

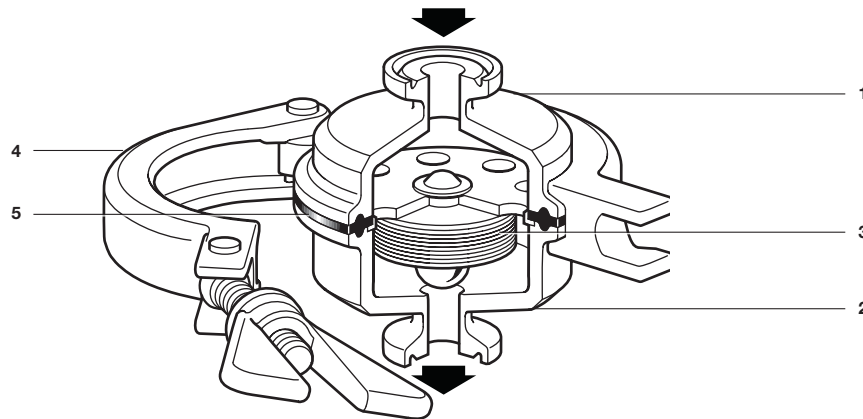


## High Purity Technical Information

<b>Tech. Illus. #</b>	<b>Model</b>
TI-P180-30-US	Sanitary Balanced Pressure Thermostatic Steam Trap BT6-B
TI-2-0002-US	Stainless Steel Balanced Pressure Thermostatic Steam Trap BTM7/BTS7
TI-2-518-US	BTD52L Thermodynamic Steam Trap
TI-2-000-US	BT6 Horizontal Hygienic Sanitary Balanced Pressure Steam Trap
TI-P123-22-US	Stainless Steel Balanced Pressure Thermostatic Air Vent AVM7
TI-3-111-US	Stainless Steel Sanitary Pressure Regulator SRV6
TI-P403-82-US	SSC20 Sanitary Sample Cooler
TI-7-005-US	Stainless Steel Filter CSF26
TI-7-008-US	Stainless Steel Filter CSF26 4"
TI-7-009-US	Stainless Steel Filter CSF26 6"
TI-P023-59-US	CS10 Stainless Steel Clean Steam Separator
TI-P130-25-US	Stainless Steel Sanitary Sight Glass SGS10
TI-7-007-US	Sanitary Pressure Gauge
TI-7-010-US	Pharmaceutical Mobile Steam Sampling PSM Series
TI-7-011-US	Pharmaceutical Steam Sampling Panel PSS Series
TI-P183-02-US	Steri-Trol Clean Service Control Valve
TI-P182-05-US	M70i Stainless Steel Ball Valve for Sanitary Applications
TI-P182-06-US	M80i Stainless Steel Ball Valve for Sanitary Applications



## BT6-B Sanitary Balanced Pressure Thermostatic Steam Trap



### Description

The Spirax Sarco BT6-B sanitary balanced pressure thermostatic steam trap is designed to remove condensate from clean and pure steam applications with minimal condensate retention. Applications include sterile steam barriers, block and bleed installations, mains drainage and CIP/SIP of vessels and reactors and process lines. Manufactured in 316L, the crevice free body design of the BT6-B incorporates a 15° angled seat to ensure full drainability. The standard element is extremely sensitive to changes in condensate temperature and is designed to open with a minimum of sub-cooling, less than 3.6°F (2°C) from steam saturation temperature at pressures below 36 psig (2.5 barg) for typical operating conditions. Exact operating performance may be affected by operating pressure, installation and ambient conditions. Each trap is individually packaged within a 'clean' environment with protective end caps and sealed in a protective plastic bag.

### Available types

<b>BT6-BL</b>	Low capacity
<b>BT6-BH</b>	High capacity

### Body surface finish

(measured to ISO 4287-1997 and ISO 4288-1997):

- Internal surfaces have a finish of mechanical and electropolishing to 0.375 µm (15 µ-in Ra)
- External surfaces have a finish of 1.0 µm (40 µ-in Ra)

### Options:

- For applications requiring closer to steam saturation temperatures, for example, critical SIP applications, please consult Spirax Sarco.
- For dairy applications a PTFE encapsulated Viton seal (item 5) can be supplied.

### Standard

This product fully complies with ASME BPE and the requirements of the European Pressure Equipment Directive 97/23/EC. All seals comply with FDA CFR title 21, part 177, section 1550 and USP24 class VI.

### Certification

This product is available with the following certification at extra cost:

- EN 10204 3.1 material certificates.
- Typical internal surface finish certificates.
- Typical certification of seals FDA/USP compliance.

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

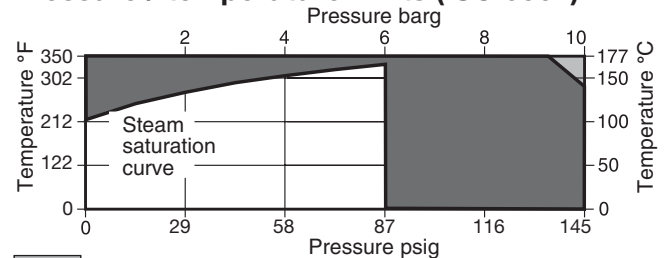
### Sizes and pipe connections

½", ¾", 1" and 1½" sanitary clamp ends to ASME BPE.  
For other connections please consult Spirax Sarco.

### Materials

No.	Part	Material
1	Body (inlet)	Stainless steel ASTM A276 316L
2	Body (outlet)	Stainless steel ASTM A276 316L
3	Capsule element	Stainless steel AISI 316L
4	Body clamp	Stainless steel AISI 316
5	Seal	Viton Optionally, for dairy applications, a PTFE encapsulated Viton seal can be supplied.

### Pressure / temperature limits (ISO 6552)



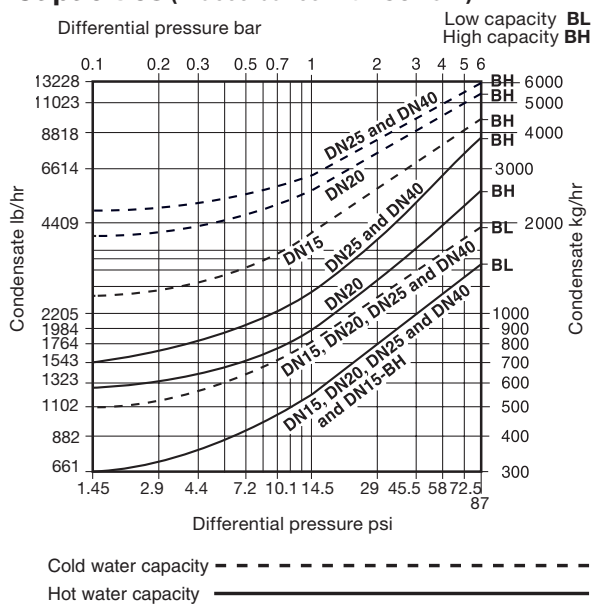
The product **must not** be used in this region.

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

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

Body design condition	PN10
PMA Maximum allowable pressure	145psig@284°F (10barg@140°C)
TMA Maximum allowable temperature	350°F@133psig (177°C@9.2barg)
Minimum allowable temperature	-425°F (-254°C)
PMO Maximum operating pressure for saturated steam service	87 psig (6barg)
TMO Maximum operating temperature	329°F@87psig (165°C@6barg)
Minimum operating temperature	32°F (0°C)
Designed for a maximum cold hydraulic test pressure of	218 psig (15 barg)

## Capacities (in accordance with ISO 7842)



## Safety information, installation and maintenance

For full details see the Installation and Maintenance Instructions (IM-P180-31) supplied with the product.

### Installation note

The BT6-B is designed to be installed in vertical lines with the flow downwards so that the body is self-draining. Check the flow arrow on the body for correct orientation. Fittings and pipe clamps are not supplied.

Installation should include a suitable cooling leg to avoid condensate back-up into process equipment under normal operating conditions.

Do not expose the capsule element to superheat conditions. Handle all components carefully to avoid damage to surfaces.

## Operation

The operation relies on a stainless steel capsule that is filled with a temperature sensing fluid. During cold or start-up conditions the capsule will be fully open allowing large volumes of air, condensate and/or CIP fluid to be drained. As the system approaches steam temperature the fluid in the capsule expands and the valve closes the trap to prevent live steam loss. This closure occurs very close to steam temperature to ensure efficient drainage of the system.

## How to order

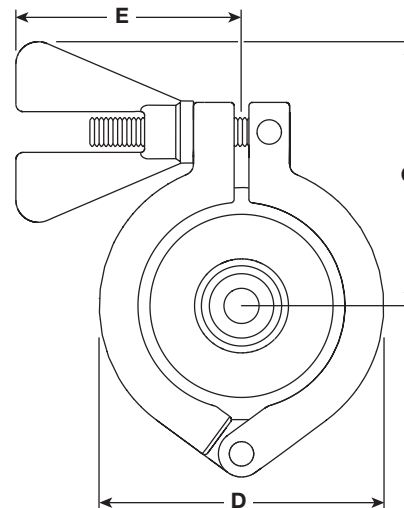
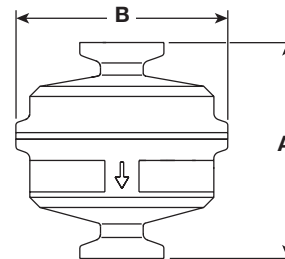
**Example:** 1 off Spirax Sarco ½" BT6-BH sanitary balanced pressure thermostatic steam trap with self-draining body. Connections to be sanitary clamp ends to meet the requirements of ASME BPE. Suitable for pressure up to 6 bar g. Internal surface finish to be electropolished to 15 µ-in Ra (0.375 µm).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

## Sample Specification

Balanced pressure steam traps with in-line connections shall be designed for specific use in sanitary/hygienic applications. The trap shall be suitable for CIP/SIP systems requiring large cold condensate discharge capacities at low pressures typically encountered at the start of sterilizing cycles. The trap must be available in both high and low capacity versions. High capacity traps must discharge at least 2400 lb/h (1100 kg/h) of cold condensate with 3'3" (1.4 psi) water column differential. Traps must open approximately 3.6°F (2°C) below steam temperature at discharge pressures of 36 psig (2.5 barg) or less for minimal sub-cooling of condensate, and typical condensate back up shall be 6" (150 mm) or less at all times. The trap shall have a sanitary safety body clamp and housing design to prevent accidental disassembly and incorrect reassembly. The trap shall be self-draining with at least a 15° angled seat to ensure full drainability when mounted vertically. Construction shall be of 100% 316L, including bodies, internals and related systems. The maximum allowable internal surface finish for wetted parts shall be 15 µ-in Ra (0.375 µm), and 40 µ-in Ra (1 µm) for external surfaces. Traps must comply fully with ASME BPE and the European PED 97/23/EC, and all seals must comply with FDA CFR title 21, part 177, section 1550 and USP24 class VI.

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

Size	A	B	C	D	E	Weight
½"	2.56 (65)	2.52 (64)	2.42 (71.5)	3.03 (77)	2.4 (61)	1.54 (0.70)
¾"	2.56 (65)	2.52 (64)	2.42 (71.5)	3.03 (77)	2.4 (61)	1.56 (0.71)
1"	2.56 (65)	2.52 (64)	2.42 (71.5)	3.03 (77)	2.4 (61)	2.07 (0.94)
1½"	2.56 (65)	2.52 (64)	2.42 (71.5)	3.03 (77)	2.4 (61)	1.89 (0.86)



## Spare parts

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

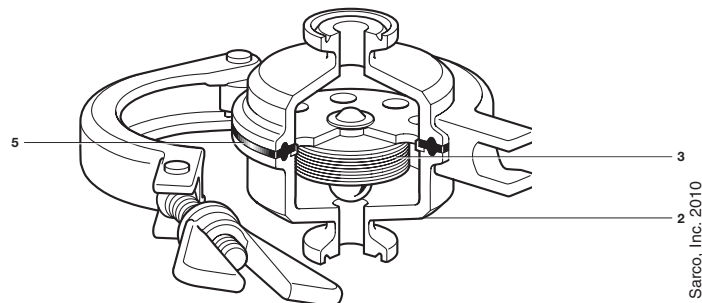
### Available spares

Capsule element assembly	3
Seal	5
Body (outlet) including seat	2

### How to order spares

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

**Example:** 1 - Capsule element assembly for a ½" BT6-BH sanitary balanced pressure thermostatic steam trap.





# Stainless Steel Balanced Pressure Thermostatic Steam Trap BTM7/BTS7

The BTM7 (maintainable) and BTS7 (sealed) are vertical body thermostatic steam traps, with all AISI 316L construction designed for use in clean steam systems. Normal operation is close to saturated steam temperature, with minimal back-up of condensate.

Model	BTM7 / BTS7
PMO	102 psig
Sizes	(1/4" BTS7 only) 1/2", 3/4", 1"
Connections	0.065" O.D. Tube, NPT or Tri-Clamp® compatible
Construction	All 316L Stainless Steel
Options	Other connections are available Fixed bleed (BTM7 only) 3.1B available (BTM7 only)

\* A registered trademark of Tri-Clover Inc.

## Limiting Operating Conditions

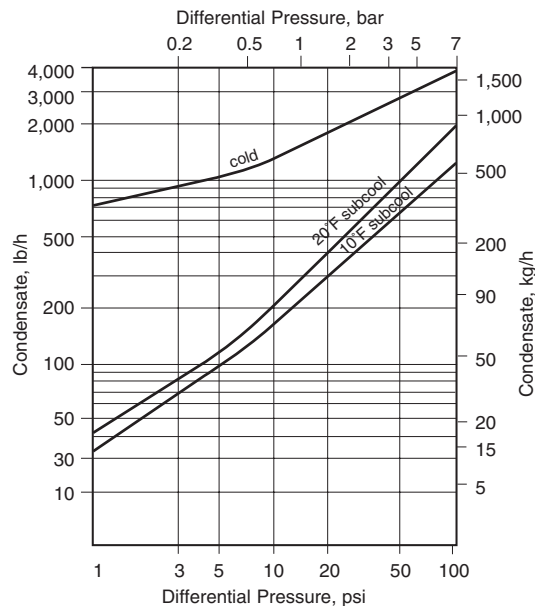
Max. Operating Pressure (PMO) 102 psig (7 barg)

Max. Operating Temperature Saturated Steam Temperature

## Pressure Shell Design Conditions

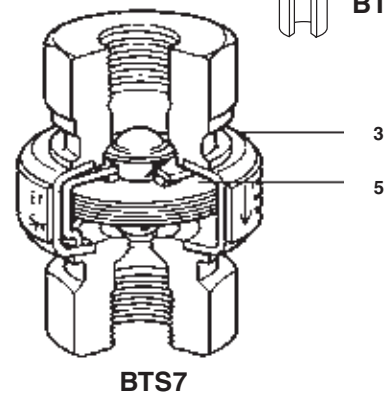
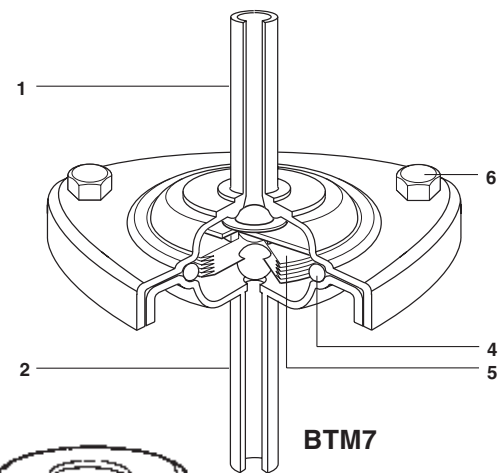
PMA	145 psig/0-302°F	10 barg/0-150°C
Max. allowable pressure	132 psig/338°F	9 barg/170°C
TMA	338°F/0-132 psig	170°C/0-9 barg
Max. allowable temperature		

## Capacities



## Typical Applications

Fermenter sterilization, steam barriers (block & bleed systems), sterilizer drainage and air venting, CIP/SIP system condensate drainage, and sterilization of process vessels and pipes.



## Construction Materials

No.	Part	Material
1 (BTM7)	Body (Inlet)	Stainless Steel AISI 316L
2 (BTM7)	Body w/ Seat (Outlet)	Stainless Steel AISI 316L
3 (BTS7)	Body	Stainless Steel AISI 316L
4 (BTM7)	O-Ring gasket	FKM compound (V1274-80) complies with FDA 21CFR 177.2600 and is USP Class VI approved. For use on all clean systems or where lactic acid may be present.
5	Element	Stainless Steel AISI 316L
6 (BTM7)	Nuts & Bolts	Stainless Steel BS6105 Gr A4 80

Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only.

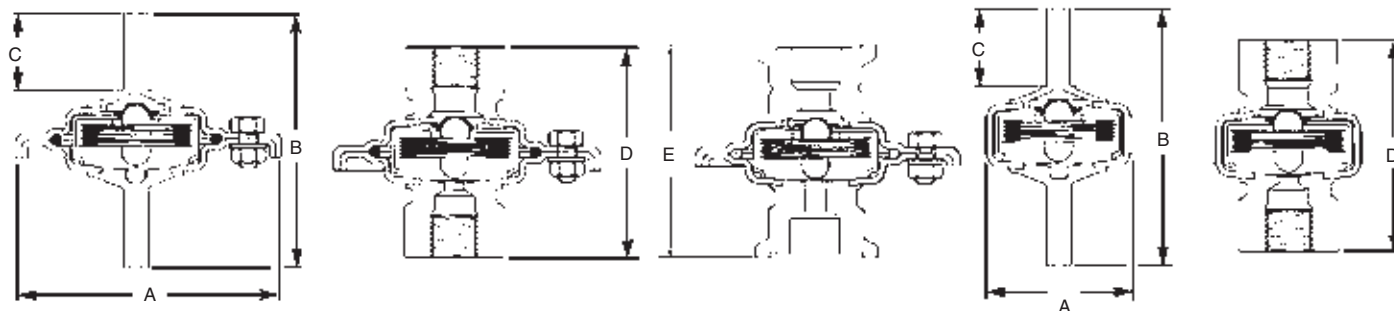
In the interests of development and improvement of the product, we reserve the right to change the specification.

TI-2-0002-US 06.10

# Stainless Steel Balanced Pressure Thermostatic Steam Trap

## BTM7/BTS7

Dimensions									
(nominal) in inches and millimeters									
BTM7					BTS7				
Size	A	B Tube	C Tube	D Screwed	E Tri-Clamp*	Weight Tube	Weight Screwed	Weight Tri-Clamp*	
1/2"	2.8 70	4.2 106	1.5 40	2.9 74	1.85 47	.62 lb .28 kg	.66 lb .30 kg	.48 lb .22 kg	
3/4"	2.8 70	5.1 130	1.5 40	3.2 81	1.85 47	.68 lb .31 kg	.77 lb .35 kg	.48 lb .22 kg	
1"	2.8 70	5.0 126	1.5 40	3.7 95	1.85 47	.77 lb .35 kg	.90 lb .41 kg	.78 lb .37 kg	
Size	A	B Tube	C Tube	D Screwed		Weight Tube	Weight Screwed	Weight Tri-Clamp*	
1/2"	1.6 40	4.2 106	1.5 4.0	2.9 74		.44 lb .20 kg	.49 lb .22 kg		
3/4"	1.6 40	5.1 130	1.5 40	3.2 81		.51 lb .23 kg	.60 lb .27 kg		
1"	1.6 40	5.0 126	1.5 40	3.7 95		.60 lb .27 kg	.73 lb .33 kg		



### Sample Specification

Steam trap shall be self-adjusting balanced pressure type capable of operating close to saturated steam temperature. All wetted parts shall be manufactured from 316L stainless steel. Trap shall be maintainable (BTM7), or sealed construction (BTS7), and shall be completely self-draining when installed in vertical pipeline. Connections shall be 0.065" extended O.D. tube, Tri-Clamp® compatible, or screwed NPT. All wetted parts of this trap are manufactured from FDA/3-A approved materials.

### Installation

The traps are designed for installation in vertical lines with the flow downward to ensure self-draining. The element may be damaged if it is exposed to superheated steam. Full-flow isolating valves, such as Spirax Sarco Model 70i or 80i Clean Ball Valve, should be installed so as to permit servicing.

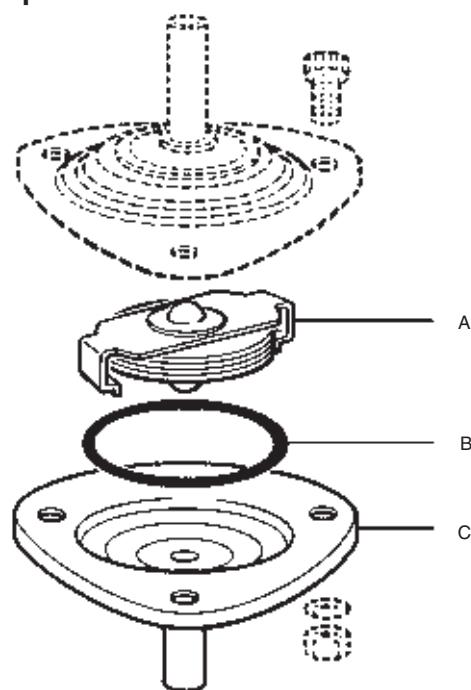
### Maintenance

The BTM7 is a maintainable trap. The BTS7 is non-maintainable. Maintenance on the BTM7 can be performed once the steam trap is isolated from system and return line pressure. Complete Installation & Maintenance instructions are given in IM-2-0002-US, which is included with the product.

### Spare Parts

Element Assembly	A
Gasket (Pkt of 3)	B
Body with Seat	C

Available spare parts are shown in heavy outline. Parts shown in broken lines are not available as spares.



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TI-2-0002-US 06.10

# spirax/sarco®

## Thermo-Dynamic® Steam Trap BTD52L

### The BTD52L Thermo-Dynamic® Steam Trap

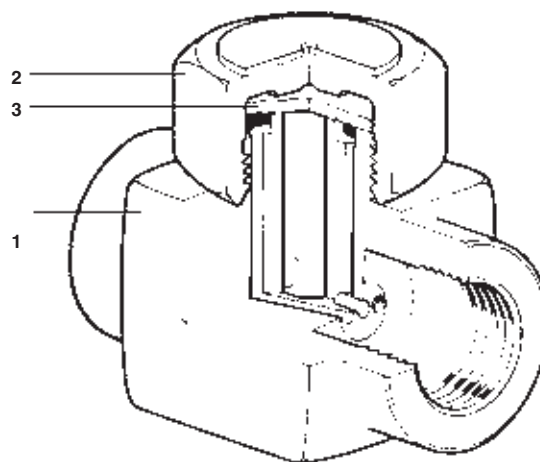
is constructed entirely of 316L stainless steel and is suitable for aggressive condensate often found in clean steam systems using deionized water. Condensate and air are discharged at saturated steam temperature without the need for a water seal.

Model	BTD52L
PMO	150 psig
Sizes	1/4", 3/8" & 1/2"
Connections	NPT, 0.065" O.D. Tube (1/2" only) Tri-Clamp®* compatible (1/2" only)
Construction	316L Stainless Steel
Options	BSP connections Insulcap

\* A registered trademark of Tri-Clover Inc.

### Typical Applications

In the biotechnology, pharmaceutical, fine chemical, food, dairy and beverage industries: main drip service, WFI system sterilization, and drainage of steam filter housing and separators.



### Limiting Operating Conditions

**Max. Operating Pressure (PMO)** 150psig (10 barg)

Minimum pressure for satisfactory operation is 3.5 psi (0.24 bar)

Maximum back pressure should not exceed 80% of the inlet pressure under any conditions of operation, otherwise the trap may not shut.

**Max. Operating Temperature** 850°F (454°C)  
at all operating pressures

### Pressure Shell Design Conditions

**PMA** 230 psig/0-850°F 16 barg/0-454°C  
Max. allowable pressure

**TMA** 850°F/0-230 psig 454°C/0-16 barg  
Max. allowable temperature

### Capacities

Pressure (psig)	1/2" sanitary clamp, 1/2" OD tube end, 1/4" NPT Flow (lb/h)	3/8", 1/2" NPT Flow (lb/h)
5	71	167
10	89	185
15	101	196
20	111	204
25	120	210
50	150	270
75	171	331
100	188	393
125	203	454
150	215	515

All flows shown are differential flows

### Construction Materials

No.	Part	Material
1	Body	Stainless Steel AISI 316L
2	Cap	Stainless Steel AISI 316L
3	Disc	Stainless Steel AISI 316L
	Insulcap (optional)	Stainless Steel AISI 304

### Material Certification

Actual mill test reports covering the O.D. tube and Tri-Clamp® body and cap material are available if specified at the time of ordering.

Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only.

In the interests of development and improvement of the product, we reserve the right to change the specification.

TI-2-518-US 03.07



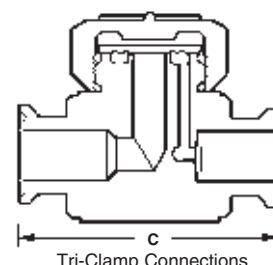
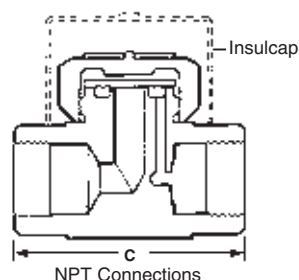
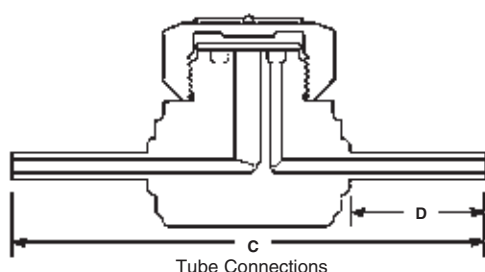
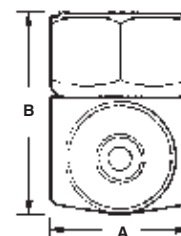
# Thermo-Dynamic® Steam Trap

## BTD52L

### Dimensions

(nominal) in inches and millimeters

Size	A	B	C Tube	C Screwed	C Tri-Clamp	D Tube	Weight Tube	Weight Screwed	Weight Tri-Clamp
1/4"	1.4 36	2.1 53	—	2.6 65	—	—	—	1 lb .45 kg	—
3/8"	1.4 36	2.1 53	—	2.6 65	—	—	—	1 lb .45 kg	—
1/2"	1.4 36	2.1 53	4.4 111	2.6 65	2.6 65	1.5 40	1 lb .45 kg	1 lb .45 kg	1.2 lb .55 kg



### Options

**Insulcap** – The insulcap is a friction-fit cover designed to reduce the effect of excessive heat loss resulting from low ambient temperatures, wind, rain, etc. Available as a spare part.

### Sample Specification

Steam trap shall be all ANSI 316L stainless steel thermodynamic disc type with connections on a common center line which can be installed in any position. Integral seat design. Shall not require any water seal for normal operation. Spirax Sarco type BTD52L for all pressures between 3.5 psig (0.24 barg), and 150 psig (10 barg).

### Installation

Preferably install in a horizontal line as close as possible to equipment or pipeline being drained. For freeze proof or self-draining installations, or where horizontal fitting is not possible, the BTD52L may be installed vertically. Full-flow isolating valves should be installed upstream and downstream of the trap.

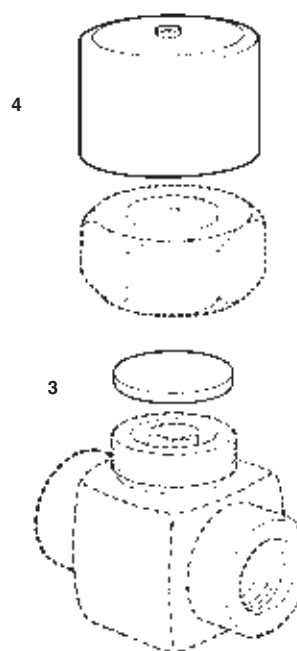
### Maintenance

This product can be maintained without disturbing the piping connections. Complete isolation of the trap from both supply and return line is required before any servicing is performed. The trap should be disassembled periodically for inspection and cleaning of the disc and seat.

The only wearing parts of the trap are the disc and seat rings, which should be inspected and cleaned periodically. Slight wear can often be corrected by resurfacing on a lapping plate.

**Complete installation and maintenance instructions are given in the IMI sheet, which accompanies the product.**

### Spare Parts



Disc	3
Insulcap	4

Only parts listed above are available as spares

TI-2-518-US 03.07





## Horizontal BT6 Hygienic Sanitary Balanced Pressure Steam Trap

### Description

The Spirax Sarco Horizontal BT6 thermostatic balanced pressure steam trap is designed to remove condensate from hygienic and sanitary steam systems with minimal backing up. Applications include sterile steam barriers, block and bleed systems, drainage of steam distribution lines, process vessels and CIP/SIP systems. Manufactured in 316L stainless steel with a crevice free body, it is self-draining and operates close to steam temperature. Traps are individually packaged with protective end caps and sealed in a polythene bag.

### Surface finish

All internal wetted surfaces have a finish of 32  $\mu$  in Ra (0.8  $\mu$ m). Surface finish of 16  $\mu$  in Ra (0.4  $\mu$ m) can be supplied on request by electro-polishing.

### Options

Electro-polishing of internal surfaces to 16  $\mu$  in Ra (0.4  $\mu$ m). Fixed bleed to ensure fail open operation. Special connections to suit most piping systems.

### Standards

The Horizontal BT6 fully complies with the ASME BPE, where applicable. It also complies with the requirements of the European Pressure Equipment Directive 97/23/EC. The seal complies with FDA CFR title 21, paragraph 177, section 1550. All wetted parts of this trap are constructed from FDA/3-A approved materials.

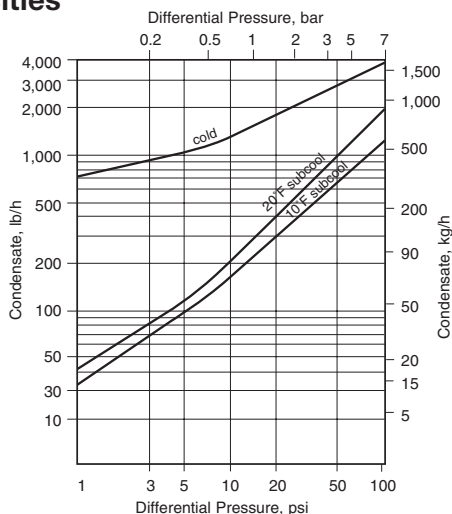
### Certification

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

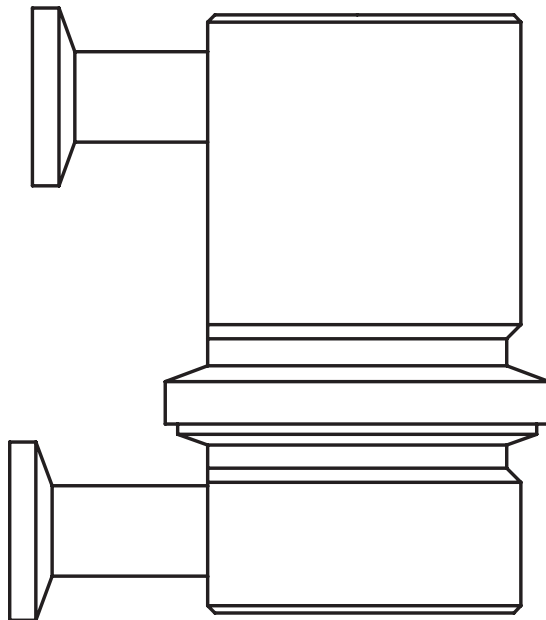
### Sizes and pipe connections

1/2" sanitary clamp compatible connections. Additional connections are available on request. Please contact Spirax Sarco.

### Capacities



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



Body design conditions		PN10
PMA Maximum allowable pressure	338°F@145psig (140°C@10 bar g)	
TMA Maximum allowable temperature	350°F@132psig (177°C@9.2 barg)	
Minimum allowable temperature	-425°F (-254°C)	
PMO Maximum operating pressure	87 psig (6 bar g)	
for saturated steam service		
TMO Maximum operating temperature	329°F@87psig (165°C@6 bar g)	
Minimum operating temperature	32°F (0°C)	
Designed for a maximum cold hydraulic test pressure of		217 psig (15 bar g)

### Construction Materials

No.	Part	Material
1	Body (Inlet Side)	Stainless Steel ASTM A276-87 Gr. 316L
2	Body (Outlet Side)	Stainless Steel ASTM A276-87 Gr. 316L
3	Element	Stainless Steel AISI 316L
4	Body Clamp	Stainless Steel AISI 304L
5	Gasket	PTFE Jacketed Viton

**Note:** PTFE complies with FDA, CFR title 21, paragraph 177, section 1550. All wetted parts of this trap are constructed from FDA approved materials.

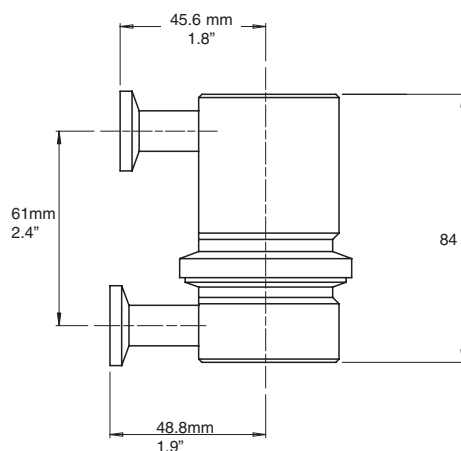
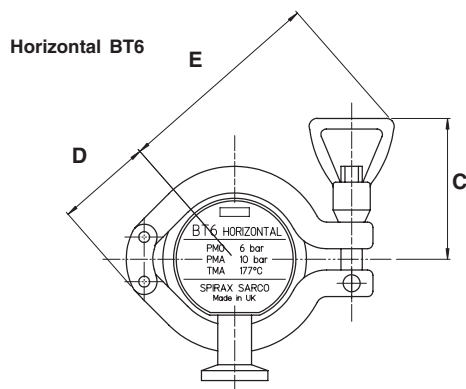
### Material Certification

Actual mill test reports covering the Horizontal BT6 body material are available if specified at the time of ordering.

# Horizontal BT6 Hygienic Sanitary Balanced Pressure Steam Trap

## Dimensions/weights (approximate) in inches and lb

Size	A	B	C	D	E	Weight
1/2"	2.6"	2.1"	2.1"	1.4"	3.3"	1.9 lb



## Spare parts

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

### Available spares

Element assembly

Seal Gasket Kit (set of 3)

Seat end connection

## How to order spares

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

**Example:** 1 - Element assembly for a Spirax Sarco 1/2" Horizontal BT6 hygienic sanitary balanced pressure steam trap.

## Installation

The trap is designed to be fitted in horizontal lines with the flow downwards so that it can be completely self-draining. Check flow arrow for correct orientation. Fittings, clamps and gaskets for pipe end connections are not supplied. Do not over expose the element to superheat conditions since over expansion may result.

Note: The body and element must be handled carefully to ensure that the machined surfaces are not damaged.

## Sample Specification

Steam trap shall be self-adjusting balanced pressure type capable of operating close to saturated steam temperature. All wetted parts shall be manufactured from 316L grade stainless steel with body parts finished internally and externally to 32  $\mu$  in Ra. Trap shall have body clamp to allow maintenance of internals, and shall be completely self-draining when installed in vertical pipeline.

## Maintenance

Before undertaking any maintenance on the trap, it must be isolated from the supply line and return line and any pressure allowed to normalize to atmosphere. The trap assembly should then be allowed to cool.

# spirax/sarco®

## Stainless Steel Balanced Pressure Thermostatic Air Vent AVM7

### Description

The AVM7 (maintainable) is a vertical body thermostatic air vent, with all AISI 316L construction designed for use in clean steam systems. Normal operation is close to saturated steam temperature.

Model	AVM7
PMO	102 psig
Sizes	1/4, 1/2", 3/4", 1"
Connections	0.065" O.D. Tube, NPT or Tri-Clamp®*
Construction	All 316L Stainless Steel
Options	3.1B available (upon request) FEP encapsulated silicone 'O' ring is recommended and available. For use on systems where there is, or maybe lactic acid present.

\* A registered trademark of Tri-Clover Inc.

### Limiting Operating Conditions

Max. Operating Pressure (PMO) 102 psig (7 barg)

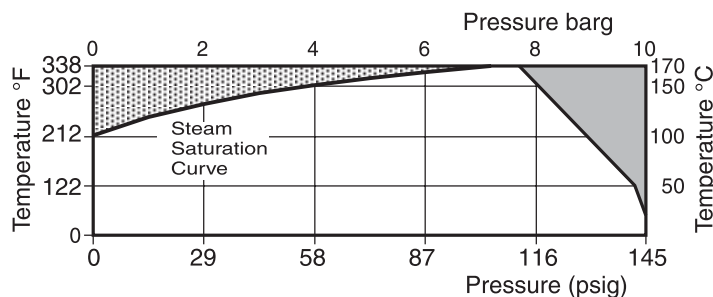
Max. Operating Temperature Saturated Steam Temperature

### Pressure Shell Design Conditions

PMA 145 psig/0-302°F 10 barg/0-150°C  
Max. allowable pressure 132 psig/338°F 9 barg/170°C

TMA 338°F/0-132 psig 170°C/0-9 barg  
Max. allowable temperature

### Pressure / temperature limits (ISO 6552)



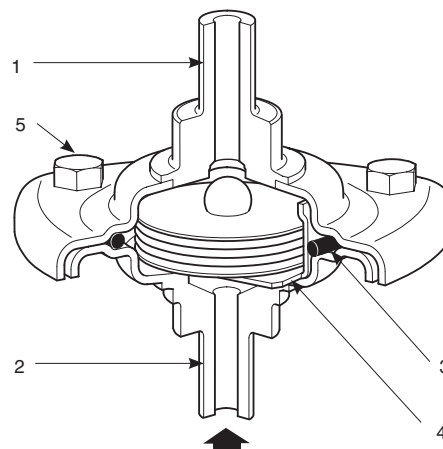
### Capacities

Pressure (psig)	Flow (SCFM)
1	7
5	8
10	11
20	15
30	19
50	28
75	39

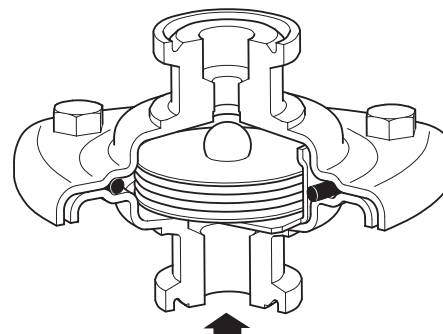
### Typical Applications

Fermenter sterilization, steam barriers (block & bleed systems), sterilizer drainage and air venting, CIP/SIP system condensate drainage, and sterilization of process vessels and pipes.

#### AVM7 with butt weld ends



#### AVM7 with sanitary clamp compatible hygienic connections



### Construction Materials

No.	Part	Material
1	Body (Inlet)	Stainless steel AISI 316L (1.4404)
2	Body with seal (outlet)	Stainless steel AISI 316L (1.4404)
3	O-Ring gasket	FKM compound (V1274-80) complies with FDA 21CFR 177.2600 and is USP Class VI approved. For use on all clean systems or where lactic acid may be present.
4	Element	Stainless Steel AISI 316L
5	Nuts & Bolts Washers	Stainless Steel BS6105 Gr A4 80 Austenitic stainless steel

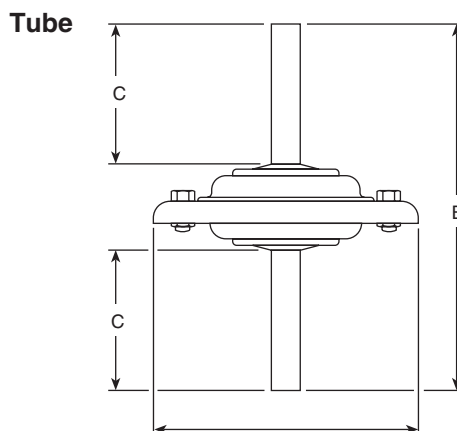
Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only.  
In the interests of development and improvement of the product, we reserve the right to change the specification.

TI-P123-22-US 2.09

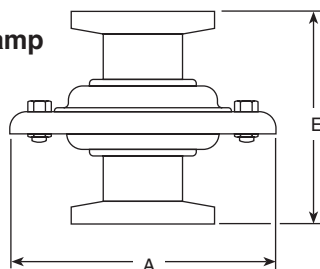
# Stainless Steel Balanced Pressure Thermostatic Air Vent AVM7

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

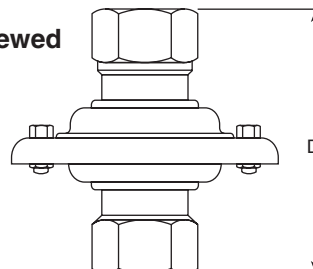
AVM7								
Size	A	B Tube	C Tube	D Screwed	E Tri-Clamp*	Weight		
						Tube	Screwed	Tri-Clamp*
1/4"	2.8 70			2.3 .58			1.2 .53	
1/2"	2.8 70	4.2 106	1.5 40	2.9 74	1.85 47	.62 lb .28 kg	.66 lb .30 kg	.48 lb .22 kg
3/4"	2.8 70	5.1 130	1.5 40	3.2 81	1.85 47	.68 lb .31 kg	.77 lb .35 kg	.48 lb .22 kg
1"	2.8 70	5.0 126	1.5 40	3.7 95	1.85 47	.77 lb .35 kg	.90 lb .41 kg	.78 lb .37 kg



Sanitary clamp



Screwed



## Sample Specification

Steam trap shall be self-adjusting balanced pressure type capable of operating close to saturated steam temperature. All wetted parts shall be manufactured from 316L stainless steel. Air Vent shall be maintainable, and shall be completely self-draining when installed in vertical pipeline. Connections shall be 0.065" extended O.D. tube, Tri-Clamp® compatible, or screwed NPT.

## Installation

The traps are designed for installation in vertical lines with the flow downward to ensure self-draining. The element may be damaged if it is exposed to superheated steam. Full-flow isolating valves, such as Spirax Sarco Model M70i Clean Steam Ball Valve, should be installed so as to permit servicing.

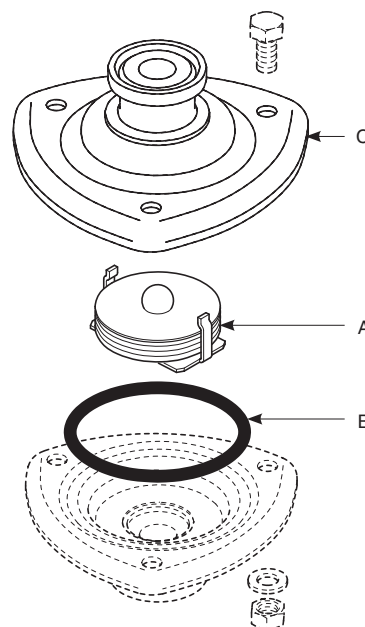
## Maintenance

The AVM7 is a maintainable trap. Maintenance on the AVM7 can be performed once the steam trap is isolated from system and return line pressure. Complete Installation & Maintenance instructions are given in IM-P123-23, which is included with the product.

## Spare Parts

Element Assembly	A
Gasket (Pkt of 3)	B
Body with Seat	C

Available spare parts are shown in heavy outline. Parts shown in broken lines are not available as spares.



# spirax/sarco®

## Stainless Steel Sanitary Pressure Regulator SRV6

The SRV6 is an angle pattern, sanitary pressure regulator with polished 316/316L stainless steel construction for use on steam, process liquids and gases.

<b>Model</b>	SRV6
<b>Sizes</b>	1", 1 1/2", 2"
<b>Connections</b>	Tri-Clamp®* compatible
<b>Construction</b>	All 316/316L Stainless Steel Wetted Parts

\* A registered trademark of Tri-Clover, Inc.

### Construction Materials

No.	Part	Material	
1	Adjusting screw	Stainless Steel (PTFE coated)	AISI 303
2	Lock nut	Stainless Steel	AISI 304
3	Spring chamber	Stainless Steel	AISI 316L
4	Spring pusher	Stainless Steel	AISI 304
5	Spring	Stainless Steel	
6	Diaphragm nut	Stainless Steel	AISI 304
7	Spring washer	Stainless Steel	
8	Spacer ring	Stainless Steel	AISI 304
9	Retainer	Stainless Steel	AISI 304
10	Upper disc	Stainless Steel	AISI 304
11	V-band clamp	Stainless Steel	AISI 300 Series
12	Lower disc	Stainless Steel	AISI 316
13	Main valve	Stainless Steel	AISI 316
14	Body	Stainless Steel	AISI 316L
15	Diaphragm	Viton/PTFE (FDA approved)	

### Surface Finish

All wetted parts mechanically polished to 20 microinch Ra then electropolished. All external parts electropolished

### Pressure Ranges

**Downstream Control Range:** 7-75 psi 0.5– 5.2 bar

### Shutoff

ANSI Class III

Note: The SRV6 should **not** be used for line isolation. If line isolation is required, a suitable shut-off valve should be installed upstream of the SRV6.

### Limiting Operating Conditions

**Max. Operating Pressure (PMO)** 116 psig 8.0 barg

**Max. Operating Temperature** 347°F 175°C

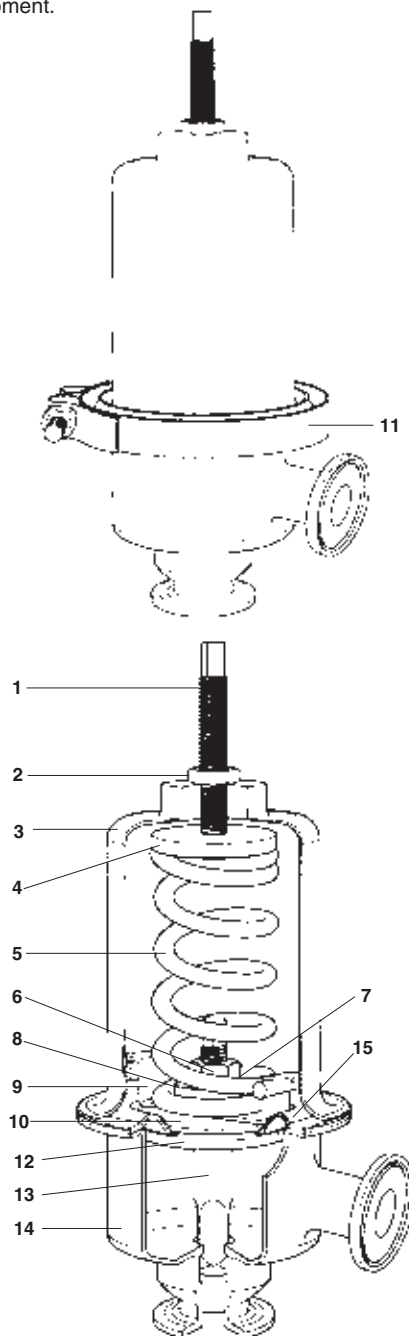
### Pressure Shell Design Conditions

**PMA** 232 psig 15 barg  
Max. allowable pressure

**TMA** 347°F 175°C  
Max. allowable temperature

### Typical Applications

Clean steam, gas, and liquid supplies to bioreactors, centrifuges, freeze dryers (lyophilizers), sterilizers, autoclaves, process tanks, production suites, humidifiers, and culinary equipment.



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

TI-3-111-US 01.95

# Stainless Steel Sanitary Pressure Regulator SRV6

## Valve Selection:

### Step 1

#### For Steam:

Establish whether the flow is critical or non-critical, and calculate the required  $C_v$  using one of the following formula:

$$\text{Critical } \Delta P \quad P_2 < \frac{1}{2} P_1 \quad C_v = \frac{Q}{1.6 \times P_1}$$

$$\text{Noncritical } \Delta P \quad P_2 > \frac{1}{2} P_1 \quad C_v = \frac{Q}{3.2 \times \sqrt{(P_1 - P_2) \times P_2}}$$

All pressures in psi absolute

#### For Liquids:

Calculate the required  $C_v$  using the following formula:

$$C_v = W \sqrt{\frac{S.G.}{\Delta P}}$$

Q = Steam load lb/h  
P1 = Primary pressure (psia)  
P2 = Secondary pressure (psia)  
W = Liquid flow rate (GPM)  
SG = Specific gravity of liquid  
 $\Delta P$  = Pressure differential

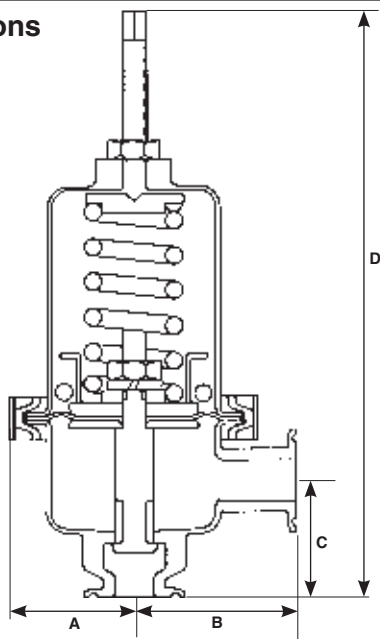
### STEP 2

For highest control accuracy, especially on widely fluctuating loads, select the valve size with the closest  $C_v$  at 20% droop to the required value.

