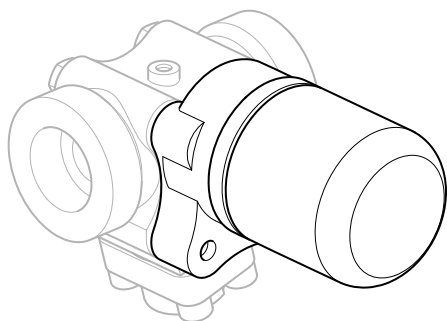

Stainless Steel Bimetallic Steam Trap for use with 4-Bolt Pipeline Connector

Installation and Maintenance Instructions



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

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. These products comply with the requirements of the European Pressure Equipment Directive 2014/68/EU and all fall within category 'SEP'.

It should be noted that products within this category are required by the Directive not to carry the  mark.

- i) These 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.
- vi) Inspect the product for any visible damage, defects, or contamination prior to installation. Verify that all components are present and in good condition. Do not install damaged or defective products.

Important: The equipment must only be used within the allowable pressure and temperature limits and only if the chemical and corrosive influences on the equipment are taken into account. This unit should not be used in highly chloride polluted environments.

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.

It is recommended that suitable hand protection is used when handling the graphite/stainless steel gaskets.

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 482 °C (900 °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

Unless otherwise specified in the Installation and Maintenance Instructions, some or all components of this product are recyclable when handled with due care. Always refer to the recycling and disposal regulations applicable in your region.

For general information on regulatory product compliance, please visit the Spirax Sarco Product Compliance webpages at:

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

For product-specific compliance inquiries, please contact your local Spirax Sarco manufacturing 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.

1.17 Assembly ratings

The pressure and temperature limits of an assembly are governed by the most restrictive component within that assembly. Where additional components such as traps, flanges, connectors, or accessories (including blowdown devices) are added, the allowable operating limits of the complete assembly must not exceed the rating of the lowest-rated component.

2. General product information

2.1 General description

The USM90 is a preset sealed non maintainable bimetallic steam trap, manufactured in austenitic stainless steel. It has been specifically designed for ASME Class 900. The USM90 is attached to a suitable pipeline connector (e.g. PC90) by four connector bolts for quick and easy installation, and replacement.

Standards

This product fully complies with the requirements of the European Pressure Equipment Directive 2014/68/EU.

Certification

This product is supplied with EN 10204 3.1 certification as standard.

Note: All certification/inspection requirements must be stated at the time of order placement.
Canadian Registration (CRN) for the USM90 is pending.

Note: For additional information see TI-P805-01.

2.2 Sizes and pipe connections

The USM90 can only be used with the PC90 4-Bolt pipeline connector or equivalent.

