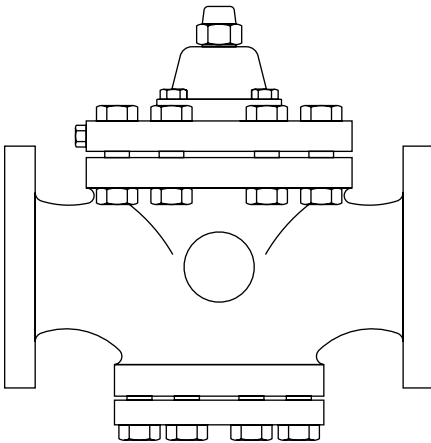


SP80 and SP100
Bimetallic Steam Traps
Installation and Maintenance Instructions



1. Safety information
2. General product information
3. Installation
4. Commissioning
5. Operation
6. Maintenance
7. Spare parts
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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 on this document) 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
SP80 and SP100	-	1	-	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 protective 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.

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.

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 Spirax Sarco SP80 and SP100 are pilot operated bimetallic steam traps made of cast steel. They are specially designed for high capacity process applications.

They are not sensitive to overheating and have a bimetallic pilot device which controls a main valve via a large diameter piston.

Both the SP80 and SP100 have a built-in strainer screen to protect the pilot valve and an external device for adjusting the discharge temperature of the condensate.

Available types

SP80N and SP100N	For use at low pressures
SP80E and SP100E	For use at medium pressure

Standards

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

Certification

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

Note: For additional product data see Technical Information Sheet TI-P624-02.

2.2 Sizes and pipe connections

DN80 SP80 or DN100 SP100 with

Flanged EN 1092 PN40, ASME 150 or ASME 300 connections.

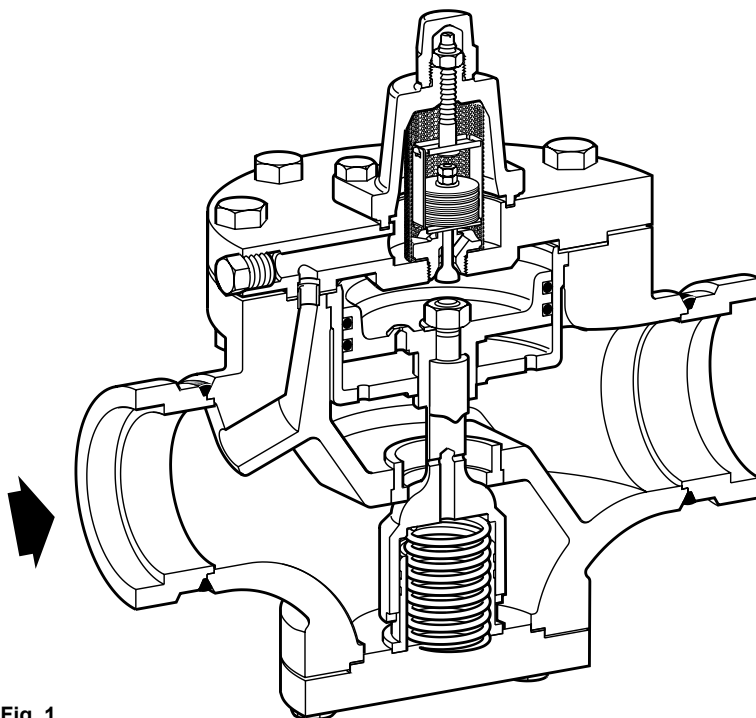
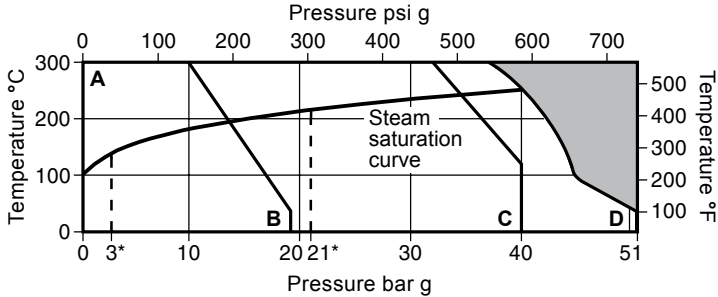


