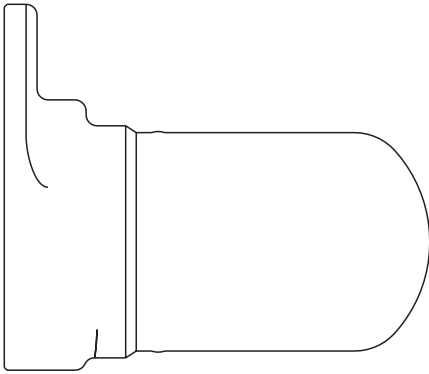

**Sealed Bimetallic Steam Trap for use with
Pipeline Connectors**
Installation and Maintenance Instructions




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 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 2014/68/EU and carries the  mark when so required.

The product falls within the following Pressure Equipment Directive categories:

Product	Group 2 Gases	Group 2 Liquid
USM21	SEP	SEP

- i) This 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.
- 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.

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 the products may reach temperatures in excess of 450 °C (850 °F).

The product is 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

This product is recyclable - No ecological hazard is anticipated with its disposal providing due care is taken.

Please visit the Spirax Sarco product compliance web pages

<https://www.spiraxsarco.com/product-compliance>

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

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 USM21 is a pre-set and maintenance free sealed bimetallic steam trap manufactured in stainless steel. It is designed for steam pressures up to 21 bar and applications such as steam tracing and mains drips. When installed in any position with a suitable pipeline connector the USM21 can easily and simply be removed without breaking into the pipeline, thus speeding up trap replacement with minimal system downtime. Pipeline connectors are available with screwed, socket weld and flanged connections.

Standards

The body/cover weld joint complies with ASME Section IX and BS EN 288.

This product fully complies with the requirements of the European Pressure Equipment Directive 2014/68/EU and carries the  mark when so required.

Certification

This product is available with certification to EN 10204 3.1.

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

2.2 Sizes and pipe connections

The USM21 can be fitted to a variety of different pipeline connectors which include:

PC10	Straight connector	ASME / ANSI 300	(TI-P128-10)
PC10HP	Straight connector	ASME / ANSI 600	(TI-P128-10)
PC20	Straight connector with strainer		(TI-P128-15)
IPC20 IPC21	Straight connector with strainer or Spiratec sensor		(TI-P128-17)
PC3	Connector with 1 piston isolation valve	ASME / ANSI 600	(TI-P128-02)
PC4	Connector with 2 piston isolation valves	ASME / ANSI 600	(TI-P128-03)

Note: See the relevant Technical Information sheet as listed above for further details of connections available on pipeline connectors.