PC90	Straight connector	ASME 900	(TI-P806-01)
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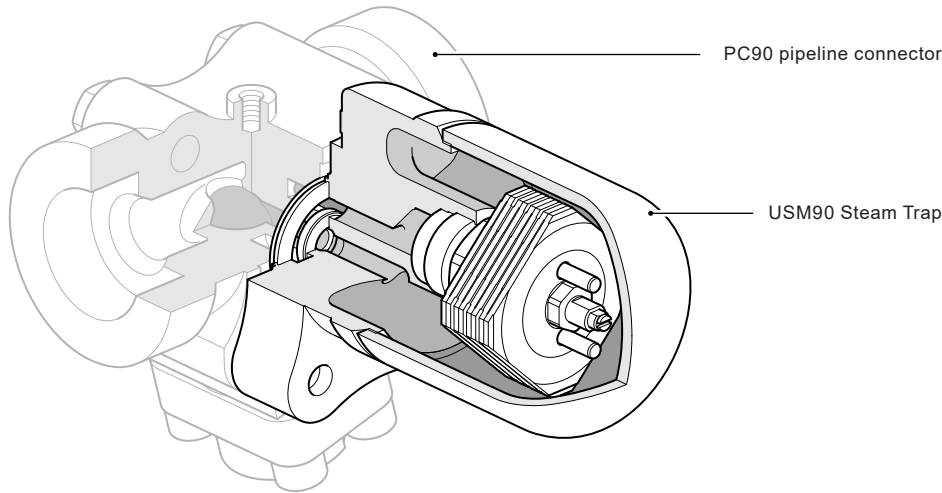
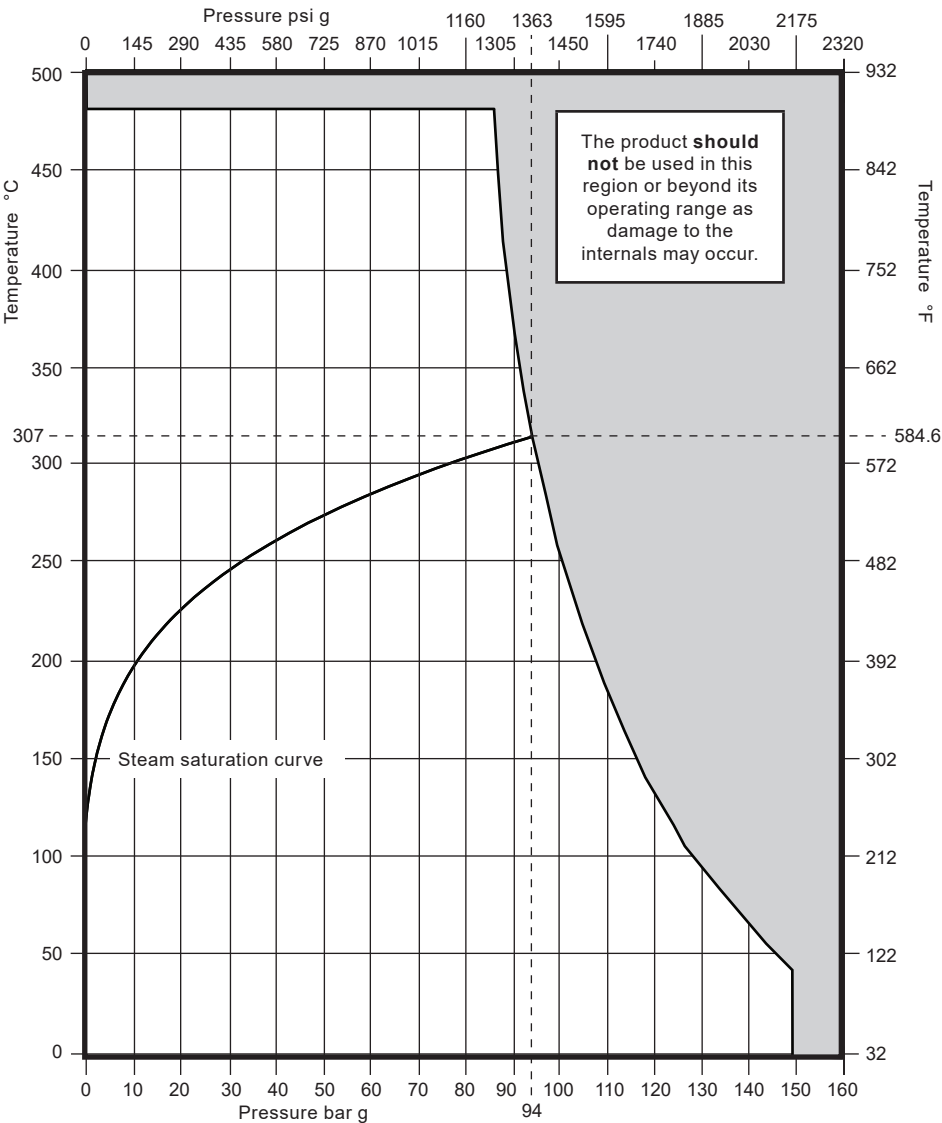


Fig. 1 USM90 shown fitted to a PC90 pipeline connector

2.3 Pressure/temperature limits (ISO 6552)

ASME Class 900 Pressure/temperature limits.



