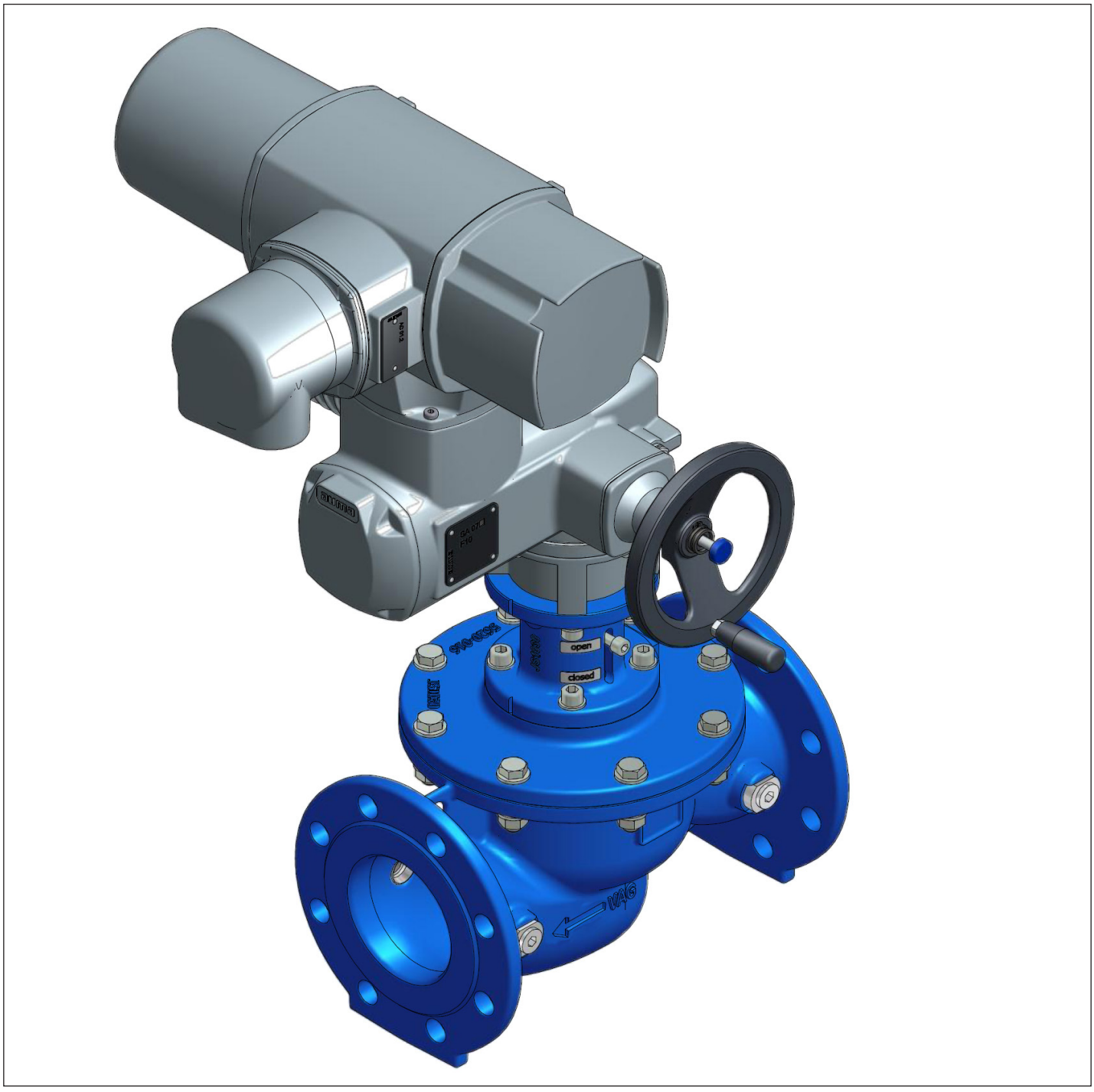
Operation and Maintenance Instructions

VAG DURA® Control Valve



KAT-B 2034 Edition 3_15-02-2022

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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 2034-A).

