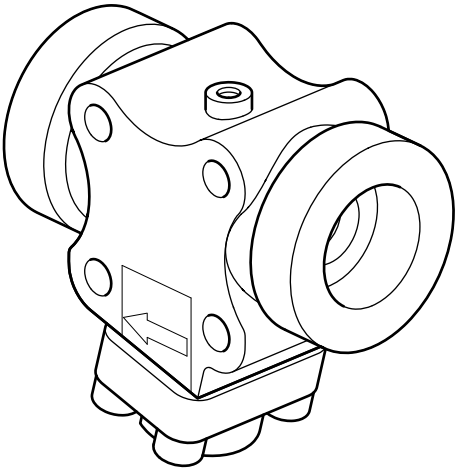
PC90
4-Bolt Pipeline Connector
Installation and Maintenance Instructions



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 1.12) 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 CE mark.

i) **These products have been specifically designed for use on steam, air or condensate/water, 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.**

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.

1.7.1 Blowdown and de-pressurisation valves

Blowdown and depressurisation valves are generally used to depressurise a system/vessel prior to maintenance or removal. Do not assume that the system has depressurised even if a pressure gauge indicates zero. Consider the direction of the depressurised flow and ensure that this will not cause a hazard to yourself or others.

1.8 Temperature

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

1.9 Isolation

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

1.10 Tools and consumables

Before starting work ensure that you have suitable tools and/or consumables available. Use only genuine Spirax Sarco replacement parts. Please see reference table for relevant tooling and the correct torque settings prior to attempting and maintenance.

1.11 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.

1.12 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.

1.13 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.

1.14 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 482 °C (900 °F).
Many products are not self-draining. Take due care when dismantling or removing the product from an installation (refer to 'Maintenance instructions').

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 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.

1.17 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.

1.18 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 4-Bolt PC90 pipeline connector is designed for the quick fitment of replacement steam traps without the need to break into the steam pipeline itself, reducing system downtime. The PC90 is designed to ASME Class 900 with all stainless steel construction specifically for use with the UTDS90 and USM90 steam traps. The PC90 is available in both Left to Right and Right to Left flow configurations and with or without a strainer blowdown connection.

Standards

This product has been designed in line with the following standards: ASME B31.3 and B16.34 Class 900 (body design conditions).

Certification

This product is supplied with EN 10204 3.1 certification as standard.
Canadian Registration (CRN) for the PC90 is pending.
Note: For additional information see TI-P806-01.

2.2 Sizes and pipe connections

Condensate inlet/outlet

Size	ASME B16.11 Class 3000 Socket Weld	Butt Weld	Flanged ASME Class 600	Flanged ASME Class 900
½" (DN15)	Y		Y	Y
¾" (DN20)	Y	Y	Y	Y
1" (DN25)	Y	Y	Y	Y

The PC90 has been designed for use with the following steam trap options - UTDS90 and USM90.

