

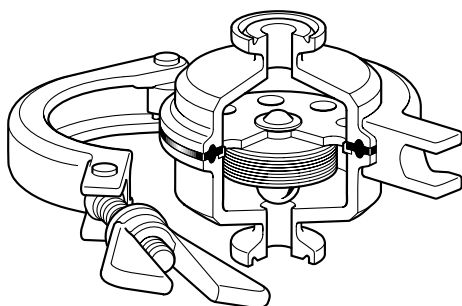


High Purity Installation and Maintenance Instructions

Tech. Illus. #	Model
IM-P180-31	Sanitary Balanced Pressure Thermostatic Steam Trap BT6-B
IM-P180-05	Stainless Steel Balanced Pressure Thermostatic Steam Trap BTM7/BTS7
IM-P181-03	BTD52L Thermodynamic Steam Trap
IM-P123-23	Stainless Steel Balanced Pressure Thermostatic Air Vent AVM7
IM-3-111-US	Stainless Steel Sanitary Pressure Regulator SRV6
IM-P403-83	SSC20 Sanitary Sample Cooler
IM-7-005-US	Stainless Steel Filter CSF26
IM-P023-60	CS10 Stainless Steel Clean Steam Separator
IM-P022-11	Stainless Steel Sanitary Sight Glass SGS10
IM-P183-03	Steri-Trol Clean Service Control Valve
IM-P182-07	M70i and M870i Stainless Steel Ball Valve for Sanitary Applications

BT6-B

Sanitary Balanced Pressure Thermostatic Steam Trap
Installation and Maintenance Instructions



1. *Safety information*
2. *General
Product information*
3. *Installation*
4. *Commissioning*
5. *Operation*
6. *Spare parts and
Maintenance*

1. Safety information

Safe operation of these products can only be guaranteed if they are properly installed, commissioned, used and maintained by qualified personnel (see Section 1.11) in compliance with the operating instructions. General installation and safety instructions for pipeline and plant construction, as well as the proper use of tools and safety equipment must also be complied with.

1.1 Intended use

Referring to the Installation and Maintenance Instructions, name-plate and Technical Information Sheet, check that the product is suitable for the intended use/application. The products listed below comply with the requirements of the European Pressure Equipment Directive 97/23/EC and all fall within category 'SEP'. It should be noted that products within this category are required by the Directive not to carry the CE mark.

- i) The product has been specifically designed for use on steam, air or water / condensate which is in Group 2 of the above mentioned Pressure Equipment Directive. The products' use on other fluids may be possible but, if this is contemplated, Spirax Sarco should be contacted to confirm the suitability of the product for the application being considered.
- ii) Check material suitability, pressure and temperature and their maximum and minimum values. If the maximum operating limits of the product are lower than those of the system in which it is being fitted, or if malfunction of the product could result in a dangerous overpressure or overtemperature occurrence, ensure a safety device is included in the system to prevent such over-limit situations.
- iii) Determine the correct installation situation and direction of fluid flow.
- iv) Spirax Sarco products are not intended to withstand external stresses that may be induced by any system to which they are fitted. It is the responsibility of the installer to consider these stresses and take adequate precautions to minimise them.
- v) Remove protective covers from all connections and protective film from all name-plates, where appropriate, before installation on a steam or other high temperature applications.

1.2 Access

Ensure safe access and if necessary a safe working platform (suitably guarded) before attempting to work on the product. Arrange suitable lifting gear if required.

1.3 Lighting

Ensure adequate lighting, particularly where detailed or intricate work is required.

1.4 Hazardous liquids or gases in the pipeline

Consider what is in the pipeline or what may have been in the pipeline at some previous time. Consider: flammable materials, substances hazardous to health, extremes of temperature.

1.5 Hazardous environment around the product

Consider: explosion risk areas, lack of oxygen (e.g. tanks, pits), dangerous gases, extremes of temperature, hot surfaces, fire hazard (e.g. during welding), excessive noise, moving machinery.

1.6 The system

Consider the effect on the complete system of the work proposed. Will any proposed action (e.g. closing isolation valves, electrical isolation) put any other part of the system or any personnel at risk?

Dangers might include isolation of vents or protective devices or the rendering ineffective of controls or alarms. Ensure isolation valves are turned on and off in a gradual way to avoid system shocks.

1.7 Pressure systems

Ensure that any pressure is isolated and safely vented to atmospheric pressure. Consider double isolation (double block and bleed) and the locking or labelling of closed valves. Do not assume that the system has depressurised even when the pressure gauge indicates zero.

1.8 Temperature

Allow time for temperature to normalise after isolation to avoid danger of burns. If parts made from Viton have been subjected to a temperature approaching 315°C (599°F) or higher, they may have decomposed and formed hydrofluoric acid. Avoid skin contact and inhalation of any fumes as the acid will cause deep skin burns and damage the respiratory system.

If parts made from PTFE have been subjected to a temperature approaching 260°C (500°F) or higher, they will give off toxic fumes, which if inhaled are likely to cause temporary discomfort. It is essential for a no smoking rule to be enforced in all areas where PTFE is stored, handled, or processed as persons inhaling the fumes from burning tobacco contaminated with PTFE particles can develop 'polymer fume fever'.

1.9 Tools and consumables

Before starting work ensure that you have suitable tools and/or consumables available. Use only genuine Spirax Sarco replacement parts.

1.10 Protective clothing

Consider whether you and/or others in the vicinity require any protective clothing to protect against the hazards of, for example, chemicals, high/low temperature, radiation, noise, falling objects, and dangers to eyes and face.

1.11 Permits to work

All work must be carried out or be supervised by a suitably competent person. Installation and operating personnel should be trained in the correct use of the product according to the Installation and Maintenance Instructions.

Where a formal 'permit to work' system is in force it must be complied with. Where there is no such system, it is recommended that a responsible person should know what work is going on and, where necessary, arrange to have an assistant whose primary responsibility is safety.

Post 'warning notices' if necessary.

1.12 Handling

Manual handling of large and/or heavy products may present a risk of injury. Lifting, pushing, pulling, carrying or supporting a load by bodily force can cause injury particularly to the back. You are advised to assess the risks taking into account the task, the individual, the load and the working environment and use the appropriate handling method depending on the circumstances of the work being done. Please refer to Section 6.2 for additional information on product handling.

1.13 Residual hazards

In normal use the external surface of the product may be very hot. If used at the maximum permitted operating conditions the surface temperature of some products may reach temperatures in excess of 177°C (350°F).

Take due care when dismantling or removing the product from an installation (refer to Section 6 'Maintenance instructions').

1.14 Freezing

Provision must be made to protect systems which are not self-draining against frost damage in environments where they may be exposed to temperatures below freezing point.

1.15 Disposal

Unless otherwise stated in the Installation and Maintenance Instructions, this product is recyclable and no ecological hazard is anticipated with its disposal providing due care is taken.

Viton:

- Can be landfilled, when in compliance with National and Local regulations.
- Can be incinerated, but a scrubber must be used to remove Hydrogen Fluoride, which is evolved from the product and with compliance to National and Local regulations.
- Is insoluble in aquatic media.

PTFE:

- Can only be disposed of by approved methods, not incineration.
- Keep PTFE waste in a separate container do not mix it with other rubbish, and consign it to a landfill site.

1.16 Returning products

Customers and stockists are reminded that under EC Health, Safety and Environment Law, when returning products to Spirax Sarco they must provide information on any hazards and the precautions to be taken due to contamination residues or mechanical damage which may present a health, safety or environmental risk. This information must be provided in writing including Health and Safety data sheets relating to any substances identified as hazardous or potentially hazardous.

— 2. General product information —

2.1 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 2°C from steam saturation temperature at pressures below 2.5 bar g 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

BT6-BL	Low capacity
BT6-BH	High capacity

Body surface finish (measured to ISO 4287-1997 and ISO 4288-1997):

- Internal surfaces have a finish of 0.6 µm (25 micro-inch Ra)
- External surfaces have a finish of 1.0 µm (40 micro-inch Ra)

Options:

- Mechanical and electropolishing to 0.375 µm (15 micro-inch Ra)
- For applications requiring closer to steam saturation temperatures, for example, critical SIP applications, please consult Spirax Sarco.

Standard

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

All seals comply with FDA CFR title 21, part 177, Section 1550 and USP24 class VI.

Certification

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

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

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

Note: For further product data see the following Technical Information Sheet, TI-P180-30.

2.2 Sizes and pipe connections

½", ¾", 1" and 1½" sanitary clamp ends to ASME BPE.

For other end connections please consult Spirax Sarco.

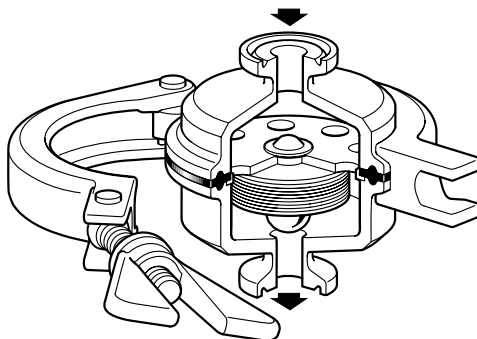
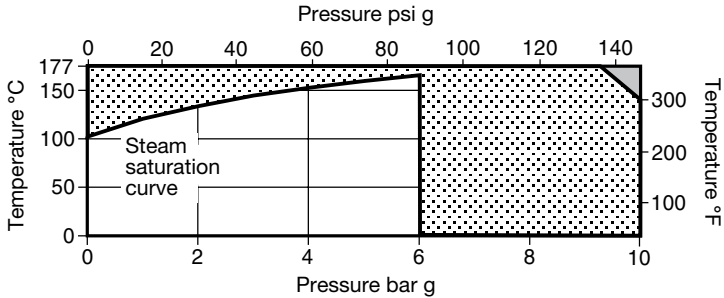



Fig. 1

2.3 Pressure / temperature limits (ISO 6552)



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

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

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

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

3. Installation

Note: Before actioning any installation observe the 'Safety information' in Section 1.

Referring to the Installation and Maintenance Instructions, name-plate and Technical Information Sheet, check that the product is suitable for the intended installation:

- 3.1** Check materials, pressure and temperature and their maximum values. If the maximum operating limit of the product is lower than that of the system in which it is being fitted, ensure that a safety device is included in the system to prevent overpressurisation.
- 3.2** Determine the correct installation situation and the direction of fluid flow.
- 3.3** Remove protective covers from all connections and protective film from all name-plates, where appropriate, before installation on a steam or other high temperature applications.
- 3.4** The trap is designed to be fitted in **vertical lines** with flow downwards so that it can be self-draining. Check flow arrow for correct orientation. Fittings, clamps and gaskets for pipe end connections are not supplied. Do not expose the element to superheat conditions since over expansion may result.
Installation should include a suitable cooling leg to avoid condensate back-up into process equipment under normal operating conditions.
Caution: Do not overtighten clamp. This may cause the seal to spread/extrude and interface with element frame. **It is normally only necessary to take up slack and tighten the nut by half a turn maximum.**

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

Note: If the trap is to discharge to atmosphere ensure it is to a safe place, the discharging fluid may be at a temperature of 100°C (212°F).

4. Commissioning

After installation or maintenance ensure that the system is fully functioning. Carry out tests on any alarms or protective devices.

Note: As with all steam systems it is very important that the pressure is built up slowly to avoid possible damage to any sensitive equipment.

5. 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.

6. Spare parts and maintenance

Note: Before actioning any maintenance programme observe the 'Safety information' in Section 1.

6.1 Spare parts

These are the available spare parts.
No other parts are supplied as 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.

6.2 Maintenance

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

Note: Damage to the capsule element assembly will occur if the body clamp is removed before the trap has cooled to 60°C or below.

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

Remove the sanitary clamps from the pipeline connections and remove the whole trap from the pipeline. Remove the body sanitary clamp (4), then the trap inlet and outlet body including the seat (2), seal (5) and capsule element assembly (3) can be removed for cleaning or replacement. Reassemble using a new seal and with the valve head in position to close onto the seat orifice. Replace and tighten sanitary clamps and put back into service. Check for leaks and retighten as necessary.

Note: Traps fitted with the viton gasket can be difficult to remove from the metal parts. The element mounting plate can bond to the gasket. To avoid damage, do not attempt to pull the element away by levering or pulling the welded capsule. Instead gently prise the gasket from the valve body as shown in **C** below.

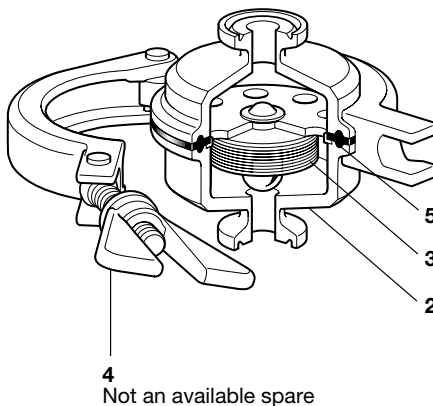


Fig. 2



A



B



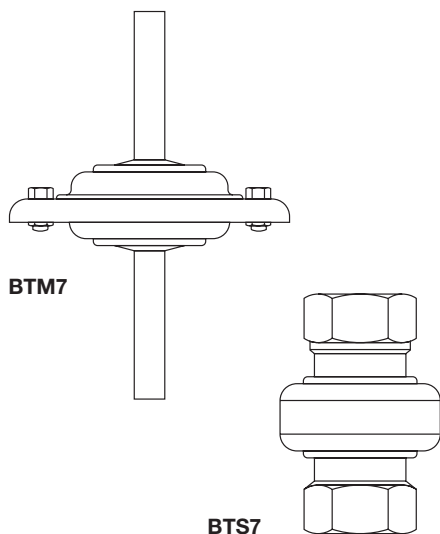
C



D

Reassemble using a new seal and with the valve head in position to close onto the seat orifice. Replace and tighten sanitary clamps and put back into service. Check for leaks and retighten as necessary

BTM7 and BTS7
Stainless Steel Thermostatic Clean Steam Traps
Installation and Maintenance Instructions



1. *Safety information*
2. *General product information*
3. *Installation*
4. *Commissioning*
5. *Operation*
6. *Maintenance*
7. *Spare parts*

1. General safety information

Safe operation of these products can only be guaranteed if they are properly installed, commissioned, used and maintained by qualified personnel (see Section 1.11) in compliance with the operating instructions. General installation and safety instructions for pipeline and plant construction, as well as the proper use of tools and safety equipment must also be complied with.

1.1 Intended use

Referring to the Installation and Maintenance Instructions, product marking and Technical Information Sheet, check that the product is suitable for the intended use/application. The products listed below comply with the requirements of the European Pressure Equipment Directive 97/23/EC and carry the CE mark when so required. The products fall within the following Pressure Equipment Directive categories:

Product	Group 2 Gases	Group 2 Liquids
BTM7	SEP	SEP
BTS7	SEP	SEP

- i) The products have been specifically designed for use on steam, air or water/ condensate which are in Group 2 of the above mentioned Pressure Equipment Directive. The products' use on other fluids may be possible but, if this is contemplated, Spirax Sarco should be contacted to confirm the suitability of the product for the application being considered.
- ii) Check material suitability, pressure and temperature and their maximum and minimum values. If the maximum operating limits of the product are lower than those of the system in which it is being fitted, or if malfunction of the product could result in a dangerous overpressure or overtemperature occurrence, ensure a safety device is included in the system to prevent such over-limit situations.
- iii) Determine the correct installation situation and direction of fluid flow.
- iv) Spirax Sarco products are not intended to withstand external stresses that may be induced by any system to which they are fitted. It is the responsibility of the installer to consider these stresses and take adequate precautions to minimise them.
- v) Remove protection covers from all connections and protective film from all name-plates, where appropriate, before installation on steam or other high temperature applications.

1.2 Access

Ensure safe access and if necessary a safe working platform (suitably guarded) before attempting to work on the product. Arrange suitable lifting gear if required.

1.3 Lighting

Ensure adequate lighting, particularly where detailed or intricate work is required.

1.4 Hazardous liquids or gases in the pipeline

Consider what is in the pipeline or what may have been in the pipeline at some previous time. Consider: flammable materials, substances hazardous to health, extremes of temperature.

1.5 Hazardous environment around the product

Consider: explosion risk areas, lack of oxygen (e.g. tanks, pits), dangerous gases, extremes of temperature, hot surfaces, fire hazard (e.g. during welding), excessive noise, moving machinery.

1.6 The system

Consider the effect on the complete system of the work proposed. Will any proposed action (e.g. closing isolation valves, electrical isolation) put any other part of the system or any personnel at risk?

Dangers might include isolation of vents or protective devices or the rendering ineffective of controls or alarms. Ensure isolation valves are turned on and off in a gradual way to avoid system shocks.

1.7 Pressure systems

Ensure that any pressure is isolated and safely vented to atmospheric pressure. Consider double isolation (double block and bleed) and the locking or labelling of closed valves. Do not assume that the system has depressurised even when the pressure gauge indicates zero.

1.8 Temperature

Allow time for temperature to normalise after isolation to avoid danger of burns.

If parts made from FKM have been subjected to a temperature above 250°C (482°F), it may have decomposed and formed flourine compounds, fluoro hydrocarbons and fluoro olefins. When subjected to temperatures above 500°C (932°F) parts made from FKM may ignite. Combustion residues are very corrosive and acidic, so acid-resistant gloves should be worn when handling, and calcium oxide/hydroxide can be used to neutralise it.

1.9 Tools and consumables

Before starting work ensure that you have suitable tools and/or consumables available. Use only genuine Spirax Sarco replacement parts.

1.10 Protective clothing

Consider whether you and/or others in the vicinity require any protective clothing to protect against the hazards of, for example, chemicals, high/low temperature, radiation, noise, falling objects, and dangers to eyes and face.

1.11 Permits to work

All work must be carried out or be supervised by a suitably competent person. Installation and operating personnel should be trained in the correct use of the product according to the Installation and Maintenance Instructions.

Where a formal 'permit to work' system is in force it must be complied with. Where there is no such system, it is recommended that a responsible person should know what work is going on and, where necessary, arrange to have an assistant whose primary responsibility is safety.

Post 'warning notices' if necessary.

1.12 Handling

Manual handling of large and/or heavy products may present a risk of injury. Lifting, pushing, pulling, carrying or supporting a load by bodily force can cause injury particularly to the back. You are advised to assess the risks taking into account the task, the individual, the load and the working environment and use the appropriate handling method depending on the circumstances of the work being done.

1.13 Residual hazards

In normal use the external surface of the product may be very hot. If used at the maximum permitted operating conditions the surface temperature of some products may reach temperatures in excess of 300°C (572°F).

Many products are not self-draining. Take due care when dismantling or removing the product from an installation (refer to 'Maintenance instructions').

1.14 Freezing

Provision must be made to protect products which are not self-draining against frost damage in environments where they may be exposed to temperatures below freezing point.

1.15 Disposal

Unless otherwise stated in the Installation and Maintenance Instructions, this product is recyclable and no ecological hazard is anticipated with its disposal providing due care is taken, except:

FKM:

- Can be landfilled, when in compliance with National and Local regulations (waste code no.57502 - rubber waste; Germany).
- Can be incinerated when in compliance with National and Local regulations.
- Is insoluble in water.
- Is soluble in aromatic hydrocarbons.

1.16 Returning products

Customers and stockists are reminded that under EC Health, Safety and Environment Law, when returning products to Spirax Sarco they must provide information on any hazards and the precautions to be taken due to contamination residues or mechanical damage which may present a health, safety or environmental risk. This information must be provided in writing including Health and Safety data sheets relating to any substances identified as hazardous or potentially hazardous.

