

OPERATING INSTRUCTIONS

Translation from the original language



Hygienic valves

GEAVARIVENT® 24/7 PMO valve 2.0, type M/2.0

GEA Tuchenhausen GmbH
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TABLE OF CONTENTS

1	General Information	7
1.1	Information on the Document	7
1.1.1	Binding Character of These Operating Instructions	7
1.1.2	Notes on the Illustrations	7
1.1.3	Symbols and Highlighting	7
1.2	Manufacturer address	8
1.3	Contact	8
1.4	EU Declaration of Conformity in accordance with the EC Machinery Directive 2006/42/EC	9
1.5	Translated copy of the EU - Declaration of conformity in accordance with the Pressure Equipment Directive 2006/42/EU	10
1.6	UK Declaration of Conformity for the Delivery of Machines (Safety) dated 2008	11
2	Safety	12
2.1	Intended use	12
2.1.1	Requirements for operation	12
2.1.2	Pressure equipment directive	12
2.1.3	ATEX directive	12
2.1.4	Improper operating conditions	13
2.2	Operator's Duty of Care	13
2.3	Subsequent changes	14
2.4	General safety instructions and dangers	14
2.4.1	Principles for safe operation	14
2.4.2	Environmental Protection	15
2.4.3	Electrical Equipment	15
2.5	Supplementary Regulations	15
2.6	Qualification of personnel	15
2.7	Safety equipment	17
2.7.1	Signage	17
2.8	Residual dangers	18
2.9	Danger zones	19
3	Description	22
3.1	Design	22
3.2	Functional description	24
3.2.1	Leakage-Proof Shut-Off	24
3.2.2	Cleaning by lifting	24
3.2.3	Actuator Function	24
4	Transport and storage	25
4.1	Storage conditions	25
4.2	Transport	25
4.2.1	Scope of supply	26
5	Technical data	27
5.1	Type plate	27
5.2	Technical data	27
5.3	Resistance and permitted operating temperature of the sealing materials	28
5.4	Pipe ends - General table of measurements	29
5.5	Tool	30
5.6	Lubricants	31
5.7	Weights	31
6	Assembly and installation	32
6.1	Safety instructions	32
6.2	Notes on installation	32
6.3	Control head	32
6.4	Valve with Detachable Pipe Connection Elements	32
6.5	Valve with welded ends	33
6.6	Pneumatic connections	34
6.6.1	Air requirement	34
6.6.2	Establishing hose connections	34
	Hose connection plan - mixproof valves M/2.0 with control top T.VIS	35
6.7	Electrical connection with T.VIS control top	36
6.7.1	Adjustment of the control top	36
	Control top T.VIS A-15 adjustment	36

	Control top T.VIS M-15 adjustment	38
6.7.2	Adjustment of the initiators in the lantern	41
	Fitting the sliding piece	41
	Set the slider	42
	Fitting the proximity switch	43
	Set the proximity switch	43
6.8	Test procedure according to PMO for valve type M/ 2.0	45
6.8.1	Test procedure	45
6.8.2	Hardware description	46
7	Start-up	48
7.1	Safety instructions	48
7.2	Notes on commissioning	48
8	Operation and control	49
8.1	Safety instructions	49
8.2	Feedback system / signal analysis	49
9	Cleaning	50
9.1	Cleaning	50
9.1.1	Cleaning Process Examples	50
9.1.2	Cleaning effect	50
9.1.3	Cleaning the leakage outlet of the mixproof valve type M/ 2.0	51
9.1.4	Cleaning of the lower balancer	51
9.1.5	Examples for cleaning by lifting	51
9.2	Passivation	51
10	Maintenance	53
10.1	Safety instructions	53
10.2	Inspections	54
10.2.1	Product contact seals	54
10.2.2	Pneumatic connections	54
10.2.3	Electrical connections	55
10.3	Maintenance intervals	55
10.4	Prior to removal	56
10.5	Disassembly	56
10.5.1	Start disassembly	56
10.5.2	Removing the control top	60
10.5.3	Disconnecting the valve from the housing	61
10.5.4	Removing the valve disk	63
10.5.5	Dismantle double-disk	64
10.5.6	Dismantle lifting actuator	65
10.5.7	Disassembly sterile lock	67
10.5.8	Disassembly balancer plug	67
10.6	Installation	68
10.6.1	Tightening torques	69
10.6.2	Fitting the lifting actuator	69
10.6.3	Installing the valve	72
10.6.4	Mount the switch bar and control top	77
10.6.5	Assembly balancer plug	78
10.6.6	Fit the sterile lock	78
10.6.7	Installing the valve in the housing	79
10.6.8	Checking the function	82
	Checking the valve stroke	82
	Check the lift stroke	82
10.7	Maintenance	82
10.7.1	Cleaning the valve	82
10.7.2	Replacing Seals	83
	Replacing V-Ring RA on the double-disk and valve disk	83
	Replace more seals	85
	Lubricating seals and threads	85
11	Alarms	88
11.1	Malfunctions and remedies	88
12	Decommissioning	89
12.1	Safety instructions	89
12.2	Disposal	89

12.2.1	General notes	89
12.2.2	Valve Actuator Disposal	89
13	Spare parts list - mixproof valve M/2.0 with cleaning of lower balancer plug	90
14	Spare parts list - mixproof valve M/2.0 without cleaning of lower balancer	95
15	Spare parts list - Lifting actuator M/2.0	100
16	Dimension sheet - mixproof valve type M/ 2.0	103
17	Appendix	105
17.1	Lists	105
17.1.1	Abbreviations and terms	105

1 General Information

1.1 Information on the Document

The present Operating Instructions are part of the user information for the product. The Operating Instructions contain all the information you need to transport, install, commission, operate and carry out maintenance for the product.

1.1.1 Binding Character of These Operating Instructions

These Operating Instructions contain the manufacturer's instructions to the operator of the product and to all persons who work on or use the product regarding the procedures to follow.

Carefully read these Operating Instructions before starting any work on or using the product. Your personal safety and the safety of the product can only be ensured if you act as described in the Operating Instructions.

Store the Operating Instructions in such a way that they are accessible to the operator and the operating staff during the entire life cycle of the product. When the location is changed or the product is sold make sure you also provide the Operating Instructions.

1.1.2 Notes on the Illustrations

The illustrations in these Operating Instructions show the product in a simplified form. The actual design of the product can differ from the illustration. For detailed views and dimensions of the product please refer to the design documents.

1.1.3 Symbols and Highlighting

In these Operating Instructions, important information is highlighted by symbols or special formatting. The following examples illustrate the most important types of highlighting.



Danger

Warning: Fatal Injuries

Failure to observe the warning can result in serious damage to health, or even death.

- ▶ The arrow identifies a precautionary measure you have to take to avoid the hazard.



Warning: Explosions

Failure to observe the warning can result in severe explosions.

- ▶ The arrow identifies a precautionary measure you have to take to avoid the hazard.

 **Warning!**

Warning: Serious Injuries

Failure to observe the warning can result in serious damage to health.

- ▶ The arrow identifies a precautionary measure you have to take to avoid the hazard.

 **Caution!**

Warning: Injuries

Failure to observe the warning can result in minor or moderate damage to health.

- ▶ The arrow identifies a precautionary measure you have to take to avoid the hazard.

Notice

Warning: Damage to Property

Failure to observe the warning can result in serious damage to the component or in the vicinity of the component.

- ▶ The arrow identifies a precautionary measure you have to take to avoid the hazard.

Carry out the following steps: = Start of a set of instructions.

1. First step in a sequence of operations.
 2. Second step in a sequence of operations.
 - Result of the previous operation.
- The operation is complete, the goal has been achieved.

 **Hint!**

Further useful information.

1.2 Manufacturer address

GEA Tuchenhausen GmbH
Am Industriepark 2-10
21514 Büchen

1.3 Contact

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Fax: +49 4155 49-2035
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www.gea.com

EU Declaration of conformity within the meaning of the EC machine directive 2006/42/EC

Manufacturer: **GEA Tuchenhagen GmbH**
Am Industriepark 2-10
21514 Büchen, Germany

Hereby, we declare that the machine designated in the following

Designation: Valve with acuator

Type: VARIVENT® / ECOVENT®

by virtue of its design and construction and in the versions placed on the market by us, complies with the essential health and safety requirements of the following directive:

Relevant EC directives: 2006/42/EC EC Machinery Directive

Applicable harmonized standards, in particular: EN ISO 12100: 2010

Remarks:

- In the event of a modification to the machine that was not agreed with us, this declaration loses its validity
- Furthermore, we declare that the specific technical documentation for this machine has been drawn up in accordance with Annex VII, Part A, and undertake to forward this documentation by means of data medium upon justified request by the national authorities

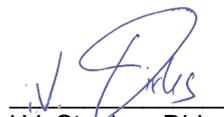
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21514 Büchen, Germany

Hereby, we declare that the machine designated in the following

Designation: Valve with actuator

Type: VARIVENT® / ECOVENT®

by virtue of its design and construction and in the versions placed on the market by us, complies with the essential health and safety requirements of the following directive:

Relevant UK legislation: Supply of Machinery (Safety) Regulations 2008

Applicable harmonized standards, in particular: EN ISO 12100: 2010

Remarks:

- In the event of a modification to the machine that was not agreed with us, this declaration loses its validity
- Furthermore, we declare that the specific technical documentation for this machine has been drawn up in accordance with Annex VII, Part A, and undertake to forward this documentation by means of data medium upon justified request by the national authorities

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2 Safety

2.1 Intended use

The mixproof valve type 24/7 M/2.0 PMO is used for the mix-proof shut-off of high-grade, non-abrasive products at intersection points in pipe systems. It is resistant to pressure surges in its closed state.



Hint!

Do not install the valve in spring-opening, as this will open when there is a current or air failure and leads to product mixing.

In a closed pipe system, hydraulic pressure build-up may occur when the valve switches and result in seal damage.

The mixproof valve type 24/7 M/2.0 PMO is intended for installation in a milk-processing plant in accordance with the Pasteurized Milk Ordinance (PMO) section 7, item 15p. (B) and complies with the 3-A standard 85-03 for mixproof valves. The function enables the safe separation of milk / milk products and cleaning or disinfecting solutions and, according to PMO section 1 15p.B permits the seat cleaning of the valve seats while milk is in the opposite housing.



Hint!

The manufacturer will not accept any liability for damage resulting from any use of the valve which is not in accordance with the designated use of the valve. The risk is borne solely by the operating company.

2.1.1 Requirements for operation

The prerequisite for reliable and safe operation of the component is proper transportation and storage as well as professional installation and assembly. Operating the unit within the limits of its designated use also involves adhering to the operating, inspection and maintenance instructions.

2.1.2 Pressure equipment directive

The component is a piece of pressure equipment (without safety function) in the sense of the pressure equipment directive 2014/68/EU. Classified according to Annex II in category 1.

According to the scope of directive 2014/34/EC, article 1, paragraph 2, f, the exception of the directive applies, due to conformity with the machine directive 2006/42/EU.

The nominal diameters smaller than DN 25 are subject to article 4, paragraph 3 of the Pressure Equipment Directive which specifies sound engineering practice. Nominal diameters \geq IPS 4"; DN 125 valid for the fluid group II.

In the event of any deviations, GEA Tuchenhausen GmbH will supply a specific Declaration of Conformity.

2.1.3 ATEX directive

In areas with an explosive atmosphere, only valves suitable for use in such areas may be used.

Refer to and observe the additional operating instructions "ATEX version valves". For details regarding the marking of valves for potentially hazardous areas also refer to the additional operating instructions "ATEX version valves".

If these valves are used in areas with a potentially explosive atmosphere, you must absolutely comply with directive 2014/34/EC with respect to all ignition hazards.

2.1.4 Improper operating conditions

The operational safety of the component can not be guaranteed under improper operating conditions. Therefore avoid improper operating conditions.

The operation of the component is not permitted if:

- Persons or objects are in the danger zone.
- Safety devices are not working or were removed.
- Malfunctions have been detected on the component.
- Damage to the component has been detected.
- Maintenance intervals have been exceeded.

2.2 Operator's Duty of Care

The operating company of the component has a special responsibility for the proper and safe handling of the component within their company. Only use the component when it is in perfect operating condition in order to prevent danger to persons and property.

This operating manual contains information that you and your employees need for safe operation over the life of the component. Be sure to read these Operating Instructions carefully and ensure that the measures described here are observed.

The operator's duty of care includes planning the necessary safety measures and monitoring that these measures are observed. The following principles apply:

- Only qualified personnel may work on the component.
- The operating company must authorize personnel to carry out the relevant tasks.
- Order and cleanliness must be maintained at the work stations and in the entire area surrounding the component.
- Personnel must wear suitable work clothing and personal protective equipment. As the operating company must ensure that work clothing and personal protective equipment are used.
- Inform personnel regarding any properties of the product which might pose a health risk and the preventative measures to be taken.
- Have a qualified first-aid representative on call during the operation. This person must be able to initiate any necessary first-aid measures in case of an emergency.

- Clearly define procedures, competences and responsibilities for those working in the area of the component. Everybody must know what to do in case of an emergency. Instruct the staff in this respect at regular intervals.
- The signs on the component must always be complete and easy to read. Check, clean and replace the signs as necessary at regular intervals.
- Observe the Technical Data specified and the limits of use!



Hint!

Carry out regular checks. This way you can ensure that these measures are actually observed.

2.3 Subsequent changes

No technical modifications should ever be made to this component. Otherwise you will have to undergo a new conformity process in accordance with the EC Machinery Directive on your own.

In general, only original spare parts supplied by GEA Tuchenhausen GmbH should be fitted. This ensures that the component is always operating properly and efficiently.

2.4 General safety instructions and dangers

The component is safe to operate. It was built according to state-of-the-art science and technology.

Nevertheless, dangers can arise from the component, if:

- the component is not used as intended
- the component is used improperly
- the component is operated under impermissible conditions

2.4.1 Principles for safe operation

Dangerous situations during operation can be avoided by safety-conscious and proactive behaviour of the staff.

To ensure safe operation of the valve the following principles apply:

- The Operating Instructions must be kept ready to hand at the valve's place of use. They must be complete and in clearly legible form.
- Only use the valve for its intended use.
- The valve must be functional and in good working order. Check the condition of the valve before starting work and at regular intervals.
- Wear tight-fitting work clothing for all work on the valve.
- Ensure that nobody can get hurt on the parts of the valve.
- Immediately report any faults or noticeable changes on the valve to the person responsible.

- Never touch the pipes and the valve when these components are hot! Avoid opening the valve unless the process plants have been emptied and depressurised.
- Observe the accident prevention regulations and all local regulations.

2.4.2 Environmental Protection

Harm to the environment can be avoided by safety-conscious and proactive behaviour of the staff.

For environmental protection the following principles apply:

- Substances harmful to the environment must not be discharged into the ground or the sewage system.
- Always observe the pertinent regulations relating to waste avoidance, disposal and utilization.
- Substances harmful to the environment must be collected and stored in suitable containers. Clearly mark the containers.
- Dispose of lubricants as hazardous waste.

2.4.3 Electrical Equipment

For all work on electrical equipment, the following principles apply:

- Access to electrical equipment should only be allowed to qualified electricians. Always keep unattended switch cabinets locked.
- Modifications of the control system can affect the safe and reliable operation. Modifications are only permitted with the express permission of the manufacturer.
- After completion of all work, check that the protective devices are fully functional.

2.5 Supplementary Regulations

In addition to the instructions in this documentation the following also has to be observed:

- pertinent accident prevention regulations,
- generally accepted safety rules,
- national regulations applicable in the country of use,
- work and safety instructions applicable in the facility,
- installation and operating regulations for use in potentially explosive areas.

2.6 Qualification of personnel

This section provides information on how the personnel working on the component must be trained.

Operating and maintenance personnel must

- have the necessary qualification to carry out their tasks,

- be instructed with regard to possible dangers,
- know and observe the safety instructions given in the documentation.

Only allow qualified electricians to carry out work on the electrical equipment or have a qualified electrician supervise the work.

Only allow specially trained personnel to carry out work on an explosion-protected system. When working on explosion-protected equipment observe the standards DIN EN 60079-14 for gases and DIN EN 50281-1-2 for dusts.

The following minimum qualifications are required:

- Training as a specialist for working independently on the component.
- Adequate instruction to work on the component under the supervision and guidance of a trained specialist

Each employee must meet the following requirements to work on the component:

- Personal suitability for the respective task.
- Sufficient professional qualification for the respective task.
- Received instruction about the functionality of the component.
- Received instruction about operating sequences on the component.
- Familiar with the safety devices and their function.
- Familiar with these Operating Instructions, especially with the safety instructions and the information which is relevant for the task on hand.
- Familiar with the basic regulations with regard to occupational health and safety and accident prevention.

When working with the component, a distinction is made between the following user groups:

User groups	
Staff	Qualifications
Operating personnel	<p>Adequate instruction and sound knowledge in the following areas:</p> <ul style="list-style-type: none"> • Functionality of the component • Operating sequences on the pump • What to do in case of an emergency • Lines of authority and responsibilities with respect to the task
Maintenance personnel	<p>Appropriate training and a sound knowledge of the structure and functionality of the component. Sound knowledge in the following areas:</p> <ul style="list-style-type: none"> • Mechanical equipment • Electrical equipment • Pneumatic system <p>Authorization with regard to safety engineering standards to carry out the following tasks:</p> <ul style="list-style-type: none"> • Setting devices into operation • Earthing of devices • Marking of devices <p>The relevant certificates of qualification must be submitted before work can be carried out on ATEX certified machines.</p>

2.7 Safety equipment

2.7.1 Signage

Dangerous points on the valve are indicated by warning signs, prohibition signs and mandatory signs.

The signs and notes on the valve must always be legible. Any illegible signs must be replaced immediately.

Signs on the valve	
Sign	Meaning
 Fig.1	General hazard warning
 Fig.2	Warning Crushing
 Fig.3	Explosive atmosphere hazard warning

2.8 Residual dangers

Dangerous situations can be avoided by safety-conscious and proactive behaviour of the staff and by wearing personal protective equipment.

Residual dangers on the valve and measures		
Danger	Cause	Measure
Danger to life	Inadvertent switch-on of the valve	Effectively disconnect all components, effectively prevent switch-on.
	Electric power	Observe the following safety rules: 1. Isolate from the power supply. 2. Take appropriate measures to prevent switch on. 3. Test absence of voltage. 4. Earthing and short-circuiting. 5. Cover or safeguard any adjacent live parts.
	Spring tension in the actuator	Danger to life caused by compression spring in the actuator. Do not open the actuator but return it to GEA Tuchenhausen for proper disposal.

Residual dangers on the valve and measures		
Danger	Cause	Measure
Danger of injury	Danger presented by moving or sharp-edged parts	<p>The operator must exercise caution and prudence.</p> <p>For all work:</p> <ul style="list-style-type: none"> • Wear suitable work clothing. • Never operate the machine if the cover panels are not correctly fitted. • Never open the cover panels during the operation. • Never reach into openings. <p>As a precautionary measure, wear personal protective equipment in the vicinity of the valve:</p> <ul style="list-style-type: none"> • Protective gloves • Safety shoes
Environmental damage	Operating materials with properties which are harmful to the environment	<p>For all work:</p> <ul style="list-style-type: none"> • Collect lubricants in suitable containers. • Dispose of lubricants in accordance with the pertinent regulations.

2.9 Danger zones

Please observe the following notes:

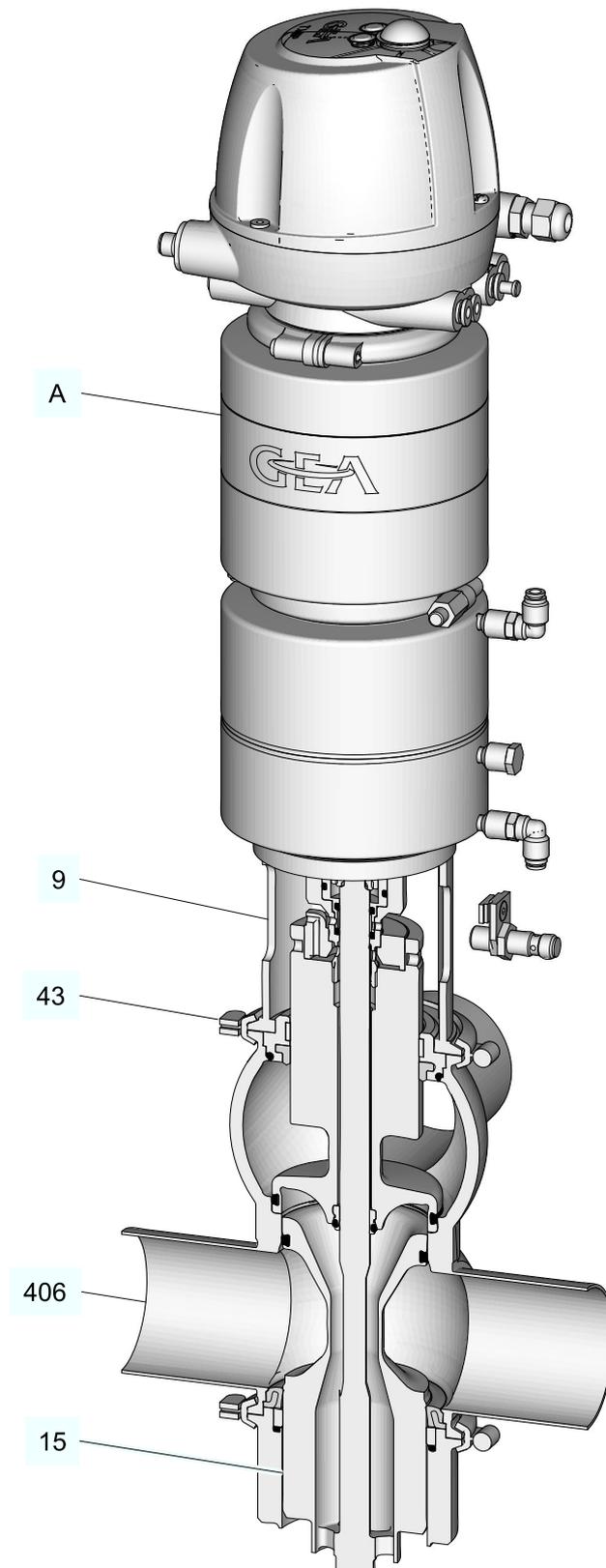


Fig.4: Danger zones

- In the event of malfunctions, shut down the valve (disconnect from the power and air supply) and secure it against being used.

- Never reach into the lantern (9) when the valve is switching. Fingers can be crushed or cut off.
- On a spring-closing valve, there is a risk of injury upon releasing the clamp connections (43) as the released spring pretension will suddenly lift the actuator (A). Before releasing the clamp connection (43) therefore relieve the spring tension by pressurizing the actuator with compressed air.
- Before starting any maintenance, servicing or repair work, disconnect the valve from the power supply and secure it against inadvertently being switched back on again.
- Only allow a qualified electrician to carry out any work on the electrical power supply.
- Check the electrical equipment of the valve at regular intervals. Immediately remedy loose connections and molten cables.
- If work on live parts cannot be avoided, call in a second person, who can operate the main switch in case of an emergency.
- The housing sockets (406) have very sharp edges. When transporting and installing the valve be sure to wear suitable protective gloves.
- When the valve switches, when the valve seat is being cleaned or if a seal is defective, medium (product cleaning medium) exits from the leakage outlet (15). Collect this liquid in a suitable container such as a funnel or a drip pan and discharge it in a safe manner. Observe the instructions in the safety data sheets issued by the cleaning agent manufacturers.

