

DT THERMODYNAMIC STEAM TRAPS

INSTALLATION AND MAINTENANCE INSTRUCTIONS



GENERAL INFORMATION

- These instructions must be carefully read before performing any work involving VALSTEAM ADCA products. Failure to observe these instructions may result in hazardous situations.
- These instructions describe the entire life cycle of the product. Keep them in a location that is accessible to every user and make these instructions available to every new owner of the product.
- Current regional and plant safety regulations must be considered and followed during installation, operation, and maintenance work.
- The images shown in these instructions are for illustration purposes only.
- For the problems that cannot be solved with the help of these instructions, please contact VALSTEAM ADCA or its representative.

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1. SAFETY INFORMATION

1.1. Explanation of symbols



DANGER

Hazardous situation which, if not avoided by applying the correct preventive measures, could result in fatal or serious injury and/or considerable damage to property.



WARNING

Hazardous situation which, if not avoided by applying the correct preventive measures, could result in fatal or serious injury and/or considerable damage to property.



CAUTION

Hazardous situation which, if not avoided by applying the correct preventive measures, could result in moderately severe or minor injury.



NOTICE

Situation which, if not avoided, can result in property damage or product malfunction.



NOTE

Indicates additional information, tips and recommendations.

1.2. Intended use

Refer to the markings on the device, such as nameplate and laser markings, Information Sheet (IS) and these Installation and Maintenance Instructions (IMI) to check that the product was designed for the intended use and meets the specifications used for sizing and selection. This includes checking application, material suitability, process medium, pressure and temperature as well as their respective limiting values.

VALSTEAM ADCA does not assume any responsibility for damage resulting from inappropriate use of the product, damage caused by external stresses or any other external factors. Correct installation of the product is the full responsibility of the contractor.

Inappropriate use of the product is any use other than the one described in this chapter.

Inappropriate use also includes:

- Use of spare parts which are not genuine;
- Performance of maintenance work not described in these instructions;
- Use outside the limits defined by the accessories connected to the product.
- Unauthorized modifications to the product.

If the product is to be used for an application or with a fluid other than the one it was designed for, contact VALSTEAM ADCA.

1.3. Qualification of personnel

Handling, installation, operation and maintenance work must be carried out by fully trained and qualified personnel, capable of judging the work which they are assigned to perform and recognizing potentially hazardous situations. They should be trained to properly use this product according to these Installation and Maintenance Instructions.

Where a formal “Permits to Work” system is implemented in the plant it must be complied with.

1.4. Personal protective equipment

Personal protective equipment should always be worn during work in order to protect against hazards posed by e.g. the process medium, dangerous temperatures, noise, falling or projected objects, working at height. These equipment includes a helmet, safety glasses, safety harness, protective clothes, safety shoes, hearing protection, etc.



NOTE

Always assess whether you or others in your vicinity require any protective equipment. When in doubt check with the plant's health & safety responsible personnel for details on required protective equipment.

1.5. The system

The complete system should be assessed as well as every action (e.g. closing of shut-off valves, disconnection of the power supply) to ensure this will not bring additional risk to personnel or property.

Dangerous actions that can result in a hazardous situation include isolation of protective devices such as safety valve, vents, vacuum relief valves, disconnection of electric safety devices, sensors and alarms.

1.6. ATEX

If the product is in the scope of the ATEX 2014/34/EU directive and as such bears the Ex marking, consult its specific Additional Instructions for use in Potentially Explosive Areas (IMI EX). In such cases, handling, installation, operation and maintenance work must only be performed by personnel qualified and authorized to work in potentially explosive areas.

1.7. General safety notes



DANGER

RISK OF BURSTING IN PRESSURE EQUIPMENT

Valves, ancillaries and pipelines are pressure equipment. Working above their operating limits or improper opening can lead to component bursting.

- Observe the maximum operating limits of the product and check if they are lower than those of the system in which it is being installed. Check the product Information Sheet (IS).
- Install a safety device.
- Before starting any work on the product, depressurize it and cool or heat it up to ambient temperature. This also applies to the line in which it is fitted.
- Drain the process medium from the product and all the relevant plant sections.



