OPERATING INSTRUCTIONS

Original instructions

Hygienic valves

GEA VARIVENT® overflow valve Q

GEA Tuchenhagen GmbH
Document number: 430BAL008550
Language: EN-GB / Date: 24.02.2026

Table of Contents

1 General

This chapter contains basic instructions for using the valve and explanations of illustration conventions. It also contains information about the design and structure.

The term valve in these Operating Instructions refers to Hygienic valves.

1.1 Information about the document

1.1.1 Purpose and structure of the document

The objective of these Operating Instructions is to provide information on how to operate the valve. To achieve this, it is divided into several chapters which are oriented on the various life phases of the valve. Compliance with the instructions will enhance the valve's longevity and reliability, and reduce the likelihood of harm to individuals or damage to property. The Operating Instructions also acts as the basis for creating operating instructions.

1.1.2 Design elements

In this document, the following design elements are used as orientation aids.

General orientation aids

- Figure numbers
- Table numbers
- Chapter numbers
- Page numbers
- Headers and footers
- References
- Lists

Lists

Bullet points are shown in lists and do not prescribe a specific sequence.

- Bullet point
- Bullet point
  - Sub-point
  - Sub-point
- Bullet point

Numbered lists

In a sequence of actions, the order of the action steps is specified by a numbered list. Partial results and the result of a sequence of actions are marked by arrows.

1. Action step one
2. Action step two
   2.1 First sub-step two
   2.2 Second sub-step two

   → Partial result
3. Action step three
   → Partial result
4. Action step four

⇒ Outcome

INFO

Informational texts contain additional information about a description or action step.

1.1.3 Reading obligation and storage

Every person who works on or with the valve must have read these Operating Instructions. They must be available to these persons at all times.

1.2 Manufacturer address

GEA Tuchenhagen GmbH

Am Industriepark 2-10

Germany

21514 Büchen

1.3 Customer service

Phone: +49 4155 49-0

Fax: +49 4155 49-2035

flowcomponents@gea.com

www.gea.com

1.4 Declarations of conformity

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:

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

Büchen, 18 July 2025

Sören de Boon
Senior Vice President
Business Unit Valves & Pumps

i.V. Stephan Dirks
Senior Director Product Engineering & Development
Business Line Hygienic Valves/ BU Valves & Pumps

251718_EC-Declaration_VAR-ECO

Translated copy of the EU - Declaration of conformity in accordance with the Pressure Equipment Directive 2006/42/EU

Manufacturer:	GEA Tuchenhagen GmbH Am Industriepark 2-10 21514 Büchen
We hereby declare that the machine named below	
Designation:	Valve with actuator
Type:	VARIVENT® / ECOVENT®
due to its design and construction as well as in the versions sold by us, meet the basic safety and health requirements of the following guideline:	
Relevant EC directives:	2006/42/EC EC Machinery Directive
Applicable harmonized standards, in particular:	EN ISO 12100: 2010
Remarks:	• This declaration will become invalid if any alterations are made to the machine which have not been agreed with us • We also declare that the relevant technical documentation for this machine has been prepared in accordance with Annex VII, Part A, and agree to submit the documentation on justified request of national authorities on a data carrier
Person authorised for compilation and handover of technical documentation:	GEA Tuchenhagen GmbH Am Industriepark 2-10 21514 Büchen, Germany
Büchen, 18th July 2025	
Sören de Boon Senior Vice President Business Unit Valves & Pumps	Signed by Stephan Dirks Senior Director Product Engineering & Development Business Line Hygienic Valves/ BU Valves & Pumps

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

GEA Importer into UK	**GEA Mechanical Equipment UK Ltd.** Westfalia House Old Wolverton Road, Old Wolverton, Milton Keynes MK12 5PY, United Kingdom
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Büchen, 23 July 2025

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2 Safety

This chapter describes the minimum requirements for the intended use of the valve. It forms the basis for safe operation of the valve.

2.1 Intended use

The Q and Q overflow valves type D-Force are used for overpressure protection in pipeline sections.

The medium must flow in the opening direction of the valve disk, so that the valve can open automatically in case of excess pressure.

The valve Q type D-Force can be opened for cleaning. In addition, the preset response pressure can be changed pneumatically with the valve Q type D-Force.

Proper use of the valve also includes compliance with these Operating Instructions.

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

INFO 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 the operation

The prerequisite for the reliable and safe operation of the valve 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, maintenance and servicing 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 Machinery Directive 2006/42/EC.

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 special Declaration of Conformity.

2.1.3 Improper operating conditions

The operational reliability of the valve cannot be ensured under improper operating conditions. Therefore avoid improper operating conditions.

Operating the valve 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 valve.
- Damage has been detected on the valve.
- Maintenance intervals have been exceeded.

2.1.4 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 this instruction manual 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!

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

2.2 Modification

Subsequent alterations of the valve are not permitted. Otherwise you will have to undergo a new conformity process in accordance with the EC Machinery Directive on your own.

In general, only genuine spare parts supplied by GEA Tuchenhagen GmbH should be fitted. This ensures the reliable and economical operation of the valve.

2.3 Structure of warning notices

Warning notices warn of hazards that may exist when performing certain actions. In this document, the following warning notices are used. The extent of the hazards is categorized into risk levels and can be recognized by the corresponding signal words.

2.3.1 Preceding warning notices

Preceding warning notices are used when there is a hazard during a sequence of actions. Warning notices are colour-highlighted and supplemented by a pictogram in the event of possible personal injury.

⚠SIGNAL WORD

Nature and source of the hazard

Consequence of disregarding the warning.

- Measure to avoid or escape the danger.

Figure 2-1 - Structure of a preceding warning notice

2.3.2 Integrated warning notices

Integrated warning notices are used when there is a hazard involved in a single action step.

1. **SIGNAL WORD** Nature and source of the hazard
   Consequence of disregarding the warning.
   - Measure to avoid or escape the danger.

Figure 2-2 - Structure of an integrated warning notice

2.3.3 Signal words

ATTENTION

The signal word ATTENTION indicates a hazard that could result in property damage if not avoided.

CAUTION

The signal word CAUTION indicates a hazard with a low risk level which could result in light to medium injuries if not avoided.

WARNING

The signal word WARNING indicates a hazard with a medium risk level which could result in death or severe injury if not avoided.

DANGER

The signal word DANGER indicates a hazard with a high risk level which will result in death or serious injury if not avoided.

2.4 Personnel qualification

The following basic requirements must be fulfilled for all actions carried out on the valve.

- These Operating Instructions have been read and understood.
- Safety tasks in and around the valve are regulated and assigned.
  - Maintaining order
  - Compliance with safety requirements
  - Securing hazard zones

Additionally, the following groups of people must possess the personnel qualifications or skills listed below and be authorised by the operator to perform actions on the valve.

Operating staff

- Trained by the operating company, a qualified customer specialist or a GEA service expert

Customer specialist

- Technical training

Trained customer specialist

- Technical training in a specific field of expertise
- Training by GEA personnel or participation in training courses of the GEA Tuchenhagen

GEA service expert

- Personnel from GEA Tuchenhagen, see *1.3 Customer service*

Where necessary, reference is made to the respective group of individuals in these Operating Instructions.

2.5 General safety instructions

The valve was built in accordance with the state of the art and recognised safety regulations at the time of its launch. However, the safety measures stipulated by the operator and listed below must still be adhered to in order to ensure safety.

2.5.1 General hazard

Source	Consequences	Measures
Faulty valve	Injury and damage	Check that the valve is fully functional.
Non-compliance with these Operating Instructions	Injury and damage	Read and familiarise yourself with these Operating Instructions.
Operating materials	Injuries	• Wear personal protective equipment. • Avoid contact with operating materials.

Table : General hazard

2.5.2 Mechanical hazard

Source	Consequences	Measures
Moving or rotating components	• Being drawn in or caught • Entrapment • Crushing • Impact	• Remove jewellery. • Tie hair back or wear a hair net. • Wear tight-fitting clothing.
• Gravity • Falling objects	• Impact • Crushing	• Do not walk under suspended loads. • Eliminate the stumbling hazards.

2.5.3 Electrical hazard

Source	Consequences	Measures
Electromagnetic processes	Implications for electronic medical implants	People with medical implants must keep their distance.
Electrostatic processes	• Electric shock • Fire • Chemical reaction	• Avoid contact to components. • Check the voltage of components. • Wear personal protective gear. • Eliminate leaked flammable substances.

2.5.4 Thermal hazard

Source	Consequences	Measures
Objects or materials at high or low temperature	• Freezing • Burns • Scalding	• Wear personal protective gear. • Wait for adjustment to room temperature.

2.6 Personal protective equipment

To prevent possible personal injuries, the personal protection equipment must be worn.

In addition, GEA recommends keeping the requirements listed below.
- Locally applicable accident prevention regulations
- Instruction manual from the operator or employer

2.7 Safety devices

No safety devices are attached to this valve.

2.8 Residual dangers

Despite all the measures taken, the following residual hazards can lead to personal injuries and property damage at any time.

- Improper use
- Material fatigue
- Failure of safety devices

Danger zones

Please observe the following notes:

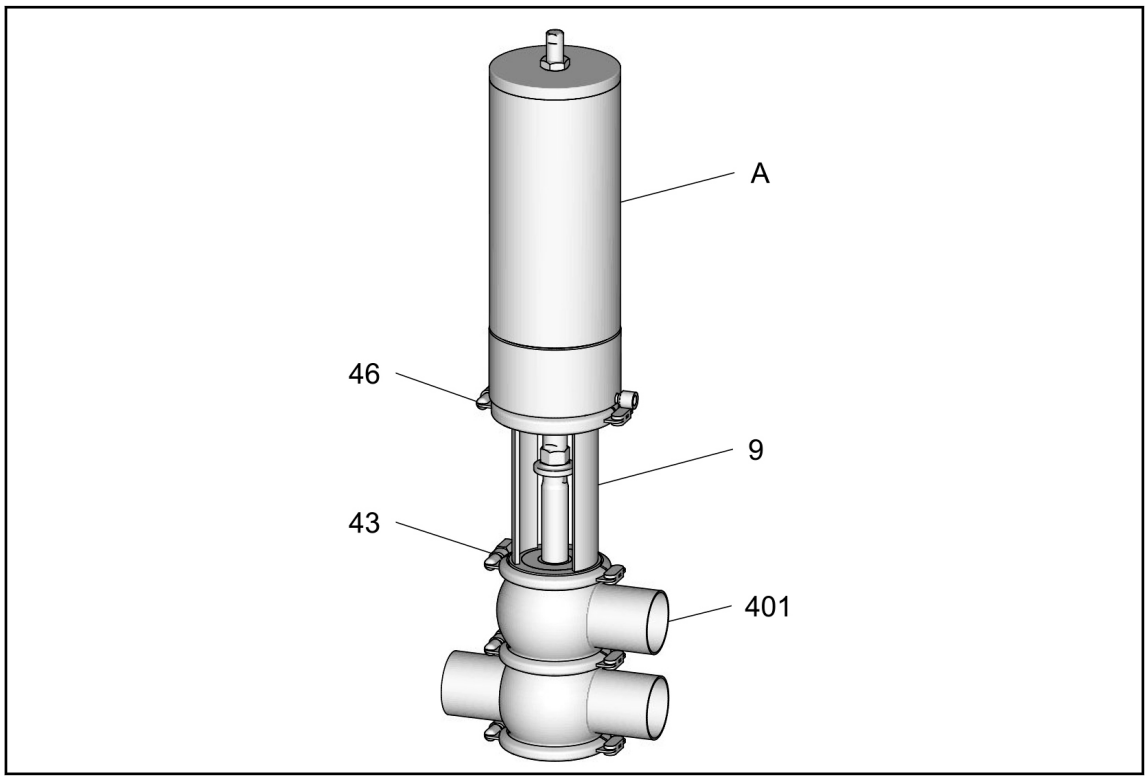


Figure 2-3 - Danger zones of the valve

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

- Never reach into the lantern (9) or the valve housing (401) when the valve is switching. Fingers can be crushed or cut off.
- On a spring-closing valve there is danger of injury when the clamp connection (43, 46) is opened, as the released spring pretension will suddenly lift the actuator. Therefore, release the spring tension before detaching the clamp connection (43, 46) by supplying the actuator (A) with compressed air.
- The housing sockets have very sharp edges. When transporting and installing the valve be sure to wear suitable protective gloves.

Dangerous situations can be avoided by safety-conscious and proactive behaviour of the personnel 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 the pressurised spring in the actuator. Do not open the actuator, rather return it to GEA Tuchenhagen for proper disposal.
Risk 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 collecting vessels. • Dispose of lubricants in accordance with the pertinent regulations.

Table 1: Residual dangers and measures

Instructions for the Safe Handling of Electronic Components During Welding Work

ATTENTION

Stray welding currents during welding
Can cause damage to electronic components
- Follow the steps below to prevent this.

1. Before starting welding work, carry out the following preparations:
   1.1 Ensure the device is switched off and no electrical connections are active.
   1.2 Disconnect the device from the power supply.
   → This protects the electronic components from potential damage caused by stray welding currents.
2. Establish a correct grounding connection:
   2.1 Place the ground connection of the welding machine as close as possible to the welding point.
   → This minimises the risk of stray welding currents and helps protect nearby electronic components from damage.
3. After completing the welding work, proceed as follows:
   3.1 Remove the welding machine's ground connection.
   3.2 Reconnect the device to the power supply.
   3.3 Perform a function test.

2.9 Safety signs

The safety symbols listed below are attached to the valve.

The position of the applicable safety symbols on the valve are shown in an overview, see *3.1.3 Signs*.

Warning signs

General warning sign

Hazard for persons, conveyed by the additional sign.

Warning, risk of hand injuries

Hazard posed by closing mechanical components on the valve.

Warning, spring tension

Hazard posed by spring tension. Do not open the actuator.

Explosion-hazarded zones warning

Special explosion protection sign

2.10 Emergency measures

In case of any emergencies on the valve, the operating regulations must be observed and the following actions implemented.

Fire

- Call local specialists
- Use extinguishing agents as outlined in the operating regulations
- Exit the hazard zone
- Warn individuals that are endangered

Injuries

- Administer first aid
- Call local emergency services

3 Description

This chapter contains instructions on how to install the valve and its functions.

