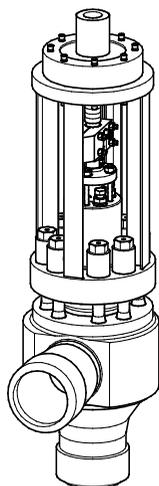
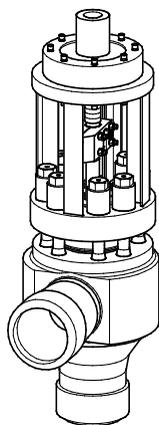


Control valve

# ZK 213



# Contents

<b>Foreword</b> .....	<b>3</b>
Availability.....	3
Formatting features in the document .....	3
<b>Safety</b> .....	<b>4</b>
Use for the intended purpose .....	4
Basic safety notes .....	4
Qualification of personnel.....	6
Protective gear .....	6
Typographic features of warning notes.....	6
Formatting features for warnings of property damage .....	6
<b>Description</b> .....	<b>7</b>
Scope of supply and equipment specification .....	7
Task and function.....	14
<b>Storing and transporting the equipment</b> .....	<b>16</b>
Storing the equipment .....	16
Transporting the equipment .....	17
<b>Mounting and connecting the equipment</b> .....	<b>18</b>
Preparing installation .....	18
Connecting the equipment .....	19
Checking the function .....	20
<b>Operating the equipment</b> .....	<b>21</b>
<b>After operation</b> .....	<b>21</b>
Maintaining the equipment.....	23
Purging the equipment.....	24
Disassembling the equipment.....	26
Assembling the equipment.....	40
Servicing the equipment and installing spare parts .....	57
<b>Troubleshooting</b> .....	<b>58</b>
<b>Putting the equipment out of operation</b> .....	<b>59</b>
Removing harmful substances.....	59
Removing the equipment .....	59
Disposing of the equipment.....	61
<b>Technical data</b> .....	<b>61</b>
Dimensions .....	61
Weights .....	61
Fluid flowrate and differential pressure.....	61
Pressure & temperature ratings.....	61
<b>Manufacturer's Declaration</b> .....	<b>62</b>

## Foreword

This installation & operating manual (IOM) will help you use the control valve ZK 213 and its variants (referred to as "equipment" in this document) safely and efficiently for its intended purpose.

This installation & operating manual is intended for anyone commissioning, using, operating, servicing, cleaning or disposing of this equipment and, in particular, for professional after-sales service technicians, qualified personnel and authorised and trained staff.

All of these persons must read and understand the content of this installation & operating manual.

Following the instructions given in this installation & operating manual helps avoiding danger and increases the reliability and service life of the equipment. Please note that in addition to the instructions given in this installation & operating manual you must also observe all locally applicable rules and regulations concerning the prevention of accidents as well as approved safety guidelines for good professional practice.

## Availability

Keep this installation & operating manual together with the plant documentation for future reference. Make sure that this installation & operating manual is available to the operator.

The installation & operating manual is part of the equipment. Please hand over this installation & operating manual when selling the equipment or passing it on.

Keep the applicable documents specified on page 7 together with this installation & operating manual for future reference.

## Formatting features in the document

Certain text elements of this installation & operating manual feature a specific typographic design. You can easily distinguish the following text elements:

Standard text

*Cross-reference*

- ▶ Listing
  - ▶ Sub-items in listings
- Steps for action.



Here you will find additional useful information and tips serving to assist you in using the equipment to its fullest potential.

## Safety

### Use for the intended purpose

The equipment is designed for controlling and regulating the level, pressure and flowrate of fluids in heat and process control systems.

Correct use includes compliance with the instructions given in this installation & operating manual, in particular obedience to all safety instructions.

Indications and instructions stated in the applicable documents are part of this installation & operating manual.

Any other use of the equipment is considered to be improper.

Note that the equipment is also used incorrectly if the materials of the equipment are not suitable for the fluid.

The equipment is also considered to be used improperly if:

- ▶ the equipment is not in proper working condition when being used
- ▶ the equipment is used in operating conditions that exceed the pressure and temperature ratings and limits stated in this IOM and the applicable documents
- ▶ the equipment is retrofitted or modified without the written approval of the manufacturer
- ▶ the equipment is fitted with spare parts that are not approved by the manufacturer
- ▶ the equipment is provided with an actuator that is not approved by the manufacturer
- ▶ the equipment is operated or serviced by unqualified personnel.

The personnel must have the qualification and experience specified on page 6.

## Basic safety notes

### Explosion hazard

- ▶ Explosion risk if equipment is used that is not suitable for the environmental conditions. When using the equipment in explosion risk areas make sure that:
  - ▶ The permissible surface temperature of the equipment for the place of installation must not be exceeded.
  - ▶ If electrically insulated equipment is installed appropriate measures must be taken to discharge any static electricity between pipe flanges.
- ▶ The heat generated by friction caused by moving parts that do not run smoothly can cause explosions. Make sure that all moving parts can operate smoothly.
- ▶ When carrying out welding work in order to install or remove the equipment flying sparks may be generated that can cause fire or explosion. Observe any on-site regulations for fire and explosion prevention. Only qualified personnel is allowed to mount or remove the equipment or its components.

### Risk of severe injuries

- ▶ The equipment may become hot during operation. Do not operate the equipment unless thermal insulation or protection against accidental contact prevents you from touching hot surfaces.
- ▶ The equipment is under pressure during operation and may be hot. Before carrying out any work on the equipment make sure that the following requirements are met:
  - ▶ The pipes must be depressurized (0 bar).
  - ▶ The fluid must be completely removed from the pipes and the equipment.
  - ▶ During work on the equipment the installation must be switched off and protected against unauthorised or unintended activation.
  - ▶ The pipes and the equipment must have cooled down to room temperature (approx. 20 °C).

- ▶ If the equipment is used in contaminated areas there is a risk of severe injuries or death caused by harmful substances in or on the equipment. Before working on the equipment make sure that it is completely decontaminated. Always wear the protective clothing prescribed for contaminated areas when working on the equipment.
  - ▶ The equipment must only be used with fluids that do not attack the material and the gaskets and sealings of the equipment. Otherwise leaks may occur and hot or toxic fluid could escape.
  - ▶ The equipment and its component parts must only be mounted or removed by qualified personnel. A qualified person must be acquainted with and experienced in the following:

    - ▶ Making pipe connections.
    - ▶ Selecting suitable lifting gear and understanding the rules for its safe use.
    - ▶ Working with dangerous (contaminated, hot or pressurized) fluids.
  - ▶ If the admissible temperature and pressure limits are exceeded the equipment may be destroyed and hot or pressurized fluid may escape. This presents the risk of severe injuries or death. Make sure that the equipment is only operated within the admissible service range. For more information on pressure and temperature ratings see name plate or the supplied parts list.
  - ▶ The equipment may be damaged if the connection of the equipment with the pipe is not stable enough or the equipment is not sufficiently supported. Hot or pressurized fluid may escape. Only qualified personnel is allowed to install and connect the equipment.
  - ▶ If the support of the equipment during installation is insufficient the equipment might fall down, thereby causing bruises or injuries. Make sure the equipment is safely held in place during installation and cannot fall down. Wear the protective clothing specified for the place of installation.
  - ▶ If the stuffing box is leaking there is a risk of severe injuries caused by escaping hot fluid.
- Use the equipment only if it is in proper working condition. Replace any leaking stuffing box seal.
- ▶ The equipment can be provided with different types of actuator, e. g. with an electric or hydraulic actuator. Depending on the type of power supply for the actuator there is a risk of severe injuries or death for various reasons. Before working on the equipment cut off power supply to the actuator. Observe all danger notes and follow all instructions given in the installation & operating manual of the actuator. If you have a question please contact the manufacturer of the actuator.
  - ▶ The moving parts of the equipment can cause severe injuries or death. Make sure that nobody is standing close to these moving parts or can touch them while the equipment is operating. Before working on the equipment make sure that the power supply to the actuator is cut off and cannot be switched on accidentally.
- Risk of minor injuries**
- ▶ Sharp edges on component parts can cause cuts. Always wear industrial gloves when servicing the equipment.
  - ▶ The equipment can become hot during operation. This presents the risk of burns caused by heat radiation or when touching the equipment. Do not touch the equipment during operation. Always wear heat resistant protective gear when working on the equipment.
- Information on property damage or malfunctions**
- ▶ Malfunctions will occur if the equipment is installed in a wrong position or with the flow arrow pointing in the opposite direction of the fluid flow. This may result in damage to the equipment or the installation. Make sure that the flow arrow on the equipment body matches the indicated direction of the fluid flow in the pipe.
  - ▶ If the material is unsuitable for the fluid, increased wear may occur and fluid may escape. Make sure that the material is suitable for the fluid used in your installation.

## Qualification of personnel

A qualified person must be acquainted with and experienced in the following:

- ▶ the pertinent on-site rules and regulations for preventing fire and explosions as well as industrial safety regulations
- ▶ working on pressure equipment
- ▶ making pipe connections
- ▶ working with dangerous (hot or pressurized) fluids
- ▶ lifting and transporting loads
- ▶ observing all notes and instructions in this installation & operating manual and the applicable documents
- ▶ connecting the power supply of the actuator

## Protective gear

The required protective gear depends on the types of fluid used and the regulations on site. For more information on suitable safety clothing and safety gear refer to the safety data sheet of the fluid in question.

Protective gear comprises the following items:

- ▶ protective helmet
- ▶ work boots
- ▶ industrial leather gloves

Wear some form of ear protection when standing close to the equipment (1 m or less) during operation.

## Typographic features of warning notes

---



### **DANGER**

Notes with the heading DANGER warn against imminent dangerous situations that can lead to death or serious injuries.

---



### **WARNING**

Notes with the heading WARNING warn against possibly dangerous situations that could lead to death or serious injuries.

---



### **CAUTION**

Notes with the heading CAUTION warn against dangerous situations that could lead to minor or moderate injuries.

---

## Formatting features for warnings of property damage

---

### ***Attention!***

This information warns of a situation leading to property damage.

---

## Description

### Scope of supply and equipment specification

#### Scope of supply

Our equipment is delivered packed and ready for assembly.

#### Applicable documents

The following documents are part of the supply of the equipment:

- ▶ Declaration of incorporation
- ▶ Parts list
- ▶ Tool list
- ▶ Dimensional drawing with indications of centre of mass
- ▶ Documents provided by the manufacturer of actuator
- ▶ Technical documents for position indicator (if available)

These documents are part of the user documentation and must be kept together with this installation & operating manual for future reference.

#### Equipment specification

The equipment consists of the following main components:

- ▶ Body
- ▶ Insert
- ▶ Yoke
- ▶ Nozzle

Different equipment variants are available. The type designation has a code that indicates the respective variant.

- ▶ The body is available as angle-type or Z-type. The code letter "E" in the type designation indicates angle-type and "Z" Z-type.
- ▶ The five available sizes differ from each other only in weight and dimensions. The size of the equipment is indicated in the type designation by a code number stated after the body design letter.

- ▶ The equipment can be fitted with various types of actuators. The actuator type is indicated by the following code numbers in the type designation:
  - ▶ 13: electrically operated linear actuator
  - ▶ 14: spindle bearing for electrically operated rotary actuator or handwheel
  - ▶ 20: pneumatically operated diaphragm actuator or piston actuator
  - ▶ 40: Hydraulic cylinder
- ▶ As optional extra a pressure balance device may be connected to the insert. Equipment with pressure balance has the suffix "mD" in its type designation. Equipment without pressure balance has the suffix "oD" in its type designation.
- ▶ The throttling system is equipped with four to six stages for pressure reduction. The number of stages is indicated after the type of nozzle.

#### Example of type designations

"ZK 213-E5/40 mD"

Angle-type design, size 5. The equipment features a hydraulic cylinder as actuator. The equipment is provided with a pressure balance device.

"ZK 213-E4/14 mD"

Angle-type design, size 4. The equipment has a spindle bearing for an electrically operated rotary actuator or a handwheel. The equipment is provided with a pressure balance device.



In most cases the equipment described in this IOM is of the angle-type and has a spindle bearing for a rotary actuator without pressure balance. If any other variant is shown or described it will be explicitly stated.

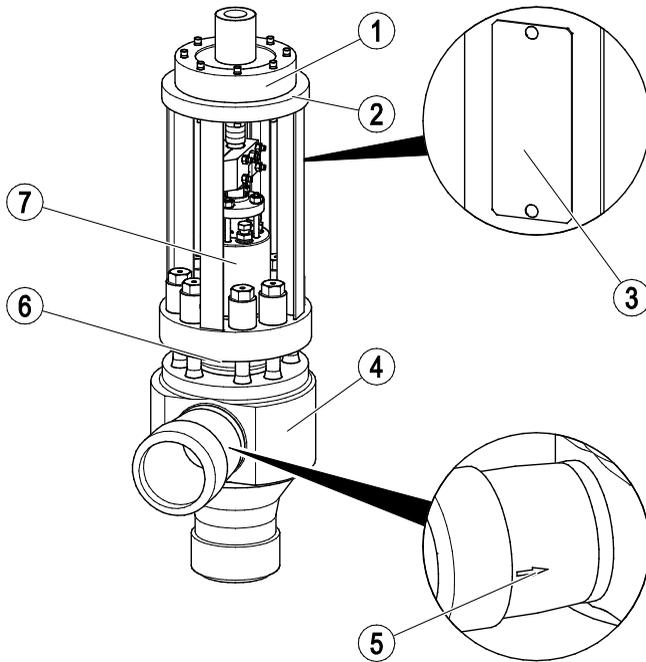
#### End connections

The equipment is available with the following end connections:

- ▶ Butt-weld ends
- ▶ Flanges

The end connection is not specified in the type designation.