WARNING

RISK OF BURNS

Depending on the operating conditions, products and pipelines may get very hot or cold and cause burn injuries.

- Do not touch the product while it is hot or cold, allowing it firstly to cool down or heat up.
- Wear protective clothing and safety gloves during working operation.
- Thermally insulate tubes and product's as a preventive measure.

RISK OF INJURY CAUSED BY FLUID ATTACK ON PRODUCTS MATERIALS

The product must only be used with mediums that do not attack the materials of the product (body, gaskets, seals). Otherwise, leaks may occur, and hot and/or hazardous fluid can escape.

- Do not use the product with mediums other than the ones it was designed for. Check section 1.2 - Intended Use.
- Prevent medium contamination.



WARNING

RISK OF INJURY CAUSED BY UNDER TIGHTENED PRODUCT OR ITS COMPONENTS

Excessively low tightening torques may cause medium to escape or and/or components to be projected at high speed which may result in a hazardous situation depending on the medium, chemical properties and/or its operating conditions.

- Do not loosen any screw while the equipment is pressurized.
- Observe the specified tightening torques on these Installation and Maintenance Instructions. If the relevant torque value is not mentioned contact VALSTEAM ADCA.

RISK OF HEARING LOSS

Depending on the operating conditions, the product may generate loud noises.

- Wear hearing protection when in the vicinity of the product.

RISK OF INJURY AS A RESULT OF ILLEGIBLE INFORMATION

Important information written in the product nameplate, markings and warning signs may wear overtime or get illegible due to e.g. dirt accumulation, resulting in hazardous situations and personal injury or property damage.

- Keep nameplates, markings and warning signs in a legible state, replacing when illegible, missing or damaged.



CAUTION

RISK OF INJURY DUE TO RESIDUAL PROCESS MEDIUM

Direct contact with dangerous process medium may lead to personal injury, e.g. smoke inhalation and chemical burns.

- Drain the process medium from the product and all the relevant plant sections.
- Wear protective clothing, safety gloves, mask, and eye protection.

RISK OF INJURY DUE TO IMPROPER HANDLING

Manual handling (e.g. lifting, carrying, pushing, pulling) of large and/or heavy products may result in personal injury.

- Assess the risk associated with the handling task.
- Use adequate handling methods and appropriate auxiliary handling equipment.



NOTICE

RISK OF PRODUCT DAMAGE DUE TO EXCESSIVELY HIGH TIGHTENING TORQUES

High tightening torques may lead to premature wearing of product components.

- Observe the specified tightening torques on these Installation and Maintenance Instructions. If the relevant torque value is not mentioned contact VALSTEAM ADCA.

2. PRODUCT INFORMATION

The DT40/2, DT42/2 and DT46 are thermodynamic steam traps that use a disk to control the discharge of condensate.

They are compact, lightweight and easy to install traps, excellent for high-pressure systems, including steam tracing applications.

These steam traps are fairly simple since they have only one moving part, and offer a wide operating range, without need for adjustments.

2.1. Principle of operation

When steam is supplied to the plant, the valve disc (5) raises from its seat ring (4) by incoming pressure allowing instant discharge of condensate, air and other non-condensable gases.

As condensate flows through the trap and becomes hot enough, flash steam starts to form. The high velocity of this flash steam creates a low-pressure area under the disc which causes an unbalancing of forces that draws the disk towards the seat.

The flash steam pressure in the steam chamber acting on the top area of the disc, forces it downwards against the pressure of the incoming fluid, closing the inlet and trapping pressure in the steam chamber.

In due course, the flash steam in the chamber above the disc condenses, decreasing its pressure and allowing the upstream pressure to raise the disc, and the cycle starts again.

The insulation cover (12) ensures consistent operation and makes it particularly suitable for those applications where the weather conditions, such as rain and wind, may affect the normal operation by causing excessive heat loss.

