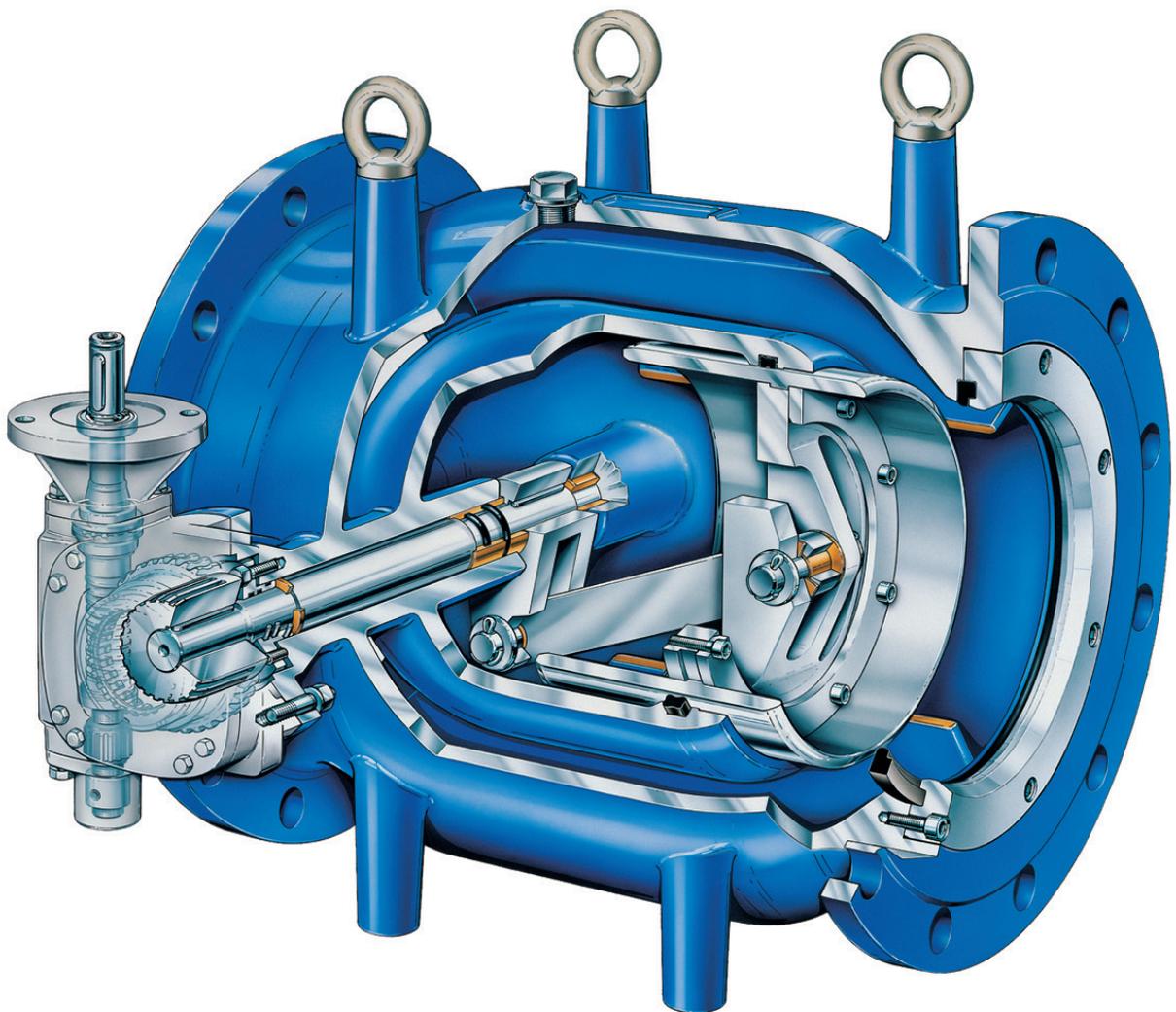


VAG RIKO® Plunger Valve



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VAG reserves the right to make technical changes and use materials of similar or better quality without ex-press notice. The pictures are non-binding.

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. national standards). The installation must only be carried out by qualified staff (see also Section 7.1 General safety instructions). For further technical information such as dimensions, materials or applications, please refer to the respective as built documentation.

VAG valves are designed and manufactured to the highest standards and their safety of operation is generally assured. However, valves may be potentially dangerous if they are operated improperly or are not installed for their 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 (also Accident Prevention Regulations and ANSI Z535).

Before removing any protective devices and/or performing any work on the valves, depressurize the pipeline section and ensure it is free of hazards. Unauthorized, unintentional and unexpected actuation as well as any hazardous movements caused by stored energy (pressurized 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.

If a valve serving as an end-of-line valve is to be opened in a pressurized pipeline, this should be done with the utmost care to prevent the emerging fluid from causing damage. Care must also be taken when closing the valve in order not to crush any limbs.

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 residue which may continue flowing.

These Operation and Maintenance Operation Instructions contain important information on the safe and reliable operation of the VAG RIKO® Plunger Valves.

Observing these Operation and Maintenance Instructions helps you to:

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

1.2 Proper use

The VAG RIKO® Plunger Valve is a control valve designed for installation in pipelines or for installation at the end of the pipeline

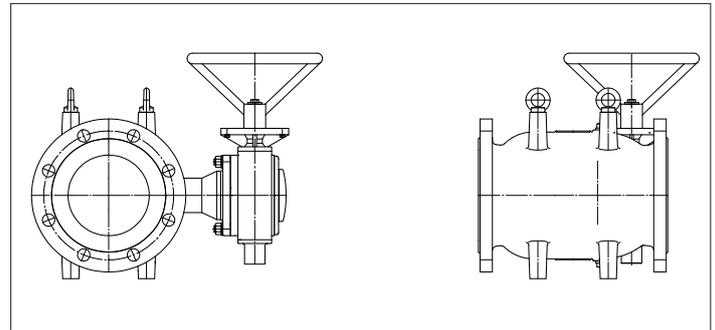
in dam installations. Plunger Valves are designed to fulfil special control functions in water supply systems. The technical application limits (e.g. working pressure, medium, temperature etc.) are described in the product-related documentation (KAT 2014-A).

