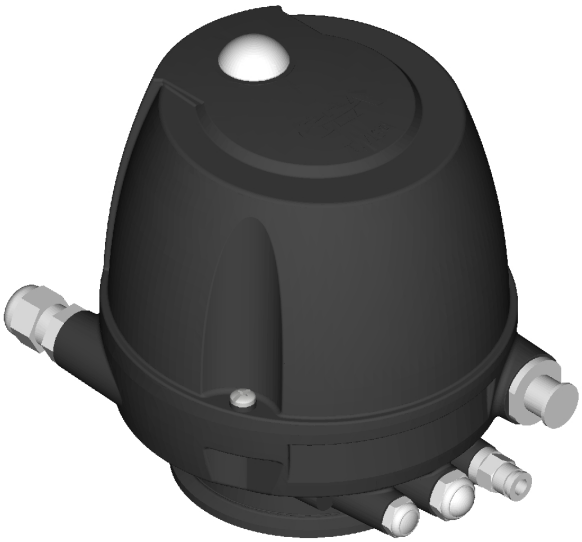
OPERATING INSTRUCTIONS

Translation from the original language



Control and feedback systems

GEA T.VIS® Q-15

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

GEA Tuchenhagen GmbH
Am Industriepark 2-10
21514 Büchen

1.3 Contact

Tel.:+49 4155 49-0
Fax:+49 4155 49-2035

flowcomponents@gea.com
www.gea.com

1.4 EU Declaration of Conformity

Engineering for a better world.

EU Declaration of Conformity

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

We hereby declare that the devices named below

Model: **Control Top T.VIS® Q-15**

Type: **24V DC**
AS-i

due to their 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:	2014/34/EU EMC 2011/65/EU RoHS
Applicable harmonized standards, in particular:	EN 61000-6-2: 2019 EN 61000-6-4: 2019 EN IEC 62026-1:2019 EN 62026-2:2013 IEC 61131-9:2013
Other applied standards and technical specifications:	DIN EN 61326-1:2013-07 DIN EN 61131-2:2008 CISPR11:2015

Remarks:
- The above mentioned standards have been taken into account in accordance with the respective scope of application .

Person authorised for compilation and handover of technical documentation:

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

Büchen, 05 March 2024

Soeren de Boon
Senior Vice President
CEO Valves & Pumps

pp. Stephan Dirks
Senior Director Engineering
Business Line Hygienic Valves
BU Valves & Pumps

1/1

1.5 Translated copy of the EU Declaration of Conformity

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

We hereby declare that the devices named below

Model:	Control top T.VIS®Q-15
Type:	24V DC AS-i

due to their 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:	2014/34/EU EMC 2011/65/EU RoHS
Applicable harmonized standards, in particular:	EN 61000-6-2: 2019 EN 61000-6-4: 2019 DIN IEC 62026-1: 2019 EN 62026-2: 2013 IEC 61131-9: 2013
Other applied standards and technical specifications:	DIN EN 61326-1: 2013-07 DIN EN 61131-2: 2008 CISPR11: 2015

Remarks:

- The standards stated have been taken into consideration according to the respective application area.

Person authorised for compilation and handover of technical documentation:	**GEA Tuchenhagen GmbH** **CE Documentation Officer** **Am Industriepark 2-10** **21514 Büchen, Germany**

Büchen, 05. March 2024

Soeren de Boon
Senior Vice President
CEO Valves & Pumps

pp. Stephan Dirks
Senior Director Engineering
Business Line Hygienic Valves
BU Valves & Pumps

1.6 UK Declaration of Conformity in accordance with the regulations for electromagnetic compatibility 2016

Engineering for a better world.

UK- Declaration of Conformity by Electromagnetic Compatibility Regulations 2016

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

Hereby, we declare that the machine designated in the following

Model:	Control top T.VIS® Q-15
Type:	24 VDC AS-i

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:	Electromagnetic Compatibility Regulations 2016 Regulations: restriction of hazardous substances (RoHS)
Applicable harmonized standards, in particular:	EN IEC 61000-6-2: 2019 EN IEC 61000-6-4: 2019 EN IEC 62026-1: 2019 EN IEC 62026-2: 2013 EN IEC 61131-9:2013
Other applied standards and technical specifications:	DIN EN 61326-1:2013 DIN EN 61161-2: 2008 CISPR11:2015

Remarks:
- The above-mentioned standards have been taken into account in accordance with the respective scope of application

Person authorised for compilation and handover of technical documentation:

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

Büchen, 05 March 2024

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i.V.
pp. Stephan Dirks
Senior Director Engineering
Business Line Hygienic Valves
BU Valves & Pumps

1/1

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2 Safety

2.1 Intended use

All VARIVENT overflow valves can be connected pneumatically and electrically using the automatic control top T.VIS Q-15. Using the device for any other purpose is considered contrary to its designated use.

The control top T.VIS Q-15 is available as

- without solenoid valve as position indicator
- with solenoid valve as control top

The control top T.VIS Q-15 is completely installed on the dedicated actuator/ adapter of the overflow valve by means of a clamp connection. For overflow valves, the control top has an option for supplying the air externally via a hose.

The control top T.VIS Q-15 may not be used in areas where ATEX approval is required.

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 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 Signs

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

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

Signs on the control top	
Sign	**Meaning**
 Fig.1	General hazard warning
 Fig.2	Warning Crushing

2.8 Residual dangers

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

Residual dangers on the control top and measures		
Danger	**Cause**	**Measure**
Danger to life	Inadvertent switch-on of the control top	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.
Damage to property	Welding can cause damage to the electronics or result in data loss.	Do not carry out any welding work in the vicinity of the control top or make sure electronics are properly protected.
	Voltage peaks	The permitted voltage ranges of the respective connection types can be found in chapters 5.3 to 5.6 and must not be exceeded.

2.8.1 Electrostatically Endangered Components and Modules

The control top contains electronic components that are sensitive to electrostatic discharge (ESD). Contact with electrostatically-charged persons or objects can endanger these components. In the worst case they are destroyed immediately or fail after being put into operation.

To minimize or prevent the possibility of damage resulting from sudden electrostatic discharge,

- observe the requirements of DIN EN 61340-5-1 and 5-2 and
- take care not to touch the electronic components!

2.8.2 Instructions for the Safe Handling of Electronic Components During Welding Work

Notice

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.a. Ensure the device is switched off and no electrical connections are active.
   1.b. 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.a. 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.a. Remove the welding machine's ground connection.
   3.b. Reconnect the device to the power supply.
   3.c. Perform a function test.

2.9 Danger zones

Please observe the following notes:

- In the event of malfunctions, shut down the control top (disconnect from the power and air supply) and secure it against being used.
- Before starting any service, maintenance or repair work, disconnect the control top 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 control top at regular intervals. Immediately repair loose connections and damaged 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.

3 Description

3.1 Functional description

3.1.1 Operation Principle

The control top T.VIS Q-15 works with a microprocessor that contains the software for operation, visualization and position detection. Opening of the valve is detected via an external sensor in the lantern and sent to the microprocessor.

Electrostatically endangered components/modules!

- The control top contains electronic components that are sensitive to electrostatic discharge (ESD). Contact with electrostatically-charged persons or objects can endanger these components. In the worst case they are destroyed immediately or fail after being put into operation.
- Observe the requirements of DIN EN 61340-5-1 and 5-2 to minimize or prevent the possibility of damage resulting from sudden electrostatic discharge.
- Also take care not to touch electronic components when supply voltage is present.
- Use ESD-compliant packaging when returning electronic components. (Contact GEA Tuchenhagen if you have any questions.)

3.1.2 Control top without solenoid valves

The control top T.VIS Q-15 without solenoid valves acts as a position indicator. After programming, it indicates the status of the overflow valve locally by coloured LEDs under the illuminated dome so that it is visible over a long distance.

The position feedback signals are supplied to the user in one of the following ways, depending on the communication method selected:

- 24V DC switching output
- AS interface data bit

3.1.3 Control Top with Solenoid Valves

The control top with solenoid valves acts as a control top. The signalling takes place in the same way as with the control top without solenoid valves (position indicator). The difference is that the solenoid valve integrated in the base is operated in accordance with the control signals. Depending on the design of the overflow valve, up to 2 solenoid valves can be installed in the control top.

To lift the valve disk or activate air application (D-force), manual actuation of the valves can be used. To do this, use a screwdriver to turn the screw (S) from 0 to 1, see figure.

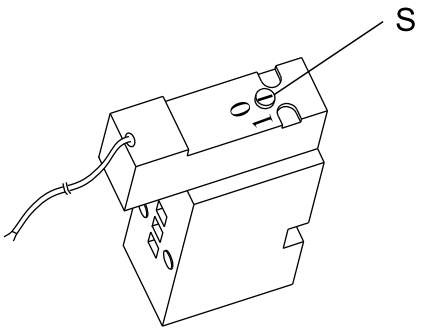
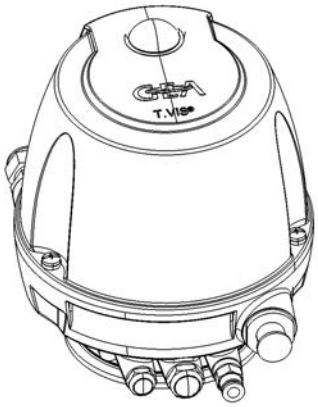


Fig.3

3.1.4 Control top with hood without buttons



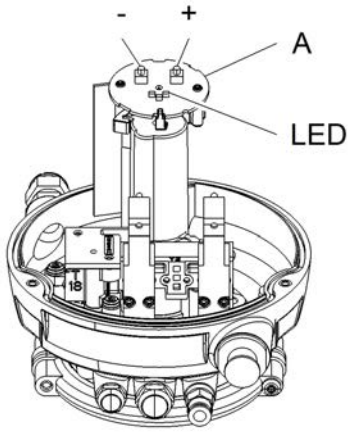


Fig.4: Control top with hood without buttons

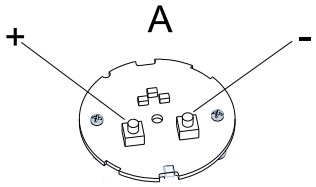


Fig.5: Circuit board (A)

According to protection class IP67 and/or 69k (EN 60529) the control top T.VIS Q-15 is suitable for use in this design and if the electrical and pneumatic connections are installed correctly.

To operate the control top, take off the cap and press the plus/minus buttons directly on the circuit board (A).

Observe the general instructions regarding ESD protection.

Operation see Chapter 8, Page 50.

3.1.5 Function of the buttons

Automatic SETUP is always activated through the buttons on the printed circuit board. For safety reasons, the buttons are only enabled within a specific time window after activation of the operating voltage. During this time window, functions can be started. The buttons are automatically locked again after the allowed time has expired.

During SETUP the control top autonomously detects the number of solenoid valves fitted in the control top and carries out the required programming steps fully automatically.

It is also possible use the function “Colour variant” to change the colours for visualisation of the non-actuated position.

3.1.6 Safety Air Exhaust/Installation Position

To provide protection against excess pressure which can build up in the inside of the control top, a vent plug E2 is fitted in the base. In operating mode, the exhaust air from the lifting actuator is discharged via this vent plug. In the unlikely event of a damaged solenoid valve or in case of sealing problems, pressure relief is ensured.

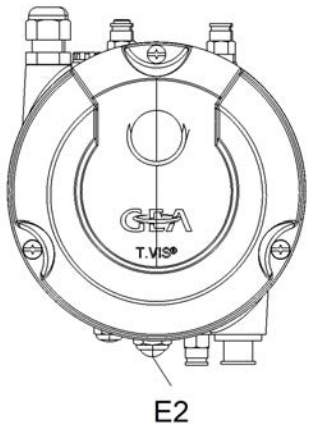


Fig.6: Control top (standard variant in IP66)

This vent plug is a safety device that must be handled as such. Do not cover the vent plug. When fitting the control top note that the installation position of the vent plug E2 must never be pointing vertically upwards.

4 Transport and storage

4.1 Storage conditions

You must first dry and preserve the control top to prevent damage if the control top is exposed to temperatures ≤ 0°C during transport or storage.

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

For transport, the following principles apply:

- Only use suitable lifting gear and slings for transporting the package units/ control tops.
- Observe the pictograms on the package.
- Control tops must be protected from animal and vegetable fats.
- The synthetic materials of the control tops are susceptible to breaking. Take care when transporting the control top. Do not grip sensitive parts of the unit to lift or push the unit or to support yourself.

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 is used to uniquely identify the control top.