— 2. General product information —

2.1 General description

The **BTM7** (maintainable) and **BTS7** (sealed) are thermostatic steam traps designed to remove condensate from clean steam systems with minimal backing up of condensate, to a maximum pressure of 7 bar g. Manufactured in all 316L stainless steel with minimal crevices, they are self-draining, have a typical surface finish of 1.6 - 3.2 Ra and operate close to steam saturation temperature. All wetted parts are manufactured from FDA approved materials. As standard the BTM7 is fitted with an FKM 'O' ring which complies with FDA Title 21, Paragraph 177 Section 2600 and USP Class VI.

Options

The fixed bleed option will ensure a 'Fail-open' condition

Standards

Products comply with the requirements of the European Pressure Equipment Directive 97/23/EC.

The BTM7 and BTS7 have been designed in general accordance with ASME BPE.

All elastomers used comply with FDA CFR title 21, Paragraph 177 Section 2600 and USP Class VI.

Certification

The **BTM7** is available with material certification to EN 10204 3.1.

The **BTS7** is available with a Manufacturers' Typical Test Report.

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

Note

For further product data see the following Technical Information sheets;

For the BTS7: TI-P180-03

For the BTM7: TI-P180-11

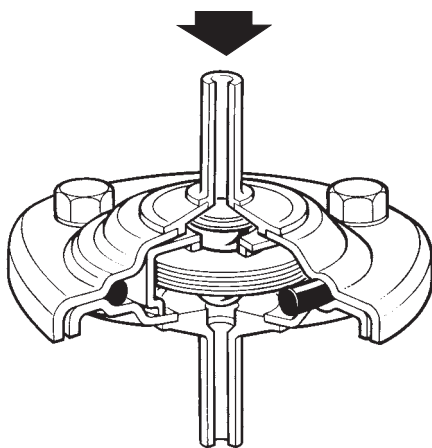


Fig. 1 BTM7

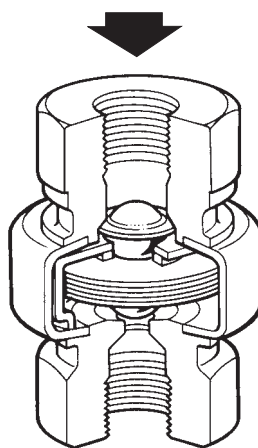


Fig. 2 BTS7

2.2 Sizes and pipe connections

1/4", 1/2", 3/4" and 1" screwed BSP or NPT.
1/2", 3/4" and 1" O/D x 16 swg (0.065") wall thickness tube butt weld.
1/2", 3/4" and 1" sanitary clamp compatible hygienic connection.

DIN 11850 (Series 1) tube butt weld ends

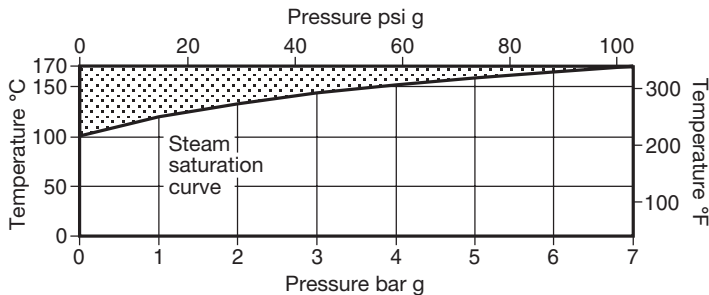
12 mm O/D x 1.0 mm wall thickness tube butt weld (DN10-D)
18 mm O/D x 1.0 mm wall thickness tube butt weld (DN15-D)

ISO 1127 (Series 1) tube butt weld ends

13.5 mm O/D x 1.6 mm wall thickness tube butt weld (DN8-I)
17.2 mm O/D x 1.6 mm wall thickness tube butt weld (DN10-I)
21.3 mm O/D x 1.6 mm wall thickness tube butt weld (DN15-I)

Note: On request other connection options are available at extra cost. Please note that seat end spares for specially requested connections will require a minimum order quantity - Please consult Spirax Sarco for further information.

2.3 Pressure/temperature limits



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

Body design conditions		PN7	
PMA	Maximum allowable pressure	7 bar g @ 170°C	(101.5 psi g @ 338°F)
TMA	Maximum allowable temperature	170°C @ 7 bar g	(338°F @ 101.5 psi g)
Minimum allowable temperature	BTM7	-10°C	(14°F)
	BTS7	-254°C	(-425°F)
PMO	Maximum operating pressure for saturated steam service	7 bar g	(101.5 psi g)
TMO	Maximum operating temperature	170°C	(338°F)
Minimum operating temperature		0°C	(32°F)
Designed for a maximum cold hydraulic test pressure		10.5 bar g	(152.25 psi g)

3. Installation

Note: Before actioning any installation observe the 'Safety information' in Section 1.

Referring to the Installation and Maintenance Instructions, product marking and Technical Information Sheet, check that the product is suitable for the intended installation:

- 3.1** Check materials, pressure and temperature and their maximum values. If the maximum operating limit of the product is lower than that of the system in which it is being fitted, ensure that a safety device is included in the system to prevent overpressurisation.
- 3.2** Determine the correct installation situation and the direction of fluid flow.
- 3.3** Remove protection covers from all connections and protective film from all nameplates, where appropriate, before installation on steam or other high temperature applications.
- 3.4** The traps are designed for installation in **vertical lines** with the flow downward to ensure self-draining operation. Do not expose the element to superheat conditions since over expansion may result. The inlet end of the trap can be identified easily because it has a groove in it. Suitable isolation valves must be installed to allow for safe maintenance/ replacement. Open isolation valves slowly until normal operating conditions are achieved. Check for leaks.

Caution: In order to prevent undue stresses on the pipeline and steam trap, ensure adequate provision is made for thermal expansion.

Note: The body and element must be handled carefully to ensure that surfaces are not damaged. If the trap is to discharge to atmosphere ensure it is to a safe place, the discharging fluid may be at a temperature of 100°C (212°F).

4. Commissioning

After installation or maintenance ensure that the system is fully functional. Carry out tests on any alarms or protective devices.

5. Operation

The operating element is a capsule containing a small quantity of a special liquid with a boiling point below that of water. In the cold conditions that exist at start-up, the capsule is relaxed. The valve is off its seat and is wide open, allowing unrestricted removal of air. This is a feature of all balanced pressure traps and explains why they are well suited to air venting.

As condensate passes through the balanced pressure steam trap, heat is transferred to the liquid in the capsule. The fill liquid boils before steam reaches the trap. The vapour pressure within the capsule causes it to expand and the trap shuts. Heat loss from the trap then cools the water surrounding the capsule, the fill condenses and the capsule contracts, opening the valve and releasing condensate until steam temperature approaches again at which the cycle is repeated.

If the capsule is subjected to superheated steam it may cause it to over expand. This will prevent correct operation.

6. Maintenance

Note: Before actioning any maintenance program observe the 'Safety information' in Section 1.



6.1 General information

Before undertaking any maintenance on the trap it must be isolated from the supply line and return line and any pressure allowed to safely normalise to atmosphere. The trap should then be allowed to cool. When reassembling, ensure that all joint faces are clean. Always ensure the correct tools, safety procedures and protective equipment are used at all times.

6.2 How to fit new internals (BTM7 only):

- Remove nuts and bolts.
- The end connection with internal seat, gasket and capsule assembly can then be removed for cleaning or replacement. Ensure that the capsule on reassembly is fitted in the correct position (see Figure 4, page 10).
- Reassemble using a new gasket and with the valve head in position to close onto the seat orifice.
- Replace nuts and bolts and tighten them to the recommended torque (see Table 1) and put back into service.
- Open isolation valves slowly until normal operating conditions are achieved.
- Check for leaks.

Table 1 Recommended tightening torques

Item	Part	 or mm		N m	(lbf ft)
5	Nuts and bolts	8 A/F	M5	3 - 4	(2.5 - 3.0)

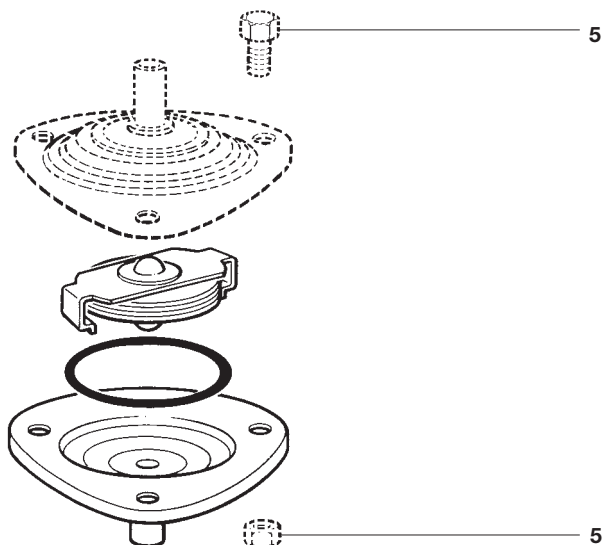


Fig. 3

7. Spare parts

BTM7 only - Available spares are shown in solid outline. Parts drawn in broken lines are not available as spares.

Available spares

Element assembly	2
'O' ring (packet of 3)	3
Body with seat (outlet)	4

How to order spares

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

Example: 1 - Body with seat (outlet) for a Spirax Sarco ½" BTM7 stainless steel thermostatic steam trap having screwed NPT connections.

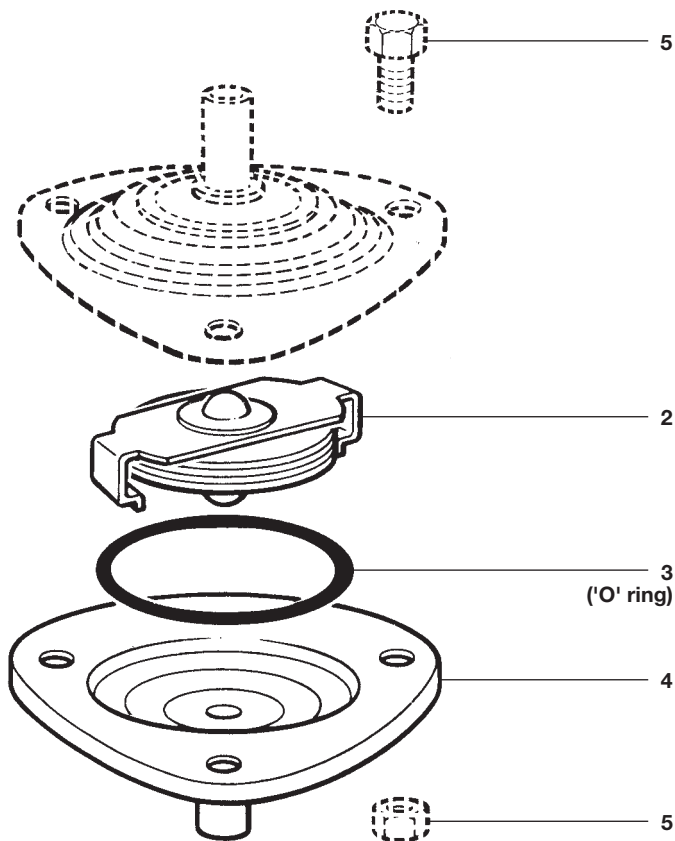
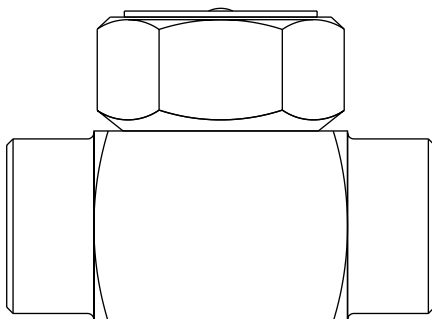


Fig. 4

BTD52L

Thermodynamic Steam Trap
Installation and Maintenance Instructions



1. *General
safety information*
2. *General
product information*
3. *Installation*
4. *Commissioning*
5. *Operation*
6. *Maintenance*
7. *Spare parts*

1. General safety information

Safe operation of these units can only be guaranteed if they are properly installed, commissioned and maintained by a qualified person (see Section 11 of the attached Supplementary Safety Information) in compliance with the operating instructions. General installation and safety instructions for pipeline and plant construction, as well as the proper use of tools and safety equipment must also be complied with.

Isolation

Consider whether closing isolating valves will put any other part of the system or personnel at risk. Dangers might include: isolation of vents and protective devices or alarms. Ensure isolation valves are turned off in a gradual way to avoid system shocks.

Pressure

Before attempting any maintenance consider what is or may have been in the pipeline. Ensure that any pressure is isolated and safely vented to atmospheric pressure before attempting to maintain the product, this is easily achieved by fitting Spirax Sarco depressurisation valves type DV (see separate literature for details). Do not assume that the system is depressurised even when a pressure gauge indicates zero.

Temperature

Allow time for temperature to normalise after isolation to avoid the danger of burns and consider whether protective clothing (including safety glasses) if required.

Disposal

These products are recyclable. No ecological hazard is anticipated with the disposal of these products providing due care is taken.

2. General product information

2.1 General description

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

Optional extras

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

Note: For additional information see Technical Information Sheet TI-P181-01.

2.2 Sizes and pipe connections

1/4", 3/8", 1/2" screwed BSP or NPT.

1/2" O/D x 16 swg (0.065") wall thickness tube end.

DN 11850 (Series 1) tube ends

12 mm O/D x 1.0 mm wall thickness (DN10)

18 mm O/D x 1.0 mm wall thickness (DN15)

ISO 1127 (Series 1) tube ends

17.2 mm O/D x 1.6 mm wall thickness (DN10)

21.3 mm O/D x 1.6 mm wall thickness (DN15)

1/2" Sanitary clamp compatible connections (DN15)

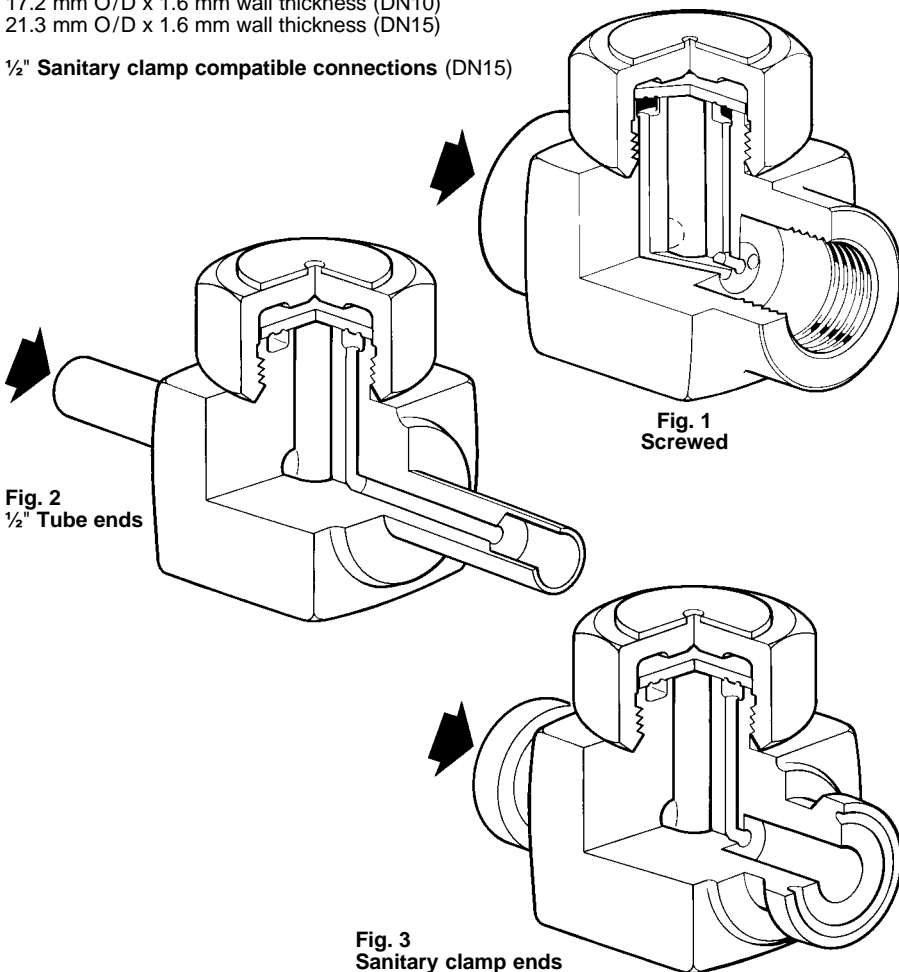


Fig. 2
1/2" Tube ends

Fig. 1
Screwed

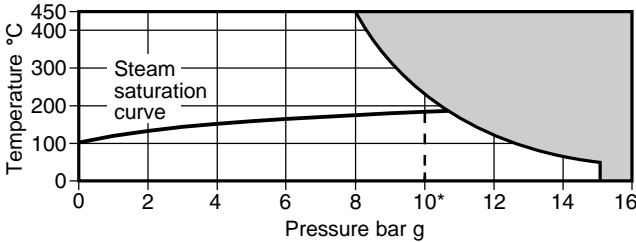
Fig. 3
Sanitary clamp ends

2.3 Limiting conditions

Body design conditions		PN16
PMA - Maximum allowable pressure	16 bar g	(232 psi g)
TMA - Maximum allowable temperature	450°C	(842°F)
PMO - Maximum operating pressure	10 bar g	(145 psi g)
TMO - Maximum operating temperature	450°C	(842°F)
Designed for a maximum cold hydraulic test pressure of:	24 bar g	(348 psi g)

Note: Minimum pressure for satisfactory operation is 0.25 bar g (3.6 psi g).

2.4 Operating range



* PMO Maximum operating pressure recommended for steam service.

PMOB Maximum operating back pressure is 80% of the upstream pressure.

3. Installation

Note: Before actioning any installation observe the 'Safety information' in Section 1.

Referring to the Installation and Maintenance Instructions, name-plate and Technical Information Sheet, check that the product is suitable for the intended installation.

- 3.1** Check materials, pressure and temperature and their maximum values. If the maximum operating limit of the product is lower than that of the system in which it is being fitted, ensure that a safety device is included in the system to prevent overpressurisation.
- 3.2** Determine the correct installation situation and the direction of fluid flow.
- 3.3** Remove protective covers from all connections.
- 3.4** Always ensure the correct tools, safety procedures and protective equipment are used at all times.
- 3.5** The trap should be installed in the horizontal plane, preferably preceded by a small drop leg. For freeze proof installation, or where horizontal fitting is not possible. The BT52L may be installed vertically, but the service life may be affected.
- 3.6** Suitable isolation valves must be installed to allow for safe maintenance and trap replacement.
- 3.7** Where the trap discharges into a closed return system, a non-return valve should be fitted downstream to prevent return flow. Remove all packaging and protective covers and ensure all connections ports are clear from obstruction.
- 3.8** Always open isolation valves slowly until normal operating conditions are achieved - this will avoid system shocks. Check for leaks and correct installation.

Note: If the trap is to discharge to atmosphere ensure it is to a safe place. The discharging fluid may be at a temperature of 100°C (212°F)

4. Commissioning

After installation or maintenance ensure that the system is fully functional. Carry out tests on any alarms or protective devices.

5. Operation

The thermodynamic steam trap will discharge condensate with a blast type action at a few degrees below steam saturation temperature, due care must be given to the site of the discharge.

6. Maintenance

Note: Before actioning any maintenance programme observe the 'Safety information' in Section 1.

6.1 General maintenance

Before undertaking any maintenance on the trap it must be isolated from both the supply line and return line and any pressure allowed to safely normalise to the atmosphere. The trap should then be allowed to cool. When reassembling, ensure that all joint faces are clean.