3 Description

3.1 Design

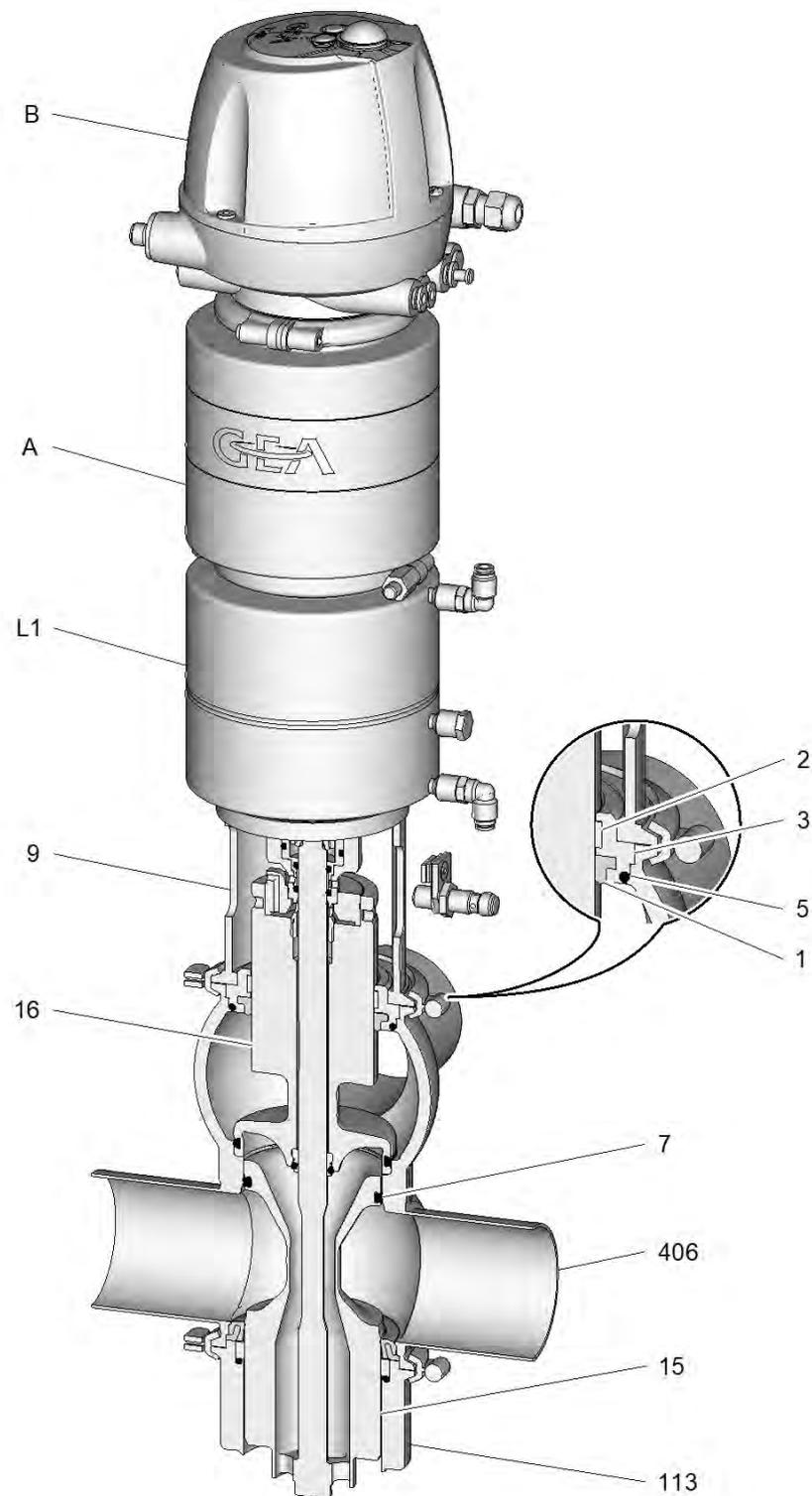


Fig.5

The Varivent type M/2.0 is fitted with a radial valve disk and double-disk seal.

Design	
No.	Designation
A	Actuator
B	T.VIS control top
1	Seal ring
2	Rod guide ring
3	Seal disk
5	O-ring
7	V-ring RA
9	Lantern
15	Valve disk
16	Double-disk
L1	Lift actuator
406	Valve housing
113	Sterile lock MMU

Description

Functional description

3.2 Functional description

3.2.1 Leakage-Proof Shut-Off

The upper and the lower valve housing of the mixproof valve type M/2.0 are each equipped with a valve seat. The chamber between the valve discs is connected to the periphery via a leakage outlet that is integrated into the lower valve disc. If a fault occurs in the seal, leaking fluid can drain securely to the outside. Seal damage can be easily recognised in this way. Under normal operating conditions, liquid from one pipe is prevented from entering the other pipe.

3.2.2 Cleaning by lifting

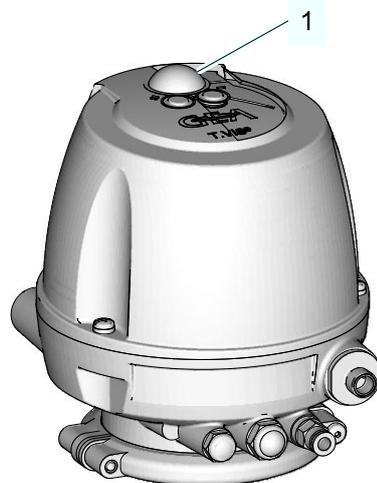
When cleaning the pipeline, the valve disk in contact with the cleaning liquid can be lifted separately. This allows the cleaning liquid to enter the leakage cavity and to clean the seats and the leakage cavity.

3.2.3 Actuator Function

The actuator is of the spring-closing type (Z). The valve is closed in the non-actuated position.

Identification on the T.VIS control top once the installation (SET-UP) has been completed:

- Permanent light (1) green: valve in idle position (non-actuated position)
- Permanent light (1) yellow: valve in end position (actuated position)



T.VIS A-15

Fig.6

4 Transport and storage

4.1 Storage conditions

The valves, valve inserts or spare parts should be stored in a dry place, free of vibrations and dust, and protected from light. To avoid damage, leave the components in their original packaging if possible.

If, during transport or storage, the valve is going to be exposed to temperatures $\leq 0^{\circ}\text{C}$, it must be dried beforehand and suitable measures must be taken to protect it from damage.



Hint!

We recommend that the valve should be stored at a temperature of $\geq 5^{\circ}\text{C}$ for a period of 24 hours prior to any handling (disassembling the housings / activation of actuators) so that any ice crystals formed by condensation water can melt.

4.2 Transport



Fig.7

For transport, the following principles apply:

- When transporting the valve be sure to unscrew the control top and the switch bar from the actuator (2) and use the screwed-in eye bolt (1), material no. 221-104.98, to lift the valve.
- Only use suitable lifting gear and slings for transporting the package units/ valves.
- Observe the pictograms on the package.
- Handle valves with care to avoid damage caused by impact or careless loading and unloading. The outside synthetic materials are susceptible to breaking.
- Control tops must be protected from animal and vegetable fats.
- Only allow qualified staff to transport the valve.
- Movable parts must be properly secured.

- Only use approved, fully functional load lifting devices and lifting accessories which are suitable for the intended purpose. Observe the maximum load-bearing capacities.
- Secure the valve against slipping. Take the weight of the valve into account and the position of the point of gravity.
- Under no circumstances should anyone stand under a suspended load.
- Take care when transporting the valve. Do not grip sensitive parts of the unit to lift or push the unit or to support yourself. Avoid putting the unit down with a jerk.

4.2.1 Scope of supply

After taking delivery of the component, check if

- the details on the type plate correspond to the data in the order and delivery documents,
- the equipment is complete and all components are in good order.

5 Technical data

5.1 Type plate

The type plate clearly identifies the valve.

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Am Industriepark 2-10, 21514 Büchen, Germany

GEA

Type

Serial

Mat.

Air bar/psi min. max.

PSI bar/psi 1 2 3

CE

Fig.8

The type plate provides the following key data:

Key data of the valve	
Type	Mixproof valve M/2.0
Serial	Serial number
Material	1.4404 (AISI 316L) / EPDM (FDA)
Control air pressure bar/psi	6 bar to 8 bar (87 psi to 116 psi)
Product pressure bar/psi	10 bar (145 psi) max.

5.2 Technical data

Refer to the following tables for the key technical data of the valve:

Technical data: Valve	
Designation	Description
Size	1.5" to 6" OD
Material of product contact parts	Stainless steel 1.4404
Fitting position	Vertical

Technical data: Ambient temperatures	
Designation	Description
- Valve	0 to 45 °C (32 ... 113 °F), standard < 0 °C (32 °F): Use control air with low dew point. Protect valve rods against freezing.
- Initiator	-20 to +80 °C (-4 ... +176 °F)

Technical data

Resistance and permitted operating temperature of the sealing materials

Technical data: Ambient temperatures	
Designation	Description
- Control top type T.VIS M-15, A-15	-20 to +50 °C (-4 ... +122 °F)
Product temperature and operating temperature	depending on the sealing material

Technical data: Compressed air supply	
Designation	Description
Air hose	
- metric	Material PE-LD Outside Ø 6 mm Inside Ø 4 mm
- Inch	Material PA Outside Ø 6.35 mm Inside Ø 4.3 mm
Product pressure	max. 10 bar (145 psi)
Resistance to pressure surges* From 1 1/2" OD	max. 50 bar
Control air pressure	6 bar, max. 8 bar (87 psi, max. 116 psi)
Control air	acc. to ISO 8573-1
- Solid particle content:	Quality class 6 Particle size max. 5 µm Particle density max. 5 mg/m ³
- Water content:	Quality class 4 max. dew point +3 °C If the unit is used at higher altitudes or at low ambient temperatures, the dew point must be adapted accordingly.
- Oil content:	Quality class 3, preferably oil free, max. 1 mg oil to 1 m ³ air

*Resistance to pressure surges in the closed state

5.3 Resistance and permitted operating temperature of the sealing materials

The resistance and permitted operating temperature of the sealing materials depend on the type and temperature of the medium conveyed. The exposure time can adversely affect the service life of the seals. The sealing materials comply with the regulations of FDA 21 CFR 177.2600 or FDA 21 CFR 177.1550.

The maximum operating temperature is defined by the sealing type and its mechanical load.

Due to the various operating conditions (e.g. duration of operation, switching frequency, type and temperature of product and cleaning agents as well as operating environment), GEA Tuchenhausen recommends the performing of resistance tests by the user.

Resistance:

- + = good resistance
- o = reduced resistance
- - = no resistance

Table sealing resistance / permitted operating temperature				
Medium	Maximum operating temperatures	Sealing materials		
		EPDM	FKM	HNBR
Alkalis up to 3%	up to 80 °C (176°F)	+	o	+
Alkalis up to 5%	up to 40 °C (104°F)	+	o	o
Alkalis up to 5%	up to 80 °C (176°F)	+	-	-
Alkalis more than 5%		o	-	-
Inorganic acids up to 3%	up to 80 °C (176°F)	+	+	+
Inorganic acids up to 5%	up to 80 °C (176°F)	o	+	o
Inorganic acids up to 5%	up to 100 °C (212°F)	-	+	-
Water	up to 100 °C (176°F)	+	+	+
Steam	up to 135 °C (275°F)	+	o	o
Steam, approx. 30 min	up to 150 °C (302°F)	+	o	-
Fuels/hydrocarbons		-	+	+
Product with a fat content of max. 35%		+	+	+
Product with a fat content of more than 35%		-	+	+
Oils		-	+	+

Table sealing material - temperature resistance	
Sealing materials	General temperature resistance*
EPDM	-40...+135 °C (-40...275 °F)
FKM	-10...+200 °C (+14...+392 °F)
HNBR	-25...+140 °C (-13...+284 °F)
* The general resistance of the material does not correspond to the maximum operating temperature.	

5.4 Pipe ends - General table of measurements



Hint!

Not every valve is available in every size. Particulars of available sizes of valves see Chapter 5, Page 27.

Technical data

Tool

Dimensions for tubes in inch OD				
Inch OD	Outside diameter	Wall thickness	Inside diameter	Outside diameter acc. to BS 4825
0.5"	12.7	1.65	9.4	x
0.75"	19.05	1.65	15.75	x
1"	25.4	1.65	22.1	x
1.5"	38.1	1.65	34.8	x
2"	50.8	1.65	47.5	x
2.5"	63.5	1.65	60.2	x
3"	76.2	1.65	72.9	x
4"	101.6	2.11	97.38	x
6"	152.4	2.77	146.86	x

5.5 Tool



Hint!

The following tools are required for maintenance work on the valve:

- Vice
- Torque wrench

List of tools	
Tool	Material no.
Mandrel 6 mm	403-211
Slot-head screwdriver 2.5 mm	406-102
Open end spanner, a/f 10/11	408-033
Open end spanner, a/f 16/18	408-183
Open end spanner, a/f 14/17	406-045
Hook wrench to hold the driver sleeve Ø30/Ø4 for DN 50-DN100	408-202
Hook wrench to hold the driver sleeve Ø34/Ø4 for DN 125, 6"IPS	408-204
Allen key 3 mm	408-121
Open-ended wrench, ends ground, a/f 17-19	229-119.01
Open-ended wrench, ends ground, a/f 22-24	229-119.03
Installation mandrel D2 for driver unit up to DN100/4"OD DN125, DN150, 6"OD	221-105.76 221-105.77
Installation mandrel D1 to install the bushing in the driver sleeve up to DN100 / 4"OD DN125, DN150, 6"OD	221-105.94 221-105.95

List of tools	
Tool	Material no.
Assembly tool pickset 5 pieces	221-007248
Eye bolt T.VIS M14	221-104.98
Box spanner SW 36	408-208
Vice support	470-001
Hose cutter	407-065
Snap ring pliers straight J3	408-483
V-ring insertion tool	229-109.88

5.6 Lubricants

Lubricants	
Lubricant designation	Material no.
Rivolta F.L.G. MD-2 (1000 g)	413-071
Rivolta F.L.G. MD-2 (100 g)	413-136

5.7 Weights

Size	Weight [kg]
OD 1.5"	17
OD 2"	17
OD 2.5"	29
OD 3"	29
OD 4"	41
OD 6 "	90

6 Assembly and installation

6.1 Safety instructions

Hazardous situations during installation can be avoided by safety-conscious and proactive behaviour of the personnel.

For installation, the following principles apply:

- Only qualified personnel are allowed to set-up, install and commission the component.
- Ensure that adequate working and traffic areas are available at the place of installation.
- Observe the maximum load-bearing capacity of the installation surface.
- Observe the transport instructions and markings on the part(s) to be transported.
- Remove any nails protruding from transport crates immediately after opening the crate.
- Under no circumstances should anyone stand under a suspended load.
- Safety devices of the component may not work effectively during installation.
- Reliably secure sections of the plant which have already been connected against inadvertently being switched on.

6.2 Notes on installation

The installation position of the valve is upright. Care must be taken to ensure that the valve housing and the pipe system can drain properly.

To prevent damage, make sure that

- the valve is installed in the pipe system free of tension and
- no foreign materials (e.g. tools, bolts, lubricants) are left in the system.

6.3 Control head

If external valves are connected in a control top with several solenoid valves, make sure that the control air pressure in the main actuator does not fall below the operating pressure.

If several lift actuators are controlled by a pilot valve, there might be malfunctions. Such installation is to be avoided.

6.4 Valve with Detachable Pipe Connection Elements

This section describes the procedure to fit the valve.

⚠ Caution!

Liquids in pipes

Danger of injury due to liquid spraying out

- ▶ Therefore, before releasing any pipe connections or hinged clamps: drain the pipe and, if necessary, clean or rinse it.
- ▶ Separate the pipe section in which the valve is to be fitted from the rest of the piping system to prevent product entering again.

Carry out the following steps:

1. Fit valves with detachable pipe connection elements – using suitable connection fittings – directly into the pipe system.
- Valve is installed.

6.5 Valve with welded ends

This section describes the welding procedure for the valve.

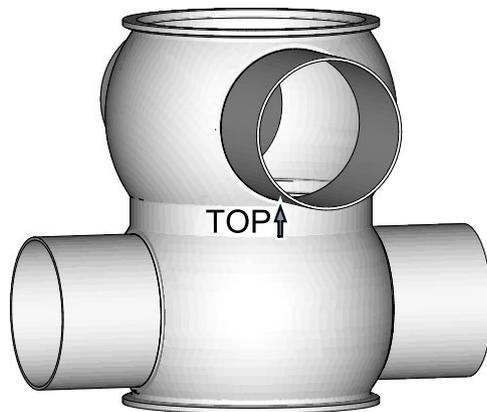


Fig.9: Installation position of the valve housing

⚠ Warning!

Spring tension in the valve

Danger of injury when opening the clamp connections on the actuator or on the housing as the released spring pretension will suddenly lift the actuator.

- ▶ Therefore, release the spring tension before detaching the clamp connection by pressurising the actuator with compressed air at max. 8 bar.

Notice

The valve housing can be installed in any position!

If installed incorrectly, the valve will not work correctly

- ▶ Ensure that the housing is aligned correctly (top), see figure.

Carry out the following steps:

1. Release the spring tension.
2. Remove the valve, see Section 10.5, Page 56.
3. Fit the housing without gaskets.

4. Fit the housing into place and attach it.
 5. Prior to welding, the housing must always be kept closed.
 6. Flush the housing with forming gas from the inside to push the oxygen out of the system.
 7. Weld the housing into the pipe system; use welding filler if necessary. When technically possible, use the WIG-orbital welding process with pulse configuration, according to guidelines EHEDG documentation. 35.
 8. Passivate the seam after welding.
 9. Fit the seals
 10. Assemble the valve and vent the actuator.
 11. → The valve disk is lowered.
- Install the valve with welded ends.



Hint!

Welding method: We recommend using the automatic orbital welding method. All welding work should only be performed by certified welders or machine operators (orbital welders).

Housing-O-rings: When assembling the valve always replace the housing O-rings to ensure that the valve is tight.

6.6 Pneumatic connections

6.6.1 Air requirement

Size	Actuator type	Air requirement (dm ³ _n /stroke) (dm ³ _n at 1.01325 bar at 0° C acc. to DIN 1343 for total stroke*	Air requirement (dm ³ _n /stroke) (dm ³ _n at 1.01325 bar at 0° C acc to DIN 1343 for venting Strike of the valve disk (lower disk)	Air requirement (dm ³ _n /stroke) (dm ³ _n at 1.01325 bar at 0° C acc. to DIN 1343 for venting Stroke of the valve disk (upper disk)
1.5"	BD/BLM35	0.66	0.36	0.13
2"	BD/BLM48	0.71	0.36	0.13
2.5", 3", 4"	CF5/CLMR56	1.31	0.65	0.19
6"	EH6Z/ELMN6	4.45	2.25	0.30

* 1 dm³_n /stroke = 1 ln /stroke ≈ 61 inch³/stroke

6.6.2 Establishing hose connections

To ensure reliable operation, the compressed air hoses must be cut exactly at a right angle.

Tools required:

- A hose cutter

Carry out the following steps:

1. Shut off the compressed air supply.

2. Use the hose cutter to cut the pneumatic hoses at a right angle.
 3. Establish the hose connections in accordance with the hose connection diagram, see .
 4. Push the air hose into the air connector on the control top.
 5. Re-open the compressed air supply.
- Hose connection has been established.

6.6.2.1 Hose connection plan - mixproof valves M/2.0 with control top T.VIS

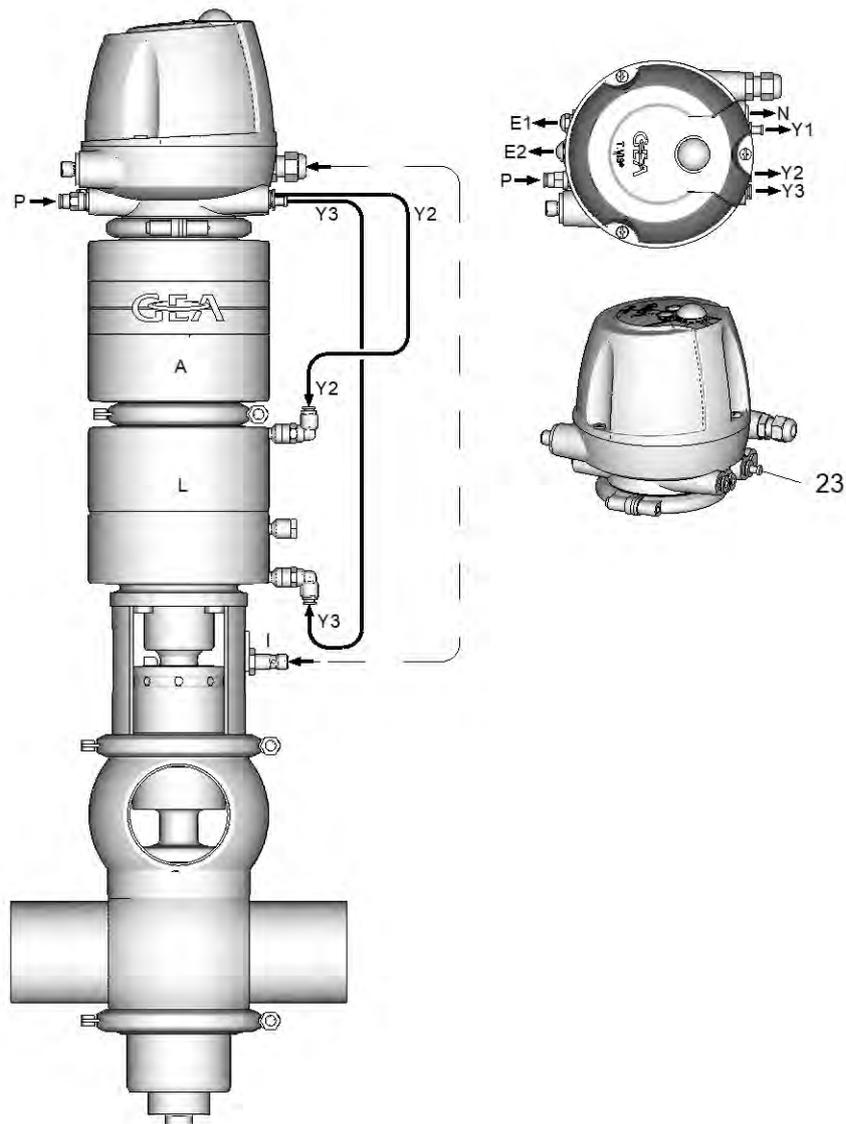


Fig.10

I = Proximity switch serves to detect the double-disk rest position (double-disk not lifted)

E1 = Exhaust air main lift Y1

E2 = Exhaust air lift drive Y2 + Y3

N = Air connection for spring force backup only with logic element NOT

Assembly and installation

Electrical connection with T.VIS control top

P = Compressed air supply
Y1 = Air connection with external main stroke connection with plug (23)
Y2 = Discharge, lift valve disk
Y3 = Discharge, lift double-seat disk



Hint!