Fig.7

Code/Type	T Q 1 5	J	9	B	A	H
Item in the order code	14	15	16	17	18	19

Explanation of the items in the order code		
Item in the order code	**Designation**	**Explanation**
14	**Feedback location**	
	T Q 1 5	Control top T.VIS Q-15
15	**Control top type**	
	N	without solenoid valve
	P	1 solenoid valve Y3=Lift valve disk
	J	2 solenoid valves Y1 = D-force; Y3=Lift valve disk
16	**Feedback**	
	9	External initiator (valve disk)
17	**Type of interface/mode**	
	A	AS-interface (A/B slave)
	B	24 V DC 3-wire PNP
18	**Solenoid valve**	
	A	24 V DC
	0	without
19	**Screw connection (cable/air) for air hose Ø 6/4 mm (metric)**	
	J	5-pin connector M12 AS-interface

Explanation of the items in the order code		
Item in the order code	**Designation**	**Explanation**
	H	8-pin connector M12 24 V DC
	for air hose Ø 6.35/4.31 mm (imperial)	
	P	5-pin connector M12 AS-interface
	N	8-pin connector M12 24 V DC
Options	/22	5-pin M12 junction box for screw connection J, P (Material No. 508-963) 8-pin M12 junction box for screw connection H, I (Material No. 508-061)
	/81	AS-i junction box on cable 1m with M12 junction box for screw connection J or P
	/82	AS-i junction box on cable 2m with M12 junction box for screw connection J or P
	/UC	Certification UL/CSA For indoor use and only for the type of interface connection: A - AS-interface B - 24 V DC

5.2 Technical data

Refer to the following tables for the key technical data of the control top:

Technical data: compressed air supply, product pressure and CIP pressure	
Designation	**Description**
Air hose	
• Metric	Material PE-LD Outside Ø 6 mm +/-0.1 mm Inside Ø 4 mm
• Inch	Material PA Outside Ø 6.35 mm +/- 0.1 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 in 1m^3 air
Control air pressure	6 bar (87 psi), max. 8 bar (116 psi) configuration with standard drive Alternative combinations of product pressure and control air pressure on request

Technical data: materials	
Designation	**Description**
Housing	PA 12/L
Seals	NBR / EPDM / FKM
Operating elements	TPE

Technical data: electrical specifications	
Designation	**Description**
Protection class EN 60529	IP66 - powerful water jet IP67 - immersion IP69 - high pressure
EC EMC directives	2014/30/EU
Immunity for industrial environments	EN 61000-6-2: 2005
Radio frequency interference	EN ISO 61000-6-4:2007 + A1: 2011
EC Low Voltage Directive	73/23/EEC
Electrical wiring configuration	– 5-pin M12 round connector only with AS-interface or – 8-pin M12 round plug only with 24V version
Signal attenuation of feedback group	none; short; medium; long

5.3 Specifications for 24V DC version

Technical data: supply	
Designation	**Description**
Supply voltage UV	24 V DC (+20%... -12.5%)
Current consumption	
– No-load current	≤ 25 mA
– One solenoid valve incl. relay function	60...70 mA
– PLC-typical load of the feedback	10 mA
– (max. load of the feedback)	50 mA
– Proximity switch	10 mA
Total	205 mA

Technical data: inputs	
Designation	**Description**
Control voltage	max. 28.8 V DC High = ≥ 13 V DC Low = ≤ 6 V DC
Control current	≤ 10mA

Technical data: outputs	
Designation	**Description**
Output voltage	High = UV - ≤ 1 V Low = ≤ 5 V
Max. current per output	100 mA short circuit proof
Switching frequency (ohmic + inductive loads ≤ 25 mH)	2 Hz

5.4 Specifications for AS-interface

Technical data: supply	
Designation	**Description**
Supply voltage UV	26.5...31 V DC
Current consumption - No-load current - One solenoid valve incl. relay function - Initiator	 ≤ 25 mA 60...70 mA 10 mA
Total	approx. 105 mA

Software version C (see version label CASi)

Technical data: inputs as seen from the AS-interface master			
Bit		**Feedback**	**Signal**
DI0*		**S1**	D-force deactivated
DI1*		**S2**	D-force activated
DI2		**S3**	0 = Valve disk lifted 1 = Valve disk in non-actuated position
DI3		not assigned	

Technical data: outputs as seen from the AS-interface master		
Bit	**Actuation**	**Signal**
DO0	**PV Y1** Activation of solenoid valve Y1	1 = solenoid valve activated 0 = solenoid valve not activated
DO1	**PV Y2** not assigned	not assigned
DO2	**PV Y3 (if PV Y1 = 0)** Activation of solenoid valve Y3	1 = solenoid valve activated 0 = solenoid valve not activated
DO3	Reserved for A/B identification	

Technical data: electrical specifications	
Designation	**Description**
ASi specification	V3.0 (A/B slave)
Configuration IO code / ID code / ID2 code	7.A.7.E.
Reverse voltage protection	yes

5.5 Accessories

Accessories must be ordered separately.

Accessories	Part no.
Cable socket, angular – M12; 5-pole: A coded	508-963
Cable socket, straight – M12; 8-pole: A-coded	508-061
Cable socket, straight – M12; with 1 m cable and ASI insulation displacement terminal	508-027
Cable socket, straight – M12; with 2 m cable and ASI insulation displacement terminal	508-028

5.6 Tool

List of tools	
Tool	**Material no.**
Hose cutter	407-065
Hex key, size 3	408-121
Pin-type face spanner, pin dia. 4	9065837
Open-ended wrench a/f 23	408-046
Open end spanner a/f 16x18	408-138
Open-ended wrench a/f 15	408-035
Open end spanner a/f 13x17	408-036
Open-ended wrench, a/f 24+27	408-040

5.7 Lubricants

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

5.8 Equipment

Technical data - equipment	
Equipment	**Material no.**
Proximity switch M12x1 in the lantern • after NAMUR, normally open contact • 7.5...30 V DC • Ambient temperature: -20...+70°C • Protection class IP 67 • metal-vaporized switching	505-041
Solenoid valve • 24 V DC (+20% / -12.5%), 0.85 W • Ambient temperature: -20...+60°C • Protection class IP 51 • Pressure range: 2.0...8.0 bar	512-169
Sound absorber G 1/8" • Filter material: stainless steel wool • Ambient temperature: -20...+70°C • max. pressure 10 bar	933-175
Sound absorber G 1/4" • Filter material: stainless steel wool • Ambient temperature: -20...+70°C • max. pressure 10 bar	933-174

6 Assembly and installation

6.1 Safety instructions

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

For installation, the following principles apply:

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

6.2 Establishing hose connections

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

Tools required:

- Hose cutter

Carry out the following steps:

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

→ Done.

Hint!

Avoid kinks in the pneumatic hoses!

6.3 Pneumatic connection

6.3.1 Control top without solenoid valve

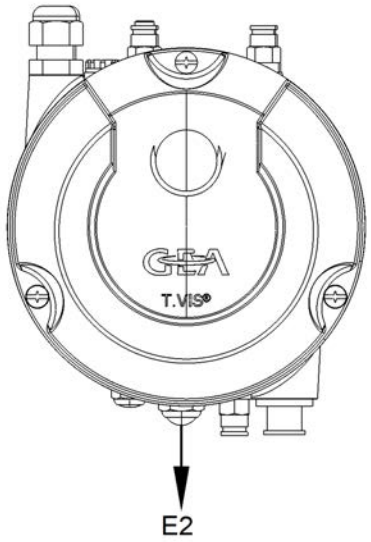


Fig.8: Control top

E2	Safety ventilation against overpressure and exhaust air of the main stroke Y3 Non-return valve Connection E2 must not be closed!

6.3.2 Control top with 1 solenoid valve (Y3)

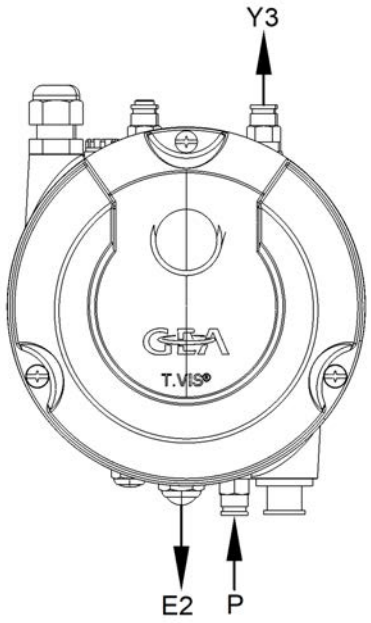


Fig.9

E2	Safety ventilation against overpressure and exhaust air of the lifting stroke Y3 Non-return valve Connection E2 must not be closed!
P	Central air supply with integrated filter
Y3	Air connection for lifting stroke

6.3.3 Control top with 2 solenoid valves (Y1 and Y3)

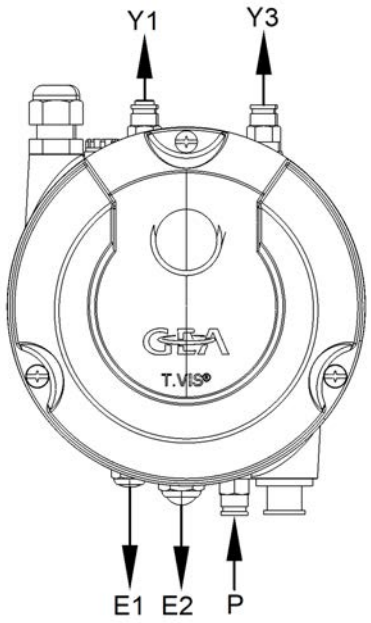


Fig.10: Control top

E1	Ventilation D-force Y1 with sound absorber Connection E1 must not be closed!
E2	Safety ventilation against overpressure and exhaust air of the lifting stroke Y3 Non-return valve Connection E2 must not be closed!
P	Central air supply with integrated filter
Y1	Air connection D-force
Y3	Air connection for lifting stroke

6.4 Electrical connections

⚠ Danger

To satisfy the UL requirements, use a protective insulation power-limited power supply according to UL/IEC 60950 or power limited according to UL/IEC 61010-1 3cd cl. 9.4 or a Class II power supply according to NEC.

►

6.4.1 Overview

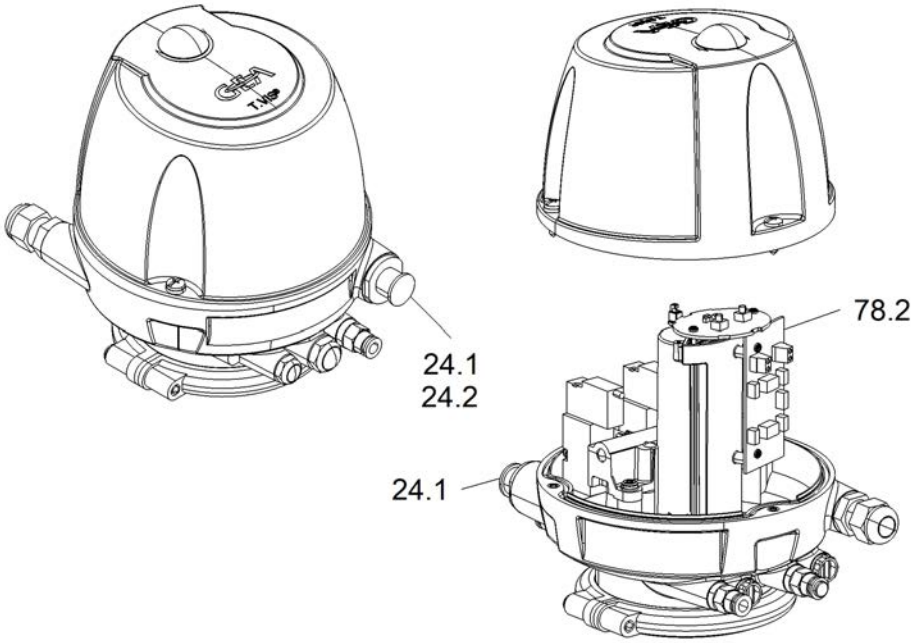


Fig.11

Danger

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

►

Hint!

The cables must be suitable for use in the temperature range from -20 °C to 75 °C!

6.4.2 Electrical 24 V DC Wiring

6.4.2.1 Connector M12 / 8-pin (24.1)

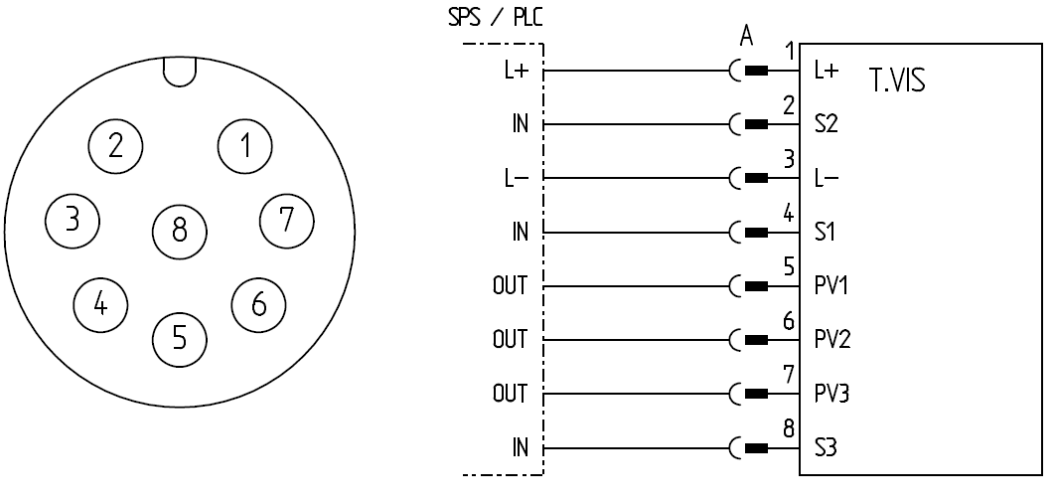


Fig.12: 8-pin M12 plug-in connector A-coded: device connector and view of pin strip

Corresponding cable socket part no. 508-061.