For steady load applications, or where high accuracy of control is not required, the maximum  $C_v$  figure can be used for selection.

C <sub>v</sub> Values				
Valve size	1"	1-1/2"	2"	
Average C <sub>v</sub> at 20% droop	2.5	3.0	4.2	
Maximum C <sub>v</sub>	5.5	13.5	27	

## Dimensions



### Dimensions (nominal) in inches and millimeters

Size	A	B	C	D	Weight lb(kg)
1"	2.3	3.0	2.4	12	6.5
	58	77	60	305	3.0
1-1/2"	2.3	3.0	3.5	13.3	7.2
	58	77	90	340	3.3
2"	2.3	3.0	4.3	14.8	8.9
	58	77	110	355	4.0

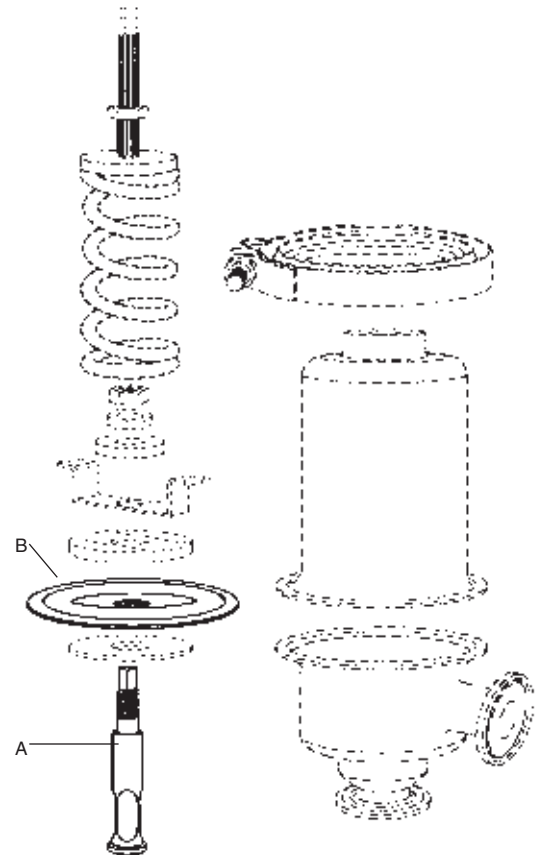
## Installation

The SRV6 should be installed with the inlet vertical and the spring chamber upward. Full installation instructions accompany each valve.

## Maintenance

Complete isolation of the valve is required before any servicing is performed. **Full installation & maintenance instructions are given in IMI 3.111 which accompanies the product.**

## Spare Parts



Main Valve A  
Diaphragm B  
Only parts listed above are available as spares.

## Sample Specification

Stainless steel sanitary pressure regulator shall be diaphragm actuated with integral valve guide and have all wetted parts in AISI 316/316L mechanically polished to 20 microinch Ra then electropolished. All parts AISI 300 series with electropolished external surfaces. Angle pattern design shall be fully self-draining when installed with inlet vertical. Valve travel stops shall prevent over extension of diaphragm, and diaphragm shall include an integral valve stem seal, complete with restraint. Spirax Sarco SRV6 sanitary pressure regulator

TI-3-111-US 01.95

# spirax/sarco

## SSC20 Sanitary Sample Cooler

### Description

The Spirax Sarco SSC20 sanitary sample cooler has been specifically designed for taking high quality chemical, conductivity and microbiological samples quickly and safely from clean/pure steam, water for injection (WFI) and other high purity media systems.

The unit consists of high quality 316L stainless steel components and utilizes a counter current flow to maximize cooler efficiency, resulting in a compact, space saving design.

All sample contact surfaces are compliant to current ASME BPE requirements, surface finish of better than 20  $\mu$ -in Ra (0.5  $\mu$ -m Ra).

The unit is provided with an integral pre drilled mounting bracket to allow simple installation at point of use.

### Principal features:

- Internal surface finish of coil better than 20  $\mu$ -in Ra (0.5  $\mu$ -m Ra) to ensure high sterility.
- Coil manufactured from fully traceable 316L stainless steel.
- Self-draining design to eliminate sample retention.
- Fully sterilizable/autoclavable - to ensure integrity of unit between samples.
- Integral mounting bracket to facilitate simple installation.

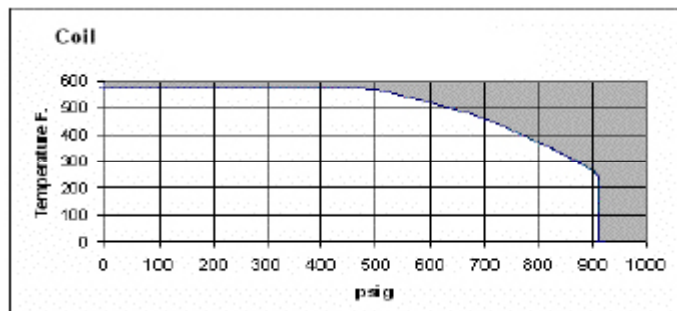
### Sizes and pipe connections

Cooling water inlet and outlet connections	BSP version	1/2" BSP
	NPT version	1/2" NPT

Sample tube inlet and outlet connections	1/2" adaptor for clamp fitting (clamp not supplied) on sample inlet. 6 mm O/D on sample outlet.
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### Limiting conditions

Part	Design temperature	Design pressure
Body	212°F	145 psig
Cold hydraulic test pressure		232 psig

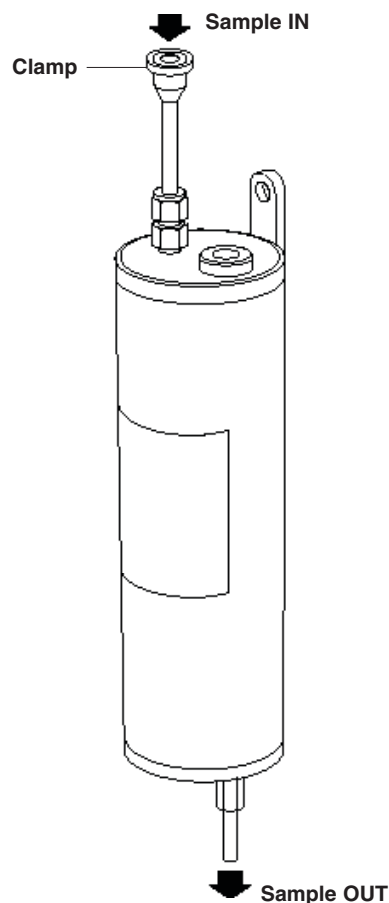


The product must not be used in this region.

**Clamp** - Pressure and temperature dependent on clamp manufacturers recommendation.

### Materials

Body	Austenitic stainless steel grade 316L
Coil	Austenitic stainless steel grade 316L



### Surface finish

Sample contact surfaces are compliant to current ASME BPE requirements.

Ra Maximum 20  $\mu$ -in Ra (0.5  $\mu$ -m Ra).

Polished shell available as an optional extra.

### Packaging

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

- Sample Inlet and outlet connections are capped.
- Sample coolers are sealed in 100-micron thick plastic bags.

### Certification

If requested at the time of order the SSC20 can be supplied with the following certification:

- Materials certificates to EN 10204 3.1
- Internal coil surface finish certification.



# SSC20 Sanitary Sample Cooler

## Performance

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

### Example

A sample flowrate of 0.13 GPM is required from a boiler operating at 145 psig. For a cooling water flowrate of 4.8 GPM from Table 1 the sample outlet temperature would be 7°F above the cooling water inlet temperature. If the cooling water is at 60°F, the sample temperature would be 67°F. Table 2 is used in the same way for steam. Samples may not be taken where marked '-' as the flow is limited by the sample inlet valve capacity.

**Table 1 Saturated water (e.g. boiler water)**

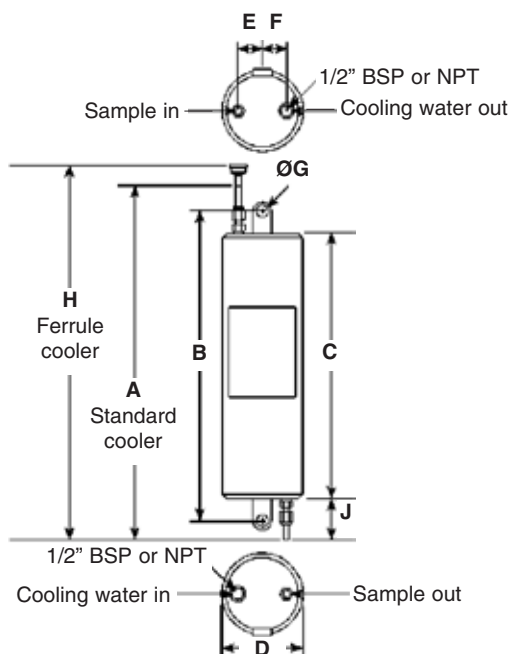
Sample Flowrate GPM	Cooling water flowrate 1.6 GPM					Cooling water flowrate 4.8 GPM					Cooling water flowrate 9.5 GPM				
						Boiler pressure psig									
	15	45	100	145	290	15	45	100	145	290	15	45	100	145	200
0.04	2°F	2°F	5°F	11°F	11°F	0°F	0°F	2°F	2°F	7°F	0°F	0°F	0°F	0°F	4°F
0.09	4°F	4°F	11°F	14°F	14°F	2°F	2°F	4°F	4°F	11°F	0°F	0°F	0°F	2°F	7°F
0.13	9°F	9°F	14°F	20°F	20°F	5°F	5°F	7°F	7°F	14°F	0°F	0°F	4°F	5°F	11°F
0.18	13°F	13°F	20°F	23°F	23°F	9°F	9°F	11°F	11°F	18°F	2°F	2°F	4°F	5°F	14°F
0.22	18°F	18°F	23°F	27°F	27°F	11°F	11°F	14°F	14°F	22°F	5°F	5°F	7°F	9°F	16°F
0.26	25°F	25°F	29°F	32°F	32°F	16°F	16°F	18°F	18°F	25°F	7°F	9°F	9°F	11°F	20°F
0.35	29°F	32°F	36°F	40°F	40°F	20°F	22°F	23°F	25°F	32°F	11°F	13°F	14°F	16°F	27°F
0.44	32°F	36°F	43°F	47°F	49°F	27°F	29°F	29°F	32°F	40°F	18°F	20°F	22°F	23°F	32°F
0.53	40°F	41°F	52°F	54°F	56°F	31°F	32°F	36°F	41°F	47°F	20°F	23°F	27°F	31°F	40°F

**Table 2 Saturated steam**

Sample Flowrate b/h	Cooling water flowrate 1.6 GPM						Cooling water flowrate 4.8 GPM						Cooling water flowrate 9.5 GPM					
	Boiler pressure psig																	
	7 5°F	30 5°F	75 7°F	100 9°F	145 11°F	290 11°F	7 4°F	30 4°F	75 5°F	100 5°F	145 7°F	290 7°F	7 2°F	30 2°F	75 2°F	100 4°F	145 4°F	290 4°F
11	-	13°F	14°F	14°F	16°F	16°F	-	7°F	7°F	7°F	7°F	9°F	-	2°F	4°F	4°F	4°F	4°F
22	-	-	16°F	18°F	18°F	20°F	-	-	9°F	11°F	11°F	13°F	-	-	4°F	4°F	5°F	7°F
33	-	-	-	22°F	23°F	25°F	-	-	-	14°F	16°F	16°F	-	-	-	7°F	9°F	11°F
44	-	-	-	-	38°F	38°F	-	-	-	-	25°F	25°F	-	-	-	-	16°F	18°F
66	-	-	-	-	-	50°F	-	-	-	-	-	36°F	-	-	-	-	-	23°F
88	-	-	-	-	-	63°F	-	-	-	-	-	45°F	-	-	-	-	-	31°F
110	-	-	-	-	-	76°F	-	-	-	-	-	54°F	-	-	-	-	-	38°F
132	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
154	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

## Dimensions (approximate) in inches

A	B	C	D	E	F	G	H	J
16.1	13.8	11.8	3.5	1.0	0.9	0.5	17.7	2.2



## How to order

Example: 1 of Spirax Sarco type SSC20 sanitary sample cooler with 1/2" sanitary clamp sample inlet connection and maximum coil internal surface finish of 20 µ-in Ra (0.5 µ-m Ra). The cooling water connections are to be BSP.

## Installation

See Installation and Maintenance Instructions for full details, as insufficient information is given here for safe installation.

### Notes on installation

**WARNING:-** To avoid the risk of scalding, it is essential that a full flow of cooling water is present before opening the sample inlet valve. Always close the sample inlet valve before turning off the cooling water.

Sample pipework becomes very hot under normal working conditions, and will cause burns if touched.

We recommend the use of corrosion resistant pipework suitable for the fluid being sampled.

Keep the length of all pipe runs to the minimum.

Cooling water must be clean and free from scale forming salts.

The sample cooler must be mounted vertically.

The cooling water inlet is connected in 1/2" nominal bore pipe via an inlet valve.

The cooling water outlet should be piped to an open drain or funnel.

The sample inlet pipe should be in 6 mm O/D tube.

We recommend that a funnel piped to drain is located under the outlet, with sufficient space below it for a beaker or similar sample container.

## Weights (approximate)

Cooler	6.8 lbs
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## Maintenance

No routine maintenance is required.

TI-P403-82-US 5.09

# spirax/sarco®

## Stainless Steel Filter CSF26

The CSF26 is an in-line all 316 stainless steel filter suitable for use in steam, gas and liquid systems. The CSF26 is USDA approved, and conforms to the requirements of 3-A Accepted Practice Number 609-03 for the production of culinary steam. The CSF26 utilizes a fully cleanable sintered stainless steel element for reduced cost of ownership.

Model	CSF26
Sizes	1/2", 3/4", 1", 1-1/2", 2", 2-1/2", 3"
Connections	NPT (1/2" - 2"), ANSI 150 (2-1/2" & 3")
Construction	Body: 316 Stainless Steel Element: 316 Stainless Steel
Element Rating	2.8 microns Absolute
Options	Tri-Clamp® compatible, flanged ANSI 150 (1/2"-2") and BSP connections, 4" & 6" sizes

### Typical Applications

The CSF26 is ideally suited for culinary applications, where steam is being directly injected into food product, wash-down water, etc. Other applications include autoclaves, sterilizers and humidification systems often found in the healthcare and pharmaceutical industries.

### Limiting Operating Conditions

**Max. Operating Pressure (PMO)** 150 psig/(10.3 barg)

**Max. Operating Temperature (TMO)** 366°F/(186°C)

### Pressure Shell Design Conditions

**PMA** 275 psig/0-100°F 19 barg/0-38°C

Max. allowable pressure

**TMA** 750°F/0-95 psig 399°C/0-6.5 barg

Max. allowable temp.

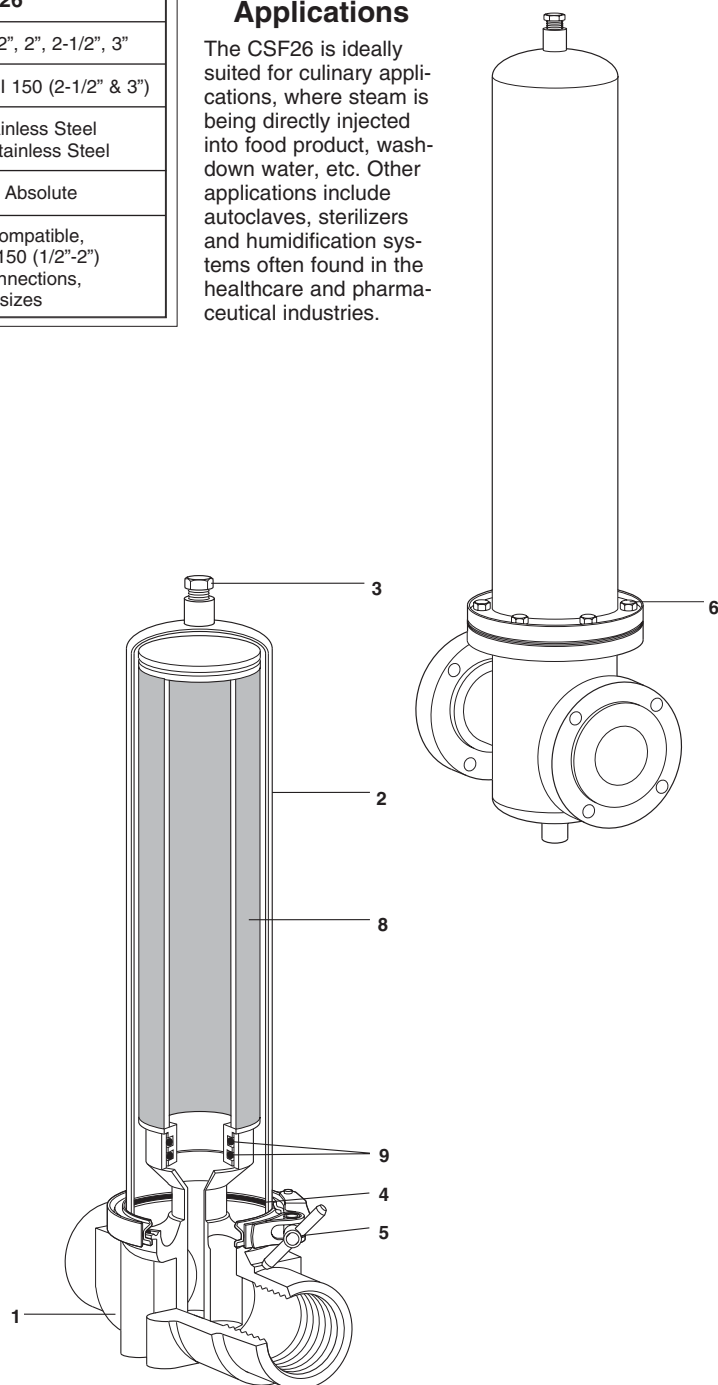
**Element Design Conditions** 15 psi/1 bar

Max. element differential pressure

### Construction Materials

No.	Part	Material
1	Filter Body	Stainless Steel
		1/2" & 3/4" SA-351 CF3M
		1" - 2-1/2" SA-351 CF8M
		3" SA-240 Gr. 316
2	Filter Bowl	Stainless Steel
		1/2" & 1" SA-240 Gr. 316L
		1-1/2" - 3" SA-240 Gr. 316
3	Plug	Stainless Steel 316
4	O-Ring	EPDM
5	Body Clamp (1/2"-2-1/2")	Stainless Steel 300 Series
6	Bolt (3" only)	Stainless Steel SA-193 Gr. B8
7*	Nut (3" only)	Stainless Steel 304
8	Element	
		Sintered Material Stainless Steel 316L Sintered Media
		End Caps Stainless Steel SA-479 Gr. 316
		O-Rings (2) EPDM

\* Not shown in drawing.



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

TI-7-005-US 5.09

# Stainless Steel Filter CSF26

## Dimensions (nominal) in inches and millimeters

Size	A	B	C	D	E	Weight
1/2"	8.0 203	4.3 110	0.6 14	2.5 64	7.0 178	3.6 lb 1.6 kg
3/4"	8.9 225	4.9 124	0.6 16	2.5 64	8.0 203	4.2 lb 1.9 kg
1"	9.6 245	4.9 124	1.3 32	4.0 102	7.0 178	5.9 lb 2.7 kg
1-1/2"	13.8 349	6.3 160	1.6 40	4.0 102	10.0 254	10.5 lb 4.8 kg
2"	22.3 565	6.7 170	1.9 48	4.0 102	18.0 457	14.0 lb 6.3 kg
2-1/2"	28.9 734	11.0 279	3.5 89	4.0 102	23.0 584	33.0 lb 15.0 kg
3"	44.0 1118	14.0 356	6.1 154	6.6 168	30.0 762	80.0 lb 36.4 kg

Vent and drain connection on all sizes - 1/4" NPT. Weight includes element.

**Capacities** — The following table lists CSF26 capacities, in lb/h of saturated steam, based on a pipeline velocity of 100 ft/s and an approximate differential pressure across the filter of 1 psi.

Steam Supply Pressure psig	Filter Size						
	1/2"	3/4"	1"	1-1/2"	2"	2-1/2"	3"
10	35	65	110	270	445	640	1,000
20	50	90	150	370	615	880	1,375
30	60	110	190	470	780	1,120	1,745
40	75	135	230	565	945	1,350	2,110
50	90	160	270	660	1,105	1,585	2,470
60	100	185	310	755	1,265	1,810	2,830
70	115	210	350	850	1,420	2,040	3,180
80	125	230	385	950	1,580	2,270	3,535
90	140	255	425	1,040	1,740	2,495	3,885
100	150	280	460	1,130	1,895	2,710	4,235
110	165	300	500	1,230	2,050	2,945	4,585
120	175	325	540	1,320	2,210	3,170	4,945
130	190	350	575	1,400	2,365	3,395	5,290
140	200	370	615	1,500	2,520	3,615	5,635
150	210	390	650	1,600	2,675	3,840	5,985

For liquid and gas applications, consult factory.

Higher capacities are available with 4" and 6" size filters. For further information, consult factory.

## Steam Filter Efficiency

The 2.8 micron absolute rated filter element will remove 95% of all particles exceeding 2 microns.

## Filter Stations

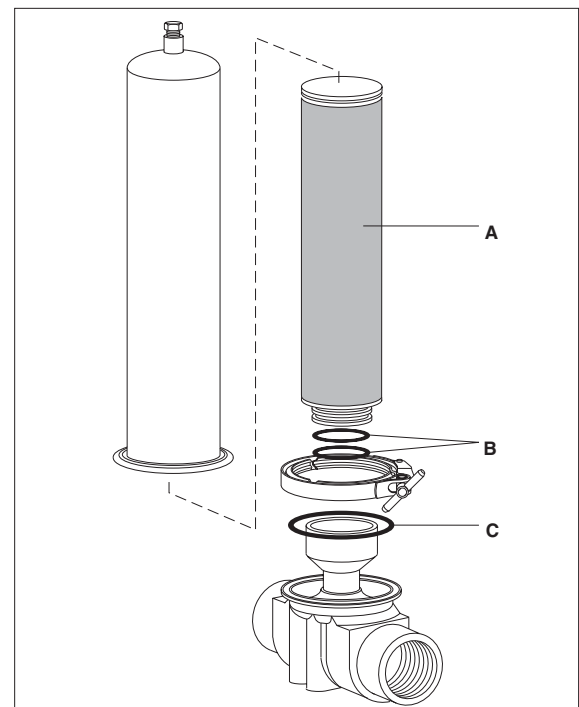
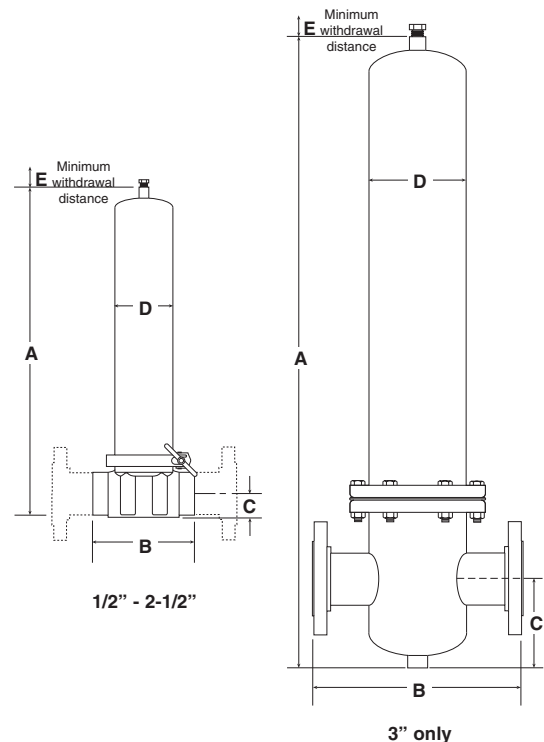
Also available from Spirax Sarco are a range of steam filter stations which conform to the requirements of the 3-A Accepted Practice Number 609-03. Each filter station includes a moisture separator with trap-set, strainer, CSF26 filter, together with the necessary auxiliary products required for efficient steam filtration. Further details are available upon request.

