Control and feedback systems

GEA T.VIS® E-20

Operating instruction (Translation from the original language)

430BAL013985EN_10

engineering for a better world

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We kindly request that you answer a few short questions about these instruction manual. Use the following QR code or link to access the questionnaire:

https://www.ntgt.de/ra/s.aspx?s=367112X57707125X58087

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1 General Information

1.1 Information about this document

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.

1.1.1 Binding Character of These Operating Instructions

These Operating Instructions contain the manufacturer's instructions to the operator of the product and to all persons who work on or use the product regarding the procedures to follow.

Carefully read these Operating Instructions before starting any work on or using the product. Your personal safety and the safety of the product can only be ensured if you act as described in the Operating Instructions.

Store the Operating Instructions in such a way that they are accessible to the operator and the operating staff during the entire life cycle of the product. When the location is changed or the product is sold make sure you also provide the Operating Instructions.

1.1.2 Notes on the Illustrations

The illustrations in these Operating Instructions show the product in a simplified form. The actual design of the product can differ from the illustration. For detailed views and dimensions of the product please refer to the design documents.

1.1.3 Symbols and Highlighting

In these Operating Instructions, important information is highlighted by symbols or special formatting. The following examples illustrate the most important types of highlighting.

⚠ Danger

Warning: Fatal Injuries

Failure to observe the warning can result in serious damage to health, or even death.

► The arrow identifies a precautionary measure you have to take to avoid the hazard.

Explosive Atmospheres!

Warning: Explosions

Failure to observe the warning can result in severe explosions.

► The arrow identifies a precautionary measure you have to take to avoid the hazard.

Warning!

Warning: Serious Injuries

Failure to observe the warning can result in serious damage to health.

► The arrow identifies a precautionary measure you have to take to avoid the hazard.

Caution!

Warning: Injuries

Failure to observe the warning can result in minor or moderate damage to health.

► The arrow identifies a precautionary measure you have to take to avoid the hazard.

Notice

Warning: Damage to Property

Failure to observe the warning can result in serious damage to the component or in the vicinity of the component.

► The arrow identifies a precautionary measure you have to take to avoid the hazard.

Carry out the following steps: = Start of a set of instructions.

1. First step in a sequence of operations.
2. Second step in a sequence of operations.

   → Result of the previous operation.

→ The operation is complete, the goal has been achieved.

Hint!

Further useful information.

1.2 Manufacturer address

GEA Tuchenhagen GmbH
Am Industriepark 2-10
21514 Büchen

1.3 Contact

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

flowcomponents@gea.com
www.gea.com

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

Engineering for a better world.

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

Manufacturer: **GEA Tuchenhagen GmbH**
Am Industriepark 2-10
21514 Büchen, 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: CE 0539 Ex

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 60079-0:2018
EN 60079-11: 2012
EN 60079-31: 2014
EN 61000-6-2: 2005
EN 61000-6-4: 2007 + A1:2011

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 Büchen, Germany

Büchen, 07 December 2023

Franz Bürmann
Managing Director

i.V. Stephan Dirks
Senior Director Engineering

1.5 Translated copy of the EU Declaration of Conformity according to ATEX 2014/34/EU

Manufacturer: **GEA Tuchenhagen GmbH**
Am Industriepark 2-10
21514 Büchen, 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 EC directives: 2014/34/EU ATEX

Identification CE 0539 Ex

T.VIS E-20 with 2 or 3 pilot valves:
UL 21 ATEX 2348X
II 2G Ex ia IIC T4…T5 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 T4…T5 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: 2018
EN 60079-11: 2012
EN 60079-31: 2014
EN 61000-6-2: 2005
EN 61000-6-4: 2007 + A1:2011

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

Remarks:

- The named body of UL International Demko A/S has carried out an EC type examination and issued the following certificate: UL 21 ATEX 2348X.
- The ATEX instructions including the intended use and safety instructions defined therein must be observed.
- Electrostatic charge must be avoided. It must be ensured that the valve and the control top are grounded.
- Process and media temperatures above the permissible ambient temperature must not lead to an impermissible ambient temperature.
- The particular application conditions according to the operating instructions must be observed.

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

Büchen, 08. December 2023

Franz Bürmann
Managing Director

by order Stephan Dirks
Senior Director Engineering

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

Engineering for a better world.

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 2011/65/EU	EMC RoHS
Applicable harmonized standards, in particular:	EN IEC 61000-6-2: 2019 DIN EN 61000-6-4: 2011-09	
Other applied standards and technical specifications:	DIN EN 61326-1:2013 EN 62026-2: 2013	

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
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21514 Buechen, Germany

Büchen, 28 February 2023

Franz Bürmann
Managing Director

i.V. Matthias Südel
Senior Director Engineering

1.7 Translated copy of the EU Declaration of Conformity according to EMC (2014/30/EU) and RoHs (2011/65/EU)

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

We hereby declare that the devices named below

Model:	**Control top T.VIS®**
Type:	**E-20**

due to its design and construction as well as in the versions sold by us, meet the basic safety and health requirements of the following guideline:

Relevant EC directives:	2014/30/EU	EMC
	2011/65/EU	RoHS
Applicable harmonized standards, in particular:		EN IEC 61000-6-2: 2019
		DIN EN 61000-6-4: 2011-09
Other applied standards and technical specifications:		DIN EN 61326-1:2013
		EN 62026-2: 2013

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

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

Büchen, 28 February 2023

Franz Bürmann
Managing Director

by order Matthias Südel
Senior Director Engineering

1.8 UKEX Declaration of Conformity for use in potentially explosive atmospheres UKSI 2016:1107

Engineering for a better world.

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

Manufacturer: **GEA Tuchenhagen GmbH**
Am Industriepark 2-10
21514 Büchen, 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 2016:1107	UKEX
Identification:	UKCA 0843	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 60079-11: 2012 EN 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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Büchen, 07 December 2023

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i.V. Stephan Dirks
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1.9 Translated copy of the UKEX Declaration of Conformity for use in potentially explosive atmospheres UKSI 2016:1107

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

We hereby declare that the devices named below

Model:	**Control top T.VIS®**
Type:	**E-20**

due to its design and construction as well as in the versions sold by us, meet the basic safety and health requirements of the following guideline:

Relevant UK directives: UKSI 2016:1107 UKEX

Identification UKCA 0843

T.VIS E-20 with 2 or 3 pilot valves:
UL 22 UKEX 2718X
II 2G Ex ia IIC T4…T5 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 22 UKEX 2718X
II 2G Ex ia IIC T4…T5 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 60079-11: 2012
EN 60079-31: 2014

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

Remarks:

- The named body of UL International Demko A/S has carried out a UK type examination and issued the following certificate: UL 21 UKEX 2718X.
- The UKEX instructions including the intended use and safety instructions defined therein must be observed.
- Electrostatic charge must be avoided. It must be ensured that the valve and the control top E-20 are grounded.
- Process and media temperatures above the permissible ambient temperature must not lead to an impermissible ambient temperature.
- The particular application conditions according to the operating instructions must be observed.

