

# OPERATING INSTRUCTIONS

Translation from the original language



## Control and feedback systems

### GEA T.VIS® P-15

GEA Tuchenhausen GmbH  
Document number: 430BAL010747  
Language: EN / Date: 08.05.2025

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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 Tuchenhausen 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 Declarations of Conformity



### EU Declaration of Conformity

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

We hereby declare that the devices named below

Model: Control Top T.VIS P-15

Type: 24 VDC

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: 2014/30/EU EMC  
2011/65/EU RoHS

Applicable harmonized standards, in particular: EN 61000-6-2 (10/01)  
EN 61000-6-3 (10/01) + A11:2004

Other applied standards  
and technical specifications:

Remarks: 


- Examination of interference emission analogous to EN 61000-6-4 taking into account the narrower limit values of EN 61000-6-3

Person authorised for compilation and handover of technical  
documentation:

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

Büchen, 02 February 2021

  
Franz Bürmann  
Managing Director

  
pp Matthias Südel  
Head of Engineering

**Translated Copy of the EU Declaration of Conformity**

Manufacturer: **GEA Tuchenhausen GmbH**  
**Am Industriepark 2-10**  
**21514 Büchen, Deutschland**

We hereby declare that the device named below

---

Model: Control Top T.VIS P-15

Type: 24 VDC

---

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: 2014/30/EU EMV  
2011/65/EU RoHS

Applicable harmonized standards, in particular: EN 61000-6-2 (10/01)  
EN 61000-6-3 (10/01) + A11:2004

Other applied standards and technical specifications:

---

Remarks: 

- Examination of interference emission analogous to EN 61000-6-4 taking into account the narrower limit values of EN 61000-6-3

---

Person authorised for compilation and handover of technical documentation:	<b>GEA Tuchenhausen GmbH</b> <b>CE Documentation Officer</b> <b>Am Industriepark 2-10</b> <b>21514 Büchen, Germany</b>
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Büchen, 02 February 2021

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Franz Bürmann  
Managing Director

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pp Matthias Südel  
Head of Engineering



**UK Declaration of Conformity in accordance with the Electromagnetic Compatibility Regulations 2016****UK- Declaration of Conformity by Electromagnetic Compatibility Regulations 2016**

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

Hereby, we declare that the machine designated in the following

Model: Control top T.VIS P-15

Type: 24 VDC

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: (10/1)  
EN IEC 61000-6-4: (10/1) + A11:2004

Other applied standards  
and technical specifications:

Remarks:

- The above-mentioned standards have been taken into account in accordance with the respective scope of application
- Examination of interference emission analogous to EN 61000-6-4 taking into account the narrower limit values of EN 61000-6-3

Person authorised for compilation and handover of technical documentation:

**GEA Tuchenhausen GmbH**  
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**Am Industriepark 2-10**  
**21514 Büchen, Germany**

Büchen, 28 October 2022

Franz Bürmann  
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Director Hygienic Valves I & Control Top

## 2 Safety

### 2.1 Intended use

The programmable positioner T.VIS P-15 (Tuchenhagen Valve Informations System) allows GEA Tuchenhagen and ASEPTOMAG single-seat valves to be set to any position within the given stroke (5-70 mm), provided the pneumatic and electrical connections are established correctly.

The positioner T.VIS P-15 consists of a base and a hood. It is completely mounted on the actuator/adaptor of the process valve provided for this purpose using two clamps. The internal hose system directly connects the control air to the process valve. For process valves which do not allow the air to be guided internally, the control top has a connection option for supplying the air externally via a hose.

The control top T.VIS P-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 Tuchenhausen GmbH should be fitted. This ensures that the component is always operating properly and efficiently.

## **2.4 IP Protection Classes**

The control top T.VIS P-15 in its standard version fulfils the requirements of protection class IP66 (DIN EN 60529). Models in protection classes IP67 or IP69k (both DIN EN 60529) are also available.

IP classes provide information about the degree of protection an electrical device housing provides against the ingress of solids (first digit) or humidity (second digit). They attempt to reproduce common kinds of failure and assign so-called IP codes to the protected systems. The letters IP stand for 'International Protection' and are prefixed to the code numbers.

Position of the digit	Explanation
1. digit*	Protection against solids
6	Dust tight
2. digit*	Protection against humidity
6	Protected against powerful water jets
7	Protected against temporary immersion
9k	Protected against high pressure spray downs
*For additional digits and more detailed descriptions please refer to the pertinent standard.	

Digits not to be mentioned can be replaced by the letter x (e. g. IPx6).

Concerning the ingress of humidity, IPx6 includes all lower IP classes. This is, however, not the case for the higher protection class IPx7!

If cleaning agents are used that significantly reduce the surface tension and/or if high-pressure cleaners are used, we recommend using IP69k rated equipment as an option.



**Hint!**

**The specified IP classes only apply if the connectors are connected correctly, if the cable gland is properly sealed and if the control top is fitted on the valve, see Chapter 6, Page 28.**

## 2.5 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

### 2.5.1 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.

### **2.5.2 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.

### **2.5.3 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.

## **2.6 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.

## **2.7 Qualification of personnel**

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

Operating and maintenance personnel must

- have the necessary qualification to carry out their tasks,
- be instructed with regard to possible dangers,
- know and observe the safety instructions given in the documentation.

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

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

The following minimum qualifications are required:

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

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

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

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



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

## 2.8 Safety equipment

### 2.8.1 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

## 2.9 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.

### 2.9.1 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,
- be careful not to touch the electronic components,
- also take care not to touch electronic components when supply voltage is present.

Use ESD-compliant packaging when returning electronic components. (Contact GEA Tuchenhausen if you have any questions.)



## 2.9.2 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.

## 2.10 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 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.

### **3 Description**

#### **3.1 Functional description**

##### **3.1.1 Operation Principle**

The positioner T.VIS A-15 works with an integrated microprocessor, which contains the software for the operation, visualization and intelligent position detection. The valve stroke is detected by a contactless position measuring system integrated in the positioner, and the information is supplied to the microprocessor.

During automatic initialization and end position programming, the positioner learns the stroke of the valve used completely autonomously. This procedure can be activated either by operating the button in/under the cap or by an external control signal (programming input).

After completion of the programming procedure, the positioner T.VIS P-15 is in operating mode.

Here, when the customer feeds an analogue signal (4-20 mA), the positioner can receive a nominal value default which is processed in the microprocessor and which by means of appropriate pilot valve activations leads to the desired stroke of the process valve.

The position regulated in this way is made available for further external treatment by the positioner as an analogue signal (4-20 mA). Additionally, the position feedback signals for START/END and an error signal can be made available to the user as a 24 V DC switching output. The status of the process valve is locally displayed to be visible from a distance by coloured LEDs under the dome light.

In manual mode, the main actuator can be controlled using the buttons in the cap in order to move the process valve to its end positions or by operating the solenoid valves manually. To do this, use a screwdriver to turn the screw (S) from 0 to 1, see graphic.

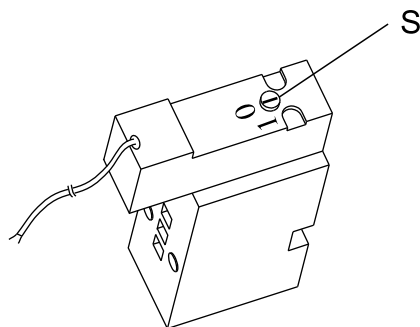


Fig.3

To assemble or disassemble the valve insert, the main actuator can be controlled in service mode using the buttons in the cap in order to relieve the spring tension, which depends on the valve type.

### 3.1.2 Control Top with Cap Including Buttons

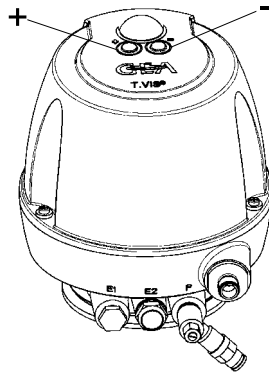


Fig.4: Control top with cap including buttons (standard variant in IP66)

According to protection class IP66 (EN 60529) the control top T.VIS P-15 is suitable for use in this design and if the electrical and pneumatic connections are installed correctly.

The control top is operated with the cap closed using the plus/minus buttons.  
Operation see Section 8.2, Page 45.

### 3.1.3 Control Top with Cap without Buttons

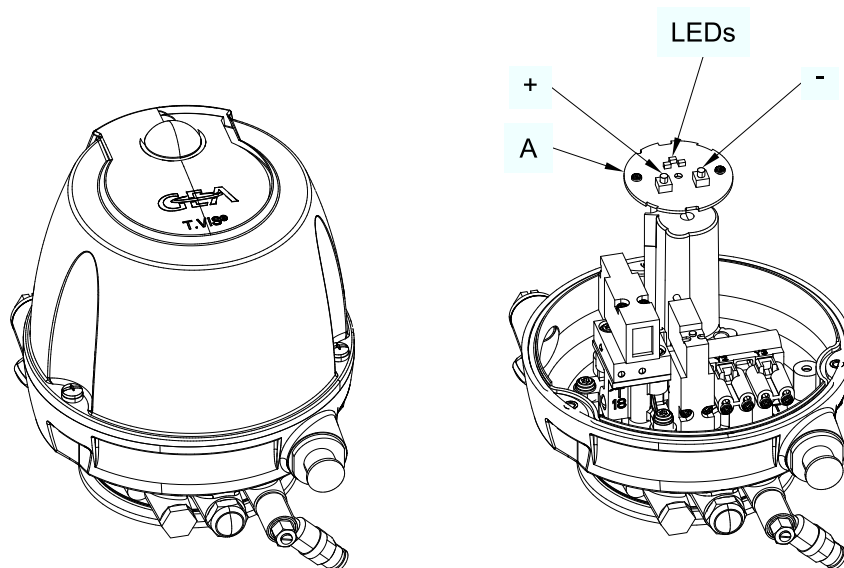


Fig.5: Control Top with Cap without Buttons

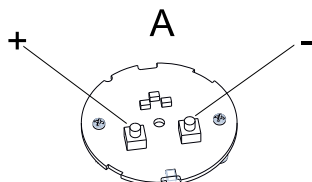


Fig.6: Circuit board (A)

According to protection class IP67 and/or 69k (EN 60529) the control top T.VIS P-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 Section 8.2, Page 45.