For any deviating operating conditions and applications the user must obtain the manufacturer's prior written approval.

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- Improve the operational safety and useful life of the equipment.



Picture 1: Preferred transport position

1.3 Identification

Every valve is marked with the body material and the manufacturer. The name plate on the body provides the following information:

VAG Name of manufacturer

Valve type

Valve size [inch]

Pressure class

Control insert type

PS max. admissible operating pressure

Material of the body

Date of manufacturing

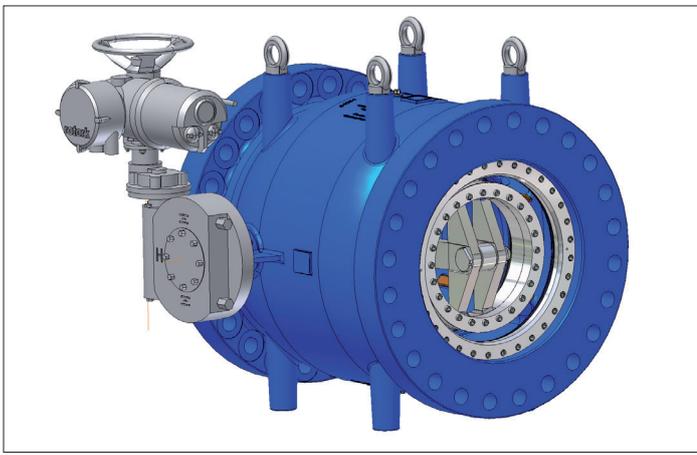
2 Transport and Storage

2.1 Transport

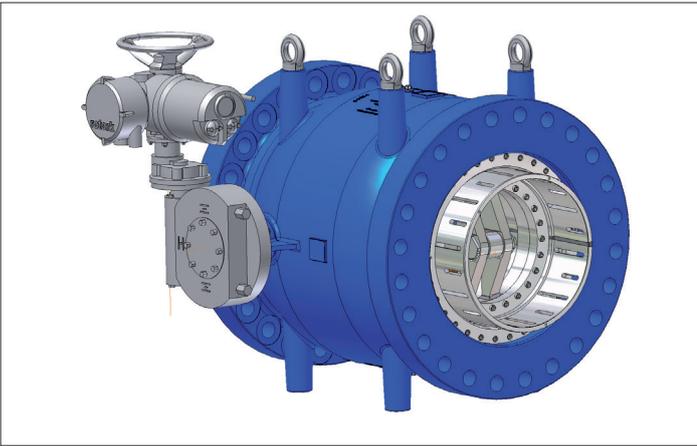


To transport the valve to its installation site, it must be packed in a stable, properly sized container. The container also needs to ensure that the valve is protected against weather influences and damage. When the valve is transported long distance (e.g. overseas) and exposed to special climatic conditions, it needs to be protected by sealing it in plastic wrapping and adding a desiccant.

The RIKO® Plunger Valve needs to be transported with the feet on the floor (see picture 1). The factory-applied corrosion protection coating and mountings (e.g. gearbox or electric actuator) need to be specially protected.



Picture 2: Standard version -Type E



Picture 3: Version SZ (with slotted cylinder)

If the valve is equipped with actuators, it must be made sure that the actuators are safely stored/anchored and that the connections are not exposed to shunt loading.

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 center of gravity of the entire unit must be taken into account. The center of gravity is marked on each side of the crate at our factory and must be considered for all lifting operations.

2.2 Storage

The RIKO® Plunger Valve is to be stored horizontally on its feet (see picture 1). The valves should be stored in a dry, well-ventilated area. The direct exposure of the valves to radiation heat emitted by radiators should be avoided. The assemblies and components relevant for proper function of the valve, such as plunger must be protected against dust and other kinds of dirt by appropriate covers.

The valves have to be stored in a dry location, protected from dirt and accidental damage. Protection caps and wrapping material around the connection parts have to be removed immediately before installation. Lifting gear such as ropes and belts must be attached only to the body or the eye-bolts of the valve, not to the actuator or gearbox.

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 -5° F to + 120° F (protected by adequate covers). If the valve is stored at temperatures below +32° F, it should be warmed up to at least +40° F before installation and before it is put into operation.

3 Product features

3.1 Features and function description

Plunger Valves are designed to fulfill regulating functions in the water supply. Unlike butterfly or gate valves assuming only shut-off functions in pipeline systems, plunger valves meet the special requirements of regulating operations. The compact and single-piece body is made of high quality ductile iron. Up to 24" dia. all inner parts are made of stainless steel. An essential advantage is the new piston guide: armor-coated with bronze.

New sealing systems for pistons, shaft bearings and seats guarantee a good corrosion protection and high performance.

3.2 Applications

As the seals of the VAG RIKO® Plunger Valve are made of EPDM materials, the valve can be used with the following media:

- Water, raw water, cooling water,
- Air
- Hydropower stations
- Dams
- Drinking water reservoirs
- Man-made reservoirs
- Storm water retaining basins

If the valve is used with media containing oil or gas, this may destroy the EPDM O-rings and therefore the use with such media is not permissible. If the valve is to be operated under deviating operating conditions and in other fields of application, the manufacturer must be consulted.

3.3 Performance limits

VAG RIKO® Plunger Valves are designed for regulating the flow rate. During operation, the cavitation limits have to be observed according to calculation diagram of the VAG UseCAD®.

