

OPERATING INSTRUCTIONS

Original instructions



Control and Feedback Systems

GEA T.VIS® E-20

GEA Tuchenhagen GmbH
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1 General

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

The term control top in these Operating Instructions refers to Control and Feedback Systems.

1.1 Information about the document

1.1.1 Purpose and structure of the document

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

The present instruction manual are part of the user information for the component. The instruction manual contains all the information you need to transport, install, commission, operate and carry out maintenance for the component.

These operating instructions serve to describe the control top T.VIS E-20, which fulfils the requirements of:

- ATEX (2014/34/EU)*: EU Declaration of Conformity
- UKEX Directive 2016 No. 1107
- IECEx*: Certificate of conformity (accessible via database www.iecex.com)
- CCCEX certificate*
- Hazardous location CEC&NEC*

* The T.VIS E-20 must be ordered according to the required approvals.

1.1.2 Design elements

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

General orientation aids

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

Lists

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

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

Numbered lists

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

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

→ Partial result
 3. Action step three

→ Partial result
 4. Action step four
- ⇒ Outcome

INFO

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

1.1.3 Reading obligation and storage

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

1.2 Manufacturer address

GEA Tuchenhausen GmbH
Am Industriepark 2-10
Germany
21514 Büchen

1.2.1 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.
- 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.
- The permanent magnet on the switch bar is fragile and must therefore be protected against mechanical impact.

1.3 Customer service

Phone: +49 4155 49-0
Fax: +49 4155 49-2035
flowcomponents@gea.com
www.gea.com

1.4 Declaration of conformity

1.4.1 EU Declaration of Conformity according to ATEX 2014/34/EU



EU Declaration of Conformity according to ATEX (2014/34/EU)

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

We hereby declare that the devices named below

Model: T.VIS®

Type: E-20

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 ATEX

Identification:

T.VIS E-20 with 2 or 3 solenoid valves:
UL 21 ATEX 2348X
II 2G Ex ia IIC T5...T4 Gb -10°C ≤ Ta ≤ +42°C
II 2D Ex tb IIIC T85°C Db -10°C ≤ Ta ≤ +38°C
IECEx ULD 22.0009X

T.VIS E-20 with 0 or 1 solenoid valve:
UL 21 ATEX 2348X
II 2G Ex ia IIC T5...T4 Gb -10°C ≤ Ta ≤ +46°C
II 2D Ex tb IIIC T85°C Db -10°C ≤ Ta ≤ +42°C
IECEx ULD 22.0009X

Applicable harmonized standards, in particular: EN IEC 60079-0:2019
EN IEC 60079-11: 2012
EN IEC 60079-31: 2014

Other applied standards and technical specifications: TRGS 727:2016-01

- Remarks:
- The notified body UL International Demko A/S has carried out an EC type examination and issued the following certificate: UL 21 ATEX 2348X
 - The ATEX operating instructions including the intended use and safety instructions defined therein must be observed.
 - Electrostatic charge must be avoided. Ensure the grounding of the T.VIS E-20 and valve
 - Process- and media temperature higher than permissible ambient temperature must not lead to inadmissible ambient temperature
 - Special conditions of use as defined in the operating manual must be observed

Person authorized for compilation and handover of technical documentation:

GEA Tuchenhagen GmbH
CE-Documentation officer
Am Industriepark 2-10
21514 Buechen, Germany

Buechen, 19 June 2025

Sören de Boon
Senior Vice President
Business Unit Valves & Pumps

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

1.4.2 EU Declaration of Conformity according to EMC (2014/30/EU) and RoHS (2011/65/EU)



EU Declaration of Conformity according to EMC (2014/30/EU) and RoHS (2011/65/EU)

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

Hereby, we declare that the machine designated in the following

Model: Control top T.VIS®

Type: E-20

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

Relevant EC directives:	2014/30/EU	EMC
	2011/65/EU	RoHS


Applicable harmonized standards, in particular:	EN IEC 61000-6-2: 2019
	EN IEC 61000-6-4: 2019


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 Buechen, Germany
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Buechen, 19 June 2025


Sören de Boon
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Business Unit Valves & Pumps


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

1.4.3 UKEX Declaration of Conformity for use in potentially explosive atmospheres



UK- Declaration of Conformity for use in Potentially Explosive Atmospheres UKSI 2016:1107

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

We hereby declare that the devices named below

Model: Control top T.VIS®

Type: E-20

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 UK directives: UKSI UKEX
2016:1107

Identification:



T.VIS E-20 with 2 or 3 solenoid valves:
UL 22UKEX2718X
II 2G Ex ia IIC T5...T4 Gb -10°C ≤ Ta ≤ +42°C
II 2D Ex tb IIIC T85°C Db -10°C ≤ Ta ≤ +38°C



T.VIS E-20 with 0 or 1 solenoid valve:
UL 22UKEX2718X
II 2G Ex ia IIC T5...T4 Gb -10°C ≤ Ta ≤ +46°C
II 2D Ex tb IIIC T85°C Db -10°C ≤ Ta ≤ +42°C



Applicable harmonized standards, in particular: EN IEC 60079-0:2018
EN IEC 60079-11: 2012
EN IEC 60079-31: 2014

Other applied standards and technical specifications: TRGS 727:2016-01

- Remarks:
- The notified body UL International Demko A/S has carried out an UK type examination and issued the following certificate: UL 22 UKEX 2718X
 - The UKEX operating instructions including the intended use and safety instructions defined therein must be observed.
 - Electrostatic charge must be avoided. Ensure the grounding of the T.VIS E-20 and valve
 - Process- and media temperature higher than permissible ambient temperature must not lead to inadmissible ambient temperature
 - Special conditions of use as defined in the operating manual must be observed

Person authorized for compilation and handover of technical documentation:

GEA Tuchenhagen GmbH
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Buechen, 19 June 2025

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

1.4.4 UK Declaration of Conformity for use in accordance with EMC regulations 2016



UK- Declaration of Conformity by Electromagnetic Compatibility Regulations 2016

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

Hereby, we declare that the machine designated in the following

Model: Control top T.VIS®

Type: E-20

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

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
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Buechen, 19 June 2025

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

2 Safety

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

2.1 Intended use

The T.VIS E-20 control top can be used for the pneumatic and electrical connection of all Tuchenhagen process valves with VARIVENT adaptation. Using the device for any other purpose is considered contrary to its designated use.

INFO Correspondingly approved valve control modules and barriers must be used for the electrical connection.

The T.VIS E-20 control top is available:

- Without solenoid valve as position indicator
- With solenoid valve as control top

The complete control top T.VIS E-20 is mounted on the dedicated actuator/adaptor of the process valve by means of a clamp connection. Due to the internal air guiding system, the control air can pass directly from the control top into the actuator on suitable process valves. 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.

To control different process valve functions, the T.VIS E-20 can be equipped with up to three solenoid valves. The T.VIS E-20 is able to control a maximum of two process valves by simultaneous actuation of a maximum of two solenoid valves.

T.VIS E-20 allows the following on all valves

- monitoring the non-actuated position of the valve disk,
- monitoring the actuated position of the valve disk,
- coloured visualization of the valve position and status via the illuminated dome fitted on the control top.

The control top T.VIS E-20 may be used in areas where ATEX/UKEX, IECEx, CCCEX and HazLoc approval is required.

The unit can be used in potentially explosive atmospheres as indicated:

- ATEX (2014/34/EU)*: EU Declaration of Conformity
- UKEX Directive 2016 No. 1107
- IECEx*: Certificate of conformity (accessible via database www.iecex.com)
- CCCEX certificate*
- HazLoc: Hazardous Location Certification CEC&NEC*

* The T.VIS E-20 must be ordered according to the required approvals.

INFO The control top T.VIS E-20 may only be used in indoor areas and must be protected from external weather conditions!

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

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

2.1.1 Requirements for the operation

The prerequisites for the reliable and safe operation of the control top are proper transportation and storage as well as professional installation and assembly. Operating the unit within the limits of its designated use also involves adhering to the operating, maintenance and servicing instructions.

2.1.2 Improper operating conditions

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

Operating the control top 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 control top.
- Damage has been detected on the control top.
- 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 this instruction manual carefully and ensure that the measures described here are observed.

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

- Only qualified personnel may work on the component.
- The operating company must authorize personnel to carry out the relevant tasks.
- Order and cleanliness must be maintained at the work stations and in the entire area surrounding the component.
- Personnel must wear suitable work clothing and personal protective equipment. As the operating company must ensure that work clothing and personal protective equipment are used.
- Inform personnel regarding any properties of the product which might pose a health risk and the preventative measures to be taken.
- Have a qualified first-aid representative on call during the operation. This person must be able to initiate any necessary first-aid measures in case of an emergency.
- Clearly define procedures, competences and responsibilities for those working in the area of the component. Everybody must know what to do in case of an emergency. Instruct the staff in this respect at regular intervals.
- The signs on the component must always be complete and easy to read. Check, clean and replace the signs as necessary at regular intervals.
- Observe the technical data specified and the limits of use!

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

2.3 Special terms of use

 WARNING	
Explosive atmosphere!	
Special terms of use and technical data must be observed.	
Failure to observe the conditions terms of use may result in severe explosions.	
<ul style="list-style-type: none">• Special conditions of use which are marked with the following triangular exclamation mark () must be taken into account.• Additional technical data and special conditions as described in chapter 3.2.2 <i>Technical data</i> must be observed.	

Special precautions are required to reduce the risk from electrostatic discharge.



See installation/operating instructions: When used for a Group III (dust) application, the surface of the housing may be affected by electrostatic charge and become a source of ignition in low relative humidity applications <~30%, humidity if the surface is relatively free of surface contaminants, such as dirt, dust or oil. Information on protection against ignition hazards due to electrostatic discharge can be found in IEC EN TR50404 and IEC TS60079-32-1. Surface cleaning should always only be done with a damp cloth.



The applicable ambient temperature must be maintained by reading and understanding the user manual, taking into account the temperature of the process medium.



The unit is designed and certified for simultaneous actuation of a maximum of two solenoid valves. The simultaneous operation of more than two solenoid valves will increase the temperature to a critical and non-certified level.



Cable glands are certified and specified in the test reports and must be used as intended.

The cable glands must be certified at least according to ATEX/UKEX and IECEx IP65.



Special precautions are required to reduce the risk from electrostatic discharge. See installation/operating instructions.



In the case of dust explosion protection, the IP protection of the housing must not be compromised.

For this reason, please note: If there is a potentially explosive dusty atmosphere, the T.VIS E-20 must not be opened.



The capacitance measured at the exposed metallic screw connections is 91.8 pF. The user must determine the suitability of the unit in the end-use application.

2.4 Ambient and process temperatures

WARNING

Explosive atmosphere!

The permissible ambient temperatures must be observed.

Failure to observe the permissible ambient temperatures may result in severe explosions.

- The permissible ambient temperatures specified in chapter 3.2 *Technical data and operating conditions* must be observed.

The permissible ambient temperature must not be exceeded.

The T.VIS E-20 control top mounted on valves as described in chapter 5.5 *Mounting the control top to different valves* is installed with a defined distance to the valve process housing and to the piping systems. The permissible process and media temperatures for the valve process housing are specified in the operating instructions for the valve. Depending on the sealing material, process and media temperatures of up to 135 °C (275 °F) and, for short periods, 150 °C (302 °F) are permissible.



It must be ensured that process and media temperatures higher than the permissible ambient temperature do not result in an impermissible ambient temperature for the T.VIS E-20. Particular attention must be paid to adjacent pipelines, equipment and other system components.



Please take into account the different permissible ambient temperatures for gases and dusts defined in chapter 3.2.2.1 *ATEX/UKEX; IECEx, HazLoc and CCCEX designations with associated technical data*.

2.5 Avoidance of electrostatic charge

WARNING

Explosive atmosphere!

The intended installation to avoid electrostatic charge must be observed.

Failure to observe the intended installation may result in serious explosions due to electrostatic hazards.

- The intended installation described in chapter 5.5 *Mounting the control top to different valves* must be followed to ensure proper earthing.
- The earthing of the T.VIS and the valve must be ensured.

The T.VIS E-20 is earthed by mounting it on the corresponding valves. The conductive contact bridge to earth is established by installing the mounting surface of the T.VIS E-20 flush with the mounting surface of the valve actuator. Both components are clamped by two half rings.



Observe the instructions on the warning sign of the T.VIS E-20:

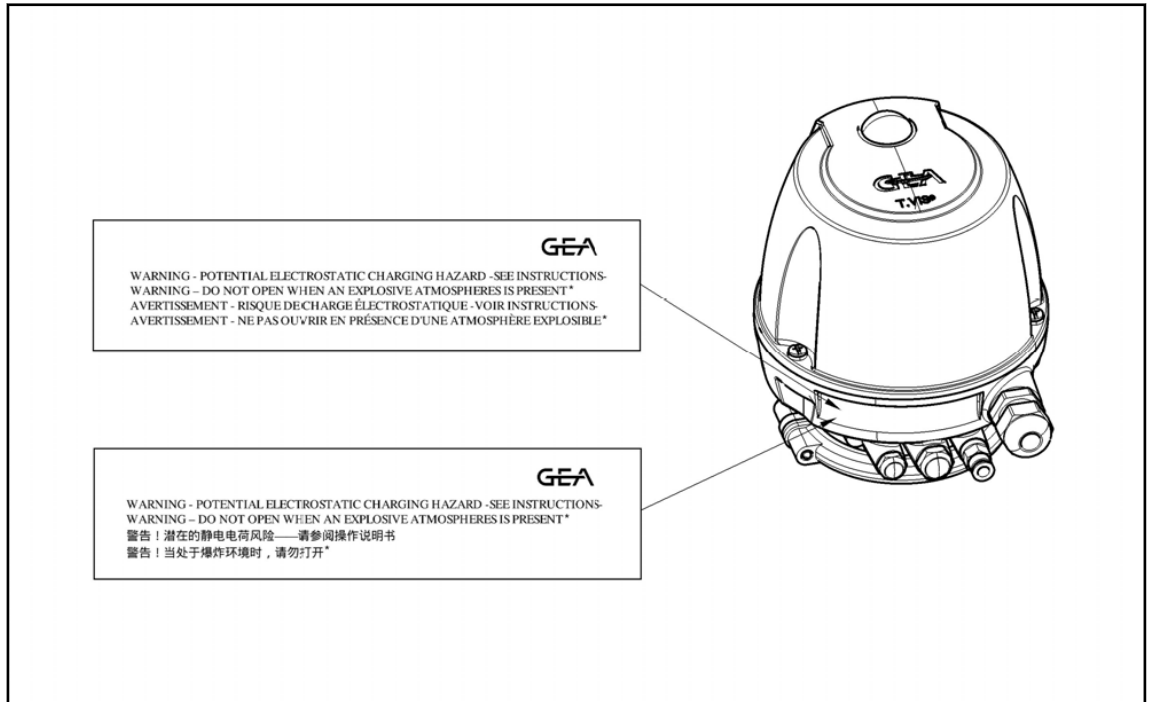


Figure 2-1 - Top sign: Information sign for ATEX/UKEX and IECEx certificate and HazLoc / Bottom sign: Information sign for CCCEX certificate

Explanation of the test on the information sign:

- WARNING - Danger due to electrostatic charge- see operating instructions!
- WARNING - Do not open the control top if an explosive atmosphere is present! *

* Relevant for use in dust protection systems



Please ensure that the T.VIS E-20 is installed as described in chapter 5.5 *Mounting the control top to different valves*. Make sure that the valve is earthed via the piping.

2.6 Modification

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

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

Specific explosion-proof equipment - as defined in chapter 3.2.5 *Setup* - is supplied with the T.VIS E-20 and must be used.

2.7 IP Protection classes

The control top T.VIS E-20 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
1st digit *	Protection against solids
6	Dust tight
2nd digit *	Protection against humidity
6	Protected against powerful water jets
7	Protected against temporary immersion
9k	Protected against high pressure/steam 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.

INFO 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 *5 Assembly and installation*.

2.8 Structure of warning notices

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

2.8.1 Preceding warning notices

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

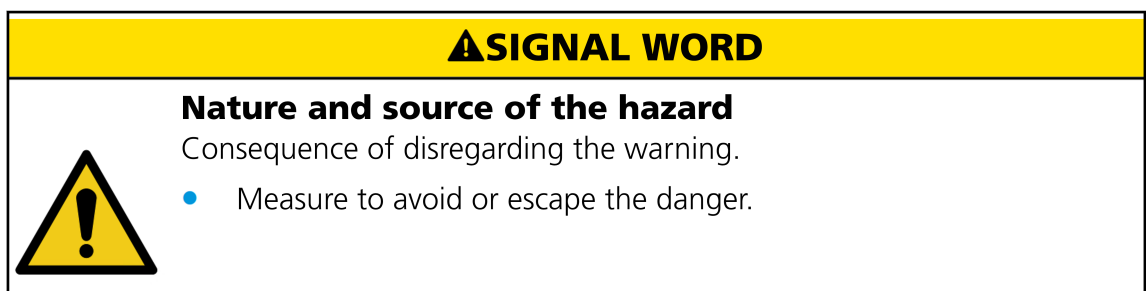


Figure 2-2 - Structure of a preceding warning notice

2.8.2 Integrated warning notices

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

- | |
|--|
| <ol style="list-style-type: none">1. SIGNAL WORD Nature and source of the hazard
Consequence of disregarding the warning.<ul style="list-style-type: none">• Measure to avoid or escape the danger. |
|--|

Figure 2-3 - Structure of an integrated warning notice

2.8.3 Signal words

ATTENTION

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

CAUTION

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

WARNING

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

DANGER

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

2.9 Personnel qualification

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

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

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

Operating staff

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

Customer specialist

- Technical training

Trained customer specialist

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

GEA service expert

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

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

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 installation. When working on explosion-protected installation observe the standards DIN EN 60079-14 for gases and DIN EN 50281-1-2 for dusts.

2.10 General safety instructions

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

2.10.1 General hazard

Source	Consequences	Measures
Control top not in proper condition	Injury and damage	Check that the control top is in proper condition.
Non-compliance with these Operating Instructions	Injury and damage	Read and familiarise yourself with these Operating Instructions.
Operating materials	Injuries	<ul style="list-style-type: none"> Wear personal protective equipment. Avoid contact with operating materials.

Table 1: General hazard

2.10.2 Mechanical hazard

Source	Consequences	Measures
Moving or rotating components	<ul style="list-style-type: none"> Being drawn in or caught Entrapment Crushing Impact 	<ul style="list-style-type: none"> Remove jewellery. Tie hair back or wear a hair net. Wear tight-fitting clothing.
<ul style="list-style-type: none"> Gravity Falling objects 	<ul style="list-style-type: none"> Impact Crushing 	<ul style="list-style-type: none"> Do not walk under suspended loads. Eliminate the stumbling hazards.

2.10.3 Electrical hazard

Source	Consequences	Measures
Electromagnetic processes	Implications for electronic medical implants	People with medical implants must keep their distance.
Electrostatic processes	<ul style="list-style-type: none"> Electric shock Fire Chemical reaction 	<ul style="list-style-type: none"> Avoid contact to components. Check the voltage of components. Wear personal protective gear. Eliminate leaked flammable substances.

2.10.4 Thermal hazard

Source	Consequences	Measures
Objects or materials at high or low temperature	<ul style="list-style-type: none"> Freezing Burns Scalding 	<ul style="list-style-type: none"> Wear personal protective gear. Wait for adjustment to room temperature.

2.11 Personal protective equipment

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

In addition, GEA recommends keeping the requirements listed below.

- Locally applicable accident prevention regulations
- Instruction manual from the operator or employer

2.12 Safety devices

No safety devices are installed on this control top.

2.13 Residual dangers

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

- Improper use
 - Material fatigue
 - Failure of safety devices
-
- 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.

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.
- Make sure you do not 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 Tuchenhagen if you have any questions.)

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: <ol style="list-style-type: none"> 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.

Instructions for the Safe Handling of Electronic Components During Welding Work

ATTENTION

Stray welding currents during welding
 Can cause damage to electronic components

- Follow the steps below to prevent this.

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

2.14 Safety signs

The safety symbols listed below are attached to the control top.

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

Warning signs



General warning sign

Hazard for persons, conveyed by the additional sign.



Warning, risk of hand injuries

Hazard posed by mechanical components on the control top.

2.15 Emergency measures

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

Fire

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

Injuries

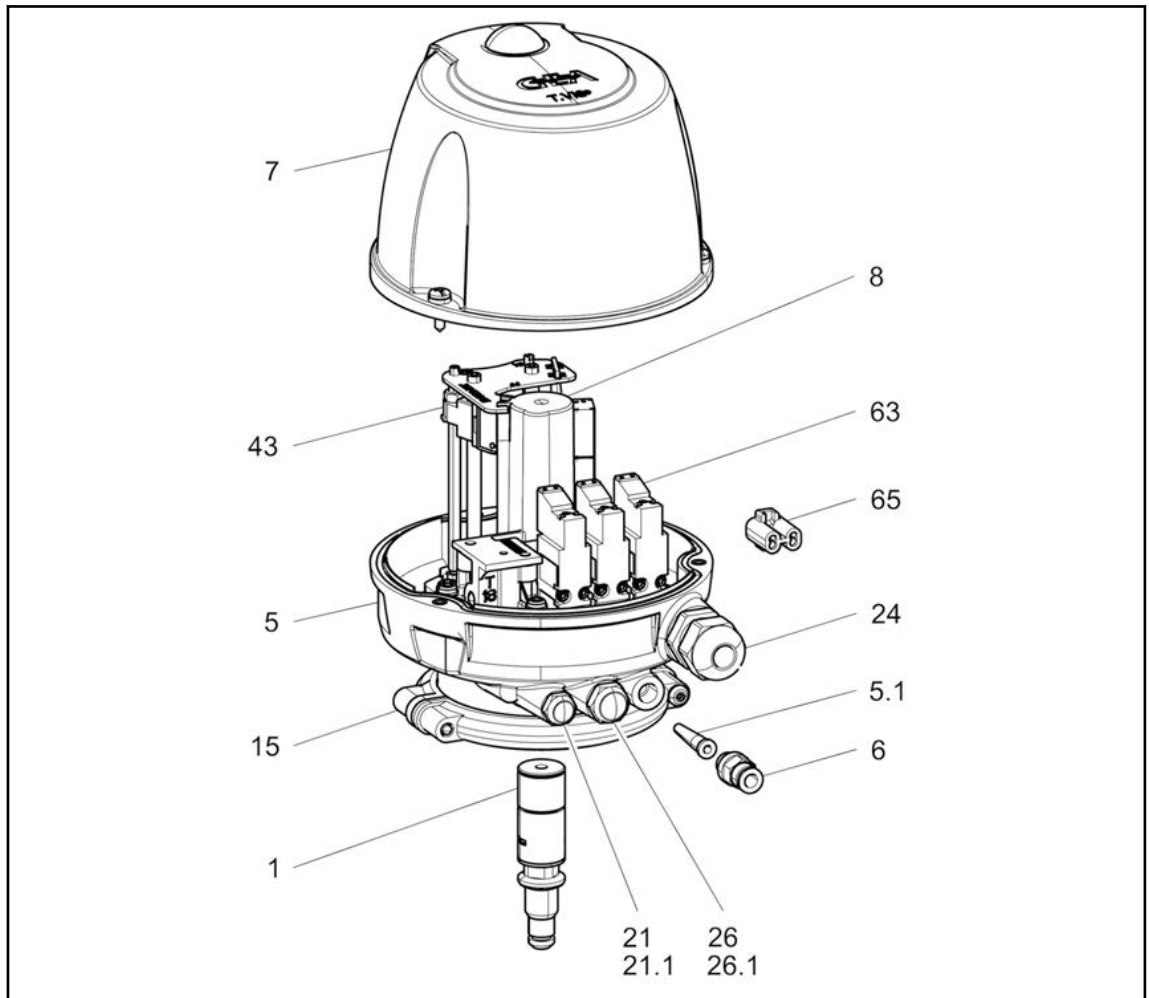
- Administer first aid
- Call local emergency services

3 Description

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

3.1 Structure and function

3.1.1 Design



Position Description	Position Description
1 - Switch bar	5 - Base
5.1 - Filter	6 - Screw-in plug connection
7 - Cap	8 - Pneumatic block
15 - Clamp connection	21 - Sound absorber
21.1 - Throttle, optional	24 - Cable gland
26 - Sound absorber	26.1 - Non-return valve (cannot be replaced)
43 - Sensor module (including 2 sensors)	63 - Solenoid valves
65 - Control plate/blind plate	

The T.VIS E-20 control top consists of:

- A sensor module with 2 sensors for the detection of the two valve end positions
- A maximum of three solenoid valves for the actuation of the main stroke and the lift strokes

- An exhaust air throttle (optional) for the infinitely adjustable setting of the closing velocity of the main stroke
- A supply air throttle (optional) for the infinitely adjustable setting of the opening velocity of the main stroke

Note the following instructions when handling the control top:

- The permanent magnet on the switch bar (1) is fragile and must therefore be protected against mechanical impact.
- Magnetic fields can delete data carriers and affect or destroy electronic or mechanical components. Always avoid the influence of external magnetic fields on the sensor system!
- Do not perform welding work in the vicinity of the control top, as this could cause data losses.