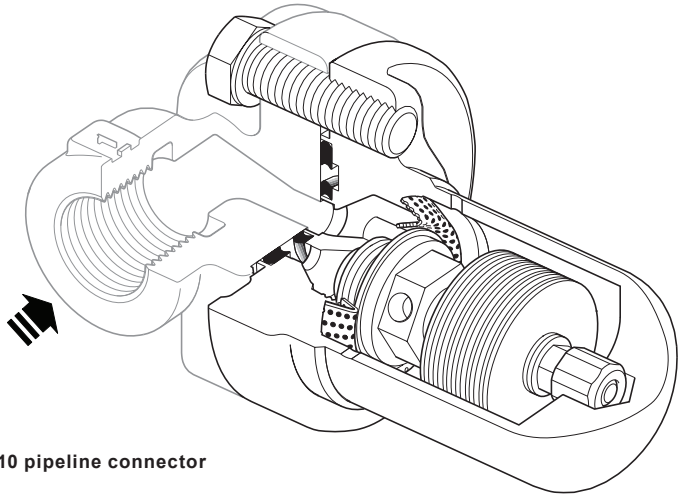


Fig. 1 USM21 fitted to a PC10 pipeline connector

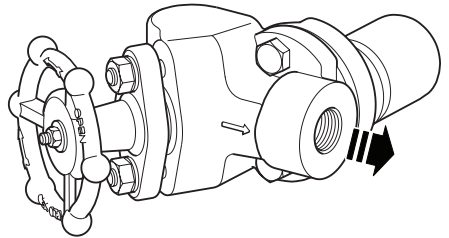


Fig. 2 USM21 fitted to a PC3 pipeline connector

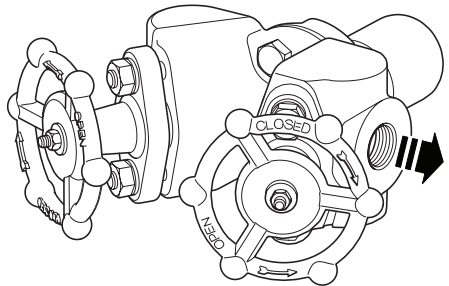
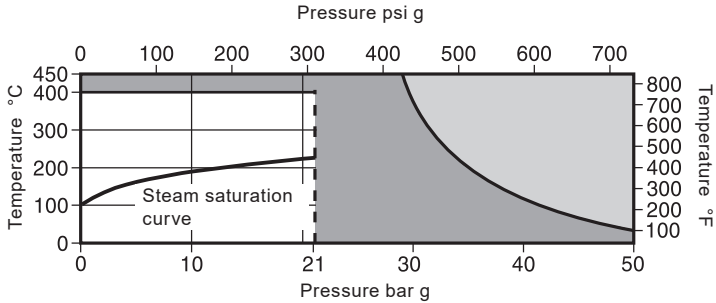


Fig. 3 USM21 fitted to a PC4 pipeline connector

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: The model of pipeline connector and connections selected will dictate the maximum operating pressure and temperature of the complete assembly. Consult the specified Technical Information sheet as listed in 'Sizes and pipe connections' for relevant data.

Body design conditions		ANSI/ ASME 300	
PMA	Maximum allowable pressure	50 bar g @ 40 °C	(725 psi g @ 104 °F)
TMA	Maximum allowable temperature	450 °C @ 29 bar g	(842 °F @ 420 bar g)
	Minimum allowable temperature	-29 °C	(-20 °F)
PMO	Maximum operating pressure for saturated steam service	21 bar g	(304 psi g)
TMO	Maximum operating temperature	400 °C @ 21 bar g	(752 °F @ 304 psi g)
*	Minimum operating pressure	0°C	(32 °F)
ΔPMX	Maximum differential pressure	21 bar g	(304 psi g)
	Designed for a maximum cold hydraulic test pressure of:	75 bar g	(1 087 psi g)

* Traps are available in a range of subcooled temperature settings. Except for start-up and shutdown, they must operate above the minimum differential pressure values shown in the table below:

Nominal subcooled temperature	External identification	Threshold differential pressure
-10°C (14 °F)	"-1"	5 bar g (72.51 psi g)
-30°C (-22 °F)	"-3"	2 bar g (29.00 psi g)
-50°C (-58 °F)	"-5"	0.5 bar g (7.25 psi g)
-70°C (-94 °F)	"-7"	0.1 bar g (1.45 psi g)

3. Installation

Note: Before attempting 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 and the correct direction of fluid flow.
- 3.3** Remove protective covers from all connections.
- 3.4** Install the pipeline connector and steam trap downstream of the equipment to be drained, ensuring that it is easily accessible for inspection and maintenance.
- 3.5** The USM21 can be installed on any pipeline connector in any plane. See separate Installation and Maintenance instructions for Spirax Sarco pipeline connectors (IM-P128-06, IM-P128-11 and IM-P128-13).
- 3.6** Mount the steam trap with the arrow on the body pointing in the direction of the flow of the fluid.
- 3.7** For socket welded traps, observe qualified welding procedures in accordance with the relevant National and International welding standards. When welding, it is not necessary to remove the trap from the PC connector so long as the electric arc method is used. Avoid excessive heat.
- 3.8** Ensure both gasket faces are clean and that transfer holes are clear. Place the trap against the connector and fit the bolts (11). Ensure that the bolt threads have a small amount of anti-seize compound on them. Tighten the screws finger tight to ensure the trap/ connector face is parallel and then tighten to the required torque see Table 1, page 11.
- 3.9** Open isolation valves slowly until normal operating conditions are achieved.
- 3.10** Check for leaks.

Note: If the trap is to discharge to atmosphere ensure that it is to a safe place, the discharging fluid may be at a temperature of 100°C (212°F). It is strongly recommended that a diffuser is installed on the outlet side of the trap. This reduces the problem of noise and erosion by cushioning the high velocity discharge. See TI-P155-02 for further information.

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 USM21 is a sealed bimetallic steam trap designed for use with any Spirax Sarco PC_ pipeline connector.

This trap operates 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.