The cavitation value is calculated as follows, when the pressure values at upstream and downstream side of the valve as well as the flowrate are known:

Calculating the σ - Value:

$$\sigma = \frac{H_2 + H_{At} - H_d}{(H_1 - H_2) + \frac{v^2}{2 * g}}$$

H1 = overpressure at entry of the valve (mWS)

H2 = overpressure at exit of the valve (mWS)

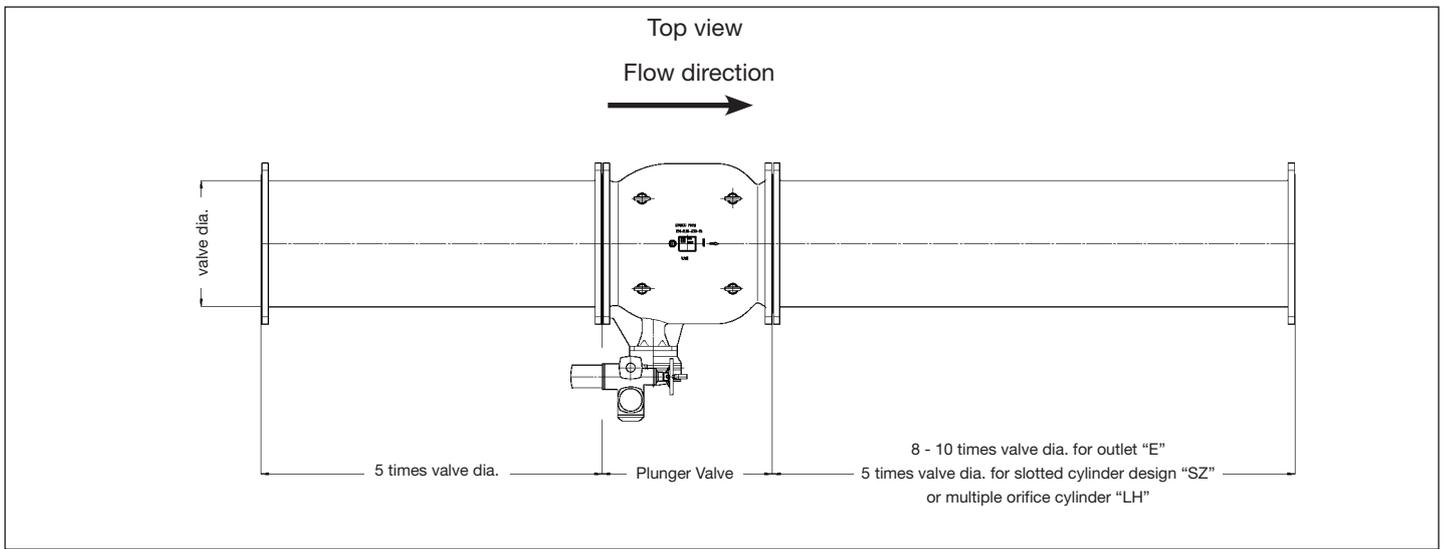
HAt = atmospheric pressure (mWS)

Hd = evaporating pressure (mWS)

v = flow rate in the pipe (m/s)

g = standard acceleration of free fall (m/s²)

VAG RIKO® Plunger Valves are dimensioned correctly when the calculated σ - value lies above the limit curves of σ_K . We recommend a control range between 10-100% opening. Below there is no reliable control function. However, if during commissioning banging noises or severe vibration occurs, then the actual operating conditions have to be checked. It may be necessary to re-



Picture 4: Arrangement of the VAG RIKO® Plunger Valve

place the cylinder because of differing operating conditions. If the calculated σ - value lies under the limit curves of σ_K cavitation will occur. The following remedies may help:

- replacing the orifice or slotted cylinder
- altering the back pressure
- installing the valve in another place



If the calculated σ - value lies above the limit curves of σ_K there must be another cause for the noise. The whole pipeline should be checked.

3.4 Permissible and impermissible mode of operation

The maximum operating temperatures and pressures stated in the technical documentation (KAT 2014-A) must not be exceeded. The closed valve must only be exposed to the rated pressure.



The maximum permissible flow velocity is that according to ANSI standard. In addition to this, the Valve may be operated at flow velocities of up to 16 ft/s irrespective of the pressure level. Exceptions are the application in bottom outlets of dams. For installations in bottom outlets of dams with free discharge, the maximum permissible flow velocity is 50 ft/s.

4 Installation into the pipeline

4.1 Conditions required on site

While installation on pipeline flanges the flanges/pipelines must be plane parallel and in true alignment. Misaligned pipelines must be aligned before the valve is installed as otherwise the pipeline will be exposed to impermissibly high forces during operation. It may be useful to install a lockable dismantling piece which eliminates and/or transmits the axial pipeline forces. In some installation situations it needs to be ensured that a removable intermediate or dismantling piece of sufficient length is provided which allows the installation and/or dismantling of the VAG RIKO® Plunger Valve from the pipeline.

In case of civil or construction works around the valve causing dirt (e.g. painting, masonry or working with concrete), the valve must be protected by adequate covering. Special attention needs to be paid to the welded-on sliding rails surfaces located on the cylindrical pipe of the valve body, on which the rear sliding shoes

run. Make sure that they are perfectly clean. This surface should not be greased to prevent caking of dirt.

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 place of installation for the valve must be selected in a way that ensures there is enough space to allow function checks and maintenance work (e.g. dismantling and cleaning of the valve).

For open-air installation, the valve must be protected against extreme weather conditions, such as the formation of ice, by covering it appropriately.

To ensure proper function and a long service life of the valve, several factors need to be considered for the best place of installation.



Attention: Pressure on the closed valve must not exceed its nominal pressure (see KAT-A 2014).

Installed equipment in the pipeline upstream and downstream of the VAG RIKO® Plunger Valve (see picture 4):

When using polluted mediums a filter with a suitable mesh size has to be provided upstream of the valve to sustain the function of the control valve.