### 3.1.4 Function of the Buttons

Automatic end position programming and manual mode are generally activated using the buttons in or under the cap. 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.

In manual mode the stroke of the actuator can be changed locally in 5 % steps in the direction of the START or END position using the buttons in or under the cap. The buttons in the cap can also be used to make customer-specific parameter settings for the positioner.

### 3.1.5 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 actuators 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.

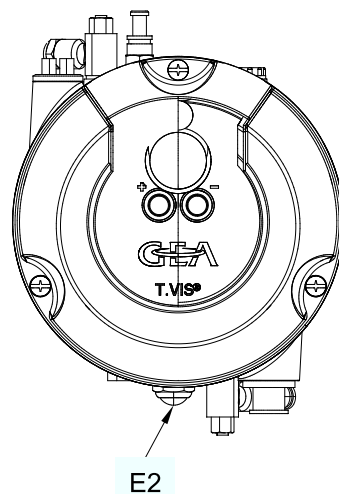


Fig.7: Control top (standard variant in IP66)

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  $\leq 0^{\circ}\text{C}$  during transport or storage.



#### Hint!

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

---

### 4.2 Transport

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.8

Code/Type	T P 1 5	N	4	P	A	J
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 P 1 5		Control Top T.VIS P-15			
15	Control top type					
	N		2 solenoid valves			
16	Feedback					
	4		T.VIS P-15 (with analog module)			
	5		T.VIS P-15 (with analog module + 2 digital feedback signals / 1 error output)			
17	Type of interface/mode					
	P		24 V DC programmable			
18	Solenoid valve					
	A		24 V DC 0.85/ 1.6 W			
19	Screw connection (cable/air) for air hose Ø 6/4 mm					

Explanation of the items in the order code		
Item in the order code	Designation	Explanation
	J	5-pin connector M12/5-wire/M20x1.5 Acoded / for feedback code 5: additional 5-pin connector M12/M16; B-coded
	for air hose Ø 6,35/4,31 mm	
	P	5-pin connector M12/5-wire/M20x1.5 Acoded / for feedback code 5: additional 5-pin connector M12/M16; B-coded
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)
	/67	Protection class IP 67 (immersion)
	/69k	Protection class IP 69K (high-pressure spray down cleaning)
	/A	For ASEPTOMAG valves Example: TP15I4PAJ/A
	/UC	Certification UL/CSA For indoor use

## 5.2 Technical data

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

Technical data: Temperatures and compressed air supply	
Designation	Description
Ambient temperature	-20 to +55 °C
Control air	acc. to ISO 8573-1

Technical data: Temperatures and compressed air supply	
Designation	Description
- Solid particle content:	Quality class 6 (recommended) Particle size max. 5µm Particle density max. 5 mg/m <sup>3</sup>
- 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 <sup>3</sup> air
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 pressure	max 8 bar, min 2 bar
Sound pressure level using sound absorber	max. 72 dB

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

Technical data: Electrical information	
Designation	Description
Protection class EN 60529*	Standard: IP66 - powerful water jet Optional: IP67 - immersion Optional: IP69k - high pressure spray down*
EC EMC directives	2014/30/EU
Immunity for industrial environments	EN 61000-6-2
EC Low Voltage Directive	73/23/EEC



Technical data: Electrical information	
Designation	Description
Electrical wiring configuration	<ul style="list-style-type: none"> <li>– 5-pin M12 circular connector or</li> <li>– Terminal strip</li> </ul>
Switch point tolerance	adjustable 0.3; 0.7; 1.0; 2.0 mm
Dead band	< 1%; < 2%; < 3%
Characteristic curve	linear or percent 1:25

\* When using detergents with high surface tension reduction and/or when using high-pressure cleaners, we recommend the use of optional protection class IP69k.

### 5.3 Specifications for 24V DC Version

Technical data: power supply	
Designation	Description
Supply voltage UV	24 V DC (+20%... -12.5%)
Current consumption	
<ul style="list-style-type: none"> <li>– No-load current</li> <li>– one solenoid valve</li> <li>– Max. load of the feedback</li> </ul>	<div>≤ 20 mA</div> <div>35 ... 45 mA</div> <div>50 mA</div>
Total	approx. 260 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 = $U_v - \leq 5\%$ Low = $\leq 5\text{ V}$
Max. current per output	200 mA short circuit proof
Switching frequency (ohmic + inductive loads ≤ 25 mH)	2 Hz

## 5.4 Accessories

Accessories must be ordered separately.

Accessories	Part no.
Cable socket – M12; 5-pin: A-coded	508-963
Cable socket – M12; 5-pin: B-coded	508-964

## 5.5 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 end spanner a/f 13x17	408-036
Open-ended wrench a/f 14	

## 5.6 Lubricants

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

## 5.7 Equipment

Technical data - equipment	
Equipment	Material no.
Sound absorber G 1/4" <ul style="list-style-type: none"> <li>• Filter material: stainless steel wool</li> <li>• Ambient temperature: -20...+70 °C</li> <li>• max. pressure 10 bar</li> </ul>	933-174
Sound absorber G 1/8" <ul style="list-style-type: none"> <li>• Filter material: stainless steel wool</li> <li>• Ambient temperature: -20...+70 °C</li> <li>• max. pressure 10 bar</li> </ul>	933-175
Supply/exhaust air throttle G 1/8" <ul style="list-style-type: none"> <li>• Filter material: sintered stainless steel</li> <li>• Pressure range: 0.2 ... 10 bar</li> <li>• Infinitely adjustable flow at <math>\Delta p</math> 6 bar: 310 dm<sup>3</sup> / min<sub>n</sub></li> <li>• Ambient temperature: -10 ... +70 °C</li> <li>• Flow rate setting at 0 ... +70 °C</li> </ul>	603-042

## 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.



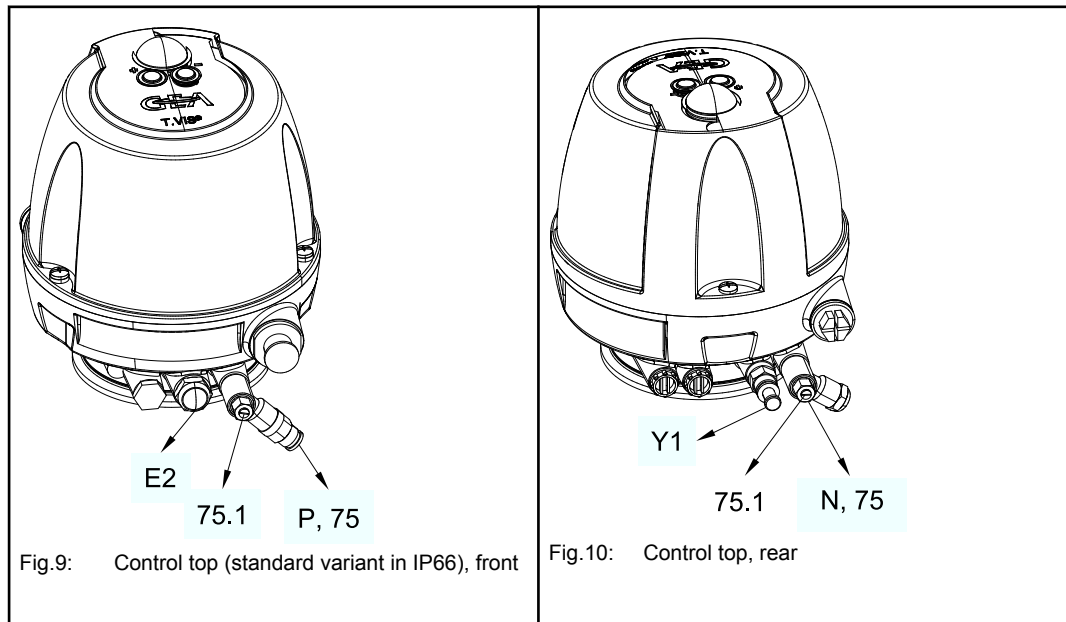
**Hint!**

**Avoid kinks in the pneumatic hoses!**

---

### 6.3 Pneumatic connections

### 6.3.1 Control Top with Solenoid Valves



E2	Safety vent against excess pressure
P	Central air supply with integrated filter at solenoid valve NC via supply air throttle (75)
N	Exhaust air of the main stroke via solenoid valve NC and NO via exhaust throttle (75)
Y1	Air connection for external main stroke connection with sealing plug

#### **Caution!**

Compressed air outlet

Control air can be present at the plugs for the air connections!

► Before removing a sealing plug, make sure that the respective air connection is pressure-free!

#### **Basic setting of the throttle valve:**

→ using a slotted screwdriver (75.1), turn the throttle clockwise to close it and counterclockwise by 2 turns to open it! Can be adjusted to the process conditions.

#### **Hint!**

**On most of the GEA Tuchenhausen valve types, solenoid valve Y1 internally guides the main control air through the switch bar into the main actuator. The external air connection Y1 is provided in addition.**

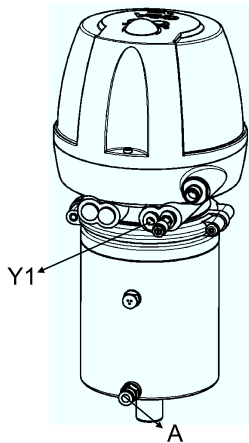



Fig.11: Control top with air connection

A	Air connection on actuator
Y1	Air connection on control top

→ Connect air connection on control top and air connection on actuator with an air hose.