3.1 Structure and function

3.1.1 Design

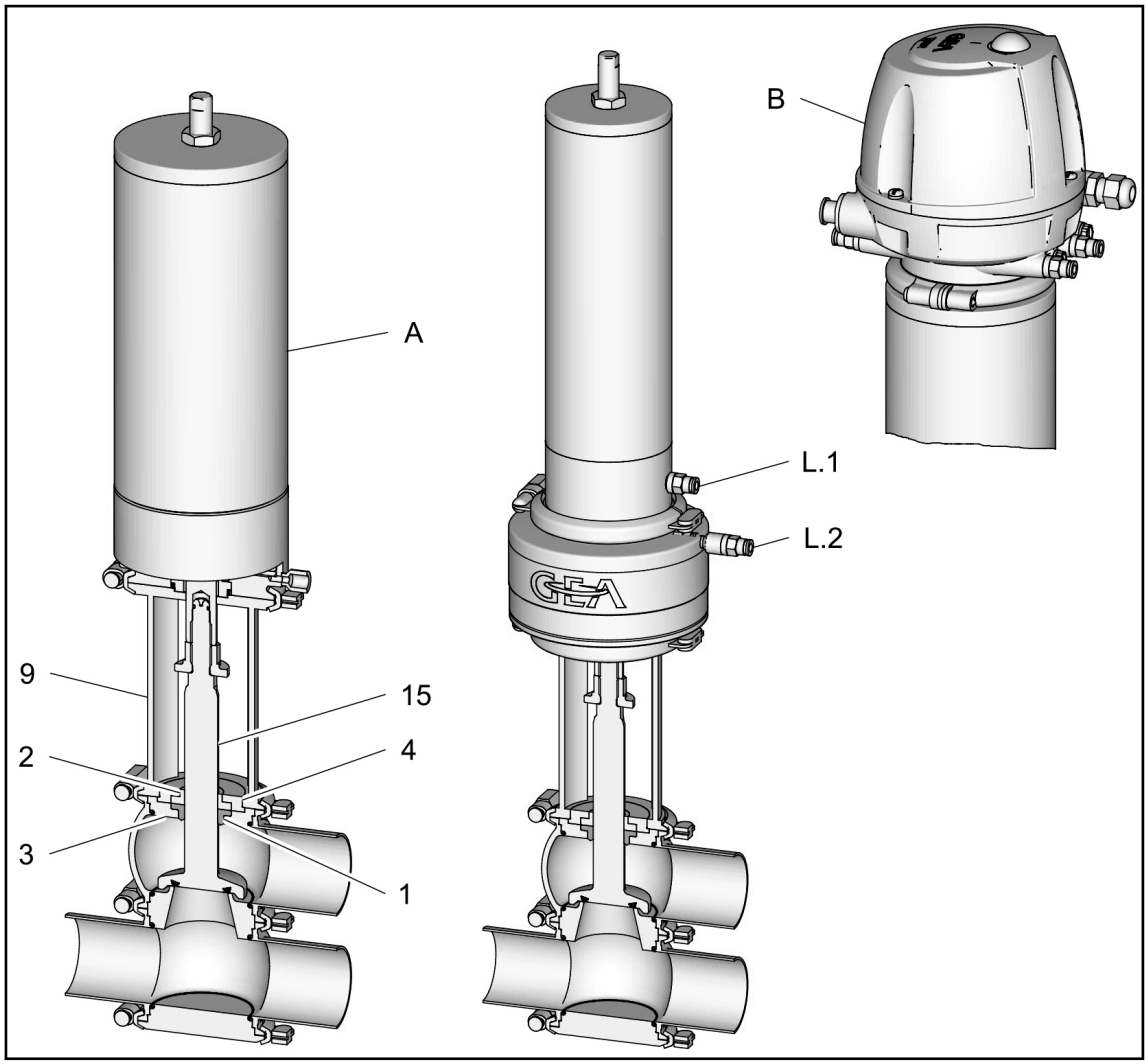


Figure 3-1 - Design of the valve

Position	Description	Position	Description
A	Actuator	B	T.VIS control top
1	Seal ring	2	Bearing
3	Seal disk	4	Bearing disk
9	Lantern	15	Valve disk
L.1	Air connection to open valve type F-CJ	L.2	Air connection to open valve type F-CJ

3.1.2 Functional description

3.1.2.1 Valve Q

Closing direction: from top to bottom

Standard: spring-to-close

Identification on the T.VIS Q-15 control top once the installation (SET-UP) has been completed:

- Valve in non-actuated position: green
- Downforce activated: yellow
- Lift: flashing yellow
- Programming mode active: red
- Error/malfunction: rapidly flashing red
- Flashing (1) yellow: Valve lifted

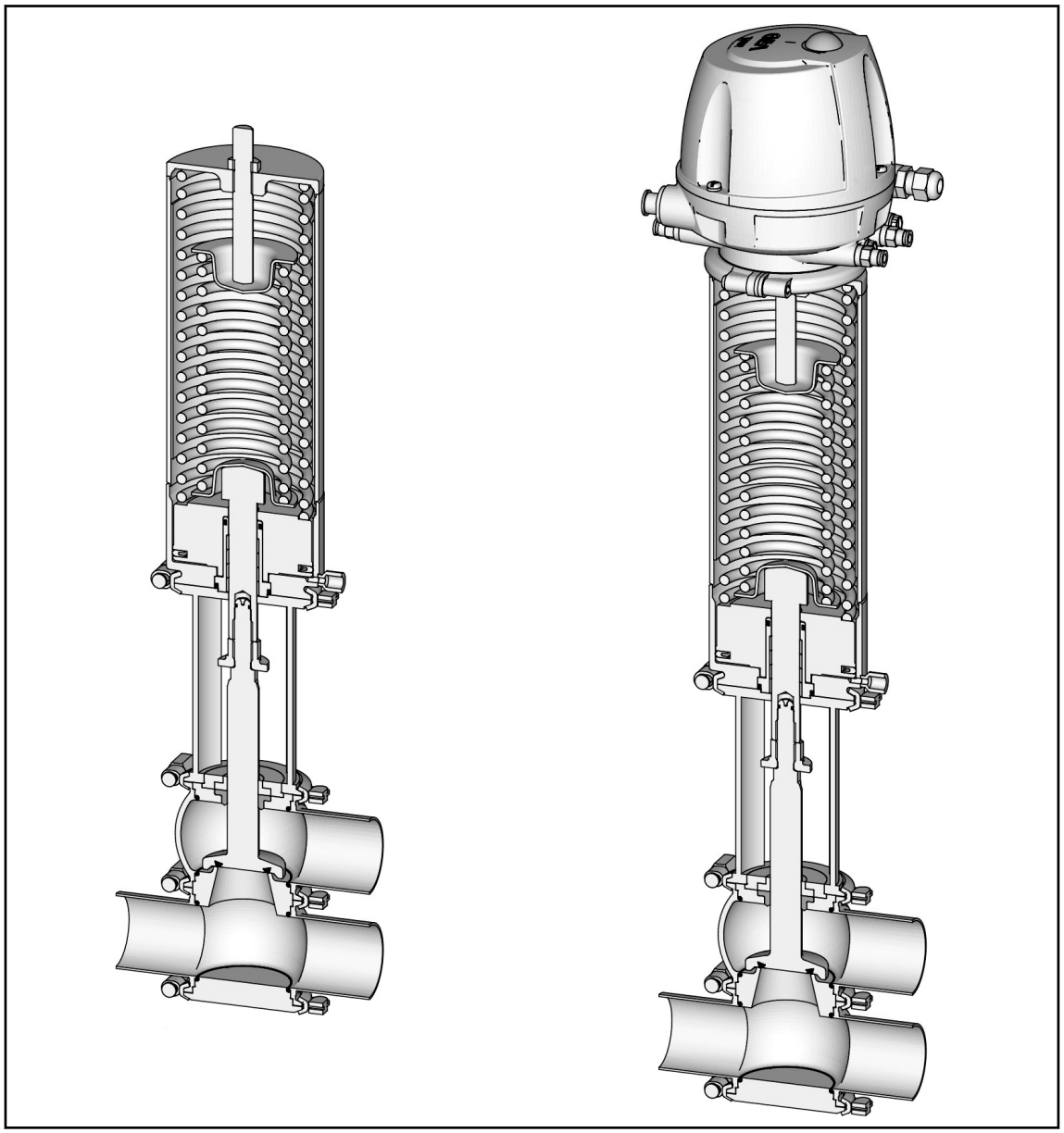


Figure 3-2 - Valve Q - without control top (left) and with control top T.VIS Q-15 (right)

Actuator F with adjustable spring:
- Valve opens when the set opening pressure is exceeded.

Actuator M with adjustable spring and integrated pneumatic actuator:
- Valve opens when the set opening pressure is exceeded.
- Valve can be lifted pneumatically, e.g. for cleaning.

Actuator F-CJ – type D-Force with adjustable spring and integrated pneumatic actuator:
- Valve opens when the set opening pressure is exceeded.
- Valve can be lifted pneumatically, e.g. for cleaning. A greater locking force can be achieved by applying air.

3.1.2.2 Possible Response Pressure Settings

The versions are available with different spring packages. For the selection of the suitable actuator see the following tables:

Possible response pressure settings [bar]

	Actuator type						
Nominal width	F11 M11	F21 M21	F1 M1	F2 M2	F3 M3	F4 M4	M5
DN 25 OD 1"	1.5-4.5	3.0-9.0	8.0-20.0*	--	--	--	--
DN 40 OD 1 1/2"	--	1.5-2.0	1.5-5.0	4.0-15.0	14.0-20.0*	--	--
DN 50 OD 2" IPS 2"	--	--	1.5-4.0	3.0-11.0	10.0-20.0*	--	--
DN 65 OD 2 1/2"	--	--	--	1.0-4.0	3.0-10.0	9.0-15.0	14.0-20.0*
DN 80 OD 3" IPS 3"	--	--	--	1.0-4.0	3.0-10.0	9.0-15.0**	14.0-20.0**
DN 100 OD 4" IPS 4"	--	--	--	0.5-1.5	0.5-4.0	3.0-7.0	6.0-12.0**
Required control air pressure for lifting [Type M]	3	3	3	4	3	5	6

Possible response pressure settings [bar]

	Actuator type			
Nominal width	D-Force F1-CJ	D-Force F2-CJ	D-Force F3-CJ	D-Force F4-CJ
DN 25 OD 1"	8.0-20.0*	--	--	--

Nominal width	Actuator type			
	D-Force F1-CJ	D-Force F2-CJ	D-Force F3-CJ	D-Force F4-CJ
DN 40 OD 1 1/2"	1.5-5.0	4.0-15.0	14.0-20.0*	--
DN 50 OD 2" IPS 2"	1.5-4.0	3.0-11.0	10.0-20.0*	--
DN 65 OD 2 1/2"	--	1.0-4.0	3.0-10.0	9.0-15.0
DN 80 OD 3" IPS 3"	--	1.0-4.0	3.0-10.0	9.0-15.0**
DN 100 OD 4" IPS 4"	--	0.5-1.5	0.5-4.0	3.0-7.0
Required control air pressure for lifting [Type F-CJ]	3	3	4	6.5

* Response pressures > 16 bar only in combination with the increased pressure level PS20 (see option /37)

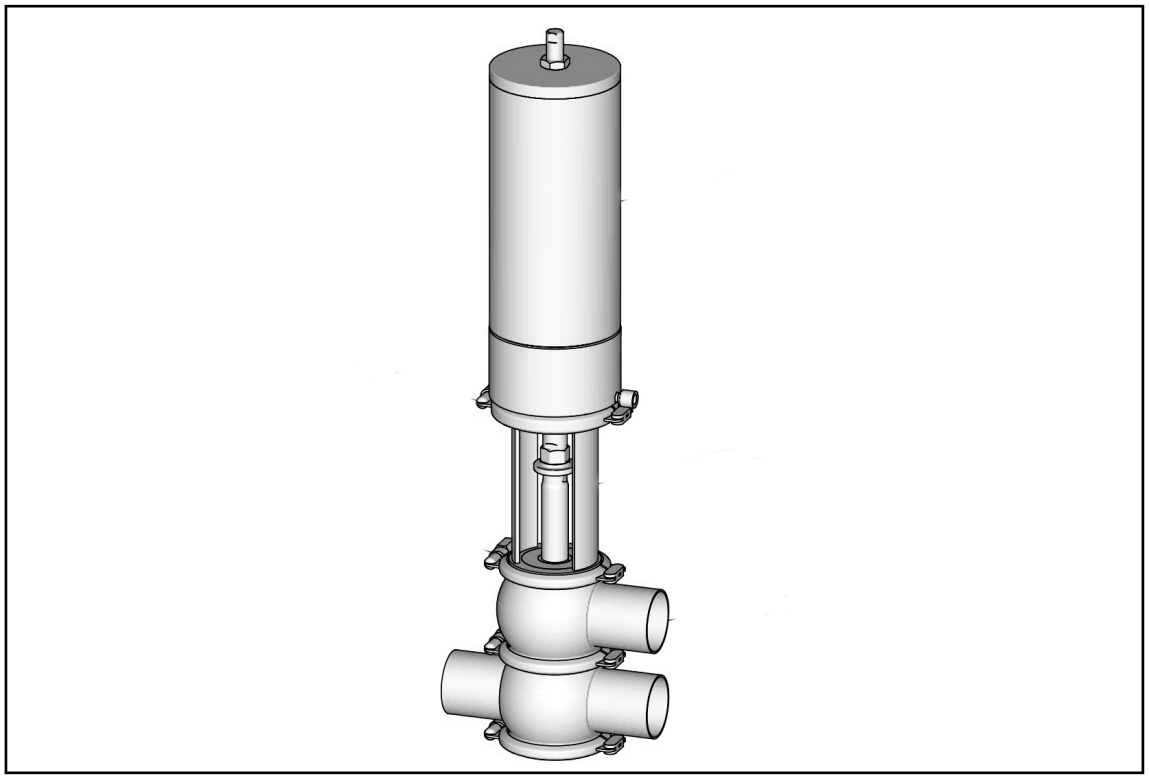
** Response pressures > 10 bar only in combination with the increased pressure level PS20 (see option /37)

3.1.3 Signs

Overview and layout

All safety symbols and other signs must meet the following criteria throughout the life cycle of the valve.

- Complete
- Attached as shown
- Clean and legible



No.	Signs
1	Type plate T.VIS; adhered to T.VIS
2	Type plate valve; adhered to actuator
3	Warning: do not open, taut springs; adhered to actuator
4	Warning: crushing (refers to the lantern) adhered to actuator after lantern

The representation and meaning of the safety symbols used are listed in an overview corresponding to their category, see chapter *2.9 Safety signs*

3.1.4 Protective devices

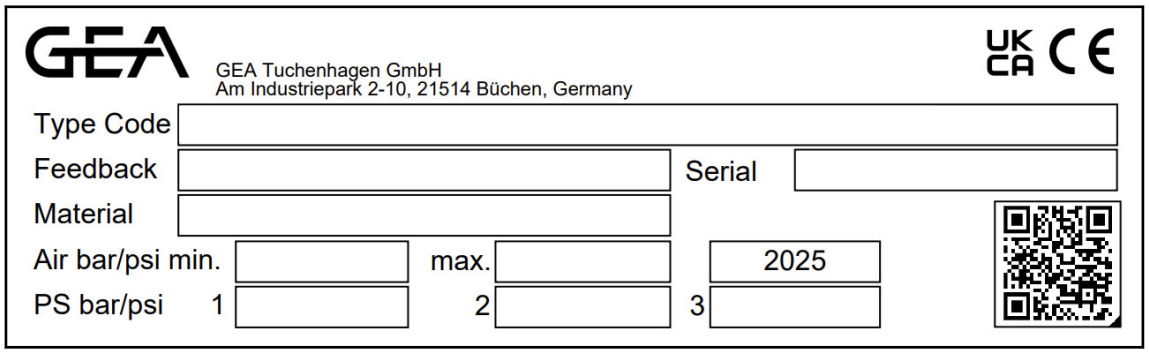
To avoid personal injuries, danger zones are made inaccessible by protective devices. The following protective devices are installed on this machine.