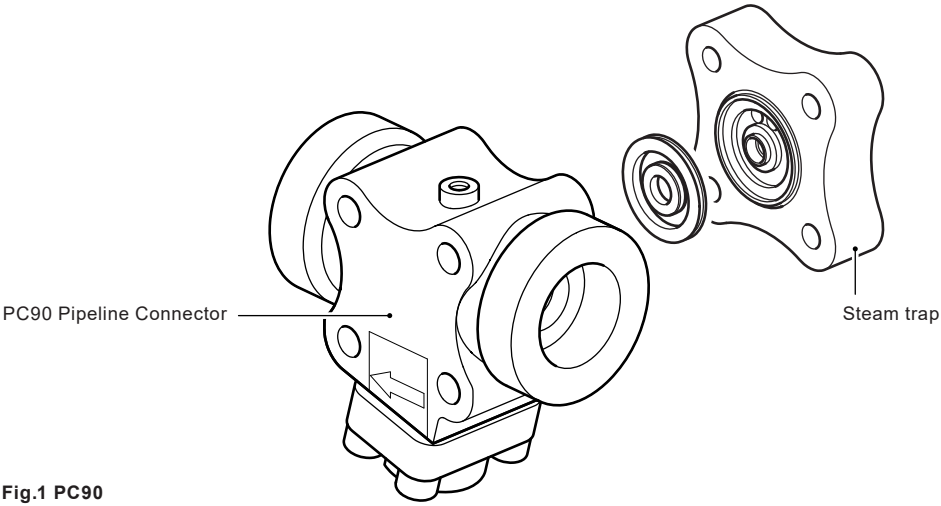
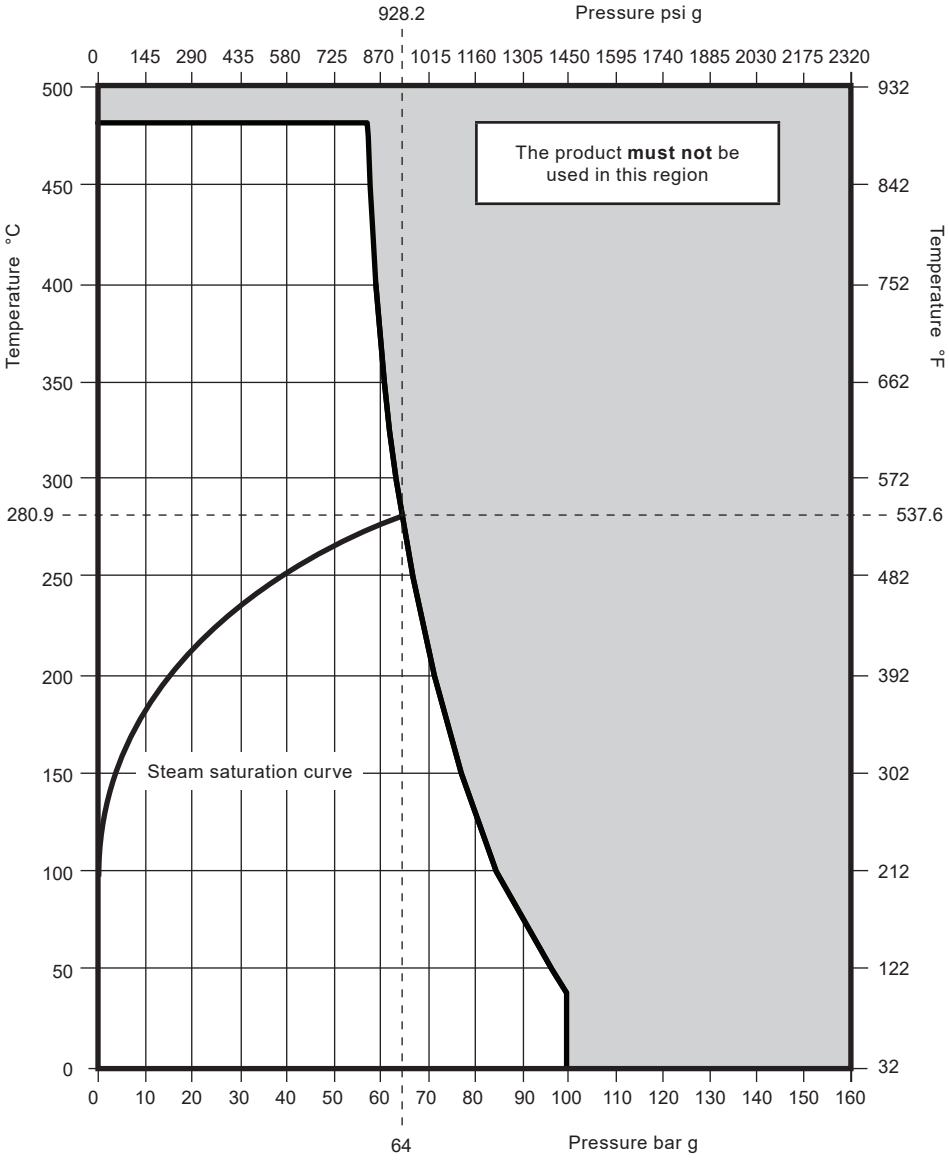


Fig.1 PC90

2.3 Pressure/temperature limits (ISO 6552)

ASME Class 600 Pressure/temperature limits.