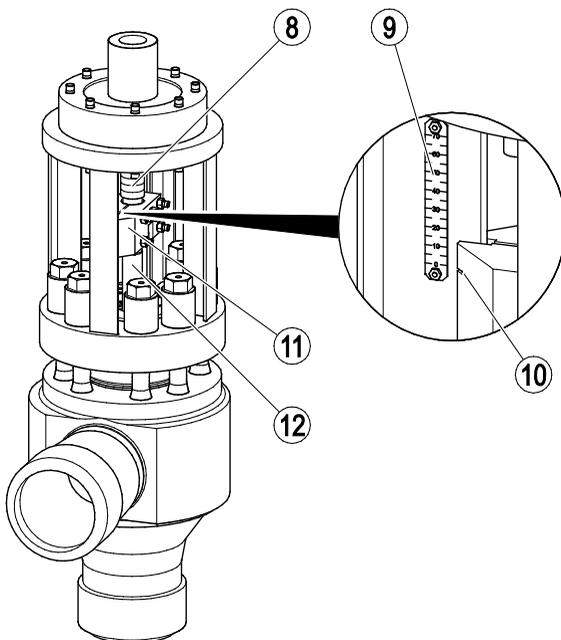
## Component parts



No.	Designation
1	Mechanical connection for actuator, in equipment with rotary actuator this is a spindle bearing (shown here)
2	Yoke
3	Name plate
4	Body

No.	Designation
5	Direction arrow (on both sides)
6	Insert
7	Pressure balance device

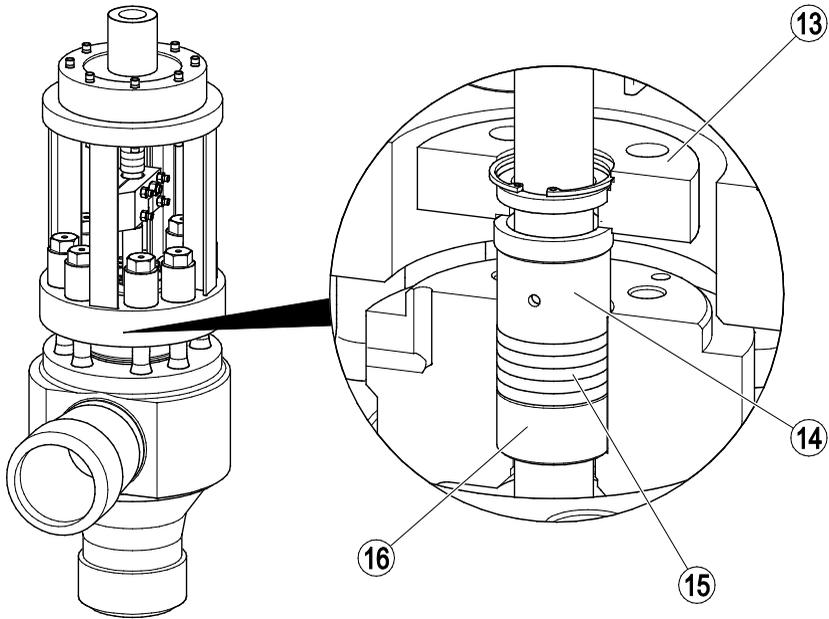
The yoke is fitted with the following items:



No.	Designation
8	Spindle
9	Scale
10	Scale marking on coupling

No.	Designation
11	Coupling
12	Stem

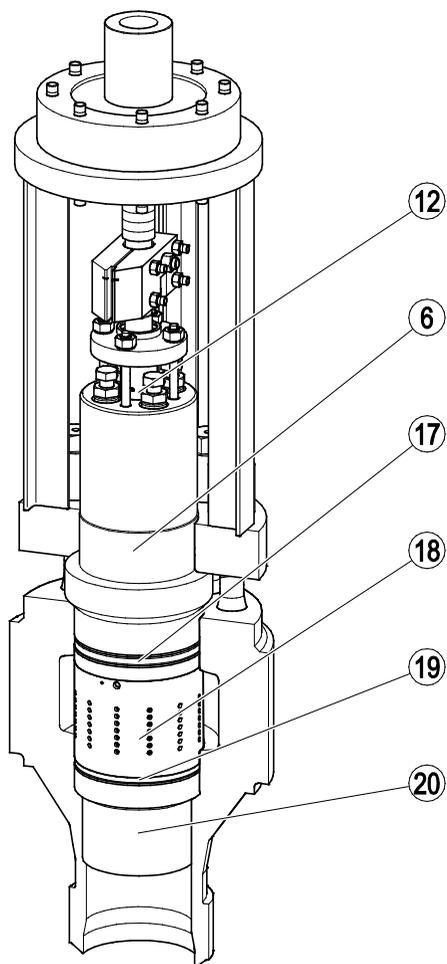
The stuffing box seal consists of the following items:



No.	Designation
13	Stuffing box flange
14	Stuffing box

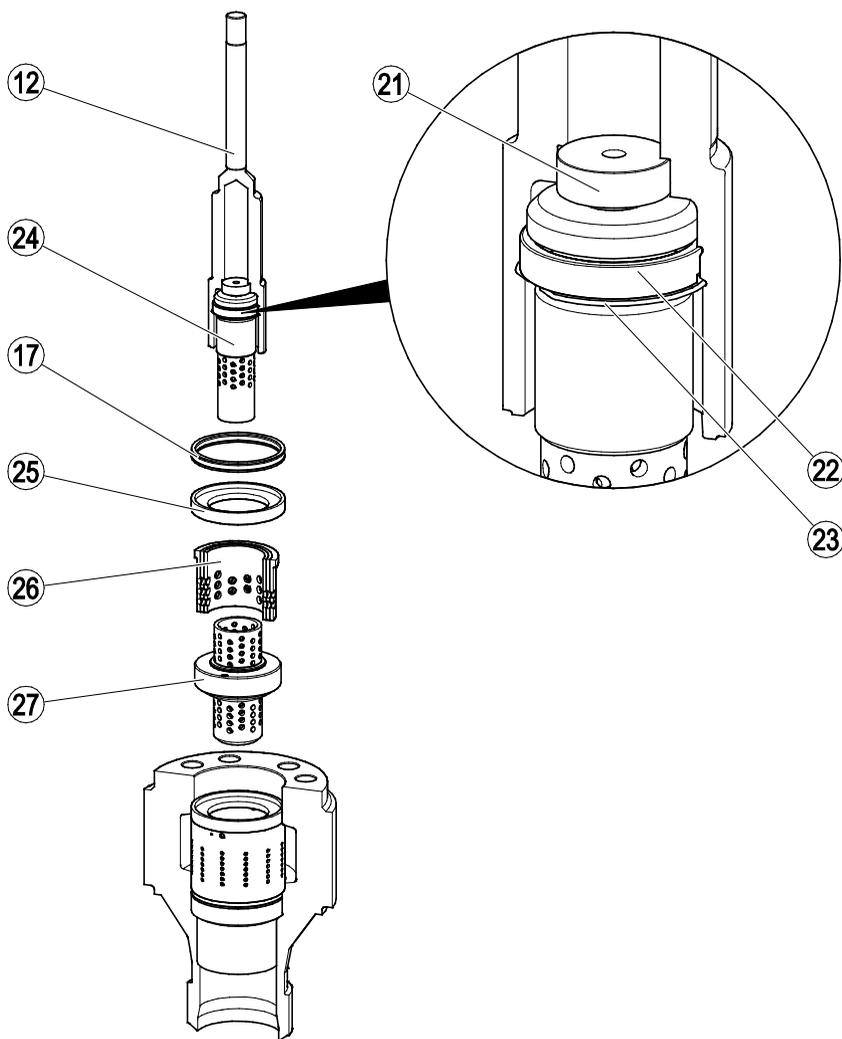
No.	Designation
15	Gland packing
16	Stuffing box ring

The following items are fitted inside the equipment:



No.	Designation
6	Insert (here with pressure balance)
12	Stem
17	Upper main gasket

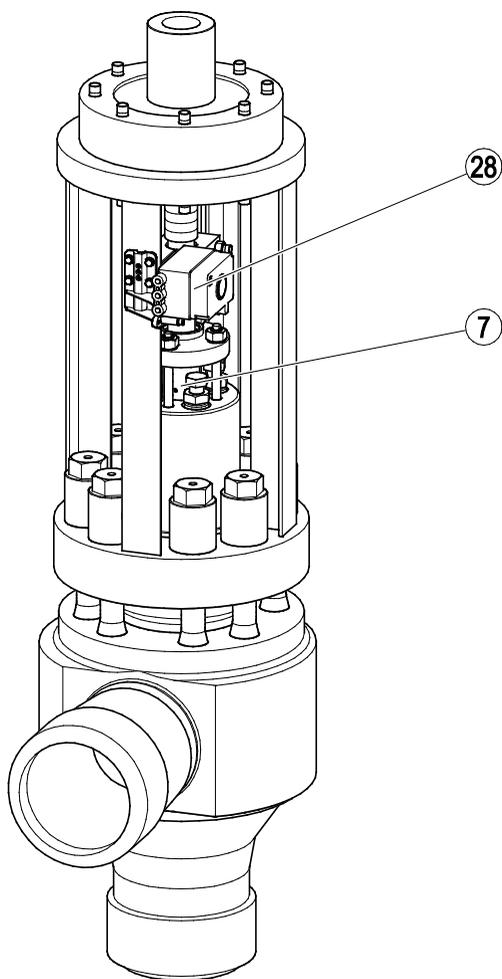
No.	Designation
18	Sleeve
19	Lower main gasket
20	Collar bush



No.	Designation
12	Stem
17	Upper main gasket
21	Pressure piece
22	Threaded ring
23	Retaining ring

No.	Designation
24	Valve plug
25	Thrust ring
26	Sleeves
27	Seat bushing

The following items are available as optional extra:



No.	Designation
7	Pressure balance device
28	Position indicator

## Name plate

The following items are indicated on the name plate:

- ▶ Manufacturer
- ▶ Type designation
- ▶ Design
- ▶ Nominal size
- ▶ Pressure rating
- ▶ Max. service temperature
- ▶ Max. service pressure
- ▶ Max. admissible differential pressure
- ▶ Flow characteristic
- ▶ CE marking
- ▶ Serial number

The following items are indicated on the equipment body:

- ▶ Material
- ▶ Identification marking of material testing
- ▶ Batch code
- ▶ Direction of flow
- ▶ Manufacturing date (quarter/year)

## Application of European Directives

### Pressure Equipment Directive

The equipment conforms to this Directive (see "Declaration of Incorporation" section) and can be used for the following media:

- ▶ Fluids of group 2

### ATEX Directive

The equipment has classification: CE Ex II 2G/D c X.

For use in potentially explosive atmospheres in zones (surrounding atmosphere to Directive 1999/92/EC) 1, 2, 21 and 22, please read and observe the following information:

The sign "X" in the Ex label signifies that operation at an excessive surface temperature caused by the medium must be avoided. The equipment itself does not generate additional surface temperatures.

Once installed, static electricity may arise between the equipment and the connected system. During

use in potentially explosive atmospheres, the discharge or prevention of possible electrostatic charging is the responsibility of the manufacturer or owner of the system. If there is a possibility that medium might escape, e.g. via actuating devices or leaks in screwed couplings, the manufacturer or owner of the system must take this into consideration when dividing the area into zones.

The equipment classification and Declaration of Conformity do not apply to any electric, hydraulic or pneumatic drive that may be installed.

If using the equipment with a drive, the category of the drive may have an adverse effect on the equipment category 2G/D.

- Please read and observe the relevant information in the drive manufacturer's documentation.

## Task and function

### Purpose

The equipment is designed to reduce pressure in pipes through which the following fluids flow:

- ▶ water
- ▶ steam
- ▶ condensed water

In addition the equipment can control the flowrate and the fluid level. The equipment can stop the fluid flow completely, effecting a pipe seal to attain bubble-tight shut off.

The tandem seat reduces the flow velocity at the seating surface during opening and closing, thereby minimizing the wear on the seating surfaces.

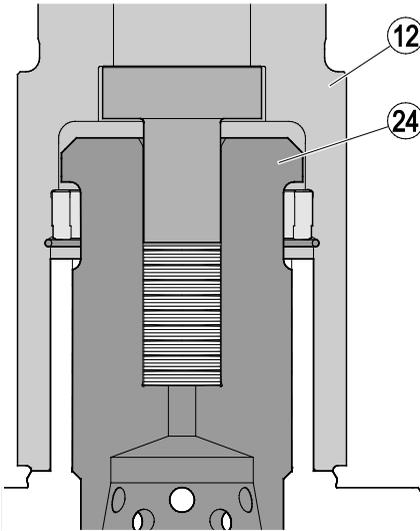
**Function**

The equipment features a system of flash chambers where the differential pressure is reduced in stages and the flow is split up into many partial flows. This decreases the noise level during operation and dramatically extends the service life of the equipment thanks to its high wear resistance.