There are no protective devices installed on this machine.

3.2 Technical data

3.2.1 Type plate

The type plate clearly identifies the valve.



The type plate provides the following key data:

Key data of the valve

Characteristics	Values
Type code	Overflow valve type Q
Feedback	Order code control top T.VIS
Serial	Serial number
Material	1.4404 (AISI 316L) / EPDM (FDA)
Control air pressure bar/psi	6.0 / 87
Product pressure bar/psi	5.0 / 72.5

3.2.2 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 2" to 4" IPS
Material of product contact parts	Stainless steel 1.4404
Fitting position	Vertical

Technical data: ambient temperatures

Designation	Description
Valve	0 to 45 °C (32 to 113 °F), standard < 0 °C (32 °F): Use control air with low dew point. Protect valve rods against freezing.
Control top T.VIS Q-15	-20 to +55 °C (-4 to +131 °F)
Product temperature and operating temperature	Dependent on the seal material, see also *3.2.3 Resistance and permitted operating temperature of the sealing materials*

Technical data: Compressed air supply, control air pressure and product pressure

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
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
Control air pressure	See table in chapter *3.1.2.2 Possible Response Pressure Settings*. max. 8 bar
Product pressure	See table in chapter *3.1.2.2 Possible Response Pressure Settings*.

Weights

Valve Without Actuator

Size	Weight [kg]
DN 25, 1"	approx. 2.0
DN 40, 1.5"	approx. 2.6
DN 50, 2"	approx. 2.7
DN 65, 2.5"	approx. 4.0
DN 80, 3"	approx. 5.5
DN 100, 4"	approx. 7.0

Actuator type M

Size	Weight [kg]
M 11	5.3
M 21	5.4
M 1	7.4
M 2	7.5
M 3	8.9
M 4	9.2
M 5	12.8

Actuator type F

Size	Weight [kg]
F 11	1.6
F 21	1.9
F 1	2.7
F 2	2.8
F 3	3.2
F 4	3.6

D-Force Actuator Type F-CJ

Size	Weight [kg]
F 1-CJ (D-Force)	11.8
F 2-CJ (D-Force)	11.9
F 3-CJ (D-Force)	12.3
F 4-CJ (D-Force)	12.7

3.2.3 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 seal 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

Seal resistance / permissible application temperature of the seal materials

Medium	Maximum operating temperatures	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 more than 5%	up to 80 °C (176°F)	+	–	–
Alkalis more than 5%	(no temperature specification)	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%		+	+	+

Medium	Maximum operating temperatures	EPDM	FKM	HNBR
Product with a fat content of more than 35%		–	+	+
Oils		–	+	+

Table 2: Resistance and permitted operating temperature of the sealing materials

Temperature resistance of the sealing materials

Sealing materials	General temperature resistance*
EPDM	-40 to +135 °C (-40 °F to 275 °F)
FKM	-10 to +200 °C (+14 °F to +392 °F)
HNBR	-25 to +140 °C (-13 °F to +284 °F)

* The general resistance of the material does not correspond to the maximum operating temperature.

Table 3: Temperature resistance of the sealing materials

3.2.4 Pipe ends - General table of measurements

INFO Not every valve is available in every size. For information about the available sizes of valves, see *3.2.2 Technical data*.

Dimensions for tubes in DN

Metric DN	Outside diameter	Wall thickness	Inside diameter	Outside diameter acc. to DIN 11850
10	13	1.5	10	X
15	19	1.5	16	X
20	23	1.5	20	X
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
150	154	2.0	150	X

Table 4: Dimensions pipe DN

Dimensions for pipes 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

Table 5: Dimensions pipe OD

Dimensions for tubes in Inch IPS

Inch IPS	Outside diameter	Wall thickness	Inside diameter	Outside diameter according to DIN EN ISO 1127
2"	60.3	2	56.3	X
3"	88.9	2.3	84.3	X
4"	114.3	2.3	109.7	X
6"	168.3	2.77	162.76	X

Table 6: Dimensions pipe IPS

3.2.5 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

Table 7: Lubricants

4 Storage and transport

This chapter contains information about transporting the valve. It also describes the minimum requirements for storage after delivery and for any necessary intermediate storage.

The target group of this chapter is all persons who carry out actions related to the transport or storage of the valve.

4.1 Scope of supply

On receipt of the valve check whether

- 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.

4.2 Storage

The valves, valve inserts or spare parts should be stored in a dry place, free of vibration 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.

INFO We recommend storing at a temperature of ≥ 5 °C for a period of 24 hours prior to any handling (removal of the housing / activation of actuators with compressed air) so that any ice crystals formed by condensation water can melt.

4.3 Transport

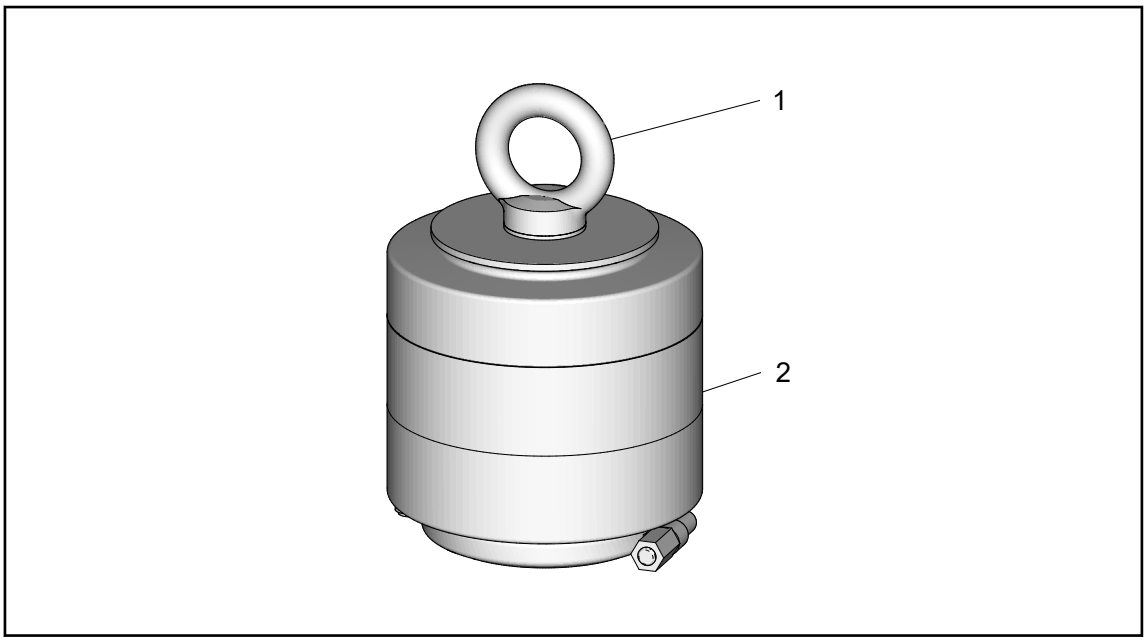


Figure 4-1 - Valve transport

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) 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 and the position of the point of gravity into account, see *Weights*.
- 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 jerky movements when putting down the unit.

5 Assembly and installation

This chapter contains information and instructions about the assembly and installation of the valve.

The target group of this chapter is all persons who carry out actions related to the valve.

5.1 Notes on installation

Valve fitting position

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

To avoid damage, ensure that the valve is installed into the pipe system without tension and no objects remain in the system after assembly (e.g. tools, screws, lubrication oils).

5.2 Control top

If different valves are operated via a control top, it must be ensured for each of the connected valves that the air supply does not fall below the required operating points.

5.3 Install the valve with detachable pipe connection elements

Prerequisites

- The pipe is drained, and cleaned or rinsed, if necessary.
- The pipe section for the valve to be mounted must be separated from the remaining pipe system.

⚠CAUTION

Liquids in pipes

Danger of injury due to liquid spraying out.

- Therefore, before loosening pipe connections or clamp connections: Drain the pipeline and, if necessary, clean or flush 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.

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

⇒ Valve is installed.

5.4 Install valve with welding ends

ATTENTION

Welding distortions

The housing can warp during welding.

- Tack the pipe sockets of the housings without and gaps and tension to the pipe and housing and weld.

ATTENTION

Stray welding currents during welding
Can cause damage to electronic components

- For avoidance measures, see *Instructions for the Safe Handling of Electronic Components During Welding Work*.

Prerequisites
- The pipe is drained, and cleaned or rinsed, if necessary.
- The pipe section for the valve to be mounted must be separated from the remaining pipe system.

1. Release the spring tension.
2. Remove the valve insert, see *9.5 Removing the valve*.
3. Weld the housing, without gaskets, into position, ensuring that the connection is free of stress.
   3.1 Fit the housing into place and tack it.
   3.2 Flush the housing with forming gas from the inside to push the oxygen out of the system.
   3.3 Weld the housing into the pipe system; use welding additive, if necessary.
   → When technically possible, use the WIG-orbital welding process with pulse configuration, according to the EHEDG D.35 guideline.
4. Passivate the seam after welding.
5. **INFO**

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

   Insert the seals.
6. Depending on the actuator closing direction:
   6.1 Spring-to-close actuator (NC): pressurize the actuator. Assemble the valve. Depressurize the actuator to lower the valve disk.
   6.2 Spring-to-open actuator (NO): install the valve.

⇒ Install the valve with welded ends.

INFO 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).

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

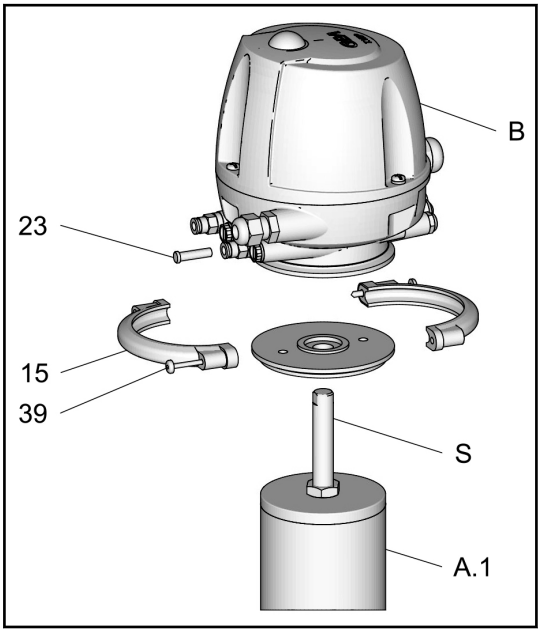
5.5 Installation on overflow valve

This chapter describes how the control top is installed on VARIVENT overflow valves (option with lifting actuator).

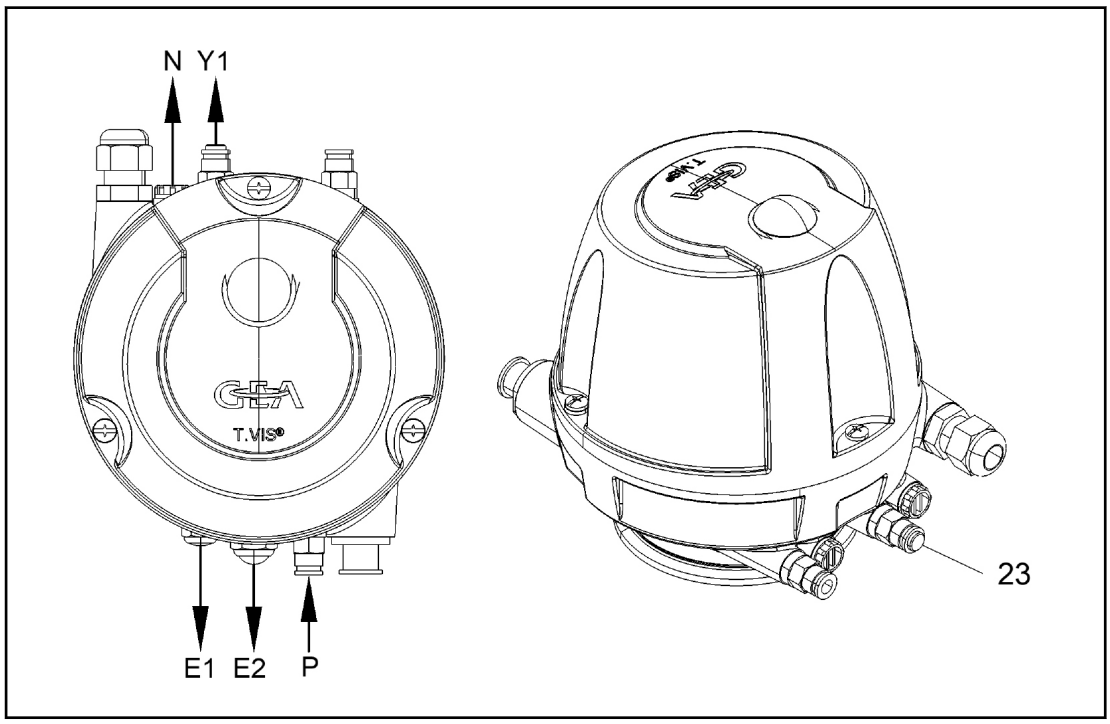
Prerequisites

- Pay attention not to kink the air hoses when mounting the control top.

1. Unscrew the pin screw(S) completely from the valve.
2. Set the installation base (198) in place and screw the pin screw (S) back into the valve together with the installation base.
   → When screwing, note that the spring force acting on the valve disk can change due to the pin screw (S) rotating. See *9.7.2 Setting the Response Pressure*.



3. Set the required response pressure.
4. Tighten the installation base using a face spanner.
5. Fit the control top (B) over the pin screw (S) on the actuator (A.1).
6. Tighten the clamps (15) and screws (39) to a torque of 1Nm (0.7 lbft).
7. Align the pneumatic and electrical connections in accordance with the valve block configuration.



8. Carry out commissioning, see chapter *5 Assembly and installation* as well as the operating manual for T.VIS Q-15 / 430BAL015251.

⇒ The control top is mounted.