Person authorised for compilation and handover of technical documentation:
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Büchen, 08. December 2023

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Managing Director

by order Stephan Dirks
Senior Director Engineering

1.10 UK Declaration of Conformity for use in potentially explosive atmospheres UKSI 2016

Engineering for a better world.

UK- Declaration of Conformity by Electromagnetic Compatibility Regulations 2016

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

Hereby, we declare that the machine designated in the following

Model:	Control top T.VIS®
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: 2011-09
Other applied standards and technical specifications:	DIN EN 61326-1:2013 EN IEC 62026-2: 2013

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
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Büchen, 28 February 2023

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Senior Director Engineering

1.11 Translated copy of the UK Declaration of Conformity for use in potentially explosive atmospheres UKSI 2016

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

We hereby declare that the devices named below

Model:	**Control top T.VIS®**
Type:	**E-20**

due to its design and construction as well as in the versions sold by us, meet the basic safety and health requirements of the following guideline:

Relevant UK directives:	Regulations on electromagnetic compatibility 2016
	Regulations: Restriction of hazardous substances (RoHS)
Applicable harmonized standards, in particular:	EN IEC 61000-6-2: 2019
	EN IEC 61000-6-4: 2011-09
Other applied standards and technical specifications:	EN IEC 61326-1: 2013
	EN IEC 62026-2: 2013

Remarks:

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

Person authorised for compilation and handover of technical documentation:

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

Büchen, 28 February 2023

Franz Bürmann
Managing Director

by order Matthias Südel
Senior Director Engineering

2 Safety

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.

Hint!

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

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

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

The control top T.VIS E-20 is completely installed on the dedicated actuator/ adapter 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.

With T.VIS E-20 the following can be carried out for 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.

Hint!

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

Hint!

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

2.1.1 Requirements for operation

The prerequisite for reliable and safe operation of the component is proper transportation and storage as well as professional installation and assembly. Operating the unit within the limits of its designated use also involves adhering to the operating, inspection and maintenance instructions.

2.1.2 Improper operating conditions

The operational safety of the component can not be guaranteed under improper operating conditions. Therefore avoid improper operating conditions.

The operation of the component is not permitted if:

- Persons or objects are in the danger zone.
- Safety devices are not working or were removed.
- Malfunctions have been detected on the component.
- Damage to the component has been detected.
- Maintenance intervals have been exceeded.

2.2 Operator’s Duty of Care

The operating company of the component has a special responsibility for the proper and safe handling of the component within their company. Only use the component when it is in perfect operating condition in order to prevent danger to persons and property.

This operating manual contains information that you and your employees need for safe operation over the life of the component. Be sure to read these Operating Instructions carefully and ensure that the measures described here are observed.

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

- Only qualified personnel may work on the component.
- The operating company must authorize personnel to carry out the relevant tasks.
- Order and cleanliness must be maintained at the work stations and in the entire area surrounding the component.
- Personnel must wear suitable work clothing and personal protective equipment. As the operating company must ensure that work clothing and personal protective equipment are used.

- Inform personnel regarding any properties of the product which might pose a health risk and the preventative measures to be taken.
- Have a qualified first-aid representative on call during the operation. This person must be able to initiate any necessary first-aid measures in case of an emergency.
- Clearly define procedures, competences and responsibilities for those working in the area of the component. Everybody must know what to do in case of an emergency. Instruct the staff in this respect at regular intervals.
- The signs on the component must always be complete and easy to read. Check, clean and replace the signs as necessary at regular intervals.
- Observe the Technical Data specified and the limits of use!

Hint!

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

2.3 Special terms of use

Explosive Atmospheres!

Special terms of use and technical data must be observed.

Failure to observe the conditions terms of use may result in severe explosions.

► Special conditions of use marked with the following triangle exclamation mark must be observed.

► Additional technical data and special conditions as described in chapter 5 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 TS 60079-32-1. The surface should only be cleaned 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. Therefore, bear in mind:
If there is a potentially explosive 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

Explosive Atmospheres!

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 5.2 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 6.6 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 5.2.1.

2.5 Avoidance of electrostatic charge

Explosive Atmospheres!

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 6.6 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 grounded 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.

⚠

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

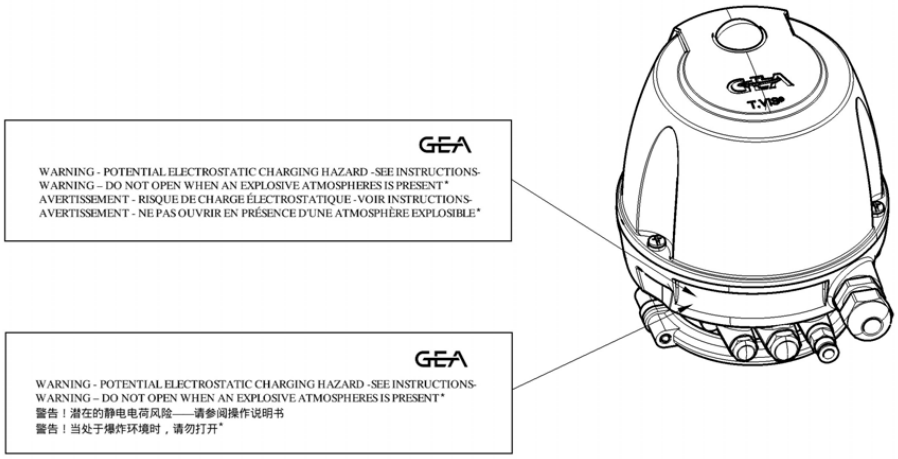


Fig.1: Sign above: Information sign for ATEX/UKEX and IECEx certificate and HazLoc/ sign below: Information sign for CCCEx certificate

Explanation text sign:

WARNING - Danger due to electrostatic charge- see operating instructions!

WARNING - Do not open the control top in explosive atmospheres!*

* Relevant for use in dust protection systems

⚠

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

2.6 Subsequent changes

No technical modifications may be made to this component. Otherwise, you must subject to a new conformity procedure yourself in accordance with the applicable EC directives.

In general, only original spare parts of GEA Tuchenhagen GmbH should be installed. This ensures that the component always works properly and efficiently.

Specific explosion-proof equipment - as defined in chapter 5.6 - 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**
1. digit*	Protection against solids
6	Dust tight
2. digit*	Protection against humidity
6	Protected against powerful water jets
7	Protected against temporary immersion
9k	Protected against high pressure spray downs
*For additional digits and more detailed descriptions please refer to the pertinent standard.	

