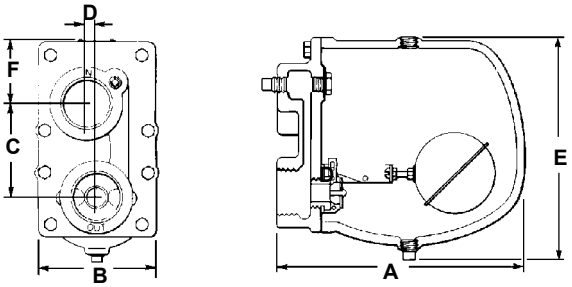
2½" FAB-75



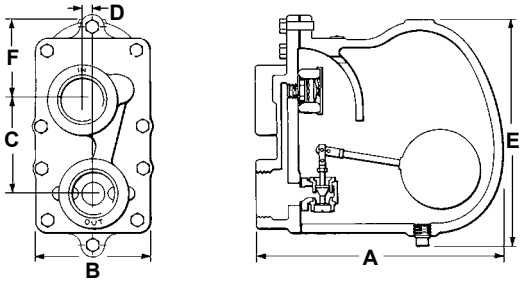
No.	Part	Material	
17	Valve Head	Stainless Steel (FAB-10, 150, 175)	Type 303
			ASTM A351GR. CF8M
18	Float Arm	Stainless Steel	Type 301
19	Seat Bracket	Stainless Steel (FAB-10)	Type 304
	Head Bracket, Stop, Link	Stainless Steel (FAB-10)	Type 301

Dimensions/weights (nominal) in inches (mm) and lbs (kg)

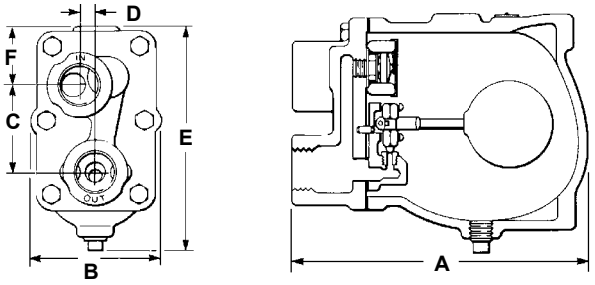
2" FAB-10



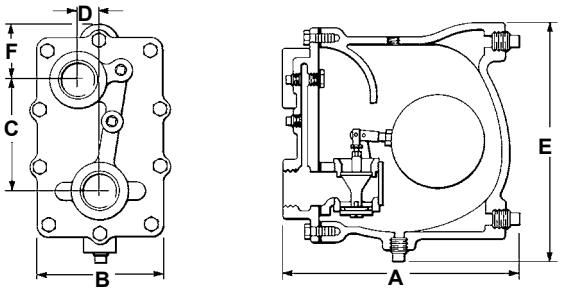
2"FAB-175



1½"FAB-150



2½" FAB-75



Type and Size	A	B	C	D	E	F	Weight
FAB-10 2"	12.2 (310)	5.9 (150)	4.5 (114)	0.5 (13)	10.7 (272)	3 (76)	43 lb (19.5 kg)
FAB-150 1½"	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 (307)	5.9 (150)	4.5 (114)	0.5 (13)	11 (279	4 (102)	48 lb (21.8 kg)
FAB-75 2½"	15.4 (391)	9.25 (235)	7.25 (184)	1.4 (36)	15.6 (396)	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 TI-P102-04-US.

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

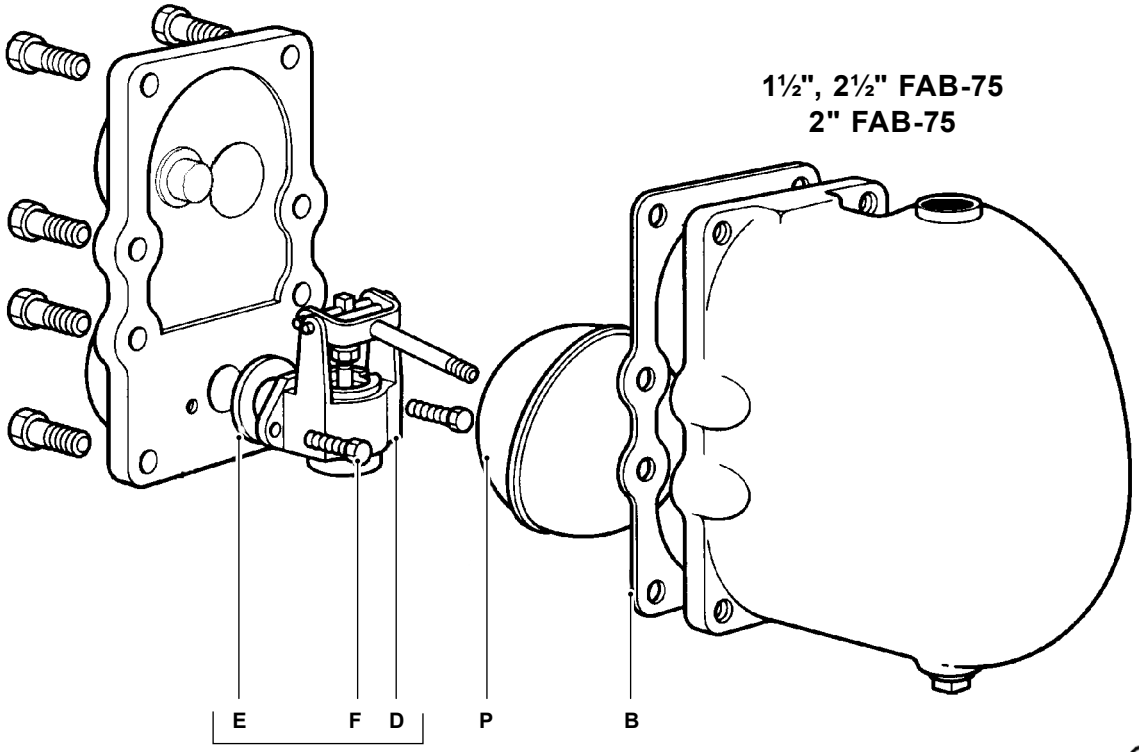
This product can be maintained without disturbing the piping connections. Complete isolation of the trap from both supply and return line is required before any servicing is performed.
The trap should be disassembled periodically for inspection and cleaning of the valve head and seat.
Worn or damaged 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.

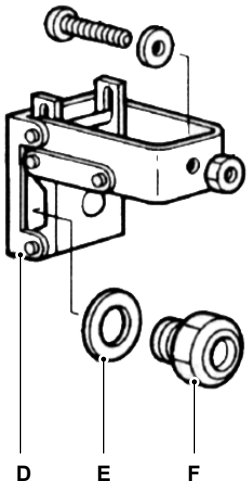
Spare parts

Gasket Kit (set of 3 cover and Mechanism Gaskets)	**B, E**
Valve Mechanism Kit (less float)	**D, E, F**
Float Kit	**P**

1½", 2½" FAB-75
2" FAB-75



Valve Mechanism Assembly



2" FAB-10
Valve Mechanism Kit

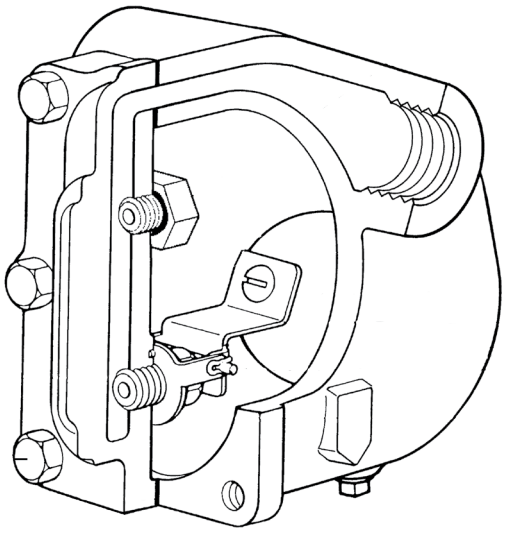
TI-P105-10-US
Issue 1

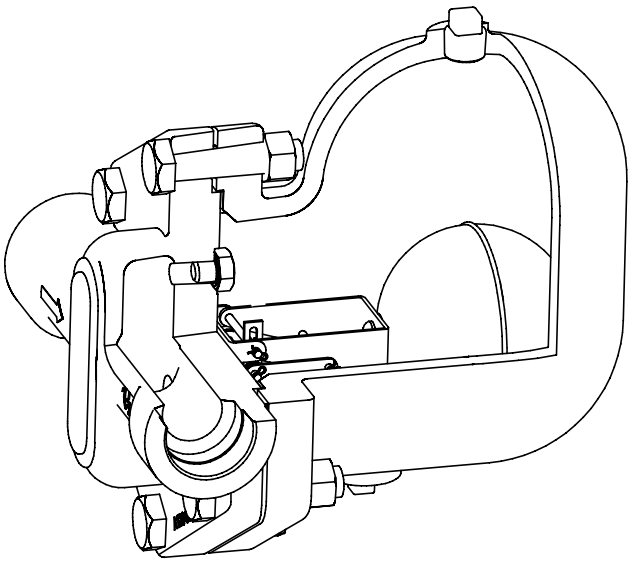
Iron Liquid Drain Traps
FAI-30, FAI-75, FAI-150, FAI-200

Description

The float-operated liquid drain trap discharges continuously in direct response to variations in liquid flow rate, assuring thorough drainage of the system.

FAI-30 and FAI-200 only





Model	FAI-30	FAI-75	FAI-150	FAI-200
Sizes	½", ¾", 1", 1 1/2" (DN15, DN20, DN25, DN65)			
Connections	NPT			
Construction	Cast Iron Body and Cover Stainless steel Internals 1½" FAI 30 and FAI 200 only			

Typical applications

Receiver and air line drainage, draining a liquid from its vapor phase

Limiting operating conditions

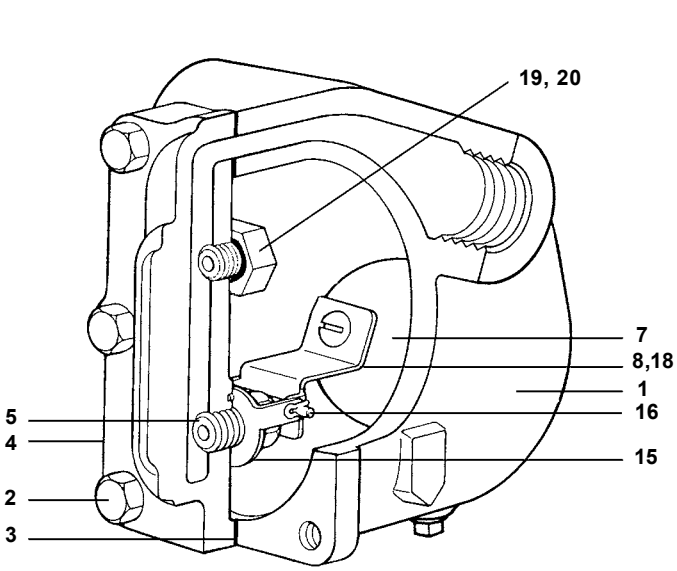
PMO	Maximum operating pressure The PMO depends on the model selected and the specific gravity of the liquid being drained. See TI-P102-04.	Up to 200 psi g (13.8 bar g)
Maximum operating temperature		450 °F (232 °C)

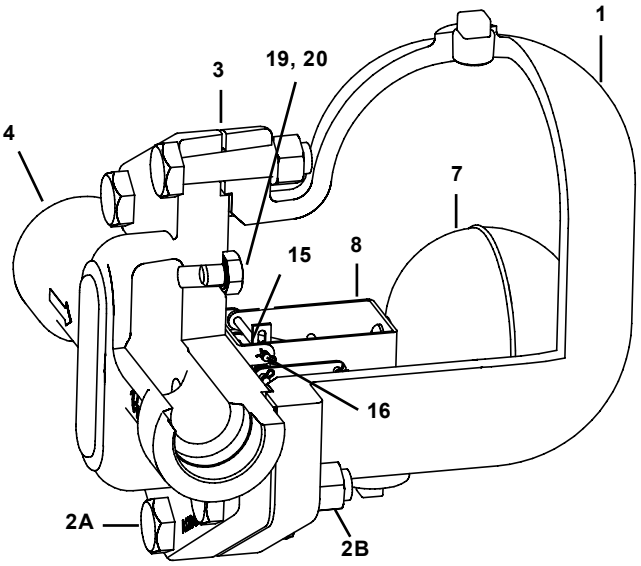
Pressure shell design conditions

PMA	Maximum allowable pressure	200 psi g/0-450 °F (13.8 bar g/0-232 °C)
TMA	Maximum allowable temperature	450 °F/0-200 psi g (232 °C/0-13.8 bar g)

Materials

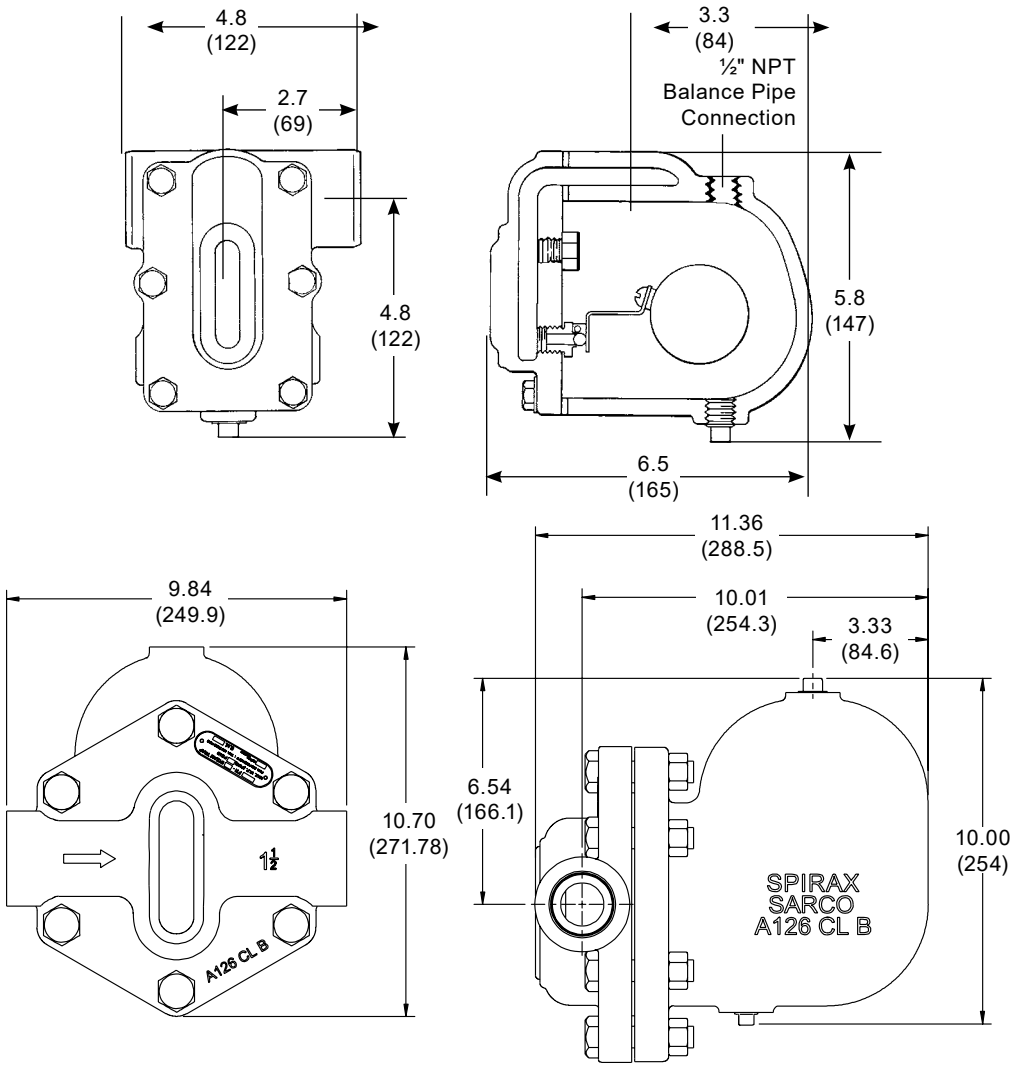
FAI-30 and FAI-200 only





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 ¾" and 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

Dimensions/weights (approximate) in inches (*mm*) and lbs (*kg*)



Weight

13.4 lb
(6 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 TI-P102-04.

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 ½" 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.

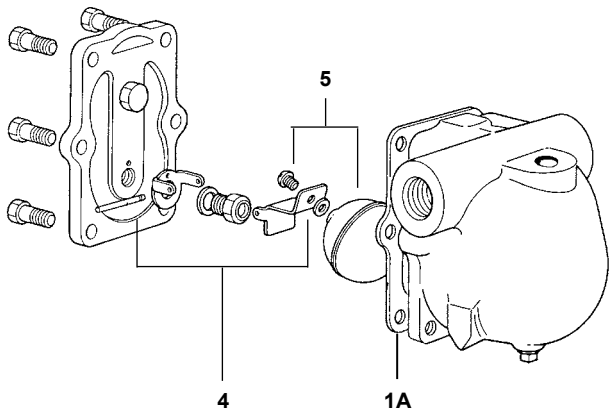
The high point of the body is provided with a ½" NPT tapping for a balance pipe, which is essential for satisfactory operation of this unit. The balance pipe must be connected with a continuous rise between the tapping provided on the body of the trap and the vessel being drained. The trap discharge should be piped to a safe place.

Maintenance

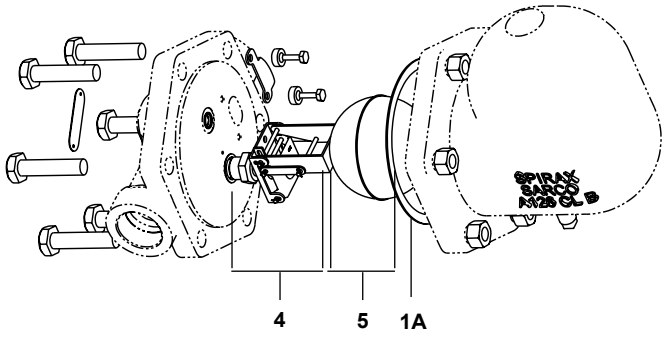
This product can be maintained without disturbing the piping connections. Complete isolation of the trap from both supply and return line is required before any servicing is performed.
The trap should be disassembled periodically for inspection and cleaning of the valve head and seat.
Worn or damaged 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

½", ¾", 1" Sizes (DN15, DN20, DN25)



1½" Sizes (DN65)



Gasket Kit (set of 3 Cover)		**1A**
Complete Valve Mechanism Kit (less float)		**4**
Float Kit	Float, Screw, Washer	**5**

TI-P148-12
CMGT Issue 11

CA14
SG Iron
Air and Gas Trap ½" and ¾" (Screwed)

Description
The CA14 is a range of float type automatic liquid drainers for air and gas systems. The body and cover are of SG iron and the complete unit is readily maintainable.
The standard version with a Viton valve cone is designated CA14.
A stainless steel valve cone version is designated CA14S.

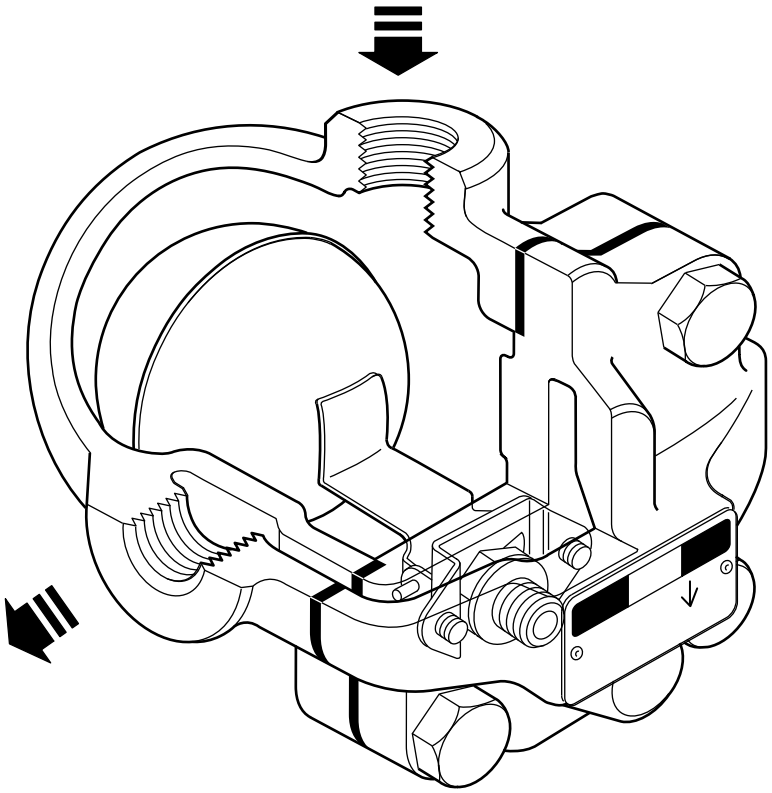
Operating media
The CA14 is designed for use on air or gases within PED group 2.

Note: The CA14 is not suitable for use on PED group 1 liquids or gases.

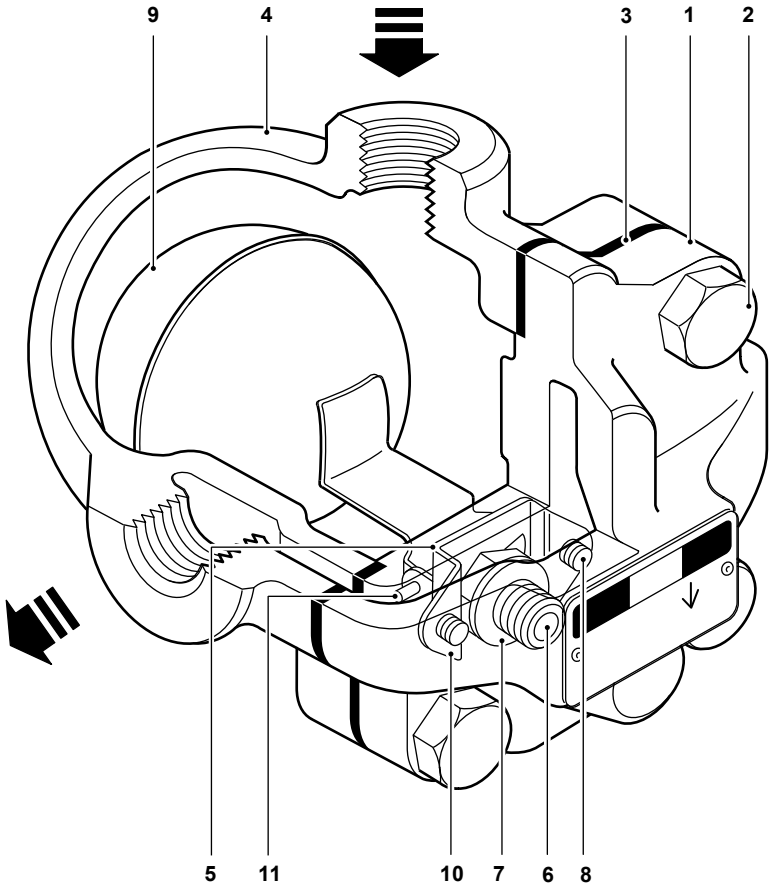
Standards
The product fully complies with the requirements of the European Pressure Equipment Directive 2014/68/EU.

Certification
The product is available with material certification to EN 10204 2.2.
Note: All certification/inspection requirements must be stated at the time of order placement.

Sizes and pipe connections
½" and ¾" screwed BSP T Rp (ISO 7-1) or NPT.

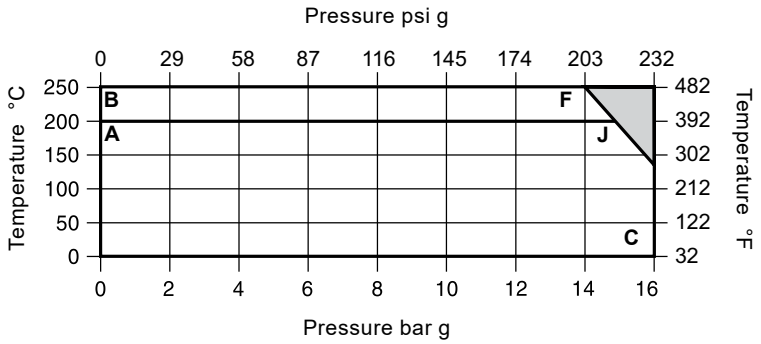


Material



No.	Part		Material	
1	Body		SG iron	EN-GJS-400-15
2	Cover bolt		Steel	BS 3692 Gr. 8.8
3	Cover gasket	Reinforced exfoliated graphite		
4	Cover		SG iron	EN-GJS-400-15
5	Main valve cone	CA14	Synthetic rubber	Viton
		CA14S	Stainless steel	AISI 440B
6	Main valve seat	Stainless steel	BS 970 431 S29	
7	Main valve seat gasket	Stainless steel	BS 1449 304 S11	
8	Main valve assembly screws		Stainless steel	BS 6105 Cl A270
9	Ball float and lever	Stainless steel	BS 1449 304 S16	
10	Pivot frame		Stainless steel	BS 1449 304 S16
11	Pivot pin		Stainless steel	

Pressure/temperature limits



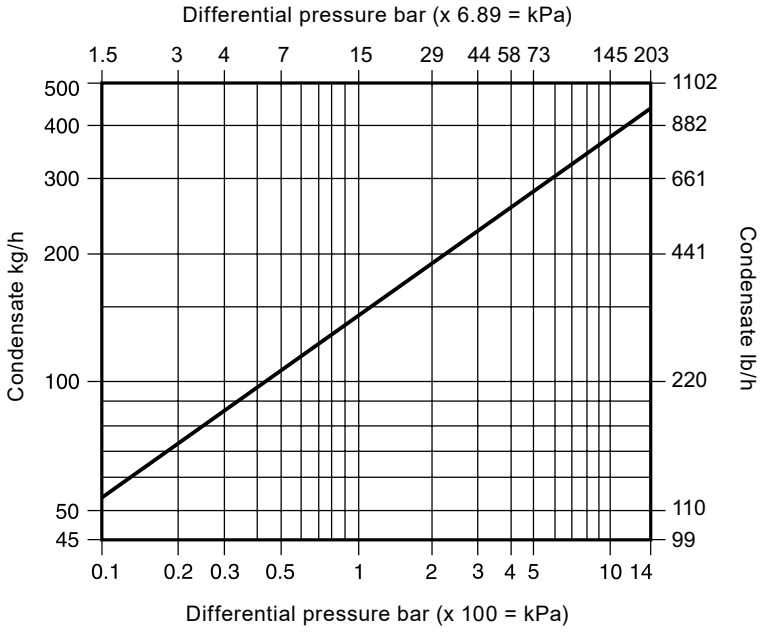
The product **must not** be used in this region.

A-J-C CA14 screwed BSP T Rp (ISO 7-1) or NPT.

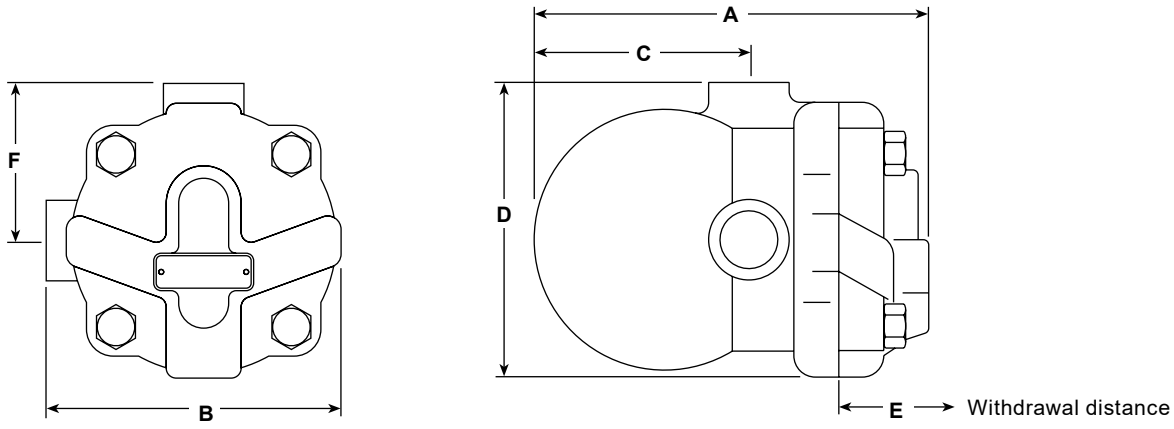
B-F-C CA14S screwed BSP T Rp (ISO 7-1) or NPT.