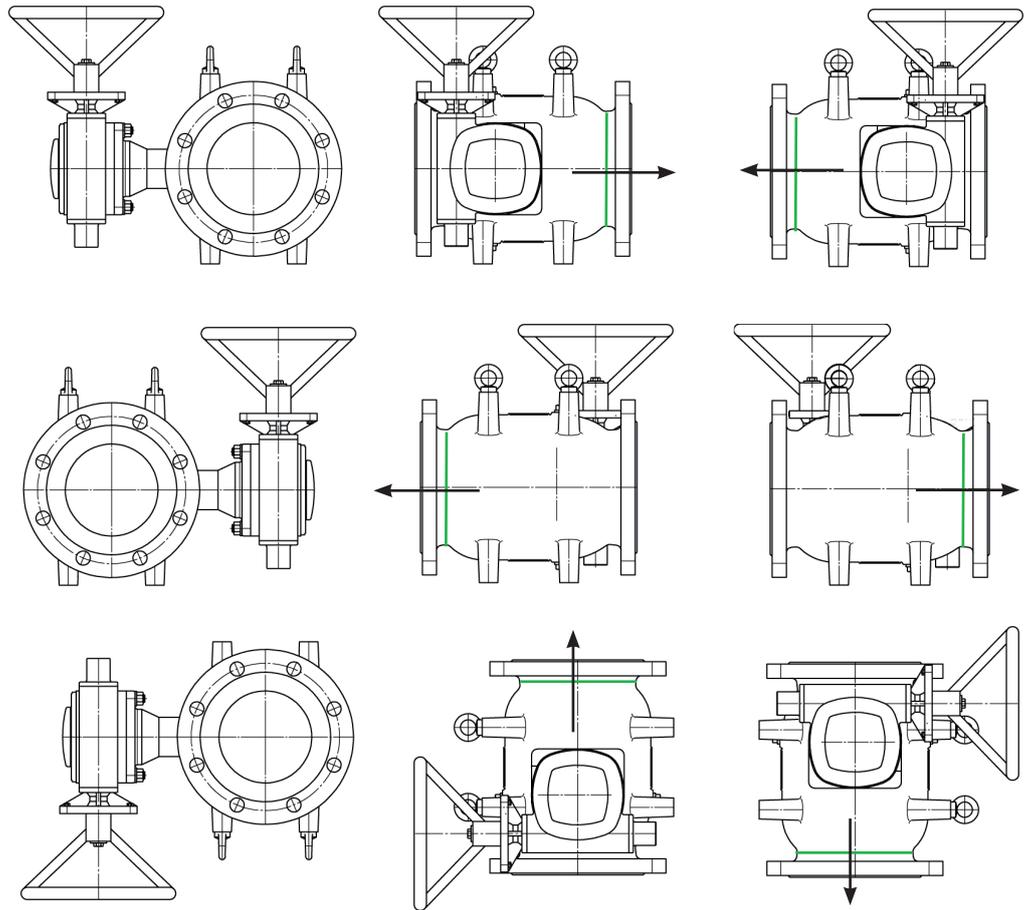
Avoid installing an inspection valve, elbows, T-pieces and Y-filters directly upstream of the VAG RIKO® Plunger Valve (5 times valve dia.) as this may cause irregular upstream flow and thus disturb the function of the control valve.

When installing the Plunger Valve as a control valve in a closed pipeline, it has to be strictly observed that a straight outlet section is provided downstream of the Plunger Valve, i.e.:

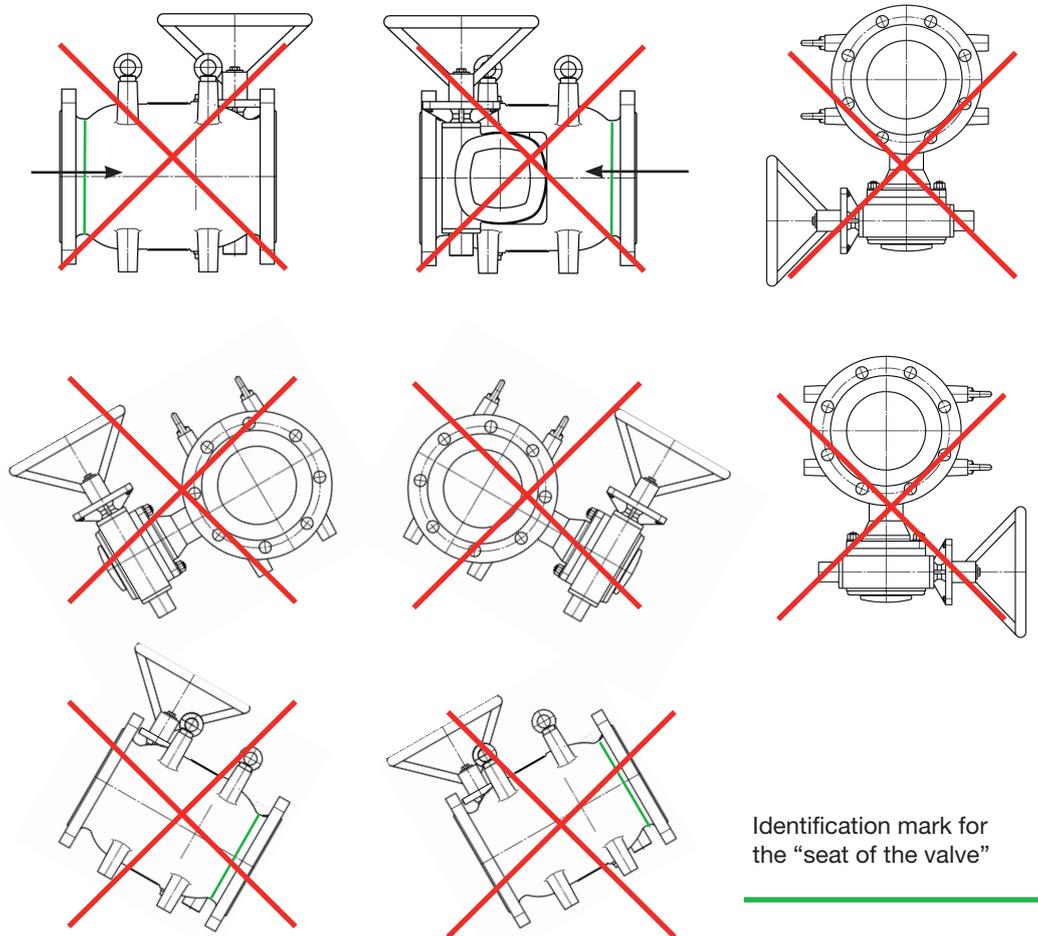
- for version with outlet type "E", the length of this section should be 8 - 10 times valve diameter.
- for version with multiple orifice or slotted cylinder, this length should be minimum 5 times valve diameter.