Digits not to be mentioned can be replaced by the letter x (e. g. IPx6). Concerning the ingress of humidity, IPx6 includes all lower IP classes. This is, however, not the case for the higher protection class IPx7!

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

Hint!

The specified IP classes only apply if the connectors are connected correctly, if the cable gland is properly sealed and if the control top is fitted on the valve, see Chapter 6, Page 50.

2.8 General safety instructions and dangers

The component is safe to operate. It was built according to state-of-the-art science and technology.

Nevertheless, dangers can arise from the component, if:

- the component is not used as intended
- the component is used improperly
- the component is operated under impermissible conditions

2.8.1 Principles for safe operation

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

To ensure safe operation of the valve the following principles apply:

- The Operating Instructions must be kept ready to hand at the valve's place of use. They must be complete and in clearly legible form.
- Only use the valve for its intended use.
- The valve must be functional and in good working order. Check the condition of the valve before starting work and at regular intervals.
- Wear tight-fitting work clothing for all work on the valve.
- Ensure that nobody can get hurt on the parts of the valve.
- Immediately report any faults or noticeable changes on the valve to the person responsible.
- Never touch the pipes and the valve when these components are hot! Avoid opening the valve unless the process plants have been emptied and depressurised.
- Observe the accident prevention regulations and all local regulations.

2.8.2 Environmental Protection

Harm to the environment can be avoided by safety-conscious and proactive behaviour of the staff.

For environmental protection the following principles apply:

- Substances harmful to the environment must not be discharged into the ground or the sewage system.
- Always observe the pertinent regulations relating to waste avoidance, disposal and utilization.
- Substances harmful to the environment must be collected and stored in suitable containers. Clearly mark the containers.
- Dispose of lubricants as hazardous waste.

2.8.3 Electrical Equipment

For all work on electrical equipment, the following principles apply:

- Access to electrical equipment should only be allowed to qualified electricians. Always keep unattended switch cabinets locked.
- Modifications of the control system can affect the safe and reliable operation. Modifications are only permitted with the express permission of the manufacturer.

- After completion of all work, check that the protective devices are fully functional.

2.9 Supplementary Regulations

In addition to the instructions in this documentation the following also has to be observed:

- pertinent accident prevention regulations,
- generally accepted safety rules,
- national regulations applicable in the country of use,
- work and safety instructions applicable in the facility,
- installation and operating regulations for use in potentially explosive areas.

2.10 Qualification of personnel

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

Operating and maintenance personnel must

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

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

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

The following minimum qualifications are required:

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

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

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

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

User groups	
Staff	**Qualifications**
Operating personnel	Adequate instruction and sound knowledge in the following areas: • Functionality of the component • Operating sequences on the pump • What to do in case of an emergency • Lines of authority and responsibilities with respect to the task
Maintenance personnel	Appropriate training and a sound knowledge of the structure and functionality of the component. Sound knowledge in the following areas: • Mechanical equipment • Electrical equipment • Pneumatic system Authorization with regard to safety engineering standards to carry out the following tasks: • Setting devices into operation • Earthing of devices • Marking of devices The corresponding certification must be available for work on Ex-certified machines.

2.11 Safety equipment

2.11.1 Signs

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

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

Signs on the control top	
Sign	**Meaning**
 Fig.2	General hazard warning
 Fig.3	Warning Crushing

2.12 Residual dangers

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

Residual dangers on the control top and measures		
Danger	**Cause**	**Measure**
Danger to life	Inadvertent switch-on of the control top	Effectively disconnect all components, effectively prevent switch-on.
	Electric power	Observe the following safety rules: 1. Isolate from the power supply. 2. Take appropriate measures to prevent switch on. 3. Test absence of voltage. 4. Earthing and short-circuiting. 5. Cover or safeguard any adjacent live parts.
Damage to property	Welding can cause damage to the electronics or result in data loss.	Do not carry out any welding work in the vicinity of the control top or make sure electronics are properly protected.

2.12.1 Electrostatically Endangered Components and Modules

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

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

- observe the requirements of DIN EN 61340-5-1 and 5-2,
- be careful not to touch the electronic components,
- also take care not to touch electronic components when supply voltage is present.

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

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

Notice

Stray welding currents during welding

Can cause damage to electronic components

► Follow the steps below to prevent this.

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

2.13 Danger zones

Please observe the following notes:

- In the event of malfunctions, shut down the control top (disconnect from the power and air supply) and secure it against being used.
- Before starting any service, maintenance or repair work, disconnect the control top from the power supply and secure it against inadvertently being switched back on again.
- Only allow a qualified electrician to carry out any work on the electrical power supply.
- Check the electrical equipment of the control top at regular intervals. Immediately remedy loose connections and molten cables.
- If work on live parts cannot be avoided, call in a second person, who can operate the main switch in case of an emergency.

3 Description

3.1 Design

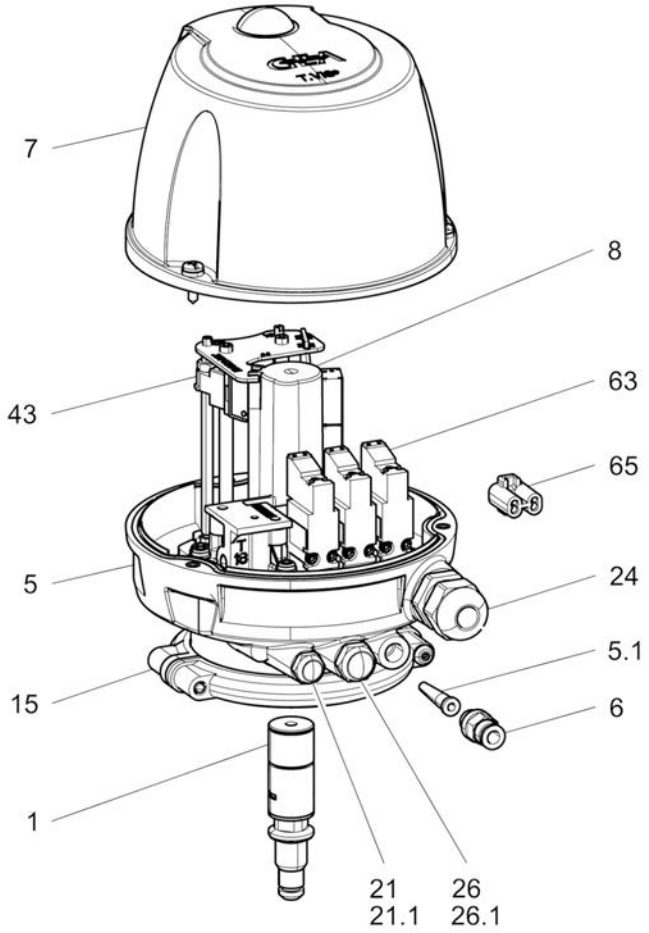


Fig.4

No.	Designation	No.	Designation
1	Switch bar	26	Sound absorber
5	Base	26.1	Non-return valve (cannot be replaced)
5.1	Filter	43	Sensor module (including 2 sensors)
6	Screw-in plug connection	63	Solenoid valves
7	Cap	65	Control plate/blind plate
8	Pneumatic block		
15	Clamp connection		
21	Sound absorber		
21.1	Throttle, optional		
24	Cable gland		

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.

