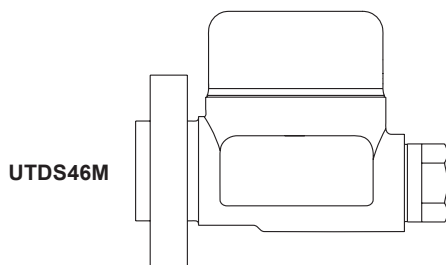
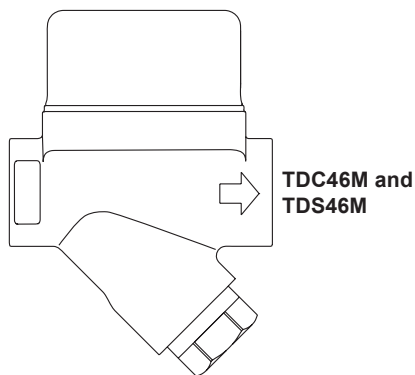

TDC46M, TDS46M and UTDS46M
Thermodynamic Steam Trap with a Maintainable Seat
Installation and Maintenance Instructions



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

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) 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. These products comply with the requirements of the European Pressure Equipment Directive 97/23/EC 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) Where fitted, remove protection covers from all connections 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 450°C (842°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 Safety information - product specific

See Section 6 'Maintenance' of this document for specific details relating to these products.

1.16 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.

1.17 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.

2. General product information

2.1 General description

The **TDC46M**, **TDS46M** and **UTDS46M** are maintainable thermodynamic steam traps with integral strainer, integral air vent, insulation cap and a replaceable seat to ease maintenance. They have been specifically designed for low capacity applications up to 46 bar g (667 psi g).

Available types:

Model	Body and cover	Pipeline connections
TDC46M	Carbon steel body with stainless steel top cap	Screwed or socket weld
TDS46M	Stainless steel	Screwed or socket weld
UTDS46M	Stainless steel	Designed for use with pipeline connectors – See Section 2.2

Optional extras

A **BDV1 integral blowdown valve** can be pre-fitted to the strainer cap on the the **TDC46M** and **TDS46M** but must be specified at the time of order placement. Alternatively a retrofit kit can be supplied – See Section 7 'Spare parts'.

A **BDV2 integral blowdown valve** can be pre-fitted to the strainer cap on the the **UTDS46M** but must be specified at the time of order placement. Alternatively a retrofit kit can be supplied – See Section 7 'Spare parts'.

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 information see the following Technical Information sheets: **TDC46M** TI-P187-04, **TDS46M** TI-P187-02 and **UTDS46M** TI-P187-03.

2.2 Sizes and pipe connections

TDC46M and **TDS46M**

½", ¾" and 1" screwed BSP or NPT.

½", ¾" and 1" socket weld ends to BS 3799 Class 3000 lb.

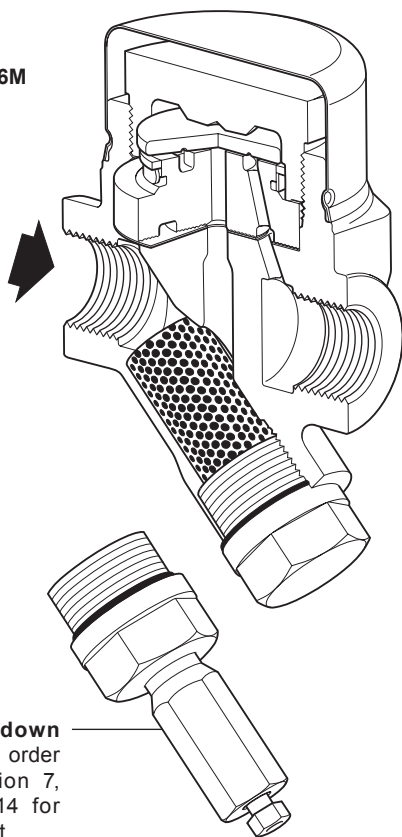
UTDS46M

The **UTDS46M** can be fitted to a variety of pipeline connectors:

PC10	Straight connector	ASME Class 600	(TI-P128-10)
PC3_	Connector with one piston isolation valve	ASME Class 600	(TI-P128-02)
PC4_	Connector with two piston isolation valves	ASME Class 600	(TI-P128-03)

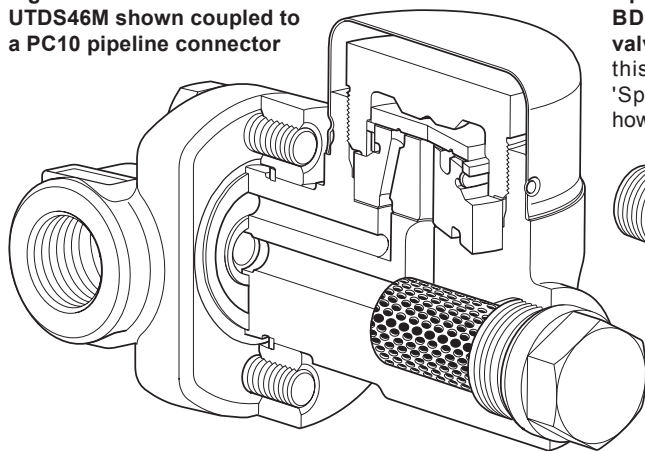
See the relevant Technical Information sheet as listed above for details of the connections available for each pipeline connector.

Fig. 1
½" TDC46M and TDS46M
screwed



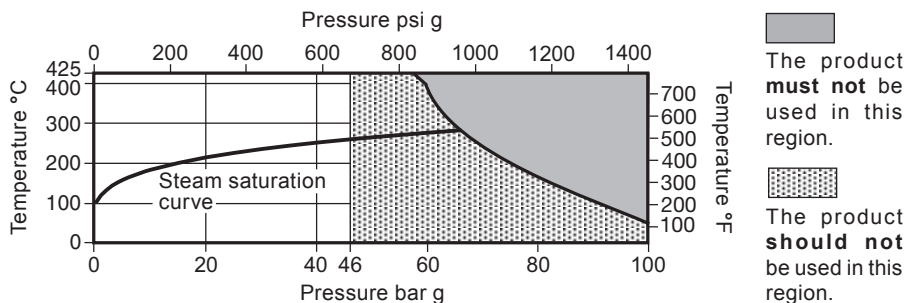
Optional extra
BDV1 integral blowdown
valve. If you didn't pre order
 this option see Section 7,
 'Spare parts', page 14 for
 how to order a retrofit kit.

Fig. 2
UTDS46M shown coupled to
a PC10 pipeline connector



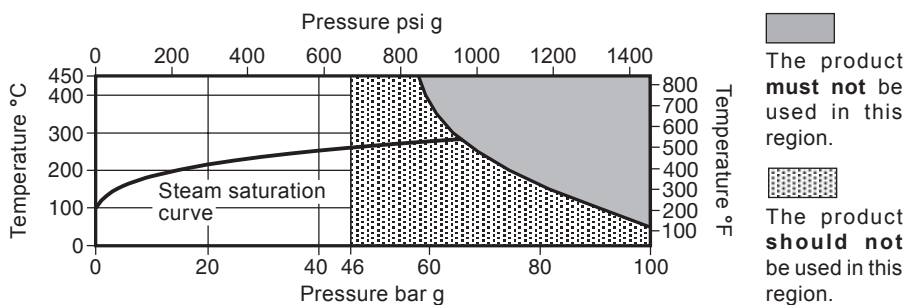
Optional extra
BDV2 integral blowdown
valve. If you didn't pre order
 this option see Section 7,
 'Spare parts', page 15 for
 how to order a retrofit kit.