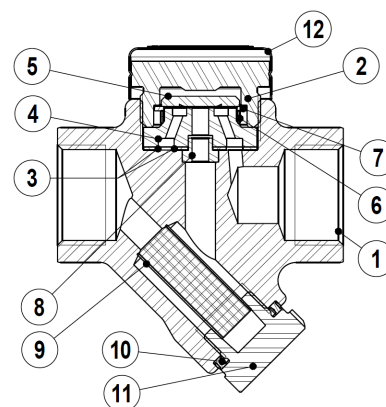


Fig. 1

The DT40/2 and DT46 feature a bimetal ring (6) which prevents air-binding, a typical phenomenon that occurs during start-up. High-velocity air causes unbalance of forces and trap closure the same way as steam does, however since air does not condense the trap stays blocked. The bimetal ring prevents such a phenomenon by keeping the disk away from the seat when temperature is low, and air is present. As temperature rises, the ring expands and falls, allowing the trap to close.

2.2. Certification

This product has been specifically designed for use with liquids and gases which are in Group 2 of the European PED – 2014/68/EU Pressure Equipment Directive and it complies with its requirements.

DT40/2 & DT42/2 – CE MARKING – GROUP 2 (PED – European Directive)	
PN63	Category
3/8" to 1" – DN 10 to 25	SEP

DT46 – CE MARKING – GROUP 2 (PED – European Directive)	
PN100	Category
1/2" to 1" – DN 15 to 25	SEP

NOTE

If the product falls within category SEP it must not be CE marked, unless other directives are applicable.

This product is not in the scope of the ATEX 2014/34/EU directive as it does not have its own potential ignition source. Personnel responsible for the plant installation must assess the risks caused by static electricity and take the necessary precautionary measures to prevent static charge. These measures include e.g. connection of the product to the equipotential bonding system.

2.3. Product identification

The following items are indicated on the product nameplate or directly on its body:


- Manufacturer
- Product model (e.g. V16/2)
- Pressure rating (e.g. PN 40, ANSI 300#)
- Nominal size (e.g. DN 40, 1 1/2")
- Min. operating temperature (e.g. T_{min} = -10 °C)
- Max. operating temperature (e.g. T_{max} = 250 °C)
- Flow direction (indicated by an arrow)

- Serial number and year of manufacturing (e.g. Reg.:17483/19)
- CE Marking (when applicable – see section 2.2 – Certification)
- EX Marking (when applicable e.g. EX h IIB T6...T3 Gb – see section 2.2 – Certification)

2.4. Technical data

For technical data including dimensions, materials, limiting conditions and versions refer to the product respective Information Sheet (IS).

3. TRANSPORT, STORAGE AND PACKAGING




WARNING

RISK DUE TO FALLING LOADS

Loads may tip or fall over resulting in damage to property, serious injury or death.

- Use suitable equipment when moving or lifting suspended loads.
- Make sure no one is standing below the suspended load.




CAUTION

RISK OF INJURY DUE TO IMPROPER HANDLING

Manual handling (e.g. lifting, carrying, pushing, pulling) of large and/or heavy products may result in personal injury such as back injury.

- Assess the risk associated with the handling task.
- Use adequate handling methods and appropriate auxiliary handling equipment.



NOTICE

RISK OF PRODUCT DAMAGE DUE TO IMPROPER STORAGE

- Do not remove any packaging or protective covers until immediately before installation at the site.
- Store the product in a solid base in a dry, cool and dust-free environment.
- Until its installation, protect it from the weather, dirt, corrosive atmospheres and other harmful influences.



NOTICE

RISK OF PRODUCT DAMAGE DUE TO LONG TERM STORAGE

Some product components may deteriorate with time (e.g. valve packings, seals).

- Do not store the product for more than 12 months.
- If for any reason the product must be stored for longer periods of time contact VALSTEAM ADCA.

Products are individually wrapped in plastic film, thermo shrinkable plastic and/or stored in a cardboard box as they leave VALSTEAM ADCA. Avoid removing packaging and any protective cover until immediately before installing the product at the site.



NOTE

If the transport packaging has any shipping damage contact VALSTEAM ADCA or its representative.

Before storing and transporting the product protect it from impacts and mechanical damage, paying special care with sealing surfaces and other fragile parts.