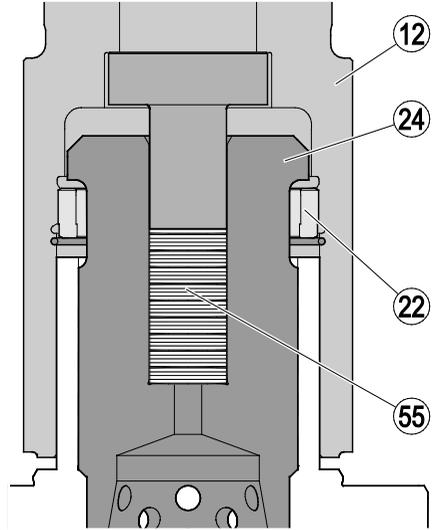
The equipment is fitted with an externally actuated stem. During the opening process the stem controls the fluid flow by successively opening a series of flash chambers.

When the stem is in the closed position the fluid flow is completely stopped and bubble-tight closure is ensured.

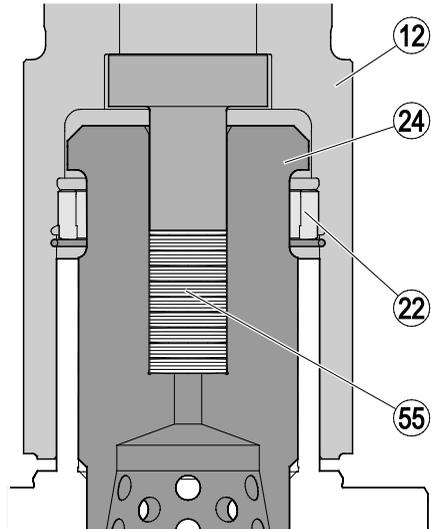
The tandem seat consists of a primary and a secondary seat for double shut-off. When the equipment is closed the stem (12) and plug (24) are in the lowest position.



During the opening process first only the stem lifts off. As a result of the reduced load the disc springs (55) decompress.



Then the plug is lifted off its seat by the threaded ring (22). The equipment is now open.



## Storing and transporting the equipment

### ***Attention!***

Equipment can be damaged if stored or transported improperly.

- Close all openings with the sealing plugs or covers supplied with the equipment or use similar sealing covers.
- Protect the equipment against moisture and corrosive atmospheres.
- Please contact the manufacturer if the specified transport and/or storage requirements cannot be met.

## Storing the equipment

- Please observe the following items when storing the equipment:
  - ▶ Make sure that the equipment is completely disconnected.
  - ▶ Before storage make sure that the equipment is dry and free from any fluid residues.
  - ▶ The equipment must be protected by its packaging. The packaging must protect the equipment from moisture and mechanical damage.
  - ▶ The equipment must be stored in a horizontal position.
  - ▶ Make sure that the stem of the equipment is moved at least every two months in order to avoid that the packing rings get stuck.



## CAUTION

There is a risk of getting crushed by the spindle.

- Wear sturdy leather gloves when working on the spindle or stem.
  - Make sure that no persons are in the area of the spindle or stem.
  - Move the spindle slowly.
- 
- Follow all instructions given in the installation & operating manual of the actuator.
  - Observe and follow all instructions given in the installation & operating manual for the position indicator.
  - Make sure that all these requirements are always met when storing the equipment.
  - Please contact the manufacturer if you cannot comply with the recommended storage conditions.

## Transporting the equipment

---



### DANGER

Risk of bruises if the equipment or component parts fall down.

- Always wear protective gear when working on the equipment.
- Use suitable lifting gear when moving or lifting the equipment and/or component parts.
- Make sure that the equipment cannot topple over.
- To lift the equipment use only the valve body or the bonnet.
- Make sure that nobody is standing below the lifted equipment.

---

The protective gear must comprise at least the following:

- ◆ Safety helmet to EN 397
- ◆ Safety footwear to EN ISO 20345
- ◆ Protective leather gloves to EN 388

For more information on suitable safety clothing and safety gear refer to the safety data sheet of the fluid in question.

The lifting gear must be of sufficient strength for the equipment including the actuator.

For more information on the weight of the equipment see the attached documents. For more information on the weight of the actuator see the documents provided by the actuator manufacturer.

For more information on lifting points and the centres of mass see the attached documents.

- Carefully clean the equipment before transportation.
- Meet the requirements for storage also when transporting the equipment.
- Prior to transport seal off connections with sealing plugs.



If you do not have the sealing plugs supplied with the equipment use appropriate seal caps to seal off the connections.

- For short distances (only a few metres) you can transport the equipment unpacked.
- When transporting the equipment over larger distances use the original packaging.
- If you do not have the original packaging use a box that protects the equipment adequately against corrosion and physical damage.

## Mounting and connecting the equipment



### DANGER

Risk of bruises if the equipment or component parts fall down.

- Always wear protective gear when working on the equipment.
- Use suitable lifting gear when moving or lifting the equipment and/or component parts.
- Make sure that the equipment cannot topple over.
- To lift the equipment use only the valve body or the bonnet.
- Make sure that nobody is standing below the lifted equipment.

The protective gear must comprise at least the following:

- ▶ Safety helmet to EN 397
- ▶ Safety footwear to EN ISO 20345
- ▶ Protective leather gloves to EN 388

For more information on suitable safety clothing and safety gear refer to the safety data sheet of the fluid in question.

The lifting gear must be of sufficient strength for the equipment including the actuator.

For more information on the weight of the equipment see the attached documents. For more information on the weight of the actuator see the documents provided by the actuator manufacturer.

## Preparing installation

- Remove the transport packaging.
- Check the equipment for transport damage.
- If you detect any transport damage, please contact the manufacturer.

When supplied by the factory, the connections may be sealed off with sealing plugs.

- Remove sealing plugs before mounting the equipment.
- Keep the sealing plugs and the packing for further use.



### DANGER

Personnel working on pipes are exposed to safety risks and may suffer severe injuries, poisoning or even loss of life.

- Make sure that no hot or hazardous fluid is in the equipment or the pipes.
- Make sure that the pipes upstream and downstream of the equipment are depressurised.
- Make sure that the installation is switched off and protected against unauthorised or unintended activation.
- Make sure that the equipment and the pipes have cooled down to room temperatures.
- Wear protective clothing that is suitable for the fluid and, if necessary, wear protective gear.

For more information on suitable protective clothing and safety gear refer to the safety data sheet of the fluid in question.

- Drain pipes until they are empty.
- Switch the installation off and protect it against unauthorised or unintended re-activation.

## Connecting the equipment

---



### **DANGER**

Incorrectly connected equipment can result in accidents with extremely severe injuries or death.

- Make sure that only specialist personnel connect the equipment to the pipe.
- Make sure that the direction of flow in the pipe matches the flow direction arrow on the equipment.
- Make sure that the connected pipe does not subject the body to any stress (forces or torques) during installation and operation.

---

Specialist personnel must have knowledge and experience of the type of pipe connection used.



An arrow indicating the flow direction is provided on both sides of the inlet of the valve body.

---

### **Attention!**

Equipment will be damaged if the support is undersized or in the wrong place.

- Mount the support to the pipes next to the equipment.
  - Make sure that the supports are strong enough to hold the weight of the equipment and to withstand the forces that occur during operation.
  - Contact the manufacturer if you want to mount the supports directly to the equipment.
- 



The equipment is designed for installation with the stem in vertical position and the actuator mounted on top.

Other installation positions are possible.

- Contact the manufacturer if you want to mount the equipment in a different position of installation.
- Mount the equipment in the desired installation position.
- Make sure that the equipment is supported by the pipes.



If the supports can only be attached directly to the equipment ask the manufacturer for more information on possible positions for the supports.

- Connect the end connections of the equipment properly to the pipes.

Some materials require a subsequent heat treatment of the welds after the equipment has been welded in place. If you want to perform a heat treatment please observe the following notes:



You do not have to remove the internals of the equipment in order to perform the heat treatment.

---

### **Attention!**

The equipment might get damaged.

- Make sure that only qualified personnel carries out the heat treatment.
  - Before starting the heat treatment make sure that the equipment is not insulated.
- 

Specialist personnel must be highly qualified and fully experienced in making welded joints with the type of material used. For information on the materials of the equipment see the nameplate on the equipment.

- Make sure that the valve is at its middle position, i. e. half stroke.

- Make sure that only qualified personnel carries out the heat treatment.
- After the heat treatment you may insulate the equipment if necessary.



## DANGER

Incorrectly connected equipment can cause fatal accidents or severe injuries.

- Make sure that only qualified skilled personnel connect the actuator to the power supply.
- Follow all instructions given by the actuator manufacturer.

---

Specialist personnel must be highly qualified and fully experienced in connecting the power supply in question.

- Connect the actuator properly with the mechanical connection of the equipment.



For more details on how to connect the actuator with the stem and how to mount the mechanical connection see section "*Assembling the equipment*" from page 40 onwards.

- Connect the actuator properly to its power supply.

## Checking the function

- Make sure that the equipment is safely mounted and that all connections are made correctly.



To remove residues from the pipes and the equipment after installation purge the pipes with the fluid to be used. For more information see chapter "*Purging the equipment*" on page 24.



## CAUTION

There is a risk of getting crushed by the spindle.

- Wear sturdy leather gloves when working on the spindle or stem.
  - Make sure that no persons are in the area of the spindle or stem.
  - Move the spindle slowly.
- 
- Carry out a performance test to check the functions of the equipment.
- The stem must perform at least one full valve stroke.
- Change, if necessary, the actuator settings as indicated in the operating manual of the actuator.

## Operating the equipment

Do not work on the equipment while it is operating.



### DANGER

Risk of bruises when working on the equipment during operation.

- Switch off the equipment if you have to work close to any moving equipment parts.
- Make sure that the equipment cannot be switched on inadvertently.

The stem of the equipment is moved according to the actuator setting.

- If you want to change the settings please follow the instructions given in the operating manual for the actuator.

### *Attention!*

Damage to the equipment or malfunctions may occur if the stem is not moved for a longer period of time.

- Make sure that the stem performs at least one full stroke every two months.

## After operation



### DANGER

If the equipment is used in contaminated areas there is a risk of severe injuries or death caused by harmful substances in or on the equipment.

- Only qualified personnel are allowed to perform work on contaminated equipment.
- Always wear the protective clothing prescribed for contaminated areas when working on the equipment.
- Make sure that the equipment is completely decontaminated before carrying out any service work.
- Follow the pertinent instructions for handling the hazardous substances in question.



### DANGER

Personnel working on pipes are exposed to safety risks and may suffer severe injuries, poisoning or even loss of life.

- Make sure that no hot or hazardous fluid is in the equipment or the pipes.
- Make sure that the pipes upstream and downstream of the equipment are depressurised.
- Make sure that the installation is switched off and protected against unauthorised or unintended activation.
- Make sure that the equipment and the pipes have cooled down to room temperatures.
- Wear protective clothing that is suitable for the fluid and, if necessary, wear protective gear.

For more information on suitable protective clothing and safety gear refer to the safety data sheet of the fluid in question.

---



## **DANGER**

Risk of bruises when working on the equipment during operation.

- Switch off the equipment if you have to work close to any moving equipment parts.
  - Make sure that the equipment cannot be switched on inadvertently.
- 
- 

## ***Attention!***

Damage to the equipment due to improper maintenance work.

- Make sure that only qualified personnel performs maintenance work.
- 

A qualified person must be acquainted with and experienced in the following:

- ▶ Working on pressure equipment
- ▶ Lifting loads
- ▶ Assembling and disassembling the equipment
- ▶ The qualified personnel must observe and follow the instructions given in this operating manual and in the applicable documents.

## Maintaining the equipment

### Maintenance schedule

Interval	Component	Activity
2 months	Stem	Move stem by at least one complete stroke.
3 months	Stuffing box seal	Visually inspect to ensure tightness. Retighten a leaky stuffing box, replace if necessary.
	<ul style="list-style-type: none"> <li>▶ Connections</li> <li>▶ Body gasket</li> <li>▶ Positioning of spindle in gland seal</li> <li>▶ Spindle</li> </ul>	Visually inspect the following points: <ul style="list-style-type: none"> <li>▶ Tightness</li> <li>▶ Cleanliness</li> <li>▶ Wear</li> </ul> Replace leaky or worn components. Remove dirt.
	<ul style="list-style-type: none"> <li>▶ Stem</li> <li>▶ Seat ring</li> </ul>	Check that the equipment closes correctly when the stem is in closed position by measuring the temperature. Replace leaky or worn components.
	Spindle bearing	Grease with the recommended grease (see next section) and a lint-free cloth.
	Lubricating nipples on spindle bearing (equipment with rotating motor)	Apply the recommended grease (see next section).
12 months	Secure actuator fastening	Check that screws and bolts are secure. Tighten loose screws to the specified torque. You can find information on the required torques in the actuator installation instructions.
36 months	Overall equipment	Check condition of inner parts. Check condition of spindle. Replace faulty or worn components. Replace main gaskets before assembly.

## Lubricating the equipment

---

### **Attention!**

Equipment may be damaged if unsuitable lubricant is used.