This means that fittings like elbows, T-pieces, Butterfly Valves, Non-return Valves or Y-filters must not be installed within this pipe section. By this the turbulent flow in the flow profile influenced by the Plunger Valve can be calmed. If these preconditions cannot be

permissible



impermissible



Identification mark for the "seat of the valve"

Picture 5: Permissible / impermissible positions of installation and flow directions

fulfilled, one has to expect with more noise and damages at the corresponding components. Avoid arranging diffusers on the outlet side. In this case, VAG RIKO® Plunger Valves can be factory-mounted with a sudden enlargement. If the distances required for inlet and outlet zones cannot be complied with this way, this may result in disturbances of the plant or inferior control behavior.

- The temperature limits for the flow medium must not be exceeded.
- The nominal pressure is the max. pressure to be applied on the closed valve.
- Extending the operating elements is not allowed, by e.g. levers.

4.3 Position of installation

VAG RIKO® Plunger Valves can be installed in the vertical as well as in the horizontal position. The valve will not operate in any other pipeline position (see picture 5).

The flow-through direction arrow has to be observed. Pay attention to the direction of operation arrow on the valve body.

4.4 Assembly instructions and fittings

Before the valve is installed, it must be checked for transport or storage damage. While being stored on the construction site before its installation, the valve must be protected against dirt by an appropriate cover. When the valve is installed it must be free of dust and dirt. VAG does not assume any liability for consequential damage caused by dirt, grit etc.

The proper motion and function of the function parts should be checked before installation.

If the valves are painted later on, it must be made sure that the function parts are not painted over.

For the assembly of the VAG RIKO® Plunger Valve it needs to be ensured that suitable lifting devices are available.

The valve may only be suspended using its eye bolts. If the valve is suspended using any other parts, this may damage or even destroy the valve.

When the valve is connected to the pipeline flanges, the hexagonal screws and bolts used in the bore holes must be screwed in using washers from flange to flange.

The screws must be fastened crosswise to prevent unnecessary tension and cracks or breaks that may result.

This will guarantee a regular pressure on the gaskets and thus the leak-proofness of the flange connection.

The pipeline must not be pulled towards the valve. If the gap between the fitting and the flange is too large, this must be compensated by using thicker seals. VAG recommends using steel-reinforced rubber seals.

Please note, the pipeline flanges to be connected to the valve have to be aligned in axial and in parallel position.

Any remedial welding work carried out on the valve should be completed before installation of the valve, in order to prevent damage to the gaskets or to the valves protective coating. Remove any welding splashes before putting the valve into service.

The pipeline installation has to be carried out in such a way that no harmful strains occur upon the valve body. In the event that continued installation occurs near or above the valve, the valve has to

be covered for protection from accidental damage.

Should repainting of the installation be required, make sure that no name or type plates are covered by the paint. If the installation is blasted before painting, these plates have to be covered for protection. If any detergents are used for cleaning, ensure that no detergent damages the gaskets of the pipeline or of the valve.

5 Set-up and operation of the valve

5.1 Visual inspection and preparation

Before putting the valve and the equipment into operation, all functional parts must be subjected to visual inspection. All screwed connections need to be checked as to whether they are tightly fastened.

Before taking a new installation into operation and especially after preparation works, open the valves completely and purge the pipeline system. When using cleaning or disinfecting agents, take care that these do not attack the materials of the valve. Valves are generally closed by turning the gear wheel clockwise.

Shafts and drives are designed in that way that the valves can be operated by a person via a handwheel. Extensions for operation are not admitted as they may cause damages on the valve by over tension. The 90° movement of the disk is limited by a limit stop in the actuator or gearbox. Excessive forced movement beyond the limits will cause damage. Check the proper functioning of the valve by opening and closing it a few times.

5.2 Function check and pressure test

Before the installation of the valve, its function parts should be completely opened and closed at least once and their proper running should be tested.



Caution! When closed, the Valve must only be exposed to pressures not exceeding its nominal pressure. When a pipeline pressure test is performed during which the test pressure exceeds the permissible nominal pressure in the closing direction of the valve, the pressure compensation must be effected via a bypass.



Warning! The pressure exerted on the closed valve must not exceed its maximum admissible operating pressure (see technical data sheet KAT-A 2014).

Carefully purge all newly installed pipeline systems in order to remove any foreign particles. Should residues or dirt particles be in the pipeline they may clog installations such as multiple orifice cylinders or slotted cylinders when the pipeline is flushed. This may have a negative effect on the function of the valve or even block it completely.

6 Actuators

6.1 General

The adjustment of the limit stops (OPEN, CLOSE) must not be changed without the manufacturer's consent.

For detailed information on gears and actuators, please refer to the operation manuals issued by the manufacturers of these components (e.g. AUMA, Rotork). In some cases the manuals need to be obtained by the user himself.

The cylindrical sleeve of the VAG RIKO® Plunger Valve travels axially and its travel is limited by the “setting of the actuator” when the valve is in open position and by the seat ring with seal when the valve is in closed position.

Limit position and torque adjustment are to be made according to the operation manuals provided by the respective manufacturers of the electric or hydraulic actuators.

Non-compliance with these regulations may result in danger of life and limb and/or cause damage to the pipeline system. If actuators powered by external sources of energy (electric, pneumatic or hydraulic) have to be disassembled from the valve, the safety instructions under Section 1.1 need to be observed and the external source of energy must be switched off.

6.2 Operating torques

Operating torques are the maximum required torques ft/lbs acting on the actuator stem at full differential pressure including a safety factor of 1.5. If required, you can contact us for information about the respective torques and/or controlling torques for electric actuators.

6.3 Assembly of the electric actuator

The electric actuator is mounted to the input flange of the gear. The actuator size is selected according to the maximum actuation elements.

