

VAG TOP-STOP Diaphragm Non-Return Valve



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1. General

1.1 Safety



These Operation and Maintenance Instructions must be observed and applied at all times along with the general "VAG Installation and Operation Instructions for Valves" (see www.vag-group.com / Category: Installation and Operation Instructions).

Arbitrary alterations of this product and the parts supplied with it are not allowed. VAG will not assume any liability for consequential damage due to non-compliance with these instructions. When using this valve, the generally acknowledged rules of technology have to be observed (e.g. DIN standards, DVGW data sheets, VDI directives, etc.). The installation must only be carried out by qualified staff (see also Section 6.1 General safety instructions). For further technical information such as dimensions, materials or applications, please refer to the respective documentation (KAT 1543-A).

VAG valves are designed and manufactured to the state of the art and their safety of operation is ensured in general. However, valves may be potentially dangerous if they are operated improperly or are not applied for the intended use.

Everyone dealing with the assembly, disassembly, operation, maintenance and repair of the valves must have read and understood the complete Operating and Maintenance Instructions (Accident Prevention Regulations, VBG 1 §§ 14 [Regulations issued by the Trade Associations] ANSI Z535).

Before removing any protective devices and/or performing any work on the valves, depressurise the pipeline section and ensure it is free of hazards. Unauthorised, unintentional and unexpected actuation as well as any hazardous movements caused by stored energy (pressurised air, water under pressure) must be prevented.

In case of equipment that must be monitored and inspected, all relevant laws and regulations, such as the Industrial Code, the Accident Prevention Regulations, the Ordinance of Steam Boilers and instructional pamphlets issued by the Pressure Vessels Study Group must be complied with. In addition, the local accident prevention regulations must be observed.

When a valve needs to be dismantled from a pipeline, fluid may emerge from the pipeline or the valve. The pipeline must be emptied completely before the valve is dismantled. Special care needs to be taken in case of residues which may continue flowing.

1.2 Proper use

The VAG TOP-STOP Diaphragm Non-Return Valve is a valve designed for installation into pipelines.

The standard model is suitable to permit the flow of the medium in pressurised pipelines in one direction and to prevent the return flow of the medium automatically.

For the respective technical application ranges (e.g. operating pressure, medium, temperature) please refer to the product-related documentation (KAT 1543-A).

For any deviating operating conditions and applications, the manufacturer's written approval must be obtained!

These Operation and Maintenance Operation Instructions contain important information on the safe and reliable operation of the VAG TOP-STOP Diaphragm Non-Return Valve.

Observing these Operation and Maintenance Instructions helps you to:

- Prevent hazards,
- Reduce repair costs and down-times of the valve and/or the entire equipment,
- Improve the operational safety and useful life of the equipment.

1.3 Identification

According to DIN EN 19 all valves bear an identification label specifying the nominal diameter (DN), nominal pressure (PN), body material and the manufacturer's logo.

A rating plate is attached to the body and contains at least the following information:

VAG	Manufacturer's name
DN	Nominal diameter of the valve
PN	Nominal pressure of the valve
	Material of which the body is made, e.g. EN-JS 1030 = GGG 40
	Date of manufacture

2. Transport and Storage

2.1 Transport

For transportation to its installation site, the valve must be packed in stable packaging material suitable for the size of the valve. It must be ensured that the valve is protected against atmospheric influences and external damage. When the valve is shipped under specific climatic conditions (e.g. overseas transport), it must be specially protected and wrapped in plastic film and a desiccant must be added.

The factory-applied corrosion protection and any assemblies must be protected against damage by external influences during transport and storage.

The best way of transporting the non-return valve is in closed position with no load on the diaphragm. For this purpose, the valve must be placed on its inlet-side flange (see Fig. 1).

For transport purposes and also to support assembly, lifting devices such as cables and belts must only be attached to the valve body. The length and positioning of the cables/belts must ensure that the valve is in a horizontal position during the entire lifting procedure.

For valves that have been factory-packed in transport crates (wooden crates), the centre of gravity of the entire unit must be taken into account. The centre of gravity is marked on each side of the crate at our factory and must be considered for all lifting operations.