For an optimal fit at the air connection, it is necessary to cut the pneumatic hoses at a right angle with the hose cutter.

6.7 Electrical connection with T.VIS control top



Danger

Live parts

Electrical shock can result in serious personal injury or death.

- ▶ Only allow properly qualified staff to carry out work on the electrical equipment.
 - ▶ Prior to establishing electrical connections check the maximum permissible operating voltage.
-



Explosive gases or dusts

An explosion can result in serious personal injury or death.

- ▶ Observe the installation and operating regulations for use in potentially explosive areas!
-

Carry out the following steps:

1. Connect in accordance with the connection diagram and the instructions in the Operating Instructions for T.VIS control tops.

→ Done



Hint!

The initiators are factory set. During transport and installation it can happen that the settings are changed, so that readjustment may be required (see the instruction manual for the control top).

6.7.1 Adjustment of the control top

6.7.1.1 Control top T.VIS A-15 adjustment

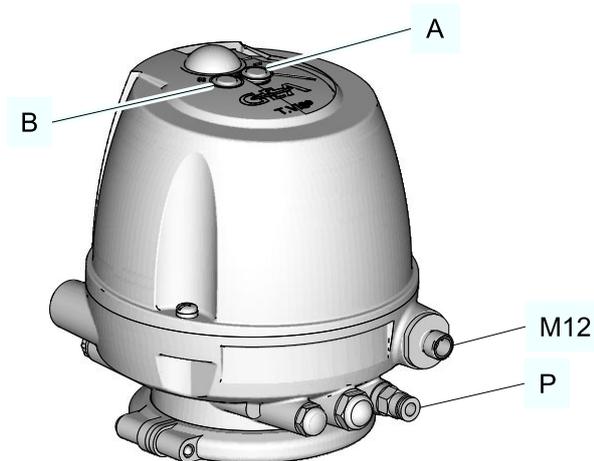


Fig.11

Warning!

Risk when actuating the valve, if there is fluid in the valve.

Fluids can leak or become mixed in the pipes.

- ▶ Ensure that there is no fluid in the valve.

Carry out the following steps:

1. Connect the control air line to the control top T.VIS A-15 (connection P).
2. Switch on the control top by connecting the power supply to the M12 plug connector.
3. Within 30 seconds after activation, press the two black buttons (A, B) on the control button for 3 to 7 seconds at the same time.
 - The setup is carried out automatically. This process lasts approx. 90 seconds. Do not press any buttons during setup. Regardless of whether and in what colours the LED shines or flashes.
 - As soon as the LED shines permanently green, the setup is completed and the valve is operational.

Caution!

Changing the default settings of the control top

The default settings (signal damping / tolerance) of the control top are changed by pressing the buttons during the setup.

- ▶ Do not press any buttons during the setup.

Hint!

In case of incorrect operation or when adjusting the default setting of the control top, please refer to the operating instructions of the T.VIS A-15

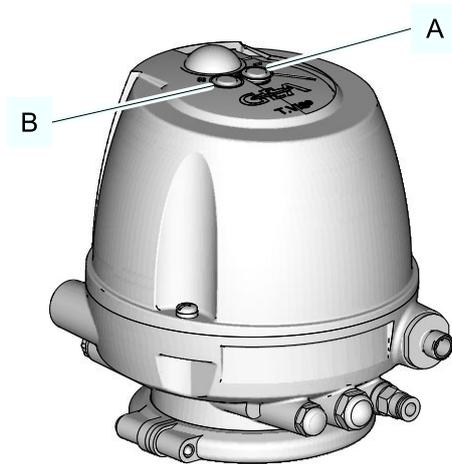


Fig.12

→ Done



Hint!

Refer to the chapter 'Troubleshooting' in the operating instructions for T.VIS A-15, if the LED does not shine green permanently after two minutes.

6.7.1.2 Control top T.VIS M-15 adjustment

Non-actuated position (idle position)

Requirement:

- Valve is in the idle position, non-actuated.



Hint!

Turning the adjusting screw (1) clockwise will move the sensor upwards, turning it anticlockwise moves the sensor downwards.



Warning!

Risk when actuating the valve, if there is fluid in the valve.

Fluids can leak or become mixed in the pipes.

- ▶ Ensure that there is no fluid in the valve.
-

Notice

There is the risk of overturning the adjusting screw (1).

This would damage the adjusting screw.

- ▶ Therefore, turn the adjusting screw (1) with a torque of max. 0.3 Nm.
-

Carry out the following steps:

1. Release the Philips screws (25) and take off the cap (7).

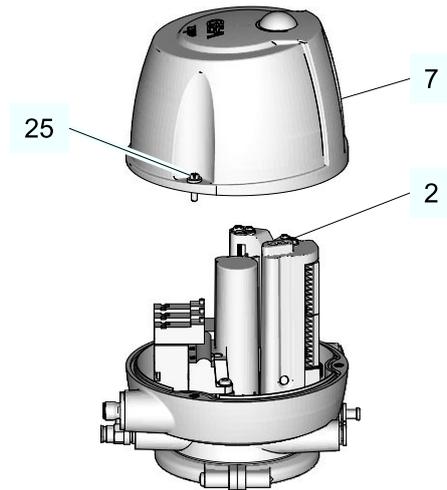


Fig.13

2. Release the lock screw (2).

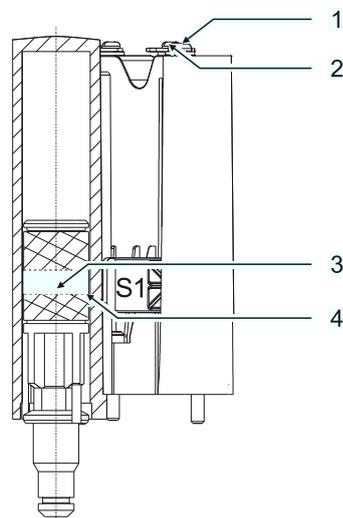


Fig.14

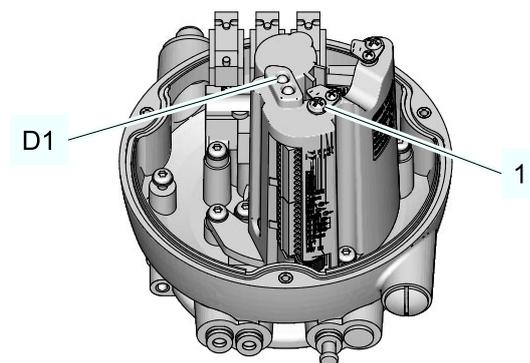


Fig.15

Presetting sensor 1

Carry out the following steps:

1. Set the sensor (S1) by turning the adjusting screw (1) clockwise to the switchpoint until the LED (D1) shines green.

2. Set the sensor (S1) by turning the adjusting screw (1) clockwise over the switchpoint until the LED (D1) goes off.

Switch setting sensor 1

Carry out the following steps:

1. Set the sensor (S1) by turning the adjusting screw (1) anticlockwise to the switchpoint until the LED (D1) shines green.
2. Also position sensor (S2) with the adjusting screw (1) by one anticlockwise turn.
3. Tighten the lock screw (2).

→ Done

Control position valve (main stroke)

Prerequisite

- Move the valve disk to the controlled position by electrically or manually actuating the solenoid valve Y1.

Carry out the following steps:

1. Release the lock screw (2).

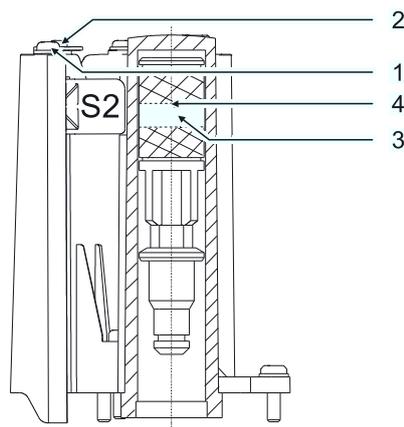


Fig.16

Presetting sensor 2

Carry out the following steps:

1. Set the sensor (S2) by turning the adjusting screw (1) clockwise to the switchpoint until the LED (D1) shines yellow.
2. Set the sensor (S2) by turning the adjusting screw (1) clockwise over the switchpoint until the LED (D1) goes off.

Setting the switchpoint sensor 2

Carry out the following steps:

1. Set the sensor (S2) by turning the adjusting screw (1) anticlockwise to the switchpoint until the LED (D1) shines yellow.

2. Also position sensor (S2) with the adjusting screw (1) by one anticlockwise turn.
3. Tighten the lock screw (2).
4. De-activate the solenoid valve Y1.
 - The valve disk moves to the non-actuated position.
 - The yellow LED (D2) goes off and the green LED (D1) shines.
5. Attach the cap (7) and tighten the Philips screws (25).
 - Done

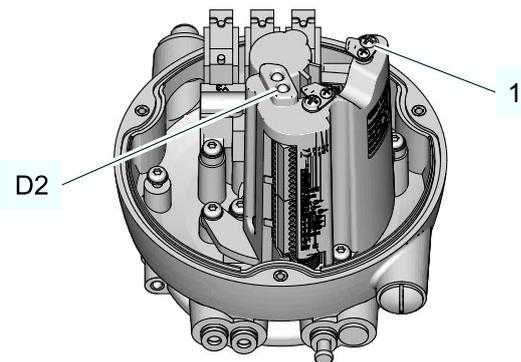


Fig.17

6.7.2 Adjustment of the initiators in the lantern



Hint!

Only in combination with T.VIS A-15 / M-15.

6.7.2.1 Fitting the sliding piece

Carry out the following steps:

1. Position the nut (2) against the slot (4.1) in the lantern (4) from the inside and hold it in position with a finger.

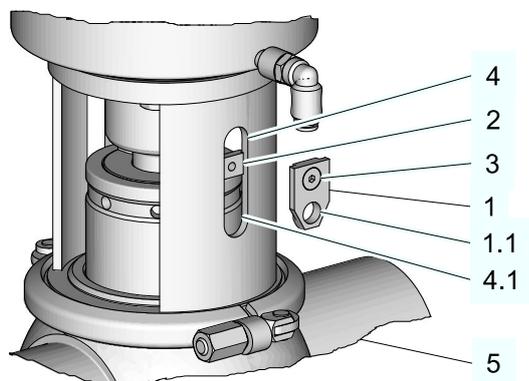


Fig.18

2. Attach the sliding piece (1) with the countersunk screw (3) with the assembly borehole (1.1) in the direction shown pointing toward the housing (5).

3. Tighten the nut (2) against the slot (4.1).

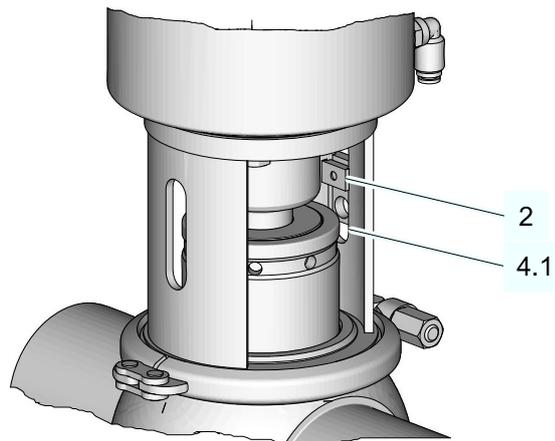


Fig.19

→ Done

6.7.2.2 Set the slider

Carry out the following steps:

1. Screw the adjusting mandrel (6) into the sliding piece (1) until it reaches the upper edge of the double-disk (7).

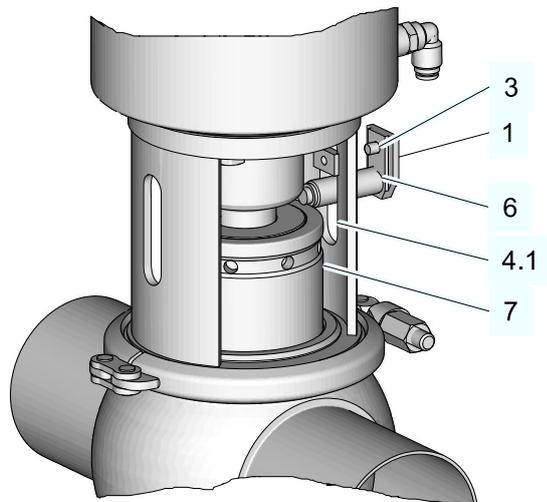


Fig.20

2. Position the sliding piece (1) by releasing the countersunk screw (3) in the slot (4.1) in the recess in the lantern so that the tip of the adjusting mandrel (6) lies on the shoulder of the double-disk (7).
3. Tighten the sliding piece (1) with the countersunk screw (3).

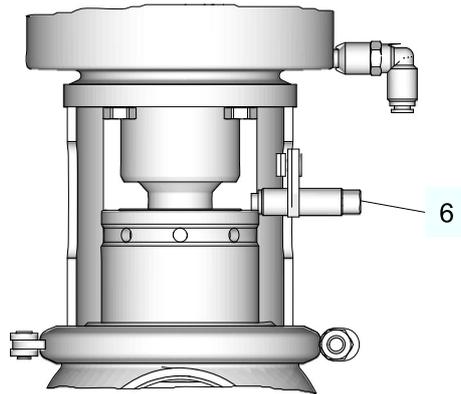


Fig.21

4. Remove the adjusting mandrel (6)
→ Done

6.7.2.3 Fitting the proximity switch

Carry out the following steps:

1. Screw in the proximity switch M12 (8) together with the lock nut (11) into the sliding piece through to the double-disk (7).

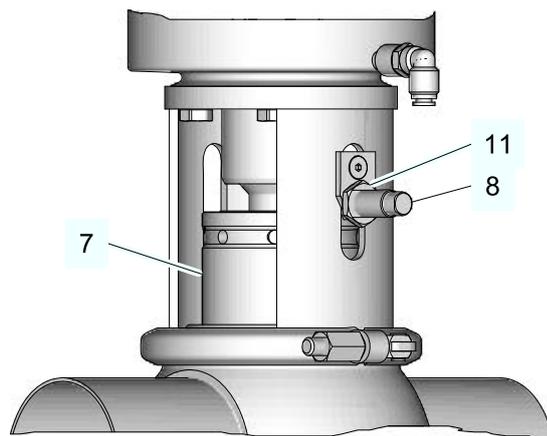


Fig.22

→ Done

6.7.2.4 Set the proximity switch

Carry out the following steps:

1. Unscrew the proximity switch (8) by one full turn (360°) to set the gap (a) to approx. 1 mm.

Assembly and installation

Electrical connection with T.VIS control top

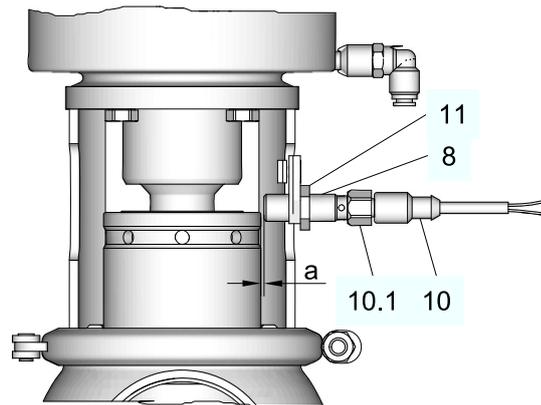


Fig.23

2. Tighten the counter nut (11).
 3. Attach the connector (10), that is already connected electrically to the control top (B), on the proximity switch (8) using the union nut M12 (10.1). The LED on the proximity switch (8) must now shine in operating mode.
- Done

6.8 Test procedure according to PMO for valve type M/ 2.0

Purpose

With test procedure 1, a controller checks if the sensor systems which detect and confirm the closed position of the upper and lower seats of the PMO - valve (in accordance with PMO Item 15p (B)- point 1. b. (2)) are correct and are functioning properly.

With test procedure 2, the controller checks if the superordinate control system (PLC) of the PMO valve (type M/2.0) is closed effectively during an active CIP process.

6.8.1 Test procedure

Please refer to chapter 6.8.2 for an explanation of the required hardware.

Test procedure 1

With test procedure 1, the inspector lifts the seats of the upper and lower valve disk and checks if the sensor system correctly detects the closed position of the respective closed valve disk.

Step 1

Requirement:

- The valve must be in the closed position. This can be recognised by the green LED of the control head.

Step 2

Carry out the following steps:

1. Activate the lifting process of the lower seat by controlling the solenoid valve Y2 via the PLC.
 - When the seat moves downwards (approx. 6 mm), the green LED on the top of the control top will turn off to indicate that the control top no longer detects the lower seat as closed position.
 - If the green LED does not turn off, the control top is NOT set correctly and the adjustment procedure must be repeated as described, see Section 6.7.1, Page 36.

Step 3

2. Activate the lifting process of the upper seat by controlling the solenoid valve Y3 via the PLC.
 - When the seat moves upwards (approx. 2 mm), the yellow LED on the proximity switch S3 on the lantern will turn off to indicate that the proximity switch S3 no longer detects the lower seat as closed position.
 - If the yellow LED does not turn off, the proximity switch is NOT set correctly and the adjustment procedure must be repeated as described, see Section 6.7.1, Page 36

→ Done

Test procedure 2

With test procedure 2, the controller checks the interlock of the superordinate control system (PLC), via the manually forced opening of a seat, while a CIP circuit is active in the opposite housing. In this case, the CIP pump or the pressure of the CIP feeder should be deactivated.

Notice

When carrying out test procedure 2, proceed with great caution!

There is the risk of the CIP liquid mixing with product if the control system interlocks are not activated effectively.

► Make sure that there is no product in the housing opposite the CIP circuit during the test duration.

Step 1

Requirement:

- Make sure that the valve being tested is part of an active CIP circuit programme and determine which housing (upper or lower) of the valve is supplied with CIP liquid.

Step 2

Carry out the following steps:

1. If the upper housing is part of the active CIP circuit:
 - Activate the lifting process of the lower seat by controlling the solenoid valve Y2 on the PLC.
2. If the lower housing is part of the active CIP circuit:
 - Activate the lifting process of the upper seat by controlling the solenoid valve Y3 on the PLC.

Step 3

3. If the superordinate control system (SPS) is locked properly, the CIP pump or the pressure of the CIP feeder is deactivated.
 - If the CIP pump or the pressure of the CIP feeder is not deactivated, the system should be switched off immediately and the interlock of the superordinate control (SPS) investigated.
 - Done

6.8.2 Hardware description

There are three solenoid valves located on the valve in the control top T.VIS A-15 or T.VIS M-15.

1. Y1 - Main control of the valve
2. Y2 - Activation of the ventilation of the lower seat
3. Y3 - Activation of the ventilation of the upper seat

The closed position of the lower seat is detected by a position measuring system. The correct setting of this system, to detect the closed position of the lower seat, can be found at Section 6.7, Page 36.

The sensitivity of the position measuring system is 0.1 mm.

The closed position of the upper seat is detected by the externally mounted proximity switch S3 of the lantern. The correct setting of this initiator, to detect the closed position of the upper seat, can be found at Section 6.7, Page 36.

The sensitivity of the position measuring system is also 0.1 mm.

7 Start-up

7.1 Safety instructions

Initial commissioning

For initial commissioning, the following principles apply:

- Take protective measures against dangerous contact voltages in accordance with pertinent regulations.
- The valve must be completely assembled and correctly adjusted. All screw connections must be securely tightened. All electrical cables must be installed correctly.
- Reliably secure machine parts which have already been connected against inadvertently being switched on.
- Relubricate all lubricating points.
- Make sure lubricants are used properly.
- After conversion of the valve, residual risks must be reassessed.

Setting into Operation

For commissioning, the following principles apply:

- Only allow properly qualified staff to set the valve into operation.
- Establish all connections correctly.
- The safety devices for the valve must be complete, fully functional and in perfect condition. Check the function before starting any work.
- When the valve is switched on, the danger zones must be free.
- Remove any liquids that have escaped without leaving residues.

7.2 Notes on commissioning

Before starting commissioning observe the following:

- Make sure that there are no foreign materials in the system.
- Actuate the valve once by applying compressed air.
- Clean the pipe system prior to the first product run.
- During commissioning, regularly check all sealing points for leaks. Replace defective seals.

8 Operation and control

8.1 Safety instructions

Dangerous situations during operation can be avoided by safety-conscious and proactive behaviour of the personnel.

For operation, the following principles apply:

- Monitor the component during operation.
- Safety devices must not be changed, removed or taken out of service. Check all safety devices at regular intervals.
- All guards and hoods must be fitted as intended.
- The installation location of the component must always be properly ventilated.
- Structural changes to the component are not permitted. Report any changes to the component immediately to the person in charge.
- Always keep danger zones clear. Do not leave any objects in the danger zone. Only allow persons to enter the danger zone when the machine is de-energized.
- Regularly check that all emergency stop devices are working correctly.

8.2 Feedback system / signal analysis



Hint!

The purpose of the proximity switch is to monitor the double-disk idle position during the idle position of the valve and when lifting the seat of the valve disk.

When the main stroke is actuated, the signal of the proximity switch S3 is not relevant and does not need to be analysed from a process aspect.

The feedback of the end position of the valve (main lift) is sent to the PLC via the S2 signal.

Overview of the feedback signals								
Feedback system		Activation			Electric feedback			
		Solenoid valve			Signal			
		Y1	Y2	Y3	S1	S2	S3	S4
Start position	Valve closed	0	0	0	1	0	1	1
End position	Valve opened	1	0	0	0	1	0	0
Seat lift	Lower valve disk	0	1	0	0	0	1	1
Seat lift	Upper valve disk	0	0	1	1	0	0	1

→ Analysis S4 available for T.VIS A-15.

→ The double-disk is queried via S3 when the seat of the valve disk is cleaned.

9 Cleaning

9.1 Cleaning

All parts in contact with product must be cleaned at regular intervals. Always observe the safety data sheets issued by the cleaning agent manufacturers. Only use cleaning agents which do not cause damage to the seals and the inner parts of the valve. When the pipe is cleaned, the cleaning medium also flows through and cleans the valve housings.

With respect to the cleaning method and parameters like detergents, temperatures, times, and intervals, the component manufacturer can merely make recommendations but cannot provide any generally applicable details. Method and parameters should be determined and defined by the operator in accordance with the relevant process and product.

The cleaning effect must be checked regularly by the operator!

9.1.1 Cleaning Process Examples

Typical Cleaning Parameters in Dairy Operations

Example of a two-phase cleaning process:

- Sodium hydroxide solution and sodium hydroxide based combination products in concentrations from 0.5% to 2.5% at 75 °C (167 °F) to 80 °C (176 °F).
- Phosphoric or nitric acid, and combination products based thereon in the concentrations of 0.3 to 1.5% at approx. 65 °C (149 °F).

Example of a cleaning operation in one cleaning step:

- Formic acid and formic acid-based combination products at up to 85 °C (185 °F).

Typical Cleaning Parameters in Breweries

- Sodium hydroxide solution and sodium hydroxide based combination products in concentrations of 1% to 4% at about 85 °C (185 °F).
- Phosphoric or nitric acid, and combination products based thereon in the concentrations of 0.3 to 1.5% at 20 °C (68 °F).

9.1.2 Cleaning effect

The cleaning effect depends on the following factors:

- Temperature
- Time
- Mechanics
- Chemicals
- Degree of soiling

These factors can be combined in such a way as to make an optimal cleaning result probable.