6.2 How to service:

- Note; refer to Figure 4, page 7, for part number location.
- Remove the insulating cover (4) if fitted.
- Unscrew the cap (2) using a spanner. **Do not use** Stillsons or a wrench of similar type which may cause distortion of the cap.
- If the disc (3) and body seating surfaces (1) are only slightly worn they can be refaced by lapping individually on a flat surface such as the surface plate. A figure of eight motion and a little grinding compound such as Carborundum Co's Compound I.F. gives the best results. If the wear is too great to be rectified by simple lapping, the seating faces on the body must be ground flat and then lapped and the disc replaced with a new one. The total amount of metal removed in this way should not exceed 0.25 mm (0.01").
- When reassembling the disc (3) is normally placed in position with the grooved side in contact with the body seating face.
- Screw on the cap (2); no gasket is required but a fine smear of Molybdenum Disulphide grease should be applied to the threads. Tighten the cap (2) to the recommended tightening torque (see Table 1).

Warning: When torquing or untorquing the cap (2), some support should be given to the body of the trap to prevent over stressing and/or distortion of the end connections and system pipework.

Table 1 Recommended tightening torques

Warning: When torquing or untorquing the cap (2), some support should be given to the body of the trap to prevent over stressing and/or distortion of the end connections and system pipework.

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

7. Spare parts

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

Available spares

Disc	3
Insulating cover	4

How to order spares

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

Example: 1 - Disc for the Spirax Sarco ½" BSP Spirax Sarco BT52L thermodynamic steam trap.

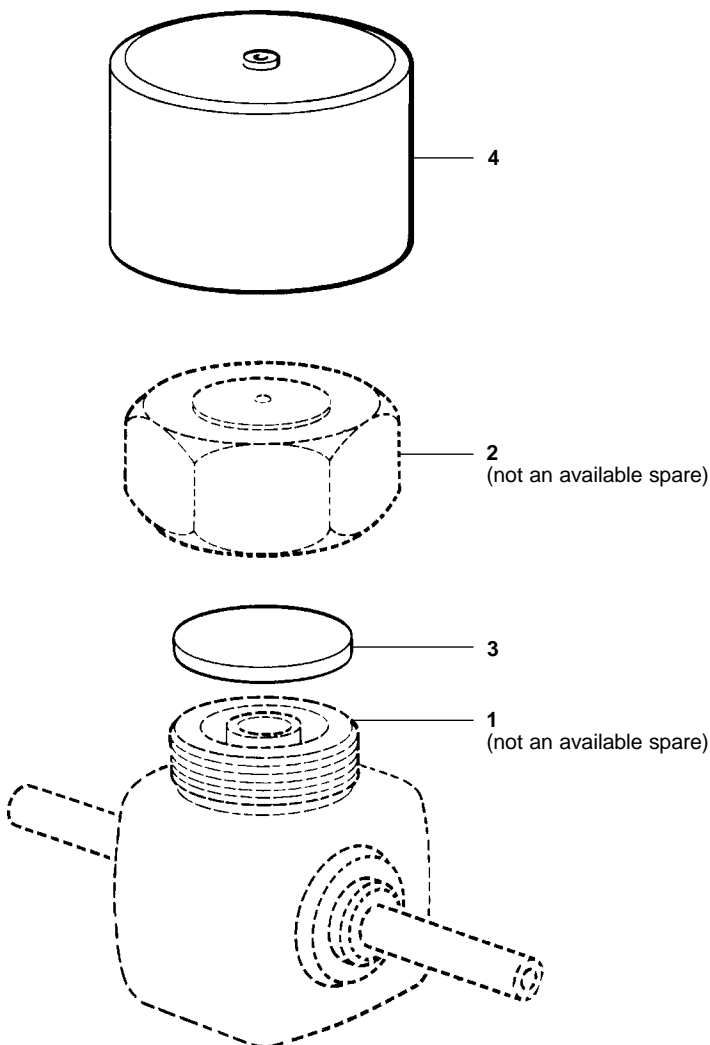
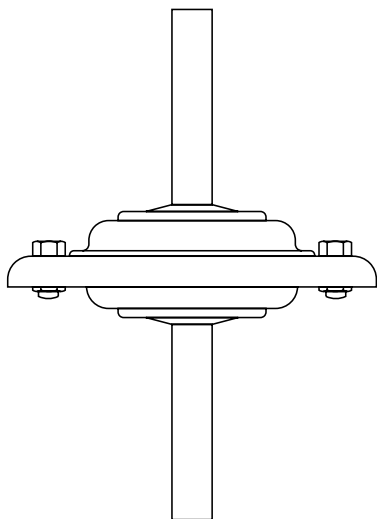


Fig. 4

Stainless Steel Thermostatic Air Vent
Installation and Maintenance Instructions



- 1. *Safety information*
- 2. *General product information*
- 3. *Installation*
- 4. *Commissioning*
- 5. *Operation*
- 6. *Maintenance*
- 7. *Spare parts*

1. Safety information

Safe operation of this product can only be guaranteed if it is properly installed, commissioned, used and maintained by qualified personnel (see Section 1.11) in compliance with the operating instructions. General installation and safety instructions for pipeline and plant construction, as well as the proper use of tools and safety equipment must also be complied with.

1.1 Intended use

Referring to the Installation and Maintenance Instructions, name-plate and Technical Information Sheet, check that the product is suitable for the intended use/application. The product listed below complies with the requirements of the European Pressure Equipment Directive 97/23/EC and carries the CE mark when so required. The product falls within the following Pressure Equipment Directive categories:

Product	Group 2 Gases	Group 2 Liquids
AVM7	SEP	SEP

- i) The product has been specifically designed for use on steam, air or water/condensate which are in Group 2 of the above mentioned Pressure Equipment Directive. The products' use on other fluids may be possible but, if this is contemplated, Spirax Sarco should be contacted to confirm the suitability of the product for the application being considered.
- ii) Check material suitability, pressure and temperature and their maximum and minimum values. If the maximum operating limits of the product are lower than those of the system in which it is being fitted, or if malfunction of the product could result in a dangerous overpressure or overtemperature occurrence, ensure a safety device is included in the system to prevent such over-limit situations.
- iii) Determine the correct installation situation and direction of fluid flow.
- iv) Spirax Sarco products are not intended to withstand external stresses that may be induced by any system to which they are fitted. It is the responsibility of the installer to consider these stresses and take adequate precautions to minimise them.
- v) Remove protective covers from all connections and the protective film from all name-plates, where appropriate, before installation on steam or other high temperature applications.

1.2 Access

Ensure safe access and if necessary a safe working platform (suitably guarded) before attempting to work on the product. Arrange suitable lifting gear if required.

1.3 Lighting

Ensure adequate lighting, particularly where detailed or intricate work is required.

1.4 Hazardous liquids or gases in the pipeline

Consider what is in the pipeline or what may have been in the pipeline at some previous time. Consider: flammable materials, substances hazardous to health, extremes of temperature.

1.5 Hazardous environment around the product

Consider: explosion risk areas, lack of oxygen (e.g. tanks, pits), dangerous gases, extremes of temperature, hot surfaces, fire hazard (e.g. during welding), excessive noise, moving machinery.

1.6 The system

Consider the effect on the complete system of the work proposed. Will any proposed action (e.g. closing isolation valves, electrical isolation) put any other part of the system or any personnel at risk?

Dangers might include isolation of vents or protective devices or the rendering ineffective of controls or alarms. Ensure isolation valves are turned on and off in a gradual way to avoid system shocks.

1.7 Pressure systems

Ensure that any pressure is isolated and safely vented to atmospheric pressure. Consider double isolation (double block and bleed) and the locking or labelling of closed valves. Do not assume that the system has depressurised even when the pressure gauge indicates zero.

1.8 Temperature

Allow time for temperature to normalise after isolation to avoid danger of burns.

If parts made from FKM have been subjected to a temperature above 250°C (482°F), it may have decomposed and formed flourine compounds, fluoro hydrocarbons and fluoro olefins. When subjected to temperatures above 500°C (932°F) parts made from FKM may ignite. Combustion residues are very corrosive and acidic, so acid-resistant gloves should be worn when handling, and calcium oxide/hydroxide can be used to neutralise it.

1.9 Tools and consumables

Before starting work ensure that you have suitable tools and/or consumables available. Use only genuine Spirax Sarco replacement parts.

1.10 Protective clothing

Consider whether you and/or others in the vicinity require any protective clothing to protect against the hazards of, for example, chemicals, high/low temperature, radiation, noise, falling objects, and dangers to eyes and face.

1.11 Permits to work

All work must be carried out or be supervised by a suitably competent person. Installation and operating personnel should be trained in the correct use of the product according to the Installation and Maintenance Instructions.

Where a formal 'permit to work' system is in force it must be complied with. Where there is no such system, it is recommended that a responsible person should know what work is going on and, where necessary, arrange to have an assistant whose primary responsibility is safety.

Post 'warning notices' if necessary.

1.12 Handling

Manual handling of large and/or heavy products may present a risk of injury. Lifting, pushing, pulling, carrying or supporting a load by bodily force can cause injury particularly to the back. You are advised to assess the risks taking into account the task, the individual, the load and the working environment and use the appropriate handling method depending on the circumstances of the work being done.

1.13 Residual hazards

In normal use the external surface of the product may be very hot. If used at the maximum permitted operating conditions the surface temperature of some products may reach temperatures in excess of 300°C (572°F).

Many products are not self-draining. Take due care when dismantling or removing the product from an installation (refer to 'Maintenance instructions').

1.14 Freezing

Provision must be made to protect products which are not self-draining against frost damage in environments where they may be exposed to temperatures below freezing point.

1.15 Disposal

Unless otherwise stated in the Installation and Maintenance Instructions, this product is recyclable and no ecological hazard is anticipated with its disposal providing due care is taken, except:

FKM:

- Can be landfilled, when in compliance with National and Local regulations (waste code no.57502 - rubber waste; Germany).
- Can be incinerated when in compliance with National and Local regulations.
- Is insoluble in water.
- Is soluble in aromatic hydrocarbons.

1.16 Returning products

Customers and stockists are reminded that under EC Health, Safety and Environment Law, when returning products to Spirax Sarco they must provide information on any hazards and the precautions to be taken due to contamination residues or mechanical damage which may present a health, safety or environmental risk. This information must be provided in writing including Health and Safety data sheets relating to any substances identified as hazardous or potentially hazardous.

— 2. General product information —

2.1 General description

The AVM7 is a balanced pressure thermostatic air vent suitable for use on systems up to 7 bar g (101.5 psi g). The air vent is manufactured in AISI 316L stainless steel with a typical surface finish of 1.6 - 3.2 Ra. Normal operation is close to saturated steam temperature, with complete air removal.

Materials

All wetted parts are manufactured from FDA and USP Class VI approved materials.

Options

Special connections to suit most piping systems at an extra cost. Please note that seat end spares for specially requested connections will require a minimum order quantity.

Standards

The AVM7 has been designed in general accordance with ASME BPE.

The unit also complies with the requirements of the European Pressure Equipment Directive 97/23/EC.

All elastomers used comply with FDA CFR title 21, paragraph 177 section 2600 and USP Class VI.

Certification

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

Note: for further product data see Technical Information Sheet TI-P123-22.

2.2 Sizes /pipe connections

¼", ½", ¾" and 1" screwed BSP or NPT.

½", ¾" and 1" O/D x 16 swg (0.065") wall thickness tube butt weld.

½", ¾" and 1" sanitary clamp compatible hygienic connection.

DIN 11850 (Series 1) tube butt weld ends

12 mm O/D x 1.0 mm wall thickness tube butt weld (DN10-D)

18 mm O/D x 1.0 mm wall thickness tube butt weld (DN15-D)

ISO 1127 (Series 1) tube butt weld ends

13.5 mm O/D x 1.6 mm wall thickness tube butt weld (DN8-I)

17.2 mm O/D x 1.6 mm wall thickness tube butt weld (DN10-I)

21.3 mm O/D x 1.6 mm wall thickness tube butt weld (DN15-I)

Note: On request other connection options are available at extra cost. Please note that seat end spares for specially requested connections will require a minimum order quantity - Please consult Spirax Sarco for further information.

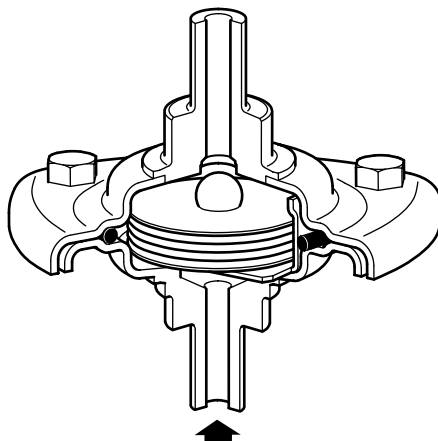
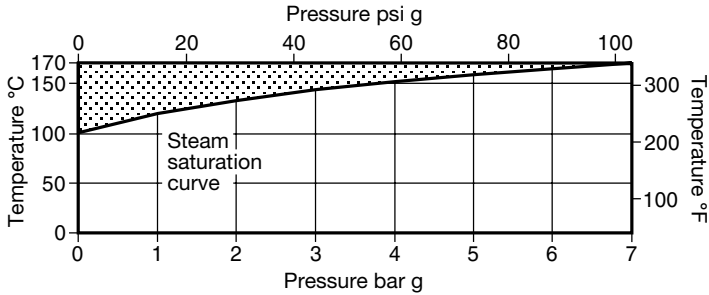



Fig. 1 AVM7

2.3 Pressure/temperature limits



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

Body design conditions		PN7	
PMA	Maximum allowable pressure	7 bar g @ 170°C	(101.5 psi g @ 338°F)
TMA	Maximum allowable temperature	170°C @ 7 bar g	(338°F @ 101.5 psi g)
Minimum allowable temperature		-10°C	(14°F)
PMO	Maximum operating pressure for saturated steam service	7 bar g	(101.5 psi g)
TMO	Maximum operating temperature	170°C	(338°F)
Minimum operating temperature		0°C	(32°F)
Designed for a maximum cold hydraulic test pressure		10.5 bar g	(152.3 psi g)

3. Installation

Note: Before actioning any installation observe the 'Safety information' in Section 1.

Referring to the Installation and Maintenance Instructions, name-plate and Technical Information Sheet, check that the product is suitable for the intended installation:

- 3.1** Check materials, pressure and temperature and their maximum values. If the maximum operating limit of the product is lower than that of the system in which it is being fitted, ensure that a safety device is included in the system to prevent overpressurisation.
- 3.2** Determine the correct installation situation and the direction of fluid flow.
- 3.3** Remove protective covers from all connections and the protective film from all name-plates, where appropriate, before installation on steam or other high temperature applications.
- 3.4** The product is designed for installation in **vertical lines** with the flow upwards to ensure self-draining operation. Do not expose the element to superheat conditions since over expansion may result. Suitable isolation valves must be installed to allow for safe maintenance/replacement. Open isolation valves slowly until normal operating conditions are achieved. Check for leaks.

Caution: In order to prevent undue stresses on the pipeline and air vent, ensure adequate provision is made for thermal expansion.

Note: The body and element must be handled carefully to ensure that surfaces are not damaged. If the trap is to discharge to atmosphere ensure it is to a safe place, the discharging fluid may be at a temperature of 100°C (212°F).

4. Commissioning

After installation or maintenance ensure that the system is fully functional. Carry out tests on any alarms or protective devices.

5. Operation

The operating element is a capsule containing a small quantity of a special liquid with a boiling point below that of water. In the cold conditions that exist at start-up, the capsule is relaxed. The valve is off its seat and is wide open, allowing unrestricted removal of air.

As air passes through the product, heat is transferred to the liquid in the capsule. The fill liquid boils before steam reaches the trap. The vapour pressure within the capsule causes it to expand and the unit shuts.

6. Maintenance

Note: Before actioning any maintenance program observe the 'Safety information' in Section 1.



6.1 General information

Before undertaking any maintenance on the product it must be isolated from the supply line and return line and any pressure allowed to safely normalise to atmosphere. The product should then be allowed to cool. When reassembling, ensure that all joint faces are clean. Always ensure the correct tools, safety procedures and protective equipment are used at all times.

6.2 How to fit new internals:

- Remove nuts and bolts.
- The end connection with internal seat, gasket and capsule assembly can then be removed for cleaning or replacement. Ensure that the capsule on reassembly is fitted in the correct position (see Figure 2, page 8).
- Reassemble using a new gasket and with the valve head in position to close onto the seat orifice.
- Replace nuts and bolts and tighten them to the recommended torque (see Table 1) and put back into service.
- Open isolation valves slowly until normal operating conditions are achieved.
- Check for leaks.

Table 1 Recommended tightening torques

Item	Part		or		N m	(lbf ft)
		mm				
5	Nuts and bolts	8 A/F		M5	3 - 4	(2.5 - 3.0)

7. Spare parts

Available spares are shown in solid outline. Parts drawn in broken lines are not available as spares.

Available spares

Element assembly	2
'O' ring (packet of 3)	3

How to order spares

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

Example: 1 - Element assembly for a Spirax Sarco ½" AVM7 stainless steel thermostatic air vent having screwed NPT connections.

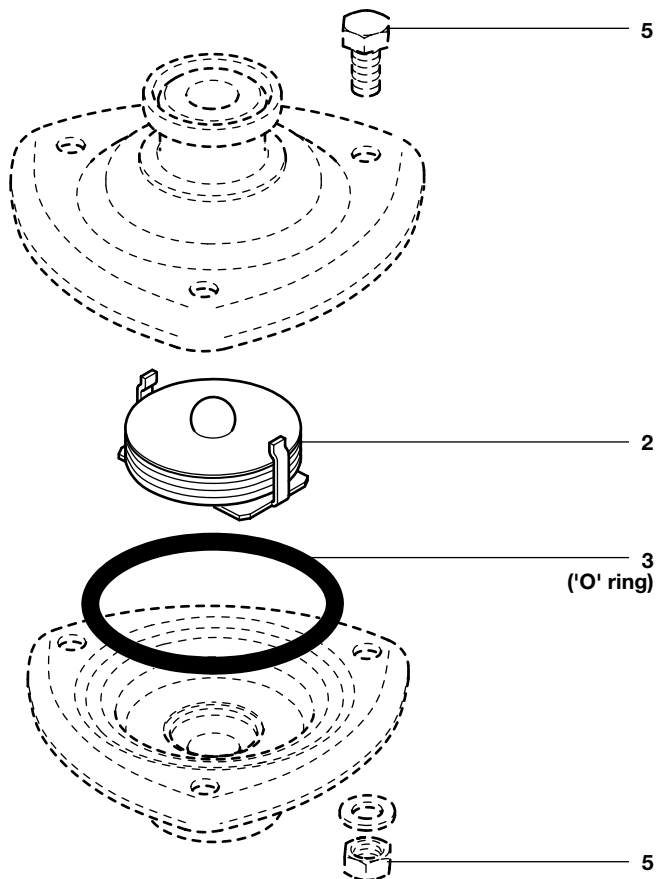


Fig. 2



INSTALLATION AND MAINTENANCE INSTRUCTIONS

IM- 3-111-US

May 1995

Stainless Steel Sanitary Pressure Regulator SRV6

Description

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

NOTE: The SRV6 should **not** be used for line isolation. If line isolation is required, a Model 61 Ball Valve should be installed upstream of the SRV6.

Maximum Operating Conditions

Maximum Operating Pressure: 116 psig, 8.0 bar

Maximum Operating Temperature: 347°F, 175°C

Downstream Control Range: 7-75 psi

Start-Up & Operation

1. First make sure that all stop valves are closed.
2. Check that adjusting screw (1) is slack. If necessary, turn counter-clockwise to release tension.
3. Open stop valves in the following order:
 - a. Open stop valve upstream of steam trap on inlet side of the regulator.
 - b. Open downstream stop valve.
 - c. **CAUTION:** OPEN INLET STOP VALVE SLOWLY TO AVOID DAMAGE FROM WATERHAMMER.
4. Slowly adjust screw (1) by turning clockwise until required reduced pressure is indicated downstream of the regulator.
5. Once the system has stabilized, it may be necessary to re-adjust the regulator. Tighten lock nut (2).
6. When not in use, isolate the valve upstream of the SRV6.