3.1.2 Functional description

Operation Principle

Pneumatic and electronic modules are located inside the control top T.VIS E-20. The pneumatic modules in this case are solenoid valves, the number of which varies between 0 and 3, depending on the intended purpose. Control air is supplied to the relevant control air chambers via air connections at the outside of the control top. On VARIVENT valves and ECOVENT standard valves, the main control air is guided through the switch bar. On process valves which do not allow the air to be guided internally, the main control air is supplied to the actuator via a hose connected to a separate air connection on the control top. The exhaust air of the main actuator is discharged via an air connection with sound absorber or optionally via an adjustable exhaust air throttle. Exhaust air from the optional lifting actuators is discharged from the control top via a venting diaphragm and via a non-return valve.

The main task of the sensor module with its sensors is to determine the valve position on the basis of the position of the valve stem and to generate the corresponding feedback signals for this position in order to send them to a higher-level control system.

Due to the illuminated dome integrated in the cap of the control top the light emitting diodes arranged on the sensor module can be seen even if the cap is closed. The 2 differently coloured LEDs allow visualization of the main functions of the valve.

Visualization:

- Valve in non-actuated position – green
- Valve in actuated position – yellow
- Valve deviating from its adjusted actuated positions – no indication.
- Valve idle – no indication

Control top without solenoid valves

The control top T.VIS E-20 without solenoid valves acts as a position indicator. Once the two sensors have been adjusted, the control top indicates the status of the process valve locally by coloured LEDs under the illuminated dome.

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

- 12 V DC or 24 V DC switching output

To adjust the second sensor, the process valve must be moved once to its end positions by an external solenoid valve.

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. 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 process valve, up to 3 solenoid valves can be installed in the control top.

The control signals are given by the user's process control system or by operating the solenoid valves manually. To do this, use a screwdriver to turn the screw (S) from 0 to 1, see figure.

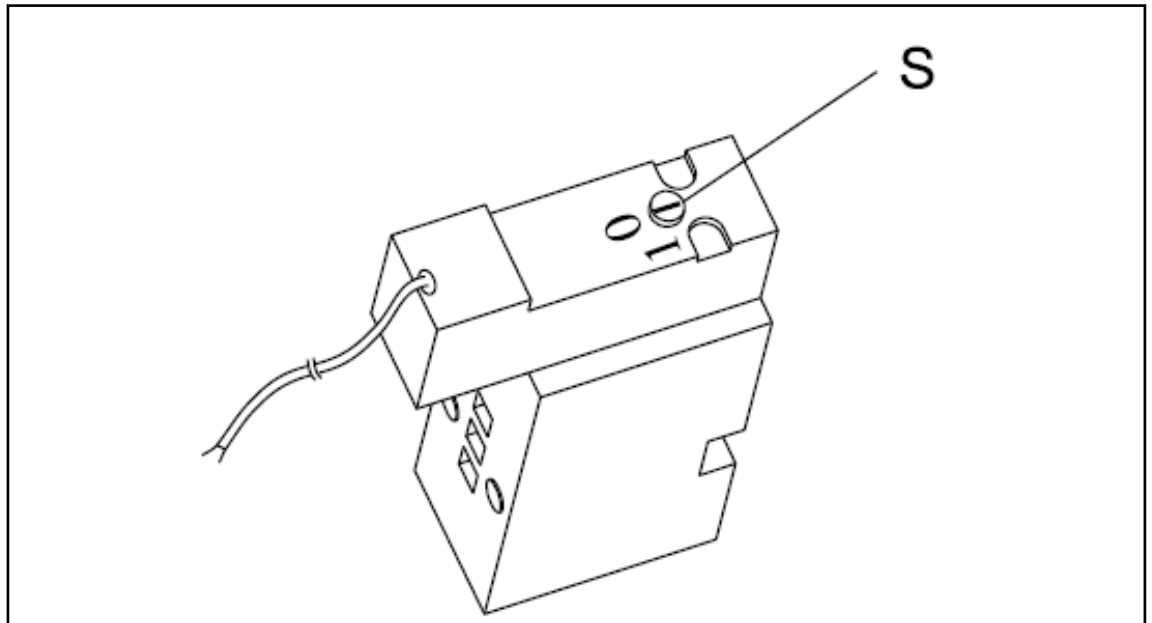


Figure 3-1 - Screw (S) on the solenoid valve

Control top with cap

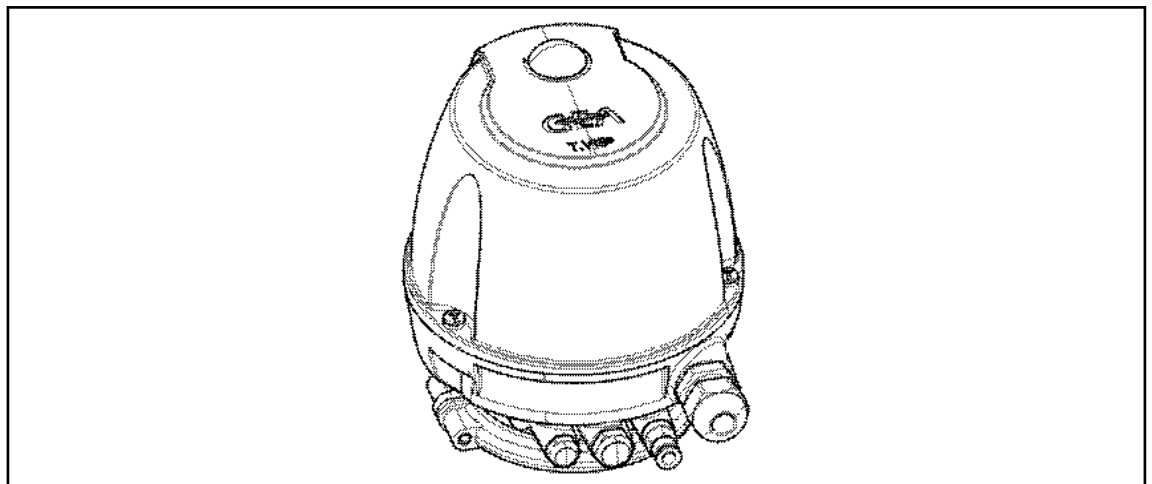


Figure 3-2 - Control top with cap

This version of the T.VIS E-20 control top is suitable for use in accordance with protection class IP67 and/or 69k (EN 60529) if the electrical and pneumatic connections are fitted correctly.

Observe the general instructions regarding ESD protection.

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.

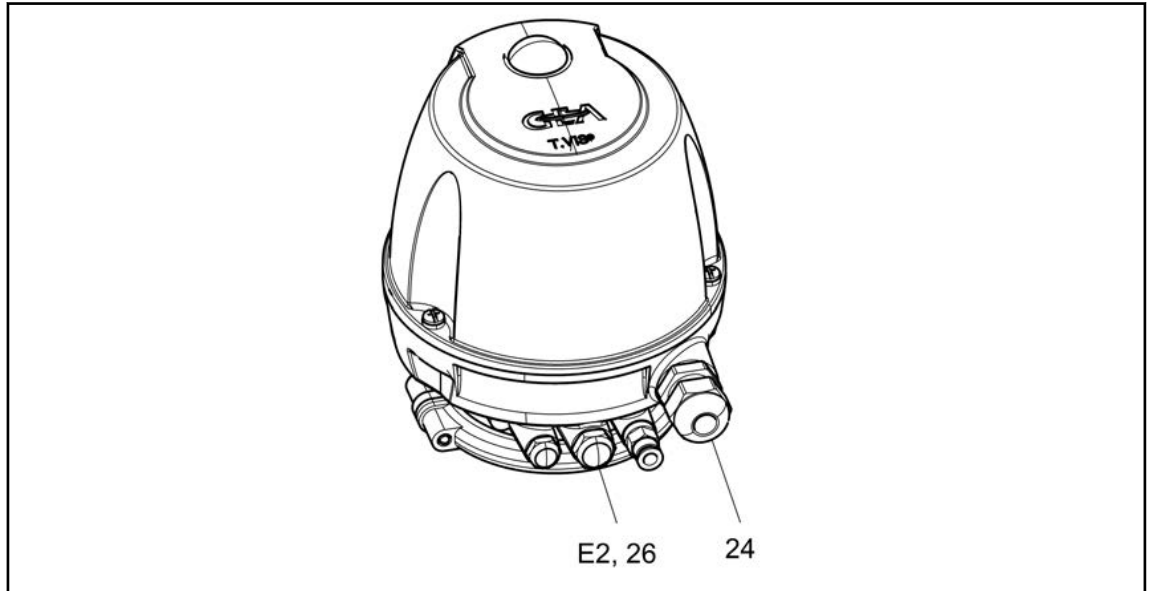


Figure 3-3 - Control top with cap

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.

Openings of the outer housing to the outside atmosphere

The cable gland (24) and the silencer (26) are sealed connections to the outside atmosphere.

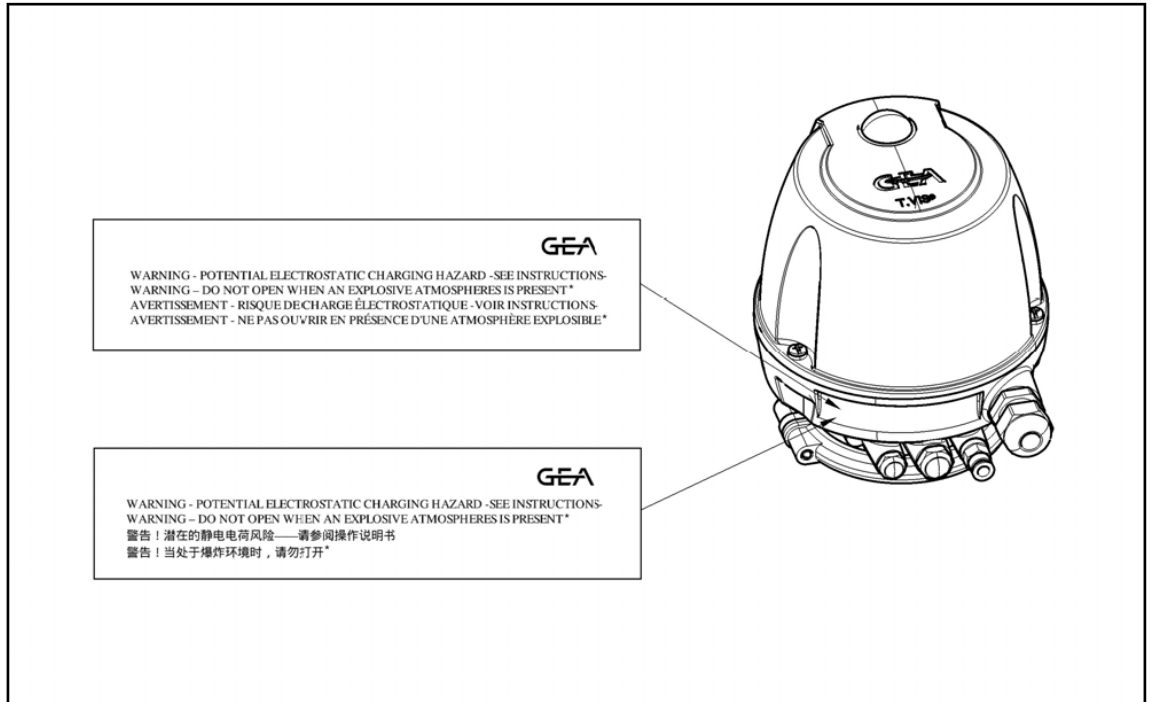
The cable gland (24) is a closing devices with its own explosion protection certification.

3.1.3 Signs

Overview and layout

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

- Complete
- Attached as shown
- Clean and legible



No.	Signs
1	Type plate T.VIS; adhered to T.VIS
2	Warning: crushing (refers to the lantern) adhered to actuator after lantern

The representation and meaning of the safety symbols used are listed in an overview corresponding to their category, see chapter 2.14 Safety signs

3.1.4 Protective devices

No protective devices are installed on this control top.

3.2 Technical data and operating conditions

⚠ WARNING

Explosive atmosphere!

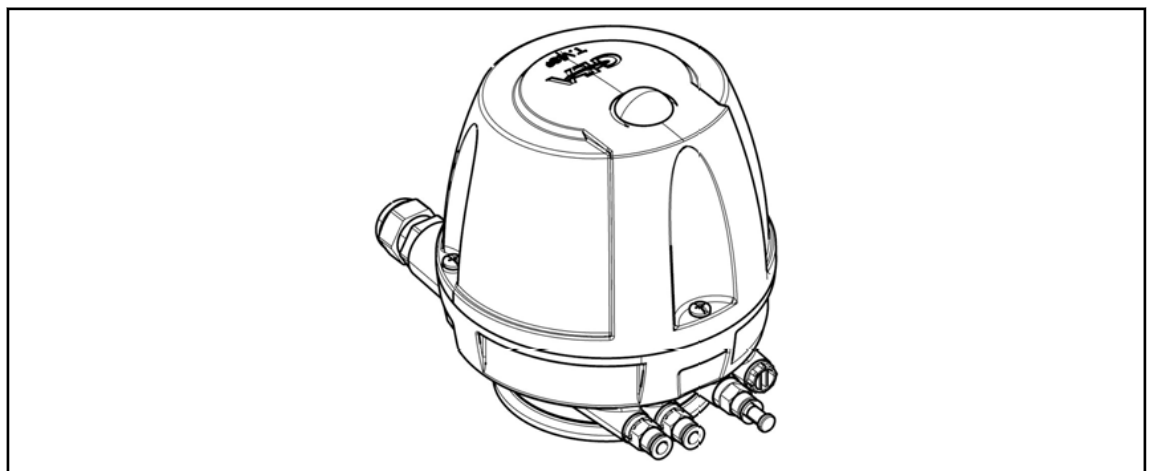
Technical data and special conditions of use must be observed.

Failure to observe the technical data and special operating conditions may result in severe explosions.

- Technical data (see chapter 3.2 *Technical data and operating conditions*) and special conditions of use must be observed.

3.2.1 Type plate

The type plate is used to uniquely identify the control top.








Order code for number of solenoid valves and maximum ambience temperature





Solenoid valves type BATX10-1/2-1-*: Mat no. 512-174 and 512-177	Ambient temperature Group II EPL Gb	Ambient temperature Group III EPL Db
Without solenoid valve for order code TE20N2E0.../AEx/IEx		
Connection terminal strip V1-/V1+ for order code TE20R2EE/X.../AEx/IEx	$-10^{\circ}\text{C} \leq T_a \leq +46^{\circ}\text{C}$	$-10^{\circ}\text{C} \leq T_a \leq +42^{\circ}\text{C}$
Connection terminal strip V1-/V1+ and V2-/V2+ for order code TE20I/L2EE/X.../AEx/IEx		
Connection terminal strip V1-/V1+ and V3-/V3+ for order code TE20J/L2EE/X.../AEx/IEx	$-10^{\circ}\text{C} \leq T_a \leq +42^{\circ}\text{C}$	$-10^{\circ}\text{C} \leq T_a \leq +38^{\circ}\text{C}$

Type plates






Example of type plate on the control top for option AEx (ATEX/UKEX certification):

Ambient Temperature: Group II EPL Gb		Group III EPL Db
UL21 ATEX 2348X UL22 UKEX 2718X  II 2G Ex ia IIC T5...T4 Gb -10°C ≤ Ta ≤ +42°C II 2D Ex tb IIIC T85°C Db -10°C ≤ Ta ≤ +38°C  IECEx ULD 22.0009X		
Type: TE20R2EEE/52/69k/AEx SNR: XXXXXXX-XXXXX Mode: Ex 12/24VDC-NAMUR		 GEA Tuchenhagen GmbH Am Industriepark 2-10, 21514 Büchen, Germany max. 8 bar   2023 0539 0843 IP69







Example of type plate on the control top for option IEx (IECEx certification):

Ex ia IIC T5...T4 Gb -10°C ≤ Ta ≤ +42°C Ex tb IIIC T85°C Db -10°C ≤ Ta ≤ +38°C  IECEx ULD 22.0009X		 GEA Tuchenhagen GmbH Am Industriepark 2-10, 21514 Büchen, Germany max. 8 bar   2023 IP69
Type: TE20R2EEE/52/69k/IEx SNR: XXXXXXX-XXXXX Mode: Ex 12/24VDC-NAMUR		

Example of type plate on the control top for option CCx (CCCEx certification):

 防爆合格证号: GYJ23.1019X Ex ia IIC T5...T4 Gb -10°C ≤ Ta ≤ +42°C Ex tb IIIC T85°C Db -10°C ≤ Ta ≤ +38°C  IECEx ULD 22.0009X		 德国汉堡比兴工业园路 2-10号 基伊埃图亨哈根有 限公司 邮编 21514 max. 8 bar   2023 IP69
名称: T.VIS E-20控制模块 型号: TE20R2EEE/52/69k/CCx 序列号: XXXXXXX-XXXXX 类型: Ex 12/24VDC-NAMUR		

Example of type plate on the control top for option CDx (HazLoc certification):

 CL I, DIV 2, GRP A,B,C,D,T5...T4 Ex ia IIC T5...T4 Gb -10°C ≤ Ta ≤ +42°C CL II, DIV 2, GRP F,G,T85°C Ex tb IIIC T85°C Db -10°C ≤ Ta ≤ +38°C  CL I, ZN 1, AEx ia IIC T5...T4 Gb CL II, ZN 21, AEx tb IIIC T85°C Db  CSA 24CA80190780X Proc. Cont. Eq. also for use in Haz Loc (IS) Control Drawing: 221LDB014544EN		 GEA Tuchenhagen GmbH Am Industriepark 2-10, 21514 Büchen, Germany max. 8 bar   2024 IP69
Type: TE20R2EEE/52/69k/CDx SNR: XXXXXXX - XXXXX Mode: Ex 12/24VDC-NAMUR		

Explanation of the order code

Code/Type	TE20	L	2	S	X	S
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	
	TE 20	Control top T.VIS E-20
15	Control top type	
	N	without solenoid valve
	M	1 solenoid valve Y1 (retrofitable: Y2, Y3)
	N	2 solenoid valves Y1, Y2/ 2 Y1=main stroke Y2=lifting of the valve disk (retrofitable: Y3)
	J	2 solenoid valves Y1, Y3 Y1=main stroke Y3=lifting of the double-disk for the external air connection of an air/air actuator or an external process valve (retrofitable: Y2)
16	Feedback	
	2	2 digital feedback signals
17	Type of interface/mode	
	S	Ex 12/24VDC-NAMUR
18	Solenoid valve	
	S	12VDC/EX
	X	24VDC/EX
	0	without
19	Screw connection	
	S	Air connection metric, M20x1.5/Ex cable gland
	N	Air connection imperial, M20x1.5/Ex cable gland
Options	/18	Supply air throttle: regulates the opening speed of the valves



Item in the order code	Designation	Explanation
/19		Exhaust air throttle: regulates the closing speed of the valves
/50		Metal plate engraved
/51		Metal plate (US version)
/52		Adhesive plate
/66		Protection class IP 66 (powerful water jet)
/67		Protection class IP 67 (immersion)
/69k		Protection class IP 69K (high-pressure cleaner)
/A		T.VIS for ASEPTOMAG valves Example: TE20L2EXE/A
/AEx		ATEX/UKEX Certificate
/IEx		IECEX Certificate
/CCx		CCCEX certificate
/CDx		Certificate HazLoc CEC&NEC



3.2.2 Technical data

3.2.2.1 ATEX/UKEX; IECEX, HazLoc and CCCEX designations with associated technical data





The following technical data and restrictions must be taken into account for use in ATEX/UKEX, IECEX, HazLoc and CCCEX applications.

Technical data – ATEX/ UKEX designation



Applica- tion	Description	
Gases	Designation	II 2G Ex ia IIC T5...T4 Gb
	Ambient temperature	-10°C ≤ Ta ≤ +42°C 
		-10°C ≤ Ta ≤ +46°C * * only for order code TE20N2... and TE20R2... 
Dust	Designation	II 2D Ex tb IIIC T85°C Db

Applica- tion	Description
Ambient temperature	 $-10^{\circ}\text{C} \leq T_a \leq +38^{\circ}\text{C}$
	 $-10^{\circ}\text{C} \leq T_a \leq +42^{\circ}\text{C} *$ * only for order code TE20N2... and TE20R2...
ATEX Certification no.	UL 21 ATEX 2348X
UKEX Certification no.	UL 22 UKEX 2718X





Technical data - IECEx designation

Applica- tion	Description
Gases	Designation Ex ia IIC T5...T4 Gb
Ambient temperature	 $-10^{\circ}\text{C} \leq T_a \leq +42^{\circ}\text{C}$
	 $-10^{\circ}\text{C} \leq T_a \leq +46^{\circ}\text{C} *$ * only for order code TE20N2... and TE20R2...
Dust	Designation Ex tb IIIC T85°C Db
Ambient temperature	 $-10^{\circ}\text{C} \leq T_a \leq +38^{\circ}\text{C}$
	 $-10^{\circ}\text{C} \leq T_a \leq +42^{\circ}\text{C} *$ * only for order code TE20N2... and TE20R2...
Certification no.	IECEx ULD 22.0009X

Technical data - CCCEX designation

Applica- tion	Description
Gases	Designation Ex ia IIC T5...T4 Gb
Ambient temperature	 $-10^{\circ}\text{C} \leq T_a \leq +42^{\circ}\text{C}$
Dust	Designation Ex tb IIIC T85°C Db
Ambient temperature	 $-10^{\circ}\text{C} \leq T_a \leq +38^{\circ}\text{C}$
Certification no.	GYJ23.1019X

Technical data - HazLoc designation

Applica- tion	Description	
Gases	Designation	Class I, Division 2, Group A, B, C, D, T5...T4 Ex ia IIC T5...T4 Class I, Zone 1, AEx ia IIC T5...T4 Gb
	Ambient temperature	 -10°C ≤ Ta ≤ +42°C
		 -10°C ≤ Ta ≤ +46°C* * only for order code TE20N2... and TE20R2...
Dust	Designation	Class II, Division 2, Group F, G, T85°C Ex tb IIIC T85°C Db Class II, Zone 21, AEx tb IIIC T85°C Db
	Ambient temperature	 -10°C ≤ Ta ≤ +38°C
		 -10°C ≤ Ta ≤ +42°C* * only for order code TE20N2... and TE20R2...
	Certification no.	CSA 24CA80190780X

INFO Special conditions of use must be observed (see 3.2.2.2 *Special terms of use and safety instructions*). Electrical wiring configuration and specification must be observed (see 3.2.2.3 *Configuration and specification of the electrical wiring*).

3.2.2.2 Special terms of use and safety instructions

Technical data: Special terms of use



Special precautions are required to reduce the risk from electrostatic discharge. See installation and operating instructions: When used for a Group III (dust) application, the surface of the housing may be affected by electrostatic charge and become a source of ignition in low relative humidity applications <~30%, humidity if the surface is relatively free of surface contaminants, such as dirt, dust or oil. Information on protection against ignition hazards due to electrostatic discharge can be found in IEC EN TR50404 and IEC TS60079-32-1. Surface cleaning should always only be done with a damp cloth.



The applicable ambient temperature must be maintained by reading and understanding the user manual, taking into account the temperature of the process medium.



The unit is designed and certified for simultaneous operation of a maximum of two solenoid valves. Simultaneous operation of more than two solenoid valves raises the temperature to a critical and non-certified level.