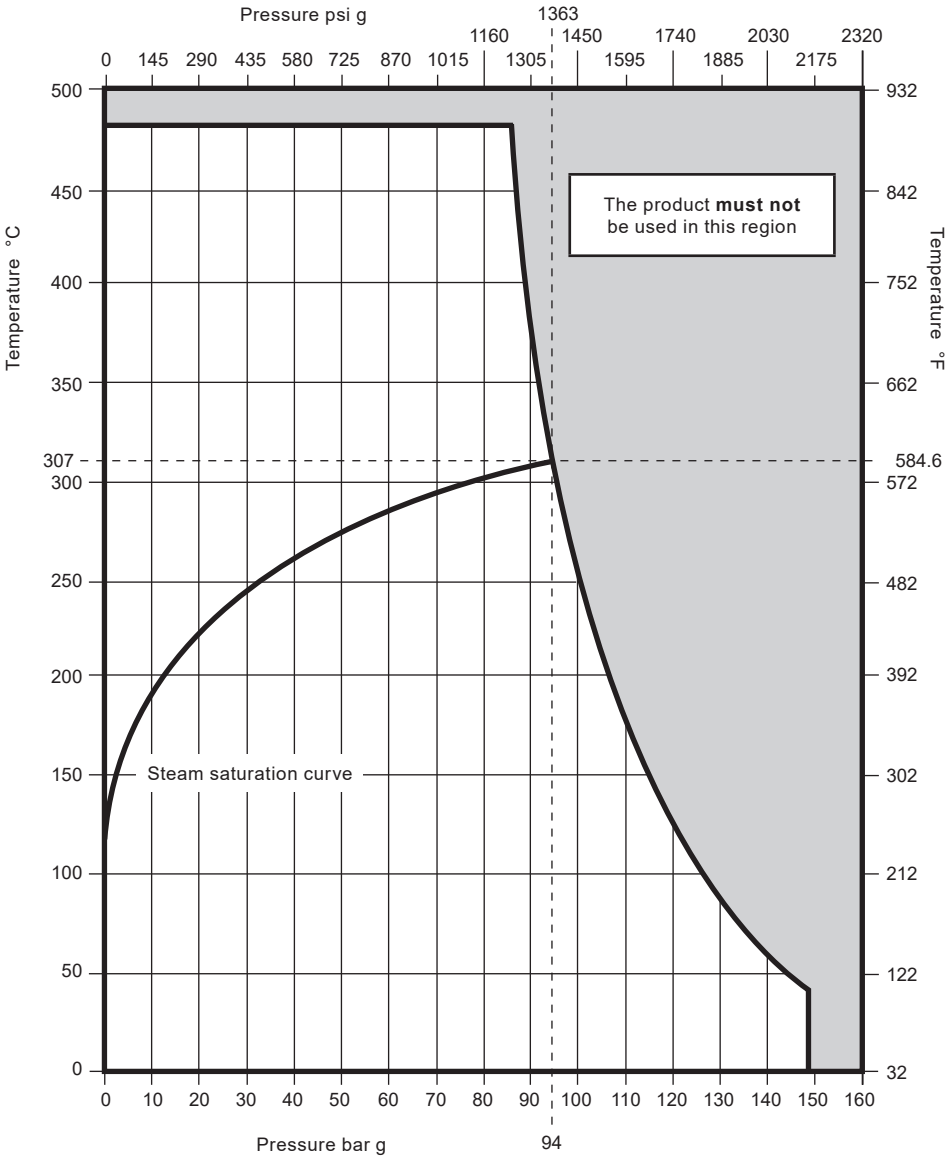
Notes:
- If flange connections are fitted then these will limit the maximum design conditions of the pipeline connector.
- The maximum operating limits of the complete assembly will be dictated by the steam trap of choice. Reference the specific steam trap Technical Information sheet for its maximum pressure/temperature limitations.