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. Avoid any 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.

3.2 Functional description

3.2.1 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. 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

3.2.2 Control top without solenoid valves

The control top T.VIS E-20 without solenoid valves works 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:

- 12V DC or 24V DC switching output

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

3.2.3 Control Top with Solenoid Valves

The control top with solenoid valves acts as a control top. The signalling takes place in the same way as with the control top without solenoid valves. with the difference being 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.

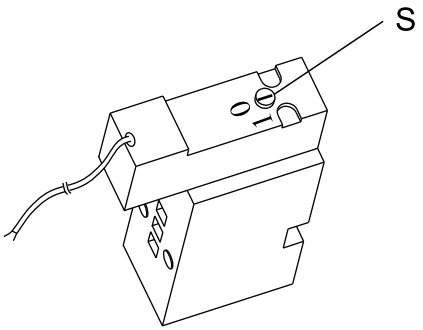


Fig.5

3.2.4 Control Top with Cap

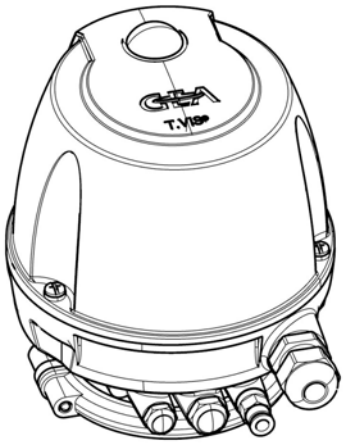


Fig.6: Control Top with Cap

According to protection class IP67 and/or 69k (EN 60529) the control top T.VIS E-20 is suitable for use in this design and if the electrical and pneumatic connections are installed correctly.

Observe the general instructions regarding ESD protection.

3.2.5 Safety Air Exhaust / Installation Position

To provide protection against excess pressure which can build up in the inside of the control top, a vent plug (E2) is fitted in the base.

In operating mode, the exhaust air from the lifting actuators is discharged via this vent plug. In the unlikely event of a damaged solenoid valve or in case of sealing problems, pressure relief is ensured.

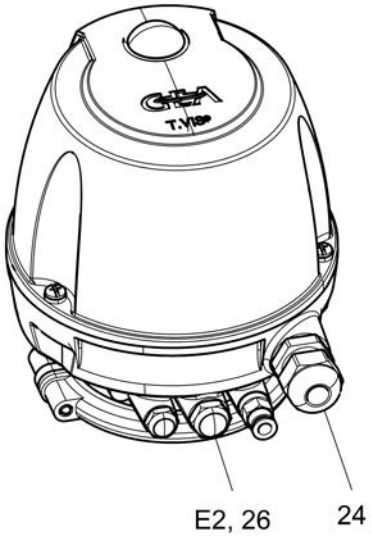


Fig.7: Control Top with Cap

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.

3.2.6 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.

4 Transport and storage

4.1 Storage conditions

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

Hint!

We recommend that the valve should be stored at a temperature of ≥ 5 °C for a period of 24 hours prior to any handling (disassembling the housings / activation of actuators) so that any ice crystals formed by condensation water can melt.

4.2 Transport

For transport, the following principles apply:

- Only use suitable lifting gear and slings for transporting the package units/ control tops.
- Observe the pictograms on the package.
- 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.

4.2.1 Scope of supply

After taking delivery of the component, check if

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

5 Technical data and operating conditions

Explosive Atmospheres!

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 and special operating conditions must be observed

5.1 Type plate

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

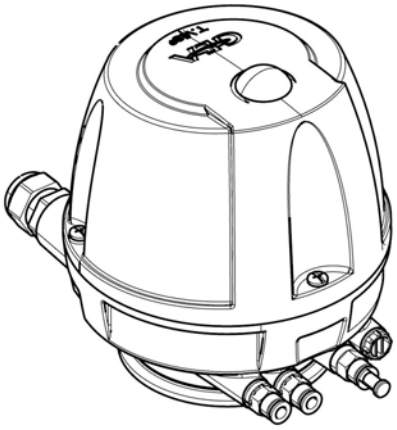


Fig.8

Order code for number of pilot valves and maximum ambience temperature		
Pilot valves type BATX10-1/2-1-*: mat. no. 512-174 and 512-177	**Ambience temperature group II EPL Gb**	**Ambience temperature group III EPL Db**
without solenoid valve for order code TE20N2E0…/AEx/IEx	-10°C ≤ Ta ≤ +46°C	-10°C ≤ Ta ≤ +42°C
Connection terminal strip V1-/V1+ for order code TE20R2EE/X…/AEx/IEx		
Connection terminal strip V1-/V1+ and V2-/V2+ for order code TE20I/L2EE/X…/AEx/IEx	-10°C ≤ Ta ≤ +42°C	-10°C ≤ Ta ≤ +38°C
Connection terminal strip V1-/V1+ and V3-/V3+ for order code TE20J/L2EE/X…/AEx/IEx		

