

VAG PICO[®] M100 Pilot Operated Control Valve

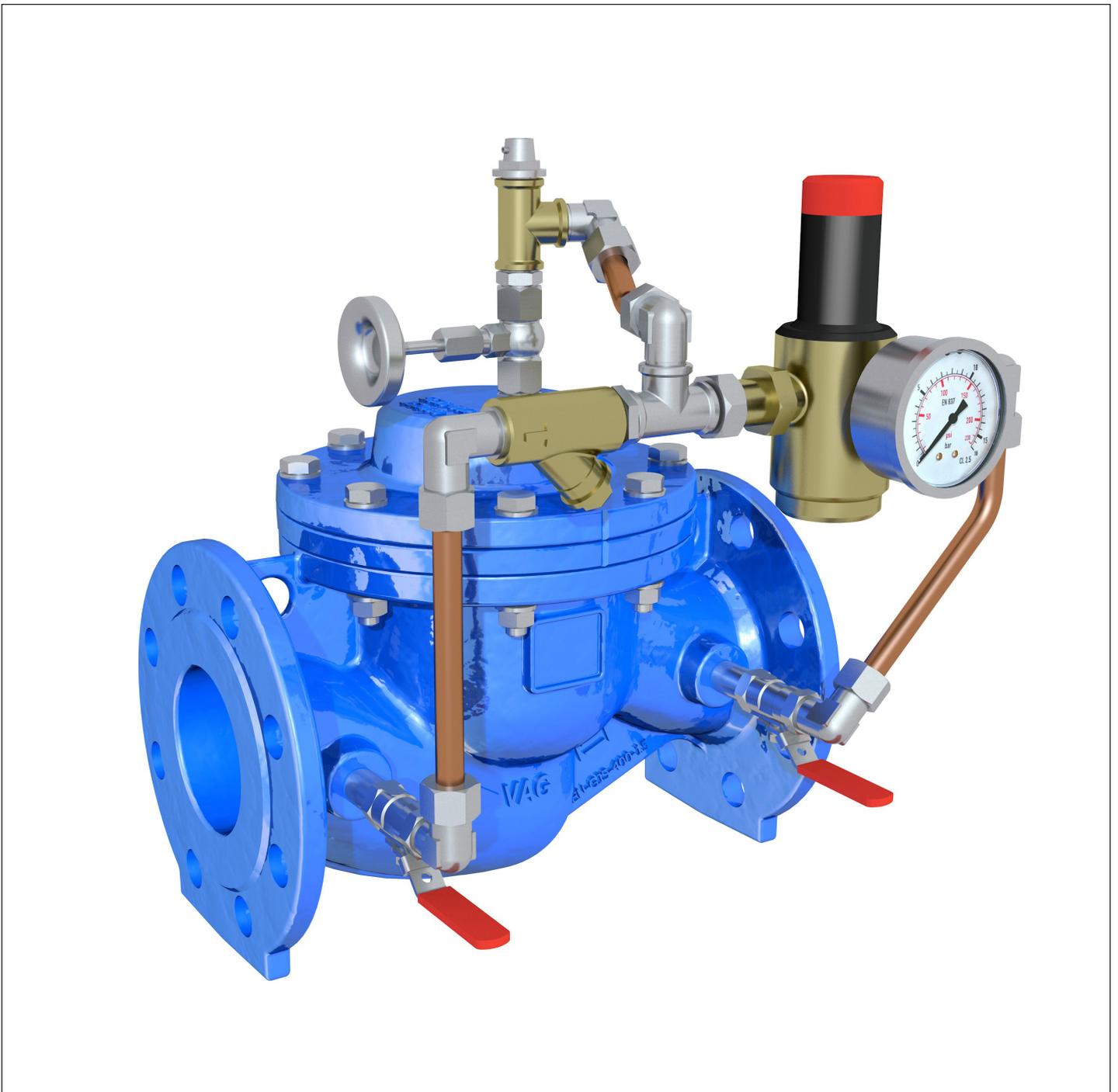


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1 General

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 General safety instructions). For further technical information such as dimensions, materials or applications, please refer to the respective documentation (KAT-A 2035).

VAG valves are designed and manufactured to the highest standards and their safety of operation is generally ensured. However, valves may be potentially dangerous if they are operated improperly or are not installed for their intended use.

All personnel 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 and following [Regulations issued by the Trade Associations] and 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 the 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.

Before dismantling the VAG PICO® M100 Pilot Operated Control

Valve from the pipeline, always make sure that the diaphragm chamber and the control circuit have been depressurised. This can be checked by opening the venting valve.

Also remember that the VAG PICO® M100 Pilot Operated Control Valve can only be operated properly with the ball valves on the control circuit open. Closing the ball valve on the upstream pressure side during operation may cause the control function of the valve to be ineffective.

1.2 Proper use



The VAG PICO® M100 Pilot Operated Control Valve is a control valve intended for installation in horizontal pipelines (for exceptions see Section 4.4). When the valve is installed between pipeline flanges, the flanges must be plane parallel and in true alignment. As shown in Figure 1, the VAG PICO® M100 Pilot Operated Control Valve (C) should preferably be installed between two shut-off valves (A + D) and a strainer (B) on the upstream pressure side. **We strongly recommend using a suitable support for the pipeline.** It must be ensured that the valve and especially its control circuit are easily accessible for operation and maintenance. For emergency operation a bypass line may be useful. The arrows on the valve body indicate the flow direction and need to be observed when the valve is installed. For proper use of the VAG PICO® M100 Pilot Operated Control Valve, the control circuit must be properly assembled at the main valve. The control circuit may only be modified by the manufacturer itself or in close consultation with the manufacturer. Improper modification may cause the valve to lose its control function and lead to consequential damage. For proper use and to prevent malfunction, a damping zone of 2 to 3 times DN should be provided upstream of the VAG PICO® M100 Pilot Operated Control Valve. On the downstream side, we recommend a damping zone of at least 5 times the nominal diameter (see also Section 4.3).