Body design conditions			ASME Class 600
PMA	Maximum allowable pressure	99.4 bar g @ 38 °C	1442 psi g @ 100 °F
TMA	Maximum allowable temperature	482 °C @ 57 bar g	900 °F @ 828 psi g
Minimum allowable temperature		-46 °C	-50.8 °F
PMO	Maximum operating pressure for saturated steam	64 bar g @ 280.9 °C	928.2 psi g @ 537.6 °F
TMO	Maximum operating temperature	482 °C @ 57 bar g	900 °F @ 828 psi g
Minimum operating temperature*		0 °C	32 °F
Designed for a maximum cold hydraulic test pressure of		149 bar g	2161 psi g

The PC90 is suitable for full vacuum condition

* For lower operating temperatures consult Spirax Sarco

ASME Class 900 Pressure/temperature limits.



Notes:
- If flange connections are fitted then these will limit the maximum design conditions of the pipeline connector.
- The maximum operating limits of the complete assembly will be dictated by the steam trap of choice. Reference the specific steam trap Technical Information sheet for its maximum pressure/temperature limitations.

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 temperature		0 °C	32 °F
Designed for a maximum cold hydraulic test pressure of		224 bar g	3249 psi g

The PC90 is suitable for full vacuum condition

*For lower operating temperatures consult Spirax Sarco

3. Installation

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

WARNING
If a red cap is installed in the stainer cap it signifies that there is an open aperture ready for a blowdown installation - Live steam must not be applied until the blowdown device is fitted.

3.1 General

3.1.1 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.

3.1.2 Determine the correct installation situation and the direction of fluid flow.

3.1.3 Remove protective covers from all connections, where appropriate, before installation on steam or other high temperature applications.

3.1.4 The PC90 shall be installed with flow in the direction of the arrow. Flow can be horizontal (either direction) or vertical with flow downwards, see Figures 5 and 6.

3.1.5 The connection face for the connector steam trap must always be in the vertical plane.

3.1.6 The correct steam trap and end connection must be selected to meet the system design conditions. Steam trap connector bolts are supplied with the selected steam trap.

3.1.7 After installation it is recommended that the pipeline connector is insulated to minimise radiated heat losses and to protect personnel from burns risk. Please note that there are some trap types that should not be insulated.

3.1.8 Open isolation valves slowly until normal operating conditions are achieved.

3.1.9 Check for leaks.

Check distances (d) to allow for withdrawal of bolts/screws, check specific trap instructions and technical information.