9.1.3 Cleaning the leakage outlet of the mixproof valve type M/ 2.0

The leakage outlet is cleaned by lifting the upper or lower valve disk when the respective pipe is cleaned. During this process, cleaning fluid flows past the seals via a metal throttle gap in the leakage outlet and cleans the seal surfaces of the lifted valve disc and the leakage outlet.

This kind of leakage outlet cleaning process is used for sensitive media, in which the seal surfaces also need to be cleaned in order to flush away micro-organisms that may have adhered to them. This kind of cleaning is also recommended for media that adheres and crystallises.

9.1.4 Cleaning of the lower balancer

Optionally, those surfaces of the lower balancer that come into contact with the product can be cleaned during seat cleaning.

When the lower valve disk is lifted, the gap between the lower balancer seal and the valve disk is exposed automatically. This allows the cleaning fluid to enter the Balancer Cleaning Device and thereby clean the surface of the balancer.

9.1.5 Examples for cleaning by lifting

Examples			
Medium	Duration [s]	Number of venting the valve disk	Comments
Beer	1-2	2-3	During every cleaning phase: 1. Prerinse 2. Hot caustic 3. Intermediate rinse/ 4. Acid 5. Rinse
Yeast	1-2	2-3	
Fruit juice	2-6	3	
Milk	2-5	3	
Yoghurt	3-5	3	

The recommended cleaning pressure is min. 2 bar (29 psi) at a flow speed of $\geq 1.5\text{m/s}$.

The component manufacturer can only make a recommendation on the type of cleaning with respect to cleaning agents, temperature, times and intervals, but no binding information can be given. This should be determined or defined by the operating company depending on the process.

Depending on the cleaning method (medium, concentration, temperature and contact times), the seals are affected to different degrees. This can impair the function and the service life.

9.2 Passivation

Before commissioning a plant, passivation is commonly carried out for long pipes and tanks.

Valve blocks are usually excepted from this. Passivation is typically performed using nitric acid (HNO_3) at approx. 80 °C (176 °F) at a concentration of 3 % and a contact time of 6 to 8 hours.

10 Maintenance

10.1 Safety instructions

Maintenance and repair

Before carrying out maintenance and repair work on the component's electrical equipment, perform the following steps in accordance with the "5 safety rules":

- Isolate from the power supply
- Take appropriate measures to prevent switch on
- Test absence of voltage
- Earthing and short-circuiting
- Cover or safeguard any adjacent live parts.

For maintenance and repair, the following principles apply:

- Observe the intervals specified in the maintenance schedule.
- Only qualified personnel may carry out maintenance or repair work on the component.
- The component must be switched off and secured against being switched back on before maintenance or repair work. Work may only be started once any residual energy has been discharged.
- Block access for unauthorized persons. Put up notice signs which draw attention to the maintenance or repair work going on.
- Do not climb on the component. Use suitable access aids and working platforms.
- Wear suitable protective clothing.
- Only use suitable and undamaged tools to carry out maintenance work.
- When replacing parts only use approved, fully functional load lifting devices and lifting accessories which are suitable for the intended purpose.
- Before setting the unit back into operation, refit all safety devices as originally provided in the factory. Then check that all safety devices are working correctly.
- Make sure lubricants are used properly.
- Check pipes are firmly secured, also check for leaks and damage.
- Check that all emergency stop devices are working correctly.

Disassembly

For disassembly, the following principles apply:

- Only qualified personnel are allowed to dismantle the component.
- The component must be switched off and secured against being switched back on before it is dismantled. Work may only be started once any residual energy has been discharged.

- Disconnect all power and utility lines.
- Markings, e.g. on lines, must not be removed.
- Do not climb on the component. Use suitable access aids and working platforms.
- Mark the lines (if unmarked) prior to disassembly to ensure they are not confused when re-assembling.
- Protect open line ends with blind plugs against ingress of dirt.
- Pack sensitive parts separately.
- For longer periods of standstill, observe the storage conditions, see Section 4.1, Page 25.

10.2 Inspections

Between the maintenance periods, the valves must be checked for leakage and proper function.

10.2.1 Product contact seals

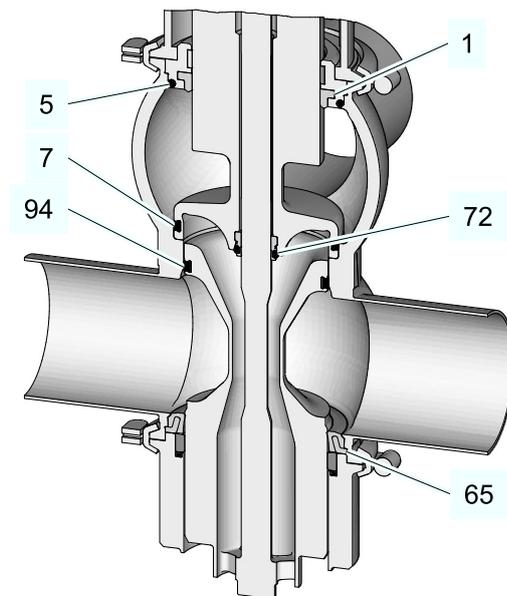


Fig.24

Carry out the following steps:

1. Regularly check:
 - upper gasket
 - V-ring in the valve disks
 - lower gasket
- Done

10.2.2 Pneumatic connections

Carry out the following steps:

1. Check the operating pressure at the pressure reducing and filter station.
 2. Regularly clean the air filter in the filter station.
 3. Check that the air hoses sit firmly in the air connections.
 4. Check the lines for kinks and leaks.
 5. Check the solenoid valves for proper function.
- Done

10.2.3 Electrical connections

Carry out the following steps:

1. Check that the union nut on the cable gland is tight
 2. Check that the cable connections are firmly secured.
 3. Check the solenoid valves for proper function.
 4. Check that the proximity switch connections are clean.
- Done



Hint!

The electrical cable must be long enough to allow the control top to be removed via the switch bar.

10.3 Maintenance intervals

To ensure the highest operational reliability, all wearing parts should be replaced at longer intervals.

The actual maintenance intervals can only be determined by the user since they depend on the operating conditions, for instance:

- daily period of use,
- switching frequency,
- type and temperature of the product,
- type and temperature of the cleaning solution,
- ambient conditions.

Maintenance Intervals	
Applications	Maintenance intervals (guideline values)
Media at temperatures of 60 °C to 130 °C (140 °F to 266 °F)	approx. every 3 months
Media at temperatures of < 60 °C (< 140 °F)	approx. every 12 months

10.4 Prior to removal

Requirement:

- Make sure that during maintenance and servicing work no process is in operation in the area concerned.

Carry out the following steps:

1. Drain all pipe system elements that lead to the valve and, if necessary, clean or rinse them.
2. Disconnect the power supply.
3. Take the valve out of the pipe section, with all housings and housing connections if possible.

→ Done

10.5 Disassembly

10.5.1 Start disassembly

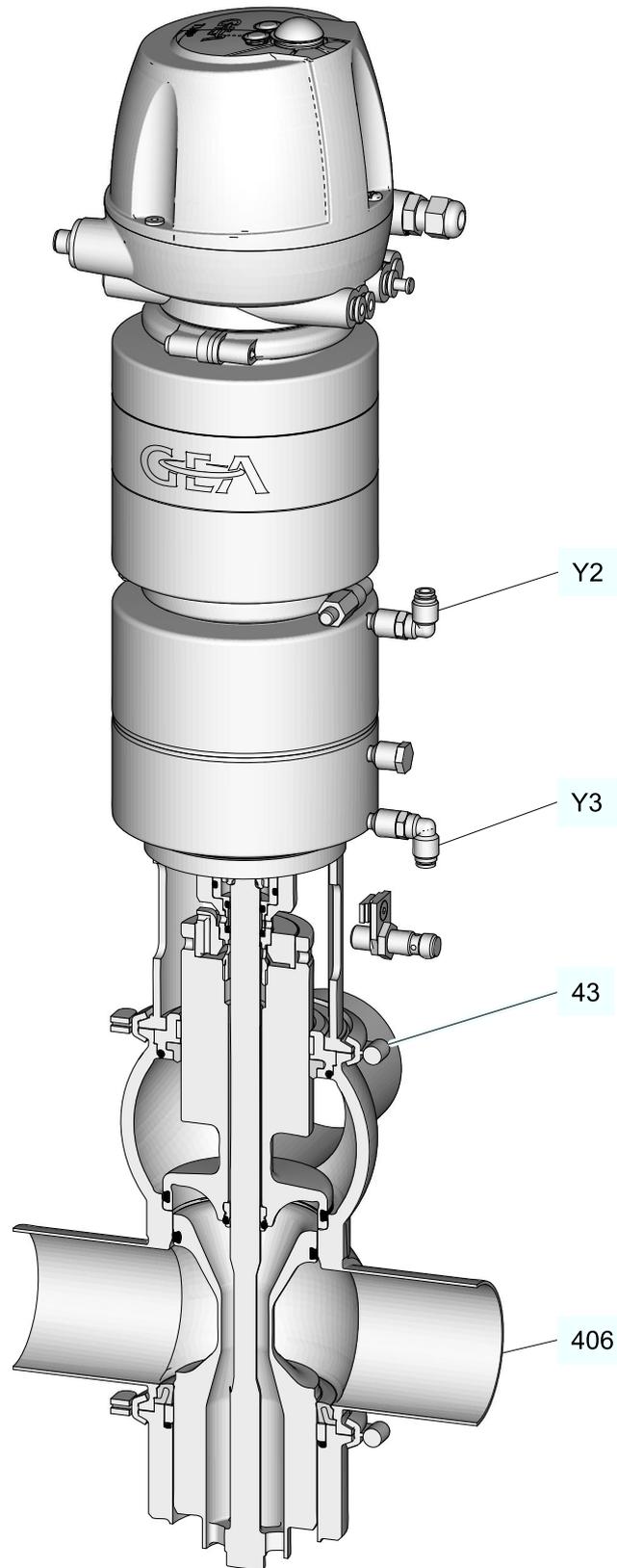


Fig.25

Requirement:

- No solenoid valve must be actuated electrically.
- The pneumatic and electrical connections on the plant side can remain on the control top.

 **Warning!**

Spring tension in the valve

Danger of injury when detaching the clamp connection (43) as the released spring pretension will suddenly lift the actuator.

► Therefore, release the spring tension before detaching the clamp connection by pressurising the actuator with compressed air at max. 8 bar.

Tools required:

- Open-ended wrench
- Philips screwdriver
- Slotted screwdriver

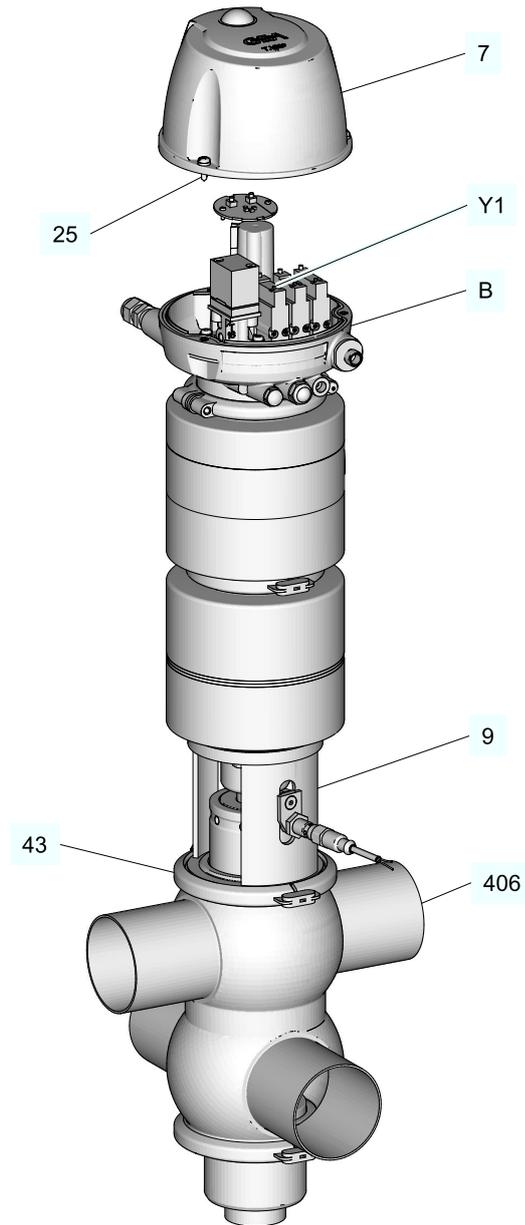


Fig.26

1. Release the Philips screws (25) and take off the cap (7).
 2. Control the drive via the manual actuator (Y1).
 3. Remove the clamp connection (43) between the housing (406) and the lantern (9).
 4. Vent the drive via the manual actuator (Y1), 0 bar.
 5. Attach the cap (7) and tighten the Philips screws (7)
- Done

10.5.2 Removing the control top

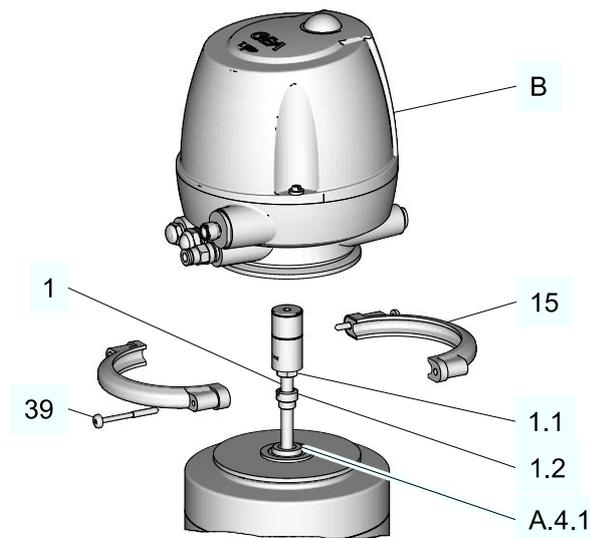


Fig.27

Requirement:

- No solenoid valve must be actuated electrically.
- The pneumatic and electrical connections on the plant side can remain on the control top.

Notice

The switch bar is sensitive and must be protected from impact stress.

Damage to switch bar.

- ▶ Protect the switch bar against impact stress.

Tools required:

- Hex socket key
- Open-ended wrench
- Slotted screwdriver

Carry out the following steps:

1. Release the electrical connection (plug) from the proximity switch in the lantern.
2. Undo screws (39) with the inner hex socket key.
3. Remove snap rings (15) from the control top (B).
4. Remove the compressed air connections (Y2+Y3) on the lifting actuator.
5. Pull the control top (B) upwards.
 - The feedback signal to the overriding control system is interrupted. The green LED goes off and the red LED shines.
6. Loosen the switching bar (1) with an open-ended wrench on the spanner flats (1.1) and remove.



Hint!

If the eyebolt is used for transport, see Section 4.2, Page 25.

7. Unscrew the sliding piece (1.2) with a slot-head screwdriver from the piston rod (A.4.1).

→ Done

10.5.3 Disconnecting the valve from the housing

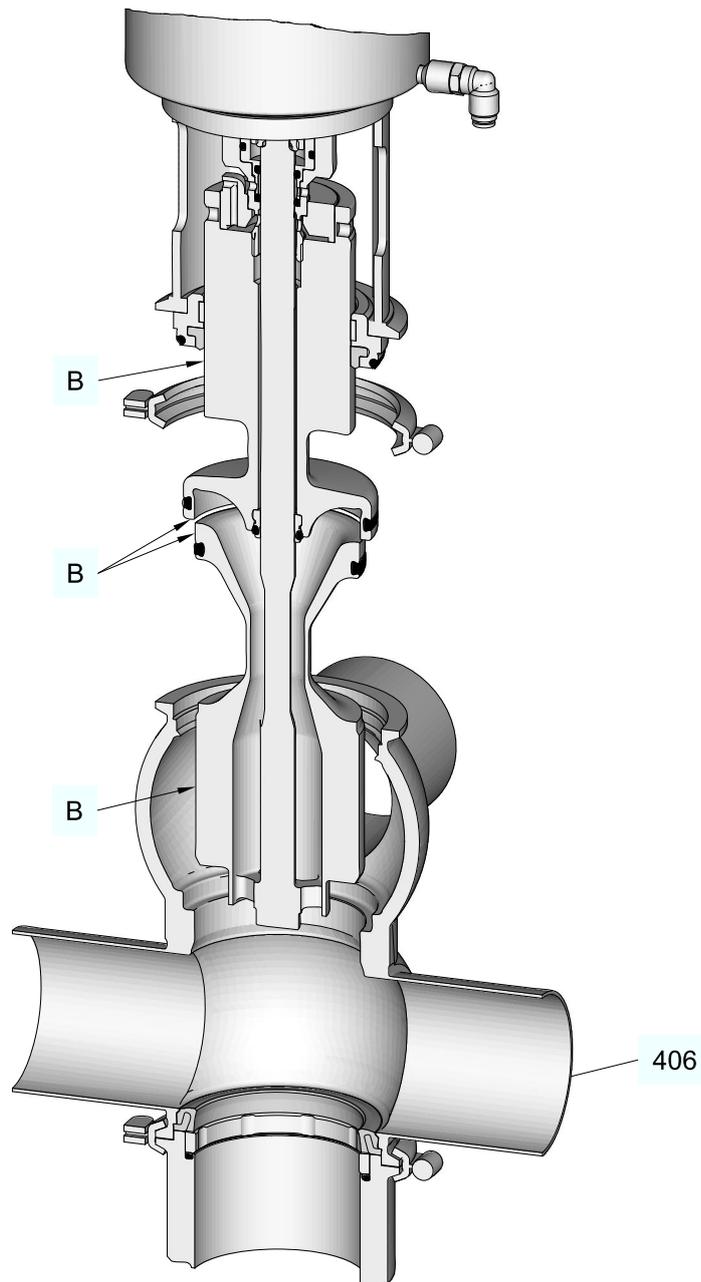


Fig.28

Notice

Sensitive parts

The surfaces of the valves and double-disks (B) are sealing surfaces and may not be damaged.

► When removing the valve from the pipe (B), take care not to hit the balancer against the housing. Carefully disassemble the valve.

Carry out the following steps:

1. Carefully remove the valve insert out of the housing (406).

→ Done

10.5.4 Removing the valve disk

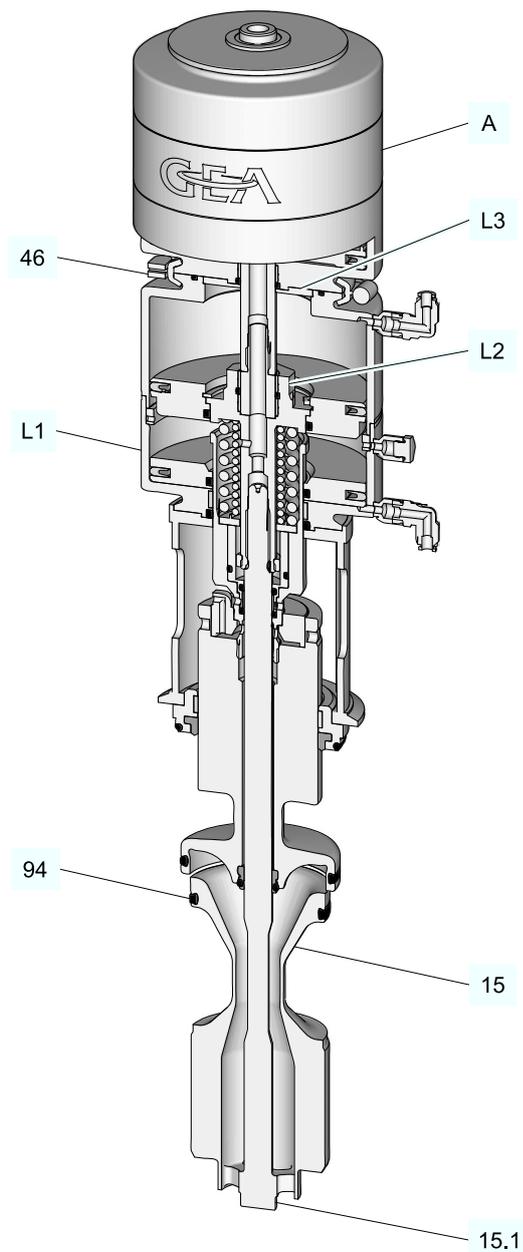


Fig.29

Tools required:

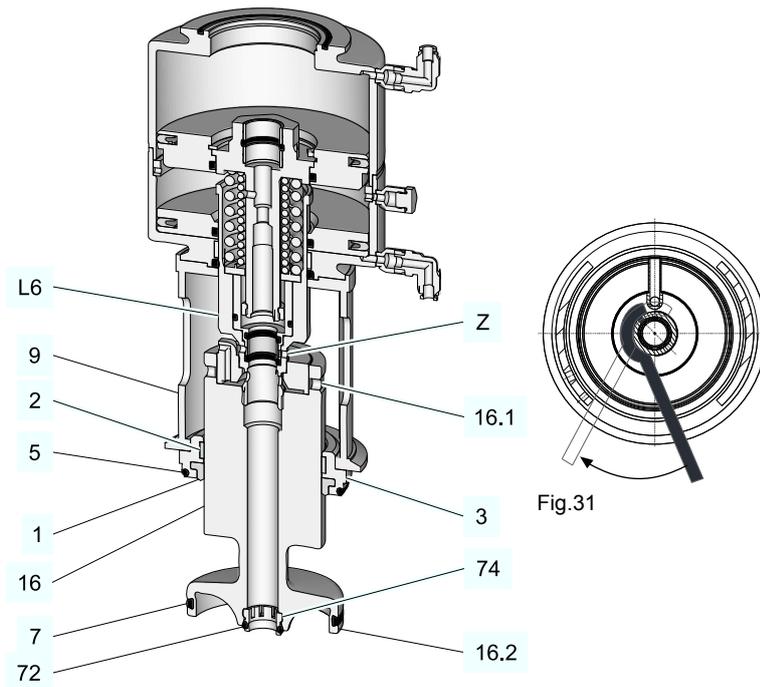
- Hex socket key
- Socket wrench (hex ring wrench)
- Open-ended wrench

Carry out the following steps:

1. Release the clamp connection (46).
2. Remove the drive (A) from the lift drive (L1).
3. Lift the locking flange (L) from the lift drive.

4. Lock the carrier (L2) using the hex ring wrench, size 36.
 5. Loosen the valve disk with an open-ended wrench on the spanner flats (15.1) and unscrew it from the carrier (L2)
- The V-ring (94) can now be accessed freely.
- Valve disk has been removed.

10.5.5 Dismantle double-disk



Notice

The double-disk (16) and the edges (16.2) on the double-disk are sensitive components.

The sealing surfaces of the double-disk (16) and the seal disk (3) may become damaged. Damage to these parts can result in malfunction.

► Proceed carefully when removing the double-disk (16). The edges must be handled carefully.

Tools required:

- Hook wrench
- Mandrel

Carry out the following steps:

1. Place the hook wrench onto the driver sleeve (L6) on point (Z) and turn the sleeve as far as possible toward the lantern (9) by turning the double-disk (16).

→ The driver sleeve is locked.