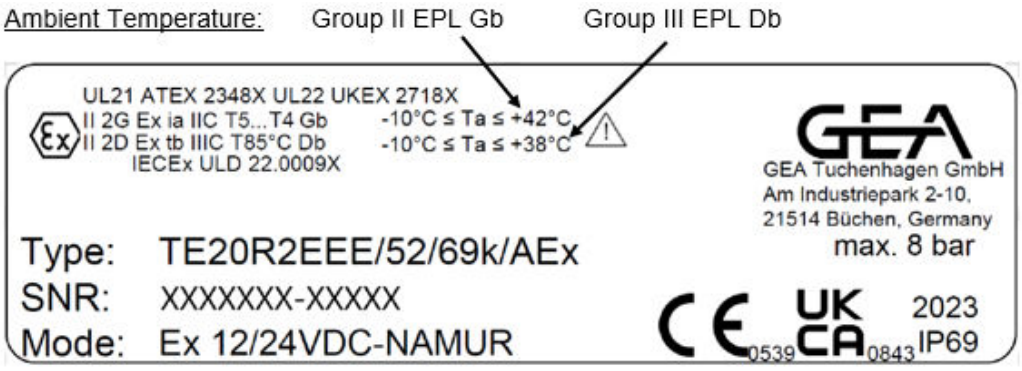


Fig.9: Example for control top type plate/ ATEX/UKEX

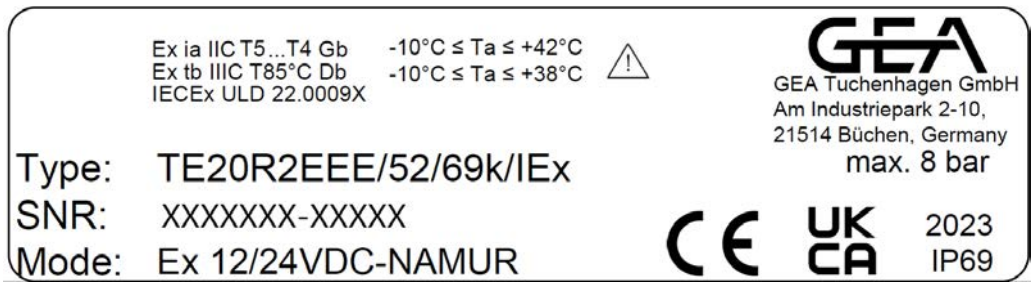


Fig.10: Example for control top type plate/ IECEx

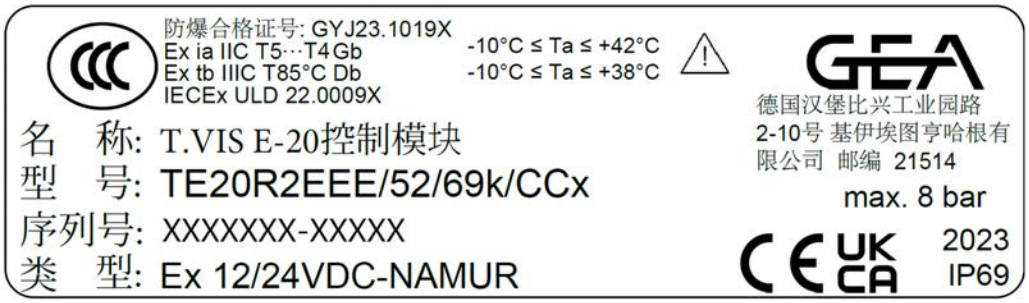


Fig.11: Example for control top type plate/ CCCEx

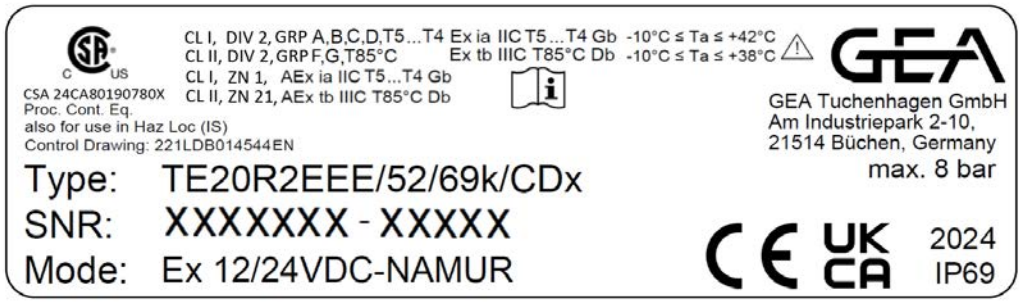


Fig.12: Example for control top type plate/ HazLoc

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
	R	1 solenoid valve Y1 (retrofittable: Y2, Y3)
	I	2 solenoid valves Y1, Y2/ 2 Y1=main stroke Y2=lifting of the valve disk (retrofittable: 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 (retrofittable: Y2)
	L	3 solenoid valves Y1, Y2, Y3
16	**Feedback**	
	2	2 digital feedback signals
17	**Type of interface/mode**	
	E	Ex 12/24VDC-NAMUR
18	**Solenoid valve**	
	E	12VDC/EX
	X	24VDC/EX
	0	without
19	**Screw connection**	
	E	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
	/19	Exhaust air throttle: regulates the closing speed of the valves
	/50 /51 /52	Metal plate engraved Metal plate (US version) Adhesive plate
	/66 /67 /69k	Protection class IP 66 (powerful water jet) Protection class IP 67 (immersion) 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

5.2 Technical data

The most important technical data of the control top can be found in the following tables.

5.2.1 ATEX/UKEX; IECEx, HazLoc and CCCEx designations and 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			
Application	**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
	Ambient temperature	⚠	-10°C ≤ Ta ≤ +38°C
		⚠	-10°C ≤ Ta ≤ +42°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			
Application	**Description**		
Gases	Designation		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		Ex 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.		IECEx ULD 22.0009X

Technical data - CCCEx designation			
Application	**Description**		
Gases	Designation		Ex ia IIC T5...T4 Gb
	Ambient temperature	⚠	-10°C ≤ Ta ≤ +42°C
Dust	Designation		Ex tb IIIC T85°C Db
	Ambient temperature	⚠	-10°C ≤ Ta ≤ +38°C
	Certification no.		GYJ23.1019X

Technical data - HazLoc designation			
Application	**Description**		
Gases	Designation		Class I, Division 2, Group A, B, C, D, T5...T4 Ex ia IIC T5…T4 Gb 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

Hint!

Special conditions of use must be observed, see chapter 5.2.2

Electrical wiring configuration and specification must be observed, see chapter 5.2.3.

5.2.2 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/ 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 TS 60079-32-1. The surface should only be cleaned 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.
⚠

Technical data: Special terms of use
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.
⚠
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. Therefore, bear in mind: If there is a potentially explosive 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 6.6 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 5.2.1.