Technical data: Special terms of use



Cable glands are certified and specified in the test reports and must be used as intended. The cable glands must be certified at least according to ATEX/UKEX and IECEx IP65.



Special precautions are required to reduce the risk from electrostatic discharge. See installation/operating instructions.



In the case of dust explosion protection, the IP protection of the housing must not be compromised. For this reason, please note: If there is a potentially explosive dusty atmosphere, the T.VIS E-20 must not be opened.



The capacitance measured at the exposed metallic screw connections is 91.8 pF. The user must determine the suitability of the unit in the end-use application.

Technical data: Ambient and process temperatures

Do not exceed the permissible ambient temperature. The T.VIS E-20 control tops mounted on valves in chapter 5.5 *Mounting the control top to different valves* are mounted with a defined distance to valve process housings and piping systems. The permissible process and media temperatures for the valve process housing are defined in the valve operating instructions. Depending on the gasket material, process and media temperatures up to 135 °C (275 °F) and briefly 150 °C (302 °F) are permissible.



It must be ensured that process and media temperatures above the permissible ambient temperature do not lead to an impermissible ambient temperature of the T.VIS E-20. Particular attention must be paid to adjacent pipelines, equipment and other system parts.

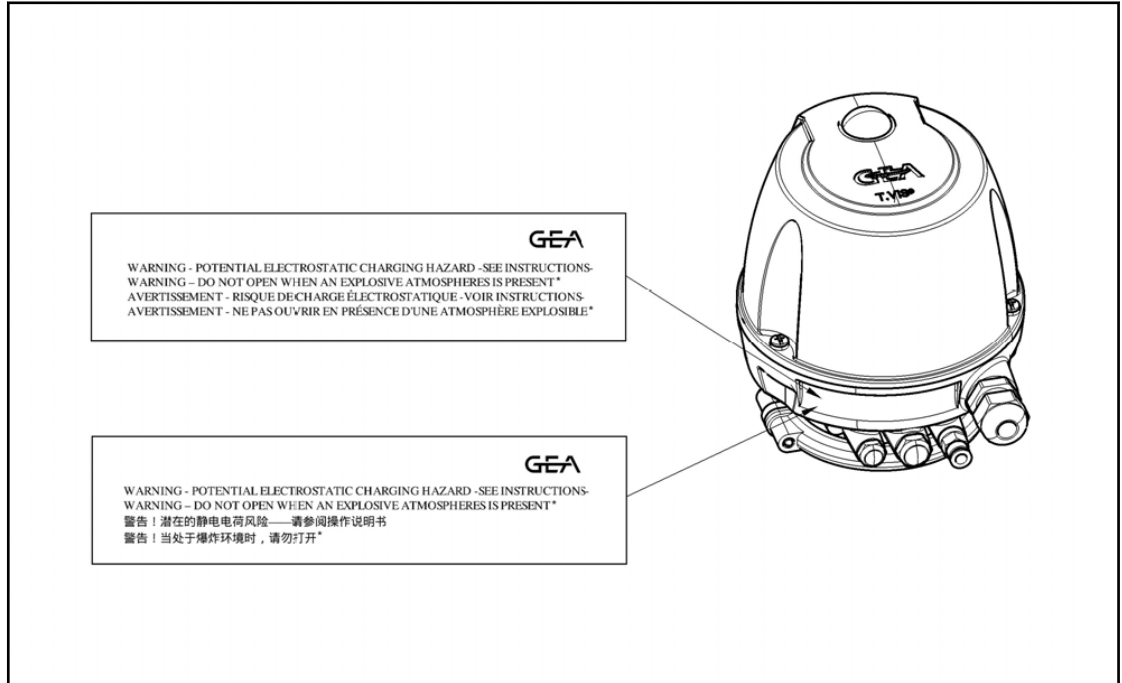


Please consider the differing permissible ambient temperatures for gases and dusts according to chapter 3.2.2.1 *ATEX/UKEX; IECEx, HazLoc and CCCEX designations with associated technical data.*

Technical data: Avoidance of electrostatic charge



The instructions on the warning sign of the T.VIS E-20 must be observed:



Top sign: Information sign for ATEX/UKEX and IECEx certificate, HazLoc

Bottom sign: Information sign for CCCEX certificate

Explanation text sign:

- WARNING - Danger due to electrostatic charge- see operating instructions!
- WARNING - Do not open the control top if an explosive atmosphere is present! *

* Relevant for use in dust protection systems



Please make sure that the T.VIS E-20 is installed as described in chapter 5.5 *Mounting the control top to different valves*. Make sure that the fitting is earthed above the piping. Make sure that the valve is earthed via the pipe system.

3.2.2.3 Configuration and specification of the electrical wiring

The maximum cable length and dimensions must be considered based on the following cable parameters:

Designation	Description
Configuration of the electrical wiring	Terminal strip
Cable specification	Ci cable/cable = 58 pF/m Ci cable/shielding = 270 pF/m According to EN 60079-11, the distance between intrinsically safe circuits and earth must take into account an insulation for 30 V of 0.7 mm.
Conductor cross-section for connection terminal	up to 1.5 mm ²
Required cable diameter for cable gland	Ø6 mm - Ø12 mm

3.2.2.4 Delivery and input data

INFO Note electrical connections, terminal occupation and designation in relation to order code. (See chapter 5.3 *Electrical connection*).

Solenoid valve for pneumatic valves

⚠ WARNING

Explosive atmosphere!

Intrinsically safe wiring
 Errors in the intrinsically safe wiring can lead to serious explosions.

- Please note the terminal designation for intrinsically safe wiring (see chapter 5.3.3.2 *Terminal strip designation and separate intrinsically safe circuits*).

Type designation: 512-174 / 512-177

Technical data:

Designation	Description
Type	24 VDC: BATX10 – 1 – 1 – 4 12 VDC: BATX10 – 2 – 1 – 4
Nominal and supply voltage UV	12 VDC or 24 VDC (+/-10%)
Operating currents	<ul style="list-style-type: none"> per solenoid valve 12V DC per solenoid valve 24V DC Max. load of the feedback
	<ul style="list-style-type: none"> 50 mA** 25 mA** 2.1 mA
Total	approx. 52 mA**

Technical data: Inputs for solenoid valve activation 24 VDC

Designation	Description
Control voltage	max. 24 VDC +/-10%
Current consumption, solenoid valve	25 mA**

Designation	Description
Pull-in voltage	19.2 VDC
Minimum switching current	18.5 mA
Short-circuit protection	no
Nominal power	0.6 W
Resistance	1028 Ω

Technical data: Inputs for solenoid valve activation 12 VDC

Designation	Description
Control voltage	max. 12 VDC +/-10%
Current consumption, solenoid valve	50 mA**
Pull-in voltage	9.5 VDC
Minimum switching current	37.7 mA
Short-circuit protection	no
Nominal power	0.6 W
Resistance	252 Ω

** Nominal value, reduction by electrical voltage supply through corresponding Ex valve control module

Technical data: Solenoid valve safety classifications (intrinsic safety)

Voltage (VDC)	Nominal power (mW)	Temperature class (Group II)	Temperature class				
			Ui (VDC)	Ii (mA)	Pi (W)	Li ** (μH)	Ci** (nF)
24	600	T4	30	210	1.6	negligible	negligible
24	600	T5	30	120	0.9	negligible	negligible
12	600	T4	30	210	1.6	negligible	negligible
12	600	T5	30	120	0.9	negligible	negligible

** Ci and Li do not include the capacitance/inductance of cables to and from T.VIS E-20.

Sensor module data

⚠ WARNING	
Explosive atmosphere!	
Intrinsically safe wiring	
Errors in the intrinsically safe wiring can lead to serious explosions.	
<ul style="list-style-type: none"> Please note the terminal designation for intrinsically safe wiring (see chapter 5.3.3.2 <i>Terminal strip designation and separate intrinsically safe circuits</i>). 	

Type designation: 221-589.91

Technical data: 2-wire sensor

Designation	Description
Type	BIM-PST-Y1 Group M
Power consumption without operation	≤ 1.2 mA
Power consumption during operation	≥ 2.1 mA
Voltage	nom. 8,2V DC/NAMUR
Short circuit and overload protection	no

Technical data: 2-wire sensor safety data (intrinsic safety)

Temperature class	Ui (VDC)	Ii (mA) (Resistively limited)	Pi (mW)	Li ** (μH)	Ci** (nF)
T4	20	60	200	150	150
T5	20	60	130	150	150
T85°C	20	60	130	150	150

** Ci and Li do not include the capacitance/inductance of cables to and from T.VIS E-20.

3.2.2.5 General Technical Data

Technical data: temperatures and compressed air supply

Designation	Description
Control air	According to ISO 8573-1:2001
<ul style="list-style-type: none"> Solid particle content: 	Quality class 6 (recommended)

Designation	Description
<ul style="list-style-type: none"> 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.
<ul style="list-style-type: none"> Oil content: 	Quality class 3 preferably oil free max. 1 mg oil to 1 m ³ air
Air hose	
<ul style="list-style-type: none"> Metric 	Material PE-LD Outside Ø 6 mm Inside Ø 4 mm
<ul style="list-style-type: none"> 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 with sound absorber	max. 72 dB
Weight	max. 1.0 kg

Technical data: Material

Designation	Description
Housing	PA 12/L
Seals	EPDM, FKM and NBR

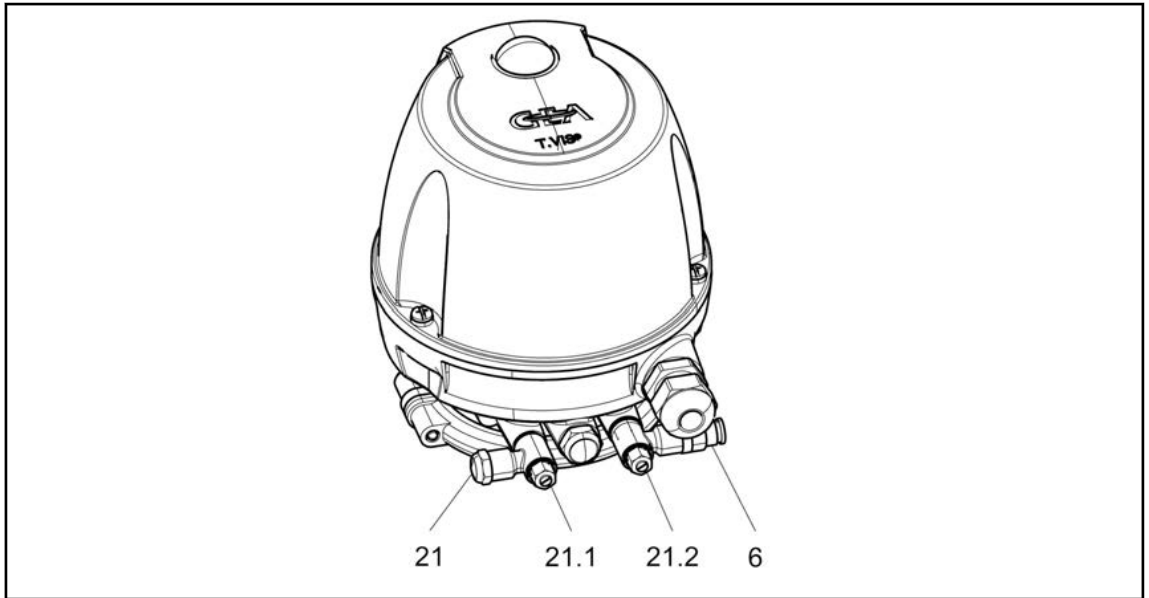
Technical data: electrical specifications

Designation	Description
Protection class EN 60529*	Standard: IP66 – powerful water jets Optional: IP67 – Immersion Optional: IP69k– high pressure*
Fitting position	Any position
EU-EMC - Directive	2014/30/EU
Interference immunity for industrial environments	EN ISO 61000-6-2: 2019
Radio frequency interference	EN 61000-6-4: 2019
EC Low Voltage Directive	73/23/EEC
Pollution degree 2: Overvoltage category OVC I	EN 60664-1*VDE 0110-1

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

3.2.3 Accessories

Accessories must be ordered separately.



Accessories	Part no.
Supply air throttle (21.2) with plug-in screw connector (6) to reduce the opening speed of the main stroke on the central air supply P	603-042
Exhaust air throttle (21.1) with sound absorber (21) to reduce the closing speed of the main stroke on exhaust air connection E1	603-042

3.2.4 Lubricants

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

Table 2: Lubricants

3.2.5 Setup

Technical data - equipment

Equipment	Material no.	Item	Number EU Type Examination Certificate Designation	IECEX-Certification Number Designation
Solenoid valve <ul style="list-style-type: none"> • 24 V DC (+/- 10%), 0.6 W • II 1G Ex ia IIC T6 Ga • II 1D Ex ia IIIC T85°C Da • Ambient temperature: -10...+50°C • Protection class IP 40 • Pressure range: 2.0...8.0 bar 	512-174	63	IMQ 19 ATEX 001 X II 1G Ex ia IIC T6/T5/T4 Ga II 1D Ex ia IIIC T ₂₀₀ 80 / T ₂₀₀ 90 / T ₂₀₀ 95 / T ₂₀₀ 100 T ₂₀₀ 115 / T ₂₀₀ 120 / T ₂₀₀ 135 / T ₂₀₀ 140 °C Da	IECEX IMQ 21.0012X Ex ia IIC T6/T5/T4 Ga Ex ia IIIC T ₂₀₀ 80 / T ₂₀₀ 90 / T ₂₀₀ 95 / T ₂₀₀ 100 T ₂₀₀ 115 / T ₂₀₀ 120 / T ₂₀₀ 135 / T ₂₀₀ 140 °C Da
Solenoid valve <ul style="list-style-type: none"> • 12 V DC (+/- 10%), 0.6 W • II 1G Ex ia IIC T6 Ga • II 1D Ex ia IIIC T85°C Da • Ambient temperature: -10...+50°C • Protection class IP 40 • Pressure range: 2.0...8.0 bar 	512-177	63	IMQ 19 ATEX 001 X II 1G Ex ia IIC T6/T5/T4 Ga II 1D Ex ia IIIC T ₂₀₀ 80 / T ₂₀₀ 90 / T ₂₀₀ 95 / T ₂₀₀ 100 T ₂₀₀ 115 / T ₂₀₀ 120 / T ₂₀₀ 135 / T ₂₀₀ 140 °C Da	IECEX IMQ 21.0012X Ex ia IIC T6/T5/T4 Ga Ex ia IIIC T ₂₀₀ 80 / T ₂₀₀ 90 / T ₂₀₀ 95 / T ₂₀₀ 100 T ₂₀₀ 115 / T ₂₀₀ 120 / T ₂₀₀ 135 / T ₂₀₀ 140 °C Da
Sound absorber G 1/8" <ul style="list-style-type: none"> • Filter material: stainless steel wool • Ambient temperature: -20...+70°C • max. pressure 10 bar 	933-175	21	--	--
Sound absorber G 1/4" <ul style="list-style-type: none"> • Filter material: stainless steel wool • Ambient temperature: -20...+70°C • max. pressure 10 bar 	933-174	26	--	--
Supply/exhaust air throttle G 1/8" <ul style="list-style-type: none"> • Filter material: sintered stainless steel • Pressure range: 0.2 ... 10 bar • Gradually adjustable flow at Δp 6 bar: 310 dm³ / min n • Ambient temperature: -10 ... +70 °C • Flow rate setting at 0 ... +70 °C 	603-042	21.2	--	--
Cable gland M20x1.5/Ex with O-ring <ul style="list-style-type: none"> • II 2G Ex eb IIC Gb • II 1D Ex ta IIIC Da • Cable diameter 6-12 mm • Ambient temperature: -20 ... +85°C • Protection class IP 68 	508-919	24	BVS 14 ATEX E 025 X II 2G Ex eb IIC Gb II 1D Ex ta IIIC Da	IECEX BVS 14.0020X Ex eb IIC Gb Ex ta IIIC Da

4 Storage and transport

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

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

4.1 Scope of supply

On receipt of the control top, check whether

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

4.2 Storage

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

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.

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

5 Assembly and installation

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

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

5.1 Establishing hose connections

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

Tools

- Hose cutter

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

⇒ Hose connection has been established.

INFO Make sure you do not kink the pneumatic hoses during mounting.

5.2 Pneumatic connection

5.2.1 Control Top with 1 Solenoid Valve or Without Solenoid Valve

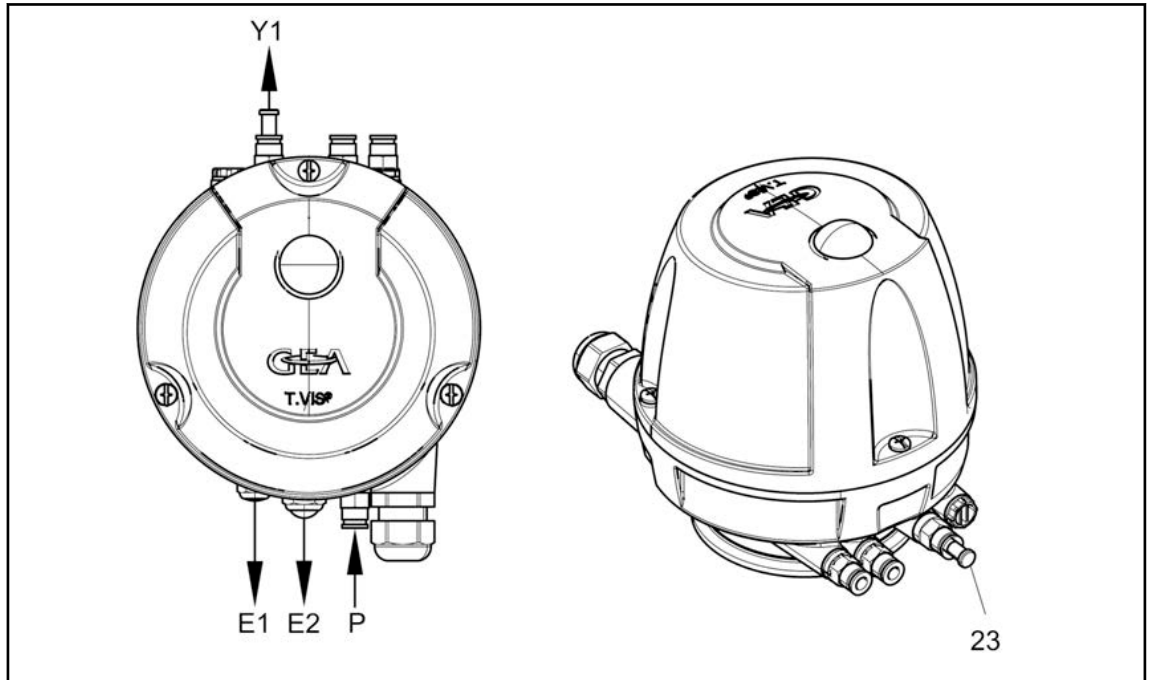


Figure 5-1 - Control top (standard variant in IP 66)

No.	Designation
E1	Exhaust air of the main stroke Y1 (sound absorber or exhaust air throttle, optional) Connection E1 must not be closed!
E2	Safety vent against excess pressure and exhaust air of lifting actuators Y2 and Y3 Connection E2 must not be closed!
P	Central air supply with integrated filter Optional: supply air throttle
N	Not available
Y1	Air connection for external main stroke connection with plug (23)
23	Plug Control air pressure can be present at the plugs for the air connections! Before removing a sealing plug (23), make sure that the respective air connection is pressure-free!

On most of the GEA Tuchenhagen 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.

5.2.2 Control top with 2 solenoid valves

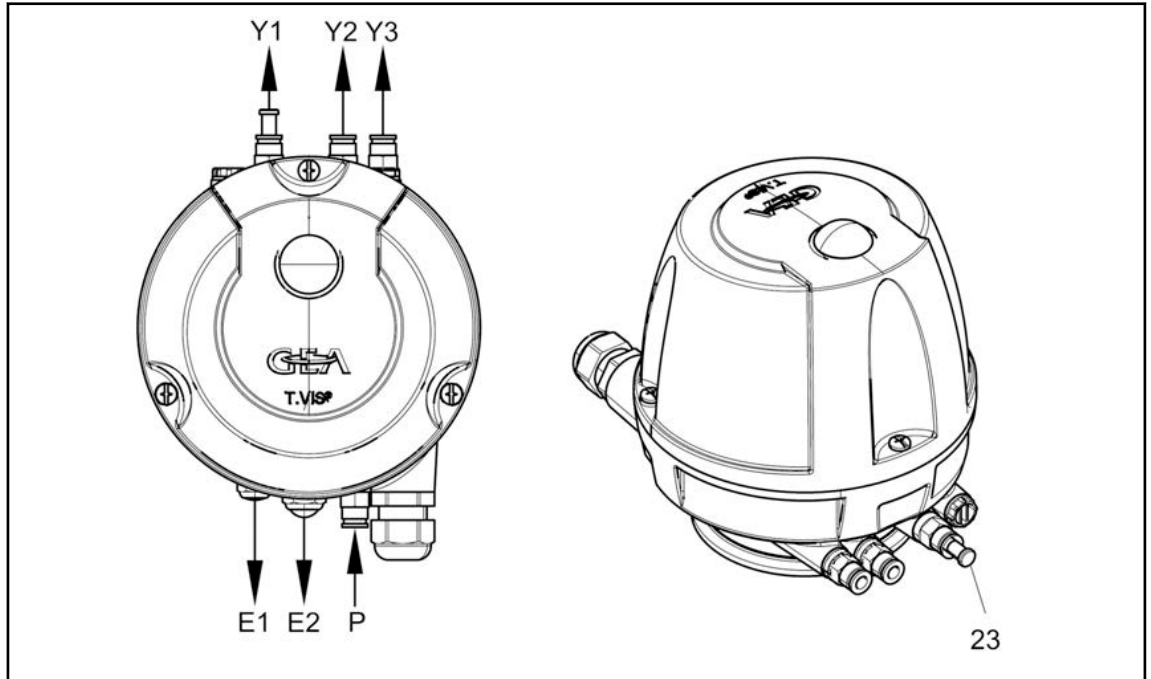


Figure 5-2 - Control top (standard variant in IP 66)

No.	Designation
E1	Exhaust air of the main stroke Y1 (sound absorber or exhaust air throttle, optional) Connection E1 must not be closed!
E2	Safety vent against excess pressure and exhaust air of lifting actuators Y2 and Y3 Connection E2 must not be closed!
P	Central air supply with integrated filter Optional: supply air throttle
N	Not available
Y1	Air connection for external main stroke connection with plug (23)
Y2	Air connection for lifting the valve disk
Y3	Air connection for lifting the double-disk or for the main stroke of an external process valve
23	Plug Control air pressure can be present at the plugs for the air connections! Before removing a sealing plug (23), make sure that the respective air connection is pressure-free!

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.

The second solenoid valve is provided at connection Y2 or Y3, depending on its use.

5.2.3 Control top with 3 solenoid valves

⚠ WARNING

Explosive atmosphere!

Only two solenoid valves may be operated at the same time.

The simultaneous operation of more than two solenoid valves will increase the temperature to a critical and non-certified level.

- The conditions of use in chapter 2.3 *Special terms of use* must be observed.

INFO

To ensure adequate compressed air supply to the process actuators, a max. of 2 solenoid valves are electrically activated at the same time! It must be ensured that there can be no simultaneous control of the actuator or the lifts at the same process valve!