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

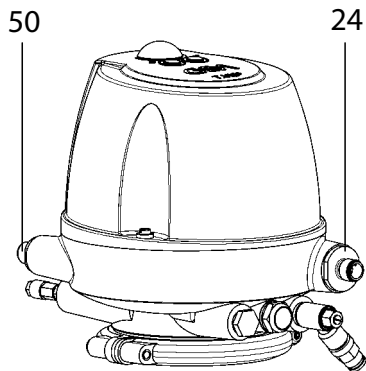


Fig.12

24	M12 plug connection front
50	M12 plug connection rear



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

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 / 5-pin, A-coded (24)

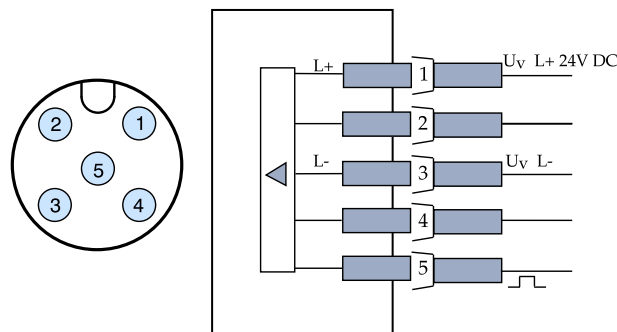


Fig.13: 5-pin M12 plug-in connector A-coded: device connector and view of pin strip

Corresponding cable socket see "Accessories" Section 5.4, Page 26.

1	L+	$U_V$ L+24 V DC supply voltage
2		Nominal value input <sup>+</sup>
3	L-	$U_V$ L- reference potential
4		Setpoint output <sup>+</sup>
5		Programming input

\* Assignment for colour variant green, see "Colour changeover" Section 6.5.2, Page 33.

Carry out the following steps:

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

→ Done.

6.4.2.2 Connector M12/5-pin, B-coded (50)

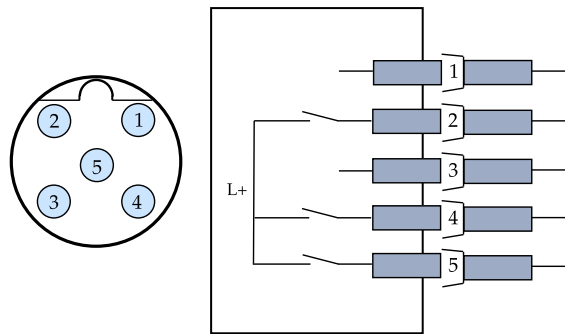


Fig.14: 5-pin M12 connector B-coded: device connector and view of male connector

Corresponding cable socket see “Accessories” Section 5.4, Page 26

1		not assigned
2		Feedback OPEN
3		not assigned
4		Feedback CLOSED
5		Error output

\* Assignment for colour variant green, see "Colour changeover" Section 6.5.2, Page 33.

Carry out the following steps:

1. Connect cable via air connector M12/5-pin, B-coded.  
→ Done.

6.5 Visual Display



### 6.5.1 Illuminated dome

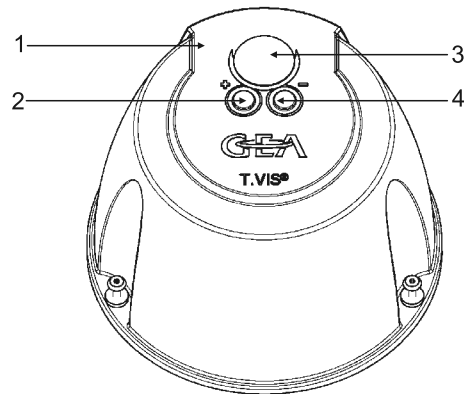


Fig.15

1	Cap
2	+ button
3	Illuminated dome
4	- button

The following statuses are visualized by the illuminated dome, also see Section 6.5.2, Page 33:

- Valve in non-actuated position: green
- Valve in actuated position: yellow
- Programming mode active: red
- Error/malfunction: rapidly flashing red
- Valve unprogrammed: flashing 3 times - pause - flashing 3 times - pause
- Position is being adjusted: flashing blue
- Position is adjusted: blue

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, valve in actuated position, moving.

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!**

When the colours are swapped, the feedback signals are also swapped.

### 6.5.3 Connection Diagram for T.VIS Circuit Board (Bottom)

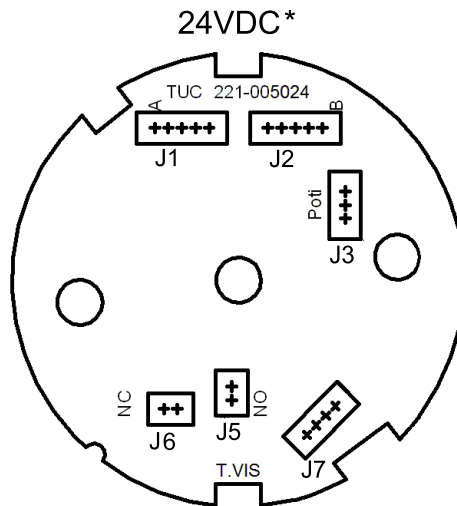


Fig.16

Explanation of the pin assignment			
Plug position	Connector type	Item no. in the Spare Parts List	Designation
J1	PicoBlade 5-pin	24	Plug-in connector M12/5-wire/M20/A-coded
J2	PicoBlade 5-pin	50	Plug-in connector M12/3-wire/M20/B-coded
J3	PicoBlade 3-pin	9	T.VIS sensor module
J5	PicoBlade 2-pin	64	Solenoid valve NO
J6	PicoBlade 2-pin	63	Solenoid valve NC
J7	PicoBlade 4-pin		

## 6.6 Mounting the Control Top to Different Valves

This chapter describes how the control top T.VIS P-15 is installed and removed on actuators of different valve types. Observe the following notes when doing so.

**Notice**

**Magnetic fields can influence the position measuring system.**

Measured values can be changed.

► Protect the control top from external magnetic fields.

### 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 Mounting to VARIVENT Shut-Off and Divert Valves

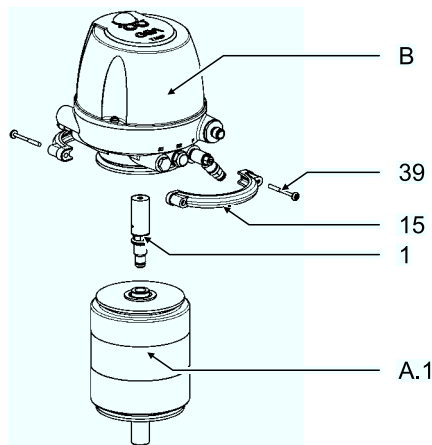


Fig.17

Requirement:

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

Carry out the following steps:

1. Check that the switch bar (1) is firmly in place. If necessary, tighten using an a/f 13 open end spanner; torque 2 Nm (1.4 lbft).
  2. Fit the control top (B) over the switch bar (1) and on the actuator (A.1).
  3. Tighten the clamps (15) and screws (39) to a torque of 1 Nm (0.7 lbft).
  4. Align the pneumatic and electrical connections in accordance with the valve block configuration.
  5. Close the air connection Y1 with a sealing plug since the control top T.VIS P-15 has an inner air duct.
  6. Perform commissioning, see Chapter 6, Page 28 and Chapter 7, Page 41.
- Done.

## 6.6.2 Mounting to a Butterfly Valve T-smart 8000

Requirement:

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

Carry out the following steps:

1. Fit the bearing (201) into the locking screw (198).

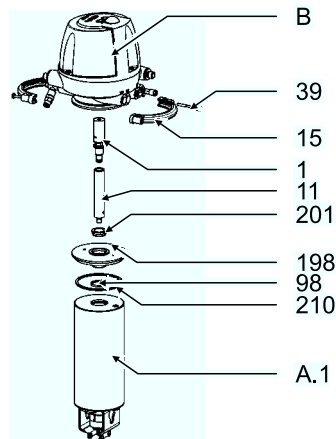


Fig. 18

2. Fit the O-rings (210, 98).
  3. Use a face spanner to screw the locking screw (198) into the actuator (A.1).
  4. Screw the switch bar (1) together with switch bar (11) into the actuator, torque 2 Nm.
  5. Fit the control top (B) over the switch bar (1) and on the actuator.
  6. Tighten the clamps (15) and screws (39) to a torque of 1 Nm (0.7 lbft).
  7. Align the pneumatic and electrical connections in accordance with the valve block configuration.
  8. Perform commissioning, see Chapter 6, Page 28 and Chapter 7, Page 41.
- Done.

### 6.6.3 Mounting to a Butterfly Valve T-smart 7 and a Mixproof Butterfly Valve T-smart 9

Requirement:

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

Carry out the following steps:

1. Screw the switch bar (11) into the actuator; torque: 22 Nm/16.2 lbft.

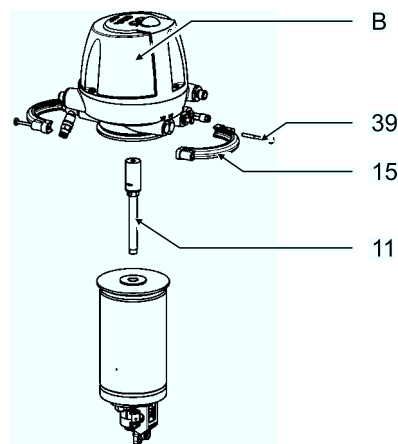


Fig. 19

2. Fit the control top (B) over the switch bar (11) and on the actuator.

3. Tighten the clamps (15) and screws (39) to a torque of 1 Nm (0.7 lbft).
  4. Align the pneumatic and electrical connections in accordance with the valve block configuration.
  5. Perform commissioning, see Chapter 6, Page 28 and Chapter 7, Page 41.
- Done.

#### 6.6.4 Mounting to ECOVENT Valves N\_ECO and W\_ECO

Requirement:

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

Carry out the following steps:

1. Complete the T.VIS mounting base (198) with O-rings (29, 101) and a plain bearing (202).

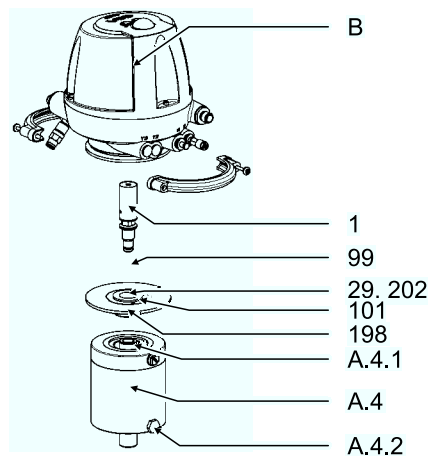


Fig.20

2. Screw the mounting base (198) into the actuator (A.4) and tighten using a face spanner.
  3. Screw the switch bar (1) with ring (99) into the piston rod (A4.1) and tighten by applying an a/f 13 open end spanner at (1.1); torque 2 Nm (1.4 lbft).
  4. Fit the control top (B) over the switch bar (1) and on the actuator.
  5. Tighten the clamps (15) and screws (39) to a torque of 1 Nm (0.7 lbft).
  6. Align the pneumatic and electrical connections in accordance with the valve block configuration.
  7. Due to the internal air guiding of the control top (B), the connection A 4.2 on the actuator and air connection Y1 (23) on the steering top are closed.
  8. Perform commissioning, see Chapter 6, Page 28 and Chapter 7, Page 41.
- Done.