1	L+	U_V L+24V DC supply voltage
2	S2	Signal downforce active
3	L-	U_V L- reference potential
4	S1	Signal downforce inactive
5	PV1	Actuation of solenoid valve Y1 (D-force)
6	PV2	not assigned
7	PV3	Actuation of solenoid valve Y3 (valve disk lift)
8	S3	Lift (external initiator)

Carry out the following steps:

1. Connect cable via air connector M12/8-pin.

→ Done.

6.4.3 Electrical Wiring of AS-Interface

6.4.3.1 Plug M12 / 5-pin (24.1)

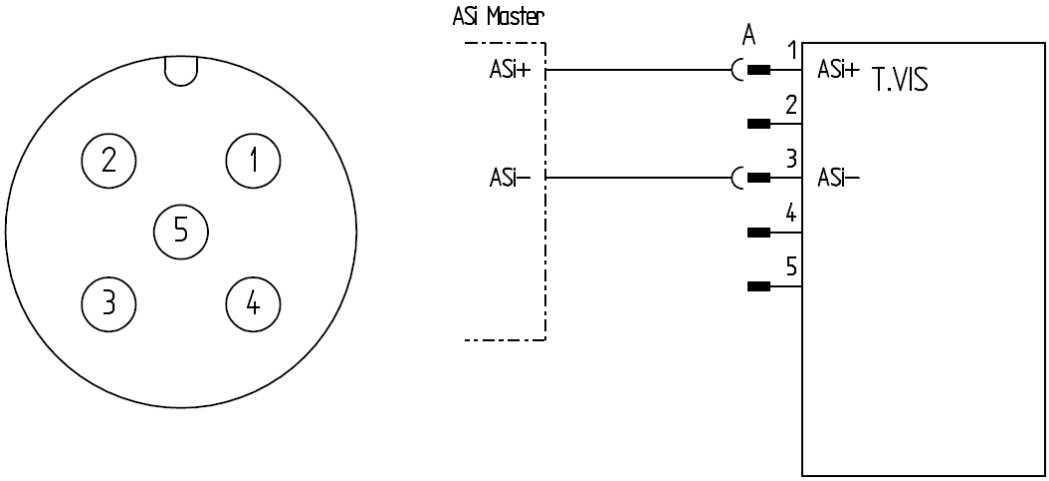


Fig.13: 5-pin M12 plug-in connector A-coded: device connector and view of pin strip

Associated cable sockets part 508-027, 508-028 and 508-963.

1	AS-I+
2	Not connected
3	AS-I-
4	Not connected
5	Not connected

Carry out the following steps:

1. Connect cable via air connector M12/5-pin.

→ Done.

6.4.3.2 External Proximity Switch (78.2)

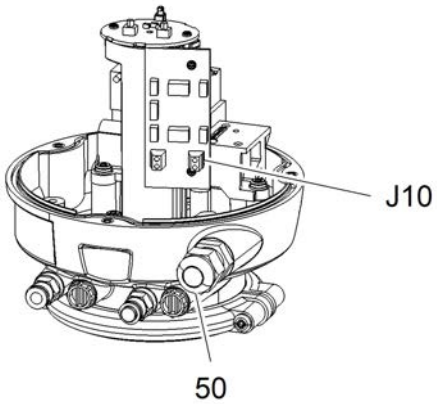


Fig.14

⚠ Caution!

Only use proximity switches specified in the chapter "Technical data", see Chapter 5, Page 21.

► The use of a different initiator leads to no feedback being sent.

Carry out the following steps:

1. Insert the cable (Ø 3-7mm) through the cable gland (50) and connect it to the terminal (K1) according to the connection diagram. see Section 6.4.4, Page 37.
2. Secure the cable in the cable gland at a torque of 2.5 Nm.

→ Done.

6.4.4 Connection diagram for T.VIS circuit board (bottom)

24V DC

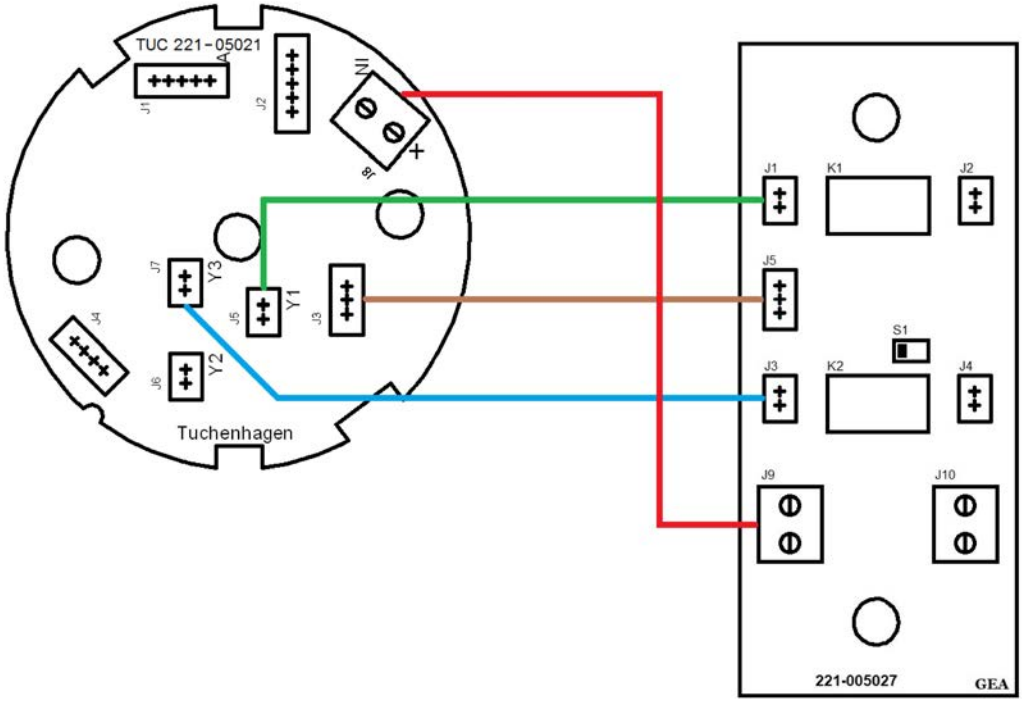


Fig.15

AS-interface

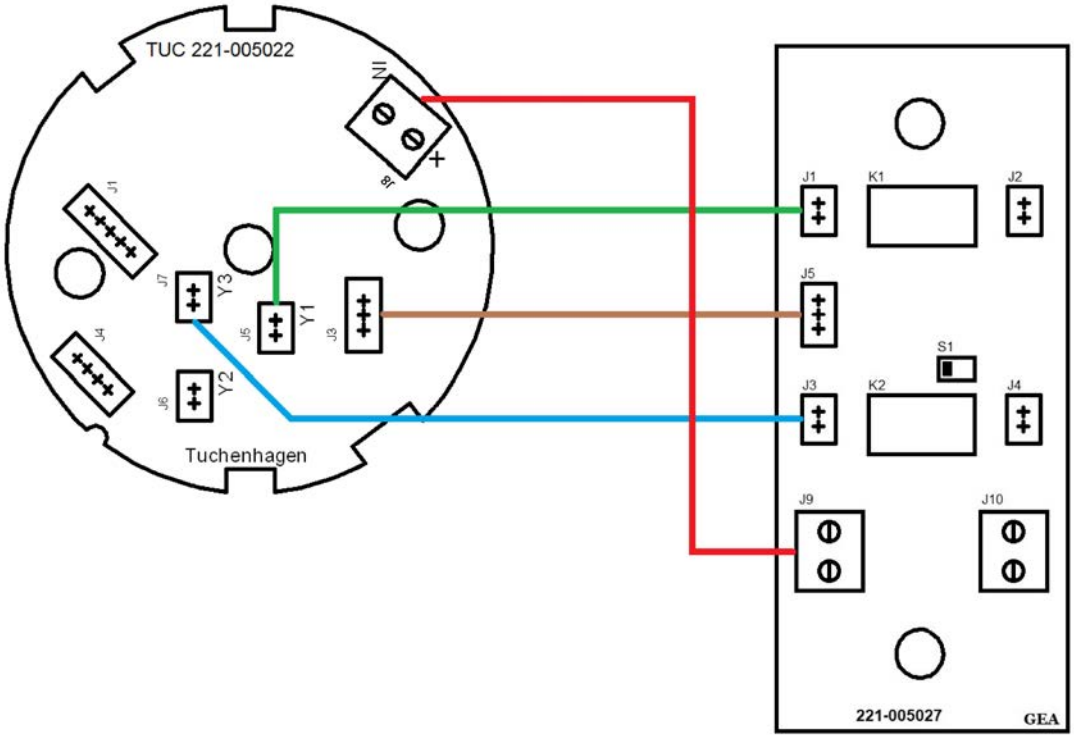


Fig.16

Explanation of the connection assignment (221-005021 and 221-005022)			
Connector position	**Connector type**	**Item no. in the Spare Parts List**	**Designation**
J1	PicoBlade 5-pin	24.1(only for printed circuit board 24VDC) 24.2(only for printed circuit board ASi)	Connector M12/3
J2	PicoBlade 5-pin	24.1	Connector M12/3 (only with 221-005021)
J3	Pico-Blade 3-pin	--	Evaluation signal S1 and S2
J4	PicoBlade 4-pin	--	Diagnostics connection / data interface
J5	PicoBlade 2-pin	--	See Fig. 17 and 18
J7	PicoBlade 2-pin	--	See Fig. 17 and 18
J8	Terminal strip	--	See Fig. 17 and 18

Explanation of the connection assignment (221-005027)			
Connector position	**Connector type**	**Item no. in the spare parts list**	**Designation**
J1	Pico-Blade 2-pin	--	See Fig. 17 and 18
J2	Pico-Blade 2-pin	63	Solenoid valve Y1
J3	Pico-Blade 2-pin	--	See Fig. 17 and 18
J4	Pico-Blade 2-pin	63	Solenoid valve Y3
J5	Pico-Blade 3-pin	--	See Fig. 17 and 18
J9	Terminals 2-pin	--	See Fig. 17 and 18
J10	Terminals 2-pin	78.2	Cable connection external initiator

6.5 Visual Display

6.5.1 Illuminated dome

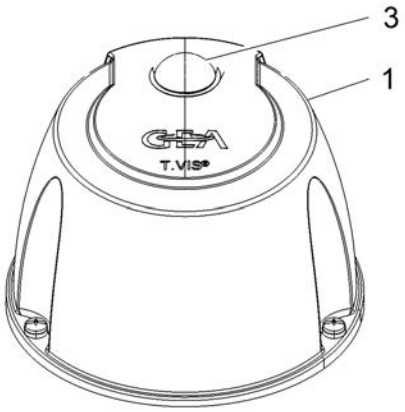


Fig.17

1	Cap
3	Illuminated dome

The following statuses are visualized by the illuminated dome:

- Valve in non-actuated position: green, see also Section 6.5.2, Page 40
- Downforce activated: yellow, see also Section 6.5.2, Page 40
- Valve disk lifted: yellow flashing
- Programming mode active: red
- Default, standard version:

  Control top not programmed: flashing 3 times - pause - flashing 3 times - pause
- Default, special version:

  Control top not programmed: flashing 2 times - pause - flashing 2 times - pause

There is a power failure if no signal is displayed for more than 5 seconds!

6.5.2 Colour Changeover

The "colour changeover" function allows you to swap the colour (from green to yellow or yellow to green) for the following visualizations: valve in non-actuated position, downforce activated, lift.

Carry out the following steps:

1. Disconnect the control top from the power supply.
2. Press both buttons at the same time and keep them pressed.
3. Switch the power supply back on. After switching on the power supply voltage, continue to press the buttons for another 3 seconds.

→ Done.

Hint!

With colour changeover, only the optional D-force signals are swapped!

6.6 Installation of the control top on overflow valves

This chapter describes how the control top is installed on and removed from overflow valves. Observe the following notes when doing so.

Notice

The vent plug E2 is a safety element.

If the element is not installed correctly or if the vent is covered, the safety function is no longer guaranteed.

► The installation position of the vent plug E2 must never be pointing vertically upwards.
► The vent plug E2 must never be covered.