2. Insert the mandrel into one of the boreholes (16.1) of the double-disk (16).
3. Release the double-disk (16) with the mandrel and pull out of the lantern.
→ The V-ring (7), snap seal (74) and O-ring (72) are now accessible.
4. Remove the seal disk (3) with the bearings / guide ring (2), O-ring (5), seal ring (1) from the double-disk (16).
→ Done

10.5.6 Dismantle lifting actuator

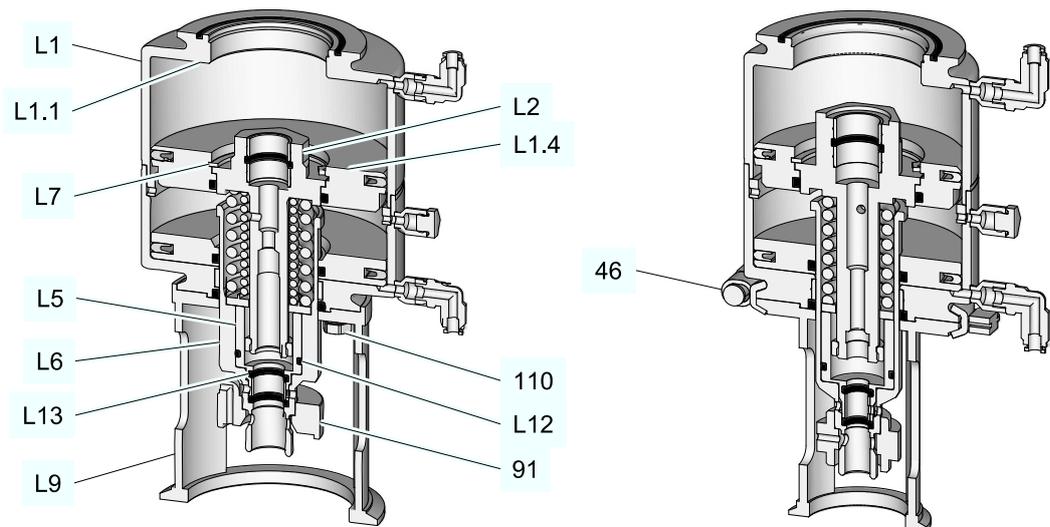


Fig.32

Tools required:

- Snap ring pliers
- Open-ended wrench

Carry out the following steps:

1. Remove the leakage indicator (91) from the driver sleeve (L6).
2. Push the driver sleeve (L6) upwards toward the flange of the lifting actuator (L1.1).
3. Release and remove the circlip (L7) with the snap ring pliers from the piston (L1.4).
4. Pull the carrier (L2) and the driver sleeve (L6) out of the lift actuator (L1).
5. Pull the bush (L5) from the driver sleeve (L6).



Hint!

Release the bush (L5) by striking the driver sleeve (L6) on a suitable surface.

→ The O-rings (L12, L13) are now accessible.

6. **Rated widths up to 2" OD and DN 50:** Release and remove the clamp connection (46), see figure 32.
Rated widths from 2.5" OD and DN 65: Release and unscrew the hex screws (110), see figure 32.
7. Remove the lantern (L9 from the lifting actuator (L1).

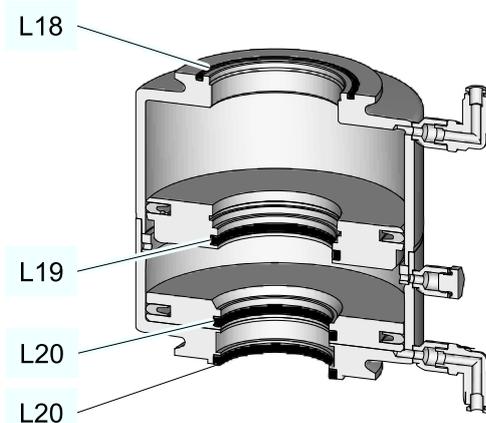


Fig.33

- The O-rings (L18, L19, L20) are now accessible.
- Done

10.5.7 Disassembly sterile lock

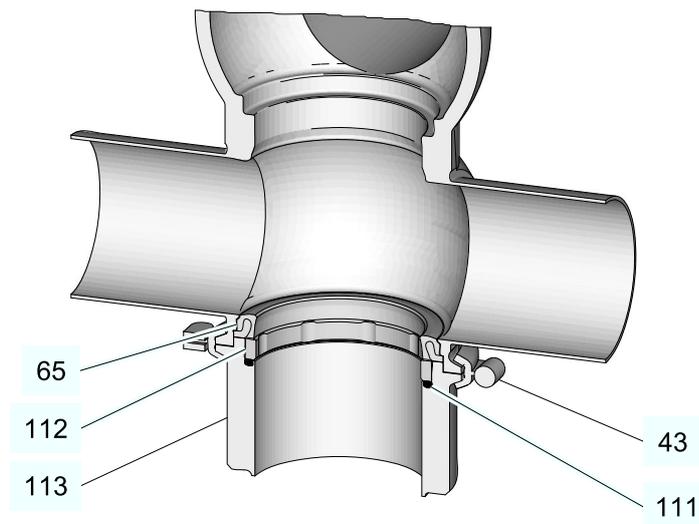


Fig.34

Tools required:

- Open-ended wrench

Carry out the following steps:

1. Unscrew and remove the clamp connection (43).
 2. Disconnect the sterile lock (113) from the housing.
 3. Take the guide MU (112) from the sterile lock.
- Seal ring (65) and O-ring (111) are now accessible.
→ Done

10.5.8 Disassembly balancer plug

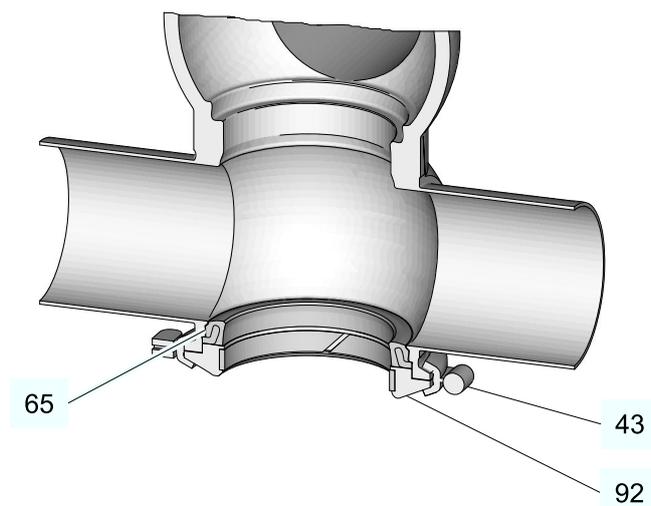


Fig.35

Tools required:

- Open-ended wrench

Carry out the following steps:

1. Unscrew and remove the clamp connection (43).
2. Disconnect the balancer plug (92) from the housing.
 - The gasket (65) can now be accessed freely.
 - Done

10.6 Installation

10.6.1 Tightening torques

Tighten the corresponding valve components to the torques specified in the table.

Tightening torques		[Nm]	[lbf·ft]
Valve disk	M8	22	16.2
	M14	80	59
	M18	95	70
Clamps on the control top		1	0.7
Clamp connection cast half rings Bolts	M6	9	6.6
	M8	22	16.2
	M10	45	33

10.6.2 Fitting the lifting actuator

Tools required:

- Installation mandrel D1+D2
- Vice
- Socket wrench
- Snap ring pliers
- Hex socket key
- Open-ended wrench
- Vice support

Carry out the following steps:

1. Equip the lifting actuator (L1) with O-rings (L18, L19, L20).

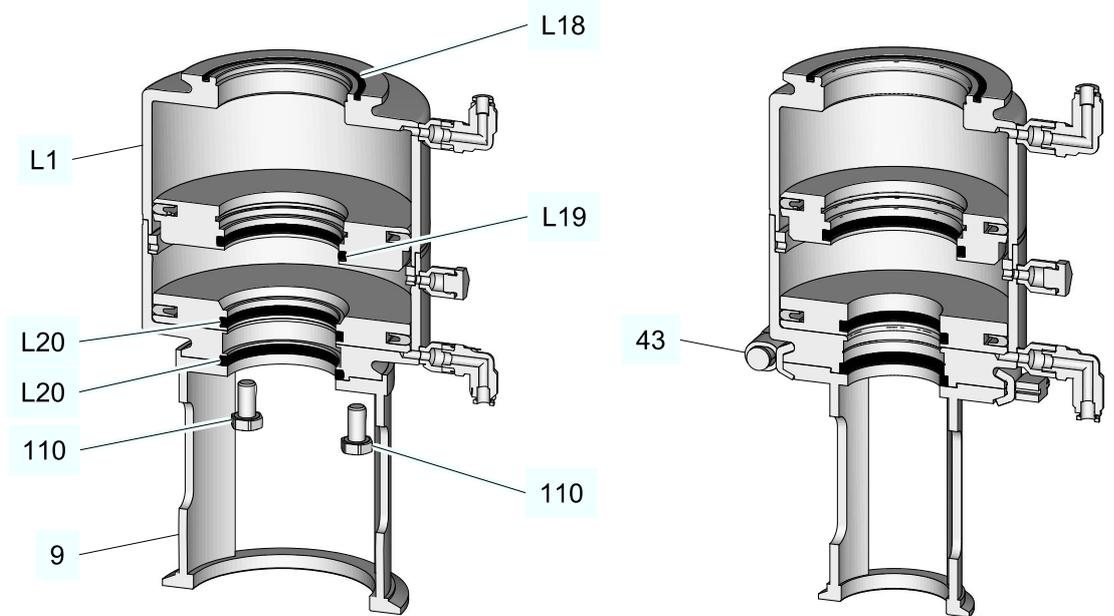


Fig.36

2. **Rated widths up to 2" DN:** Grease the thread of the clamp connection (43) and attach the lantern (9) on the lift (L1) with the clamp connection (43).
Rated widths from 2.5" DN: Attach the lantern (9) with hex screws (110) on the lifting actuator (L1) with a jaw wrench.
- Ensure that the clamp connection (43) is firmly installed.
 - ! Observe "torques" table, see Section 10.6.1, Page 69

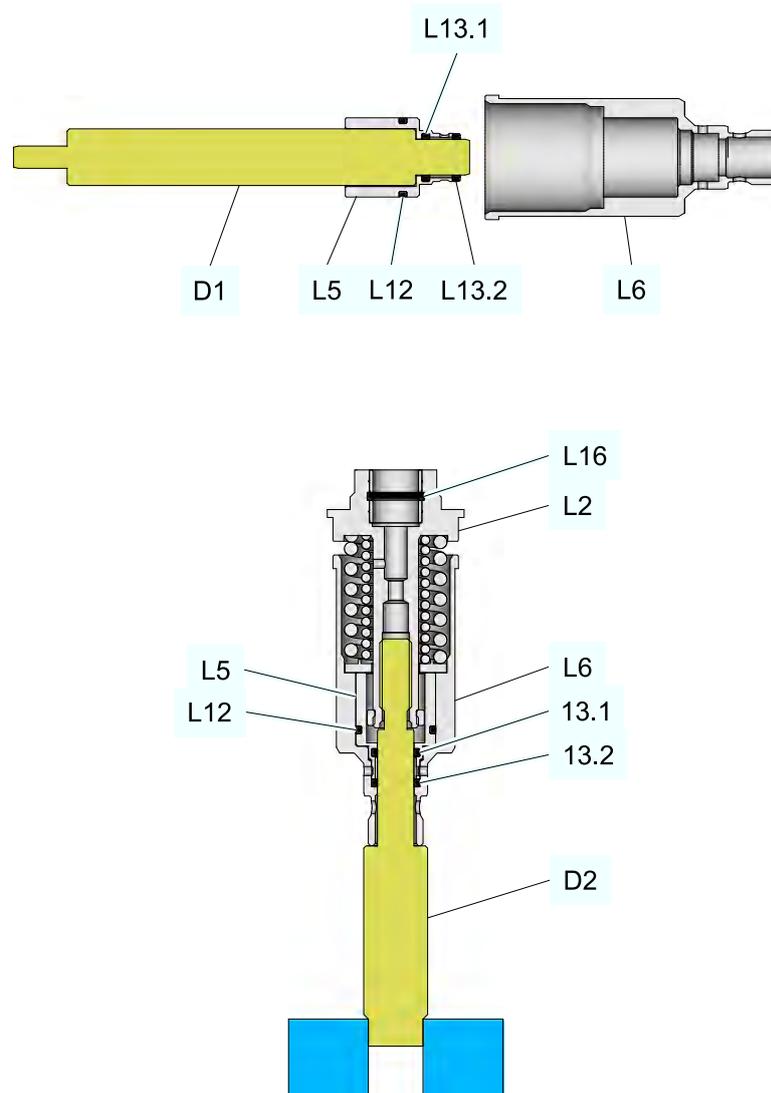


Fig.37

3. Fit the bush (L3) with O-rings (L12, L13.1) and push onto the mandrel (D1).
4. Place the O-ring (13.2) over the mandrel (D1) onto the bush (L5).
5. Push the driver sleeve (L6) onto the mandrel (D1) and bush (L5), then remove the mandrel (D1).
6. Clamp the mandrel (D2) in the vice
7. Push driver sleeve (L6) on the threaded side onto the mandrel (L2).
8. Push the drive sleeve (L2) and the O-ring (L16) into the carrier sleeve (L6) and pre-tighten / screw using the socket wrench with a mandrel (D2).

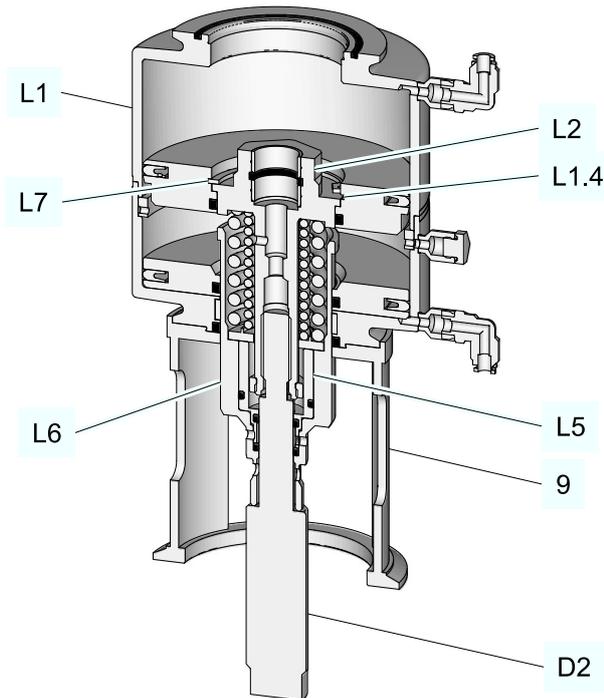


Fig.38

9. Place the carrier unit (L2, L5, L6, D2) into the lift actuator (L1) and push until below the lantern (9).
10. Use the snap ring pliers to place the circlip (L7) into the groove of the piston (L1.4).
→ Carrier (L2) is now attached.
11. Screw and remove the mandrel (D2) from the driver sleeve (L6) with the socket wrench.
→ Done

10.6.3 Installing the valve

Tools required:

- Hook wrench
- Mandrel
- Socket wrench
- Open-ended wrench

Carry out the following steps:

1. Push the leakage indicator (91) onto the driver sleeve (L2).

Notice

The edges on the double disk (16.2) are sensitive components.

The edges at the double disk can get damaged.

- ▶ The edges must be handled carefully.

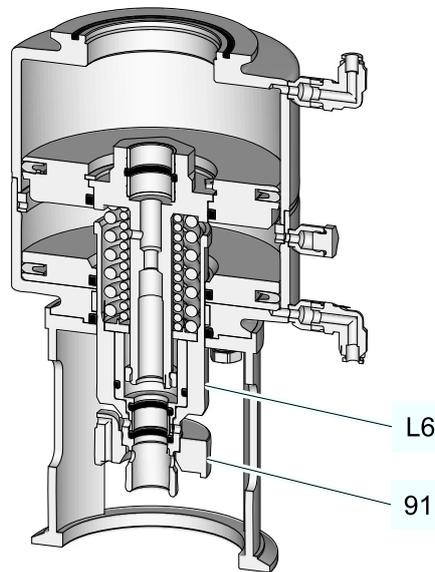


Fig.39

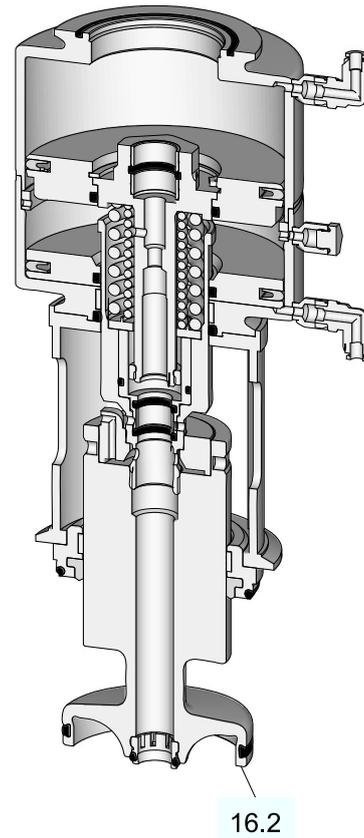


Fig.40

2. Equip with double-disk (16) with a snap seal (74), O-ring (72) and V-ring (7).
 3. Push the seal disk (3) with the bearings / guide ring (2), O-ring (5) and seal ring (1) onto the double-disk (16).
 4. Screw in the double-disk (16) with the driver sleeve (L6).
- When screwing in the double-disk (16), press the seal disk (3) against the lantern (9).

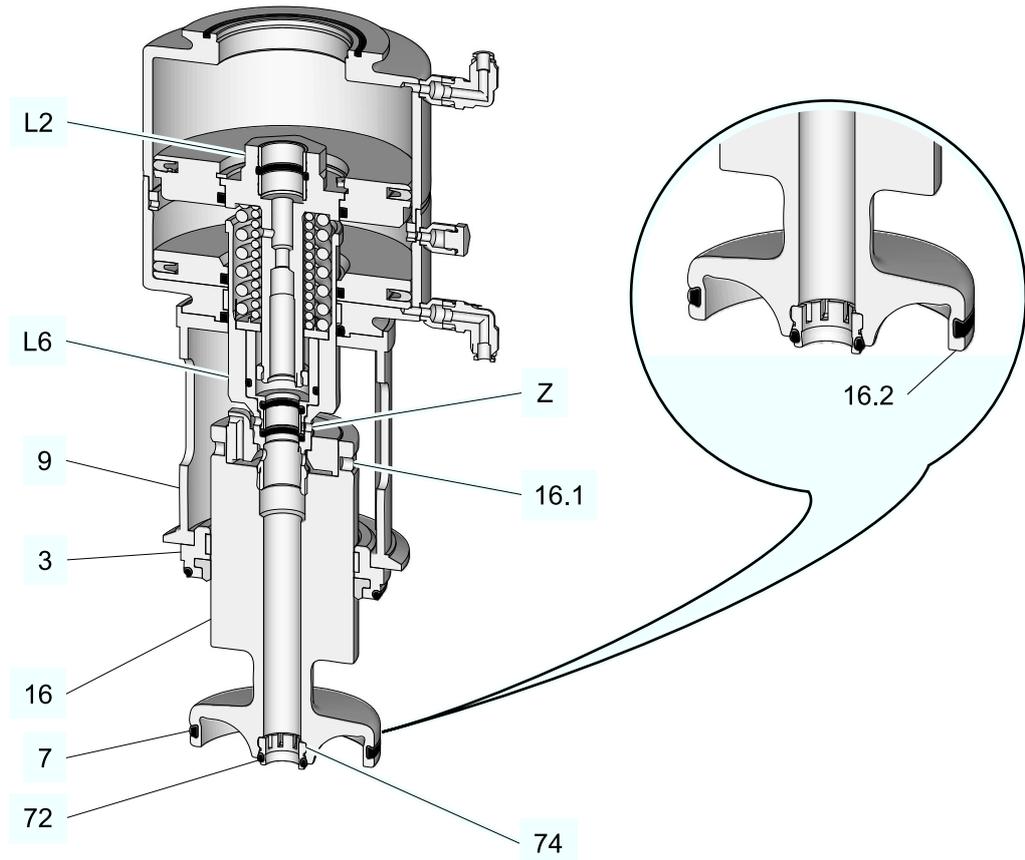


Fig.41

5. Affix / hold the driver sleeve (L6) with a hook wrench at (Z).

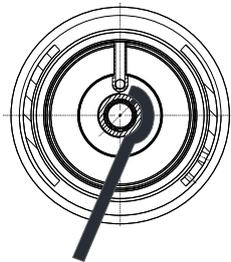


Fig.42

6. Insert the mandrel into one of the boreholes (16.1) and tighten the double-disk (16).
7. Position and affix the wrench to the hex of the carrier (L2).

