OPERATING INSTRUCTIONS

Translation from the original language

Hygienic valves

GEAVARIVENT® bellows stop valve type N_A

GEA Tuchenhagen GmbH
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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

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1.3 Contact

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Engineering for a better world.

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 acutator
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

---

Person authorised for compilation and handover of technical documentation:

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i.V. Stephan Dirks
Senior Director Product Engineering & Development
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Engineering for a better world.

UK- Declaration of conformity by Supply of Machinery (Safety) Regulations 2008

Manufacturer: **GEA Tuchenhagen GmbH**
Am Industriepark 2-10
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 VARIVENT® bellows stop valve N_A is used for opening and closing pipeline sections.

It offers maximum process safety and product quality for aseptic and sterile working processes.

The valve is suitable for cleaning in the installed state, using established cleaning processes in hygienic systems (CIP-capable).

The medium should preferably flow in the opening direction of the bellows to avoid pipe hammers when the valve is opened or closed.

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 valve 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 ≥ IPS 4“; DN 125 valid for the fluid group II.

In the event of any deviations, GEA Tuchenhagen 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 Tuchenhagen 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	Adequate instruction and sound knowledge in the following areas: • 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	Appropriate training and a sound knowledge of the structure and functionality of the component. Sound knowledge in the following areas: • Mechanical equipment • Electrical equipment • Pneumatic system Authorization with regard to safety engineering standards to carry out the following tasks: • Setting devices into operation • Earthing of devices • Marking of devices The relevant certificates of qualification must be submitted before work can be carried out on ATEX certified machines.

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 Tuchenhagen for proper disposal.

Residual dangers on the valve and measures		
Danger	**Cause**	**Measure**
Danger of injury	Danger presented by moving or sharp-edged parts	The operator must exercise caution and prudence. For all work: • 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. As a precautionary measure, wear personal protective equipment in the vicinity of the valve: • Protective gloves • Safety shoes
Environmental damage	Operating materials with properties which are harmful to the environment	For all work: • Collect lubricants in suitable containers. • Dispose of lubricants in accordance with the pertinent regulations.

2.9 Danger zones

Please observe the following notes:

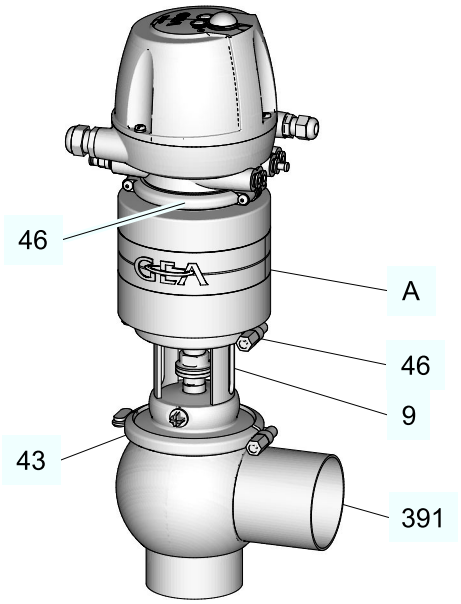

Fig.4: Danger zones

- 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) or the valve housing (391) 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 (46) as the released spring pretension will suddenly lift the actuator (A). Therefore, relieve the spring tension before detaching the clamp connection (43/46) by ventilating the actuator with compressed air.

- Before releasing the snap ring therefore relieve the spring tension by ventilating the actuator with compressed air using a solenoid valve or assembly tool.
- 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 have very sharp edges. When transporting and installing the valve be sure to wear suitable protective gloves.

3 Description

3.1 Design

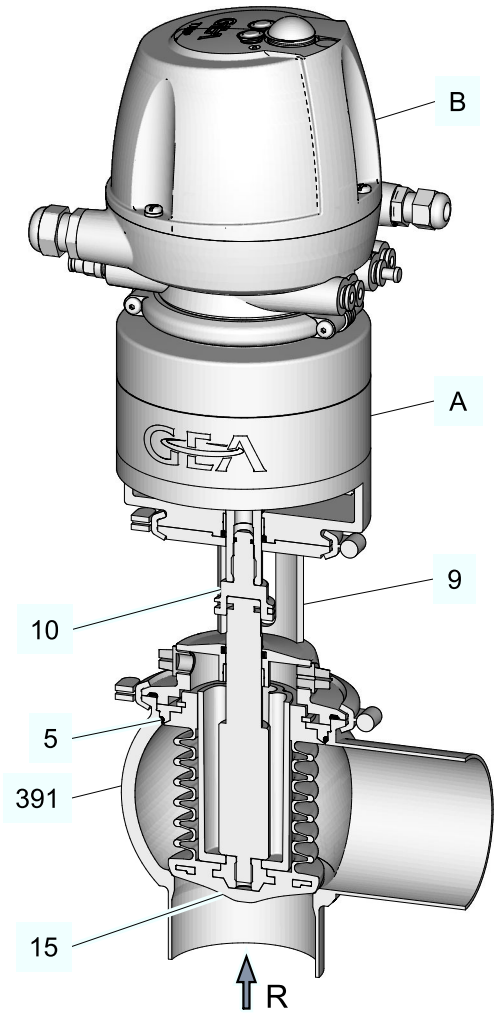

Fig.5: Valve design with PTFE bellows / R = Direction of flow

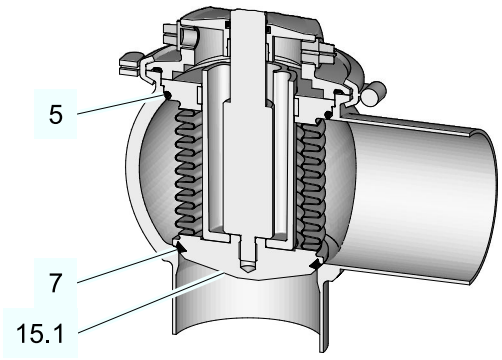

Fig.6: Design of metal bellows

Design	
No.	**Designation**
A	Actuator
B	Control top T.VIS
5	O-ring
7	V-ring
9	Lantern
10	Adapter
15	PTFE bellows
15.1	Metal bellows
391	Valve housing

3.2 Functional description

3.2.1 Bellows monitoring/rinsing

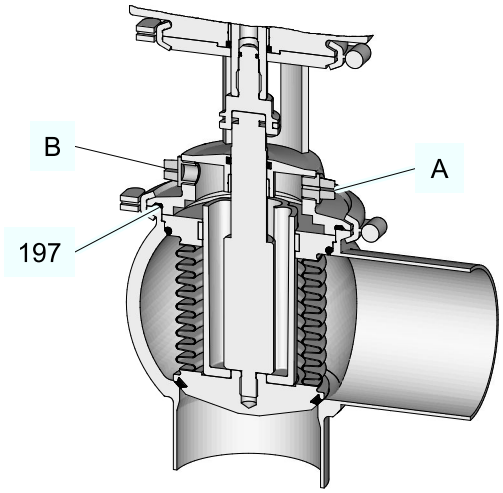

Fig.7: Bellow monitoring

There is an optional possibility for monitoring or rinsing the valve disk interior (metal bellows). This enables bellows defects to be recognised quickly and prevents germs entering the process.

For this purpose, a corresponding control medium can be added through connections A and B.

The liquid pressure during rinsing must not exceed 1 bar. The type of control medium must be matched to the product being pumped.

In order to make specific leakage discharge possible, the leakage chamber of the bellows must be sealed at the lantern flange. The O-ring (197) must be used for this.

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 ≤ 0°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 ≥ 5 °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

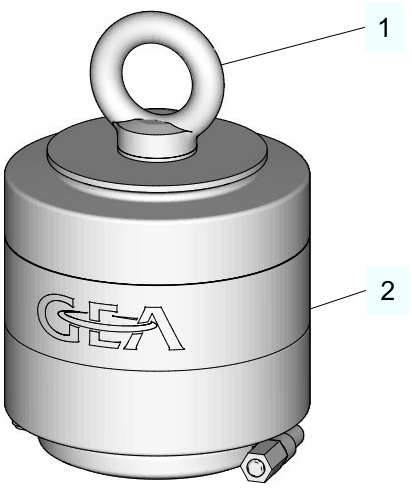

Fig.8: Eyebolt

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 hoist 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.

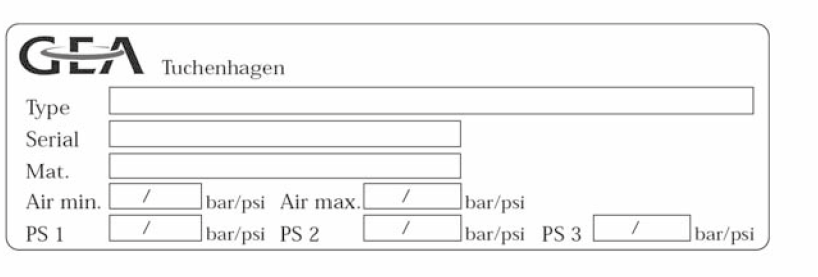

Fig.9: Type plate

The type plate provides the following key data:

Key data of the valve	
Type	NLA or NTA
Serial	Serial number
Material	1.4404 (AISI316L)/EPDM (FDA)
Control air pressure bar	min. 4.0 max. 6.0
Product pressure bar	6.0

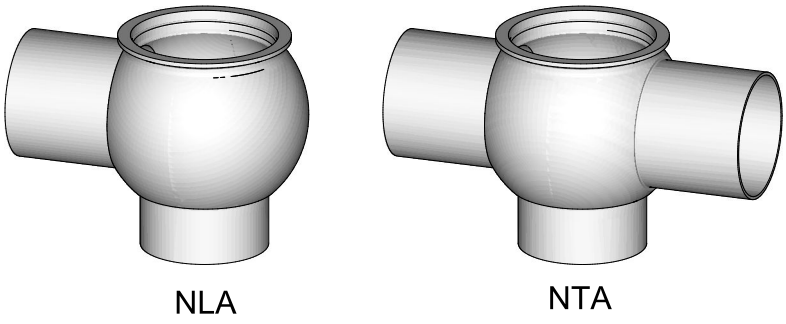

Fig.10: Valve type

5.2 Technical data

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

Technical data: Valve	
Designation	**Description**
Size	DN 25 to DN 100 1" to 4" OD
Weight	5 to 22 kg, depending on design size and equipment

Technical data: Valve	
Designation	**Description**
Material of product contact parts	Stainless steel 1.4404 (AISI 316L)
Material PTFE bellows	PTFE TFM 1705
Material metal bellows	1.4404/1.4571 (optionally Hastelloy C (2.4819))
Material seals	Standard: EPDM-FDA compliant
	Optional: FKM FDA-compliant
Material of parts that do not come into contact with product	1.4301(AISI 304)
Surface finish	Inside: $R_a \leq$ 0.8 µm Exterior: bright
Fitting position	any position, with bellows monitoring actuator upright

Technical data: temperatures	
Designation	**Description**
- Ambient temperature of the valve	0 to 60 °C, standard < 0 °C: Use control air with low dew point. Protect valve rods against freezing. < −15 °C: no solenoid valves in the control top > +50 °C: no solenoid valves in the control top
- Operating temperature of the valve	Liquids: 5 °C to 105 °C Sterile vapour: 150 °C max 1h

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. 6 bar standard > 6 bar on request

Technical data: Compressed air supply	
Designation	**Description**
Control air pressure	4 bar, max. 6 bar > 6 bar on request
Control air	acc. to ISO 8573-1:2010
- Solid particle content:	acc. to ISO 8573-1:2001 Quality class 6 Particle size max. 5 µm Part density max. 5 mg/m³
- 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 in 1m³ air

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 versatile conditions of use (e.g. usage duration, switching frequency, type and temperature of product and cleaning agents as well as usage environment), GEA Tuchenhagen recommends that the user carries out resistance tests.