For pressure-reducing valves, we recommend the installation of a safety valve on the downstream-pressure side.

The control valve is available in several varieties and performs control tasks in water supply systems. The following varieties of the VAG PICO® M100 Pilot Operated Control Valve are available:

- Pressure-reducing valve

For the respective technical application ranges (e.g. operating pressure, medium, temperature) please refer to the specific product-related documentation (KAT-A 2035).

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

These Operation and Maintenance Instructions contain important

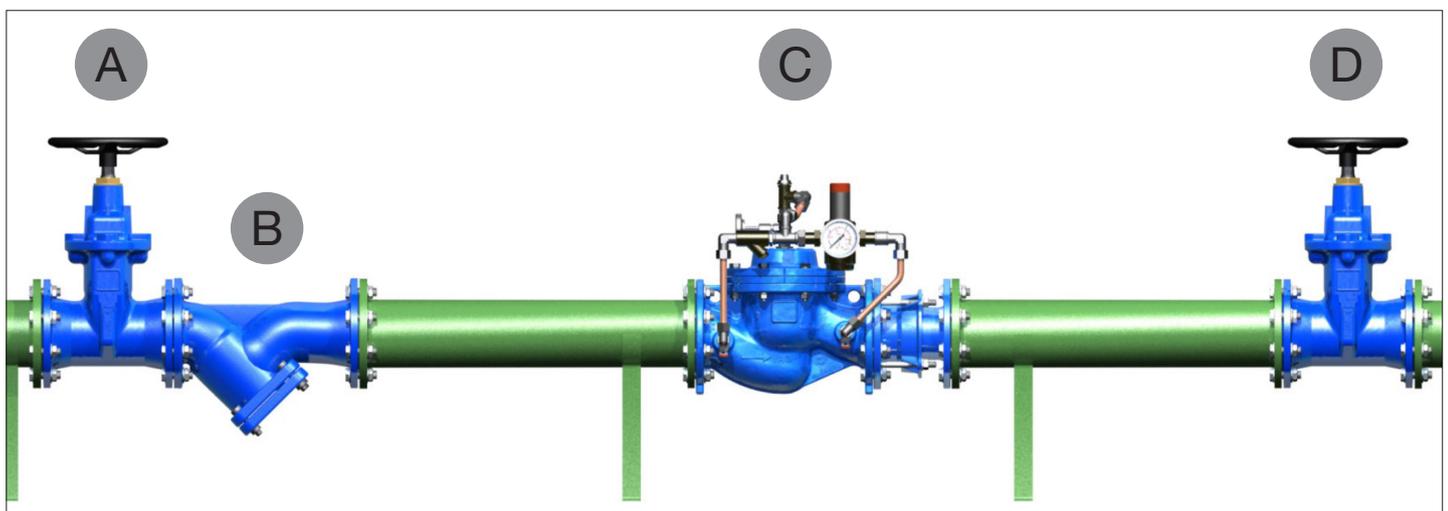


Figure 1: Installation recommendation of the VAG PICO® M100 Pilot Operated Control Valve

information on the safe and reliable operation of the VAG PICO® M100 Pilot Operated Control 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 plant
- Improve the operational safety and useful life expectancy 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
PICO®	Registered product name of VAG-Armaturen GmbH
DN	Nominal diameter of the valve
PN	Nominal pressure of the valve
Date of manufacture	
Serial number	

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. Ensure 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.

When transporting the VAG PICO® M100 Pilot Operated Control Valve ensure that the lines of the control circuit are protected against damage by tipping.

For transport purposes and also to support assembly, lifting devices such as cables and belts must only be attached to the transport bores provided (A) at the top of the body (see Figure 2). Select the length and position of the cables and belts so that they ensure the horizontal position of the valve during the entire lifting procedure.

Please remember that lifting or suspending the VAG PICO® M100 Pilot Operated Control Valve at the pilot lines may cause damage to the valve.

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.

2.2 Storage

When storing the VAG PICO® M100 Pilot Operated control Valve, ensure that it is adequately protected against dirt and dust. The manufacturer recommends using suitable desiccants in the container.

Store the valves in dry and well ventilated place where they are protected against dirt and damage. The elastomeric parts (seals) must be protected against direct sunlight and/or UV light as otherwise their long-term sealing function cannot be guaranteed. Protect the valve against direct radiation from heat sources.