- Use only specified lubricants.

The following lubricants are recommended for lubricating the equipment:

- ▶ WINIX 5000
- Use only lithium-saponified grease, penetration grade 2, with MoS<sub>2</sub> additive.
- Lubricate all moving parts of the equipment every three months.

### **Removing dirt deposits**

- To remove dirt deposits rinse the equipment with fresh water and wipe it with a clean, lint-free cloth.
- To remove any persistent residues use a cleaning agent that is suitable for the material and carefully wipe the equipment with a clean, lint-free cloth.

For details on the materials refer to the parts list.

### **Replacing component parts**

To replace a component part proceed as follows:

- Disassemble the equipment as described from page 26 onwards.
- Replace the component part with an original spare part from the manufacturer.

For details on how to order spare parts refer to the parts list.

- The two main gaskets of the equipment must be replaced in any case.
- Re-assemble the equipment as described in section "*Assembling the equipment*" from page 40 onwards.

## Purging the equipment

Rinse the equipment in order to remove any dirt particles or fluid residues inside the equipment.



### **DANGER**

Personnel working on pipes are exposed to safety risks and may suffer severe injuries, poisoning or even loss of life.

- Make sure that no hot or hazardous fluid is in the equipment or the pipes.
- Make sure that the pipes upstream and downstream of the equipment are depressurised.
- Make sure that the installation is switched off and protected against unauthorised or unintended activation.
- Make sure that the equipment and the pipes have cooled down to room temperatures.
- Wear protective clothing that is suitable for the fluid and, if necessary, wear protective gear.

For more information on suitable protective clothing and safety gear refer to the safety data sheet of the fluid in question.

### **Preparing equipment for rinsing**

Remove all parts from the body before rinsing the equipment.

- Disassemble the equipment as described from page 26 onwards.
- Put a blind flange onto the body.

Contact the manufacturer to obtain information on suitable blind flanges.

- Fasten the blind flange with the stud bolts and hexagon nuts for the insert.
- Tighten the hexagon nuts with the same torque that is specified for tightening the insert.

## Rinsing equipment and pipes

You can rinse the equipment with the same fluid that is used during normal operation. You can also use a special cleaning agent.



### **DANGER**

Personnel working on pipes are exposed to safety risks and may suffer severe injuries, poisoning or even loss of life.

- Make sure that no hot or hazardous fluid is in the equipment or the pipes.
- Make sure that the pipes upstream and downstream of the equipment are depressurised.
- Make sure that the installation is switched off and protected against unauthorised or unintended activation.
- Make sure that the equipment and the pipes have cooled down to room temperatures.
- Wear protective clothing that is suitable for the fluid and, if necessary, wear protective gear.

---

For more information on suitable protective clothing and safety gear refer to the safety data sheet of the fluid in question.

---

### ***Attention!***

Equipment may be damaged by unsuitable cleaning fluid.

- Rinse the pipe with the same fluid that is used during normal operation.
  - Make sure that the cleaning fluid does not damage the equipment material if you use a different fluid for cleaning than the normal operating fluid.
  - Make sure that the cleaning fluid does not come into contact with the fluid used during normal operation.
- 

For details on the materials refer to the parts list.

- Switch on the installation and rinse the pipes.
- Check connections for leaks.
- After rinsing keep the installation switched on until the pipes are completely empty.
- Switch the installation off and protect it against unauthorised or unintended re-activation.

## **Mounting parts after rinsing**

After rinsing re-install the removed parts to render the equipment operational.

- Undo the hexagon nuts of the blind flange.
- Remove the blind flange and keep it for future use.
- Re-assemble the equipment as described in section "*Assembling the equipment*" from page 40 onwards.

## Disassembling the equipment

You have to disassemble the equipment if you want to

- ▶ rinse the pipes and the equipment
- ▶ service component parts
- ▶ replace or exchange component parts.



If you exchange component parts you can use the equipment for different application conditions.

For this purpose you do not have to remove the equipment from the installation.

- Ask the manufacturer for information on possible retrofitting modifications for your equipment.



### CAUTION

Sharp edges on component parts can cause cuts.

- Wear industrial gloves when servicing equipment parts.

## Preparing the equipment for disassembly



### DANGER

Personnel working on pipes are exposed to safety risks and may suffer severe injuries, poisoning or even loss of life.

- Make sure that no hot or hazardous fluid is in the equipment or the pipes.
- Make sure that the pipes upstream and downstream of the equipment are depressurised.
- Make sure that the installation is switched off and protected against unauthorised or unintended activation.
- Make sure that the equipment and the pipes have cooled down to room temperatures.
- Wear protective clothing that is suitable for the fluid and, if necessary, wear protective gear.

For more information on suitable protective clothing and safety gear refer to the safety data sheet of the fluid in question.

- Shut off the pipes upstream and downstream of the equipment.



## DANGER

Risk of bruises if the equipment or component parts fall down.

- Always wear protective gear when working on the equipment.
- Use suitable lifting gear when moving or lifting the equipment and/or component parts.
- Make sure that the equipment cannot topple over.
- To lift the equipment use only the valve body or the bonnet.
- Make sure that nobody is standing below the lifted equipment.

---

The protective gear must comprise at least the following:

- ◆ Safety helmet to EN 397
- ◆ Safety footwear to EN ISO 20345
- ◆ Protective leather gloves to EN 388

For more information on suitable safety clothing and safety gear refer to the safety data sheet of the fluid in question.

The lifting gear must be of sufficient strength for the equipment including the actuator.

For more information on the weight of the equipment see the attached documents. For more information on the weight of the actuator see the documents provided by the actuator manufacturer.

Connect the lifting gear to the equipment or part that you want to lift.

- For this purpose use a noose strap of sufficiently sturdy material.
- Attach the noose strap to the lifting points or a flange.



The space required for disassembling and re-assembling the equipment depends on the optional extras and the type of actuator.

For more information on the required service space see the attached drawings.

---

## ***Attention!***

The equipment or component parts may be damaged if it is disassembled or re-assembled in the wrong order.

- Always follow the sequence of activities described in the following sections.

---

## ***Attention!***

Equipment may be damaged if unsuitable tools are used.

- When working on the equipment use only the tools specified in the attached tools list.
-

## Removing actuator parts

If the equipment is fitted with an actuator first remove the actuator.

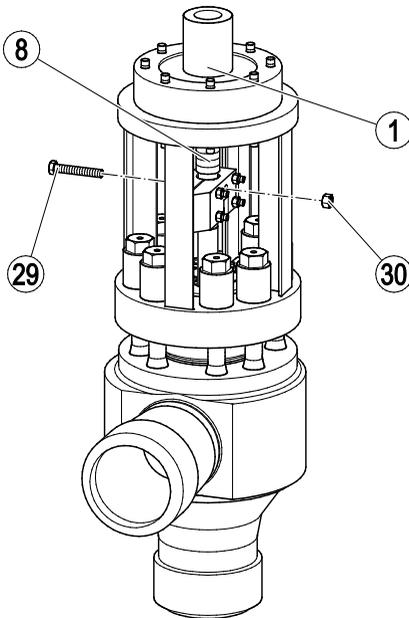
- Disconnect the actuator as described in the operating manual for the actuator.
- Remove the actuator as described in the operating manual for the actuator.

You can now remove the mechanical connection for the actuator from the equipment.

For equipment with an electrical rotating motor, you must remove the spindle bearing. You do not have to remove the spindle from the bearing to do this.

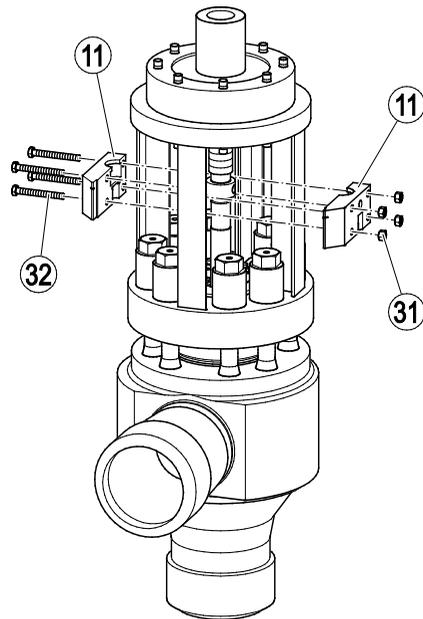
To remove the spindle bearing (1) and spindle (8), you must first detach the coupling. To do so, proceed as follows:

- Loosen the hexagon nut (30) on the coupling anti-rotation device.
- Remove the hexagon head bolt (29).



**i** Some equipment is fitted with a position indicator. The position indicator comes with a separate installation & operating manual (IOM).

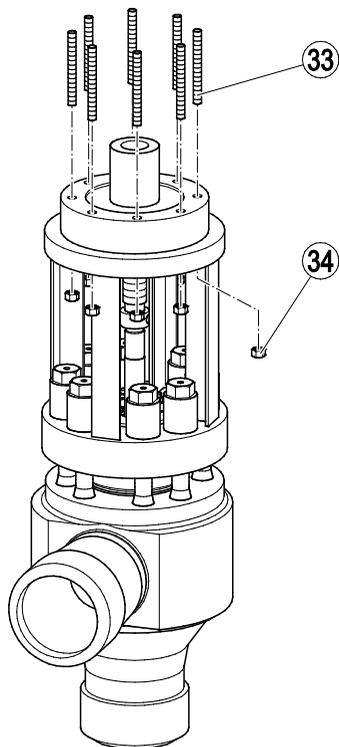
- Remove the position indicator as described in the IOM for the position indicator.
- Loosen the hexagon nut (31) on the coupling.
- Remove the hexagon head bolts (32).
- Remove the two halves of the coupling (11).



You can now remove the mechanical connection for the actuator.

For equipment with an electrical rotating motor, you must remove the spindle bearing and spindle.

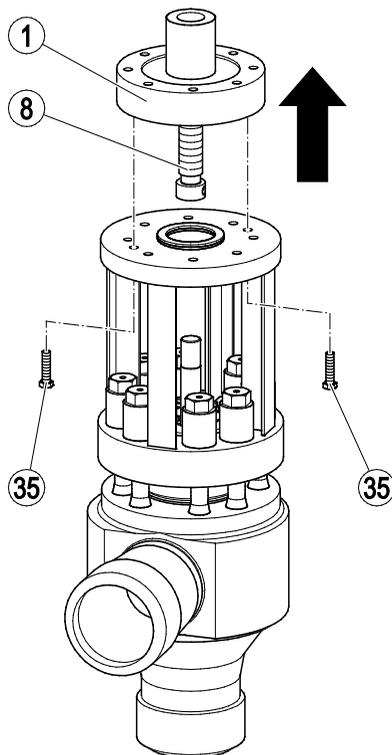
- Loosen the nuts (34).
- Remove the stud bolts (33).



- Remove the two hexagon head bolts (35).

**i** The following drawing shows the equipment with actuator bearing for an electric rotary actuator. Here the mechanical connection for the actuator is designed as a spindle bearing (1). The spindle (8) is connected with the spindle bearing and can be removed together with it.

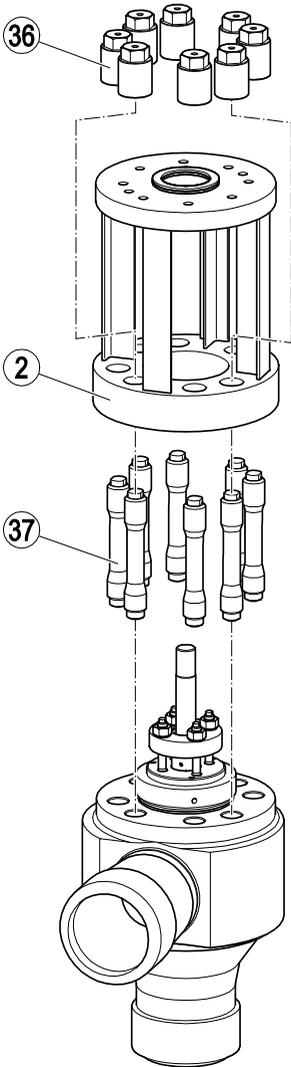
- Remove the mechanical connection for the actuator from the equipment.



- Unscrew the spindle out of the bearing if necessary.

## Removing the bonnet

- Remove the eight cap nuts (36).
- Connect the noose strap of a sufficiently strong lifting gear to the bonnet flange.
- Lift off the bonnet (2).
- Remove the eight stud bolts (37).



## Removing the insert from equipment without pressure balance

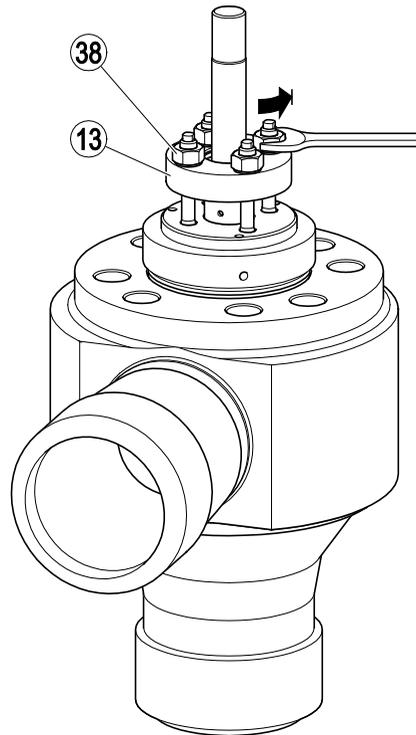
- ⓘ The procedure for equipment with pressure balance is described on page 32.