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		ASME Class 900	
PMA	Maximum allowable pressure	149.1 bar g @ 38 °C	2163 psi g @ 100 °F
TMA	Maximum allowable temperature	482 °C @ 86 bar g	900 °F @ 1245 psi g
Minimum allowable temperature		-46 °C	-50.8 °F
PMO	Maximum operating pressure for saturated steam	94 bar g @ 307 °C	1363 psi g @ 584.6 °F
TMO	Maximum operating temperature	482 °C @ 86 bar g	900 °F @ 1245 psi g
Minimum operating differential pressure		4 bar g	58 psi g
Minimum operating temperature *		0 °C	32 °F
ΔPMX	Maximum differential pressure	86 bar g	1245 psi g
Designed for a maximum cold hydraulic test pressure of		224 bar g	3249 psi g

The USM90 is suitable for full vacuum condition.

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

3. Installation

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

Referring to the Installation and Maintenance Instructions, laser 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 and the correct direction of fluid flow.
- 3.3** Remove protective covers from all connections, where appropriate, before installation on steam or other high temperature applications.
- 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 USM90 can be installed on any approved 4-Bolt pipeline connector, in any orientation, provided the connection face is in the vertical plane.
- 3.6**
 - The new trap unit should be positioned against the connector gasket face, ensuring gaskets are correctly in place.

Ensure that both gaskets (4, 5) are clean and undamaged and that the transfer holes are clear.

 - Apply anti-seize compound (ROCOL SA-610) liberally and completely to the connector bolts (3), including all mating threads and connector bolt head bearing/contact surfaces, ensuring full coverage over the entire engaged thread length in accordance with ASME PCC-1 guidance. Care shall be taken to achieve a uniform coating and to avoid contamination of gasket sealing faces.
 - Finger tighten the connector bolts (3) ensuring that the trap unit is parallel to the pipeline connector.
 - Tighten the connector bolts (3) in a diagonal (star) pattern i.e. 1-2-3-4 as shown in Fig.5, using multiple passes in accordance with ASME PCC-1 to ensure even gasket compression.
 - Tighten the connector bolts (3) to the recommended torque value (see Table 1).
- 3.7** Open isolation valves slowly until normal operating conditions are achieved.
- 3.8** 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-P805-01 for further information.



CAUTION!

ROCOL SA-610 is a specialist high-temperature surface engineering solution that provides excellent corrosion protection and is optimised to prevent stainless galling for stainless/superalloy fasteners and should not be substituted for another anti-seize compound. Use of an anti-seize compound other than ROCOL SA-610 will affect material compatibility and torque-tension relationship and is not approved.



Only the supplied or equivalent should be used for the heavy hex connector bolts identified with the markings shown.