## Sample Specification

Steam filter shall be all 316 stainless steel, with cleanable sintered stainless steel element. Filter element to utilize double O-Ring seal, and be capable of removing 95% of all particles 2 microns and above. Body and element seals to be an FDA approved material.

## Installation & Maintenance

When used in steam service, it is recommended to remove the plastic drain plug and fit the CSF26 with a condensate drain trap and an air vent (Spirax Sarco MST 21). To prolong service life and ensure optimum filter efficiency, a strainer and separator should be installed upstream of the filter. This will ensure that entrained moisture and larger solid particles such as rust and pipescale are removed prior to filtration. It is recommended that the element be removed for cleaning when the differential pressure across the filter reaches 10 - 15 psi. Cleaning can be achieved either chemically or ultrasonically. **Complete installation and maintenance instructions, which include element cleaning procedures, accompany the product.**



## Spare Parts

Filter Element with O-Rings	A
Filter Element O-Rings(Pack of 2)	B
Body O-Rings(Pack of 2)	C

TI-7-005-US 5.09

Spirax Sarco, Inc., 1150 Northpoint Blvd, Blythewood, SC 29016

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# spirax/sarco®

## Stainless Steel Filter 4" CSF26

The CSF26 is an in-line all 316 stainless steel filter suitable for use in steam, gas and liquid systems. The CSF26 is USDA approved, and conforms to the requirements of 3-A Accepted Practice Number 609-03 for the production of culinary steam. The CSF26 utilizes a fully cleanable sintered stainless steel element for reduced cost of ownership.

Model	CSF26
Sizes	4"
Connections	ANSI 150
Construction	Body: 316 Stainless Steel Element: 316 Stainless Steel (2 Elements Required)
Element Rating	2.8 microns Absolute
Options	Tri-Clamp® compatible, BSP connections

### Typical Applications

The CSF26 is ideally suited for culinary applications, where steam is being directly injected into food product, wash-down water, etc. Other applications include autoclaves, sterilizers and humidification systems often found in the healthcare and pharmaceutical industries.

### Limiting Operating Conditions

**Max. Operating Pressure (PMO)** 195 psig/(10.4 barg)

**Max. Operating Temperature (TMO)** 375°F/(190°C)

### Pressure Shell Design Conditions

**PMA** 200 psig/0-100°F 13.8 barg/0-38°C  
Max. allowable pressure

**TMA** 375°F/0-95 psig 190°C/0-6.5 barg  
Max. allowable temp.

**Element Design Conditions** 20 psi/1.4 bar

Max. element differential pressure  
Housing is designed to contain (2) filter cartridges. Cartridges are not factory installed.

### Construction Materials

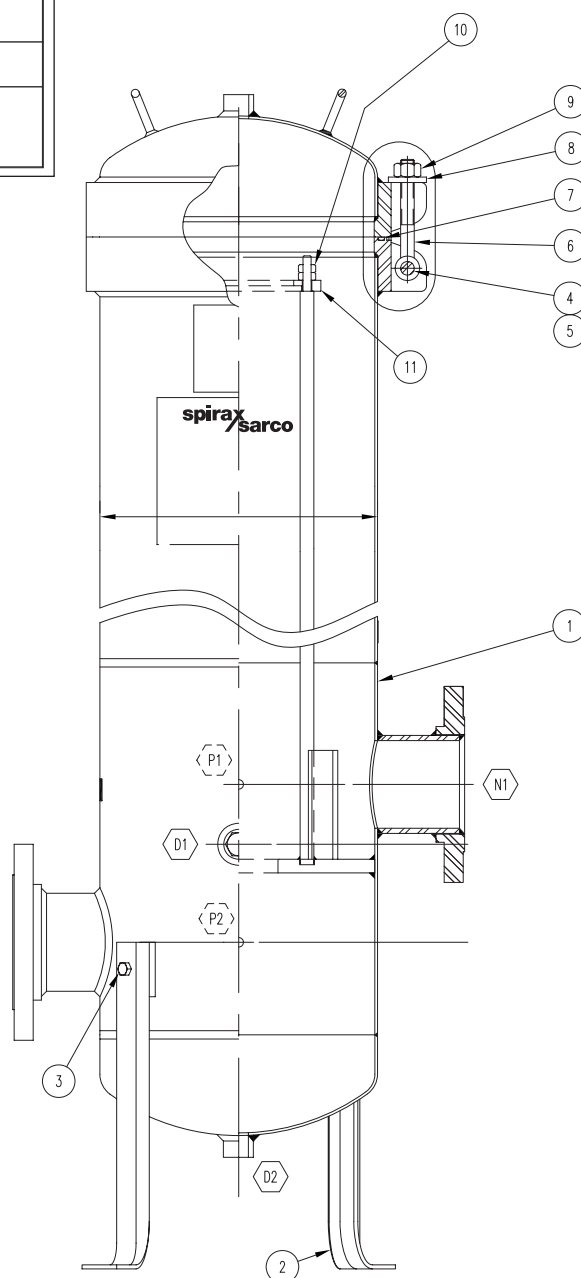
No.	Part	Material
1	HSG, Filter	316 SST
2	LEG, Filter (4)	304 SST
3	Kit, Accessory (4)	SST
4	Ring, RTNG (16)	Truarc 5133-62
5	Pin (5)	SA193 GRB7 ZP
6	Bolt Rod End (8)	5/8-11 UNC-2A x 5.00LG SA193 GRB7 ZP
7	O-Ring	Ethylene Propylene
8	Washer, Plain (8)	5/8" x 1/4" THK CS Zinc Pltd
9	Nut, Hex (8)	5/8-11 UNC-2B SA194 GR2H ZP
10	Nut, Hex (4)	3/8-16UNC, 316SST SA184 GR8M
11	Plate, Guide	SA240 316

### Minimum Clearance

29.875" (758.8) minimum required for element removal

### Surface Finish

All internal process wetted surfaces are 316 stainless steel material. The interior surface is electropolished. The exterior surface is left in the as-fabricated and as-welded condition, then electropolished.



# Stainless Steel Filter

## 4" CSF26

### Nozzle Schedule

N1	Inlet	4" - 150 lb ANSI RFSO Flange
N2	Outlet	4" - 150 lb ANSI RFSO Flange
D1, D2	Drain	¾" NPT 3000 lb Half Coupling
V1	Vent	¾" NPT 3000 lb Half Coupling
P1, P2	Pressure Tap	¼" NPT 3000 lb Half Coupling

**Capacities** — The following table lists CSF26 capacities, in lb/h of saturated steam, based on a pipeline velocity of 100 ft/s and an approximate differential pressure across the filter of 1 psi.

Steam Supply Pressure psig	Filter Size
	4"
10	1850
20	2500
30	3200
40	3910
50	4940
60	5450
70	6250
80	6850
90	7500
100	7750
110	8350
120	9000
130	9650
140	10300
150	10950

For liquid and gas applications, consult factory.

### Steam Filter Efficiency

The 2.8 micron absolute rated filter element will remove 95% of all particles exceeding 2 microns.

### Filter Stations

Also available from Spirax Sarco are a range of steam filter stations which conform to the requirements of the 3-A Accepted Practice Number 609-03. Each filter station includes a moisture separator with trap-set, strainer, CSF26 filter, together with the necessary auxiliary products required for efficient steam filtration. Further details are available upon request.

### Sample Specification

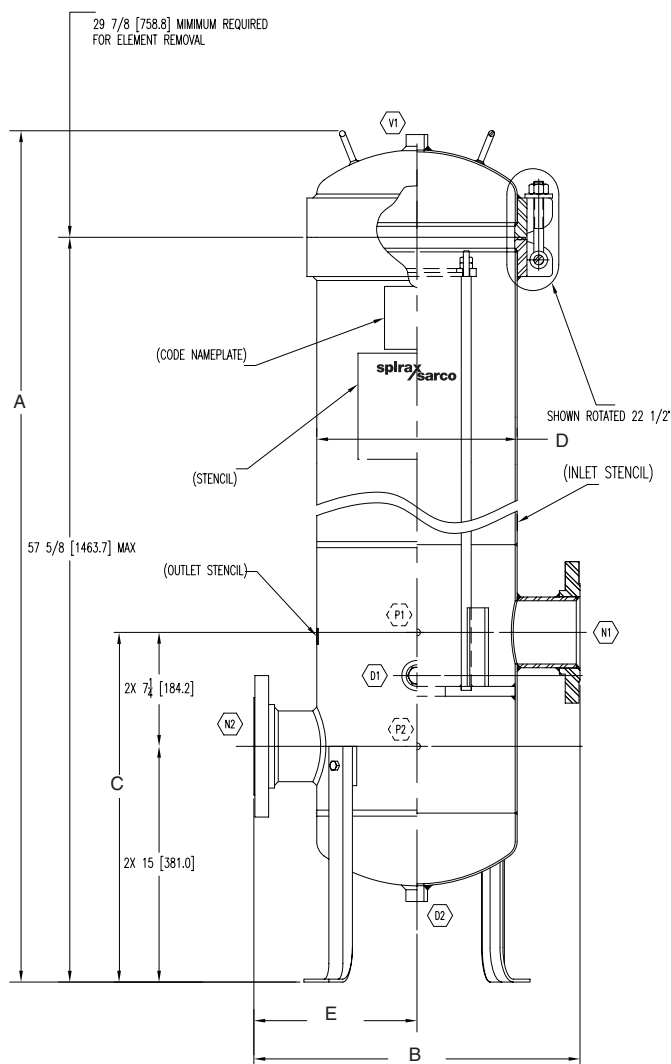
Steam filter shall be all 316 stainless steel, with cleanable sintered stainless steel element. Filter element to utilize double O-Ring seal, and be capable of removing 95% of all particles 2 microns and above. Body and element seals to be an FDA approved material.

### Installation & Maintenance

When used in steam service, it is recommended to remove the plastic drain plug and fit the CSF26 with a condensate drain trap and and air vent (Spirax Sarco MST 21). To prolong service life and ensure optimum filter efficiency, a strainer and separator should be installed upstream of the filter. This will ensure that entrained moisture and larger solid particles such as rust and pipescale are removed prior to filtration. It is recommended that the elements be removed for cleaning when the differential pressure across the filter reaches 15 - 20 psi. Cleaning can be achieved either chemically or ultrasonically. **Complete installation and maintenance instructions, which include element cleaning procedures, accompany the product.**

### Dimensions (nominal) in inches and millimeters

Size	A	B	C	D	E	Weight
4"	67 1702	20.75 527	22.25 565.2	12.75 323.9	10.375 263.5	254 lb 115 kg



### Spare Parts

Filter Element with O-Rings

Filter Element O-Rings (Pack of 2)

Body O-Rings (Pack of 2)

# spirax/sarco®

## Stainless Steel Filter 6" CSF26

The CSF26 is an in-line all 316 stainless steel filter suitable for use in steam, gas and liquid systems. The CSF26 is made of USDA approved material, and conforms to the requirements of 3-A Accepted Practice Number 609-03 for the production of culinary steam. The CSF26 utilizes a fully cleanable sintered stainless steel element for reduced cost of ownership.

<b>Model</b>	<b>CSF26</b>
<b>Sizes</b>	6"
<b>Connections</b>	ANSI 150
<b>Construction</b>	Body: 316 Stainless Steel Element: 316 Stainless Steel (4 Elements Required)
<b>Element Rating</b>	2.8 microns Absolute
<b>Options</b>	Tri-Clamp® compatible, BSP connections

### Typical Applications

The CSF26 is ideally suited for culinary applications, where steam is being directly injected into food product, wash-down water, etc. Other applications include autoclaves, sterilizers and humidification systems often found in the healthcare and pharmaceutical industries.

### Limiting Operating Conditions

**Max. Operating Pressure (PMO)** 195 psig/(13.4 barg)

**Max. Operating Temperature (TMO)** 375°F/(19°C)

### Pressure Shell Design Conditions

**PMA** 200 psig/0-100°F 13.8 barg/0-38°C  
Max. allowable pressure

**TMA** 375°F/0-95 psig 190°C/0-6.5 barg  
Max. allowable temp.

**Element Design Conditions** 100 psig/70 barg  
Max. element differential pressure  
Housing is designed to contain (4) filter cartridges. Cartridges are not factory installed.

### Construction Materials

No.	Part	Material
1	Tank Weldment	SA240-316
2	Cover Weldment	SA240-316
3	Davit Weldment	Carbon Steel
4	O-Ring	Nordel
5	Capture Plate	SA240-316
6	Hex Nut (8)	SA194GR8
7	Eyebolt - 5/8-11NC (14)	SA19B37
8	Hex Nut (14)	SA194GR2H
9	Washer (14)	ZP Steel
10	Pin (14)	SA193B7 ZP
11	Retainer (28)	SST
12	Stud ¾" - 10NC	SA193B7 Zinc Plated
13	Hex Nut	SA194GR2H
14	Washer	ZP Steel
15	Crank Handle	Malleable Iron - ZP
16	Grease Fitting	303 S/S
17	Pipe Plug (3)	SA182F316
18	Pipe Plug (2)	SA182F316
19	Code Nameplate	302 S/S
20	Stencil Plate	S/S

### Minimum Clearance

33" (838.2) minimum required for element removal

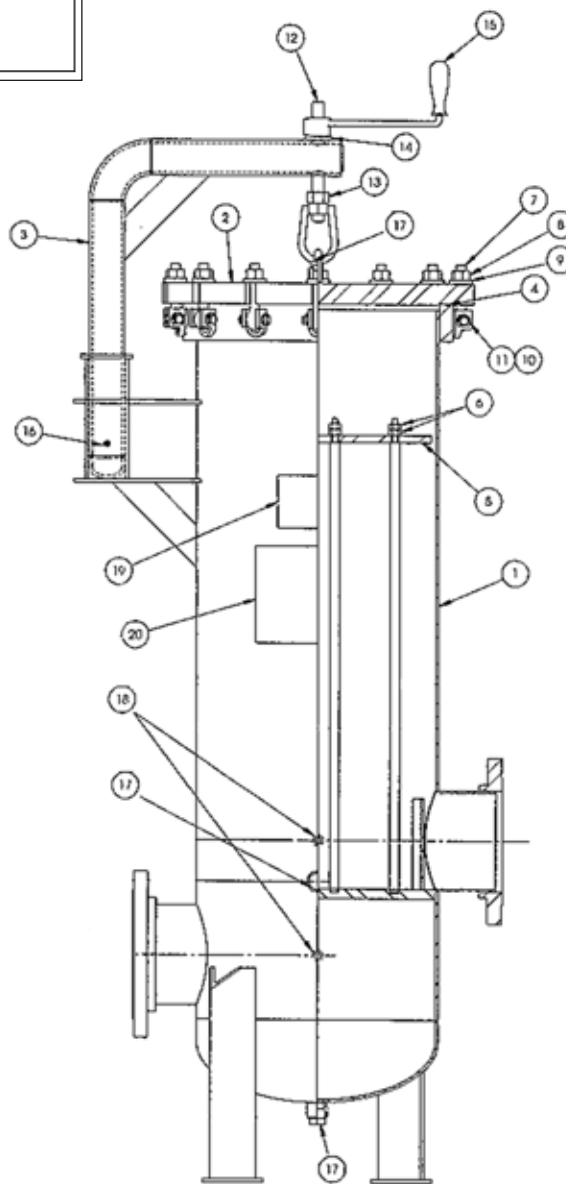
### Surface Finish

All internal process wetted surfaces are 316 stainless steel material. The interior surface is electropolished. The exterior surface is left in the as-fabricated and as-welded condition, then electropolished.

*Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only.*

*In the interests of development and improvement of the product, we reserve the right to change the specification.*

TI-7-009-US 5.09





## Stainless Steel Filter 6" CSF26

## Connections

Inlet	6" - 150 lb ANSI RF SO Flange
Outlet	6" - 150 lb ANSI RF SO Flange
Drain	¾" NPT 3000 lb Half Coupling
Vent	¾" NPT 3000 lb Half Coupling
Pressure Tap	¼" NPT 3000 lb Half Coupling

## Capacities

**Capacities** — The following table lists CSF26 capacities, in lb/h of saturated steam, based on a pipeline velocity of 100 ft/s and an approximate differential pressure across the filter of 1 psi.

Steam Supply Pressure psig	Filter Size
	6"
10	4050
20	5625
40	8900
60	12050
100	18100
150	25000

For liquid and gas applications, consult factory.

## Steam Filter Efficiency

The 2.8 micron absolute rated filter element will remove 100% of particles 2.8 micron particles and larger and 95% of 1 micron particles.

## Filter Stations

Also available from Spirax Sarco are a range of steam filter stations which conform to the requirements of the 3-A Accepted Practice Number 609-03. Each filter station includes a moisture separator with trap-set, strainer, CSF26 filter, together with the necessary auxiliary products required for efficient steam filtration. Further details are available upon request.

## Sample Specification

Steam filter shall be all 316 stainless steel, with cleanable sintered stainless steel element. Filter element to utilize double O-Ring seal, and be capable of removing 100% of all particles 2.8 microns and above. Body and element seals to be an FDA approved material.

## Installation & Maintenance

When used in steam service, it is recommended to remove the plastic drain plug and fit the CSF26 with a condensate drain trap and and air vent (Spirax Sarco MST 21). To prolong service life and ensure optimum filter efficiency, a strainer and separator should be installed upstream of the filter. This will ensure that entrained moisture and larger solid particles such as rust and pipescale are removed prior to filtration.

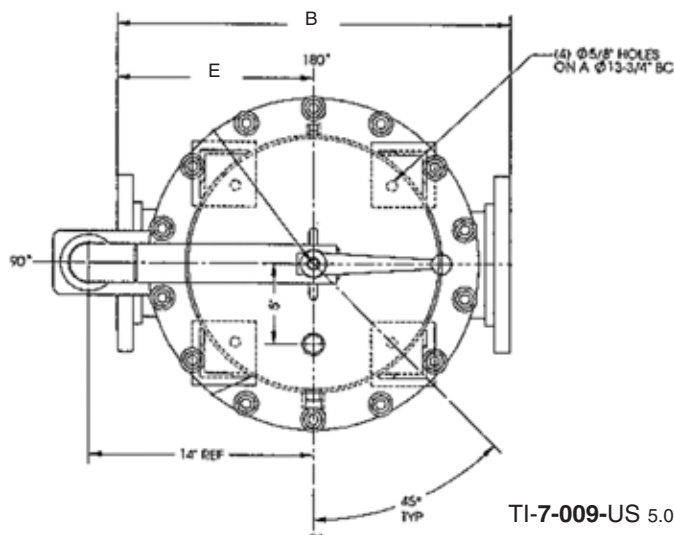
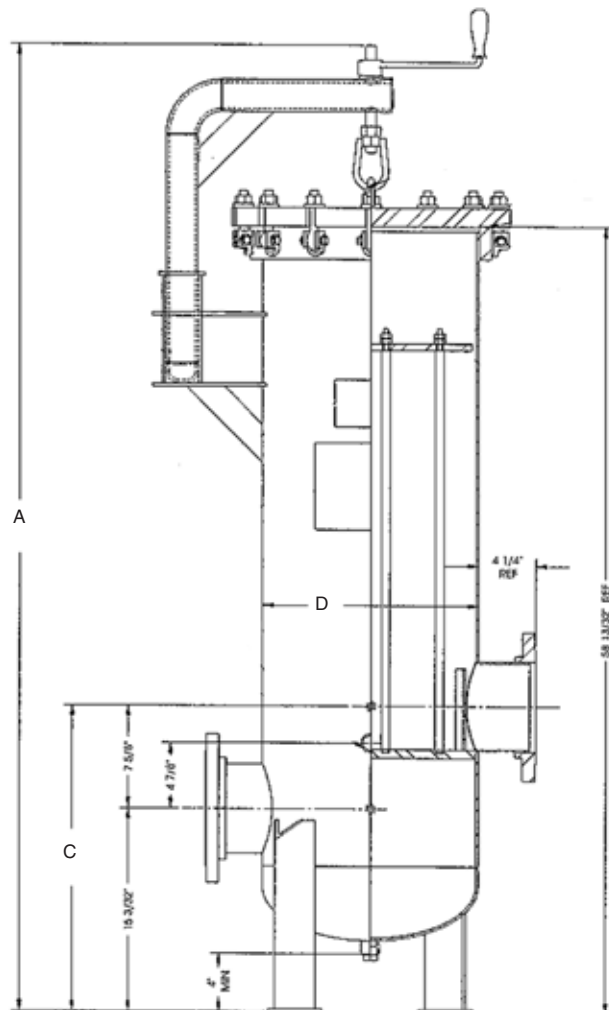
It is recommended that the elements be removed for cleaning when the differential pressure across the filter reaches 15 - 20 psi. Cleaning can be achieved either chemically or ultrasonically. **Complete installation and maintenance instructions, which include element cleaning procedures, accompany the product.**

## Spare Parts

Filter Element with O-Rings  
Filter Element O-Rings (Pack of 2)  
Body O-Rings (Pack of 2)

### Dimensions (nominal) in inches and millimeters

Size	A	B	C	D	E	Weight
6"	74 1880	24.5 622	22.72 577	16.0 406	12.25 311	490 lb 222 kg





# spirax/sarco

## CS10 Stainless Steel Clean Steam Separator

### Description

Even in the cleanest and best designed clean steam system entrained moisture can still occur, resulting in an unacceptably low dryness fraction, non-compliance of critical sterilization standards, damage to control valves/instrumentation and a generally low efficiency of the system.

The CS10 clean steam separator has been designed in full accordance with the latest edition of ASME BPE to overcome the issues of removing entrained moisture from clean and pure steam systems.

### Available types

Model	CS10-1	CS10-2
Internal	20 µ-in Ra (0.5 µm) maximum/SFV1 - as outlined in ASME BPE, with all welds ground and polished.	30 µ-in (0.75 µm) Ra maximum/SFV3 - as outlined in ASME BPE, with all welds passivated but left as laid.
External	1.6 µm (63 µ-in) Ra maximum, with a satin bead blast finish.	

### Optional surface finish (CS10-1 only)

Internal	Polish to 20 µ-in Ra (0.5 µm) maximum + Electropolished.
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**Note:** Both options have been designed with the feature of a removable baffle plate, allowing the unit to be fully inspected prior to installation and to ease periodic cleaning and de-rouging.

### Standards

This product has been designed in accordance with the latest standard of the ASME BPE guide. It also complies with the requirements of the European Pressure Equipment Directive 97/23/EC. All elastomers used comply with FDA regulation CFR 21 paragraph 177 section 2600.

1/2", 3/4" and 1" sizes are available with USP class VI.

### Certification

This product is available with the following certification:

- EN 10204 3.1 material certifications.
- Certificate of conformity including internal surface finish.
- Certification of elastomer FDA/USP compliance (the polymers for the 1 1/2" and 2" sizes are FDA approved only).

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

### Packaging

Packaging for this product is conducted in a clean environment, segregated from other non stainless steel products, and in accordance with ASME BPE for optimum protection and cleanliness; The inlet and outlet connections of the product are fitted with protective caps before being sealed with shrink wrap.

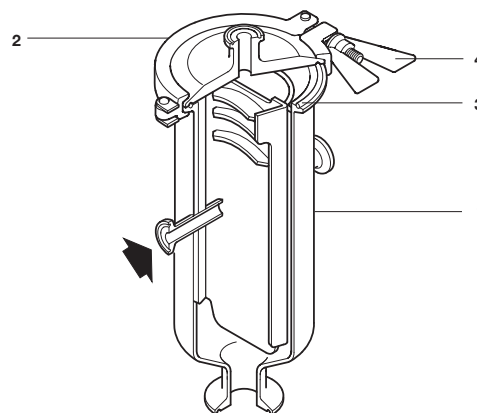
### Sizes and pipe connections

Steam inlet and outlet pipe	1/2", 3/4", 1", 1 1/2" and 2" Sanitary clamp ASME BPE (Tri-clamp®) or DIN 32676 upon request. Extended tube weld ends (ETO) ASME BPE or DIN 11850 upon request.
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Drain	1" ASME BPE (Tri-clamp®)
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Vent	1/2" ASME BPE (Tri-clamp®)
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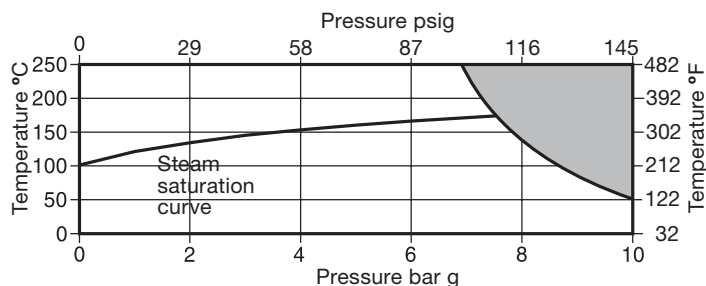
**Note:** Other connections are available upon request.