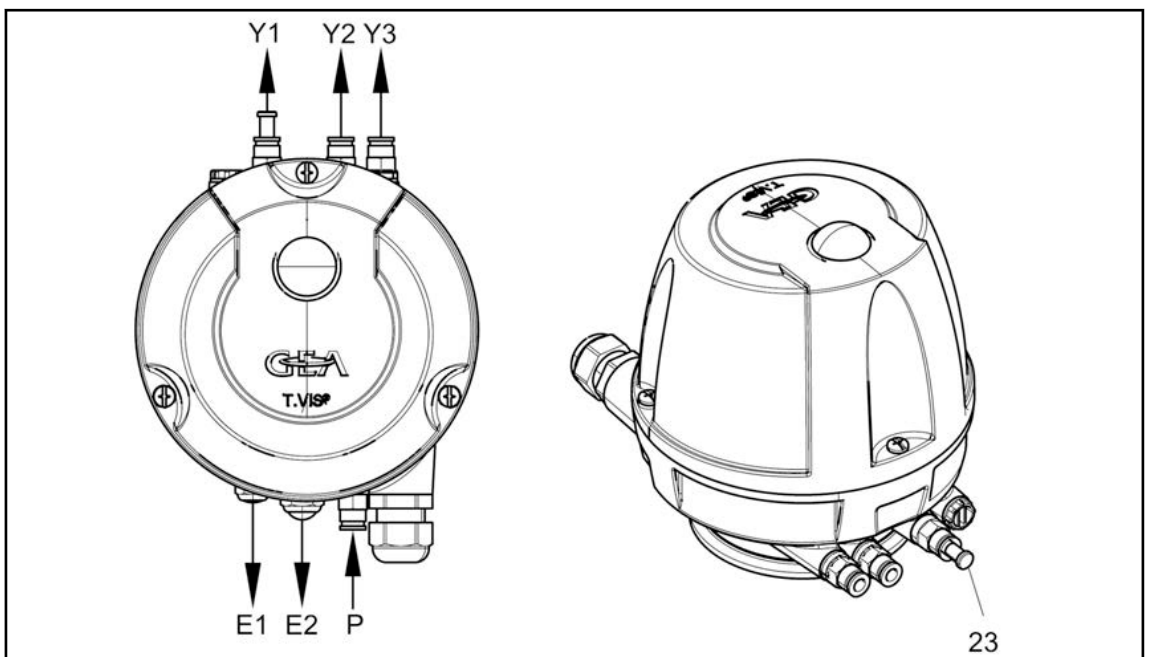


Figure 5-3 - Control top (standard variant in IP 66)

No.	Designation
E1	Exhaust air of the main stroke Y1 (sound absorber or exhaust air throttle, optional) Connection E1 must not be closed!
E2	Safety vent against excess pressure and exhaust air of lifting actuators Y2 and Y3 non-return valve Connection E2 must not be closed!
P	Central air supply with integrated filter Optional: supply air throttle
N	Not available

No.	Designation
Y1	Air connection for external main stroke connection with plug (23)
Y2	Air connection for lifting the valve disk
Y3	Air connection for lifting the double-disk or for the main stroke of an external process valve
23	Plug Control air pressure can be present at the plugs for the air connections! Before removing a sealing plug (23), make sure that the respective air connection is pressure-free!

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.

5.3 Electrical connection

⚠ DANGER

Live parts

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.

- Always follow the instructions for commissioning and maintenance when working in potentially explosive atmospheres.

⚠ WARNING

Explosive atmosphere!

Electrical installations and installation in potentially explosive atmospheres

- The standards for electrical installations and installation in accordance with EN 60079-11 and EN 60079-14 must be observed.

5.3.1 Overview

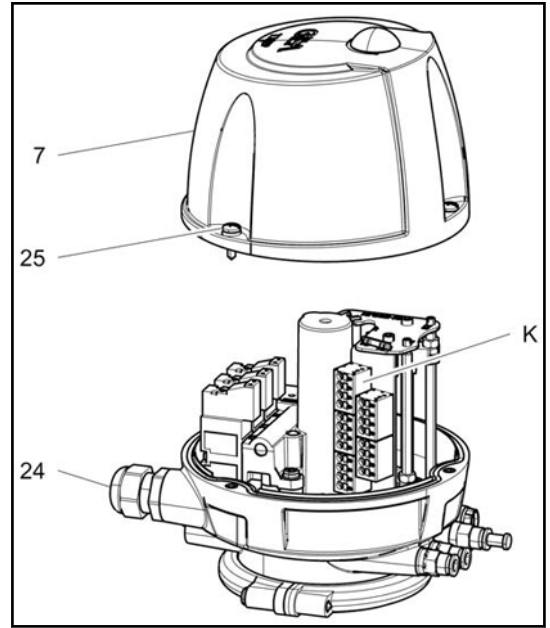
⚠ DANGER

Live parts

Electrical shocks can cause serious personal injuries or death.

- Only allow properly qualified staff to work on the electrical equipment.
- Prior to establishing electrical connections, check the maximum permissible operating voltage.
- During work in potentially explosive areas, always follow the instructions on commissioning and maintenance.

1. Release the cheese head screws (25) and take off the cap (7).
2. Feed the cable (Ø 6-12 mm) through the cable gland (24) and connect it to the terminals (K) in the control top according to the wiring diagram. Use wires with end-ferrules, max. 1.5 mm².
3. Secure the cable in the cable gland with a torque of 2.5 Nm.



5.3.2 Specification for electrical wiring

The maximum cable length and dimensions must be considered based on the following cable parameters:

Designation	Description
Configuration of the electrical wiring	Terminal strip
Cable specification	Ci cable/cable = 58 pF/m Ci cable/shielding = 270 pF/m According to EN 60079-11, the distance between intrinsically safe circuits and earth must take into account an insulation for 30 V of 0.7 mm.
Conductor cross-section for connection terminal	up to 1.5 mm ²
Required cable diameter for cable gland	Ø6 mm - Ø12 mm

INFO 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 +60 °C (-4 °F to +140 °F)!

INFO Cables with sheathing or marking in "light blue" colour must be used, as the "intrinsically safe connection cables" must always be marked with this colour!

5.3.3 Electrical wiring

5.3.3.1 Terminal strip assignment in relation to the order code

The following terminal strip assignment must be observed in relation to the order code:

External connection solenoid valves

Order code	Terminal strip
TE20 N 2 E E/X***	--
TE20 R 2 E E/X***	V1-/V1+
TE20 I 2 E E/X***	V1-/V1+ and V2-/V2+
TE20 J 2 E E/X***	V1-/V1+ and V3-/V3+
TE20 L 2 E E/X***	V1-/V1+ and V2-/V2+ and V3-/V3+

External connection two-wire proximity sensor

Order code	Terminal strip
TE20 N/R/I/J/L 2 E E/X/0***	R1-/R1+ and R2-/R2+

5.3.3.2 Terminal strip designation and separate intrinsically safe circuits

WARNING

Explosive atmosphere!

Intrinsically safe external connections

The external connection must be supplied by intrinsically safe circuits.

- Isolating switch amplifiers (ignition protection barriers) must be installed for the intrinsically safe supply.

WARNING

Explosive atmosphere!

Polarity of solenoid valves

If the polarity is incorrect or reversed, the solenoid valves may be damaged and dangerous explosive situations may occur.

- DO NOT reverse the polarity.
- Always make the electrical connections carefully observing the correct +/- polarity marked on the solenoid valve coil.
- The terminal strip assignments and designations from chapter 5.3.3 *Electrical wiring* must be observed.

The following terminal strip assignment must be observed for internal and external connections:

Description of the function of the terminal strips

Intrinsically safe circuit	Terminal strip	Designation	Functional description
Sensor S1	S1+	Sensor S1+	Internal connection sensor L+ (brown wire)
	S1-	Sensor S1-	Internal connection sensor L- (blue wire)
	R1-	Feedback R1-	External connection feedback sensor S1-
	R1+	Feedback R1+	External connection feedback sensor S1+
Sensor S2	S2+	Sensor S2+	Internal connection sensor L+ (brown wire)
	S2-	Sensor S2-	Internal connection sensor L- (blue wire)
	R2-	Feedback R2-	External connection feedback sensor S2-
	R2+	Feedback R2+	External connection feedback sensor S2+
Solenoid valve Y1	Y1+	Solenoid valve Y1+	Internal connection solenoid valve L+ (red wire)
	Y1-	Solenoid valve Y1-	Internal connection solenoid valve L- (black wire)
	V1-	Actuation V1-	External connection solenoid valve Y1-
	V1+	Actuation V1+	External connection solenoid valve Y1+
Solenoid valve Y2	Y2+	Solenoid valve Y2+	Internal connection solenoid valve L+ (red wire)
	Y2-	Solenoid valve Y2-	Internal connection solenoid valve L- (black wire)
	V2-	Actuation V2-	External connection solenoid valve Y2-
	V2+	Actuation V2+	External connection solenoid valve Y2+
Solenoid valve Y3	Y3+	Solenoid valve Y3+	Internal connection solenoid valve L+ (red wire)
	Y3-	Solenoid valve Y3-	Internal connection solenoid valve L- (black wire)
	V3-	Actuation V3-	External connection solenoid valve Y3-
	V3+	Actuation V3+	External connection solenoid valve Y3+

Light-emitting diodes A/B

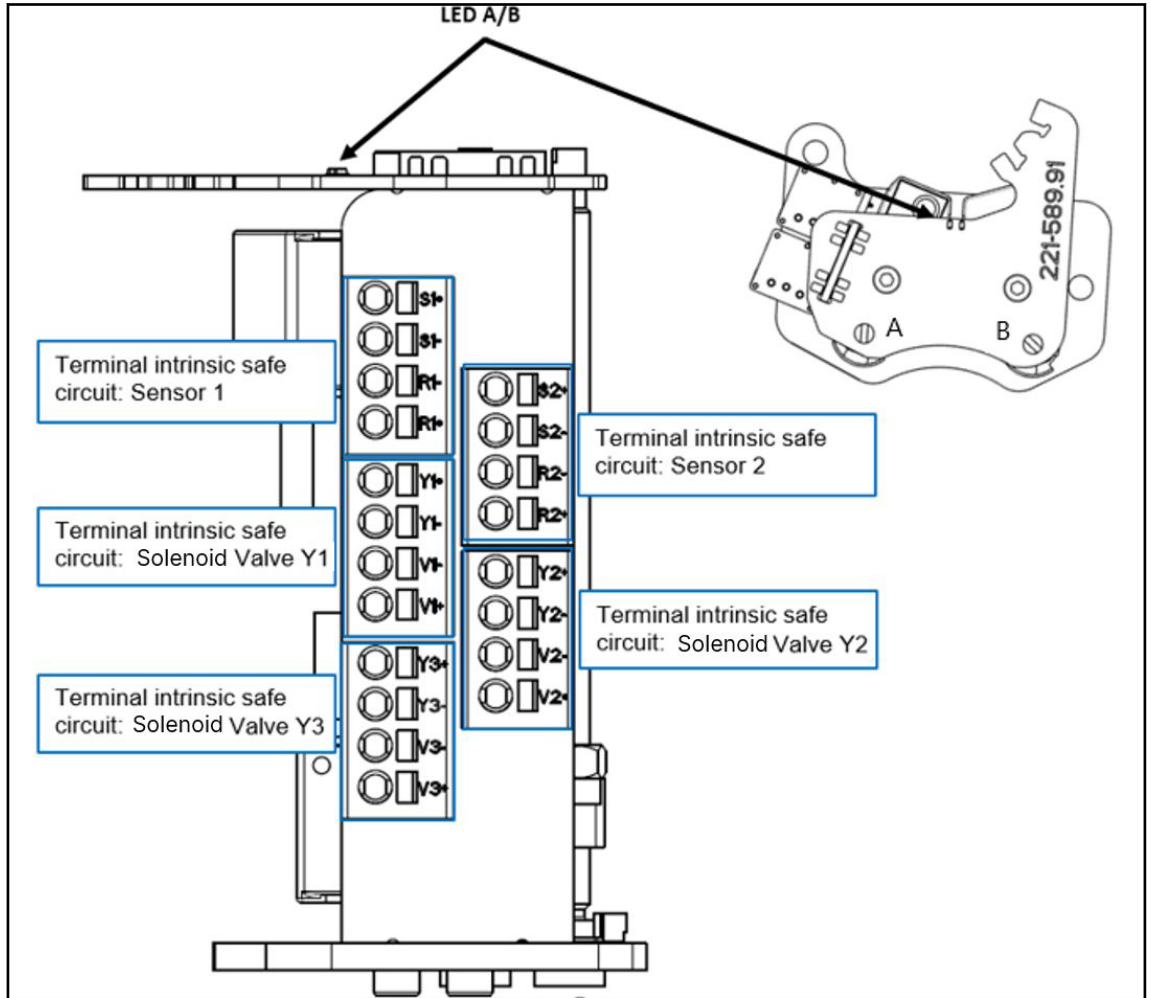


Figure 5-4 - Terminal strip assignment

Light-emitting diode	Colour	Indication
A (LED A)	Green	Permanent light – valve in idle position (non-actuated position)
B (LED B)	Yellow	Permanent light – valve in end position (actuated position)

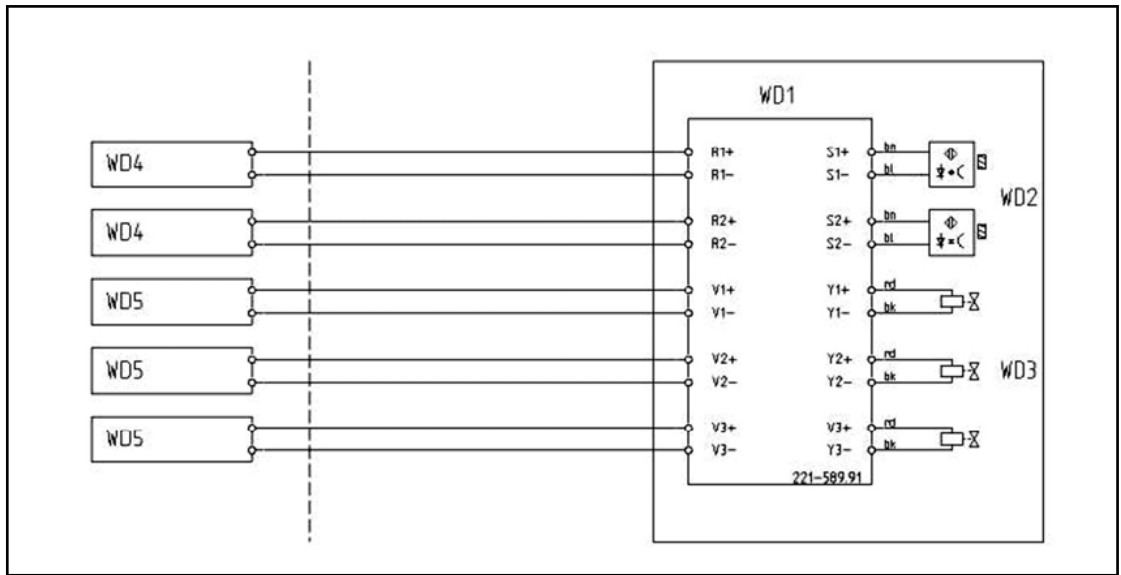
5.3.3.3 Wiring diagram T.VIS E-20

INFO

Check the assignment of the wires before connecting the cables!

External control (non Ex-area)

Control top T.VIS E-20 (Ex-area)



Key to the wiring plan

Position	Description
WD.1	Sensor module T.VIS E-20/Ex mat no. 221-589.91
WD.2	Two NAMUR-sensors S1 and S2
WD.3	Max. three solenoid valves 12VDC/Ex mat no. 512-177 or 24VDC/Ex mat no. 512-174
WD.4	Switch isolator for the connection of one NAMUR sensor each in the intrinsically safe input circuit in potentially explosive areas
WD.5	Valve control module (separating barrier) for connection of one intrinsically safe solenoid valve each in potentially explosive areas

The two sensors in the sensor module must be supplied with a NAMUR voltage of 8.2 VC. Suitable switch isolators are used to make the sensor feedback signals available to the higher-order control. The ignition protection type "intrinsically safe" is guaranteed by these switch isolators and separation between Ex and non-Ex area is given.

The solenoid valves are available in the voltage variants 12VDC or 24VDC in the product range. The solenoid valves are supplied with the corresponding voltage via suitable valve control modules.

The valve control modules limit current and voltage in the event of a fault, which allows the solenoid valves to be operated "intrinsically safe" and thus guarantee separation between Ex and non-Ex areas.

5.3.3.4 Execution and verification of the connection of internal and external circuits

⚠ WARNING

Explosive atmosphere!

Execution of the connection of external circuits

The standards for the electrical installation of intrinsically safe circuits according to EN 60079-11 must be observed.

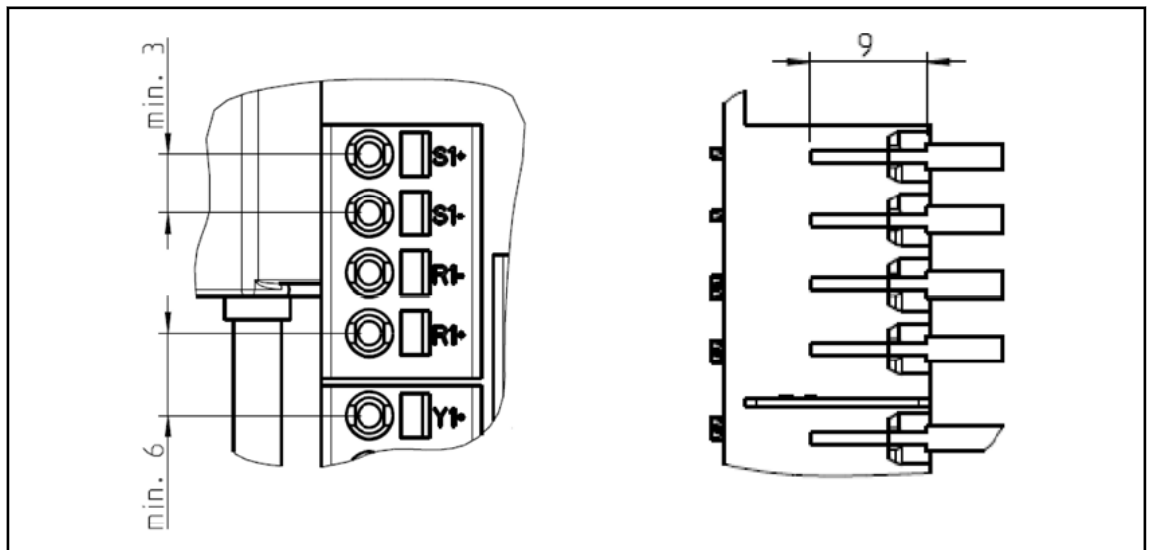
- Check distance between non-insulated strands of at least 3.0 mm to earthed parts.
- Check distance between intrinsically safe circuits of at least 6.0 mm.
- Check the length of the stripping of max. 9 mm.
- Check the cables for tight fit.

For internal and external connections, the intrinsically safe circuits are defined by the sensor module and its designation.

The distance within an intrinsically safe circuit and to earthed parts is at least 3 mm.

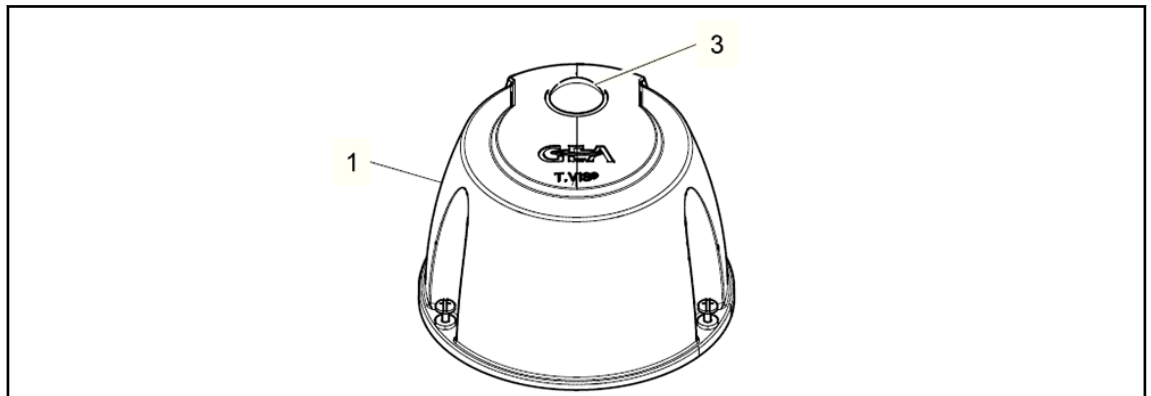
The distance between different intrinsically safe circuits is at least 6 mm.

The length of the stripping must not exceed 5 mm.



5.4 Visual Display

5.4.1 Illuminated dome



Position Description

Position Description

1 - cap

3 - Illuminated dome

The following statuses are visualized by the illuminated dome:

- Valve in non-actuated position: green
- Valve in actuated position: yellow
- Valve deviating from its adjusted actuated positions – no indication.
- Valve idle: no indication

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

5.5 Mounting the control top to different valves

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

ATTENTION

The installation of the control top T.VIS E-20 is only permitted on valves in vertical or horizontal position!

Any installation other than this will void the operating license!

- Pay attention to vertical or horizontal position.

ATTENTION

Magnetic fields can affect the proximity switch system.

Measured values can be changed.

- Protect the control top from external magnetic fields.

ATTENTION**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.

ATTENTION**The permanent magnet of the switch bar is fragile and must be protected against impact stress.**

Damage to the permanent magnet.

- Protect the permanent magnet against impact stress.

ATTENTION**Magnetic fields in the switch bar (1)**

Magnetic fields can delete data carriers and affect or destroy electronic or mechanical components.

- Keep the switch bar away from data carriers and electronic and mechanical components.

⚠ WARNING**Explosive atmosphere!****The intended installation to avoid electrostatic charge must be observed.**

Failure to observe the intended installation may result in serious explosions due to electrostatic hazards.

- The intended installation described in chapter 5.5 *Mounting the control top to different valves* must be followed to ensure proper earthing.
- The earthing of the T.VIS and the valve must be ensured.

The T.VIS E-20 is earthed by mounting it on the corresponding valves.

The conductive contact bridge to earth is established by installing the mounting surface of the T.VIS E-20 flush with the mounting surface of the valve actuator. Both components are clamped by two half rings.

Notes on mounting the control top

Please ensure that the T.VIS E-20 is installed as described in chapter 6.6.
Make sure that the valve is earthed via the piping.

5.5.1 Mounting VARIVENT Valve or STERICOM Valve Types N_A/D, R

ATTENTION

The permanent magnet of the switch bar is fragile and must be protected against impact stress.

Damage to the permanent magnet.

- Protect the permanent magnet against impact stress.

ATTENTION

Magnetic fields in the switch bar (1)

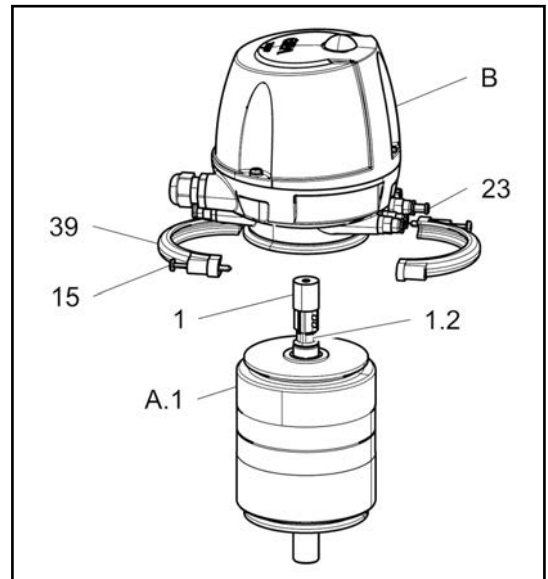
Magnetic fields can delete data carriers and affect or destroy electronic or mechanical components.

- Keep the switch bar away from data carriers and electronic and mechanical components.

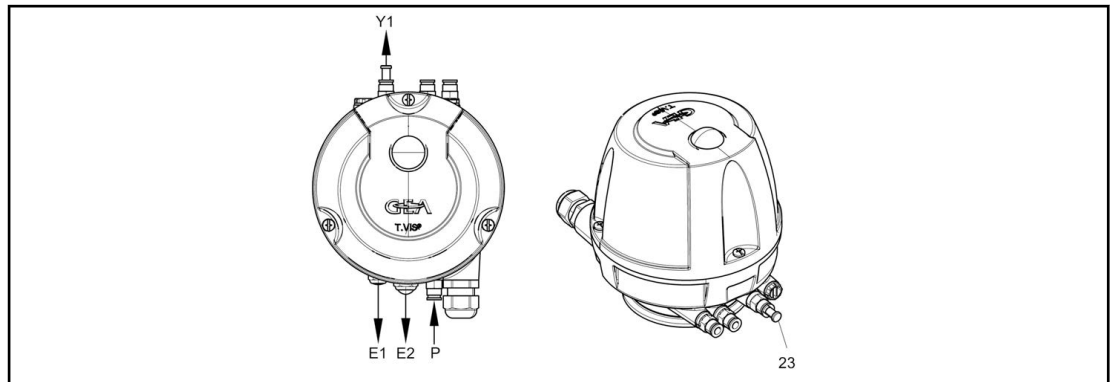
Prerequisites

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

1. Check that the switch bar (1) is firmly in place. If required, tighten with jaw wrench A/F 13 at (1.2), torque 2 to 2.5 Nm (1.4 to 1.7 lbft).
2. Fit the control top (B) over the switch bar (1) and on the actuator (A.1).
3. Tighten the clamp connection (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 air connection Y1 with a sealing plug (23), since the air is guided inside the T.VIS E-20 control top.