To remove the packing rings proceed as follows:

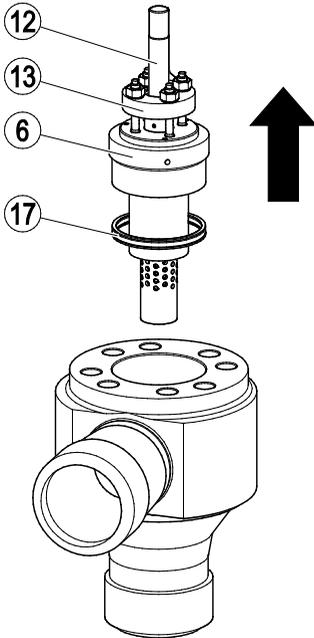
### **Attention!**

Excessive loosening can damage the stuffing box packing.

- Loosen the nuts of the stuffing box bolts only until the resistance felt ceases.
- 
- Loosen the four nuts (38) of the stuffing box flange (13) until the resistance felt ceases.



- Connect the noose strap of a sufficiently strong lifting gear to the stuffing box flange (13).
- Lift the insert (6) off the equipment.
- Take the stem (12) out of the equipment.
- Take the upper main gasket (17) out of the equipment.



For details on how to disassemble the stuffing box packing see page 36.

## Removing the insert from equipment with pressure balance



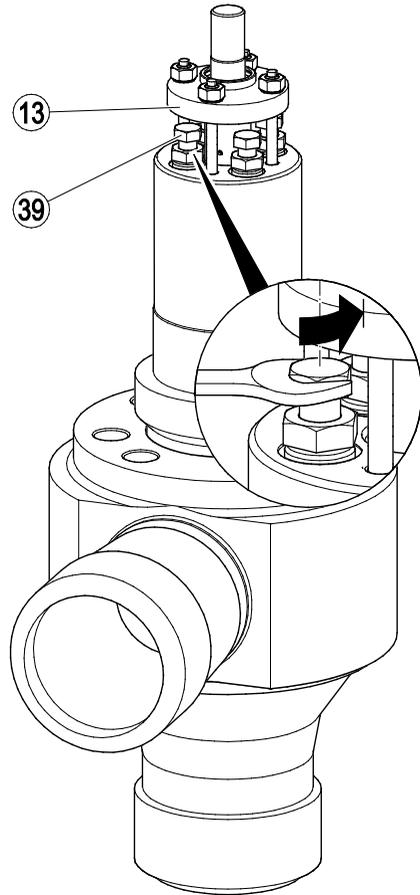
The procedure for equipment without pressure balance is described on page 36.

To remove the packing rings proceed as follows:

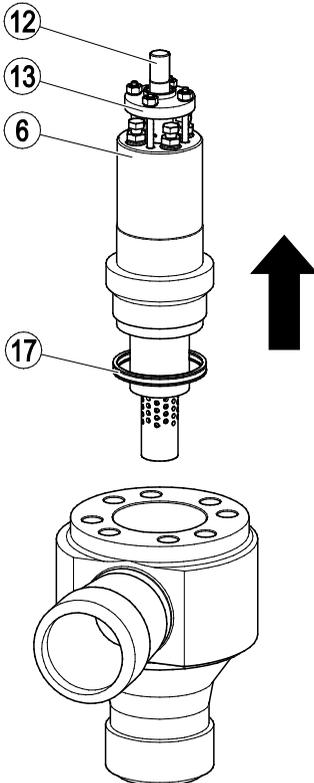
### **Attention!**

Excessive loosening can damage the stuffing box packing.

- Loosen the nuts of the stuffing box flange (13) until the resistance felt ceases.
- Loosen the bolts (39) of the pressure balance device until the resistance felt ceases.



- Connect the noose strap of a sufficiently strong lifting gear to the stuffing box flange (13).
- Lift the insert (6) off the equipment.
- Take the stem (12) out of the equipment.
- Take the upper main gasket out of the equipment.



**i** For details on how to disassemble the stuffing box packing see page 36.

## Removing the thrust ring

To remove the thrust ring use a special removal support. The removal support comprises:

- a support frame of sufficient height (extending beyond the upper edge of the equipment)
- two steel rods attached to the support frame with one bore each
- two threaded rods with one nut each

### **Attention!**

The equipment may be damaged if the bearing capacity of the removal support is not sufficient.

- Make sure that all parts of the removal support are capable of withstanding the loads and forces encountered during the removal process.

The weight of the parts to be removed depends on the equipment type. For information on the weight of the parts to be removed contact the manufacturer.

The required dimensions of the removal support and the position of the threaded holes depend on the equipment type. Contact the manufacturer for a detailed specification.

**i** The removal support described in this section is only a recommendation. Contact the manufacturer if you want to use a different kind of removal support.

- Place the support frame with the rods above the upper edge of the body.

The bores in the rods must be exactly above the threaded holes (42) in the thrust ring (25).

- Screw the two threaded rods (41) through the bores in the rods into the threaded holes (42) in the thrust ring.
- Once the threaded rods are firmly attached to the thrust ring screw the two nuts (40) above the rods handtight.

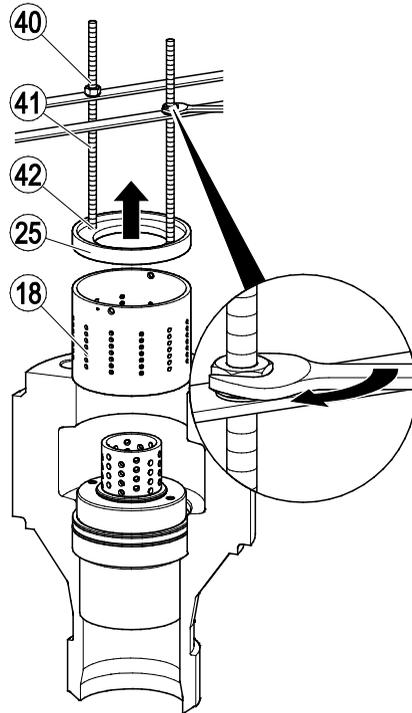
---

### **Attention!**

If the equipment is tilted while being lifted with the removal support the resulting misalignment can damage the equipment.

- Tighten the nuts of the removal support evenly.

- 
- To remove the thrust ring (25) from the body tighten the two nuts of the removal support evenly.
  - Tighten the nuts until the thrust ring is completely lifted off the body.
  - Use a suitable lifting device to remove the thrust ring.
  - Pull the threaded rods off the thrust ring
  - Remove the removal support and keep it ready for the re-installation of the thrust ring.
  - Use a suitable lifting device to lift the sleeve insert (18) off the body.



## Removing the seat bushing

To remove the seat bushing use a special removal support. The removal support comprises:

- ▶ a support frame of sufficient height (extending beyond the upper edge of the equipment)
- ▶ two steel rods attached to the support frame with one bore each
- ▶ two threaded rods with one nut each

### **Attention!**

The equipment may be damaged if the bearing capacity of the removal support is not sufficient.

- ▶ Make sure that all parts of the removal support are capable of withstanding the loads and forces encountered during the removal process.

The weight of the parts to be removed depends on the equipment type. For information on the weight of the parts to be removed contact the manufacturer.

The required dimensions of the removal support and the position of the threaded holes depend on the equipment type. Contact the manufacturer for a detailed specification.



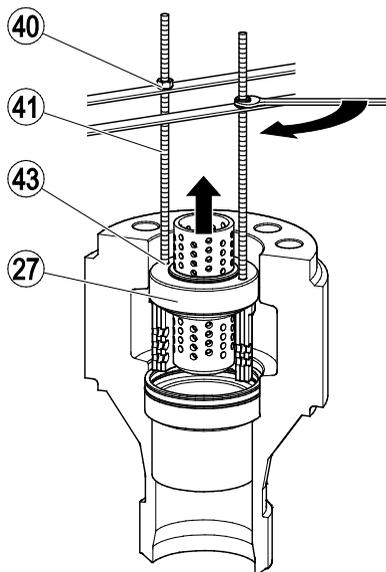
The removal support described in this section is only a recommendation. Contact the manufacturer if you want to use a different kind of removal support.

- ▶ Place the support frame with the two rods above the upper edge of the body.

The bores in the rods must be exactly above the threaded holes (43) in the seat bushing (27).

- ▶ Screw the two threaded rods (41) through the bores in the rods into the threaded holes (43) in the seat bushing.

- ▶ Once the threaded rods are firmly attached to the seat bushing screw the two nuts (40) above the rods handtight.

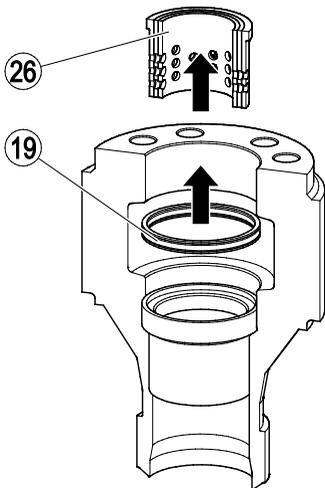


### **Attention!**

If the equipment is tilted while being lifted with the removal support the resulting misalignment can damage the equipment.

- ▶ Tighten the nuts of the removal support evenly.

- To remove the seat bushing from the body tighten the two nuts of the removal support evenly.
- Tighten the nuts until the seat bushing is completely lifted off the body.
- Use a suitable lifting device to remove the seat bushing.
- Remove the removal support and keep it ready for the re-installation of the seat bushing.
- Use a suitable lifting device to lift the sleeve (26) off the body.
- Remove the lower main gasket (19).



### Removing the collar bush

Normally you do not have to remove the collar bush from the body.

- Contact the manufacturer if you want to remove the collar bush.

### Disassembling the stuffing box in equipment without pressure balance

**i** The procedure for equipment with pressure balance is described on page 37.

You only have to disassemble the stuffing box packing if you want to replace or service it. In any

other case the stuffing box can remain attached to the insert in order to avoid damage to the packing rings.

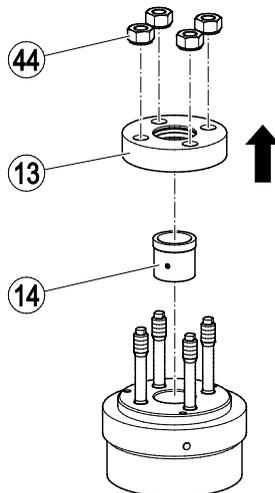
### **Attention!**

The packing rings may get damaged.

- Make sure you do not damage the packing rings during installation and removal.
- When installing and removing the packing rings never use force. Make sure that the packing rings are correctly positioned and not skewed.

For this purpose proceed as follows:

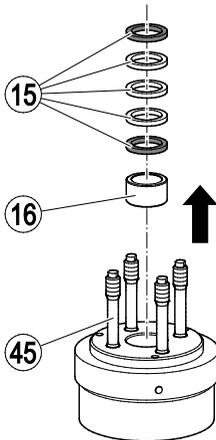
- Remove the nuts (44) from the stud bolts.
- Remove the stuffing box flange (13).
- Take the stuffing box (14) out of the insert.



- Lift the packing rings of the stuffing box (15) off the insert.

**i** In equipment with a connection for sealing fluid the medium packing ring is replaced by a grooved ring.

- Lift the stuffing box ring (16) off the insert.
- Take the stud bolts (45) out of the insert.



### Disassembling the stuffing box in equipment with pressure balance

**i** The procedure for equipment without pressure balance is described on page 36.

You only have to disassemble the stuffing box packing if you want to replace or service it. In any other case the stuffing box can remain attached to the insert in order to avoid damage to the packing rings.

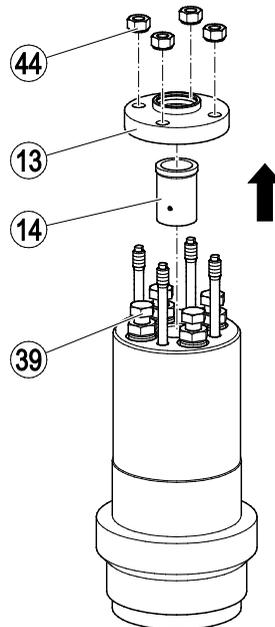
### Attention!

The packing rings may get damaged.

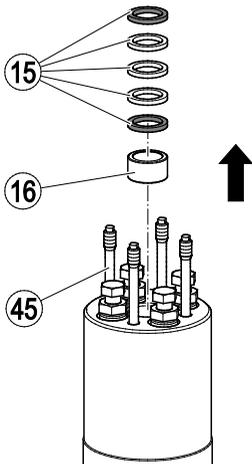
- Make sure you do not damage the packing rings during installation and removal.
- When installing and removing the packing rings never use force. Make sure that the packing rings are correctly positioned and not skewed.

For this purpose proceed as follows:

- Loosen the bolts (39) of the pressure balance device.
- Remove the nuts (44) from the stud bolts.
- Remove the stuffing box flange (13).
- Take the stuffing box (14) out of the insert.