Body design conditions						PN16
PMA	Maximum allowable pressure				16 bar g @ 120 °C	(232 psi g @ 248 °F)
TMA	Maximum allowable temperature				250 °C	(482 °F)
Minimum allowable temperature					0 °C	(32 °F)
PMO	Maximum operating pressure				16 bar g	(232 psi g)
TMO	Maximum operating temperature:			CA14	200 °C @ 14.7 bar g	(392 °F @ 213 psi g)
				CA14S	250 °C @ 13.9 bar g	(482 °F @ 202 psi g)
Minimum operating temperature					0 °C	(32 °F)
ΔPMX	Maximum differential pressure bar, depending on the specific gravity of the liquid being drained:					
	Specific gravity	1.0	0.9	0.8	0.7	Min. 0.6
	ΔPMX bar (psi)	14.0 (203)	14.0 (203)	14.0 (203)	9.0 (131)	5.0 (73)
ΔPMN	Minimum differential pressure				0.1 bar	(1.5 psi)
Product is safe for use under full vacuum conditions						
Designed for a maximum cold hydraulic test pressure of					24 bar g	(348 psi g)

Capacities



Dimensions/weights (approximate) in mm (inches) and kg (lbs)



Size	A	B	C	D	E	F	Weight
½" ¾"	147 (5.8)	114 (4.5)	80 (3.2)	114 (4.5)	105 (4.1)	60.5 (2.4)	2.5 (5.5)

Safety information, Installation and Maintenance

For full details see the Installation and Maintanence Instructions (IM-P144-02) supplied with the product.

Installation note:

The CA14 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.

Disposal

If a product which contains a Viton component has been subjected to a temperature approaching 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 recognised manner as stated in the Installation and Maintenance Instructions. No other ecological hazard is anticipated with the disposal of this product providing due care is taken.

How to order

Example: 1 off Spirax Sarco ½" CA14 having screwed BSP T Rp (ISO 7-1) connections with SG iron body and cover.

Spare parts

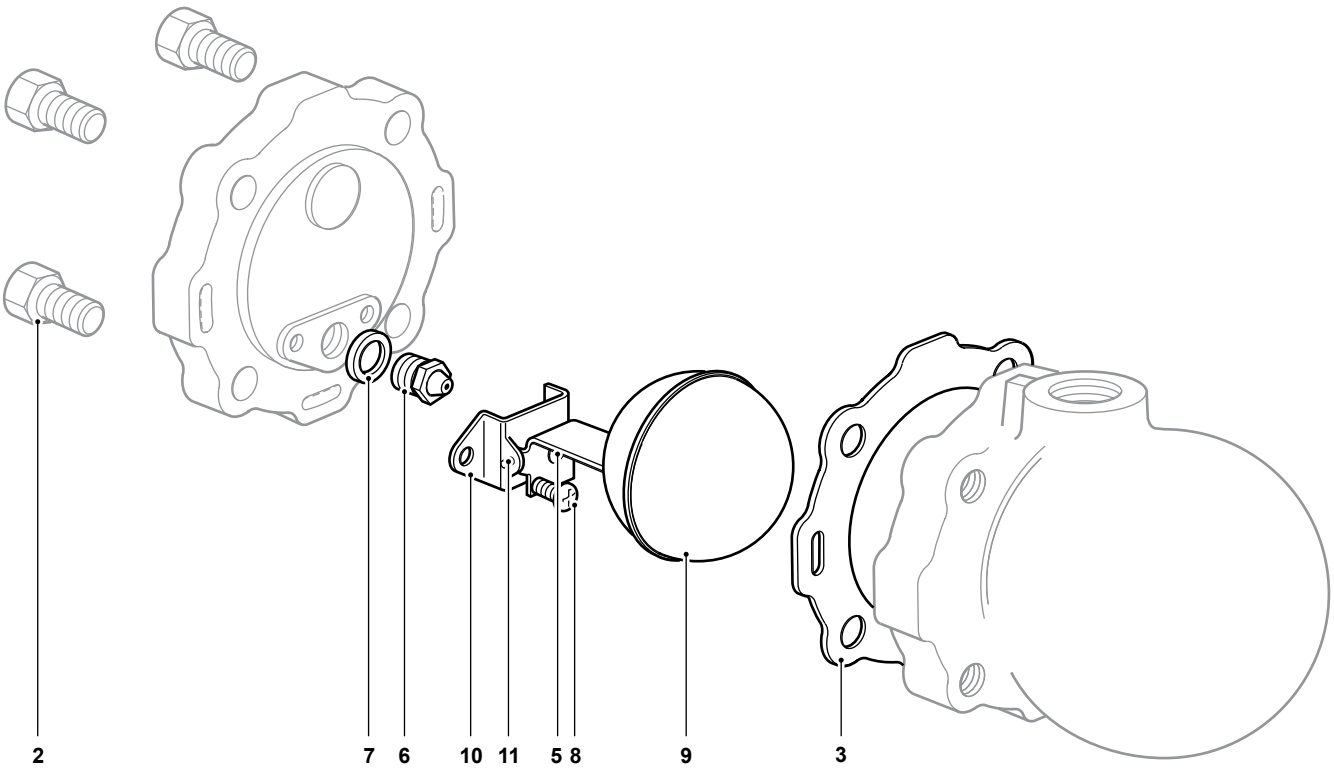
The spare parts available are shown in heavy outline. Parts drawn in a grey line are not supplied as spares.

Available spares

Maintenance kit	CA14	**3, 5+9, 6, 7, 8 (2 off), 10, 11**
	CA14S	**3, 5+9, 6, 7, 8 (2 off), 10, 11**
Seal kit	CA14	**3, 5**

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 off Maintenance kit for a Spirax Sarco ½" CA14 air and gas trap.



Not an available spare

Recommended tightening torques

Item	or mm		N m	(lbf ft)
2	17 A/F	M10 x 30	47 - 50	(35 - 37)
6	17 A/F		50 - 55	(37 - 41)
8	Pozidrive	M4 x 6	2.5 - 3.0	(1.8 - 2.2)

TI-P105-07-US
Issue 1

Steel Liquid Drain Trap
FA450

Description

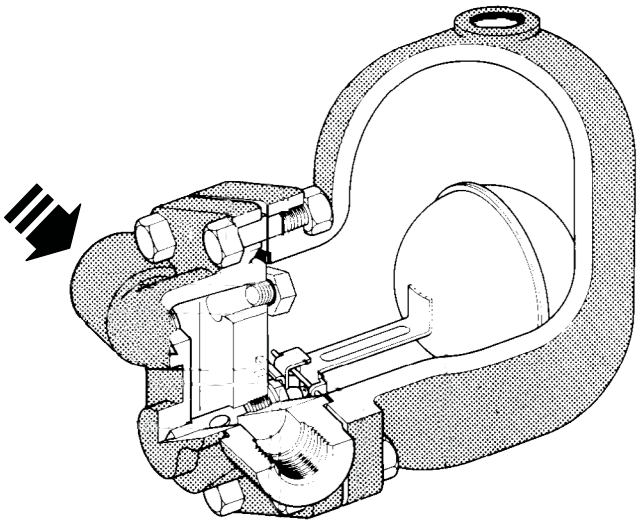
The float-operated liquid drain trap discharges continuously in direct response to variations in liquid flow rate, assuring thorough drainage of the system.

Model	FA450
PMO	465 psi g (32.1 bar g) (see Limiting operating conditons)
Sizes	¾" to 2"
Connections	NPT
Construction	Carbon Steel Body Stainless Steel Internals
Options	ANSI 150, 300 or 600 flanges SW Connections to ANSI B16.11 ½" Bottom Drain

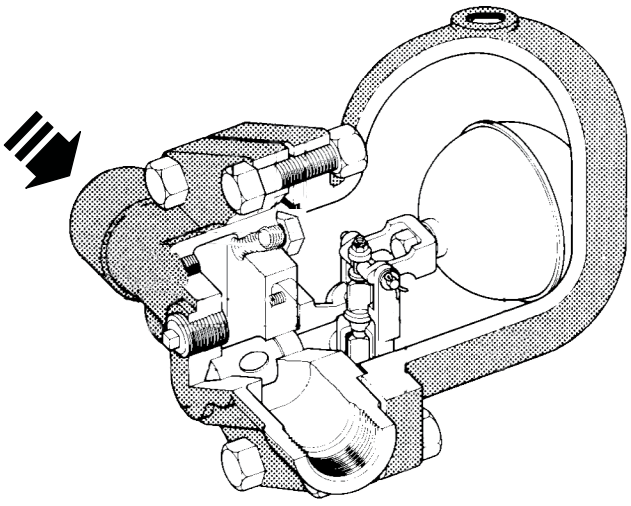
Note: 1½" and 2" valves are double-seated, and may not shut tight under no-load conditions. Normally, the liquid load will always be greater than the small residual leakage.
Liquid drain traps can be used to drain liquids from most gases. However, some applications, particularly those involving hazardous 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.

Typical applications

Receiver and air line drainage, draining a liquid from its vapor phase.



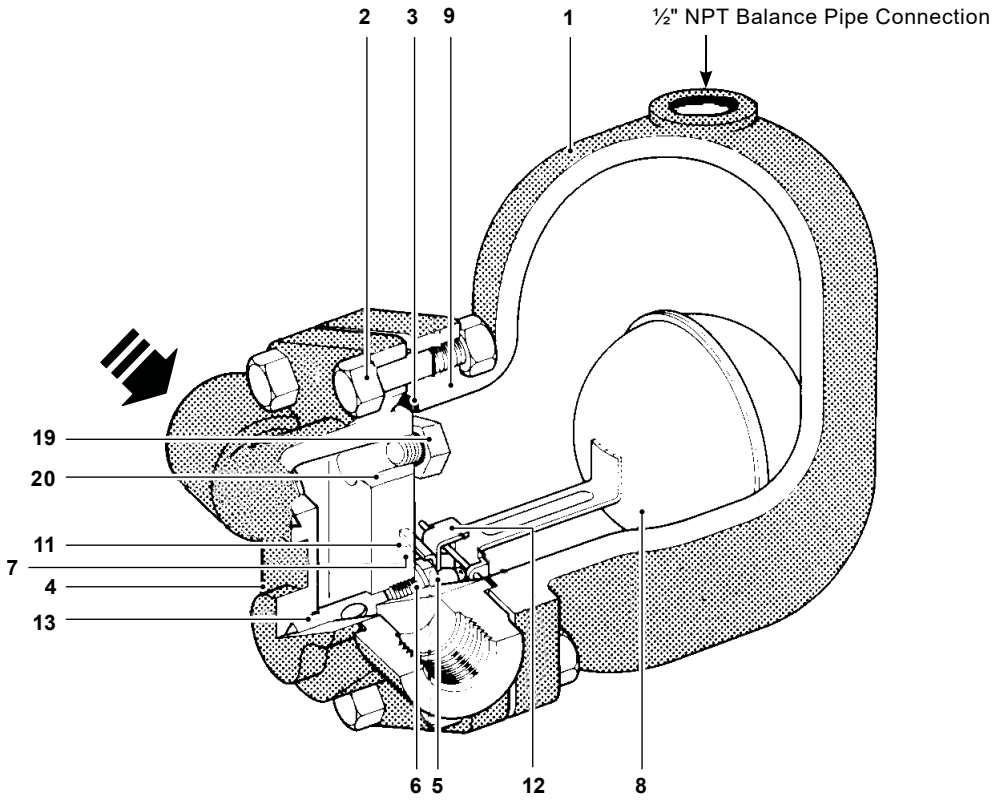
¾" and 1"



1½" and 2"

Materials

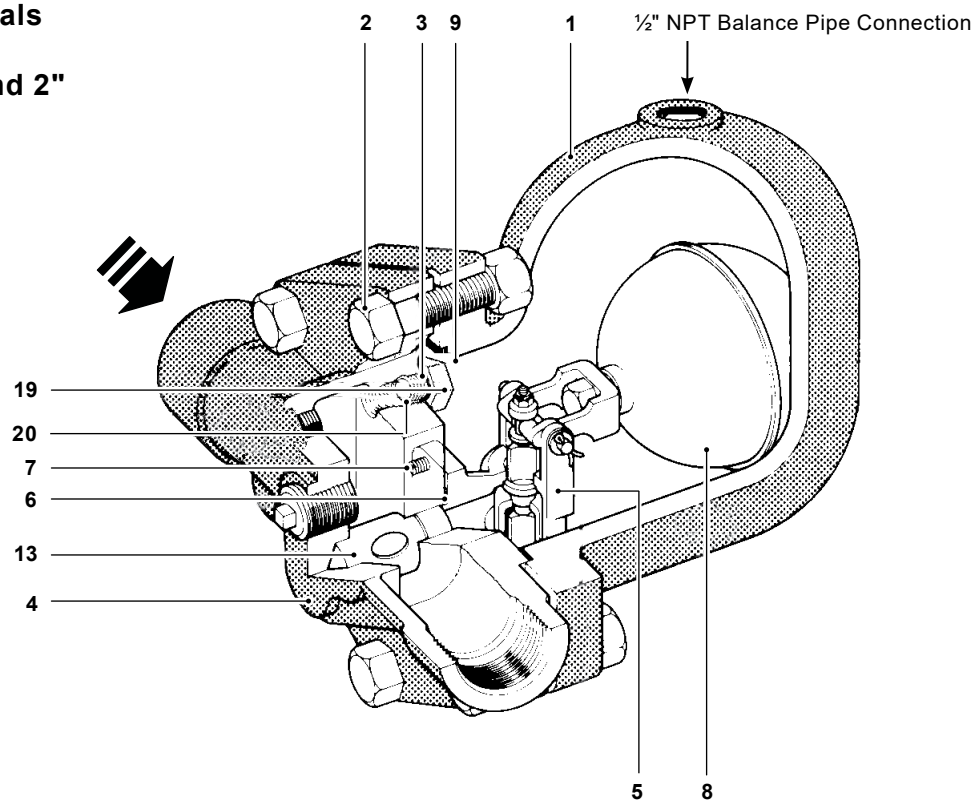
¾" and 1"



No.	Part		Material	
1	Body		Steel	ASTM A216 WCB
2	Cover Bolts		Steel	ASTM A 193 B7
	Cover Nuts	¾" and 1"	7/16 - 14 UNC-2A	ASTM A 194 2H
		1½" and 2"	⅝-11 UNC-2A	
3	Cover Gasket		Stainless Steel Reinforced Exfoliated Graphite	
4	Cover		Steel	ASTM A216 WCB
5	Valve Seat (¾" and 1")		Stainless Steel	ASTM A276 Type 420F
	Main Valve Assembly w/ erosion deflector (1½" and 2")		Stainless Steel	AISI 431
6	Valve Seat Gasket (¾" and 1")		Stainless Steel	ASTM A240 Type 301
	Main Valve Assembly Gasket 1½" and 2"		Stainless Steel Reinforced Exfoliated Graphite	
7	Pivot Frame Assembly		Stainless Steel	AISI 18-8
	Set Screws (¾" and 1")		10-24 Fillister Head	ANSI B 18.6.3
	Main Valve Assembly		Steel	
	Cap Screws (1½")		¼ - 20	ASTM 276 Type 304
	Studs and Nuts (2")		5/16 - 18	ASTM 276 Type 431 and 304
8	Ball Float and 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

Materials

1½" and 2"



No.	Part		Material	
1	Body		Steel	ASTM A216 WCB
2	Cover Bolts		Steel	ASTM A 193 B7
	Cover Nuts	¾" and 1"	7/16 - 14 UNC-2A	ASTM A 194 2H
		1½" and 2"	5/8-11 UNC-2A	
3	Cover Gasket		Stainless Steel Reinforced Exfoliated Graphite	
4	Cover		Steel	ASTM A216 WCB
5	Valve Seat (¾" and 1")		Stainless Steel	ASTM A276 Type 420F
	Main Valve Assembly w/ erosion deflector (1½" and 2")		Stainless Steel	AISI 431
6	Valve Seat Gasket (¾" and 1")		Stainless Steel	ASTM A240 Type 301
	Main Valve Assembly Gasket 1½" and 2"		Stainless Steel Reinforced Exfoliated Graphite	
7	Pivot Frame Assembly		Stainless Steel	AISI 18-8
	Set Screws (¾" and 1")		10-24 Fillister Head	ANSI B 18.6.3
	Main Valve Assembly		Steel	
	Cap Screws (1½")		¼ - 20	ASTM 276 Type 304
	Studs and Nuts (2")		5/16 - 18	ASTM 276 Type 431 and 304
8	Ball Float and 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

Limiting operating conditions*

PMO	Maximum Operating Pressure (PMO)	Up to 465 psi g (32.1 bar g). The PMO depends on the model selected and the specific gravity of the liquid being drained. See TI-P102-04-US.
	Maximum Operating Temperature	750 °F (400 °C)

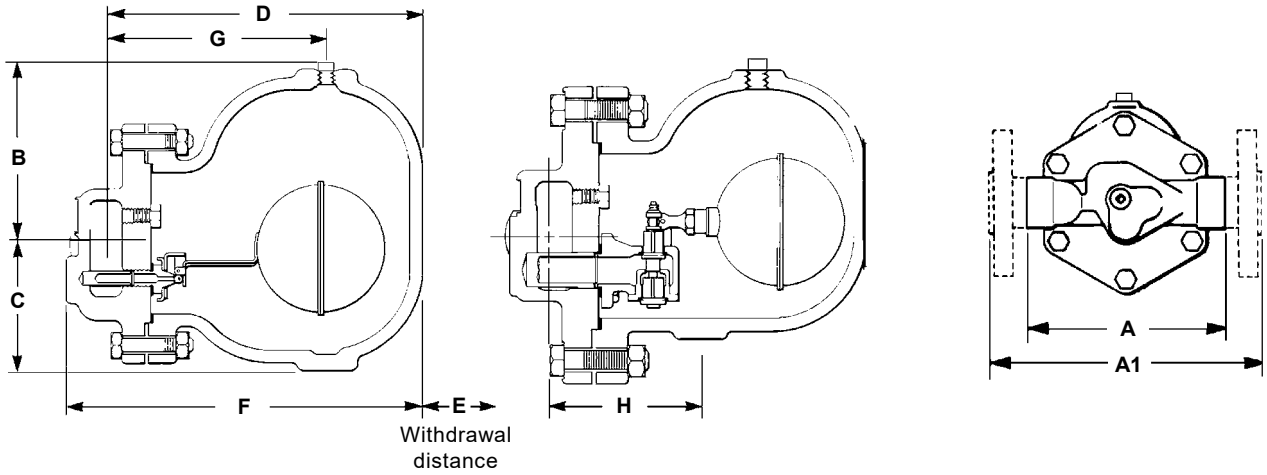
Product is safe for use under full vacuum conditions.

Pressure shell design conditions*

PMA	Maximum allowable pressure	535 psi g @ 650 °F (37 bar g @ 343 °C)
		505 psi g @ 750 °F (35 bar g @ 400 °C)
TMA	Maximum allowable temperature	750 psi g @ 505 °F (400 °C @ 35 bar g)

* The limiting operating and design conditions for ANSI 150 flanged units will be limited by the flange rating

Dimensions/weights (approximate) in inches (mm) and lbs (kg)



Size-DN	A	A1	B	C	D	E	F	G	H	Weight	
										NPT/SW	Flg
¾" DN20	6.1 (155)	10.0 (254)	2.6 (66)	2.6 (66)	6.4 (163)	4.7 (119)	7.4 (188)	4.0 (102)		18.0 lb (8.2 kg)	23.8 lb (10.8 kg)
1" DN25	6.5 (165)	10.4 (264)	4.5 (114)	3.3 (84)	8.2 (208)	6.3 (160)	9.2 (234)	5.8 (147)		28.0 lb (12.7 kg)	33.0 lb (15.0 kg)
1½" DN40	9.8 (249)	14.0 (356)	5.1 (130)	3.1 (79)	9.7 (246)	7.7 (196)	11.0 (279)	6.4 (163)	4.7 (119)	55.1 lb (25.0 kg)	64.0 lb (29.0 kg)
2" DN50	11.8 (300)	16.0* (406*)	5.5 (140)	3.6 (91)	9.9 (251)	7.7 (196)	11.5 (292)	6.5 (165)	6.0 (152)	68.0 lb (31.0 kg)	82.0 lb (37.2 kg)

***Note :** ANSI 600 16.5" (419 mm)

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-P102-04-US.

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.

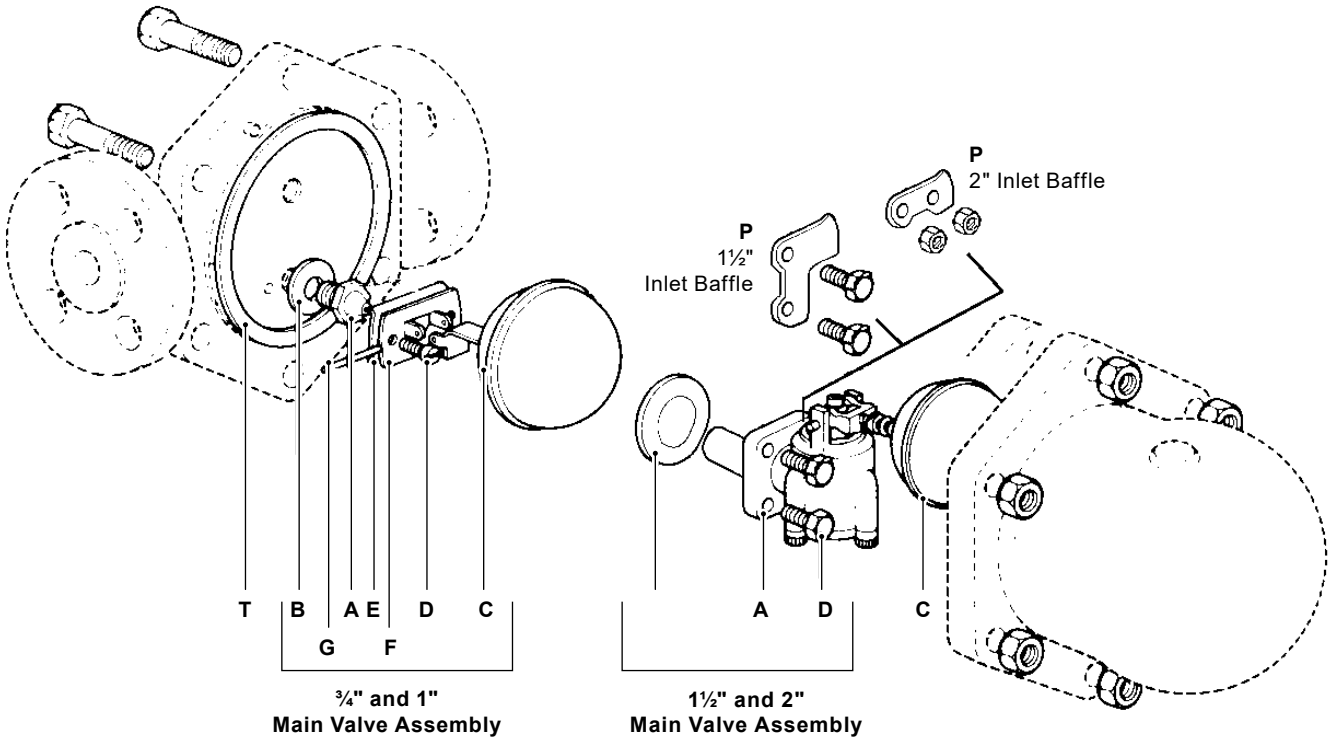
Installation
The trap must be fitted in a horizontal pipe line with direction of flow as indicated and so that the float mechanism is free to rise and fall in a vertical plane. Full-flow isolating valves should be placed to permit servicing.
The high point of the body is provided with a ½" NPT tapping 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.

Spare parts

Valve Mechanism Kit w/ Float (¾" and 1")	**A, B, C, D, E, F, G**
Valve Mechanism Kit (1½" and 2")	**A, B, D, P**
Gasket Kit (3 sets of cover and Mechanism Gaskets)	**B, T**
Float Kit (1½"and 2")	**C**

The erosion deflector is pressed into the body during manufacture and not available as a spare.

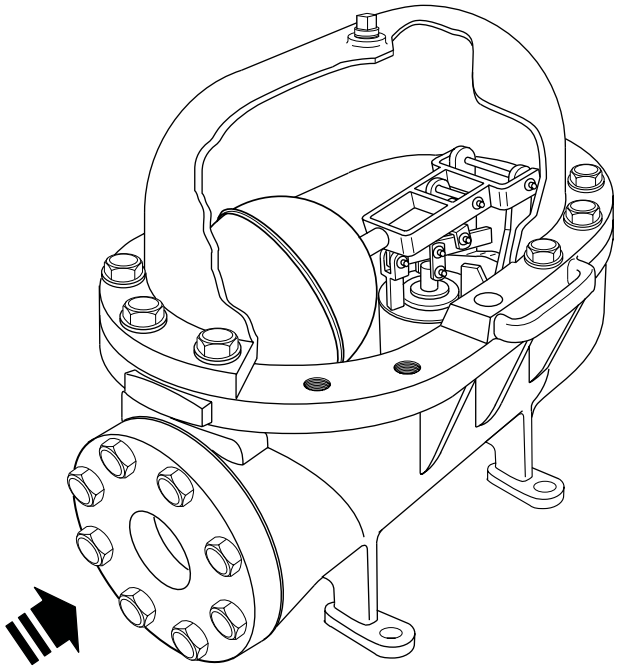


TI-P105-04-US
Issue 3

Steel Liquid Drain Trap
3" (DN80) and 4" (DN100) FA450

Description
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" (DN80)	4" (DN100)
Connections	NPT, SW, Flanged	Flanged
Construction	Carbon steel body Stainless steel internals	



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.

Typical applications
Draining a liquid from a gas in large process applications.

Limiting operating conditions*

PMO	Maximum operating pressure	Up to 450 psi g (31 bar g), depending on the specific gravity of the liquid being drained. See TI-P102-04-US.
Maximum operating temperature		650 °F (343 °C) at 450 psi g (31 bar g)
		750 °F (400 °C) at operating pressures below 375 psi g (26 bar g)

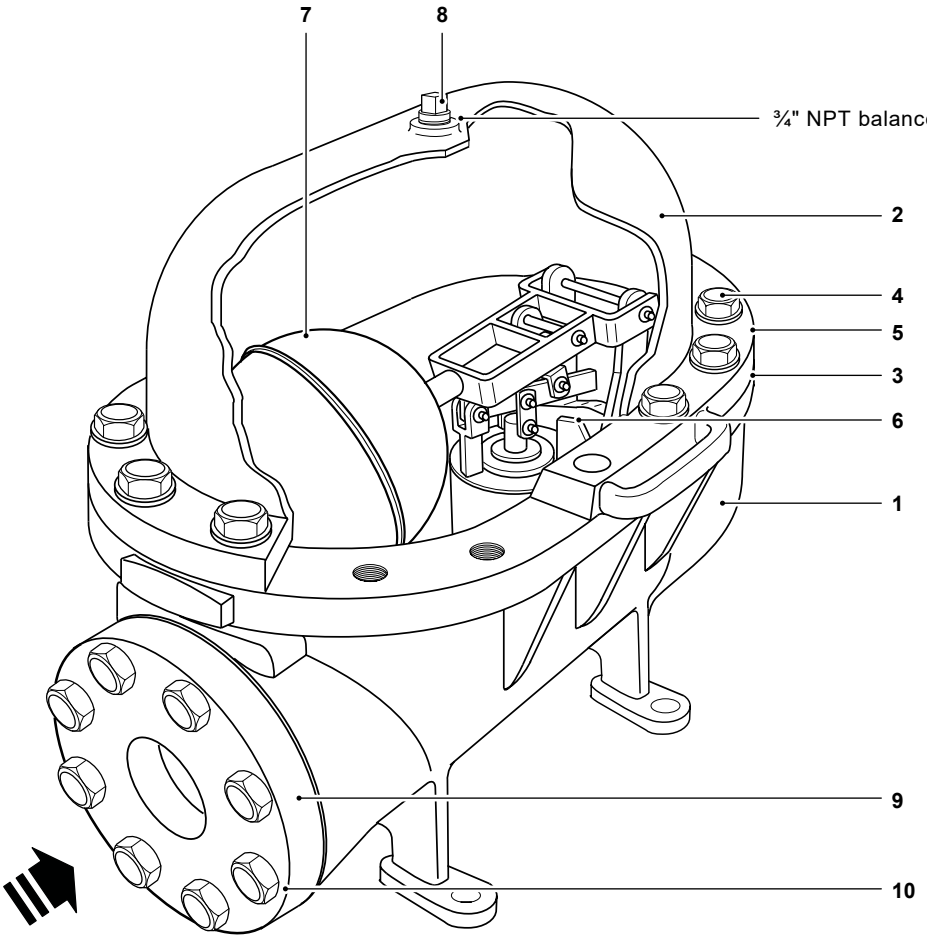
Product is safe for use under full vacuum conditions.