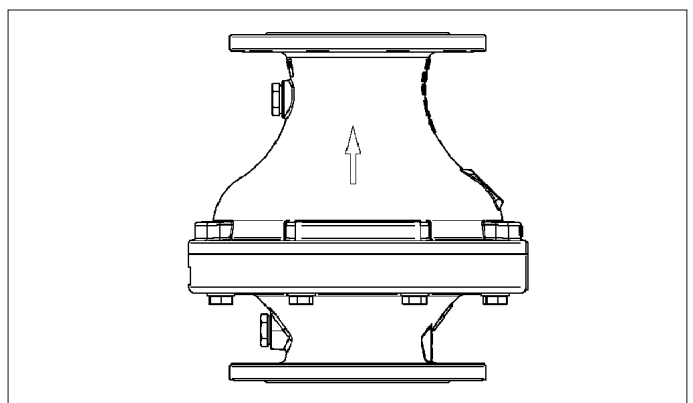


Figure 1: Preferred transport position

2.2 Storage

The TOP-STOP Diaphragm Non-Return Valve is to be stored in a way that ensures that the diaphragm is in closed position and free from any loads. Preferably the valve should be placed on its inlet-side flange (see Fig. 1).

The elastomeric parts (seals) must be protected against direct sunlight and/or UV light as otherwise their long-term sealing function cannot be guaranteed. Store the valve in a dry and well-aerated place and avoid direct radiator heat. Protect any assembly units important for the function such as the diaphragm and the cone of the seat against dust and other dirt by adequate covering.

Do not remove the protective caps of the connections / flanges and the packaging materials until immediately prior to assembly.

The valve can be stored in ambient temperatures ranging from $-20\text{ }^{\circ}\text{C}$ to $+50\text{ }^{\circ}\text{C}$ (protected by adequate covers). If the valve is stored at temperatures below $0\text{ }^{\circ}\text{C}$, it should be warmed up to at least $+5\text{ }^{\circ}\text{C}$ before installation and before it is put into operation.

3. Product features

3.1 Features and function description

The VAG TOP-STOP valve is a diaphragm non-return valve in full flange design and can be used between two flanges under full operating pressure. The rubber diaphragm is located in the cone of the seat of the body and opens automatically even under low fluid pressure. In the opposite direction, the valve is also sealed by pressure and it is resilient seated. Due to its design the valve closes fast and emits only little noise. Water hammers are adequately absorbed. To ensure complete sealing, a back-pressure of about 3 m water column is required.

The valve is supplied with two drain plugs as a standard (see Fig. 2).

As an alternative, a bypass can be installed instead of the drain plugs (not included in the VAG range). It allows the forced bypassing of the diaphragm to permit the return flow of the fluid.

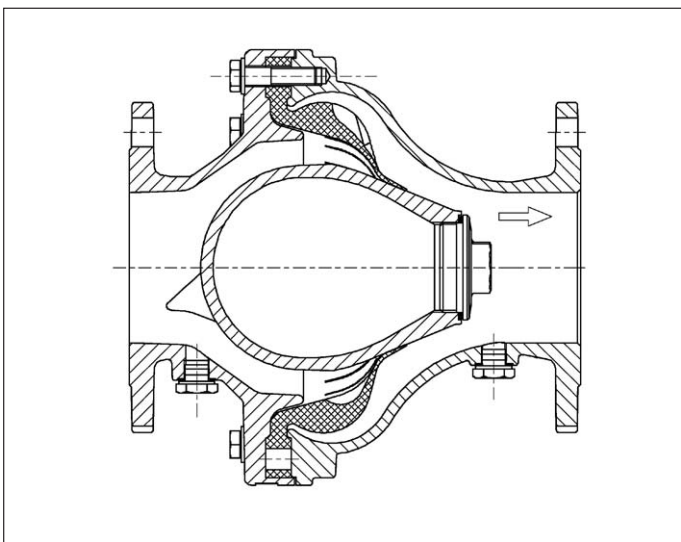


Figure 2: Standard model VAG TOP-STOP Diaphragm Non-Return Valve

3.2 Applications

Due to its EPDM sealing materials the standard version of the VAG TOP-STOP valve can be used for the following fluids:

- Water,
- Raw water and cooling water,
- Weak acids and alkaline fluids

For use with fluids containing oil or gas, the TOP-STOP valve is also available with an NBR diaphragm.

Due to their abrasive effect, solids contained in the water may reduce the service life of the diaphragm.

Larger particles of solids in the water may clog the non-return valve. Therefore the valve must not be used with this kind of fluids.

For information about the corresponding temperature limits, please refer to the product-related technical documentation (KAT 1543-A).

In case of deviating operating conditions and applications, please consult the manufacturer.

3.3 Permissible and impermissible modes of operation

The maximum operating temperatures and operating pressures specified in the technical documentation (KAT 1543-A) must not be exceeded.