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

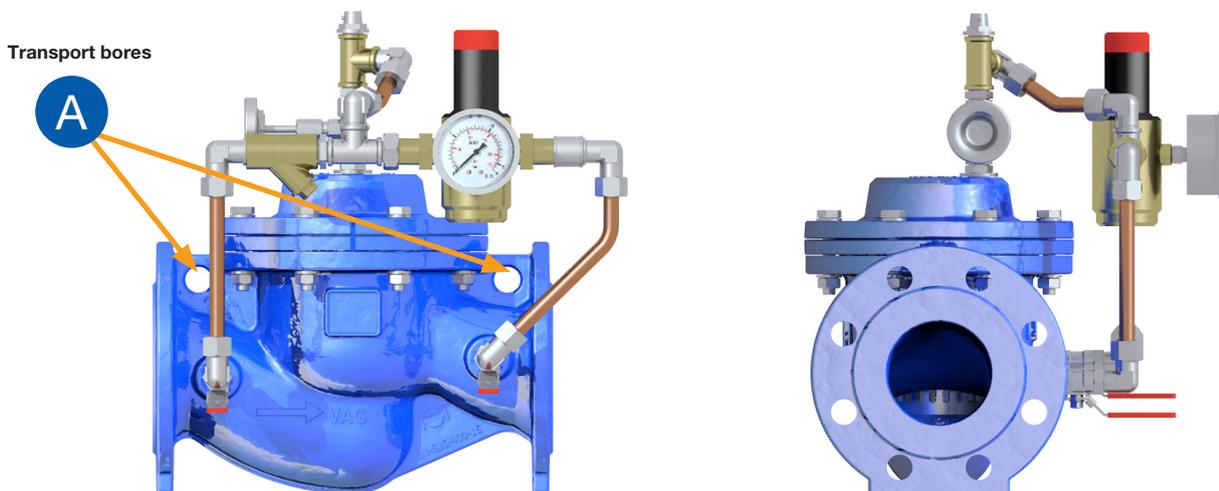


Figure 2: Transport position

3 Product features

3.1 Features and function description

The VAG PICO® M100 Pilot Operated Control Valve is a straight-way control valve and can be installed in a pipeline system via flanged connections. It has been designed to perform control tasks in water supply systems and, unlike butterfly valves and gate valves which merely perform shut-off tasks, it is suitable to meet the special requirements of regulation.

The main valve consists of the body, the diaphragm retaining disk, the bonnet and the internal parts with the diaphragm, the control insert and the valve stem. The control lines with filter and pilot valve and pressure gauge attached to the main valve form the VAG PICO® M100 Pilot Operated Control Valve. The seat of the valve is sealed by a profiled sealing ring.

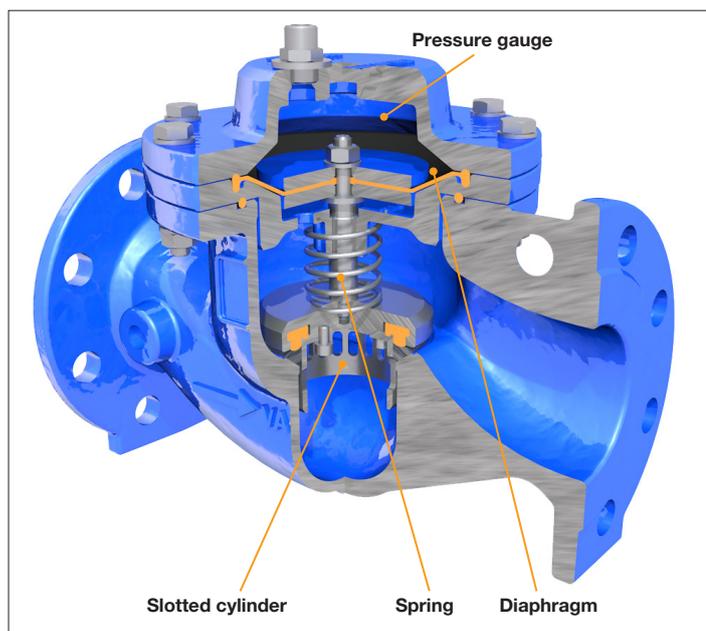


Figure 3: VAG PICO® M100 Pilot Operated Control Valve as pressure-reducing valve

The control valve is controlled automatically via the pilot valve in the control circuit. When the pilot valve is closed, the valve disk is kept in closed position at the same pressures, which is due to the larger effective area in the diaphragm chamber as compared to the valve seat. When the pilot valve is closed, the pressure inside the diaphragm chamber rises to the upstream pressure level and the main valve closes. When the pilot valve is open and there is flow in the control line, the pressure in the diaphragm chamber drops and the main valve opens.

As a standard the valve is delivered with a slotted cylinder (see Figure 3) which has been designed based on the operating conditions.

3.2 Applications

The VAG PICO® M100 Pilot Operated Control Valve in its standard version can be used for the following media due to its EPDM sealing materials:

- Drinking water
- Service water

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-A 2035) must not be exceeded.

The pressure applied to the closed valve must not exceed its rated pressure. To ensure the reliable function of the pilot operated control valve, a minimal differential pressure of 0,5 bar is required.

The maximum permissible flow velocity (at stable flow) is that according to EN 1074-1. In addition to this, the valve, irrespective of its nominal pressure, can be operated at a flow velocity of 5m/s maximum.

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

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 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.

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

4.2 Installation location

To ensure trouble-free function and a long service life of the valve, several factors have to be taken into consideration with regard to its location in the system. 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 outdoors, it must be protected against extreme atmospheric influences (e.g. formation of ice etc.) by adequate covers.

A submerged installation is not admissible for this type of valve.