2.3 Pressure/temperature limits - TDC46M



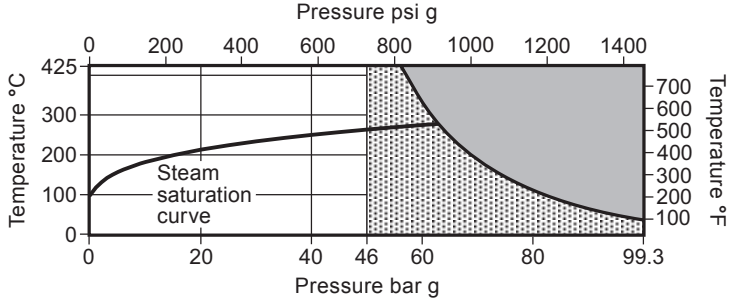
Body design conditions		PN100 and ASME Class 600	
PMA	Maximum allowable pressure	100 bar g @ 50°C	(1450 psi g @ 122°F)
TMA	Maximum allowable temperature	425°C @ 57.5 bar g	(797°F @ 834 psi g)
Minimum allowable temperature		-29°C	(-21°F)
PMO	Maximum operating pressure	46 bar g	(667 psi g)
TMO	Maximum operating temperature	425°C @ 46 bar g	(797°F @ 667 psi g)
Minimum operating pressure		1.5 bar g	(22 psi g)
Minimum operating temperature		0°C	(32°F)
Note: For lower operating temperatures consult Spirax Sarco			
PMOB Maximum operating backpressure should not exceed 80% of the upstream pressure			
Designed for a maximum cold hydraulic test pressure of 150 bar g (2175 psi g)			

2.4 Pressure/temperature limits - TDS46M



Body design conditions		PN100 and ASME Class 600	
PMA	Maximum allowable pressure	100 bar g @ 50°C	(1450 psi g @ 122°F)
TMA	Maximum allowable temperature	450°C @ 58.3 bar g	(842°F @ 845 psi g)
Minimum allowable temperature		-50°C	(-58°F)
PMO	Maximum operating pressure	46 bar g	(667 psi g)
TMO	Maximum operating temperature	450°C @ 46 bar g	(842°F @ 667 psi g)
Minimum operating pressure		1.5 bar g	(22 psi g)
Minimum operating temperature		0°C	(32°F)
Note: For lower operating temperatures consult Spirax Sarco			
PMOB Maximum operating backpressure should not exceed 80% of the upstream pressure			
Designed for a maximum cold hydraulic test pressure of 150 bar g (2175 psi g)			

2.5 Pressure/temperature limits - UTDS46M



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

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

Note: The model of pipeline connector and connection selected will dictate the maximum operating limits of the complete assembly.

Reference the specific pipeline connector Technical Information sheet as detailed in 'Pipeline connector options'.

Body design conditions			ASME Class 600
PMA	Maximum allowable pressure	99.3 bar g @ 38°C	(1440 psi g @ 100°F)
TMA	Maximum allowable temperature	425°C @ 56 bar g	(797°F @ 812 psi g)
Minimum allowable temperature			-48°C (-54°F)
PMO	Maximum operating pressure	46 bar g @ 425°C	(667 psi g @ 797°F)
TMO	Maximum operating temperature	425°C @ 46 bar g	(797°F @ 667 psi g)
Minimum operating pressure			1.5 bar g (22 psi g)
Minimum operating temperature			0°C (32°F)
Note: For lower operating temperatures consult Spirax Sarco			
PMOB Maximum operating backpressure should not exceed 80% of the upstream pressure			
Designed for a maximum cold hydraulic test pressure of			149 bar g (2161 psi g)

3. Installation

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

Referring to the Installation and Maintenance Instructions, product markings and Technical Information Sheet, check that the product is suitable for the intended installation:

- 3.1** Check materials and maximum pressure / temperature 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 direction of fluid flow. The flow direction is clearly marked on the trap body or pipeline connector. A typical installation is shown in Figure 3.
- 3.3** Remove protective covers from all connections, where appropriate, before installation on steam or other high temperature applications.
- 3.4** The preferred installation is in a horizontal pipe with the insulating cap uppermost. The trap will operate in other positions, but the service life will be reduced. The installation should have a small drop leg preceding the trap. Access for removal of the integral strainer screen should also be provided.
- 3.5** Suitable isolation valves must be installed to allow for safe maintenance and trap replacement.
Where the trap discharges into a closed return system a non-return valve should be fitted downstream to prevent back flow.
- 3.6** Always open isolation valves slowly until normal operating conditions are achieved – this will avoid system shocks. Check for leaks and correct operation.
- 3.7** Always ensure the correct tools, safety procedures and protective equipment are used at all times.
- 3.8** The disc and seating surfaces of these traps have been produced to a high degree of flatness to achieve good shut-off under high pressure conditions. An integral strainer helps prevent dirt and scale from entering the trap. If particles become entrapped between the disc and seat, the high flow velocities can cause rapid wear and erosion. A separate strainer and / or dirt pocket will provide additional protection.
- 3.9** When a socket weld version is being installed the welding should be carried out to an approved procedure of a recognised standard.

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).

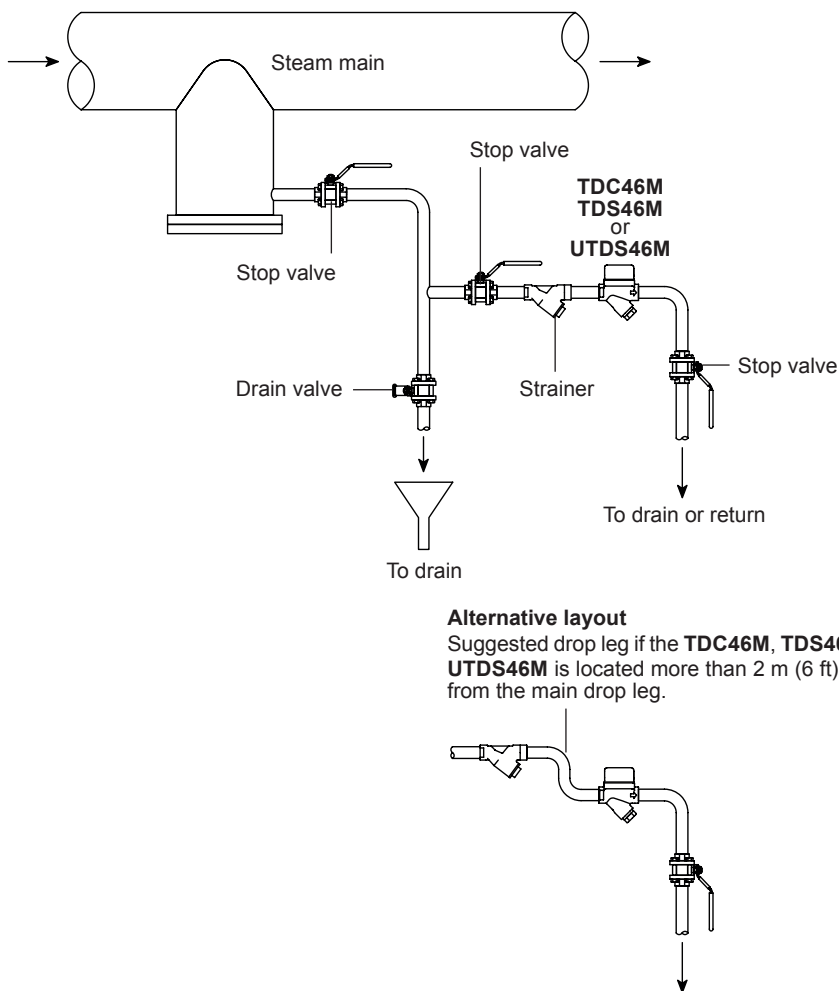


Fig. 3 Typical installation

4. Commissioning

4.1 Commissioning with particular reference to venting air

After installation and maintenance ensure that the system is fully functional. Carry out tests on any alarms or protective devices.