Installation (Refer to Fig. 1)

1. The SRV6 should be installed with the inlet vertical and the spring chamber upward for fully self draining operation.
2. For steam applications, a steam trap should be installed at the bottom of the vertical riser into the SRV6 to prevent build-up of condensate. Alternatively, a separator with trap should be installed immediately upstream of the SRV6.
3. Piping on the downstream side of the regulator should be increased to prevent restriction of flow.
4. Clean ball valves such as the Spirax Sarco Model 61 should be used both upstream and downstream to enable the regulator to be isolated for maintenance.
5. Before installing the valve, make sure the piping is free of foreign material, scale, etc.
6. To permit accurate setting of the regulator and to aid trouble shooting, pressure gauges should be installed both upstream and downstream.
7. In order to adequately protect downstream equipment, a safety valve or bursting disc may be required.

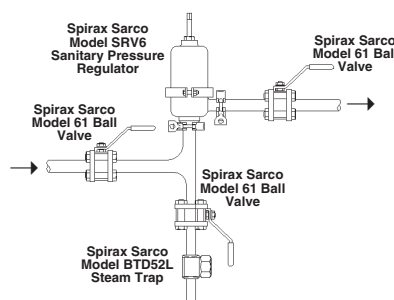
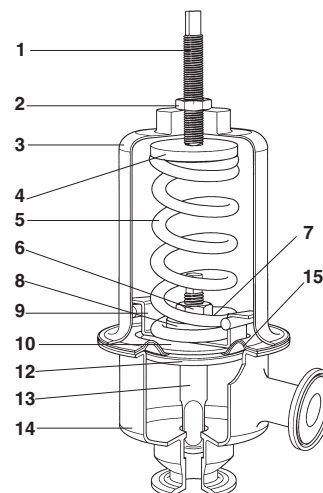


Fig. 1 Recommended installation - steam service



General Maintenance

While a program of planned maintenance is always to be recommended, the Spirax Sarco SRV6 regulator will give long and trouble-free service if correctly selected, installed and kept reasonably free of particulate matter. Dirt and foreign matter are most likely to collect during installation and later trouble can be avoided by inspecting the pipeline before installation. After a few days operation, check all joints for leakage.

Inspection/Repair (Refer to Fig. 2)

1. Shut isolating valves upstream and downstream and allow valve to cool.
2. Remove regulator from the pipeline.
3. Release spring tension by turning adjusting screw (1) fully counter-clockwise after first slackening lock nut (2).
4. Remove V-band clamp.
5. Firmly hold edge of diaphragm (15) and body (14) and rotate spring chamber (3) through 90° (see Fig. 3). The arrow on the lower edge of the spring chamber can be used as a guide.
6. Remove spring chamber (3).
7. Remove spring pusher (4) and spring (5).
8. Holding flat section at top of main valve (13) with a wrench, remove diaphragm nut (6) and spring washer (7).
- 9.* Remove spacer ring (8), retainer (9), upper disc (10), diaphragm (15), and lower disc (12).
10. The main valve (13) can be removed through the regulator inlet.
11. Inspect valve head and seat. Re-lap or replace main valve (13) if necessary.
12. Inspect diaphragm (15) for wear and replace if necessary.
13. Re-assemble in reverse order noting in particular:
 - a. Lower disc (12) has chamfered edge on the central hole to allow a seal to be made with the diaphragm (15) and main valve (13). ENSURE THAT UPPER (10) AND LOWER DISCS (12) ARE NOT TRANSPOSED, AND THAT BOTH ARE INSTALLED WITH ROUNDED EDGE FACING DIAPHRAGM.
 - b. When spring chamber is replaced, line up arrow so that it is directly in front of one of the legs of the retainer (9) - see Fig. 3. Firmly hold diaphragm edge (15) and body (14) and rotate spring chamber (3) through 90°. This locks the diaphragm restraint in place and will prevent over-extension.
 - c. Ensure that the diaphragm is accurately centered before refitting the V-band clamp. Tighten clamp to a torque of 75 lbin.

* Valves marked with dual range (circa 5/94) may have upper discs (10) and lower discs (12) measuring 1.75" in diameter. To accommodate the current diaphragm design, the discs should measure 1.25" in diameter. Replacement discs for valves that use the 1.75" diameter discs are available by contacting the factory.

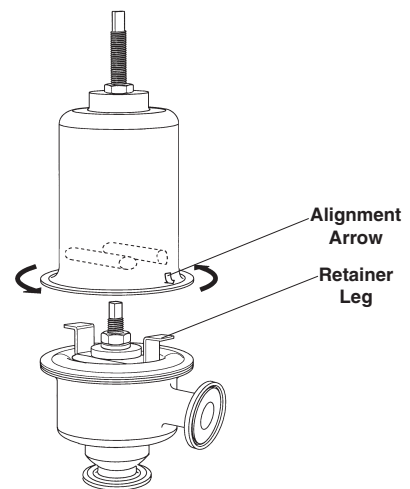


Fig. 3

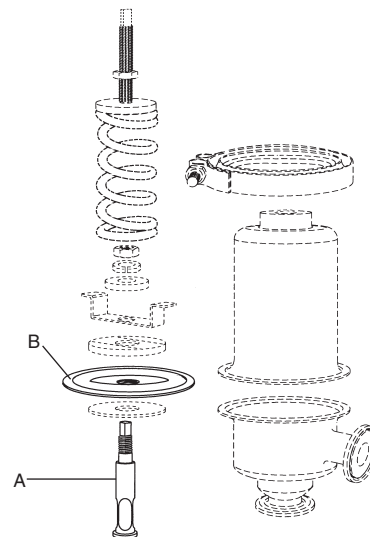


Fig. 4 Available Spares

Spare Parts

Available spare parts are shown in Fig. 4. Always order spares using the descriptions given, together with the valve type and size.

AVAILABLE SPARES

Main Valve	A
Diaphragm	B

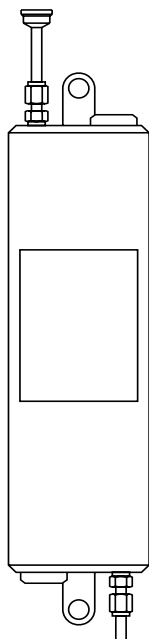
Spirax Sarco Applications Engineering Department
Toll Free at: 1-800-833-3246

SPIRAX SARCO, INC. • 1150 NORTHPOINT BLVD. • BLYTHEWOOD, SC 29016
PHONE 803-714-2000 • FAX 803-714-2200

SSC20

Sanitary Sample Cooler

Installation and Maintenance Instructions



- 1. Safety information*
- 2. General
product information*
- 3. Installation*
- 4. Commissioning*
- 5. Operation*
- 6. Maintenance*
- 7. Spare parts*
- 8. Certificate
of conformity*

1. Safety information

Safe operation of these products can only be guaranteed if they are properly installed, commissioned, used and maintained by qualified personnel (see Section 1.11) in compliance with the operating instructions. General installation and safety instructions for pipeline and plant construction, as well as the proper use of tools and safety equipment must also be complied with.

1.1 Intended use

Referring to the Installation and Maintenance Instructions, name-plate and Technical Information Sheet, check that the product is suitable for the intended use/application. The products comply with the requirements of the European Pressure Equipment Directive 97/23/EC and fall within category 'SEP'. It should be noted that products within this category are required by the directive not to carry the CE mark.

- i) The products have been specifically designed for use on steam and water, which are in Group 2 of the above mentioned Pressure Equipment Directive. The products' use on other fluids may be possible but, if this is contemplated, Spirax Sarco should be contacted to confirm the suitability of the product for the application being considered.
- ii) Check material suitability, pressure and temperature and their maximum and minimum values. If the maximum operating limits of the product are lower than those of the system in which it is being fitted, or if malfunction of the product could result in a dangerous overpressure or overtemperature occurrence, ensure a safety device is included in the system to prevent such over-limit situations.
- iii) Determine the correct installation situation and direction of fluid flow.
- iv) Spirax Sarco products are not intended to withstand external stresses that may be induced by any system to which they are fitted. It is the responsibility of the installer to consider these stresses and take adequate precautions to minimise them.
- v) Remove protection covers from all connections and protective film from all name-plates, where appropriate, before installation on steam or other high temperature applications.

1.2 Access

Ensure safe access and if necessary a safe working platform (suitably guarded) before attempting to work on the product. Arrange suitable lifting gear if required.

1.3 Lighting

Ensure adequate lighting, particularly where detailed or intricate work is required.

1.4 Hazardous liquids or gases in the pipeline

Consider what is in the pipeline or what may have been in the pipeline at some previous time. Consider: flammable materials, substances hazardous to health, extremes of temperature.

1.5 Hazardous environment around the product

Consider: explosion risk areas, lack of oxygen (e.g. tanks, pits), dangerous gases, extremes of temperature, hot surfaces, fire hazard (e.g. during welding), excessive noise, moving machinery.

1.6 The system

Consider the effect on the complete system of the work proposed. Will any proposed action (e.g. closing isolation valves, electrical isolation) put any other part of the system or any personnel at risk?

Dangers might include isolation of vents or protective devices or the rendering ineffective of controls or alarms. Ensure isolation valves are turned on and off in a gradual way to avoid system shocks.

1.7 Pressure systems

Ensure that any pressure is isolated and safely vented to atmospheric pressure. Consider double isolation (double block and bleed) and the locking or labelling of closed valves. Do not assume that the system has depressurised even when the pressure gauge indicates zero.

1.8 Temperature

To avoid burns, it is essential that cooling water is flowing before opening the sample inlet valve. Always close the sample inlet valve before turning off the cooling water.

1.9 Tools and consumables

Before starting work ensure that you have suitable tools and/or consumables available. Use only genuine Spirax Sarco replacement parts.

1.10 Protective clothing

Consider whether you and/or others in the vicinity require any protective clothing to protect against the hazards of, for example, chemicals, high/low temperature, radiation, noise, falling objects, and dangers to eyes and face.

1.11 Permits to work

All work must be carried out or be supervised by a suitably competent person. Installation and operating personnel should be trained in the correct use of the product according to the Installation and Maintenance Instructions.

Where a formal 'permit to work' system is in force it must be complied with. Where there is no such system, it is recommended that a responsible person should know what work is going on and, where necessary, arrange to have an assistant whose primary responsibility is safety.

Post 'warning notices' if necessary.

1.12 Handling

Manual handling of large and/or heavy products may present a risk of injury. Lifting, pushing, pulling, carrying or supporting a load by bodily force can cause injury particularly to the back. You are advised to assess the risks taking into account the task, the individual, the load and the working environment and use the appropriate handling method depending on the circumstances of the work being done.

1.13 Residual hazards

In normal use the external surface of the product may be very hot. If used at the maximum permitted operating conditions the surface temperature of some products may reach temperatures of 350°C (662°F).

Many products are not self-draining. Take due care when dismantling or removing the product from an installation (refer to 'Maintenance instructions').

1.14 Freezing

Provision must be made to protect products which are not self-draining against frost damage in environments where they may be exposed to temperatures below freezing point.

1.15 Disposal

Unless otherwise stated in the Installation and Maintenance Instructions, this product is recyclable and no ecological hazard is anticipated with its disposal providing due care is taken.

1.16 Returning products

Customers and stockists are reminded that under EC Health, Safety and Environment Law, when returning products to Spirax Sarco they must provide information on any hazards and the precautions to be taken due to contamination residues or mechanical damage which may present a health, safety or environmental risk. This information must be provided in writing including Health and Safety data sheets relating to any substances identified as hazardous or potentially hazardous.

— 2. General product information —

2.1 Description

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

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

All sample contact surfaces are compliant to current ASME BPE. Surface finish of better than 0.5 μ -m Ra (20 μ -in Ra).

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

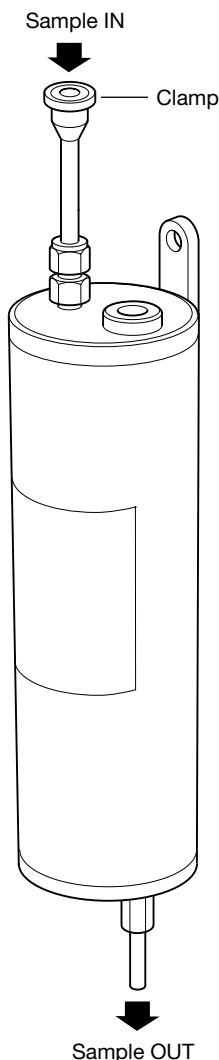


Fig. 1

2.2 Sizes and pipe connections

Cooling water inlet and outlet connections	BSP version	½" BSP
	NPT version	½" NPT
Sample tube inlet and outlet connections	½" adaptor for clamp fitting (clamp not supplied) on sample inlet. 6 mm O/D on sample outlet.	

2.3 Limiting conditions

Part	Design temperatures	Design pressure
Coil	300°C (572°F)	32 bar g (464 psi g)
	260°C (500°F)	44 bar g (638 psi g)
	120°C (248°F)	63 bar g (913 psi g)
Body	100°C (212°F)	10 bar g (145 psi g)
Cold hydraulic test pressure		16 bar g (232 psi g)

Clamp - The pressure and temperature rating is dependant on the clamp manufacturers recommendations.

3. Installation

Note: Before actioning any installation observe the 'Safety information' in Section 1.

- We recommend the use of corrosion resistant pipework suitable for the fluid being sampled.
- Keep the length of all pipes to a minimum.
- Cooling water must be clean and free of scale forming salts.
- The sample cooler must be mounted vertically, using the pre-drilled top and bottom mounting brackets (see Figure 3).
- Allow sufficient space below the SSC20 for collection of the sample in a beaker or similar container. We recommend that a tundish piped to drain is located underneath this outlet. No connection is required on the sample OUT.
- Connect the pipework as shown in the drawing. The cooling water IN should be piped to the bottom of the sample cooler in ½" nominal bore pipe via a cooling water inlet valve. A ½" BSP/NPT male/female elbow makes a suitable connector.
- Pipe the cooling water OUT from the top of the sample cooler to an open drain or tundish.
Caution: to avoid the possibility of an air lock at the top of the sample cooler, do not allow the thread of the cooling water OUT elbow to protrude into the sample cooler body - maximum thread engagement 15 mm.
- Install the clamp fitting and seal in accordance with the manufacturer's instructions.

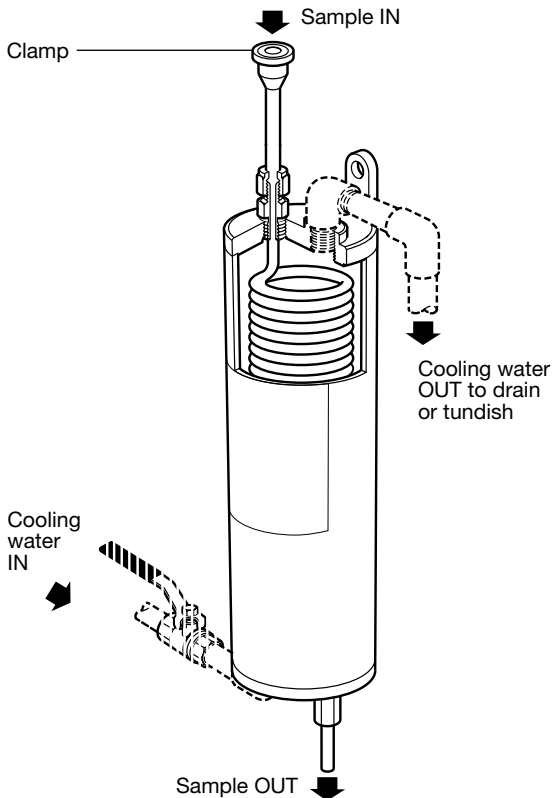


Fig. 2

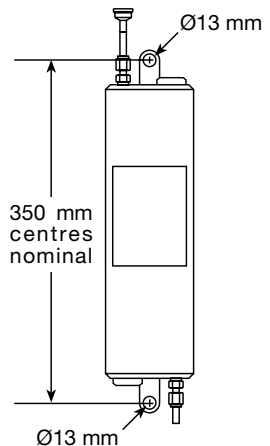


Fig. 3

4. Commissioning

After installation or maintenance carry out tests to ensure that the system is fully functional.

5. Operation

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.

Follow this procedure for safe operation and accurate sampling:-

- Open the cooling water inlet valve first and ensure that a full flow can be seen at the cooling water outlet.
- Gradually open the sample inlet valve and regulate the flow to achieve a cooled sample at about 25°C (77°F).
- Allow the sample to run for a while before collection. This will ensure that a true sample is collected for analysis.
- When enough liquid has been collected **close the sample inlet first**, and then the cooling water inlet valve.
- After closing the sample inlet valve the sample OUT connection may drip for a few minutes while the coil drains.

6. Maintenance

No routine maintenance is required.

7. Spare parts

The following components are available as spares:

Component	Stock no.
Stud coupling stainless steel BSP	0963243

CERTIFICATE OF CONFORMITY

We, Spirax Sarco Ltd.
St. George's Road,
Cheltenham,
Gloucestershire,
UK.

Certify that the product:

SSC20: SANITARY SAMPLE COOLER.

Has been designed within the general requirements of the ASME BPE Standard.

- All wetted components have a surface finish $< 0.5\mu\text{m Ra}$ (SFT5).
- All wetted components have material certification to EN 10204 type 3.1.

Cheltenham, UK, 07.



M. Forno,
Product Director.

ATTENTION!

The attention of the specifier, purchaser, installer or user is drawn to special measures and limitations to use that must be observed when this product is taken into service to maintain compliance with the general requirements of the ASME BPE Standard. Details of these special measures and limitations to use are available on request and are also contained in the Installation and Maintenance Instructions.

Stainless Steel Filter CSF26

About the CSF26

The CSF26 is an in-line all 316 stainless steel filter with 2.8 micron absolute rated element suitable for steam, liquid and gas service.

In order to avoid possible damage during shipping, the CSF26 body and element are packed in separate boxes.

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) Max. Allowable Pressure
275 psig/0-100°F 19 barg/0-38°C

(TMA) Max. Allowable Temperature
750°F/0-95 psig 399°C/0-6.5 barg

Element Design Conditions
Max. Element Differential Pressure 15 psi/1 bar

Installation

In steam service

1. When used in steam service, the CSF26 should be installed as in the Fig. 1 hook-up. This hook-up is in accordance with 3-A Accepted Practice Number 609-01 which covers the production of culinary steam.
The separator and strainer shown will remove residual condensate and larger solid particles, such as rust and pipescale prior to filtration. This will increase filter efficiency and prolong element life.
2. The filter body (1) should be installed with the filter bowl (2) vertically up, and the flow arrow pointing in the direction of steam flow.
3. A steam trap should be fitted to the filter body (1) to remove residual condensate which will form during operation, or when the filter is isolated.
4. An air vent (Spirax Sarco MST18) should be fitted to the filter bowl (2) to ensure maximum filter efficiency.
5. Pressure gauges should be fitted upstream and downstream of the filter to indicate filter element condition.
To avoid re-contamination of the system, all downstream pipe and fittings should be stainless steel.

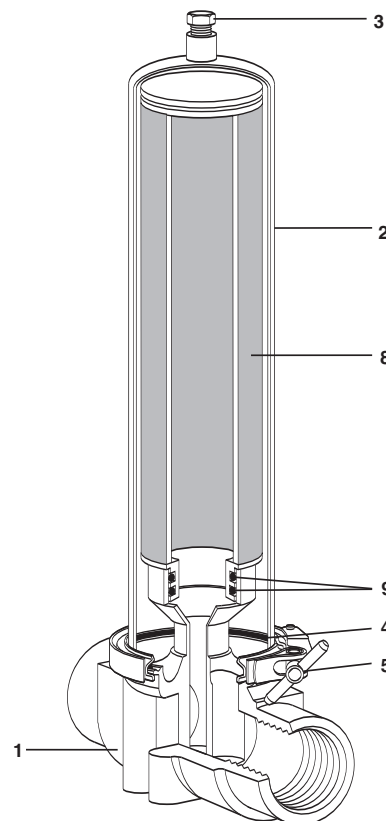
In gas service

1. A separator and strainer should be installed upstream of the CSF26.
2. Pressure gauges should be fitted upstream and downstream of the filter to indicate filter element condition. To avoid re-contamination of the system, all downstream pipe and fittings should be stainless steel.