Resistance:

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

Table of sealing resistance / permitted operating temperature				
Medium	**Temperature**	**Sealing material**		
		EPDM	**FKM**	**PTFE**
Alkalis up to 3%	up to 80 °C (176°F)	+	o	+
Alkalis up to 5%	up to 40 °C (104°F)	+	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	+	+

Table of sealing resistance / permitted operating temperature				
Medium	**Temperature**	**Sealing material**		
		EPDM	**FKM**	**PTFE**
Inorganic acids up to 5%	up to 100 °C (212°F)	–	+	+
Water	up to 80 °C (176°F)	+	+	+
Steam	up to 135 °C (275°F)	+	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 materials - temperature resistance	
Sealing materials	**General temperature resistance***
EPDM	-40...+135°C (-40...275°F)
FKM	-10...+200 °C (+14...+392°F)
PTFE	-200...+260°C (+392...500°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 23.

Dimensions for tubes in DN				
Metric DN	**Outside diameter**	**Wall thickness**	**Inside diameter**	**Outside diameter acc. to DIN 11850**
25	29	1.5	26	x
40	41	1.5	38	x
50	53	1.5	50	x
65	70	2.0	66	x
80	85	2.0	81	x
100	104	2.0	100	x
125	129	2.0	125	x

Dimensions for tubes in Inch OD				
Inch OD	**Outside diameter**	**Wall thickness**	**Inside diameter**	**Outside diameter acc. to BS 4825**
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

5.5 Tool

List of tools	
Tool	**Material no.**
Mounting tool	221-105.99
Belt wrench	408-142
V-ring insertion tool	229-109.88
Assembly tool for retaining clip (10.1)	229-000031
Hose cutter	407-065
Open-ended wrench, ends ground, a/f 22-24	229-119.03
Outer circlip pliers form B - cropped jaws 90°, size A31 for DN 40/1.5” up to DN 100/4”	
Outer circlip pliers form B - cropped jaws 90°, size A21 for DN 25/1”	
Scriber	414-001
Ring spanner or open-ended wrench size 10	408-033
Ring spanner or open-ended wrench size 13x17	408-036
Torque wrench	

5.6 Lubricants

Lubricants	
Lubricant designation	**Material no.**
Rivolta F.L.G. MD-2	413-071
PARALIQ GTE 703	413-064

5.7 Weights

Weight data		
Size	**Weight [kg] with pneumatic actuator**	
	N_A/P	**N_A/S**
DN 25, 1"	5.1	5.2
DN 40, 1.5"	6.8	7
DN 50, 2"	7.0	7.3
DN 65, 2.5"	9.3	10.1
DN 80, 3"	13.5	15
DN100, 4"	20	21.2

6 Assembly and installation

6.1 Safety precautions

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.
- Do not use conventional greases and oils for lubrication.

6.2 Notes on installation

The fitting position of the valve is:

- with bellows monitoring - actuator upright
- without bellows monitoring preferably with vertically upright actuator, or horizontal, taking the direction of emptying into account

.

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
- If the valve is installed horizontally, the stress on the valve stem seals is higher than in the vertical installation position. Therefore, support the actuator and regularly check the valve for leakage.

6.3 Pneumatic connections

6.3.1 Air requirement

Air requirement			
Actuator type	**Actuator Ø [mm]**	**Air requirement (dm^3_n/Stroke) dm^3_n at 1.01325 bar at 0 °C as per DIN 1343**	**Use**
A...	99	0.16	DN 25 - DN 100 1" - 4" OD
B...	109	0.26	
B...5	109	0.34	
C...	135	0.42	
C...5	135	0.54	
D...	170	0.70	
E...	210	1.10	
E...5	210	1.40	
E...6	210	2.00	
S...6	261	3.20	
D...6	170	1.30	
R...[1]	170	1.60	
S...[1]	210	2.00	
T...[1]	210	3.10	
T...6[1]	210	4.00	
U...6[1]	261	5.10	

[1] Actuators with booster cylinder for increasing the pneumatic actuating force when lower control air pressures are used

6.3.2 Establishing Hose Connections

To ensure reliable operation, the compressed air hoses must be cut exactly square.

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 square.
3. Push the air hose into the air connector on the control top.
4. Re-open the compressed air supply.

→ Establish a hose connection.

6.4 Electrical connections

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 corresponding operating instructions for the control top.

→ 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).

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.

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. For further information regarding the resistance of the individual sealing materials, see Section 5.3, Page 25.

When the pipe is cleaned, the cleaning medium also flows through and cleans the valve housings.

For optimal cleaning results, it is recommended that the valve be activated briefly during cleaning.

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 operating company!

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.

9.2 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 21.

10.2 Inspections

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

10.2.1 Product contact seals

Carry out the following steps:

1. Check the bellows at regular intervals.
2. Check the O-rings between the valve housings at regular intervals.
3. Check the V-ring of the metal bellows at regular intervals.

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 Servicing intervals

To ensure the highest operational reliability of the valves, all wearing parts should be replaced at longer intervals. Keep an adequate supply of wearing parts (seals) in your spare parts stock.

In practice, the actual maintenance intervals can only be determined by the user since they depend on the operating conditions.

Examples of relevant process parameters are:

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

If there is still no or too little information available for the definition of practically-orientated maintenance intervals, the reference values listed in the following table can be considered as a basis. The following information is based on the experience of GEA Flow Components and applies to installations working in a 2-shift operation.

Servicing intervals		
Component	**Measure**	
	Valve with elastomer valve seat seal such as EPDM, FKM, HNBR	
Maintenance activities to be performed once a month		
Valve	Visual check without dismantling	
Maintenance activities to be performed after 3 months		
Product contact seals	Media temperature 60...130 °C (140...266 °F)	Media temperature < 60 °C (< 140 °F)
	Seal replacement	Mechanical & visual inspection of condition
Internal assembly	Check of mechanical parts and visual inspection of condition	
Actuator	Function check	
Valve	Function check	
Feedback	Function check	
Pneumatic connections	Check of mechanical parts and visual inspection of condition – leak test	

Servicing intervals	
Component	**Measure**
	Valve with elastomer valve seat seal such as EPDM, FKM, HNBR
Electrical connections	Visual inspection
Maintenance activities to be performed once a year	
Product contact seals	Seal replacement
Internal assembly	Check of mechanical parts and visual inspection of condition
Actuator	Check of mechanical parts and visual inspection of condition – function test
Valve	Check of mechanical parts and visual inspection of condition – function test
Feedback	Check of mechanical parts and visual inspection of condition – function test
Pneumatic connections	Check of mechanical parts and visual inspection of condition – function test
Electrical connections	Check of mechanical parts and visual inspection of condition

10.4 Removing the valve

10.4.1 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. Block control air if it is not required for removal.
4. Take the valve out of the pipe section, with all housings and housing connections if possible.

→ Done

10.4.2 Ventilating the actuator for disassembly

Via pilot valve

Hint!

The pneumatic and electrical connections can remain on the control top.

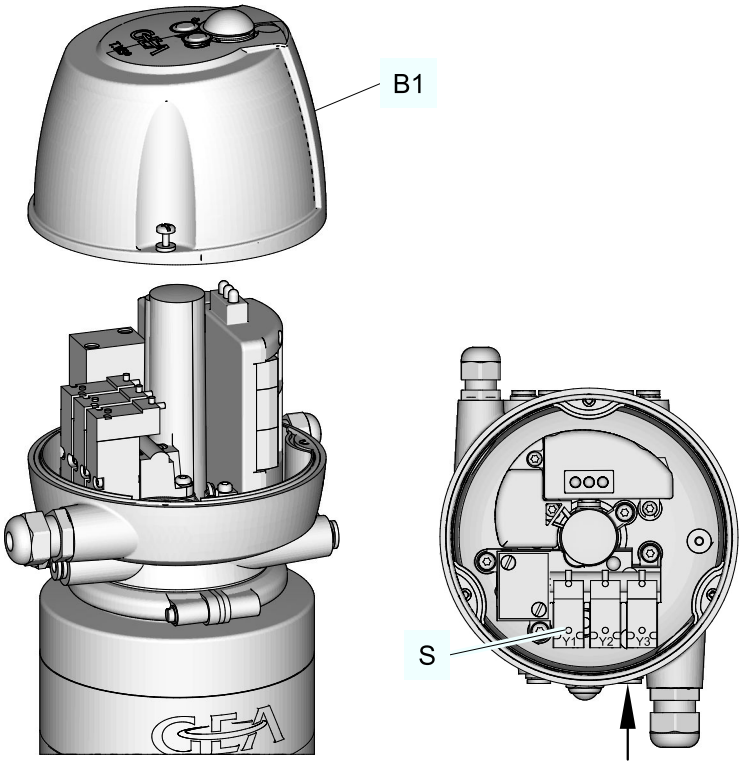

Fig.11: Ventilate the actuator

Carry out the following steps:

1. Remove the hood (B1) of the control top.
2. Turn the screw (S) of the manual control element at the solenoid valve (see Chapter “Commissioning”)

   → The valve is ventilated.

With assembly tool

⚠ Caution!

The permanent magnet on the switch bar is fragile.

Mechanical impact may break the permanent magnet.

► Protect the permanent magnet from mechanical impact.

⚠ Caution!

Influence on electronic and mechanical components.

Data carriers may be erased by the permanent magnet.

► Do not place any mechanical or electronic components next to the permanent magnet.

⚠ Caution!

Data loss

Data may be lost by welding work near the control top.

► Do not carry out any welding work near the control top.

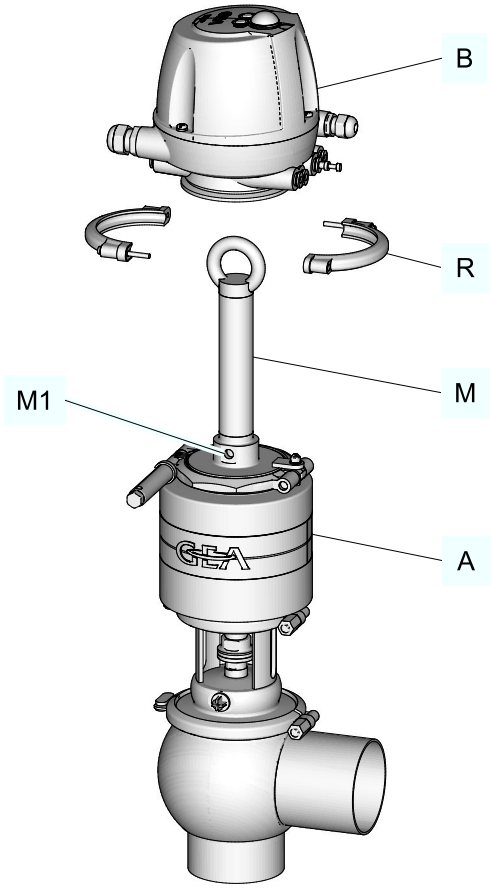

Fig.12: Mounting tool

Carry out the following steps:

1. Remove the clamps (R) between control top and actuator.
2. Pull off the control top (B) upwards.
3. Mount the assembly tool (M), part no. 221-105.99, onto the actuator (A) via the switch bar.