Pressure shell design conditions*

PMA	Maximum allowable pressure	450 psi g @ 650 °F	(31 bar g @ 343 °C)
		425 psi g @ 700 °F	(29 bar g @ 371 °C)
		375 psi g @ 750 °F	(26 bar g @ 400 °C)
TMA	Maximum allowable temperature	750 °F @ 375 psi g	(400 °C @ 26 bar g)

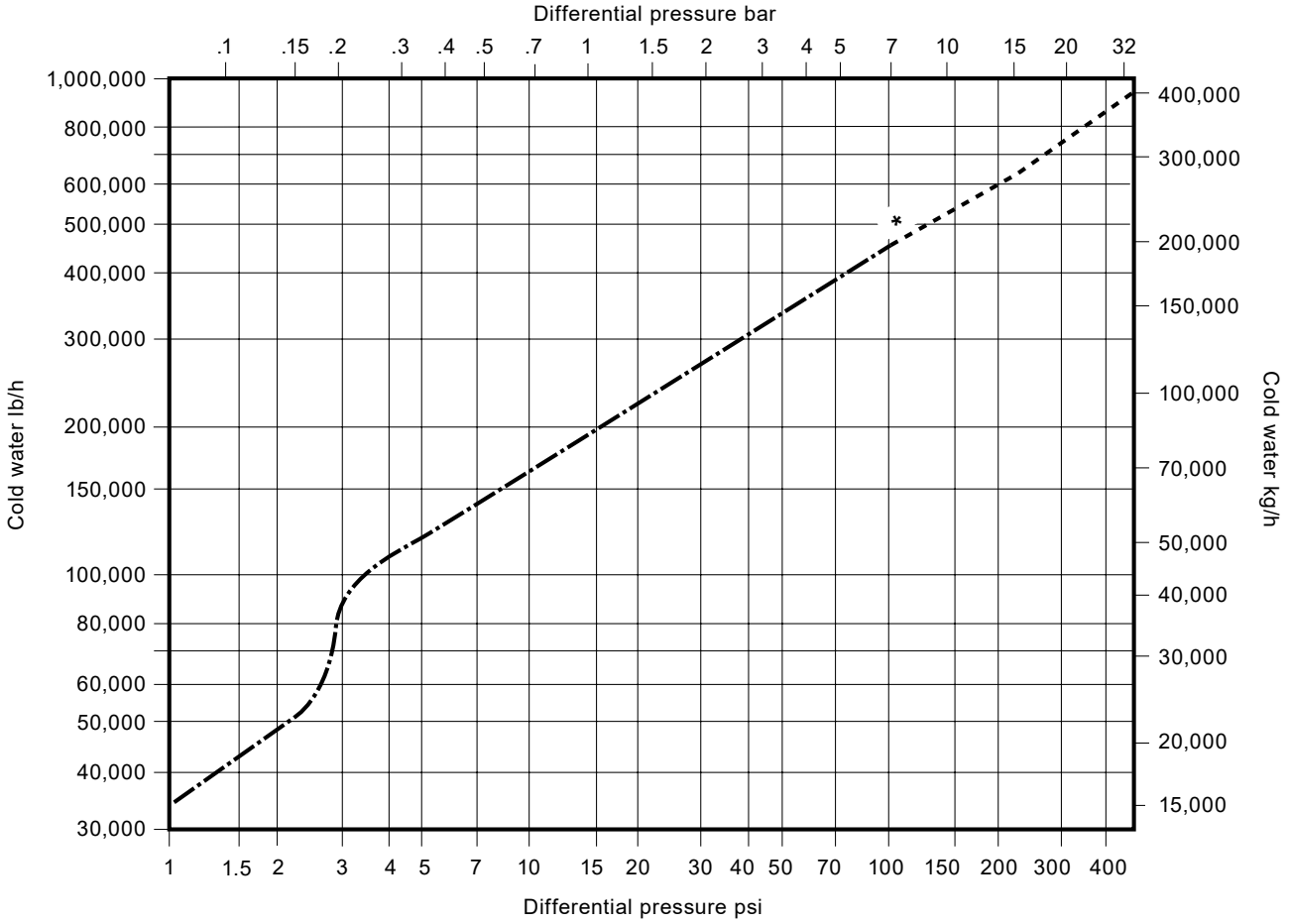
* The limiting operating and design conditions for ANSI 150 flanged units will be limited by the flange rating.

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 stainless steel insert	
4	Cover bolts		Steel	ASTM A193 GR B7
5	Lockwashers		Steel	
6	Main valve Assembly		Stainless steel	AISI 300 and hardened head and seat
	Valve mechanical gasket		Graphite	
	Valve mechanical Screws		Stainless steel	
7	Float		Stainless steel	ASTM A240 Type 304
8	Cover plug	(¾" NPT)	Steel	
	Drain plug	(¾" NPT)	Steel	
9	Companion flange		Forged steel	
10	Flange bolts		Steel	ASTM A193 GR B7

Capacities

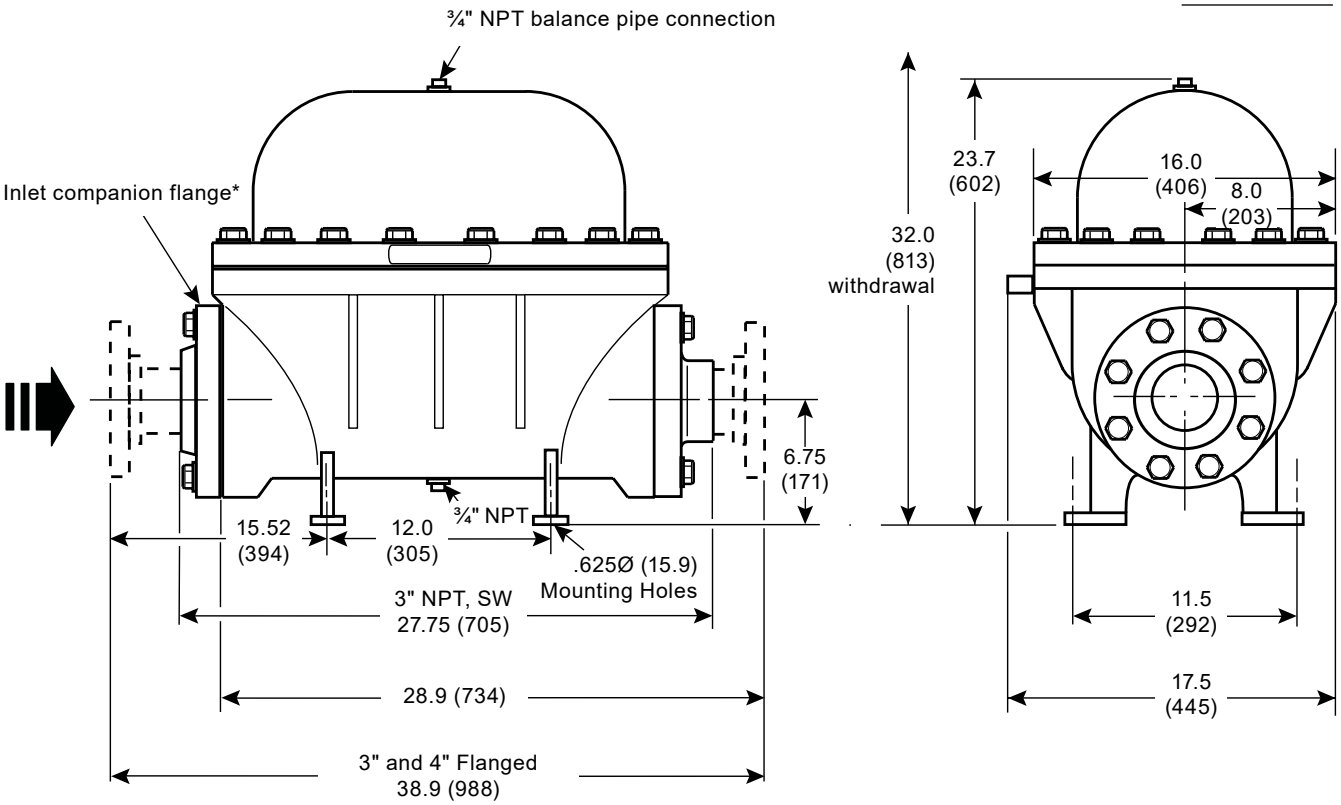


* In this region the trap capacity may exceed the flow capactiy of the connection piping.

For liquids other than cold water, see TI-P102-04-US.

Dimensions/weights (approximate) in inches (mm) and lbs (kg)

Weight
485 lb. (220 kg)



* The inlet connection on NPT and SW traps is a standard 4" (DN100) ANSI 300 RF Flange bolted to the trap body. The flange bore is 3" (DN80), 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 ¾" NPT balance pipe connection. The balance pipe must be connected with a continuous rise between the trap and the eaquipment being drained.

Complete installation instructions are given in IM-7-3151-US.

10.1

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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.

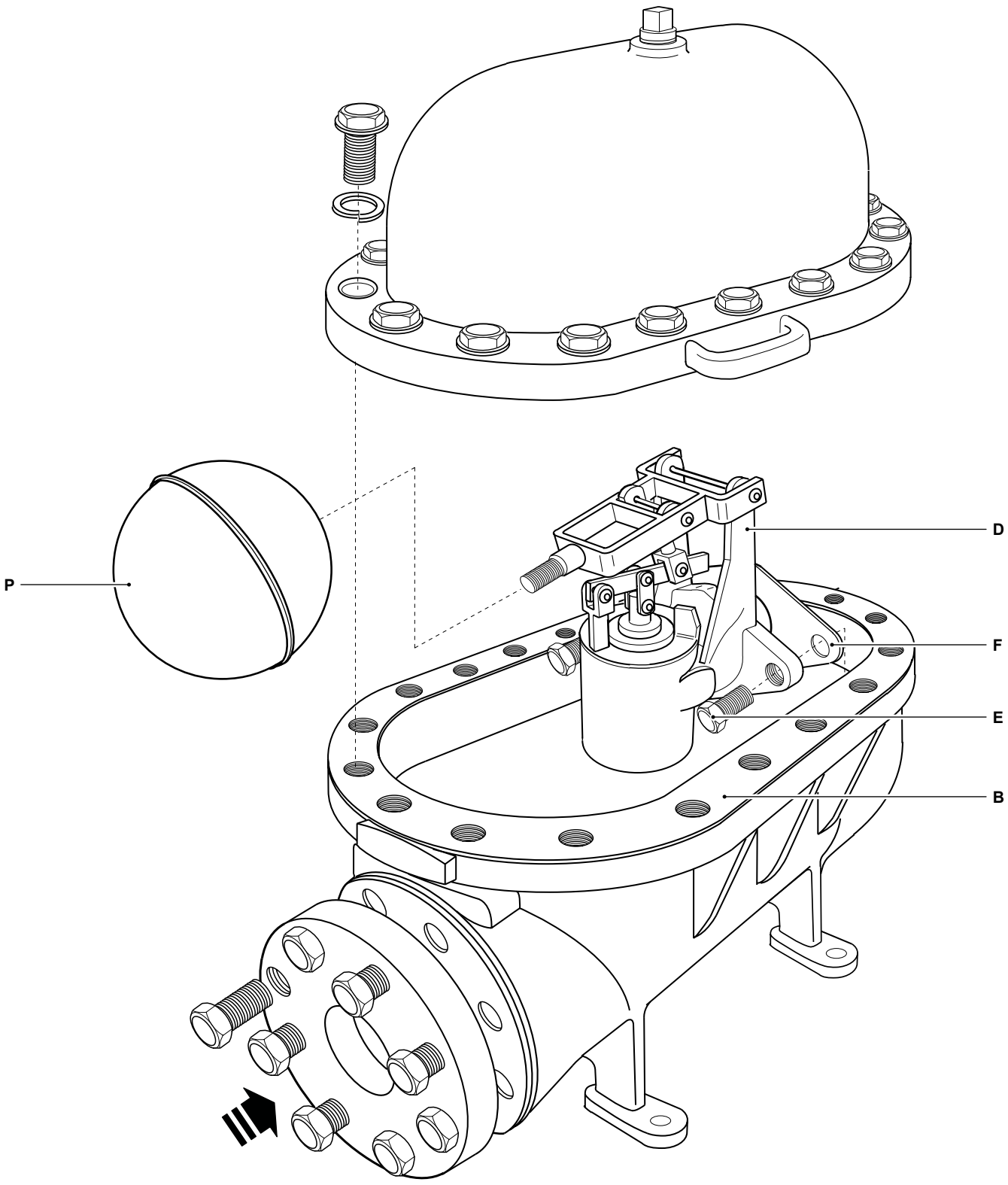
Complete installation and maintenance instructions are given in IM-7-3151-US, which accompanies the product.

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

Valve Mechanism Kit	**D, E, F**
Gasket Kit (pkt of 3 each)	**B, F**
Float Kit	**P**



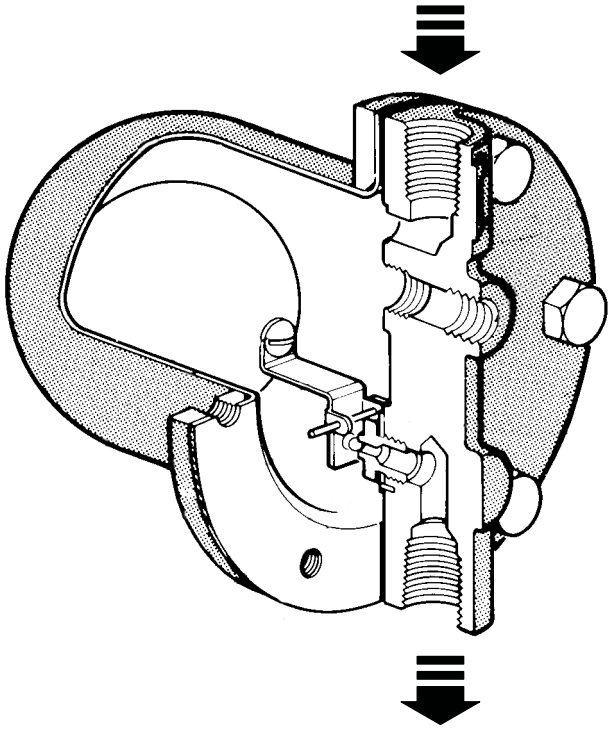
TI-P105-08-US
Issue 1

Stainless Steel Liquid Drain Trap
F-150V, F-300V

Description

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 psi g (10.3 bar g)	300 psi g (20.7 bar g)
Sizes	½"	
Connections	NPT	
Construction	Stainless Steel Body, Cover and Internals	
Options	SW to ANSIB16.11	



Typical applications

Receiver and air line drainage, draining a liquid from its vapor phase.

Limiting operating conditions

Maximum operating pressure (PMO)

	F-150V		F-300V	
Specific Gravity	psi g	bar g	psi g	bar g
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	8.2	243	16.8
.70	100	6.8	203	14.0
.65	80	5.5	164	11.3
.60	61	4.2	125	8.6
.55	42	2.9	86	5.9
.50	23	1.6	46	3.2

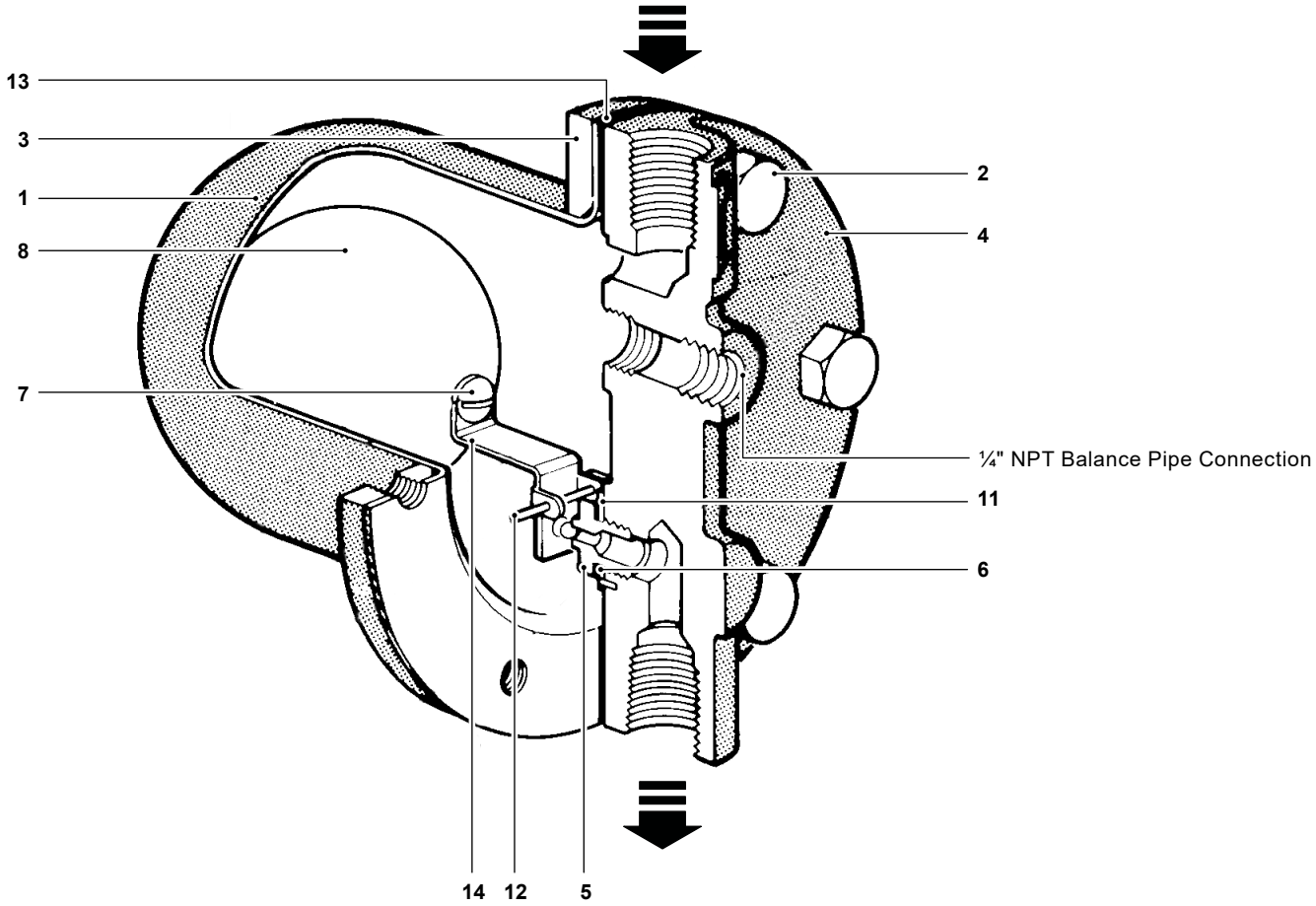
Maximum operating temperature

750 °F (399 °C)

Pressure shell design conditions

PMA	Maximum allowable pressure	450 psi g @ 0-750 °F (31 bar g @ 0-399 °C)
TMA	Maximum allowable temperature	750 °F @ 0-450 psi g (399 °C @ 0-31 bar g)

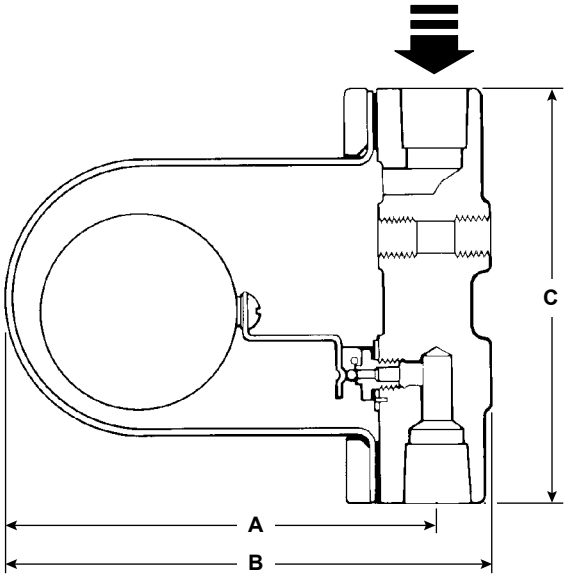
Materials



No.	Part	Material	
1	Body	Stainless Steel	AISI 304
2	Cover Screws	Steel	ASTM A449 Type 1
3	Cover Gasket	Graphite	
4	Cover	Stainless Steel	AISI 304
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

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

A	B	C	Weight
5.4 (137)	6.1 (155)	5.3 (135)	6 lb (2.7)



Cold water capacity lb/(kg/h)

Differential pressure

psi	1	2	5	10	20	30	50	65	75	100	125	150	250	300
bar	.07	.14	.34	.69	1.4	2.1	3.5	4.5	5.2	6.9	8.6	10.3	17.2	20.7
F-150V	150 (68)	200 (91)	295 (134)	395 (179)	530 (240)	625 (283)	785 (356)	880 (399)	940 (426)	1060 (841)	1160 (526)	1250 (597)		
F-300V	80 (36)	105 (48)	145 (66)	210 (95)	280 (127)	335 (152)	420 (204)	470 (213)	500 (227)	570 (259)	620 (281)	680 (308)	850 (386)	920 (417)

For kg/h, multiply lb/hr by .454

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 and 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 ¼" 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 ¼" 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.

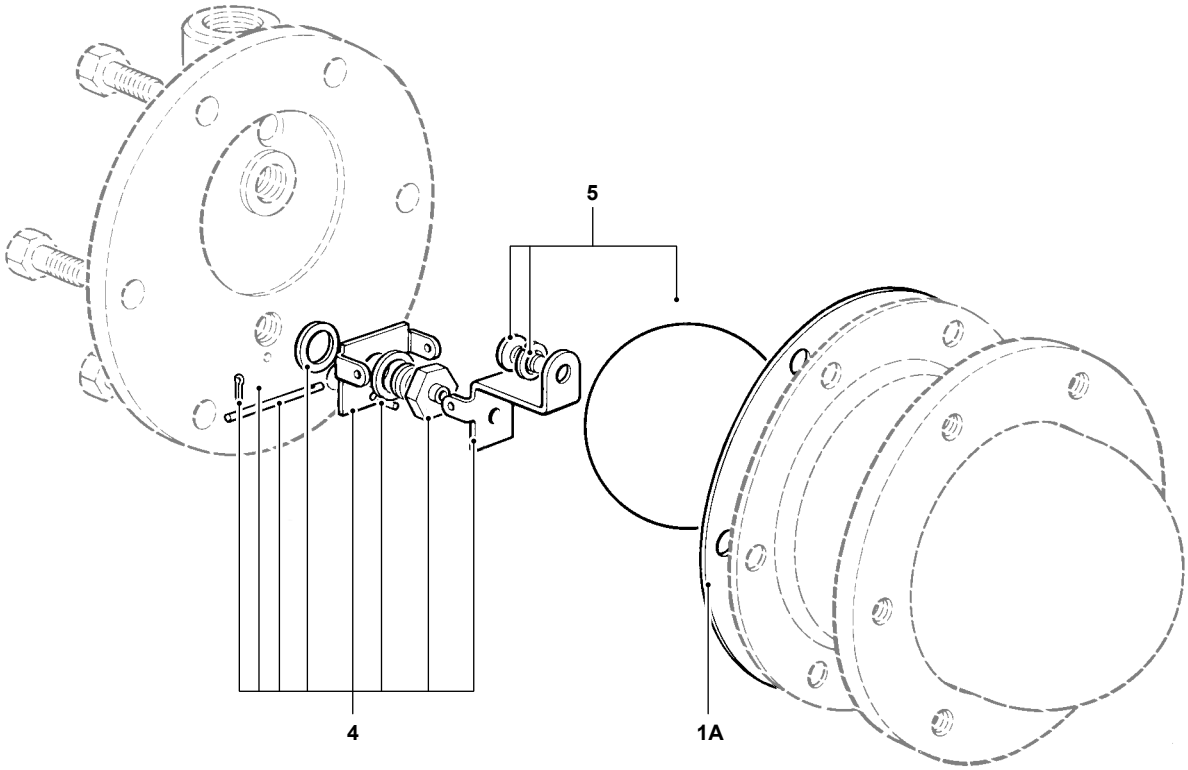
Maintenance

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 IM 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 and Seat Gaskets)	**1A**
Valve mechanism Kit	**4**
Float kit	**5**

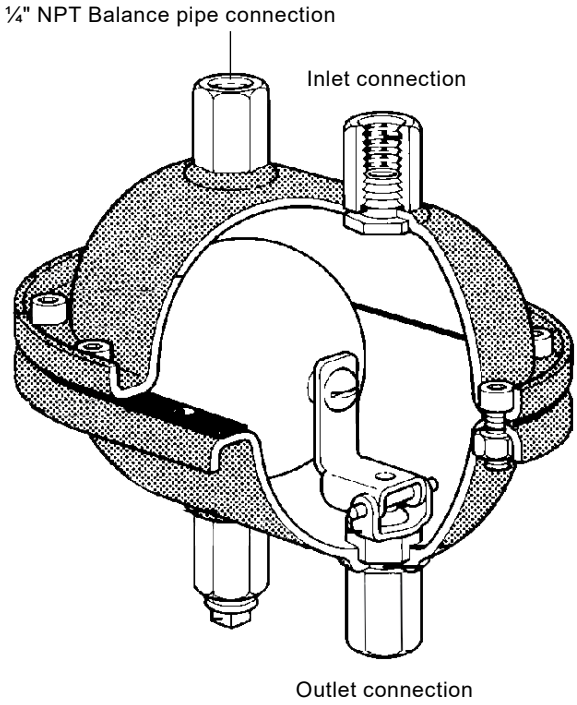


TI-P105-03-US
Issue 2

Stainless Steel Liquid Drain Trap
FA-150

Description
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-150
PMO	150 psi g (10.3 bar g)
Sizes	¼" (DN8)
Connections	NPT
Construction	Stainless steel body and internals



Typical applications
Receiver and air line drainage, draining liquid from its vapor phase.

