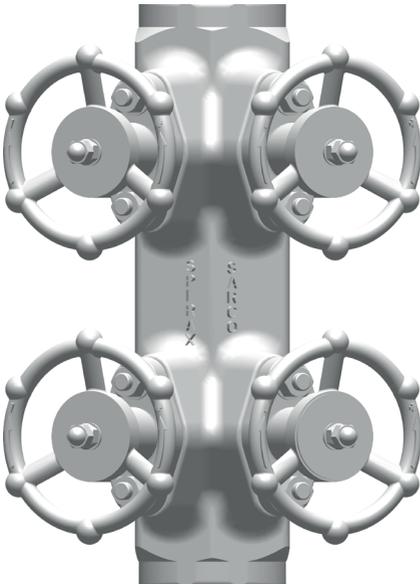

MSC Manifolds - ASTM
for Steam Distribution and Condensate Collection
Installation and Maintenance Instructions



MSC04 shown

- 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, product markings and Technical Information Sheet, check that the product is suitable for the intended use/application. This product complies with the requirements of the European Pressure Equipment Directive 2014/68/EU and falls within Category '1' and therefore carries the  mark.

- i) This product has 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, 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 progressively 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.

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 may reach temperatures in excess of 425 °C (797 °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

A range of forged carbon steel compact manifolds with integral piston type stop valves for steam distribution and condensate collection duty. MSC manifolds can be used for either steam distribution duty or condensate collection duty depending on the way they are installed.

Optional extras

The following are available at extra cost:

- Mounting kit comprising of studs, spacers and nuts.
- Insulating jacket.
- Fitted with steam traps for quick installation projects.

Standards

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

Certification

The 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 information see the following Technical Information Sheet: TI-P117-02.

2.2 Available types, sizes and pipe connections

MSC manifolds are available with 4, 8 or 12 connections designated:

MSC04, **MSC08** and **MSC12** respectively and flanged BS 1560 (ASME) class 150 or 300 or socket weld to ASME B 16.11 Class 3000 or screwed BSP or NPT. Available in 125 mm and 160 mm pitch.

The steam main/condensate return connection is **DN40** socket weld to ASME B 16.11.

The tracer line and drain connections are available as **DN15**, **DN20** flanged, screwed BSP, NPT and SW to ASME B 16.11.

Recommended alternatives

Flow direction when used for steam distribution duty | Flow direction when used for condensate collection duty

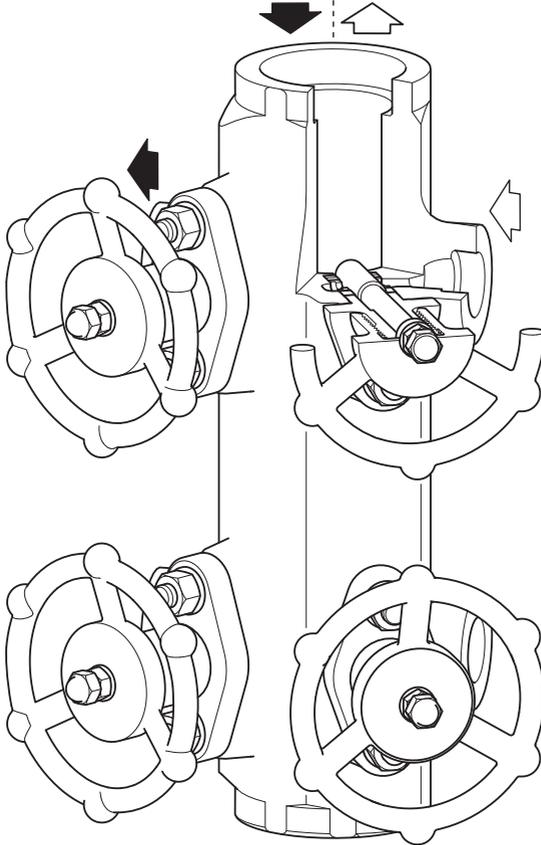
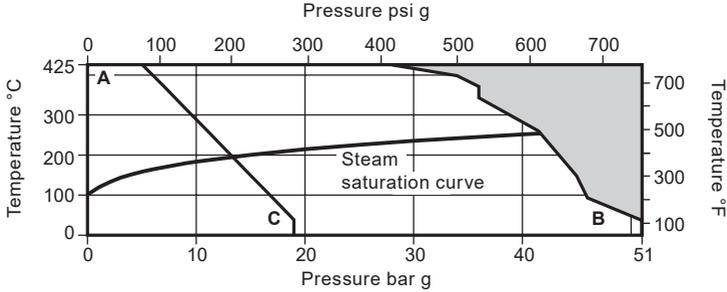