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.

1.2 Proper use

The VAG DURA Control Valve is a control valve intended for installation in horizontal pipelines.

In its standard version, the valve is suitable for controlling the pressure or the flow rate in water supply systems.

For the respective technical application ranges (e.g. operating pressure, medium, temperature) please refer to the specific product-related documentation (KAT-A 2034).

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

These Operation and Maintenance Instructions contain important information on the safe and reliable operation of the VAG DURA 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
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.

For transport purposes and also to support assembly, lifting devices such as cables and belts must only be attached to the transport bores provided at the top of the body. 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.

For transportation to its installation site, the valve version equipped with an electric actuator must be secured against tilting with an additional belt on the actuator.

If the valve is equipped with actuation assemblies, be sure that the actuators are safely stored to prevent transverse loads from affecting the connections. The valve can also be transported in a horizontal position (contrary to what is shown in the illustration). Avoid jerks and jolts when lifting or lowering the valve to prevent damage to the actuator and 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.

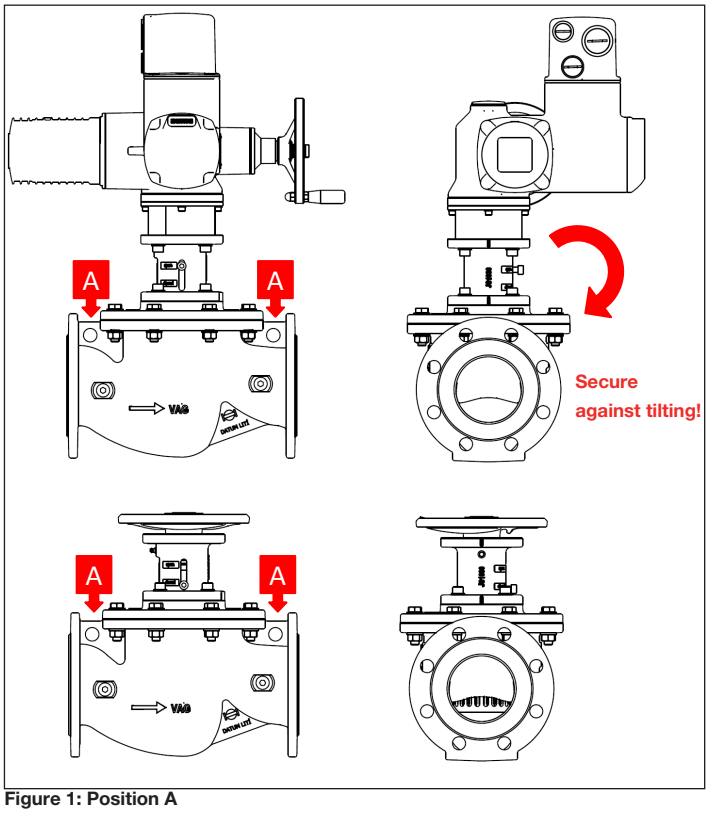


Figure 1: Position A

2.2 Storage

When storing the VAG DURA 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 a dry and well ventilated environment 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.

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

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.

3 Product features

3.1 Features and function description

The VAG DURA Control Valve has been designed for controlling the flow in water supply systems. Unlike butterfly valves and gate valves which can only be used for shut-off functions, the control valve meets the special requirements of flow control operation.

The name “DURA Valve” is an acronym derived from the German terms describing its design features, i.e. straight-through valve, universally suitable, with control and shut-off functions. The main valve consists of the body, the bonnet, the yoke and the internal parts with pressure-balanced cylinder, slotted cylinder and stem.

Due to the pressure-balanced cylinder, the force required to operate the valve is largely independent of the operating conditions. The pressure and flow rate are controlled via the position of the internal parts and/or the slotted cylinder.