6. Carry out commissioning, see chapter 6 *Commissioning*.
- ⇒ The control top is mounted.

5.5.2 Mounting to a Butterfly Valve T-smart 8000

ATTENTION

The permanent magnet of the switch bar is fragile and must be protected against impact stress.

Damage to the permanent magnet.

- Protect the permanent magnet against impact stress.

ATTENTION

Magnetic fields in the switch bar (1)

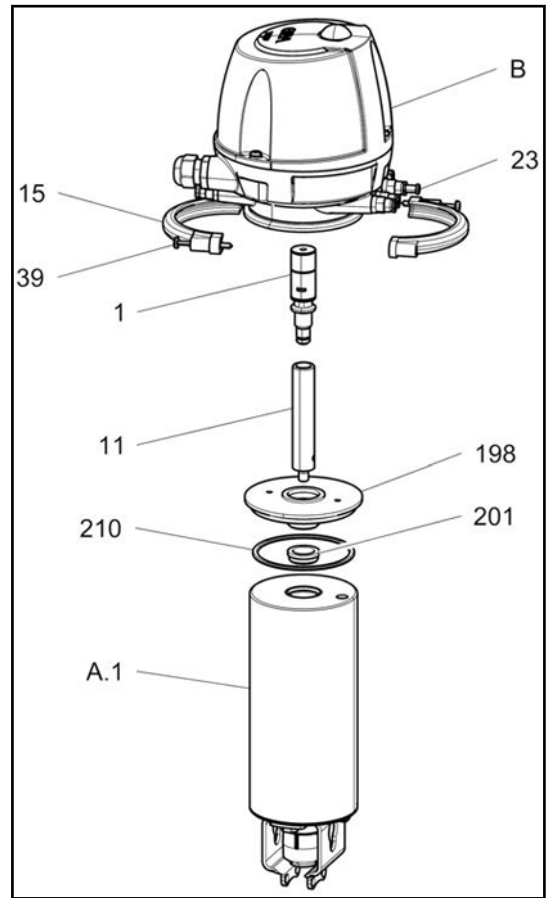
Magnetic fields can delete data carriers and affect or destroy electronic or mechanical components.

- Keep the switch bar away from data carriers and electronic and mechanical components.

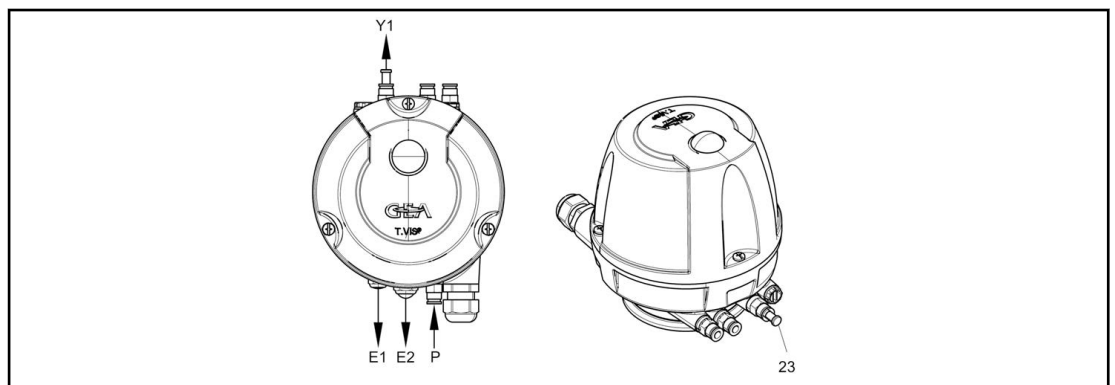
Prerequisites

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

1. Fit the bearing (201) into the locking screw (198).
2. Fit the O-ring (210).
3. Use a face spanner (408-133) 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 to 2.5 Nm (1.4 to 1.7 lbft).
5. Fit the control top (B) over the switch bar (1) and on the actuator.
6. Tighten the half rings (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. Close air connection Y1 with a sealing plug (23), since the air is guided inside the T.VIS E-20 control top.



9. Carry out commissioning, see chapter 6 *Commissioning*.

⇒ The control top is mounted.

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

ATTENTION

The permanent magnet of the switch bar is fragile and must be protected against impact stress.

Damage to the permanent magnet.

- Protect the permanent magnet against impact stress.

ATTENTION

Magnetic fields in the switch bar (1)

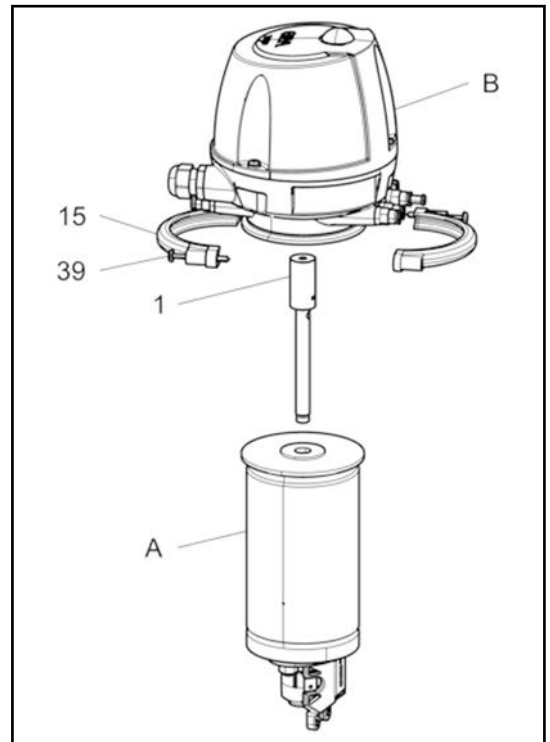
Magnetic fields can delete data carriers and affect or destroy electronic or mechanical components.

- Keep the switch bar away from data carriers and electronic and mechanical components.

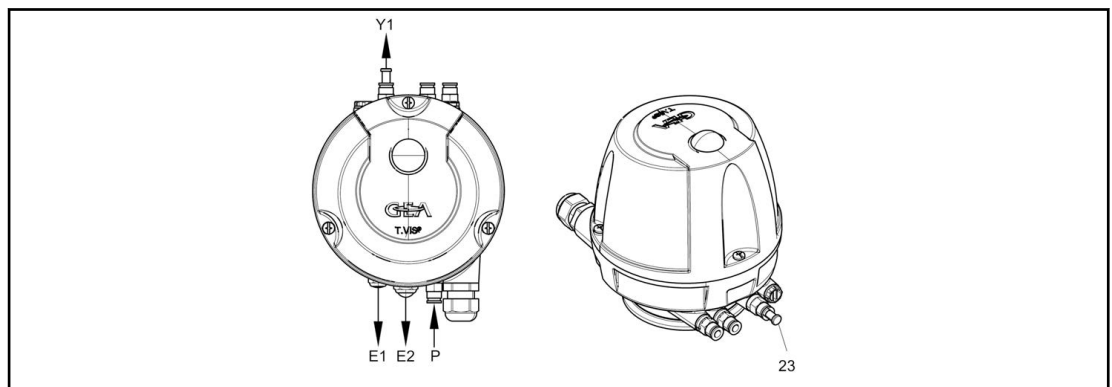
Prerequisites

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

1. Screw switch bar (1) into the actuator (A) and tighten with a pin punch Gm 5.0, torque 22 Nm (15.4 lbft).
2. Fit the control top (B) over the switch bar (1) and on the actuator.
3. Tighten the half rings (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 air connection Y1 with a sealing plug (23), since the air is guided inside the T.VIS E-20 control top.



6. Carry out commissioning, see chapter 6 *Commissioning*.

⇒ The control top is mounted.

5.5.4 Mounting to ECOVENT Valves N_ECO and W_ECO

ATTENTION

The permanent magnet of the switch bar is fragile and must be protected against impact stress.

Damage to the permanent magnet.

- Protect the permanent magnet against impact stress.

ATTENTION

Magnetic fields in the switch bar (1)

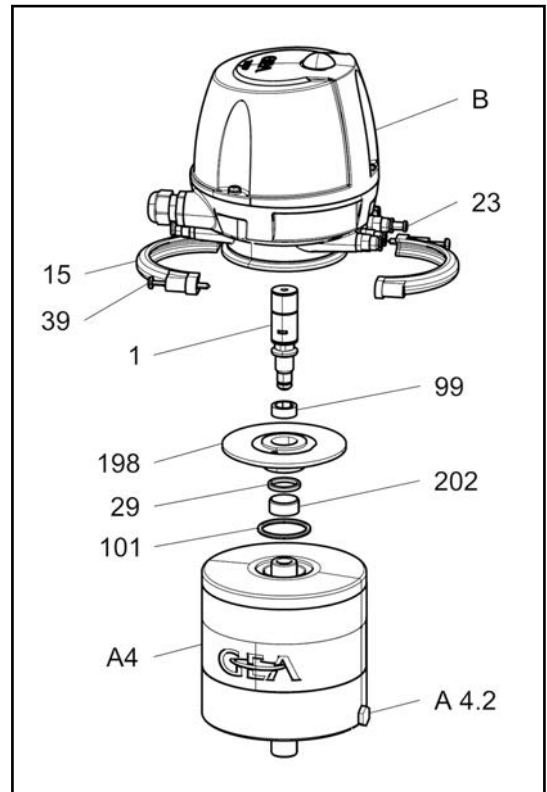
Magnetic fields can delete data carriers and affect or destroy electronic or mechanical components.

- Keep the switch bar away from data carriers and electronic and mechanical components.

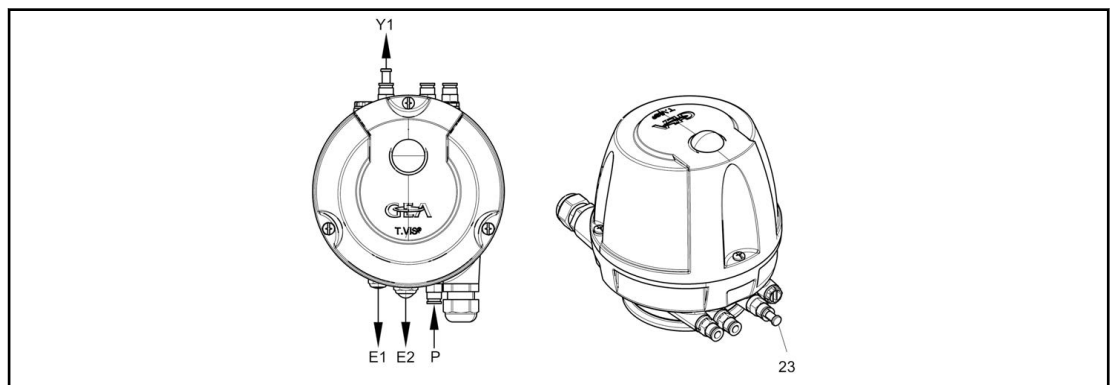
Prerequisites

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

1. Complete the T.VIS installation base (198) with O-rings (29, 101) and a plain bearing (202).
2. Screw the installation base (198) into the actuator (A4) and tighten using a face spanner (408-133).
3. Screw switch bar (1) into the piston rod (A.4.1) and tighten with jaw wrench A/F 13, torque 2 to 2.5 Nm (1.4 to 1.7 lbft).
4. Place the control top over the T.VIS switch bar (1) and on the actuator.
5. Tighten the clamp connection (15) with screws (39) at a torque of 1 Nm (0.7 lbft).



6. Align the pneumatic and electrical connections in accordance with the valve block configuration.



→ As the air is guided inside the T.VIS control top (B), connection A.4.2 on the actuator is closed.

7. Carry out commissioning, see chapter 6 *Commissioning*.

⇒ The control top is mounted.

5.5.5 Mounting to VESTA Valve H_A/M

ATTENTION

The permanent magnet of the switch bar is fragile and must be protected against impact stress.

Damage to the permanent magnet.

- Protect the permanent magnet against impact stress.

ATTENTION

Magnetic fields in the switch bar (1)

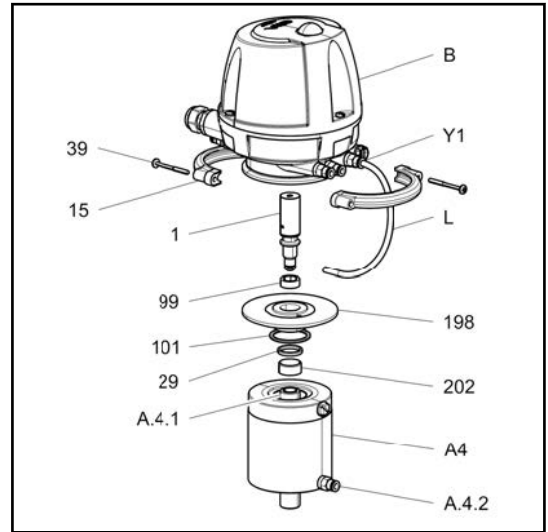
Magnetic fields can delete data carriers and affect or destroy electronic or mechanical components.

- Keep the switch bar away from data carriers and electronic and mechanical components.

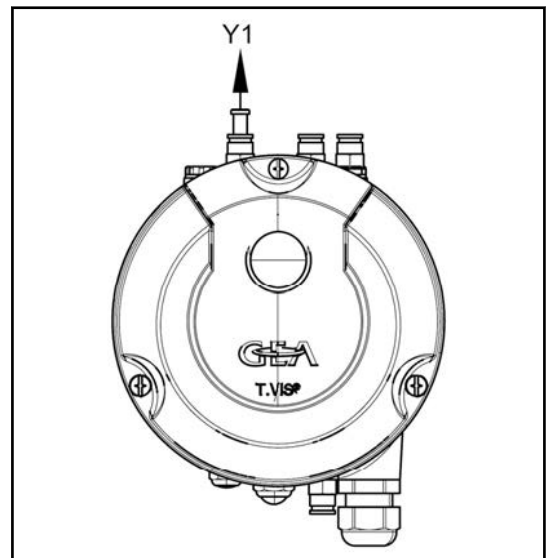
Prerequisites

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

1. Complete the T.VIS installation base (198) with O-rings (29, 101) and a plain bearing (202).
2. Screw the installation base (198) into the actuator (A4) and tighten using a face spanner (408-133).
3. Screw switch bar (1) into the piston rod (A.4.1) and tighten with jaw wrench A/F 13, torque 2 to 2.5 Nm (1.4 to 1.7 lbft).
4. Fit the control top (B) over the switch bar (1) and on the actuator.
5. Tighten the half rings (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 A4.2 on the actuator with an air hose (L).



8. Carry out commissioning, see chapter 6 *Commissioning*.
- ⇒ The control top is mounted.

5.5.6 Mounting to Valve N_/E or W_/E or STERICOM Valve

ATTENTION

The permanent magnet of the switch bar is fragile and must be protected against impact stress.
Damage to the permanent magnet.

- Protect the permanent magnet against impact stress.

ATTENTION

Magnetic fields in the switch bar (1)

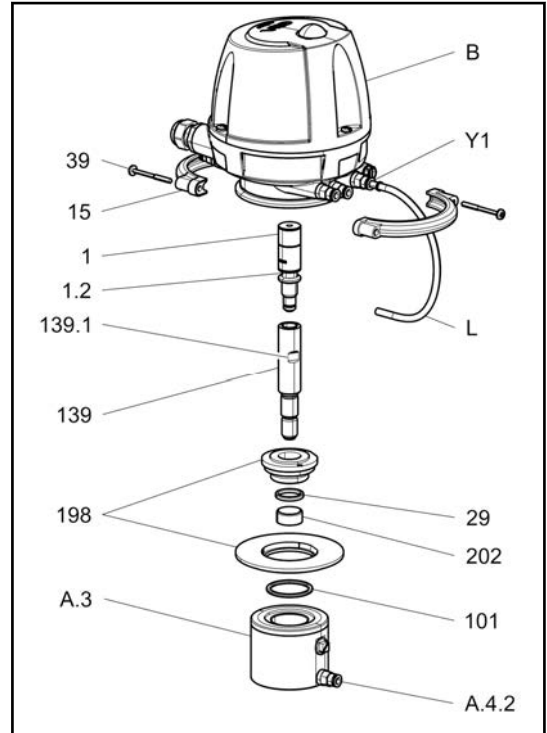
Magnetic fields can delete data carriers and affect or destroy electronic or mechanical components.

- Keep the switch bar away from data carriers and electronic and mechanical components.

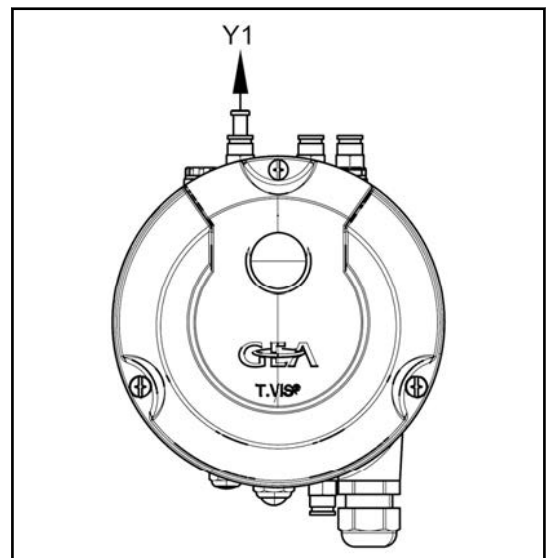
Prerequisites

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

1. Complete the T.VIS installation base (198) with O-rings (29, 101) and a plain bearing (202).
2. Screw the adapter T.VIS E/SHO (139) into the actuator with jaw wrench on wrench surface (139.1) and tighten.
3. Screw the installation base (198) into the actuator (A.3) via the adapter T.VIS E/SHO (139) and tighten using a face spanner (408-133).
4. Screw the switch bar T.VIS (1) into the adapters T.VIS E / SHO (139) and tighten with jaw wrench at (1.2), torque 2 to 2.5 Nm (1.4 to 1.7 lbft).
5. Place the control top over the T.VIS switch bar (1) and on the actuator.
6. Tighten the clamp connection (15) with screws (39) at a torque of 1 Nm (0.7 lbft).



7. Align the pneumatic and electrical connections in accordance with the valve block configuration.
- Internal air guiding is not possible on these valve types. Therefore connect the air connection (Y1) on the control top and the connection (A.4.2) on the actuator to the air hose (L).



8. Carry out commissioning, see chapter 6 *Commissioning*.
- ⇒ The control top is mounted.

5.5.7 Fitting to an ASEPTOMAG Valve

ATTENTION

The permanent magnet of the switch bar is fragile and must be protected against impact stress.

Damage to the permanent magnet.

- Protect the permanent magnet against impact stress.

ATTENTION

Magnetic fields in the switch bar (1)

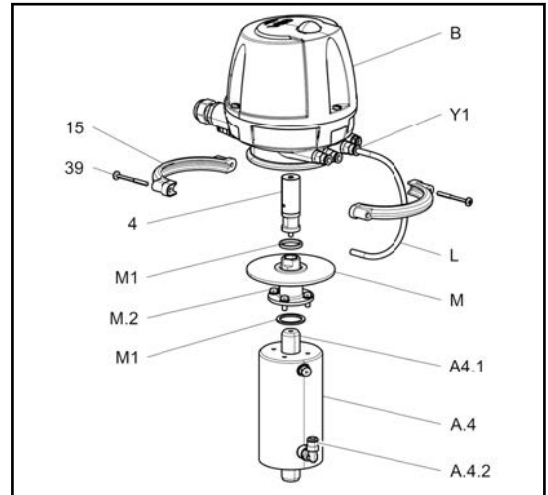
Magnetic fields can delete data carriers and affect or destroy electronic or mechanical components.

- Keep the switch bar away from data carriers and electronic and mechanical components.

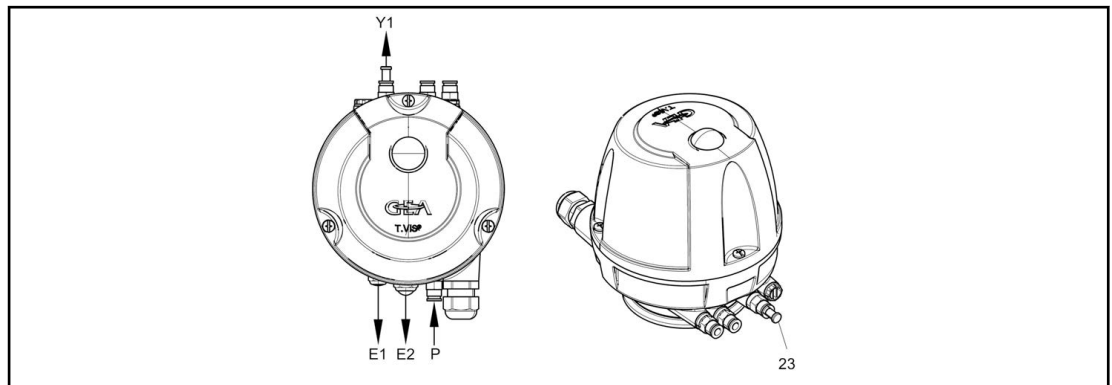
Prerequisites

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

1. Place the T.VIS installation base (M), with O-rings (M1), on the actuator (A.4) and secure it with four M5 screws (M.2).
2. Screw the switch bar (4) Mat. 221-589.87, into the piston rod (A4.1) and tighten with jaw wrench A/F 13, torque 3 Nm (2.1 lbft).
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 (0.7 lbft).



5. Align the pneumatic and electrical connections in accordance with the valve block configuration.



→ On ASEPTOMAG valves, internal air guiding is not possible. Therefore connect the air connection (Y1) on the control top and the connection (A.4.2) on the actuator to the air hose (L).

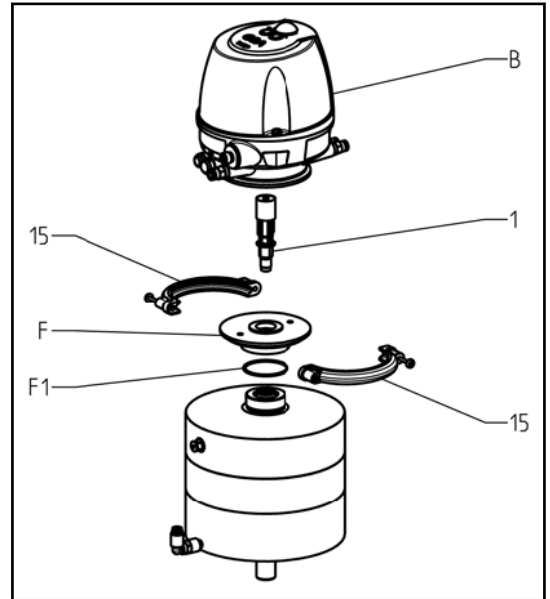
6. Connect the pneumatic hose, or 2-3 hoses for valves with seat lifting, in accordance with the hose connection diagram for the valve.
 7. Carry out commissioning, see chapter 6 *Commissioning*.
- ⇒ The control top is mounted.