The pressure applied to the closed valve must not exceed its rated pressure.

The maximum permissible flow velocity (stable flow) is according to the EN 1074-1 standard.

Valves with PN 10: 3 m/s

Valves with PN 16: 4 m/s

Any exceptions from the above require the manufacturer's express written approval.

In case of turbulent flow (e.g. installation downstream of elbows and similar parts) the flow velocity must be reduced accordingly in consultation with the manufacturer. Should this not be possible, the valve must be serviced at shorter intervals.

4. Installation into the pipeline

4.1 Conditions required on site

When installing the valve between two pipeline flanges, these must be coplanar and in alignment. If the pipes are not in alignment, they must be aligned before installation of the valve, as otherwise this may result in impermissibly high loads acting on the valve body during operation, which may eventually even lead to fracture.

When installing the valve into the pipeline, make sure it is as tension-free as possible. The pipeline forces transmitted to the valve must not exceed the values specified in DIN EN 1074-3.

The space between the flanges should be wide enough to prevent damage to the coating of the flange gasket frames during installation.

In case of works around the valve causing dirt (e.g. painting, masonry or working with concrete), the valve must be protected by adequate covering.

For assembly in drinking water pipelines, suitable sealing materials, lubricants and process materials must be used which are approved for use in drinking water pipelines.

Before putting the valve into operation, clean and purge the corresponding pipeline sections.

4.2 Installation location

The installation location of the valve must be selected to provide sufficient space for function checks and maintenance works (e.g. dismantling and cleaning of the valve).

If the valve is installed in the open, it must be protected against extreme atmospheric influences (e.g. formation of ice) by adequate covers.

To ensure the trouble-free function and long service life of the valve, several factors have to be taken into account when positioning the valve.

4.2.1 Stable flow

Subcritical and even flow ensures the vibration-free position of the valve in the flow even at higher flow velocities (see Section 3.3). To achieve stable flow, a straight damping zone of $3 \times \text{DN}$ should be provided upstream of the VAG TOP-STOP Diaphragm Non-Return Valve (see Fig. 3).

If it is not possible to provide the required damping zone, turbulences in the flow may cause the diaphragm to vibrate, reduce its service life and result in disturbances in the equipment.



In consultation with the manufacturer, the flow velocity should be reduced to 2 m/s (e.g. by using a larger nominal diameter) or maintenance intervals should be shortened as a counter-measure.

We recommend an outlet section of $3 \times \text{DN}$ downstream of the VAG TOP-STOP Diaphragm Non-Return Valve to allow the flow to steady upstream of subsequent pipeline installations. For this purpose please refer to the technical documentation on the corresponding installations.

4.2.2 Flow velocity

The VAG TOP-STOP Diaphragm Non-Return Valve is suitable for operation at a maximum flow velocity according to EN 1074-1 (see Section 3.3).

For safe operation, installation with an upstream damping zone is required (see Section 4.2.1, Figure 3)

If the provision of a damping zone is impossible, the minimum flow velocity must be reduced according to the installation situation (e.g. $< 2 \text{ m/s}$ when installed downstream of elbows).

If the above instructions are not complied with, the diaphragm will flutter and thus be subject to increased wear and tear which may result in a shorter service life.