#### 6.6.5 Mounting to VESTA Valve H\_A/M

Requirement:

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

Carry out the following steps:

1. Complete the T.VIS mounting base (198) with O-rings (29, 101) and a plain bearing (202).

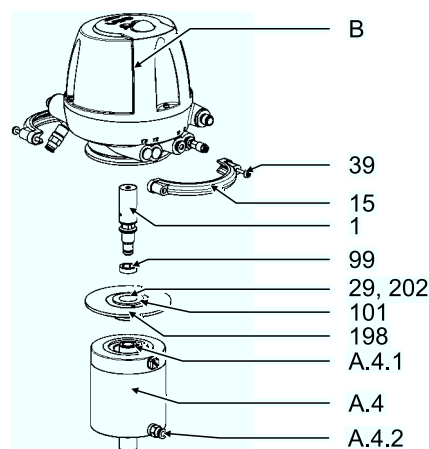


Fig.21

2. Screw the mounting base (198) into the actuator (A.4) and tighten using a face spanner.
  3. Screw switch bar (1) with ring (99) into the piston rod (A.4.1) and tighten with open-end wrench SW 13, torque 2 Nm (1.4 lbft).
  4. Fit the control top (B) over the switch bar (1) and on the actuator.
  5. Tighten the clamps (15) and screws (39) to a torque of 1 Nm (0.7 lbft).
  6. Align the pneumatic and electrical connections in accordance with the valve block configuration.
  7. As internal air guiding is not possible on VESTA valves, connect the air connection (Y1) on the control top to connection (A.4.2) on the actuator with an air hose (L).
  8. Perform commissioning, see Chapter 6, Page 28 and Chapter 7, Page 41.
- Done.

### 6.6.6 Mounting to VESTA Valve H\_A

Requirement:

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

Carry out the following steps:

1. Place O-rings (139.2) in the adapter (139) at the bottom side of the thread (139.1).

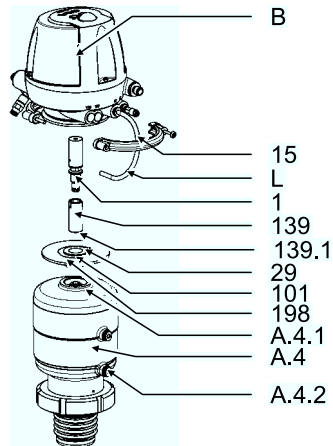


Fig. 22

2. Screw the adapter into the actuator (A4.1) and tighten using an a/f 17 open end spanner.
  3. Complete the T.VIS mounting base (198) with O-rings (29, 101) and a plain bearing (202).
  4. Screw the mounting base (198) into the actuator (A4) and tighten using a face spanner.
  5. Screw the switch bar (1) into the adapter (139) and tighten using an a/f 13 open end spanner; torque 2 Nm (1.4 lbft).
  6. Fit the control top (B) over the switch bar (1) and on the actuator.
  7. Tighten the clamps (15) and screws (39) to a torque of 1 Nm (0.7 lbft).
  8. Align the pneumatic and electrical connections in accordance with the valve block configuration.
  9. As internal air guiding is not possible on VESTA valves, connect the air connection (Y1) on the control top to connection A4.2 on the actuator with an air hose (L).
  10. Carry out commissioning, see Section 7.2, Page 41.
- Done.

#### 6.6.7 Fitting to an ASEPTOMAG Valve

Requirement:

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

Carry out the following steps:

1. Place the T.VIS adapter plate (M), with O-rings (M1), on the actuator (A.4) and secure it with four M5 screws (M.2).

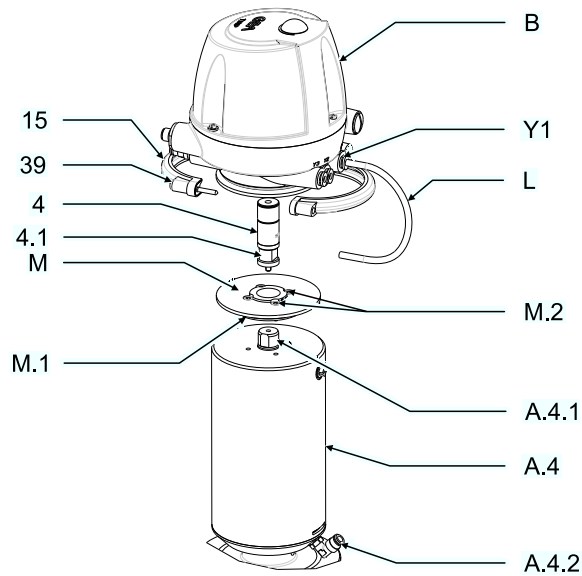


Fig. 23

2. Screw the switch bar (4) Mat. 221-589.87, into the piston rod (A.4.1) and tighten with open-end wrench SW 13, torque 3 Nm.
  3. Fit the control top (B) over the switch bar (4) and on the actuator.
  4. Tighten the clamp connection (15) and screws (39) to a torque of 1 Nm.
  5. Align the pneumatic and electrical connections in accordance with the valve block configuration.  
! As internal air guiding is not possible for ASEPTOMAG valves, connect the air connection (Y1) on the control top to connection (A.4.2) on the actuator with an air hose (L).
  6. Carry out commissioning, see Section 7.2, Page 41.
- Done.

### 6.6.8 Replacing Control Tops

When replacing the control top observe the following warning note:



#### **Caution!**

##### **Collision of the switch bar with the pneumatic block**

If a valve with the wrong type of switch bar is used, there is a risk of injury as the switch bar can damage the pneumatic block.

- When replacing a predecessor model with a control top T.VIS P-15 the switch bar must always be replaced!



## **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.

#### **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 with Solenoid Valves**

#### **Activating the Control Top**

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

#### **Notice**

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

Carry out the following steps:

1. Switch on the control air supply.  
! Make sure that the supply air and exhaust air throttles are not completely closed.
2. Check the valve function by activating the solenoid valve:
  - Switch on solenoid valve Y1 using the manual operating element on the solenoid valve: Use a screwdriver to turn the screw (S) 0 from 0 to 1.
  - Switch the solenoid valves Y1 off again: use a screwdriver to turn the screw (S) in direction 0.

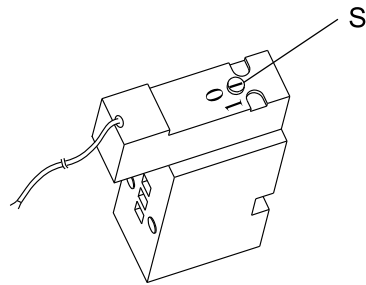


Fig.24



Fig.25

→ Further information about Y1: see Section 6.3, Page 28.

3. Switch on the power supply.
  4. Activate programming mode via key operation, see Section 8.2, Page 45 or by applying a 24 V DC signal at the programming input for at least 1 second.
    - Automatic programming start is indicated by the steady red light in the illuminated dome.
    - Valve travels to both end positions.
    - Colour changes cyclically between red and green: user can choose between 0.3; 0.7; 1.0 and 2.0 mm switchpoint tolerance (accuracy of the end position feedback) by pressing the + button.
    - Colour changes cyclically between red and blue: user can choose between linear and equal percentage (1:25) control characteristic by pressing the + button
    - Colour changes cyclically between yellow and red: user can choose a dead band of either < 1%; < 2% or < 3% for the control loops by pressing the + button.
    - If no selection was made with the + push button or confirmed or cancelled with the - push button within 30 seconds, then the setting most recently activated is adopted.
    - A steady red light in the illuminated dome indicates that the set values are being calculated in relation to the measured stroke.
    - If no selection is made within 30 seconds, the setting last selected is automatically adopted and visualized in accordance with the colours selected.
- Positioner T.VIS P-15 then automatically changes from programming mode to operating mode and regulates the process valve in accordance with the relevant setpoint value applied.
- The control top is activated.



**Hint!**

Changing the setpoint setting in the range of 0...100% in order to check the controller function and to optimize the settings of the throttles. For this purpose, first close both throttles fully – the valve will not work – and then start to open them slowly step by step and continue to change the setpoint setting until the optimum is found between valve disk travel speed and positioning behaviour. The valve should travel as slowly as possible and as quickly as necessary.



**Hint!**

Checking the end position feedbacks is also possible in operating mode using a setpoint setting in the range of 0...100% or in manual mode by gradually moving towards the closed or open position using the operating buttons.

**Checking 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. Carry out the following steps:

1. Activate the solenoid valves via PLC in order to check the proper function of the feedback on the control top T.VIS P-15 .

→ This completes commissioning.



**Hint!**

The solenoid valve can also be activated and deactivated in manual mode via the control buttons, see "Operating overview" (Section 8.2, Page 45).

### 7.3 Service Function

If maintenance must be conducted on a process valve that is fitted with a control top T.VIS P-15, the valve core must be pulled out of the housing. For this purpose, the valve disk pretension of the process valve must be relieved by actuating the main actuator. This is possible with the service function, see "Operating overview" Section 8.2, Page 45.

Another option with the hood removed is the manual override on the solenoid valve, see "Control top with solenoid valves" .