5.6 Pneumatic connection

5.6.1 Air requirement

Actuator Ø [mm]	Air requirement (dm^3_n/stroke) dm^3_n at 1.01325 bar at 0 °C as per DIN 1343	Use
98	0.16	DN 25 - DN 100 1" - 4" OD 2"- 4" IPS
109	0.26	
135	0.42	
170	0.70	
210	1.10	
170	1.60	
210	2.00	
210	2.20	

5.6.2 Establishing hose connections

Hose connection diagram with T.VIS control top

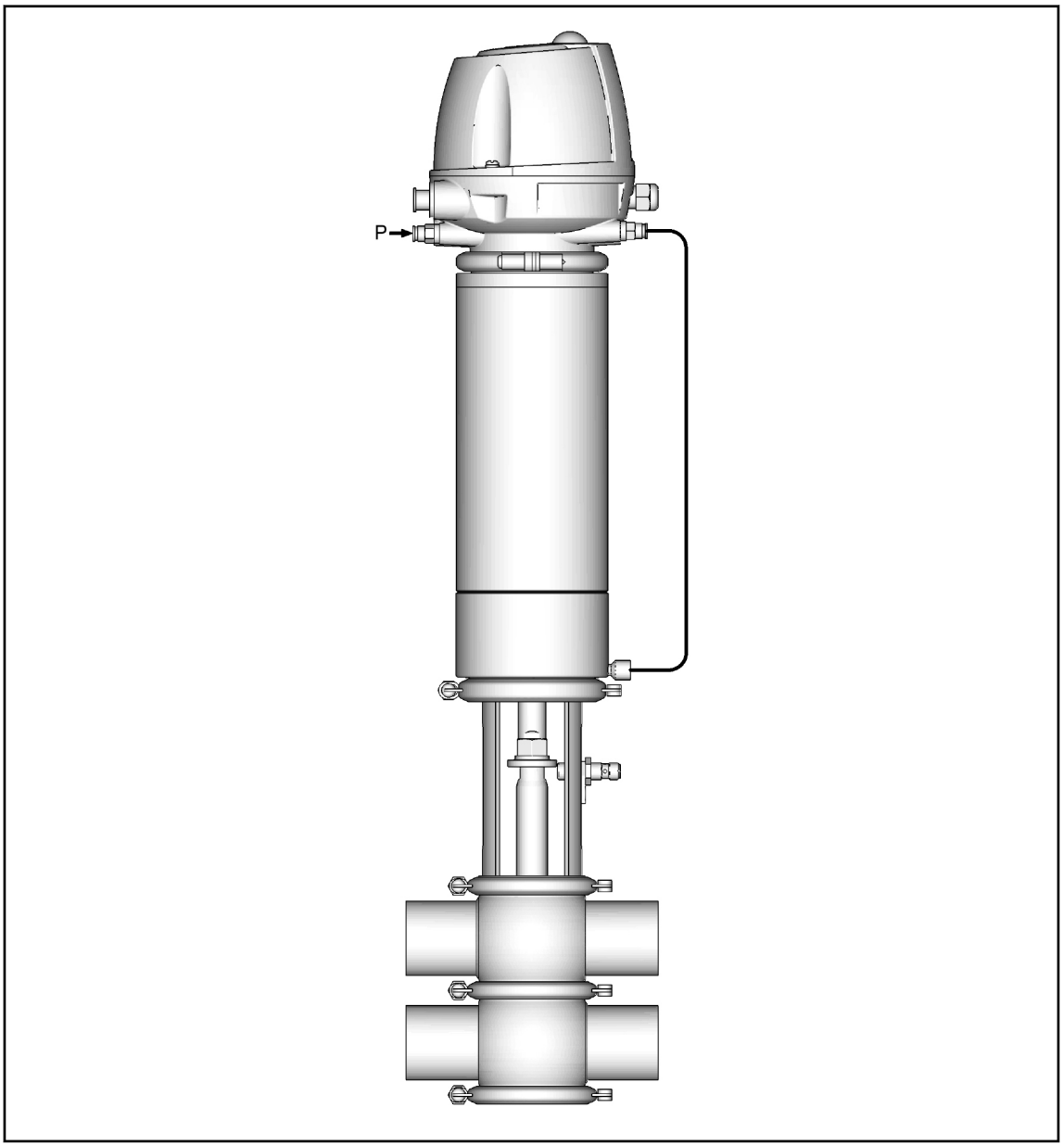


Figure 5-1 - Hose Connection Diagram

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

Tools

- Hose cutter

1. Shut off the compressed air supply.
2. Use the hose cutter to cut the pneumatic hoses at a right angle.
3. Push the air hose into the air connector on the control top.
4. Re-open the compressed air supply.

⇒ Hose connection has been established.

5.7 Electrical connection with T.VIS control top

⚠DANGER

Live parts

Electrical shocks can cause serious personal injuries or death.

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

⚠DANGER

Explosive gases or dusts

An explosion can cause serious personal injuries or death.

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

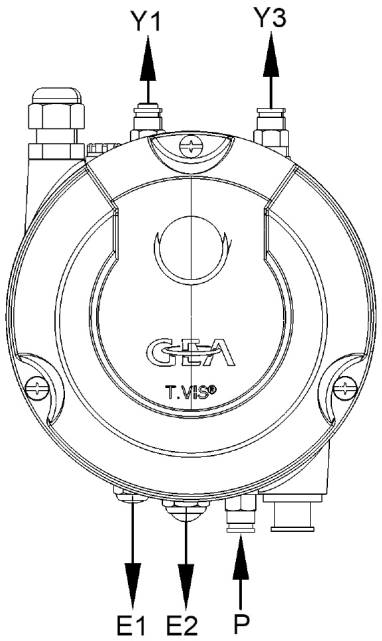
Prerequisites

- Valve is installed

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

⇒ Control top is connected.

INFO The proximity switches are set ex-works. Settings can become changed during transport and installation and may need to be reset, see the instruction manual for the control top.



For assignment of Y1, Y3, E1, E2 and P refer to the operating instructions for control top T.VIS Q-15

6 Commissioning

This chapter contains information for the initial and any subsequent commissioning of the valve. It also describes the necessary checks and tests.

The target group of this chapter is all persons who carry out actions related to the valve.

6.1 Preparing 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.

Notes on commissioning

Before starting commissioning observe the following:

- Make sure that there are no foreign materials in the system.
- Only with actuator M and F-CJ: 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.

6.2 Restarting

The following principles apply for restarting:

- Only allow properly qualified staff to set the valve into operation.
- Make sure all connections are connected properly.
- 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 Operation and control

This chapter contains information on operating and shutting down the valve.

The target group of this chapter is the operators of the valve.

7.1 Monitoring operation

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

For operation, the following principles apply:

- Monitor the valve during the 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 mounted as intended.
- The place of installation of the valve must be adequately ventilated at all times.
- Structural alterations of the valve are not permitted. Immediately report any changes on the valve to the person responsible.
- 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.

7.2 Shutdown

The following principles apply for shutdown:

- Switch off the compressed air.
- Switch off the valve.
- 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.
- In case of longer shut-downs, observe the storage conditions, see *4.2 Storage*.

8 Cleaning

This chapter contains information about cleaning the valve. It also contains information about cleaning intervals and the use of cleaning agents.

The target group of this chapter is all persons who carry out actions related to cleaning the valve.

8.1 General

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 operating company!

8.1.1 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

Example of a two-phase cleaning process:

- 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).

8.1.2 Cleaning results

The cleaning result 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.

8.2 Passivation

Before a system with long pipes and tanks is commissioned, it usually needs to be passivated.

Valve blocks are usually excepted from this.

Passivation is usually carried out with nitric acid (HNO_3) at about 80 °C (176 °F) in a concentration of 3 % and a contact time of 6 to 8 hours.

9 Maintenance

This chapter contains information about valve maintenance, inspection and repairs.

The target group of this chapter is all persons who carry out actions related to the valve.

9.1 Carrying out inspections

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

9.1.1 Checking seals that come into contact with the product

Prerequisites

- Access to seals that come into contact with the product

1. Regularly check the seals that come into contact with the product.
   1.1 Check the rod seal between upper housing and lantern.
   1.2 Check the V-ring in the valve disks.
   1.3 Check the O-rings between the valve housings.

⇒ Seals that come into contact with the product have been tested.

9.1.2 Checking the pneumatic connection

Prerequisites

- Access to the pneumatic connection

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 connections are tight.
4. Check the lines for kinks and leaks.
5. Check the solenoid valves for proper function.

⇒ The pneumatic connection has been checked.

9.1.3 Checking the electrical connection

Prerequisites

- Access to the electrical connection

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.

⇒ The electrical connection has been checked.

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

9.1.4 Checking the signs on the valve

Prerequisites

- Valve is accessible

1. Check the signs on the valve, see also *2.9 Safety signs*.
2. If necessary, replace damaged or missing labels with new labels.

⇒ The signs on the valve have been checked.

9.2 Servicing intervals

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

The actual servicing intervals can only be determined by the operating company 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

Servicing intervals

Applications	Servicing 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

9.3 List of tools

Tool	Intended Purpose	Material no.
Belt wrench	Removing/mounting the actuator	408-142
Jaw wrench ground a/f 17x19	Removing the valve disk	229-119.01
Jaw wrench ground a/f 21x23	Removing the valve disk	229-119.05
Jaw wrench ground a/f 22x24	Removing the valve disk	229-119.03
Jaw wrench A/F 30x32	Removing the valve disk	408-041
Scriber		414-001
Hose cutter	Cutting the pneumatic hoses to size	407-065
Vice support	Removing/mounting V-ring aid	470-001

Tool	Intended Purpose	Material no.
Articulated face spanner ¾” square adapter 5 mm journal	Removing/mounting the installation base	408-448
V-ring insertion tool	Mount the V-rings	229-109.88

Table 8: List of tools

9.4 Prior to removal

Prerequisites

- Ensure that no active processes are running in the relevant area during maintenance and servicing work .
- Before turning out the pin screw, mark the position of the screw with a pencil for later assembly.

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

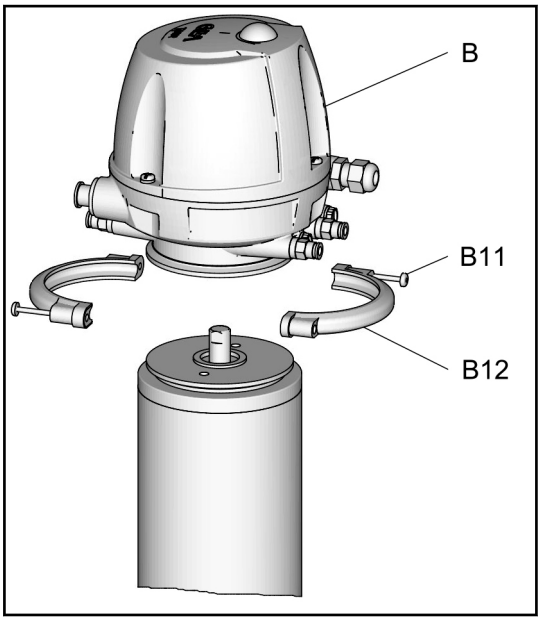
9.5 Removing the valve

9.5.1 Removing the control top

Tools

- Hex socket screw size 3

1. Unscrew the screws (B11) of the half-rings (B12) using a hex key, size 3, and remove the half-rings (B12).
2. Lift off the control top (B), also refer to the operating instructions for the "T.VIS control top".



⇒ Control top is removed.

9.5.2 Disconnecting the Valve from the Housing

⚠WARNING

Danger of injury through sudden release of spring force

Danger of injury when detaching the clamp connections (46, 43) as the released spring pretension will suddenly lift the actuator.

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

ATTENTION

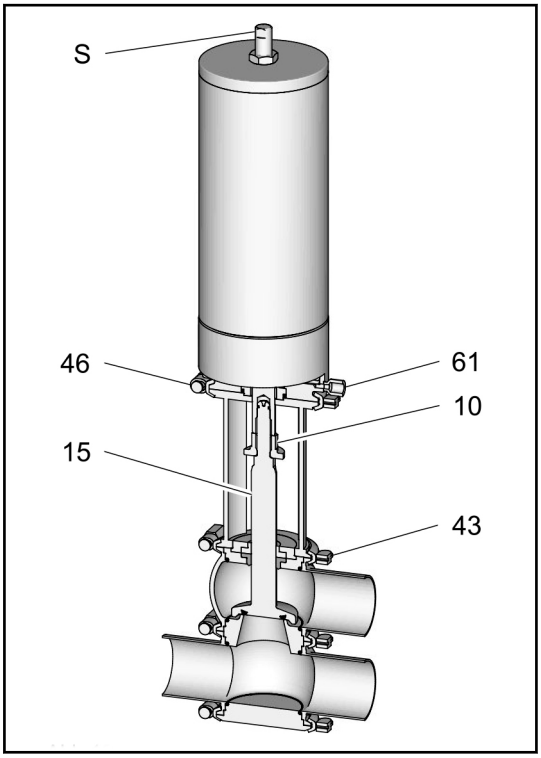
Sensitive parts.

Damage to these parts can result in malfunction.

- When the valve is pulled out, the stem of the valve disk (15) must not hit the valve housing!
- Do not set the valve insert down on the valve disk, lay it down instead.

9.5.2.1 Actuators M and F-CJ

1. Vent actuator at connection (61) with compressed air, max. 8 bar.
   → The valve disc (15) is raised.
2. Remove the clamp connection (43).

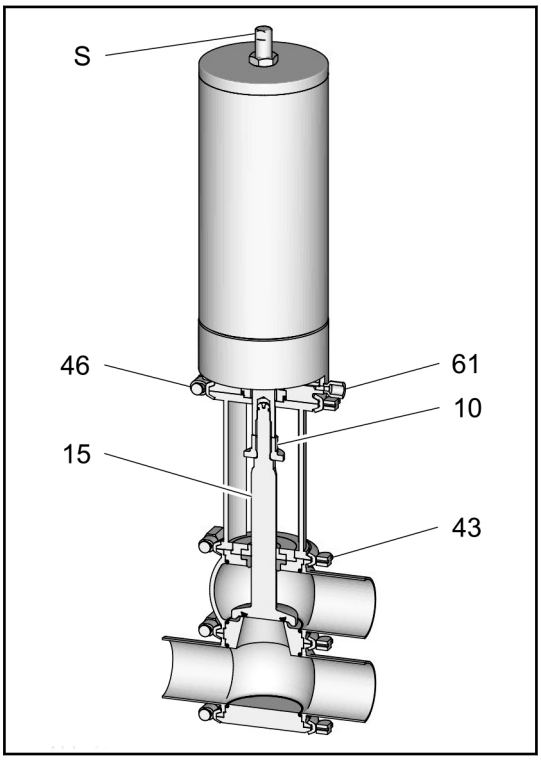


3. Vent the actuator.
4. Carefully draw the valve out of the housing.

⇒ The valve is separated from the housing.

9.5.2.2 Actuator F

1. Unscrew the adjuster screw (S).
2. Remove the clamp connection (43).
3. Carefully draw the valve out of the housing.



⇒ The valve is separated from the housing.