### Materials

No.	Part	Material
1	Body	Fabricated stainless steel ASTM A312 316L ASTM A240 316L ASTM A276 316L
2	Cover + Baffle	Fabricated stainless steel ASTM A240 316L ASTM A276 316L
3	Seal	Viton
4	Clamp	Stainless steel AISI 316

### Pressure/temperature limits (ISO 6552)



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

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

Body design conditions		PN10
PMA	Maximum allowable pressure	10 bar g @ 50°C (145 psig @ 122°F)
TMA	Maximum allowable temperature	250°C (482°F)
Minimum allowable temperature		-10°C (14°F)
PMO	Maximum operating pressure for saturated steam service	7.6 bar g (110 psi g)
TMO	Maximum operating temperature	250°C @ 6.8 bar g (99 psig @ 482°F)
Minimum operating temperature		0°C (32°F)
Designed for a maximum cold hydraulic test pressure of 15 bar g (217 psig)		

Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only.

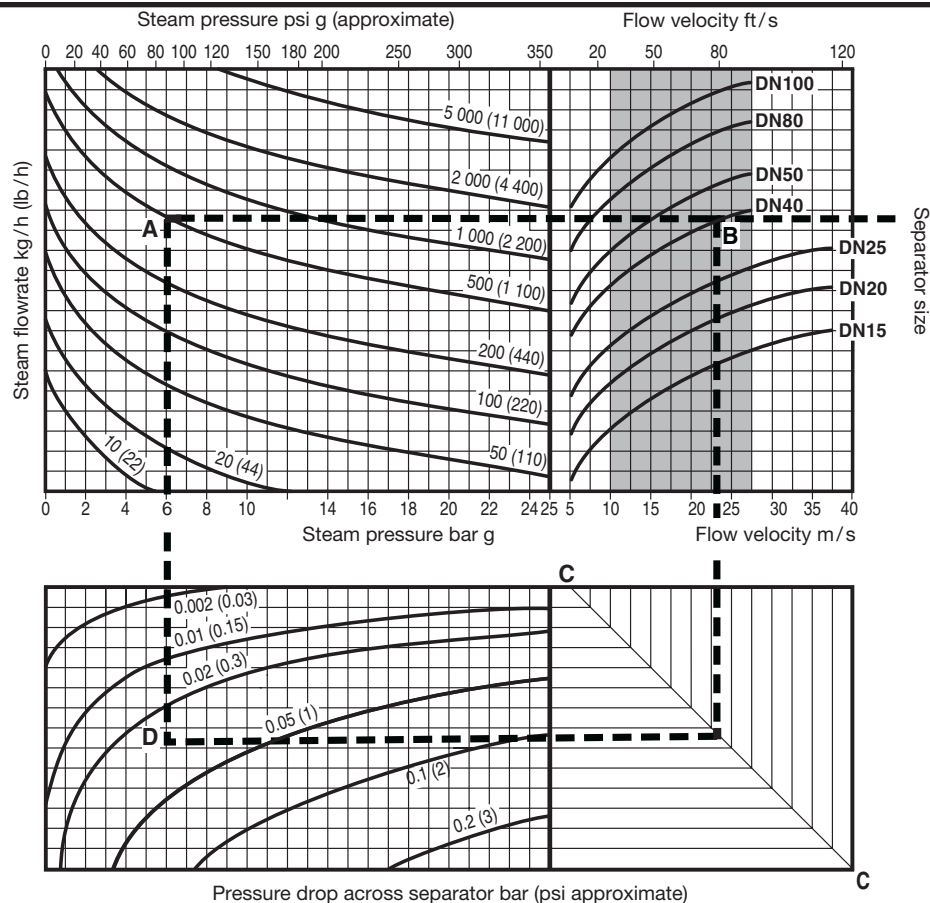
In the interests of development and improvement of the product, we reserve the right to change the specification.

TI-P023-59-US 06.10

## Steam sizing example

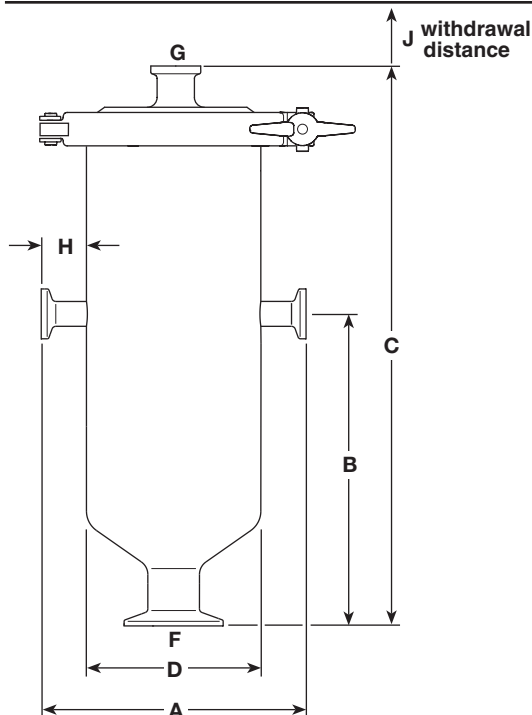
- Plot point A** where the steam pressure and flowrate cross, e.g. 6 bar g / 500 kg/h: Draw a horizontal line.
- Select line size.** Any separator curve that is bisected by this line within the shaded area will operate at near 100% efficiency, e.g. 1½" (DN40), point B.
- Ascertain velocity.** Line velocity for any size can be determined by dropping a vertical line from point B. This line crosses the velocity axis at 23 m/s.
- Pressure drop.** Where the line extended from point B crosses the line C - C, plot a horizontal line. Now drop a vertical line from point A. The point of intersection, D, is the pressure drop across the separator, i.e. about 0.035 bar.
- Separators should be selected on the basis of the best compromise between line size, velocity and pressure drop for each application.**

**Note:** For larger sizes and alternative, metals and pressure and temperatures that exceed these operating conditions please contact Spirax Sarco for a bespoke product. Independent research carried out by Liverpool University in England provided the experimental data from which the above graph was derived.



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

Steam inlet/outlet size	A	B	C	D	F (drain)	G (vent)	H	J	Weights	Volume
½"	135 (5.3)	161 (6.3)	290 (11.4)	88.9 (3.5)	1"	½"	23 (0.9)	215 (8.5)	3.0 (6.6)	1.2 (0.3)
¾"	160 (6.3)	178 (7.0)	371 (14.6)	114.3 (4.5)	1"	½"	23 (0.9)	290 (11.4)	5.0 (11.0)	2.5 (0.7)
1"	160 (6.3)	178 (7.0)	371 (14.6)	114.3 (4.5)	1"	½"	23 (0.9)	290 (11.4)	5.0 (11.0)	2.5 (0.7)
1½"	195 (7.7)	213 (8.4)	485 (19.1)	141.3 (5.6)	1"	½"	27 (1.1)	400 (15.7)	9.2 (20.3)	5.5 (1.5)
2"	195 (7.7)	213 (8.4)	535 (21.0)	141.3 (5.6)	1"	½"	27 (1.1)	450 (17.7)	10.0 (22.0)	6.3 (1.7)



## Safety information, installation and maintenance

For full details see the Installation and Maintenance Instructions (IM-P023-60) supplied with the product.

### Installation note

The CS10 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 x 2" Spirax Sarco CS10-1 stainless steel clean steam separator with removable baffle plate. Sanitary clamp connections to ASME BPE, internal surface finish of 20 micro-inch complete with material certification to EN 10204 3.1.

## Spare parts

Please refer to the dimension drawing to the left.

### Available spares

Seal	3
Clamp	4

### How to order spares

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

**Example:** 1 x Seal for a Spirax Sarco 1½" CS10-1 stainless steel clean steam separator.

TI-P023-59-US 06.10

# spirax/sarco

## SGS10 Stainless Steel Sanitary Sight Glass

### Description

The SGS10 sanitary sight glass is a full view, full port sight glass suitable for a wide range of high purity applications in the food, medical, and bio-pharmaceutical industries. The unit is designed in accordance with the 3A's sanitary standards and is manufactured from 316 stainless steel and toughened borosilicate.

#### Surface finish

Internal surface finish - <0.4 uRa (15 micro inch).

#### Standards:

- The SGS10 has been designed in full accordance with 3A's sanitary standard 65-00 - design criteria for sight glasses.
- All elastomers used comply with FDA regulation CFR 21 paragraph 177 section 2600.
- Extended tube weld end material (316L) as per criteria outlined in the current edition of ASME BPE - to special order.

#### Certification

This product is available with the following certification:

- EN 10204 3.1 material certifications.
- Certification to 3A's standard No. 65-00 - design criteria for sight glasses.
- Certificate of conformity including internal surface finish.
- Certification of elastomer FDA compliance.

**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 the current edition of ASME BPE. Inlet and outlet connections are capped and the product is sealed in a plastic bag or shrink wrapped prior to boxing.

### Sizes and pipe connections

1/2", 3/4", 1", 1 1/2" and 2" available as standard. 2 1/2", 3" and 4" are available to special order.

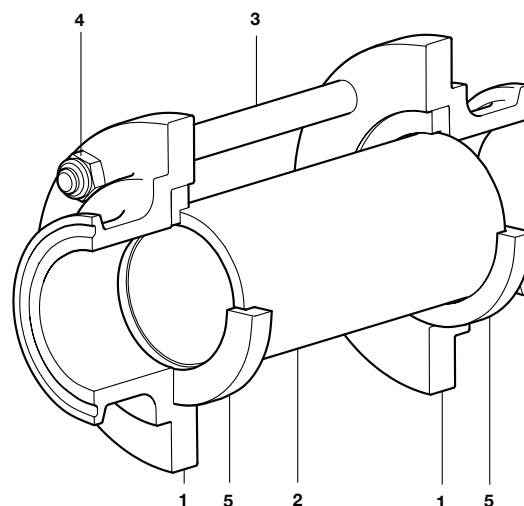
- ASME BPE clamp.

#### Connections available to special order:

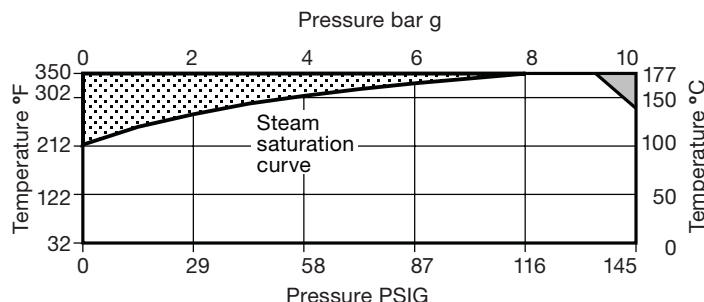
- Sanitary clamp to DIN 32676.
- Extended tube weld ends to ASME BPE.
- Extended tube weld ends to DIN 11850.

### Materials


No.	Part	Material
1	Body (sanitary clamp)	Stainless steel 316
	Extended tube weld ends	Stainless steel 316 L
2	Glass	Borosilicate
3	Tie rods	Stainless steel 316
4	Nuts	Stainless steel 316
5	Seals	1/2" - 3/4" FDA compliant teflon
		1" - 4" FDA compliant viton



### 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.

**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	145 PSIG @ 284°F 10 bar g @ 140°C
TMA	Maximum allowable temperature	350°F @ 133 PSIG 177°C @ 9.2 bar g
Minimum allowable temperature		-425°F -254°C
PMO	Maximum operating pressure for saturated steam service	87 PSIG 6 bar g
TMO	Maximum operating temperature	329°F @ 87 PSIG 165°C @ 6 bar g
Minimum operating temperature		32°F 0°C
Designed for a maximum cold hydraulic test pressure of 15 bar g		

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

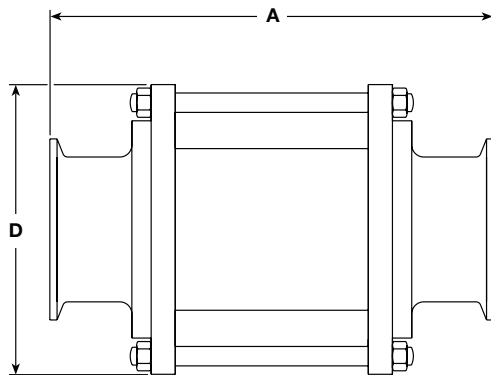
TI-P130-25-US 3.07

## Dimensions (approximate) in inches and mm for ASME BPE units

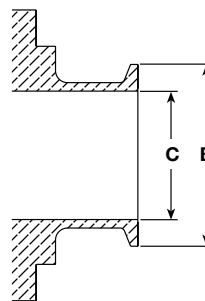
**Note:** To facilitate orbital welding extended tube end connections are provided with 40 mm (1½" - 2½") and 50 mm (3" and 4") tube extensions as specified in ASME BPE.

Sanitary clamp									
	A		B		C		D		Weight
Size	inches	mm	inches	mm	inches	mm	inches	mm	lbs.
½"	5.2	131.4	1.0	25.2	0.4	9.4	1.9	47.0	1.0
¾"	5.2	131.4	1.0	25.2	0.6	15.8	2.0	50.0	0.8
1"	5.6	143.0	2.0	50.5	0.9	22.1	3.1	79.0	2.6
1½"	5.9	151.0	2.0	50.5	1.4	34.8	3.3	85.0	2.5
2"	6.1	155.0	2.5	64.0	1.9	47.5	4.1	105.0	3.7
2½"	6.1	155.0	3.1	77.5	2.4	60.2	4.4	112.0	3.7
3"	6.2	157.0	3.6	91.0	2.9	72.9	4.9	125.0	4.8
4"	6.4	163.0	4.7	119.0	3.8	97.4	6.2	157.0	7.2

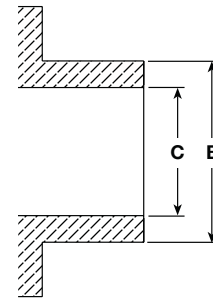
Extended tube weld ends									
	A		B		C		D		Weight
Size	inches	mm	inches	mm	inches	mm	inches	mm	lbs.
½"	6.5	166	0.5	12.7	0.4	9.4	1.9	47.0	0.8
¾"	6.5	166	0.7	19.05	0.6	15.75	2.0	50.0	0.7
1"	7.5	190	1.0	24.4	0.9	22.1	3.1	79.0	2.0
1½"	7.2	183	1.5	38.1	1.4	34.8	3.3	85.0	2.3
2"	7.6	192	2.0	50.8	1.9	47.5	4.1	105.0	3.5
2½"	7.6	194	2.5	63.5	2.4	60.2	4.4	112.0	3.5
3"	8.5	216	3.0	76.2	2.9	72.9	4.9	125.0	3.9
4"	8.6	218	4.0	101.6	3.8	97.38	6.2	157.0	6.5



Sanitary Clamp

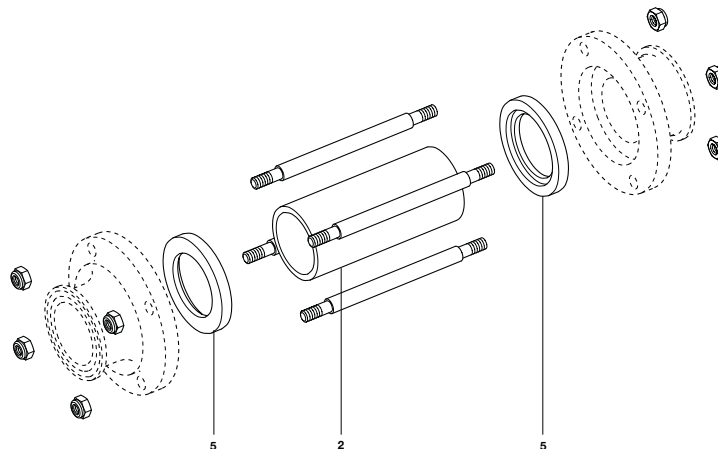


Extended tube ends



## Spare parts

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



# spirax/sarco

## Sanitary Pressure Gauge

### Description

The hygienic pressure gauge for clean steam applications is made of stainless steel and can be used in adverse service conditions where pulsation or vibration exists. It is 3A compliant and suitable for corrosive environments and gaseous or liquid media that will not obstruct the pressure system.

#### Available dial size and ranges:

Dial Size	Range	Range	Range	Range
2-1/2"	0-30 psi	0-60 psi	0-100 psi	0-160 psi
4"	0-30 psi	0-60 psi	0-100 psi	30hg/60psi

Note: Other sizes and ranges are available through special request.

### Certification

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

### Pipe connection 1½" sanitary clamp connection.

Note: Other pipe connections are available through a special quote.

### Pressure/temperature limits

PMA	Maximum allowable pressure	Short time	1.3 x Full scale reading
		Steady	Full scale reading
		Fluctuating	0.9 x Full scale reading
TMA	Maximum allowable temperature		200°C
	Minimum allowable temperature		-20°C
PMO	Maximum operating pressure		Range 1 6 bar
			Range 2 10bar
TMO	Maximum operating temperature		184°C

### Accuracy

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

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

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

### Installation note:

It is recommended that all gauges are fitted with suitable isolation valves to allow for safe maintenance/replacement. Fittings, clamps and gaskets for pipe end connections are not supplied.

### Maintenance note:

The only maintenance work necessary is regular cleaning of the polycarbonate window. Solvents should not be used to clean the window as it may impair clarity.

### Caution

Do not over-tighten the clamp as this may cause the gasket to spread/extrude.

### Disposal

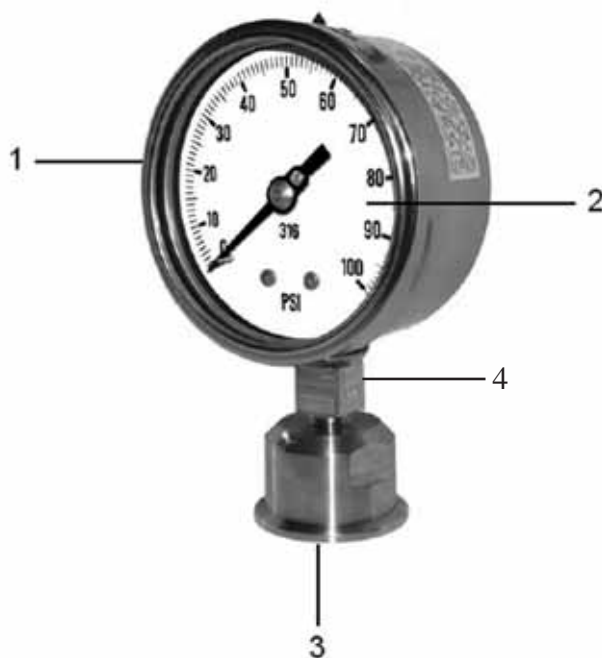
The product is recyclable. Care must be taken to ensure disposal of oil is carried out in accordance with national and local regulations regarding disposal of waste oil.

### Spare parts

No spare parts are available for the hygienic pressure gauge.

### How to order

**Example:** 1 off Spirax Sarco 2½" hygienic pressure gauge with a pressure range of 0 - 100 psi and having sanitary clamp connections.

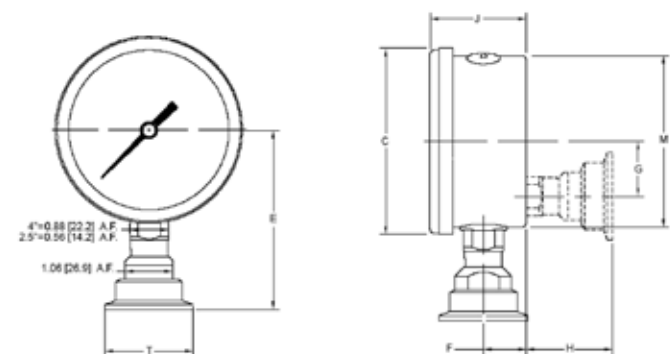


### Materials

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

Hermetically Sealed/Weather Proof

### Dimensions/weight (approximate) in mm and kg



Tri-Clamp		C	E	F	G	H	J	M	T
2½"	1½"	2.72 [69.1]	2.87 [73]	0.39 [10]	CENTER	1.63 [41.5]	1.14 [29]	2.48 [63]	1.98 [50]
	2"	2.72 [69.1]	3.07 [78]	0.39 [10]	CENTER	1.83 [46.5]	1.14 [29]	2.48 [63]	2.51 [64]
4"	1½"	4.18 [106.2]	4.02 [102]	0.96 [24.4]	1.24 [24.4]	1.93 [49]	2.15 [54.6]	3.85 [97.8]	1.98 [50]
	2"	4.18 [106.2]	4.21 [107]	0.96 [24.4]	1.24 [54]	2.12 [54]	2.15 [54.6]	3.85 [97.8]	2.51 [64]

Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only.

In the interests of development and improvement of the product, we reserve the right to change the specification.

Spirax Sarco, Inc., 1150 Northpoint Blvd., Blythewood, SC 29016 • Phone: (803) 714-2000 • Fax: (803) 714-2222

TI-7-007-US 2.07

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# spirax/sarco

## Pharmaceutical Mobile Steam Sampling PSM Series

### Description

The Model PSM Mobile Steam Sampling Cart is engineered and fabricated to improve safety, efficiency, and operability in the collection of clean steam samples for testing. The unit is specifically designed for taking critical quality samples for total organic carbon (TOC), conductivity and microbiological/endotoxin monitoring. The highest regard is given to maintaining the integrity of your quality samples.

The Model PSM, available in three sample delivery capacities, is a complete and comprehensive package for pure or clean steam systems.

### Typical applications

Pure/clean steam sampling, point-of-use cooling in hot purified water systems.

### Principal features

- Cooling Heat Exchanger
- Sample Temperature Gauge
- Sample Outlet Valve
- Cooling Water Pressure Gauge
- Cooling Water Isolation Valve
- Pressure Relief Valve
- Sanitary Pipe Supports
- Swivel Casters With Brakes
- Tri-Clamp Connections
- Cleanroom Compatible Construction

### Sizes and pipe connections

- Cooling water supply, cooling water return, clean steam supply, sample outlet
- All 3/4" Tri-Clamp

### Limiting conditions (heat exchanger)

Pressure Range (Dry, Saturated Steam) <sup>1</sup>	0–4.1 barg	0–60 psig
Condensate Sample Outlet Flows	0.25–1.75 litres/min	
HE Tube Side Max. Pressure	8.6 barg	125 psig
Shell Side Max. Pressure (Including Spikes) <sup>2</sup>	27.6 barg	400 psig

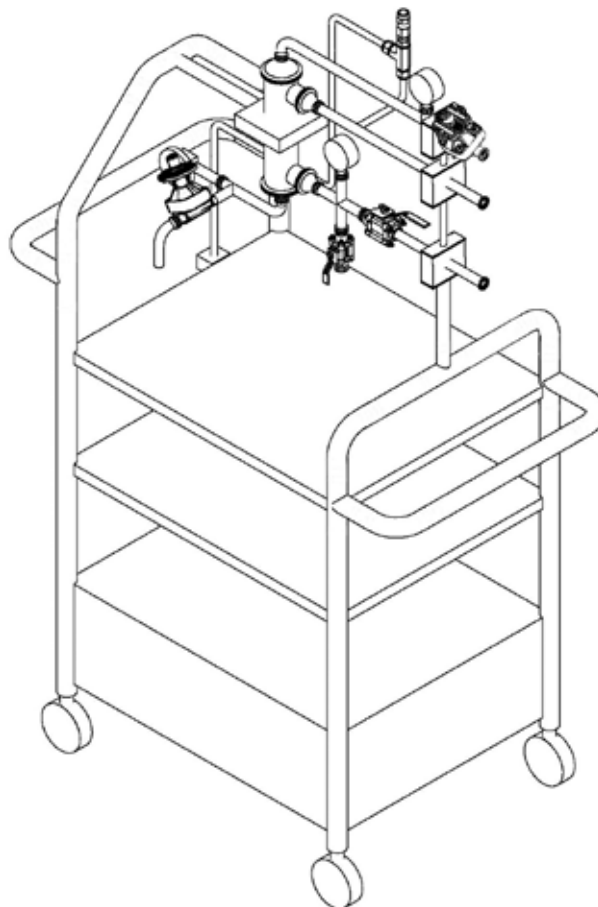
<sup>1</sup>Requires Clean Steam Inlet Pressure Gauge and Clean Steam Inlet Valve (Options 007 and 008) for pressures higher than 3.1 barg (45 psig).