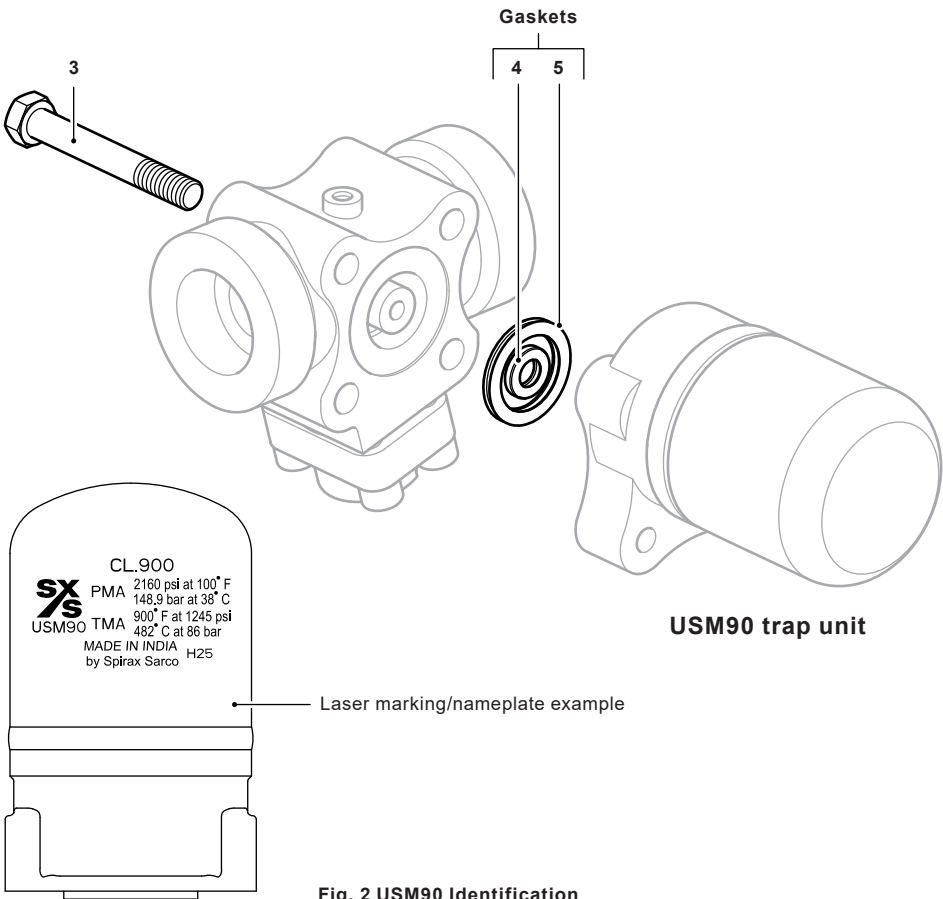
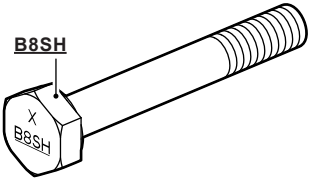