Fig. 1 Type MSC04 socket weld version shown

2.3 Pressure/temperature limits



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

A - B Flanged ASME Class 300, screwed and socket weld.

A - C Flanged EN 1092 PN40.

Body design conditions		ASME Class 300	
PMA	Maximum allowable pressure	51 bar g @ 38 °C	740 psi g @ 100 °F
TMA	Maximum allowable temperature	425 °C @ 28 bar g	797 °F @ 406 psi g
Minimum allowable temperature		-46 °C	-50 °F
PMO	Maximum operating pressure for saturated steam service	ASME 150	14 bar g / 203 psi g
		ASME 300, SW, NPT	41.5 bar g / 602 psi g
TMO	Maximum operating temperature	ASME 150	425 °C @ 5.5 bar g / 797 °F @ 80 psi g
		ASME 300, SW, NPT	425 °C @ 28 bar g / 797 °F @ 406 psi g
Minimum operating temperature		0 °C	32 °F
Note: For lower operating temperatures consult Spirax Sarco			
Designed for a maximum cold hydraulic test pressure of:		76 bar g	1 102 psi g

2.4 K_v values

All sizes K_v 1.8

For conversion:

$$C_v \text{ (UK)} = K_v \times 0.963$$

$$C_v \text{ (US)} = K_v \times 1.156$$

The K_v stated is for each valve rather than the complete manifold.

3. Installation

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

Referring to the Installation and Maintenance Instruction, 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.

Note: If the trap draining the manifold 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).

3.4 General information

The manifold has been designed for vertical installation. Ensure that there is sufficient access to the handwheel to allow proper operation. The back is provided with threaded connections M12 for attaching to a supporting structure.

For ease of insulation it is recommended that spacers are fitted to give the manifold a stand-off of at least 50 mm.

For convenience the following sets of mounting kit are available:

- A single set comprising 2 off each stud, nut and spacer suitable for installing one MSC04 or MSC08.
- A single set comprising 4 off each stud, nut and spacer suitable for installing one MSC12.
- A multiple set comprising 12 off each stud, nut and spacer suitable for installing 6 x MSC04, 6 x MSC08 or 3 x MSC12.

After installation it is recommended that the manifold is insulated to minimise radiated heat losses and to protect personnel from burn risks. This is most easily done using the optional insulating jacket.