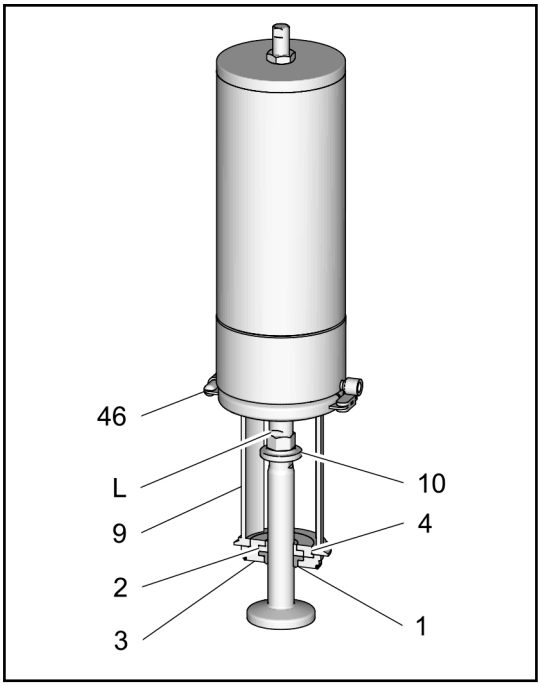
9.5.3 Removing the valve disk

ATTENTION

Sensitive valve parts
Damage to the valve parts can lead to a malfunction.

- Protect the valve parts against impact stress.

1. Release the clamp connection (46) but do not remove it.
2. Place an open end spanner on the spanner flat (L), another open end spanner on the spacer nut (10) and detach the valve disk from the actuator.



3. Unscrew the valve disk together with the bearing disk (3), the bearing (2), the seal ring (1) and the seal disk (4).
   → The bearing disk (3) and the seal disk (4) must not hit the rod of the valve disk when the valve disk is withdrawn.
4. Unscrew the spacer nut (10) from the valve disc using 2 open-ended wrenches.
5. Pull off the bearing disk (3) with the bearing (2) and the sealing washer (4) with the gasket (1) from the valve disk.
6. Remove the clamp connection (46) between the lantern and the actuator.
7. Remove the lantern (9).

⇒ This completes removal of the valve disk.

9.6 Maintenance

9.6.1 Cleaning the valve

ATTENTION

The rod of the valve disk (15), the housing seat (401), and the V-ring groove are precision parts.
Damage to these parts can result in malfunction.

- Handle the valve with care!

Prerequisites

- The valve has been removed, see *9.5 Removing the valve*.

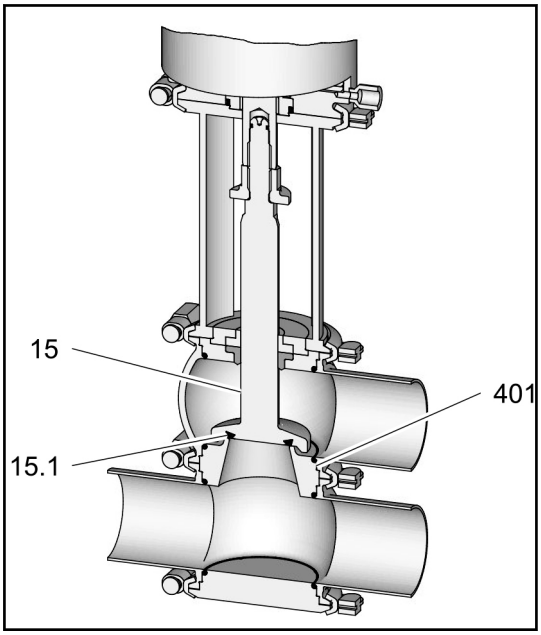
ATTENTION

Damage to the valve

Damage to the valve parts can result in a malfunction.

- Observe the safety information sheets issued by the detergent manufacturers!
- Only use detergents which are non-abrasive and not aggressive towards stainless steel.

1. Carefully clean the individual parts.

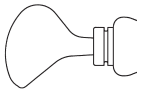


⇒ The valve has been cleaned.

INFO Observe the safety data sheets supplied by the detergent manufacturers. Only use detergents which are non-abrasive and not aggressive towards stainless steel.

9.6.2 Replacing the V-ring

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



V-ring insertion tool

Prerequisites

- The valve has been removed, see *9.5 Removing the valve*.
- V-ring groove must be clean and dry.
- Insert V-Ring without grease.

Tools

- Pickset
- V-ring insertion tool
- Vice support

⚠CAUTION

Sharp-edged tool

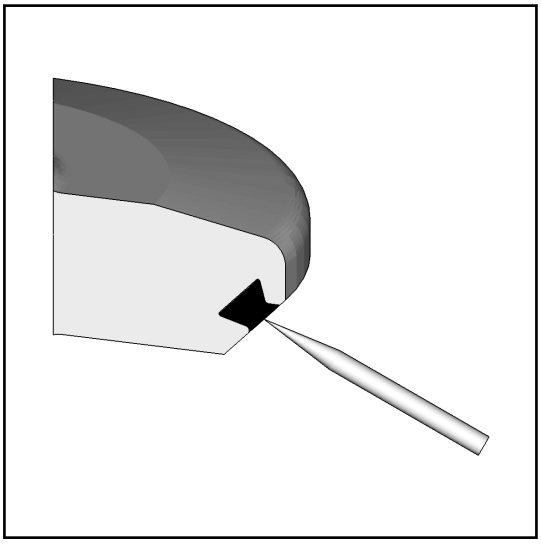
Risk of injury if the pickset tool slips when removing the V-ring.

- Clamp the valve disk with the vice mount into the vice.

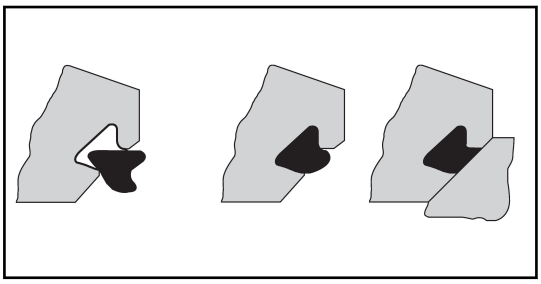
INFO Functional and running surfaces of the valves may not be damaged.

INFO Do not grease the V-ring. To facilitate fitting, use water with a drop of washing-up liquid to remove the surface tension. To ensure that no rust is transferred, the washing-up liquid solution must be mixed in a ceramic, plastic, or stainless steel container.

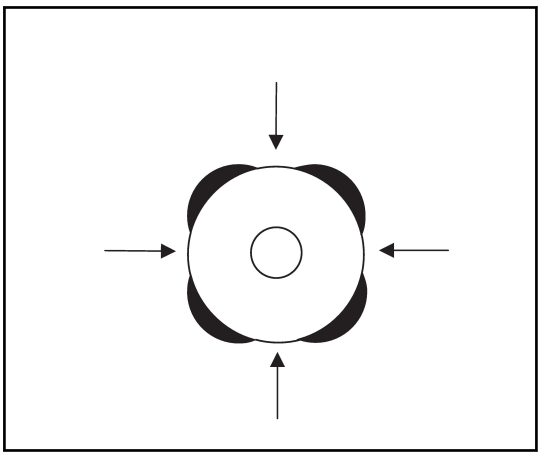
1. Put a tool from the pickset into the V-ring and take it out.



2. Check the V-ring groove: it must be clean and dry.
3. Wet the V-ring with water before fitting.
4. Put in the V-ring. Make sure the installation position of the V-ring is correct.



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



6. Insert the V-ring evenly.

⇒ V-ring has been exchanged.

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

9.6.3 Lubricating seals and threads

Prerequisites

- The valve has been removed, see *9.5 Removing the valve*.

Tools

- Lubricants Rivolta F.L.G. MD-2 and PARALIQ GTE

ATTENTION

Damage to seals and threads

Stainless steel threads tend to seize and stick, 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.

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 inside of the seal ring (1) (contact surface).

⇒ Seals and threads have been lubricated.

INFO 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 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 Tuchenhagen. 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 Tuchenhagen 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!

9.7 Installing the valve

Assemble the valve in reverse order of disassembly.

Observe the notes and instructions given in the following sections when doing so.

9.7.1 Tightening torques

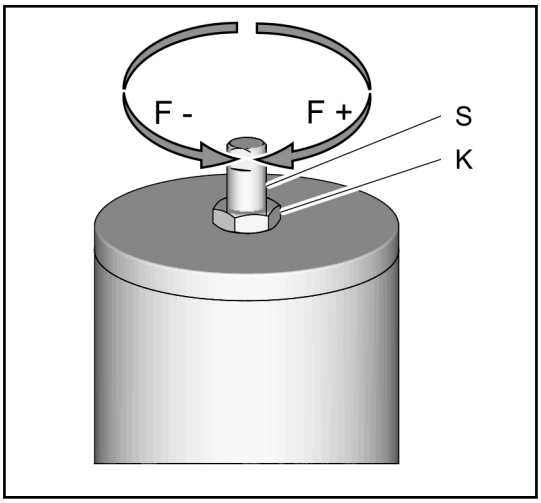
Tighten the following valve connections to the torques specified in the table.

Tightening torques for		[Nm]	[lbft]
Clamp connection cast half rings	M6	8	5.9
	M8	15	11
	M10	45	33

9.7.2 Setting the Response Pressure

9.7.2.1 Variant without T.VIS

1. Release the lock nut (K).

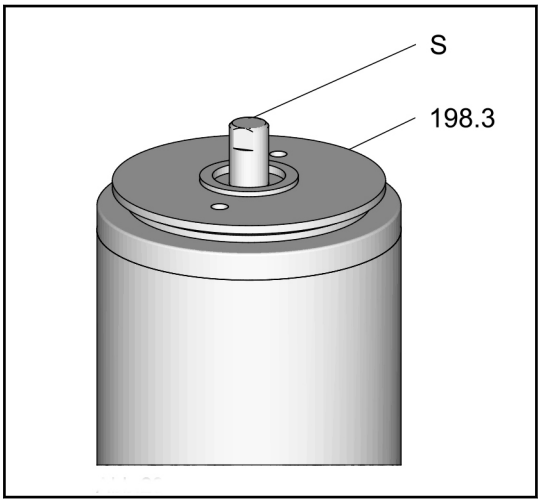


2. Turn the pin screw (S) to change the spring force acting on the valve disk.
   2.1 Turn clockwise: the spring force is increased, which results in an increase in the response pressure.
   2.2 Turn anti-clockwise: the spring force is decreased, which results in a decrease in the response pressure.
3. Set the required response pressure.
4. Tighten counter nut (K).
5. Check the required response pressure on the pressure gauge and repeat the procedure if necessary.

⇒ The response pressure has been set.

9.7.2.2 Variant with T.VIS

1. Loosen the installation base (198.3).

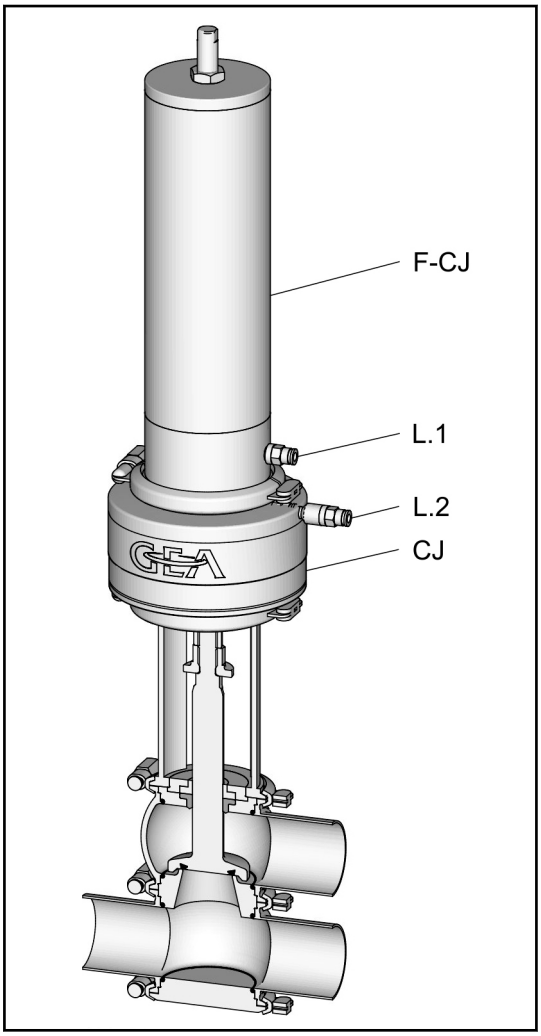


2. Turn the pin screw (S) to change the spring force acting on the valve disk.
   2.1 Turn clockwise: the spring force is increased, which results in an increase in the response pressure.
   2.2 Turn anti-clockwise: the spring force is decreased, which results in a decrease in the response pressure.
3. Set the required response pressure.
4. Tighten the installation base (198.3).
5. Check the required response pressure on the pressure gauge and repeat the procedure if necessary.

⇒ The response pressure has been set.

9.7.3 Install valve Q with actuator F-CJ type D-Force

1. Fit actuator CJ with air connection at the top of the lantern.
2. Screw rod F-CJ into actuator CJ.
3. Fit actuator F-CJ on actuator CJ.
   - 3.1 L.1 Air connection for full stroke
   - 3.2 Air connection for keeping-shut function



⇒ The actuator is installed.

9.7.4 Checking the function

Check function actuator M

1. Actuate the valve with compressed air.

⇒ Function actuator M has been checked.

10 Malfunctions

This chapter contains information about how to rectify problems with the valve.

The target group of this chapter is all persons who carry out actions related to the valve.

Fault	Possible cause	Measure
Valve with actuator M or F-CJ does not work	Fault in the controller	Check the system configuration
	No compressed air or compressed air too low	Check the compressed air supply Check air hoses for free passage and air tightness
	Fault in the electrical system	Check actuation / external controller and routing of electrical wires
	Solenoid valve defective	Replace the solenoid valve
Valve does not close	Dirt/foreign material between valve seat and valve disk	Clean valve housing and valve seat
	V-rings defective	Replace the V-rings
	Seat defective	Replace the 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 Change housing O-rings
Leakage on the valve shaft	Seal ring defective	Replace the seal ring
Does not respond when the pressure is elevated	Valve set incorrectly	Setting the Response Pressure
Response pressure too high	Seals dry	Grease the seals
Actuator making loud noise	Spring or spring plate broken	Replace the spring
Valve with actuator F-CJ does not close properly	Friction too high	Shut valve briefly by air support

Table 9: Malfunctions

11 Decommissioning, dismantling and disposal

This chapter contains information about decommissioning the valve. It also describes the removal and disposal processes. The target group of this chapter is all persons who carry out actions related to the valve.

11.1 Decommissioning

The following principles apply for decommissioning:
- 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 *4.2 Storage*.

11.2 Dismantling

Prerequisites
- Ensure that no active processes are running in the relevant area during dismantling.

1. Empty all pipe elements that lead to the valve.
2. Shut off the control air supply.
3. Disconnect the power supply.
4. Take the valve out of the pipe section, with all housings and housing connections if possible.
   → The valve has been dismantled.

11.3 Disposal

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

The valve is made 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 instruction manual for the individual components.

⚠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 the proper disposal free of charge.

Prerequisites

- The valve should be disposed of

1. Remove the actuator.
2. Pack the actuator securely and send it to GEA Tuchenhagen GmbH.

⇒ The valve actuator has been disposed of.

12 Replacement parts

This chapter contains information on ordering replacement parts for the valve and is aimed at all users of the valve.

12.1 Order information

Only original spare parts from GEA may be used. All spare parts are packed in GEA original packaging and marked accordingly.