5. Operation

The **TDC46M**, **TDC46M** and **UTDS46M** are thermodynamic steam traps that use a disc to control the release of condensate and to trap steam. The trap cycles open and closed to discharge condensate, close to steam temperature, and closes tight between discharges. The disc, rises and falls in response to dynamic forces produced by the partial re-evaporation (flashing) of hot condensate. Cool condensate, air and other non-condensable gases enter the trap through the central orifice, the bimetal ring holding the disc off the seat allows the air to escape downstream. As the condensate temperature rises, the bimetal ring drops away allowing the disc to operate. When the condensate approaches steam temperature, a percentage of it flashes as it enters the trap. The flash steam passes at high velocity over the underside of the disc and collects in the control chamber above. The resulting pressure imbalance, forces the disc downward onto the seating surfaces, stopping the flow. The trap remains tightly closed until the loss of heat through the trap body lowers the control chamber pressure, allowing the inlet pressure to raise the disc and repeat the cycle. An insulating cover prevents the trap being unduly influenced by excessive heat loss when subjected to low ambient temperature, wind, rain, etc.

6. Maintenance

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

6.1 How to fit the disc and seat:

- Twist off the insulating cover (3) and unscrew the top cap (2). Provision of spanner flats on the body will facilitate this operation and prevent bending of adjacent pipework.
- Lift off the disc (4).
- Lift out the seat unit (5, 6 and 7).
- Carefully remove the seat gasket (8) from the body of the trap. Ensuring that no damage is caused to the trap body (1).
- Ensure that the gasket contact surface in the body is clean and fit a new seat gasket (8).
- Fit the new seat unit (5, 6 and 7).
- Fit a new disc (4) - Ensure that the disc is fitted with the grooves facing the seat.
- Replace the top cap (2) and tighten to the recommended torque (see Table 1).
Note: A suitable anti-galling thread lubricant must be used.
- Replace the insulating cover (3).
- Always open the isolation valves slowly and check for leaks.

6.2 How to clean or replace the strainer screen:

- Access to the strainer screen can be obtained by removing strainer cap (11).
- Remove the strainer screen (9) and gasket (10).
- Fit a new or cleaned strainer screen into the recess in the cap (11).
- A new gasket (10) must always be fitted and the cap (11) screwed into the body and tightened to the recommended torque (see Table 1).
Note: A suitable anti-galling thread lubricant must be used.