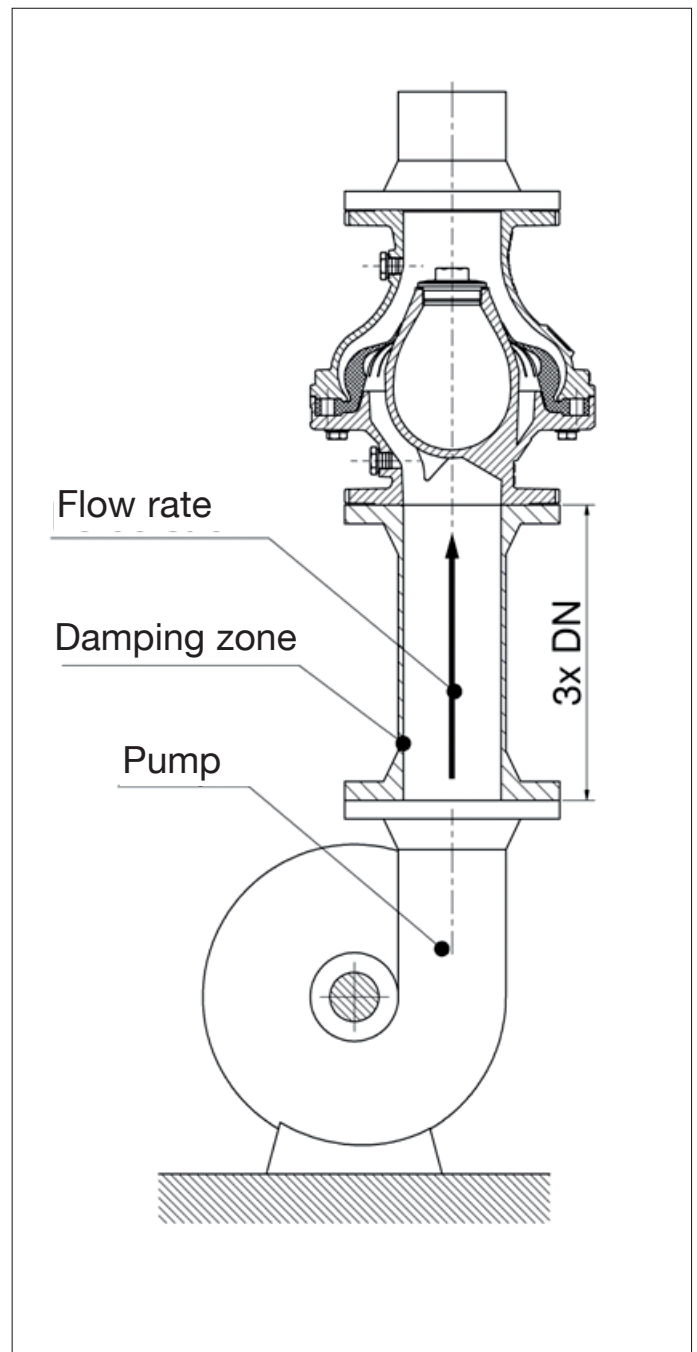


Figure 3: Stable flow

4.3 Installation position

The VAG TOP-STOP Diaphragm Non-Return Valve may be installed in the pipeline in any position. When installing the valve, please observe the flow arrow on the valve body to obtain the proper flow direction.

The VAG TOP-STOP Diaphragm Non-Return Valve closes reliably in all operating positions if there is sufficient back-pressure (Figure 4).