   → The valve can be ventilated at M1.

10.4.3 Removing the Valve Insert

Danger

Risk of injury through spring tension

During release of the snap ring the spring pre-tension raises the actuator suddenly if this has not been relieved prior to release.

► Before releasing the snap ring relieve the spring tension.

Carry out the following steps:

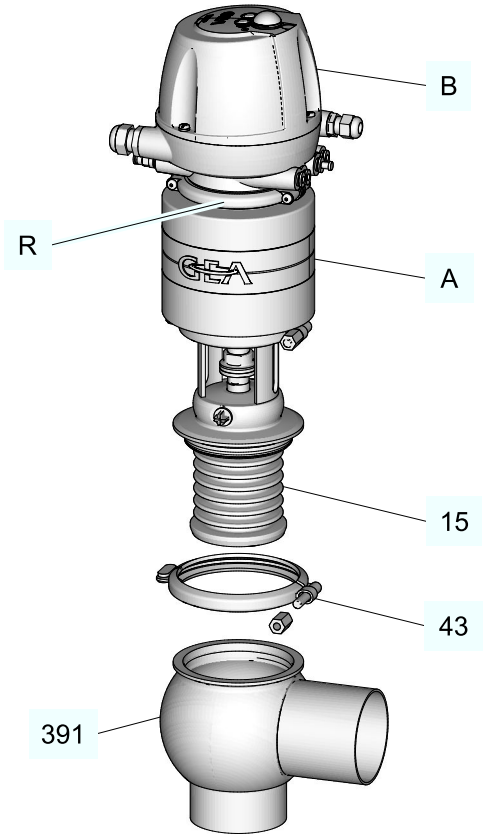

Fig.13: Valve insert

Spring-opening valve

1. Vent the actuator.

   → The bellows (15) are raised.

2. Release the snap ring (43).

Spring-closing valve

⚠ Caution!

Damage to the metal bellows

As the valve insert is being pulled out of the housing (391) the metal bellows (15) can become damaged by being knocked against the housing.

► Pull the valve insert carefully out of the housing.
► Do not place the valve insert down on the metal bellows.
► Always set the metal bellows down on a clean and soft surface.

1. pressurize the actuator.

   → The bellows (15) are raised.

2. Vent the actuator.
3. Pull the valve insert out of the housing (391).
4. Remove the clamps (R) between control top and actuator.
5. Pull off the control top (B) upwards.

10.4.4 Removing the bellows

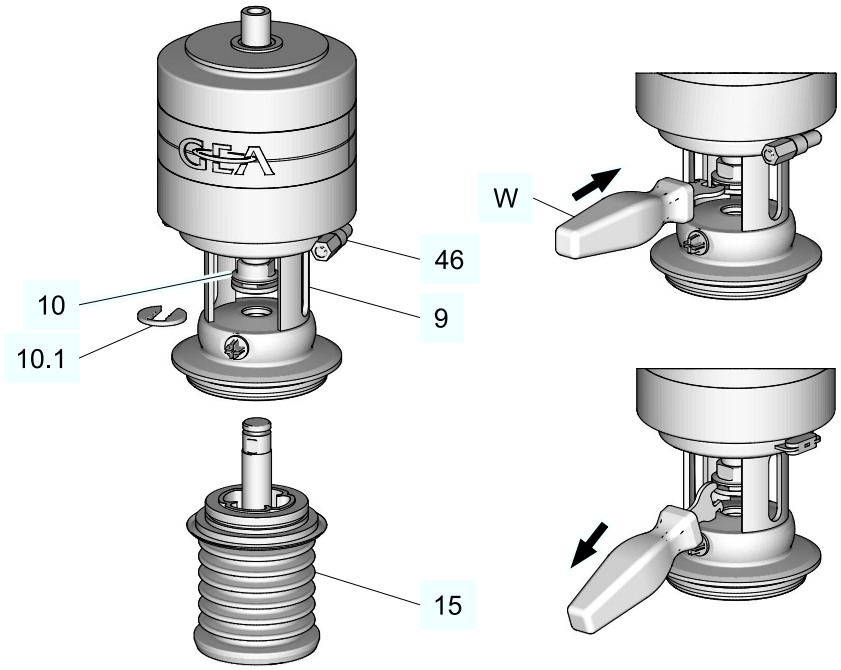

Fig.14: Removing the bellows

1. Use assembly tool (W) part no. 229-000031 to drive the retaining clip (10.1) out of the adapter:
2. To do this, place the assembly tool (W) at the open section of the retaining clip (10.1) and press this out as far as the tool will go.
3. Use the assembly tool hook to pull the retaining clip (10.1) ot on the other side of the lantern (9).
4. If the retaining clip (10.1) is not accessible, release the snap ring (46) and turn the lantern (9) to the corresponding position – with spring-opening function ventilate the actuator for this.
5. Pull the bellows (15) down and out of the lantern.

→ This completes removal of the bellows.

10.4.5 Dismantling the PTFE bellows

⚠ Caution!

Risk of damage to the surface of the bellows.

During dismantling, the surface of the bellows can become damaged.

► To screw the bellows out, hold them with a paper towel or a piece of leather and never clamp them with a tool.

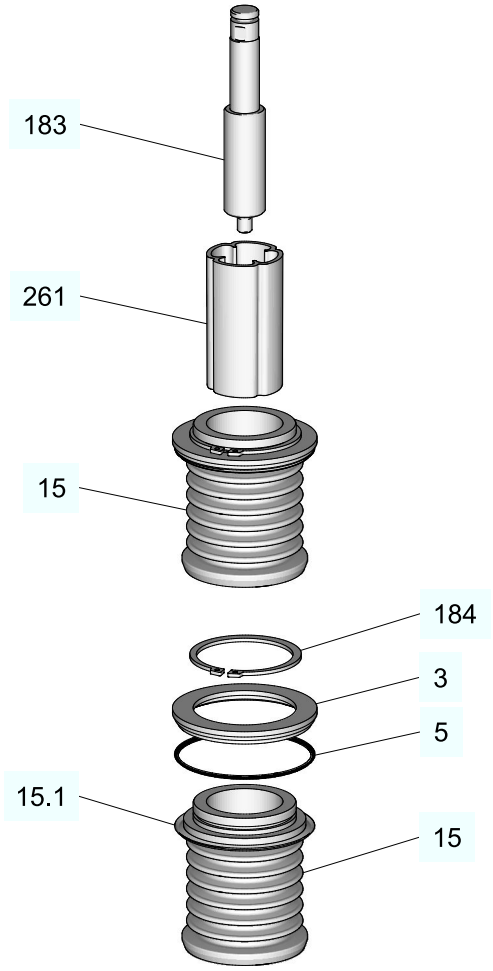

Fig.15: Dismantling the PTFE bellows

1. Hold the bellows (15) tight using a clean paper cloth or a piece of leather.
2. Unscrew the valve stem (183) from the bellows (15) using an open-ended wrench a/f 17.
3. Remove the spacer ring (261).
4. Remove the retaining ring (184) using outer circlip pliers.

Hint!

Do not damage the sealing lip (15.1) of the bellows while removing the O-ring (5).

5. Pull the pressure disk (3) and O-ring (5) off the bellows (15).

10.4.6 Dismantling the lantern

Notice

Sensitive valve parts

Damage to valve parts.

► Protect the valve parts against impact stress.

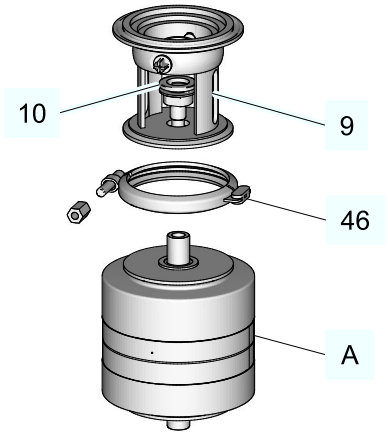

Fig.16: Dismantling the lantern

Spring-closing valve

Carry out the following steps:

1. Unscrew and remove the clamp connection (46).
2. Use an open-ended wrench to screw the adapter (10) out of the actuator (A). If necessary, use a belt wrench to counter at the actuator (A).
3. Pull the lantern (9) with the adapter (10) off the actuator.

→ The lantern and control top are dismantled.

Spring-opening valve

1. Unscrew and remove the clamp connection (46).
2. Unscrew the adapter (10) with the aid of an open-ended wrench and screw it out by approx. one turn. If necessary, use a belt wrench to counter at the actuator.
3. Vent the actuator.
4. Screw the adapter (10) completely out of the actuator and remove together with the lantern (9).

→ The lantern is dismantled

10.5 Maintenance

10.5.1 Cleaning the valve

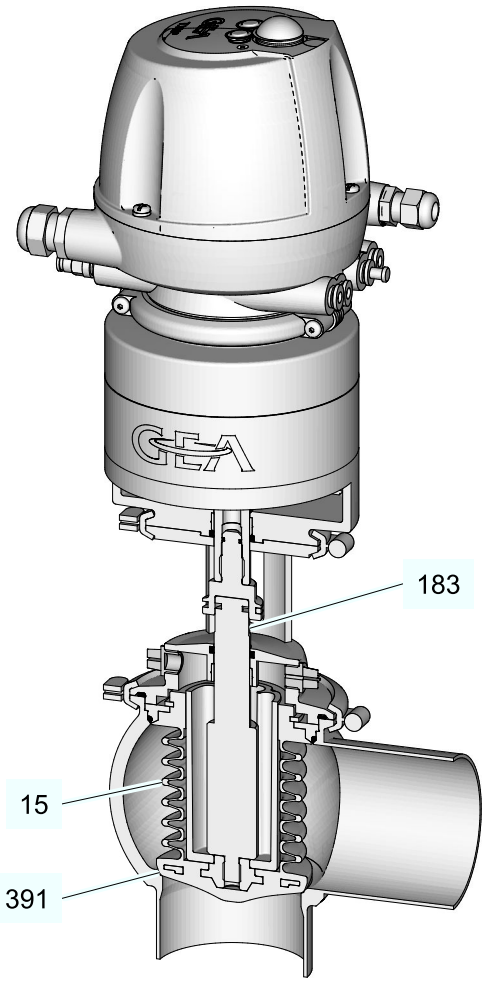

Fig.17: Cleaning

Notice

The bellows (15) with valve stem (183) and housing seat (391) are precision areas.

Damage to these parts can result in malfunction.

► Handle the valve with care!

Notice

Damage to the valve

Damage to these 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.