Fig. 1

2.3 Pressure/temperature limits



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

- A - B** Flanged ASME 150
- A - C** Flanged PN40
- A - D** Flanged ASME 300

Body design conditions		Class 300	
PMA	Maximum allowable pressure	51 bar g @ 38°C (739.5 psi g @ 100°F)	
TMA	Maximum allowable temperature	300°C @ 38.9 bar g (572°F @ 564.2 psi g)	
	Minimum allowable temperature	0°C (14°F)	
* PMO	Maximum operating pressure	Version N	3 bar g @ 144°C (44 psi g @ 291°F)
		Version E	21 bar g @ 217°C (305 psi g @ 422°F)
TMO	Maximum operating temperature	300°C @ 38.9 bar g (572°F @ 564.2 psi g)	
Minimum operating pressure		Version N	0.5 bar g (7 psi g)
		Version E	1.5 bar g (22 psi g)
	Minimum operating temperature	0°C (14°F)	
ΔPMX The backpressure for correct operation must not exceed 90% of the upstream pressure			
Designed for a maximum cold hydraulic test pressure of:		100 bar g	(1 450 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 correct direction of fluid flow.
- 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** Install the steam trap downstream of the equipment to be drained, ensuring that it is easily accessible for inspection and maintenance.
- 3.5** Before installing a steam trap ensure the pipework is clean and free of debris.
- 3.6** Mount the steam trap horizontally with the arrow on the body pointing in the direction of the flow of the liquid.
- 3.7** The steam trap can be welded onto the pipework without removing the internal components. For socket welded traps, observe qualified welding procedures. It is not necessary to remove the trap internals when welding, but avoid excessive heat.
- 3.8** The steam trap is factory set.

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).

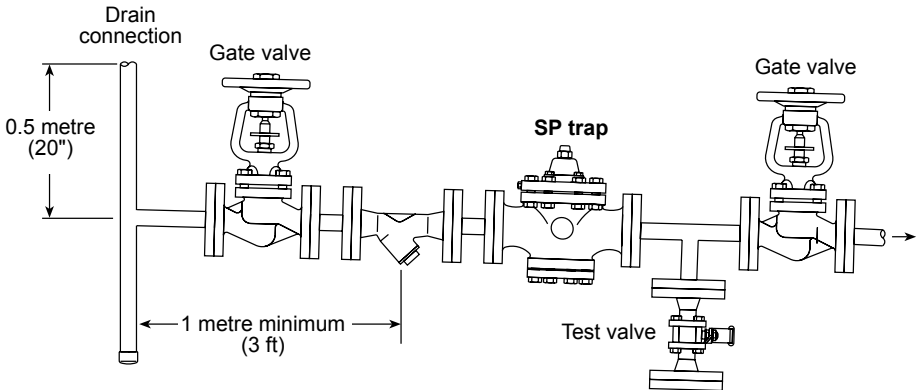


Fig. 3 Recommended installation - Note: pipework to fall in the direction of flow.

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 Spirax Sarco SP80 and SP100 are bimetallic steam traps.

These traps operate on the basis of two opposing forces acting on the valve - an opening force created by system pressure, and a closing force resulting from the condensate temperature acting on the bimetallic elements.

These steam traps can be repaired inline. They operate with no loss of steam and automatically and quickly drain air, non-condensable gases and large quantities of cold water on start-up.