NOTE

If the corrosion protection (paint and other surface coatings) of the product is damaged during transport or other handling procedures repair it immediately.

4. INSTALLATION

Before performing any installation work, refer to section 1 – Safety information.



WARNING

RISK OF INJURY DUE TO INSUFFICIENT SUPPORT DURING INSTALLATION

Insufficient support of the product during installation may cause it to fall and cause personal injury.

- Ensure the product is safely held in place during installation.
- Wear protective safety shoes.



NOTICE

RISK OF PRODUCT DAMAGE DUE TO STRESS

The product is not intended to withstand external stresses that may be induced by the system to which it is being connected to.

- Make sure that the connected pipe does not subject the body to any stress (forces or torques) during installation and operation.
- Do not use the product as an elevation point.

4.1. Preparation for installation

Before installation, make sure the following conditions are met:

- The installation area has easy access and the device is to be installed in a position where operation and maintenance work can be performed safely.
- The product will be installed with proper support and free of any stresses that can be induced by the system due to e.g. pipe expansions. The necessary precautions are recommended during system design.
- The pipeline where the product will be installed is designed in such a way that it takes into account the weight of the product. The pipeline may require support on both sides next to the product, particularly if its size and weight are considerable and especially if vibrations are to be expected in the system.
- The product is not damaged.
- Make sure all the necessary materials and tools are readily available during installation work.
- Referring to this Installation and Maintenance Instructions (IMI), Information Sheet (IS) and nameplate, check that the product is suitable for the intended installation: temperature, medium, pressure, temperature, etc. – see section 1.2 – Intended use.
- Check that there are no foreign bodies inside the pipelines and ancillaries, flushing may be necessary. These should be thoroughly cleaned.
- Check any mounted pressure gauges and make sure they function properly.
- A typical installation is shown in Figure 2. The check valve is necessary to prevent back flow when discharging to a closed return line.
- An additional ADCA pipeline strainer or filter may be necessary to install upstream of the steam trap in some applications, preventing solid particles in the process medium from damaging the product.

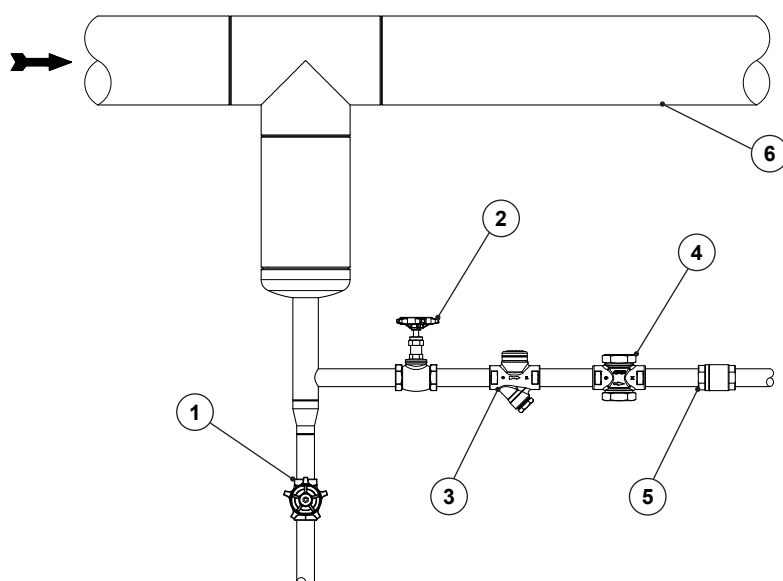


Fig. 2

POS. N°	DESIGNATION
1	Shut-off valve
2	Shut-off valve
3	DT40/2, DT42/2, DT46
4	Sight glass
5	Check valve
6	Steam main



NOTE

Assembly Drawings (AD) with assembly details and parts lists are available on request.



WARNING

RISK OF BURNS DUE TO CONDENSATE DISCHARGING TO ATMOSPHERE

Steam trap discharge to the atmosphere may cause severe injury as the discharged medium may be at a temperature of 100°C.

- Ensure the steam trap is discharging to a safe place.