Carry out the following steps:

1. Disassemble the valve, see Section 10.4, Page 39.
2. Carefully clean the individual parts.

→ Done

10.5.2 Replacing wearing parts

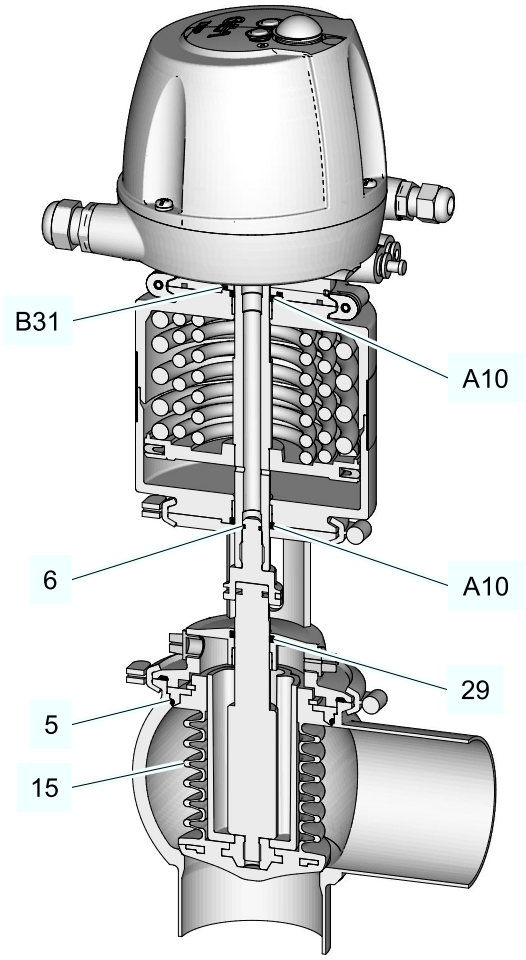

Fig.18: Replacing wearing parts of valve with PTFE bellows

B31	O-ring, control top
A10	O-ring, actuator
6	O-ring
5	O-ring
29	O-ring
7	V-ring
15/15.1	Bellows

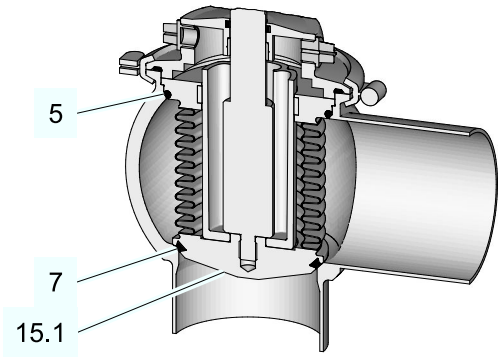

Fig.19: Replacing wearing parts of valve with metal bellows

Requirement:

- Always use genuine spare parts!
- Used seals must not be used again, since the proper function of the seal can then no longer be ensured!

Carry out the following steps:

1. Replace faulty bellows (15).
2. Replace all the seals and plain bearings marked on the diagram.

Done

10.5.2.1 Note on Seal Replacement

Replace all the faulty seals marked on the diagram and the bellows.

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

Always use genuine spare parts.

10.5.2.2 Replacing the V-ring

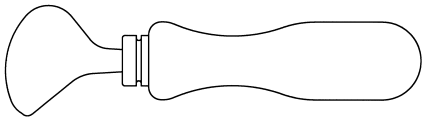

Fig.20: V-ring insertion tool

Requirement:

- Insert V-Ring without grease. To facilitate fitting, use water with a drop of washing-up liquid to remove the surface tension. In order that no rust is transferred, the washing-up liquid solution must be made up in a ceramic, plastic, or stainless steel container.

Tools required:

- V-ring insertion tool

⚠ Caution!

Danger of injury!

The scriber can slip off when the V-ring is removed

► Grip the valve stem (15) in a vice with protective jaws.
► Unscrew the curved side of the scriber.

Carry out the following steps:

1. Put a scriber (T5) into the V-ring (7) and take it out.

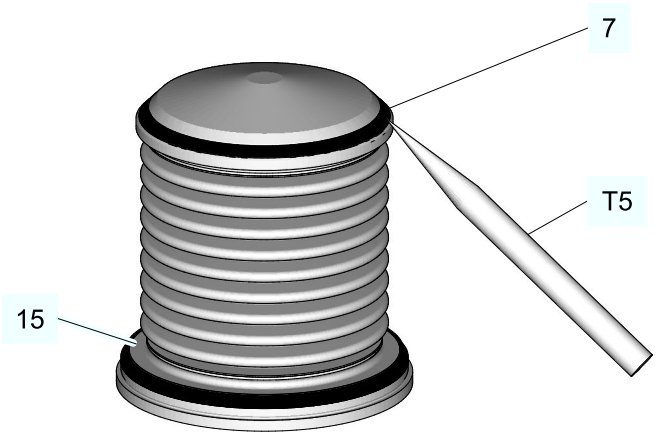

Fig.21: Removing the V-ring

Hint!

Insert V-Ring without grease. Use water containing domestic washing-up liquid (1 drop/L) as a wetting agent as a mounting aid for V-rings. In order that no rust is transferred, the washing-up liquid solution must be made up in a ceramic, synthetic material , or stainless steel container.

2. Before fitting, wet the V-ring 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 the V-ring. Make sure the installation position of the V-ring is correct (see illustration).

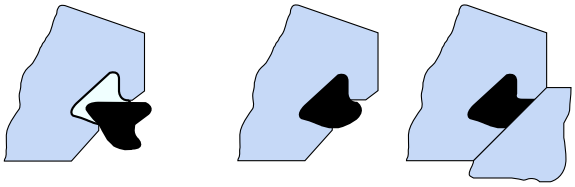

Fig.22: Inserting the V-ring

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

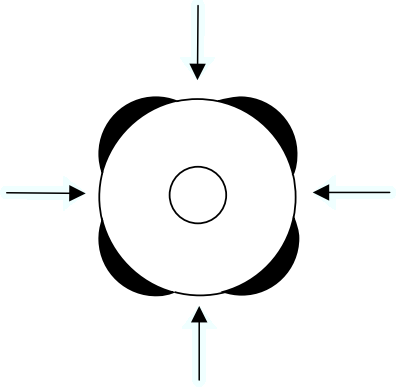

Fig.23

5. Insert the V-ring evenly.
6. Replace all the other seals identified in the spare parts lists.

→ Done

Hint!

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

10.5.2.3 Replacing the guide ring of the metal bellows

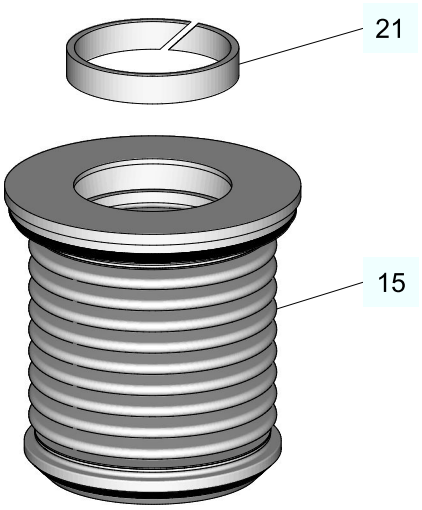

Fig.24: Changing the guide ring of the metal bellows

Carry out the following steps:

1. Remove the guide ring (21).
2. Fit new guide ring.

10.5.2.4 Replacing the plain bearing in the lantern

Hint!

Heed the position of the chamfer during press-in!

Carry out the following steps:

1. Break the plain bearing out
2. Press plain bearing in vertically using suitable round material.

10.6 Installation

⚠ Caution!

Danger of injury by spring force being released on valves with spring closing direction of activation

You can sustain injuries to your fingers when you put your hand into a valve with spring-closing action if the valve has not been opened beforehand.

► Before screwing in the valve disk, pretension the actuator using an emergency manual actuator (H) (part no. 221-310.74) or pressurize it with compressed air using assembly tool HBV (part no. 221-105.99).

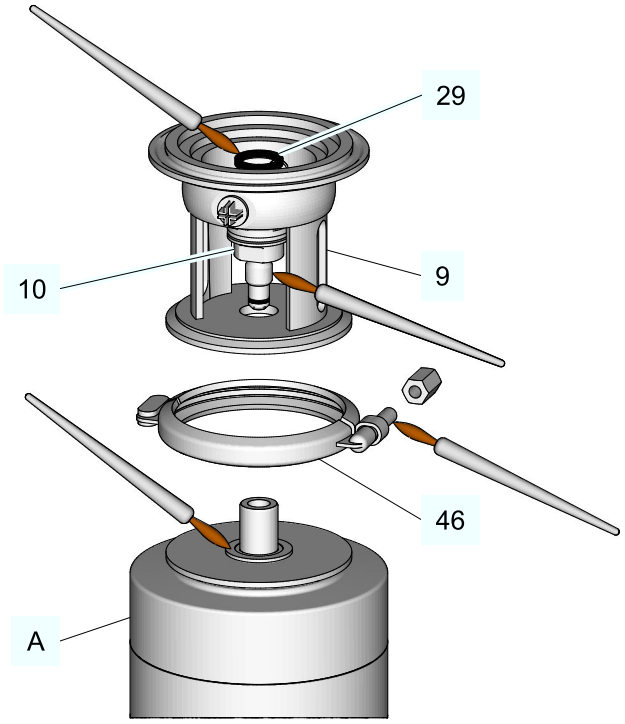

Fig.25: Installation

10.6.1 Installing the lantern

Hint!

GEA Tuchenhagen 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 can be ordered from Tuchenhagen under the part no. 413-064 and 413-071.

1. Grease thread and O-ring (6) on the adapter (10).
2. Degrease O-ring (29) of the rod bushing in the lantern.

Spring-closing valve

1. Screw the adapter (10) with lantern (9) into the piston rod by hand. Use an open-ended wrench to tighten the adapter. If necessary, use a belt wrench to counter at the actuator.

Spring-opening valve

1. pressurize the actuator.
2. Screw the adapter (10) with lantern (9) into the piston rod by hand and tighten using an open-ended wrench. If necessary, use a belt wrench to counter at the actuator.
3. Vent the actuator.
4. Position the lantern in such a way that the retaining clip (10.1) can later be mounted through the lantern window.
5. Grease the thread of the snap ring (46) and mount the snap ring.

10.6.2 Mounting the PTFE bellows

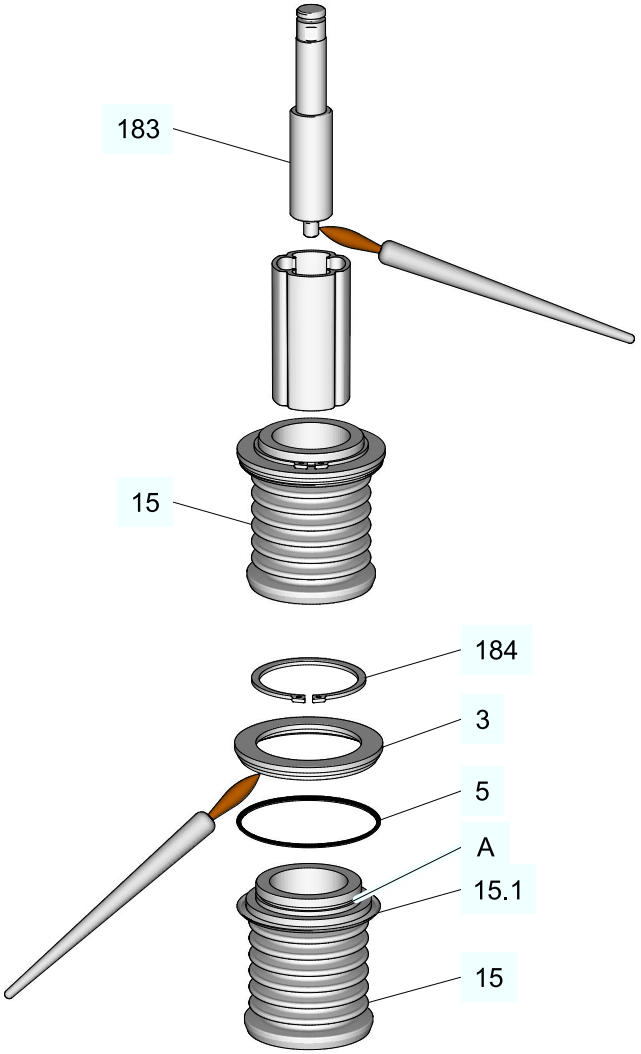

Fig.26: Mounting the PTFE bellows

⚠ Caution!