6. Maintenance

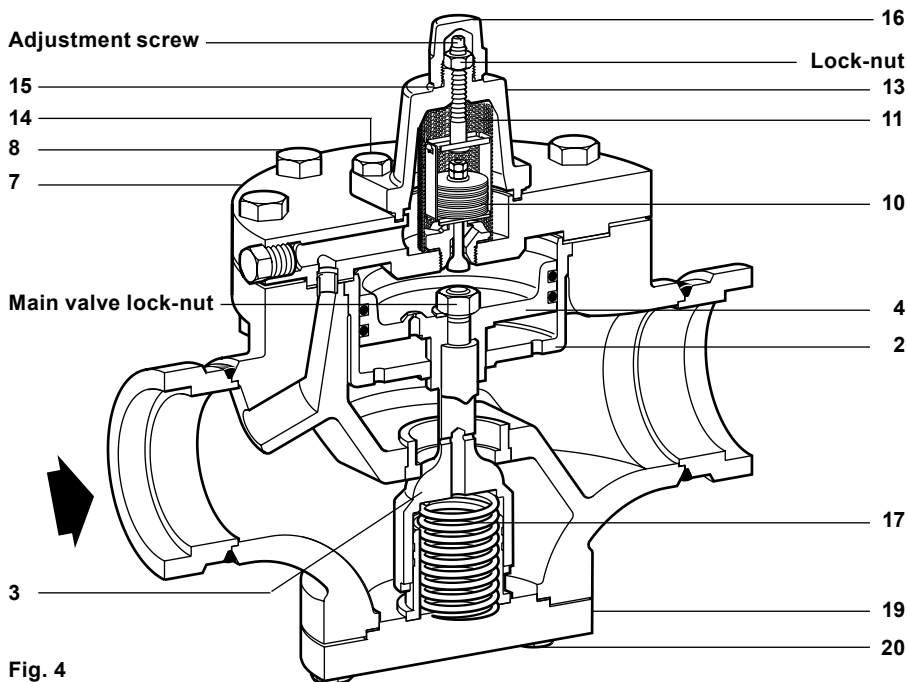




Fig. 4

Table 1 Spanners to be used and recommended tightening torques

Item	Part	 or 	mm	N m	(lbf ft)
Lock-nut	on adjustment screw		13 A/F		
8	Top cover bolt		22 A/F	72 - 78	(53 - 57)
10	Bimetallic element		36 A/F	120 - 132	(88 - 97)
14	Pilot valve cover bolt		17 A/F	45 - 55	(33 - 40)
16	Blind nut		29 A/F	78 - 88	(53 - 65)
20	Bottom cover bolt		19 A/F	54 - 66	(40 - 49)
Main valve lock-nut			19 A/F	45 - 55	(33 - 40)

Note:

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

Warning

The cover gasket and main valve assembly gasket contains a thin stainless steel support ring which may cause physical injury if not handled and disposed of carefully.

Safety note:

These traps are installed in high pressure steam lines. Personnel doing the adjustment work should wear heavy gloves, long sleeve shirt, and other safety equipment designed to protect the wearer (goggles, face shield, etc.) in the event of a leak.

The equipment needed to proceed with any maintenance program is listed in Table 1. The SP trap has an external adjustment screw which permits the flushing of the trap seat and the setting of the discharge temperature of the condensate in the inlet line.

Maintenance can be completed with the trap in the pipeline, once the safety procedures have been observed. It is recommended that new gaskets and spares are used whenever maintenance is undertaken. Ensure that the correct tools and necessary protective equipment are used at all times. When maintenance is complete open isolation valves slowly and check for leaks.

6.1 Trap seat flushing during operation

To clean the steam trap during operation, it is advisable to close the steam inlet valve before turning the adjustment screw, and proceed as follows: (in a closed return system, close the discharge line and open the test valve):

- Remove the blind nut (16) and loosen the locking gland nut on the adjustment screw.
- Using a screwdriver, tighten the adjustment screw a few turns, clockwise. This completely disengages the valve inlet.
- Open the upstream isolation valve slightly. This causes a strong purging action, which removes any impurities that may have been deposited in the steam trap.
- Move the adjustment screw up (turning it anticlockwise) until the valve comes into contact with the valve seat.
- Tighten the lock-nut. Replace the blind nut gasket (15) and the blind nut (16) and tighten to the recommended torque (see Table 1).

6.2 Discharge temperature adjustment:

- Remove the blind nut (16) and loosen the lock-nut on the adjustment screw.
- Using a screwdriver tighten the adjustment screw a few turns clockwise. This completely disengages the valve inlet.
- The discharge temperature of the condensate is adjusted by moving the adjustment screw up a greater or lesser amount from the point where the valve is in contact with the valve seat (**standard adjustment, turn the screw an additional ¼ to ½ turn anticlockwise**).
- Tighten the lock-nut on the adjustment screw when the adjustment has been completed.
- Replace the blind nut gasket (15) and the blind nut (16) and tighten to the recommended torque (see Table 1).
- Shut the test valve and open the discharge line valve. In a closed return system, a test tee and valve must be used to observe trap operation. The trap should modulate the condensate discharge depending on inlet temperature and pressure.
- Open the upstream isolation valve fully when the adjustment has been completed.

6.3 Replacing the bimetallic element

Spares available to repair steam traps (see Section 7).

6.3.1 Dismantling and assembly of the steam trap:

- Please observe all the safety information given in this IMI before dismantling the trap, also use all the recommended torques where applicable (see Table 1).
- Isolate the steam trap before dismantling, (observe safety note).
- Unscrew the top cover bolts (8) and remove the top cover assembly.
- Unscrew the bottom cover bolts (20) and remove the bottom cover assembly (19).
- Remove the spring (17).
- Hold the main valve (3) using the flats, being careful not to damage the valve seating surfaces.
- Unscrew the lock-nut from the main valve.
- The main valve (3), the main piston (4) and piston cylinder (2) can now be removed, cleaned and checked for wear.
- Assembly of the bottom cover and main valve assembly are opposite to removal.
- The lock-nut holding the main valve on the piston can now be retorqued (see Table 1). Apply a drop of Loctite 620 to the threads to firmly secure.

6.3.2 Dismantling and assembly of the pilot valve bimetallic assembly (N or E version):

- Remove the blind nut (16), and blind nut gasket (15), loosen the lock-nut on the adjustment screw and remove.
- Unscrew the bolts (14) on the pilot valve cover (13) and remove.
- Remove the strainer screen (11).
- Unscrew the bimetallic element assembly (10) from the upper cover (7) using the specified pipe wrench.
- Assembly of the upper cover is the opposite to the removal.