<sup>2</sup>Maximum operating pressure for sanitary fittings is determined by the sanitary flange clamp rating used for connections. Refer to manufacturer's literature for details.

### Materials

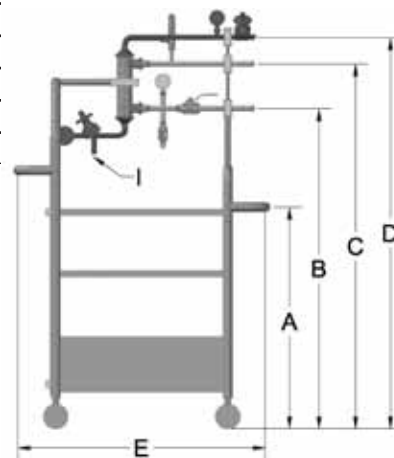
Cart	316L/304 Stainless Steel		
Clean Steam Piping	316L Stainless Steel		
Sample Piping	316L Stainless Steel		
Cooling Water Piping	304 Stainless Steel		
Casters	304 Stainless Steel	with non-marking polyurethane wheels	

Material certification documents provided.



### Dimensions (nominal)

	mm	in.
A	915	3'-0"
B	1320	4'-4"
C	1500	4'-11"
D	1600	5'-3"
E	1015	3'-4"



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## Packaging

All packaging of the PSM Series mobile unit is conducted in a clean environment segregated from other non stainless steel manufacturing and is in accordance with ASME BPE.

## How to order

Size the unit based on required sample volume. Time to produce the sample volume is based on heat exchanger heat transfer area. Actual sample delivery rates are dependent upon clean steam pressure, cooling water inlet temperature and available cooling water flow.

Heat Tfr. Area, m <sup>2</sup> (ft <sup>2</sup> )	Sample Flow Rate, litres/min	Part No.	Order Code
0.07 (0.75)	0.25–0.5	PSM-075-01	A1
0.13 (1.43)	0.5–1.0	PSM-143-02	A2
0.39 (4.19)	>1.5	PSM-419-03	A3

### Options:

Description	Part No.	Order Code
Custom Option	N/A	X
Site Acceptance Testing	PSM-SAT-001	001
Commissioning/Validation Protocols & Execution	PSM-CVPE-002	002
Standard Operating Procedures (SOPs)	PSM-SOP-003	003
Electropolished Piping	PSM-EP-004	004
Third Party Weld Inspection	PSM-TPWI-005	005
Double Tubesheet Heat Exchangers	PSM-DTHE-006	006
Clean Steam Inlet Pressure Gauge	PSM-IPG-007	007
Clean Steam Inlet Valve	PSM-IV-008	008
Hose Packages	PSM-HP-009	009
Third Storage Shelf	PSM-SS-010	010
Cooling Water Inlet Carbon Filter (Recommended for use with municipal water service)	PSM-CF-011	011

### Example:

Series	Size	Options
PSM	A2	003-005-007-008-009-011

## Specification

The mobile steam sampling cart shall be of all-stainless steel, clean room-compatible construction, with sanitary, self-draining piping design. The steam condenser shall be a clean steam-compliant shell & tube heat exchanger sized to deliver an appropriate test sample volume in a reasonable time and shall be able to accommodate chilled water, cooling tower water or municipal water as a cooling source. The system shall include the following instrumentation and controls at minimum: a sample temperature gauge, a cooling water pressure gauge, a sample outlet valve, a cooling water isolation valve and a pressure relief valve. All wetted-surface pipeline components shall be manufactured from 316L stainless steel and provided with Tri-Clamp sanitary couplings. Service connections shall be 3/4-in. Tri-Clamp. Vertical clearance beneath the sample outlet valve shall be at least 10 in. A validatable documentation package shall be provided upon delivery, including drawings, material certification documents and weld certification documents.

## Weights (nominal)

Standard cart, kg (lb)	45–54 (100–120)
Cart with hose option, kg (lb)	52–61 (115–135)

## Installation

Approach piping for both clean steam and cooling water should be evaluated by a qualified engineer and necessary modifications undertaken to minimize the potential for destructive and/or dangerous water hammer events during operation.

Cooling water pressure, including momentary spikes, should be controlled so as not to exceed the heat exchanger operational specification. Soft opening and closing control valves are recommended.

Correct condensate drainage within the clean steam line is important to protection of clean steam sample cooler cart as well as other steam system components to guard against potential water hammer damage.

## Safety and operation

NOTE: This cart is engineered to provide a safer way of obtaining clean steam samples efficiently. However, no steam sample collection device is completely fail-safe. The prudent manager will consider the capabilities of employees and evaluate potential risks and advisability of configuring the system with additional safety-related instrumentation and controls. Your Spirax Sarco representative is available to offer advice.

WARNING: To avoid the risk of scalding, it is essential that cooling water is flowing before opening the sample valve. Always close the sample inlet valve before turning off the cooling water.

# spirax/sarco

## Pharmaceutical Steam Sampling Panel PSS Series

### Description

The Model PSS Steam Sample Cooler Panel is engineered and fabricated to improve safety, efficiency, and operability in the collection of clean steam samples for testing. The unit is specifically designed for taking critical quality samples for total organic carbon (TOC), conductivity and microbiological/endotoxin monitoring. The highest regard is given to maintaining the integrity of your quality samples.

The Model PSS, available in two sample delivery capacities, is a complete and comprehensive package for pure or clean steam systems.

### Typical applications

Pure/clean steam sampling, point-of-use cooling in hot purified water systems.

### Principal features

- Cooling Heat Exchanger
- Sample Temperature Gauge
- Sample Outlet Valve
- Cooling Water Pressure Gauge
- Cooling Water Isolation Valve
- Pressure Relief Valve
- Sanitary Pipe Supports
- Tri-Clamp Connections
- Cleanroom Compatible Construction

### Sizes and pipe connections

- Cooling water supply, cooling water return, clean steam supply, sample outlet
- All 3/4" Tri-Clamp

### Limiting conditions (heat exchanger)

Pressure Range (Dry, Saturated Steam) <sup>1</sup>	0–4.1 barg	0–60 psig
Condensate Sample Outlet Flows	0.25–1.75 litres/min	
HE Tube Side Max. Pressure	8.6 barg	125 psig
Shell Side Max. Pressure (Including Spikes) <sup>2</sup>	27.6 barg	400 psig

<sup>1</sup>Requires Clean Steam Inlet Pressure Gauge and Clean Steam Inlet Valve (Options 007 and 008) for pressures higher than 3.1 barg (45 psig).

<sup>2</sup>Maximum operating pressure for sanitary fittings is determined by the sanitary flange clamp rating used for connections. Refer to manufacturer's literature for details.

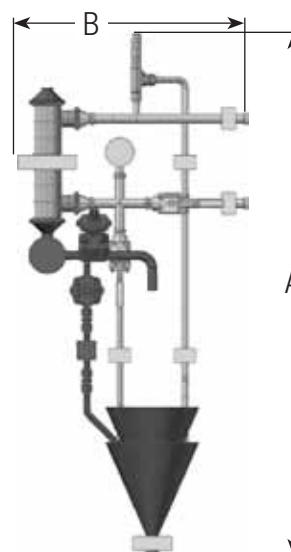
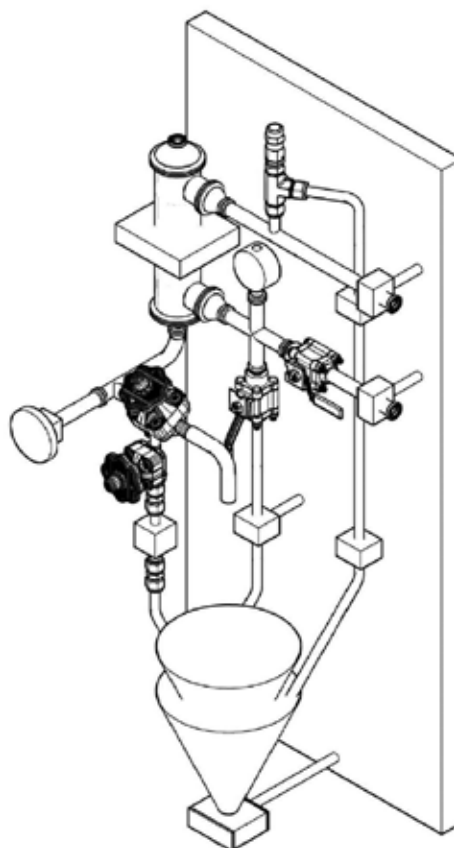
### Materials

Clean Steam Piping	316L Stainless Steel
Sample Piping	316L Stainless Steel
Cooling Water Piping	304 Stainless Steel

Material certification documents provided.

### Dimensions (nominal)

	mm	in.
A	1143	3' 9"
B	508	1' 8"



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## Packaging

All packaging of the PSS Series panel unit is conducted in a clean environment segregated from other non stainless steel manufacturing and is in accordance with ASME BPE.

## How to order

Size the unit based on required sample volume. Time to produce the sample volume is based on heat exchanger heat transfer area. Actual sample delivery rates are dependent upon clean steam pressure, cooling water inlet temperature and available cooling water flow.

Heat Tfr. Area, m <sup>2</sup> (ft <sup>2</sup> )	Sample Flow Rate, litres/min	Part No.	Order Code
Lower Pressure 45 psig Units			
0.07 (0.75)	0.25–0.5	PSS-075-01	A1
0.13 (1.43)	0.5–1.0	PSS-143-02	A2
0.39 (4.19)	>1.5	PSS-419-03	A3
Higher Pressure 60 psig Units			
0.11 (1.2)	0.25–0.5	PSS-120-60-04	A4
0.17 (1.8)	0.5–0.75	PSS-180-60-05	A5
0.24 (2.6)	0.75–1.0	PSS-260-60-06	A6

### Options:

Description	Part No.	Order Code
Custom Option	N/A	X
Site Acceptance Testing	PSS-SAT-001	001
Commissioning/Validation Protocols & Execution	PSS-CVPE-002	002
Standard Operating Procedures (SOPs)	PSS-SOP-003	003
Electropolished Piping	PSS-EP-004	004
Third Party Weld Inspection	PSS-TPWI-005	005
Double Tubesheet Heat Exchangers	PSS-DTHE-006	006
Clean Steam Inlet Pressure Gauge	PSS-IPG-007	007
Clean Steam Inlet Valve	PSS-IV-008	008
Hose Packages	PSS-HP-009	009
Third Storage Shelf	PSS-SS-010	010
Cooling Water Inlet Carbon Filter (Recommended for use with municipal water service)	PSS-CF-011	011

### Example:

Series	Size	Options
PSS	A2	003-005-007-008-011

## Specification

The steam sampling panel shall be of all-stainless steel, clean room-compatible construction, with sanitary, self-draining piping design. The steam condenser shall be a clean steam-compliant shell & tube heat exchanger sized to deliver an appropriate test sample volume in a reasonable time and shall be able to accommodate chilled water, cooling tower water or municipal water as a cooling source. The system shall include the following instrumentation and controls at minimum: a sample temperature gauge, a cooling water pressure gauge, a sample outlet valve, a cooling water isolation valve and a pressure relief valve. All wetted-surface pipeline components shall be manufactured from 316L stainless steel and provided with Tri-Clamp sanitary couplings. Service connections shall be 3/4-in. Tri-Clamp. Vertical clearance beneath the sample outlet valve shall be at least 10 in. A validatable documentation package shall be provided upon delivery, including drawings, material certification documents and weld certification documents.

## Weights (nominal)

Lower pressure model, kg (lb)	32–41 (70–90)
Higher pressure model, kg (lb)	41–50 (90–110)

## Installation

Approach piping for both clean steam and cooling water should be evaluated by a qualified engineer and necessary modifications undertaken to minimize the potential for destructive and/or dangerous water hammer events during operation.

Cooling water pressure, including momentary spikes, should be controlled so as not to exceed the heat exchanger operational specification. Soft opening and closing control valves are recommended.

Correct condensate drainage within the clean steam line is important to protection of clean steam sample cooler cart as well as other steam system components to guard against potential water hammer damage.

## Safety and operation

NOTE: This cart is engineered to provide a safer way of obtaining clean steam samples efficiently. However, no steam sample collection device is completely fail-safe. The prudent manager will consider the capabilities of employees and evaluate potential risks and advisability of configuring the system with additional safety-related instrumentation and controls. Your Spirax Sarco representative is available to offer advice.

WARNING: To avoid the risk of scalding, it is essential that cooling water is flowing before opening the sample valve. Always close the sample inlet valve before turning off the cooling water.



## STERI-TROL Clean Service 'S' series Two-port and Three-Port Control Valves - DN15 (½") to DN100 (4")

### Description

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

### Available types

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

### Valve characteristics - options:

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

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

### Approvals and certification

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

### Valve seating - options:

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

### Valve stem sealing - options:

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

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

<b>Electric</b>	EL3500 and EL5600 series
<b>Pneumatic</b>	PNS3000, PNS4000, PN9000E and PN9000R series
	PP5 (pneumatic) or EP5 (electropneumatic)
<b>Positioners</b>	ISP5 (intrinsically safe electropneumatic)
	SP200 (smart electropneumatic)
	SP300

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

### Sizes and end connections

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

**\*Note:** Other end connections are available as detailed on page 14. 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.

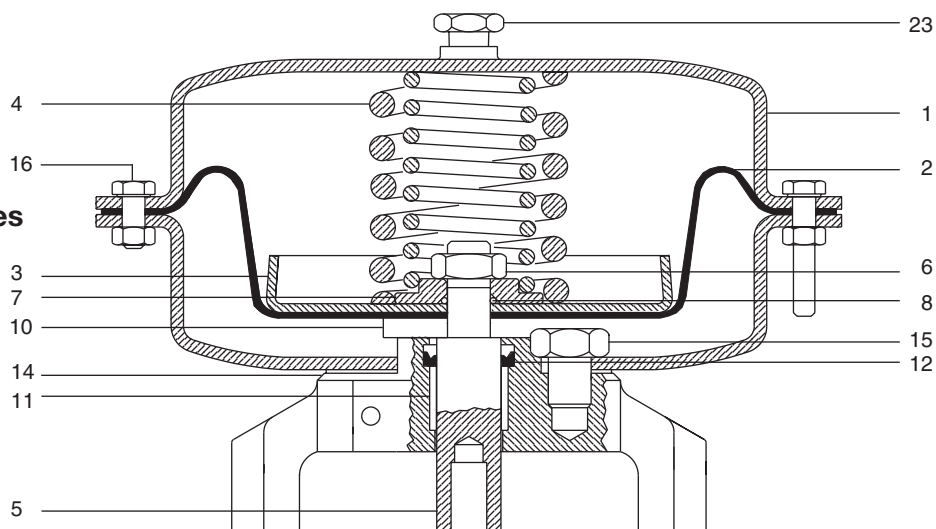


### Technical data

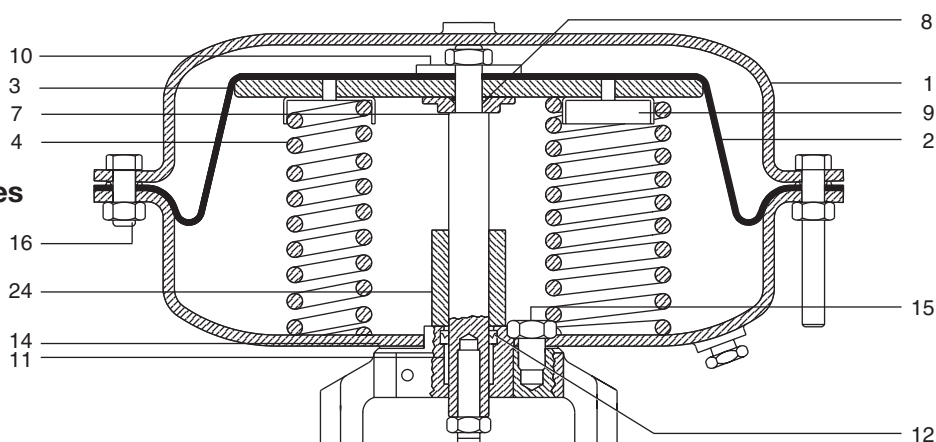
<b>Plug design</b>	DN15 to DN100	Parabolic
<b>Leakage</b>	Metal-to-metal	IEC 534-4 Class IV
	Soft seal	IEC 534-4 Class VI
<b>Rangeability</b>	Equal percentage	50:1
	Linear	30:1
<b>Travel</b>	DN15 to DN50 (½" to 2")	¾"
	DN65 to DN100 (2½" to 4")	1 ⅜"
<b>Surface finish</b>	Internal (Mechanical or electro polished)	16 Ra
	External	< 24 Ra

## Materials

### PNS3000 series



### PNS4000 series



### PNS3000 and PNS4000 series actuators

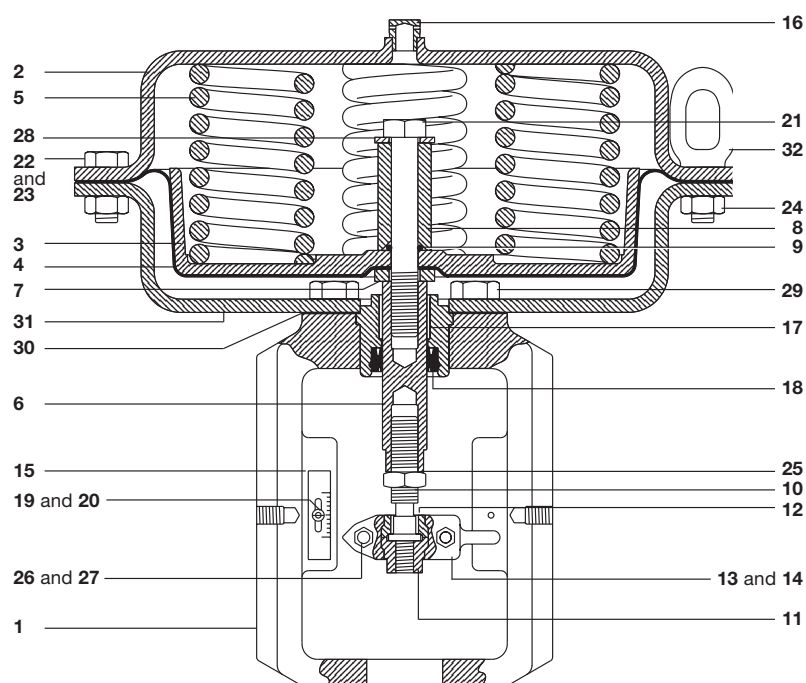
No. Part	Material
1 Diaphragm housing	Stainless steel 304
2 Diaphragm	Reinforced nitrile rubber
3 Diaphragm plate	Pressed steel
4 Springs	Spring steel
5 Spindle	Stainless steel
6 Lock-nut	Stainless steel
7 Spacer	Zinc plated steel
8 'O' ring	Rubber
9 Spring guide	Zinc plated steel
10 Diaphragm clamp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

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

## PN 9000 series actuators

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

PN9000

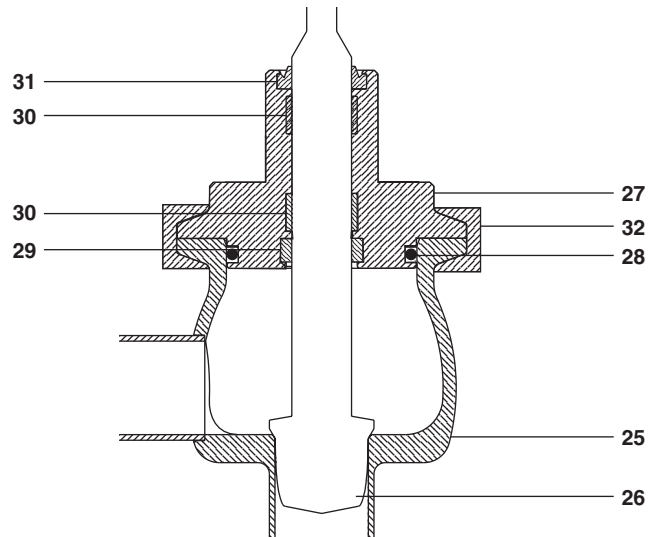


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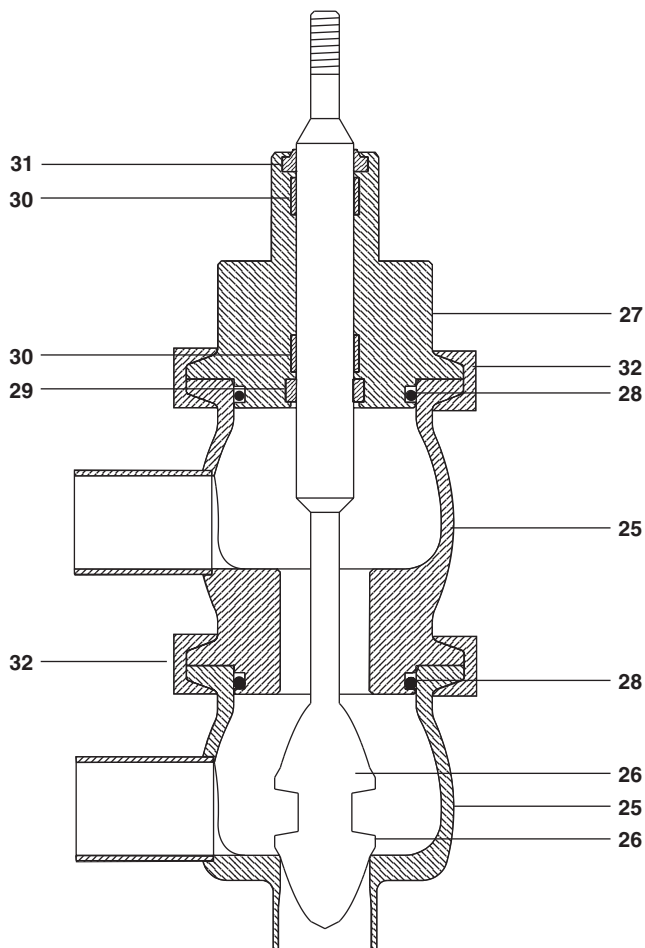
## SA, SH and SQ control valves

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

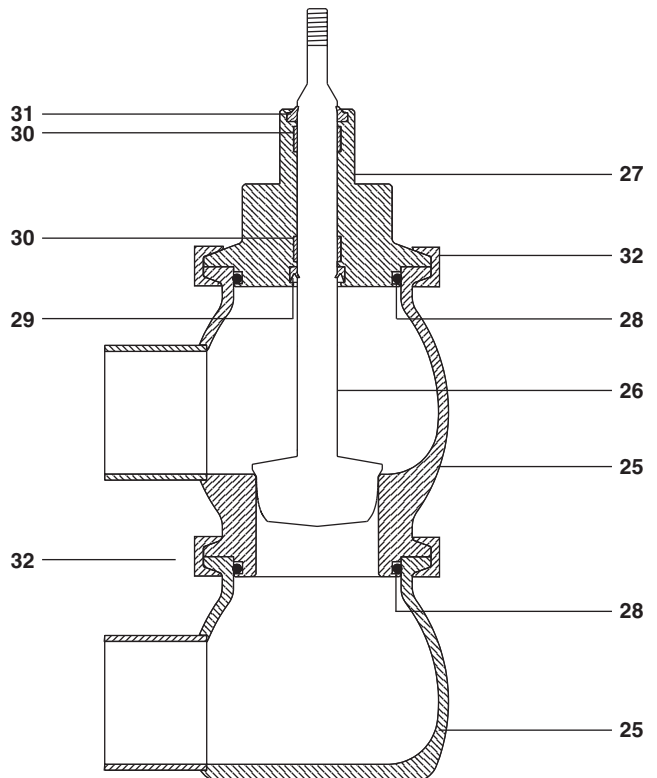
### SA 2-port control valve



### SQ 3-port control valve

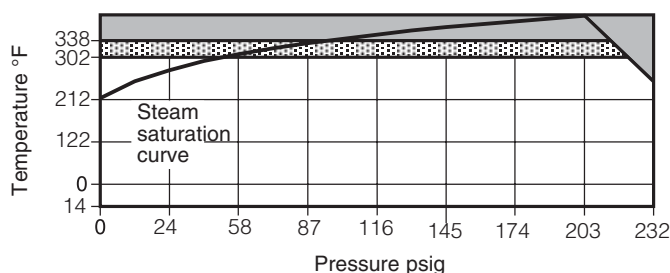




### SH 2-port control valve





## Pressure / temperature limits



 The product **must not** be used in this region.  
 Viton (V) stem seals **must be selected** for use in this region.  
**Note:** the EPDM (E) stem seals are limited to 302°F

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

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

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

### Cv (Kv) values (SQ model)

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

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

Micro-flow trim	Travel	¾" (20 mm)				
	Trim size	⅛"	⅜"	¼"	¼"	⅜"
Linear characteristic	Cv (Kvs)	.47 (0.4)	.74 (0.63)	1.17 (1.0)	1.9 (1.6)	2.9 (2.5)

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

#### Notes:

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

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

### PNS3000 spring-to-extend actuators

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

### PN9000 spring-to-extend actuators

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

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

### PNS4000 spring-to-retract actuators

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

### PN9000 spring-to-retract actuators

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

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

### PNS3000 spring-to-extend actuators

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

### PN9000 spring-to-extend actuators

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

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

### PNS4000 spring-to-retract actuators

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

### PN9000 spring-to-retract actuators

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

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

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

### PNS3000 spring-to-extend actuators

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

### PN9000 spring-to-extend actuators

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

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

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

### PNS4000 spring-to-retract actuators

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

### PN9000 spring-to-retract actuators

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



## Valve dimensions (approximate in inches)

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

## Valve weights (lb)

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

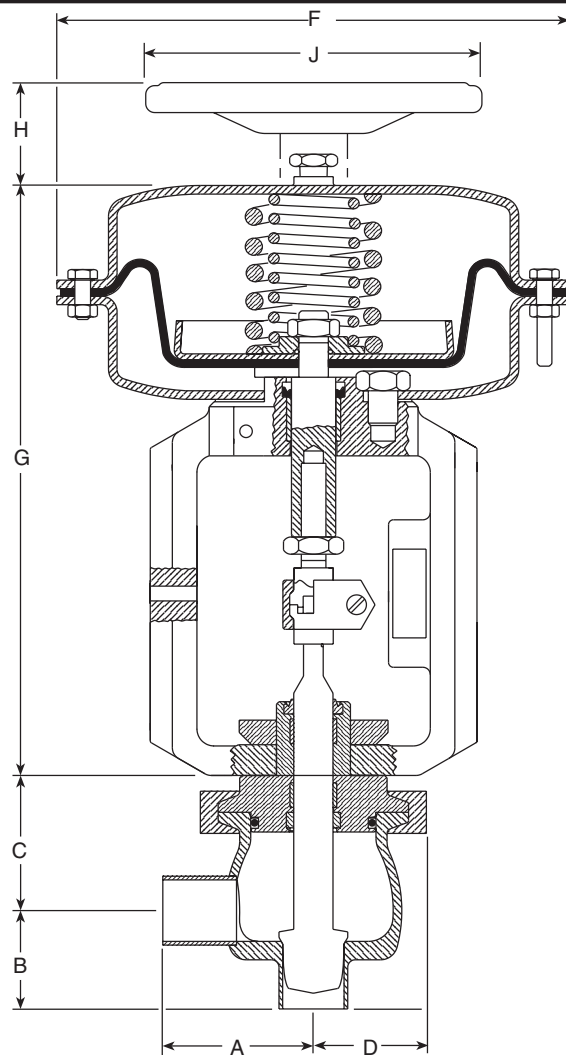
## PNS3000/4000 actuator dimensions and weights (approximate) in inches and lb.