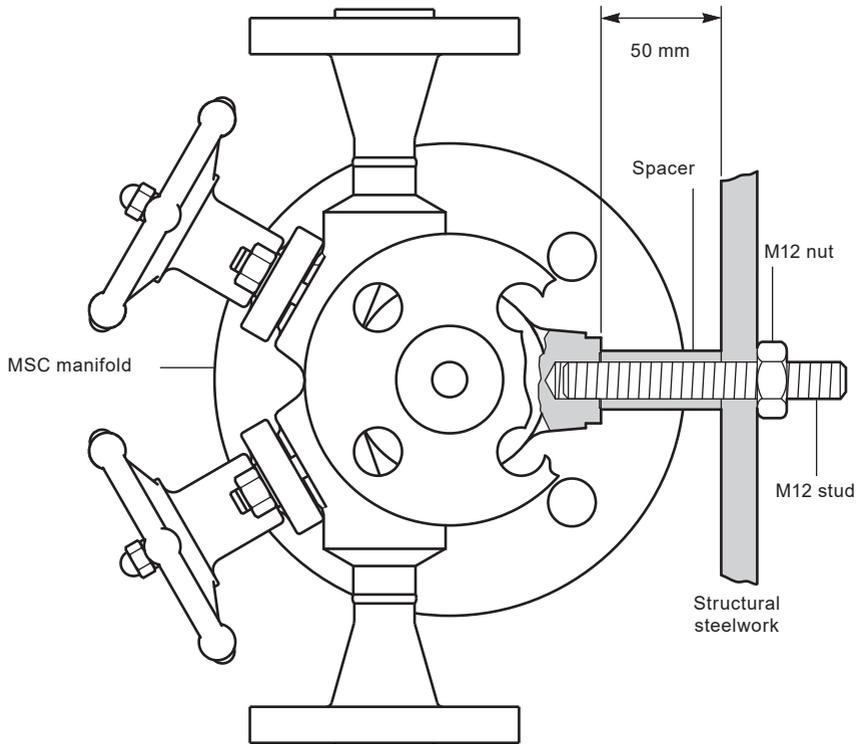


Fig. 2 Installation view from underneath

3.5 Steam distribution duty

The recommended installation is with the steam inlet connection at the top of the manifold. A trap set should be fitted to the bottom. The discharge from this trap set should ideally be returned. If it is to be discharged to atmosphere we recommend that a diffuser is fitted.

3.6 Condensate collection duty

The recommended installation is with the condensate outlet at the top. The bottom of the manifold should be fitted with a stop valve for blowdown purposes. Again, we recommend that a diffuser is fitted.

3.7 Pipeline welding

Any welding provided by Spirax Sarco or our nominated sub-vendors will be in accordance with our latest Weld Procedures and associated documentation. Copies are available, if required, on request and should be approved before any orders are placed.

Any welding that is not being carried out by Spirax Sarco or their sub-vendors, will remain the full responsibility of the customer, user or their own appointed contractors/sub-vendors.

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 integral piston valves should be either fully open or fully closed. They are not intended for throttling duties. **During closing operation** the piston ensures a permanent seal by means of the handwheel. Therefore during service never remove the handwheel from the spindle. Due to the large sealing area of the piston valve, it is not necessary to use a valve key to ensure leaktight shut-off.

During opening operation the piston is stopped when the valve is fully open as its top touches the inside of the bonnet.

Operation of the handwheel should always be light.

6. Maintenance

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

Warning

The graphite stem sealing rings (items 8 and 9) contain thin stainless steel support rings which may cause physical injury if not handled and disposed of carefully.

6.1 Maintenance in service

After the manifold is first put into service or after a change of sealing rings (8 and 9), the bonnet nuts (4) should be lightly followed up with the valve in the closed position. Ensure the bonnet (2) is driven down straight during tightening and that care is taken with the handwheel operation. This operation is to be repeated should any trace of leakage develop. If perfect sealing cannot be achieved in this way, repack the valve following the procedure below. The handwheel can be unscrewed from the piston valve assembly following the removal of the top nut and domed lock-nut, (11). A washer is located under these nuts and also one between the the handwheel and valve bonnet. During reassembly ensure that these are refitted in the correct locations, by using a suitable anti-seize compound applied to the washers and applying the recommended torque to the nuts - See Table 1.

The top nut and domed lock-nut (item 11) should be locked together by unscrewing the top nut by an 1/8th of a turn whilst maintaining the position of the domed lock-nut.

6.2 Preparation of valve dismantling

Before starting work ensure that you have suitable tools and/or consumables available. Before attempting to carry out any maintenance, ensure that the manifold is fully isolated and safely depressurised. Do not assume the system is depressurised even when the pressure gauge indicates zero. If performing maintenance whilst the pipework is hot, wear appropriate protective clothing. Carefully remove insulation if fitted. When using the optional insulation jacket, this is easily removed by undoing the fastenings.