The spare parts are not included in the scope of supply of the machine.

The specifications listed below must be cited on every spare part order.

- Machine type: see type plate
- Machine number: see type plate
- Order number: see spare parts list
- Name: see spare parts list

12.2 Spare parts lists

12.2.1 Spare parts list – overflow valve Q

221ELI000582

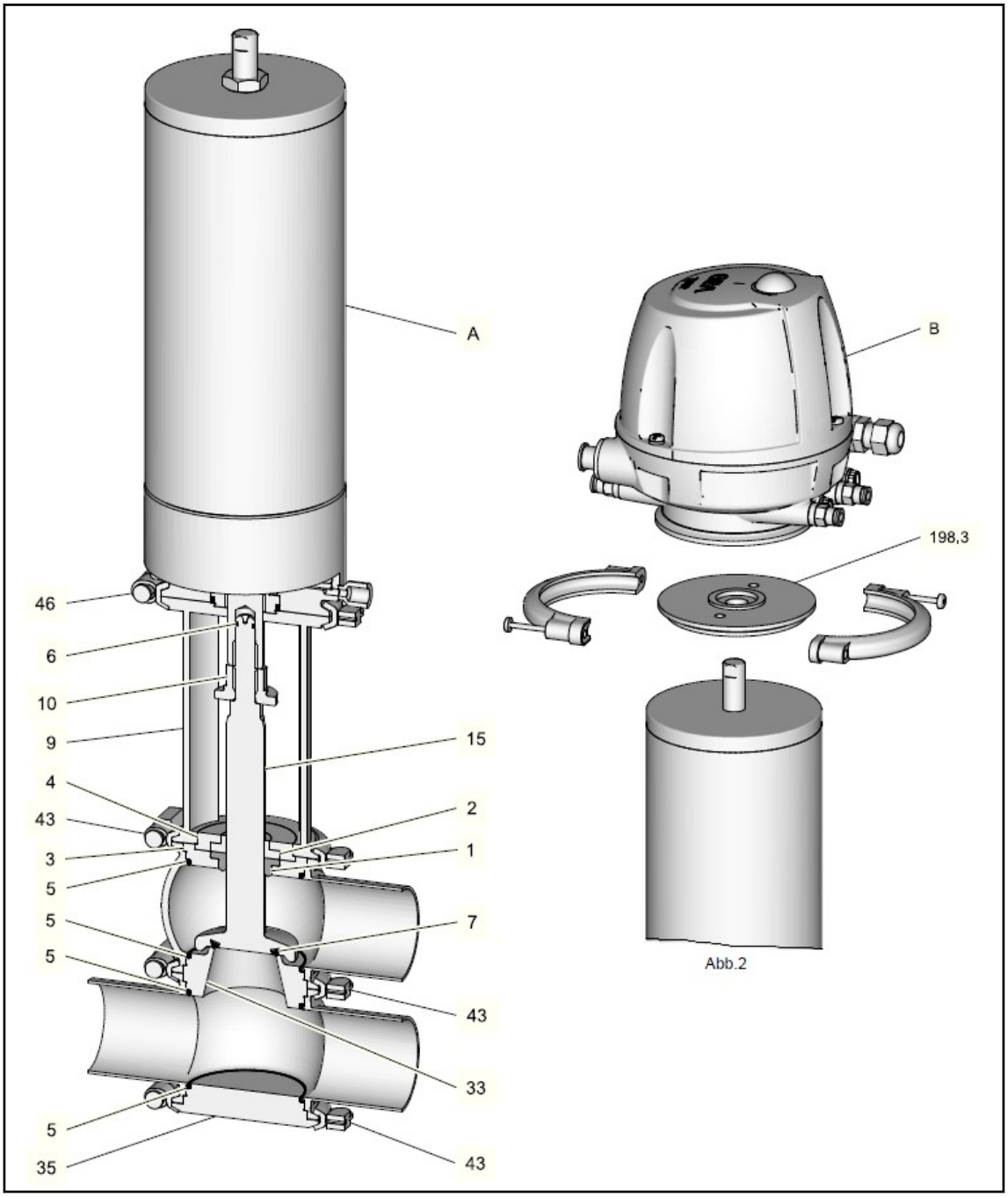
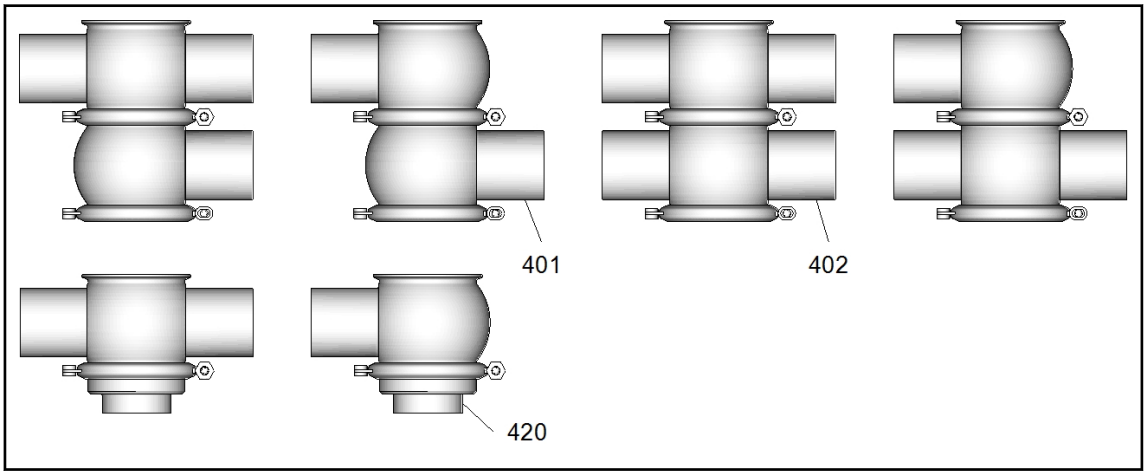


Figure 12-1 - Spare parts – overflow valve Q



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Spare parts list - overflow valve type Q [DN]

Pos.	Designation	Material	DN 25	DN 40	DN 50	DN 65	DN 80	DN 100
Seal set complete 1)		EPDM	221-304.39	221-304.40	221-304.40	221-304.41	221-304.41	221-304.42
		FKM	221-519.49	221-519.50	221-519.50	221-519.51	221-519.51	221-519.52
		HNBR	221-519.62	221-519.63	221-519.63	221-519.64	221-519.64	221-001019
1) The seal set contains items 1, 5, 6 and 7. Items marked with an * are wearing parts. ** Do not grease item 7. *** Q-MET > metal sealing (without V-ring)								
1*	Seal ring	EPDM	924-084	924-084	924-084	924-085	924-085	924-085
		FKM	924-082	924-082	924-082	924-083	924-083	924-083
		HNBR	924-311	924-311	924-311	924-313	924-313	924-313
2	Bearing	PTFE/carbon	935-001	935-001	935-001	935-002	935-002	935-002
	Bearing, 3A	SUSTA-PVDF	935-098	935-098	935-098	935-099	935-099	935-099
3	Seal disk	1.4404	221-141.01	221-141.02	221-141.02	221-141.03	221-141.03	221-141.04
4	Bearing disk	1.4301	221-142.01	221-142.02	221-142.02	221-142.03	221-142.03	221-142.03
5*	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
		HNBR	930-632	930-633	930-633	930-634	930-634	930-863
6*	O-ring	NBR	930-004	930-004	930-004	930-004	930-004	930-004
**7*	V-ring	EPDM	932-058	932-046	932-046	932-021	932-021	932-025
		FKM	932-049	932-030	932-030	932-033	932-033	932-036
		HNBR	932-086	932-087	932-087	932-088	932-088	932-101

Pos.	Designation	Material	DN 25	DN 40	DN 50	DN 65	DN 80	DN 100
9	Lantern	1.4301	221-574.01	221-574.02	221-574.02	221-574.03	221-574.03	221-574.04
10	Lock nut	1.4301	221-147.02	221-147.02	221-147.02	221-147.01	221-147.01	221-147.01
15	Valve disk Q	1.4404	221-266.01	221-266.02	221-266.02	221-266.03	221-266.05	221-266.04
	Valve disk Q-MET***	1.4404	221-339.05	221-339.01	221-339.01	221-339.02	221-339.03	221-339.04
33	Seat ring Q	1.4404	221-274.01	221-274.02	221-274.02	221-274.03	221-274.03	221-274.04
35	Blanking plate	1.4404	221-144.01	221-144.02	221-144.02	221-144.03	221-144.03	221-144.04
43	Clamp connection KL	1.4308	221-507.27	221-507.28	221-507.28	221-507.30	221-507.30	221-507.31
46	Clamp connection KL	1.4308	221-507.29	221-507.29	221-507.29	221-507.29	221-507.29	221-507.29
198.3	Installation base	1.4305	221-007461	221-007461	221-007461	221-007461	221-007461	221-007461
401	Housing V1	1.4404	221-101.19	221-101.21	221-101.22	221-101.05	221-101.06	221-101.07
402	Housing V2	1.4404	221-102.41	221-102.43	221-102.44	221-102.05	221-102.06	221-102.07
420	Housing connection Q	1.4404	221-572.02	221-572.04	221-572.06	221-572.09	221-572.11	221-572.14
A	Actuator F/F-CJ		See parts list for actuator F/F-CJ					
	Actuator M		See parts list for actuator M					
B	Control top T.VIS Q-15		See spare parts list for Control Top T.VIS P-15.					
	Grease RIVOLTA F.L.G. 100g tube not included with seal set.		413-136					

Table 10: Spare parts list - overflow valve type Q (DN 25 - DN 100)

Spare parts list - overflow valve type Q [OD]

Pos.	Designation	Material	1" OD	1.5" OD	2" OD	2.5" OD	3" OD	4" OD
Seal set complete 1)		EPDM	221-304.39	221-304.40	221-304.40	221-304.41	221-304.41	221-304.42
		FKM	221-519.49	221-519.50	221-519.50	221-519.51	221-519.51	221-519.52
		HNBR	221-519.62	221-519.63	221-519.63	221-519.64	221-519.64	221-001019
1) The seal set contains items 1, 5, 6 and 7. Items marked with an * are wearing parts. ** Do not grease item 7. *** Q-MET > metal sealing (without V-ring)								
1*	Seal ring	EPDM	924-084	924-084	924-084	924-085	924-085	924-085
		FKM	924-082	924-082	924-082	924-083	924-083	924-083
		HNBR	924-311	924-311	924-311	924-313	924-313	924-313
2	Bearing	PTFE/carbon	935-001	935-001	935-001	935-002	935-002	935-002
	Bearing, 3A	SUSTA-PVDF	935-098	935-098	935-098	935-099	935-099	935-099
3	Seal disk	1.4404	221-141.01	221-141.02	221-141.02	221-141.03	221-141.03	221-141.04
4	Bearing disk	1.4301	221-142.01	221-142.02	221-142.02	221-142.03	221-142.03	221-142.03
5*	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
		HNBR	930-632	930-633	930-633	930-634	930-634	930-863
6*	O-ring	NBR	930-004	930-004	930-004	930-004	930-004	930-004
**7*	V-ring	EPDM	932-058	932-046	932-046	932-021	932-021	932-025
		FKM	932-049	932-030	932-030	932-033	932-033	932-036
		HNBR	932-086	932-087	932-087	932-088	932-088	932-101

Pos.	Designation	Material	1" OD	1.5" OD	2" OD	2.5" OD	3" OD	4" OD
9	Lantern	1.4301	221-574.01	221-574.07	221-574.07	221-574.08	221-574.08	221-574.09
10	Lock nut	1.4301	221-147.02	221-147.02	221-147.02	221-147.01	221-147.01	221-147.01
15	Valve disk Q	1.4404	221-266.01	221-266.02	221-266.02	221-266.03	221-266.05	221-266.04
	Valve disk Q-MET***	1.4404	221-339.05	221-339.01	221-339.01	221-339.02	221-339.03	221-339.04
33	Seat ring Q	1.4404	221-274.01	221-274.02	221-274.02	221-274.03	221-274.03	221-274.04
35	Blanking plate	1.4404	221-144.01	221-144.02	221-144.02	221-144.03	221-144.03	221-144.04
43	Clamp connection KL	1.4308	221-507.27	221-507.28	221-507.28	221-507.30	221-507.30	221-507.31
46	Clamp connection KL	1.4308	221-507.29	221-507.29	221-507.29	221-507.29	221-507.29	221-507.29
198.3	Installation base	1.4305	221-007461	221-007461	221-007461	221-007461	221-007461	221-007461
401	Housing V1	1.4404	221-101.27	221-101.28	221-101.29	221-101.30	221-101.31	221-101.32
402	Housing V2	1.4404	221-102.52	221-102.53	221-102.54	221-102.55	221-102.56	221-102.57
420	Housing connection Q	1.4404	221-572.01	221-572.03	221-572.05	221-572.08	221-572.10	221-572.13
A	Actuator F/F-CJ		See parts list for actuator F/F-CJ					
	Actuator M		See parts list for actuator M					
B	Control top T.VIS Q-15		See spare parts list for Control Top T.VIS P-15.					
	Grease RIVOLTA F.L.G. 100g tube not included with seal set.		413-136					

Table 11: Spare parts list - overflow valve type Q (OD 1" - OD 4")

Spare parts list - overflow valve type Q [IPS]

Pos.	Designation	Material	2" IPS	3" IPS	4" IPS
Seal set complete 1)		EPDM	221-304.40	221-304.41	221-304.42
		FKM	221-519.50	221-519.51	221-519.52
		HNBR	221-519.63	221-519.64	221-001019
1) The seal set contains items 1, 5, 6 and 7. Items marked with an * are wearing parts. ** Do not grease item 7. *** Q-MET > metal sealing (without V-ring)					
1*	Seal ring	EPDM	924-084	924-085	924-085
		FKM	924-082	924-083	924-083
		HNBR	924-311	924-313	924-313
2	Bearing	PTFE/carbon	935-001	935-002	935-002
	Bearing, 3A	SUSTA-PVDF	935-098	935-099	935-099
3	Seal disk	1.4404	221-141.02	221-141.03	221-141.04
4	Bearing disk	1.4301	221-142.02	221-142.03	221-142.03
5*	O-ring	EPDM	930-144	930-150	930-156
		FKM	930-171	930-176	930-178
		HNBR	930-633	930-634	930-863
6*	O-ring	NBR	930-004	930-004	930-004
**7*	V-ring	EPDM	932-046	932-021	932-025
		FKM	932-030	932-033	932-036
		HNBR	932-087	932-088	932-101