4.2. Installation procedure

1. Remove plastic film and other packaging, as well as the protective covers which are placed on flanges or connection ends. Make sure the steam trap is free from foreign matter.
2. The recommended installation position is horizontal with the filter element pointing downwards. Vertical installation is possible however increased wear is expected shortening its service lifetime.
3. The steam trap has an arrow or inlet/outlet designations, be sure that it is installed in the appropriate direction according to fluid flow.
4. Take care with jointing materials and sealing compounds to ensure that none may be permitted to block or enter the steam trap causing malfunction. In case of flanged connections use appropriate flange gaskets.

5. When a socket weld or butt weld version is being installed, the welding should be carried out by qualified personnel following an appropriate welding procedure. Do not weld on top of the corrosion protection (paint, surface coatings). If there is corrosion protection on the welding ends remove it before welding. After welding the steam trap to the pipeline repair its corrosion protection.

5. START-UP

Before performing the start-up procedure, refer to section 1 – Safety information.

The start-up procedure must be followed every time the product is put back into service.

5.1. Preparation for start-up

Before starting up, make sure the following conditions are met:

- All works on the system have been completed.
- All the necessary safety devices have been installed.
- When required, warning notices are used to alert others that the system is starting up.
- The product is correctly installed – see section 4 – Installation.
- Referring to these Installation and Maintenance Instructions (IMI), Information Sheet (IS) and nameplate, check that the product is suitable for the intended installation: temperature, medium, pressure, temperature, etc. – see section 1.2 – Intended use.
- A safety check was performed by qualified personnel. Checking for leaks, structural damage and integrity of system components.



NOTICE

RISK OF PRODUCT DAMAGE DUE TO CONTAMINATION

The plant operator is responsible for cleaning the pipelines in the plant as well as keeping the product well maintained. At start-up, the presence of small particles in the medium (dirt, scale, weld splatters, etc.) may damage the product or cause malfunction.

- Flush pipelines before start-up.
- Clean protection varnishes from pipes and flanges, leftover paint, graphite, grease, etc.
- Use a pipeline strainer or a filter.

5.2. Start-up procedure

1. Open shut-off valves slowly, until normal operating conditions are achieved. This will prevent sudden surges of pressure that can damage the steam trap. Furthermore, slow increase of inlet pressure on the trap will reduce the chance of air-binding in the specific case of the DT42/2, if a separate thermostatic air eliminator hasn't been installed.
2. Check for any leaks.
3. Check the steam trap to ensure it is operating correctly.



NOTE

24 hours after system start-up, it is recommended to check pipe connection for leaks and retighten when necessary. Clean strainers/filters to avoid blocking.

6. OPERATION

Before operating the product refer to section 1 – Safety information.

Immediately after completing the start-up procedure, the product is ready for operation.

6.1. Operating the BDV blowdown valve

The BDV blowdown valve is an optional device, that can be fitted on steam traps with integral strainer such as the DT40/2, DT42/2 and DT46. The device is manually operated and uses internal pressure to discharge strainer screen contents such as scale, dirt and other debris. It can also be used as a depressurization valve.

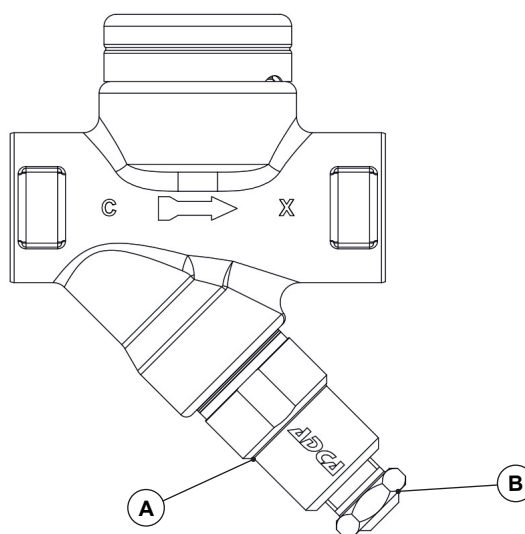


Fig.3: DT series steam trap installed with BDV blowdown valve.