Limiting operating conditions
Maximum operating pressure (PMO)

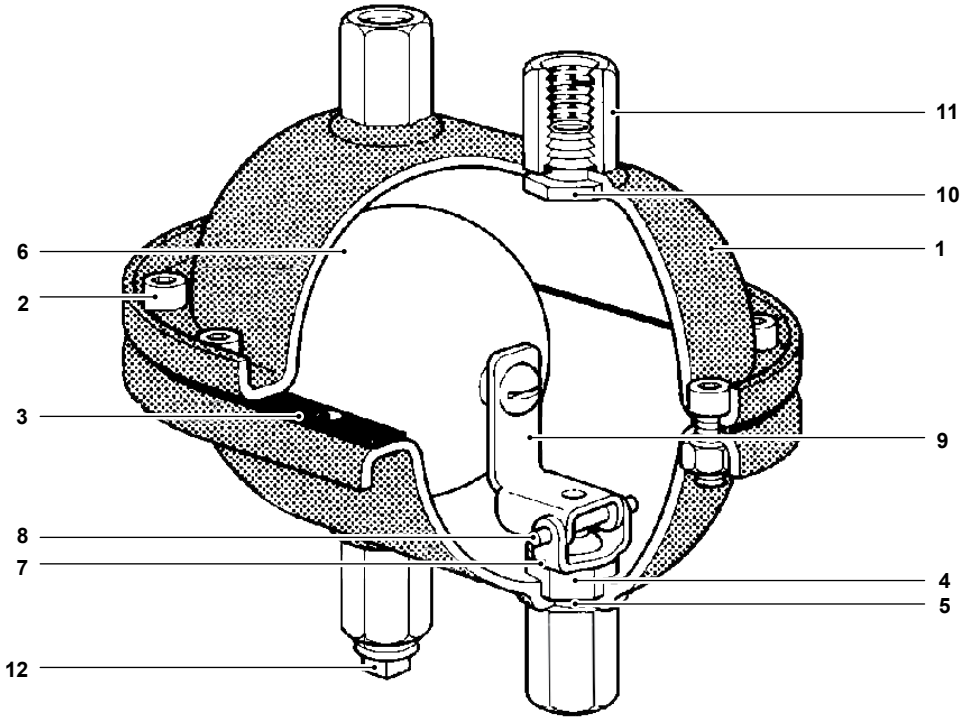
Specific gravity	psi g	bar g
1.0	150	10.3
.95	135	9.3
.90	119	8.2
.85	104	7.2
.80	89	6.1
.75	73	5.0
.70	58	4.0
.65	43	3.0
.60	25	1.7
.55	12	0.8

Maximum operating temperature	250 °F (121 °C)

Pressure shell design conditions

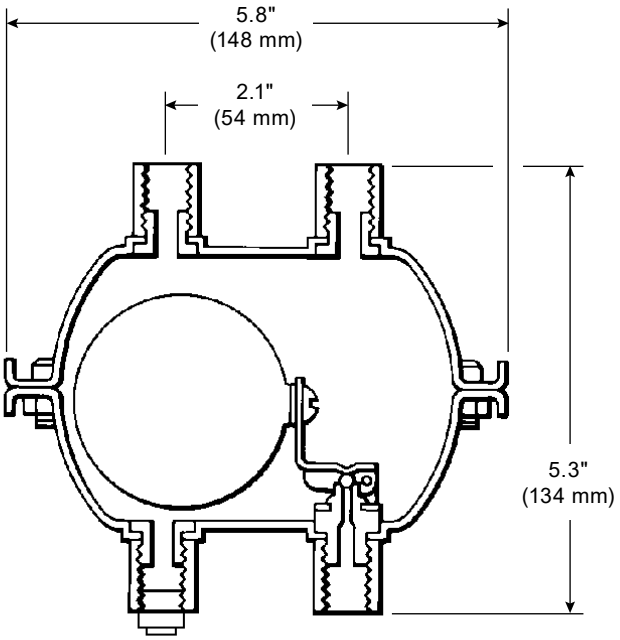
Maximum allowable pressure	PMA	150 psi g @ 0 to 250 °F (10.3 bar g @ -17 to 121 °C)
Maximum allowable temperature	TMA	250 °F @ 0 to 150 psi g (121 °C @ 0 to 10.3 bar g)

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 and 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

Dimensions (approximate) in inches (mm)



Weight (approximate) in lbs (kg)

2 lb
(0.9 kg)

Cold water capacity lb/h 0.10" (2.5 mm) orifice diameter

			Differential pressure											
		psi	1	2	5	10	20	30	50	65	75	100	125	150
¼"	FA-150	bar	.07	.14	.34	.69	1.4	2.1	3.4	4.5	5.2	6.9	8.6	10.3
		lb/h	125	165	250	330	450	530	650	750	790	900	980	1025
		kg/h	57	75	113	150	204	240	295	340	358	408	445	465

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 and 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 ¼" 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

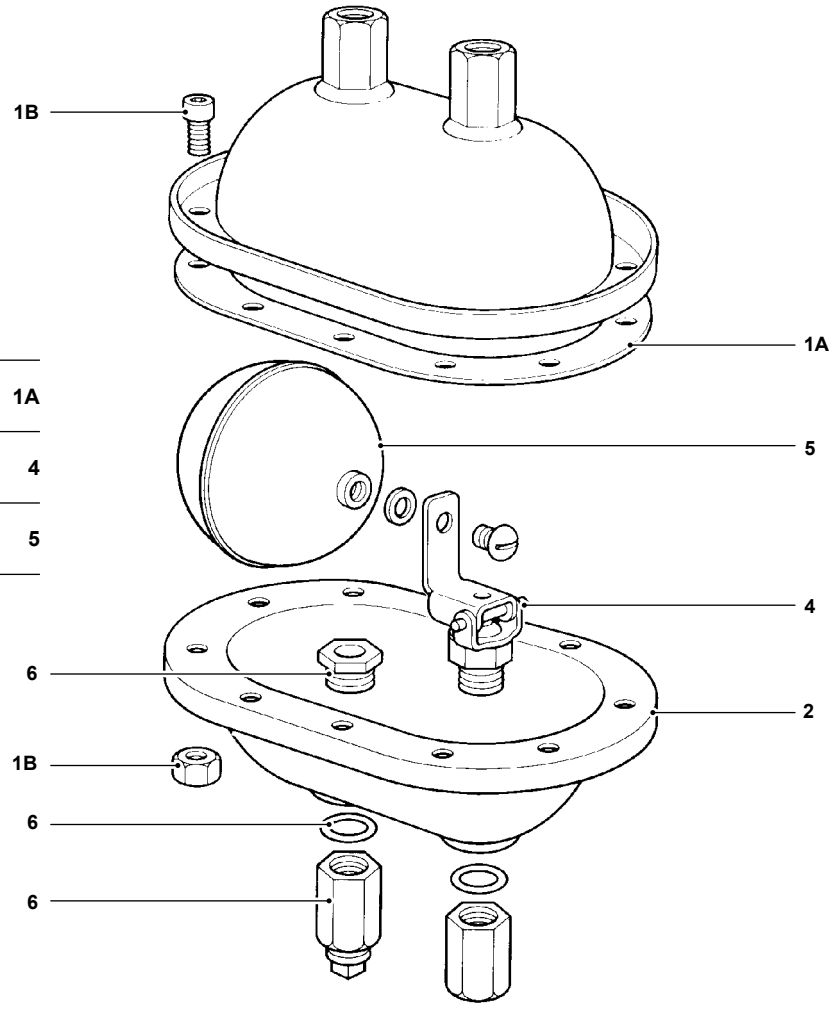
This product can be maintained without disturbing the inlet piping connections. Complete isolation of the trap from both supply and return line is required before any servicing is performed.

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 and Washer	5

TI-P148-38
CMGT Issue 6

CAS14 and CAS14S Austenitic Stainless Steel Ball Float Air and Gas Traps

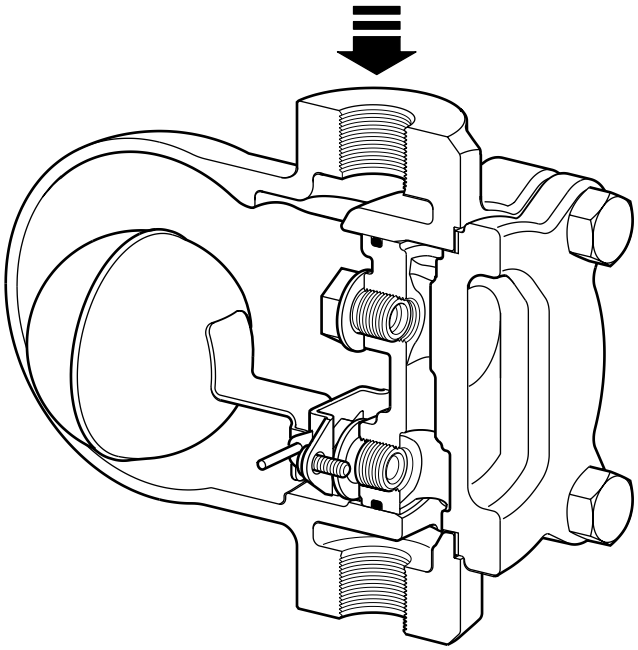
Description

The CAS14 and CAS14S are austenitic stainless steel ball float gas/air drain traps.
They provide efficient condensate drainage from compressed air and other gas systems, allowing the process to operate to its optimum potential.
The connections are in the vertical plane for flow downwards.
Body and cover castings are produced by a TÜV approved supplier in accordance with AD-Merkblatt WO/TRD100.

Operating media

The CAS14 and CAS14S are designed for use on air or gases within PED group 2.

Note: The CAS14 and CAS14S are not suitable for use on PED group 1 liquids or gases.



Available types

CAS14	fitted with a viton valve cone ½" and ¾"
CAS14S	fitted with a stainless steel valve cone ½", ¾" and 1"

Optional extra

An integral screen.

Standards

These products fully comply with the requirements of the European Pressure Equipment Directive 2014/68/EU and carry the CE mark when so required.

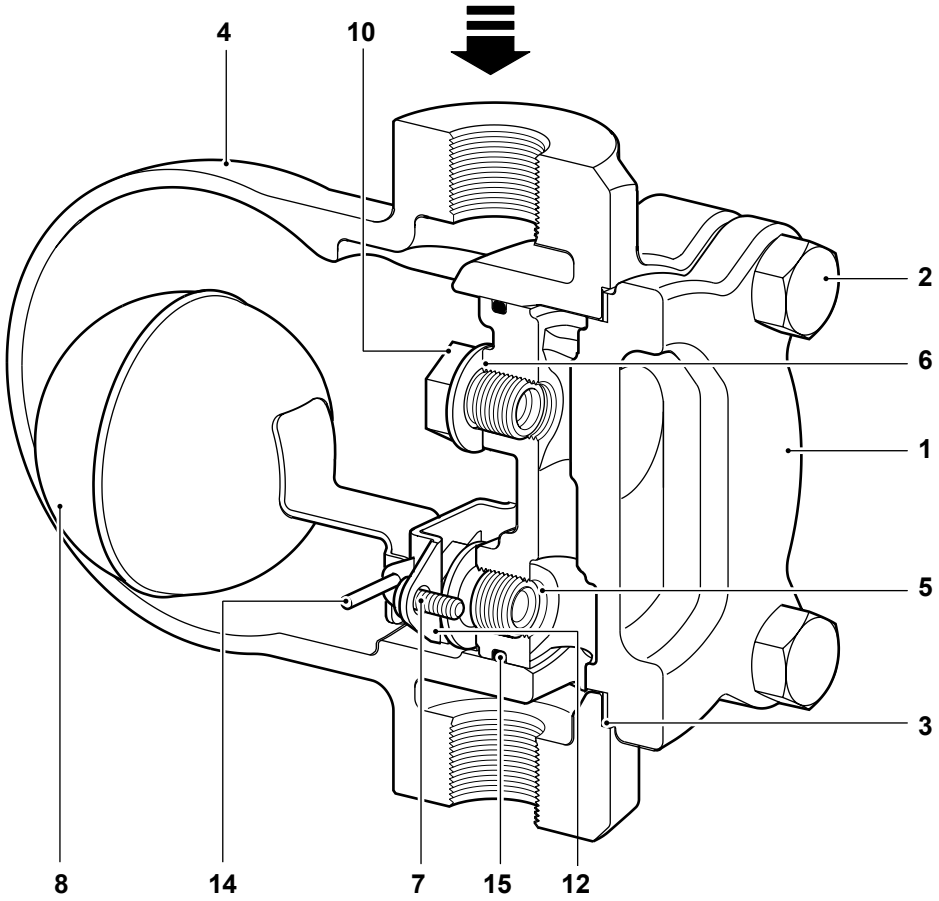
Certification

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", ¾" and **1"**	Screwed BSP T Rp (ISO 7-1) (BS 21 and DIN 2999) or NPT (ANSI B 1.20.1).
½", ¾" and **1"**	Socket weld ends to ANSI B 16.11, BS 3799 Class 3000 and DIN 3239.

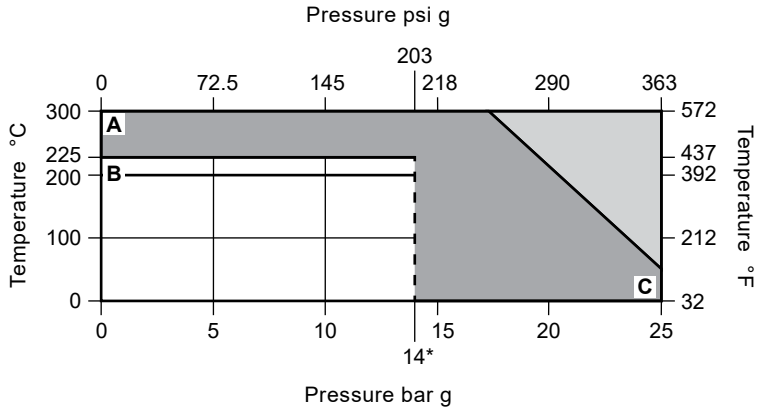
Materials



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 page 4.

Pressure/temperature limits (ISO 6552)



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

The Viton soft seat versions should not be used in this region.

A - C CAS14S

B - C CAS14

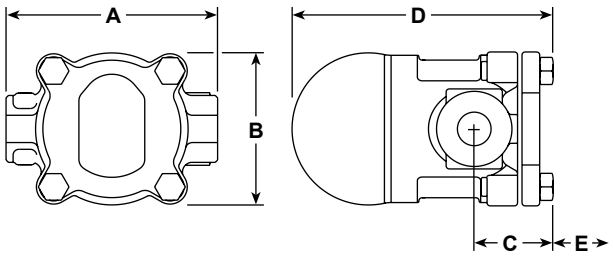
*PMO	Maximum operating pressure		14 bar g	203 psi g
Body design conditions				PN25
PMA	Maximum allowable pressure		25 bar g	363 psi g
TMA	Maximum allowable temperature		300 °C	572 °F
Minimum allowable temperature			-20 °C	-4 °F
PMO	Maximum operating pressure for saturated steam service		14 bar g	203 psi g
TMO	Maximum operating temperature	**CAS14**	200 °C	392 °F
		CAS14S	225 °C	437 °F
ΔPMX Maximum differential pressure				
Minimum operating temperature			0 °C	32 °F

The maximum differential pressure depends on the specific gravity of the liquid being drained.

	Specific Gravity				
Trap	**1.0**	**0.9**	**0.8**	**0.7**	**0.6**
	Maximum differential pressure bar (psi)				
CAS14	14.0 (203)	14.0 (203)	14.0 (203)	9.0 (131	5.0 (72.5)
CAS14S					

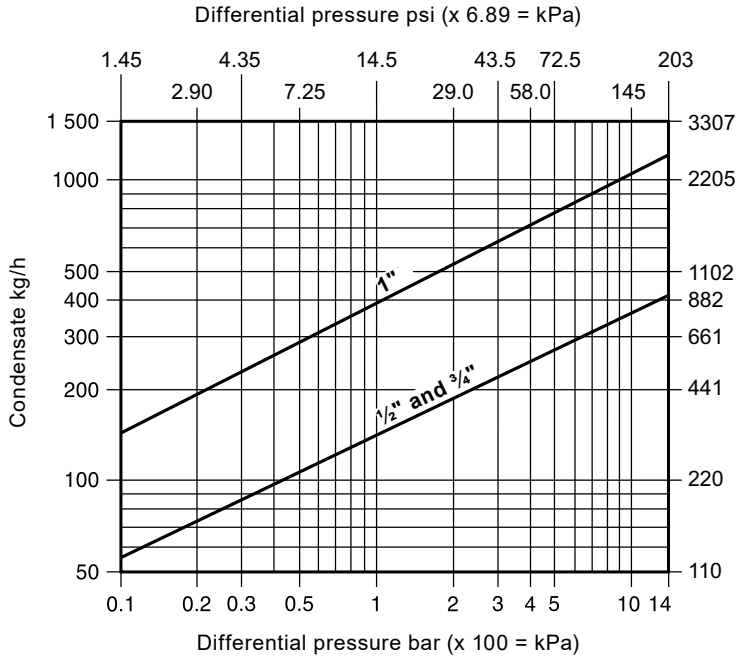
Minimum specific gravity of liquid	0.6
Product is safe for use under full vacuum conditions	
Designed for a maximum cold hydraulic test pressure of:	37.5 bar g / 544 psi g

Dimensions/weights (approximate) in mm (inches) and kg (lbs)



Size	A	B	C	D	E Withdrawal distance	Weight
½" ¾"	135 (5.31)	97 (3.82)	48 (1.89)	162 (6.38)	135 (5.31)	3.73 (8.22)
1"	139 (5.47)	113 (4.45)	51 (2.01)	179 (7.05)	145 (5.71)	4.23 (9.33)

Capacities



Safety information, installation and maintenance

For full details see the Installation and Maintenance Instructions (IM-P106-02) supplied with the product.

How to order

Example: 1 off Spirax Sarco ½" CAS14 austenitic stainless steel ball float air and gas trap having screwed BSP T Rp (ISO 7-1) connections.

Spare parts

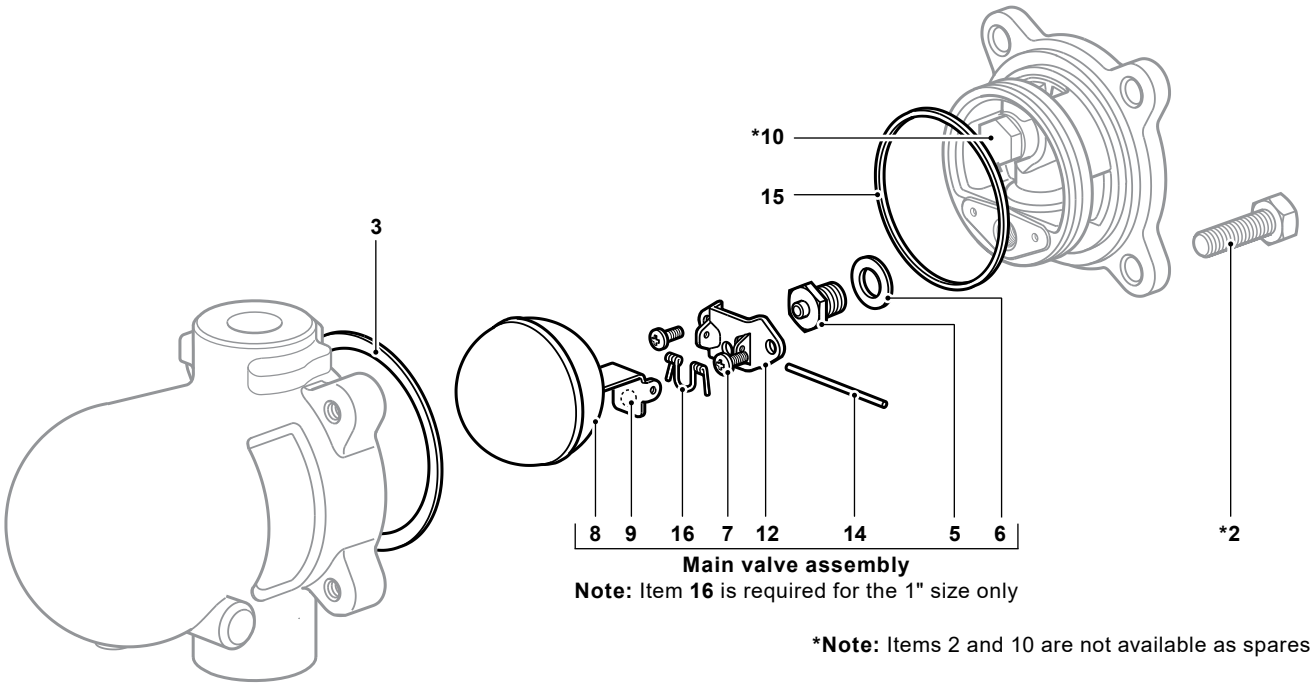
The spare parts available are shown in solid outline. Parts drawn in a grey line are not supplied as spares.

Available spares

Maintenance kit	**CAS14**	**3**, **5**, **6**, **7** (2 off), **8**, **9**, **12**, **14**, **15**
	CAS14S	**3**, **5**, **6**, **7** (2 off), **8**, **9**, **12**, **14 + 16** (1" only), **15**
Seal set		**3**, **9**, **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 ½" CAS14 austenitic stainless steel ball float air and gas trap.



Main valve assembly
Note: Item **16** is required for the 1" size only

***Note:** Items 2 and 10 are not available as spares

Recommended tightening torques

Item	Part	or mm	N m	ft lbf
2	Cover bolt	M10 x 30	20 - 25	15 - 18
5	Main valve seat	17 A/F	50 - 55	37 - 41
7	Main valve assembly screws	pozidrive M4 x 6	2.5 - 3.0	1.8 - 2.2
10	Blanking plug	17 A/F	50 - 55	37 - 41

TI-P148-04
CMGT Issue 13

CA46 and CA46S
Austenitic Stainless Steel
Air and Gas Traps Flanged DN15 (½") to DN25 (1")

Description
The CA46 is an austenitic stainless steel ball float air and gas trap. It is available with a soft valve cone given designation CA46 or with a metal valve cone given designation CA46S both having horizontal flanged connections. The cover will be drilled and tapped ½" BSP or NPT for the purpose of fitting a balance line. Body and cover castings are produced by a TÜV approved foundry.

Standards
This product fully complies with the requirements of the European Pressure Equipment Directive 2014/68/EU and carries the CE mark when so required.

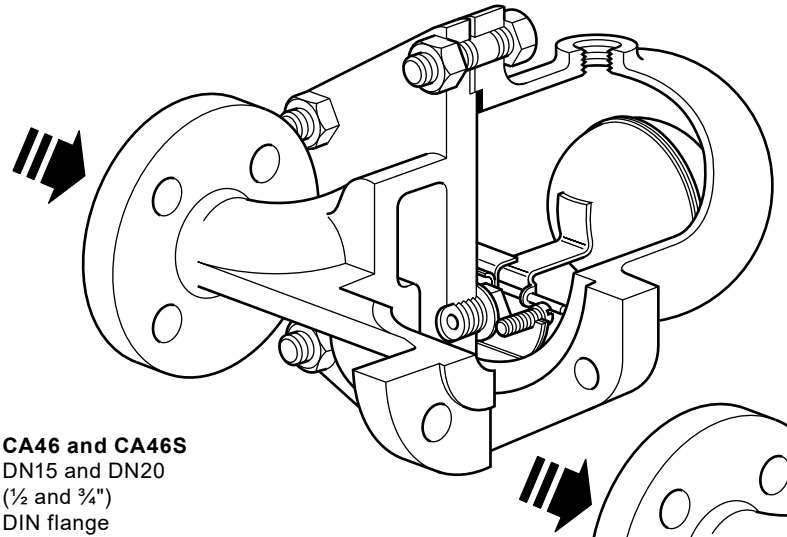
Certification
The product is available with material certification to EN 10204 3.1.
Note: All certification/inspection requirements must be stated at the time of order placement.

Sizes and pipe connections
CA46 - DN15 and DN20 (½" and ¾")
CA46S - DN15, DN20 and DN25 (½", ¾" and 1")

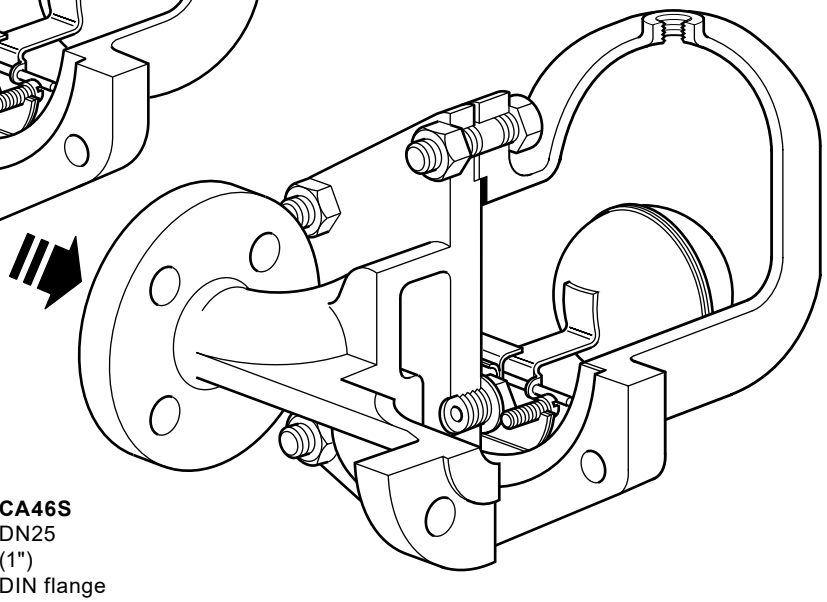
Standard flanges are:

- EN 1092 PN40 with DIN face-to-face dimensions.
- ASME 150, ASME 300 and JIS/KS 20 flanges are provided with drilled and tapped bolt holes with DIN face-to-face dimensions.

Balance line - PN flanges will be provided with BSP balance line and ASME and JIS/KS 20 flanges with NPT balance line.



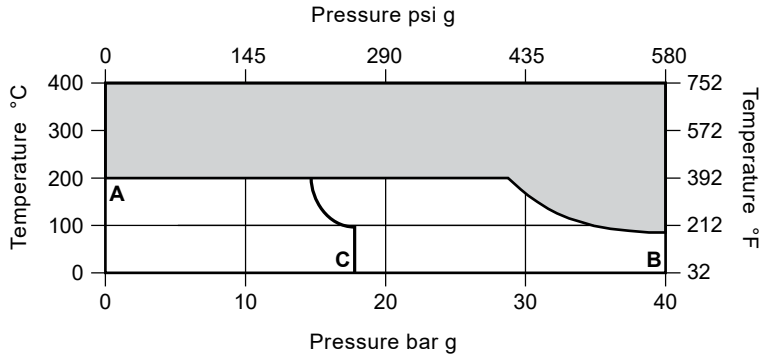
CA46 and CA46S
DN15 and DN20
(½ and ¾")
DIN flange



CA46S
DN25
(1")
DIN flange

Pressure/temperature limits

CA46 - DN15 and DN20 (½" and ¾") flanged



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

A - B Flanged EN 1092 PN40 and ASME 300.

A - C Flanged ASME 150 and JIS/KS 20K.

Body design conditions		PN40
PMA Maximum allowable pressure	40 bar g @ 80 °C	580 psi g @ 176 °F
TMA Maximum allowable temperature	200 °C @ 29 bar g	392 °F @ 420 psi g
Minimum allowable temperature	0 °C	32 °F
PMO Maximum operating pressure	40 bar g @ 80 °C	580 psi g @ 176 °F
TMO Maximum operating temperature	200 °C @ 29 bar g	392 °F @ 420 psi g
Minimum operating temperature	0 °C	32 °F

Note: For lower operating temperatures consult Spirax Sarco

ΔPMX Maximum differential pressure

The maximum differential pressure depends on the specific gravity of the liquid being drained.

	Specific gravity				
Trap	**1.0**	**0.9**	**0.8**	**0.7**	**0.6**
CA46-32	32.0	32.0	29.0	20.0	12.0

Product is safe for use under full vacuum conditions

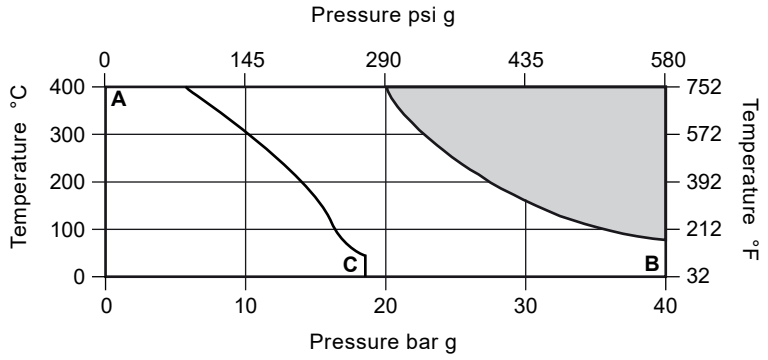
Designed for a maximum cold hydraulic test pressure of:

PN40	60 bar g	870 psi g
ASME 300	60 bar g	870 psi g
ASME 150	30 bar g	435 psi g
JIS/KS 20K	49 bar g	710 psi g

Caution: The trap in its complete operational form must not be subjected to a pressure of greater than 48 bar (696 psi) otherwise damage to the internal mechanism may result.