The valve is switched off

- position-dependent in Open position

- position-dependent in Closed position

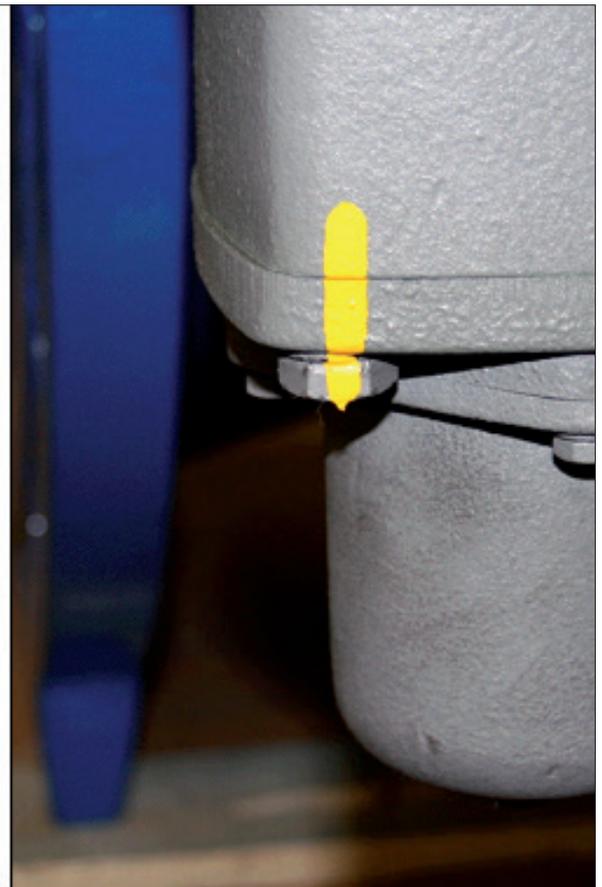
The switching points are factory-adjusted. The torque switches serve as overload protection in the intermediate positions. If the valve is retrofitted with an electric actuator, the position switches have to be adjusted after the actuator has been mounted. For the adjustment procedure, please refer to the operating manual issued by the manufacturer of the electric actuator.

The relevant safety regulations and the instructions of the manufacturer of the electric actuator must be observed.

When the items are delivered, the adjustment screws and the connection bolts of the gear and the electric actuator are sealed with labels and/or identified by color markings. The removal or breaking of these identifications will result in the loss of the manufacturer's warranty. If foreign matter gets stuck while the valve is being operated, the torque switch for the respective direction is activated and switches the motor off. Then the electric actuator can no longer be started in this position. First, the valve must be inspected and then it must be operated in the opposite direction.

Operation in inching mode is permissible as described below:

If the torque switch responds in intermediate position, the valve must be operated in opposite direction until the torque switch completely returns to its resting position. Only then must the valve be operated in the direction in which the malfunction occurred. By this procedure, the torques are reached which correspond to the torques adjusted at the torque switch. Additionally, the foreign matter may come loose and be washed out of the seat area.



Picture 6: Gearbox markings

Emergency manual operation (handwheel):

If the valve is operated via the handwheel of the electric actuator, the torque switches do not have any safety function. If foreign matter is jammed while the valve is in intermediate position, the higher operating forces required may damage the actuator components – especially in case of high reduction gearing.



Attention: If you feel resistance during manual emergency operation of the valve, turn the handwheel into the opposite direction by making several turns, before turning it back into the direction in which the malfunction was identified (washing out of foreign matter). Operate the valve very carefully, avoiding excessive force, and flush the pipeline, if necessary.

7 Maintenance and repair

7.1 General safety instructions

Prior to any inspection and maintenance work to be performed on the valve or mounted parts and attachments, the pressurized pipeline must be shut off, the pressure must be relieved and the system must be secured against unintentional switching on. Depending on the kind and criticality of the medium or fluid conveyed, all the required safety regulations must be complied with!

Upon completion of the maintenance work and prior to resuming operation, all connections must be checked for proper fastening and leak-freeness. The individual steps as stated under Section 5 need to be performed.

Please note, a plunger valve is not self-locking. Therefore neither the drive nor the gear must be dismantled while the valve is pressurized. This section also applies when the valve is completely dismantled.

7.2 Inspection and operation intervals

The valve should be checked for tightness, proper operation and corrosion protection “at least once per year”.

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

For inspection and maintenance work, no protective devices must be removed before the pipeline section in which the valve is installed has been shut off and depressurized.