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

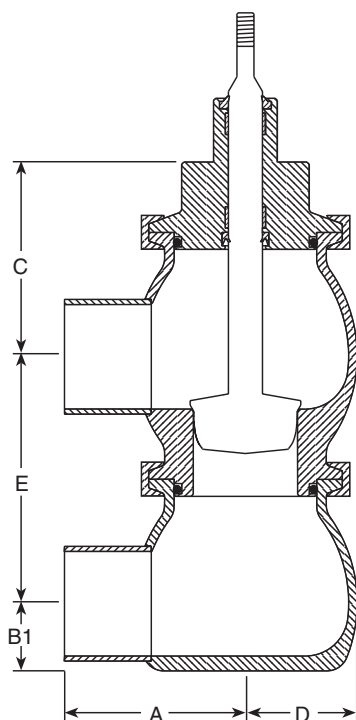
## PN9000 actuator dimensions and weights (approximate) in inches and lb.

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

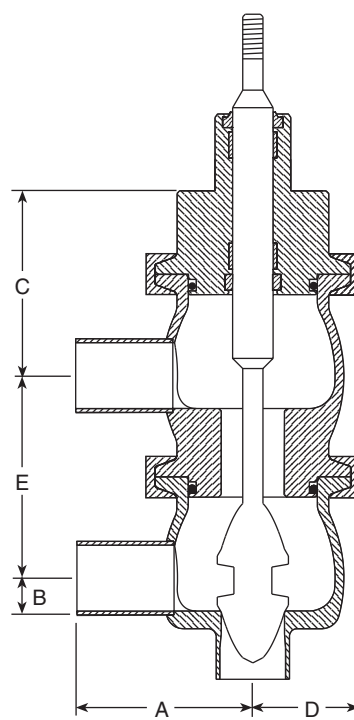
**Actuator and SA valve**



**SH valve**

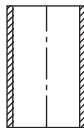

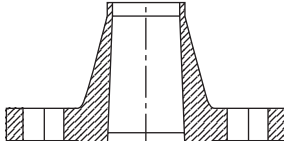
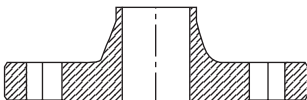
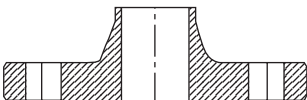
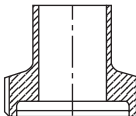
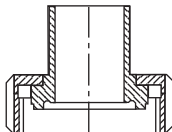
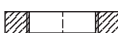


**SQ valve**



## Connection codes

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

Connection		Specification	Code	
Butt weld		DIN 11850 (Series 2)	OO	
		ISO 2037 / SMS 3008	OA	
		EN ISO 1127	OB	
		BS 4825 (Pt 1)	OC	
		ASME BPE	OD	
Sanitary clamp		ASME BPE (Tri-clamp®)	AO	
		BS 4825 (Pt 3)	BO	
		ISO 2852	CO	
		DIN 32676	SO	
ANSI 150		ANSI B 16.5	FA	
Flanged	PN16		DIN 2633	FD
With smooth sealing face		EN 1092 PN6	FE	
		EN 1092 PN10	FF	
		EN 1092 PN16	FG	
Aseptic-thread (fitted on pipe)		DIN 11864 T1 Form A	GS	
		DIN 11864 T1 Form B	GT	
		DIN 11887 (11851)	GU	
		SMS 3008	GV	
Aseptic-clamp and nut		DIN 11864 T1 Form A	BS	
		DIN 11864 T1 Form B	BT	
Screwed connection		DIN ISO 228	XG	
		NPT ANSI-B1. 20.1-1983	XN	

## How to order

### Ordering a control valve

<b>Valve size</b>	DN15, DN20, DN25, DN32, DN40, DN50, DN65, DN80 and DN100	<b>DN15</b>
<b>Valve series</b>	SA = Two-port angle pattern design SH = Two-port horizontal design SQ = Three-port valve design	<b>SA</b>
<b>Valve characteristic</b>	E = Equal percentage (SA and SH models only) L = Linear	<b>E</b>
<b>Body material</b>	6 = 316L stainless steel	<b>6</b>
<b>Connection standard</b>	To be specified - See page 14	<b>SO</b>
<b>Seating option</b>	S = Stainless steel V = White Viton (FDA, 3A and USP 26 Class VI approved)	<b>S</b>
<b>Stem and body sealing option</b>	E = EPDM (FDA and 3A approved) V = White Viton (FDA, 3A and USP 26 Class VI approved)	<b>V</b>
<b>Centre face dimensions (A)</b>	0 = Standard 1 = Other please specify (mm)	<b>0</b>
<b>Centre face dimensions (B)</b>	0 = Standard 1 = Other please specify (mm)	<b>0</b>
<b>Internal surface finish</b>	0 = Standard 16 Ra micron mechanically polished 1 = 16 Ra micron electropolished 2 = Other please specify	<b>0</b>
<b>K<sub>VS</sub></b>	To be specified (non standard K <sub>VS</sub> to special order)	<b>4</b>

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

\*Not available in stainless steel

### Ordering example:

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

## Spare parts

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

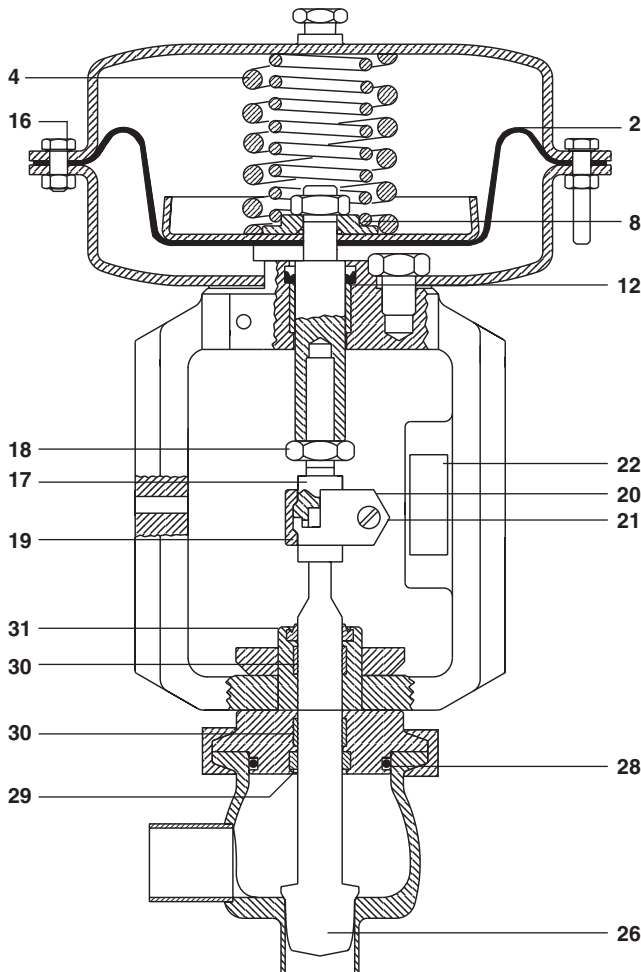
### Available spares for the SA, SH and SQ control valves and the PNS3000 and PNS4000 series actuators

Description		Part number	
Actuator	Stem seal kit ('O' ring and 'V' ring)	8 and 12	
	Diaphragm kit (diaphragm 'O' ring and 'V' ring)	2, 8 and 12	
	Travel indicator	22	
	Spring kit (set of springs, included 3 off longer hex, head bolts and nut on some spring range)	4 and 16	
	Linkage kit (lock-nut, top adaptor connectors, bolts and nuts)	17, 18, 19, 20 and 21	
Valve	Valve stem seal set (excluding bonnet seal)		29, 30 and 31
	SA, SH and SQ models	Bonnet seal EPDM (packet of 3)	28
		Viton (packet of 3)	28
		Plug and stem (Equal percentage or Linear)	26

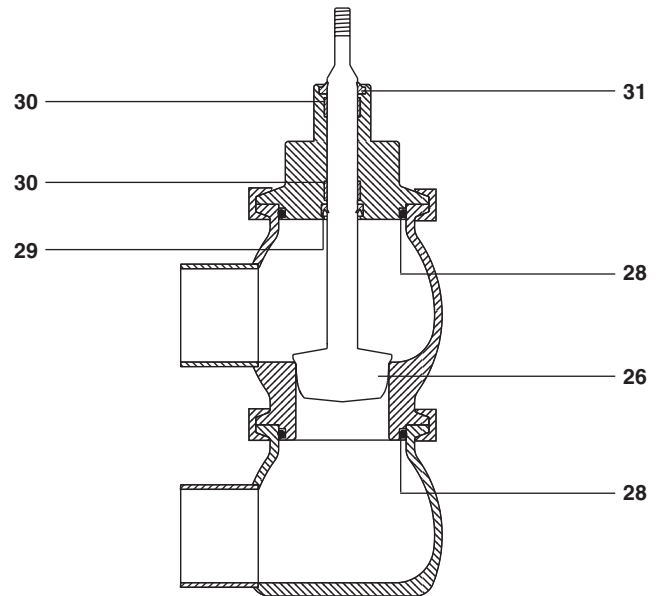
### Spare parts ordering example:

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

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



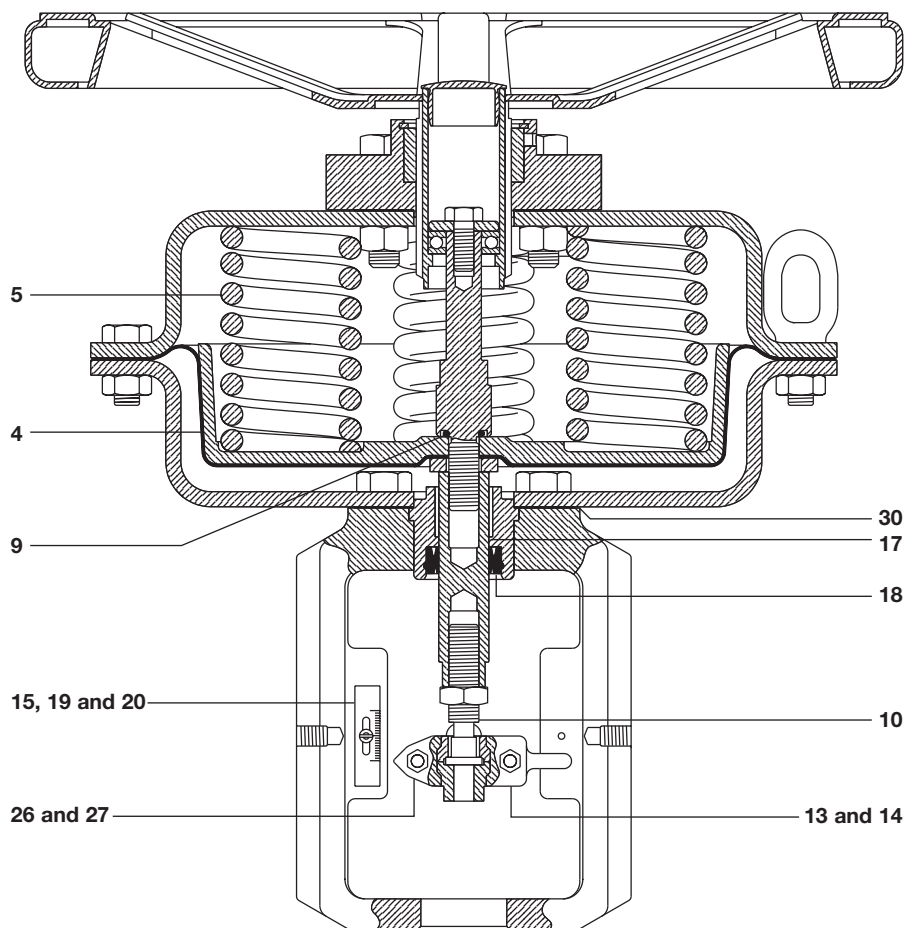
Actuator and SA valve



SH valve

## Available spares for the PN9000 series actuators

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







# spirax/sarco

## 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 in accordance with ASME BPE for use as an isolating valve, not a control valve on clean steam and other high purity and aseptic processes where bacteria and media deposits can put product quality at risk. The low maintenance, clean design is suitable for steam, liquid and gas services ranging from vacuum to the higher temperatures and pressures. Applications include the pharmaceutical, biotech, food and beverage and cosmetics industries.

### Principal features:

- **True port design** - The internal diameter of the end connections and ball precisely match that of the connecting tubing to guarantee drainability.
- **Forged material** - The M70i is manufactured from high integrity ASTM A182 F316L.
- **Low ferrite** - Body and end connections have <1% ferrite content to help prevent rouge.
- **Designed with orbital welding in mind** - ASME BPE compliant extended tube weld end connections means that automatic orbital welding can be performed without valve disassembly and low sulphur (0.005% to 0.017%) content helps a consistent and fully penetrated weld.
- **Designed for automation** - ISO 5211 mounting pad as standard enabling simple actuator mounting.
- **Lockable handle** - A spring loaded lockable handle allows the valve to be locked in the chosen position – ensuring system integrity.

### Surface finish

Standard internal surface finish is 0.5 micron Ra (20 micro inch). Electro-polishing to 0.375 micron Ra (15 micro inch) is available to special order. External surface finishes are as forged / machined.

### Available types

<b>M70iV ISO</b>	Virgin PTFE TFM 1600
<b>M70iVEP ISO</b>	Virgin PTFE TFM 1600 electro-polished to 0.375 micron Ra
<b>M70iG ISO</b>	Mineral filled RPTFE
<b>M70iGEP ISO</b>	Mineral filled RPTFE electro-polished to 0.375 micron Ra

### Optional extras:

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

### Standards

This product fully complies with the requirements of the European Pressure Equipment Directive 97/23/EC.

### Certification:

- Material Certification to EN 10204 3.1
- Elastomer FDA / USP compliance certificate.
- Surface finish certification.

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

### Packaging

The M70i is finished and packaged in a segregated clean environment. Each valve is end capped and sealed in a plastic bag, in accordance with ASME BPE, to ensure the ingress of dirt is avoided.

### Sizes and pipe connections

1/2", 3/4", 1", 1-1/2", 2" sanitary clamp (ASME BPE).

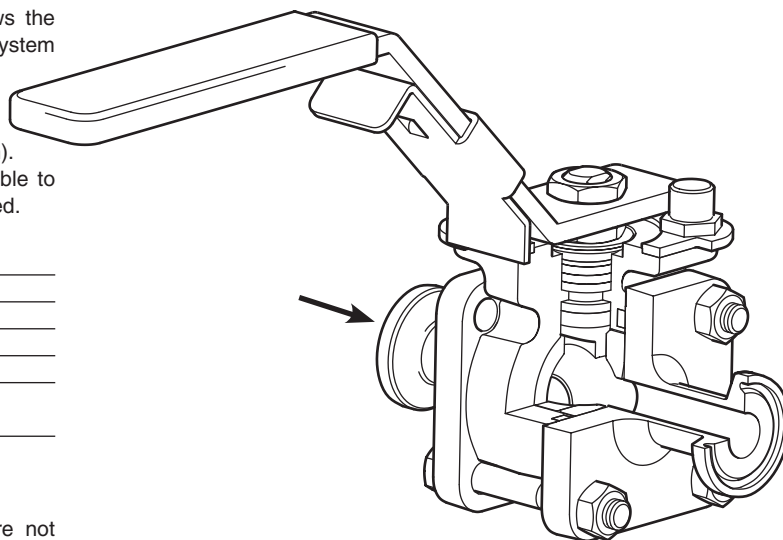
1/2", 3/4", 1", 1-1/2", 2" extended O/D tube weld ends (ETO) (ASME BPE).

Sanitary clamp / ETO combinations are also available.

2-1/2", 3" and 4" forged valves are also available to special order.

**Alternatively:** 2-1/2", 3" and 4" investment cast sanitary ball valves are available through our M80i range - see TI-P182-06-US.

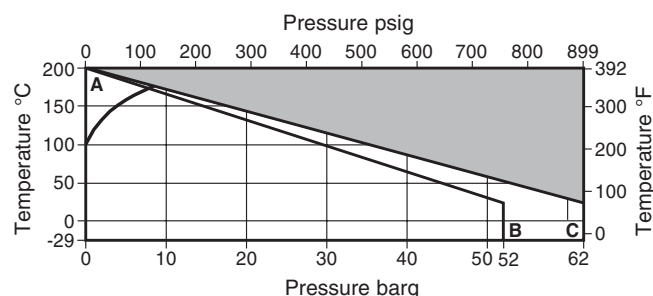
**Note:** Other connection options are available on request. Please consult Spirax Sarco.



TI-P182-05-US 3.07

# M70i ISO Forged Stainless Steel Ball Valve for Sanitary Applications

## Pressure / temperature limits



The product must not be used in this region.

A - B Virgin PTFE TFM 1600.  
A - C Mineral filled PTFE

## Body design conditions

PN63

**PMA** Maximum allowable pressure 900 psig (62 barg) @ 68°F (20°C)

**TMA** Maximum allowable temperature 390°F (200°C) @ 0 psig (0 barg)

**Minimum allowable temperature** -20°F (-29°C)

**PMO** Maximum operating pressure Virgin PTFE 100 psig (7.0 barg)  
for saturated steam service Mineral filled PTFE 123 psig (8.5 barg)

**TMO** Maximum operating temperature 390 °F (200°C) @ 0 psig (0 barg)

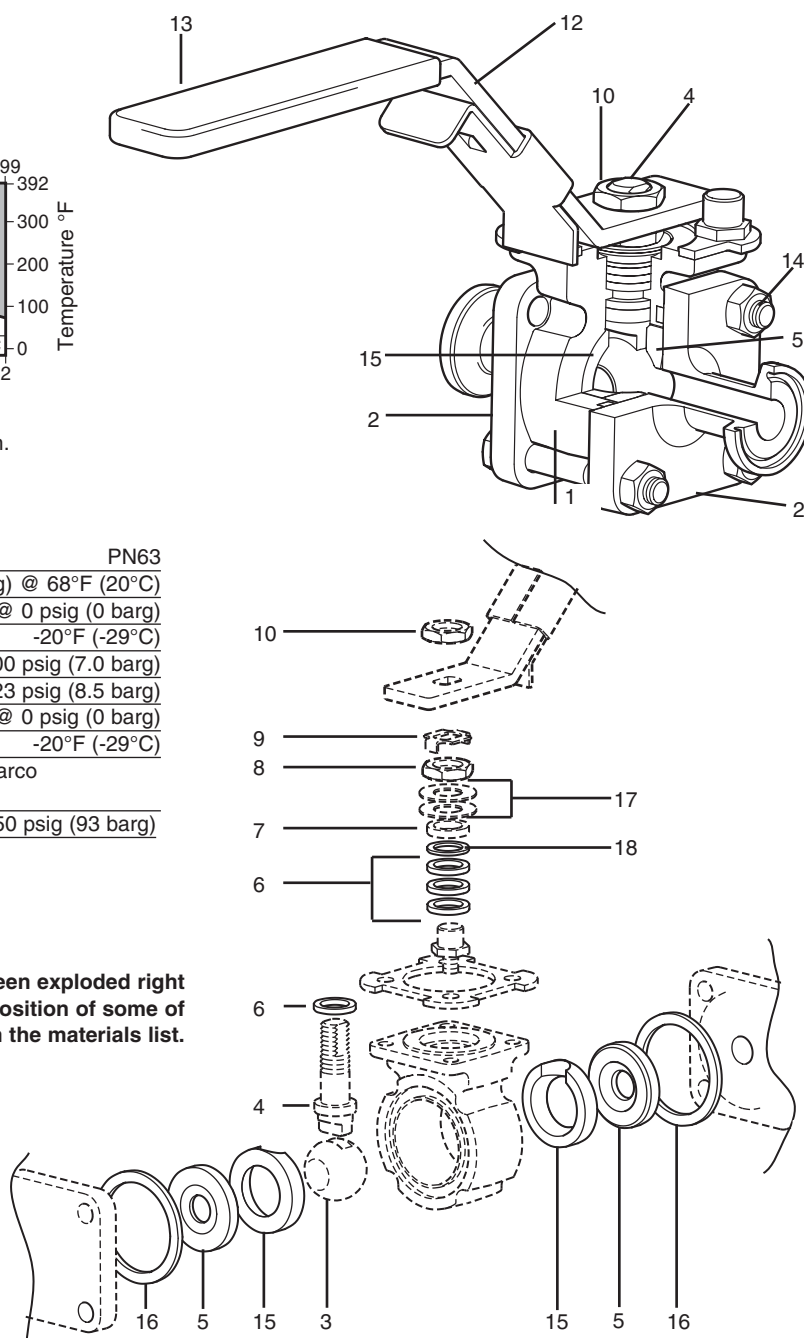
**Minimum operating temperature** -20°F (-29°C)

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

$\Delta$ PMX Maximum differential pressure is limited to the PMO

Designed for a maximum cold hydraulic test pressure of 1350 psig (93 barg)

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



## Materials

No.	Part	Material
1	Body	Stainless steel ASTM A 182 F316L
2	End connections	Stainless steel ASTM A 182 F316L
3	Ball	Stainless steel AISI 316L
4	Stem	Stainless steel AISI 316L
5	Seat	M70iG Mineral filled RPTFE M70iV Virgin PTFE TFM 1600
6	Stem seals	Virgin PTFE TFM 1600
7	Spacer	Stainless steel AISI 316
8	Compression nut	Stainless steel AISI 316
9	Lock washer	Stainless steel AISI 316

10	Stem nut	Stainless steel	AISI 316
11	Name-plate (not shown)	Stainless steel	AISI 430
12	Handle	Stainless steel	AISI 316
13	Cover	Vinyl	
14	Bolts and nuts	Stainless steel	AISI 316
15	Cavity filler	Virgin PTFE TFM 1600	
16	Body cap gasket	Virgin PTFE TFM 1600	
17	Bellville washer	Stainless steel	AISI 316
18	Stem seal	PEEK	

TI-P182-05-US 3.07

# M70i ISO Forged Stainless Steel Ball Valve for Sanitary Applications

## Technical data

<b>Leakage</b>	Test procedure to ISO 5208 (rate3)
	Materials comply with
<b>Stem seal and seat</b>	—FDA CFR title 21 paragraph 177. section 1550. —USP23 Class VI
<b>Flow characteristic</b>	Modified linear
<b>Port</b>	True port design

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

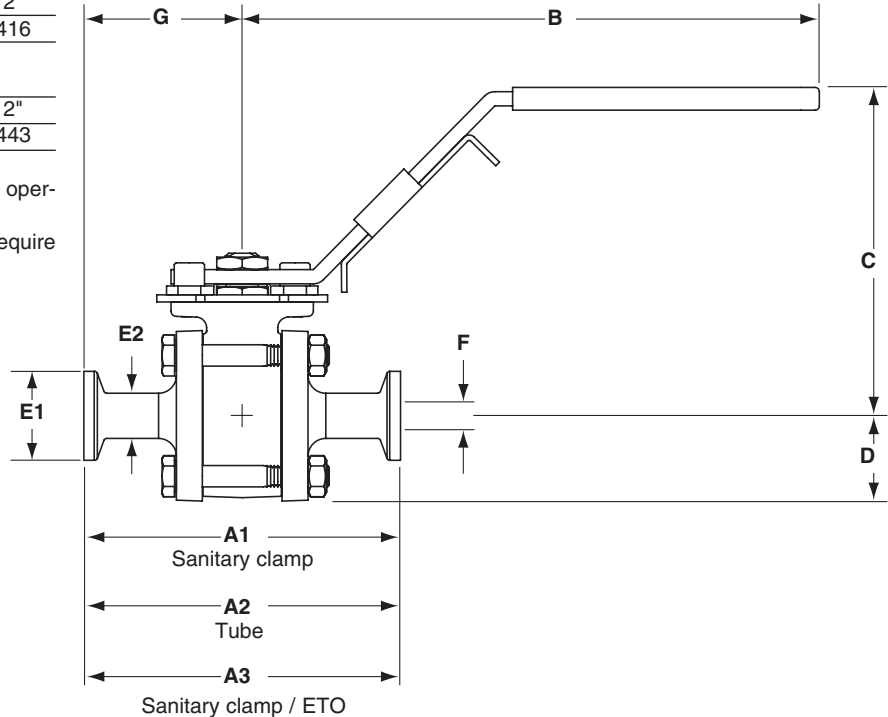
<b>Size</b>	1/2"	3/4"	1"	1-1/2"	2"
<b>C<sub>v</sub></b>	8.1	29	65	190	416

## Torque value

<b>Size</b>	1/2"	3/4"	1"	1-1/2"	2"
<b>in lbs</b>	62	80	133	195	443

The torque figures shown are for a valve at maximum operating pressure that is operated frequently.