6.3 Dismantling the valve:

- Using the handwheel (10), fully open the valve.
- Remove the bonnet nuts (4) and washers (5) from studs (3).
- Carefully turn the handwheel in the closing direction to lift the bonnet (2).
- Rotate the bonnet (2) to ensure that the flange bolt holes are misaligned with the studs (3).
- Turn the handwheel in the opening direction to release the piston (6) from the upper and lower sealing rings (8 and 9) and so release piston/bonnet sub-assembly from the pipeline connector body (1).
- Examine the piston (6) for signs of scoring, corrosion etc. which could affect perfect tightness of the valve.
- Check other parts for wear/damage and replace if necessary.

Table 1 Recommended tightening torques

Item	 or mm	 UNC	N m	lbf ft
4	14	5/16" x 18 UNC	12	8.9
11	10	M6	5.0	3.68

Fig. 5 View showing valve internals

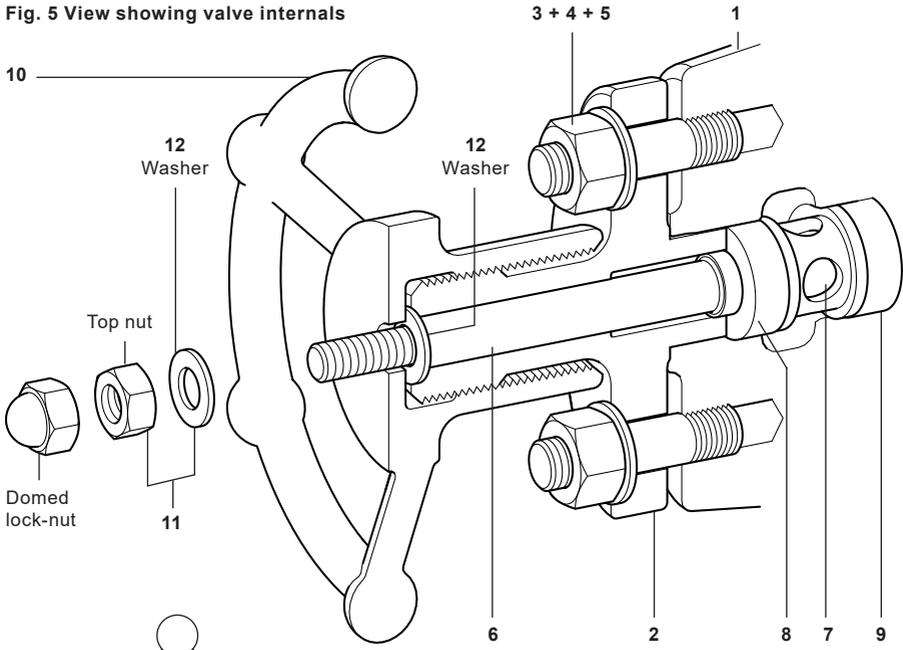
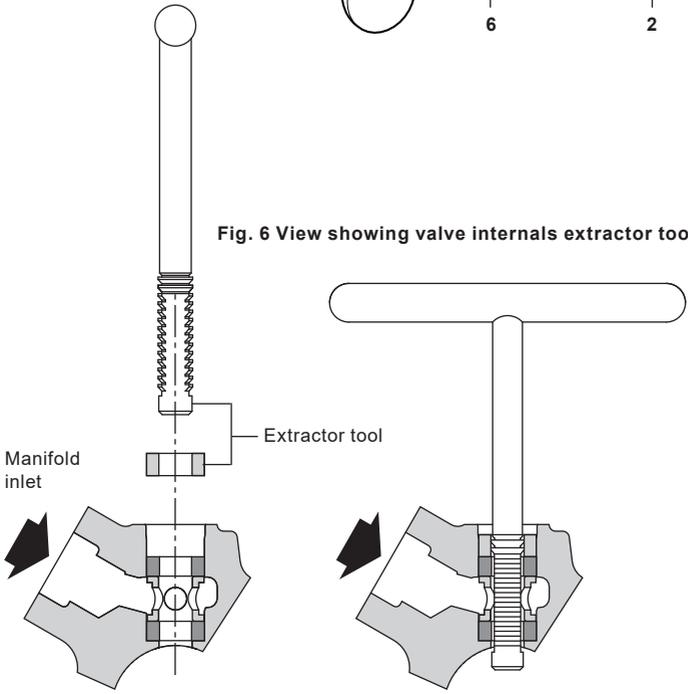