6.6.1 Installation on overflow valve

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

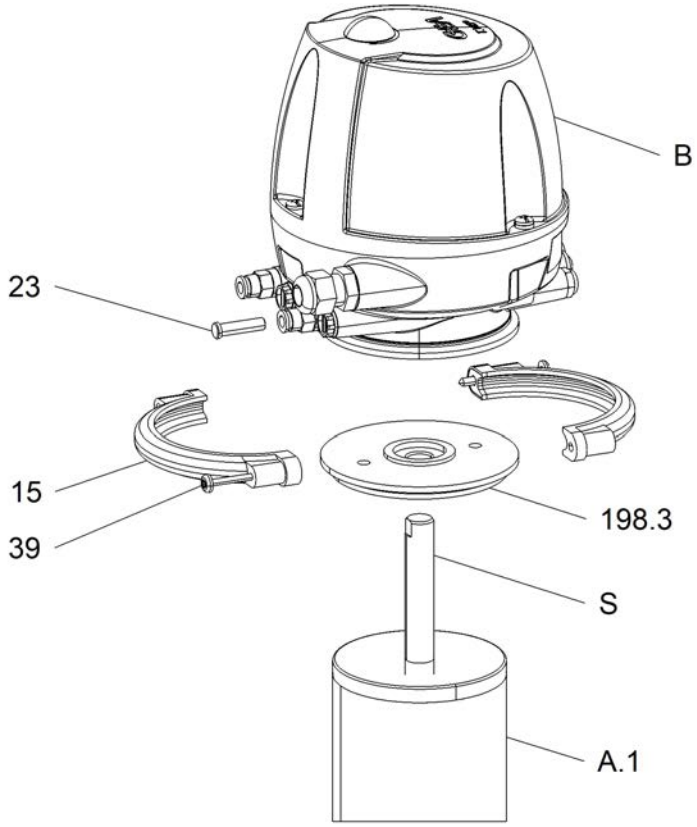


Fig.18

Requirement:

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

Carry out the following steps:

1. In order to mount the installation base T.VIS on the Q-valve, the pin screw (S) must be screwed completely out of the valve. The installation base cannot be screwed on until this has been done. Then the pin screw together with the installation base must be screwed back into the valve. When screwing, note that the spring force acting on the valve disk can change due to the pin screw (S) rotating. (see operating manual Q-valve)

→ Retrofit: If the Q-valve was delivered from the factory without T.VIS installation base (198.3), this must be retrofitted first. The counter nut (K) must be loosened first for this. Then the pin screw (S) must be screwed completely out of the drive (A.1) and the counter nut (K) must be removed from the pin screw (S). Once this has been done, the T.VIS installation base (198.3) can be screwed to the pin screw (S). Subsequently the pin screw must be screwed back into the drive (A.1) together with the T.VIS installation base (198.3). When screwing, note that the spring force acting on the valve disk can change due to the pin screw (S) rotating. (see operating manual Q-valve).

2. Set the required response pressure.

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

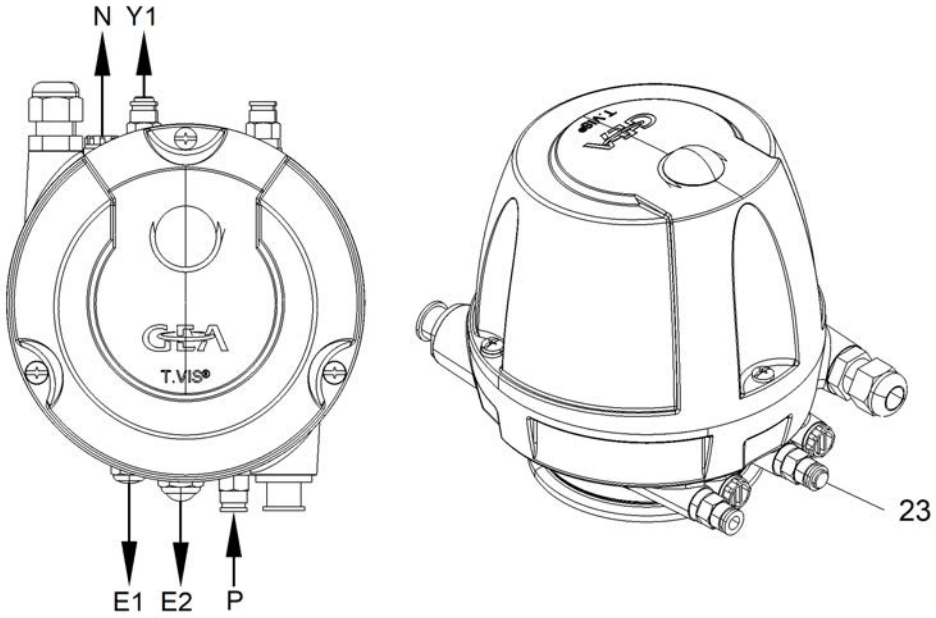


Fig.19

7. Perform commissioning, see Chapter 6, Page 29 and Chapter 7, Page 43.

→ Done.

7 Start-up

7.1 Safety precautions

Initial commissioning

For initial commissioning, the following principles apply:

- Take protective measures against dangerous contact voltages in accordance with pertinent regulations.
- The control top 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.
- After conversion of the control top, residual risks must be reassessed.

Hint!

The external sensor in the lantern is still in the original factory setting and must therefore be reset during initial commissioning, see Section 7.2, Page 43. The manufacturer will not accept any liability for malfunctions. The risk is borne solely by the operating company.

Commissioning

For commissioning, the following principles apply:

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

7.2 Commissioning – Control Top without Solenoid Valves

Activating the Control Top

Once the control top has been properly mounted on the valve and the electrical connections have been established correctly, commissioning can be carried out.

Requirement:

- The overflow valve must be in the safety position, i.e. an external solenoid valve must not be actuated.

Carry out the following steps:

1. DIP switch (S1), set to ON (right). (The setting described is only valid for a control top without solenoid valves)

Fig.20

2. Switch on the power supply.
   → Only with reset: Activate programming mode by key operation, see Section 8.2, Page 50.
   → Only with reset: Programming mode runs through automatically and during this time the illuminated dome is lit red.

→ The control top is activated.

Hint!

With colour changeover, only the optional D-force signals are swapped!

Checking the Control Top

Carry out the following steps:

1. Check proper function of the feedback at the T.VIS.

→ This completes commissioning.

7.3 Commissioning – Control Top with Solenoid Valves

Activating the Control Top

Once the control top has been properly mounted on the valve and the electrical connections have been established correctly, commissioning can be carried out.

Notice

The solenoid valve Y3 for the lift stroke of the overflow valve is connected.

The lifting stroke of the overflow valve is briefly activated during the SETUP.

► Only carry out the SETUP when the pipe is empty.

Carry out the following steps:

1. DIP switch (S1), set to OFF (left). (The setting described is only valid for a control top with solenoid valves)

Fig.21

2. Switch on the control air supply.
3. Check the valve function by activating the solenoid valves:

→ Switch on the solenoid valves in sequence Y3 and Y1 (if fitted) one after the other by means of the manual operating element: Turn the screw (S) from 0 to 1 using a screwdriver.

→ Switch off all pilot valves again in sequence Y3 and Y1 (if fitted): Turn the screw (S) to 0 using a screwdriver.

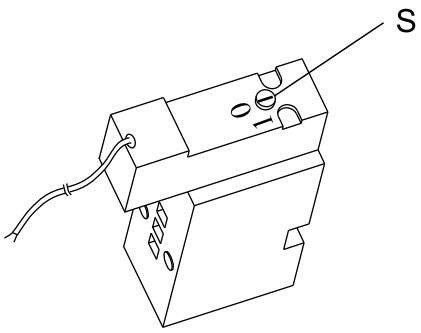


Fig.22

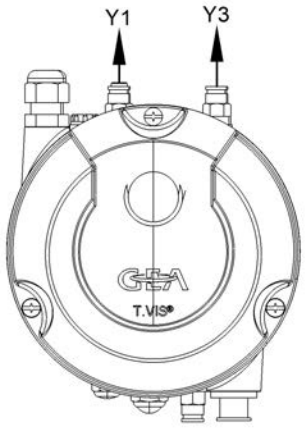


Fig.23

→ Further information about Y1/Y3: seeSection 6.3.2, Page 31.

4. Switch on the power supply.

→ Only with reset: Activate programming mode by key operation, see Section 8.2, Page 50.

→ Only with reset: During the automatic programming workflow, the solenoid valves installed in the control top are activated and deactivated, which leads to the overflow valve carrying out valve-specific functions. During this period, the illuminated dome is continuously lit red. After completion of end position programming, the colours in the illuminated dome change cyclically.

→ The control top is activated.

Checking the Control Top

Once the control top has been properly mounted on the valve and the electrical connections have been established correctly, the functional test can be carried out.

Carry out the following steps:

1. Activate the solenoid valves in succession via the PLC in order to check the proper function of the T.VIS feedback.

→ This completes commissioning.

Hint!

The solenoid valve Y1 (D-force) can also be activated and deactivated in manual mode using the operating buttons.

7.4 Fitting the initiator in the lantern

Fitting the initiator holder

Carry out the following steps:

1. Preassemble sliding piece (1), countersunk screw (3) and nut NI (2).

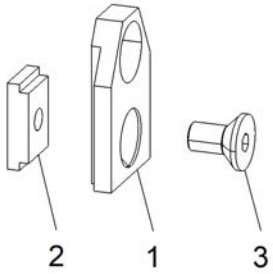


Fig.24

2. Insert the preassembled part in the slot (4.1) in the lantern (4) with the mounting hole (1.1) facing in the direction of the housing (5).

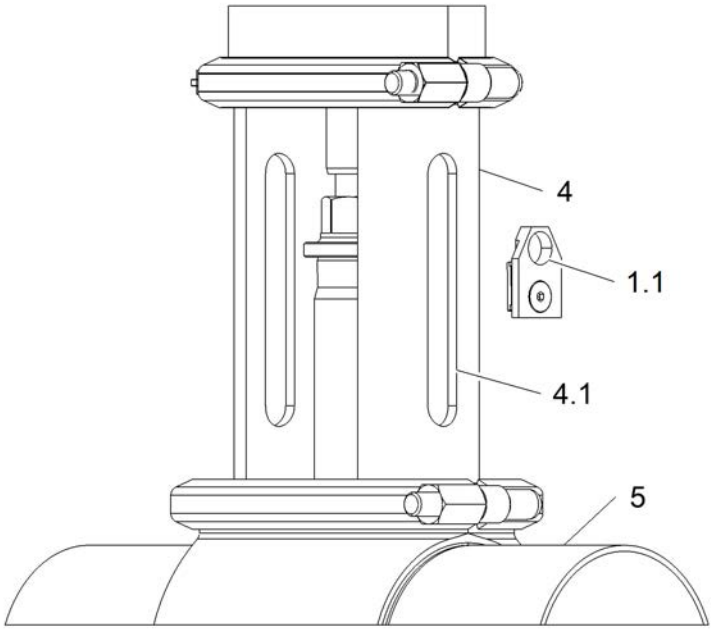


Fig.25

3. Turn the nut NI (2) in the slot (4.1) in the lantern through 90° and tighten with the countersunk screw (3).

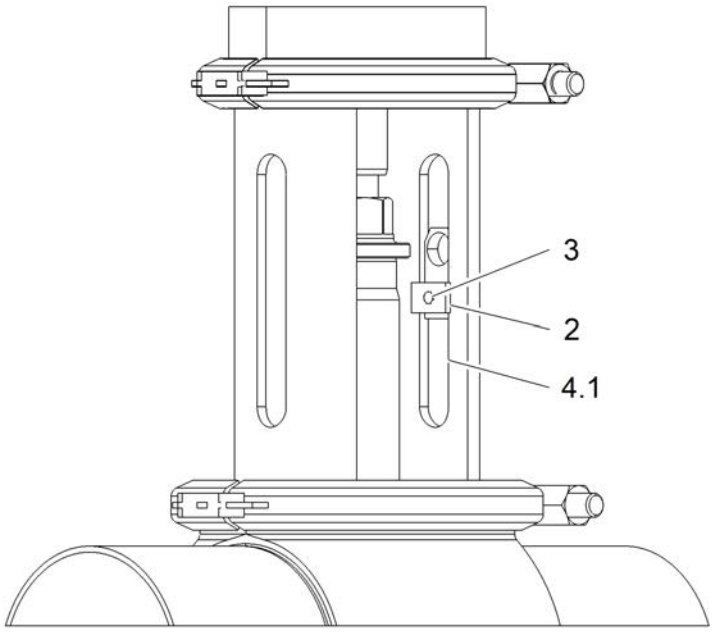


Fig.26

→ Done.

Adjusting the proximity switch holder

Carry out the following steps:

1. Screw the initiator (6) into the initiator holder down to the counter nut collar (7).

   Unscrew the proximity switch by one full turn (360°) to set the gap (a) in the range from 0.5 to 1.0 mm.

2. Secure the connector (10), which has already been electrically connected to the control top, to the proximity switch using the cap nut M12 (10.1).