5.5.8 Mounting to FLOWVENT valve

Prerequisites

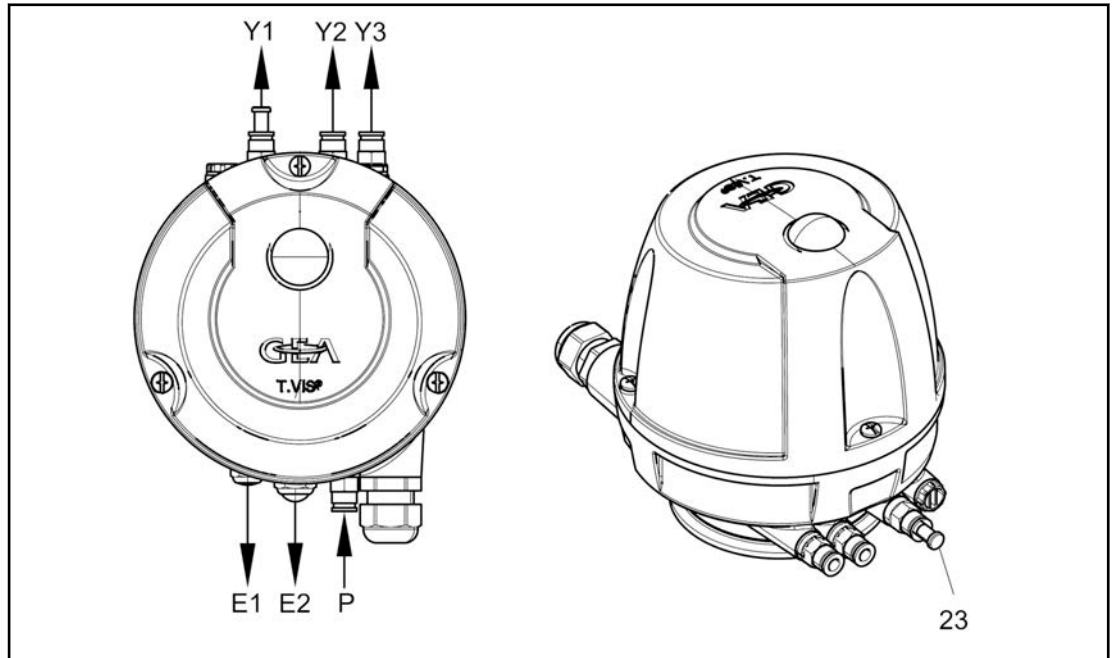
- Pay attention not to kink the air hoses when mounting the control top.

1. Insert the O-ring (F1) into the lower O-ring groove of the installation base (F).
2. Lightly grease the O-ring (F1) and the inner thread of the installation base (F) and then screw the installation base onto the actuator and tighten using a pin-face spanner (408-133) and a torque of 20 Nm (14 lbft). When setting the torque heed the correction factor of the plug tool. If the plug tool (408-451) is used, the torque to be set is 15 Nm (10.5 lbft).



3. Screw switch bar (1) into the actuator and tighten with A/F 17, torque 2 to 2.5 Nm (1.4 to 1.7 lbft).
4. Fit the control top (B) over the switch bar (1) onto the installation base and push until stop. For optimum assembly the O-ring (31) should be slightly greased.
5. Turn the control top into the required position and tighten the clamp connection (15) and screws (15) with a torque of 1 Nm (0.7 lbft) (base/ installation base).
→ On FLOWVENT valves, internal air guiding is not possible!

6. Therefore, use an air hose (L) to connect the air connection (Y1) on the control top with the connection Y1 on the valve actuator. In the case of a FLOWVENT valve and control tops with lift stroke, connect the air connections Y2 and Y3 to the connections Y2 and Y3 of the valve actuator. In the case of valves with air assist, connect Y2 to connection Y2 of the valve actuator (see hose connection plan of the valve).



7. Carry out commissioning, see chapter 6 *Commissioning*.
8. Fit the cap and tighten the screws to 1 Nm (0.7 lbft). →

The control top is mounted.

5.5.9 Replacing Control Tops

When replacing the control top observe the following warning note:

⚠ CAUTION

Spring tension being released if the wrong switch bar is used

When a valve is used with the wrong type of switch bar, there is a risk of injury as the spring tension can suddenly be released.

- When replacing predecessor models with a control top T.VIS E-20, the switch bar must always be replaced, too!

6 Commissioning

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

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

6.1 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.

6.2 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 clear.
- Remove any liquids that have escaped without leaving residues.

6.3 Switching On Control Air and Operating Voltage

Commissioning can take place if the control top has been mounted correctly on the valve and if the electrical and pneumatic connections have been established correctly.

Switching the control air on

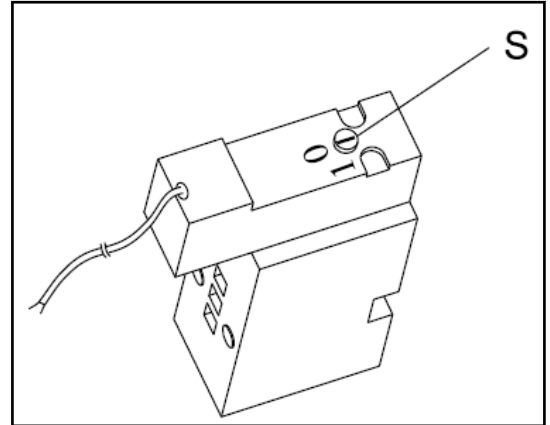
1. Switch on the control air supply.
- ⇒ The control air is switched on.

Switching the operating voltage on

1. Switch on the operating voltage.
- ⇒ The operating voltage is switched on.

6.4 Checking Valve Actuation

1. Check valve functions by activating the solenoid valves using the manual operating element on the solenoid valves: Turn screw (S) from 0 to 1 using the screwdriver.
2. Switch all of the solenoid valves on and off again one after the other in the order Y1, Y2 and Y3 – if fitted.
 - 2.1 Y1 – main actuator
 - 2.2 Y2 – valve disk lifting
 - 2.3 Y3 – double-disk lifting



⇒ The valve actuation has been checked.

6.5 Service Function

If maintenance is to be carried out on a process valve equipped with a T.VIS E-20 control top, the valve insert 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.

Another option, when the cap is removed, is manual override at the pilot valve, see *Control Top with Solenoid Valves*.

6.6 Adjusting sensors on the control top

⚠ CAUTION

- When actuating the valve for adjusting the sensor or for checking the switching function, make sure that no media are inside the valve.

⚠ CAUTION

- There is the risk of over-tightening the pin screw (1)! Therefore only turn the pin screw (1) with a torque of max. 0.3 Nm up to the upper or down to the lower limit stop of the sensor.

ATTENTION

The assignment of spindle (A/B) to sensor (S1/S2) depends on the electrical connection of the sensors at the terminal strip.

The connection is determined by the valve actuation “spring-closing” or “spring-opening” and is described in more detail below.

- For each valve, a tolerance according to following table must be added after the sensor has been recorded.

INFO Turning the spindle (A) or (B) clockwise moves the sensor upwards, turning anti-clockwise moves the sensor downwards!

Adjustment of sensor tolerance ΔS using spindles A and B

Valve type	Spindle [rotation] from illumination
Seat valve	1
Bellows valve	0.5
Valve with air support: Y1 NC/ Y2 NO actuated via DO	1.5
Butterfly valve	6

Table 3: Tolerance setting

INFO The spindle turn, not the LED brightness, is decisive for setting the tolerances.

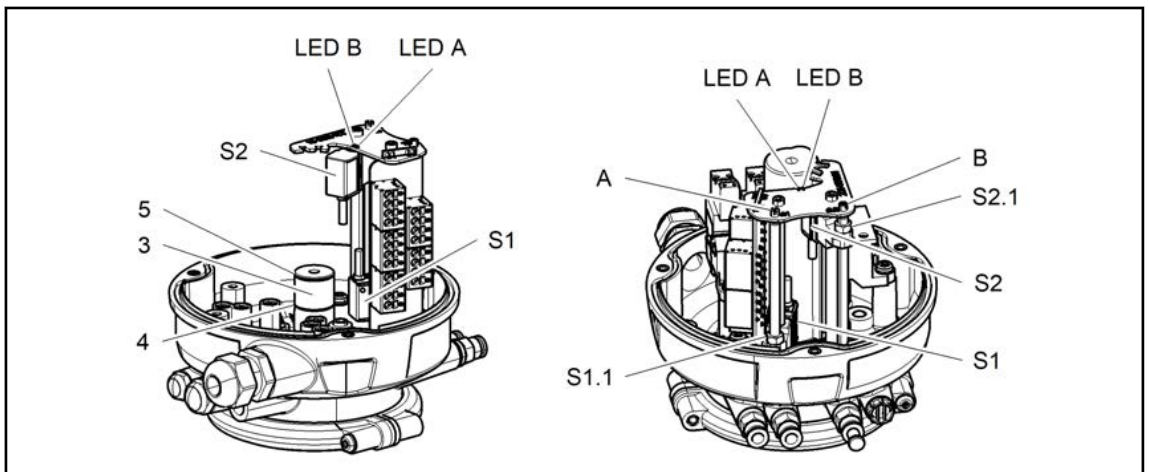


Figure 6-1 - Control top shown without pneumatic block

No.	Description
LED A	LED A
LED B	LED B
A	Spindle A
B	Spindle B
S1	Sensor 1
S1.1	Locking nut M5
S2	Sensor 2
S2.1	Locking nut M5
3	Detection range
4	Lower switching edge
5	Upper switching edge

6.6.1 Spring-closing valves

This chapter describes the adjustment of the sensor for the following valves:

- VARIVENT, ECOVENT, STERICOM valves except valve type U for actuator selection "Z or NC": rest position of the valve spring-closing
- VARIVENT valve type U with actuator selection "A or NO": rest position of the valve spring-opening
- VESTA valves with actuator selection "Z or NC": rest position of the valve spring-closing

Assignment:

Sensor *1	LED colour	Spindle
S1	Green	A
S2	Yellow	B

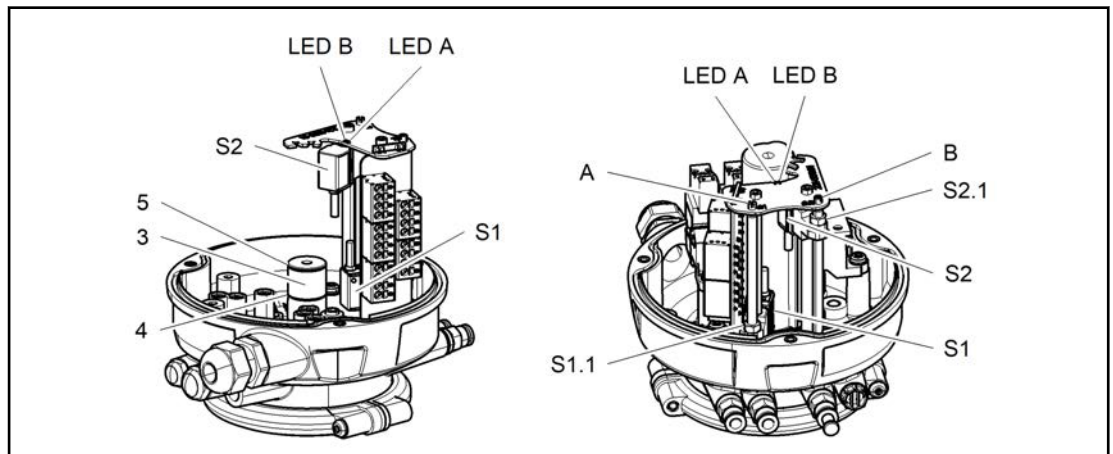
*1 see wiring diagram at the terminal strip

Adjusting sensor S1

Prerequisites

- Valve is not actuated.

1. Loosen lock nut M5 S1.1 using jaw wrench A/F 8 in counter-clockwise direction.



2. To adjust sensor S1, turn the sensor position on spindle A into the lower area in accordance with the figure below. LED A may light up during this, and must go out again after the lower switching edge (4) has been passed.
→ Attention: Sensor S1 must be moved from the top into the detection range (3)!
3. Move sensor S1 into the detection range (3) of the target by turning spindle A to the right (clockwise) until the green LED A starts to light up slightly (orange line on figure below).

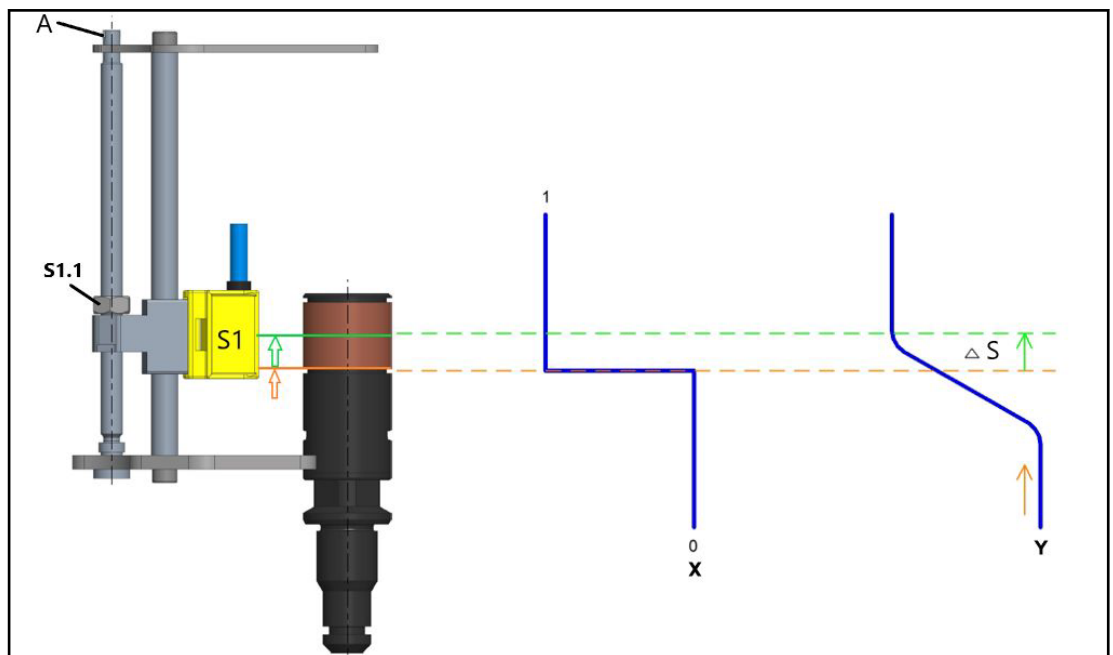


Figure 6-2 - X = signal curve sensor / Y = current course curve (LED brightness)

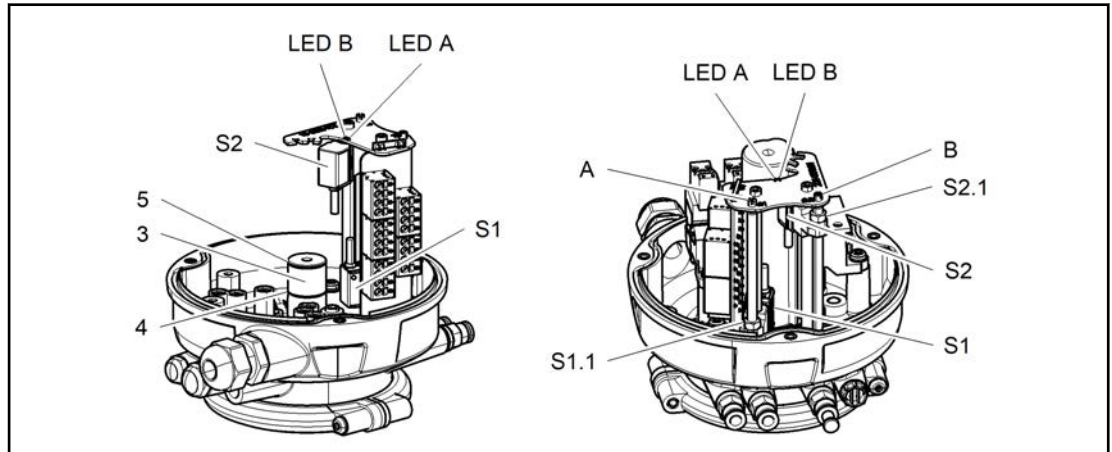
4. To adjust tolerance depending on the valve type from the beginning of LED A illumination, complete the necessary spindle rotation by turning to the right (clockwise) in accordance with the tolerance settings table (green line on figure above).
→ The light intensity of LED A changes.
5. Loosen lock nut M5 S1.1 using jaw wrench A/F 8 in clockwise direction.
⇒ Sensor S1 is adjusted with tolerance.

Adjusting sensor S2

Prerequisites

- Bring the valve to the actuated end position (see *Control Top with Solenoid Valves*).

1. Loosen lock nut M5 S2.1 using jaw wrench A/F 8 in counter-clockwise direction.



2. To adjust sensor S2, turn the sensor position on spindle B into the upper area in accordance with the figure below. LED B may light up during this, and must go out again after the upper switching edge (5) has been passed.
→ Attention: Sensor S2 must be moved from the top into the detection range (3)!
3. Move sensor S2 into the detection range (3) of the target by turning spindle B to the left (anti-clockwise) until the yellow LED B starts to light up slightly (orange line on figure below).

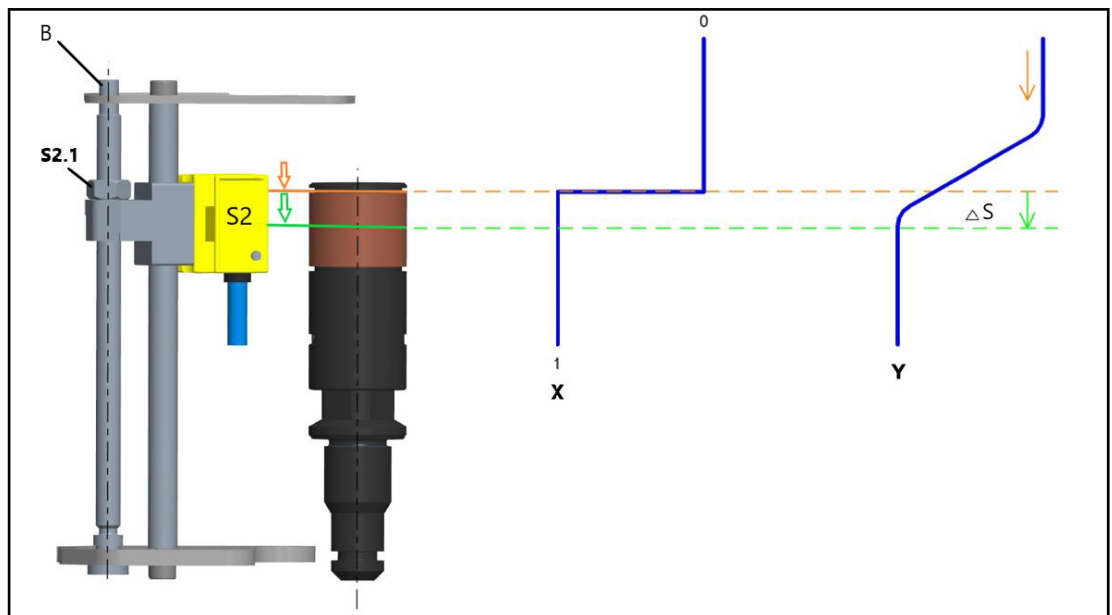


Figure 6-3 - X = signal curve sensor / Y = current course curve (LED brightness)

4. To adjust tolerance, depending on the valve type, from the beginning of LED B illumination, complete the necessary spindle rotation by turning to the left (anti-clockwise) in accordance with the tolerance setting table to add the necessary tolerance allowance (green line on figure above).
→ The light intensity of LED B changes.

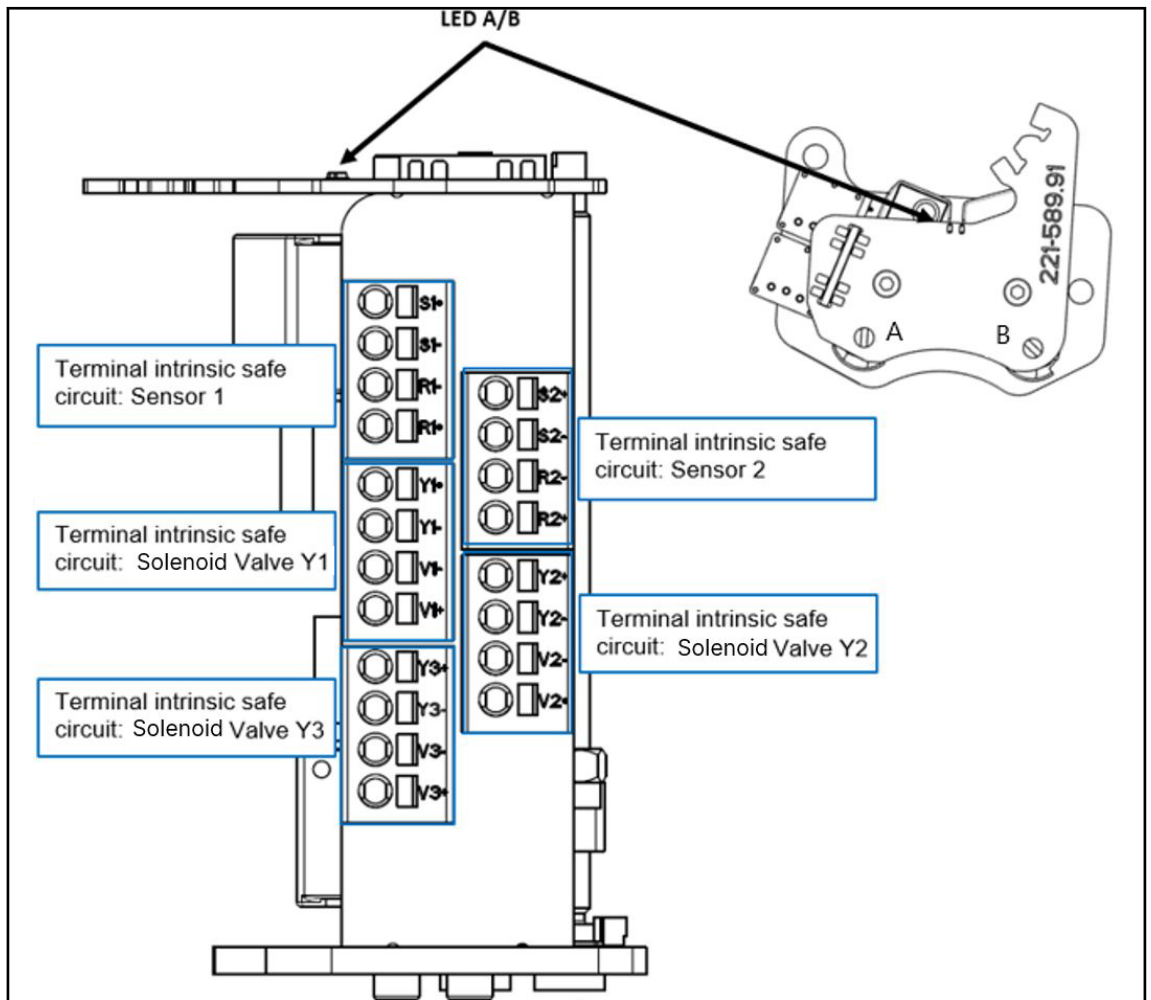
5. Loosen lock nut M5 S2.1 using jaw wrench A/F 8 in clockwise direction.
 - Sensor S2 is adjusted with tolerance.
- ⇒ Reset valve actuation, LED B goes out and LED A lights up green.