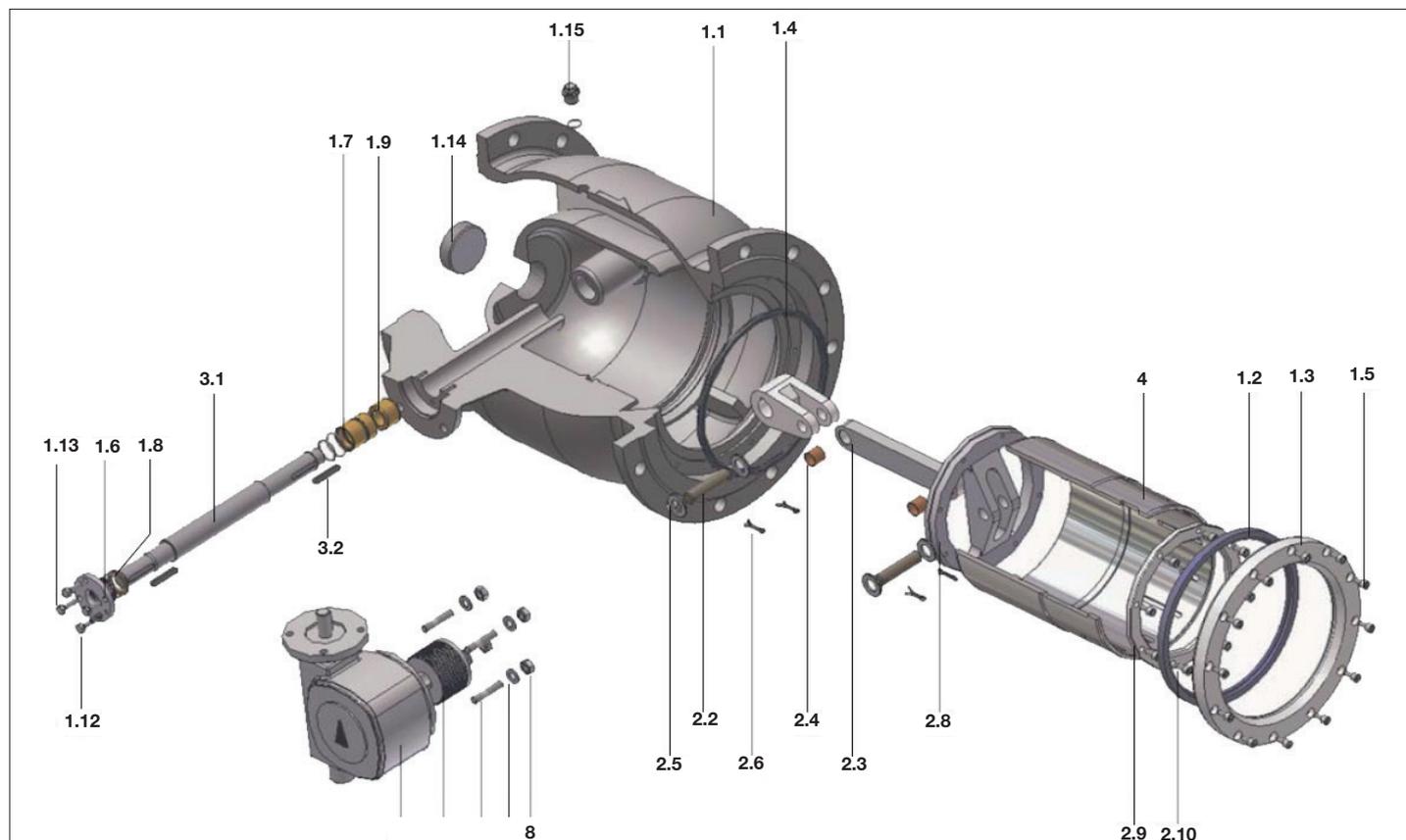
- Check the exterior condition of the valve including its actuator, clean if necessary and repair damaged places.
- Check the flanges for leak-freeness.
- Check whether the valve and actuator run smoothly and operate over the entire travel, if possible (see Section 4).
- Check the body seal for tightness.
- Check the gearbox connections for tightness.
- Clean the working surfaces.
- Check the condition of the cardan shafts and liners.

We recommend operating the valve at regular intervals (several times per year) over its entire travel (open – close) to prevent deposits accumulating on the slide faces of the cylindrical sleeve.

7.3 Maintenance work and replacement of parts

The required spare parts and the parts subject to wear and tear can be found in the order-related documentation.

7.3.1 Design



Picture 7: VAG RIKO® Plunger Valve design and parts

Pos.	Description	Material	Spare part
1.1	Body	Ductile Iron A536 Gr. 60-40-18	
1.2	Profile sealing ring	EPDM	X
1.3	Retaining ring	Stainless Steel Type 304/316/CA6-NM	
1.4	Quad O-ring	EPDM	X
1.5	Hexagon socket head cap screw	Stainless Steel Type 316	X
1.6	Bearing flange	Ductile Iron, A536 Gr. 60-40-18	
1.7	Bearing Bushing	Bronze	
1.8	Thrust washer	Bronze	X
1.9	Counter Bearing Bushing	Bronze	
1.10	O-ring	EPDM	X
1.11	O-ring	EPDM	X
1.12	Hexagon cap screw	Stainless Steel Type 316	
1.13	Threaded pin	Stainless Steel Type 316	
1.14	Plug	Fabricated Steel, A283M Gr. D	
1.15	Screw plug	Stainless Steel Type 316	X
2.1	Crank	Stainless Steel Type 304/316 (size 6"-24")	
2..1*	Crank from DN 700	Ductile Iron A536 Gr. 60-40-18 (size 28"-78")*	
2.2	Crank bolt	Stainless Steel Type 420/431/DUPLEX	
2.3	Piston rod	Stainless Steel Type 304/316 (size 6"-24")	
2.3*	Piston rod from DN700	Ductile Iron A536 Gr. 60-40-18 (size 28"-78")*	
2.4	Cylinder bearing	Bronze / PTFE	X
2.5	Washer	Stainless Steel Type 316	
2.6	Split pin	Stainless Steel Type 420	X
2.7	Thrust washer	Bronze	X
2.8	Piston rod bearing DN150...250	X20 Cr13 (1.4021)	
2.8 ^{*1}	Piston rod bearing DN300...600	Stainless Steel Type 304/316 (size 6"-24")	
2.8 ^{*2}	Piston rod bearing from DN 700	Ductile Iron A536 Gr. 60-40-18 (size 28"-78")*	
2.9	Retaining ring piston rod bearing	Stainless Steel Type 304/316/CA6-NM	
2.10	Hexagon socket head cap screw	Stainless Steel Type 316	X
3.1	Crank shaft	Stainless Steel Type 420/431/DUPLEX	
3.2	Key	Stainless Steel Type 304	
4	Plunger	Stainless Steel Type 304/316/CA6-NM	
8	Gear box nut	Stainless Steel Type 316	