In liquid service

1. The plug in the filter bowl (2) should be removed, and fitted in the lower filter body drain connection.
2. An automatic air vent should be installed on the filter bowl.
3. Pressure gauges should be fitted upstream and downstream of the filter to indicate filter element condition. To avoid re-contamination of the system, all downstream pipe and fittings should be stainless steel.

Note: Before commissioning the CSF26, the 1/4" NPT plastic drain plug on the body needs to be removed and a steam trap or other suitable plug installed.



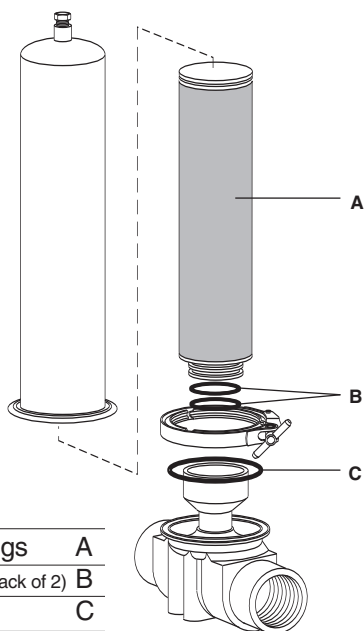
Removing and Fitting the filter element

1. Loosen and remove the body clamp (5) (1/2" - 2-1/2" CSF26). Remove body bolts (3"CSF26).
2. Remove filter bowl (2).
3. Remove element (8).

Reassembling and Fitting the filter element

1. Lubricate element O-Rings (9) with petroleum gel or silicone oil as approved for the application.
2. Gently push element (8) into filter body (1).
3. Re-fit filter bowl (2) and body clamp(5)/body bolts.
4. Hand tighten clamp (5) (1/2" - 2-1/2"CSF26). Tighten body bolts (3" CSF26) to 20-25 lb-ft, 27-34 Nm.

Note: It is recommended that the body O-Ring (4) be replaced each time an element is cleaned or renewed.



Spare Parts

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

Element Cleaning

It is recommended that the CSF26 element be removed for cleaning or replacement when the differential pressure across the unit reaches 10 - 15 psi.

Upon removal from the filter body, contaminants on the surface of the element such as rust, will begin to corrode, potentially damaging the element media. It is therefore important to clean a contaminated element promptly upon removal from the filter.

The element can be cleaned chemically or in an ultrasonic bath as outlined below:

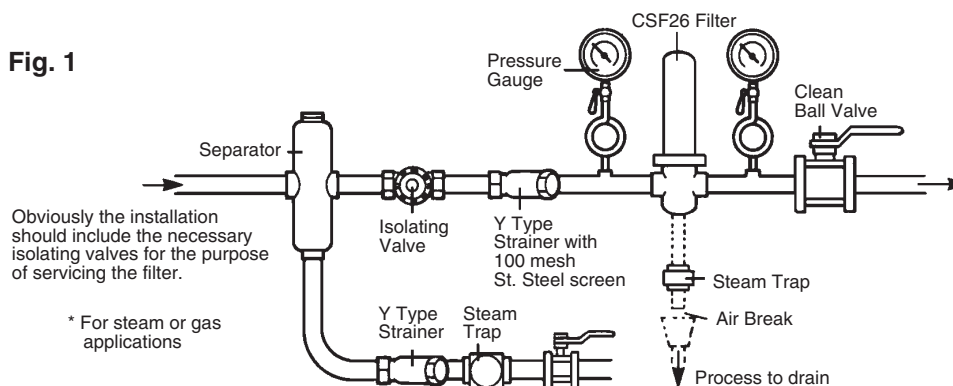
Chemical cleaning

1. Remove O-Rings (9)
2. Immerse the element (8) slowly in a solution of 17% by weight: sodium hydroxide (chlorine free), 3% by weight: sodium carbonate, 80% water. Boil for one hour. (Do not flow through element as caustic particles may be removed from the cleansing fluid and clog filter medium.)
- Caution:** Safety controls for hazardous solutions are necessary. Bath container must be able to safely accommodate hot caustic solution. Protective clothing, hand, eye and face equipment is required as recommended by the chemical supply company.
3. Rinse element with water to remove alkali.
4. Soak element in hot (200°F) 14% nitric acid for 10 minutes. Nitric acid, 14%, is made by adding 1 part concentrated acid to 4 parts water.
5. Wash element in cold water. If water is unfiltered, do not force water through element as fine particulate matter in water will partially clog the porous media.
6. Air dry at a temperature not to exceed 230°F.
7. Install new O-Rings.

Ultrasonic cleaning

Elements can be cleaned ultrasonically, using cleaning agents compatible with the element material. Prior to cleaning, the element O-Rings should be removed. New O-Rings should always be installed once an element has been cleaned. It is recommended that the manufacturer of the ultrasonic equipment be contacted to establish an appropriate cleaning routine.

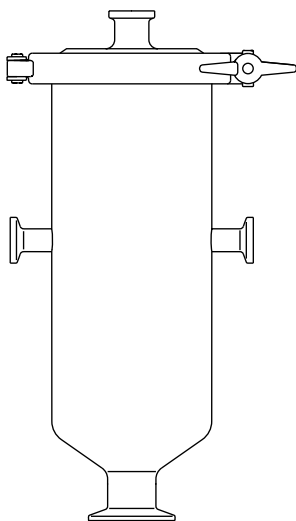
Fig. 1



For any additional information you may require, contact: Spirax Sarco Applications Engineering Department
Toll Free 1-800-833-3246

**spirax
sarco**

**CS10 Stainless Steel
Clean Steam Separator
Installation and Maintenance Instructions**



- 1. Safety information*
- 2. General
product information*
- 3. Installation*
- 4. Commissioning*
- 5. Operation*
- 6. Maintenance*
- 7. Spare parts*

1. Safety information

Safe operation of this product can only be guaranteed if it is properly installed, commissioned, used and maintained by qualified personnel (see Section 1.11) in compliance with the operating instructions. General installation and safety instructions for pipeline and plant construction, as well as the proper use of tools and safety equipment must also be complied with.

1.1 Intended use

Referring to the Installation and Maintenance Instructions, body markings and Technical Information Sheet, check that the product is suitable for the intended use/application. The product listed below complies with the requirements of the European Pressure Equipment Directive 97/23/EC and carries the CE mark when so required.

Product		Group 1 Gases	Group 2 Gases	Group 1 Liquids	Group 2 Liquids
CS10-1 and CS10-2	DN15 - DN25 (½" - 1")	-	SEP	-	SEP
	DN40 - DN50 (1½" - 2")	-	1	-	SEP

- i) This product has been specifically designed for use on steam, air or water/condensate which is in Group 2 of the above mentioned Pressure Equipment Directive. The products' use on other fluids may be possible but, if this is contemplated, Spirax Sarco should be contacted to confirm the suitability of the product for the application being considered.
- ii) Check material suitability, pressure and temperature and their maximum and minimum values. If the maximum operating limits of the product are lower than those of the system in which it is being fitted, or if malfunction of the product could result in a dangerous overpressure or overtemperature occurrence, ensure a safety device is included in the system to prevent such over-limit situations.
- iii) Determine the correct installation situation and direction of fluid flow.
- iv) Spirax Sarco products are not intended to withstand external stresses that may be induced by any system to which they are fitted. It is the responsibility of the installer to consider these stresses and take adequate precautions to minimise them.
- v) Remove protection covers from all connections and protective film from all name-plates, where appropriate, before installation on steam or other high temperature applications.

1.2 Access

Ensure safe access and if necessary a safe working platform (suitably guarded) before attempting to work on the product. Arrange suitable lifting gear if required.

1.3 Lighting

Ensure adequate lighting, particularly where detailed or intricate work is required.

1.4 Hazardous liquids or gases in the pipeline

Consider what is in the pipeline or what may have been in the pipeline at some previous time. Consider: flammable materials, substances hazardous to health, extremes of temperature.

1.5 Hazardous environment around the product

Consider: explosion risk areas, lack of oxygen (e.g. tanks, pits), dangerous gases, extremes of temperature, hot surfaces, fire hazard (e.g. during welding), excessive noise, moving machinery.

1.6 The system

Consider the effect on the complete system of the work proposed. Will any proposed action (e.g. closing isolation valves, electrical isolation) put any other part of the system or any personnel at risk?

Dangers might include isolation of vents or protective devices or the rendering ineffective of controls or alarms. Ensure isolation valves are turned on and off in a gradual way to avoid system shocks.

1.7 Pressure systems

Ensure that any pressure is isolated and safely vented to atmospheric pressure. Consider double isolation (double block and bleed) and the locking or labelling of closed valves. Do not assume that the system has depressurised even when the pressure gauge indicates zero.

1.8 Temperature

Allow time for temperature to normalise after isolation to avoid the danger of burns and consider whether protective clothing (including safety glasses) is required.

If the sanitary clamp seal (which is made from PTFE encapsulated Viton) has been subjected to a temperature approaching 250°C (482°F) or higher, it will give off toxic fumes, which if inhaled are likely to cause temporary discomfort. It is essential for a NO SMOKING rule to be enforced in all areas where PTFE is stored, handled, or processed as persons inhaling the fumes from burning tobacco contaminated with PTFE particles can develop 'polymer fume fever'.

If the sanitary clamp seal has been subjected to a temperature approaching 315°C (599°F) or higher, the Viton may have decomposed and formed hydrofluoric acid. Avoid skin contact and inhalation of any fumes as the acid will cause deep skin burns and damage to the respiratory system.

1.9 Tools and consumables

Before starting work ensure that you have suitable tools and/or consumables available. Use only genuine Spirax Sarco replacement parts.

1.10 Protective clothing

Consider whether you and/or others in the vicinity require any protective clothing to protect against the hazards of, for example, chemicals, high/low temperature, radiation, noise, falling objects, and dangers to eyes and face.

1.11 Permits to work

All work must be carried out or be supervised by a suitably competent person. Installation and operating personnel should be trained in the correct use of the product according to the Installation and Maintenance Instructions.

Where a formal 'permit to work' system is in force it must be complied with. Where there is no such system, it is recommended that a responsible person should know what work is going on and, where necessary, arrange to have an assistant whose primary responsibility is safety.

Post 'warning notices' if necessary.

1.12 Handling

Manual handling of large and/or heavy products may present a risk of injury. Lifting, pushing, pulling, carrying or supporting a load by bodily force can cause injury particularly to the back. You are advised to assess the risks taking into account the task, the individual, the load and the working environment and use the appropriate handling method depending on the circumstances of the work being done.

1.13 Residual hazards

In normal use the external surface of the product may be very hot. If used at the maximum permitted operating conditions the surface temperature of some products will exceed temperatures of 250°C (482°F).

Many products are not self-draining. Take due care when dismantling or removing the product from an installation (refer to 'Maintenance instructions').

1.14 Freezing

Provision must be made to protect products which are not self-draining against frost damage in environments where they may be exposed to temperatures below freezing point.

1.15 Disposal

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

Viton:

- Can be land filled, when in compliance with National and Local regulations.
- Can be incinerated, but a scrubber must be used to remove Hydrogen Fluoride, which is evolved from the product and with the compliance of National and Local regulations.

1.16 Returning products

Customers and stockists are reminded that under EC Health, Safety and Environment Law, when returning products to Spirax Sarco they must provide information on any hazards and the precautions to be taken due to contamination residues or mechanical damage which may present a health, safety or environmental risk. This information must be provided in writing including Health and Safety data sheets relating to any substances identified as hazardous or potentially hazardous.

— 2. General product information —

2.1 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 sterilisation 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

CS10-1 Has a surface finish of 0.5 µm Ra and all welds are polished.

CS10-2 Has a surface finish of 0.75 µm Ra and all welds passivated but left as laid.

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-rousing.

Standard surface finish

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

Optional surface finish (CS10-1 only)

Internal Polish to 0.5 µm Ra maximum + Electropolished.

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 polymers used comply with FDA regulation CFR 21 paragraph 177 section 2600. ½", ¾" and 1" sizes are available with USP class VI.

Certification

This product is available with the following certification:

- EN 10204 3.1 material certifications.
- Certificate of conformity including internal surface finish.
- Certification of polymers FDA/USP compliance (the polymers for the 1½" 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.

Note: For additional information see Technical Information Sheet TI-P023-59.

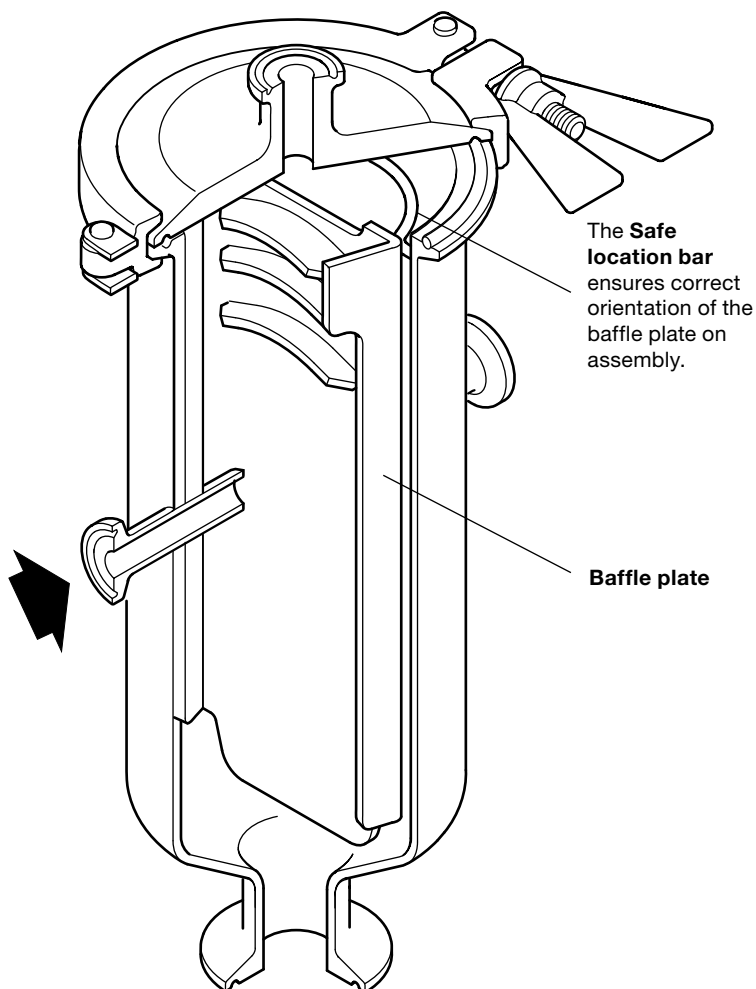


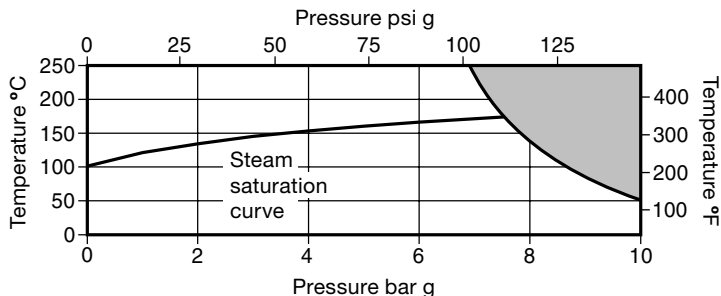
Fig. 1 CS10

2.2 Sizes and pipe connections

Steam inlet and outlet	1/2", 3/4", 1", 1 1/2" and 2" sanitary clamp ASME BPE (Tri-clamp®) or
	DIN 32676 upon request.
Drain	Extended Tube Weld ends (ETO) ASME BPE or
	DIN 11850 upon request.
Vent	1" ASME BPE (Tri-clamp®)
	1/2" ASME BPE (Tri-clamp®)

Note: Other connections are available upon request.

2.3 Pressure /temperature limits (ISO 6552)



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

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

Body design conditions		PN10
PMA	Maximum allowable pressure	10 bar g @ 50°C (145 psi g @ 122°F)
TMA	Maximum allowable temperature	250°C (482°F)
Minimum allowable temperature		-10°C (14°F)
PMO	Maximum operating pressure for saturated steam service	7.6 bar g (110 psi g)
TMO	Maximum operating temperature	250°C @ 6.8 bar g (482°F @ 98 psi g)
Minimum operating temperature		0°C (32°F)
Designed for a maximum cold hydraulic test pressure of:		15 bar g (217 psi g)

3. Installation

Note: Before actioning any installation observe the 'Safety information' in Section 1.

Important installation note:

Install in a horizontal pipeline with the drain directly below.

To ensure that any separated liquid is drained away quickly, a suitable liquid drainer or steam trap must be connected to the drain.

Referring to the Installation and Maintenance Instructions, name-plate and Technical Information Sheet, check that the product is suitable for the intended installation:

- 3.1** Check materials, pressure and temperature and their maximum values. If the maximum operating limit of the product is lower than that of the system in which it is being fitted, ensure a safety device is included in the system to prevent overpressurisation.
- 3.2** Determine the correct installation situation and the direction of fluid flow.
- 3.3** Remove protective covers from all connections and the protective film from all name-plates, where appropriate, before installation on steam or other high temperature applications.
- 3.4** The separators may be lagged if required.
- 3.5** Install in a horizontal pipeline with the drain directly below.
To ensure that any separated liquid is drained quickly, a suitable liquid drainer or steam trap must be connected to the drain connection. A float type trap is recommended. For those steam systems where air can be present, air can collect in the upper portion of the separator. In this situation a suitable air vent should be connected to the air vent connection.
If an air vent is not being fitted then the connection must have the plastic transit protection plug removed and must have an ASME BPE / BS 4825 Tri-Clamp® fitted.

Notes:

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

4. Commissioning

After installation or maintenance ensure that the system is fully functioning. Carry out tests on any alarms or protective devices.

Note: If installed on a steam / condensate system, it is very important that the pressure is built up slowly to avoid possible damage to the unit.

5. Operation

Separators are designed to gather together small droplets of entrained liquids and then separate them from the gas / vapour flow. The relatively heavy droplets impinge on the internal baffles and are then directed to the separator drain connection and removed from the system using a steam trap, or when used on air or gas distribution system, a liquid drainer.

6. Maintenance

Note: Before actioning any maintenance programme observe the 'Safety information' in Section 1.

Before undertaking any maintenance on the separator it must be isolated from the supply line and return line and any pressure allowed to slowly normalise to atmosphere. The separator should then be allowed to cool.

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

Remove sanitary clamps. The cover with baffle plate and seal can then be removed for cleaning or replacement. Reassemble using a new seal. Whenever the cover is disassembled, the seal is to be changed with a new one. Replace and tighten sanitary clamps and put back into service. Check for leaks and retighten as necessary.

Note: The Safe location bar (Refer to Figure 1) ensures correct orientation of the baffle plate on assembly.

Note: Minimum service interval of the seal is 1 year.

7. Spare parts

Spare parts are available as indicated. No other parts are supplied as spares.

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, model number and pressure rating of the trap.