4.3 Installations in the pipeline upstream and downstream of the valve

The VAG PICO® M100 Pilot Operated Control Valve should preferably be installed between two shut-off valves and a strainer with suitable mesh size on the upstream pressure side to filter coarse dirt particles upstream of the valve and to prevent clogging of the control lines. For this purpose, the following requirements must be observed:

- Directly upstream (**2 to 3 x DN**) and downstream (**5 x DN**) of

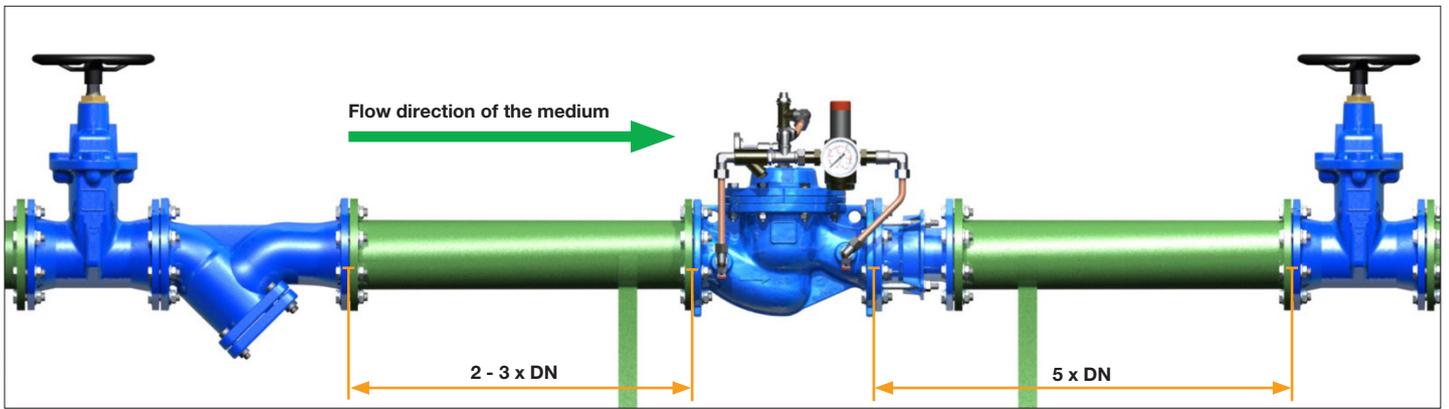


Figure 4: Installation situation of a VAG PICO® M100 Pilot Operated Control Valve

the VAG PICO® M100 Pilot Operated Control Valve, no inspection valves, elbows, T-pieces and Y-filters should be installed as otherwise irregular flow might impair the proper function of the VAG PICO® M100 Pilot Operated Control Valve.

- The temperature limits for the medium conveyed must not be exceeded.
- The nominal pressure is the maximum pressure which may be applied when the valve is closed.

4.4 Installation position

The VAG PICO® M100 Pilot Operated Control Valve must be installed in a horizontal position. Any other installation positions require the manufacturer's express approval (Figure 5).

Exception: Up to and including nominal diameter DN 100 a vertical installation position is also possible. However, the flow must be from the bottom to the top according to the flow direction arrow on the main valve.

4.5 Assembly instructions and fittings

Check the valve for possible damage that may have occurred during transport or storage. Protect the valve against dirt from the construction site by adequate covering until installation. VAG does not assume any liability for consequential damage caused by dirt, shot-blasting gravel residue etc.

It should be checked before installation whether all function parts (e.g. ball valves, adjustment screws) run well and are fully operational.

In case that subsequent repair is needed, it must be ensured that no paint is applied to the functional parts. The identification plates must not be painted over either. If the equipment is sand-blasted for any reason prior to installation, these parts must be adequately covered. If solvents are used for cleaning, You should ensure that they do not damage the seals of the pipeline or the valve.

For the assembly of the VAG PICO® M100 Pilot Operated Control Valve you must ensure that proper load suspension devices as