Fig. 2 USM90 Identification

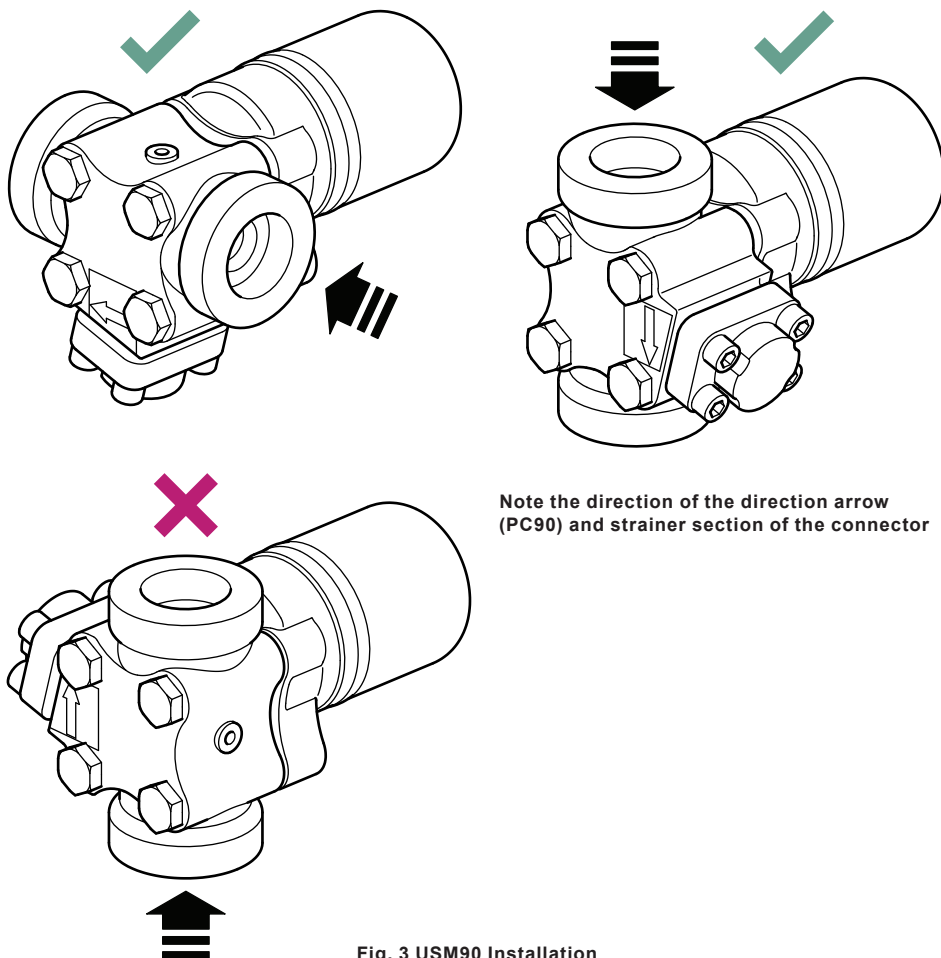


Fig. 3 USM90 Installation

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 USM90 is a sealed bimetallic steam trap designed for use with the Spirax Sarco PC90 4-Bolt pipeline connector or equivalent.

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 USM90 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 (4 and 5) used when installing/maintaining the USM90 to a PC90 pipeline connector consist of graphite and thin stainless steel support rings which may cause physical injury if not handled and disposed of carefully.

It is recommended that suitable hand protection is used when handling the graphite/stainless steel gaskets.



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 four connector bolts (3) and removing the trap unit.
- The new trap unit should be positioned against the connector gasket face, ensuring gaskets are correctly in place.

Ensure that both gaskets (4, 5) are clean and undamaged and that the transfer holes are clear.

- Apply anti-seize compound (ROCOL SA-610) liberally and completely to the connector bolts (3), including all mating threads and connector bolt head bearing/contact surfaces, ensuring full coverage over the entire engaged thread length in accordance with ASME PCC-1 guidance. Care shall be taken to achieve a uniform coating and to avoid contamination of gasket sealing faces.
- Finger tighten the connector bolts (3) ensuring that the trap unit is parallel to the pipeline connector.
- Tighten the connector bolts (3) in a diagonal (star) pattern i.e. 1-2-3-4 as shown in Fig.5, using multiple passes in accordance with ASME PCC-1 to ensure even gasket compression.
- Tighten the connector bolts (3) to the recommended torque value (see Table 1).
- Open isolation valves slowly until normal operating conditions are achieved.
- Check for leaks.