Table 1 * Stainless Steel option upon request

7.3.2 Replacing the profile sealing ring (Position 1.2)

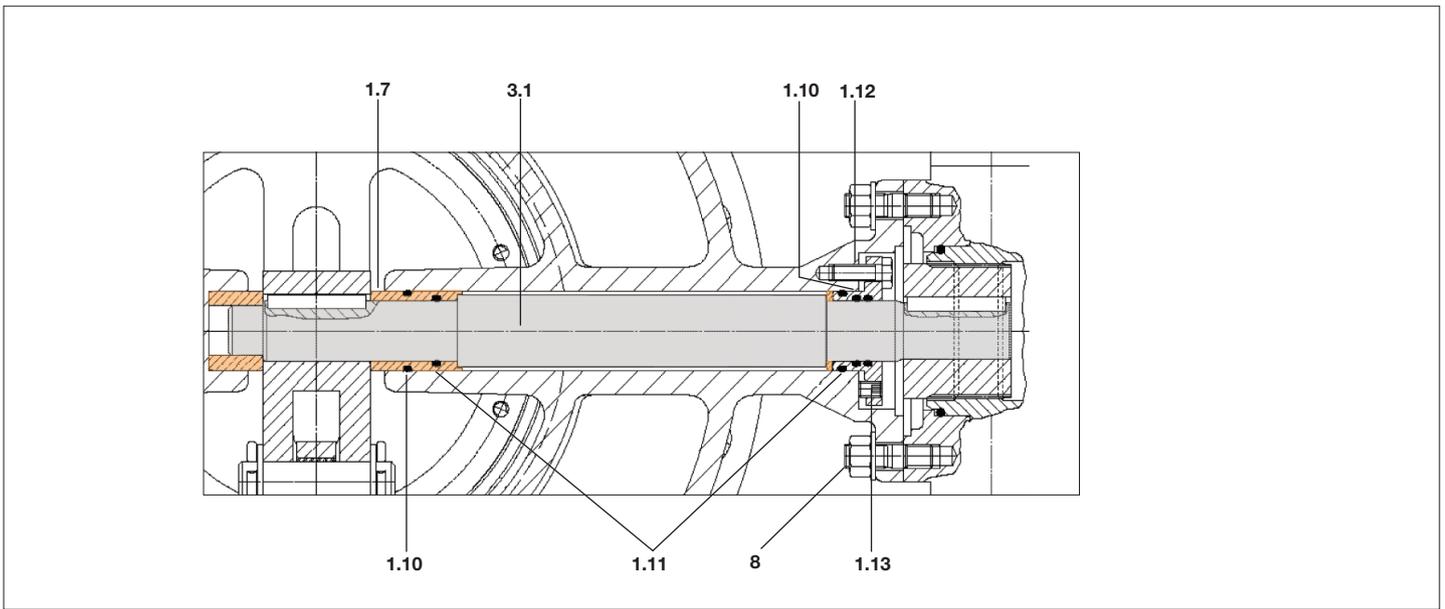
- Open the VAG RIKO® Plunger Valve completely up to the limit stop.
- Unscrew the hexagon socket head cap screws (1.5) and the retaining ring (1.3).
- Clean the parts thoroughly.
- Replace the profile sealing ring (1.2).
- Apply a thread locking substance on the hexagon socket head cap screws (1.5) and tighten them according to table 4.

7.3.3 Replacing the quad O-ring (Position 1.4)

- Dismantle the VAG RIKO® Plunger Valve as described in 7.3.2.
- Unscrew the hexagon socket head cap screws (2.10) within the plunger piston.
- Remove the retaining ring / push rod bearing (2.9).
- Remove the plunger (4). The crank drive (crank, piston rod and piston rod bearing) remains in the valve.
- Clean the parts thoroughly.
- Replace the quad O-ring (1.4).
- Re-assemble in reverse order. Tighten the screws according to table 2.

7.3.4 Replacing the O-rings (Position 1.10 and 1.1)

- Dismantle the VAG RIKO® Plunger Valve as described in 7.3.2.
- Unscrew the gear box nuts (8).
- Unscrew the hexagon cap screw (1.12) and remove the bearing flange (1.6).
- Remove the crank shaft (3.1) together with the thrust washer (1.8).
- Remove the bearing bush (1.7).
- Clean the parts thoroughly.
- Replace the O-rings (1.10 and 1.11).
- Re-assemble in reverse order. Tighten screws according to table 4.
- Observe the position of the bearing bush (1.7). The shoulder of the bearing bush must show towards the gear box.
- Attention: Insert the hexagon cap screws (1.12) only to adjust the shaft with the bearing.
- Tighten the screwed connection with the threaded pins (1.13).
- Continue re-assembling in reverse order.
- Re-install the gear box.
- Tighten the gear box nuts (8) according to table 2.
- Re-adjust the limit stops of the gear. (See operating instructions for AUMA worm gears)



Picture 8: 7: Detail view

7.3.5 Tightening torque for the screws in ft/lbs

DN	M6	M8	M10	M12	M16	M20	M24	M30	M36	M42	M48
1.5 Cylinder screw, retaining ring, body	4	7	15	26	60	120	222	-	-	-	-
1.12 Hexagon cap screw, bearing cover	3	6	11	18	44	88	-	-	-	-	-
1.13 Threaded pin, bearing cover	3	6	11	18	44	-	-	-	-	-	-
2.10 Hexagon socket head cap screw, retaining ring, piston	4	7	15	26	60	120	222	430	740	1180	1850
8 Nut, gear box	-	-	26	44	110	214	370	700	1220	-	-

Table 2

8 Trouble-shooting

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

Problem	Possible cause	Remedial action
Valve makes noise	Unfavorable installation position and thus unfavorable flow at the valve (e.g. installed too closely behind the elbow)	Change installation position (cf. Section 4.3)
	Valve operating beyond the design limits	Check design and/or operational data; if required, change resistance in valve by using other trims.
Valve cannot be operated	Foreign particle jammed in the seat area	Flush valve; if required, disassemble valve and remove foreign object
	Gear blocked	Dissolving the blockage
	Electric actuator not yet connected to power supply	Connect to power supply
	Unfavorable flow at the valve and obstruction of the movement	Change installation position (cf. Section 4.3)
Leaks in the body seat	Valve not completely closed yet	Close valve completely
	Valve sealing damaged or worn	Replace sealing ring
Desired flow volume is not reached	Operational data have been changed	Check design and/or operational data; if required, change resistance in valve by using other trims.
	Dimensions of multiple-orifice or slotted cylinders too small.	
Flow volume is too high	Multiple-orifice or slotted cylinders optionally are clogged.	Flush valve; if required, disassemble valve and remove foreign object
	Operational data have been changed	Check design and/or operational data; if required, change resistance in valve by using other trims.
Dimensions of multiple-orifice or slotted cylinders too large		
Desired back pressure is too high	Operational data have been changed	Check design and/or operational data; if required, change resistance in valve by using other trims.
	Dimensions of multiple-orifice or slotted cylinders too large	
Cavitation in the valve	Valve operating beyond the design limits	Check design and/or operational data; if required, change resistance in valve by using other trims.
	Operational data have been changed	

9 How to contact us

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