6.3.3 Adjustment:

- Open both the downstream isolation valve and steam inlet valve slightly.
- Tighten the adjustment screw a few turns clockwise, wait a few moments for the steam trap to reach the required temperature and for steam to be present.
- Move the adjustment screw up (anticlockwise) until the valve comes into contact with the valve seat.
- The condensate discharge temperature is adjusted by moving the adjustment screw up a greater or lesser amount from the point at which the valve and the valve seat are in contact. To raise the condensate temperature turn the adjustment screw clockwise in increments of ½ turn, pausing between steps to allow temperature equilibrium to be reached. Continue adjusting until desired performance is obtained.
- Tighten the lock-nut onto the adjustment screw once the adjustment has been completed.
- Replace the blind nut gasket (15) and blind nut (16) and tighten to the recommended torque (see Table 1).
- Open the upstream isolation valve fully once the adjustment has been completed.

7. Spare parts

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

Available spares

Pilot valve assembly N type	10, 11, 12, 15, 21
Pilot valve assembly E type	10, 11, 12, 15, 21
Gasket kit	6, 12, 15, 18, 21

How to order spares

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

Example: 1 - Gasket kit for a DN80 Spirax Sarco SP80 bimetallic steam trap.

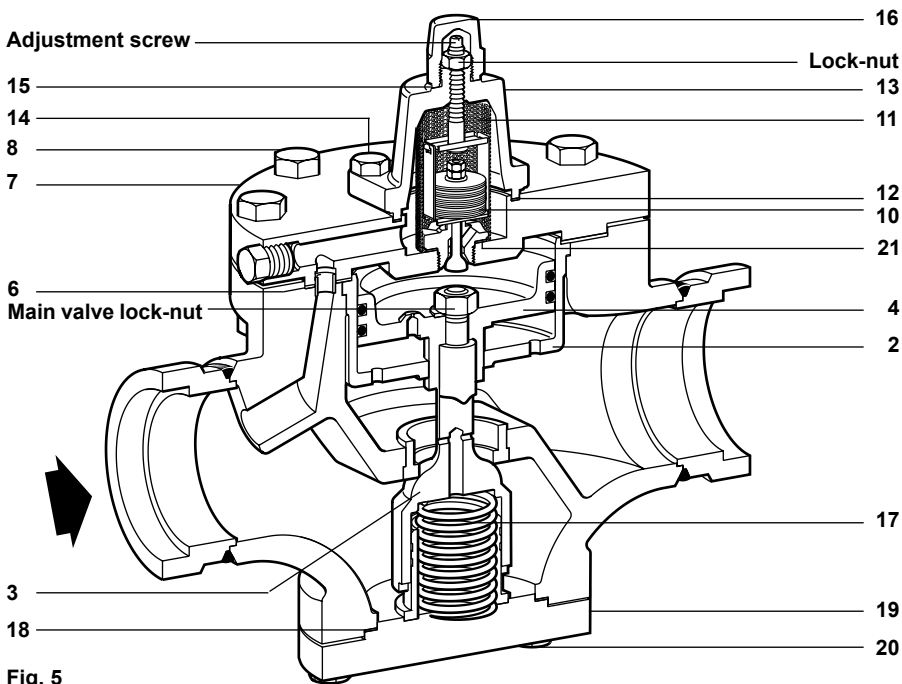




Fig. 5

Table 1 Spanners to be used and recommended tightening torques

Item	Part	 or mm		N m	(lbf ft)
Lock-nut	on adjustment screw	13 A/F			
8	Top cover bolt	22 A/F		72 - 78	(53 - 57)
10	Bimetallic element	36 A/F		120 - 132	(88 - 97)
14	Pilot valve cover bolt	17 A/F		45 - 55	(33 - 40)
16	Blind nut	29 A/F		78 - 88	(53 - 65)
20	Bottom cover bolt	19 A/F		54 - 66	(40 - 49)
Main valve lock-nut		19 A/F		45 - 55	(33 - 40)

8. Fault finding

Trap fails to pass condensate	1. Make sure upstream and downstream valves are open.
	2. Check external strainers for clogging; blowdown or dismantle and clean.
	3. Backpressure too high. Downstream system must be corrected. Back pressure will also lower the discharge temperature.
	4. Valve port clogged with dirt. Follow 'Trap seat flushing' procedure (See Section 6.1).
	5. Bimetallic element improperly adjusted. Adjust as described under 'Discharge temperature adjustment'(See Section 6.2).
	6. Dismantle and inspect internals. See 'Dismantling the steam trap' (See Section 6.3.1).
Trap blows live steam	1. Dirt on seating surface. Flush as described in 'Trap seat flushing' procedure (See Section 6.1).
	2. Bimetallic element improperly adjusted. Adjust as described under 'Discharge temperature adjustment' (See Section 6.2).
	3. Worn valve seat. Dismantle, inspect and replace if necessary.