Pressure/temperature limits

CA46S - DN15, DN20 and DN25 (½", ¾" and 1") flanged



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

A - B Flanged EN 1092 PN40 and ASME 300.

A - C Flanged ASME 150 and JIS/KS 20K.

Body design conditions		PN40
PMA Maximum allowable pressure	40 bar g @ 80 °C	580 psi g @ 176 °F
TMA Maximum allowable temperature	400 °C @ 20 bar g	752 °F @ 290 psi g
Minimum allowable temperature	0 °C	32 °F
PMO Maximum operating pressure	40 bar g @ 80 °C	580 psi g @ 176 °F
TMO Maximum operating temperature	400 °C @ 20 bar g	752 °F @ 290 psi g
Minimum operating temperature	0 °C	32 °F

Note: For lower operating temperatures consult Spirax Sarco

ΔPMX Maximum differential pressure

The maximum differential pressure depends on the specific gravity of the liquid being drained.

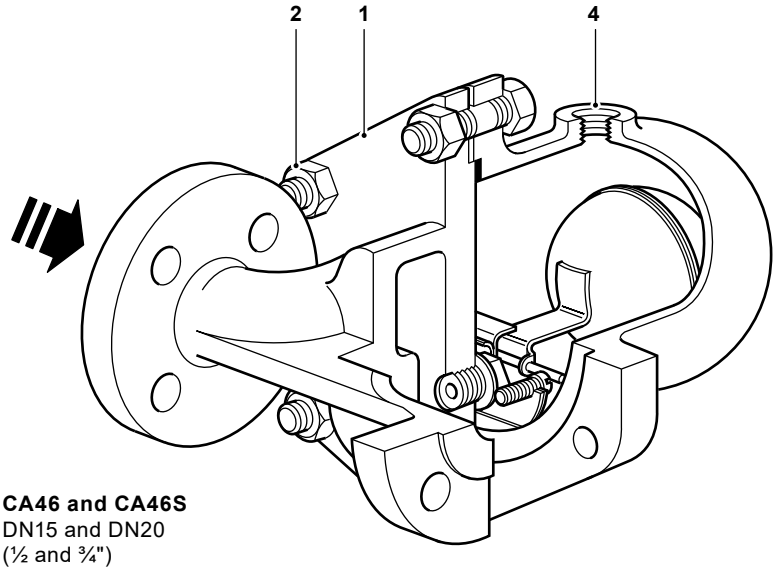
	Specific gravity				
Trap	**1.0**	**0.9**	**0.8**	**0.7**	**0.6**
CA46S-4.5	4.5	4.5	4.5	3.4	2.0
CA46S-10	10.0	9.5	6.8	5.5	3.4
CA46S-14	14.0	14.0	11.0	8.0	5.0
CA46S-21	21.0	19.0	15.0	10.0	6.5
CA46S-32	32.0	30.0	23.0	16.5	10.0

Product is safe for use under full vacuum conditions

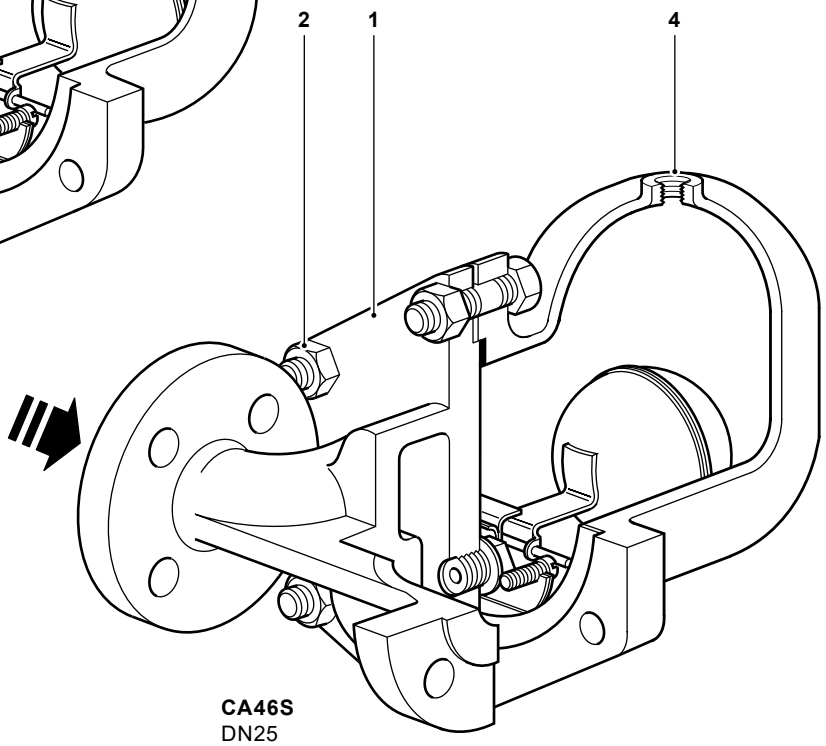
Designed for a maximum cold hydraulic test pressure of:	PN40	60 bar g	870 psi g
	ASME 300	60 bar g	870 psi g
	ASME 150	30 bar g	435 psi g
	JIS/KS 20K	49 bar g	710 psi g

Caution: The trap in its complete operational form must not be subjected to a pressure of greater than 48 bar (696 psi) otherwise damage to the internal mechanism may result.

Materials



CA46 and CA46S
DN15 and DN20
(½ and ¾")
DIN flange

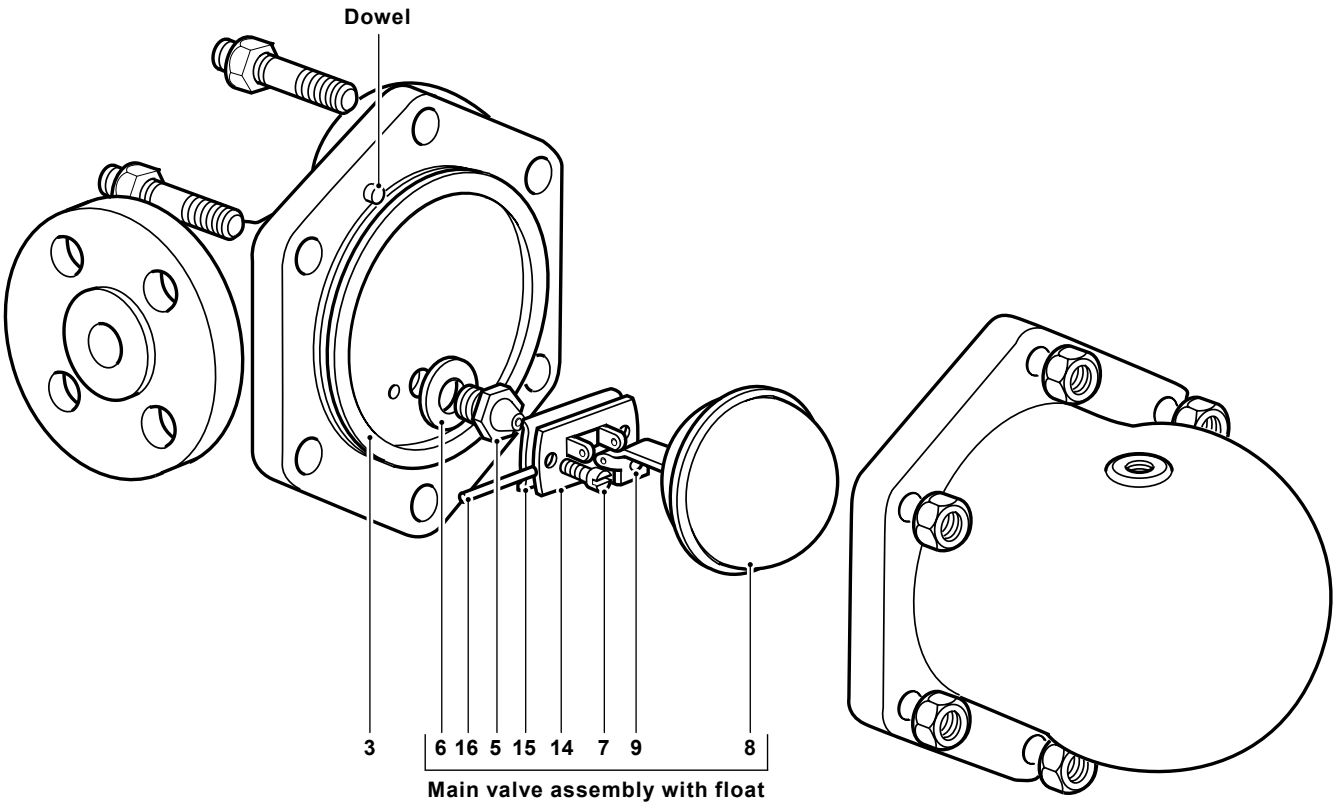


CA46S
DN25
(1")
DIN flange

No.	Part	Material	
1	Body	Austenitic stainless steel (316)	1.4408/CF8M
2	Cover stud	Austenitic stainless steel	BS 6105 A2-70
	Cover nut	Austenitic stainless steel	BS 6105 A2
3	Cover gasket (shown on page 4)	Reinforced exfoliated graphite	BS 1449 304 S16
4	Cover	Austenitic stainless steel	1.4408/CF8M

Materials continued on next page

Materials (continued)

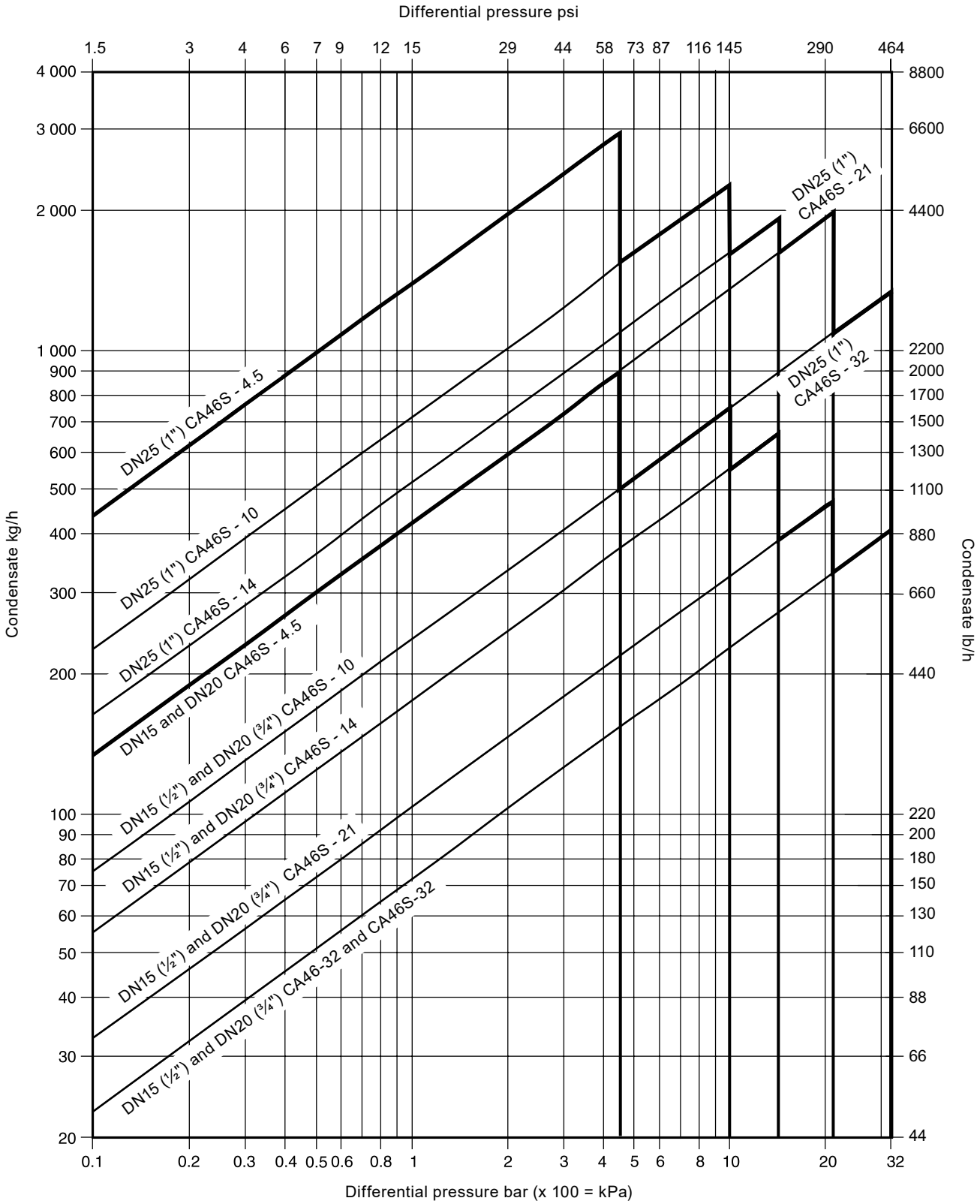


Internals that are common to all sizes

No.	Part		Material	
5	Valve seat		Stainless steel	BS 970 431 S29
6	Valve seat gasket		Stainless steel	BS 1449 304 S11
7	Pivot frame assembly		Stainless steel set screws	BS 4183 18/8
8	Ball float and lever		Stainless steel	BS 1449 304 S16
9	Valve cone	**CA46**	Synthetic rubber	Viton
		CA46S (The valve cone in the CA46S is permanently attached to the ball float and lever)	Stainless steel	
14	Support frame		Stainless steel	BS 1449 304 S16
15	Pivot frame		Stainless steel	BS 1449 304 S16
16	Pivot		Stainless steel	

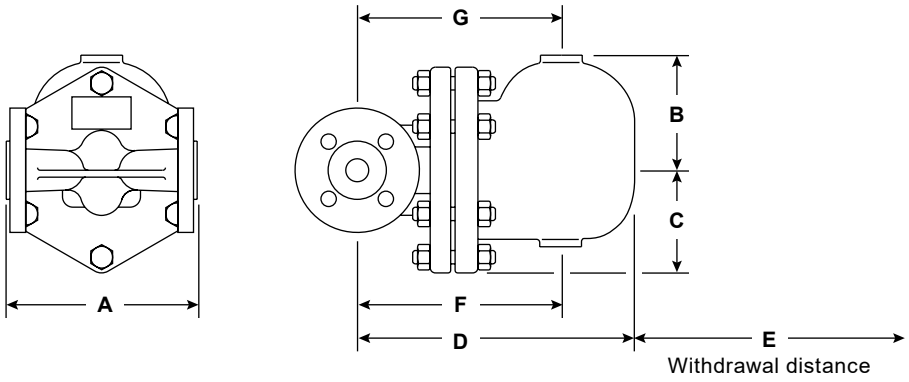
Capacities

Note: The capacities provided here are calculated using water at ambient temperature.
The discharge capacity is affected with a change in specific gravity, for further information contact Spirax Sarco.

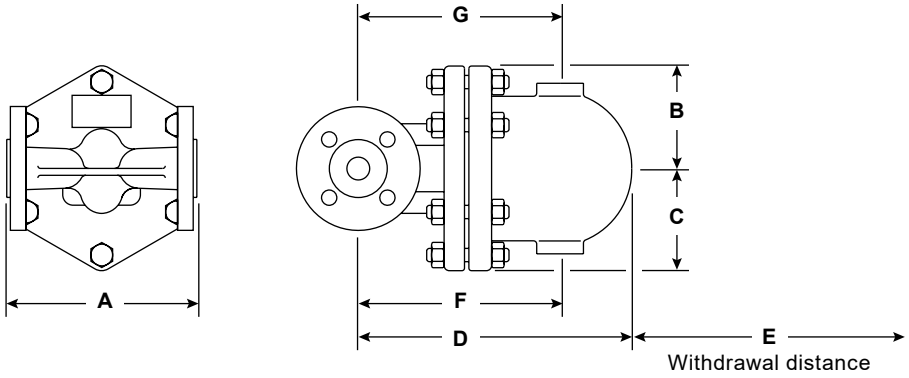


Dimensions/weights (approximate) in mm (inches) and kg (pounds)

CA46S
DN25 (1") DIN flange



CA46 and CA46S
DN15 (½")
and
DN20 (¾") DIN flange



Size	A	B	C	D	E	F	G	Weight
DN15	150 (5.9)	80 (3.1)	80 (3.1)	215 (8.5)	120 (4.7)	155 (6.1)	155 (6.1)	10.8 (24)
DN20				225 (8.9)		165 (6.5)	165 (6.5)	
DN25	160 (6.3)	115 (4.5)	85 (3.3)	282 (11.1)	170 (6.7)	215 (8.5)	215 (8.5)	15.0 (33)

	Size	ASME 150	ASME 300	JIS/KS 20
Flange bolt hole tappings	DN15	½" - 13 UNC - 2B	½" - 13 - UNC - 2B	M12
	DN20	½" - 13 UNC - 2B	½" - 13 - UNC - 2B	M12
	DN25	½" - 13 UNC - 2B	⅝" - 11 - UNC - 2B	M16

Safety information, installation and maintenance
For full details see the Installation and Maintenance Instructions (IM-P148-37) supplied with this product.

Installation note
The trap should be fitted in the horizontal plane below what it is draining, with the direction of flow as indicated on the body so that the float mechanism is free to rise and fall in a vertical plane.
One of the advantages of the float trap for draining air and gas systems is that no bleed is required for satisfactory operation. However, because the trap has no bleed a separate balance line is needed to prevent it becoming air or gas locked.
Make sure that the balance line is piped back to the upstream side.
A balance line is essential for the correct operation of this product.
For convenience of maintenance it is recommended that a union is fitted in the balance line near to the trap cover.

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 DN25 CA46S-32 air and gas trap flanged to EN 1092 PN40 with austenitic stainless steel body and cover.

Spare parts

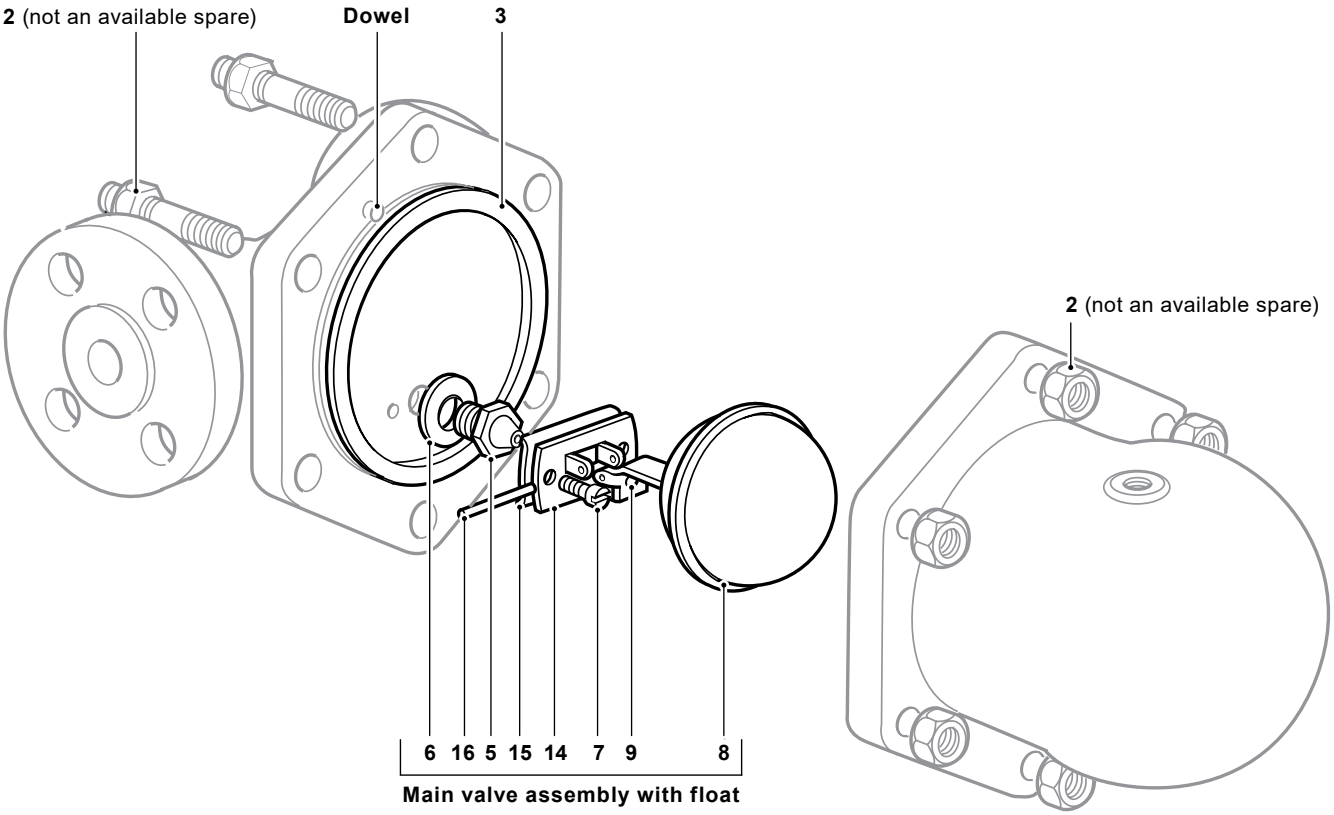
The spare parts available are shown in solid outline. Parts drawn in a grey line are not supplied as spares.

Available spare

Soft valve cone CA46	(packet of 3)	**9**
Main valve assembly with float	**CA46**	**5, 6, 7, 8, 9, 14, 15, 16**
	CA46S	**5, 6, 7, 8 + 9, 14, 15, 16**
Complete set of gaskets	(packet of 3 sets)	**3, 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 trap.
Example: 1 - Main valve assembly for a Spirax Sarco DN25 CA46S-32 air and gas trap.



Recommended tightening torques

Item	or mm		N m	ft lbf
2	17	M10 x 60	29 - 33	21 - 24
5	17	M12 x 8	50 - 55	37 - 41
7	Cheesehead	M5 x 20	2.5 - 2.8	1.8 - 2.5

TI-P148-07
CMGT Issue 12

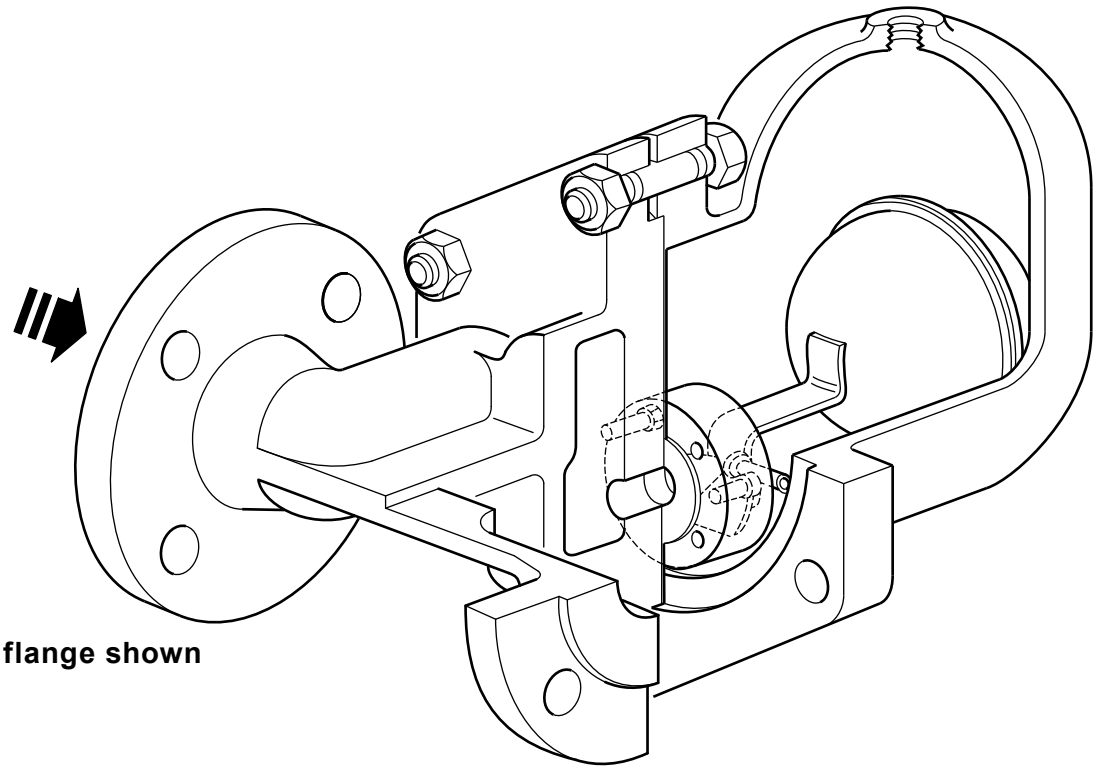
CA46S
Austenitic Stainless Steel
Air and Gas Trap DN40 and DN50

Description
The CA46S is an austenitic stainless steel ball float air and gas trap. It has a metal valve cone and is available with horizontal flanged connections. The cover will be drilled and tapped ¾" BSP T Rp (ISO 7-1) or NPT for the purpose of fitting a balance line. Body and cover castings are produced by a TÜV approved supplier in accordance with AD-Merkblatt WO/TRD100.

Standards
This product fully complies with the requirements of the European Pressure Equipment Directive 2014/68/EU and carries the CE mark when so required.

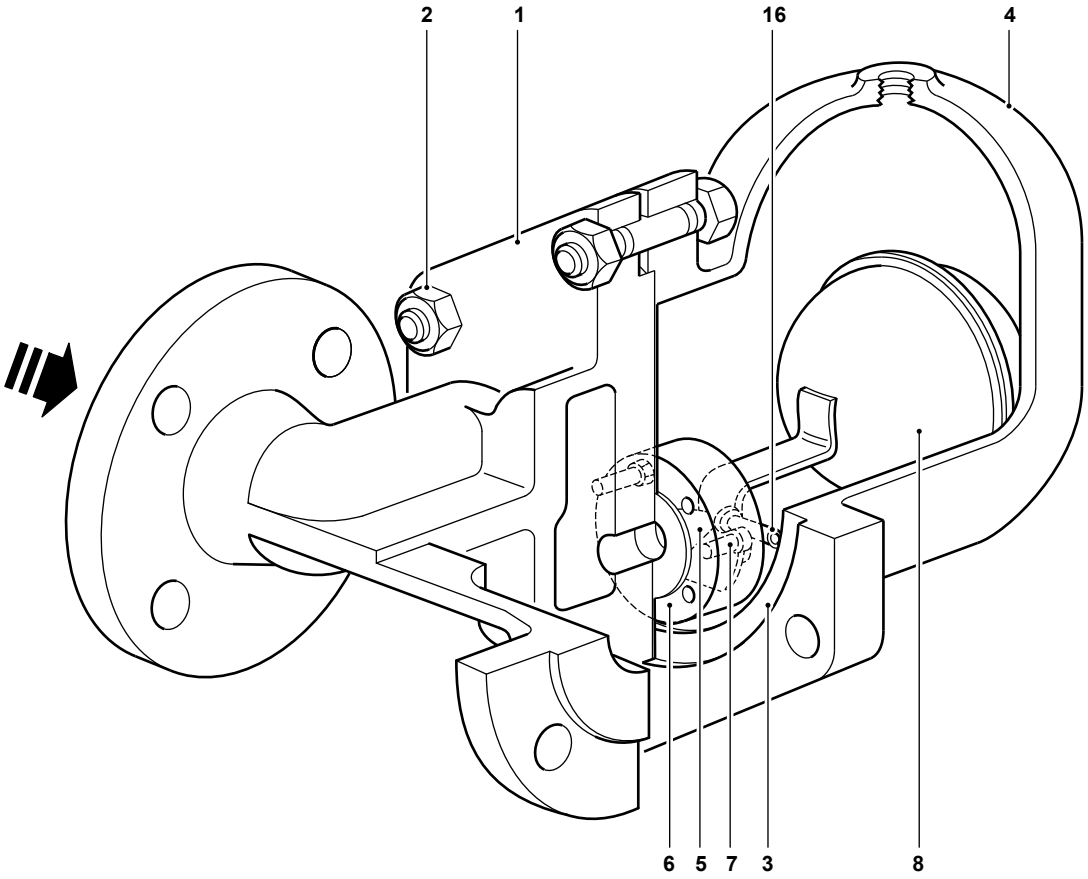
Certification
The product is available with material certification to EN 10204 3.1.
Note: All certification/inspection requirements must be stated at the time of order placement.