Technical data: Avoidance of electrostatic charge
⚠
The instructions on the warning sign of the T.VIS E-20 must be observed:

Technical data: Avoidance of electrostatic charge

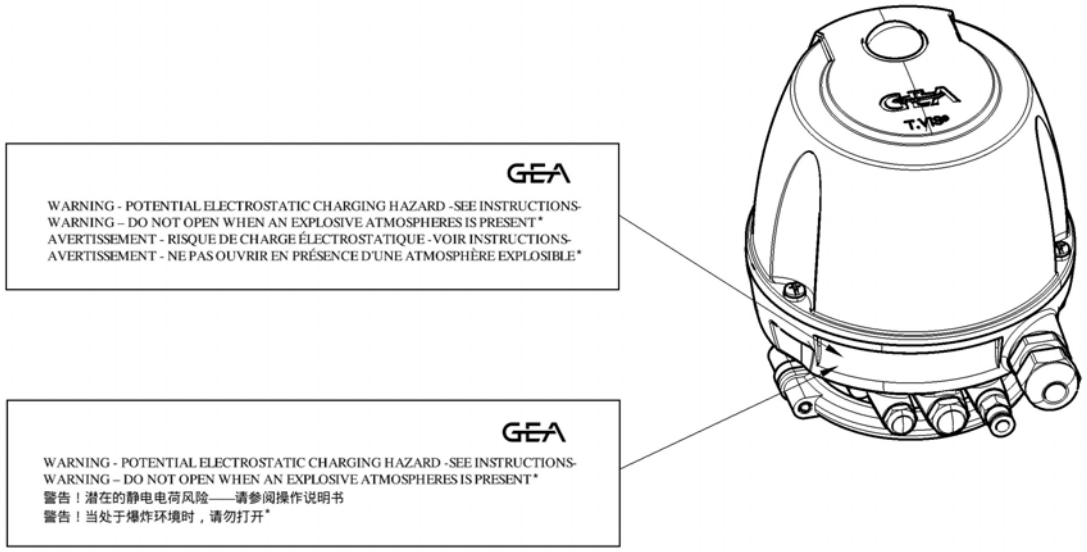


Fig.13: Sign above: Information sign for ATEX/UKEX and IECEx certificate, HazLoc/ sign below: Information sign for CCCEx certificate

Explanation text sign:

WARNING - Danger due to electrostatic charge- see operating instructions!
WARNING - Do not open the control top in explosive atmospheres!*
* Relevant for use in dust protection systems

⚠

Please make sure that the T.VIS E-20 is installed as described in chapter 6.6. Make sure that the fitting is grounded above the piping. Make sure that the valve is grounded via the pipe system.

5.2.3 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	Ø 6 mm - Ø 12 mm

5.2.4 Delivery and input data

Hint!

Electrical connections in chapter 6.4 must be observed.

Observe terminal assignment and designation in relation to order code, see chapter 6.4

5.2.4.1 Solenoid valve for pneumatic valves

Intrinsically safe wiring

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

► PLEASE OBSERVE THE TERMINAL DESIGNATION IN CHAPTER 6.4.3.2 (PAGE 48) FOR INTRINSICALLY SAFE WIRING.

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	
– per solenoid valve 12V DC – per solenoid valve 24V DC – max. feedback load	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**
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)**	**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.

5.2.4.2 Sensor module data

Explosive Atmospheres!

Intrinsically safe wiring

Failures in the intrinsically safe wiring can lead to serious explosions!

► PLEASE OBSERVE THE TERMINAL DESIGNATION IN CHAPTER 6.4.3.2 (PAGE 48) FOR INTRINSICALLY SAFE WIRING.

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.

5.2.5 General Technical Data

Technical data: temperatures and compressed air supply	
Designation	**Description**
Control air	According to ISO 8573-1:2001
- Solids content:	Quality class 6 (recommended)
- Water content:	Quality class 4 max. dew point +3 °C If the component is operated at a higher altitude or at low ambient temperatures, the dew point must be adjusted accordingly.
- Oil content:	Quality class 3, Preferably oil-free, max. 1 mg of oil in 1m3 air
Air hose	
- metric	Material PE-LD Outside Ø 6 mm Inside Ø 4 mm
- Inch	Material PA Outside Ø 6.35 mm Inside Ø 4.3 mm
Control air pressure	max. 8 bar, min. 2 bar
Sound pressure level 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:	
Designation	**Description**
Protection class EN 60529*	Standard: IP66 – powerful water jets Optional: IP67 – Immersion Optional: IP69k– high pressure*
Fitting position	Any position
EU-EMV - Directive	2014/30/EU
Interference immunity for industrial environments	EN ISO 61000-6-2: 2019
Radio frequency interference	EN 61000-6-4: 2007 +A1: 2011
EC Low Voltage Directive	73/23/EEC

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

5.3 Accessories

Accessories must be ordered separately.

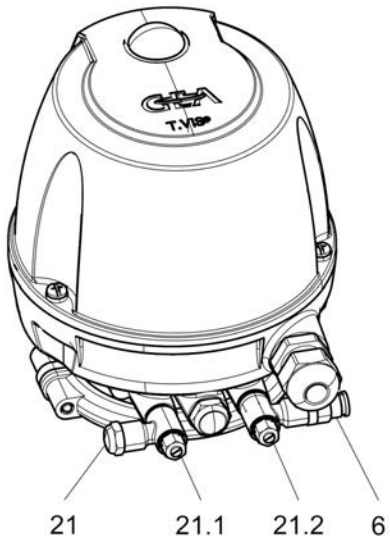


Fig.14

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

5.4 Tool

Hint!

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!

List of tools	
Tool	**Material no.**
Hose cutter	407-065
Hex key, size 3	408-121
Jaw wrench a/f 12x13	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 25	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	---

For mounting on Vesta or Ecovent	
Tool	**Material no.**
Adjustable face wrench 160/4.0	408-133

For mounting on FLOWVENT	
Tool	**Material no.**
Adjustable face wrench 80/5”	408-448
Plug-in tool square 1-1/2"	408-451

For mounting on T-Smart butterfly valves	
Tool	**Material no.**
Pin punch with hand grip Dm 5.0 mm	408-434

5.5 Lubricants

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

5.6 Equipment

Technical data - equipment				
Equipment	**Material no.**	**Item**	**Number EU Type Examination Certificate Designation**	**IECEx-Certification Number Designation**
Solenoid valve • 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 • 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" • Filter material: stainless steel wool • Ambient temperature: -20...+70°C • max. pressure 10 bar	933-175	21	--	--
Sound absorber G 1/4" • Filter material: stainless steel wool • Ambient temperature: -20...+70°C • max. pressure 10 bar	933-174	26	--	--
Supply/exhaust air throttle G ¹/8" • Filter material: sintered stainless steel • Pressure range: 0.2 ... 10 bar • Gradually adjustable flow at Δp 6 bar: 310 dm^3 / 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 • 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

6 Assembly and installation

6.1 Safety precautions

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

For installation, the following principles apply:

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

6.2 Establishing hose connections

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

Tools required:

- Hose cutter

Carry out the following steps:

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

→ Done.

Hint!

Avoid kinks in the pneumatic hoses!