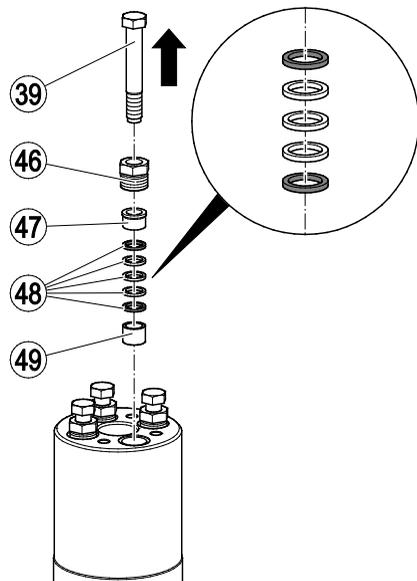
- Lift the packing rings of the stuffing box (15) off the insert.
- Lift the stuffing box ring (16) off the insert.
- Take the stud bolts (45) out of the insert.



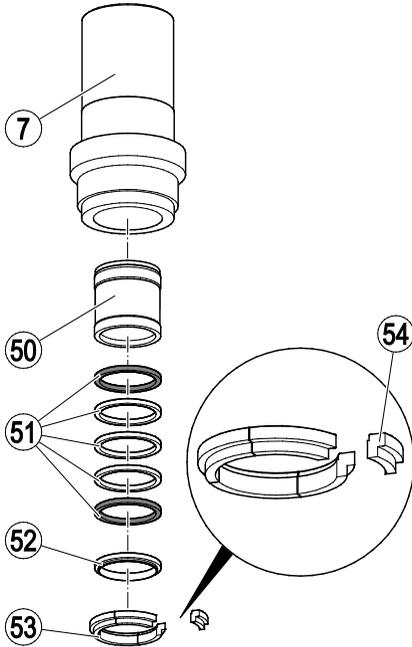
### Removing the pressure balance element

You can now take the pressure balance device out of the insert. For this purpose proceed as follows:

- Remove the bolts (39) of the pressure balance device.
- Loosen the stuffing box screw (46) of the pressure balance device.
- Remove the balance ring (47).
- Take the packing rings (48) out of the stuffing box.
- Take the ring (49) off the bore.
- Remove any dirt deposits in the bore of the stuffing box.



- Pull the small segment (54) out of the support ring (53).
- To remove the support ring pull it out of the sleeve of the pressure balance device (7).
- Remove the retaining ring (52) from the insert.
- Take the packing rings (51) out of the insert.
- Take the sleeve (50) of the pressure balance device out of the insert.



### Removing the valve plug

The threaded ring and the retaining ring connect the plug with the stem. After removing the stem the threaded ring and the retaining ring are accessible through the gap between the plug and the stem.



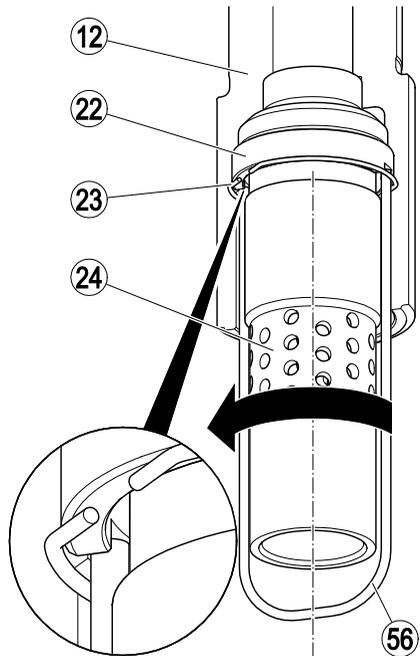
Use a claw tool to remove the threaded ring. The size of the claw tool depends on the equipment type.

- For more details on the dimensions contact the manufacturer.

- Press the valve plug (24) into the stem (12) and hold it there.

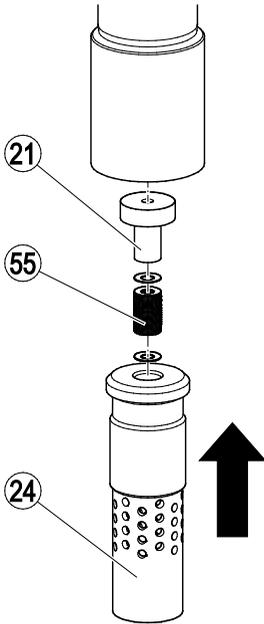
The disc springs are compressed. The pressure on the retaining ring is relieved. You can now remove the retaining ring.

- Remove the retaining ring (23).
- Put the claw tool (56) into the groove in the threaded ring (22).
- To loosen the threaded ring turn the claw tool anticlockwise.
- Remove the threaded ring.



To remove the plug proceed as follows:

- Pull the valve plug (24) downwards off the stem.
- Take the pressure piece (21) off the valve plug.
- Take the disc springs (55) out of the valve plug.



### **Attention!**

Equipment may leak if the gaskets are damaged.

- Always insert new main gaskets when assembling the equipment.
- Check all gaskets, seals and packing rings before installing them.
- Replace any damaged gasket, seal or packing ring.

- Check all component parts.
- Replace the two main gaskets and any damaged components.

### **Attention!**

Equipment may not work properly or get damaged if parts are tilted or skewed when installed.

- Use suitable lifting gear to mount the component parts.
- Do not tilt or skew the component parts during installation.
- During installation make sure that the component parts are not damaged by physical shocks.

## **Assembling the equipment**

### **Work prior to re-installation**



### **CAUTION**

Sharp edges on component parts can cause cuts.

- Wear industrial gloves when servicing equipment parts.

- Clean all component parts before re-installing them.
- Make sure that the sealing surfaces of the stem and seat are correctly surfaced in relation to one another.

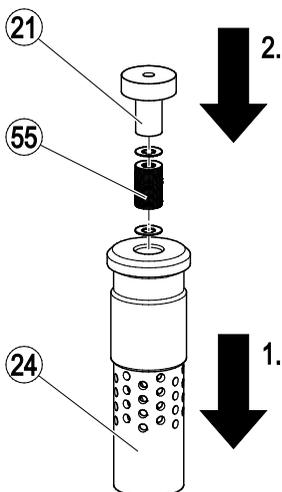
The required bearing capacity of the lifting gear depends on the equipment type. Contact the manufacturer for more information on the weights of the individual parts.

## Fitting the valve plug

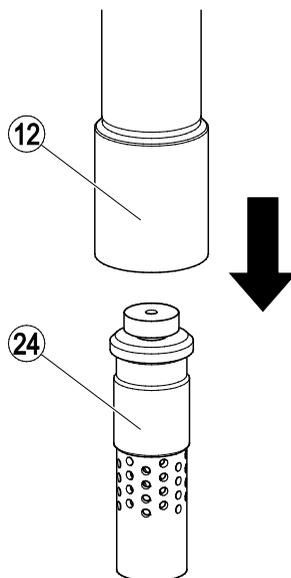


The number and position of the disc springs is shown and described in the supplied technical documents.

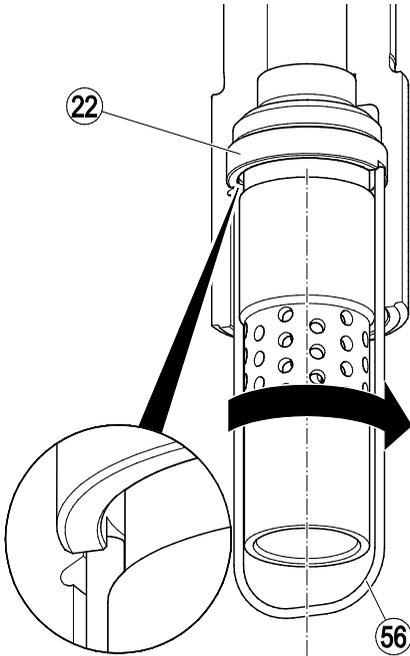
- Insert the disc springs (55) into the hole in the valve plug (24) (1.).
- Put the pressure piece (21) onto the disc springs (2.).



- Put the bore in the stem (12) onto the valve plug (24).

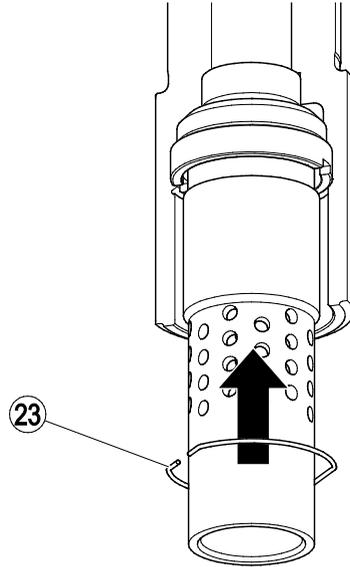


- Insert the threaded ring (22) into the gap between the stem and the valve plug.
- Put the claw tool (56) into the groove in the threaded ring (22).
- To fix the threaded ring turn the claw tool clockwise.
- Press the valve plug into the stem.
- Fasten the threaded ring hand-tight.



- Insert the retaining ring (23) into the gap between the stem and the valve plug.
- Let go of the valve plug.

The retaining ring now secures the threaded ring in place.



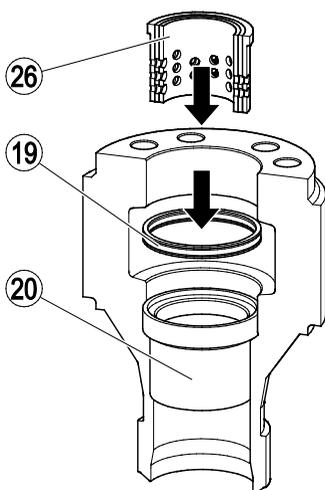
### Fitting the collar bush

Normally you do not have to remove the collar bush from the body.

- Let a qualified technician authorised by the manufacturer install the collar bush.

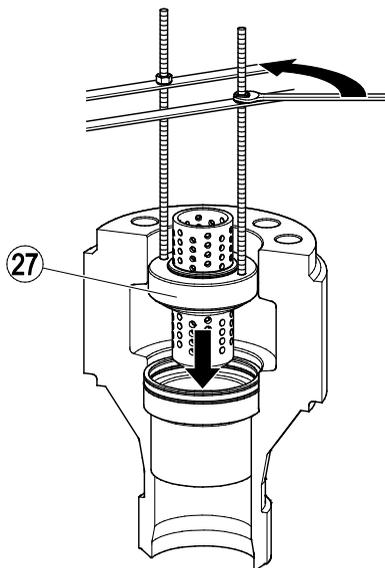
### Fitting the seat bushing

- Put a new lower main gasket (19) onto the collar bush (20) in the body.
- Use a suitable lifting device to put the sleeve (26) onto the body.



- Use a suitable lifting device to put the seat bushing (27) onto the body.

For the installation proceed in reverse order of the removing procedure.



## Fitting the sleeves and stem

### **Attention!**

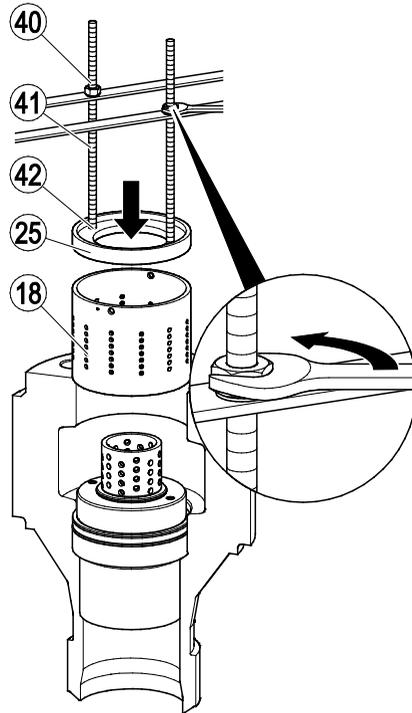
Equipment may get damaged if the sleeves are tilted or skewed when fitted.

- Make sure that the sleeves are not tilted or skewed when put into the body.
- Use a suitable mounting support or lifting device.

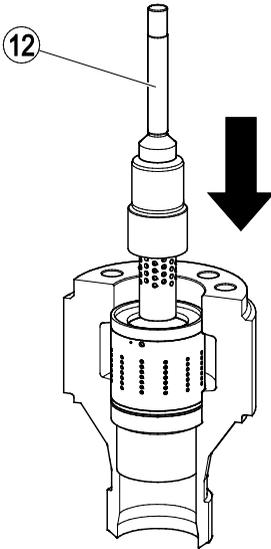
To install the sleeve use the same mounting support (40, 41, 42) that was used for removing it.

- Use a suitable lifting device to put the sleeve (18) into the body.
- Use a suitable lifting device to put the thrust ring (25) into the body.

For the installation proceed in reverse order of the removing procedure.



- Remove the mounting support and keep it for future use.
- Put the stem (12) into the sleeve.



## Compressing lower main gasket

---

### ***Attention!***

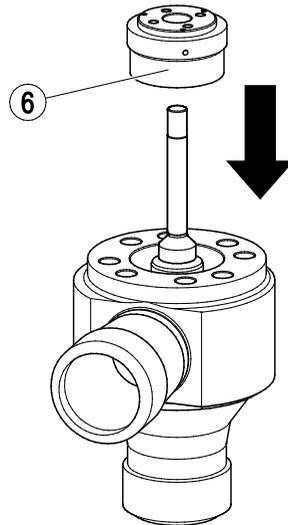
Equipment may not work properly or get damaged if screws, nuts or bolts are tightened with the wrong torques.