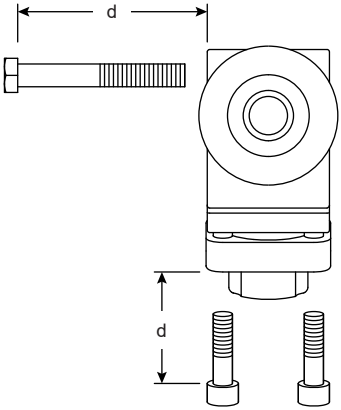


Fig. 2 Bolts/Screws withdrawal dimensions

M6 Digital Steam Trap Monitoring Interface

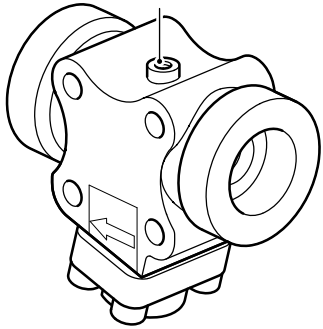
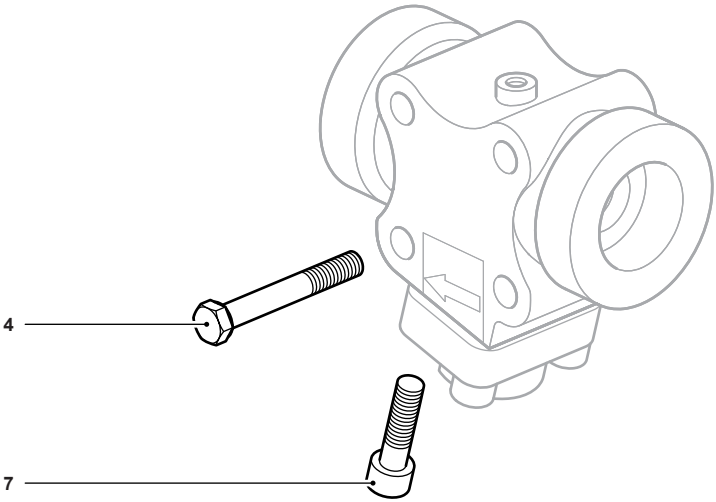


Fig. 3 Digital Steam Trap Monitoring Interface

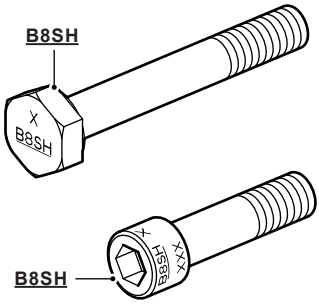


Pipeline heavy hex connector bolts (4 off)	**4**
Strainer Cap Screws (4 off)	**7**

Fig. 4

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

Only the supplied or equivalent should be used for the strainer cap screws, identified with the markings shown.



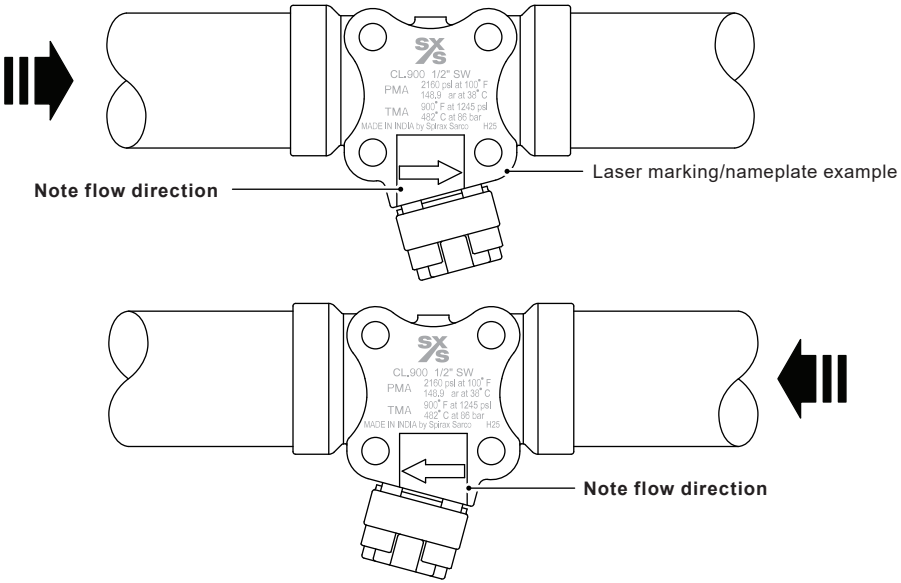
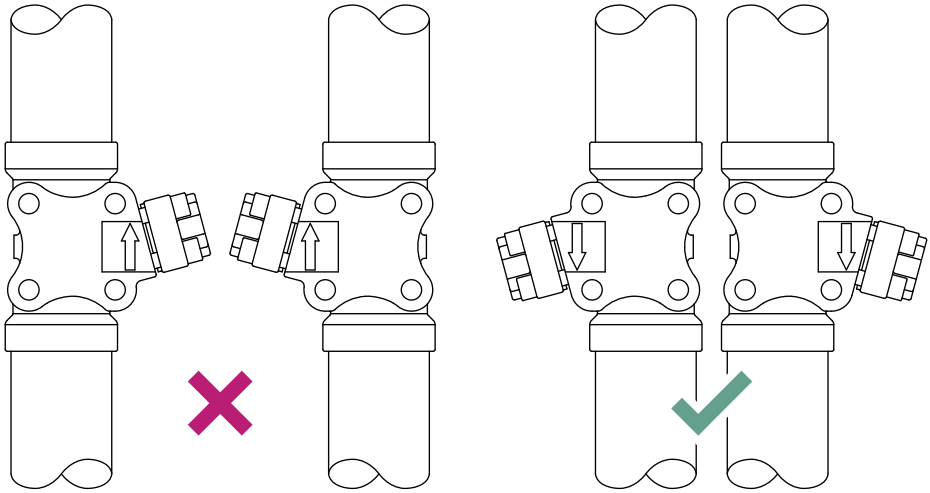