## **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 Operating Overview

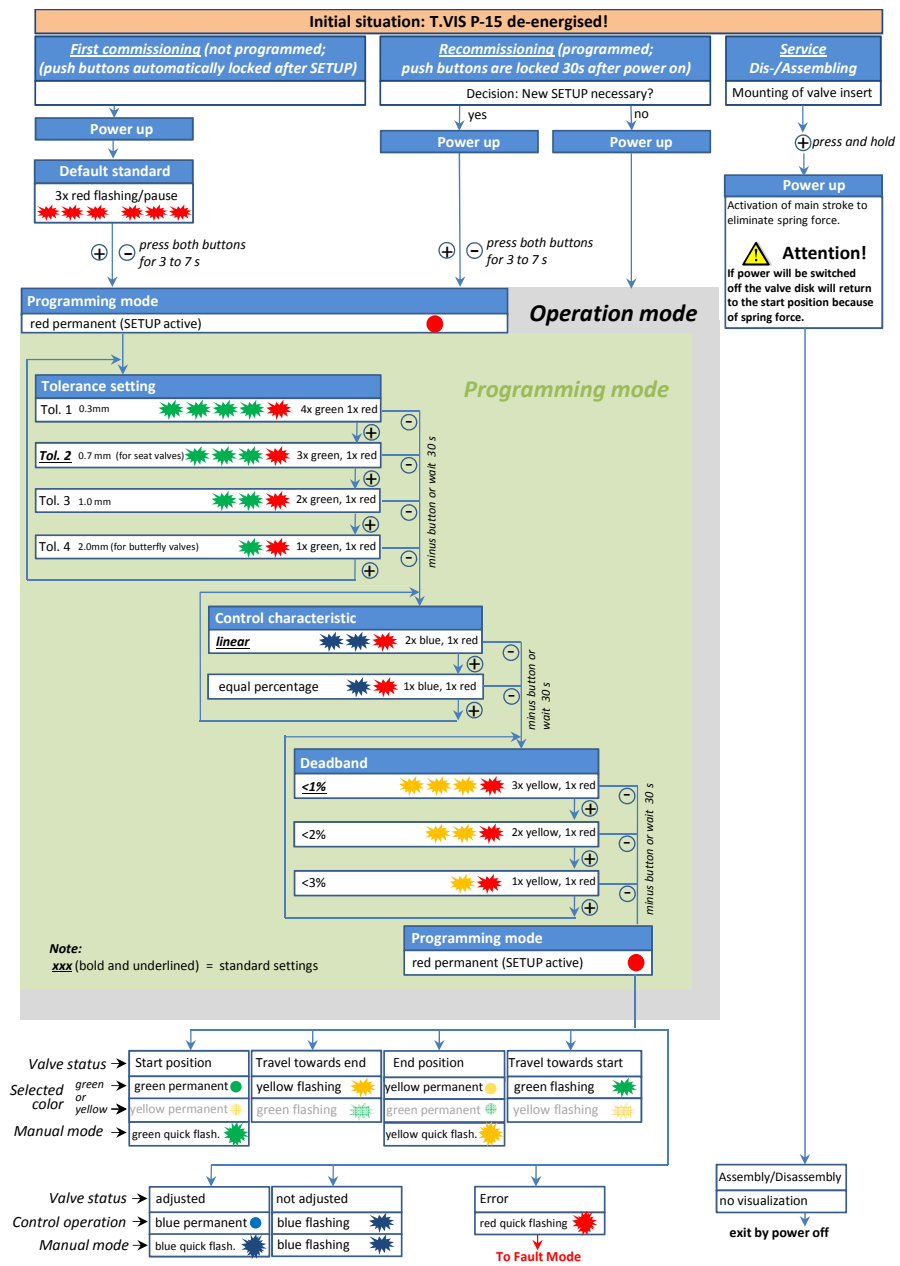


Fig.26

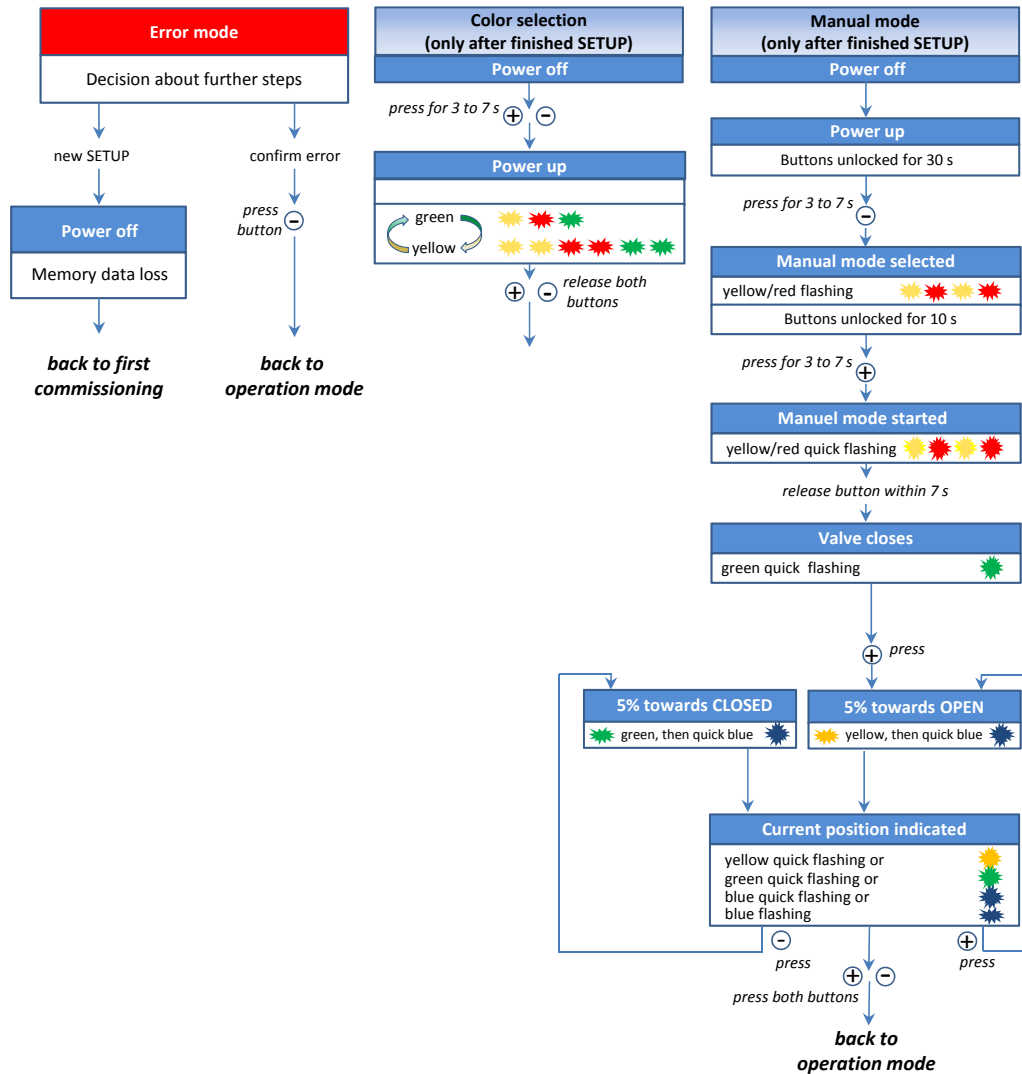


Fig.27

## **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.

## 10 Maintenance

### 10.1 Safety precautions

#### Maintenance and repair

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

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

For maintenance and repair, the following principles apply:

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

#### Disassembly

For 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 Section 4.1, Page 21.

## 10.2 Inspections

### Checking parts are firmly secured

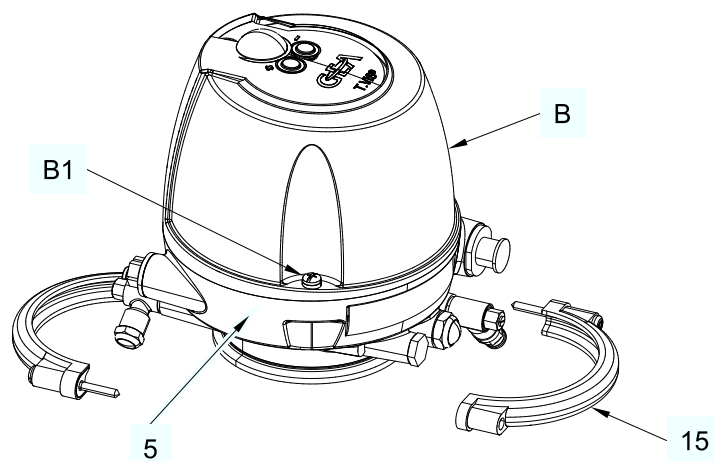


Fig.28

1. Air hose connections
2. Screw connection (B!) between hood (B) and base (5)
3. Clamp (15)
4. Plug

### Further checking

1. Check that the electrical connectors are properly secured.
2. Check the sound absorber and the exhaust air throttle for soiling.
3. Check the housing for mechanical damage.

→ Done

### 10.3 Removing the Control Top from the Valve

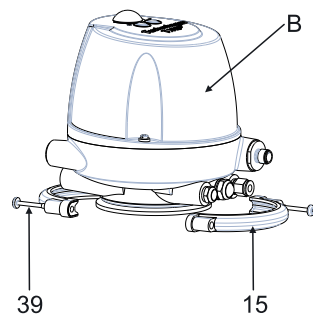


Fig.29

Requirement:

- Make sure that the solenoid valve is not actuated.