The USM21 operates with no loss of steam and automatically and quickly drains air, non-condensable gases and large quantities of cold water on start-up.

6. Maintenance

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

Warning:

The inner and outer gaskets (9 and 10), used when installing/maintaining the USM21 to a PC_ pipeline connector contain 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.

6.1 General information

All work must be carried out by a suitably competent person. 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 atmosphere. The trap should then be allowed to cool. When reassembling, ensure that all joint faces are clean.

6.2 Replacing the bimetallic trap assembly:

- Ensure that the correct tools and necessary protective equipment are used at all times.
- Replacement of the trap unit is achieved by removing the two connector screws (11) and removing the trap unit.
- The new trap unit should be positioned against the connector gasket face and apply a small amount of anti-seize compound to the threads of the connector screws.
- Finger tighten the connector screws (11) ensuring that the trap unit is parallel to the pipeline connector.
- Gradually tighten the connector screws to the recommended torque (see Table 1).
- Open isolation valves slowly until normal operating conditions are achieved.
- Check for leaks.

7. Spare parts

The USM21 is a sealed non-maintainable trap unit. No internal spares are available. The spares which are available are shown in heavy outline. Parts shown in a grey line are not available as spares.

Available spares

Connector screws (2 off)	11
Complete USM21 trap unit inclusive of gaskets (9 and 10) and connector screws (11)	

Note: The gaskets contain sharp metal reinforcement, please handle with care.

How to order spares

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

Example: 2 - Connector screws for a USM21 sealed bimetallic steam trap.

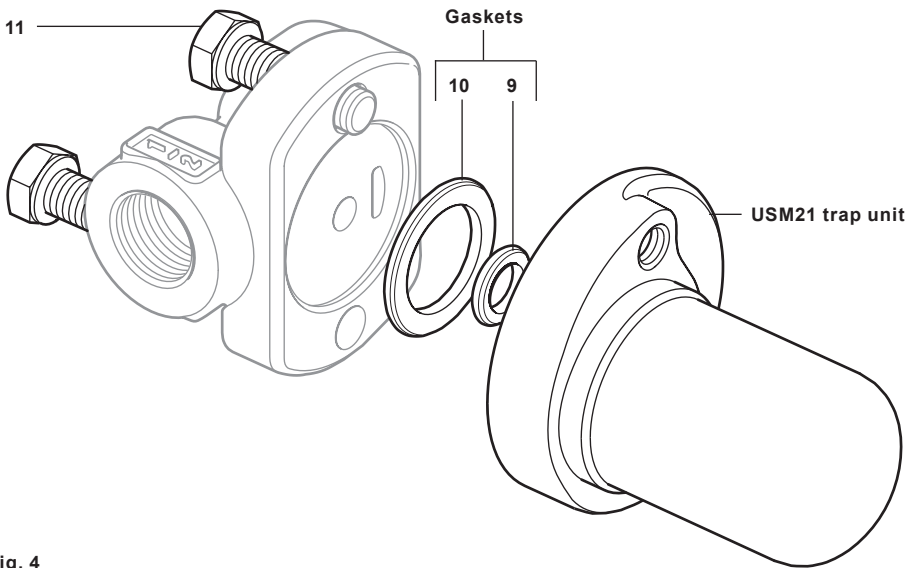




Fig. 4

Table 1 Recommended tightening torques

Item	Part	 or 	N m	(lbf ft)
11	Connector screw	9/16" A/F	30 - 35	(22 - 26)

USM21 Sealed Bimetallic Steam Trap for use with Pipeline Connectors

8. Fault finding

Trap fails to pass condensate

1. Make sure upstream, and downstream valves are open.
2. Check external strainers, e.g.: PC20, for clogging; blowdown or dismantle and clean.
3. Backpressure too high. Downstream system must be corrected.
4. Valve port clogged with dirt. Dismantle, inspect and clean.
5. Internal filter in trap clogged with dirt or bimetallic element failed. Replace trap unit.

Trap blows live steam

1. Dirt on seating surface. Replace trap unit.
2. Bimetallic element failed. Replace trap unit.
3. Worn valve seat. Replace trap unit.

Trap passing condensate at a lower discharge temperature and lower capacity

1. Backpressure may be too high, try and reduce backpressure. If it cannot be reduced, replace the trap with a less sub-cooled trap, see Section 2.3 for details.