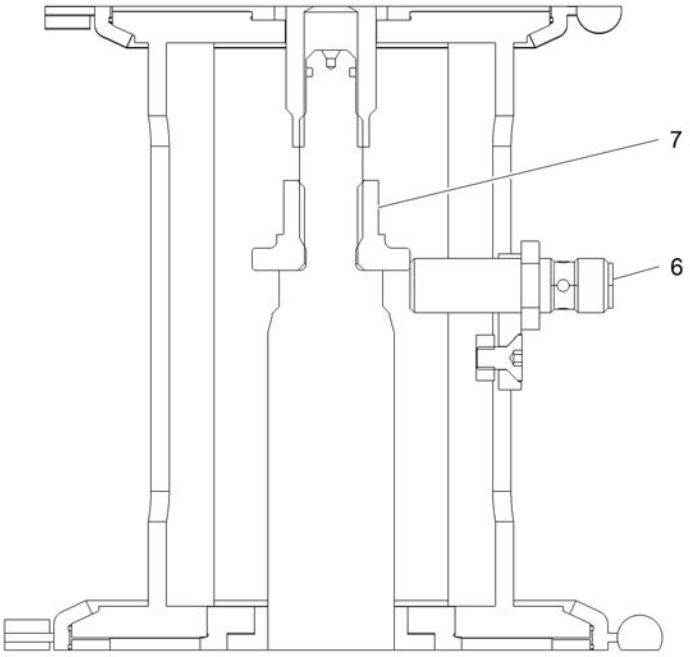


Fig.27

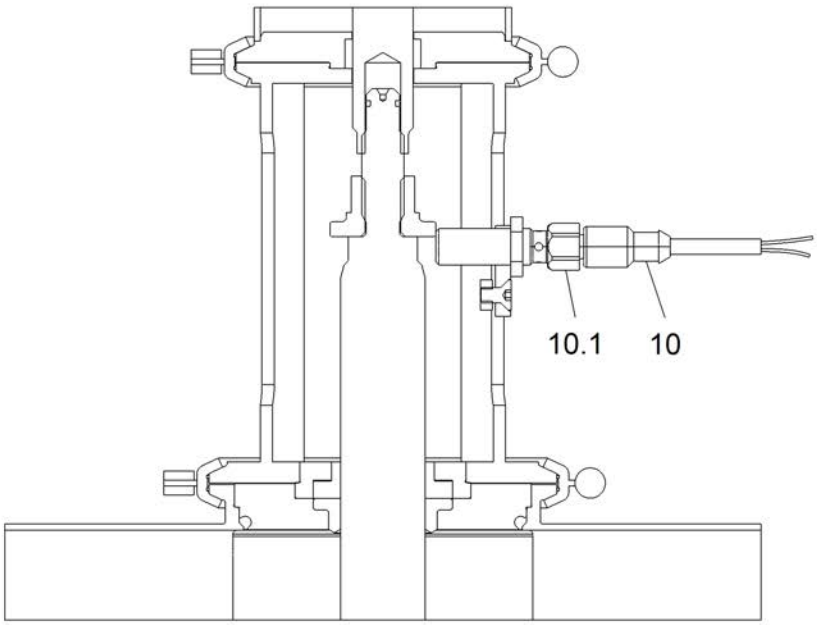


Fig.28

3. By slightly loosening the countersunk screw, position the initiator holder in the slotted hole of the lantern in such a way that the initiator (6) detects the lower edge of the counter nut.
4. In operating state (non-actuated position) and following correct initiator setting, the LED on the initiator must be lit.

→ Done.

Checking the function

Carry out the following steps:

1. (If installed) check the feedback function by actuating solenoid valve Y3.
   → The LED on the initiator must go out.
   → Done

→ The proximity switch has now been adjusted and checked.

8 Operation and control

8.1 Safety instructions

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

For operation, the following principles apply:

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

8.2 Settings in Programming Mode

Signal Attenuation for Position Feedback

Attenuation suppresses the signal changes of the feedback device for the attenuation period specified.

At the same time, a static change of a feedback signal is delayed by the attenuation period. This allows user-specific process sequences to be optimally set.

For the reliable monitoring of the valve seat seal GEA Tuchenhagen recommends the factory setting without signal attenuation. GEA Tuchenhagen will not accept any liability for damage resulting from the use of signal attenuation. The risk lies entirely with the operator of the facility.

8.3 Operating Overview

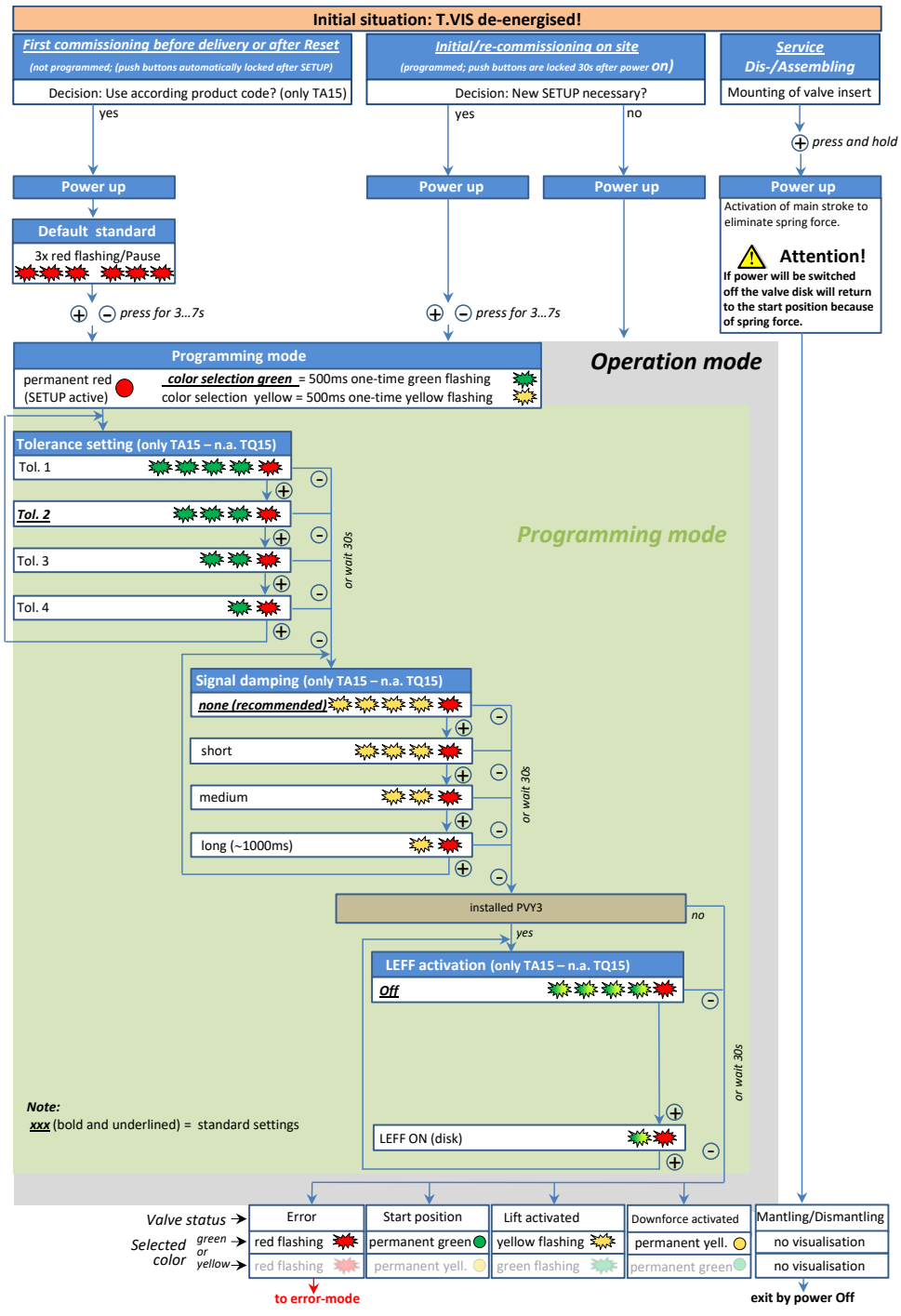


Fig.29

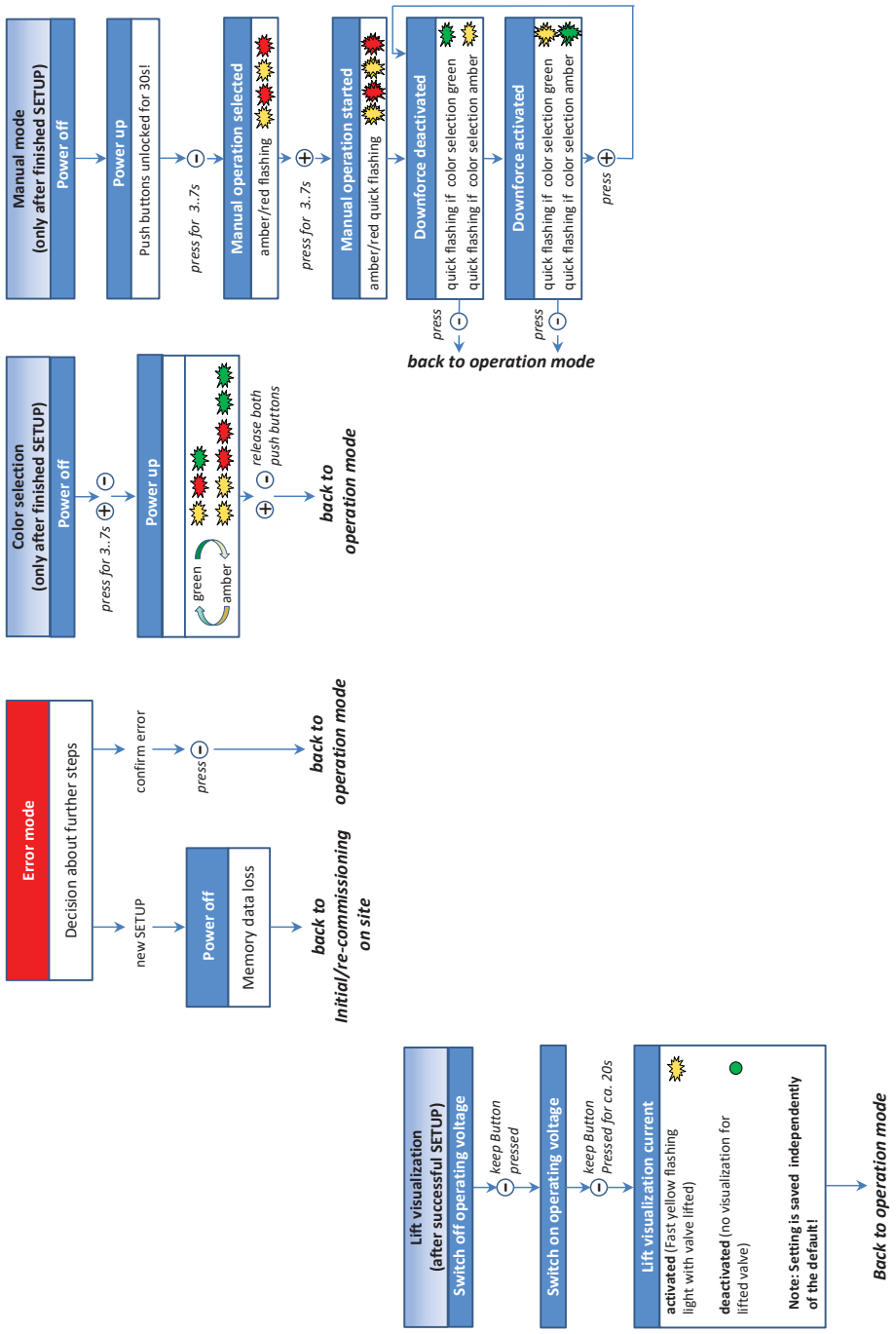

Manual mode
(only after finished SETUP)
Power off
Power up
Push buttons unlocked for 30s!
press for 3..7s
Manual operation selected
amber/red flashing
press for 3..7s
Manual operation started
amber/red quick flashing
Downforce deactivated
quick flashing if color selection green
quick flashing if color selection amber
Downforce activated
quick flashing if color selection green
quick flashing if color selection amber
press
press
press
back to operation mode
Color selection
(only after finished SETUP)
Power off
press for 3..7s
Power up
green
amber
release both push buttons
back to operation mode
Error mode
Decision about further steps
confirm error
press
back to operation mode
new SETUP
Power off
Memory data loss
back to Initial/re-commissioning on site
Lift visualization
(after successful SETUP)
Switch off operating voltage
keep Button pressed
Switch on operating voltage
keep Button Pressed for ca. 20s
Lift visualization current
activated (Fast yellow flashing light with valve lifted)
deactivated (no visualization for lifted valve)
Note: Setting is saved independently of the default!
Back to operation mode

Fig.30

9 Cleaning

9.1 Cleaning

Observe the safety data sheets supplied by the detergent manufacturers.

Only use detergents which are not aggressive towards synthetic materials and the sealing materials used and which are non-abrasive.

Hint!

After all cleaning work, make sure that the control top still complies with all safety instructions in this operating manual and thus that intended use is still given.

10 Maintenance

10.1 Safety precautions

Repair

Before carrying out 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.

The following basic principles apply for repair work:

- Only qualified personnel may carry out repair work on the component.
- The component must be switched off and secured against being switched back on before 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 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 work.
- 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 removal, 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 disassembled. 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 .