6.6.2 Spring-opening valves

This chapter describes the adjustment of the sensor for the following valves:

- VARIVENT, ECOVENT, STERICOM valves except valve type U for actuator selection "A or NO": rest position of the valve spring-closing
- VARIVENT valve type U with actuator selection "Z or NC": rest position of the valve spring-opening
- VESTA valves with actuator selection "A or NO": rest position of the valve spring-closing
- In-Line Sprayer IS 25
- Butterfly and leakage butterfly valve

The as-delivered state of the T.VIS-E-20 is executed as a single-head delivery without valves as "spring-closing" wiring. The wiring of the sensors S1 and S2 must be changed as follows for spring-opening valves:



Assignment:

Sensor *1	LED colour	Spindle
S1	Green	B
S2	Yellow	A

*1 see wiring diagram at the terminal strip

Description of the function of the terminal strips

Intrinsically safe circuit	Terminal strip	Designation	Functional description
Sensor S1	S2+	Sensor S2+	Internal connection sensor L+ (brown wire)
	S2-	Sensor S2-	Internal connection sensor L- (blue wire)
Sensor S2	S1+	Sensor S1+	Internal connection sensor L+ (brown wire)
	S1-	Sensor S1-	Internal connection sensor L- (blue wire)
Solenoid valve Y1	Y1+	Solenoid valve Y1+	Internal connection solenoid valve L+ (red wire)
	Y1-	Solenoid valve Y1-	Internal connection solenoid valve L- (black wire)
Solenoid valve Y2	Y2+	Solenoid valve Y2+	Internal connection solenoid valve L+ (red wire)
	Y2-	Solenoid valve Y2-	Internal connection solenoid valve L- (black wire)
Solenoid valve Y3	Y3+	Solenoid valve Y3+	Internal connection solenoid valve L+ (red wire)
	Y3-	Solenoid valve Y3-	Internal connection solenoid valve L- (black wire)

Changing the wiring of sensor S1 and S2

Prerequisites

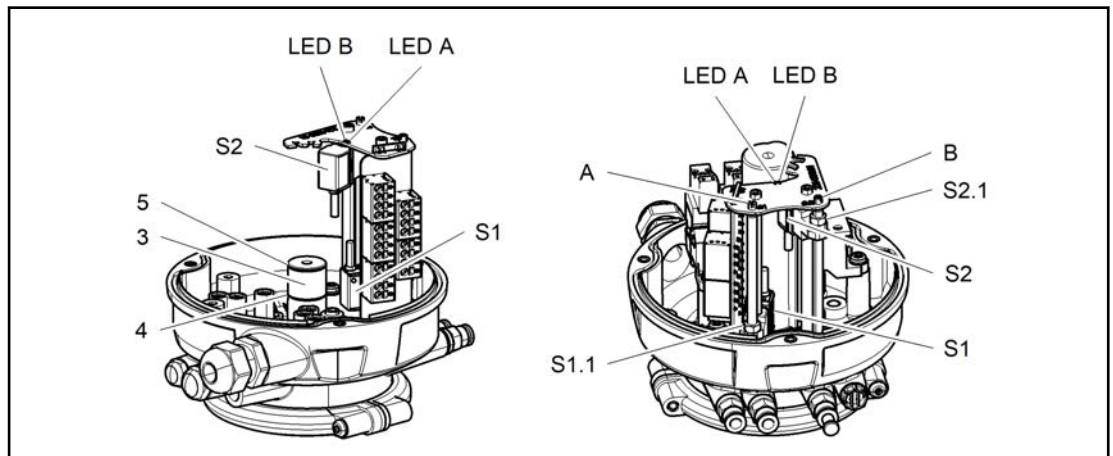
- See table above (description of the function of the terminal strips).
 - Switch off the supply voltage.
1. Loosen both wires of sensor S1 and S2 from the terminal strip S1+/S1- and S2+/S2- using a flat-blade screwdriver.
 2. Insert the wires from sensor S2 into terminal strip S1+ (brown wire) and S1- (blue wire).
 3. Insert the wires from sensor S1 into terminal strip S2+ (brown wire) and S2- (blue wire).
 4. Check the cables for a tight fit.
- ⇒ Switch on the power supply.

Adjusting sensor S1

Prerequisites

- Valve is not actuated.

1. Loosen lock nut M5 S1.1 using jaw wrench A/F 8 in counter-clockwise direction.



2. To adjust sensor S1, turn the sensor position on spindle B into the upper area in accordance with the figure below. LED A may light up during this, and must go out again after the upper switching edge (5) has been passed.
→ Attention: Sensor S1 must be moved from the top into the detection range (3).
3. Move sensor S1 into the detection range (3) of the target by turning it to the left (anti-clockwise) until the green LED A starts to light up slightly (orange line on figure below).

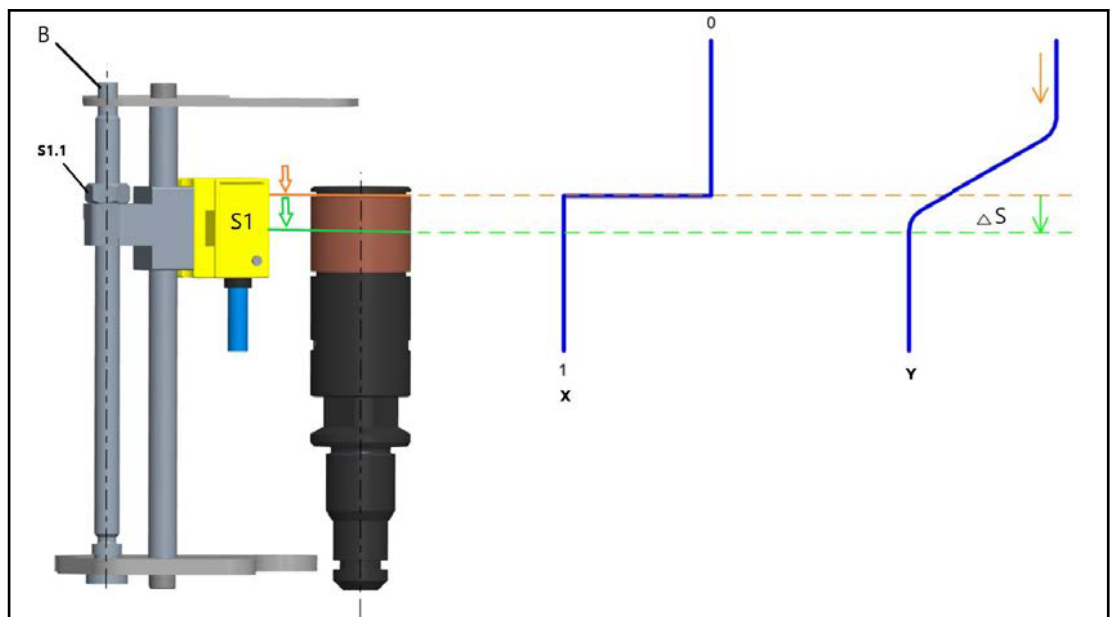


Figure 6-4 - X = signal curve sensor / Y = current course curve (LED brightness)

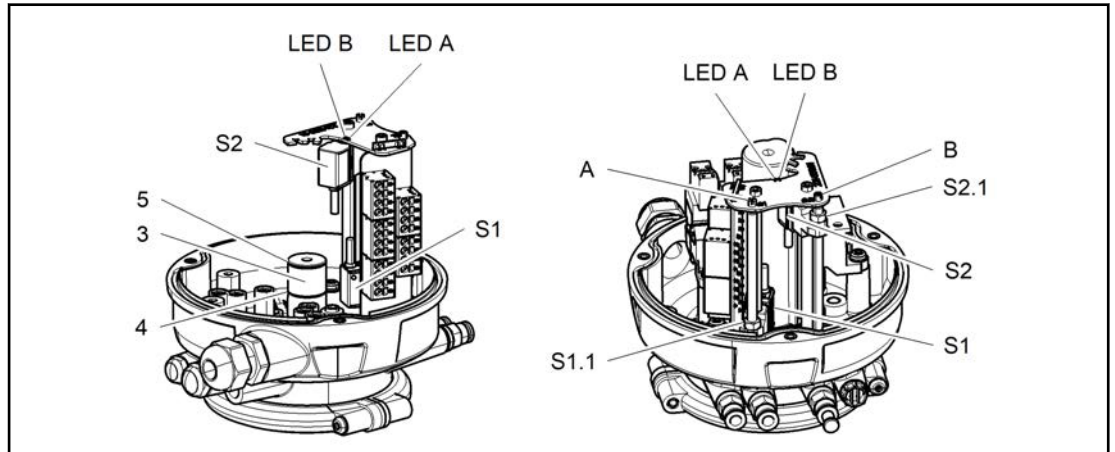
4. To adjust tolerance, depending on the valve type, from the beginning of LED A illumination, complete the necessary spindle rotation by turning to the left (anti-clockwise) in accordance with the tolerance setting table to add the necessary tolerance allowance (green line on figure above).
→ The light intensity of LED A changes.
5. Loosen lock nut M5 S1.1 using jaw wrench A/F 8 in clockwise direction.
⇒ Sensor S1 is adjusted with tolerance.

Adjusting sensor S2

Prerequisites

- Bring the valve to the actuated end position (see *Control Top with Solenoid Valves*).

1. Loosen lock nut M5 S2.1 using jaw wrench A/F 8 in counter-clockwise direction.



2. To adjust sensor S2, turn the sensor position on spindle A into the lower area in accordance with the figure below. LED A may light up during this, and must go out again after the lower switching edge (4) has been passed.
→ Attention: Sensor S2 must be moved from the top into the detection range (3)!
3. Move sensor S2 into the detection range (3) of the target by turning it to the right (clockwise) until the yellow LED B starts to light up slightly (orange line on figure below).

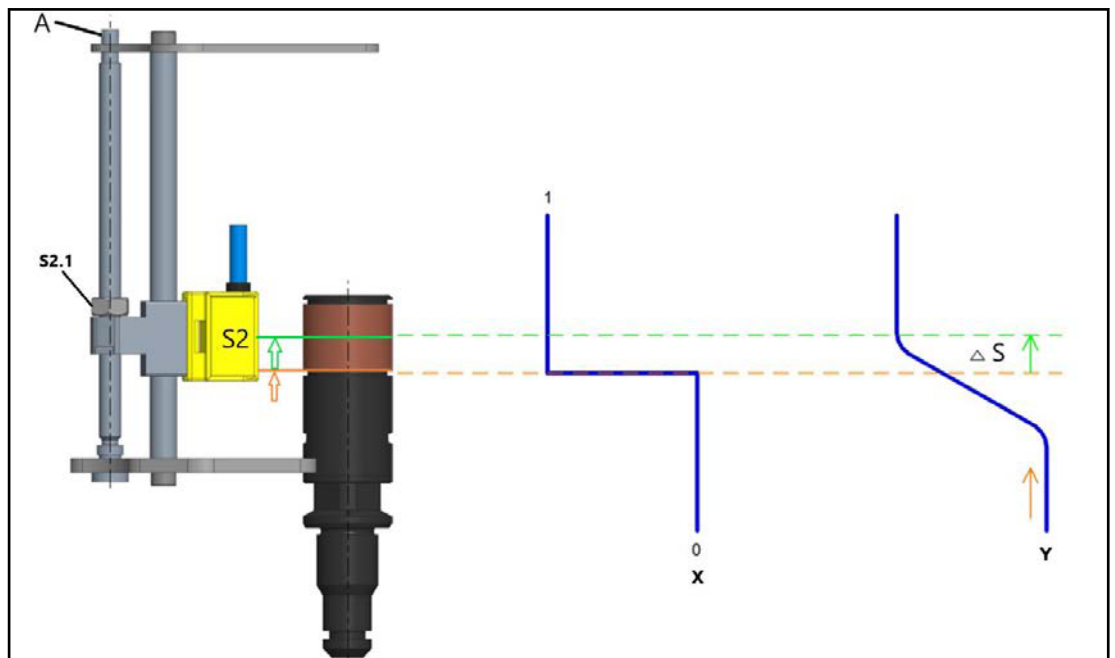


Figure 6-5 - X = signal curve sensor / Y = current course curve (LED brightness)

4. To adjust tolerance, depending on the valve type, from the beginning of LED B illumination, complete the necessary spindle rotation by turning to the right (clockwise) in accordance with the tolerance settings table (green line on figure above).
→ The light intensity of LED B changes.

5. Loosen lock nut M5 S2.1 using jaw wrench A/F 8 in clockwise direction.
 - Sensor S2 is adjusted with tolerance.
- ⇒ Reset valve actuation, LED B goes out and LED A lights up green.

7 Operation and control

This chapter contains information on starting up and shutting down the control top.

The target group of this chapter is the operators of the control top.

7.1 Monitoring operation

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

For operation, the following principles apply:

- Monitor the control top during the operation.
- Safety devices must not be changed, removed or taken out of service. Check all safety devices at regular intervals.
- All guards and caps must be mounted as intended.
- The place of installation of the control top must be adequately ventilated at all times.
- Structural alterations of the control top are not permitted. Immediately report any changes on the control top to the person responsible.
- Always keep danger zones clear. Do not leave any objects in the danger zone. Only allow persons to enter the danger zone when the machine is de-energized.
- Regularly check that all emergency stop devices are working correctly.

8 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.

Regular cleaning should be carried out to prevent the accumulation of dust on the surface when the product is used and maintained in a dusty environment!

9 Maintenance

This chapter contains information about maintenance, inspection and repairs of the control top.

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

INFO Please check the components on a regular basis. Depending on the pollution degree in the environment, inspection intervals should be carried out at corresponding regular intervals. Pay particular attention to the functionality of sealing components such as gaskets, check non-return valves, filters, silencers and membranes. If the functionality is no longer guaranteed due to a high pollution degree or defects in components, replace with original spare parts before restarting the equipment.

9.1 List of tools

INFO The tools used in the Ex-areas must comply with the ATEX directives and the Ex directives of the respective areas of application. The operator is responsible for this!

Tool	Intended Purpose	Material no.
Hose cutter	Cutting the pneumatic hoses to size	407-065
Allen key 3 mm	Removing/mounting the half-rings T.VIS	408-121
Jaw wrench a/f 12x13	Remove clamp connection	408-034
Jaw wrench a/f 14x17		408-045
Jaw wrench A/F 20		---
Jaw wrench A/F 22		408-039
Jaw wrench A/F 24x27		408-040
Jaw wrench A/F 25x28		408-268
Screw driver Torx 10 IP		---
Screw driver Torx 20 IP Plus		---
Crosstip screwdriver size 2		---
Slot screwdriver A 0.4 x 2.5		---

Table 4: List of tools

9.1.1 Mounting on VESTA or ECOVENT valve

Tool	Intended Purpose	Material no.
Adjustable face wrench 160/4.0		408-133

Table 5: List of tools

9.1.2 Mounting to FLOWVENT valve

Tool	Intended Purpose	Material no.
Adjustable face wrench 80/5"		408-448
Plug-in tool square 1-1/2"		408-451

Table 6: List of tools

9.1.3 Mounting to a T-smart butterfly valve

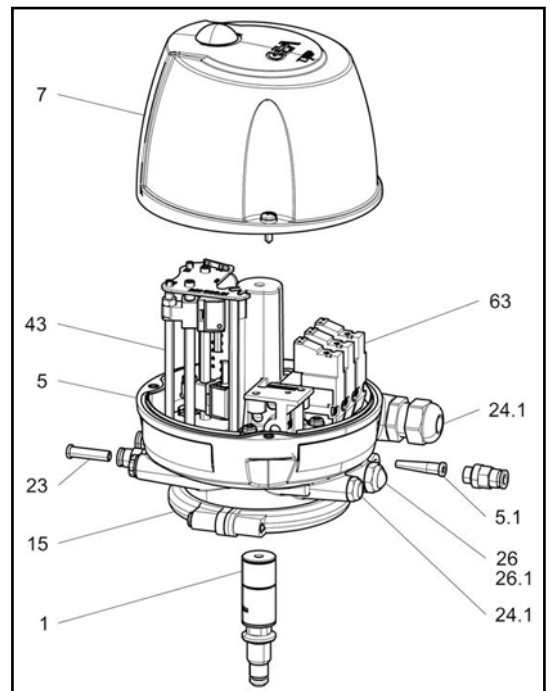
Tool	Intended Purpose	Material no.
Pin punch with hand grip Dm 5.0 mm		408-434

Table 7: List of tools

9.2 Carrying out inspections

9.2.1 Checking parts are firmly secured

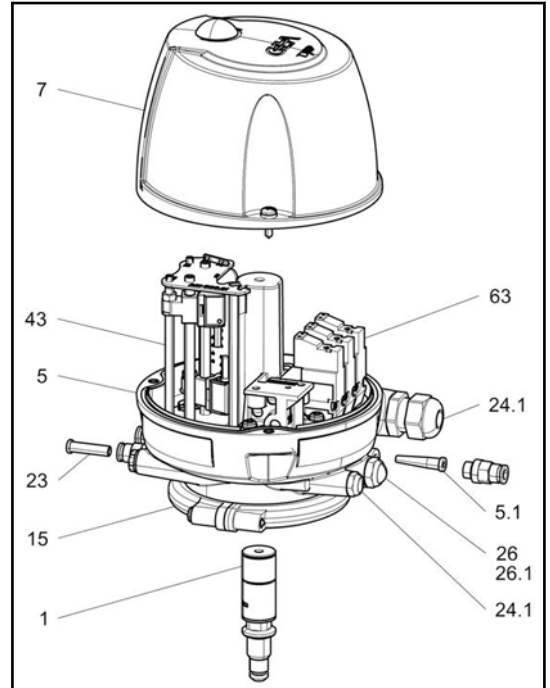
1. Air hose connections
2. Cable connections at the sensor module
3. Screw connection between sensor module (43) and base (5)
4. Half ring (15)
5. Screw connection to the base (5) and in the sensor module terminal strip (43)
6. Cap nut of the cable gland (24.1)



7. Lock nut on the sensor
 8. Screw connection between cap (7) and base (5)
 9. Check the housing for mechanical damage.
 10. Plug (23)
- ⇒ All components have been checked for a tight fit.

9.2.2 Checking solenoid valves and sound absorbers

1. Check the solenoid valves (63) for pressure-sealed seat.
2. Check sound absorbers (21, 26), non-return valve (26.1) and filter (5.1) for soiling.



⇒ Solenoid valves and sound absorbers have been checked.

9.3 Dismantling

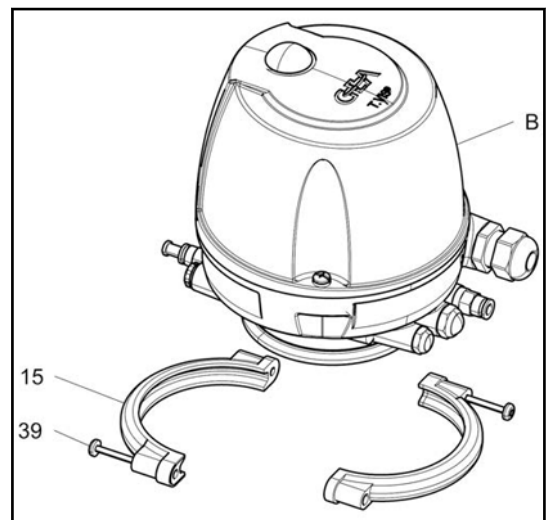
9.3.1 Removing the Control Top from the Valve

Prerequisites

- Make sure that the solenoid valve is not actuated.

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

1. Release the screw connection (39) and remove the clamp ring (15).
2. Pull the control top vertically off the valve.
 - LED A (green) then goes out.



⇒ The control top has been removed from the valve.

9.3.2 Dismantling the Control Top into its Components

9.3.2.1 Variants of the Control Top

The control top can be fitted with:

- 3 solenoid valves (63) or
- 2 solenoid valves (63) and 1 valve plate (65) or
- 1 solenoid valve (63) and 2 valve plates (65) or
- without solenoid valve with 3 valve plates (65)

9.3.2.2 Dismantle the cap

⚠ DANGER

Live parts

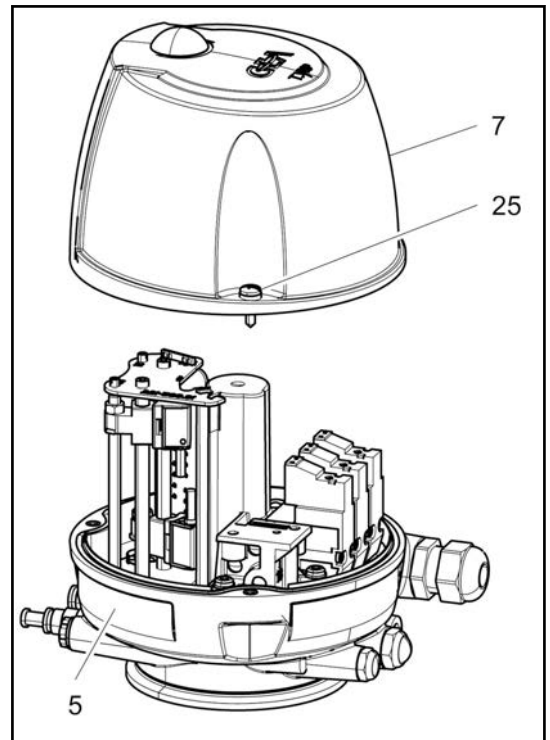
Electrical shocks can cause serious personal injuries or death.

- Only allow properly qualified staff to work on the electrical equipment.
- Switch off the , voltage supply and the control air before removing the control top.

Prerequisites

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

1. Loosen the 3 screws (25) on the cap (7).
2. Take the cap (7) off the base (5).



⇒ The cap has been removed.

9.3.2.3 Removing Solenoid Valves and Valve Plate

WARNING

Risk of burns from the solenoid valve

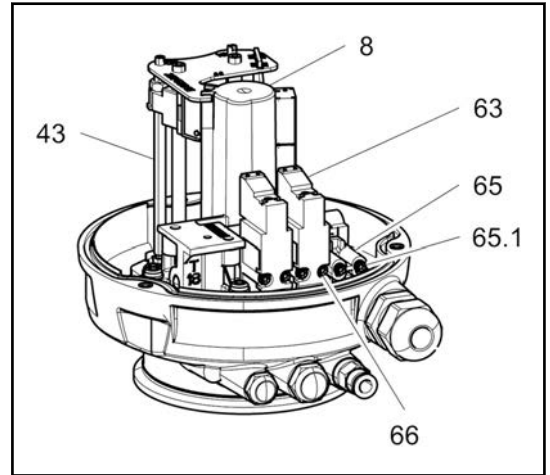
There is a risk of burns from the solenoid valve if this is switched on for a long time and with high ambient temperature.

- Allow to cool before removal.

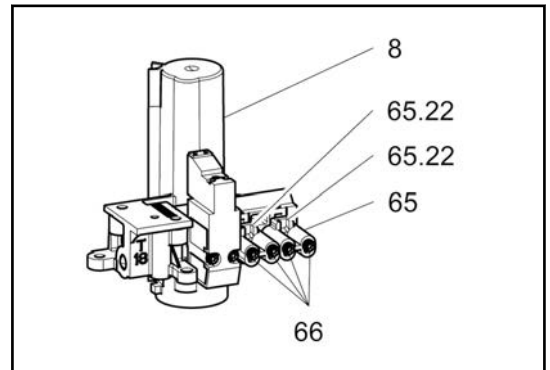
Prerequisites

- Observe the assignment of cables between the solenoid valve and the sensor module (solenoid valve Y1 to be connected to terminal Y1+/Y1-).
- Only use solenoid valve types specified in chapter 3.2 *Technical data and operating conditions*.

1. Disconnect the cables of the solenoid valve from the terminals of the sensor module (43).
2. Undo the screws (66) and separate the solenoid valve (63) from the pneumatic block (8).



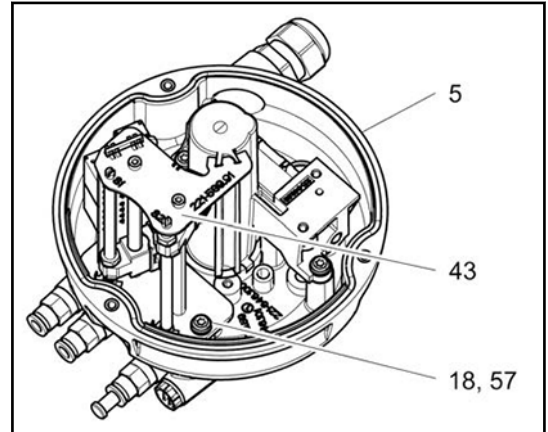
3. Undo the screws (65.1) and separate the valve plate (65) from the pneumatic block (8).



⇒ Solenoid valves and valve plate are removed.

9.3.2.4 Removing the Sensor Module

1. Disconnect all cables from the connection terminals of the sensor module (43).
2. Unscrew and remove all screws (57) with washers (18).
3. Remove the sensor module (43) from the base (5).



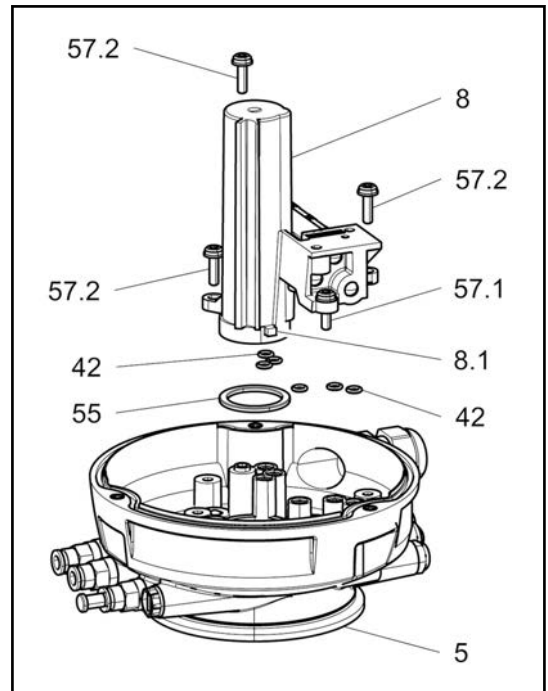
⇒ The sensor module is removed.