The valve seat is sealed by a pull-out proof profiled sealing ring. The pressure-balanced cylinder is sealed by a quadring seal.

Depending on the customer’s requirements, the valve can be delivered equipped with a handwheel (Figure 2) or an electric actuator (Figure 3). The actuator can be changed subsequently on site. The applicable safety regulations must be observed.

Figure 2: Valve with handwheel

Figure 3: Valve with electric actuator

As a standard, the electric actuator is mounted with the handwheel above the pipeline axis in flow direction (Figure 4). For electric actuators with directly mounted control, the handwheel and control panel are on the right in flow direction as a standard (Figure 5). Any other arrangements must be specified when the valve is ordered. The alignment/actuator can be changed on site later on. The applicable safety regulations must be observed.

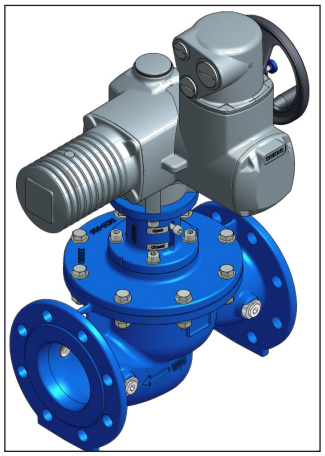


Figure 4: Standard version of electric actuator

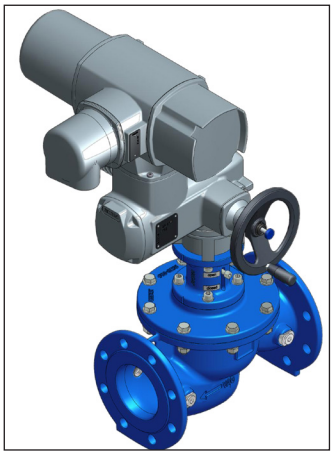


Figure 5: Standard version with electric actuator with directly mounted control

The slotted cylinder installed inside the control valve has been designed according to the existing operating data to ensure optimum control behaviour of the valve. As a standard, slotted cylinder types SZ20, SZ40 and SZ60 are available (Figures 6-8). The number indicates the percentage of the slot surface in relation to the nominal diameter surface.

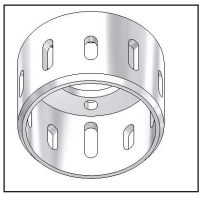


Figure 6: Slotted cylinder SZ20

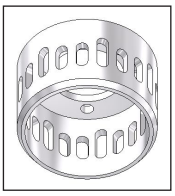


Figure 7: Slotted cylinder SZ40

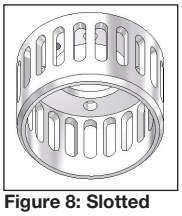


Figure 8: Slotted cylinder SZ60

3.2 Applications

The VAG DURA Control Valve in its standard version can be used for the following media due to its EPDM sealing materials:

- Drinking water
- Service water

The use of media containing oil and gas may cause the destruction of the seals and is therefore impermissible.

The VAG DURA Control Valve should only be used in media in which there is no risk of clogging.

For information about the corresponding temperature limits, please refer to the product-related technical documentation (KAT 2034-A).

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

3.3 Operating limits

The VAG DURA Control Valve is mainly used for flow control. The cavitation limit according to the applicable design diagrams must be observed.

The maximum operating temperatures and operating pressures specified in the technical documentation (KAT-A 2034) must not be exceeded.

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

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 the valve is installed 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.

For assembly, suitable sealing materials, lubricants and process materials must be used which are approved for use in drinking water pipelines, if the valve is installed in a drinking water pipeline.

Before putting the valve into operation, clean and purge the corresponding pipeline sections. For this purpose, the regulations according to German DVGW Instruction Sheet W 291 must be observed.

4.2 Installation Location

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

If the valve is exposed to the elements, it must be protected against extreme atmospheric influences (e.g. formation of ice etc.) by adequate covers.