Fig. 5 Flow direction



Note the direction of the direction arrow and strainer section of the connector.

Fig. 6 Vertical Installations

3.2 Welding into pipeline of socket weld and butt weld variants

A universal weld procedure covering the requirements of different National and International Standards and practices is difficult to provide - specifically regarding the welding procedure, welding conditions (run number, consumable size, current, voltage, polarity), storage of consumables and make/type of consumables due to the abundance of appropriate consumable suppliers.
Welding advice based on British Standards can be provided, contact Spirax Sarco to discuss your welding requirements further. Welding can be carried out to ASME IX or BS EN standards as applicable.

3.3 Welding blowdown connection to strainer cap

3.3.1 Welding of a blowdown connection is only permitted on strainer caps specifically designated as blowdown variants.
Standard strainer caps must not be modified.

3.3.2 The blowdown pipe must not be welded to the strainer cap while the cap is installed on the PC90, as this may damage internal components, fasteners, and sealing gaskets.

3.3.3 Remove the strainer cap from the PC90 by removing the four cap screws (**7**) .
Remove the strainer screen (**5**) and strainer screen gasket (**6**) from the cap prior to welding.

3.3.4 Weld the blowdown connection to the strainer cap in accordance with applicable welding procedures, ensuring adequate heat control to prevent distortion of the cap sealing surfaces.

3.3.5 Allow the component to cool naturally.

3.3.6 Inspect the weld for defects and verify that the sealing faces and threads are free from distortion, weld spatter, or debris.

3.3.7 Reinstall new strainer screen gasket (**6**) and strainer screen (**5**) into the cap.

3.3.8 Refit the strainer cap to the PC.
Apply anti-seize compound (ROCOL SA-610) liberally and completely to the cap screws (**7**), including all mating threads and cap screw 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 cap screws (**7**) until the mating gasket faces are in parallel, intimate contact.
Tighten the cap screws (**7**) in a diagonal (star) pattern i.e. 1-2-3-4 as shown in Figure 8.1, to the recommended torque value (see Table 1) using multiple passes in accordance with ASME PCC-1 to ensure even gasket compression. Cap screws (**7**) may not be accessible with standard tools. To ensure appropriate torque is applied, an extended tool may be needed.
Open isolation valves slowly until normal operating conditions are achieved.

Important:

- Where blowdown is configured onsite, welding is the responsibility of the installer/user and be to recognised ASME standards.
- Where a blowdown pipe is fitted, adequate external pipe supports are recommended as the strainer cap is not designed to support the weight of attached pipework, and excessive loading may result in damage or leakage. Maximum weight must not exceed 10 kg.
- The maximum allowable torque applied to operate the blowdown device must not exceed 80 Nm.
- The integrity, pressure rating, and suitability of the assembled blowdown arrangement are the responsibility of the installer/user. The complete assembly must be assessed to ensure it meets the applicable design and operating conditions.