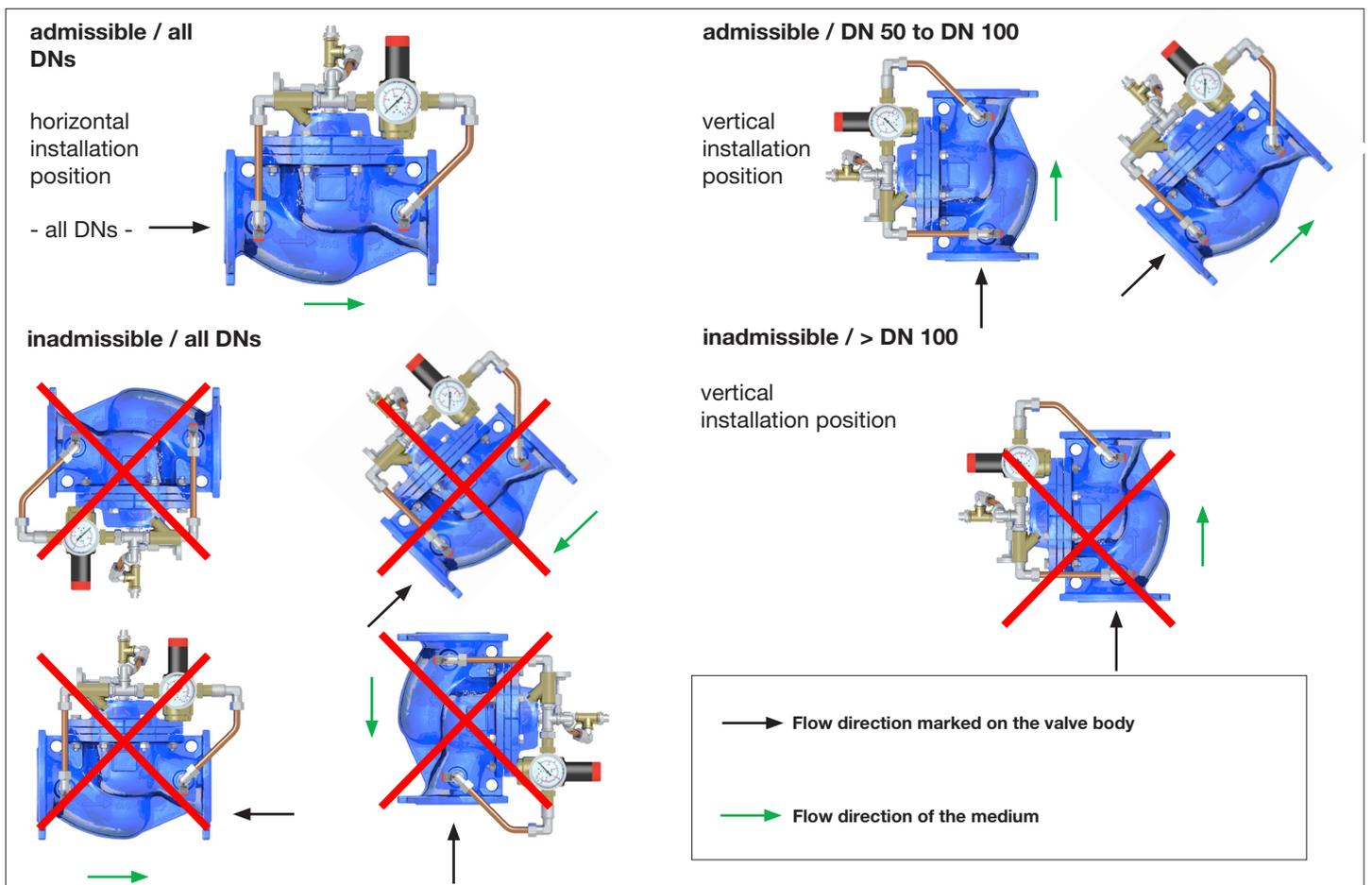


Figure 5: Installation position of the valve

well as means of transport and lifting devices are available.

The valve may only be suspended using the transport devices provided for this purpose. Any other method of suspension may lead to damage or destruction.

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 that may result cracks or breaks in the flange. 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 IBC Shape. If you use raised face flanges, the use of IBC gaskets is 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.

Prior to the commissioning of new plants and in particular after repair work performed on existing plants, the pipeline system has to be purged. During purging, the materials of the valve must not be attacked. During pressure tests the valve should only be exposed to pressures not exceeding its nominal pressure. A pressure test of the valve has already been performed by the manufacturer.

5.2 Function check and pressure test

The pressure applied to the closed valve must not exceed 1.1 times its nominal pressure (see Technical Data Sheet KAT-A 2035). When a pressure test is performed in the pipeline with a test pressure exceeding the admissible nominal pressure in closing direction, pressure compensation must be ensured via a bypass.

Newly installed pipeline systems should first be thoroughly purged to remove all foreign particles. If residues or dirt particles are present in the pipeline, they might clog the installations while the pipeline is being purged. This may impair the function of the valve or even block it.

In particular after repair work or upon the commissioning of new equipment, the pipeline system is to be purged again with the valve being fully open. If detergents or disinfectants are used it must be ensured they do not attack the valve materials.

5.3 Putting the valve into operation

The following sections describe the commissioning of the VAG PICO® M100 Pilot Operated Control Valve step by step. The com-

missioning procedure depends on the type of control valve, i.e.

- VAG PICO® M100 Pilot Operated Control Valve as pressure-reducing valve

Depending on the valve used, different steps have to be performed for putting it into operation.

5.3.1 VAG PICO® M100 Pilot Operated Control Valve as pressure-reducing valve

1. Close the shut-off valves upstream and downstream of the pressure-reducing valve.
2. Completely release the tension of the spring of the pilot valve by turning the adjustment red handwheel counter-clockwise (see Figure 6). This can be done manually by hand .
3. Put all ball valves at the control circuit into open position. The ball valves are open when the manual levers run in parallel to the piping of the control circuit (see Figure 7). Make sure that the venting valve is completely closed.
4. The speed is adjusted via throttle valve in the control circuit (see Figure 8). The speed is adjusted using a handwheel. Before the response speed can be adjusted, the throttle valve first have to be completely closed (by turning adjusting handwheel clockwise) to set the initial position to zero turns. Afterwards the speed can be adjusted. VAG recommends the following standard adjustments:

- Open by opening in counter clockwise direction

- Closing: 2 turns clockwise

If required, the response speed may be increased or reduced. To increase the response speed turn the adjustment handwheel in counter clockwise direction and to reduce the response speed turn the adjustment screw in clockwise direction.

5. The pressure-reducing valve is filled by slow and careful opening of the upstream pressure valve (e.g. a gate valve, see Figure 9) with 1 – 3 turns.

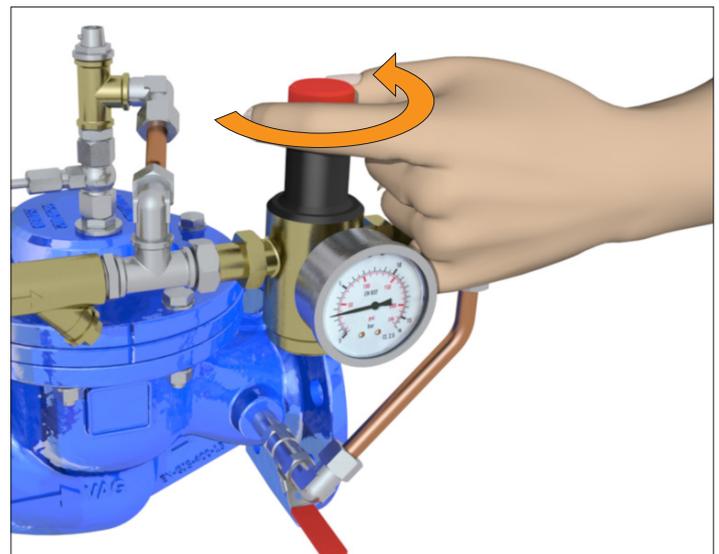


Figure 6: Releasing the tension of the spring

6. On the downstream pressure side of the pressure-reducing valve pressure gauge are installed. They record the upstream and downstream pressure on the valve. When the pressure-reducing valve is being filled, the downstream pressure may rise.