- Apply the torques indicated in the parts list when tightening screws, nuts and bolts.

---

To compress the lower main gasket install the insert and yoke and tighten them with the torques indicated in the parts list before mounting the upper main gasket.

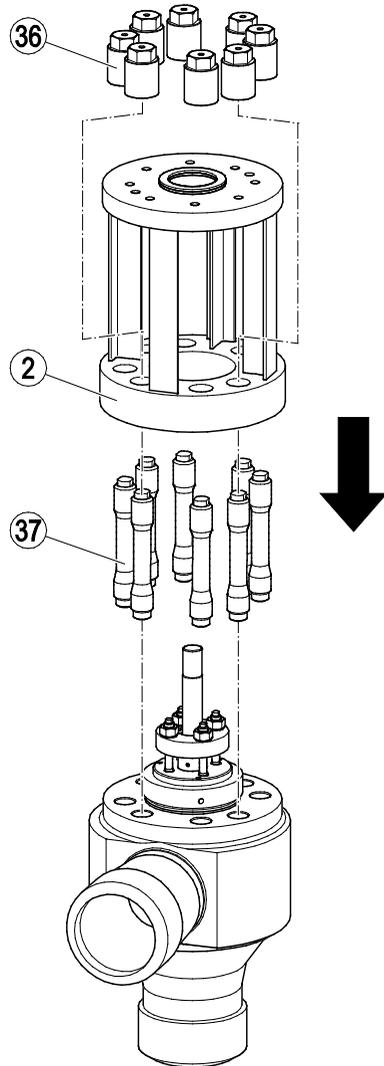
- Push the insert (6) over the stem and into the body.



- Apply MoS<sub>2</sub> grease to the threads of the stud bolts (37) and the cap nuts (36).
- Apply MoS<sub>2</sub> grease to the seating surfaces of the cap nuts.
- Screw the stud bolts into the bores of the body.
- Put the yoke (2) onto the stud bolts of the body.
- Tighten the cap nuts and the stud bolts handtight in diagonally opposite pairs.

The torques required for tightening the cap nuts and the stud bolts depend on the equipment type.

- The tightening torques for your equipment are indicated in the parts list.
- Tighten the cap nuts and the stud bolts with the specified torques.



The lower main gasket is now compressed.

To install the other component parts you have to remove the insert and the yoke.

- Unscrew the cap nuts and the stud bolts.
- Lift the yoke off the body.

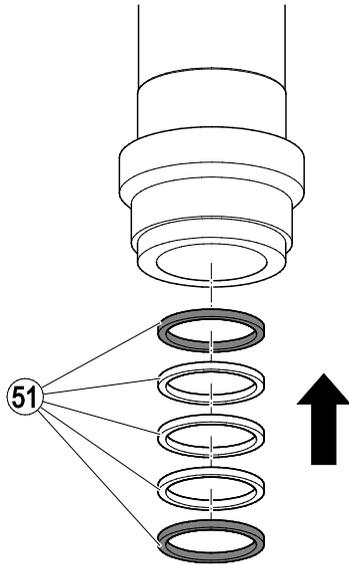
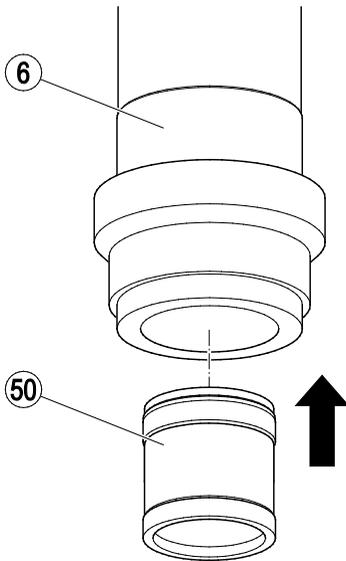
- Take the insert off the stem.



You do not have to remove the stud bolts from the body.  
In the following drawings the stud bolts are not shown for reasons of clarity.

### Attaching pressure balance element

- Put the sleeve (50) of the pressure balance device into the insert (6).



---

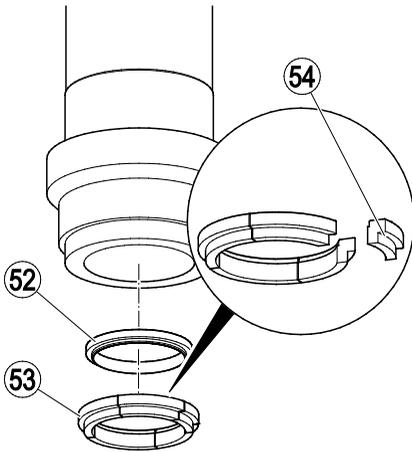
### **Attention!**

Malfunctions may occur if the packing rings are damaged.

- Before installation discard and replace any damaged packing rings.
- Make sure that the packing rings are correctly positioned and not damaged or skewed when fitted.

- 
- Put the packing rings (51) into the insert.

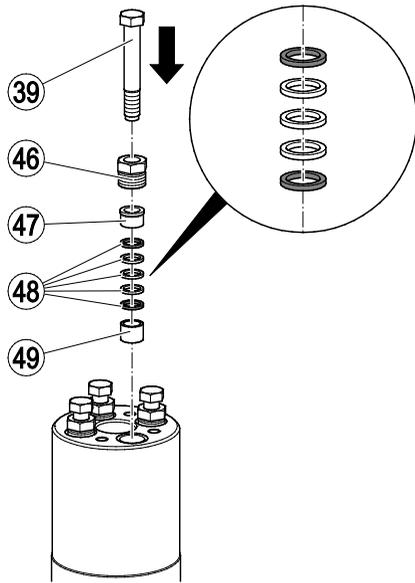
- Put the retaining ring (52) into the insert.
- Put the support ring (53) into the insert.
- Insert the small segment (54) into the support ring (53).



**Attention!**

Malfunions may occur if the packing rings are damaged.

- Before installation discard and replace any damaged packing rings.
- Make sure that the packing rings are correctly positioned and not damaged or skewed when fitted.



To mount the stuffing box packing do not tighten the bolts any more.

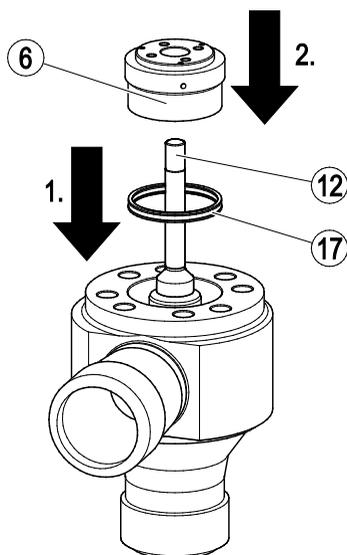
- Tighten the screws of the stuffing boxes only until their heads are below the stuffing box flange.

- Put the ring (49) into the bore.
- Put the packing rings (48) into the bore.
- Put the balance ring (47) into the bore.
- Put the stuffing box screw (46) into the bore.
- Put the bolt (39) into the bore.
- Repeat these steps for the other stuffing boxes of the pressure balance device.

## Fitting the insert

**i** The mounting procedure for the insert is the same for equipment with and without pressure balance. The following drawing shows the equipment without pressure balance.

- Put the upper main gasket (17) into the body (1.).
- Push the insert (6) over the stem (12) and into the body (2.).



## Mounting the gland packing

**i** The mounting procedure for the stuffing box packing is the same for equipment with and without pressure balance. The following drawing shows the equipment without pressure balance.

### **Attention!**

Malfunctions may occur if the packing rings are fitted incorrectly.

- Make sure that the packing rings of the stuffing box (15) are inserted in the following order:

- ▶ one wiper ring made from graphite and CrNi
- ▶ pure graphite rings
- ▶ one wiper ring made from graphite and CrNi

**i** The number of pure graphite rings depends on the size of the equipment. The exact number is indicated in the supplied parts list.

### **Attention!**

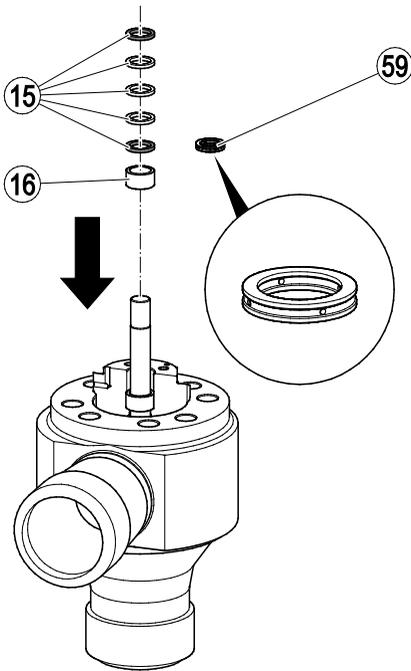
Malfunctions may occur if the packing rings are damaged.

- Before installation discard and replace any damaged packing rings.
- Make sure that the packing rings are correctly positioned and not damaged or skewed when fitted.

- Put the stuffing box ring (16) into the stuffing box.
- Put the packing rings (15) into the stuffing box.

**i** In equipment with a connection for sealing fluid the medium pure graphite ring is replaced by a grooved ring. The following drawing shows the equipment without a connection for sealing fluid.

- In equipment with a connection for sealing fluid insert the grooved ring (59) instead of the pure graphite ring.



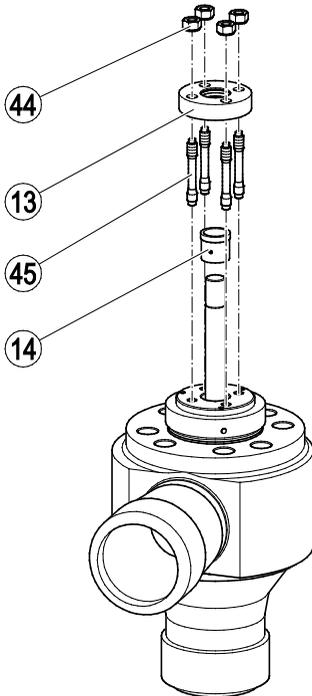
---

### **Attention!**

Equipment may not work properly or get damaged if screws, nuts or bolts are tightened with the wrong torques.

- Apply the torques indicated in the parts list when tightening screws, nuts and bolts.
- 
- The tightening torques for your equipment are indicated in the parts list.

- Put the stuffing box (14) in place.
- Apply MoS<sub>2</sub> grease to the threads of the stud bolts (45) and nuts (44).
- Screw the stud bolts into the threaded bores of the insert.
- Put the stuffing box flange (13) onto the stud bolts.
- Screw the nuts onto the stud bolts.
- The tightening torques for your equipment are indicated in the parts list.
- Fasten the nuts with the specified tightening torque.



After mounting the stuffing box flange you can fasten the bolts of the stuffing box for the pressure balance with the indicated torque.

---

### ***Attention!***

Equipment may not work properly or get damaged if screws, nuts or bolts are tightened with the wrong torques.

- Apply the torques indicated in the parts list when tightening screws, nuts and bolts.

---

The torques required for tightening the bolts depend on the equipment type.

- The tightening torques for your equipment are indicated in the parts list.
- Fasten the bolts of the stuffing box for pressure balance with the indicated torque.

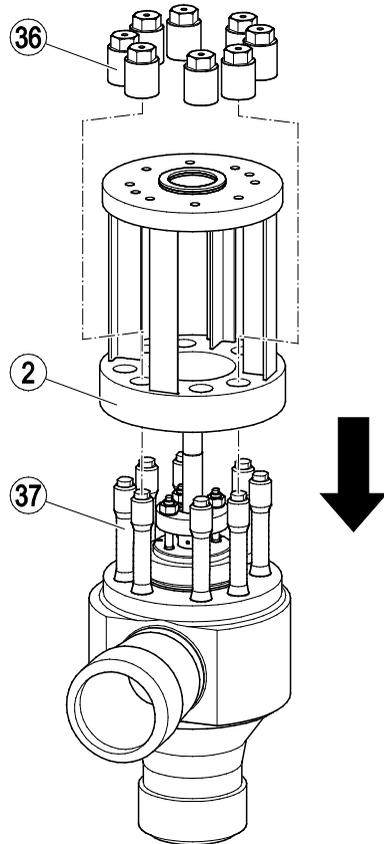
## Mounting the bonnet

### **Attention!**

Equipment may not work properly or get damaged if screws, nuts or bolts are tightened with the wrong torques.

- Apply the torques indicated in the parts list when tightening screws, nuts and bolts.

- The tightening torques for your equipment are indicated in the parts list.
- Apply MoS2 grease to the threads of the stud bolts (37) and the cap nuts (36).<sup>2</sup>
- Pay careful attention to properly aligning the scale on the yoke support with the marking on the stem (see drawings on page 55).
- Put the yoke (2) onto the stud bolts of the body.
- Tighten the cap nuts and the stud bolts handtight in diagonally opposite pairs.
- Tighten the cap nuts and the stud bolts with the specified torques.



## Installing the actuator



The work required for mounting the actuator depends on the actuator type. Proceed in reverse order of disassembling the equipment.  
The following drawing shows the equipment for a rotary actuator.