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

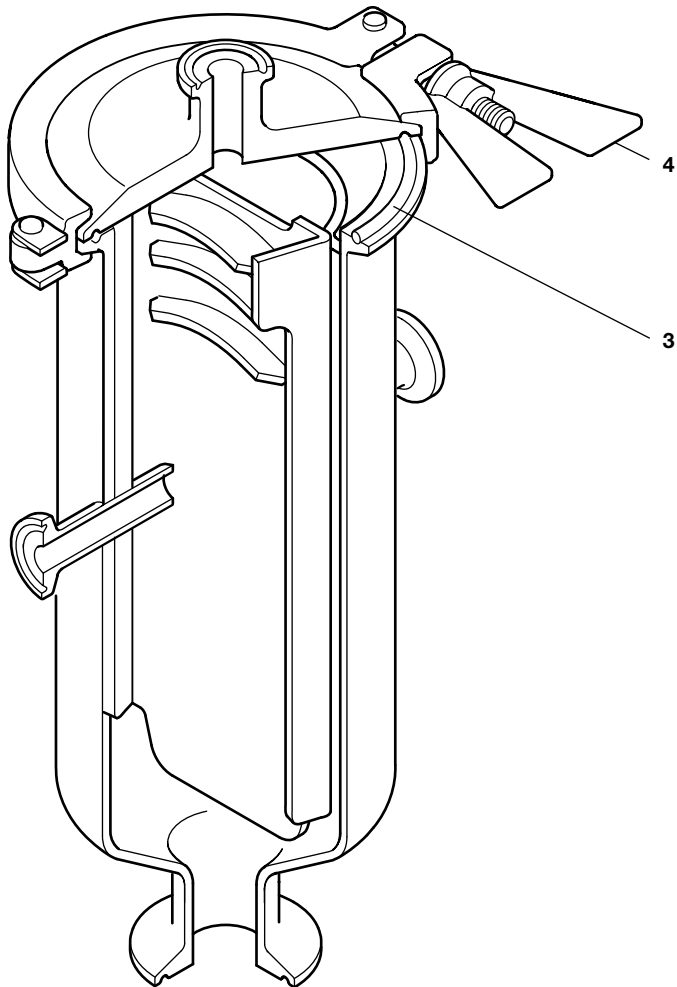
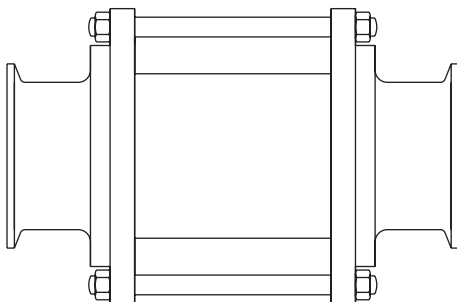


Fig. 2

**SGS10 Stainless Steel
Sanitary Sight Glass
Installation and Maintenance Instructions**





- 1. Safety information*
- 2. General product information*
- 3. Installation*
- 4. Commissioning*
- 5. Maintenance and Spare parts*

1. Safety information

Safe operation of this product can only be guaranteed if it is properly installed, commissioned, used and maintained by qualified personnel (see Section 1.11) in compliance with the operating instructions. General installation and safety instructions for pipeline and plant construction, as well as the proper use of tools and safety equipment must also be complied with.

1.1 Intended use

Referring to the Installation and Maintenance Instructions, name-plate and Technical Information Sheet, check that the product is suitable for the intended use/application. The product listed below complies with the requirements of the European Pressure Equipment Directive 97/23/EC and carries the  mark when so required. It should be noted that products rated as 'SEP' are required by the Directive not to carry the  mark. The product falls within the following Pressure Equipment Directive categories:

Product	Group 1 Gases	Group 2 Gases	Group 1 Liquids	Group 2 Liquids
SGS10 sight glass DN15 - DN100	-	Sep	-	Sep

- i) The SGS10 has been specifically designed for use on steam, air or water/ condensate which are in Group 2 of the above mentioned Pressure Equipment Directive. The products' use on other fluids may be possible but, if this is contemplated, Spirax Sarco should be contacted to confirm the suitability of the product for the application being considered.
- ii) Check material suitability, pressure and temperature and their maximum and minimum values. If the maximum operating limits of the product are lower than those of the system in which it is being fitted, or if malfunction of the product could result in a dangerous overpressure or overtemperature occurrence, ensure a safety device is included in the system to prevent such over-limit situations.
- iii) Determine the correct installation situation and direction of fluid flow.
- iv) Spirax Sarco products are not intended to withstand external stresses that may be induced by any system to which they are fitted. It is the responsibility of the installer to consider these stresses and take adequate precautions to minimise them.
- v) Remove protection covers from all connections and protective film from all name-plates, where appropriate, before installation on steam or other high temperature applications.

1.2 Access

Ensure safe access and if necessary a safe working platform (suitably guarded) before attempting to work on the product. Arrange suitable lifting gear if required.

1.3 Lighting

Ensure adequate lighting, particularly where detailed or intricate work is required.

1.4 Hazardous liquids or gases in the pipeline

Consider what is in the pipeline or what may have been in the pipeline at some previous time. Consider: flammable materials, substances hazardous to health, extremes of temperature.

1.5 Hazardous environment around the product

Consider: explosion risk areas, lack of oxygen (e.g. tanks, pits), dangerous gases, extremes of temperature, hot surfaces, fire hazard (e.g. during welding), excessive noise, moving machinery.

1.6 The system

Consider the effect on the complete system of the work proposed. Will any proposed action (e.g. closing isolation valves, electrical isolation) put any other part of the system or any personnel at risk?

Dangers might include isolation of vents or protective devices or the rendering ineffective of controls or alarms. Ensure isolation valves are turned on and off in a gradual way to avoid system shocks.

1.7 Pressure systems

Ensure that any pressure is isolated and safely vented to atmospheric pressure. Consider double isolation (double block and bleed) and the locking or labelling of closed valves. Do not assume that the system has depressurised even when the pressure gauge indicates zero.

1.8 Temperature

Allow time for temperature to normalise after isolation to avoid danger of burns. Products fitted with PTFE seals must not be subjected to temperature above 260°C (500°F). Above this temperature toxic fumes may be given off. Avoid inhalation of fumes or skin contact.

1.9 Tools and consumables

Before starting work ensure that you have suitable tools and/or consumables available. Use only genuine Spirax Sarco replacement parts.

1.10 Protective clothing

Consider whether you and/or others in the vicinity require any protective clothing to protect against the hazards of, for example, chemicals, high/low temperature, radiation, noise, falling objects, and dangers to eyes and face.

1.11 Permits to work

All work must be carried out or be supervised by a suitably competent person. Installation and operating personnel should be trained in the correct use of the product according to the Installation and Maintenance Instructions.

Where a formal 'permit to work' system is in force it must be complied with. Where there is no such system, it is recommended that a responsible person should know what work is going on and, where necessary, arrange to have an assistant whose primary responsibility is safety.

Post 'warning notices' if necessary.

1.12 Handling

Manual handling of large and/or heavy products may present a risk of injury. Lifting, pushing, pulling, carrying or supporting a load by bodily force can cause injury particularly to the back. You are advised to assess the risks taking into account the task, the individual, the load and the working environment and use the appropriate handling method depending on the circumstances of the work being done.

1.13 Residual hazards

In normal use the external surface of the product may be very hot. If used at the maximum permitted operating conditions the surface temperature of some products will exceed temperatures of 100°C (212°F).

Many products are not self-draining. Take due care when dismantling or removing the product from an installation (refer to 'Maintenance instructions').

1.14 Freezing

Provision must be made to protect products which are not self-draining against frost damage in environments where they may be exposed to temperatures below freezing point.

1.15 Disposal

Unless otherwise stated in the Installation and Maintenance Instructions, this product is recyclable and no ecological hazard is anticipated with its disposal providing due care is taken, except:

PTFE:

- Can only be disposed of by approved methods, not incineration.
- Keep PTFE waste in a separate container, do not mix it with other rubbish, and consign it to a landfill site.

1.16 Returning products

Customers and stockists are reminded that under EC Health, Safety and Environment Law, when returning products to Spirax Sarco they must provide information on any hazards and the precautions to be taken due to contamination residues or mechanical damage which may present a health, safety or environmental risk. This information must be provided in writing including Health and Safety data sheets relating to any substances identified as hazardous or potentially hazardous.

— 2. General product information —

2.1 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 316L stainless steel and toughened borosilicate.

Surface finish

Internal surface finish - $<0.4 \mu\text{Ra}$ (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 for EPDM and Section 1550 for PTFE.
- Extended tube weld end material 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 caped and the product is sealed in a plastic bag or shrink wrapped prior to boxing.

Note: For further information see the following Technical Information sheet TI-P130-25.

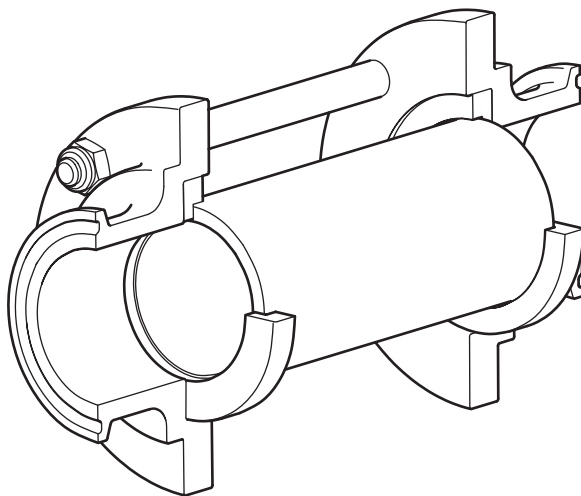


Fig. 1 SGS10

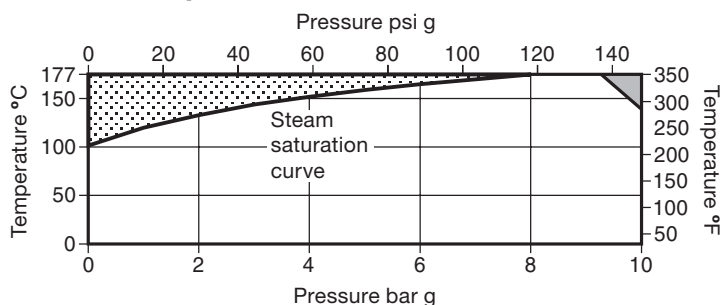
2.2 Sizes and pipe connections

½", ¾", 1", 1½" and 2" available as standard. 2½", 3" and 4" are available to special order.


Note: DIN connections are marked by the tube O/D dimension: ½" = 18 mm, ¾" = 22 mm, 1" = 28 mm, 1½" = 40 mm, 2" = 52 mm, 2½" = 70 mm, 3" = 84 mm and 4" = 104 mm.

Sanitary clamp	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	DN15 to DN50 DN65 to DN100	Series 1 Series 2

2.3 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	10 bar g @ 140°C	(145 psi g @ 284°F)
TMA	Maximum allowable temperature	177°C @ 9.2 bar g	(350°F @ 133 psi g)
Minimum allowable temperature		-254°C	(-425°F)
PMO	Maximum operating pressure for saturated steam service	6 bar g	(87 psi g)
TMO	Maximum operating temperature	165°C @ 6 bar g	(329°F @ 87 psi g)
Minimum operating temperature		0°C	(32°F)
Designed for a maximum cold hydraulic test pressure of:		15 bar g	(217 psi g)

3. Installation

Before actioning any installation, observe the 'Safety information' in Section 1.

Referring to the Installation and Maintenance Instructions, name-plate and Technical Information Sheet, check that the product is suitable for the intended installation:

- 3.1** Check materials, pressure and temperature and their maximum values. If the maximum operating limit of the product is lower than that of the system in which it is being fitted, ensure that a safety device is included in the system to prevent overpressurisation.
- 3.2** Determine the correct installation situation and the direction of flow.
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.
- 3.3** Remove protective covers from all connections and protective film from all name-plates, where appropriate, before installation on steam or other high temperature applications.
- 3.4** The SGS10 can be fitted in both horizontal and vertical lines.
- 3.5** Fittings, clamps and gaskets for the connecting tubing are not supplied.

Note: This product must be handled carefully to ensure that the glass and surface finish are not damaged.

4. Commissioning

After installation or maintenance ensure that the system is fully functioning. Carry out tests on any alarms or protective devices.

Note: If installed on a steam / condensate system, it is very important that the pressure is built up slowly to avoid possible damage to the unit.

— 5. Maintenance and Spare parts —

Note: Before actioning any maintenance, observe the 'Safety information' in Section 1.

Before undertaking any maintenance on this product, it must be isolated from the supply and return lines and any pressure allowed to normalise to atmosphere. The unit should then be allowed to cool.

Warning: In some applications the fluids can act as a solvent for the glass. It is recommended that the glass be periodically checked for thinning. The glass should be replaced immediately if there is any evidence of thinning.

Note: The unit must be handled carefully to ensure the glass and surface finish are not damaged.

5.1 How to renew the sight glass:

- Dismantle the inlet and the outlet connections and remove the unit from the system.
- Loosen nuts (4), remove tie bars (3), remove glass (2) and remove the used seals (5).
- Fit new seals and glass. Re-assemble the tie bars and tighten them evenly and without excessive force.

Warning: In some applications the fluids can act as a solvent for the glass. It is recommended that the glass be periodically checked for thinning. **The glass should be replaced immediately** if there is any evidence of thinning.

5.2 Spare parts

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

Available spares

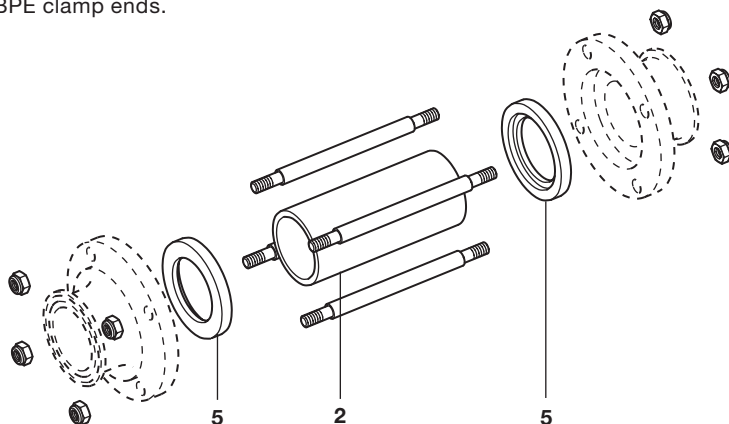
Glass and seal kit

2, 5

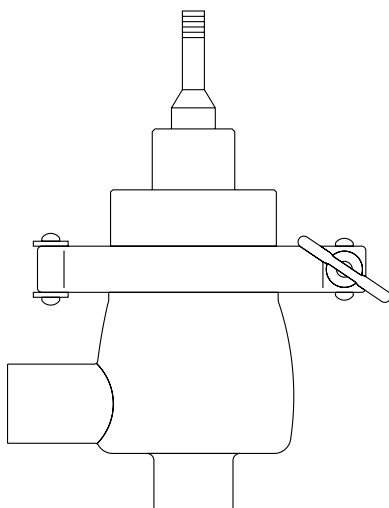
How to order spares

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

Example: 1 off Glass and seal kit for a 1" Spirax Sarco SGS10 sanitary sight glass with ASME BPE clamp ends.



STERI-TROL Clean Service 'S' Series
Two-port Control Valves DN15 (½") to DN100 (4")
Installation and Maintenance Instructions



1. *Safety information*
2. *General product information*
3. *Installation*
4. *Commissioning*
5. *Maintenance*
6. *Spare parts*

1. Safety information

Safe operation of these products can only be guaranteed if they are properly installed, commissioned, used and maintained by qualified personnel (see Section 1.11) in compliance with the operating instructions. General installation and safety instructions for pipeline and plant construction, as well as the proper use of tools and safety equipment must also be complied with.

1.1 Intended use

Referring to the Installation and Maintenance Instructions, name-plate and Technical Information Sheet, check that the product is suitable for the intended use/application. The products listed below comply with the requirements of the European Pressure Equipment Directive 97/23/EC, if required. The products fall within the following Pressure Equipment Directive categories:

Product	Group 2 Gas	Group 2 Liquid
	SEP	SEP
STERI-TROL PN16	DN15 to DN65	SEP
	DN80 to DN100	1

- I) The products have been specifically designed for use on steam, air, water, diathermic oil and/or other non-dangerous fluids which are in Group 2 of the above mentioned Pressure Equipment Directive. They can be used on other fluids in Group 2 or dangerous fluids belonging to Group 1, but if this is contemplated, Spirax Sarco should be contacted to confirm the suitability of the product for the application being considered.
- II) Check material suitability, pressure and temperature and their maximum and minimum values. If the maximum operating limits of the product are lower than those of the system in which it is being fitted, or if a malfunction of the product could result in a dangerous overpressure or overtemperature occurrence, ensure a safety device is included in the system to prevent such over-limit situations.
- III) Determine the correct installation situation and direction of fluid flow.
- IV) Spirax Sarco products are not intended to withstand external stresses that may be induced by any system to which they are fitted. It is the responsibility of the installer to consider these stresses and take adequate precautions to minimise them.
- V) Remove protection covers from all connections and protective film from all name-plates, where appropriate, before installation on steam or other high temperature applications.

1.2 Access

Ensure safe access and if necessary a safe working platform (suitably guarded) before attempting to work on the product. Arrange suitable lifting gear if required.

1.3 Lighting

Ensure adequate lighting, particularly where detailed or intricate work is required.

1.4 Hazardous liquids or gases in the pipeline

Consider what is in the pipeline or what may have been in the pipeline at some previous time. Consider: flammable materials, substances hazardous to health, extremes of temperature.

1.5 Hazardous environment around the product

Consider: explosion risk areas, lack of oxygen (e.g. tanks, pits), dangerous gases, extremes of temperature, hot surfaces, fire hazard (e.g. during welding), excessive noise, moving machinery.

1.6 The system

Consider the effect on the complete system of the work proposed. Will any proposed action (e.g. closing isolation valves, electrical isolation) put any other part of the system or any personnel at risk?

Dangers might include isolation of vents or protective devices or the rendering ineffective of controls or alarms. Ensure isolation valves are opened and closed gradually to avoid shocks to the system.

1.7 Pressure systems

Ensure that any pressure is isolated and safely vented to atmospheric pressure. Consider double isolation (double block and bleed) and the locking or labelling of closed valves. Do not assume that the system has depressurised even when the pressure gauge indicates zero.

1.8 Temperature

Allow time for temperature to normalise after isolation to avoid danger of burns.

1.9 Tools and consumables

Before starting work ensure that you have suitable tools and/or consumables available. Use only genuine Spirax Sarco replacement parts.

1.10 Protective clothing

Consider whether you and/or others in the vicinity require any protective clothing to protect against the hazards of, for example, chemicals, high/low temperature, radiation, noise, falling objects, and dangers to eyes and face.

1.11 Permits to work

All work must be carried out or be supervised by a suitably competent person. Installation and operating personnel should be trained in the correct use of the product according to the Installation and Maintenance Instructions.

Where a formal 'permit to work' system is in force it must be complied with. Where there is no such system, it is recommended that a responsible person should know what work is going on and, where necessary, arrange to have an assistant whose primary responsibility is safety.

Post 'warning notices' if necessary.

1.12 Handling

Manual handling of large and /or heavy products may present a risk of injury. Lifting, pushing, pulling, carrying or supporting a load by bodily force can cause injury, particularly to the back. You are advised to assess the risks taking into account the task, the individual, the load and the working environment and use the appropriate handling method according to the circumstances of the work being done.

1.13 PTFE - Handling precautions

Within its working temperature range PTFE is a completely inert material, but when heated to its sintering temperature it gives rise to a gaseous decomposition product or fumes which can produce unpleasant effects if inhaled. The inhalation of these fumes is easily prevented by applying local exhaust ventilation to atmosphere as near to their source as possible.

Smoking should be prohibited in workshops where PTFE is handled because tobacco contaminated with PTFE will during burning give rise to polymer fumes. It is therefore important to avoid contamination of clothing, especially the pockets, with PTFE and to maintain a reasonable standard of personal cleanliness by washing hands and removing any PTFE particles lodged under the fingernails.