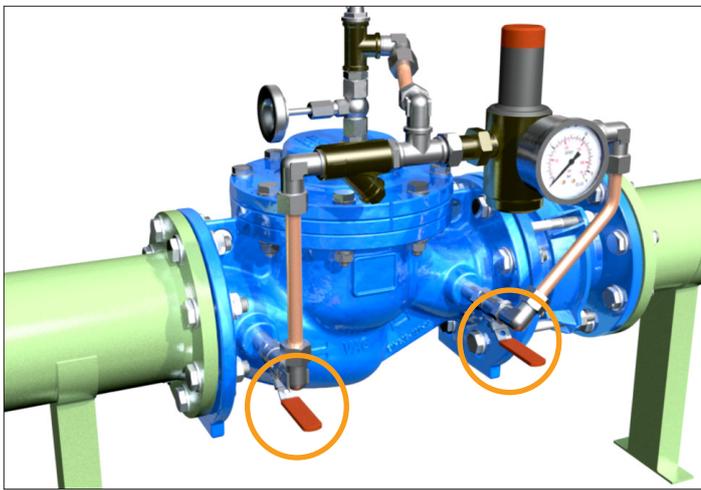


Figure 7: Open ball valves with manual levers running in parallel to the piping of the control circuit

7. Now the upstream pressure shut-off valve is opened completely. Before the downstream pressure can be adjusted, the adjustment handwheel on the pilot valve must be completely unfastened again after filling (see step 2). Afterwards, the downstream-pressure shut-off valve is partly opened (2 – 4 turns; see Figure 12). The pressure-reducing valve should now be closed. Now possibly the static downstream pressure from the plant is present.
8. Now the desired downstream pressure can be adjusted. For adjustment turn the adjustment handwheel of the pilot valve slowly clockwise until the required pressure level is reached (see Figure 6). To see whether the pressure is correct, check it on the downstream pressure gauge.
9. As soon as the desired downstream pressure level has been reached, the downstream-pressure shut-off valve can be opened further. We recommend filling the low-pressure network slowly to ensure it is properly vented and to prevent water hammers.
10. Allow enough time for the system to stabilise. Afterwards the downstream-pressure shut-off valve can be opened completely.
11. If required, the operating speed can be adjusted to the operating conditions.
12. The last step for putting the valve into service is the fine adjustment of the pilot valve, in this case the fine adjustment of the downstream pressure.

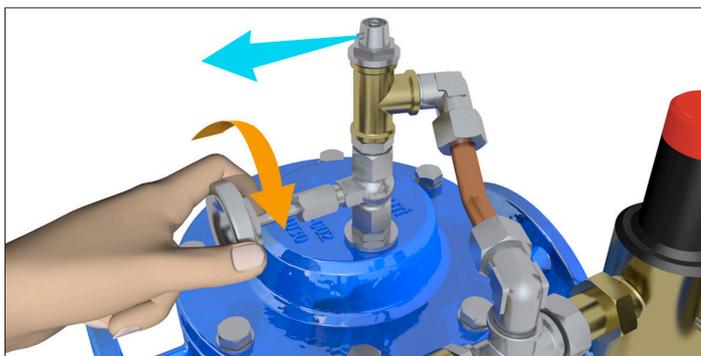


Figure 8: The filter integrated in the control circuit must be purged

- Clockwise turn=Increasing the downstream pressure
- Counter-clockwise turn=Reducing the downstream pressure

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 type and hazard risk of the fluid conveyed, comply with all required safety regulations!

After completing the maintenance works and before resuming operation, check all connections for 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

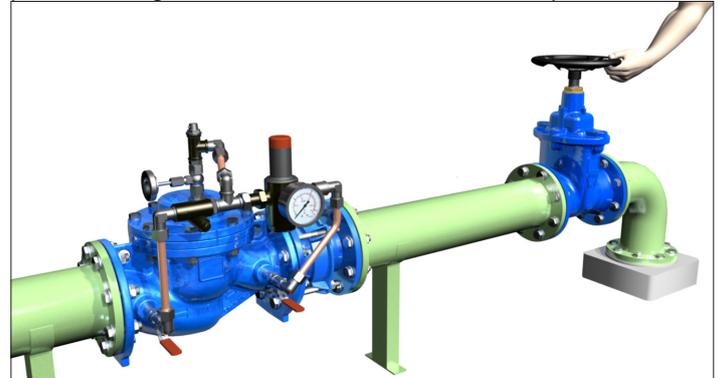


Figure 9: Complete opening of the upstream pressure valve and partial opening of the downstream-pressure valve



Figure 10: Partial opening of the upstream pressure valve

times.

Connections must never be disconnected unless they have been depressurised or de-energised.

Servicing, maintenance and inspection work as well as the replacement of spare parts must be carried out by qualified personnel. The plant operator is responsible for determining the suitability of the personnel or for ensuring that they have all relevant qualifications.