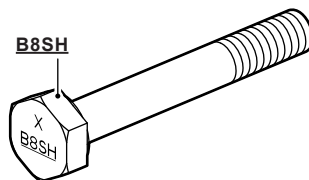


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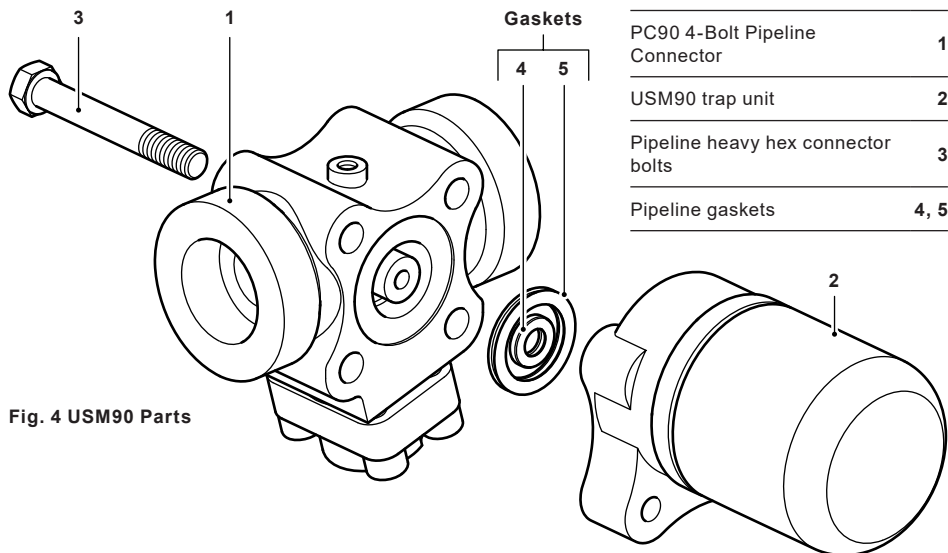
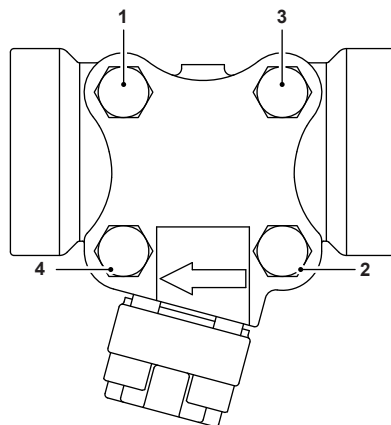


Fig. 4 USM90 Parts

Table 1 - Recommended tightening torques

Item	Part			N m	ft lbs
3	Heavy hex connector bolts	1 ¹ / ₁₆ " A/F	3 ⁸ / ₁₆ " UNC	26	19.2

Fig. 5 Heavy hex connector bolts tightening sequence



7. Spare parts

The USM90 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

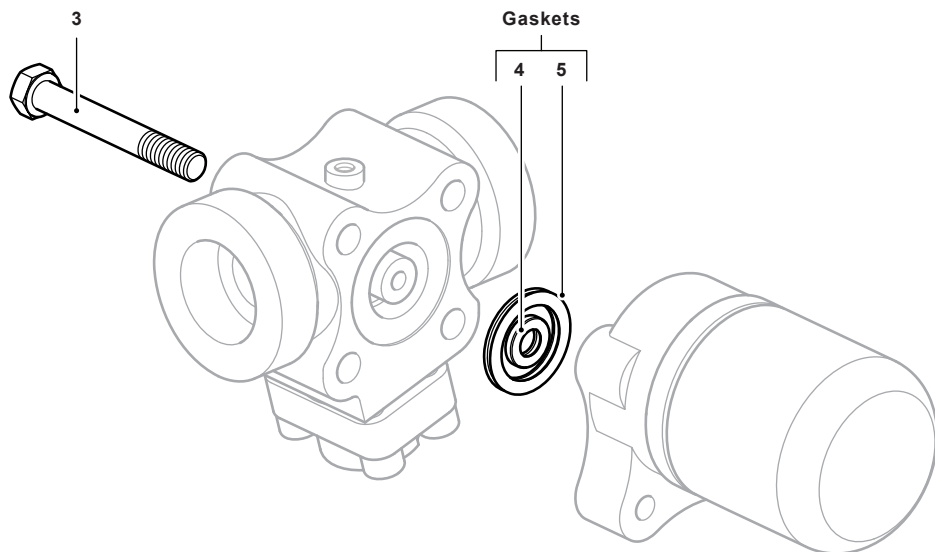
Pipeline heavy hex connector bolts (4 off)	3
Set of gaskets (pipeline)	4, 5

Note: The gaskets contain sharp metal reinforcement and graphite, 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: 4 off Pipeline heavy hex connector bolts for a USM90 sealed bimetallic steam trap.



8. Fault finding

Trap fails to pass condensate

1. Make sure upstream, and downstream valves are open.
2. Check external strainers, e.g.: PC90, 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. 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.
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