10.2 Inspections

Checking parts are firmly secured

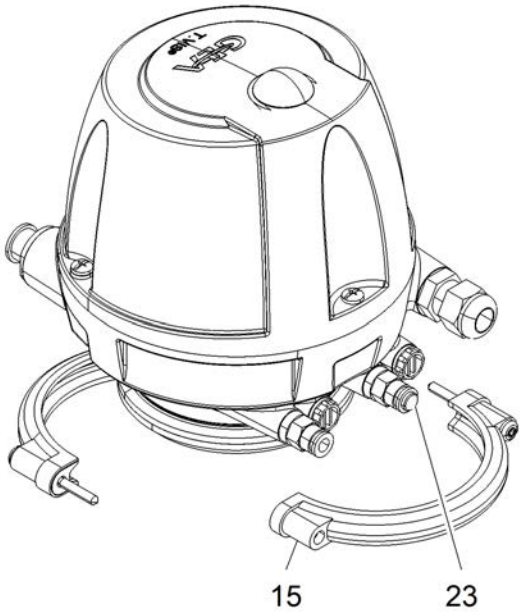


Fig.31

Carry out the following steps:

1. Check that the electrical connectors are properly secured.
2. Check that the air hose connections are firmly secured.
3. Check that the clamp (15) is firmly in place.
4. Check that the plug (23) is firmly in place.
5. Check the sound absorbers, filter, reflux for soiling.
6. Check the housing for mechanical damage.
7. Check the union nut for the cable glands for a tight fit.
8. Check the solenoid valves for pressure-sealed seat.
9. Check hood and base for firm screws. Tighten all three screws to 1 Nm if necessary.

→ Done

10.3 Maintenance intervals

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

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

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

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

10.4 Removing the Control Top from the Valve

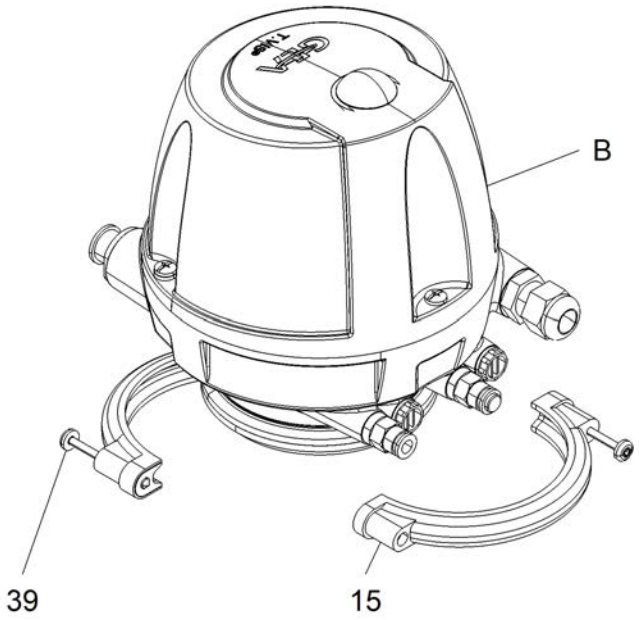


Fig.32

Requirement:

- Make sure that the solenoid valve is not actuated.

Carry out the following steps:

1. Undo the screw connection (39).
   Remove the clamp (15).
   Pull the control top vertically off the valve.
   Disconnect the M12 connectors connected electrically to the control top.
   → The green LED goes out after 5 seconds and the yellow LED flashes.

→ Done

10.5 Dismantling the Control Top into its Components

10.5.1 Variants of the Control Top

The control top can be fitted with:

- 2 solenoid valves (63)
- 1 solenoid valve (63) or
- without solenoid valve with 1 control plate (65).

10.5.2 Removing the Cap

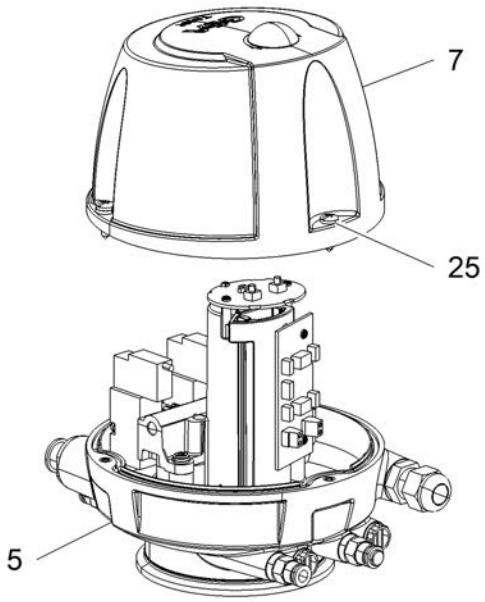


Fig.33

Notice

Electrical voltage

Danger to life

► Switch off the voltage supply and the control air before removing the control top.

Carry out the following steps:

1. Undo the 3 screws (25) of the cap (7) and remove the cap (7) from the base (5).

→ Done

10.5.3 Removing the printed circuit boards

Carry out the following steps:

1. Unscrew and remove the screws (77).

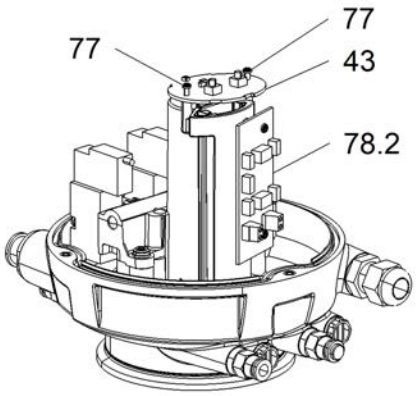


Fig.34

2. Remove all wires from printed circuit board (43) and printed circuit board (78.2).

→ Done

Hint!

In order to avoid or minimize the possibility of damage from electrostatic discharge:

- Observe the requirements of DIN EN 61340-5-1 and 5-2.
- Be careful not to touch the electronic components!

10.5.4 Installing the printed circuit board

To install the printed circuit boards, observe the wiring diagram for the T.VIS printed circuit board (underside), see Section 6.4.4, Page 37!

10.5.5 Removing the printed circuit board bracket (9)

Carry out the following steps:

1. Loosen the screws (57).

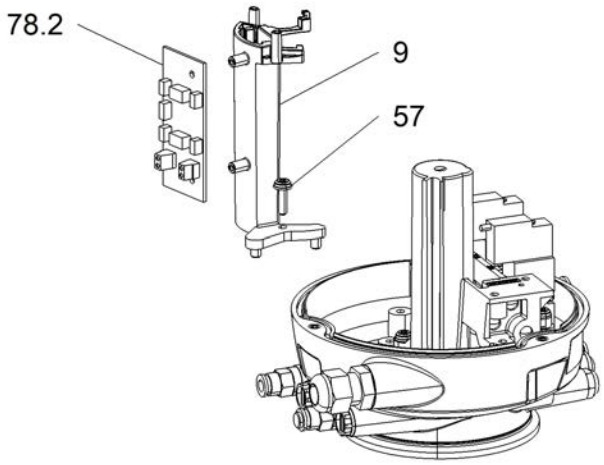


Fig.35

2. Lift the printed circuit board bracket (9) off the basic plate.

→ Done

10.5.6 Removing the Solenoid Valves and the Valve Plate

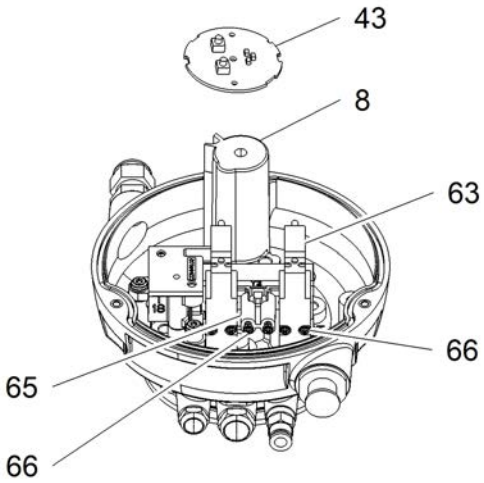


Fig.36

Requirement:

- Pay attention to the correct assignment of cables between the solenoid valves and the printed circuit board (78.1) (see Fig. 32) – solenoid valve Y1 must be connected to connector J2 and solenoid valve Y3 to connector J4.

- Use only solenoid valves as listed in the chapter "Technical data", see Chapter 5, Page 21.

⚠ Warning!

Long switch-on time and high ambient temperature.

Risk of burns from the solenoid valve

► Allow to cool before dismantling.

Carry out the following steps:

1. Disconnect the electrical connection from the solenoid valve to the Pico Blade on the circuit board (43).
2. Loosen the screws (66) and remove the solenoid valve (63) from the pneumatic block (8).
3. Loosen the screws (66) and remove the control plates (65) from the pneumatic block (8).

→ Done

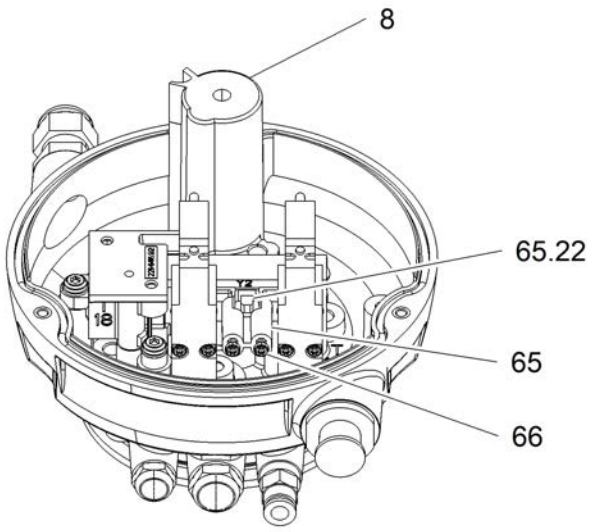


Fig.37

Hint!

When using the pneumatic block (8) with 1 valve plate (65), the groove (65.22) must be mounted upward.

The screws (66) are located in the lower mounting holes.

Tighten the screws (66) at a tightening torque of 0.8 Nm.

10.5.7 Removing the pneumatic block

Requirement:

- If only O-rings (42) and (55) are to be changed, solenoid valves (63)/valve plate (65) can remain on the pneumatic block (8).

Carry out the following steps:

1. Undo the screws (57.1, 57.2).

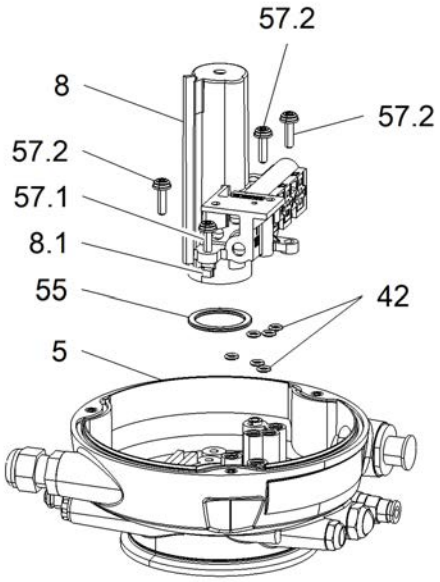


Fig.38

2. Pull off the pneumatic block (8).
3. Change the 6 O-rings (42) of the base (5).
4. Replace the O-ring (55).

→ Done

10.5.8 Fitting the Pneumatic Block

Requirement:

- When fitting the pneumatic block, make sure that it is compatible!
- Insert the journal (8.1) on the pneumatic block into the groove of the base (5)!

Carry out the following steps:

1. Tighten the screw (57.1): tightening torque: 1.5 Nm (1.0 lbft).

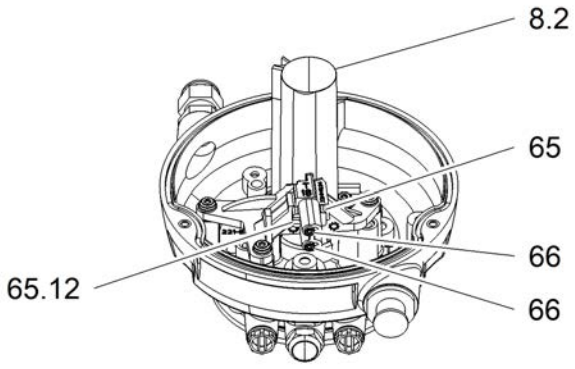


Fig.39: Pneumatic block (8.2) for max. 1 solenoid valve

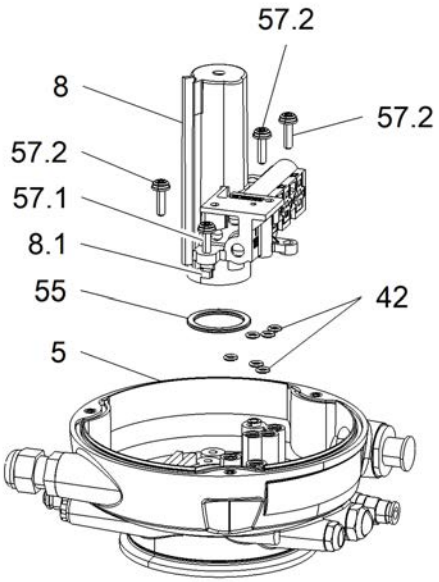


Fig.40: Pneumatic block (8) for max. 3 solenoid valves

2. Tighten the screw (57.2): tightening torque: 1.5 Nm (1.0 lbft).
3. For the other parts to be fitted (sensor, printed circuit board, solenoid valves, valve plate) refer to the preceding pages.