Damage to the bellows during mounting

Damage during mounting.

► Do not use a tool to clamp the bellows.
► For mounting, hold the bellows (15) tight using a clean paper cloth or a piece of leather.

⚠ Caution!

Damage to the bellows during mounting

Damage during mounting.

► Do not damage the edges at the rectangular puncture (A) and the sealing lip (15.1).

Carry out the following steps:

1. Guide the valve stem (183) into the bellows (15) and tighten using a hexagon screwdriver a/f 17.
2. Place the O-ring (5) and the pressure disk (3) onto the bellows (15).
3. Fit the retaining ring (184) with the aid of outer circlip pliers.

→ PTFE bellows are mounted.

10.6.3 Mounting the metal bellows

Notice

Damage to the bellows during mounting

Damage during mounting.

► Do not use a tool to clamp the bellows.
► For mounting, hold the bellows (15) tight using a clean paper cloth or a piece of leather.

Notice

Damage to the bellows during mounting

Damage during mounting.

► Do not damage the edges at the rectangular puncture (A) and the sealing lip (15.1).

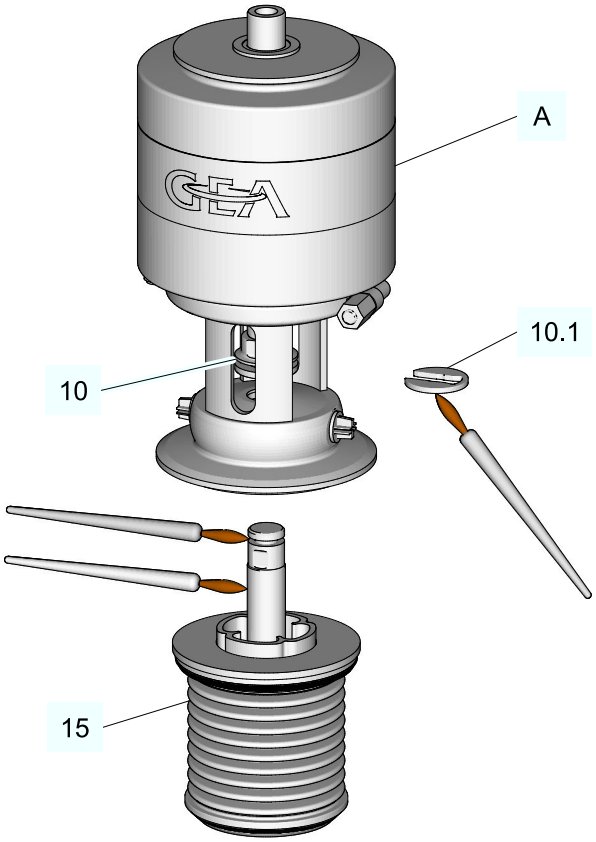

Fig.27: Mounting the metal bellows

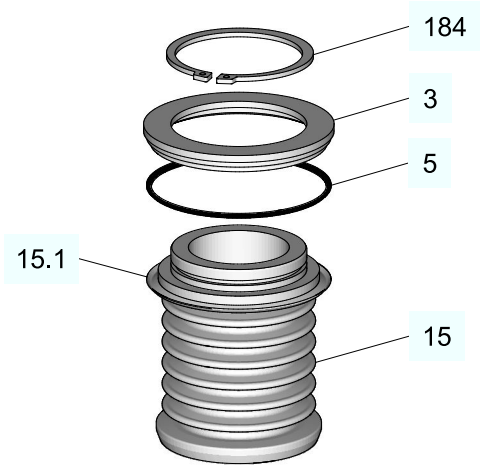

Fig.28: Bellows

Carry out the following steps:

1. Grease the shaft of the metal bellows and groove.
2. Guide the metal bellows (15) carefully through the lantern into the adapter as far as they will go.

Hint!

Spring-opening valve: Ventilate the actuator to make mounting easier!

3. Lightly grease the retaining clip (10.1) and insert into the groove of the adapter (10) until it audibly latches in place. When mounted, the retaining clip must not project beyond the adapter.
4. Place the O-ring (5) and the pressure disk (3) onto the bellows (15).
5. Fit the retaining ring (184) with the aid of outer circlip pliers.

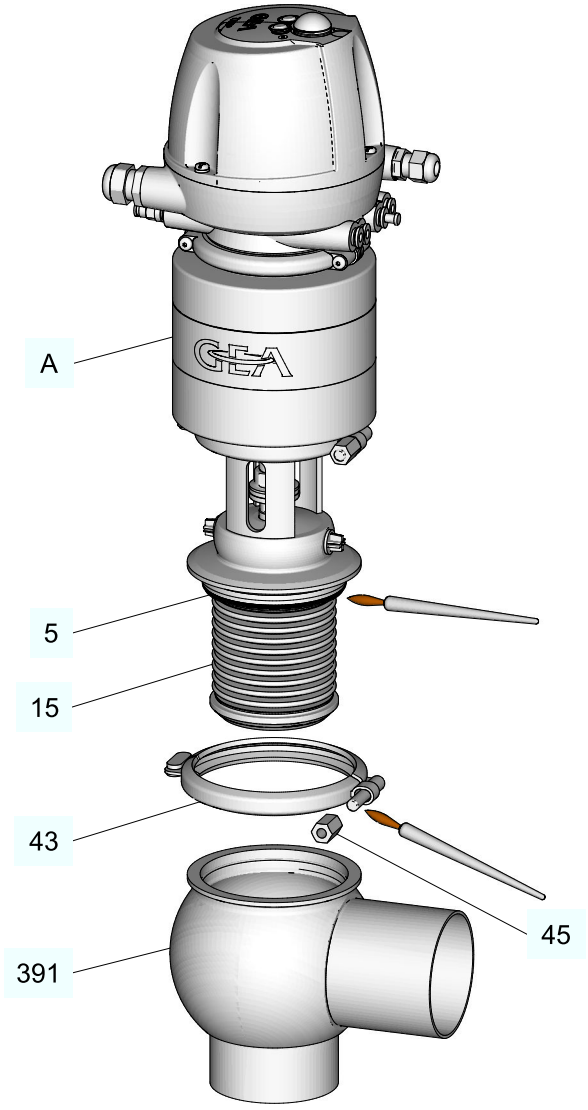

Fig.29: Installing the valve

6. **Spring-closing valve:**
   Ventilate the actuator (A).
   → The metal bellows (15) are raised.
7. **Spring-opening valve:**
   Vent the actuator (A).
   → The metal bellows (15) are raised.

Hint!

The sealing membrane at the PTFE bellows (15) and the O-ring (5) on the metal bellows (15) are sealing components and must not become damaged!

8. Guide the valve insert carefully into the housing (391).
9. Mount the snap ring (43).
10. Tighten the nut (45) to the prescribed torque, see table.

Torques		
Size	**Torques(Nm)**	**width across flats**
DN 40, 1 ½ "	9	10
DN 50, 2"	9	10
DN 65, 2 ½"	22	13
DN 80, 2"	22	13
DN 100, 4"	22	13

11. **Spring-closing valve:**
    Vent the actuator (A).

10.6.4 Checking the function

Setting the valve stroke

Carry out the following steps:

1. Actuate the valve with compressed air.
2. Check the stroke of the valve (c) in accordance with the table “Valve stroke”.

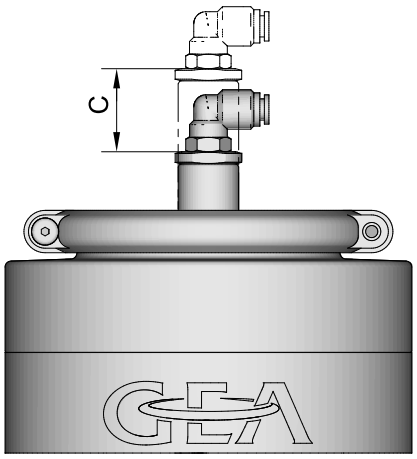

Fig.30

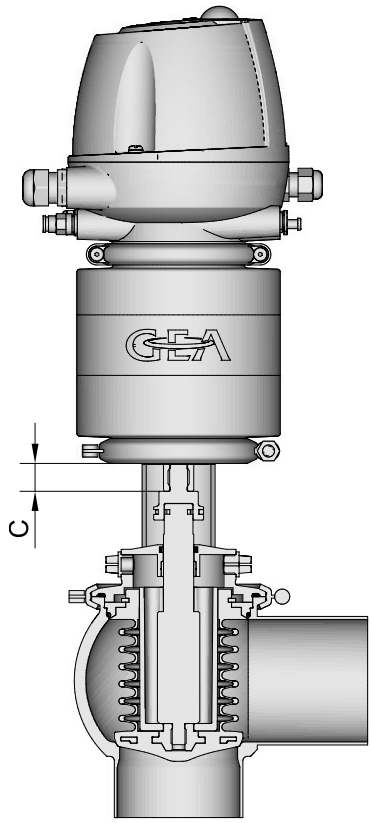

Fig.31

3. Check the function of the initiators, readjust if necessary (see instruction manual for control top).

→ Done.

→ The stroke is set.

Strokes depending on size

Valve stroke PTFE bellows			
Valve size		**Valve size**	
Metric	Valve stroke [mm]	Inch OD	Valve stroke [inches OD]
25	6.0	1"	5.0
40	11.0	1.5"	7.5
50	14.5	2"	10.5
65	19.5	2.5"	12.5
80	19.5	3"	22.0
100	27.5	4"	25.0

Valve stroke metal bellows			
Valve size		**Valve size**	
Metric	Valve stroke [mm]	Inch OD	Valve stroke [inches OD]
25	4.5	1"	3.0
40	8.0	1.5"	5.5
50	12.0	2"	10.0
65	17.0	2.5"	14.0
80	22.0	3"	19.0
100	28.0	4"	25.5

11 Alarms

11.1 Malfunctions and remedies

Notice

Warning of damage to property/loss of product

Ignoring malfunctions may cause considerable damage to property and loss of product. The safe operation of the valve in the event of a malfunction can no longer be taken for granted and in the worst case can result in a loss of sterility in the process.

► Make sure that malfunctions are quickly identified and promptly fixed.

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
Valve does not close	Dirt/foreign material between valve seat and valve disk	Clean valve housing and bellows
	Metal bellows: V-ring/O-ring defective	Replace V-Ring/ O-ring
	PTFE bellows defective	Replace PTFE bellows
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	Valve disassembly - Housing Replace the O-Ring
Leak at the valve seat.	The valve seat seal is defective. Product deposits on the valve seat.	Replace the valve seat seal. Check the housing.
Leakage in the area of the valve housing	Metal bellows: O-ring defective PTFE bellows defective	Replace the O-ring Replace PTFE bellows

Fault	Cause	Remedy
Leakage in the lantern	Bellows defective O-ring defective	Replace bellows Replacing the O-Ring
Switching point changed		Check leak-tightness

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 21.