9.3.2.5 Removing the pneumatic block

Prerequisites

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

1. Undo the screws (57.1, 57.2).
2. Pull off the pneumatic block (8).
3. Change the 6 O-rings (42) of the base (5).
4. Replace the O-ring (55).



⇒ Pneumatic block is removed.

9.4 Assembly

WARNING

Explosive atmosphere!

Ensure that the connection is firmly seated.

A tight fit of all connections is required for dust protection.

- Make sure that the connections are tightened to the defined torque.

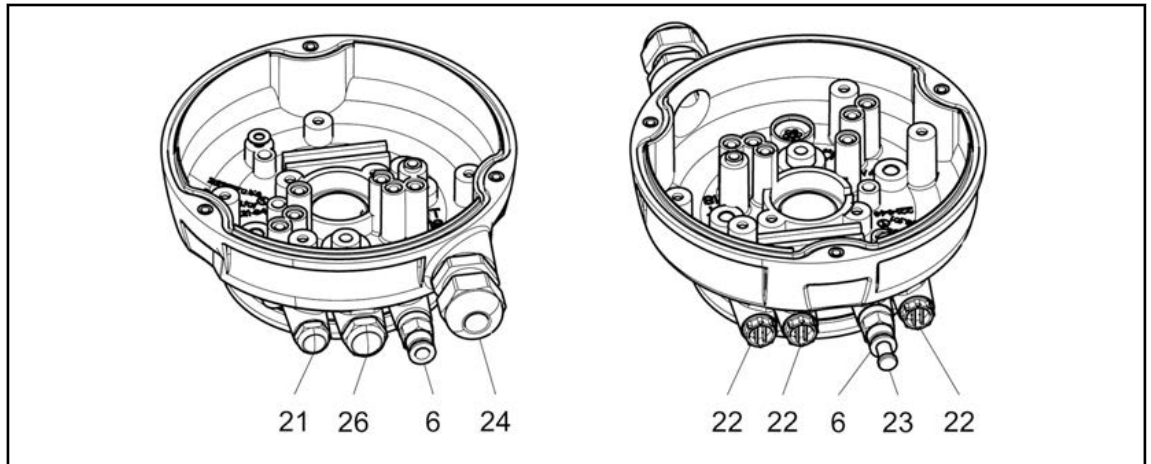
INFO Assembly is done in reverse order. Tighten the screws and connections as indicated in the table.

9.4.1 Tightening torques

No.	Designation	Tightening torques	Comments
6	Screw-in plug-in connection	2.0 Nm	-
21	Sound absorber	2.0 Nm	-
22	Locking screw	0.5 Nm	-
23	Plug	-	-
24	Cable gland	2.5 Nm	Sealed opening to the atmosphere
25	Screws, cap	2.0 Nm	-
26	Sound absorber	2.0 Nm	Sealed opening to the atmosphere
57	Screws, pneumatic block	1.5 Nm	-
66	Screws, solenoid valves	0.8 Nm	-

9.4.2 Mounting the control top

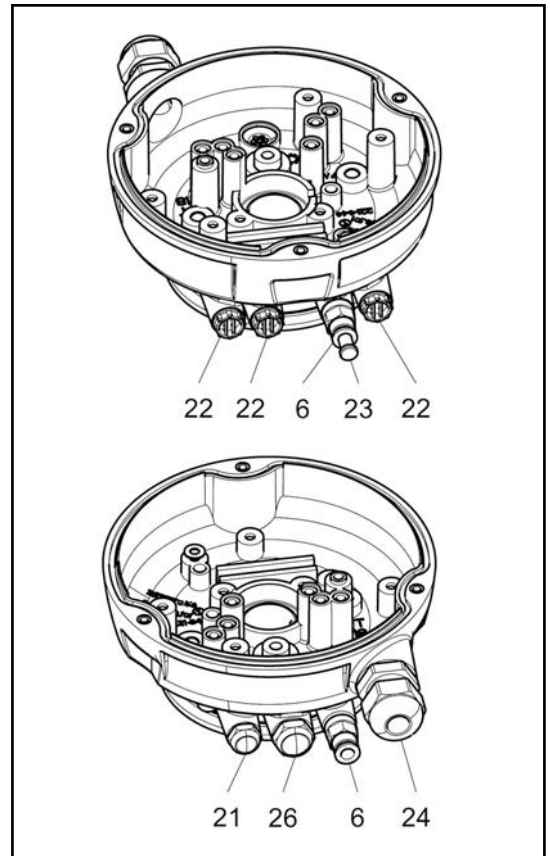
9.4.2.1 Install pneumatic and external connections



Tightening torques for pneumatic and external connections

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	-
24	Cable gland	2.5 Nm
26	Sound absorber	2.0 Nm

1. Fit the screw-in push-in connector (6), sealing plug (23) and locking screw (22) according to the markings on the control top.
2. Fit the cable gland (24).



⇒ The pneumatic and external connections are mounted.

9.4.2.2 Fitting the Pneumatic Block

Prerequisites

- 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)!

INFO The following pneumatic block must be used for ASEPTOMAG valves:
pneumatic block T.VIS-15/ 3PV/ASG material no. 221-646.92

1. Fit the 6 O-rings (42) into the base (5).
2. Fit the O-ring (55).
3. Fitting the pneumatic block (8):
 - 3.1 Tighten the screw (57.1) first.
 - 3.2 Then screw (57.2)

→ Tightening torque 1.5 Nm (1.0 lb ft)

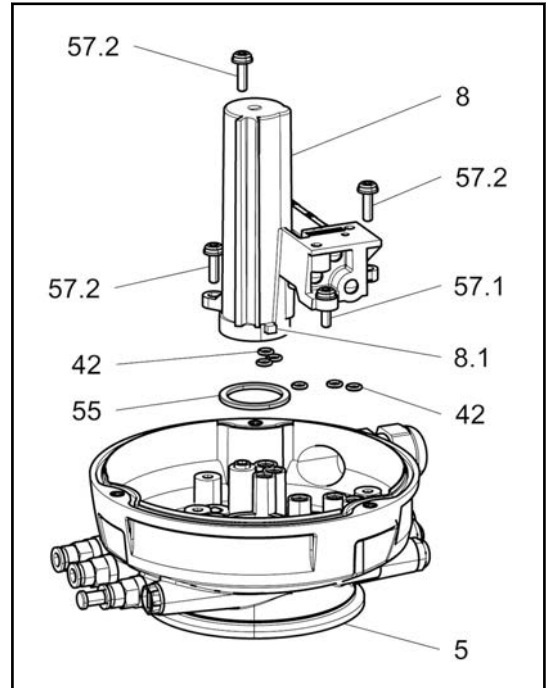


Figure 9-1 - Fitting the Pneumatic Block

⇒ The pneumatic block is mounted.

9.4.2.3 Fitting the Sensor Module

1. Insert the sensor module into the base (5) by fitting the dovetail guide in the correct position.
2. Fit all screws (57), checking that the self-adhesive washers (18) are fitted.

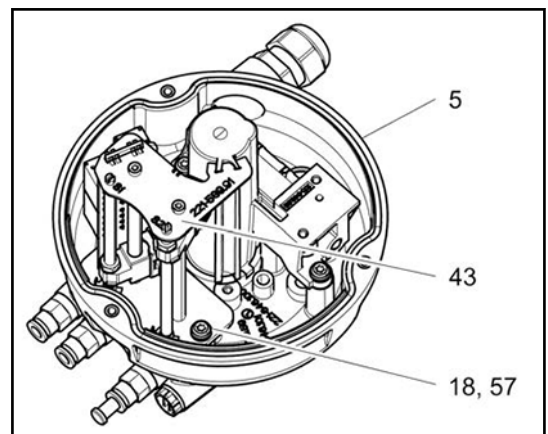


Figure 9-2 - Fitting the Sensor Module

⇒ The sensor module is mounted.

9.4.2.4 Mount solenoid valves and valve plates

INFO When using the pneumatic block (8) with 1 or 2 valve plates (65), the groove (65.22) must be mounted upward. The screws (66) are in the lower mounting holes.

Prerequisites

- Note the assignment of cables between solenoid valve and sensor module. Connect solenoid valve Y1 to terminal strip Y1+/Y1-.
- Only use the solenoid valves specified in chapter 3.2 *Technical data and operating conditions*.

1. Fit the solenoid valves (63) and the valve plate (65) to the pneumatic block (8) by tightening the screws (66).

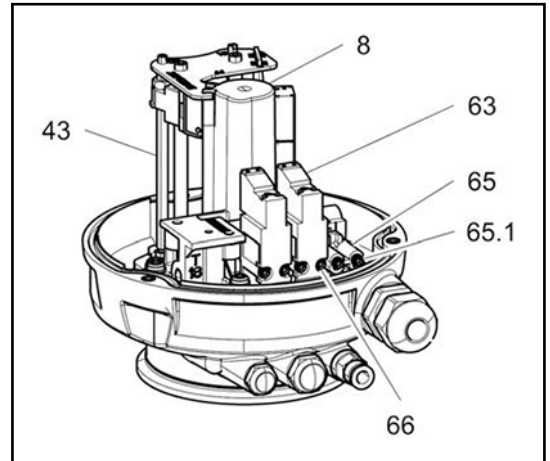


Figure 9-3 - Mount solenoid valves and valve plates

⇒ Solenoid valves and valve plate are mounted.

9.4.3 Connect internal wiring

⚠ WARNING

Explosive atmosphere!

Intrinsically safe wiring

Errors in the intrinsically safe wiring can lead to serious explosions.

- Please note the terminal designation for intrinsically safe wiring (see chapter 5.3.3.2 *Terminal strip designation and separate intrinsically safe circuits*).

⚠ WARNING

Explosive atmosphere!

Execution of the connection of internal circuits

The standards for the electrical installation of intrinsically safe circuits according to EN 60079-11 must be observed.

- Check the cables for tight fit.
- Check distance between non-insulated strands of at least 3.0 mm to earthed parts.
- Check distance between intrinsically safe circuits of at least 6.0 mm.

⚠ WARNING

Explosive atmosphere!

Polarity of solenoid valves

If the polarity is incorrect or reversed, the solenoid valves may be damaged and dangerous explosive situations may occur.

- DO NOT reverse the polarity.
- Always make the electrical connections carefully observing the correct +/- polarity marked on the solenoid valve coil.
- The terminal strip assignments and designations from chapter 5.3.3 *Electrical wiring* must be observed.

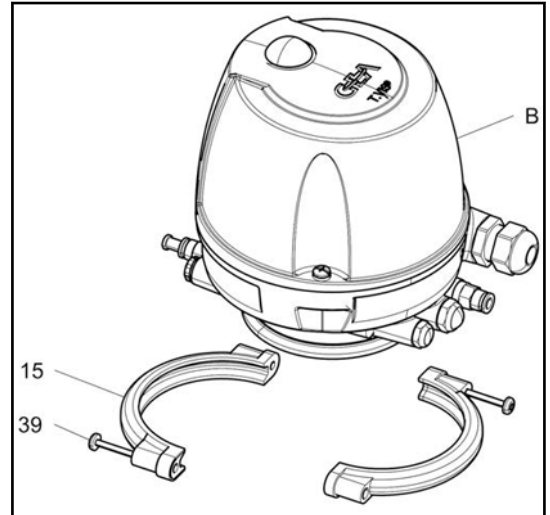
Description of the function of the terminal strip

Intrinsically safe circuit	Terminal strip	Designation	Functional description
Sensor S1	S1+	Sensor S1+	Internal connection sensor L+ (brown wire)
	S1-	Sensor S1-	Internal connection sensor L- (blue wire)
Sensor S2	S2+	Sensor S2+	Internal connection sensor L+ (brown wire)
	S2-	Sensor S2-	Internal connection sensor L- (blue wire)
Solenoid valve Y1	Y1+	Solenoid valve Y1+	Internal connection solenoid valve L+ (red wire)
	Y1-	Solenoid valve Y1-	Internal connection solenoid valve L- (black wire)
Solenoid valve Y2	Y2+	Solenoid valve Y2+	Internal connection solenoid valve L+ (red wire)
	Y2-	Solenoid valve Y2-	Internal connection solenoid valve L- (black wire)
Solenoid valve Y3	Y3+	Solenoid valve Y3+	Internal connection solenoid valve L+ (red wire)
	Y3-	Solenoid valve Y3-	Internal connection solenoid valve L- (black wire)

1. Connect the sensors S1 and S2 to the terminal strip of the sensor module (43).
 2. Connect the solenoid valve (solenoid valve) Y1, Y2 and Y3 to the terminal strip of the sensor module (43) according to the existing number of solenoid valves.
- ⇒ The sensors and solenoid valves are connected.

9.4.4 Mounting the Control Top on the Valve

1. Place the control top vertically on the valve.
→ LED A lights up green.
2. Fit clamp ring (15) with screws (39).



⇒ The control top has been fitted on the valve.

9.5 Maintenance

9.5.1 Replacing the Seals on the Base

Only use sound absorber (21, 26) or exhaust air throttle (21.1) types specified in chapter 3.2 *Technical data and operating conditions*.

Do not grease these spare parts before fitting them.

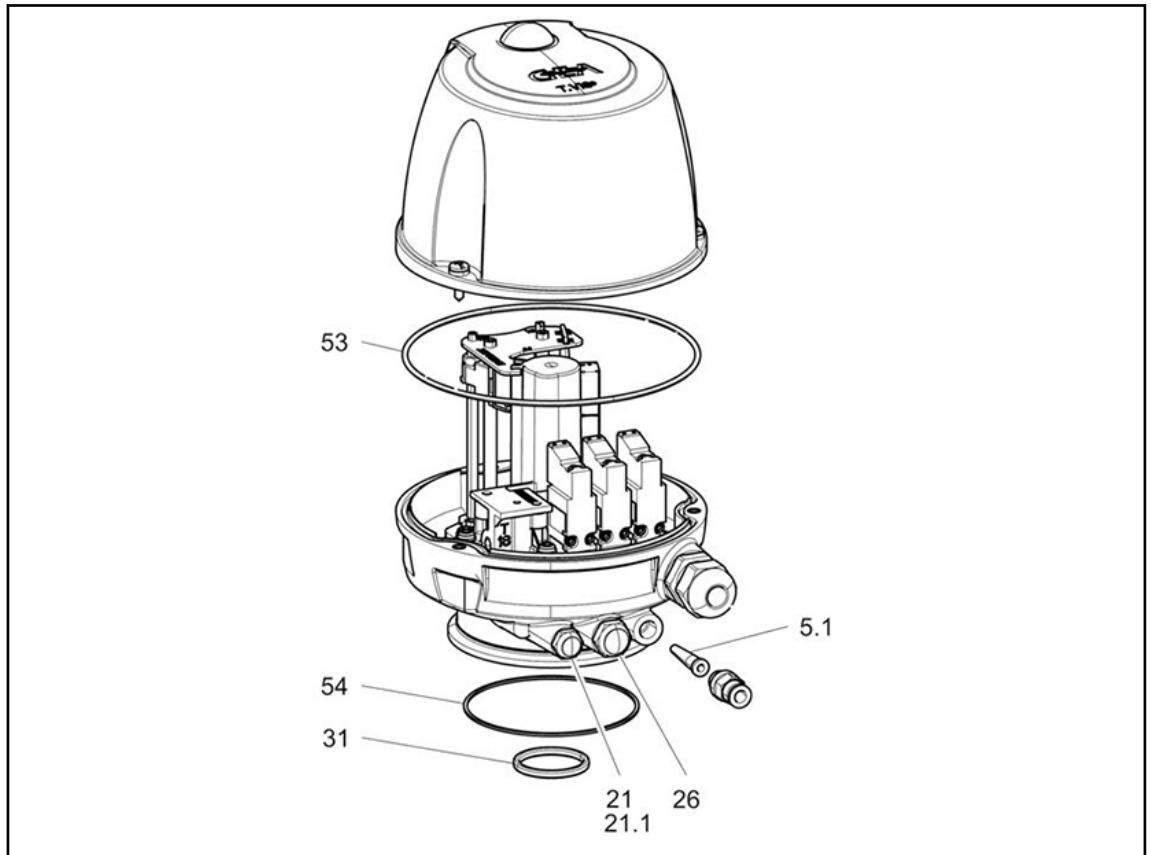


Figure 9-4 - Replacing the Seals on the Base

No.	Designation
5.1	Filter
21, 26	Sound absorber
21.1	Exhaust air throttle
26.1	Non-return valve
31, 53, 54	O-rings

⚠ CAUTION

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

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

1. Take out the O-rings (31, 53, 54) and replace them with new ones.
2. Check that the control air can exit freely from the sound absorbers (21, 26), filter (5.1), exhaust air throttle (21.1) and non-return valve (26.1) and replace the parts if necessary.

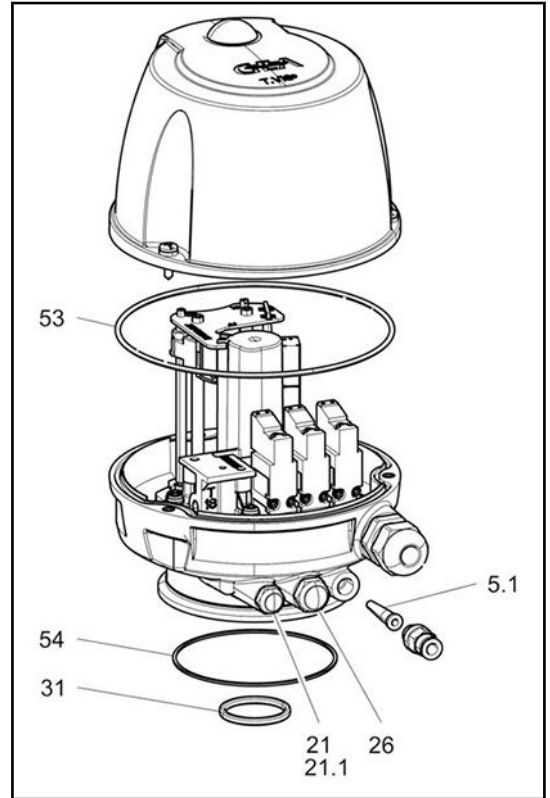


Figure 9-5 - Maintenance of Sound Absorber, Filter, Non-Return Valve and Throttles

⇒ Maintenance has been carried out on sound absorber, filter, non-return valve and exhaust air throttle.

9.5.3 Mounting the cap

WARNING

Explosive atmosphere!

Ensure that the base and cap are firmly seated.

A tight fit of the base and cap is required for dust protection.

- Make sure that the O-ring (53) is firmly in the groove.

CAUTION

- Make sure that the screws (25) are tightened with 2 Nm.

1. Carefully position the cap (7) with the light guide dome (7.1) over the sensor module (43) with the LEDs A/B and place on the base (5). The correct alignment of the cap (7) with the three screws (25) is supported by position guidance in the base (5).

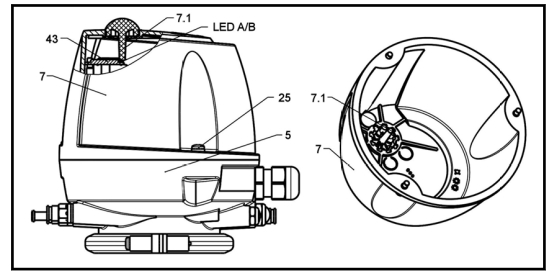


Figure 9-6 - Mounting cap

2. Use three screws (25) to fasten the cap (7) on the base (5) to tightening torque 2 Nm.
- ⇒ Cap is mounted.

10 Malfunctions

This chapter contains information about how to handle control top malfunctions.

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

10.1 Faults and remedies

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

Malfunction	Signalling	Possible cause	Measure
Activating the solenoid valves is not possible after connecting the power supply	No LED is lit	Connecting terminals for the power supply mixed up	Check the electrical connections for correct wiring
After connecting the power supply, the valve in end position status (yellow) is indicated immediately	Yellow	Actuation via process control system or manual override at the solenoid valve activated	Cancel actuation
No signal for the non-actuated or actuated position is pending at the PLC although one of the end positions has been reached	Green or yellow	No feedback for the non-actuated and actuated positions connected to the PLC	Correct wiring, see 5.3 <i>Electrical connection</i>

11 Decommissioning, dismantling and disposal

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

11.1 Decommissioning

The following principles apply for decommissioning:

- Switch off the compressed air.
- Switch off the component with the main switch.
- Padlock the main switch (if fitted) in the off position to prevent it from being switched back on. The key to the padlock must be deposited with the person responsible until the machine is restarted.
- For longer periods of standstill, observe the storage conditions, see 4.2 *Storage*.

11.2 Dismantling

Prerequisites

- Ensure that no active processes are running in the relevant area during dismantling.
1. Empty all pipe elements that lead to the valve.
 2. Shut off the control air supply.
 3. Disconnect the power supply.
 4. Take the valve out of the pipe section, with all housings and housing connections if possible.
→ The valve has been dismantled.

11.3 Disposal

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

The control top is made of the following materials:

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

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

12 Replacement parts

This chapter contains information on ordering spare parts for the control top and addresses all users of the control top.

12.1 Order information

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

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

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

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

12.2 Spare parts lists



<https://documentation.gea.com/de/gea-tuchenhagen-ersatzteilkatalog-hygienische-ventile-test01/spare-parts-list/>

Link to the GEA spare parts catalog Hygienic Valves:

Valve control and feedback

- Spare parts list - control top T.VIS E-20
- Spare parts list - switch bar T.VIS M-15 and E-20



www.GEA.com

Overview of technologies and products

13 Annex

13.1 List of abbreviations

Abbreviation	Explanation
BS	British Standard
bar	Unit of measurement of pressure [bar] All pressure data expressed in [bar/psi] is assumed to be gauge pressure [barg/psig] unless explicitly specified otherwise.
approx.	approximately
°C	Unit of measurement of temperature [degree Celsius]
CIP	Clean in Place
dm ³ n	Unit of measurement of volume [cubic decimetre] standard volume (standard litres)
DN	DIN nominal width
DIN	German standard issued by DIN (Deutsches Institut für Normung e.V., German Institute for Standardization)
EN	European Standard
EPDM	Material designation, Brief designation according to DIN/ISO 1629: Ethylene-propylene-diene- rubber
°F	Unit of measurement of temperature [degree Fahrenheit]
FKM	Material designation, short designation according to DIN/ISO 1629: Fluorine rubber
h	Unit of measurement of time [hour]
HNBR	Material designation, short designation according to DIN/ISO 1629: Hydrated nitrile butadiene rubber
IP	Protection class
ISO	International Standard of the International Organization for Standardization
kg	Unit of measurement of weight [kilogram]
kN	Unit of measurement of force [kilonewton]
Kv value	Flow coefficient [m ³ /s] 1 KV = 0.86 x Cv
l	Unit of measurement of volume [litre]
max.	maximum
mm	Unit of measurement of length [millimetre]
µm	Unit of measurement of length [micrometre]
M	Metric
NC	Normally Closed; actuator is spring-to-close, valve is closed in idle position

Abbreviation	Explanation
Nm	Unit of measurement for the tightening torque [newton metre] 1 Nm = 0.737 lbft Pound-Force (lb) + Feet (ft)
NO	Normally Open; actuator is spring-to-open, valve is open in idle position
PA	Polyamide
PE-LD	Low-density polyethylene
PPE	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.
AF	Indicates the size of spanners [width across flats]
T.VIS	Tuchenhagen valve information system
V AC	Volt alternating current
V DC	Volt direct current
W	Unit of measurement of power [Watt]
TIG	Welding method Tungsten inert gas welding
Inch	Unit of measurement of length in the Anglo-American language area
Inch OD	Tube measurement according to British Standard (BS), outside diameter
Inch IPS	American pipe measurement, iron pipe size

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