Pos.	Designation	Material	2" IPS	3" IPS	4" IPS
9	Lantern	1.4301	221-574.12	221-574.10	221-574.11
10	Lock nut	1.4301	221-147.02	221-147.01	221-147.01
15	Valve disk Q	1.4404	221-266.02	221-266.05	221-266.04
	Valve disk Q-MET***	1.4404	221-339.01	221-339.03	221-339.04
33	Seat ring Q	1.4404	221-274.02	221-274.03	221-274.04
35	Blanking plate	1.4404	221-144.02	221-144.03	221-144.04
43	Clamp connection KL	1.4308	221-507.28	221-507.30	221-507.31
46	Clamp connection KL	1.4308	221-507.29	221-507.29	221-507.29
198.3	Installation base	1.4305	221-007461	221-007461	221-007461
401	Housing V1	1.4404	221-101.37	221-101.35	221-101.36
402	Housing V2	1.4404	221-102.62	221-102.59	221-102.60
420	Housing connection Q	1.4404	221-572.07	221-572.12	221-572.15
A	Actuator F/F-CJ		See parts list for actuator F/F-CJ		
	Actuator M		See parts list for actuator M		
B	Control top T.VIS Q-15		See spare parts list for Control Top T.VIS P-15.		
	Grease RIVOLTA F.L.G. 100g tube not included with seal set.		413-136		

Table 12: Spare parts list - overflow valve type Q (IPS 2" - IPS 4")

12.2.2 Spare parts list - actuator F / F-CJ

Actuator F / F-CJ

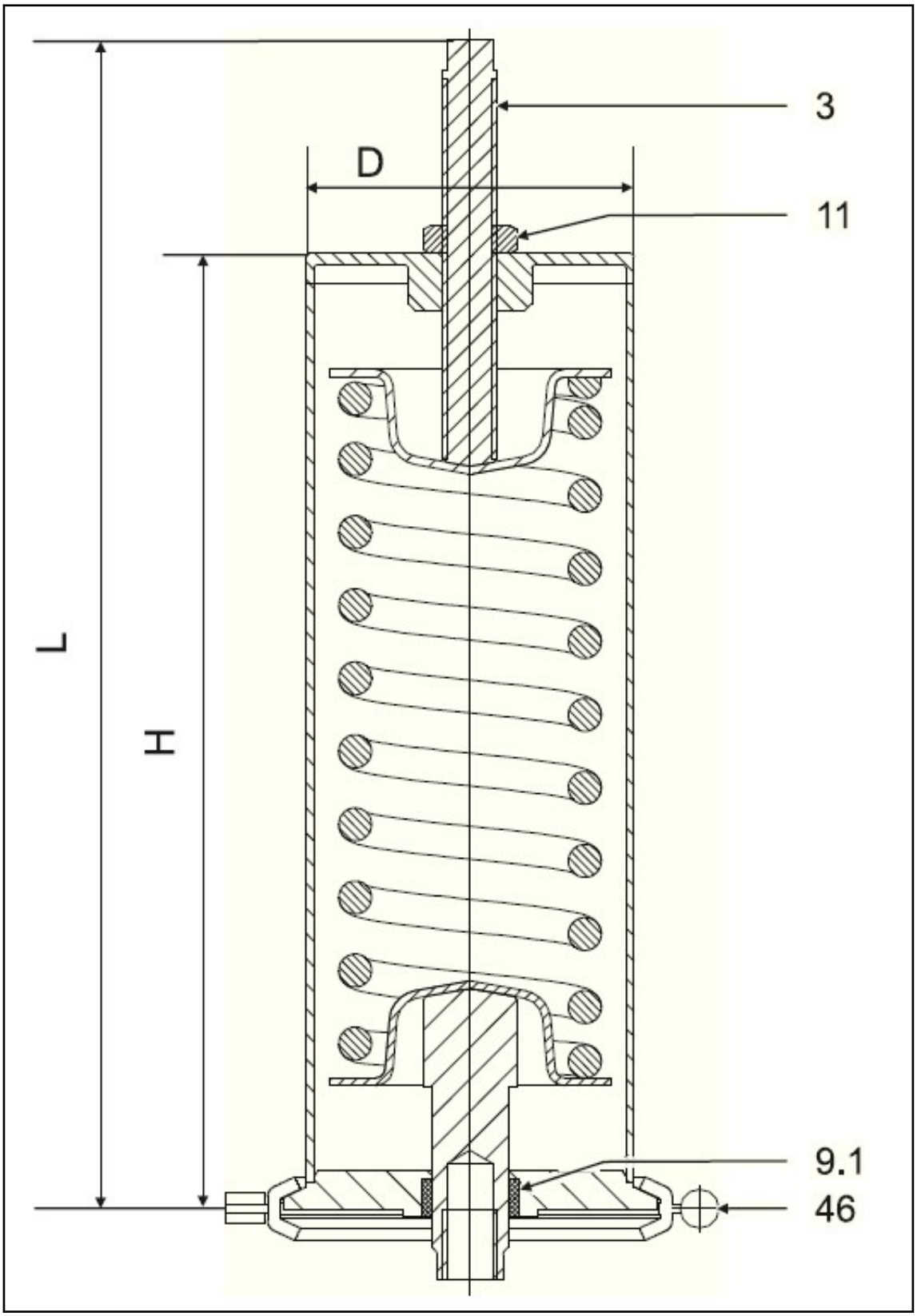


Figure 12-2 - Actuator F

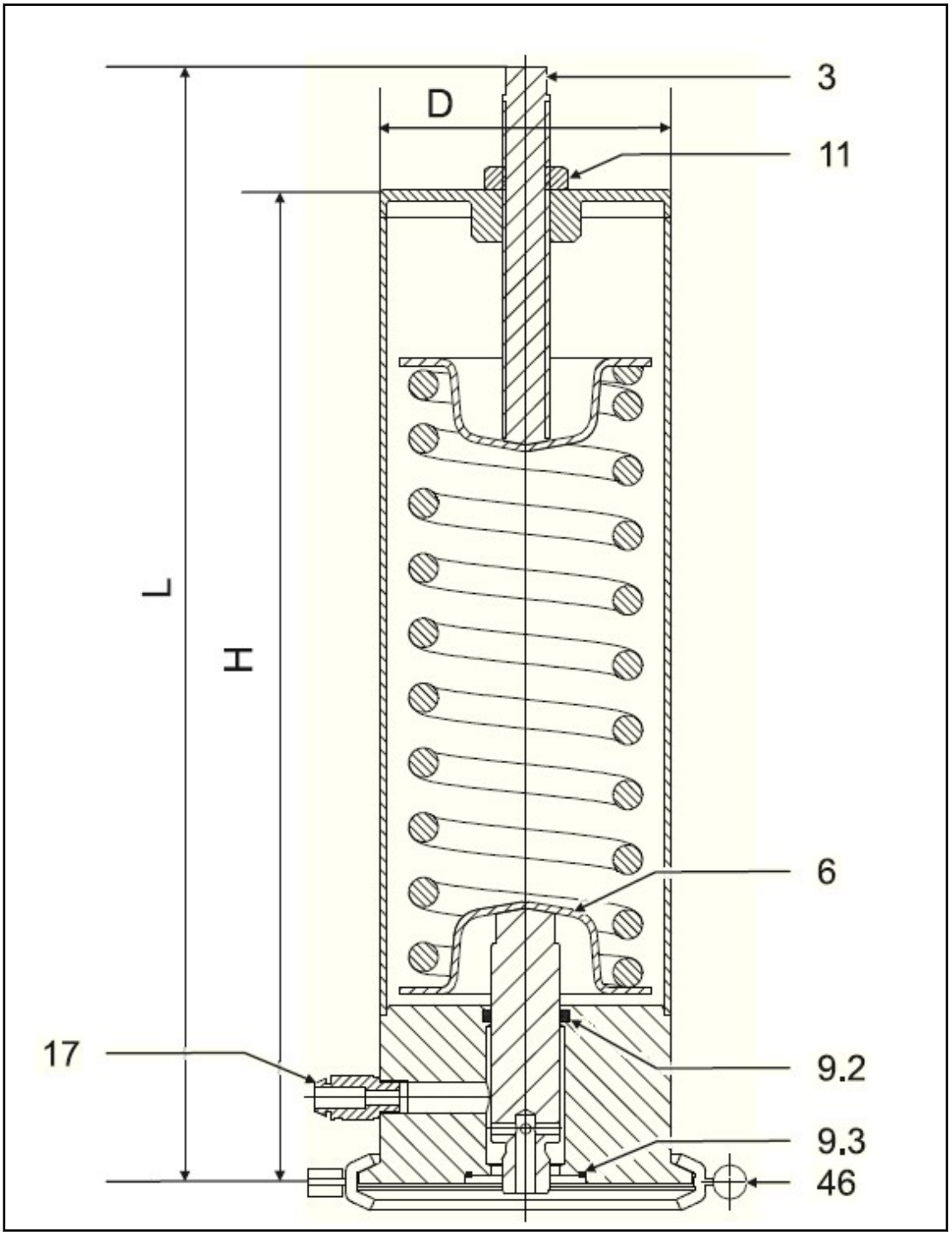


Figure 12-3 - Actuator F-CJ - only use in connection with actuator CJ.

Spare parts list - actuator F

Item	Designation	Material	F 11	F 21	F 1	F 2	F 3	F 4
Actuator complete			221-177 .10	221-177 .11	221-177 .01	221-177 .02	221-177 .03	221-177 .09
3	Pin screw	A4-70	221-177 .05	221-177 .05	221-177 .05	221-177 .05	221-177 .05	221-177 .05
6	Rod F-CJ	1.4301	--	--	--	--	--	--

Item	Designation	Material	F 11	F 21	F 1	F 2	F 3	F 4
9.1	Rod guide ring	Turcite	935-017	935-017	935-017	935-017	935-017	935-017
11	Hexagon nut	A2	910-036	910-036	910-036	910-036	910-036	910-036
17	Screw-in plug connection	Brass/ nickel-plated	--	--	--	--	--	--
46	Clamp con-nection	1.4401	221-507 .06	221-507 .06	221-507 .06	221-507 .06	221-507 .06	221-507 .06

Table 13: Spare parts list - actuator F

Dimensions table - actuator F

Designation	F 11	F 21	F 1	F 2	F 3	F 4
D	85	85	85	85	85	85
H	150	150	250	250	250	250
L	230	230	330	330	330	330

Table 14: Dimensions table - actuator F

Response pressure - actuator F

Metric	Inch OD/IPS	Response pressure (bar)					
--		F 11	F 21	F 1	F 2	F 3	F 4
25	1" OD	1.5 - 4.5	3 - 9	8 - 16	--	--	--
40	1.5" OD	--	1.5 - 2	1.5 - 5	4 - 15	14 - 16	--
50	2" OD	--	--	1.5 - 4	3 - 11	10 - 16	--
65	2.5" OD	--	--	--	1 - 4	3 - 10	9 - 15
80	3" OD	--	--	--	1 - 4	3 - 10	9 - 10
100	4" OD	--	--	--	0.5 - 1.5	0.5 - 4	3 - 7

Table 15: Response pressure - actuator F

Spare parts list - actuator F-CJ

Item	Designation	Material	F 1-CJ	F 2-CJ	F 3-CJ	F 4-CJ
Actuator complete			221-177.13	221-177.12	221-177.14	221-177.15
3	Pin screw	A4-70	221-177.05	221-177.05	221-177.05	221-177.05
6	Rod F-CJ	1.4301	221-00159 1	221-00159 1	221-00159 1	221-00159 1
9.1	Rod guide ring	Turcite	--	--	--	--

Item	Designation	Material	F 1-CJ	F 2-CJ	F 3-CJ	F 4-CJ
9.2	O-ring	NBR	930-026	930-026	930-026	930-026
9.3	O-ring	NBR	930-041	930-041	930-041	930-041
11	Hexagon nut	A2	910-036	910-036	910-036	910-036
17	Screw-in plug connection metric G1/8"-6/4	Brass/nickel-plated	933-176	933-176	933-176	933-176
	Screw-in plug connection imperial G1/8"-6.35	Brass/nickel-plated	933-173	933-173	933-173	933-173
46	Clamp connection	1.4401	221-507.06	221-507.06	221-507.06	221-507.06

Table 16: Spare parts list - actuator F-CJ

Dimensions table - actuator F-CJ

Designation	F 1-CJ	F 2-CJ	F 3-CJ	F 4-CJ
D	85	85	85	85
H	290	290	290	290
L	370	370	370	370

Table 17: Dimensions table - actuator F-CJ

Response pressure - actuator F-CJ

Metric	Inch OD/IPS	Response pressure (bar)			
--		F 1-CJ	F 2-CJ	F 3-CJ	F 4-CJ
25	1" OD	8 - 16	--	--	--
40	1.5" OD	1.5 - 5	4 - 15	14 - 16	--
50	2" OD	1.5 - 4	3 - 11	10 - 16	--
65	2.5" OD	--	1 - 4	3 - 10	9 - 15
80	3" OD	--	1 - 4	3 - 10	9 - 10
100	4" OD	--	0.5 - 1.5	0.5 - 4	3 - 7

Table 18: Response pressure - actuator F-CJ

12.2.3 Spare parts list - actuator M

Actuator M

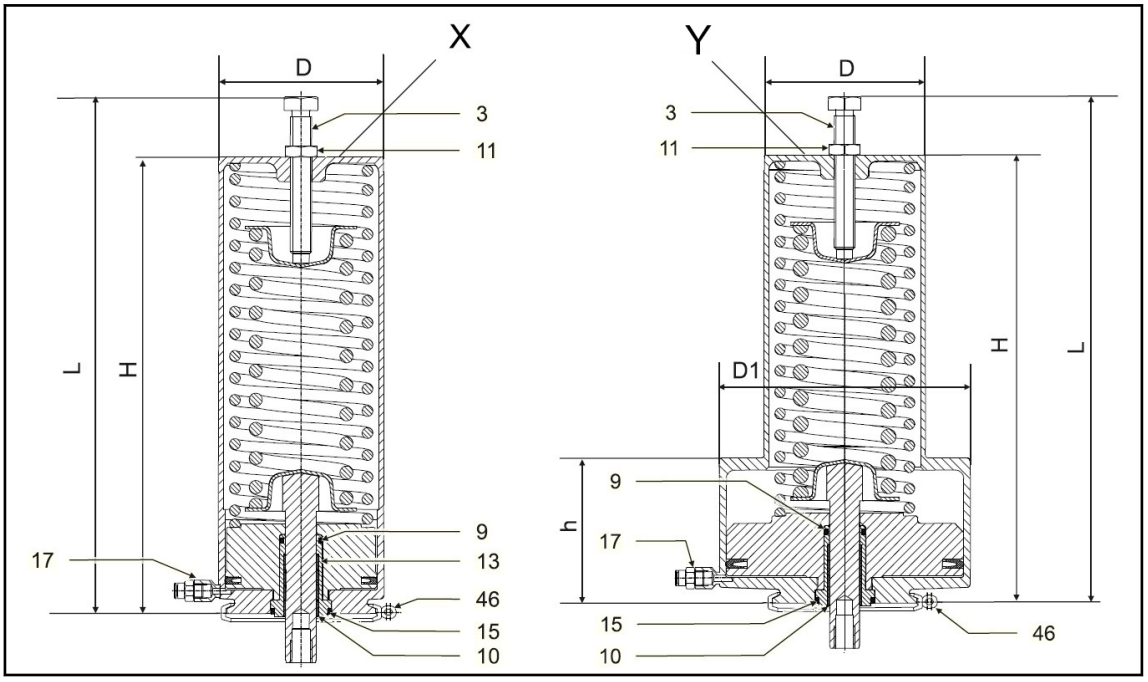


Figure 12-4 - Actuator M

Position Description	Position Description
X - M 11, M 21, M 1, M 2	Y - M 3, M 4, M 5