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.

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 PC90 is a 4-Bolt pipeline connector designed for the quick fitment of replacement steam traps without the need to break into the steam pipeline itself, reducing system downtime.

The PC90 incorporates an integral strainer screen within the connector body, providing protection against debris that could impair the steam trap performance.

Depending on site requirements, the PC90 can be configured with or without a strainer blowdown connection. The connector is available in both Left to Right and Right to Left flow configurations to suit different piping layouts.

6. Maintenance

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

Warning

The inner and outer gaskets used when installing/maintaining a compatible steam trap to a PC 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

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 How to replace the strainer screen

Before starting make sure the pipeline connector is isolated from mains pressure (both steam and condensate) and any residual pressure is vented to atmosphere.

Allow to cool before commencing work.

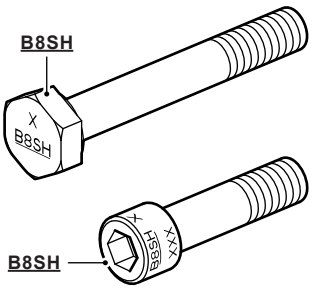
- Remove the strainer cap from the PC90 by removing the four cap screws (**7**) .
- Remove the strainer screen (**5**) and strainer screen gasket (**6**) from the cap.
- Reinstall new strainer screen gasket and strainer screen into the cap, orientating the screen so that the chamfered end is furthest from the strainer housing.
- Lightly press strainer onto the tapered location spigot to hold it during installation.
- Refit the strainer cap to the PC.
- Apply anti-seize compound (ROCOL SA-610) liberally and completely to the cap screws (**7**), including all mating threads and cap screw 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 cap screws (**7**) until the mating gasket faces are in parallel, intimate contact.
- Tighten the cap screws (**7**) in a diagonal (star) pattern i.e. 1-2-3-4 as shown in Figure 8.1, using multiple passes in accordance with ASME PCC-1 to ensure even gasket compression.
- Tighten the cap screws (**7**) to the recommended torque value (see Table 1).
- Open isolation valves slowly until normal operating conditions are achieved.

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 equivelent should be used for the heavy hex connector bolts identified with the markings shown.

Only the supplied or equivalent should be used for the strainer cap screws, identified with the markings shown.