In case the operator’s employees do not have the qualifications required, they should attend a training course. Valve related training courses can be undertaken 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 requiring such protective equipment or for which such protective equipment is prescribed.

Replacement of spare parts must be carried out by qualified personnel. The plant operator is responsible for determining the suitability of the personnel or for ensuring that they have all relevant qualifications.

6 General safety instructions

7 Inspection and operation intervals

The valve should be checked for tightness, proper operation and corrosion protection (DVGW Instruction Sheet W 392).

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

The body seals and the diaphragm can be replaced when and as required by the medium. However, we recommend the replacement of the diaphragm and of all rubber seals after five years at the latest.

7.1 Maintenance of the main valve

The following steps must be observed for the maintenance of the main valve:

1. Close the downstream-pressure shut-off valve.
2. Close the upstream pressure shut-off valve.
3. Carefully open the venting valve to relieve the pressure in the valve.
4. Loosen the threaded retaining ring connections (see Figure 11, Item 1) between the filter and the opening/closing time adjustment with the help of a size 19 open-ended spanner and a size 17 open-ended spanner for steadying.
5. Loosen the cutting ring connection (see Figure 11, Items 2 and 3) to the left of the filter unit and to the right of the pilot valve with the help of a size 17 open-ended spanner.
6. Then lift off the control circuit.
7. Loosen the cover screws with the help of a size 17 open-ended spanner and remove the cover.
8. The internal parts can now be taken out in one piece.
 - 8.1 Replacement of the profiled sealing ring
 - 8.1.1 To replace the profiled sealing ring, loosen the screws of the valve cylinder using a size 5 or size 6 fixed spanner (depending on the nominal diameter).
 - 8.1.2 Remove the profiled seal from the retaining ring and install the new sealing ring.
 - 8.1.3 Put on the valve cylinder and fasten the screws from the inside.
 - 8.2 Replacement of the diaphragm
 - 8.2.1 Loosen the nut on the stem (if necessary, steady at the spindle wrench area).
 - 8.2.2 Remove the upper clamping disk.
 - 8.2.3 Remove the old diaphragm and replace it by a new one.
 - 8.2.4 Reassemble the parts in reverse order.
9. It is recommended to replace O-ring between bonnet and cover too (Table 1, pos. 10.100).
10. Fasten the cover screws crosswise (tightening torques according to Table 7.3.3).

11. Put on the control circuit and fasten the screwed connections.

12. Put the unit into operation as described in Section 5.

7.2 Maintenance work and replacement of parts

The spare parts and wearing parts can be found in the spare parts list provided in Table 1 (page 10.).

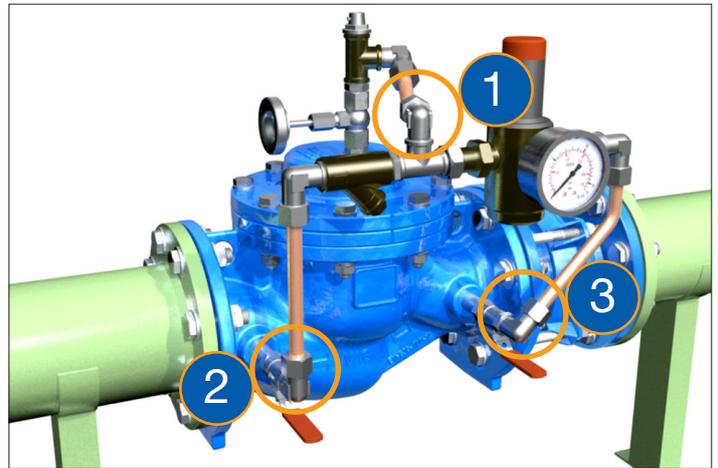
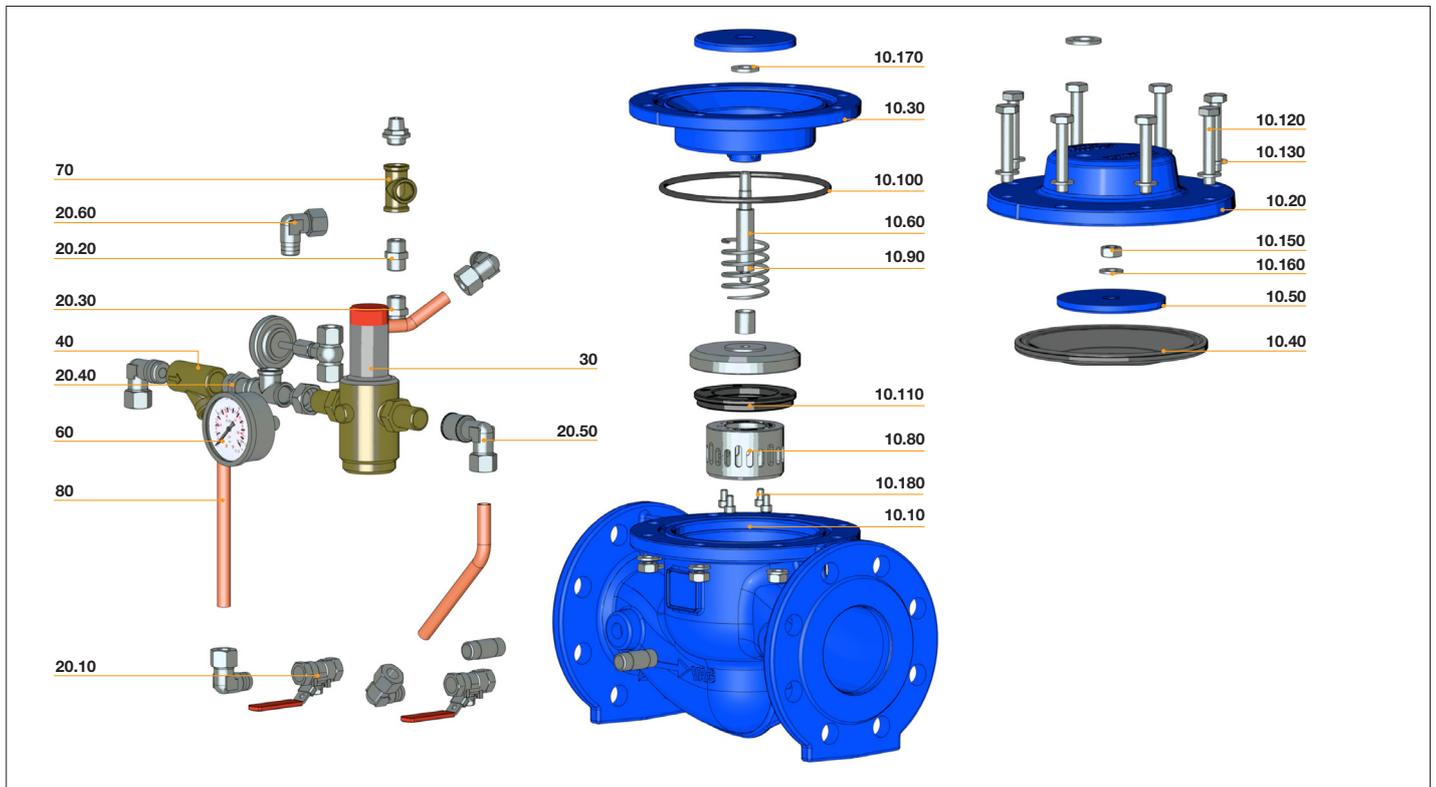