WARNING

RISK OF BURNS FROM BLOWDOWN OPERATION

Operation of the BDV blowdown discharges hot medium to the atmosphere which may cause burn injuries.

- Wear protective clothing, safety glasses and heat-resistant gloves during operation.
- When operating the valve stand to the side well clear of its outlet.

RISK OF INJURY DUE TO EXCESSIVELY LOOSENING BLOWDOWN VALVE SCREW

Excessively loosening the blowdown valve screw (B) while operating it may cause the retainer to break or come loose. This may result in the screw blowing off leading to personal injury and product malfunction.

- Loosen the valve screw slowly and do not unscrew it excessively.

1. Open the blowdown valve by slowly unscrewing the valve screw (B). Be careful to avoid contact with the hot medium which will be discharged through the valve's whole as it opens.
2. Close the valve by tightening the valve screw (B) to a torque of 20-25 Nm confirming that there is no leakage.
3. Periodical operation of the blowdown valve is recommended to ensure correct working.

7. SHUTDOWN

Before performing the shutdown procedure, refer to section 1 – Safety information.

7.1. Shutdown procedure

1. Switch off the system and secure it so it cannot be turned on by unauthorized personnel.
2. Fully close the upstream shut-off valve, to stop the process medium from flowing through the steam trap.
3. Allow medium to cool down and completely drain it from the pipeline and steam trap.
4. Make sure the pipeline and steam trap are not under pressure and are at a safe temperature.
5. Fully close the downstream shut-off valve.
6. If the steam trap is to be removed from the pipeline – see section 3 - Transport, storage and packaging.

8. PARTS LIST

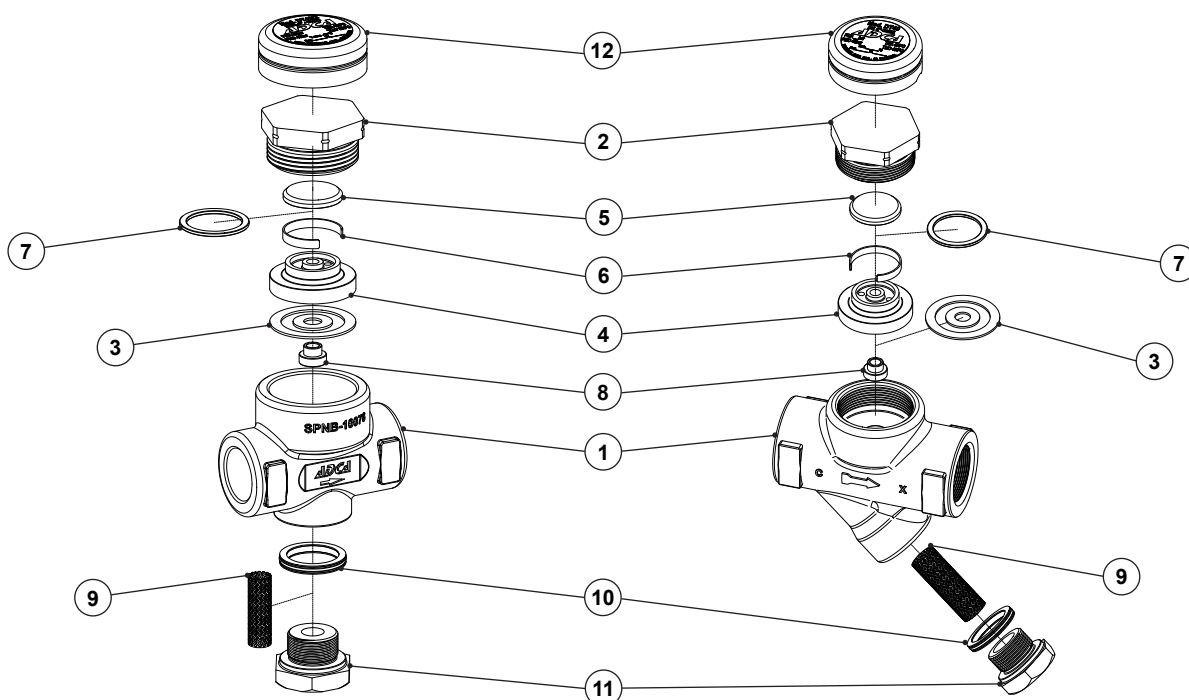


Fig.4: DT40/2 and DT46.