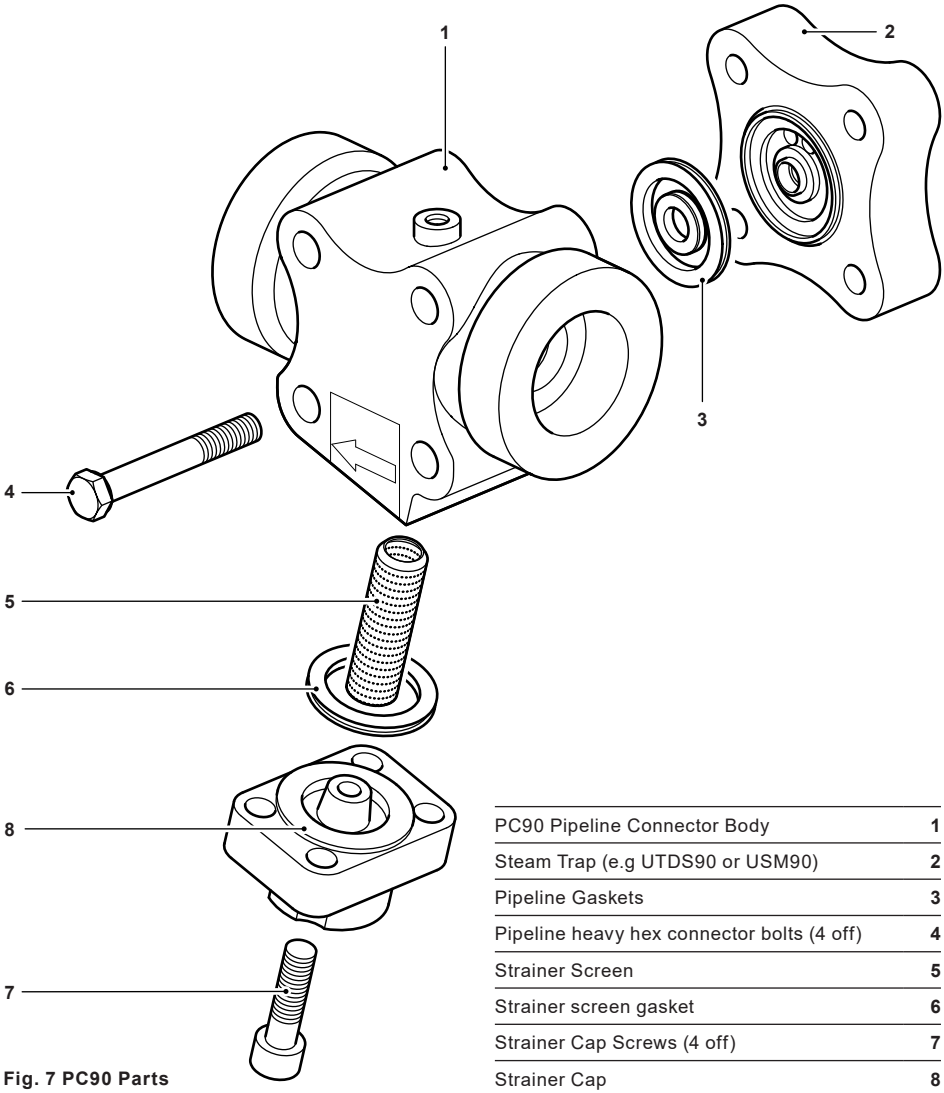


Fig. 7 PC90 Parts

PC90 Pipeline Connector Body	1
Steam Trap (e.g UTDS90 or USM90)	2
Pipeline Gaskets	3
Pipeline heavy hex connector bolts (4 off)	4
Strainer Screen	5
Strainer screen gasket	6
Strainer Cap Screws (4 off)	7
Strainer Cap	8

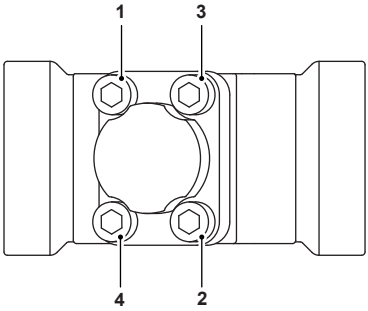


Fig. 8.1
Strainer Cap Screws tightening sequence

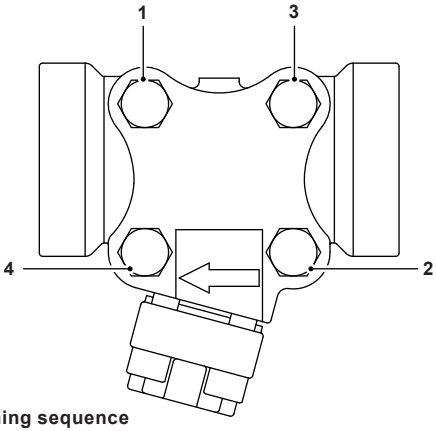


Fig. 8.2
Heavy hex connector bolts tightening sequence

Table 1 - Recommended tightening torques

Item	Part				N m	ft lbs
4	Heavy hex connector bolts		1 1/16" A/F	3/8" UNC	26	19.2
7	Strainer cap screws		1/4" A/F	5/16" UNC	14	10.3

7. Spare parts

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

Available spares

Maintenance Kit (contains strainer screen and gasket)	**5, 6**

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

How to order spares
Always order spares using the description given in the column headed 'Available spares' and state model number.
Example: 1 - Maintenance Kit for ½" PC90 connector.