In general, control valves should not be installed directly into the ground. If required, suitable chambers should be provided. Submerged installation is not permissible.

If the valve is installed as an end-of-line valve, special care needs to be taken to prevent people from accessing its free outlet side;

otherwise there is a risk of physical injury by water jets emerging.

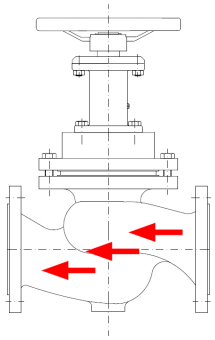
To ensure the proper function of the valve and a long service life, several factors need to be taken into account when choosing its installation location.

Installations in the pipeline upstream and downstream of the VAG DURA Control Valve:

- If the control valve is subject to media which contains debris, a screen with a sui- table mesh size must be provided upstream of the valve in order to prevent malfunction.
- Inspection valves, elbows, T-pieces and Y-filters should not be installed directly upstream (3 x DN) and directly downstream (5 x DN) of the VAG DURA Control Valve as otherwise irregular flow may affect the function of the valve.
- The temperature limits specified for the medium conveyed must not be exceeded.
- The nominal pressure is the maximum pressure which may be exerted on the closed valve.
- The extension of the operating elements e.g. by levers is not permissible.

4.3 Installation position

VAG DURA Control Valves can be installed in a horizontal or vertical position. The flow direction is indicated by an arrow on the valve and must be observed.



4.4 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. Prior to installation all components inside the valve and on the flanges must be thoroughly cleaned to remove all dirt particles. VAG does not assume any liability for consequential damage caused by dirt, shot-blasting gravel residue etc.

The function parts should be checked for proper operation prior to installation.

Should the valves be repainted later on, 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 cleaning 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 DURA Control Valve, it must be ensured that that proper load suspension devices as well as means of transport and lifting devices are available.

For the connection of 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 in 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 for 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 these seals 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.

For proper assembly, storage and transport the valves have been factory lubricated. Depending on their condition when they are to be put into operation, the valves may have to be lubricated again. If a valve is installed in a drinking water pipeline, lubricants must be used which are approved for use with food or drinking water.

5.2 Function check and pressure test

Prior to installation, the parts of the valve relevant for proper functioning have to be opened and closed completely at least once and should be checked for trouble-free operation.

Warning!! The pressure exerted on the closed valve must not exceed its nominal pressure (see Technical Datasheet KAT 2034-A). When a pressure test is performed in the pipeline with a test pressure exceeding the allowable nominal pressure in closing direction, the pressure must be compensated by way of 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, but also 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 that they do not attack the valve materials. As

a standard, the valve is closed by turning the handwheel in clockwise direction.

The dimensions of the stems and actuators allow operation by one person via the handwheel. Extensions for operation are not permissible and may damage the valve due to overstraining. Using excessive force for turning the handwheel may cause it to break. The valve has to be checked for proper function by opening and closing it several times.

6 Actuators

6.1 General

Electric actuators are designed for flow velocities according to Table 2 of the EN 1074-1 Standard (Valves for water supply; fitness for purpose requirements). In general, any deviating operating conditions need to be specified when the valve is ordered.

For detailed information about the electric actuators, please refer to the operating manual supplied by the manufacturer (e.g. AUMA, Rotork). The manuals may have to be procured by the user himself.

For the adjustment of the limit positions, please refer to the operating manual provided by the manufacturer of the actuator, such as AUMA, Rotork, etc.

Non-compliance with these instructions may result in physical injury, death and/or damage to the pipeline system. If actuators powered by an external source of energy (electric, pneumatic, hydraulic) have to be disassembled, the safety instructions provided in Section 1.1 of this manual have to be observed and the external source of energy has to be switched off prior to the commencement of any work.