Sizes and pipe connections
DN40 and DN50
Standard flanges are:
EN 1092 PN40 with DIN face-to-face dimensions and
ASME 150, ASME 300 and JIS/KS 20K flanges with drilled and tapped bolt holes with DIN face-to-face dimensions.
PN and JIS/KS flanges will be provided with BSP T Rp (ISO 7-1) balance line and ASME flanges with NPT balance line.



DIN flange shown

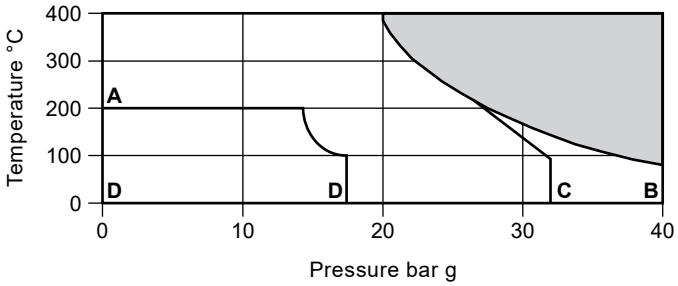
Materials



No.	Part		Material	
1	Body		Austenitic stainless steel (316)	1.4408/CF8M
2	Cover studs		Austenitic stainless steel	A2.70
	Cover nuts		Austenitic stainless steel	A2.70
3	Cover gasket		Austenitic stainless steel	BS 1449 304 S16
4	Cover		Austenitic stainless steel (316)	1.4408/CF8M
5	Valve seat		Stainless steel	BS 970 431 S29
6	Mounting plate gasket		Stainless steel	BS 1449 304 S11
7	Pivot frame assembly set screws		Stainless steel	BS 4183 18/8
8	Ball float and lever		Stainless steel	BS 1449 304 S16
9	Valve cone (The valve cone is permanently attached to the ball float and lever)		Stainless steel	
14	Support frame		Stainless steel	BS 1449 304 S16
15	Pivot frame		Stainless steel	BS 1449 304 S16
16	Pivot		Stainless steel	
18	Mounting plate		Stainless steel	316L
19	Mounting plate fasteners	DN40 bolts	Stainless steel	A2-70
		DN50 studs and nuts	Stainless steel	A2-70

Note: Parts **9**, **14**, **15**, **18** and **19** are shown on page 6.

Pressure/temperature limits



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

A - B Flanged EN 1092 PN40 and ASME 300.

A - C Flanged JIS/KS 20K.

A - D Flanged ASME 150.

Body design conditions	PN40
PMA Maximum allowable pressure	40 bar g
TMA Maximum allowable temperature	400 °C
Minimum allowable temperature	-10 °C
PMO Maximum operating pressure for saturated steam service	40 bar g
TMO Maximum operating temperature	400 °C
Minimum operating temperature for satisfactory operation is	0 °C

ΔPMX Maximum differential pressure

The maximum differential pressure depends on the specific gravity of the liquid being drained.

	Specific gravity				
Trap	**1.0**	**0.9**	**0.8**	**0.7**	**0.6**
CA46S-4.5	4.5	4.5	4.5	3.4	2.0
CA46S-10	10.0	9.5	6.8	5.5	3.4
CA46S-14	14.0	14.0	11.0	8.0	5.0
CA46S-21	21.0	19.0	15.0	10.0	6.5
CA46S-32	32.0	30.0	23.0	16.5	10.0

Product is safe for use under full vacuum conditions

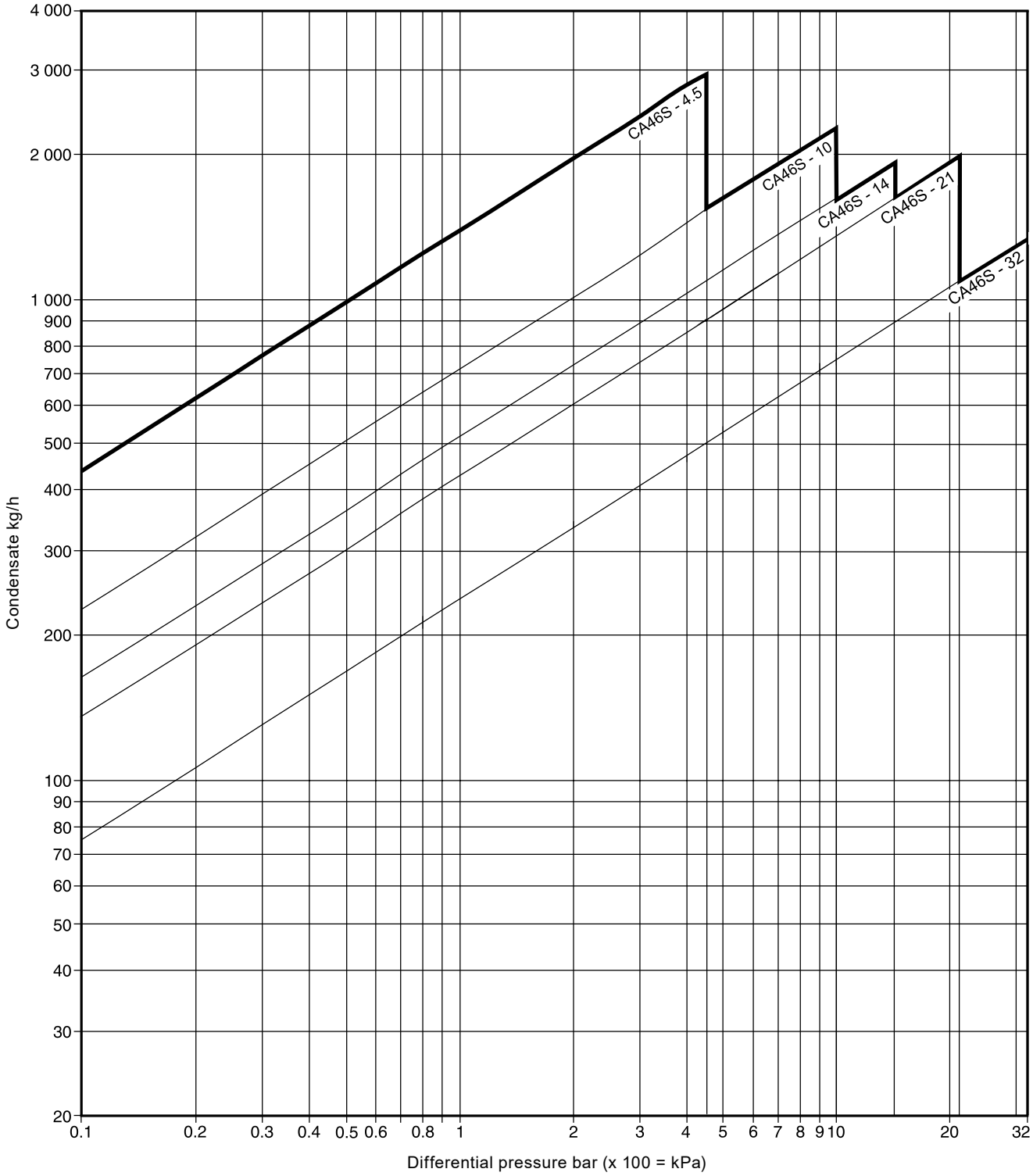
Designed for a maximum cold hydraulic test pressure of:

PN40	60 bar g
ASME 300	60 bar g
ASME 150	30 bar g
JIS/KS 20K	49 bar g

Caution: The trap in its complete operational form must not be subjected to a pressure of greater than 48 bar otherwise damage to the internal mechanism may result.

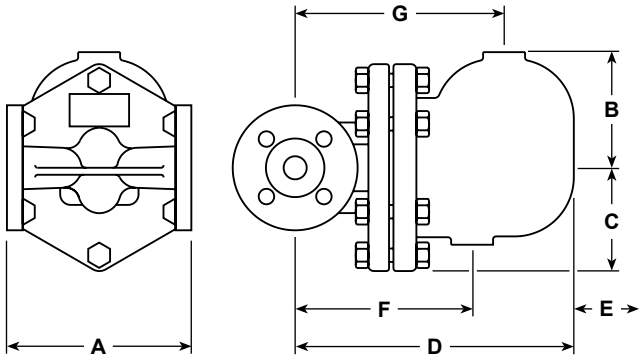
Capacities

Note: The capacities provided here are calculated using water at ambient temperature.
The discharge capacity is affected with a change in specific gravity, for further information contact Spirax Sarco.



Dimensions/weights (approximate) in mm and kg

Size	A	B	C	D	E	F	G	Weight
DN40	230	130	116	326	200	200	242	33
DN50	230	141	123	332	200	225	248	43



Flange bolt hole tappings

Size	ASME 150	ASME 300	JIS/KS 20K
DN40	½" - 13 UNC - 2B	¾" - 10 UNC - 2B	M16 x 2 - 6H
DN50	⅝" - 11 UNC - 2B	⅝" - 11 UNC - 2B	M16 x 2 - 6H

Safety information, installation and maintenance

For full details, see the Installation and Maintenance Instructions (IM-P148-37) supplied with the product.

Installation note:

The trap must be fitted in the horizontal plane below what it is draining with the direction of flow as indicated on the body so that the float mechanism is free to rise and fall in a vertical plane.
One of the advantages of the float trap for draining air and gas systems is that no bleed is required for satisfactory operation. However, because the trap has no bleed a seperate balance line is needed to prevent it becoming air or gas locked.
It should be noted that the balance line is piped back to the upstream side.
A balance line is essential for the correct operation of this product.
It is recommended that a non-return valve is fitted when discharging condensate into return lines where backpressure is experienced.
It is also recommended that a diffuser is fitted when discharging to atmosphere.
For convenience of maintenance it is recommended that a union is fitted in the balance line near to the trap cover and consideration should be given to fitting isolation valves upstream and downstream of the trap.
The CA46S must not be insulated.

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 DN50 CA46S-32 air and gas trap flanged to EN 1092 PN40 having an austenitic stainless steel body and cover.

Spare parts

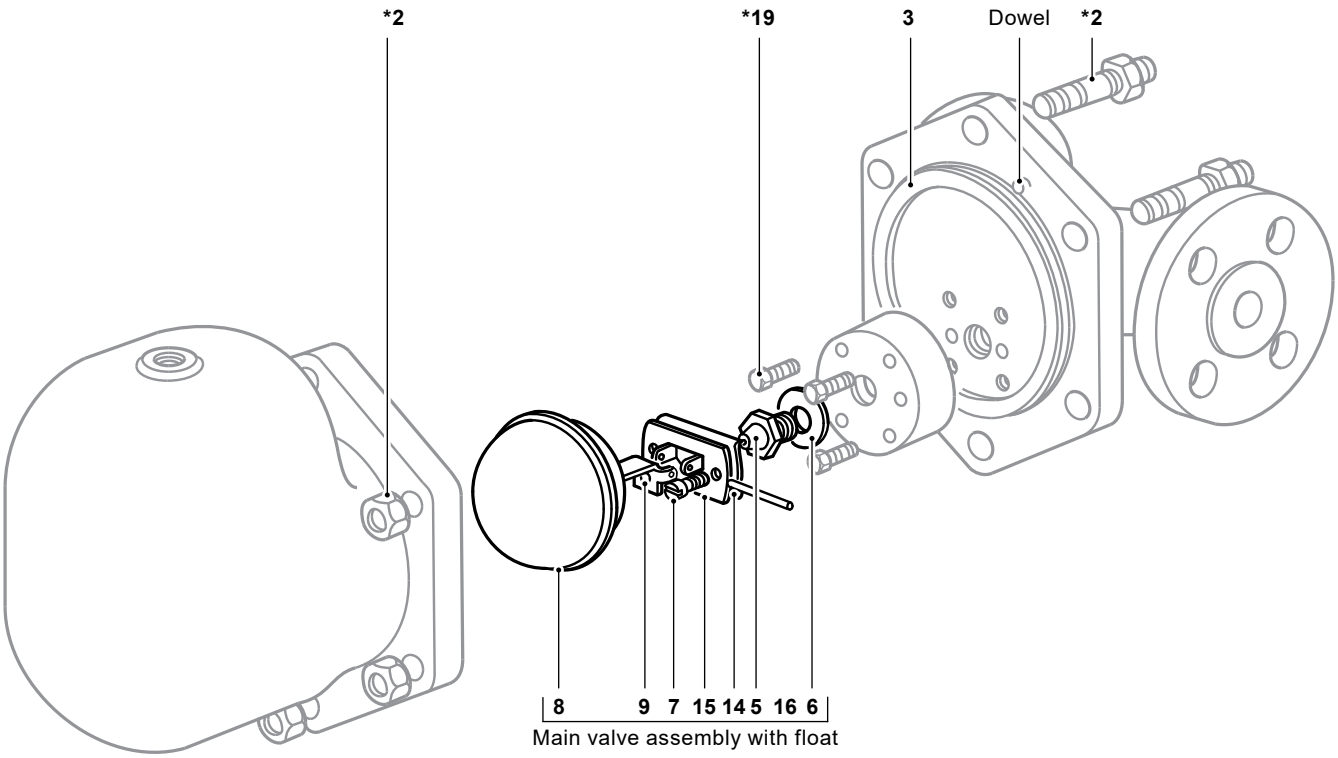
The spare parts available are shown in solid outline. Parts drawn in a grey line are not supplied as spares.

Available spares

Main valve assembly with float CA46S	**5, 6, 7, 8 + 9, 14, 15, 16**
Complete set of gaskets (packet of 3 sets)	**3, 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 trap.
Example: 1 - Main valve assembly with float for a Spirax Sarco DN50 CA46S-32 air and gas trap.



Main valve assembly with float

* **Note:** Items 2 and 19 are not an available spare.

Recommended tightening torques

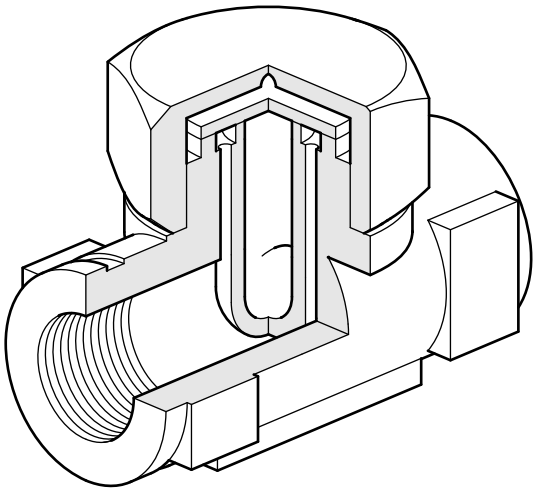
Item	Size	or mm		N m
2	DN40	24 A/F	M16 x 85	60 - 66
	DN50	24 A/F	M16 x 85	80 - 88
5		17 A/F	M12 x 8	50 - 55
7		Cheesehead	M5 x 20	2.5 - 2.8
19	DN40	10 A/F	M6 x 20	10 - 12
	DN50	13 A/F	M8 x 20	20 - 24

TI-P106-03-US
Issue 1

Thermo-Dynamic® Liquid Drain Trap
TDA52

Description
The Thermo-Dynamic® type liquid drain trap cycles periodically, discharging liquid as quickly as it accumulates, so as to prevent harmful back-up.

Model	TDA52
PMO	250 psi g (17 bar g)
Sizes	½"
Connections	NPT
Construction	Stainless steel



Typical applications
Receiver and air line drainage, gas line drainage

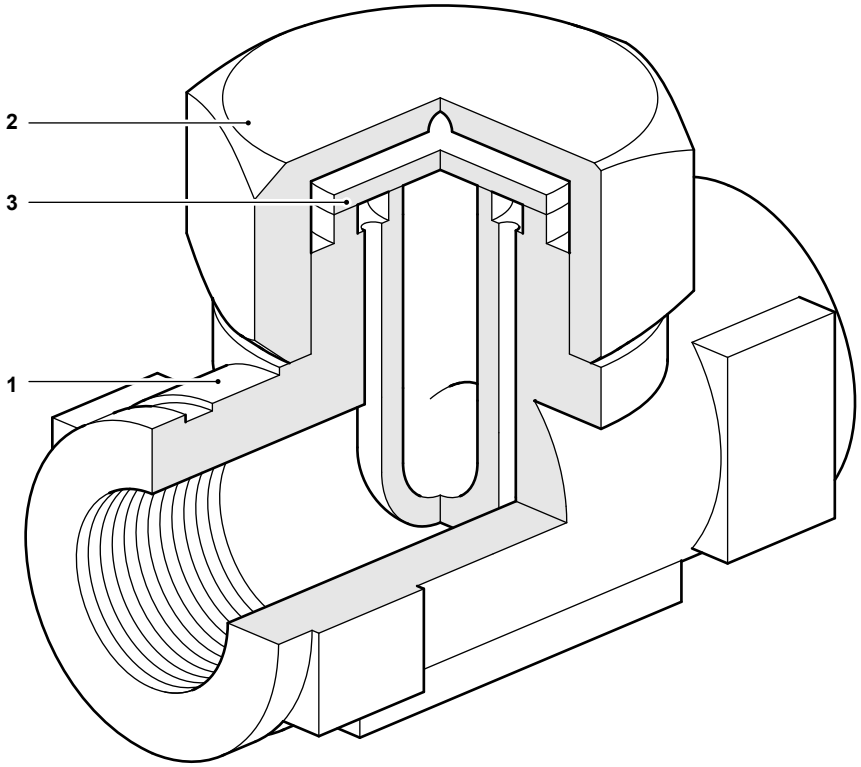
Limiting operating conditions

PMO	Maximum operating pressure	250 psi g	(17 bar g)
Maximum operating temperature		800 ˚F	(427 ˚C)
	Minimum pressure for satisfactory operation is 50 psi		(3.4 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

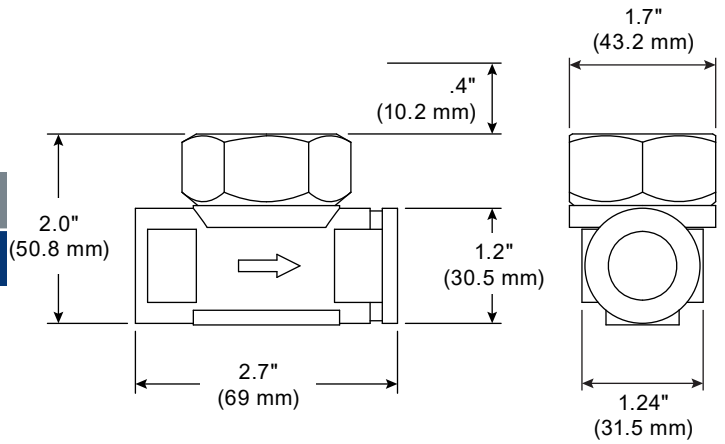
PMA	Maximum allowable pressure	600 psi g @ up to 0-800 ˚F	(41 bar g @ up to 427 ˚C)
TMA	Maximum allowable temperature	800 ˚F @ up to 0-600 psi g	(427 ˚C @ up to 41 bar g)

Materials



No.	Part	Material	
1	Body	Stainless steel	AISI 420F
2	Cap	Stainless steel	AISI 416
3	Disc	Stainless steel	AISI 420

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



Weight

.9 lb
(0.41 kg)

Capacities

Pounds of water per hour continuous discharge to atmosphere

Inlet Pressure psi g	bar	½" TDA52
50	3.4	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

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 psi g to 250 psi g (3.4 bar g to 17 bar g).

Installation

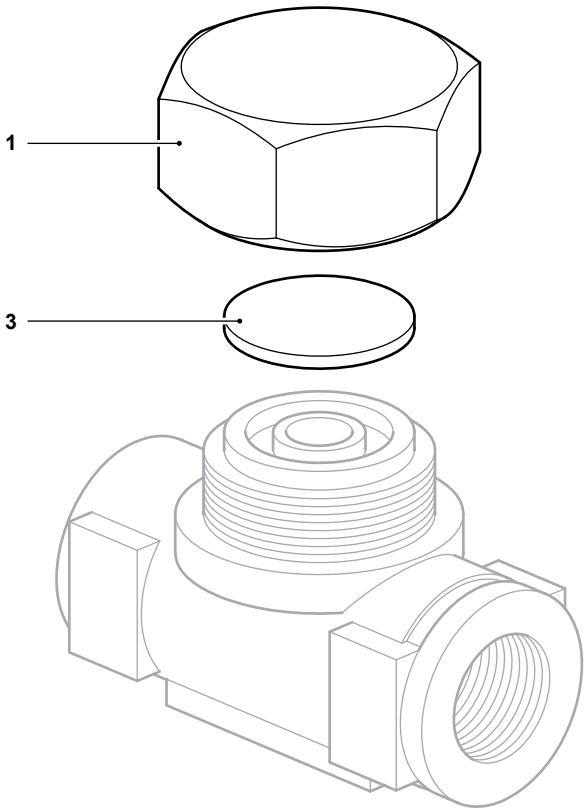
The trap should be installed in a vertical position (discharging downward) as close as possible to the equipment being drained. The discharge should be piped to a safe place.

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

TI-P102-04-US
Issue 2

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 psi g (6.9 bar g), and the back-pressure is always at least 25 psi g (1.7 bar g), the drain trap may be used at a working pressure of up to 125 psi g (8.6 bar g), provided that the nameplate PMA is at least 125 psi g (8.6 bar g) 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)	Maximum operating pressure, psi g (bar g)											
		s.g.1.00		.99 to .95		.94 to .90		.89 to .85		.84 to .80		.79 to .75	
		psi g	(bar g)	psi g	(bar g)	psi g	(bar g)	psi g	(bar g)	psi g	(bar g)	psi g	(bar g)
FA/FAI-30	½",¾",1"	35	(2.4)	31	(2.1)	28	(1.9)	24	(1.6)	21	(1.4)	17	(1.2)
	1½",2"	34	(2.3)					25	(1.7)	22	(1.5)	20	(1.4)
FA/FAI-75	½",¾",1"	90	(6.2)	81	(5.6)	73	(5)	65	(4.5)	57	(3.9)	49	(3.4)
	1½"	88	(6.1)					66	(4.6)	58	(4)	51	(3.5)
	2"	75	(5.2)	60	(4.1)	54	(3.7)	49	(3.4)	44	(3)	38	(2.6)
FA/FAI-150	½",¾",1"	150	(10.3)	142	(9.8)	128	(8.8)	114	(7.8)	100	(6.9)	86	(5.9)
	1½"			140	(9.65)	127	(8.7)	115	(7.9)	103	(7.1)	90	(6.2)
	2"			139	(9.6)							91	(6.3)
FAI-200	½",¾",1"	200	(13.8)	184	(12.7)	168	(11.6)	152	(10.5)	135	(9.3)	119	(8.2)
FA-200	1"			200	(13.8)	200	(13.8)	190	(13.1)	164	(11.3)	139	(9.6)
	1½"							191	(13.2)	168	(11.6)	145	(10)
FAB-10	2"	10	(0.69)	9	(0.62)	8	(0.55)	7.5	(0.52)	7	(0.48)	6	(0.41)
FAB150	1½"	150	(10.3)	138	(9.5)	126	(8.7)	114	(7.8)	100	(6.9)	88	(6.1)
FAB-75	2½"	75	(5.2)	69	(4.8)	63	(4.3)	57	(3.9)	50	(3.4)	44	(3)
FAB-175	2"	175	(12.1)	163	(11.2)	150	(10.3)	137	(9.5)	124	(8.5)	111	(7.7)
CA-14	½",¾"	200	(13.8)	198	(13.7)	195	(13.4)	173	(11.9)	152	(10.5)	130	(9)
CAS14	½", ¾", 1"	250	(17.2)	200	(13.8)	200	(13.8)	200	(13.8)	200	(13.8)	160	(11)
FA450 CA46S -4.5	½",¾"	65	(4.5)	65	(4.5)	65	(4.5)	65	(4.5)	65	(4.5)	55	(3.8)
	1"											57	(3.9)
	1½",2"			59	(4.1)	53	(3.7)	47	(3.2)	42	(2.9)	36	(2.5)
-10**	½",¾"	145	(10)	145	(10)	145	(10)	125	(8.6)	108	(7.4)	94	(6.5)
	1"									107	(7.4)	93	(6.4)
	1½",2"			132	(9.1)	119	(8.2)	105	(7.2)	92	(6.3)	79	(5.4)
-14	½",¾"	203	(14)	198	(13.7)	195	(13.4)	173	(11.9)	152	(10.5)	130	(9)
	1"			203	(14)	203	(14)	180	(12.4)	160	(11)	135	(9.3)
	1½",2"							203	(14)	203	(14)	203	(14)
-21	½",¾"	304	(21)	304	(21)	304	(21)	280	(19.3)	261	(18)	225	(15.5)
	1"			290	(20)	275	(19)	245	(16.9)	217	(15)	187	(12.9)
	1½",2"			304	(21)	304	(21)	304	(21)	295	(20.3)	253	(17.4)
-32	¾"	465	(32.1)	464	(32)	464	(32)	440	(30.3)	420	(29)	350	(24.1)
	1"			450	(31)	435	(30)	385	(26.5)	340	(23.4)	290	(20)
	1½",2"			422	(29.1)	380	(26.2)	337	(23.2)	295	(20.3)	253	(17.4)
FA450	3" (DN80), 4" (DN100)	450	(31)	450	(31)	450	(31)	450	(31)	450	(31)	450	(31)
FA-150	¼"	150	(10.3)	135	(9.3)	119	(8.2)	104	(7.2)	89	(6.1)	73	(5)
F-150V	½"			150	(10.3)	150	(10.3)	150	(10.3)	138	(9.5)	119	(8.2)
F-300V	½"	300	(20.7)	300	(20.7)	300	(20.7)	300	(20.7)	282	(19.4)	243	(16.8)

*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

Table 1: Maximum operating pressure with light liquids, continued on next page

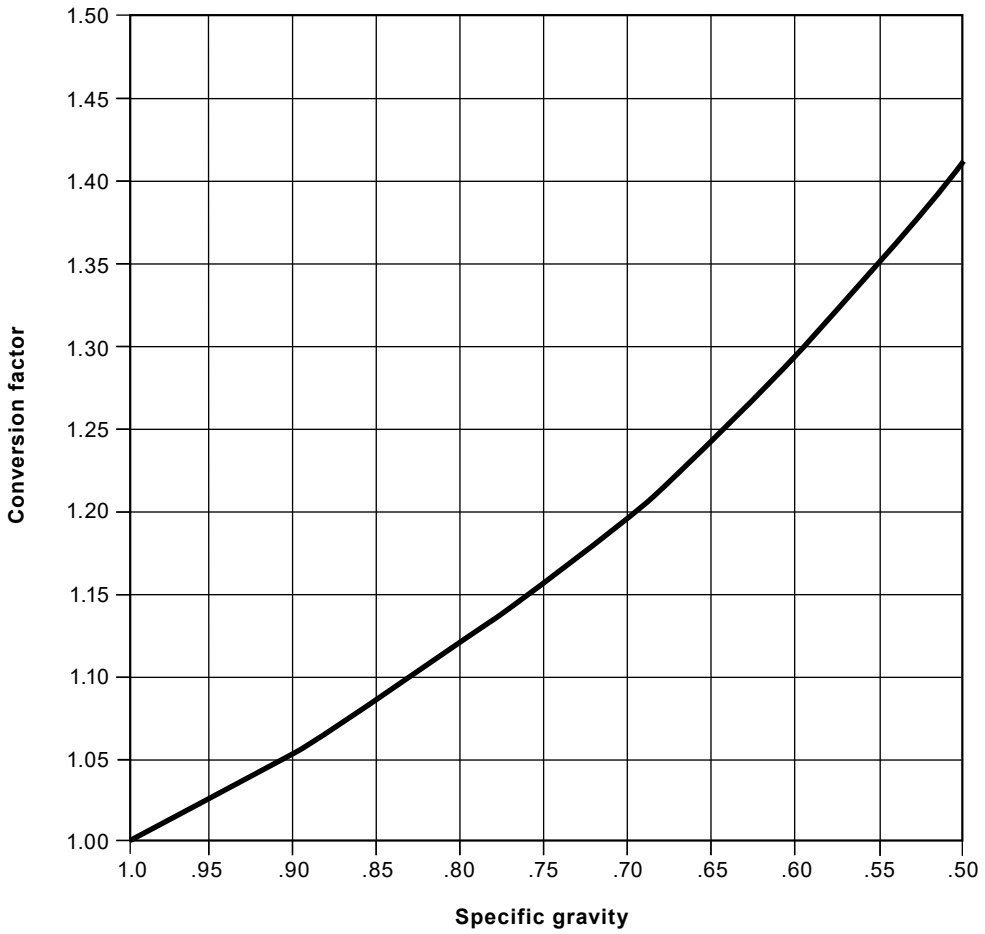
Table 1: Maximum operating pressure with light liquids (continued)