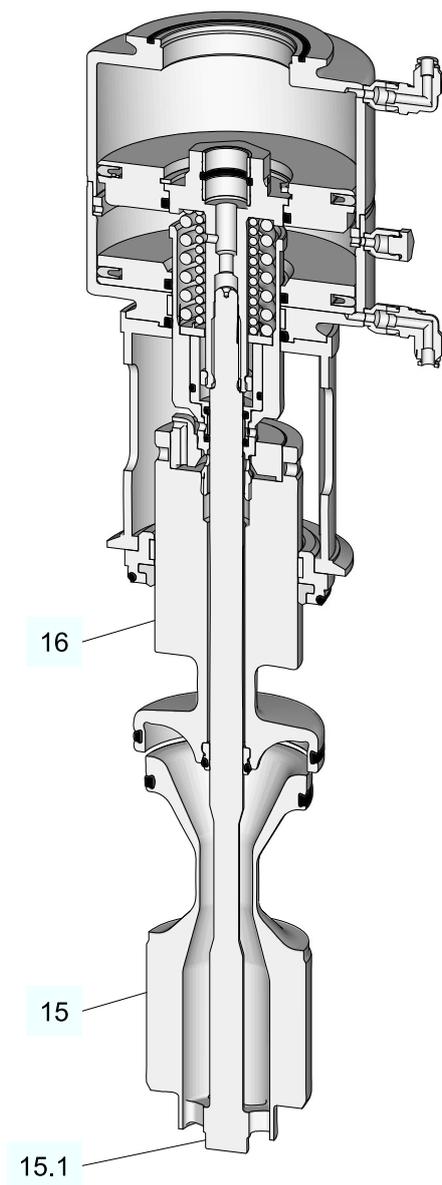


Fig.43

8. Push the valve disk (15) into the double-disk (16) and tighten with the jaw wrench on the wrench surface (15.1).
! Observe torques, see table "Tightening torques" Section 10.6.1, Page 69

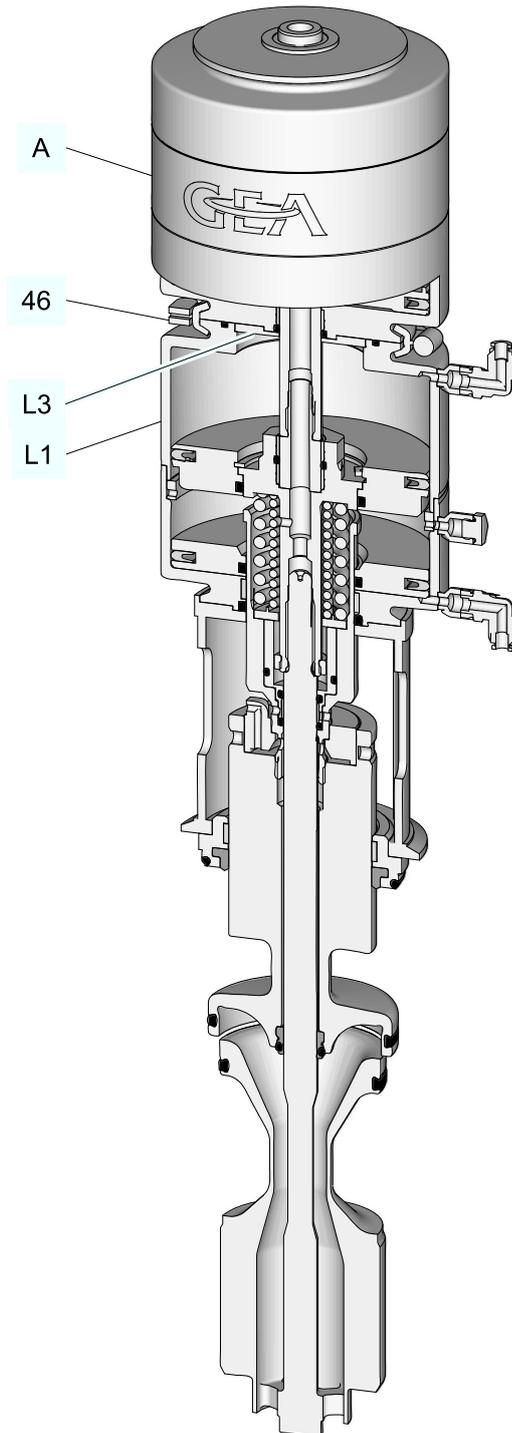


Fig.44

9. Insert the locking flange (L3) into the lift drive (L1).
10. Push drive (A) with piston rod into the lift drive (L1).
11. Grease the thread of the clamp connections (46) and install.
 - Ensure that the clamp connection (43) is firmly installed.
 - ! Observe torques, see table "Tightening torques", Section 10.6.1, Page 69
 - Done

10.6.4 Mount the switch bar and control top

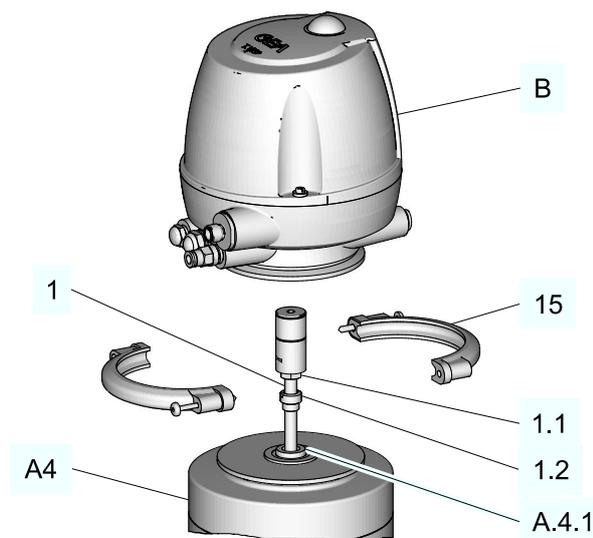


Fig.45



Caution!

The switch bar is sensitive and must be protected from impact stress.

Damage to switch bar.

► Protect the switch bar against impact stress.



Hint!

Mount the switching bar (1) only after installing the valve disk (15).

Tools required:

- Slotted screwdriver
- Philips screwdriver
- Open-ended wrench
- Hex socket key

Carry out the following steps:

1. Use the slot-head screwdriver and a torque of 2 Nm (1,4 lbft) to screw the sliding piece (1.2) into the piston rod.
2. Push the switch bar (1) into the piston rod (A.4.1) and tighten with jaw wrench. Tighten the connection with a torque of 8 Nm. Use a jaw wrench, size 13, for (1.1) with a torque of 8 Nm (16.2 lbft).
3. Place the control top (B) onto the switch bar (1) and drive (A4).
4. Mount the half-rings (15) on the control top (B).
 - ! Ensure that the half rings is mounted correctly.
 - ! Observe torques, see table "Tightening torques", Section 10.6.1, Page 69
 - Done

10.6.5 Assembly balancer plug

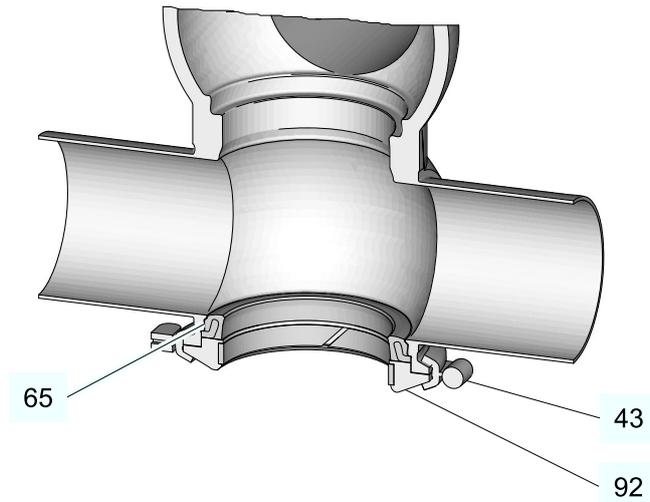


Fig.46

Tools required:

- Hex socket key

Carry out the following steps:

1. Insert the seal ring (65) into the housing.
2. Position the balancer plug (92) into the housing.
3. Grease the thread of the clamp connections (43) and install.
→ ! Ensure that the clamp connection is firmly installed.
→ ! Observe torques, see table "Tightening torques", Section 10.6.1, Page 69
→ Done

10.6.6 Fit the sterile lock

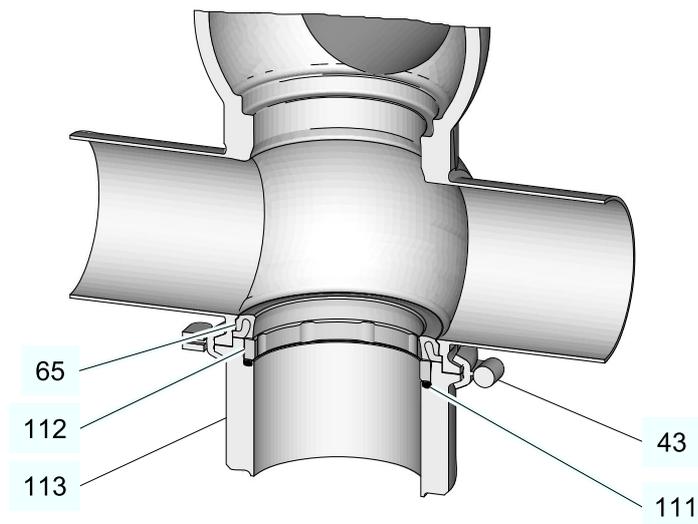


Fig.47

Tools required:

- Hex socket key

Carry out the following steps:

1. Fit the sterile lock (113) with O-ring (111) and guide MU (112).
2. Insert the seal ring (65) into the housing.
3. Position the sterile lock (113) into the housing.
4. Grease the thread of the clamp connections (43) and install.
 - ! Ensure that the clamp connections (43) are firmly installed.
 - ! Observe torques, see table "Tightening torques", Section 10.6.1, Page 69
 - Done

10.6.7 Installing the valve in the housing

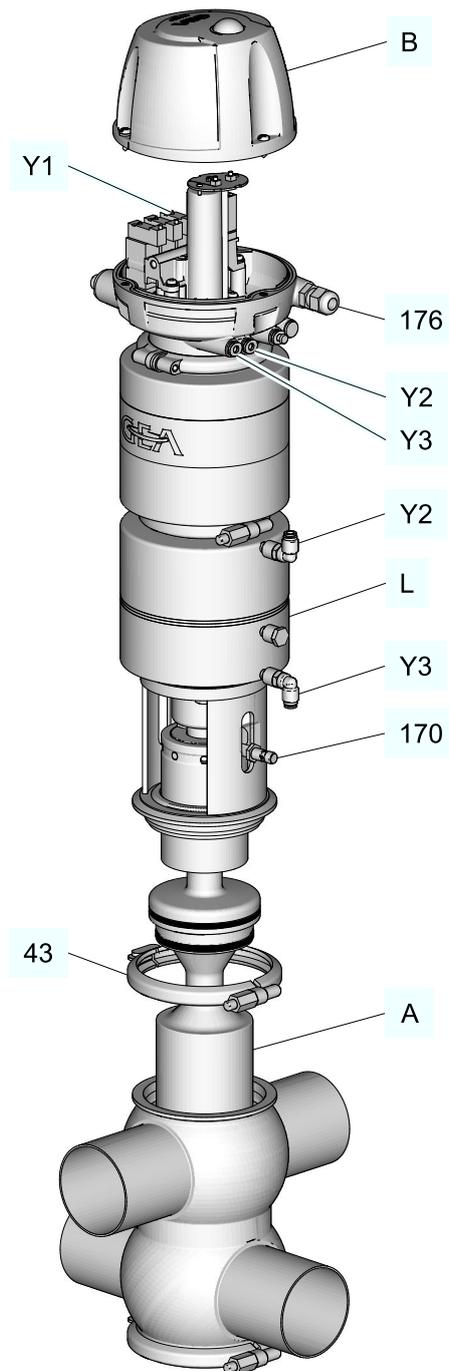


Fig.48

Requirement:

- No solenoid valve must be actuated electrically.
- The pneumatic and electrical connections on the plant side can remain on the control top.

Notice

Sensitive parts

The surfaces of the valves and double-disks are sealing surfaces and may not be damaged.

- ▶ Carefully lower the valve into the housing.
-

Tools required:

- Philips screwdriver
- Slotted screwdriver

Carry out the following steps:

1. Guide the valve insert (A) carefully into the housing.
2. Remove the cap from the control top (B) with the Philips screwdriver.
3. Control the lift stroke via the manual actuator (Y1).
4. Grease the thread of the clamp connections (43) and install.
→ ! Ensure that the clamp connections (43) are firmly installed.
→ ! Observe torques, see table "Tightening torques", Section 10.6.1, Page 69
5. De-energize the manual actuator (Y1).
6. Establish the pneumatic hose connection between the lifting actuator (L) and control top (B).
7. Establish the electrical connection (176) between the proximity switches (170).
8. Attach the hood with the Philips screwdriver and a tightening torque of 1 Nm on the control top (B).
→ Done

10.6.8 Checking the function

Valve stroke			
Valve strokes	Total stroke	Lift stroke	
Size	C	Double-disk	Valve disk
Inch OD	mm	mm	mm
1.5"	28	2.5	6
2"	35	2.5	6
2.5"	45	2.5	6
3"	45	2.5	6
4"	45	2.5	6
--	65	2.5	6
6"	65	2.5	6

10.6.8.1 Checking the valve stroke

Carry out the following steps:

1. Control the lift stroke via the manual actuator (Y1).
 2. Check the stroke of the valve (c) in accordance with the table 'Valve stroke'.
- Stroke has been checked.



Hint!

When strokes are correct, it is possible to make adjustments or set the feedback. See and the relevant operating instructions of the respective control top.

10.6.8.2 Check the lift stroke

Carry out the following steps:

1. Control the lift strokes via a manual actuator (Y2) and (Y3).
 2. Check the lift strokes according to table 'Valve stroke'.
- Stroke has been checked.



Hint!

When strokes are correct, it is possible to make adjustments or set the feedback. See and the relevant operating instructions of the respective control top.

10.7 Maintenance

10.7.1 Cleaning the valve

Notice

The valve disk (15), the double-disk (16), the housing and valve seat are precision parts.

Damage to these parts can result in malfunction.

- ▶ Handle the valve with care!

Notice

Sensitive valve parts

Damage to the valve parts can result in malfunction.

- ▶ Observe the safety information sheets issued by the detergent manufacturers!
- ▶ Only use detergents which are non-abrasive and not aggressive towards stainless steel.
- ▶ Use only cleaning mediums which do not damage the materials of the control top (PPE, PA).

Carry out the following steps:

1. Disassemble the valve, see Section 10.5, Page 56.
2. Carefully clean the individual parts.

→ Done



Hint!

Observe the safety data sheets supplied by the detergent manufacturers.

Only use detergents which are non-abrasive and not aggressive towards stainless steel.

10.7.2 Replacing Seals

10.7.2.1 Replacing V-Ring RA on the double-disk and valve disk



Hint!

Replace defective seals, but always fit new housing O-rings to ensure the tightness of the valve. Always use genuine spare parts.



Caution!

Danger of injury!

The pickset tool can slip off when the V-ring RA is removed

- ▶ Clamp the valve disk in the vice using vice supports.



Hint!

Functional and running surfaces of the valve disks and double-disks must not get damaged.

Tools required:

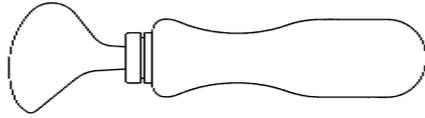


Fig.49: V-ring insertion tool

- V-ring insertion tool
- Vice support

Carry out the following steps:

1. Put a tool from the pickset into the V-ring RA and take it out.

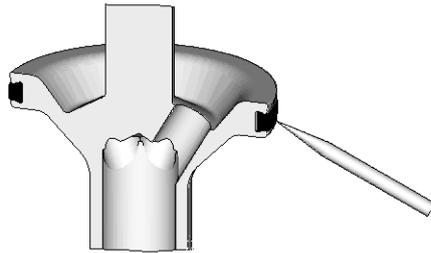


Fig.50

2. Before fitting, wet V-ring RA on the side not in contact with product (rear side). Pay attention that water does not drip into the V-ring groove on the valve disc.
3. Put in V-ring RA.
! Make sure the installation position of V-ring RA is correct (see illustration).

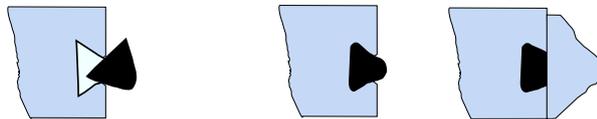


Fig.51

4. Use the insertion tool to press in the V-ring RA – evenly press in at several opposite points along the circumference.

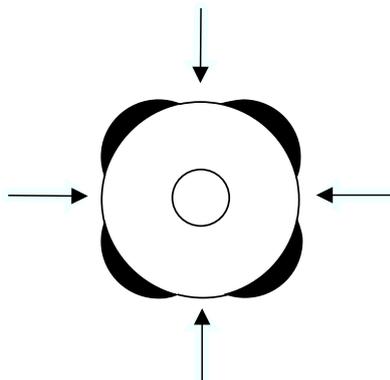


Fig.52

5. Insert V-ring RA evenly.
 6. Check that the V-ring RA is evenly and correctly inserted.
- Done



Hint!

Used seals must not be used again, since the proper function of the seal can then no longer be ensured.

10.7.2.2 Replace more seals

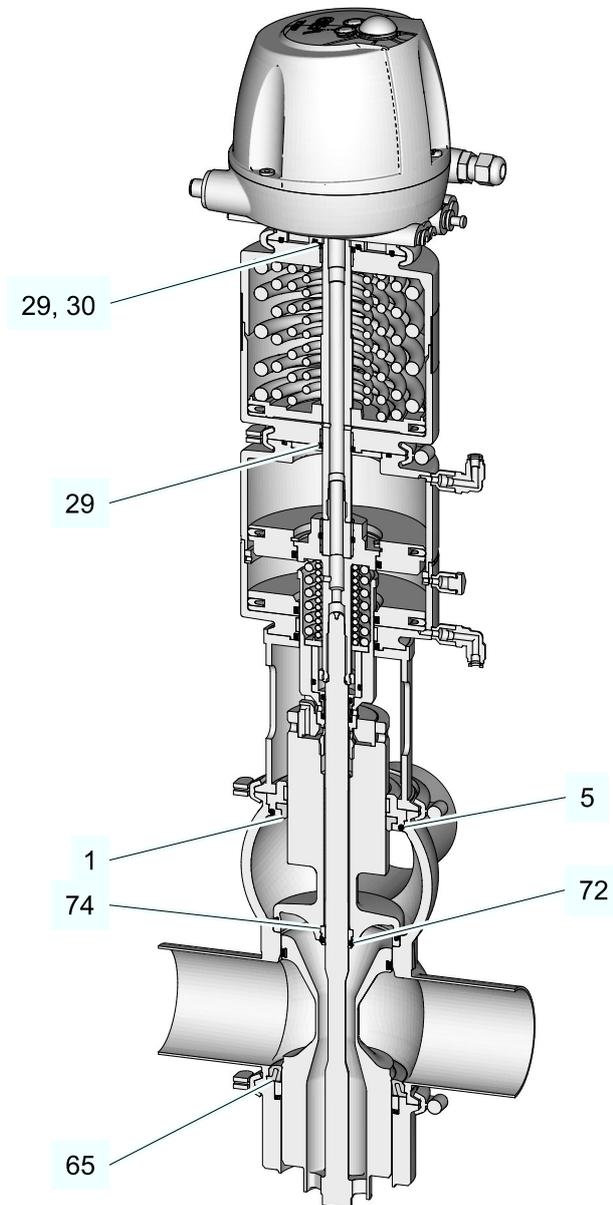


Fig.53

10.7.2.3 Lubricating seals and threads

⚠ Caution!

Damage to seals and threads

Stainless steel threads tend to seize and cold weld and must be greased. Damage to seals and threads can result in malfunction.

- ▶ Ensure that an adequate film of lubricant is applied. No grease residues must be visible once the valve has been assembled completely.
- ▶ For product contact seals only use suitable greases and oils.
- ▶ Observe the safety data sheets issued by the lubricant manufacturer.

Carry out the following steps:

1. Apply a light film of lubricant to all threads.
2. Grease all seals – including the O-rings at the top and bottom of the actuator piston stem – very thinly.
→ ! Do not grease the V-ring.
3. Grease the balancer.
4. Grease the inside of the seal ring (65) (contact surface).

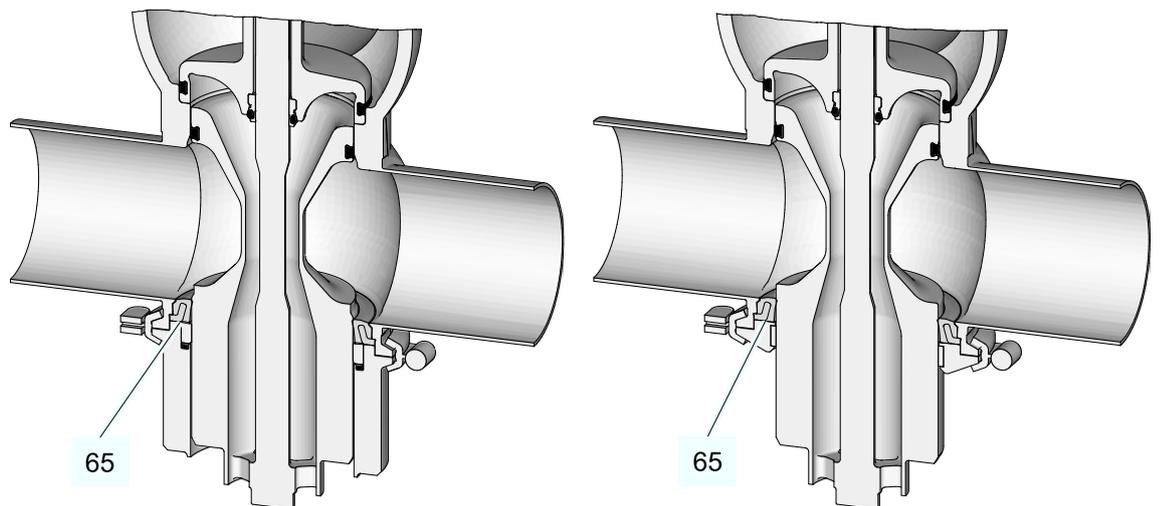


Fig.54

→ Done

**Hint!**

GEA Tuchenhausen recommends Rivolta F.L.G. MD-2 and PARALIQ GTE 703. These lubricants are approved for foodstuff and are resistant to beer froth. They have the NSF-H1 (USDA H1) registration. They do not affect the taste or the consistency of the products and are compatible with the seals in contact with product.

Rivolta F.L.G. MD-2 can be ordered from GEA Tuchenhausen. Using other types of grease can result in malfunctions or in premature seal failure. The warranty will also become null and void.

A Manufacturer's Declaration for these products can be obtained from GEA Tuchenhausen if required.

A thin film of grease is required on the seals to ensure the proper function of the fittings. It reduces friction and extends the service life of the seals. This is absolutely harmless from a health and hygienic point of view.

Running dry must be avoided!

11 Alarms

11.1 Malfunctions and remedies

In the event of malfunctions immediately deactivate the valve and secure it against inadvertent reactivation. Malfunctions may only be remedied by qualified staff, who must observe the safety precautions.

Fault	Cause	Remedy
Valve does not work	Fault in the controller	Check the system configuration
	No compressed air or compressed air too low	Check compressed air supply and check air hoses for free passage and air tightness
	Fault in the electrical system	Check actuation / external controller and routing of electrical lines
	Solenoid valve defective	Replace the solenoid valve
	Valve works against a hydraulically closed pipe	Open the pipe
Double disk oscillates during lifting or does not open	Air pressure too low	Increase air pressure
	Product pressure too high	Reduce product pressure
Valve does not close	Dirt/foreign material between valve seat and valve disk	Clean valve housing and valve seat
Valve closes too slowly	O-rings in the actuator and control top are dry (friction losses)	Grease O-rings
Leakage in the area of the valve housing	Housing O-rings defective	Removing the valve Replace the housing O-rings
Leak at the leakage outlet (closed position)	V-ring faulty	Replace the V-ring in the valve insert
Leakage in the lantern	Seal ring defective	Replace seal ring

12 Decommissioning

12.1 Safety instructions

For shutting down, the following principles apply:

- Switch off the compressed air.
- Switch off the component with the main switch.
- Padlock the main switch (if fitted) in the off position to prevent it from being switched back on. The key to the padlock must be deposited with the person responsible until the machine is restarted.
- For longer periods of standstill, observe the storage conditions, see Chapter 4, Page 25.

12.2 Disposal

12.2.1 General notes

Dispose of the component in an environmentally safe manner. Observe the statutory waste disposal regulations applicable at the place of installation.

The component consists of the following materials:

- Metals
- Synthetic materials
- Electronic parts
- Lubricants containing oil and grease

Separate the different materials and dispose of them correctly sorted. Also observe the instructions regarding disposal in the operating instructions for the individual components.

12.2.2 Valve Actuator Disposal



Danger

The spring forces in the actuator can be as high as 24 kN.

The pre-stressed spring can cause serious personal injury or death.

- ▶ Never open the actuator.
- ▶ GEA Tuchenhagen accepts unopened actuators and arranges for proper disposal free of charge.