DN	50	65	80	100	125	150
PN 16 max. operating torque [Nm] at the stem	20	20	30	30	40	40
Revolutions per stroke	7.5	12.5	12.5	15	15	22.5

6.2 Operating torques

Operating torques are the maximum required torques [in Nm] applied to the lead screw at full differential pressure including a safety factor of 1.5. If required, you can request the respective torques or controlling torques for the electric actuator from its manufacturer.

6.3 Assembly of the electric actuator

VAG DURA Control Valves are delivered with electric actuators for rising stems (e.g. AUMA SAR 07.6, Output Drive A). The thread size of the stem of the VAG DURA Control Valve is TR 18 x 2 LH for all nominal diameters.

The Actuator limit switches for open position should be set at the fully open position.

The Actuator limit switches for the closed position should be set torque-dependent.

The switching points have been set at the factory. If the valve is fitted with an electric actuator later on, the limit switches have to be adjusted after the assembly of the electric actuator. For adjustment instructions, please refer to the operating manual provided by the manufacturer of the electric actuator.

The relevant safety regulations issued by the VDI [Association of German Engineers] / VDE [German Association of Electrical, Electronic and IT Engineers] as well the instructions provided by the manufacturer of the electric actuator must be observed.

7 Maintenance and repair

7.1 General safety instructions

Prior to inspection and maintenance work on the valve or its assemblies, shut-off the pressurized pipeline, depressurize it and secure it against inadvertent activation. Depending on the type and hazard of the fluid within, 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 safety and accident prevention regulations must be observed and complied with at all times.

Take appropriate measure to prevent damage by electrical current. Never disconnect couplings and connections while they are pressurised or energised.

Servicing, maintenance and inspection work as well as the replacement of spare parts must only 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.

Should the operator’s employees not have the qualifications required, they need to attend a training course first. 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 read and understood these installation and operating instructions as well as all further instructions referred to in them.

Protective equipment such as safety boots, safety helmets, protective eyewear, protective gloves etc. must be worn during all work requiring such protective equipment or for which such protective equipment is prescribed.

Improper, wrong or abrupt use of the valve should be avoided. Prior to the enactment of any work on the valve and equipment, it must be ensured that the relevant pipeline section has been depressurized and/or de-energized.

7.2 Inspection and operation intervals

The valve should be checked for tightness, proper operation and corrosion protection once per year according to the recommendations for control valves provided in DVGW Instruction Sheet W

Item	Designation	Material	Standard	Spare part
10	Body	EN-GJS-400-15		
20	Retaining ring	1.4301 - X5CrNi18-10		
30	Bonnet	EN-GJS-400-15		
40	Stem	1.4057 – X17CrNi16-2		
50	Yoke	EN-GJS-400-15		
60	Grease fitting	zinc-coated steel	DIN 71412	
70	Cylinder	1.4301 - X5CrNi18-10		
80	Profiled sealing ring	EPDM		SP
90	Cylinder	1.4301 - X5CrNi18-10		
100	Stem bearing	CuZn40Pb2		
110	O-ring	NBR 70 Shore A		SP
120	Wiper ring	AU 90		SP
130	O-ring	NBR 70 Shore A		SP
140	O-ring	NBR 70 Shore A		SP
150	O-ring	EPDM 70 Shore A		SP
160	Hexagon socket head cap screw	A2-70	ISO 4762	
170	Hexagon head cap screw	A4-70	ISO 4017	
180	Washer	A4-70	ISO 7089	
190	Hexagon nut	A4-70	ISO 4032	
200	O-ring	NBR 90 Shore A		SP
210	Quadring	EPDM 70 Shore A		SP
220	Plug	nickeled brass		
230	Hexagon socket head cap screw	A4-70	ISO 4762	
240	Washer	A4-70	SO 7089	
250	Hexagon socket head cap screw	A2-70	ISO 4762	
260	Stem nut	CuZn40Pb2		
270	Featherkey	1.0503 - C45	DIN 6885	
280	Handwheel	EN-GJL-250		
290	Nut	zinc-coated steel		
300	“Closed” label	PET		
310	“Open” label	PET		
320	Electric actuator			