1.14 Residual hazards

In normal use, the external surface of the product may be very hot. If used at the maximum permitted operating conditions the surface temperature of some products may reach temperatures of 200°C (392°F).

Many products are not self-draining. Take due care when dismantling or removing the product from an installation (See Section 5, 'Maintenance').

1.15 Freezing

Provision must be made to protect products which are not self-draining against frost damage in environments where they may be exposed to temperatures below freezing point.

1.16 Disposal

Unless otherwise stated in the Installation and Maintenance Instructions, this product is recyclable and no ecological hazard is anticipated with its disposal providing due care is taken. However, if the valve is fitted with a Viton or PTFE seat, special care must be taken to avoid potential health hazards associated with decomposition/burning of these seats.

Viton:

- Can be landfilled, when in compliance with National and Local regulations.
- Can be incinerated, but a scrubber must be used to remove Hydrogen Fluoride, which is evolved from the product and with compliance to National and Local regulations.
- Is insoluble in aquatic media.

PTFE:

- Can only be disposed of by approved methods, not incineration.
- Keep PTFE waste in a separate container, do not mix it with other rubbish, and consign it to a landfill site.

1.17 Returning products

Customers and stockists are reminded that under EC Health, Safety and Environment Law, when returning products to Spirax Sarco they must provide information on any hazards and the precautions to be taken due to contamination residues or mechanical damage which may present a health, safety or environmental risk. This information must be provided in writing including Health and Safety data sheets relating to any substances identified as hazardous or potentially hazardous.

— 2. General product information —

2.1 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

SA	Two-port angle pattern design
SH	Two-port horizontal pattern design
SQ	Three-port design

Valve characteristics - options:

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

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 USP26 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:

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

Valve stem sealing - options:

E	EPDM (as standard) - 3A and FDA approved
V	White Viton - 3A, FDA and USP26 Class VI approved

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

Electric	EL3500 and EL5600 series	Refer to the relevant actuator Technical Information sheet for further details.
Pneumatic	PNS3000, PNS4000, PN9000E and PN9000R series	
	PP5 (pneumatic) or EP5 (electropneumatic)	
Positioners	ISP5 (intrinsically safe electropneumatic)	
	SP200 (smart electropneumatic)	
	SP300	

Note: For further product data regarding the SPIRA-TROL 'S' series see the Technical Information Sheet

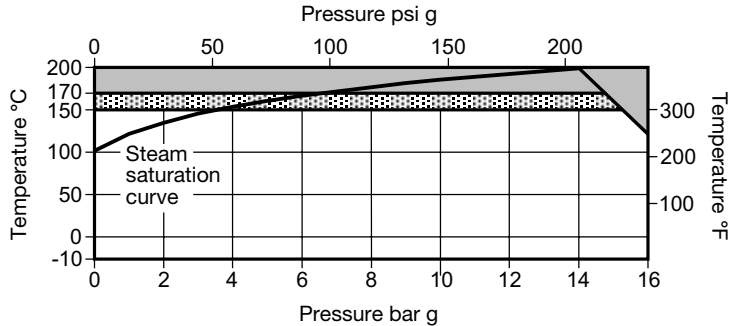
2.2 Technical data

Plug design	DN15 to DN100	Parabolic
Leakage	Metal-to-metal	(0.01% of Kv)
	Soft seal	IEC 534-4 Class VI
Rangeability	Equal percentage	50:1
	Linear	30:1
Travel	DN15 to DN50 (½" to 2")	20 mm
	DN65 to DN100 (2½" to 4")	30 mm
Surface finish	Internal (Mechanical or electropolished)	0.4 µ
	External	< 0.6 µ




Fig. 1

2.3 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 150°C

Body design conditions		PN16
Maximum design pressure	16 bar g @ 120°C (232 psi g @ 248°F)	
Maximum design temperature	200°C @ 14 bar g (392°F @ 203 psi g)	
Minimum design temperature	-20°C (-4°F)	
Maximum operating temperature	EPDM (E)	150°C (302°F)
	Viton (V)	170°C (338°F)
Minimum operating temperature	-10°C	(14°F)
Note: For lower operating temperatures consult Spirax Sarco.		
Maximum differential pressure	See the Technical Information sheet	
Designed for a maximum cold hydraulic test pressure of:	24 bar g	(348 psi g)

3. Installation

Note: Before actioning any installation observe the 'Safety information' in Section 1.

Referring to the Installation and Maintenance Instructions, name-plate and Technical Information Sheet, check that the product is suitable for the intended installation:

- 3.1** Check materials, pressure and temperature and their maximum values. **Do not exceed the performance rating of the valve.** If the maximum operating limit of the product is lower than that of the system in which it is being fitted, ensure that a safety device is included in the system to prevent overpressurisation.
- 3.2** Remove protection covers from all connections and protective film from all name-plates, where appropriate, before installation on steam or other high temperature applications.
- 3.3** Determine the correct installation situation and the direction of fluid flow. Valves will have fluid flow from the lower port. The valve should preferably be installed along a pipeline, slightly declined in the direction of flow, to ensure complete drainability of the valve body. When mounting an actuator to the valve body, the actuator Installation and Maintenance Instructions must be followed.
- 3.4 Bypass arrangements** - It is recommended that isolating valves be fitted upstream and downstream of the control valve, together with a manual bypass control valve. This enables the process to be controlled manually using the bypass valve while the pneumatic valve is isolated for maintenance.
- 3.5** Support pipework should be used to prevent stresses being exerted on the valve body.
- 3.6** Ensure adequate space is provided for the removal of the actuator from the valve body for maintenance purposes:
- 3.7** Isolate connecting pipework. Ensure it is clean from dirt, scale etc. Any debris entering the valve may damage the PTFE head seal preventing a tight shut-off.
- 3.8** Open isolation valves slowly, until normal operating conditions are achieved.
- 3.9** Check for leaks and correct operation.

4. Commissioning

Ensure all pipework is free from dirt after the process pipework has been constructed.

- 4.1** Make certain the valve actuator is in the correct position and connected up to the air or mains supply before the system is energised.
- 4.2** If the motive supply is air it must be dry, clean and free from oil contamination. This is particularly important where a pneumatic positioner is used.
- 4.3** Should an electric actuator be required then all electrical wiring and connections should be carried out in accordance with national or local regulations and standards.
- 4.4** Turn on the process fluid slowly and look for any leaks from connections.

5. Maintenance

Note: Before actioning any maintenance programme observe the 'Safety information' in Section 1.

5.1 Periodic maintenance

After 24 hours of operation	After 24 hours of operation check the piping connections for tightness.
Every 3 months of operation	Every 3 months of normal operation visually check the gland seal for signs of leakage.
Annually	Inspect the valve to check for wear or scale deposits, replacing any worn or damaged parts, such as the plug or stem or gland seal. Please see Section 6, for a list of available spare parts.

5.2 Procedure for replacing the stem packing and the stem/plug

Warning: Please acknowledge the 'Safety information' in Section 1 regarding the handling and disposal of PTFE and Viton parts.

Reference Figures 2 and 3:

- Isolate the valve on both sides.
- Remove the actuator from the valve. Refer to the Installation and Maintenance Instructions covering Spirax Sarco actuators.
- Remove the bottom adaptor (19).
- Remove the body clamp (32), lift the bonnet (27) and free the stem (26) from the bonnet.
Caution: Care should be taken when removing the cover since fluid under pressure may be trapped between the isolating valves.
- Remove the seals (29, 30 and 31).
- Examine parts for any signs of damage and/or wear. Score marks or scaly deposits on the valve stem (26) could damage the seals, and it should therefore be replaced. Fit the new seals (29, 30 and 31) after liberally smearing them with the appropriate FDA approved oil.
- Clean the parts taking care to avoid scratching the stem (26) or the packing chamber. Refit the cleaned or replacement valve stem and plug.
- Using a new bonnet seal (28), replace the bonnet (27) on the valve body (if it is the SH valve which is being serviced, also replace the body seal (28)), leaving the stem protruding. Tighten the body clamp (32).
- Ensure the valve stem (26) can move freely.
- Refit the bottom adaptor (19).
- Refit the actuator, following the relative assembly instructions.
- Bring the valve back into service. Open the isolation valves and check for leaks.

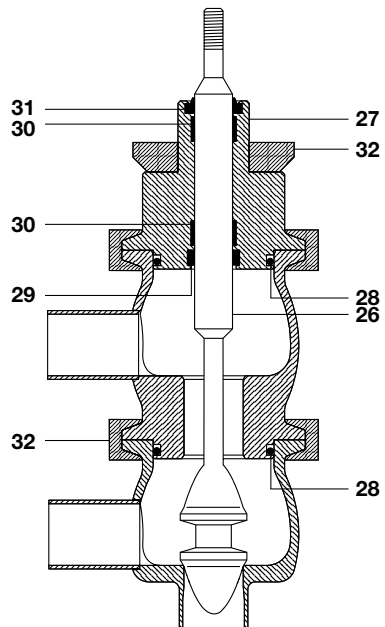
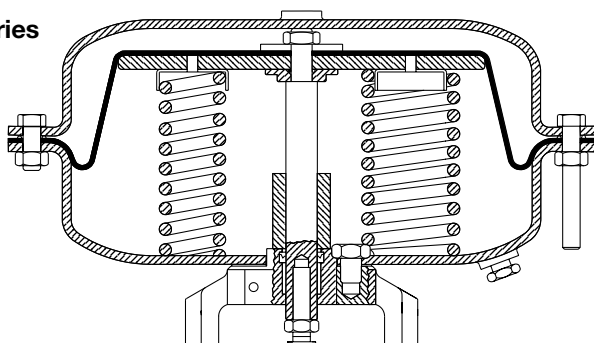


Fig. 2 SQ valve

**PNS4000 series
actuator**



**PNS3000 series
actuator**

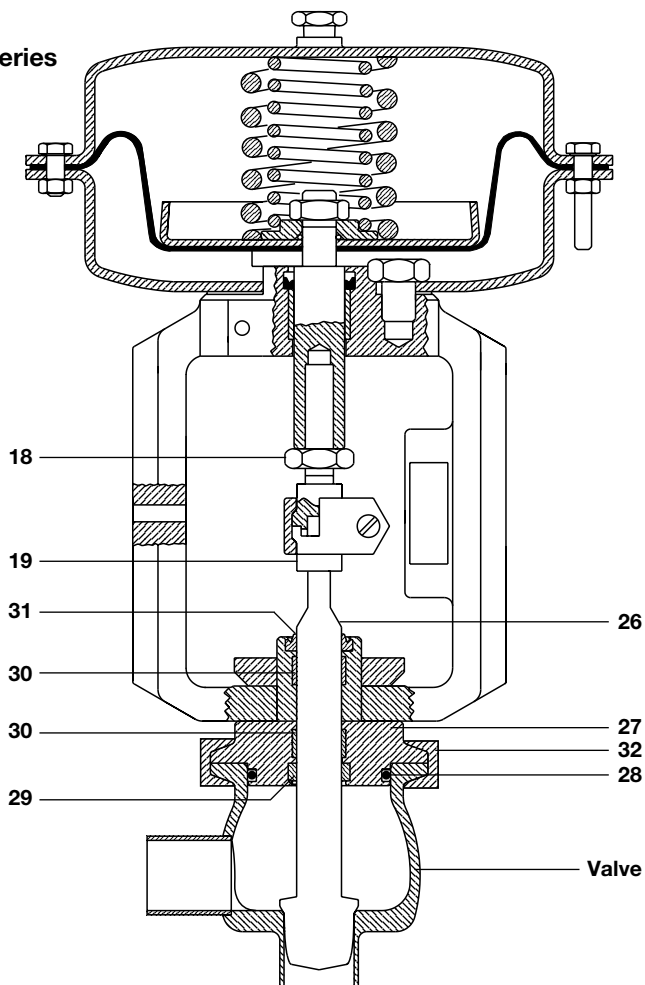


Fig. 3 Actuator and SA valve

6. Spare parts

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

	Description	Part number
	Stem seal kit ('O' ring and 'V' ring)	8 and 12
	Diaphragm kit (diaphragm 'O' ring and 'V' ring)	2, 8 and 12
Actuator	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 Bonnet seal EPDM (packet of 3)	28
	SQ models 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 0.4 to 1.2 bar.

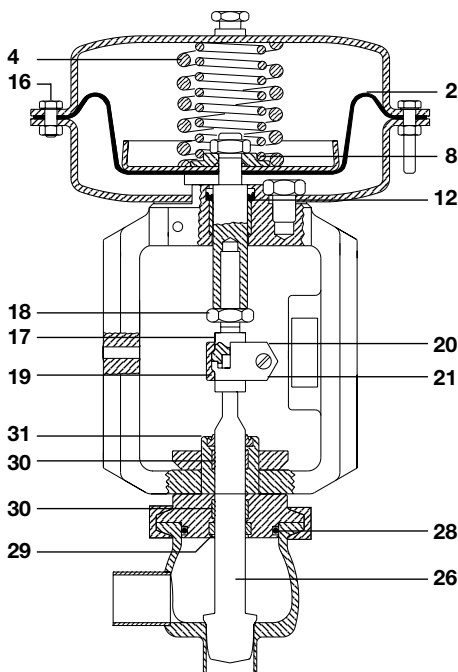


Fig. 4 Actuator and SA valve

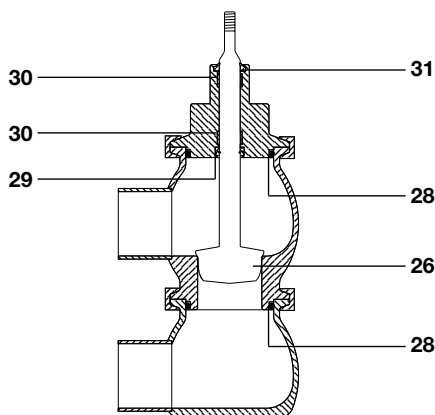
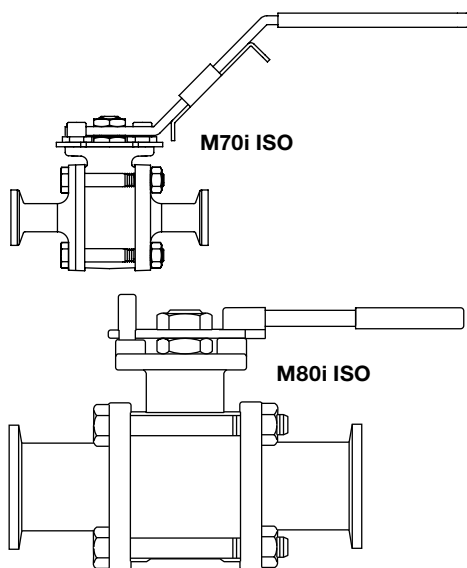


Fig. 5 SH valve

M70i ISO and M80i ISO
Stainless Steel Ball Valves
for Sanitary Systems
Installation and Maintenance Instructions



- 1. Safety information*
- 2. General product information*
- 3. Installation*
- 4. Commissioning*
- 5. Operation*
- 6. Maintenance and spare parts*

1. Safety information

Safe operation of these products can only be guaranteed if they are properly installed, commissioned, used and maintained by qualified personnel (see Section 1.11) in compliance with the operating instructions. General installation and safety instructions for pipeline and plant construction, as well as the proper use of tools and safety equipment must also be complied with.

1.1 Intended use

Referring to the Installation and Maintenance Instructions, name-plate and Technical Information Sheet, check that the product is suitable for the intended use / application. The products listed below comply with the requirements of the European Pressure Equipment Directive 97 / 23 / EC and carry the CE mark when so required. The products fall within the following Pressure Equipment Directive categories:

Product		Group 1 Gases	Group 2 Gases	Group 1 Liquids	Group 2 Liquids
M70i ISO and M80i ISO	1/2"	SEP	SEP	SEP	SEP
	3/4"	SEP	SEP	SEP	SEP
	1"	SEP	SEP	SEP	SEP
	1 1/2"	2	1	2	SEP
	2"	2	1	2	SEP
	2 1/2"	2	1	2	SEP
	3"	2	1	2	SEP
	4"	2	1	2	SEP

- i) The products have been specifically designed for use on clean/pure steam and other high purity applications that are in Group 2 of the above mentioned Pressure Equipment Directive. They can also be used on methane gas, propane gas, oxygen gas and hydrocarbons which are in Group 1 of the Pressure Equipment Directive. The products' use on other fluids may be possible but, if this is contemplated, Spirax Sarco should be contacted to confirm the suitability of the product for the application being considered.
- ii) Check material suitability, pressure and temperature and their maximum and minimum values. If the maximum operating limits of the product are lower than those of the system in which it is being fitted, or if malfunction of the product could result in a dangerous overpressure or overtemperature occurrence, ensure a safety device is included in the system to prevent such over-limit situations.
- iii) Determine the correct installation situation and direction of fluid flow.
- iv) Spirax Sarco products are not intended to withstand external stresses that may be induced by any system to which they are fitted. It is the responsibility of the installer to consider these stresses and take adequate precautions to minimise them.
- v) Remove protection covers from all connections and protective film from all name-plates, where appropriate, before installation on steam or other high temperature applications.

1.2 Access

Ensure safe access and if necessary a safe working platform (suitably guarded) before attempting to work on the product. Arrange suitable lifting gear if required.

1.3 Lighting

Ensure adequate lighting, particularly where detailed or intricate work is required.

1.4 Hazardous liquids or gases in the pipeline

Consider what is in the pipeline or what may have been in the pipeline at some previous time. Consider: flammable materials, substances hazardous to health, extremes of temperature.

1.5 Hazardous environment around the product

Consider: explosion risk areas, lack of oxygen (e.g. tanks, pits), dangerous gases, extremes of temperature, hot surfaces, fire hazard (e.g. during welding), excessive noise, moving machinery.

1.6 The system

Consider the effect on the complete system of the work proposed. Will any proposed action (e.g. closing isolation valves, electrical isolation) put any other part of the system or any personnel at risk?

Dangers might include isolation of vents or protective devices or the rendering ineffective of controls or alarms. Ensure isolation valves are turned on and off in a gradual way to avoid system shocks.

1.7 Pressure systems

Ensure that any pressure is isolated and safely vented to atmospheric pressure. Consider double isolation (double block and bleed) and the locking or labelling of closed valves. Do not assume that the system has depressurised even when the pressure gauge indicates zero.

1.8 Temperature

Allow time for temperature to normalise after isolation to avoid danger of burns. If parts made from PTFE have been subjected to a temperature approaching 260°C (500°F) or higher, they will give off toxic fumes, which if inhaled are likely to cause temporary discomfort. It is essential for a no smoking rule to be enforced in all areas where PTFE is stored, handled or processed as persons inhaling the fumes from burning tobacco contaminated with PTFE particles can develop 'polymer fume fever'.

1.9 Tools and consumables

Before starting work ensure that you have suitable tools and/or consumables available. Use only genuine Spirax Sarco replacement parts.

1.10 Protective clothing

Consider whether you and/or others in the vicinity require any protective clothing to protect against the hazards of, for example, chemicals, high/low temperature, radiation, noise, falling objects, and dangers to eyes and face.

1.11 Permits to work

All work must be carried out or be supervised by a suitably competent person. Installation and operating personnel should be trained in the correct use of the product according to the Installation and Maintenance Instructions.

Where a formal 'permit to work' system is in force it must be complied with. Where there is no such system, it is recommended that a responsible person should know what work is going on and, where necessary, arrange to have an assistant whose primary responsibility is safety.

Post 'warning notices' if necessary.

1.12 Handling

Manual handling of large and /or heavy products may present a risk of injury. Lifting, pushing, pulling, carrying or supporting a load by bodily force can cause injury particularly to the back. You are advised to assess the risks taking into account the task, the individual, the load and the working environment and use the appropriate handling method depending on the circumstances of the work being done.