#### Hint!

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

Carry out the following steps:

1. Release the screw connection (39) and remove the clamp ring (15).
2. Pull the control top vertically off the valve.
  - Light-emitting diode A (green) will go out and light-emitting diode B will flash yellow.
  - Done

### 10.4 Dismantling the Control Top into its Components

#### 10.4.1 Removing the Cap

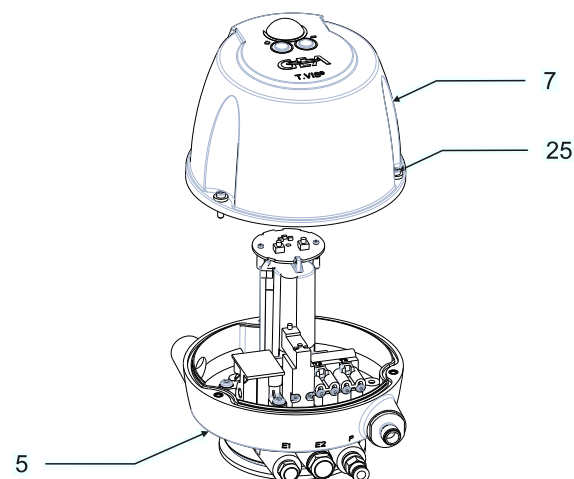


Fig.30



## **Danger**

### **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

#### **10.4.2 Remove the circuit board**

Carry out the following steps:

1. Unscrew and remove the screws (77).

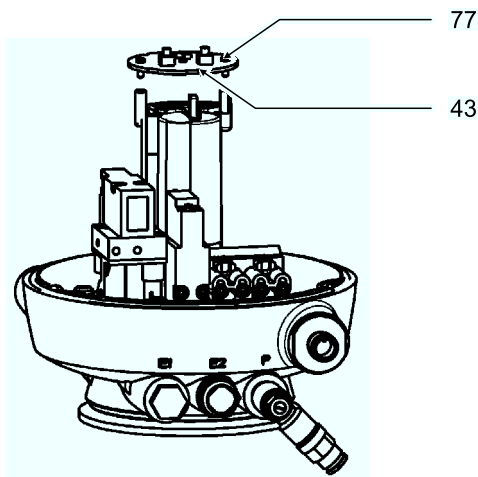


Fig.31

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

→ 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!
- 

#### **10.4.3 Install the circuit board**

To install the printed circuit board, pay attention to the wiring diagram for the printed circuit board (underside) for T.VIS P-15, see Section 6.5.3, Page 34!

#### **10.4.4 Removing the sensor module (9)**

Carry out the following steps:

1. Loosen the screws (57).

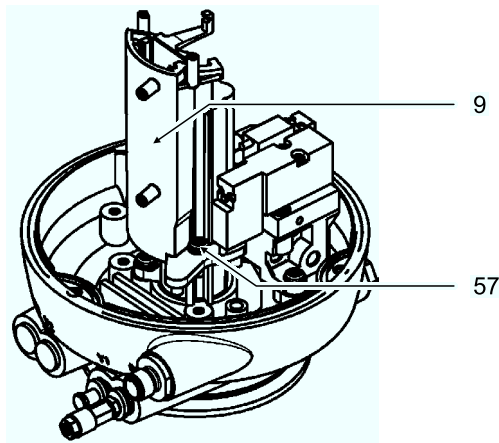


Fig.32

2. Lift the sensor module (9) off the base plate.

→ Done

#### 10.4.5 Removing the Solenoid Valves and the Control Plate

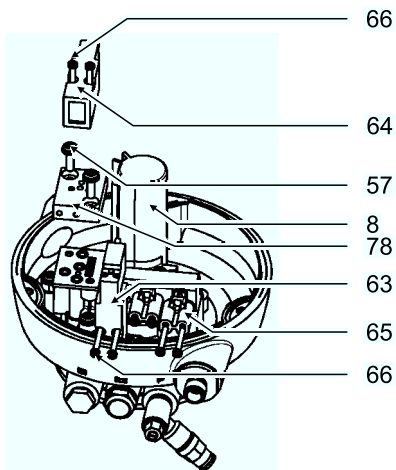


Fig.33

Requirement:

- Pay attention to the correct assignment of cables between the solenoid valves and the circuit board – solenoid valve (63) must be connected to terminal NC; solenoid valve (64) to terminal NO.
- Use only solenoid valves as listed in the chapter "Technical data", see Chapter 5, Page 22.



#### **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. Undo the screws (66) and remove the solenoid valves (63 and 64) from the pneumatic block (8).
  2. Loosen the screws (66) and remove the valve plates (65) from the pneumatic block (8).
  3. Loosen the screws (57) and remove the control plates (78) from the pneumatic block (8).
- Done

#### 10.4.6 Removing the pneumatic block

Requirement:

- If only O-rings (42) and (55) are to be changed, the solenoid valves (63), (64) / adapter plate (78) and valve plates (65) can remain on the pneumatic block (8).

Carry out the following steps:

1. Undo screws (57.1), (57.2).

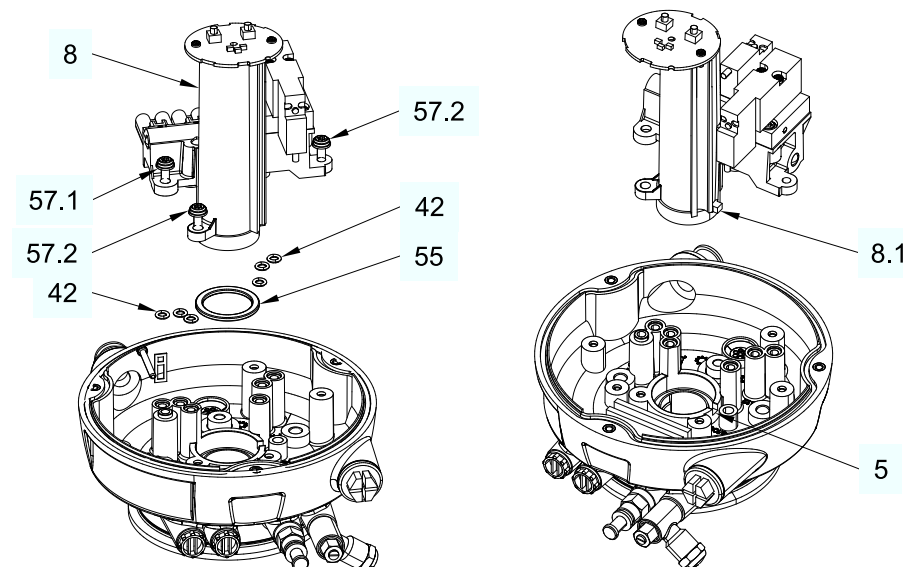


Fig.34

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

#### 10.4.7 Fitting the Pneumatic Block

Requirement:

- When fitting the pneumatic block, make sure that it is compatible!
- Insert the pin (8.1) on the pneumatic block into the groove of the base (5)!
- Use the following pneumatic block type on ASEPTOMAG valves:
  - Pneumatic block T.VIS-15/NOT 3PV/ASG mat. no. 221-646.93

Carry out the following steps:

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

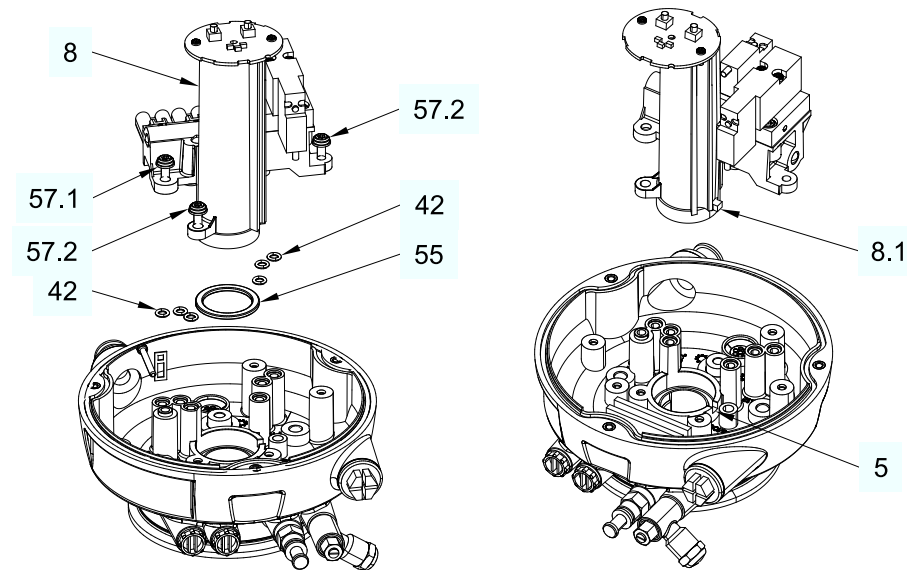


Fig.35

2. Tighten the screw (57.2): 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

#### 10.4.8 Install valve plates

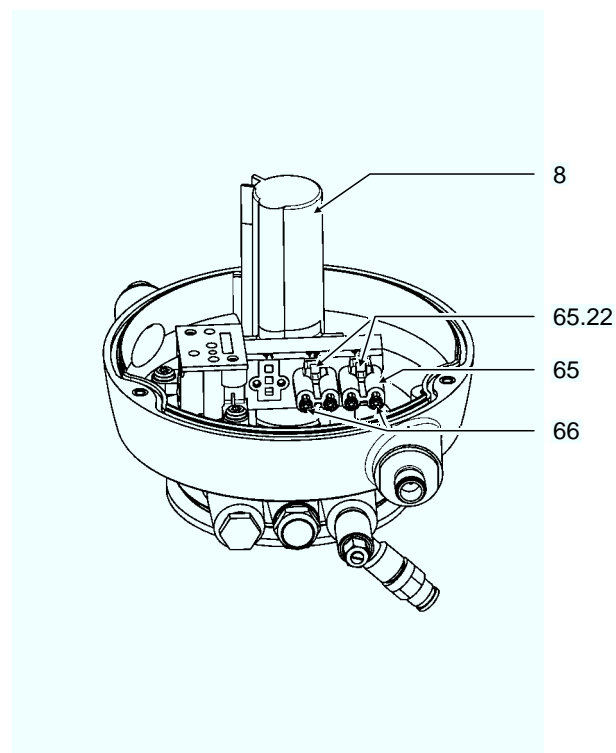


Fig.36

Carry out the following steps:

1. Position the valve plates (65) incl. the flat seal on the pneumatic block (8) at positions Y2 and Y3 with the groove (65.22) facing upwards.
2. Tighten the screws (66).

→ Done



**Hint!**

**When using the pneumatic block (8), the 2 valve plates (65) must be fitted so that the groove (65.22) is pointing upwards. The screws (66) are located in the lower mounting holes.**

**On ASEPTOMAG valves, a special type of pneumatic block must be used! Tighten the screws (66) to a max. torque of 1 Nm.**

## 10.5 Maintenance

### 10.5.1 Replacing the Seals on the Base

On VARIVENT actuators with a vent hole in the actuator cover the control top must be fitted without O-ring (54)!