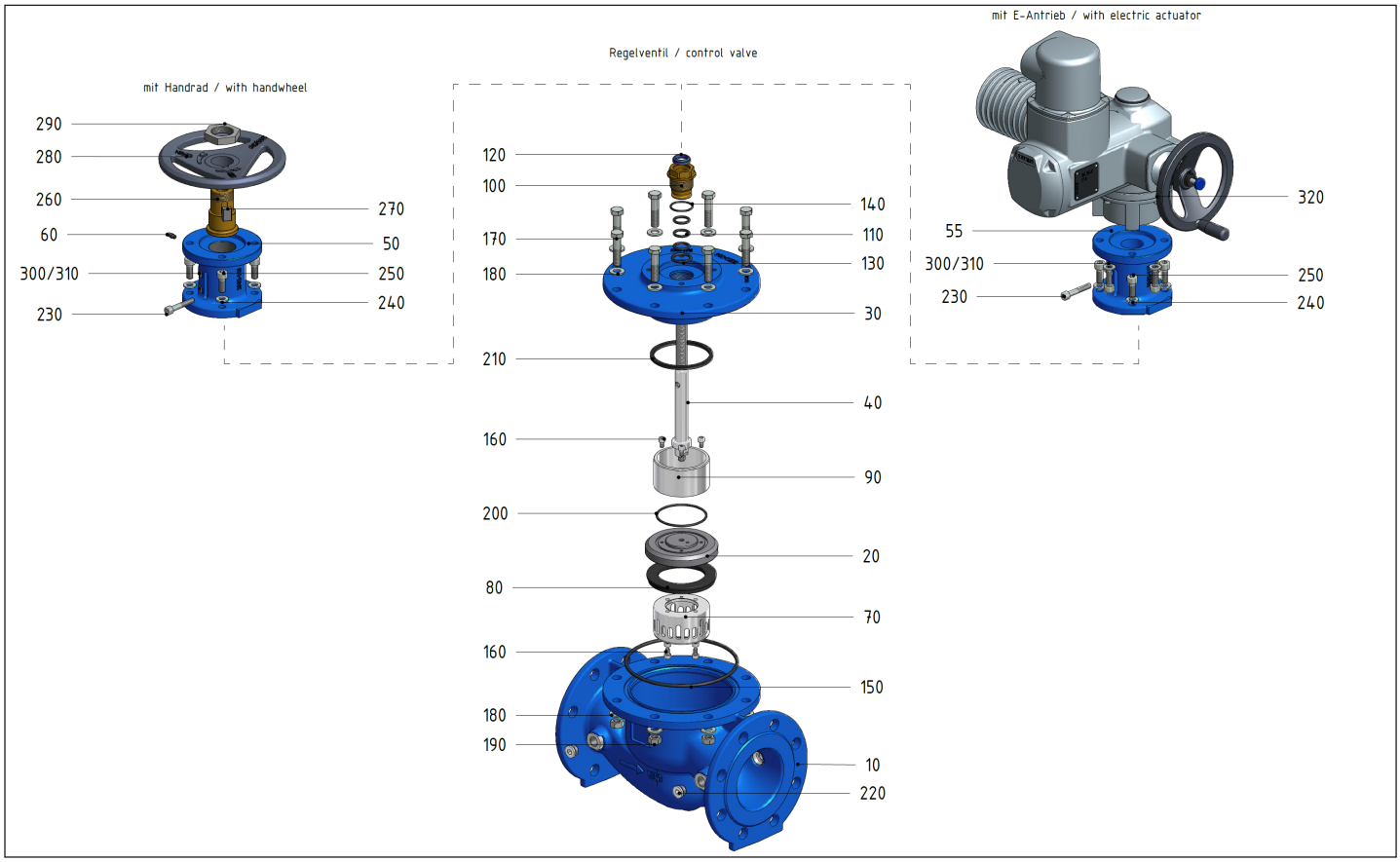


Figure 9: Overview of parts

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

7.3 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“7.3.1 Design” and/or to the separate spare parts list.