Spare parts list - actuator M

Item	Designation	Material	M 11	M 21	M 1	M 2	M 3	M 4	M 5
Actuator complete			221-260.05	221-260.06	221-260.01	221-260.02	221-260.14	221-260.13	221-260.16
3	Pin screw	A4-70	221-177.05	221-177.05	221-177.05	221-177.05	221-177.05	221-177.05	221-200569
9	O-ring	NBR	930-029	930-029	930-029	930-029	930-029	930-029	930-029
10	Plain bearing	IGLIDUR-G	704-041	704-041	704-041	704-041	704-041	704-041	704-041
11	Hexagon nut	A2	910-036	910-036	910-036	910-036	910-036	910-036	910-036
13	Bush	1.4301	221-260.15	221-260.15	221-260.15	221-260.15	221-260.15	221-260.15	221-260.15
15	O-ring	NBR	930-251	930-251	930-251	930-251	930-251	930-251	930-251
17	Screw-in plug connection metric G1/8"-6/4	Brass/nickel-plated	933-176	933-176	933-176	933-176	933-176	933-176	933-176
	Screw-in plug connection imperial G1/8"-6.35	Brass/nickel-plated	933-173	933-173	933-173	933-173	933-173	933-173	933-173
46	Clamp connection	1.4308	221-507.29	221-507.29	221-507.29	221-507.29	221-507.29	221-507.29	221-507.29

Table 19: Spare parts list - actuator M

Dimensions table - actuator M

Designation	M 11	M 21	M 1	M 2	M 3	M 4	M 5
D	110	110	110	110	110	110	110
D1	--	--	--	--	170	170	170
h	--	--	--	--	95	95	95
H	195	195	295	295	295	295	365
L	275	275	375	375	375	375	470
Required control air pressure (bar)	3	3	3	4	3	5	6

Table 20: Dimensions table - actuator M

Response pressure (bar) - actuator M

Nominal width Metric	Nominal width Inch OD/IPS	M 11	M 21	M 1	M 2	M 3	M 4	M 5
25	1"	1.5 - 4.5	3 - 9	8 - 16	--	--	--	--
40	1.5"	--	1.5 - 2	1.5 - 5	4 - 15	14 - 16	--	--
50	2"	--	--	1.5 - 4	3 - 11	10 - 16	--	--
65	2.5"	--	--	--	1 - 4	3 - 10	9 - 15	15 - 20
80	3"	--	--	--	1 - 4	3 - 10	9 - 10	15 -20
100	4"	--	--	--	0.5 - 1.5	0.5 - 4	3 - 7	7 - 12

Table 21: Response pressure - actuator M

12.2.4 Spare parts list - actuator CJ

Actuator CJ

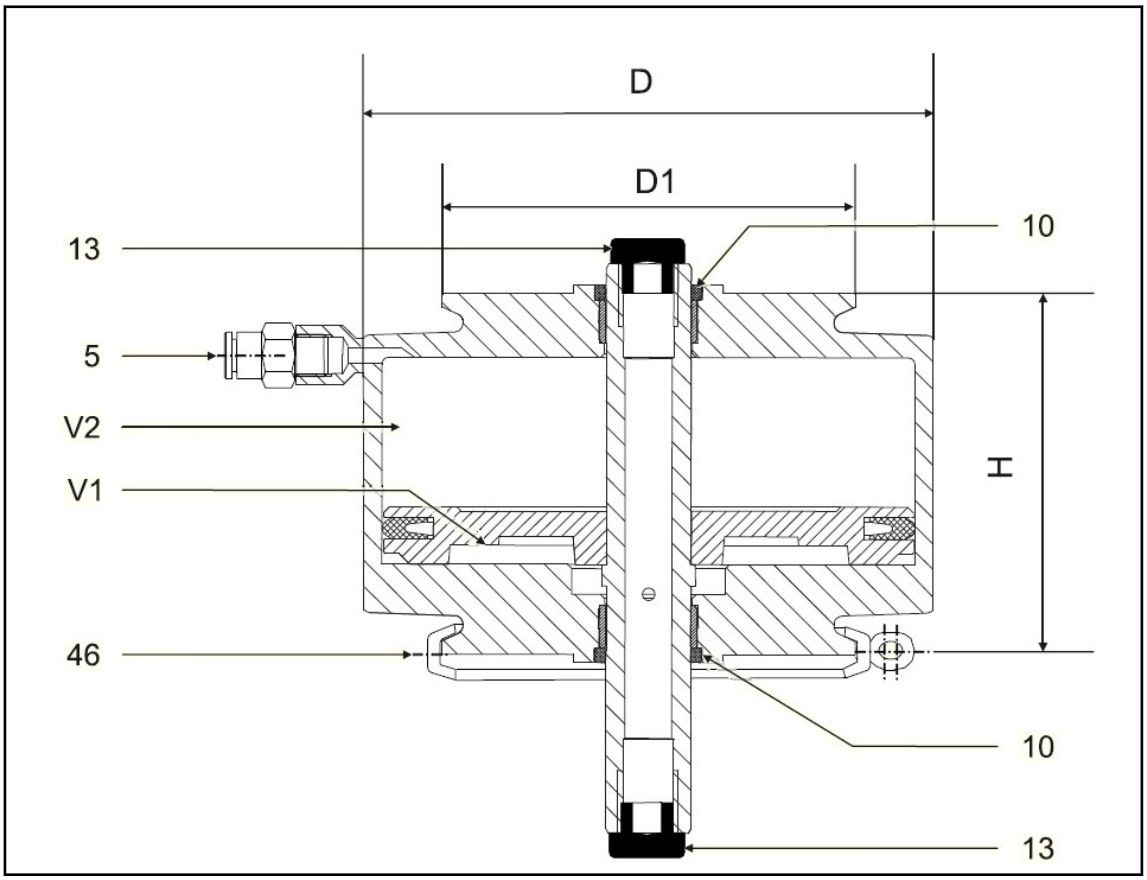


Figure 12-5 - Actuator CJ

Spare parts list - actuator CJ

Item	Designation	Material	Material no.
Actuator CJ complete			221-136.01
5	Screw-in plug connection metric G1/8"-6/4	Brass/nickel-plated	933-176
	Screw-in plug connection, imperial G1/8"-6.35	Brass/nickel-plated	933-173
10	O-ring	NBR	930-026

Item	Designation	Material	Material no.
13	Sealing plug	LD-PE	922-036
46	Clamp connection	1.4401	221-507.06
Stopping plugs, Pos.13, are only used to protect the thread. They must be removed before using the actuator.			

Table 22: Spare parts list - actuator CJ

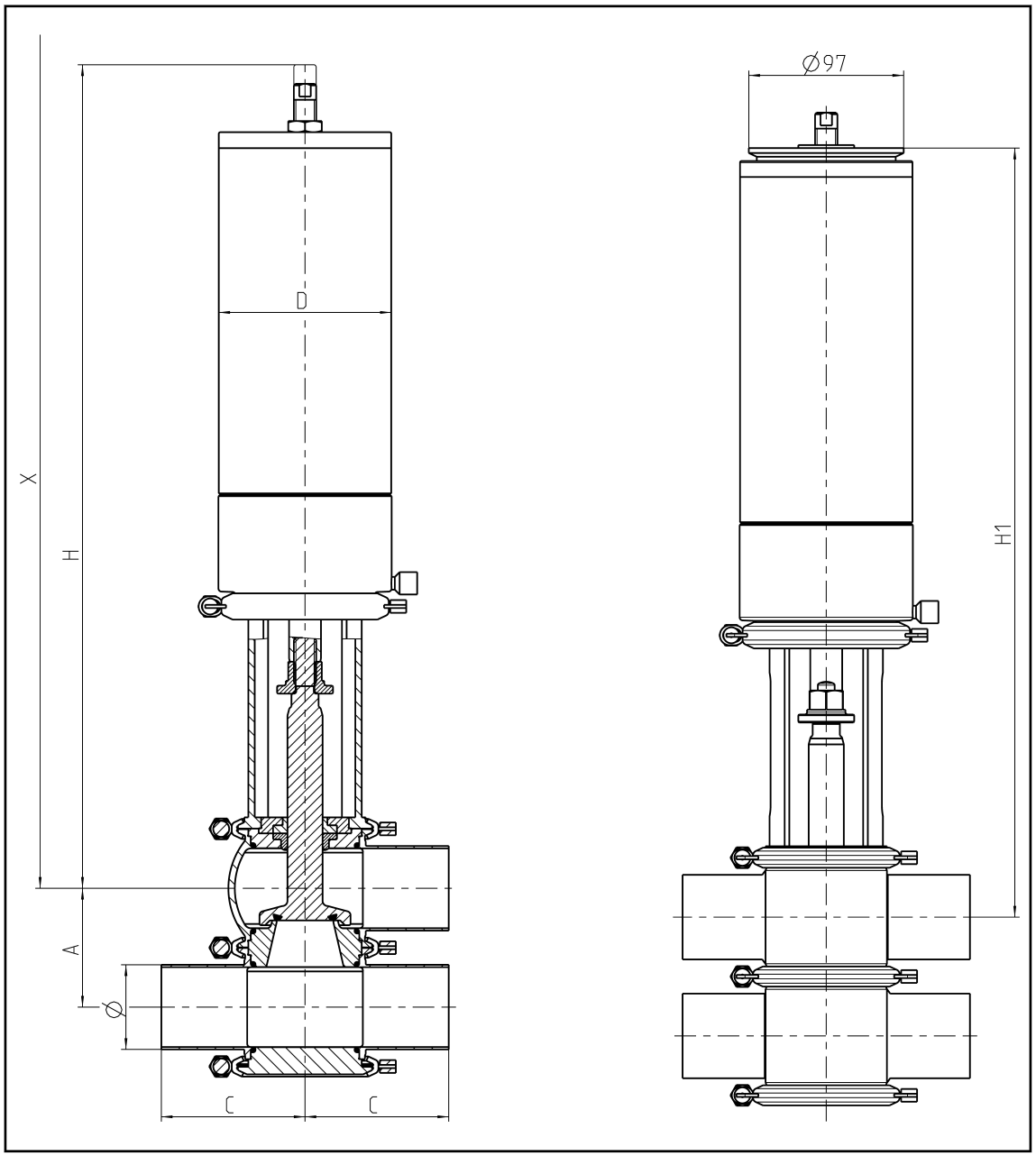
Dimensions table - actuator CJ

Designation		Dimension
D		135 mm
D1		97 mm
H		85 mm
Weight		4.35 kg
Volume V1	not actuated	0.1616 dm^3
Volume V2	actuated (stroke 35)	0.4185 dm^3

Table 23: Dimensions table - actuator CJ

12.2.5 Dimension sheet

Dimension sheet – overflow valve Q



Dimension	DN 25	DN 40	DN 50	DN 65	DN 80	DN 100	
D	29 x 1.5	41 x 1.5	53 x 1.5	70 x 2	85 x 2	104 x 2	104 x 2
A	50	62	74	96	111	130	130
C	90	90	90	125	125	125	125
Actuator F	F11 / 21	F1 / 2	F1 / 2	F3 / 4	F3 / 4	F3 / 4	--

Dimension		DN 25	DN 40	DN 50	DN 65	DN 80	DN 100	
	D	85	85	85	85	85	85	--
	H	394	500	506	517	524.5	534	--
	H1	319	425	431	442	449.5	459	--
	X	480	585	590	660	670	680	--
Actuator F-CJ in combination with actuator CJ	D	--	85/135	85/135	85/135	85/135	85/135	--
	H	--	625	631	642	649.5	659	--
	X	--	710	715	785	795	805	--
Actuator M		M11 / 21	M1 / 2	M1 / 2	M3 / 4	M3 / 4	M3 / 4	M 5
	D	110	110	110	110/170	110/170	110/170	110/170
	H	439	545	551	562	569.5	579	669
	X	525	630	635	705	715	725	820
Stroke		10	15	27	30	30	30	30

Dimension		1" OD	1.5" OD	2" OD	2.5" OD	3" OD	4" OD	
D		25.4 x 1.6	38.1 x 1.6	50.8 x 1.6	63.5 x 1.6	76.2 x 1.6	101.6 x 2	101.6 x 2
A		46	59	71.5	90	103	127.5	127.5
C		90	90	90	125	125	125	125
Actuator F		F11 / 21	F1 / 2	F1 / 2	F3 / 4	F3 / 4	F3 / 4	--
	D	85	85	85	85	85	85	--
	H	392	501.5	508	521	527.5	536	--
	H1	317	426.5	433	446	452.5	461	--
	X	480	585	595	665	675	680	--
Actuator F-CJ in combination with actuator CJ	D	--	85/135	85/135	85/135	85/135	85/135	--
	H	--	626.5	633	646	652.5	661	--
	X	--	710	720	790	800	805	--
Actuator M		M11 / 21	M1 / 2	M1 / 2	M3 / 4	M3 / 4	M3 / 4	M 5

Dimension		1" OD	1.5" OD	2" OD	2.5" OD	3" OD	4" OD	
	D	110	110	110	110/170	110/170	110/170	110/170
	H	437	546.5	553	566	572.5	581	651
	X	525	630	640	710	720	725	820
Stroke		6	15	27.5	31	29	30.5	30.5

Dimension		2" IPS	3" IPS	4" IPS	
D		60.3 x 2	88.9 x 2.3	114.3 x 2.3	114.3 x 2.3
A		81	115	140	140
C		114.3	152.4	152.4	152.4
Actuator F		F1 / 2	F3 / 4	F3 / 4	--
	D	85	85	85	--
	H	502.5	522.5	529	--
	H1	427.5	447.5	454	--
	X	590	670	675	--
Actuator F-CJ in combination with actuator CJ	D	85/135	85/135	85/135	--
	H	627.5	647.5	654	--
	X	715	795	800	--
Actuator M		M1 / 2	M3 / 4	M3 / 4	M 5
	D	110	110/170	110/170	110/170
	H	547.5	567.5	574	644
	X	635	715	720	815
Stroke		27	30	30	30

13 Annex

13.1 List of abbreviations

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]
CIP	Clean in Place
dm^3n	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, Brief 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: Hydrated nitrile butadiene rubber
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
NC	Normally Closed; actuator is spring-to-close, valve is closed in idle position

Abbreviation	Explanation
Nm	Unit of measurement for the tightening torque [newton metre] 1 Nm = 0.737 lbft Pound-Force (lb) + Feet (ft)
NO	Normally Open; actuator is spring-to-open, valve is open in idle position
PA	Polyamide
PE-LD	Low-density polyethylene
PPE	Polyphenylene ether
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.
AF	Indicates 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	Tube measurement according to British Standard (BS), outside diameter
Inch IPS	American pipe measurement, iron pipe size

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