Carry out the following steps:

1. Remove the actuator.
 2. Pack the actuator safely and send it to GEA Tuchenhagen GmbH.
- Done

13 Spare parts list - mixproof valve M/2.0 with cleaning of lower balancer plug

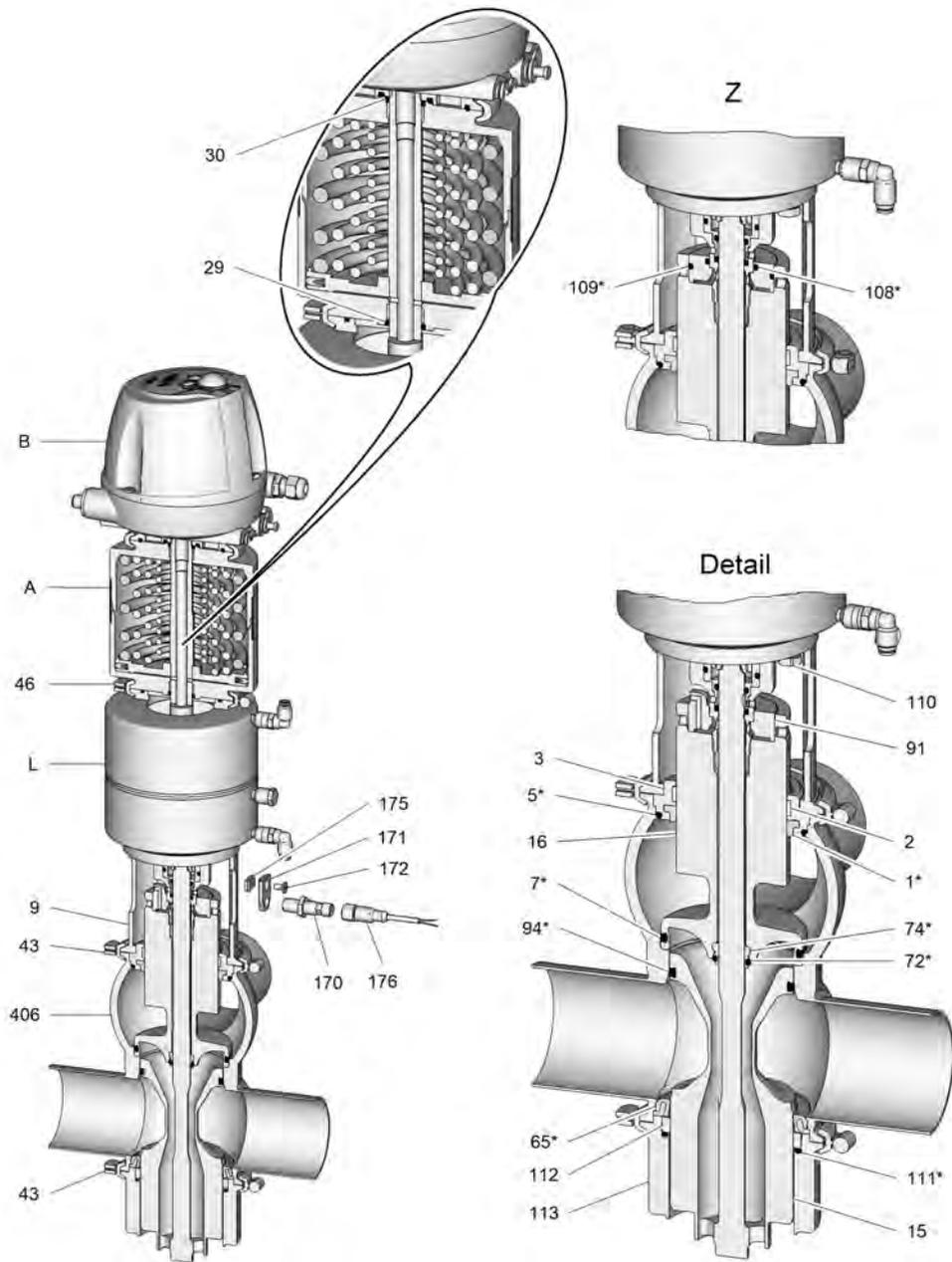


Fig.55: Z = ** relevant for variant with cleaning connection up to 2015 for 1.5" to 4" and up to 2023 for DN 150/6" OD

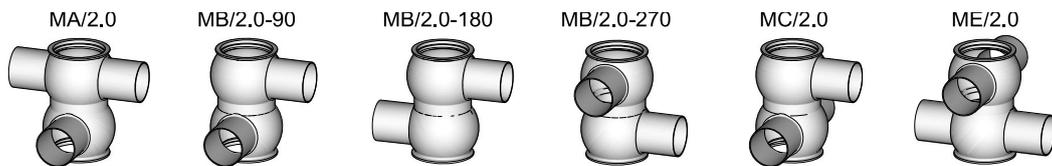


Fig.56

Spare parts list - mixproof valve M/2.0 with cleaning of lower balancer plug

Item	Designation	Material	1.5" OD	2" OD	2.5" OD
Seal set MS complete		EPDM	221-004538	221-004538	221-004547
		FKM	221-004539	221-004539	221-004548
		HNBR	221-004540	221-004540	221-004549
1*	Seal ring	EPDM	924-305	924-305	924-296
		FKM	924-307	924-307	924-308
		HNBR	924-333	924-333	924-331
2	Bearing, 3A	MF6	935-117	935-117	935-113
3	Seal disk R.N	1.4404	221-476.05	221-476.05	221-476.03
5*	O-ring	EPDM	930-144	930-144	930-150
		FKM	930-171	930-171	930-176
		HNBR	930-633	930-633	930-634
7*	V-ring RA/I	EPDM	221-365.26	221-365.26	221-365.08
		FKM	221-365.27	221-365.27	221-365.11
		HNBR	221-365.28	221-365.28	221-365.20
9	Lantern LFT	1.4301	221-651.17	221-651.17	221-651.19
15	Valve disk MS/2.0	1.4404	221-722.04	221-722.05	221-722.02
16	Double-disk M/2.0	1.4404	221-721.04	221-721.05	221-721.02
29*	O-ring	NBR	930-026	930-026	930-026
30*	O-ring	NBR	930-026	930-026	930-026
43	Clamp join KL	--	221-507.04	221-507.04	221-507.09
46	Clamp join KL	--	221-507.06	221-507.06	221-507.06
65*	Sealing ring RA	EPDM	221-367.02	221-367.02	221-367.03
		FKM	221-367.12	221-367.12	221-367.08
		HNBR	221-367.13	221-367.13	221-367.15
72*	O-ring	EPDM	930-610	930-610	930-610
		FKM	930-662	930-662	930-662
		HNBR	930-646	930-646	930-646
74*	Snap seal	PVDF	221-000522	221-000522	221-000522
91	Leakage indicator	1.4305	221-513.02	221-513.02	221-513.03
94*	V-ring RA/I	EPDM	221-365.07	221-365.07	221-365.08
		FKM	221-365.10	221-365.10	221-365.11
		HNBR	221-365.18	221-365.18	221-365.20
110	Hex head screw	A2	--	--	901-043
111*	O-ring	EPDM	930-266	930-266	930-148
112	Guide MU	MF6	221-696.07	221-696.07	221-696.08
113	Sterile lock MMU	1.4305	221-695.05	221-695.05	221-695.04
170	Proximity switch	1.4404	505-098	505-098	505-098
171	Sliding piece	1.4301	221-002919	221-002919	221-002919
172	Countersunk screw	A2-70	905-171	905-171	905-171
175	Nut	1.4301	221-002920	221-002920	221-002920
176	Round plug connector	--	508-031	508-031	508-031
403	Housing MA/2.0	1.4404	221-727.04	221-727.05	221-727.06
404.1	Housing MB/2.0-90		221-725.10	221-725.13	221-725.16

Spare parts list - mixproof valve M/2.0 with cleaning of lower balancer plug

Item	Designation	Material	1.5" OD	2" OD	2.5" OD
404.2	Housing MB/2.0-180		221-725.11	221-725.14	221-725.17
404.3	Housing MB/2.0-270		221-725.12	221-725.15	221-725.18
405	Housing MC/2.0		221-726.04	221-726.05	221-726.06
406	Housing ME/2.0		221-723.04	221-723.05	221-723.06
A	Actuator	--	221-119.02	221-119.02	221-119.10
B	Control top T.VIS®	see spare parts list for T.VIS control top			
L	Lifting actuator M/2.0	--	221-609.46	221-609.47	221-609.45
See spare parts list for lifting actuator M/2.0					
* The seal set includes the items 1, 5, 7, 29, 30, 65, 72, 74, 94, 108, 109 and 111					

Item	Designation	Material	3" OD	4" OD	6" OD
Seal set MS complete		EPDM	221-004547	221-004550	221-004553
		FKM	221-004548	221-004551	221-004554
		HNBR	221-004549	221-004552	--
1*	Seal ring	EPDM	924-296	924-254	924-261
		FKM	924-308	924-309	924-320
		HNBR	924-331	924-332	--
2	Bearing, 3A	MF6	935-113	935-114	935-116
3	Seal disk R.N	1.4404	221-476.03	221-476.01	221-476.02
5*	O-ring	EPDM	930-150	930-156	930-260
		FKM	930-176	930-178	930-259
		HNBR	930-634	930-863	--
7*	V-ring RA/I	EPDM	221-365.08	221-365.09	221-365.16
		FKM	221-365.11	221-365.12	221-365.17
		HNBR	221-365.20	221-365.19	--
9	Lantern LFT	1.4301	221-651.19	221-651.18	221-651.15
15	Valve disk MS/2.0	1.4404	221-722.01	221-722.03	221-722.11
16	Double-disk M/2.0	1.4404	221-721.01	221-721.03	221-721.06
29*	O-ring	NBR	930-026	930-026	930-035
30*	O-ring	NBR	930-026	930-026	930-026
43	Clamp join KL	--	221-507.09	221-507.11	221-507.14
46	Clamp join KL	--	221-507.06	221-507.06	221-507.11
65*	Sealing ring RA	EPDM	221-367.03	221-367.04	221-367.06
		FKM	221-367.08	221-367.09	221-367.11
		HNBR	221-367.15	221-367.14	--
72*	O-ring	EPDM	930-610	930-611	930-612
		FKM	930-662	930-663	930-664
		HNBR	930-646	930-647	--
74*	Snap seal	PVDF	221-000522	221-000523	221-000524
91	Leakage indicator	1.4301	221-513.03	221-513.03	221-513.04
94*	V-ring RA/I	EPDM	221-365.08	221-365.09	221-365.16
		FKM	221-365.11	221-365.12	221-365.17

Spare parts list - mixproof valve M/2.0 with cleaning of lower balancer plug

Item	Designation	Material	3" OD	4" OD	6" OD
		HNBR	221-365.20	221-365.19	--
110	Hex head screw	A2	901-043	901-043	901-089
111*	O-ring	EPDM	930-148	930-923	930-925
112	Guide MU	MF6	221-696.08	221-696.09	221-696.11
113	Sterile lock MMU	1.4305	221-695.04	221-695.01	221-695.03
170	Proximity switch	1.4404	505-098	505-098	505-098
171	Sliding piece	1.4301	221-002919	221-002919	221-002919
172	Countersunk screw	A2-70	905-171	508-031	508-031
175	Nut	1.4301	221-002920	221-002920	221-002920
176	Round plug connector	--	508-031	508-031	508-031
403	Housing MA/2.0	1.4404	221-727.01	221-727.02	221-727.03
404.1	Housing MB/2.0-90		221-725.01	221-725.04	221-725.07
404.2	Housing MB/2.0-180		221-725.02	221-725.05	221-725.08
404.3	Housing MB/2.0-270		221-725.03	221-725.06	221-725.09
405	Housing MC/2.0		221-726.01	221-726.02	221-726.03
406	Housing ME/2.0		221-723.01	221-723.02	221-723.03
A	Actuator	--	221-119.10	221-119.10	221-585.09
B	Control top T.VIS®	see spare parts list for T.VIS control top			
L	Lifting actuator M/2.0	--	221-609.45	221-609.45	221-609.49
		See spare parts list for lifting actuator M/2.0			
* The seal set includes the items 1, 5, 7, 29, 30, 65, 72, 74, 94, 108, 109 and 111					

Spare parts list - mixproof valve M/2.0 with cleaning of lower balancer plug

Sealing sets for mixproof valve M/2.0 with cleaning connection									
Item	Pcs.	Designation	Material	1.5" OD	2" OD	2.5" OD	3" OD	4" OD	6" OD
1	1	Seal ring	Ø	46	46	69	69	97	142
			EPDM	924-305	924-305	924-296	924-296	924-254	924-261
			FKM	924-307	924-307	924-308	924-308	924-309	924-320
			HNBR	924-333	924-333	924-331	924-331	924-332	--
5	1	O-ring	Ø	60x3	60x3	85x4	85x4	113x4	158x5
			EPDM	930-144	930-144	930-150	930-150	930-156	930-260
			FKM	930-171	930-171	930-176	930-176	930-178	930-259
			HNBR	930-633	930-633	930-634	930-634	930-863	--
7	1	V-ring RA/I	Ø	2" OD	2" OD	DN80/65	DN80/65	DN100	6" IPS
			EPDM	221-365.26	221-365.26	221-365.08	221-365.08	221-365.09	221-365.16
			FKM	221-365.27	221-365.27	221-365.11	221-365.11	221-365.12	221-365.17
			HNBR	221-365.28	221-365.28	221-365.20	221-365.20	221-365.19	--
29	1	O-ring	Ø	20x3	20x3	20x3	20x3	20x3	25x3
			NBR	930-026	930-026	930-026	930-026	930-026	930-035
30	1	O-ring	Ø	20x3	20x3	20x3	20x3	20x3	20x3
			NBR	930-026	930-026	930-026	930-026	930-026	930-026
65	1	Sealing ring RA	Ø	DN50	DN50	DN80	DN80	DN100	6" IPS
			EPDM	221-367.02	221-367.02	221-367.03	221-367.03	221-367.04	221-367.06
			FKM	221-367.12	221-367.12	221-367.08	221-367.08	221-367.09	221-367.11
			HNBR	221-367.13	221-367.13	221-367.15	221-367.15	221-367.14	--
72	1	O-ring	Ø	18x3.5	18x3.5	18x3.5	18x3.5	22x3.5	28x3.5
			EPDM	930-610	930-610	930-610	930-610	930-611	930-612
			FKM	930-662	930-662	930-662	930-662	930-663	930-664
			HNBR	930-646	930-646	930-646	930-646	930-647	--
74	1	Snap seal	Ø	DN50	DN50	DN50	DN50	DN100	6" IPS
			PVDF	221-000522	221-000522	221-000522	221-000522	221-000523	221-000524
94	1	V-ring RA/I	Ø	DN50/40	DN50/40	DN80/65	DN80/65	DN100	6" IPS
			EPDM	221-365.07	221-365.07	221-365.08	221-365.08	221-365.09	221-365.16
			FKM	221-365.10	221-365.10	221-365.11	221-365.11	221-365.12	221-365.17
			HNBR	221-365.18	221-365.18	221-365.20	221-365.20	221-365.19	--
108**	1	O-ring	Ø	28x3	28x3	28x3	28x3	28x3	35x3
			EPDM	930-243	930-243	930-243	930-243	930-243	930-356
			FKM	930-244	930-244	930-244	930-244	930-244	930-357
			HNBR	930-640	930-640	930-640	930-640	930-640	--
109**	1	O-ring	Ø	38x3	38x3	48x3	48x3	48x3	56x3
			EPDM	930-246	930-246	930-701	930-701	930-701	930-266
			FKM	930-247	930-247	930-606	930-606	930-606	930-265
			HNBR	930-631	930-631	930-977	930-977	930-977	--
111	1	O-ring	Ø	56x3	56x3	80x3	80x3	108x3	155x3
			EPDM	930-266	930-266	930-148	930-148	930-923	930-925
Seal set MS complete			Material	1.5" OD	2" OD	2.5" OD	3" OD	4" OD	6" OD
			EPDM	221-004538	221-004538	221-004547	221-004547	221-004550	221-004553
			FKM	221-004539	221-004539	221-004548	221-004548	221-004551	221-004554
			HNBR	221-004540	221-004540	221-004549	221-004549	221-004552	--

** relevant for variant with cleaning connection up to 2015 for 1.5" to 4" and up to 2023 for DN 150/6" OD

Advice on storage: storage in accordance with DIN 7716

relative humidity approx. 65%, temperature 15-25°C and protected from light

When replacing seals, observe the instructions in the instruction manual!

429-037

14 Spare parts list - mixproof valve M/2.0 without cleaning of lower balancer

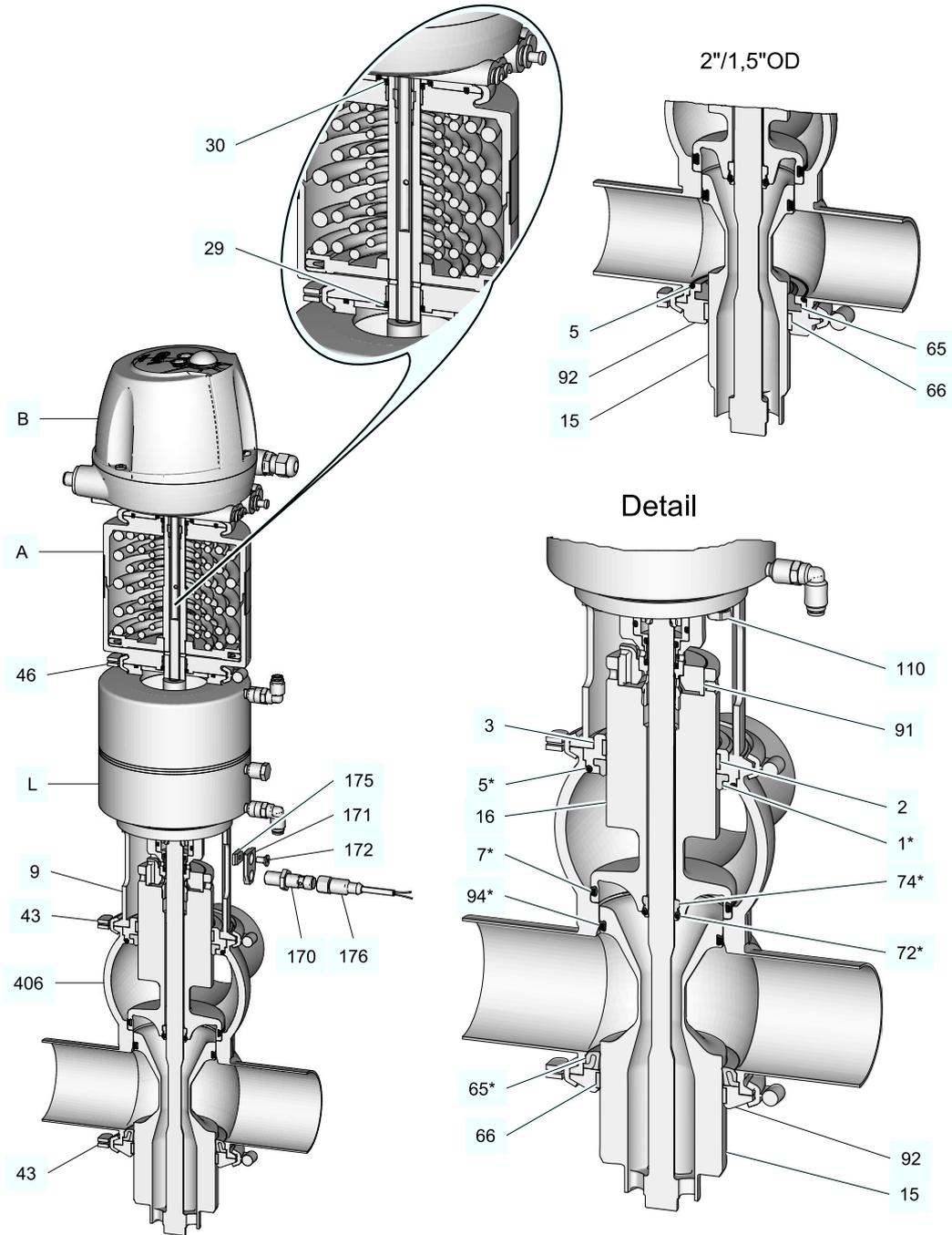


Fig.57

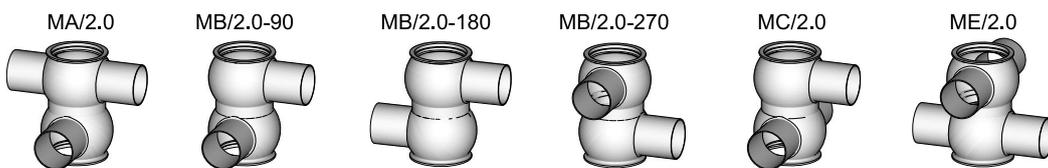


Fig.58

Spare parts list - mixproof valve M/2.0 without cleaning of lower balancer

Item	Designation	Material	1.5" OD	2" OD	2.5" OD
Sealing set MS complete		EPDM	221-004616	221-004616	221-004547
		FKM	221-004617	221-004617	221-004548
		HNBR	221-004618	221-004618	221-004549
1*	Seal ring	EPDM	924-305	924-305	924-296
		FKM	924-307	924-307	924-308
		HNBR	924-333	924-333	924-331
2	Guide ring	MF6	935-117	935-117	935-113
3	Seal disk R.N	1.4404	221-476.05	221-476.05	221-476.03
5*	O-ring	EPDM	930-144	930-144	930-150
		FKM	930-171	930-171	930-176
		HNBR	930-633	930-633	930-634
7*	V-ring RA/I	EPDM	221-365.26	221-365.26	221-365.08
		FKM	221-365.27	221-365.27	221-365.11
		HNBR	221-365.28	221-365.28	221-365.20
9	Lantern LFT	1.4301	221-651.17	221-651.17	221-651.19
15	Valve disk M/2.0	1.4404	221-722.09	221-722.10	221-722.06
16	Double-disk M/2.0	1.4404	221-721.04	221-721.05	221-721.02
29*	O-ring	NBR	930-026	930-026	930-026
30*	O-ring	NBR	930-026	930-026	930-026
43	Clamp join KL	--	221-507.04	221-507.04	221-507.09
46	Clamp join KL	--	221-507.06	221-507.06	221-507.06
65*	Sealing ring RA	EPDM	924-305	924-305	221-367.03
		FKM	924-307	924-307	221-367.08
		HNBR	924-333	924-333	221-367.15
66	Guide ring 3A	MF6	935-117	935-117	935-120
72*	O-ring	EPDM	930-610	930-610	930-610
		FKM	930-662	930-662	930-662
		HNBR	930-646	930-646	930-646
74*	Snap seal	PVDF	221-000522	221-000522	221-000522
91	Leakage indicator	1.4305	221-513.02	221-513.02	221-513.03
92	Balancer fastener	1.4305	221-348.03	221-348.03	221-538.01
94*	V-ring RA/I	EPDM	221-365.07	221-365.07	221-365.08
		FKM	221-365.10	221-365.10	221-365.11
		HNBR	221-365.18	221-365.18	221-365.20
110	Hex head screw	A2	--	--	901-043
170	Proximity switch	1.4404	505-098	505-098	505-098
171	Sliding piece	1.4301	221-002919	221-002919	221-002919
172	Countersunk screw	A2-70	905-171	905-171	905-171
175	Nut	1.4301	221-002920	221-002920	221-002920
176	Round plug connector	--	508-031	508-031	508-031
403	Housing MA/2.0	1.4404	221-727.04	221-727.05	221-727.06
404.1	Housing MB/2.0-90		221-725.10	221-725.13	221-725.16
404.2	Housing MB/2.0-180		221-725.11	221-725.14	221-725.17