6.3 Pneumatic connections

6.3.1 Control Top with 1 Solenoid Valve or Without Solenoid Valve

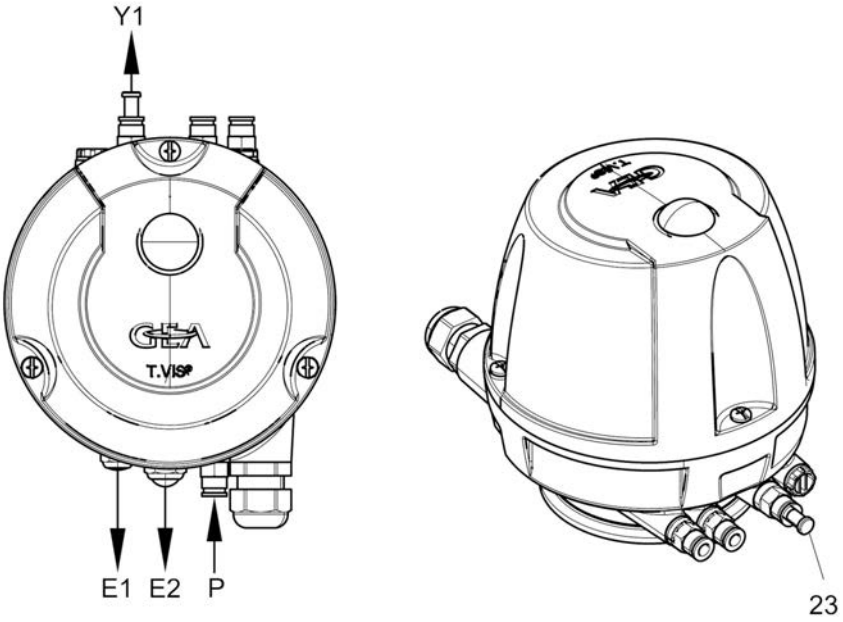


Fig.15: Control top (standard variant in IP 66)

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.

6.3.2 Control top with 2 solenoid valves

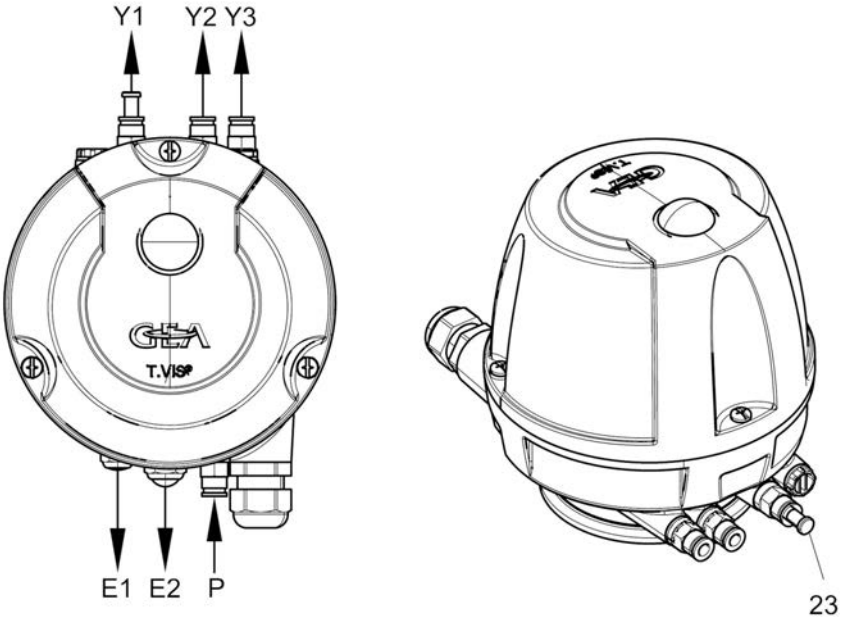


Fig.16: Control top (standard variant in IP 66)

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 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.

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

6.3.3 Control top with 3 solenoid valves

Hint!

To ensure sufficient compressed air supply to the process drives, a maximum of 2 solenoid valves are electrically controlled at the same time! It must be ensured that no simultaneous control of the drive or the lifting can take place at the same process valve!

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 must be observed.

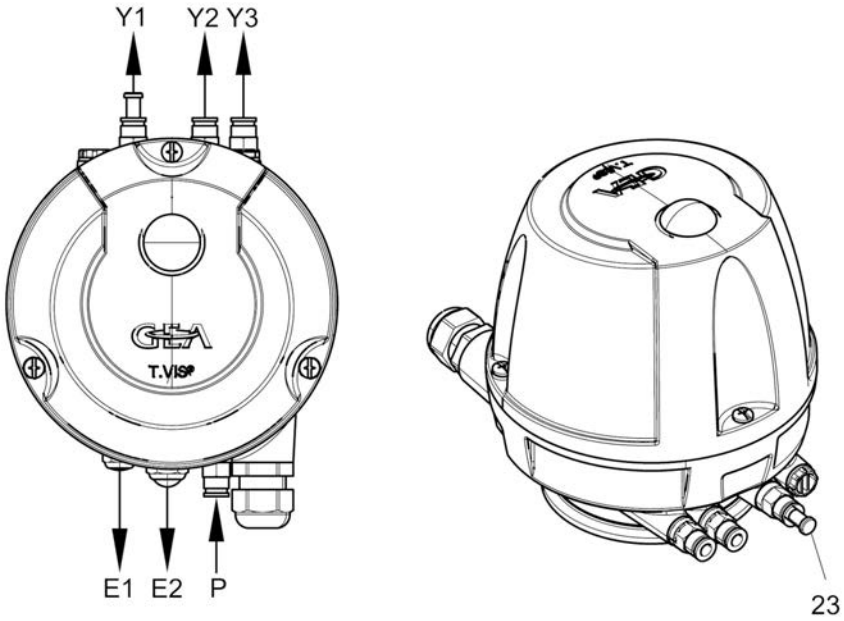


Fig.17: Control top (standard variant in IP 66)

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
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 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.

Hint!

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!

6.4 Electrical connections

Danger

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

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

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.

6.4.1 Overview

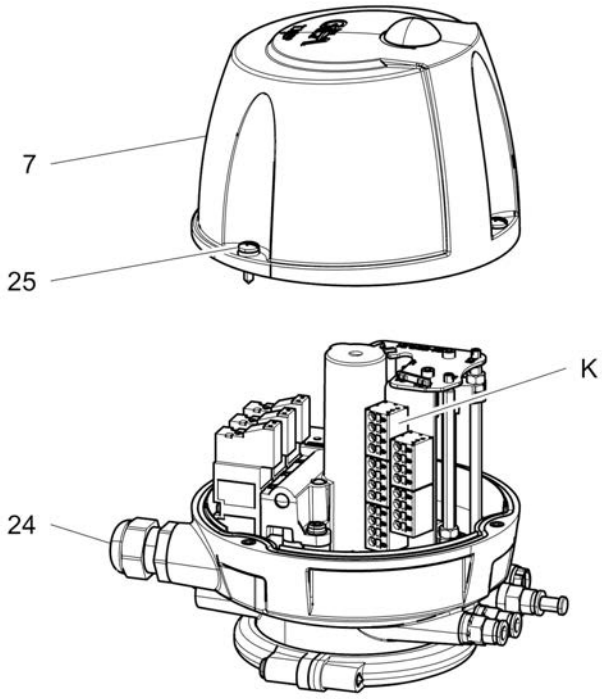


Fig.18

Danger

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

► During work in potentially explosive areas, always follow the instructions on commissioning and maintenance.