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 Parts list- ® bellows shut-off valve N_A/P

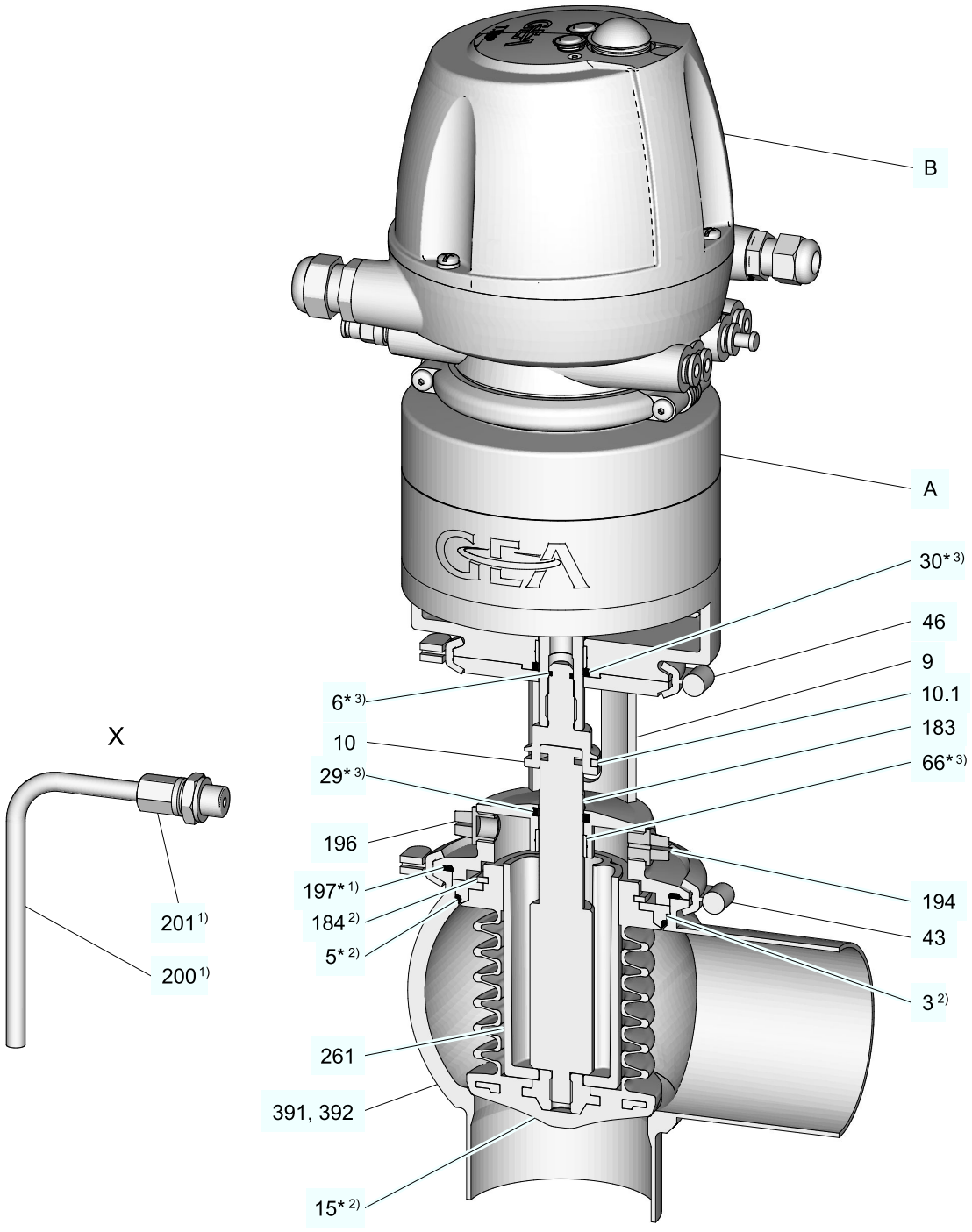

Fig.32: X = see accessories

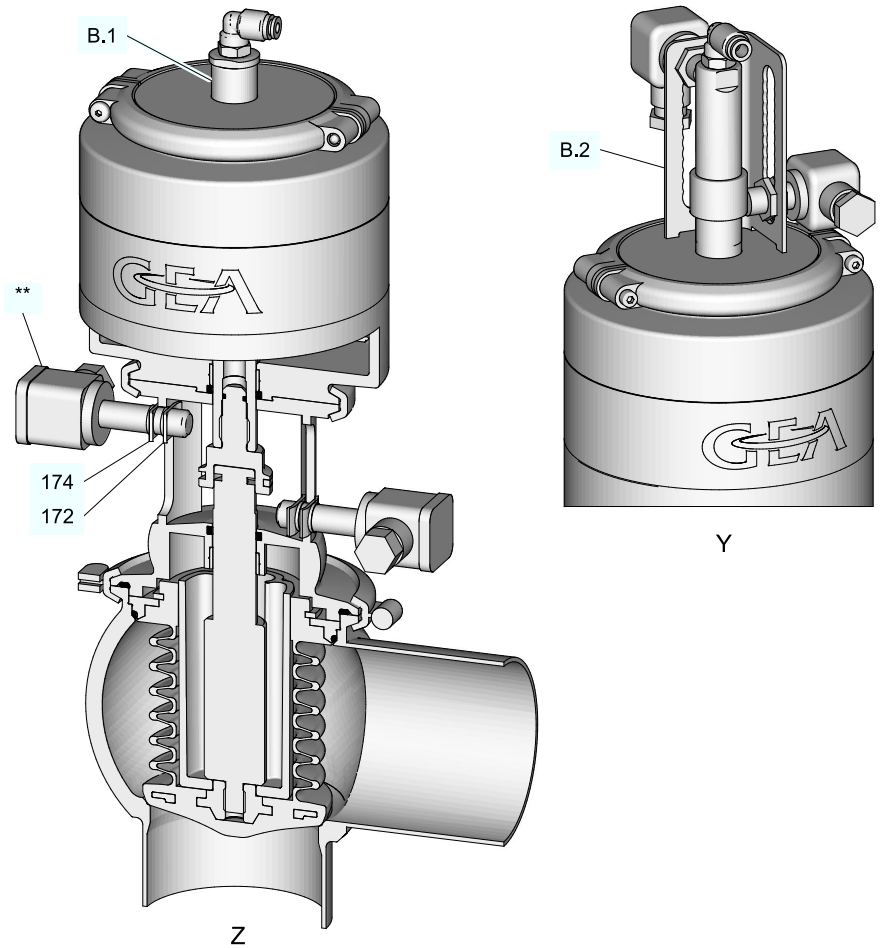

Fig.33: Y and Z = see accessories

Item	Designation	Material	DN 25	DN 40	DN 50	DN 65	DN 80	DN 100
Bellows complete 2)		--	221-540.14	221-540.16	221-540.17	221-540.18	221-540.28	221-540.21
Set of seals complete 3)		EPDM	221-004361	221-004361	221-004361	221-004361	221-004361	221-004361
		FKM	221-004362	221-004362	221-004362	221-004362	221-004362	221-004362
3 2)	Pressure disk	1.4305	221-544.01	221-544.02	221-544.02	221-544.03	221-544.03	221-544.04
*5 2)	O-ring	EPDM	930-783	930-784	930-784	930-785	930-785	930-786
*6 3)	O-ring	NBR	930-004	930-004	930-004	930-004	930-004	930-004
9	Lantern	1.4301	221-002215	221-002216	221-002216	221-002218	221-002218	221-002219
10	Adapter	1.4301	221-002140	221-002140	221-002140	221-002140	221-002140	221-002140
10.1	Retaining clip	1.4310	221-002138	221-002138	221-002138	221-002138	221-002138	221-002138
*15 2)	Bellows	TFM 1705	221-540.01	221-540.03	221-540.04	221-540.05	221-540.27	221-540.08
*29 3)	O-ring	EPDM	930-270	930-270	930-270	930-270	930-270	930-270
		FKM	930-163	930-163	930-163	930-163	930-163	930-163
*30 3)	O-ring	NBR	221-005228	221-005228	221-005228	221-005228	221-005228	221-005228
43	Clamp join KL	1.4401	221-507.02	221-507.04	221-507.04	221-507.09	221-507.09	221-507.11
46	Clamp join KL	1.4401	221-507.06	221-507.06	221-507.06	221-507.06	221-507.06	221-507.06
*66 3)	Plain bearing	IGLIDUR	704-044	704-044	704-044	704-044	704-044	704-044
183	Stem	1.4305	221-003435	221-003434	221-003433	221-003440	221-003438	221-003437
184 2)	Retaining ring	1.4122	917-105	917-121	917-121	917-160	917-160	917-160
194	Vent screw	PA 6.6	221-543.05	221-543.05	221-543.05	221-543.05	221-543.05	221-543.05
196	Screw plug G1/4"	PA 6.6	922-285	922-285	922-285	922-285	922-285	922-285
*197 1)	O-ring	EPDM	930-496	930-788	930-788	930-152	930-152	930-789
		FKM	930-906	930-907	930-907	930-908	930-908	930-909
261	Spacer ring H_A/M	PSU	--	221-003458	221-002810	221-002811	221-002812	221-003457
391	Housing EL	1.4404	221-193.05	221-193.06	221-193.07	221-193.08	221-193.09	221-193.10
392	Housing ET	1.4404	221-194.05	221-194.06	221-194.07	221-194.08	221-194.09	221-194.10
A	Actuator VARIVENT	See dimension sheet for VARIVENT actuators						
B	Control top	See parts list for Control Top T.VIS® A-7						

1) When using elbow item 200 with male threaded coupling item 201, O-ring item 197 must be used. Item 194 is no longer required accordingly.

2) Items 3, 5, 15 and 184 are included in the PTFE bellows complete.

3) Items 6, 29, 30 and 66 are all included in the sealing set complete.

* Items 5, 6, 15, 29, 66 and 197 are wearing parts.