		Maximum operating pressure, psi g (bar g)									
Model(s)*	Size(s)	.74 to .70		.69 to .65		.64 to .60		.59 to .55		.54 to .50	
		psi g	(bar g)	psi g	(bar g)	psi g	(bar g)	psi g	(bar g)	psi g	(bar g)
FA/FAI-30	½",¾",1"	14	(0.97)	10	(0.69)	7	(0.48)	3	(0.21)		
	1½",2"	17	(1.2)	14	(0.97)	11	(0.76)	8	(0.55)	6	(0.41)
FA/FAI-75	½",¾",1"	41	(2.8)	33	(2.3)	25	(1.7)	16	(1.1)	8	(0.55)
	1½"	43	(3)	36	(2.5)	28	(1.9)	21	(1.4)	13	(0.90)
	2"	33	(2.3)	28	(1.9)	23	(1.6)	17	(1.2)	12	(0.83)
FA/FAI-150	½",¾",1"	71	(4.9)	57	(3.9)	43	(3)	29	(2)	15	(1)
	1½"	78	(5.3)	65	(4.5)	53	(3.7)	40	(2.8)	28	(1.9)
	2"	79	(5.4)	67	(4.6)	55	(3.8)	43	(3)	31	(2.1)
FAI-200	½",¾",1"	103	(7.1)	87	(6)	71	(4.9)	54	(3.7)	38	(2.6)
FA-200	1"	113	(7.8)	88	(6.1)	62	(4.3)	37	(2.6)	11	(0.76)
	1½"	122	(8.4)	99	(6.8)	76	(5.2)	53	(3.7)	30	(2.1)
FAB-10	2"	5.5	(0.38)	5	(0.34)	4	(0.28)	3.5	(0.24)	3	(0.21)
FAB150	1½"	74	(5.1)	62	(4.3)	50	(3.4)	38	(2.6)	26	(1.8)
FAB-75	2½"	37	(2.6)	31	(2.1)	25	(1.7)	19	(1.3)	13	(0.90)
FAB-175	2"	98	(6.8)	85	(5.9)	72	(5)	59	(4.1)	46	(3.2)
CA-14	½",¾"	110	(7.6)	87	(6)	65	(4.5)	45	(3.1)	26	(1.8)
CAS14	½", ¾", 1"	130	(9)	97	(6.7)	72	(5)				
FA450 CA46S -4.5	½",¾"	50	(3.4)	38	(2.6)	26	(1.8)	16	(1.1)	7	(0.48)
	1"			39	(2.7)	29	(2)	20	(1.4)	11	(0.76)
	1½",2"	30	(2.1)	24	(1.7)	18	(1.2)	12	(0.83)	6	(0.41)
FA450 CA46S -10**	½",¾"	80	(5.5)	60	(4.1)	43	(3)	30	(2.1)	19	(1.3)
	1"			65	(4.5)	50	(3.4)	35	(2.4)	21	(1.4)
	1½",2"	66	(4.6)	53	(3.7)	40	(2.8)	26	(1.8)	13	(0.90)
FA450 CA46S -14	½",¾"	110	(7.6)	87	(6)	65	(4.5)	45	(3.1)	26	(1.8)
	1"	113	(7.8)	92	(6.3)	72	(5)	50	(3.4)	29	(2)
	1½",2"	203	(14)	165	(11.4)	99	(6.8)	54	(3.7)	27	(1.9)
FA450 CA46S -21	½",¾"	165	(11.4)	155	(10.7)	116	(8)	75	(5.2)	36	(2.5)
	1"	159	(11)	130	(9)	100	(6.9)	66	(4.6)	36	(2.5)
	1½",2"	211	(14.5)	165	(11.4)	99	(6.8)	54	(3.7)	27	(1.9)
FA450 CA46S -32	¾"	300	(20.7)	240	(16.5)	185	(12.8)	125	(8.6)	65	(4.5)
	1"	246	(17)	195	(13.4)	145	(10)	100	(6.9)	55	(3.8)
	1½",2"	211	(14.5)	165	(11.4)	99	(6.8)	54	(3.7)	27	(1.9)
FA450	3" (DN80), 4" (DN100)	390	(26.9)	275	(19)	158	(10.9)	40	(2.8)		
FA-150	¼"	58	(4)	43	(3)	25	(1.7)	12	(0.83)		
F-150V	½"	100	(6.9)	80	(5.5)	61	(4.2)	42	(2.9)	23	(1.6)
F-300V	½"	203	(14)	164	(11.3)	125	(8.6)	86	(5.9)	46	(3.2)

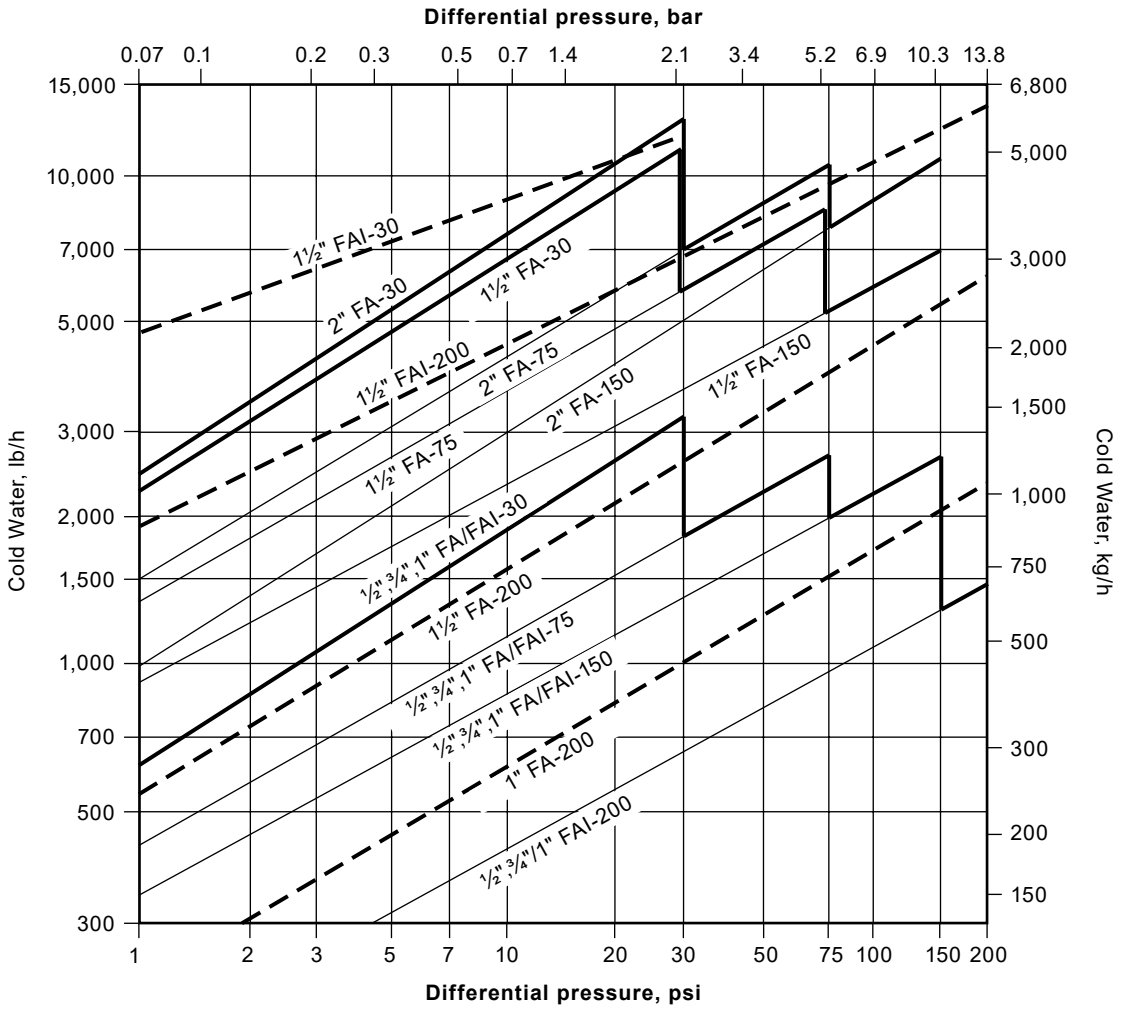
*Some models are not available in all of the listed sizes. For liquids with a specific gravity less than 0.5, please consult factory.
** FA450 Only

Capacity conversion factors

$$\text{Conversion factor} = \frac{1}{\sqrt{\text{S.G.}}}$$



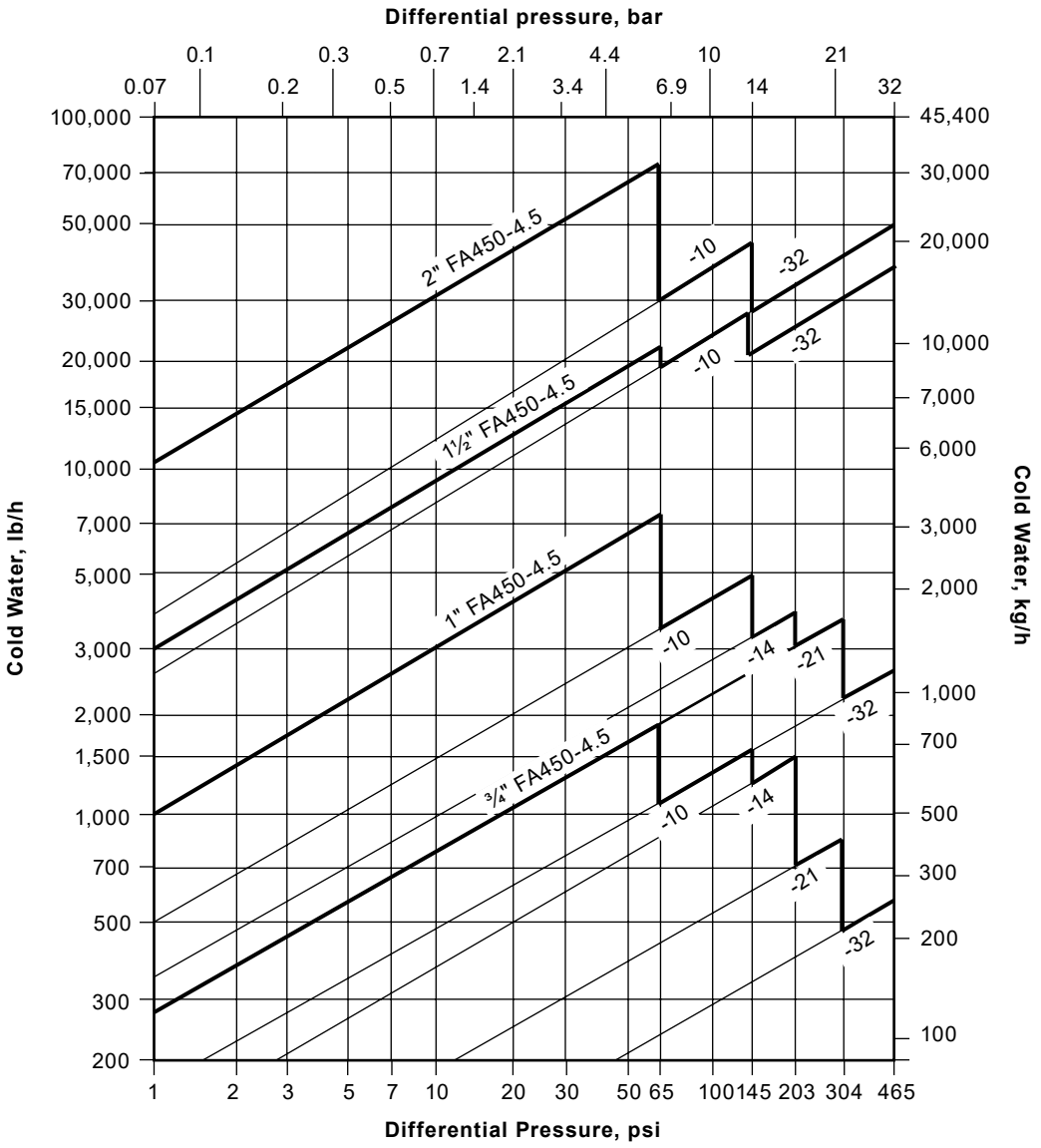
½" to 2" FA/FAI Capacities



Trap	Orifice	
	inches	mm
½", ¾", 1" FA/FA 130	.218	5.5
1½" FA30	.390	9.9
2" FA30	.500	12.7
½", ¾", 1" FA/FA 175	.166	4.2
1½" FA 75	.312	7.9
2" FA 75	.421	10.7
½", ¾", 1" FA/FAI 150	.125	3.2
1½" FA 150	.246	6.2
2" FA 150	.332	8.4
½", ¾" 1" FAI 200	.100	2.5
1" FA 200	.128	3.3
1½" FA 200	.203	5.2
1½" FAI 30	.500	12.7
1½" FAI 200	.332	8.4

Cold water capacity for single-phase flow of liquids with a specific gravity of 1.0

¾" to 2" FA450 Capacities



Trap	Orifice	
	inches	mm
¾", FA 450-4.5	.157	3.9
¾" FA 450-10	.126	3.2
¾", FA 450-14	.106	2.6
¾" FA 450-21	.079	2
¾" FA 450-32	.063	1.6
1", FA 450-4.5	.276	7
1", FA 450-10	.205	5.2

Trap	Orifice	
	inches	mm
1", FA 450-14	.185	4.6
1", FA 450-21	.157	3.9
1", FA 450-32	.126	3.2
1½", FA 450-4.5	.689*	17.5
1½", FA 450-10	.591*	15
1½", FA 450-14	.531*	13.4

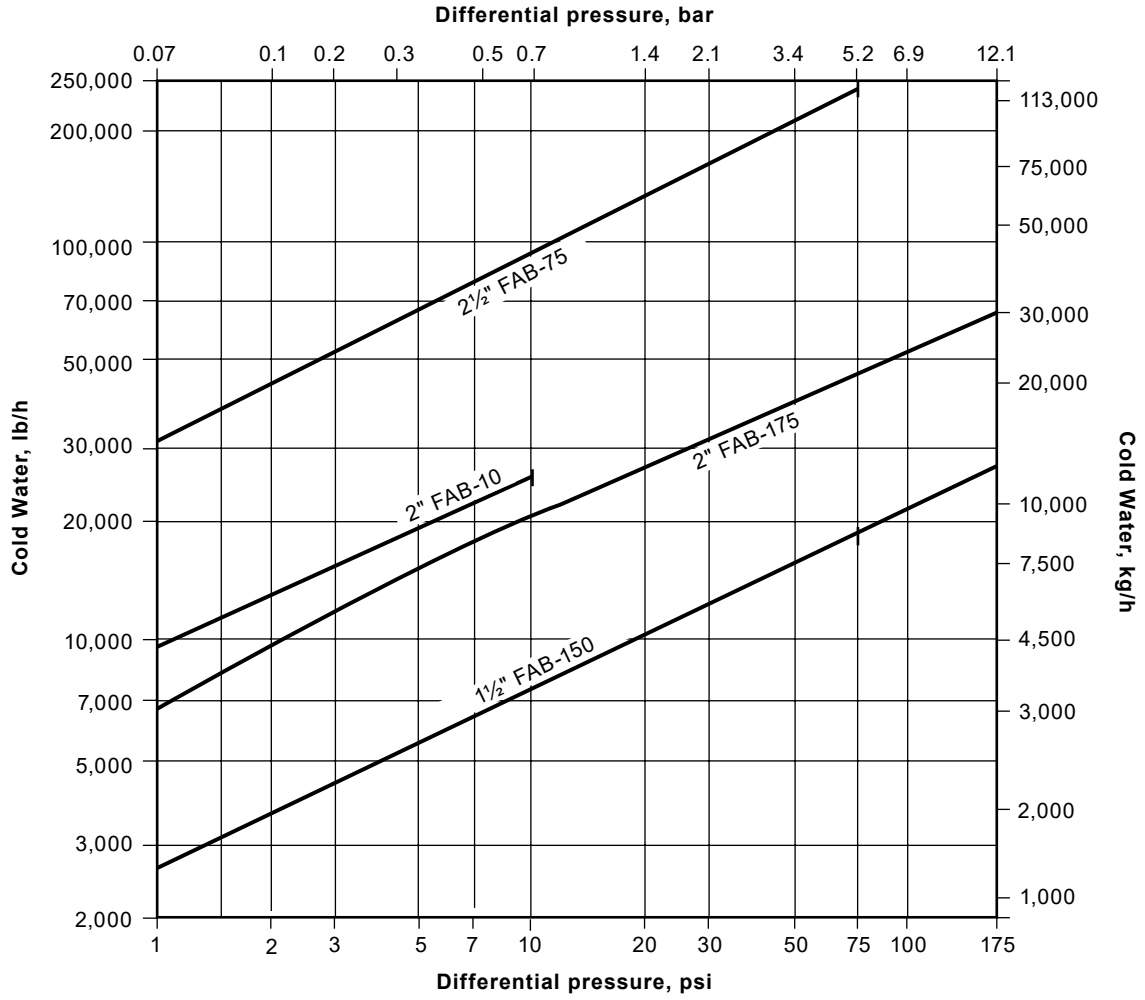
Trap	Orifice	
	inches	mm
1½", FA 450-21	.531*	13.4
1½", FA 450-32	.531*	13.4
2", FA 450-4.5	1.112*	28.2
2", FA 450-10	.807*	20.4
2", FA 450-14	.657*	16.6
2", FA 450-21	.657*	16.6
2", FA 450-32	.657*	16.6

* Double Seated (2 valve orifices)

Cold water capacity for single-phase flow of liquids with a specific gravity of 1.0

Note:
1½" 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.

1½" to 2½" FAB Capacities



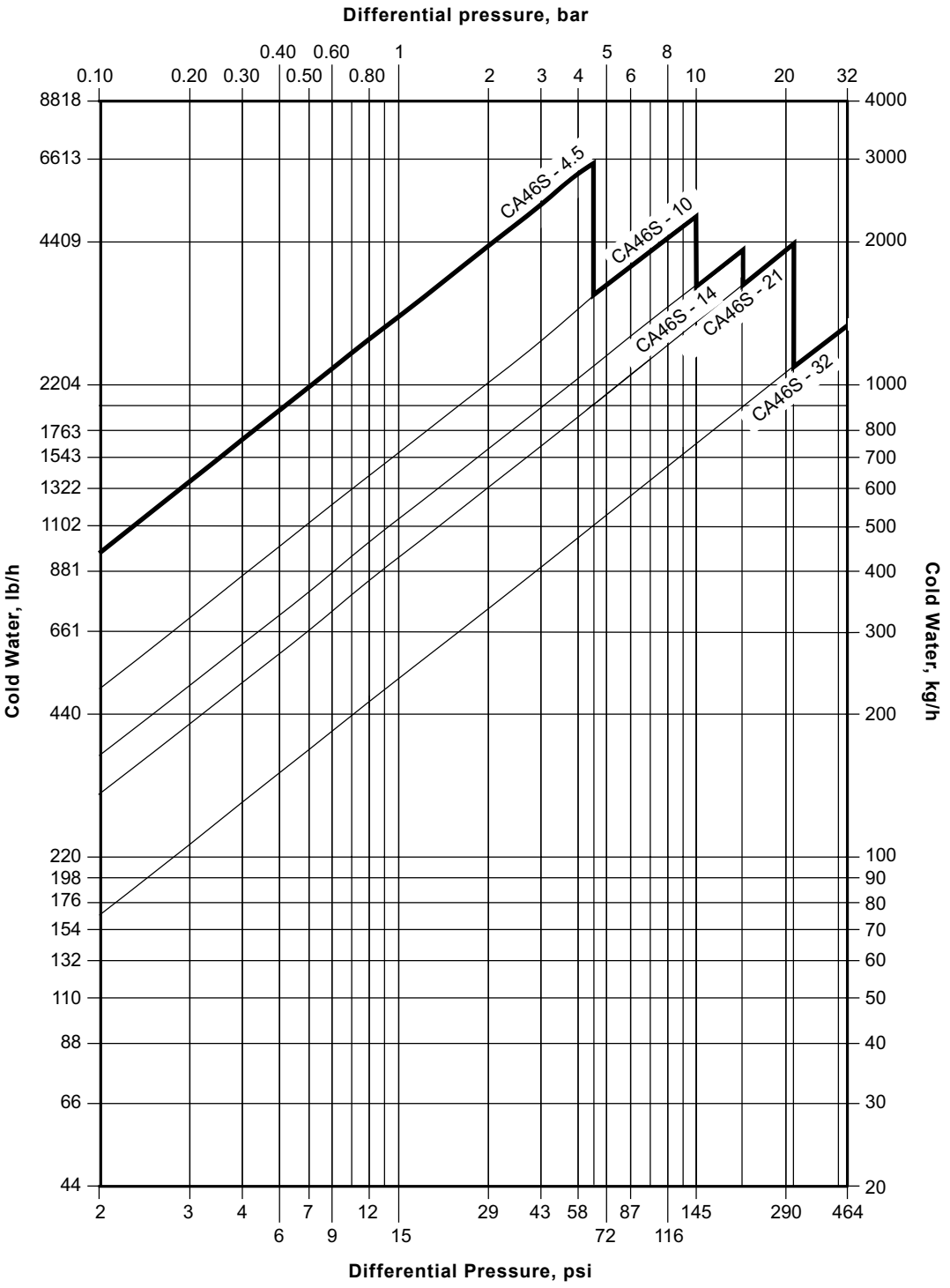
Trap	Orifice	
	inches	mm
2½", FAB-75	1.500*	38.1
2", FAB-10	.937	23.8
2", FAB-175	.750*	19.1
1½", FAB-150	.375*	9.5

* 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.

CA46S Capacities



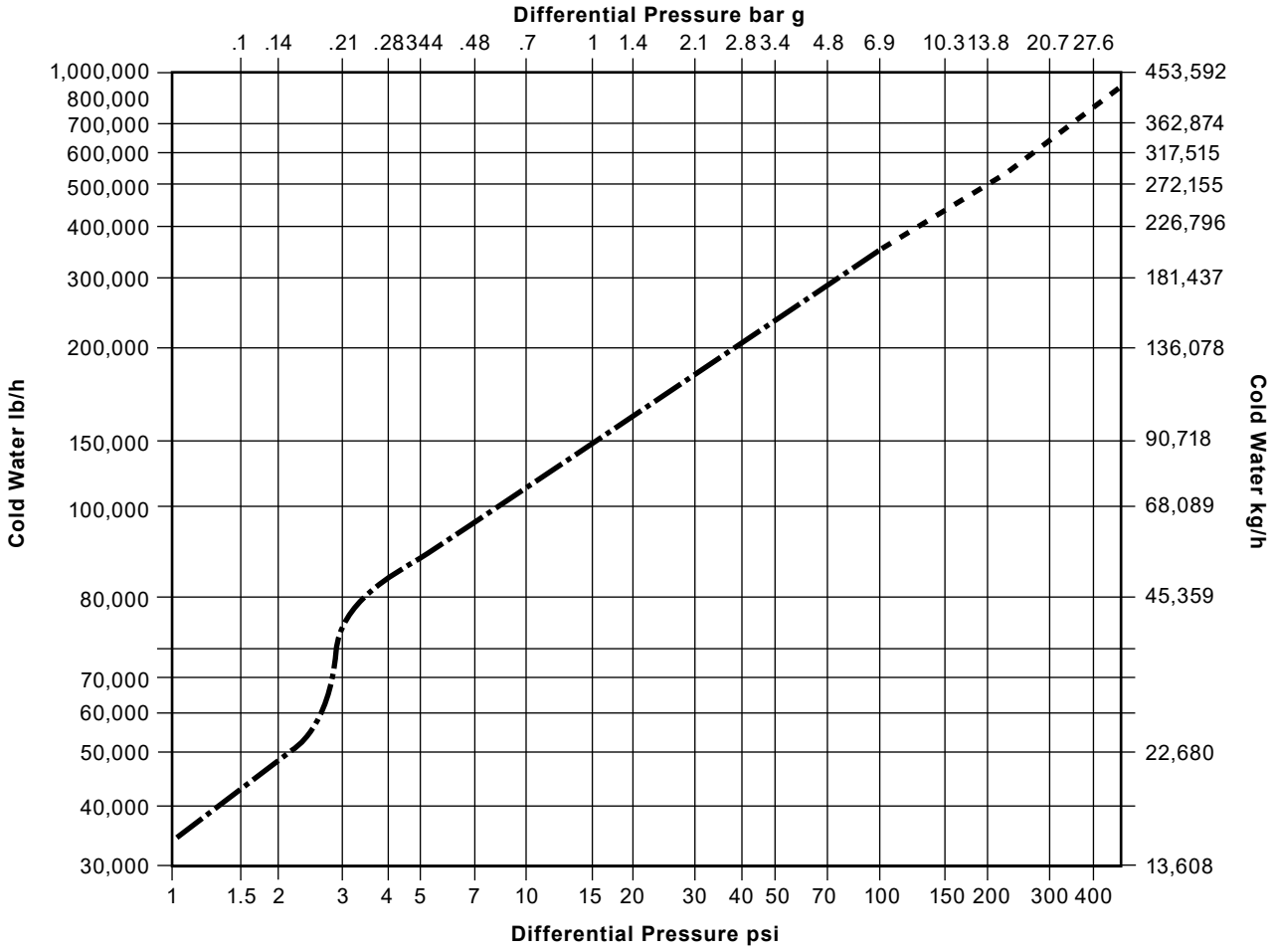
Liquid drainer	Size	Orifice diameter	
		inches	mm
CA14	All	0.079	2
CAS14	½", ¾"		
CA46S-4.5	½", ¾"	0.157	3.9
CA46S-10	½", ¾"	0.126	3.2
CA46S-14	½", ¾"	0.106	2.7
CA46S-21	½", ¾"	0.079	2
CA46S-4.5	1"	0.276	7
CA46S-10	1"	0.205	5.2
CA46S-14	1"	0.185	4.6
CA46S-21	1"	0.157	3.9
CA46S-4.5	1½" **	0.689	17.5
CA46S-21	1½" **	0.531	13.4
CA46S-4.5	2" **	1.122	28.4
CA46S-21	2" **	0.657	6.6
FA-150	¼"	0.100	2.5

** Double seated (2 valve orifices)

Cold water capacity for single-phase flow of liquids with a specific gravity of 1.0

Note:
1½" 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", (DN80) 4" (DN100) FA450 Capacities



* In this region the trap capacity may exceed the flow capacity of the connection piping.