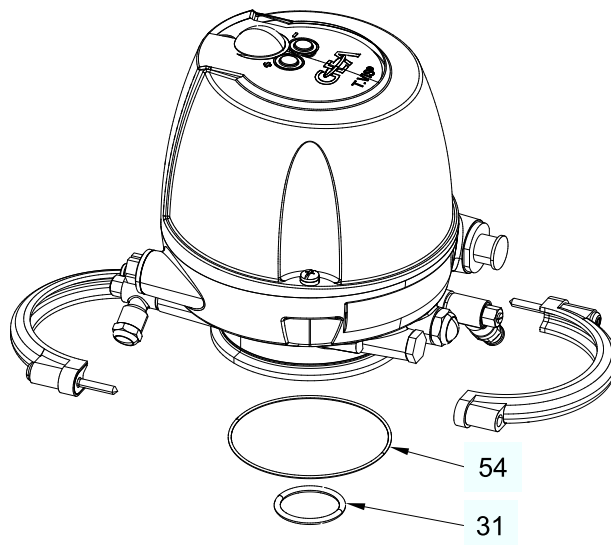


Fig.37

Carry out the following steps:

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

→ Done

### 10.5.2 Maintenance of Sound Absorber, Filter, Non-Return Valve and Exhaust Air Throttle

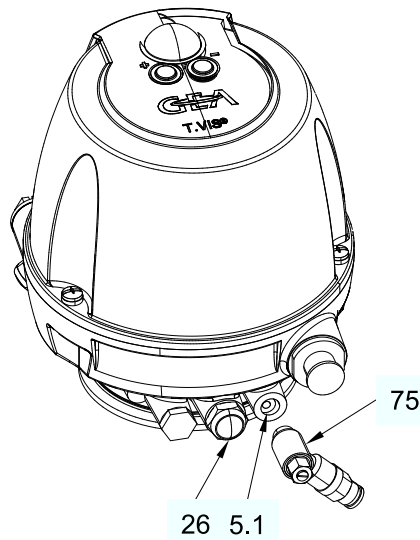


Fig.38

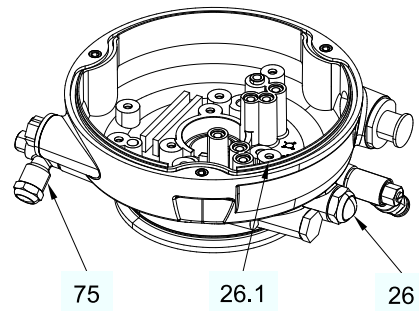


Fig.39

**Requirement:**

- Use only the exhaust air throttle (75) and sound absorber (26) specified in the spare parts list, see Chapter 13, Page 61.

**Carry out the following steps:**

1. Check that the control air can exit freely from the sound absorber (26), reflux valve (26.1), filter (5.1) and exhaust air throttle (75) and replace the parts if necessary.

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

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

→ 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	<ul style="list-style-type: none"> <li>No voltage at connector 1 (PINs 1 and 3)</li> <li>Polarity of PINs 1 and 3 mixed up</li> <li>Service function active</li> </ul>	<ul style="list-style-type: none"> <li>Check the electrical connections for correct wiring</li> <li>Connect PIN 1 and PIN 3 correctly</li> <li>Disconnect the plug</li> </ul>
After connecting the supply voltage, green/yellow is indicated immediately	Green or yellow	Device already programmed at least 1 x	Reprogram in order to adjust to the process conditions: Press the + and - buttons at the same time for 3 ... Actuate 7 s, see restarting, Section 8.2, Page 45
Programming cannot be completed	Steady red light	End positions cannot be reached	
		<p>due to missing control air pressure or</p> <p>due to incorrectly fitted switch bar</p>	<p>Check the control air pressure: observe the minimum pressure for the process valve indicated on the type plate</p> <p>Check and tighten the fitted adapter, see Section 6.6, Page 34</p>

Malfunction, signalling, cause, remedy			
Malfunction	Signalling	Cause	Remedy
		because stroke is too small (below minimum stroke of 1 mm)	Reprogram the T.VIS P- 15 after checking the above/mentioned points
		Throttle settings are incorrect	Open the supply air throttle (at P) further Open the exhaust air throttle (at N) further
After programming, the valve position is not properly regulated	Blue flashing	Adapter in the process valve not fitted correctly	Control and tightening of the installed adapter, see "Installation of the control top on different valves"
		Control air pressure not sufficient to actuate the process valve	Check the control air pressure: observe the minimum pressure for the process valve indicated on the type plate
		Control air pressure was sufficient during programming, but drops in the system during the operation	Check the control air pressure: observe the minimum pressure for the process valve indicated on the type plate
		Throttle settings are incorrect	Supply air throttle at P Exhaust air throttle at N Fine adjustment required
No feedback signal is pending at the PLC although one of the end positions has been reached	Red LED flashing	T.VIS P-15 in factory setting and not yet programmed	Programming according to Operating overview, see Section 8.2, Page 45

Malfunction, signalling, cause, remedy			
Malfunction	Signalling	Cause	Remedy
	Red LED continuous light	T.VIS P-15 currently in programming mode	Wait until programming mode ends
	Red LED flashing rapidly	T.VIS P-15 has a malfunction: Programmed position overrun (possibly from shape change of the bellows) only at 0.3 mm tolerance setting)	Check the bellows and possibly reprogram, see operating overview Section 8.2, Page 45

## 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. Put the control top into operation, see “Commissioning – control top with solenoid valves” (Section 7.2, Page 41).
  - 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 21.

### **12.2 Disposal**

#### **12.2.1 General notes**

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

The component consists of the following materials:

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

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

# 13 Spare parts list - control top type T.VIS P-15

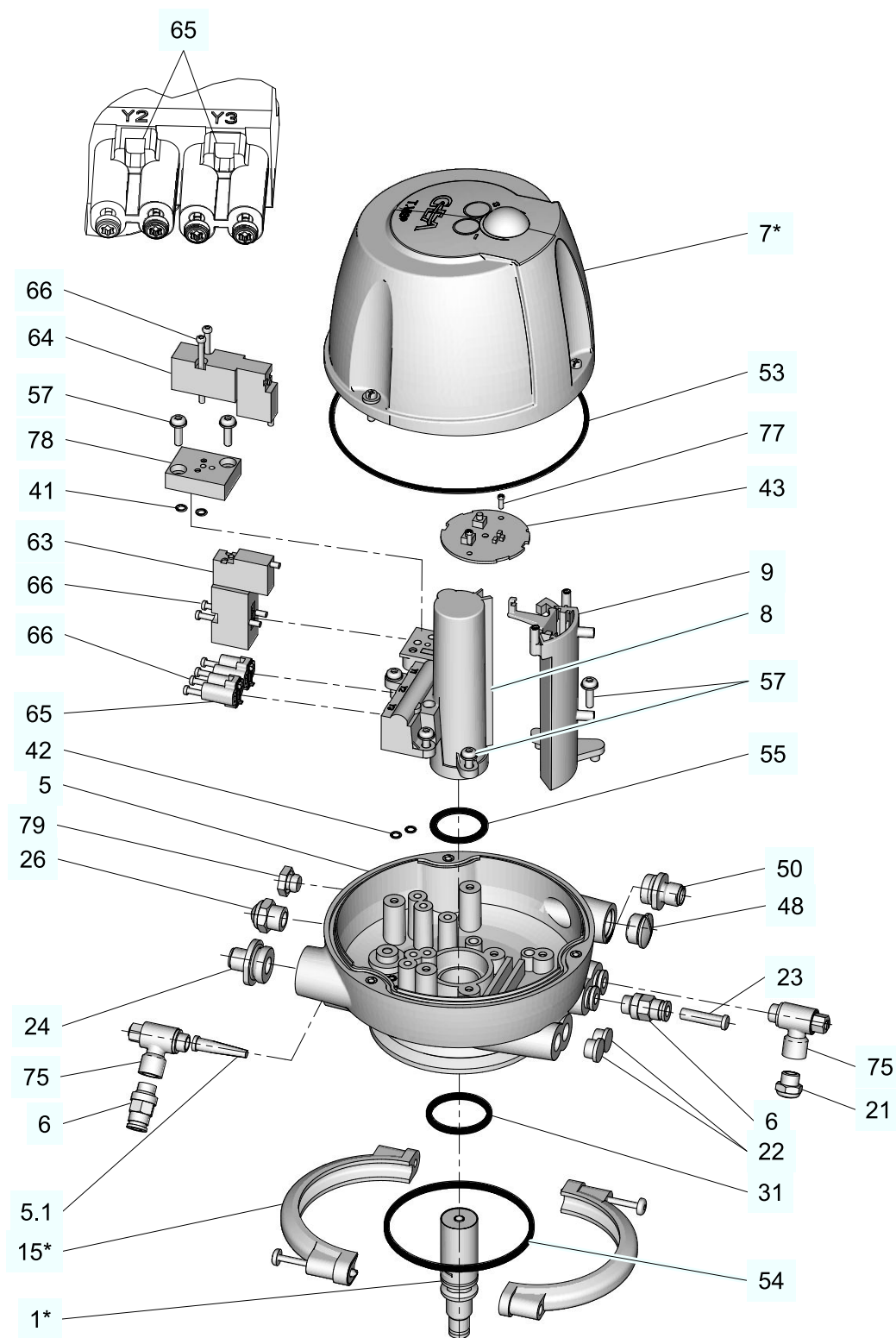


Fig.40

## Spare parts list - control top type T.VIS P-15

Item	Designation	Material	Material no.	
			Air connections	
			Metric	Inch
B	Control Top T.VIS P-15		221-739.33	221-739.35
	Control top T.VIS P-15/RM (for position feedback only, binary signals)		221-739.34	221-739.36
1*	For switch bar T.VIS P-15 refer to spare parts list 221ELI010731DE			
5	Base T.VIS T-18	PA12/L	221-646.100	221-646.100
5.1	Filter	PE	221-003869	221-003869
6	Screw-in plug connection	MS CV	933-176	933-173
7*	Cap T.VIS P-15/A-15 with button	PA12/L	221-646.87	221-646.87
	Hood T.VIS M/A-15	PA12/L	221-646.88	221-646.88
8	Pneumatic block T.VIS-18/3PV/NOT	PA12/L	221-646.90	221-646.90
	Pneumatic block with NOT/ASG for ASEPTOMAG valves*	PA12/L	221-646.93	221-646.93
9	Sensor module T.VIS P/A-15	--	221-589.74	221-589.74
15*	Clamp connection KU	--	221-507.08	221-507.08
21	Sound absorber G1/8"	MS CV	933-175	933-175
22	Locking screw	PE-HD	922-369	922-369
23	Plug	PP	922-281	922-280
24	Connector M12/5-pin/A-coded/M20/cpl.	--	221-005.101	221-005.101
26	Sound absorber G1/4"	MS CV	933-174	933-174
31	O-ring	NBR	930-041	930-041
41	O-ring	NBR	930-436	930-436
42	O-ring	NBR	930-169	930-169
43	Circuit board T.VIS P-15	--	221-005024A	221-005024A
48	Locking screw (not for T.VIS P-15/RM)	PA	922-370	508-370
50	Connector M12/ 5-pin/B-coded/M16/cpl. (only for T.VIS P-15/RM)	PA	221-005822	221-005822
53	O-ring	NBR	930-833	930-833
54	O-ring	NBR	930-117	930-117
55	O-ring	NBR	930-038	930-038
57	Thread-forming screw	A2	514-750	514-750
63	Solenoid valve 3/2 way NC 24VDC	PBT	512-169	512-169
64	Solenoid valve 3/2 way NO 24VDC	PBT	512-168	512-168
65	Control plate without screws incl. seals	PPO	221-589.27	221-589.27
66	Thread-forming screw	A2	514-761	514-761
75	Throttle valve	Brass, nickel-plated	603-042	603-042
77	Thread-forming screw	galv. steel	514-763	514-763
78	Adapter	PA 6	221-589.69	221-589.69
79	Locking screw	1.4404	922-316	922-316
Items marked with an * are not included in the control top subassemblies, item B!				

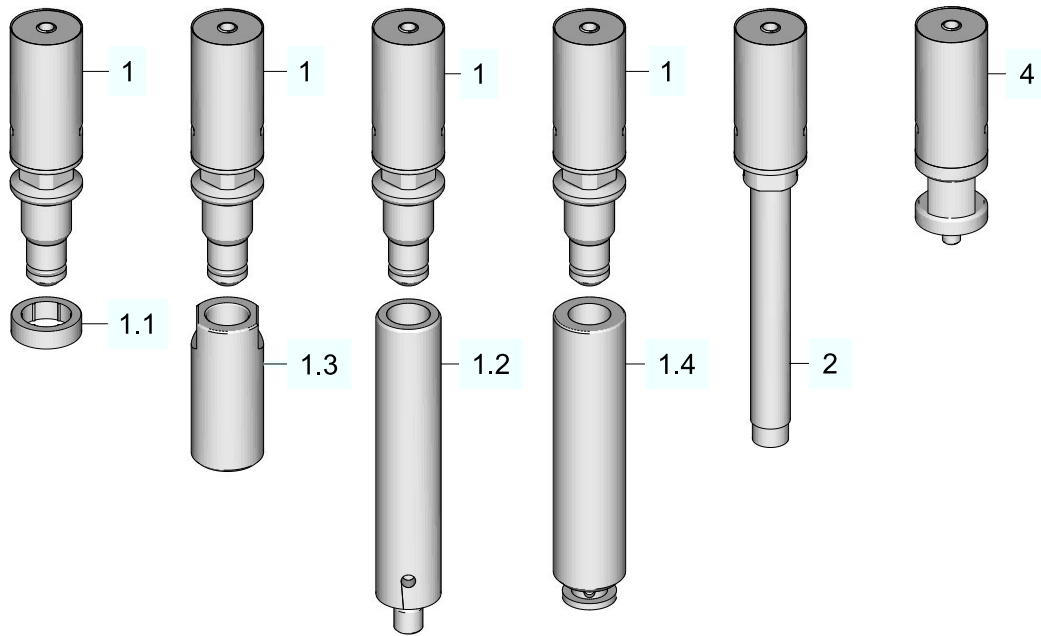
**14 Spare parts list - switch bar T.VIS P-15**

Fig.41

**Spare parts list - switch bar T.VIS P-15**

Item	Designation	Material	Material no.	Application
1	Switch bar	PA6/GK30	221-589.104	Standard for all valves with the exception of butterfly valves T-smart 7
1.1	Ring T.VIS/ECO	Noryl/GFN2	221-002396	In addition to item 1, only for ECOVENT-valves and VESTA XL H_A/M-valves
1.2	Switch bar	1.4301	224-000214	In addition to item 1, adapter only for T-smart 8000 butterfly valves
1.3	Switch bar incl. O-ring	1.4305	221-589.57	In addition to item 1, adapter only for valves type VESTA H_A
1.4	TME/T.VIS adapter	1.4305	221-573.06	In addition to item 1, only for butterfly valves ECOVENT-S
2	Switch bar BFV-7	1.4301/PA6	224-001696	for butterfly valves T-smart 7
3	Switch bar A/P-15/ASG	1.4305/PA6	221-589.88	For all GEA ASEPTOMAG valves
4	Switch bar A/P-15/N_V	1.4305/PA6	221-589.90	only for VARIVENT long-stroke valves with ZEF/V and ZFD/V actuator



## 15 Dimension sheet - control top type T.VIS P-15

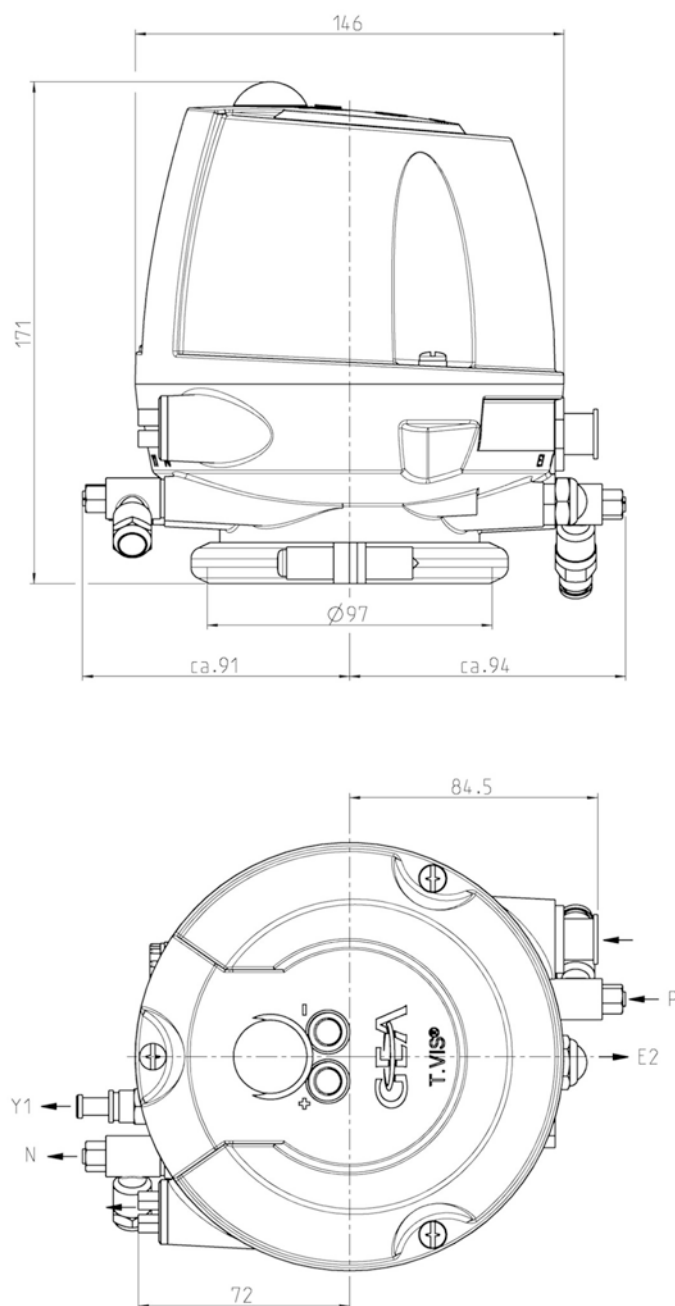


Fig.42: N is exhaust air

## 16 Appendix

### 16.1 Lists

#### 16.1.1 Abbreviations and terms

Abbreviation	Explanation
BS	British Standard
bar	Unit of measurement of pressure [bar] All pressure data expressed in [bar/psi] is assumed to be gauge pressure [barg/psig] unless explicitly specified otherwise.
approx.	approximately
°C	Unit of measurement of temperature [degree Celsius]
C <sub>v</sub>	valve coefficient, non-metric flow coefficient, see K <sub>v</sub>
dm <sup>3</sup> <sub>n</sub>	Unit of measurement of volume [cubic decimetre] standard volume (standard litres)
DN	DIN nominal width
DIN	German standard issued by DIN (Deutsches Institut für Normung e.V., German Institute for Standardization)
EN	European Standard
EPDM	Material designation Short designation according to DIN/ISO 1629: Ethylene Propylene Diene Rubber
°F	Unit of measurement of temperature [degree Fahrenheit]
FKM	Material designation, short designation according to DIN/ISO 1629: Fluorine rubber
h	Unit of measurement of time [hour]
HNBR	Material designation Short designation according to DIN/ISO 1629: Hydrogenated Acrylonitrile 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]
K <sub>v</sub> value	Flow coefficient [m <sup>3</sup> /s], 1 K <sub>v</sub> = 0.86 × C <sub>v</sub>
l	Unit of measurement of volume [litre]
max.	maximum
mm	Unit of measurement of length [millimetre]

Abbreviation	Explanation
µm	Unit of measurement of length [micrometre]
M	Metric
Nm	Unit of measurement of work [newton metre] TORQUE SPECIFICATION: 1 Nm = 0.737 lb-ft Pound-Force (lb)× Feet (ft)
PA	Polyamide
PE-LD	Low-density polyethylene
PPE	Polytetrafluoroethylene
psi	Anglo-American unit of measurement for pressure [pound-force per square inch] All pressure data expressed in [bar/psi] is assumed to be gauge pressure [barg/psig] unless explicitly specified otherwise.
PTFE	Polytetrafluoroethylene
SET-UP	Self-learning installation During commissioning and maintenance, the SET-UP procedure carries out all the necessary settings for the generation of messages.
SW	Indicates the size of spanners [width across flats]
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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