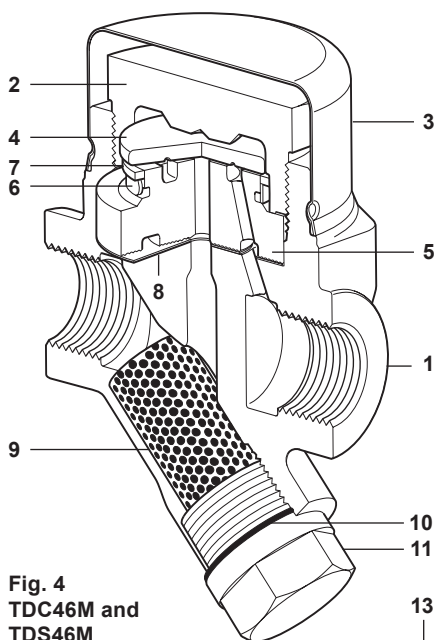


Fig. 4
TDC46M and
TDS46M

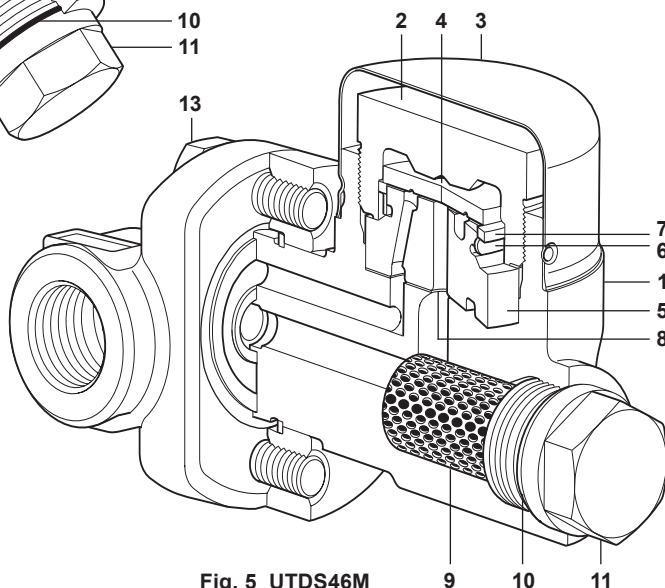



Fig. 5 UTDS46M

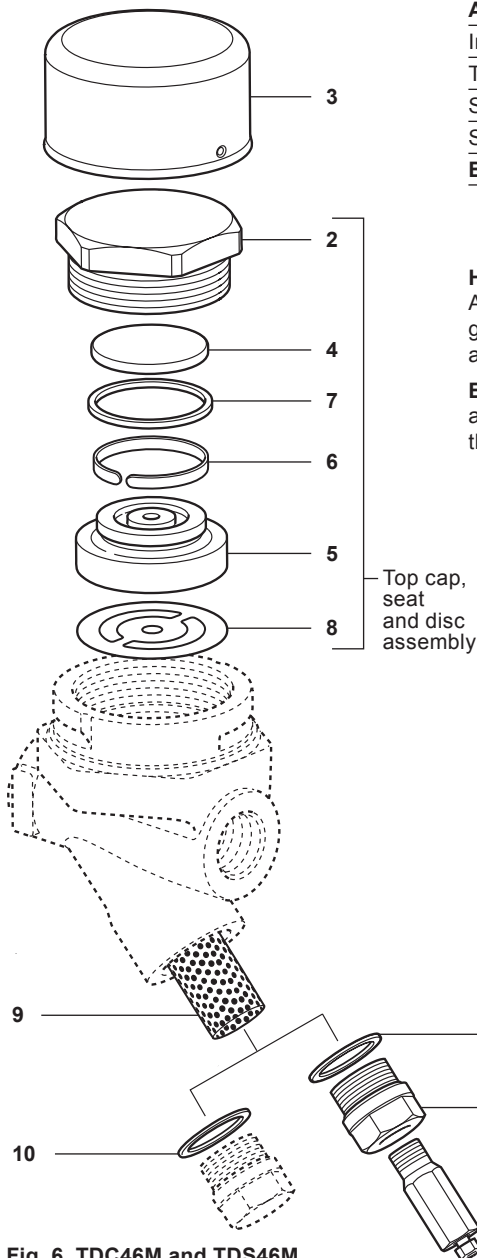
Table 1 Recommended tightening torques
(for suitably lubricated threads)

Item	Part	 mm	N m	(lbf ft)
2	Top cap	50 A/F	250 - 275	184 - 203
11	Strainer cap	24 A/F	105 - 110	63 - 66
13	Connector screws UTDS46M only	9/16" A/F	35	26

7. Spare parts

Spare parts - TDC46M and TDS46M

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



Available spares

Insulating cover	3
Top cap, seat and disc assembly	2, 4, 5, 6, 7, 8
Strainer screen and gasket	9, 10
Set of gaskets (packet of 3 sets)	8, 10
BDV1 blowdown valve retrofit kit	

How to order spares

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

Example: 1 off Top cap, seat and disc assembly for a Spirax Sarco ½" TDC46M thermodynamic steam trap.

Fig. 6 TDC46M and TDS46M

Spare parts - UTDS46M

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

Available spares

Insulating cover	3
Top cap, seat and disc assembly	2, 4, 5, 6, 7, 8
Strainer screen	9, 10
Set of gaskets (packets of 3 sets)	8, 10
Connector screws and gaskets	13, 14, 15
BDV2 blowdown valve retrofit kit	

How to order spares

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

Example: 1 off Top cap, seat and disc assembly for a Spirax Sarco UTDS46M thermodynamic steam trap.