---

### **Attention!**

Stem may get damaged if the spindle protrudes too much.

- Screw the spindle further into the spindle bearing.

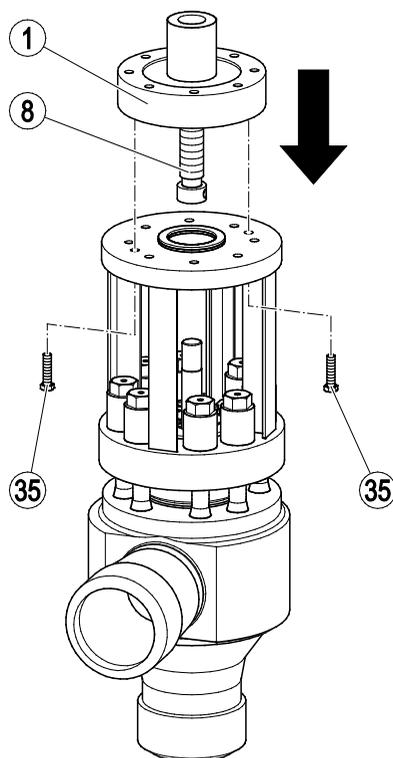
---

### **Attention!**

Equipment may not work properly or get damaged if screws, nuts or bolts are tightened with the wrong torques.

- Apply the torques indicated in the parts list when tightening screws, nuts and bolts.

- 
- The tightening torques for your equipment are indicated in the parts list.
  - In equipment with rotary actuator put the spindle bearing (1) with the spindle (8) screwed in place onto the yoke.
  - Use the two screws (35) to fix the mechanical connection of the actuator.



---

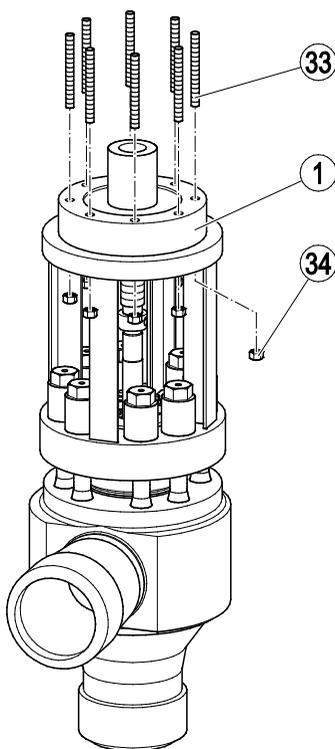
### **Attention!**

Equipment may not work properly or get damaged if screws, nuts or bolts are tightened with the wrong torques.

- Apply the torques indicated in the parts list when tightening screws, nuts and bolts.

- Connect the actuator properly to its power supply.

- 
- The tightening torques for your equipment are indicated in the parts list.
  - Insert the stud bolts (33) into the spindle bearing (1) and the yoke.
  - Fasten the nuts (34) with the specified tightening torque.



- Install the actuator as described in the operating manual for the actuator.

## Mounting the coupling

### **Attention!**

Malfunctions may occur if the coupling is not properly aligned with the stem.

- Make sure that the marking on the stem and the scale are properly aligned.
- Make sure that there is adequate spacing between the coupling and the stem.

The spacing must not exceed 10 mm, but it should be as large as possible.

- Place the two halves of the coupling (11) around the stem (12) and spindle (8) as shown.

The two outer edges of the coupling must be situated next to the cap support as shown.

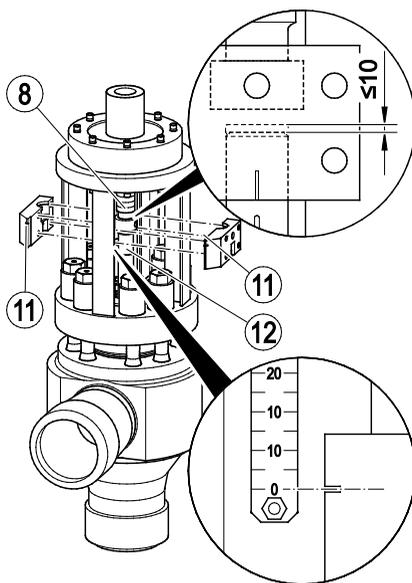
- Rotate the coupling to align it.

The marking on the coupling must be situated above the marking on the stem.

- Make sure the largest possible gap, of 10 mm maximum, is left between the coupling and the stem.
- If necessary, turn the cap round so that the marking of the coupling is lined up with the scale.
- Align the coupling with the cap support as shown.

The marking on the coupling must match that on the scale as shown.

- If necessary, screw the spindle (8) further in or out.

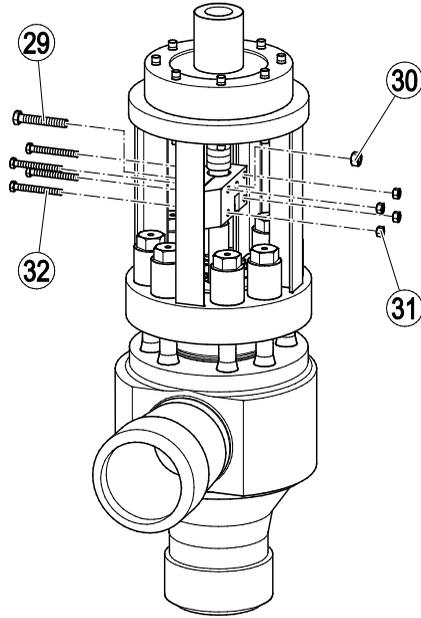


- Align the central hole in the halves of the coupling with the hole in the spindle.
- Connect the coupling and spindle with the hexagon head bolt (29).
- Hand-tighten the nut (30) on the hexagon head bolt (29).

### **Attention!**

Equipment may not work properly or get damaged if screws, nuts or bolts are tightened with the wrong torques.

- Apply the torques indicated in the parts list when tightening screws, nuts and bolts.
- 
- The tightening torques for your equipment are indicated in the parts list.
  - Use the four hexagon head bolts (32) to screw the two coupling halves together.
  - Fasten the hexagon nuts (31) on the hexagon head bolts handtight.
  - Tighten the hexagon nuts (30) and (31) with the specified torque.



Some equipment is fitted with a position indicator. The position indicator comes with a separate installation & operating manual (IOM).

- Mount the position indicator as described in the IOM for the position indicator.

## Servicing the equipment and installing spare parts

You may exchange the following component parts in case of wear or damage:



The material specification and stock code numbers of the component parts are indicated in the supplied parts list.

- Disassemble the equipment as described from page 26 onwards.
  - Remove the defective component part from the equipment.
- 

### ***Attention!***

Equipment may leak if the gaskets are damaged.

- Always insert new main gaskets when assembling the equipment.
  - Check all gaskets, seals and packing rings before installing them.
  - Replace any damaged gasket, seal or packing ring.
- 
- Mount the new component part.
  - Check all component parts before re-installing them.
  - Replace the defective component parts.
  - Replace the two main gaskets.
  - Re-assemble the equipment as described in section "*Assembling the equipment*" from page 40 onwards.

## Troubleshooting

<b>Problem</b>	<b>Cause</b>	<b>Remedy</b>
The stem moves with difficulty or jerky.	Malfunction in actuator.	Follow the instructions in the operating manual for the actuator.
The actuator switches off automatically.	Malfunction in controller.	Follow the instructions in the operating manual for the controller.
	The stuffing box packing affects the stem lift.	Loosen the nuts of the stuffing box flange. Replace the stuffing box packing if it keeps affecting the stem lift.
The flowrate is too small.	The stem lift is affected by foreign matter. The nozzles are dirty or clogged by foreign particles.	Rinse the installation. If necessary disassemble the equipment and clean the component parts.
During operation loud noises are audible.	The nozzles are dirty or clogged by foreign particles.	
The stuffing box is leaking.	The stuffing box has not been tightened enough.	Tighten the nuts to the recommended torque. Make sure that the stuffing box does not impair the movement of the stem and that it does not leak.
	The stuffing-box packing is damaged.	Replace the stuffing-box packing.

- If faults occur that are not listed above or cannot be corrected, please contact our Technical Service or authorized agency in your country.

## Putting the equipment out of operation

### Removing harmful substances



#### **DANGER**

If the equipment is used in contaminated areas there is a risk of severe injuries or death caused by harmful substances in or on the equipment.

- Only qualified personnel are allowed to perform work on contaminated equipment.
- Always wear the protective clothing prescribed for contaminated areas when working on the equipment.
- Make sure that the equipment is completely decontaminated before carrying out any service work.
- Follow the pertinent instructions for handling the hazardous substances in question.

Qualified personnel must have extensive experience with and a working knowledge of:

- ◆ pertinent rules and regulations concerning handling hazardous substances
- ◆ special regulations for handling the hazardous substances encountered on site
- ◆ using the required personal protective equipment (PPE) and clothing

#### **Attention!**

Environmental damage may be caused by poisonous fluid residues.

- Before disposing of the equipment make sure that it is clean and free of fluid residues.
- For the disposal of all materials observe the pertinent legal regulations concerning waste disposal.

- Remove all residues from the equipment.
- For the disposal of all residues observe the pertinent legal regulations concerning waste disposal.

### Removing the equipment



#### **DANGER**

Personnel working on pipes are exposed to safety risks and may suffer severe injuries, poisoning or even loss of life.

- Make sure that no hot or hazardous fluid is in the equipment or the pipes.
- Make sure that the pipes upstream and downstream of the equipment are depressurised.
- Make sure that the installation is switched off and protected against unauthorised or unintended activation.
- Make sure that the equipment and the pipes have cooled down to room temperatures.
- Wear protective clothing that is suitable for the fluid and, if necessary, wear protective gear.

For more information on suitable protective clothing and safety gear refer to the safety data sheet of the fluid in question.



## DANGER

Risk of bruises if the equipment or component parts fall down.

- Always wear protective gear when working on the equipment.
- Use suitable lifting gear when moving or lifting the equipment and/or component parts.
- Make sure that the equipment cannot topple over.
- To lift the equipment use only the valve body or the bonnet.
- Make sure that nobody is standing below the lifted equipment.

The protective gear must comprise at least the following:

- ▶ Safety helmet to EN 397
- ▶ Safety footwear to EN ISO 20345
- ▶ Protective leather gloves to EN 388

For more information on suitable safety clothing and safety gear refer to the safety data sheet of the fluid in question.

The lifting gear must be of sufficient strength for the equipment including the actuator.

For more information on the weight of the equipment see the attached documents. For more information on the weight of the actuator see the documents provided by the actuator manufacturer.

- Switch the installation off and protect it against unauthorised or unintended re-activation.



## WARNING

Risk of severe injuries or death if the actuator is not removed correctly.

- Before working on the actuator cut off power supply to the actuator.
- Follow all instructions and observe all notes given in the operating manual for the actuator.
- Make sure that only qualified and trained personnel work on the actuator and its connections.

A qualified person must be acquainted with and experienced in the following:

- ▶ safety issues when working on the installation
- ▶ establishing connections with the respective power source of the actuator
- ▶ mechanical work on pipes.
- Cut off the power supply to the actuator.
- Detach the actuator from the mechanical connection of the equipment.
- Detach the end connections of the equipment from the pipes.
- Put the equipment onto a suitable base.

The base must be sufficiently strong to withstand the weight of the equipment.

- If necessary disassemble the equipment and put down individual parts.
- Store the equipment as described in section "*Storing the equipment*" from page 16 onwards.

## Disposing of the equipment

---

### ***Attention!***

Environmental damage may be caused by poisonous fluid residues.

- Before disposing of the equipment make sure that it is clean and free of fluid residues.
- For the disposal of all materials observe the pertinent legal regulations concerning waste disposal.

---

The materials of the individual component parts are specified in the parts list for the equipment.

## Technical data

### **Dimensions**

For information on the exact dimensions of the equipment see the dimensional drawing supplied with the equipment.

### **Weights**

For information on the exact weights of the equipment see the dimensional drawing supplied with the equipment.

### **Fluid flowrate and differential pressure**

For information on flowrate and differential pressure see name plate and/or the supplied parts list.

### **Pressure & temperature ratings**

You can find precise information on the pressure and temperature ratings of your equipment on the name plate and in the data sheet.

## Manufacturer's Declaration

You can find details on the conformity assessment in accordance with European Directives in our Declaration of Conformity or our Declaration of Incorporation.

To request the valid Declaration of Conformity or Declaration of Incorporation, please contact:

### **GESTRA AG**

Münchener Straße 77

28215 Bremen

Germany

Telefon +49 421 3503-0

Telefax +49 421 3503-393

E-Mail [info@de.gestra.com](mailto:info@de.gestra.com)

Web [www.gestra.de](http://www.gestra.de)

This declaration is no longer valid if modifications are made to the equipment without consultation with us.





Agencies all over the world: [www.gestra.de](http://www.gestra.de)

## **GESTRA AG**

Münchener Straße 77

28215 Bremen

Germany

Telefon +49 421 3503-0

Telefax +49 421 3503-393

E-Mail [info@de.gestra.com](mailto:info@de.gestra.com)

Web [www.gestra.de](http://www.gestra.de)

818449-03/07-2017 kx\_mm (808557-03) © GESTRA AG Bremen Printed in Germany