Item	Designation	Material	1" OD	1.5" OD	2" OD	2.5" OD	3" OD	4" OD
Bellows complete 2)		--	221-540.15	221-540.16	221-540.17	221-540.18	221-540.20	221-540.21
Bellows complete 3A 2)		--	221-540.31	--	--	--	--	--
Set of seals complete 3)		EPDM	221-004361	221-004361	221-004361	221-004361	221-004361	221-004361
		FKM	221-004362	221-004362	221-004362	221-004362	221-004362	221-004362
3 2)	Pressure disk	1.4305	221-544.01	221-544.02	221-544.02	221-544.03	221-544.03	221-544.04
*5 2)	O-ring	EPDM	930-783	930-784	930-784	930-785	930-785	930-786
*6 3)	O-ring	NBR	930-004	930-004	930-004	930-004	930-004	930-004
9	Lantern	1.4301	221-002215	221-002216	221-002216	221-002218	221-002218	221-002219
10	Adapter	1.4301	221-002140	221-002140	221-002140	221-002140	221-002140	221-002140
10.1	Retaining clip	1.4310	221-002138	221-002138	221-002138	221-002138	221-002138	221-002138
*15 2)	Bellows	TFM 1705	221-540.02	221-540.03	221-540.04	221-540.05	221-540.06	221-540.08
	Bellows 3A		221-540.30	221-540.03	221-540.04	221-540.05	221-540.06	221-540.08
*29 3)	O-ring	EPDM	930-270	930-270	930-270	930-270	930-270	930-270
		FKM	930-163	930-163	930-163	930-163	930-163	930-163
*30 3)	O-ring	NBR	221-005228	221-005228	221-005228	221-005228	221-005228	221-005228
43	Clamp join KL	1.4401	221-507.02	221-507.04	221-507.04	221-507.09	221-507.09	221-507.11
46	Clamp join KL	1.4401	221-507.06	221-507.06	221-507.06	221-507.06	221-507.06	221-507.06
*66 3)	Plain bearing	IGLIDUR	704-044	704-044	704-044	704-044	704-044	704-044
183	Stem	1.4305	221-003436	221-003434	221-003433	221-003440	221-003439	221-003437
184 2)	Retaining ring	1.4122	917-105	917-121	917-121	917-160	917-160	917-160
194	Vent screw	PA 6.6	221-543.05	221-543.05	221-543.05	221-543.05	221-543.05	221-543.05
196	Screw plug G1/4"	PA 6.6	922-285	922-285	922-285	922-285	922-285	922-285
*197 1)	O-ring	EPDM	930-496	930-788	930-788	930-152	930-152	930-789
		FKM	930-906	930-907	930-907	930-908	930-908	930-909
261	Spacer ring H_A/M	PSU	--	221-003458	221-002810	221-002811	221-002811	221-003457
391	Housing EL	1.4404	221-193.15	221-193.18	221-193.11	221-193.12	221-193.13	221-193.14
392	Housing ET	1.4404	221-194.15	221-194.18	221-194.11	221-194.12	221-194.13	221-194.14
A	Actuator VARIVENT	See dimension sheet for VARIVENT actuators						
B	Control top	See parts list for Control Top T.VIS® A-7						

1) When using elbow item 200 with male threaded coupling item 201, O-ring item 197 must be used. Item 194 is no longer required accordingly.
2) Items 3, 5, 15 and 184 are included in the PTFE bellows complete.
3) Items 6, 6, 29 and 66 are all included in the set of seals complete.
* Items 5, 6, 15, 29, 66 and 197 are wearing parts.

Accessories			
B.1	Connection 0	See parts list for connection 0 221ELI004602	
B.2	Proximity switch holder INA/V	See parts list for proximity switch holder INA/V 221ELI001977	
Item	**Designation**	**Material**	**Material no.**
172	Sheet metal nut	1.4301	221-105.10
174	Retaining plate	1.4301	221-002389
200 [1)]	Elbow ASK 100	1.4301	221-551.01
201 [1)]	Male threaded coupling	1.4571	221-000918
**	no more than 2 initiators M12 can be fitted		

14 Parts list - VARIVENT® bellows shut-off valve N_A/S

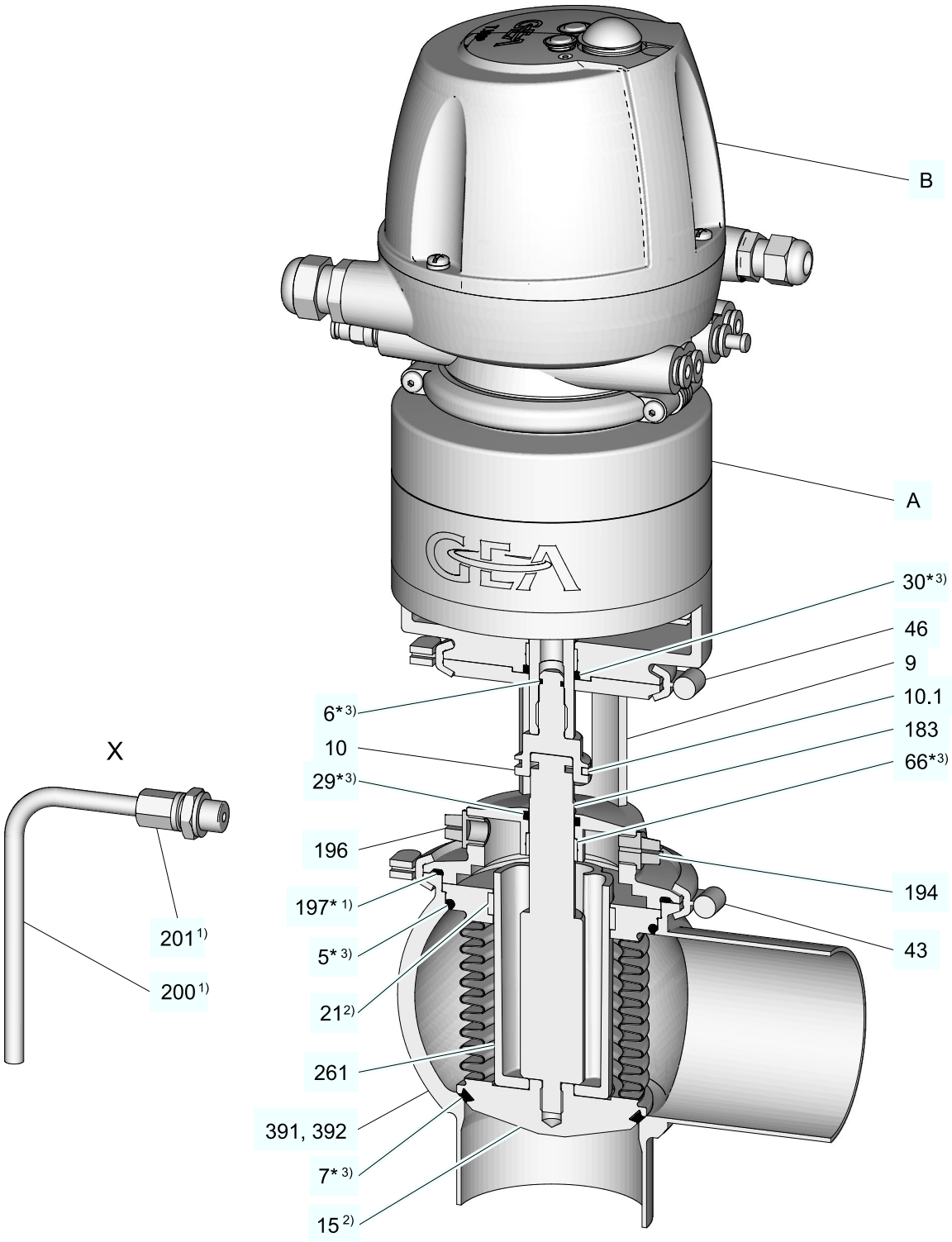

Fig.34: X = see accessories

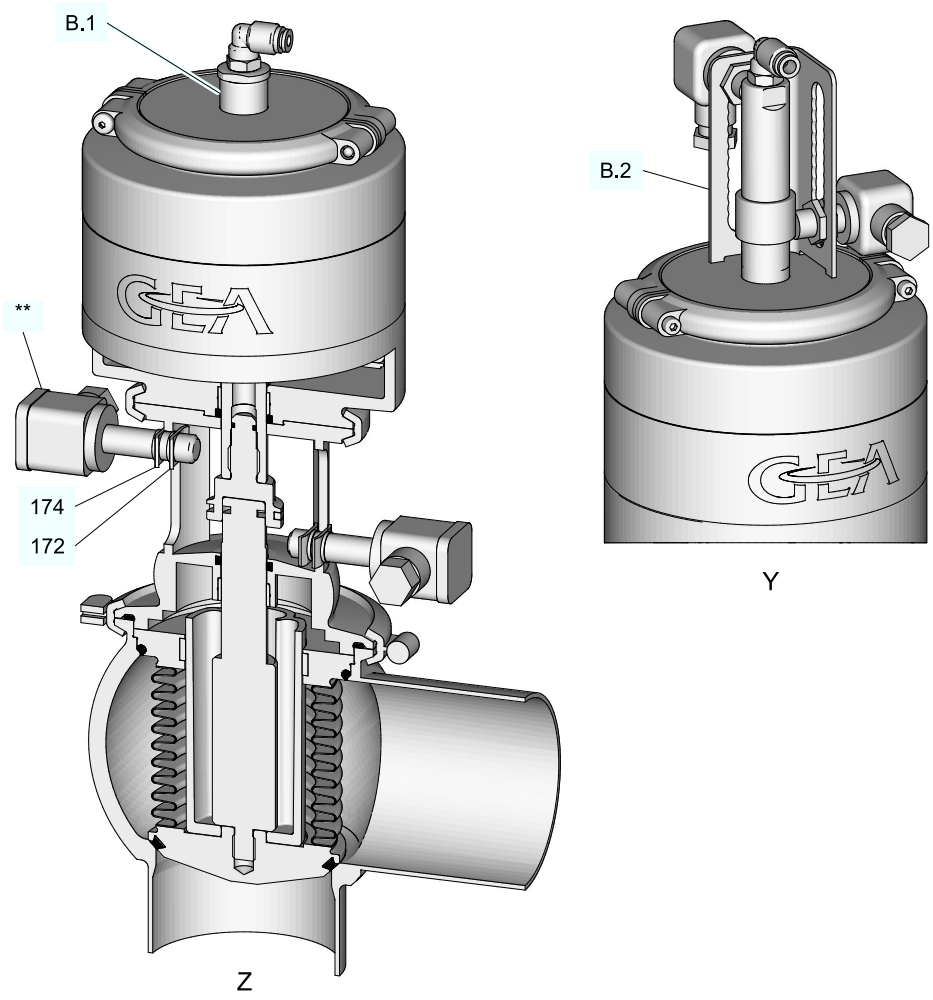

Fig.35: Y and Z = see accessories

Item	Designation	Material	DN 25	DN 40	DN 50	DN 65	DN 80	DN 100
Metal bellows complete 2)		--	221-541.10	221-541.12	221-541.13	221-541.14	221-541.16	221-541.18
Set of seals complete *		EPDM	221-003491	221-003493	221-003493	221-003495	221-003495	221-003497
		FKM	221-003492	221-003494	221-003494	221-003496	221-003496	221-003498
*5 3)	O-ring	EPDM	930-309	930-144	930-144	930-150	930-150	930-156
		FKM	930-168	930-171	930-171	930-176	930-176	930-178
*6 3)	O-ring	NBR	930-004	930-004	930-004	930-004	930-004	930-004
*7 3)	V-ring	EPDM	932-046	932-021	932-021	932-024	932-024	932-028
		FKM	932-030	932-033	932-033	932-035	932-035	932-039
9	Lantern	1.4301	221-002215	221-002216	221-002216	221-002218	221-002218	221-002219
10	Adapter	1.4301	221-002140	221-002140	221-002140	221-002140	221-002140	221-002140
10.1	Retaining clip	1.4310	221-002138	221-002138	221-002138	221-002138	221-002138	221-002138
*15 2)	Metal bellows	1.4404	221-000798	221-000799	221-000800	221-000802	221-000804	221-000805
21 2)	Guide ring	Turcite-T51	935-020	935-080	935-080	935-015	935-015	935-015
*29 3)	O-ring	EPDM	930-270	930-270	930-270	930-270	930-270	930-270
		FKM	930-163	930-163	930-163	930-163	930-163	930-163
*30 3)	O-ring	NBR	221-005228	221-005228	221-005228	221-005228	221-005228	221-005228
43	Clamp join KL	1.4401	221-507.02	221-507.04	221-507.04	221-507.09	221-507.09	221-507.11
46	Clamp join KL	1.4401	221-507.06	221-507.06	221-507.06	221-507.06	221-507.06	221-507.06
*66 3)	Plain bearing	IGLIDUR	704-044	704-044	704-044	704-044	704-044	704-044
183	Stem	1.4305	221-003435	221-003434	221-003433	221-003440	221-003438	221-003437
184 2)	Retaining ring	1.4122	917-105	917-121	917-121	917-105	917-105	917-105
194	Vent screw	PA 6.6	221-543.05	221-543.05	221-543.05	221-543.05	221-543.05	221-543.05
196	Screw plug G1/4"	PA 6.6	922-285	922-285	922-285	922-285	922-285	922-285
*197 1)	O-ring	EPDM	930-496	930-788	930-788	930-152	930-152	930-789
		FKM	930-906	930-907	930-907	930-908	930-908	930-909
261	Spacer ring H_A/M	PSU	--	221-003458	221-002810	221-002811	221-002812	221-003457
391	Housing EL	1.4404	221-193.05	221-193.06	221-193.07	221-193.08	221-193.09	221-193.10
392	Housing ET	1.4404	221-194.05	221-194.06	221-194.0	221-194.08	221-194.09	221-194.10
A	Actuator VARIVENT	See dimension sheet for VARIVENT actuators						
B	Control top	See parts list for Control Top T.VIS® A-7						