Spare parts list - mixproof valve M/2.0 without cleaning of lower balancer

Item	Designation	Material	1.5" OD	2" OD	2.5" OD
404.3	Housing MB/2.0-270		221-725.12	221-725.15	221-725.18
405	Housing MC/2.0		221-726.04	221-726.05	221-726.06
406	Housing ME/2.0		221-723.04	221-723.05	221-723.06
A	Actuator	--	221-119.02	221-119.02	221-119.10
B	Control top T.VIS®	see spare parts list for T.VIS control top			
L	Lifting actuator M/2.0	--	221-609.46	221-609.47	221-609.45
See spare parts list for lifting actuator M/2.0					
* The sealing set contains items 1, 5, 7, 29, 30, 65, 72, 74, 94,108, 109 and 111					

Item	Designation	Material	3" OD	4" OD	6" OD
Sealing set MS complete		EPDM	221-004547	221-004550	221-004553
		FKM	221-004548	221-004551	221-004554
		HNBR	221-004549	221-004552	--
1*	Seal ring	EPDM	924-296	924-254	924-261
		FKM	924-308	924-309	924-320
		HNBR	924-331	924-332	--
2	Guide ring 3A	MF6	935-113	935-114	935-116
3	Seal disk R.N	1.4404	221-476.03	221-476.01	221-476.02
5*	O-ring	EPDM	930-150	930-156	930-260
		FKM	930-176	930-178	930-259
		HNBR	930-634	930-863	--
7*	V-ring RA/I	EPDM	221-365.08	221-365.09	221-365.16
		FKM	221-365.11	221-365.12	221-365.17
		HNBR	221-365.20	221-365.19	--
9	Lantern LFT	1.4301	221-651.19	221-651.18	221-651.15
15	Valve disk M/2.0	1.4404	221-722.07	221-722.08	221-722.12
16	Double-disk M/2.0	1.4404	221-721.01	221-721.03	221-721.06
29*	O-ring	NBR	930-026	930-026	930-035
30*	O-ring	NBR	930-026	930-026	930-026
43	Clamp join KL	--	221-507.09	221-507.11	221-507.14
46	Clamp join KL	--	221-507.06	221-507.06	221-507.11
65*	Sealing ring RA	EPDM	221-367.03	221-367.04	221-367.06
		FKM	221-367.08	221-367.09	221-367.11
		HNBR	221-367.15	221-367.14	--
66	Guide ring 3A	MF6	935-120	935-119	935-118
72*	O-ring	EPDM	930-610	930-611	930-612
		FKM	930-662	930-663	930-664
		HNBR	930-646	930-647	--
74*	Snap seal	PVDF	221-000522	221-000523	221-000524
91	Leakage indicator	1.4301	221-513.03	221-513.03	221-513.04
92	Balancer fastener	1.4305	221-538.01	221-538.02	221-538.04
94*	V-ring RA/I	EPDM	221-365.08	221-365.09	221-365.16

Spare parts list - mixproof valve M/2.0 without cleaning of lower balancer

Item	Designation	Material	3" OD	4" OD	6" OD
		FKM	221-365.11	221-365.12	221-365.17
		HNBR	221-365.20	221-365.19	--
110	Hex head screw	A2	901-043	901-043	901-089
170	Proximity switch	1.4404	505-098	505-098	505-098
171	Sliding piece	1.4301	221-002919	221-002919	221-002919
172	Countersunk screw	A2-70	905-171	508-031	508-031
175	Nut	1.4301	221-002920	221-002920	221-002920
176	Round plug connector	--	508-031	508-031	508-031
403	Housing MA/2.0	1.4404	221-727.01	221-727.02	221-727.03
404.1	Housing MB/2.0-90		221-725.01	221-725.04	221-725.07
404.2	Housing MB/2.0-180		221-725.02	221-725.05	221-725.08
404.3	Housing MB/2.0-270		221-725.03	221-725.06	221-725.09
405	Housing MC/2.0		221-726.01	221-726.02	221-726.03
406	Housing ME/2.0		221-723.01	221-723.02	221-723.03
A	Actuator		--	221-119.10	221-119.10
B	Control top T.VIS®	see spare parts list for T.VIS control top			
L	Lifting actuator M/2.0	--	221-609.45	221-609.45	221-609.49
		See spare parts list for lifting actuator M/2.0			
* The sealing set contains items 1, 5, 7, 29, 30, 65, 72, 74, 94, 108, 109 and 111					

Spare parts list - mixproof valve M/2.0 without cleaning of lower balancer

Sealing sets for mixproof valve M/ 2.0 with cleaning connection									
Item	Pcs.	Designation	Material	1.5" OD	2" OD	2.5" OD	3" OD	4" OD	6" OD
1	1	Seal ring	Ø	46	46	69	69	97	142
			EPDM	924-305	924-305	924-296	924-296	924-254	924-261
			FKM	924-307	924-307	924-308	924-308	924-309	924-320
			HNBR	924-333	924-333	924-331	924-331	924-332	--
5	1	O-ring	Ø	60x3	60x3	85x4	85x4	113x4	158x5
			EPDM	930-144	930-144	930-150	930-150	930-156	930-260
			FKM	930-171	930-171	930-176	930-176	930-178	930-259
			HNBR	930-633	930-633	930-634	930-634	930-863	--
7	1	V-ring RA/I	Ø	2" OD	2" OD	DN80/65	DN80/65	DN100	6" IPS
			EPDM	221-365.26	221-365.26	221-365.08	221-365.08	221-365.09	221-365.16
			FKM	221-365.27	221-365.27	221-365.11	221-365.11	221-365.12	221-365.17
			HNBR	221-365.28	221-365.28	221-365.20	221-365.20	221-365.19	--
29	1	O-ring	Ø	20x3	20x3	20x3	20x3	20x3	25x3
			NBR	930-026	930-026	930-026	930-026	930-026	930-035
30	1	O-ring	Ø	20x3	20x3	20x3	20x3	20x3	20x3
			NBR	930-026	930-026	930-026	930-026	930-026	930-026
65	1	Sealing ring RA	Ø	DN50	DN50	DN80	DN80	DN100	6" IPS
			EPDM	924-305	924-305	221-367.03	221-367.03	221-367.04	221-367.06
			FKM	924-307	924-307	221-367.08	221-367.08	221-367.09	221-367.11
			HNBR	924-333	924-333	221-367.15	221-367.15	221-367.14	--
72	1	O-ring	Ø	18x3.5	18x3.5	18x3.5	18x3.5	22x3.5	28x3.5
			EPDM	930-610	930-610	930-610	930-610	930-611	930-612
			FKM	930-662	930-662	930-662	930-662	930-663	930-664
			HNBR	930-646	930-646	930-646	930-646	930-647	--
74	1	Snap seal	Ø	DN50	DN50	DN50	DN50	DN100	6" IPS
			PVDF	221-000522	221-000522	221-000522	221-000522	221-000523	221-000524
94	1	V-ring RA/I	Ø	DN50/40	DN50/40	DN80/65	DN80/65	DN100	6" IPS
			EPDM	221-365.07	221-365.07	221-365.08	221-365.08	221-365.09	221-365.16
			FKM	221-365.10	221-365.10	221-365.11	221-365.11	221-365.12	--
			HNBR	221-365.18	221-365.18	221-365.20	221-365.20	221-365.19	--
108**	1	O-ring	Ø	28x3	28x3	28x3	28x3	28x3	35x3
			EPDM	930-243	930-243	930-243	930-243	930-243	930-356
			FKM	930-244	930-244	930-244	930-244	930-244	930-357
			HNBR	930-640	930-640	930-640	930-640	930-640	--
109**	1	O-ring	Ø	38x3	38x3	48x3	48x3	48x3	56x3
			EPDM	930-246	930-246	930-701	930-701	930-701	930-266
			FKM	930-247	930-247	930-606	930-606	930-606	930-265
			HNBR	930-631	930-631	930-977	930-977	930-977	--
Sealing set MS complete			Material	1.5" OD	2" OD	2.5" OD	3" OD	4" OD	6" OD
			EPDM	221-004616	221-004616	221-004547	221-004547	221-004550	221-004553
			FKM	221-004617	221-004617	221-004548	221-004548	221-004551	221-004554
			HNBR	221-004618	221-004618	221-004549	221-004549	221-004552	--
** relevant for variant with cleaning connection up to 2015 for 1.5" to 4" and up to 2023 for DN 150/6" OD Advice on storage: storage in accordance with DIN 7716 relative humidity approx. 65%, temperature 15-25°C and protected from light When replacing seals, observe the instructions in the instruction manual!									

15 Spare parts list - Lifting actuator M/2.0

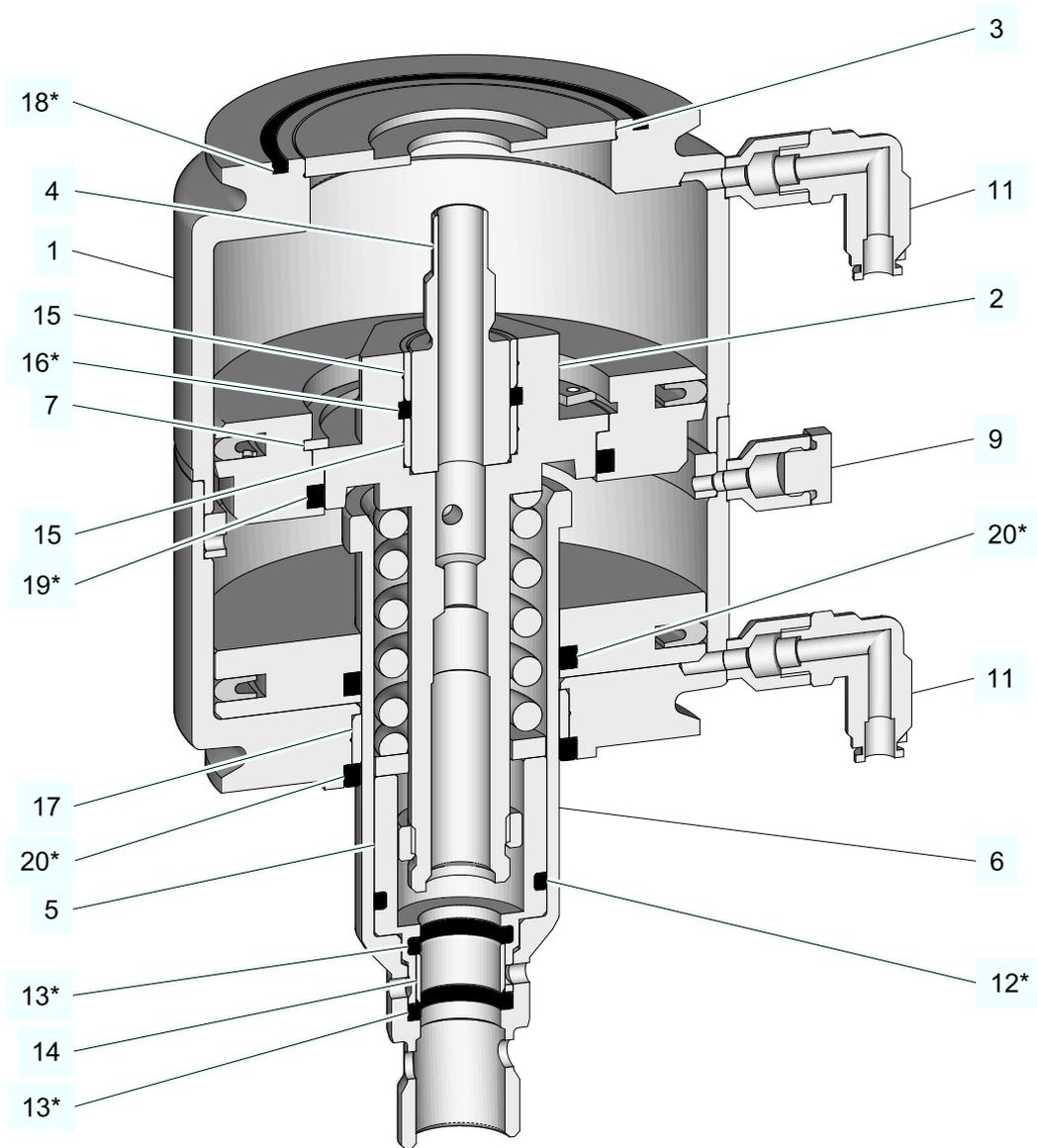


Fig.59

Spare parts list - Lifting actuator M/2.0

Item	Designation	Material	1.5" OD	2" OD	2.5" OD
Lifting actuator M/2.0 compl.			BLMN35	BLMN48	CLMN56
			221-609.46	221-609.47	221-609.45
1	Lifting actuator LFT-M/2.0	--	221-605.23	221-605.23	221-605.22
2	Carrier LFT-M/2.0	--	221-622.16	221-622.16	221-622.15
3	Sealing flange LFT-R 200	EN AW-6083 T6	221-613.13	221-613.01	221-613.01
4	Adapter LFT-R 200	EN AW-6083 T6	221-613.13	221-614.01	221-614.01
5	Socket M/2.0	1.4305	221-616.08	221-616.08	221-616.08
6	Actuator sleeve LFT-B	1.4305	221-617.03	221-617.03	221-617.07
7	Retaining ring	1.4122	917-179	917-179	917-179
9	Locking screw	1.4404	922-316	922-316	922-316
11	Elbow screwed plug-in connection 6-1/8"	Brass/nickel-plated	933-475	933-475	933-475
	Elbow screwed plug-in connection 6.35-1/8"	Brass/nickel-plated	933-979	933-979	933-979
12*	O-ring	NBR	930-041	930-041	930-041
13*	O-ring	EPDM	930-235	930-235	930-235
14	Plain bearing	IGLIDUR-G	704-043	704-043	704-043
15	Plain bearing	IGLIDUR-G	704-041	704-041	704-041
16*	O-ring	NBR	930-026	930-026	930-026
17	Plain bearing	IGLIDUR-G	704-057	704-057	704-015
18*	O-ring	NBR	930-850	930-850	930-850
19*	O-ring	NBR	930-848	930-848	930-848
20*	O-ring	NBR	930-242	930-242	930-249
Seal set Lift-LR DN40/100 NBR+EPDM			221-528.113	221-528.113	221-528.137
Seal set Lift-LR DN40/100 NBR+ FKM			221-528.114	221-528.114	221-528.138
Items marked with an * are wear parts					

Item	Designation	Material	3" OD	4" OD	6" OD
Lifting actuator M/2.0 compl.			CLMN56	CLMN56	LFT-M/2.0
			221-609.45	221-609.45	221-609.49
1	Lifting actuator LFT-M/2.0	--	221-605.22	221-605.22	221-605.25
2	Carrier LFT-M/2.0	--	221-622.15	221-622.15	221-622.17
3	Sealing flange LFT-R 200	EN AW-6083 T6	221-613.01	221-613.01	221-613.02
4	Adapter LFT-R 200	EN AW-6083 T6	221-613.01	221-614.01	221-614.04
5	Socket M/2.0	1.4305	221-616.08	221-616.08	221-616.09
6	Actuator sleeve LFT-B	1.4305	221-617.07	221-617.07	221-004592
7	Retaining ring	1.4122	917-179	917-179	917-154
9	Locking screw	1.4404	922-316	922-316	922-316
11	Elbow screwed plug-in connection 6-1/8"	Brass/nickel-plated	933-475	933-475	933-475
	Elbow screwed plug-in connection 6.35-1/8"	Brass/nickel-plated	933-979	933-979	933-979
12*	O-ring	NBR	930-041	930-041	930-052
13*	O-ring	EPDM	930-235	930-235	930-268

Spare parts list - Lifting actuator M/2.0

Item	Designation	Material	3" OD	4" OD	6" OD
14	Plain bearing	IGLIDUR-G	704-043	704-043	704-038
15	Plain bearing	IGLIDUR-G	704-041	704-041	704-042
16*	O-ring	NBR	930-026	930-026	930-035
17	Plain bearing	IGLIDUR-G	704-015	704-015	704-015
18*	O-ring	NBR	930-850	930-850	930-107
19*	O-ring	NBR	930-848	930-848	930-849
20*	O-ring	NBR	930-249	930-249	930-249
Seal set Lift-LR DN40/100 NBR+EPDM			221-528.137	221-528.137	--
Seal set Lift-LR DN40/100 NBR+ FKM			221-528.138	221-528.138	--
Seal set Lift-LR DN125/150 NBR+EPDM			--	--	221-528.115
Seal set Lift-LR DN25/150 NBR+ FKM			--	--	221-528.116
Items marked with an * are wear parts					

16 Dimension sheet - mixproof valve type M/ 2.0

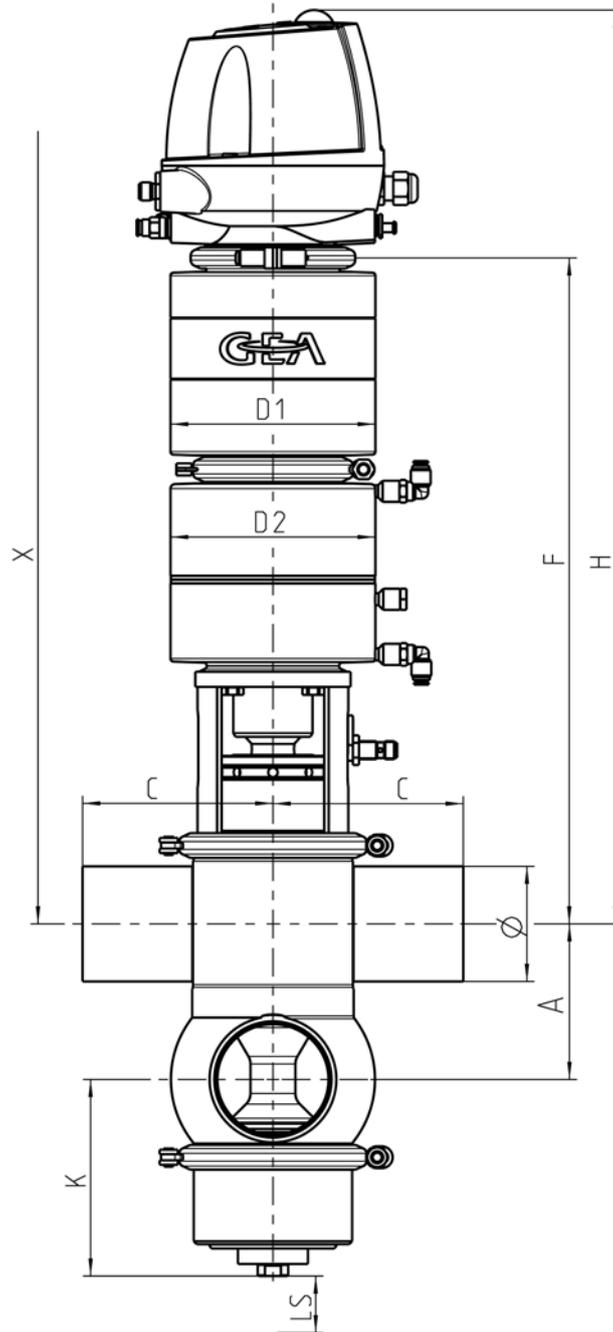


Fig.60

Dimension sheet - mixproof valve type M/ 2.0

		1"OD	1.5"OD	2"OD	2.5"OD	3"OD	4"OD	6"OD
A	[mm]	46	59	71.5	90	103	127.5	177
C	[mm]	90	90	90	125	125	125	150
Tube ID Ø	[mm]	25.4 x 1.65	38.1 x 1.6	50.8 x 1.6	63.5 x 1.6	76.2 x 1.6	101.6 x 2.1	152.4 x 2.7
D1	[mm]	110	110	110	135	135	135	210
D2	[mm]	110	110	110	135	135	135	210
F	[mm]	386	399.5	405.75	434	440.5	452.75	644.5
H incl. T.VIS	[mm]	550	563.5	569.75	598	604.5	616.75	808.5
C	[mm]	81	94.5	108.5	124	130.5	142.5	190
LS	[mm]	6	6	6	6	6	6	6
X	[mm]	540	746.5	785.5	857	889.5	950.5	1217
Stroke	[mm]	27	28	35	45	45	45	65
Small piece size	[mm]	5.5	4	9	19.5	19.5	19.5	38.5
Control air pressure	[bar]	6	6	6	6	6	6	6
Product pressure spring closing	[bar]	10	10	10	10	10	10	10
Product pressure spring opening	[bar]	10	10	10	10	10	10	10
Weight	[kg]		17	17	29	29	41	90

17 Appendix

17.1 Lists

17.1.1 Abbreviations and terms

Abbreviation	Explanation
BS	British Standard
bar	Unit of measurement of pressure [bar] All pressure data expressed in [bar/psi] is assumed to be gauge pressure [barg/psig] unless explicitly specified otherwise.
approx.	approximately
°C	Unit of measurement of temperature [degree Celsius]
dm ³ _n	Unit of measurement of volume [cubic decimetre] Standard volume (standard litre)
DN	DIN nominal width
DIN	German standard issued by DIN (Deutsches Institut für Normung e.V., German Institute for Standardization)
EN	European Standard
EPDM	Material designation Short designation according to DIN/ISO 1629: Ethylene Propylene Diene Rubber
°F	Unit of measurement of temperature [degree Fahrenheit]
FKM	Material designation, short designation according to DIN/ISO 1629: Fluorine rubber
h	Unit of measurement of time [hour]
HNBR	Material designation Short designation according to DIN/ISO 1629: Hydrogenated Acrylonitrile Butadiene Rubber
IP	Protection class
ISO	International standard issued by the International Organisation for Standardisation
kg	Unit of measurement of weight [kilogram]
kN	Unit of measurement of force [kilonewton]
Kv value	Flow coefficient [m ³ /s] 1 KV = 0,86 x Cv
l	Unit of measurement of volume [litre]
max.	maximum
mm	Unit of measurement of length [millimetre]
µm	Unit of measurement of length [micrometre]

Abbreviation	Explanation
M	Metric
Nm	Unit of measurement of work [newton metre] Specification of torque 1 Nm = 0.737 lbft Pound-Force (lb) + Feet (ft)
PA	Polyamide
PE-LD	Low-density polyethylene
PPE	Polytetrafluoroethylene
psi	America measurement for pressure [Pound-force per square inch] All pressure data expressed in [bar/psi] is assumed to be gauge pressure [barg/psig] unless explicitly specified otherwise.
PTFE	Polytetrafluoroethylene
SET-UP	Self-learning installation During commissioning and maintenance, the SET-UP procedure carries out all the necessary settings for the generation of messages.
AF	Specifications for the size of spanners width across flats
T.VIS	Tuchenhagen Valve Information System
V AC	Volt alternating current
V DC	Volt direct current
W	Unit of measurement of power [Watt]
TIG	Welding method Tungsten inert gas welding
Inch	Unit of measurement of length in the Anglo-American language area
Inch OD	Pipe measurement according to British Standards (BS), Outside Diameter
Inch IPS	American pipe measure - Iron Pipe Size

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