permissible

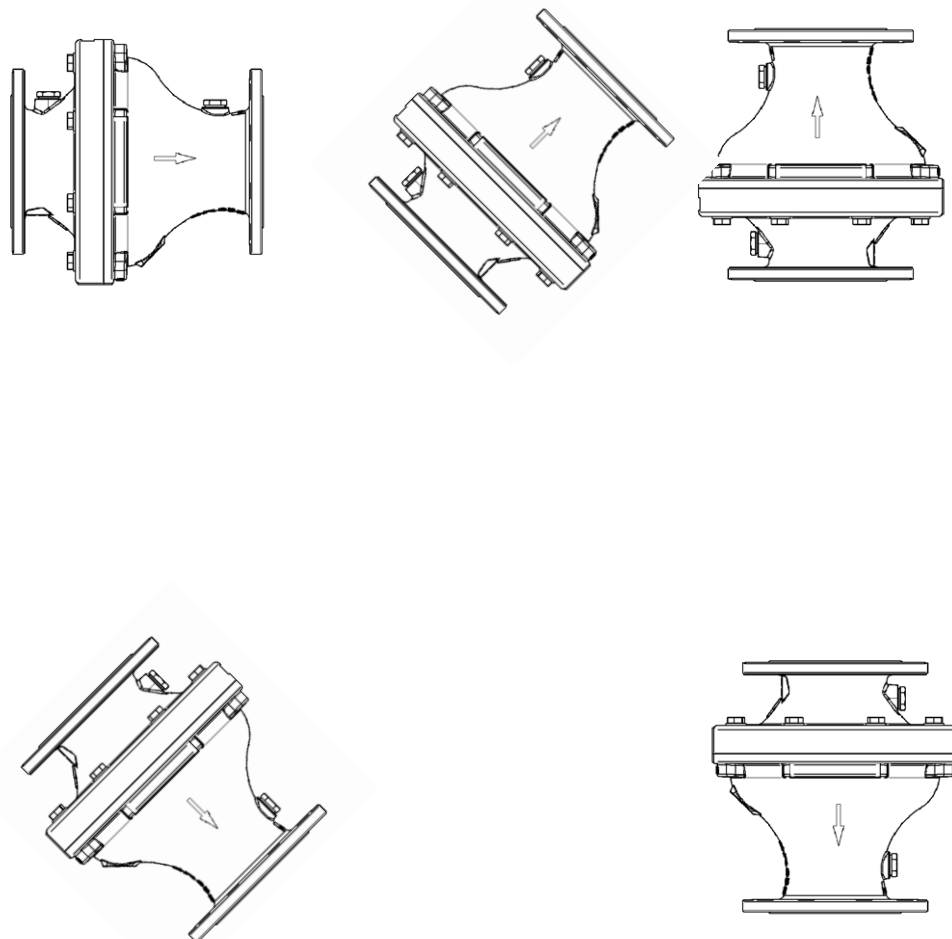


Figure 4: Permissible valve installation positions

4.4 Assembly instructions and fittings

Check the valve for possible damage that it may have suffered during transport and storage. Protect the valve against dirt caused on the construction site by adequate covering until installation. Prior to installation all components essential for proper function, such as the seat and the diaphragm must be thoroughly cleaned to remove all dirt particles. VAG does not assume any liability for consequential damage caused by dirt, shot-blasting gravel residues etc.

Should the valves be repainted later on, it must be made sure that no paint is applied to the functional parts. The identification plates must not overpainted either. If the equipment is sand-blasted for cleaning prior to installation, these parts must be adequately covered. If solvents are used for cleaning, it must be ensured that the solvents do not destroy the seals of the pipeline or the valve.

When connecting the valve with the pipeline flanges, hexagon bolts and nuts with washers from flange to flange must be used in the through holes.

Fasten the bolts evenly and crosswise to prevent unnecessary tension and the resulting cracks or breaks. The pipeline must not be pulled towards the valve. Should the gap between valve

and flange be too wide, this should be compensated by thicker seals.

We recommend using steel-reinforced rubber seals to DIN EN 1514-1 Shape IBC. If you use flared flanges, these seals are mandatory.

While the valve is being installed, it must be made sure that the flanges of the pipeline it is connected to are aligned and level with each other. Welding works on the pipeline must be performed before the valves are installed to prevent damage to the seals and the corrosion protection. Welding residues must be removed before the equipment is put into operation.

The pipeline must be laid in a way that prevents harmful pipeline forces from being transmitted to the valve body. Should construction works near or above the valve not be completed yet, the valve must be covered to protect it from dirt.

5. Set-up and operation of the valve

5.1 Visual inspection and preparation

Before putting the valve and the equipment into operation, perform a visual inspection of all functional parts. Check whether all bolted connections have been properly fastened.

5.2 Function check and pressure test

Warning!! The pressure exerted on the closed valve must not exceed its nominal pressure (see technical data sheet KAT 1543-A). When a pressure test is performed on the pipeline during which the test pressure exceeds the permissible rated pressure in the closing direction of the non-return valve, pressure compensation must be ensured via a bypass.

Prior to any tests, newly installed pipeline systems should be carefully purged to remove all foreign particles. If residues or dirt particles are left in the pipeline, they may clog the installations during the purging procedure. This may impair the function of the valve or even obstruct it completely.



When using detergents / disinfectants, make sure they do not attack any of the valve materials.

requiring such protective equipment or for which such protective equipment is prescribed.

Improper or wrong use of the valve should be avoided. Prior to the performance of any work on the valve and equipment it must be ensured that the relevant pipeline section has been depressurised and/or de-energised.

6.2 Inspection and operation intervals

The condition and function of the diaphragm should be checked at least once per year (DVGW Instruction Sheet W 392).

In case of extreme operating conditions inspection should be performed more frequently.

6.3 Maintenance work and replacement of parts

For information about the spare parts and wearing parts needed, please refer to the spare parts list in Section "6.3.1 Design".

6. Maintenance and repair

6.1 General safety instructions

Prior to the performance of inspection and maintenance work on the valve or its assemblies, shut-off the pressurised pipeline, depressurise it and secure it against inadvertent activation. Depending on the kind and dangerousness of the fluid conveyed, comply with all required safety regulations!

After completing the maintenance works and before resuming operation, check all connections for proper fastening and tightness. Perform the steps described for initial set-up as described under Section 5 "Set-up and operation".

Statutory and local provisions as well as the safety and accident prevention regulations must be observed and complied with at all times.

Couplings and connections must never be disassembled when they are under pressure.