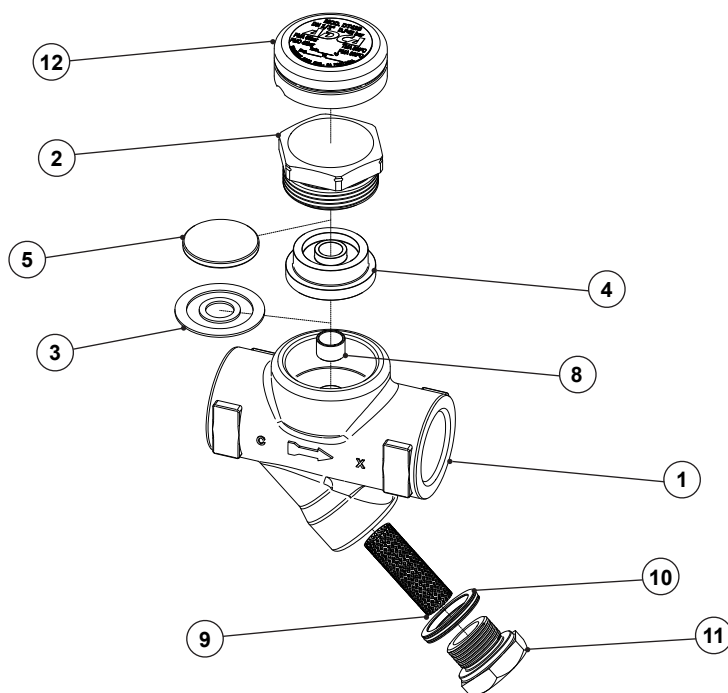


Fig.5: DT42/2.

POS. N°	DESIGNATION	SPARE PARTS
1	Body	
2	Cover	
3	Gasket	X
4	Seat	X
5	Valve disc	X
6	Bimetal ring	X
7	Washer support	X
8	Tube	X
9	Strainer screen	X
10	Gasket	X
11	Plug	
12	Insulation cover	

9. MAINTENANCE

Before performing a maintenance procedure, refer to section 1 – Safety information.

The product requires maintenance to ensure that it operates correctly and safely throughout its lifetime. Maintenance work should be performed in a planned manner at periodic intervals. These intervals must be defined by the operator according to the service conditions.

9.1. Maintenance procedure

1. Make sure all the necessary materials and tools are readily available during maintenance work.
2. Perform the shutdown procedure – see section 7 – Shutdown.
3. Perform the maintenance procedure – see the following sections.
4. Put the product back into operation – see section 5 – Start-up.

9.2. Replacing disk and seat

1. Remove the insulating cover (12), if installed, with the aid of a small flat head screwdriver on the open grooves on the sides.
2. Unscrew the upper cover and carefully remove valve disk (5), seat (4), gasket (3) and tube (8). Remove bimetal ring (6) and washer support (7) in case the steam trap is a DT40/2 or DT46.
3. Carefully clean the gasket contact surface and fit a new gasket (3).
4. Fit the tube (8) in place, a new seat (4) and valve disk (5). Ensure the valve disk has the circular grooves pointing to the seat. Take care with the sealing surfaces.
5. Apply suitable anti-seize lubricant on the cover thread and screw it in place with the recommended torque – see section 9.5 – Tightening torques. Fit the insulating cover (12).

9.3. Cleaning or replacing the strainer screen

1. Unscrew the plug (11) and remove the strainer screen (9) and gasket (10).
2. Fit a new or clean strainer screen (9) into the plug (11) groove.
3. Apply anti-seize lubricant on the plug (11) thread. Fit a new gasket (10) and screw the plug (11) with the strainer screen (9) into the body (1), tightening with the recommended torque – see section 9.5 – Tightening torques.