Figure 11: The filter integrated in the control circuit must be purged



Item	Designation	Material	Spare part
10.10	Body	EN-GJS-400-15(GGG-40)	
10.20	Bonnet	EN-GJS-400-15 (GGG-40)	
10.30	Diaphragm retaining disk	EN-JS1030 (GGG-40)	
10.40	Diaphragm	EPDM	X
10.50	Clamping disk	EN-JS1030 (GGG-40)	
10.60	Stem	1.4122	
10.70	Retaining ring	1.4301	
10.80	Cylinder	1.4301	
10.90	Spring	1.4310	
10.100	O-ring	EPDM	X
10.110	Profiled sealing ring	EPDM	X
10.120	Hexagon screw	A2-70	
10.130	Washer	A4	
10.140	Hexagon nut	A4-70	
10.150	Hexagon nut	A4-70	
10.160	Washer	A4	
10.170	Washer	A4	
10.180	Cheese head screw	A2-70	
20.10	Ball valve	1.4408	
20.20	Double nipple	1.4408	
20.30	Double nipple	1.4571	
20.40	Double nipple	1.4571	
20.50	Elbow-type screwed connection	1.4571	
20.60	Elbow-type screwed connection	1.4571	
30	Pilot valve		X see separate spare parts list (upon request)
40	Filter unit		X see separate spare parts list (upon request)
50	Speed adjustment		
60	Pressure gauge	1.4301	
70	Venting valve		
80	Pipe	1.4571	

Table 1: Parts list

8 Trouble-shooting

For all repair and maintenance work, please observe the general safety instructions described in Section 6!

Designation	Item	Size	Tightening torque [Nm]	Spanner/ wrench size
Hexagon socket head screw	10.180	M6	5	5
		M8	10	6
Hexagon screw	10.120	M10	12	17
		M12	20	19
		M16	40	24
		M20	70	30

Table 2: Tightening torques

Problem	Possible causes	Remedial action	
The main valve does not close	A shut-off ball valve in the control circuit is closed	Open the ball valve in the pilot line upstream of the filter	
	The throttle valve is closed	Set the adjustment screws to the recommended values	
	An object is jammed between the sealing seat and the obturator	Open the valve bonnet and remove the object	
	No pressure in the diaphragm chamber	Check the line pressure upstream of the valve	
		Check whether the filter is dirty	
		Check the adjustment of the throttle valve	
The valve guiding rod does not move although pressure is available	Check the pilot line for pollution by unfastening some screwed connections		
	Check whether there are deposits in the valve and remove them, if necessary.		
The main valve does not open	The valve guiding rod is distorted and replace it, if necessary.		
	The shut-off valves in the control circuit or the main line are closed	Open the shut-off valves	
	The throttle valve is closed	Set the adjustment screws to the recommended values	
	The valve guiding rod does not move although pressure is available	Check whether there are deposits in the valve and remove them, if necessary	
		Check whether the valve guiding rod is distorted and replace it, if necessary	
The screen on the filter is missing	Disassemble the filter unit and install the screen		

Problem	Possible causes	Remedial action
The main valve is leaky	Deposits/incrustations have built up on the valve seat	Remove the deposits
	The profiled sealing ring in the valve seat is leaky	Replace the profiled sealing ring
The pressure gauge do not indicate any pressure	The stop cocks are closed	Open the stop cocks
The main valve is slamming into the seat	Closing speed adjusted is too high	Set the throttle valve to the recommended value
	The operating data has changed	Identify the new operating data and contact the VAG Service Department

9 How to contact us

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<http://www.vag-group.com>

10 Service

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

Service hotline: +49 621 - 749 2222

Service per email: service@vag-group.com



www.vag-group.com

info@vag-group.com