→ Done

10.6 Install pneumatic connections

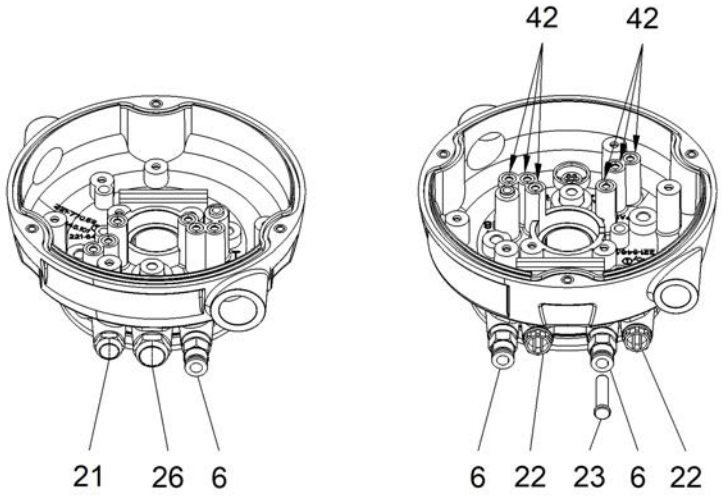


Fig.41

No.	Designation	Tightening torques
6	Screw-in plug connection	2.0 Nm
21	Sound absorber	2.0 Nm
22	Locking screw	0.5 Nm
23	Plug	--
26	Sound absorber	2.0 Nm
42	O-ring	--

Carry out the following steps:

1. Establish the pneumatic connections in accordance with the codes on the control top.

→ Done

10.7 Maintenance

10.7.1 Replacing the Seals on the Base

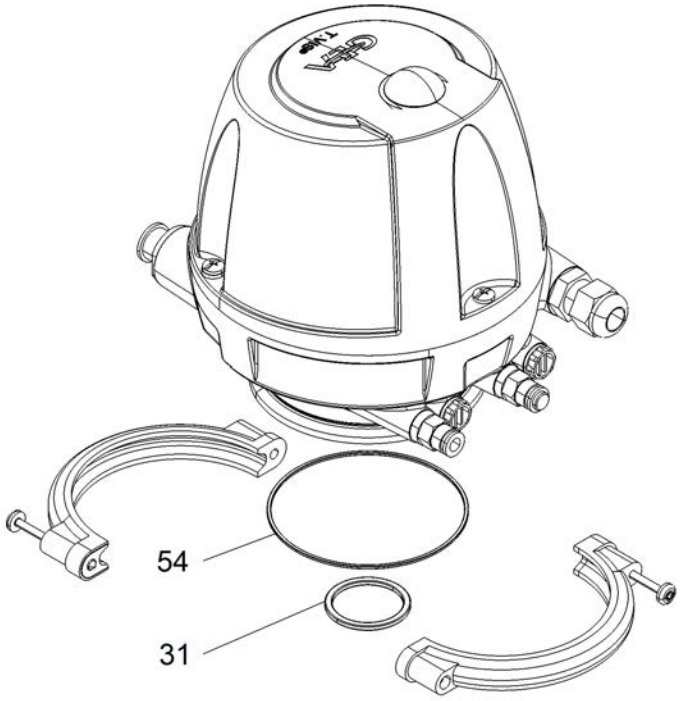


Fig.42

Carry out the following steps:

1. Remove the O-rings (31, 54) and replace.

→ Done

10.7.2 Servicing sound absorbers, filter, reflux valve

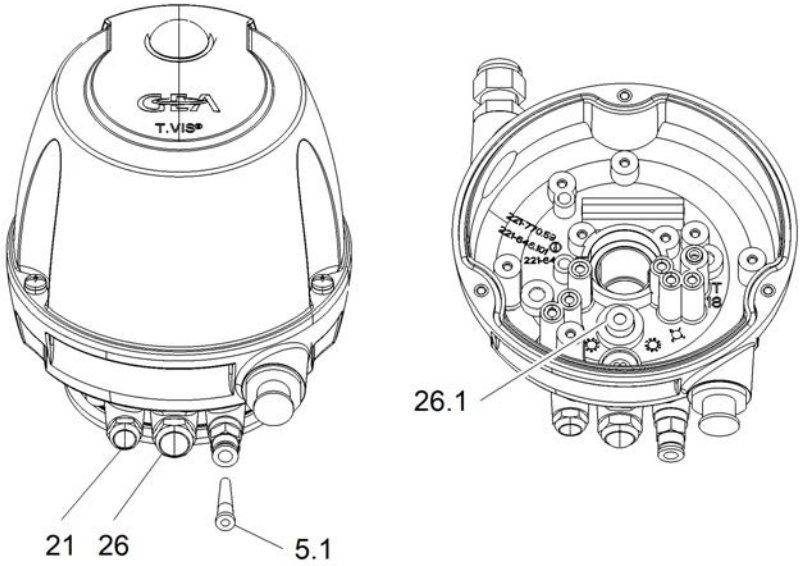


Fig.43

Requirement:

- Only use sound absorbers (26) specified in the spare parts list, see Chapter 13, Page 71.

Carry out the following steps:

1. Check the sound absorber (21, 26), reflux valve (26.1), filter (5.1) for free control air leakage and replace if necessary.

   ! The non-return valve (26.1) cannot be replaced.

2. Do not grease the spare parts before fitting them.

→ Done

10.7.3 Mounting cap

Hint!

To ensure the IP protection class, the hood must be correctly mounted on the base!

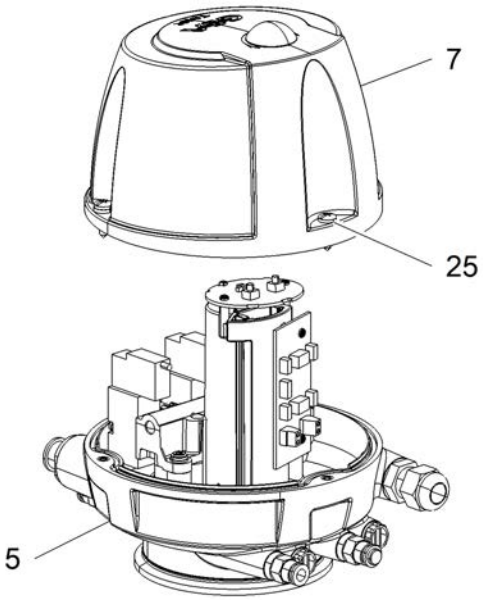


Fig.44

Carry out the following steps:

1. Use three screws (25) to fasten the hood (7) on the base (5) to tightening torque 2 Nm.

→ Done

11 Alarms

11.1 Malfunctions and remedies

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

Malfunction, signalling, cause, remedy			
Malfunction	**Signalling**	**Cause**	**Remedy**
Programming is not possible after connecting the supply voltage.	No LED is lit	• No voltage at connector 1 (PINs 1 and 3) • Polarity of PINs 1 and 3 mixed up • Service function active	• Check the electrical connections for correct wiring • Connect PIN 1 and PIN 3 correctly • Disconnect the plug
SETUP cannot be activated	Green or yellow	Time window no longer active	Disconnect from the power supply again and carry out the operation within 30 s
Manual operation cannot be activated	Green or yellow	Time window no longer active	Disconnect from the power supply again and carry out the operation within 30 s
Valve opens very slowly	Time exceeded in PLC	Fault in the compressed air supply or filter clogged up	• Clean or replace filters
Programming cannot be completed	Rapidly flashing red light	Actuated positions cannot be reached	
		due to missing control air pressure	Check the control air pressure: pay attention to the minimum pressure of the overflow valve on the type plate
		External proximity switch connected but set incorrectly	Select special default, correct connection, set proximity switch correctly

Malfunction, signalling, cause, remedy			
Malfunction	**Signalling**	**Cause**	**Remedy**
No feedback signal is pending at the PLC although one of the end positions has been reached	Red LED flashing	T.VIS Q-15 in factory setting and not yet programmed	Programming according to Operating overview, see Section 8.3, Page 51
	Red LED permanently lit	T.VIS Q-15 currently in programming mode	Wait until programming mode ends

11.2 Carrying out a Reset – Back to Default Standard

Carry out the following steps:

1. Start the SETUP procedure.
2. Switch off the operating voltage while running the SETUP.

   → LED goes out, loss of data in the memory module.
3. Commissioning the control top, see "Commissioning - control top without solenoid valves" () or "Commissioning - control top with solenoid valves" ().

→ Done.

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 20.

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.

13 Spare parts list - control top T.VIS Q-15

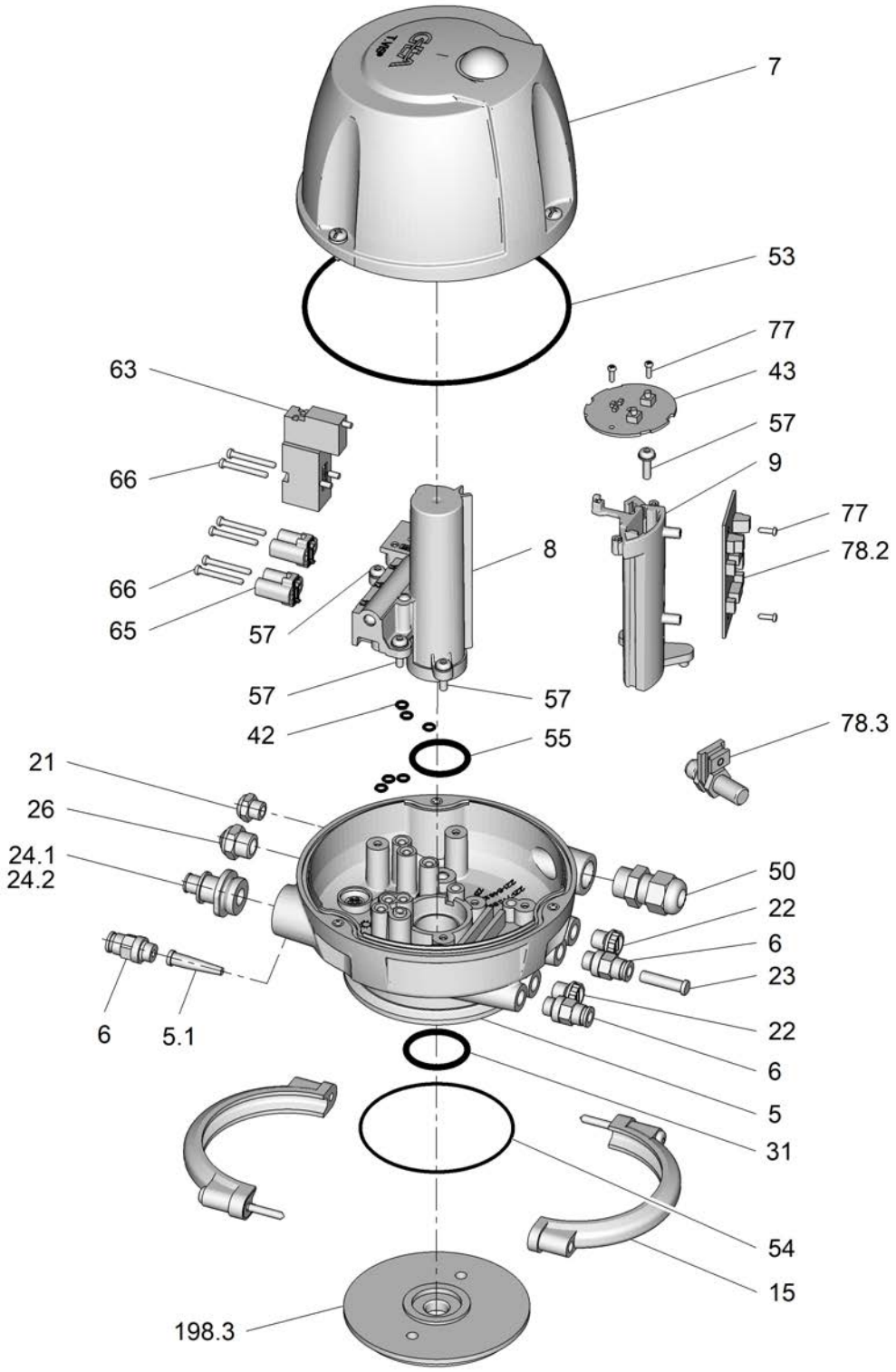


Fig.45

Control top T.VIS® Q-15 with cable connection and air connection with metric connections					
Order code			TQ15N...M	TQ15P...M	TQ15J...M
Item	**Designation**	**Material**			
5	Base T.VIS-T18	PA12/L	221-646.100	221-646.100	221-646.100
5.1	Filter	PE	221-003869	221-003.869	221-003869
6	Screw-in plug connection D 6.0	MS CV	933-176	933-176	933-176
7	Hood T.VIS M/A-15	PA12/L	221-646.88	221-646.88	221-646.88
8	Pneumatic block 3PV	PA12/L	--	221-646.92	221-646.92
	Pneumatic block 1PV	PA12/L	221-646.94	--	--
9	Housing sensor module T.VIS A/P-15	PA6/GF30	221-007563	221-007563	221-007563
15	Clamp connection KU	--	221-507.08	221-507.08	221-507.08
21	Sound absorber G1/8"	MS CV	933-175	933-175	933-175
22	Locking screw G1/8"	PE-HD	922-369	922-369	922-369
23	Plug	PP	922-281	922-281	922-281
26	Sound absorber G1/4"	MS CV	933-174	933-174	933-174
31	O-ring	NBR	930-041	930-041	930-041
42	O-ring	FKM	930-169	930-169	930-169
43	Printed circuit board 24V DC	--	221-005021D	221-005021D	221-005021D
	Printed circuit board ASi	--	221-005022C	221-005022C	221-005022C
50	Cable gland M16	PA	508-914	508-914	508-914
53	O-ring	NBR	930-833	930-833	930-833
54	O-ring	NBR	930-117	930-117	930-117
55	O-ring	NBR	930-038	930-038	930-038
56	Thread-forming screw	A2	514-749	514-749	514-749
57	Thread-forming screw	A2	514-750	514-750	514-750
63	Solenoid valve 24VDC	PBT	512-169	512-169	512-169
65	Valve plate	PPO	221-589.27	--	221-589.27
66	Thread-forming screw	A2	514-761	514-761	514-761
67	Thread-forming screw	A2	--	--	--
77	Thread-forming screw	Galv. steel	514-763	514-763	514-763
78.2	Printed circuit board T.VIS Q-valve	--	221-005027	221-005027	221-005027
78.3	Initiator NO/NAMUR S/M12x1	--	505-041	505-041	505-041
78.4	Wire/insulated T.VIS A-15 2 stranded wires	--	221-007034	221-007034	221-007034
78.5	Wire/insulated T.VIS A-15 pos 3-pole	--	221-007035	221-007035	221-007035
198.3	Installation base T.VIS	St	221-007461	221-007461	221-007461