1.13 Residual hazards

In normal use the external surface of the product may be very hot. If used at the maximum permitted operating conditions the surface temperature of these products may reach temperatures of 200°C (302°F).

These products are not self-draining. Take due care when dismantling or removing the product from an installation (refer to 'Maintenance instructions').

1.14 Freezing

Provision must be made to protect products which are not self-draining against frost damage in environments where they may be exposed to temperatures below freezing point.

1.15 Disposal

Unless otherwise stated in the Installation and Maintenance Instructions, this product is recyclable and no ecological hazard is anticipated with its disposal providing due care is taken, with the exception of PTFE.

PTFE:

- Can only be disposed of by approved methods, not incineration.
- Keep PTFE waste in a separate container, do not mix it with other rubbish, and consign it to a landfill site.

1.16 Returning products

Customers and stockists are reminded that under EC Health, Safety and Environment Law, when returning products to Spirax Sarco they must provide information on any hazards and the precautions to be taken due to contamination residues or mechanical damage which may present a health, safety or environmental risk. This information must be provided in writing including Health and Safety data sheets relating to any substances identified as hazardous or potentially hazardous.

— 2. General product information —

2.1 General description

The M70i and M80i 316L stainless steel, three-piece body ball valves have ISO mounting as standard. They have been designed in accordance with ASME BPE for use as isolating valves 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.

ISO mounting

The integral ISO body mounting allows the valve to be automated without losing seal integrity, as the body does not require disassembly. Manual to remote control may therefore be easily accomplished by fitting a BVA200 series pneumatic actuator available from Spirax Sarco. For further details contact Spirax Sarco.

Standards

These products fully comply with the requirements of the European Pressure Equipment Directive 97/23/EC and carry the **CE** mark when so required.

Certification

These products are available with the following 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.

Available types

M70iV ISO	Virgin PTFE TFM 1600
------------------	----------------------

M70iVEP ISO	Virgin PTFE TFM 1600 electro-polished to 0.375 micron Ra
--------------------	--

M70iG ISO	Mineral filled PTFE
------------------	---------------------

M70iGEP ISO	Mineral filled PTFE electro-polished to 0.375 micron Ra
--------------------	---

M80iVEP ISO	Virgin PTFE TFM 1600 electro-polished to 0.375 micron Ra
--------------------	--

2.2 Sizes and pipe connections

M70i	1/2", 3/4", 1", 1 1/2" and 2"	Sanitary clamp (ASME BPE)
		Extended O/D tube weld ends (ETO) (ASME BPE)
M80i	2 1/2", 3" and 4"	Sanitary clamp (ASME BPE)
		Extended O/D tube weld ends (ETO) (ASME BPE)

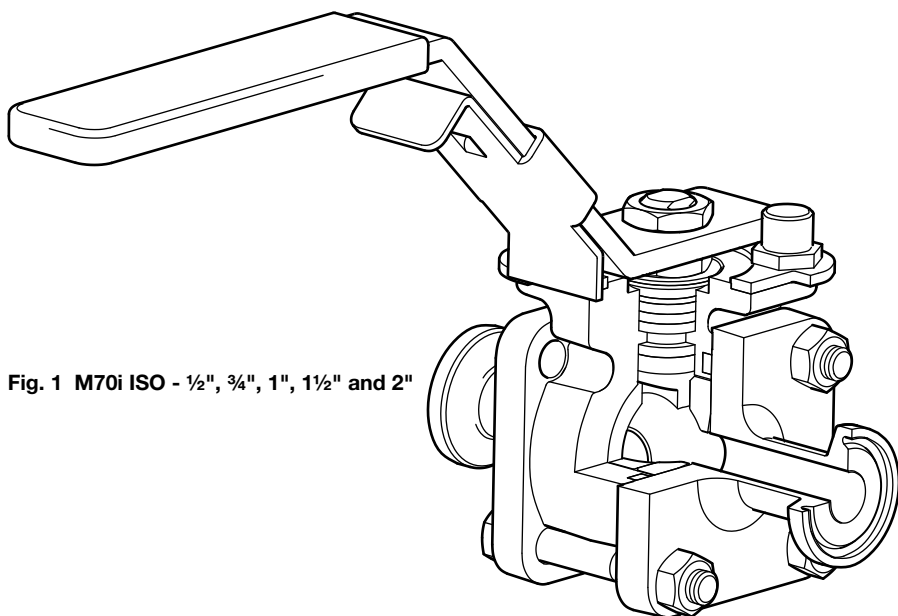
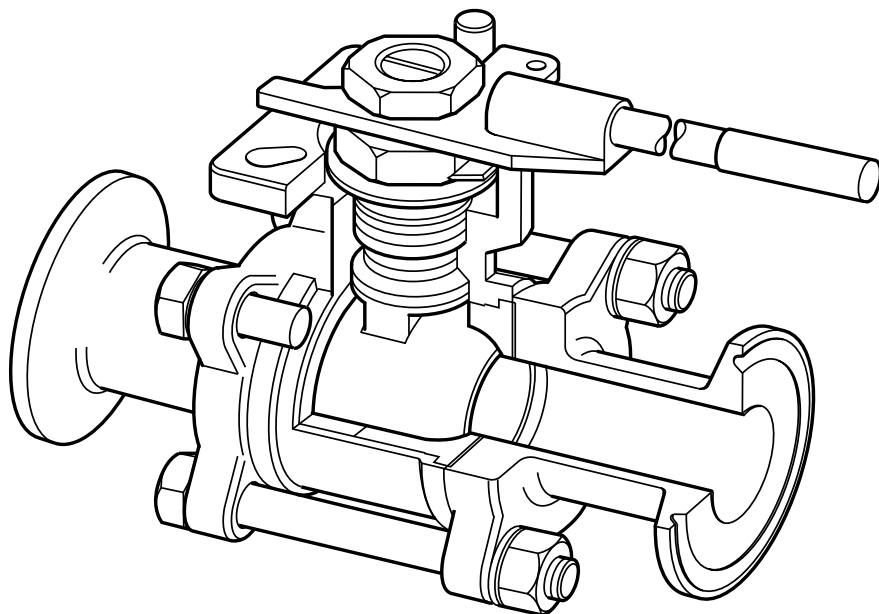


Fig. 1 M70i ISO - ½", ¾", 1", 1½" and 2"

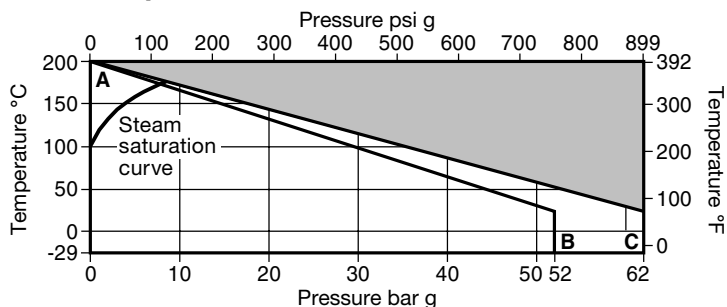


Please note that the end caps for the 3" and 4" units have a different design which uses 6 x studs enclosing the body section.

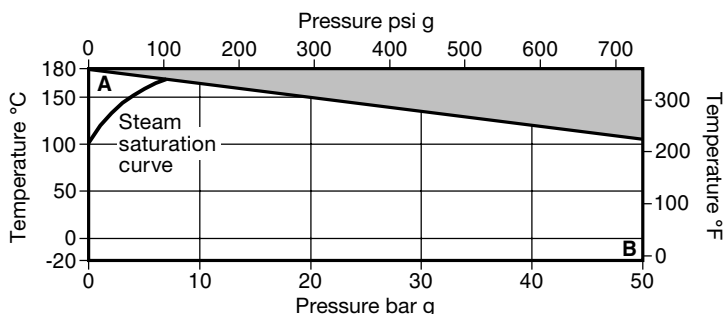
Fig. 2 M80i ISO - 2½", 3" and 4"

2.3 Pressure / temperature limits

M70i ISO



M80i ISO



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

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

Body design conditions			M70i	PN63	
			M80i	720 psi	
PMA	Maximum allowable pressure		M70i	62 bar g @ 20°C	(899 psi g @ 68°F)
			M80i	50 bar g @ 109°C	(720 psi g @ 228°F)
TMA	Maximum allowable temperature		M70i	200°C @ 0 bar g	(392°F @ 0 psi g)
			M80i	180°C @ 0 bar g	(356°F @ 0 psi g)
Minimum allowable temperature			M70i	-29°C	(-20°F)
			M80i	-20°C	(-4°F)
PMO	Maximum operating pressure for saturated steam service	M70i ISO	Virgin PTFE TFM 1600	7.0 bar g	(101 psi g)
			Mineral filled PTFE	8.5 bar g	(123 psi g)
		M80i ISO	Virgin PTFE TFM 1600	7.0 bar g	(101 psi g)
TMO	Maximum operating temperature		M70i	200°C @ 0 bar g	(392°F @ 0 psi g)
			M80i	180°C @ 0 bar g	(356°F @ 0 psi g)
Minimum operating temperature Note: For lower operating temperatures consult Spirax Sarco			M70i	-29°C	(-20°F)
			M80i	-20°C	(-4°F)
ΔPMX Maximum differential pressure is limited to the PMO					
Designed for a maximum cold hydraulic test pressure of:			M70i	93 bar g	(1348 psi g)
			M80i	75 bar g	(1087 psi g)

3. Installation

Note: Before actioning any installation observe the 'Safety information' in Section 1.

Although the valve has great structural integrity, severe misalignment and/or the pulling effect of incorrect pipe length will have a detrimental effect on the valve and must be avoided. Particular attention should be paid to correct pipe alignment such that the inlet pipework and valve are all on the same axis.

Valves are for on/off applications and may be operated manually.

Wherever practicable, valves should be installed where there is adequate space available so that they can be conveniently operated and maintained.

Before installing a valve, check to ensure that size, pressure rating, materials of construction, end connections, etc. are suitable for the service conditions of the particular application.

Care must be taken to ensure that all dirt which may have accumulated in the valve during storage is removed before installation, maintain cleanliness during installation since the introduction of dirt can result in damage to the valve seats and operating mechanism.

To minimise the danger of abrasive particles damaging the seats, pipeline strainers should be fitted upstream of the valves.

Install the valve with the handle in a suitable position. The preferred position is with the spindle vertical. The valve can be installed in any position for gas service (see Figure 4 below).

When used on steam services:

1. Fit a trapped drain pocket upstream of the valve.
2. Open valve slowly to prevent the risk of waterhammer damage.

Do not mount the valve upside down for liquid service (Figure 3).

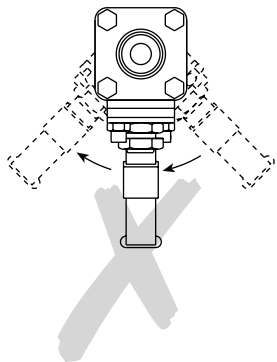


Fig. 3 Incorrect installation for liquid service

Valves should be installed into the pipeline in the fully closed position.

Always open valves slowly to avoid system shocks.

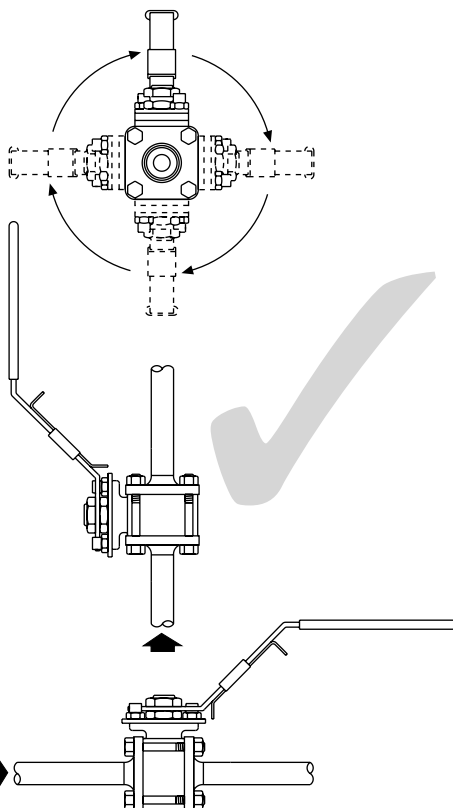


Fig. 4 Correct installation for gas service

4. Commissioning

After installation or maintenance ensure that the system is fully functioning. Carry out tests on any alarms or protective devices.

5. Operation

The valve is operated manually by a handle. Special care must be taken to ensure that the movement is made in the correct direction.

The valve can be used as an on/off valve, and can be operated fully open, or fully closed.

6. Maintenance and spare parts

Note: Before actioning any maintenance programme observe the 'Safety information' in Section 1.

6.1 General information

As with all mechanical devices, regular maintenance is the most efficient means of ensuring continued operational efficiency.

Regular scheduled inspection of all valves is essential, especially on valves which are operated only occasionally.

6.2 General maintenance

Maintenance work can be carried out without removing the complete ball valve from the pipeline. Remove the two upper nuts and bolts (see Table 1 for item no.) and loosen the lower two. The complete body assembly can then be removed and any new parts fitted - See Section 6.3 for the M70i ISO and Section 6.4 for the M80i ISO spare parts and maintenance instructions.

Table 1 Recommended tightening torques

Part	Item no.		Size	N m	(lbf ft)
Nuts and bolts	14	M70i ISO	½" and ¾"	10	7.4
			1"	25	18.0
			1½"	57	42.0
			2"	75	55.0
	3	M80i ISO	2½"	80	60.0
			3"	90	66.5
			4"	130	97.0
			Stem nut	10	M70i ISO
1"	20	14.7			
1½"	40	29.5			
2"	47	34.6			
17	M80i ISO	2½"		42	30.5
		3"		42	30.5
		4"	51	37.0	

6.3 Spare parts for the M70i ISO and maintenance instructions

6.3.1 Available spares

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

M70i ISO Seat and seal set with cavity filler

5, 6, 15, 16, 18

How to order spares

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

Example: 1 - Virgin PTFE TFM 1600 seat and seal set with cavity filler for a Spirax Sarco ½" M70iV ISO forged stainless steel ball valve.

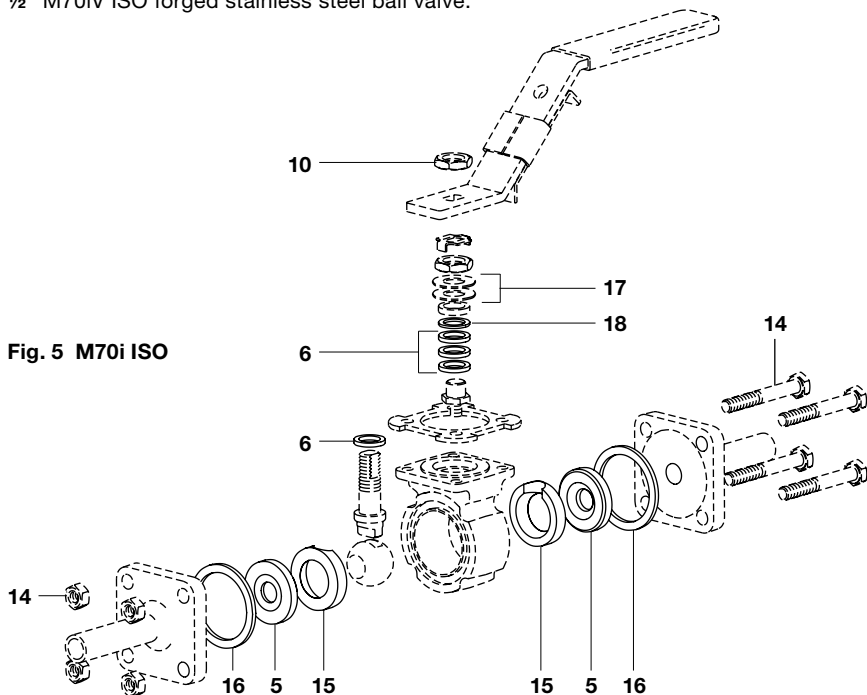


Fig. 5 M70i ISO

6.3.2 To replace seats and body gasket

- Remove the body as described in Section 6.2.
- With the body removed, remove the seats (5) and body gasket (16).
- Fit new seats (5) and body gasket (16), pushing them into the body recesses.

6.3.3 To replace stem seals

- Remove the body as described in Section 6.2.
- Remove the nuts (10 and 8), and the two bellows washers (17).
- Replace the stem seals (6 and 18).

6.3.4 Reassembly

Reassemble in reverse order to the instructions given above. The securing bolts and nuts (14) should be tightened to the recommended torques shown in Table 1.

After 24 hours in service, retighten body bolts.

6.4 Spare parts for the M80i ISO and maintenance instructions

6.4.1 Available spares

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

M80i ISO	Integrated seat and cavity filler, stem seals, stem 'O' ring, body seals kit, packing follower and thrust washer	5, 6, 11, 16, 18, 19
-----------------	--	-----------------------------

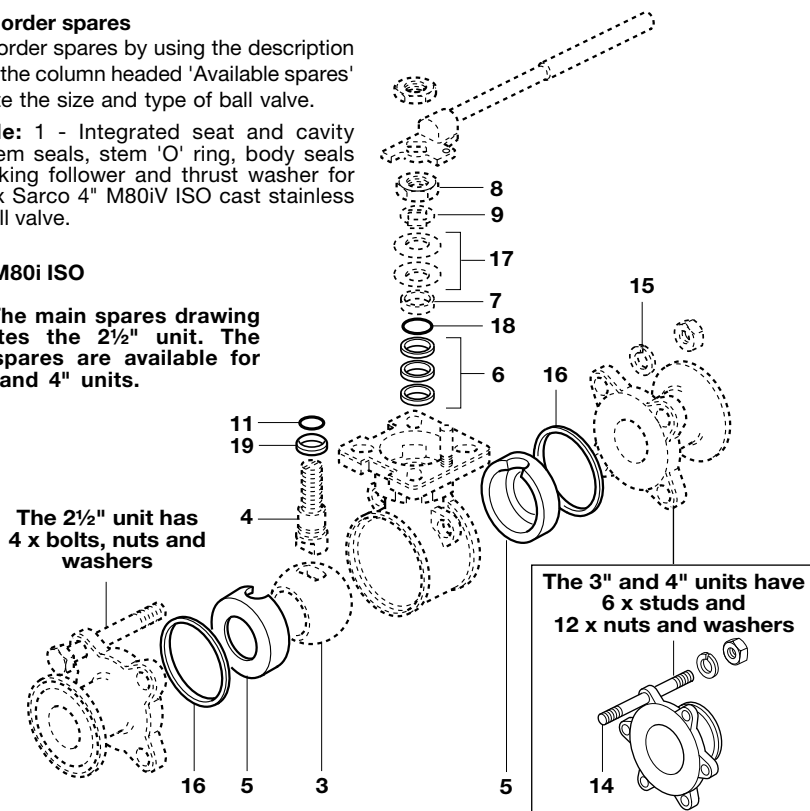
How to order spares

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

Example: 1 - Integrated seat and cavity filler, stem seals, stem 'O' ring, body seals kit, packing follower and thrust washer for a Spirax Sarco 4" M80iV ISO cast stainless steel ball valve.

Fig. 6 M80i ISO

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



6.4.2 To replace seats and body gasket

- Remove the body as described in Section 6.2.
- With the body removed, remove the seats (**5**) and body gasket (**16**).
- Fit new seats (**5**) and body gasket (**16**), pushing them into the body recesses.

6.4.3 To replace stem components

- Remove the body as described in Section 6.2.
- Remove the nuts (**10** and **8**), and the two Belleville washers (**17**).
- Replace the stem seals (**6**), stem 'O' ring (**11**), packing follower (**18**) and thrust washer (**19**).

6.4.4 Reassembly

Reassemble in reverse order to the instructions given above. The securing bolts and nuts (**14**) should be tightened to the recommended torques shown in Table 1, page 10.

After 24 hours in service, retighten body bolts.