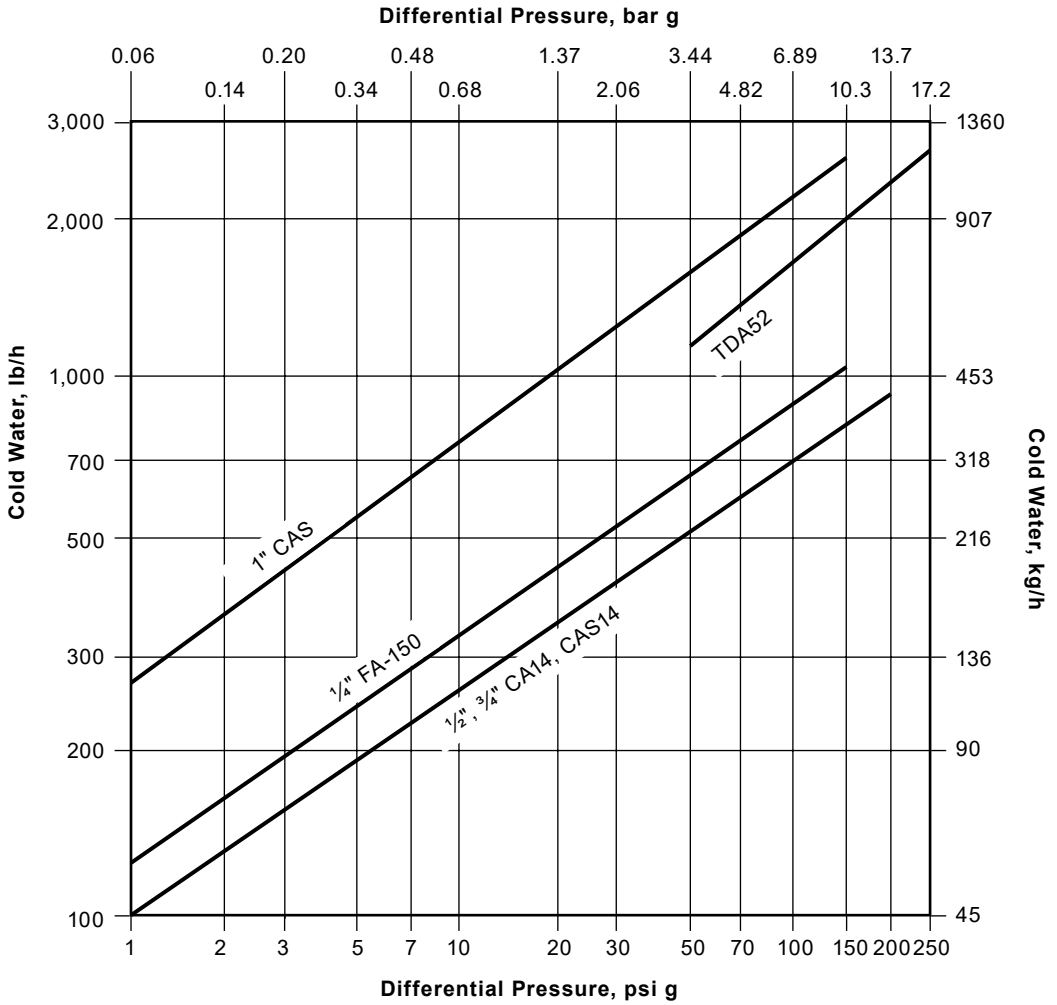
Trap	Orifice	
	inches	mm
3" (DN80) & 4" (DN100) FA450	2.063	52.4

** Double Seated (2 Valve Orifices)

Cold water capacity for single-phase flow of liquids with a specific gravity of 1.0

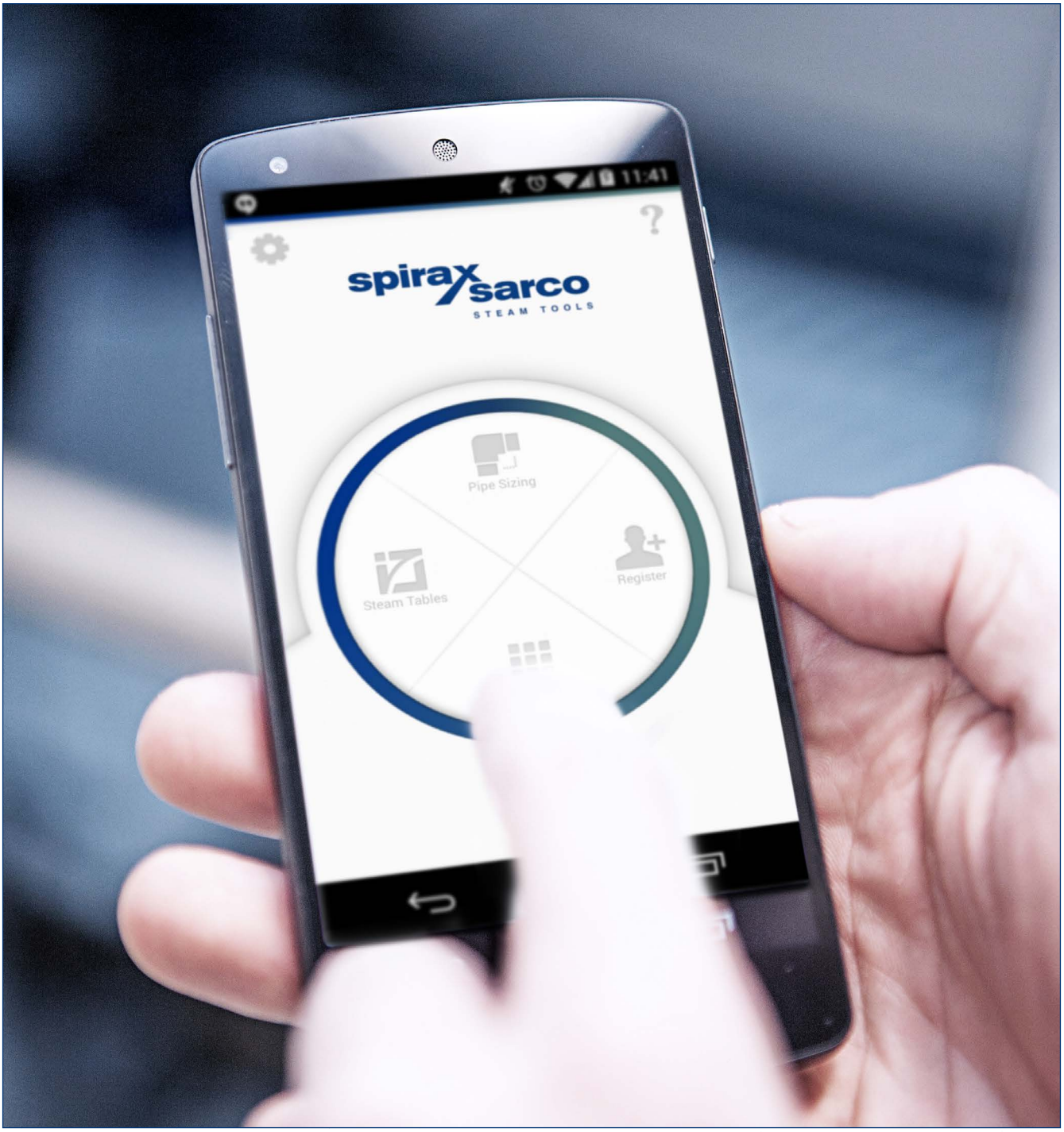
Note:
This trap has a double-seated valve which may not close tight under no-load conditions. Normally, the liquid load will always be greater than the small residual leakage.

CA14, CAS14 ¼" FA-150, TDA52 Capacities



Cold water capacity for single-phase flow of liquids with a specific gravity of 1.0

ENGINEERING DATA



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Properties of Saturated Steam

	Gauge Pressure psi g	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

Gauge Pressure psi g	Temperature °F	Heat in Btu/lb			Specific Volume ft³/lb
		Sensible	Latent	Total	
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

Gauge Pressure psi g	Temperature °F	Heat in Btu/lb			Specific Volume ft³/lb
		Sensible	Latent	Total	
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
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

Gauge Pressure psi g	Temperature °F	Heat in Btu/lb			Specific Volume ft³/lb
		Sensible	Latent	Total	
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

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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

$$\text{lb/h Condensate} = \frac{W \times Cp \times \Delta T}{L \times t}$$

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

$$\text{lb/h Condensate} = \frac{1000\ (Wi - Wf) + (Wi \times \Delta T)}{I}$$

Wi = Initial weight of the material — pounds per hour
Wf = Final wether 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

$$\text{lb/h Condensate} = \frac{G \times s.g. \times Cp \times \Delta T \times 8.3}{L \times t}$$

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 Thermostatic Traps	2 to 4
Thermo-Matic ThermostaticTraps	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 Temperature 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 Psi g			
	5	25	100	200
25%	6%	3%	0%	0%
50	20	12	10	5
75	38	30	28	23

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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 (psi g)	2"	2-½"	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

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 (psi g)	2"	2-½"	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.

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Heat Transfer Calculations

Heat Emission Rates from Pipes Submerged in Water

Published Overall Heat Transfer Rates	Btu/ft₂ 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	Btu/ft₂ h °F
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/ft² h °F difference
Light Oils	30
Heavy Oils	15 to 20
*Fats	5 to 10

Immersed steam coil, medium pressure, natural convection

	Btu/ft² 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

			* Heat Transfer Rate in Btu/ft² h °F temperature difference between oil and surrounding air	
	Position	Oil Temperature	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 Line	Sheltered	Up to 80 °F	1.5	.375
		80 to 260 °F	2.3	.575
Pipe Line	Exposed	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.

Heat Loss from Open Tanks

Liquid Temp. °F	Heat Loss from Liquid Surface Btu/ft² h			Heat Lost through Tank Wall Btu/ft² h			
	Evap. Loss	Rad. Loss	Total	Bare Steel	Insulation 1"	Insulation 2"	Insulation 3"
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.

For rough calculations it may be taken that 1 ton of fuel oil occupies 36 .4 ft³. 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.

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Issue 1

Steam Tracing

Designing of Steam Tracing
Recommended number of ½" tracers to meet average requirements

	Type A General frost protection or where solidification may occur at temperature below 75˚F	Type B Where solidification may occur at temperature between 75 - 150˚F	Type C When solidification may occur at temperature between 150 - 300˚F
Product Line Size	**Number of ½" Tracers**	**Number of ½" Tracers**	**Number of ½" Tracers**
1"	1	1	1
1-½"	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
2-½"	4"	½"
3"	6"	¾"
4"	6"	¾"
6"	8"	¾"
8"	10"	1"
10"	12"	1"

Length of jacket should not exceed 20 ft. In most cases ½" condensate outlet would be adequate but it is usual to make this same size as the steam connection as it simplifies installation.

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Recommended Header Size for Supplying Steam Tracer Lines

Header Size	Number of ½" Tracers
3/4"	2
1"	3 to 5
1-½"	6 to 15
2"	16 to 30

Recommended Header Size for Condensate Lines

Header Size	Number of ½" Tracers
1"	Up to 5
1-½"	6 to 10
2"	11 to 25

TI-S99-04-US
Issue 1

Steam Pipe Sizing

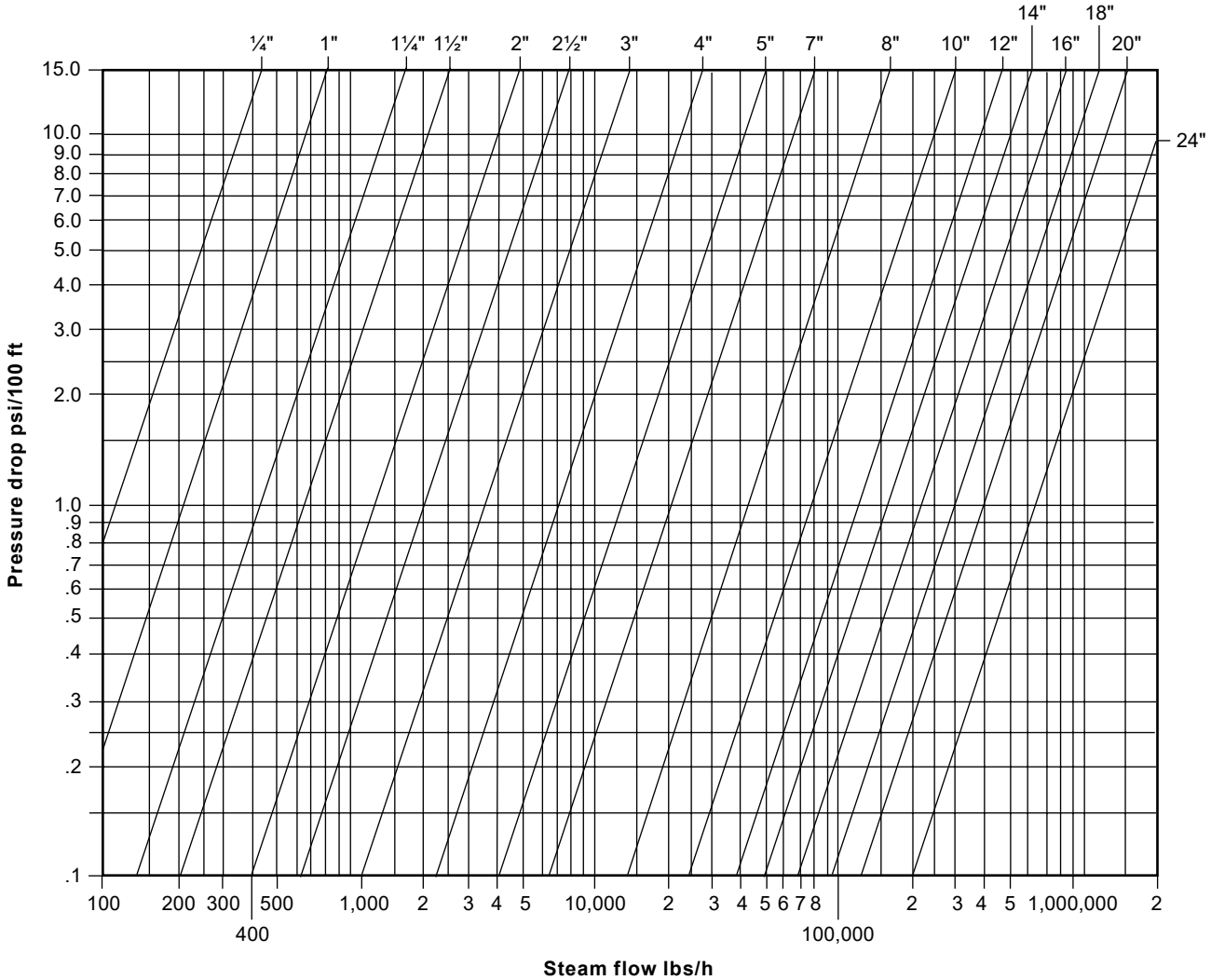
Sizing for Pressure Drop per 100 ft. in Schedule 40 Pipe

Divide “Allowable Drop" by pressure factor and use chart to select pipe size.

Based on 100 psi g saturated steam

For other pressures, multiply chart ØP by factor below

psi g	0	2	5	10	15	20	30	40	60	75	90	100	110	125	150	175	200	225	250	300	350	400	500	600
factor	6.9	6.0	5.2	4.3	3.6	3.1	2.4	2.0	1.5	1.3	1.1	1.0	0.92	0.83	0.70	0.62	0.55	0.49	0.45	0.38	0.33	0.29	0.23	0.19



How to Size Steam Pipes for Various Pressure and Velocity Conditions

To select pipe size in long mains and wherever 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 psi g inlet pressure ahead of a control valve with a capacity of 1,000 lb/h of steam reduced to 25 psi g, 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 psi g 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 1-½" 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 psi g 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 2-½" downstream piping.

Formula for Velocity of Steam in Pipes:

$$V = \frac{2.4Q\ Vs}{A}$$

Where:

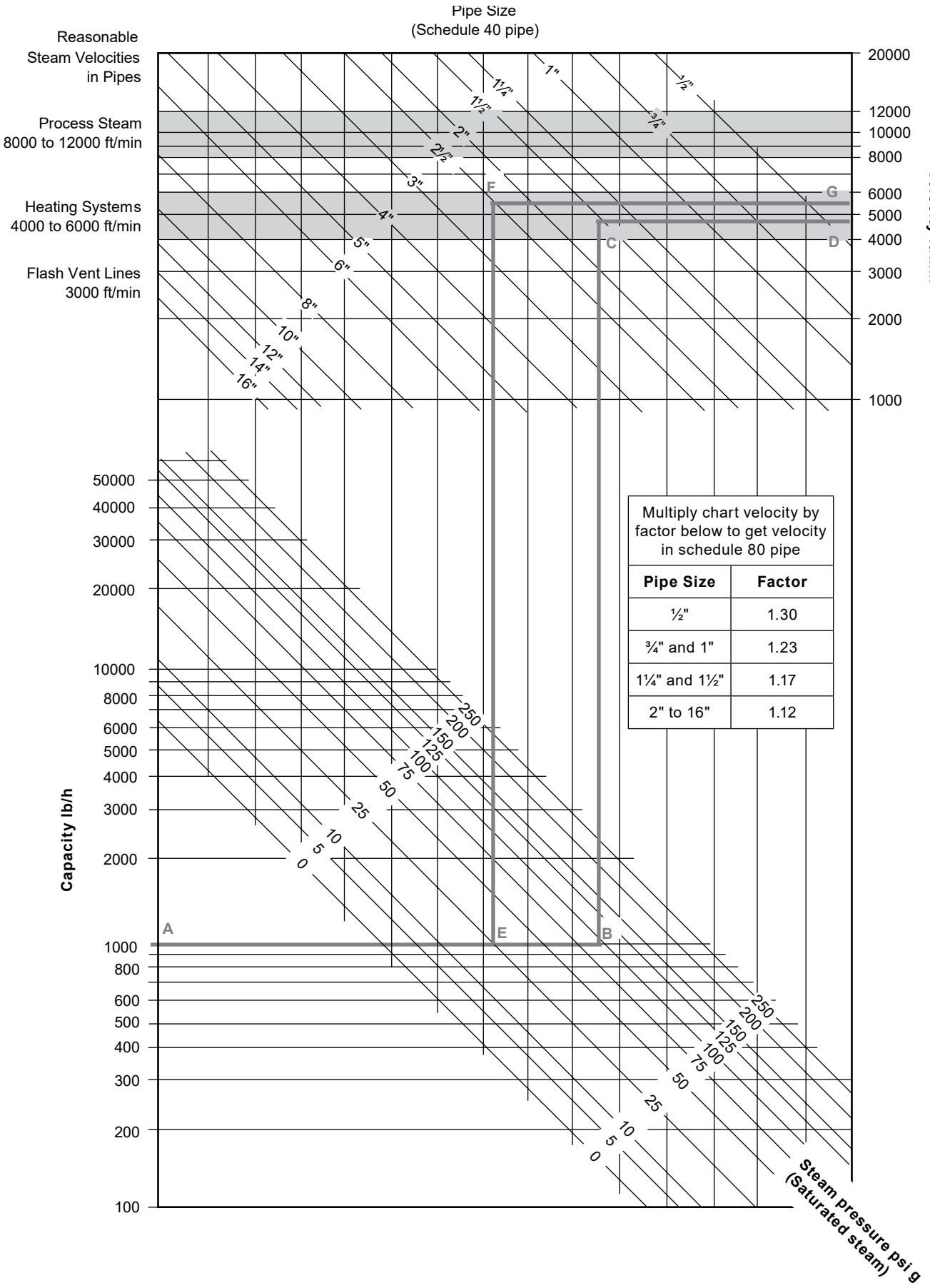
V = Velocity in ft/min

Q = Flow lb/h steam

Vs = Sp. Vol. in cu. ft^3/lb at the flowing pressure

A = Internal area of the pipe — in^2

Steam velocity chart



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Condensate Line Sizing

Condensate return lines on the discharge side of steam traps must be able to accomodate 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 accomodated. The information required for sizing is the condensate load in lb/h, inlet pressure to steam trap(s) in psi g and return line system pressure.

Example:
Size a condensate return line from a 160 psi g steam trap discharging to 20 psi g. flash tank. Load is 3,000 lb/h.

1. Determine percent flash steam produced using table. With a steam pressure of 160 psi g and a flash tank pressure of 20 psi g 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 lb/h x .124 = 372 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 psi g “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 1-½" 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.

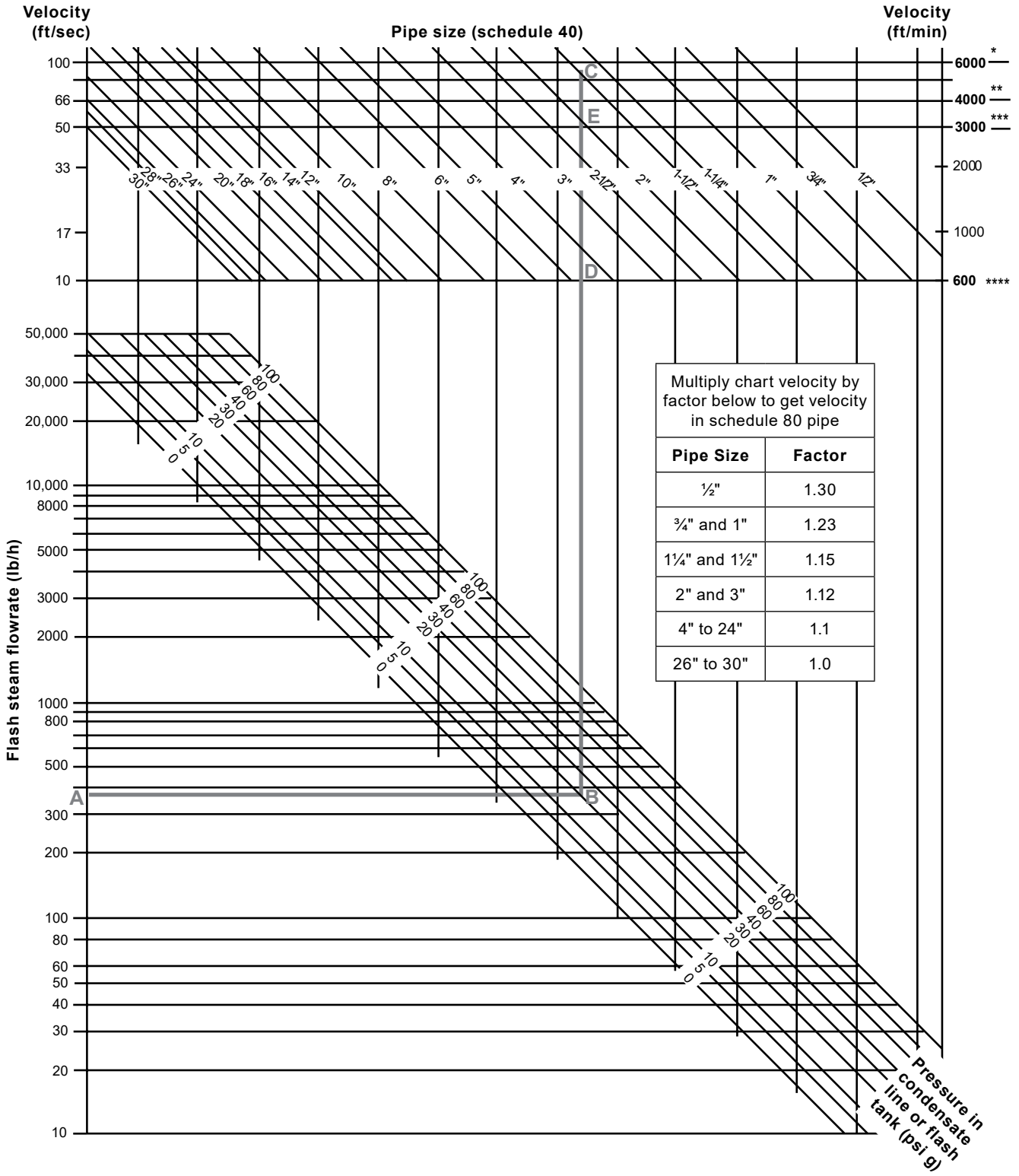
Percent Flash Steam

Produced when Condensate is discharged to atmosphere or into a flash tank controlled at various pressures.

Pressure psi g	Atmosphere	Flash Tank Pressure — psi g									
	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						
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

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Condensate Recovery Sizing



Multiply chart velocity by factor below to get velocity in schedule 80 pipe

Pipe Size	Factor
½"	1.30
¾" and 1"	1.23
1¼" and 1½"	1.15
2" and 3"	1.12
4" to 24"	1.1
26" to 30"	1.0

* Recommended Service
** Condensate Return Line Sizing
*** Vent Pipe Sizing
**** Flash Tank Diameter Sizing

TI-S99-02-US
Issue 1

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.

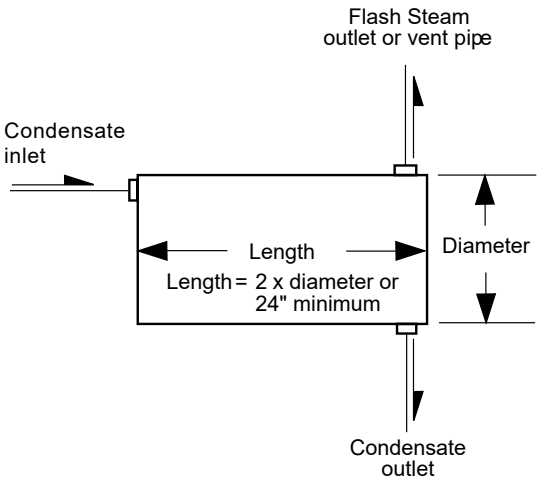
Example: Size a 20 psi g flash recovery vessel based on the information in the example on page 582 (condensate line sizing).

1. Using the calculated flash steam quantity of 372 lb/h enter Condensate Recovery Sizing chart on page 112 at “A" and move horizintally to the right to the flash tank pressure of 20 psi g “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.

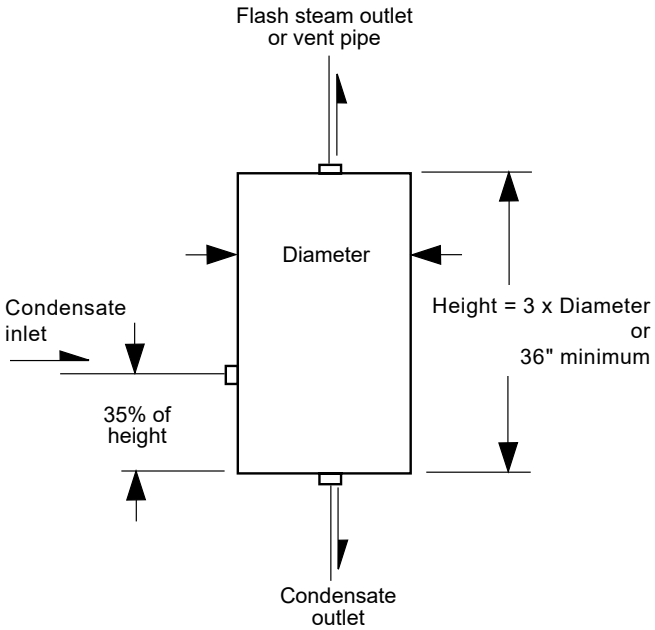
Flash vessels can be either horizontal or vertical. For flash steam recovery (pressurized receiver) the vertical style is preferred because of its ability to provide better separation of steam and water.

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.

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Issue 1

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
Steam Mains												
to 30 psi g	✓											✓
30-400 psi g		✓										✓
to 600 psi g		✓										✓
to 900 psi g		✓										✓
to 2000 psi g		✓										✓
with Superheat		✓								✓		
Separators	✓											
Steam Tracers												
Critical		✓							✓			
Non-Critical			✓					✓				

Table continued on next page

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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
Heating Equipment												
Shell & Tube Heat Exchangers	✓											✓*
Heating Coils	✓											✓*
Unit Heaters	✓											✓*
Plate & Frame Heat Exchangers	✓											✓*
Radiators			✓									
General Process Equipment												
to 30 psi g	✓											✓*
to 200 psi g	✓											✓*
to 465 psi g	✓											✓*
to 600 psi g						✓						
to 900 psi g						✓						
to 2000 psi g						✓						
Hospital Equipment												
Autoclaves	✓								✓			
Sterilizers	✓								✓			
Fuel Oil Heating												
Bulk Storage Tanks			✓				✓					
Line Heaters	✓											
Tanks & Vats												
Bulk Storage Tanks			✓				✓					
Process Vats	✓							✓				
Vulcanizers		✓						✓				
Evaporators	✓											✓
Reboilers	✓											✓
Rotating Cylinders	✓											✓
Freeze Protection					✓							