Control top T.VIS® Q-15 with cable connection and air connection with imperial connections					
Order code			TQ15N...Z	TQ15P...Z	TQ15J...Z
Item	**Designation**	**Material**			
5	Base T.VIS-T18	PA12/L	221-646.100	221-646.100	221-646.100
5.1	Filter	PE	221-003869	221-003.869	221-003869
6	Screw-in plug connection D 6.35	MS CV	933-173	933-173	933-173
7	Hood T.VIS M/A-15	PA12/L	221-646.88	221-646.88	221-646.88
8	Pneumatic block 3PV	PA12/L	--	221-646.92	221-646.92
	Pneumatic block 1PV	PA12/L	221-646.94	--	--
9	Housing sensor module T.VIS A/P-15	PA6/GF30	221-007563	221-007563	221-007563
15	Clamp connection KU	--	221-507.08	221-507.08	221-507.08
21	Sound absorber G1/8"	MS CV	933-175	933-175	933-175
22	Locking screw G1/8"	PE-HD	922-369	922-369	922-369
23	Plug	PP	922-280	922-280	922-280
25	Adapter G1/2"	PA	221-004094	221-004.094	221-004094
26	Sound absorber G1/4"	MS CV	933-174	933-174	933-174
27	O-ring	NBR	930-017	930-017	930-017
31	O-ring	NBR	930-041	930-041	930-041
42	O-ring	FKM	930-169	930-169	930-169
43	Printed circuit board 24V DC	--	221-005021D	221-005021D	221-005021D
	Printed circuit board ASi	--	221-005022C	221-005022C	221-005022C
50	Cable gland M16	PA	508-916	508-916	508-916
53	O-ring	NBR	930-833	930-833	930-833
54	O-ring	NBR	930-117	930-117	930-117
55	O-ring	NBR	930-038	930-038	930-038
56	Thread-forming screw	A2	514-749	514-749	514-749
57	Thread-forming screw	A2	514-750	514-750	514-750
63	Solenoid valve 24VDC	PBT	512-169	512-169	512-169
65	Valve plate	PPO	221-589.27	221-589.27	221-589.27
66	Thread-forming screw	A2	514-761	514-761	514-761
67	Thread-forming screw	A2	--	--	514-758
77	Thread-forming screw	Galv. steel	514-763	514-763	514-763
78.2	Printed circuit board T.VIS Q-valve	--	221-005027	221-005027	221-005027
78.3	Initiator NO/NAMUR S/M12x1	--	505-041	505-041	505-041
78.4	Wire/insulated T.VIS A-15 2 stranded wires	--	221-007034	221-007034	221-007034
78.5	Wire/insulated T.VIS A-15 pos 3-pole	--	221-007035	221-007035	221-007035
198.3	Installation base T.VIS	St	221-007461	221-007461	221-007461

Control top T.VIS® Q-15 with metric cable connection and air connection with imperial connections					
Order code			TQ15N...Z	TQ15P...Z	TQ15J...Z
Item	**Designation**	**Material**			
5	Base T.VIS-T18	PA12/L	221-646.100	221-646.100	221-646.100
5.1	Filter	PE	221-003869	221-003.869	221-003869
6	Screw-in plug connection D 6.35	MS CV	933-173	933-173	933-173
7	Hood T.VIS M/A-15	PA12/L	221-646.88	221-646.88	221-646.88
8	Pneumatic block 3PV	PA12/L	--	221-646.92	221-646.92
	Pneumatic block 1PV	PA12/L	221-646.94	--	--
9	Housing sensor module T.VIS A/P-15	PA6/GF30	221-007563	221-007563	221-007563
15	Clamp connection KU	--	221-507.08	221-507.08	221-507.08
21	Sound absorber G1/8"	MS CV	933-175	933-175	933-175
22	Locking screw G1/8"	PE-HD	922-369	922-369	922-369
23	Plug	PP	922-281	922-281	922-281
26	Sound absorber G1/4"	MS CV	933-174	933-174	933-174
31	O-ring	NBR	930-041	930-041	930-041
42	O-ring	FKM	930-169	930-169	930-169
43	Printed circuit board 24V DC	--	221-005021D	221-005021D	221-005021D
	Printed circuit board ASi	--	221-005022C	221-005022C	221-005022C
50	Cable gland M16	PA	508-914	508-914	508-914
53	O-ring	NBR	930-833	930-833	930-833
54	O-ring	NBR	930-117	930-117	930-117
55	O-ring	NBR	930-038	930-038	930-038
56	Thread-forming screw	A2	514-749	514-749	514-749
57	Thread-forming screw	A2	514-750	514-750	514-750
63	Solenoid valve 24VDC	PBT	512-169	512-169	512-169
65	Valve plate	PPO	221-589.27	221-589.27	221-589.27
66	Thread-forming screw	A2	514-761	514-761	514-761
67	Thread-forming screw	A2	--	--	514-758
77	Thread-forming screw	Galv. steel	514-763	514-763	514-763
78.2	Printed circuit board T.VIS Q-valve	--	221-005027	221-005027	221-005027
78.3	Initiator NO/NAMUR S/M12x1	--	505-041	505-041	505-041
78.4	Wire/insulated T.VIS A-15 2 stranded wires	--	221-007034	221-007034	221-007034
78.5	Wire/insulated T.VIS A-15 pos 3-pole	--	221-007035	221-007035	221-007035
198.3	Installation base T.VIS	St	221-007461	221-007461	221-007461

Item	Designation	Material	Material no.	
24.1	Connector M12/8-pin/ M20x1.5	Brass/ nickel-plated	221-005.102	Cable connection 24VDC M12/8-pole/A-coded
24.2	Connector M12/5-pole/ 5-wire/M20x1.5	Brass/ nickel-plated	221-005.101	Cable socket, ASi, M12/5-pole/A coded

Accessories (to be ordered separately)	Material no.	Application
Straight cable socket M12 / 8-pole / A-coded / 24VDC	508-061	Electrical connection to connector Item 24.1
Angled cable socket A-coded M12/5-pole/90°	508-963	Electrical connection to connector Item 24.2
Straight cable socket M12 with 1.0m cable and ASi insulation displacement connector	508-027	Electrical connection to connector Item 24.2
Straight cable socket M12 with 2.0m cable and ASi insulation displacement connector	508-028	Electrical connection to connector Item 24.2
Quick air vent valve D6 (with plug connection for hose 6mm on both sides)	603-039	

14 Dimension sheet - control top T.VIS Q-15

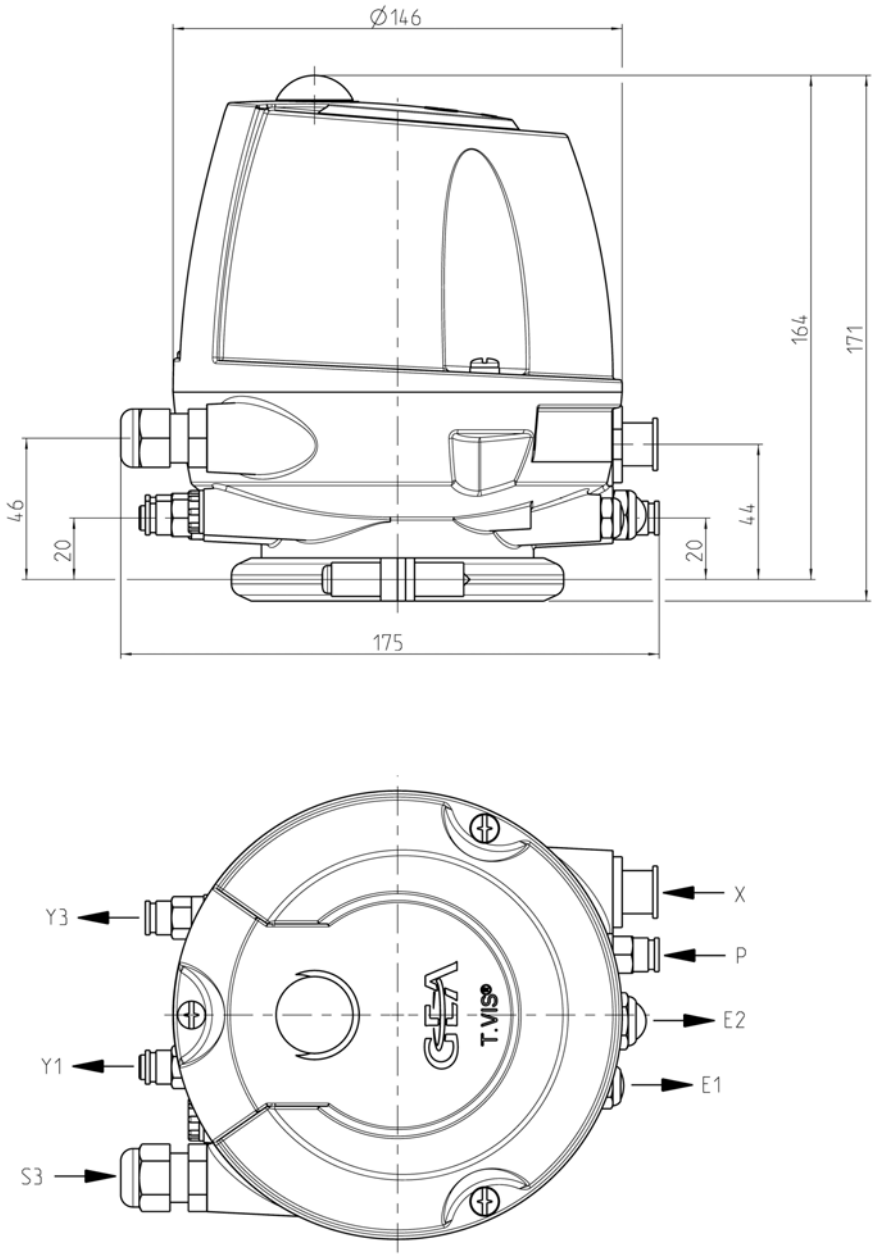


Fig.46

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

X= supply voltage, electric actuation and feedback

S3 = electrical connection for external proximity switch

15 Appendix

15.1 Lists

15.1.1 Abbreviations and terms

Abbreviation	Explanation
BS	British Standard
bar	Unit of measurement of pressure [bar] All pressure data expressed in [bar/psi] is assumed to be gauge pressure [barg/psig] unless explicitly specified otherwise.
approx.	approximately
°C	Unit of measurement of temperature [degree Celsius]
dm^3_n	Unit of measurement of volume [cubic decimetre] Standard volume (standard litre)
DN	DIN nominal width
DIN	German standard issued by DIN (Deutsches Institut für Normung e.V., German Institute for Standardization)
EN	European Standard
EPDM	Material designation Short designation according to DIN/ISO 1629: Ethylene Propylene Diene Rubber
°F	Unit of measurement of temperature [degree Fahrenheit]
FKM	Material designation, short designation according to DIN/ISO 1629: Fluorine rubber
h	Unit of measurement of time [hour]
HNBR	Material designation Short designation according to DIN/ISO 1629: Hydrogenated Acrylonitrile Butadiene Rubber
IP	Protection class
ISO	International standard issued by the International Organisation for Standardisation
kg	Unit of measurement of weight [kilogram]
kN	Unit of measurement of force [kilonewton]
Kv value	Flow coefficient [m³/s] 1 KV = 0,86 x Cv
l	Unit of measurement of volume [litre]
max.	maximum
mm	Unit of measurement of length [millimetre]
µm	Unit of measurement of length [micrometre]

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

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GEA Germany

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

Tel +49 (0)4155 49 0
Fax +49 (0)4155 49 2035

info@gea.com
gea.com