Fig. 6 View showing valve internals extractor tool



6.4 Repacking the valve:

- With the valve dismantled, insert the valve internals extractor tool through the upper and lower sealing rings (8 and 9) and lantern bush (7) (See Figure 7).
- Firmly tap to ensure that the tool bottoms out in the bore and with a quarter turn of the handle carefully remove the two sealing rings (8 and 9) and the lantern bush (7).
- Thoroughly clean the sealing rings housing and all the internals.
- Fit new lower sealing ring (9), lantern bush (7) and upper sealing ring (8), ensuring they fit perfectly. (Note: The lower and upper sealing rings are the same.)
- Apply a thin layer of graphite based grease to threads only (not to internals and piston).

6.5 Reassembling the valve - See Figure 7:

- Take the piston valve sub assembly (6,7,8 and 9), lightly inserting it into the pipeline connector body (1) and applying an even downwards force using the bonnet assembly (2) over the studs.
- Fit the belleville washers (5) and nuts (4) and evenly tighten the bonnet assembly (2) down to a torque of 12 Nm (8.9 lbf ft).
- The valve handwheel can now be reinstalled as per the instructions in Section 6.1, paying particular attention to the placement of the washers and torque figures.
- At this point the backlash of the valve should be tested ensuring it is not more than ¼ of a turn and that the securing nuts do not turn with the handwheel.

Table 1 Recommended tightening torques

Item		or mm		N m	lbf ft
4	14		5/16" x 18 UNC	12	8.9
11	10		M6	5.0	3.68

Fig. 7 View showing valve internals

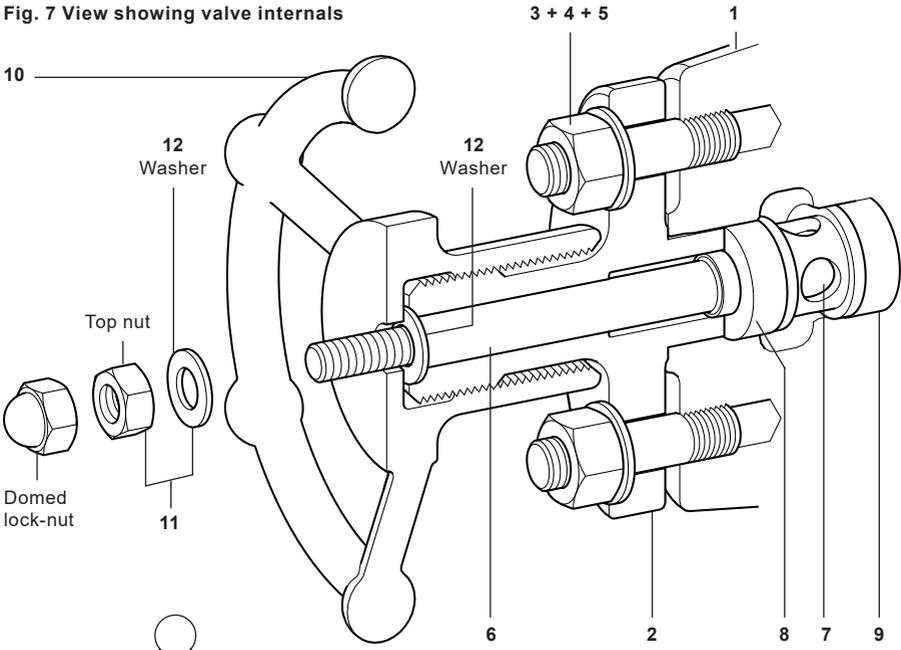
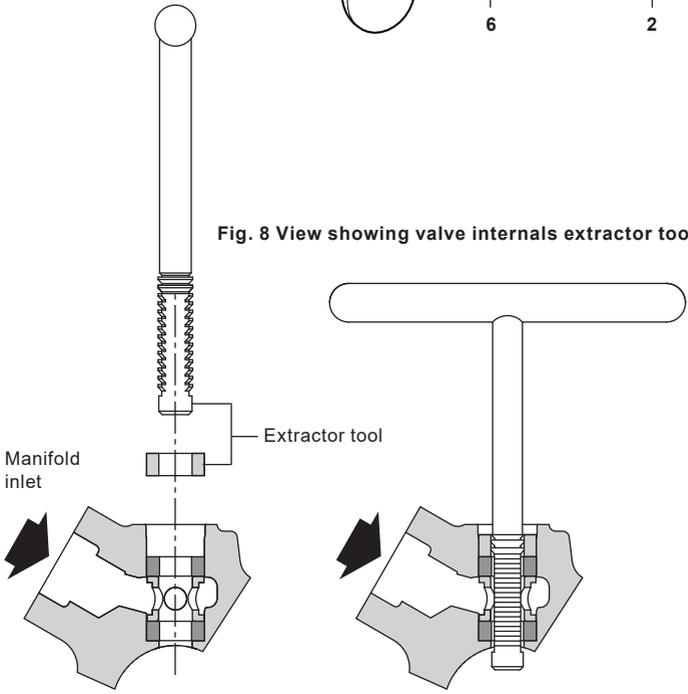