7.3.1 Design

7.3.2 Recommendations for the replacement of parts

For all work described below it is understood that prior to its enactment, the pipeline has been depressurised and the actuator has been de-energised. In addition to this, VAG’s general installation and operating instructions must be observed.

7.3.3 Replacement of seals

1. Open the VAG DURA Control Valve completely.
2. Remove the hexagon socket head cap screw (230).
3. Remove the hexagon socket head cap screws (250).
4. Variety with handwheel: Turn the yoke (50) with stem nut (260) and handwheel (280) off the stem. Attention: Left-hand thread. Variety with electric actuator: Unfasten the hexagon head cap screws between the electric actuator and output drive A (320) and remove the electric actuator. Turn the yoke (55) with assembled output drive off the stem. Attention: Left-hand thread.
5. Unfasten the hexagon head cap screws (170) of the bonnet. Keep the nuts, screws and washers in a safe place.
6. Pull the stem (40) with retaining ring (20) and cylinders (70, 90) out of the bonnet.
7. Unfasten the hexagon socket head cap screws (160) on the slotted cylinder (70) and the pressure-balanced cylinder (90). Replace the profiled sealing ring (80) and O-ring (200) with new parts. As the retaining ring (20) is chambered, you may have to use a screwdriver to remove the profiled sealing ring (80).
8. Screw the slotted and the pressure-balanced cylinders (70, 90) together again with the retaining ring (20).
9. Using a 36 mm (across-flats jaw size) wrench, turn the stem bearing (100) out of the bonnet (30).
10. Remove the O-rings (110, 130, 140) and the wiper ring (120) and clean the stem bearing (100).
11. Grease the O-rings on the inside (110) and on the outside (130,140) and assemble them. Assemble the wiper ring (120) and screw in the stem bearing (100).
12. Remove the quadring (210) from the bonnet (30). Clean the groove, thoroughly grease the quadring (210) and assemble it.
13. Place the bonnet (30) with the greased stem bearing (100)

Designation	Item	Size	Tigthening torques [Nm]	Width across flats
Hexagon socket head cap screw	160	M6	5	5
	250	M10	25	8
Hexagon head cap screw	170	M10	25	17
		M12	40	19
		M16	80	24

onto the stem (40). Carefully lower the bonnet, making sure not to jam it. The quadring must slide over the pressure-balanced cylinder smoothly and without the use of excessive force.

14. Turn the yoke (50, 55) onto the stem and fix it using the hexagon head cap screws.

Problem	Cause	Remedial action
Valve does not close	An object is jammed between the sealing seat and the plug	Remove object
Valve cannot be operated	Foreign body jammed in the seat area	Purge the valve, dismantle it, if required, and remove foreign body
	Electric actuator not yet connected to power supply	Connect actuator to power supply
	Unfavourable flow and obstruction of movement	Change installation position (see Section 4.3)
Body seat leaky	Valve not yet completely closed	Close valve completely
	Profiled sealing ring damaged or worn	Replace profiled sealing ring
Desired flow rate is not reached	Operating data have been changed	Check the design and/or operating data; change flow resistance in valve, if necessary, by using other installations
	Wrong slotted cylinder type selected	
	Slotted cylinder may be clogged	
Flow rate too high	Operating data have been changed	Check the design and/or operating data; change flow resistance in valve, if necessary, by using other installations
	Wrong slotted cylinder type selected	
Cavitation in the valve	Operating data have been changed	Check the design and/or operating data; change flow resistance in valve, if necessary, by using other installations
	Valve operates outside its design limits	

15. Insert the bonnet with its inner parts into the body and align so that the threaded boreholes and bonnet screws (170) engage. While doing so, observe the torques specified below.

7.3.4 Bolt tightening torques

8 Trouble-shooting

For all repair and maintenance work, please observe the general safety instructions described in Section 7.1!

9 How to contact us

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