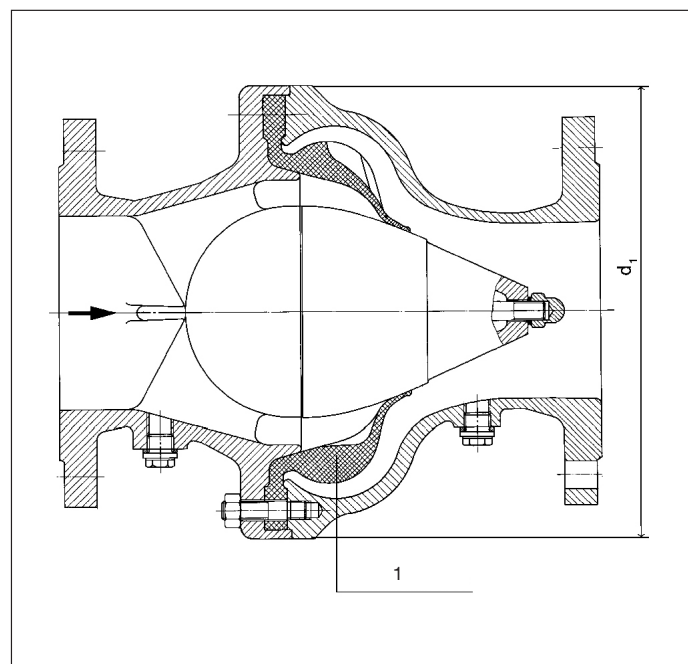
Servicing, maintenance and inspection work as well as the replacement of spare parts must only be done qualified staff. The plant operator is responsible for determining the suitability of the staff or for ensuring the relevant qualifications. In case the operator's employees do not have the qualifications required, they need to attend a training course. This training course can e.g. be held by VAG Service employees.

In addition to this, the plant operator needs to ensure that all employees have understood these Operation and Maintenance Instructions as well as all further instructions referred to in them.

Protective equipment such as safety boots, safety helmets, goggles, protective gloves etc. must be worn during all work

6.3.1 Design

Item	Designation	Material	d1 dimensions in mm
1	Circular diaphragm	NBR	150, 175, 220, 292, 374, 446, 550, 645, 720
1	Circular diaphragm	EPDM	150, 175, 220, 292, 374, 446, 550, 645, 720



6.3.2 Recommendations for the replacement of parts

- Replace diaphragm whenever necessary
Replacement intervals vary depending on the operating conditions.

6.3.3 Inspection of the diaphragm

Whether the diaphragm is leak-free can be checked in installed condition by turning out the plug on the inlet side when the entire equipment is depressurised.

Caution - danger! When the plug is opened while the equipment is still under pressure, the plug may be blown out at high speed.

After the plug has been opened, the valve is put under back-pressure and it is checked whether water runs out of it.

Caution: In case the diaphragm is defective, large quantities of the fluid conveyed will emerge - take appropriate safety precautions!

According to the recommended intervals, dismantle the valve from the pipeline, open it and check the diaphragm for cracks. If there are cracks, the diaphragm (spare part) must be replaced. When assembling the diaphragm, make sure the diaphragm is placed properly into the seat and not distorted (to make assembly easier, slightly grease the diaphragm with a suitable lubricant). Fasten the body screws evenly and crosswise until the body halves have metal to metal contact.

6.3.4 Cleaning and lubrication

To ensure proper sealing, the diaphragm and the cone of the seat must be cleaned from deposits contained in the medium. It is not necessary to lubricate the diaphragm. Reassemble the valve as described in Section 6.3.3.

8. How to contact us

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Service

Our service hotline can be reached 24/7 world-wide. In case of emergency, please contact us by phone.

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Service per email: service@vag-group.com

7. Trouble-shooting



For all repair and maintenance work, please observe the general safety instructions described in Section 6.1!

Problem	Cause	Remedial action
Diaphragm does not seal	Foreign particle jammed in the seat area	Purge valve, dismantle if necessary and remove foreign particle.
	Deposits from the medium on the seat or diaphragm	Dismantle and open valve, clean the seat area and the diaphragm.
	Insufficient back-pressure	For complete sealing, the back-pressure should be at least 3 m water column.
	Defective diaphragm	Dismantle and open valve, replace diaphragm (spare part).
Excessive wear and tear of diaphragm	Unfavourable installation position (e.g. too close downstream of an elbow, or similar) which causes unfavourable flow and fluttering of the diaphragm.	Change installation position (cf. Section 4).
	Abrasive fluid (high content of solids)	Install a preliminary filter which retains the particles.
Leaks at the body	Deteriorated seals or diaphragm	Replace seals or diaphragm (spare parts, see Section 6).



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