Fig. 8 View showing valve internals extractor tool



7. Spare parts

The spare parts available are detailed below.

To avoid any internal damage, the correct extractor tool must be used for removing the sealing rings - Please order separately.

Available spares

Sealing ring set	8 and 9
Piston valve assembly	2, 4, 5, 6, 7, 8, 9, 10, 11 and 12
Piston valve sub-assembly	6, 7, 8 and 9
Extractor tool	See Figure 8 on page 15
Mounting kit	See Figure 2 on page 10

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 manifold.

Example: 1 - Sealing ring set for an integral piston valve on a carbon steel manifold MSC04 DN15 socket weld.

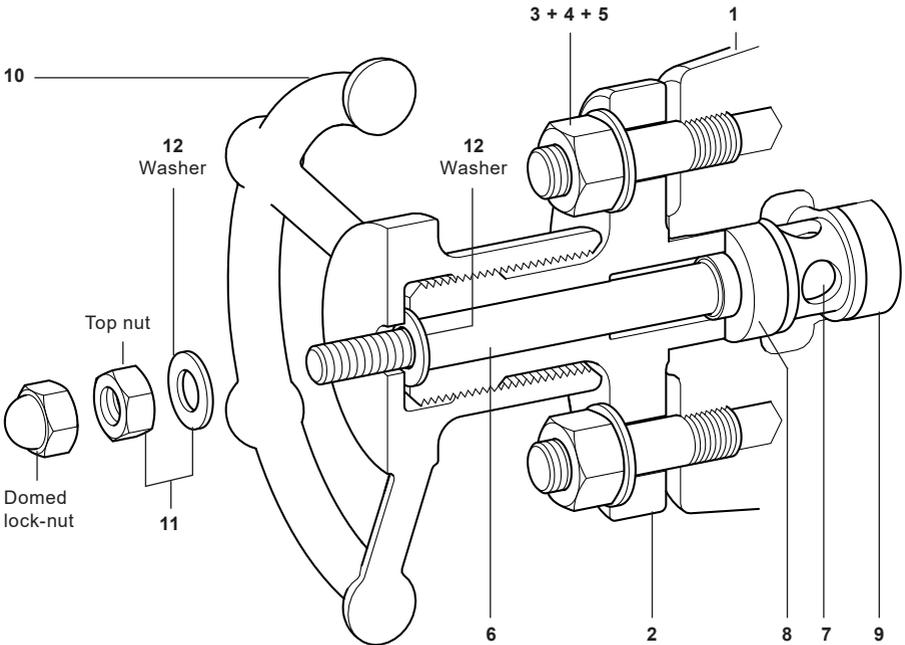


Fig. 9