9.4. Fitting the retrofit BDV blowdown valve

1. Unscrew the plug (11) and remove the strainer screen (9) and gasket (10).
2. Fit a new or clean strainer screen (9) into the BDV blowdown valve's body (11)

groove.

3. Apply anti-seize lubricant on the BDV blowdown valve (A) thread. Fit the gasket (10) supplied with the retrofit kit and screw the BDV blowdown valve (A) with the strainer screen (9) into the body (1), tightening with the recommended torque – see section 9.5 – Tightening torques.
4. Make sure the valve is closed when not in use by tightening the valve screw (B) to a torque of 20-25 Nm confirming that there is no leakage.

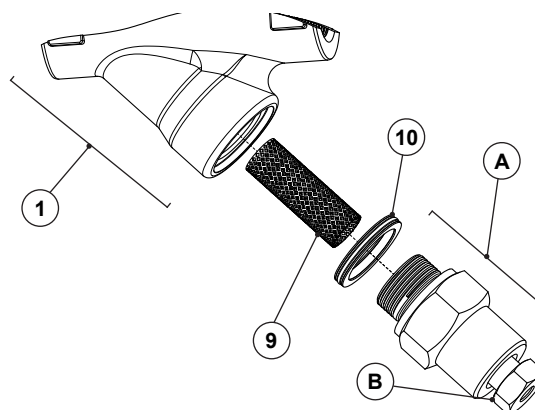


Fig. 6: BDV blowdown valve.

9.5. Tightening torques

POS. N°	DESIGNATION	TORQUE (Nm)
		All sizes
2	Cover	90
11	Plug	90
A	Blowdown valve body	50
B	Blowdown valve screw	20 - 25

10. TROUBLESHOOTING

Before applying any corrective measure, refer to section 1 – Safety information.

If the malfunction cannot be solved with the help of the following table, contact VALSTEAM ADCA or its representative.

Malfunction	Possible cause	Corrective measure
Steam trap is leaking steam.	Foreign matter is stuck between seat and plug.	• Open and clean the steam trap.
	The sealing surfaces are damaged/ worn.	• Replace disk and seat.
	Inlet pressure is too low or downstream pressure is too high.	• Use within operating range. • Replacement for a different type of steam trap may be necessary.
	System bypass valve is damaged or open.	• Replace or close bypass valve.
	Seat gasket is damaged.	• Replace seat gasket.
Steam trap is blocked (no condensate is discharging) or is discharging poorly.	Strainer screen is obstructed	• Clean or replace strainer screen.
	Bimetal ring is broken or worn causing air-binding.	• Replace bimetal ring.
	Air-binding (DT42/2 only).	• Start-up the system slowly, installing a separate thermostatic air eliminator on the line might be necessary.
	Steam trap is undersized.	• Change to steam trap of suitable capacity.

11. DISPOSAL

Once the product has reached the end of its working life, it should be sent for disposal in accordance with the prevailing national and local regulations.

Before disposal make sure that the product is clean and free from fluid residues.

During its disposal, pay special attention to rubbers, resins and polymer components (PVC, PTFE, PP, PVDF, FKM, NBR, etc.).

Do not dispose of components and hazardous substances together with household waste.

12. RETURNING PRODUCTS

Information regarding hazards and precautionary measures to be considered due to contaminating fluids and residues or mechanical damage that may represent a health, safety or environmental risk, must be provided in writing when returning products to VALSTEAM ADCA.



WARNING

RISK DUE TO PRESENCE OF HAZARDOUS RESIDUES ON RETURNED PRODUCTS

Contaminated fluids and residues may represent an environmental risk, or risk to VALSTEAM ADCA personnel.

- Information regarding any hazards or precautionary measures to be considered must be provided in writing when returning products to VALSTEAM ADCA.
- Health and Safety information sheets relating to any substances identified as hazardous or potentially hazardous must be provided outside the packaging.
- Use Hazmat labels on the packaging.

IMPORTANTE NOTE

Total or partial disregard of these Installation and Maintenance Instructions involves loss of any right to warranty.

The extent and warranty period are specified in the “General sales conditions”.