1) When using elbow item 200 with male threaded coupling item 201, O-ring item 197 must be used. Item 194 is no longer required accordingly.
2) Items 3, 5, 15 and 184 are included in the PTFE bellows complete.
3) Items 5, 6, 7, 29, 30 and 66 are all included in the sealing set.
* Items 5, 6, 15, 29, 66 and 197 are wearing parts.

Item	Designation	Material	1" OD	1.5" OD	2" OD	2.5" OD	3" OD	4" OD
Metal bellows complete 2)		--	221-541.11	221-541.12	221-541.13	221-541.15	221-541.17	221-541.18
Set of seals complete *		EPDM	221-003491	221-003493	221-003493	221-003495	221-003495	221-003497
		FKM	221-003492	221-003494	221-003494	221-003496	221-003496	221-003498
*5 2)	O-ring	EPDM	930-309	930-144	930-144	930-150	930-150	930-156
		FKM	930-168	930-171	930-171	930-176	930-176	930-178
*6 3)	O-ring	NBR	930-004	930-004	930-004	930-004	930-004	930-004
*7 3)	V-ring	EPDM	932-046	932-021	932-021	932-024	932-024	932-028
		FKM	932-030	932-033	932-033	932-035	932-035	932-039
9	Lantern	1.4301	221-002215	221-002216	221-002216	221-002218	221-002218	221-002219
10	Adapter	1.4301	221-002140	221-002140	221-002140	221-002140	221-002140	221-002140
10.1	Retaining clip	1.4310	221-002138	221-002138	221-002138	221-002138	221-002138	221-002138
*15 2)	Metal bellows	1.4404	221-000797	221-000799	221-000800	221-000801	221-000809	221-000805
21 2)	Guide ring	Turcite-T51	935-020	935-080	935-080	935-015	935-015	935-015
*29 3)	O-ring	EPDM	930-270	930-270	930-270	930-270	930-270	930-270
		FKM	930-163	930-163	930-163	930-163	930-163	930-163
*30 3)	O-ring	NBR	221-005228	221-005228	221-005228	221-005228	221-005228	221-005228
43	Clamp join KL	1.4401	221-507.02	221-507.04	221-507.04	221-507.09	221-507.09	221-507.11
46	Clamp join KL	1.4401	221-507.06	221-507.06	221-507.06	221-507.06	221-507.06	221-507.06
*66 3)	Plain bearing	IGLIDUR	704-044	704-044	704-044	704-044	704-044	704-044
183	Stem	1.4305	221-003436	221-003434	221-003433	221-003440	221-003439	221-003437
194	Vent screw	PA 6.6	221-543.05	221-543.05	221-543.05	221-543.05	221-543.05	221-543.05
196	Screw plug G1/4"	PA 6.6	922-285	922-285	922-285	922-285	922-285	922-285
*197 1)	O-ring	EPDM	930-496	930-788	930-788	930-152	930-152	930-789
		FKM	930-906	930-907	930-907	930-908	930-908	930-909
261	Spacer ring H_A/M	PSU	--	221-003458	221-002810	221-002811	221-002811	221-003457
391	Housing EL	1.4404	221-193.15	221-193.18	221-193.11	221-193.12	221-193.13	221-193.14
392	Housing ET	1.4404	221-194.15	221-194.18	221-194.11	221-194.12	221-194.13	221-194.14
A	Actuator VARIVENT	See dimension sheet for VARIVENT actuators						
B	Control top	See parts list for Control Top T.VIS® A-7						

1) When using elbow item 200 with male threaded coupling item 201, O-ring item 197 must be used. Item 194 is no longer required accordingly.
2) Items 3, 5, 15 and 184 are included in the PTFE bellows complete.
3) Items 5, 6, 7, 29, 30 and 66 are all included in the sealing set.
* Items 5, 6, 15, 29, 66 and 197 are wearing parts.

Accessories			
B.1	Connection 0	See parts list for connection 0 221ELI004602	
B.2	Proximity switch holder INA/V	See parts list for proximity switch holder INA/V 221ELI001977	
Item	**Designation**	**Material**	**Material no.**
172	Sheet metal nut	1.4301	221-105.10
174	Retaining plate	1.4301	221-002389
200 [1)]	Elbow ASK 100	1.4301	221-551.01
201 [1)]	Male threaded coupling	1.4571	221-000918
**	no more than 2 initiators M12 can be fitted		

15 Dimension sheet - VARIVENT® bellows stop valve N_A/P N_A/S

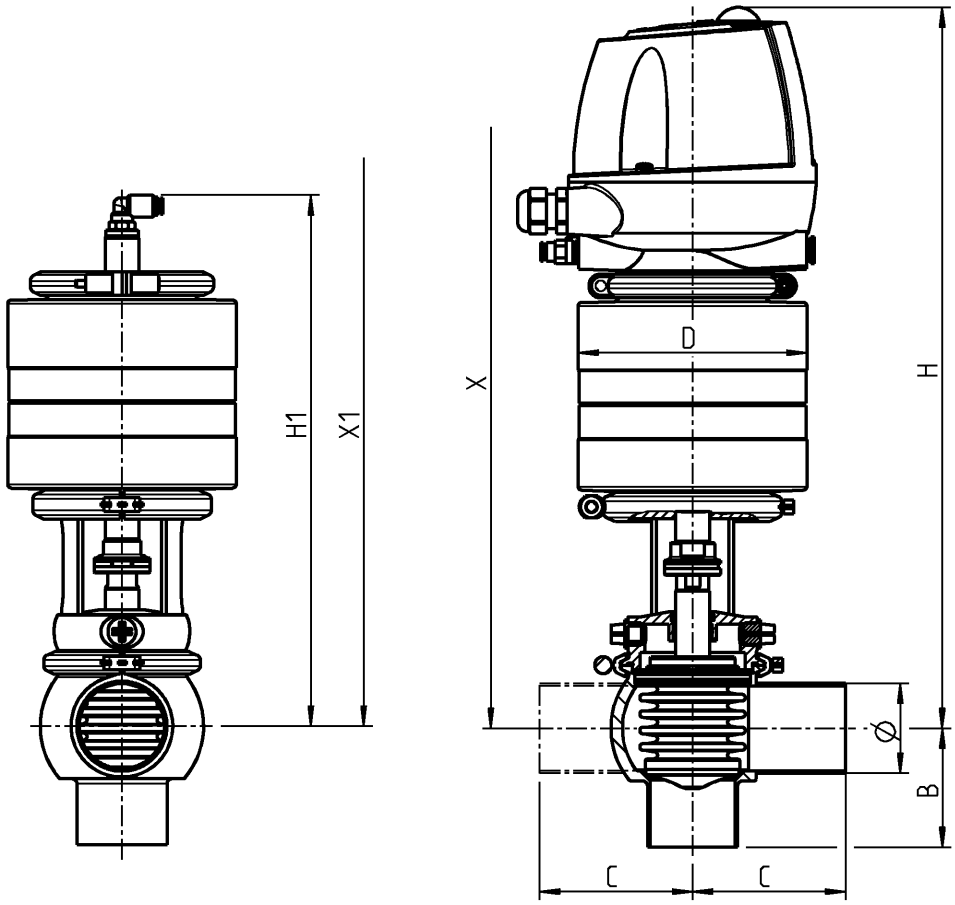

Fig.36: X and X1 are mounting dimensions

Dimensions (mm)	DN 25	DN 40	DN 50	DN 65	DN 80	DN 100
B	58	64	70	83	90.5 91	100
C	90	90	90	125	125	125
D	99	110	110	135	170	210
Ø	29x1.5	41x1.5	53x1.5	70x2	85x2	104x1
H	388	419	425	439	446	458
H1	266	310	313	322	326	333
X	420	481	500	535	555	589
X1	314	372	388	418	435	460
Stroke N_A/P	6.4	11.2	14.8	19.3	19.8	27.5
Weight (kg)	5.1	6.8	7.0	9.3	13.5	20.0
Stroke N_A/S	4.6	8.4	12.4	17	22	28
Weight (kg)	5.2	7.0	7.3	10.1	15.0	21.2

Dimensions (mm)	1" OD	1.5" OD	2" OD	2.5" OD	3" OD	4" OD
B	56	62.5 63	68.8	80	86.5 87	98.8
C	90	90	90	125	125	125
D	99	110	110	135	135	210
Ø	25.4x1.65	38.1x1.65	50.8x1.65	63.5x1.65	76.2x1.65	101.6x2
H	376	418	424	436	442	457
H1	265	312	314	326	324	334
X	422	477	496	532	545	585
X1	311	372	387	415	430	461
Stroke N_A/P	5.4	7.5	10.9	12.8	22.3	25
Weight	5.1	6.8	7.0	9.3	10.1	20.0
Stroke N_A/S	3.2	5.5	10	14.4	19.1	25.5
Weight	5.2	7.0	7.3	10.1	11.2	21.2

16 Appendix

16.1 Lists

16.1.1 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 [bar_g/psi_g] 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 litres)
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]
IP	Protection class
ISO	International Standard of the International Organization for Standardization
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]
M	Metric

Abbreviation	Explanation
Nm	Unit of measurement of work [newton metre] TORQUE SPECIFICATION: 1 Nm = 0.737 lbft Pound-Force (lb) + Feet (ft)
PA	Polyamide
PE-LD	Low-density polyethylene
psi	Anglo-American unit of 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.
SW	Indicates the size of spanners [width across flats]
s. Chapt.	see Chapter
s. Fig.	see Figure
T.VIS	Tuchenhagen valve information system
V AC	Volt alternating current
V DC	Volt direct current
VMQ	Material specification Short designation according to DIN/ISO 1629: Vinyl-methyl-silicone-rubber
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	Tube measurement according to British Standard (BS), outside diameter
Inch IPS	American pipe measurement, iron pipe size

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