Valves that are subject to long static periods may require at least 75% greater break out torque



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

Size	A1	A2	A3	B	C	D	E1	E2	F	G (Clamp)	G (ETO)	Weight
1/2"	3.51 (89.0)	5.52 (140.0)	4.51 (114.5)	6.34 (161)	3.62 (92)	0.95 (24)	0.99 (25.0)	0.50 (12.70)	0.37 (9.4)	1.75 (44.5)	2.76 (70.0)	1.8 (0.80)
3/4"	4.00 (101.6)	6.00 (152.4)	5.00 (127.0)	6.34 (161)	3.70 (94)	1.02 (26)	0.99 (25.0)	0.75 (19.05)	0.62 (15.8)	2.00 (50.8)	3.00 (76.2)	2.2 (1.00)
1"	4.50 (114.2)	6.50 (165.0)	5.50 (139.6)	6.34 (161)	3.98 (101)	1.22 (31)	1.99 (50.5)	1.00 (25.40)	0.87 (22.2)	2.25 (57.1)	3.25 (82.5)	3.5 (1.55)
1-1/2"	5.50 (139.6)	7.50 (190.4)	6.50 (165.0)	7.29 (185)	4.96 (126)	1.89 (48)	1.99 (50.5)	1.50 (38.10)	1.37 (34.8)	2.75 (69.8)	3.75 (95.2)	10.0 (4.50)
2"	6.25 (158.7)	8.00 (203.1)	7.13 (180.9)	9.85 (250)	5.56 (141)	2.25 (57)	2.52 (64.0)	2.00 (50.80)	1.87 (47.5)	3.13 (79.4)	4.00 (101.6)	17.0 (7.70)

## Safety Information, installation and maintenance

For full details see the Installation and Maintenance Instructions (IM-P182-07-US) supplied with the product.

## How to order

The M70i has a number of features that must be specified at the time of order placement; they are size, end connection, seat material, internal surface finish, and any certification that is required.

**Note:** Cavity fillers are provided as standard. If cavity fillers are not required, please specify so, when placing an order.

**Example:** 1 of Spirax Sarco M70iV ISO forged sanitary ball valve complete with sanitary clamp connections (ASME BPE) and an internal surface finish of 0.5 micron Ra (20 micro inch).

The unit is to be supplied complete with EN 10204 3.1 material certification.

# M70i ISO Forged Stainless Steel Ball Valve for Sanitary Applications

## Spare parts

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

## Available spares

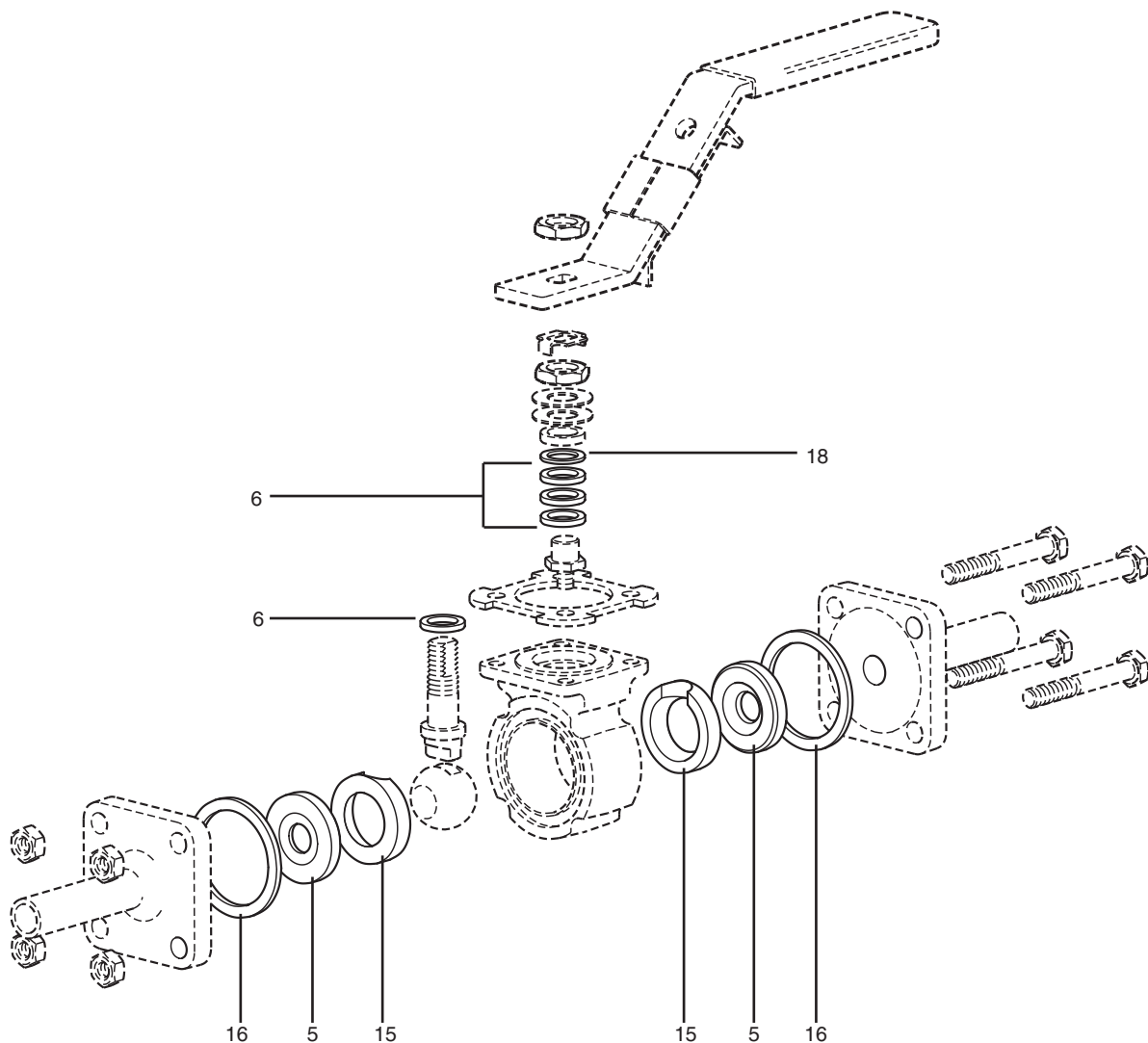
Seat and seal set with cavity filler.

5, 6, 15, 16, 18

## How to order spares

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

**Example:** 1- Virgin PTFE-TFM 1600 seat and seal set with cavity filler for a Spirax Sarco 1/2" M70iV ISO forged stainless steel ball valve.



# spirax/sarco

## M80i ISO Stainless Steel Ball Valve for Sanitary Applications

### Description

The M80i cast 316L stainless steel, three-piece body ball valve has ISO mounting as standard. It has been designed in accordance with ASME BPE for use as an isolating valve, not a control valve on clean steam and other high purity and aseptic processes where bacteria and media deposits can put product quality at risk. The low maintenance, clean design is suitable for steam, liquid and gas services ranging from vacuum to the higher temperatures and pressures. Applications include the pharmaceutical, biotech, food and beverage and cosmetics industries.

### Principal features:

- **True port design** - The internal diameter of the end connections and ball precisely match that of the connecting tubing to guarantee drainability.
- **Low ferrite** - M80i has <3% ferrite content on all wetted parts helping to prevent rouge.
- **Designed with orbital welding in mind** - ASME BPE compliant extended tube weld end connections means that automatic orbital welding can be performed without valve disassembly and low sulphur (0.005% to 0.017%) content helps a consistent and fully penetrated weld.
- **Designed for automation** - ISO 5211 mounting pad as standard enabling simple actuator mounting.
- **Lockable handle** - A spring loaded lockable handle allows the valve to be locked in the closed position – ensuring system integrity.

### Surface finish

The M80i standard internal surface finish is electro-polished to 0.375 micron Ra (15 micro inch).

External surface finishes are as cast / machined.

### Available types

<b>M80iV ISO</b>	Virgin PTFE TFM 1600 electro-polished to 0.375 micron Ra
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### Standards

This product fully complies with the requirements of the European Pressure Equipment Directive 97/23/EC.

### Certification:

- Material Certification to EN 10204 3.1
- Elastomer FDA / USP compliance certificate.
- Surface finish certification.

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

### Packaging

The M80i is finished and packaged in a segregated clean environment. Each valve is end capped and sealed in a plastic bag, in accordance with ASME BPE, to ensure the ingress of dirt is avoided.

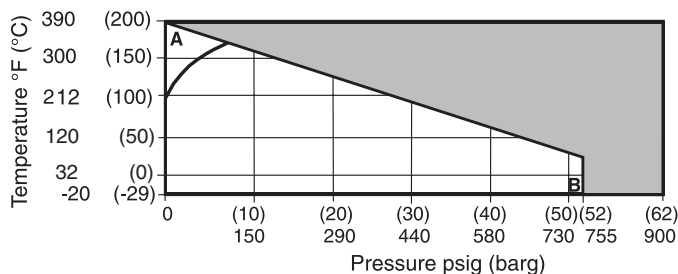
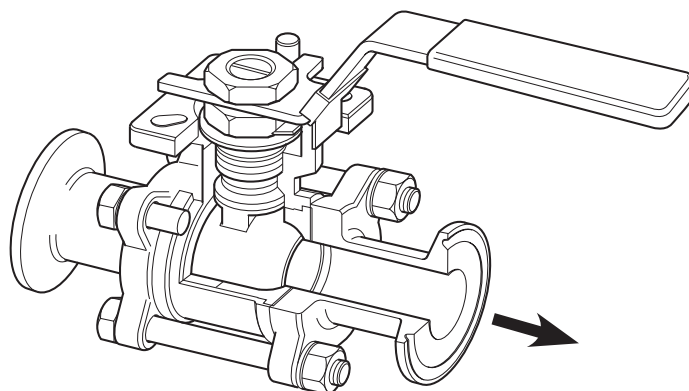
### Sizes and pipe connections

2-1/2", 3" and 4" Sanitary clamp (ASME BPE).

2-1/2", 3" and 4" extended O/D tube weld ends (ETO) (ASME BPE).

**Alternatively:** 1/2", 3/4", 1", 1-1/2" and 2" sanitary ball valves are available through our M70i range - see TI-P182-05-US.

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



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

**A - B** Virgin PTFE TFM 1600

### Body design conditions

PN63

PMA Max. allowable pressure	900 psig (62 barg) @ 68°F (20°C)
TMA Max. allowable temperature	390°F (200°C) @ 0 psig (0 barg)
Minimum allowable temperature	-20°F (-29°C)
PMO Max. operating pressure for saturated steam service	100 psig (7.0 barg)
TMO Max. operating temperature	390°F (200°C) @ 0 psig (0 barg)
Minimum operating temperature	-20°F (-29°C)

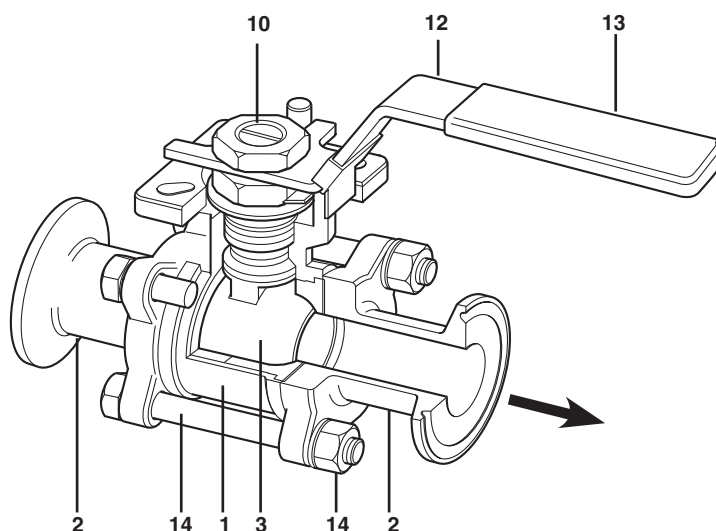
**Note:** For lower operating temperatures consult Spirax Sarco

$\Delta$ PMX Maximum differential pressure is limited to the PMO

Designed for a max. cold hydraulic test pressure of 1350 psig (93 barg)

TI-P182-06-US 9.07

# M80i ISO Stainless Steel Ball Valve for Sanitary Applications



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

## Materials

No.	Part	Material
1	Body	Stainless steel ASTM A351 Gr. CF3M (316L)
2	End connections	Stainless steel ASTM A351 Gr. CF3M (316L)
3	Ball	Stainless steel ASTM A351 Gr. CF3M (316L)
4	Stem	Stainless steel AISI 316L
5	Seat and cavity filler	Virgin PTFE TFM 1600
6	Stem seals	PTFE TFM 1600
7	Spacer	Stainless steel AISI 304
8	Compression nut	Stainless steel AISI 304
9	Lock washer	Stainless steel AISI 304
10	Stem nut	Stainless steel AISI 304
11	O-ring	Viton
12	Handle	Stainless steel AISI 304
13	Cover	Vinyl
14	Studs and nuts	Stainless steel AISI 304
15	Bolt washer	AISI 304
16	Body seal	Virgin PTFE TFM 1600
17	Beleville washer	AISI 301

## Technical data

<b>Leakage</b>	Test procedure to ISO 5208 (rate 3) Materials comply with;
<b>Stem seal and seat</b>	- FDA CFR title 21 paragraph 177, section 1550. - USP23 Class VI
<b>Flow characteristic</b>	Modified linear
<b>Port</b>	True port design

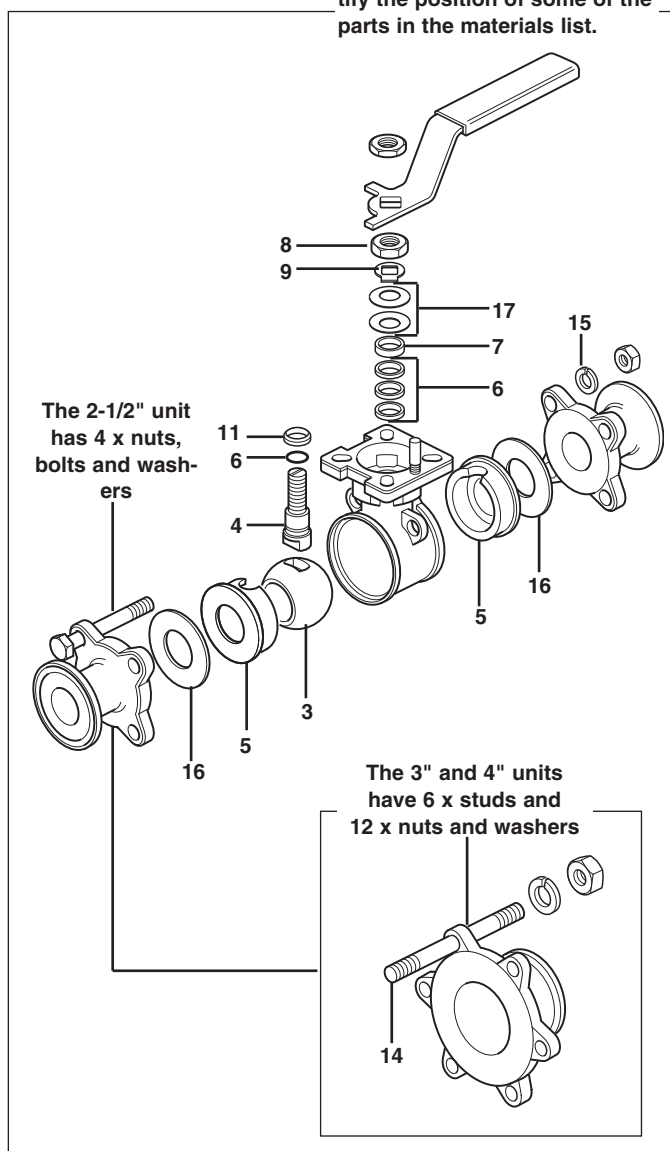
## Cv values

Size	2½"	3"	4"
Cv	786	994	2255

## Torque value

Size	2½"	3"	4"
Ft-lbs	34	37	56

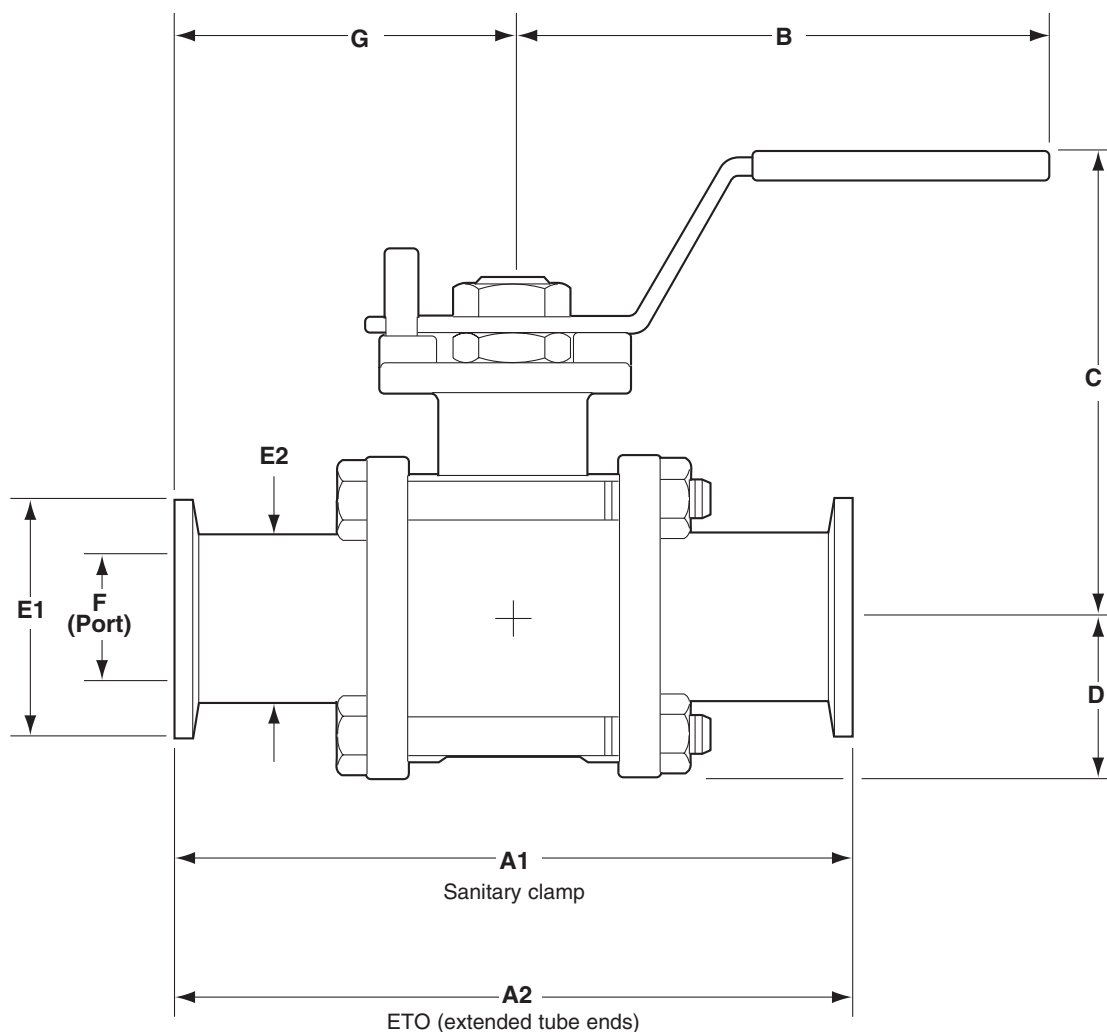
The torque figures shown are for a valve at maximum operating pressure that is operated frequently.  
Valves that are subject to long static periods may require at least 75% greater break out torque



# M80i ISO Stainless Steel Ball Valve for Sanitary Applications

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

Size	A1	A2	B	C	D	E1 (Clamp)	E2 (ETO)	F	G (Clamp)	G (ETO)	Weight
2½"	6.76 (171.6)	7.53 (191.0)	14.58 (370)	4.14 (105)	2.21 (56.14)	3.05 (77.5)	2.50 (63.4)	2.38 (60.3)	33.81 (85.80)	3.76 (95.50)	20 (9.0)
3"	9.01 (228.6)	9.06 (230.0)	14.58 (370)	4.53 (115)	3.07 (78.03)	3.58 (90.9)	3.00 (76.2)	2.88 (73.0)	4.50 (114.30)	4.53 (115.00)	40 (18.0)
4"	10.01 (254.1)	9.99 (253.5)	15.76 (400)	5.59 (142)	3.96 (100.60)	4.68 (118.9)	4.00 (101.6)	3.84 (97.4)	5.01 (127.05)	4.99 (126.75)	51 (23.0)



## Safety Information, installation and maintenance

For full details see the Installation and Maintenance Instructions (IM-P182-07-US) supplied with the product.

## How to order

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

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



# M80i ISO Stainless Steel Ball Valve for Sanitary Applications

## Spare parts

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

## Available spares

Integrated seat and cavity filler, stem, seats, stem 'O' ring and body seals kit

5, 6, 11, 16

## How to order spares

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

**Example:** 1- Integrated seat and cavity filler, stem seals, stem 'O' ring and body seals kits for a Spirax Sarco 4" M80iV ISO cast stainless steel ball valves.

Note: The main spares drawing illustrates the 2-1/2" unit. The same spares are available for the 3" and 4" units.