Carry out the following steps:

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 mm^2.
3. Secure the cable in the cable gland with a torque of 2.5 Nm.

6.4.2 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 wire/wire = 58 pF/m Ci wires/shielding = 270 pF/m According to EN 60079-11, the distance between intrinsically safe circuits and earth must allow for an insulation for 30 V of 0.7 mm.

Designation	Description
Conductor cross-section for connection terminal strip	up to 1.5 mm^2
Required cable diameter for cable gland	Ø 6 mm - Ø 12 mm

Hint!

The electric cable must be long enough so that the control top can be removed via the switch bar!

The cables must be suitable for use in the temperature range -20 °C to +60 °C!

Hint!

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!

6.4.3 Electrical wiring

6.4.3.1 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+

6.4.3.2 Terminal strip designation and separate intrinsically safe circuits

Explosive Atmospheres!

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.

Explosive Atmospheres!

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 6.4.3 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+

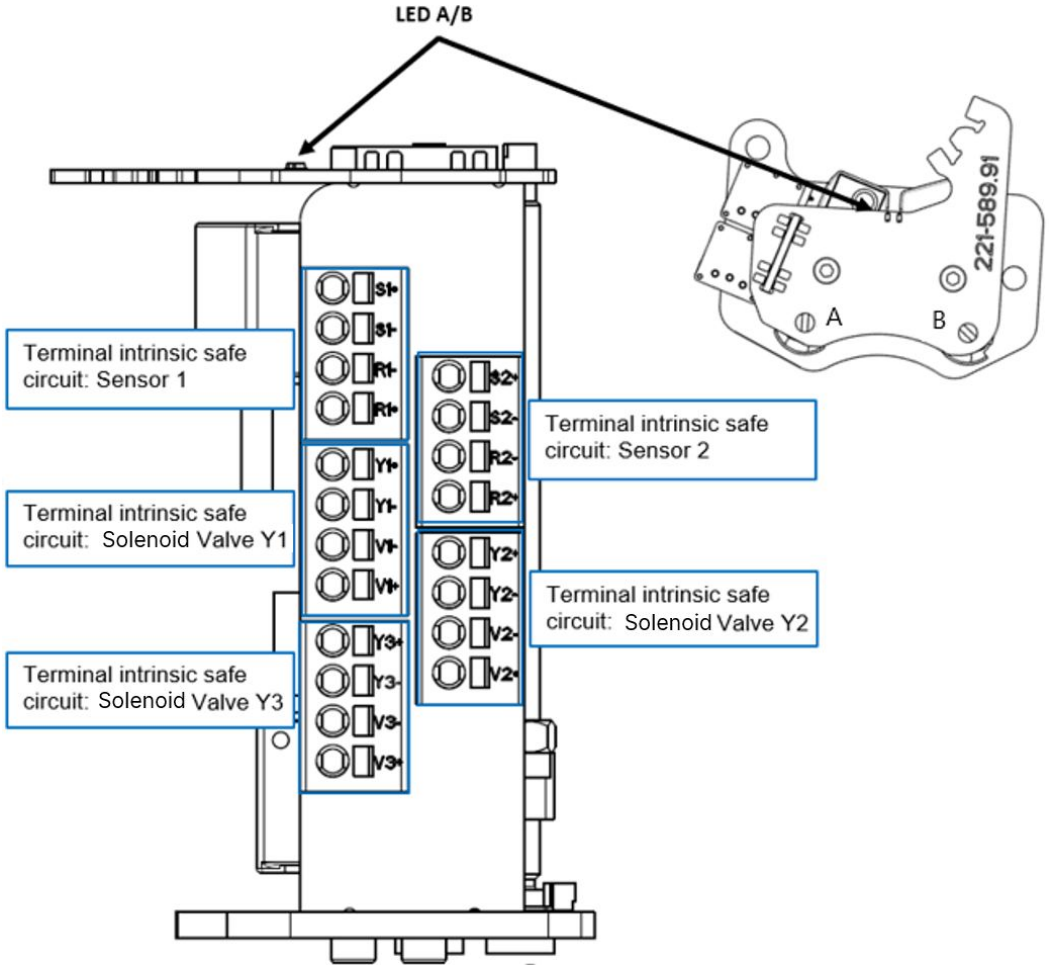


Fig.19

Light-emitting diode A (LED A)

- Colour: green
  Message: permanent light – valve in idle position (non-actuated position)

Light-emitting diode B (LED B)

- Colour: yellow
  Message: Permanent light - valve in end position (actuated position)

6.4.3.3 Wiring diagram T.VIS E-20

Hint!

Check the assignment of the wires before connecting the cables!

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

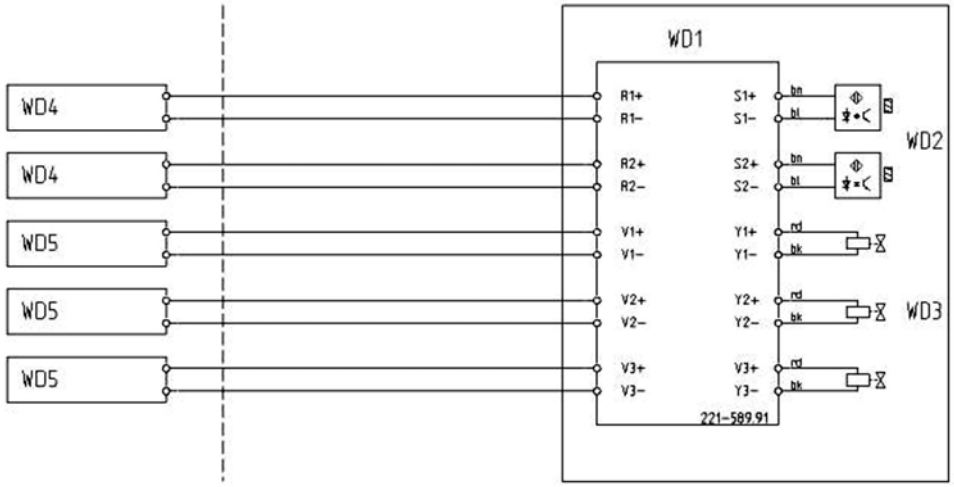


Fig.20

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.

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

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 grounded 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.

Explosive Atmospheres!

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 to grounded 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.

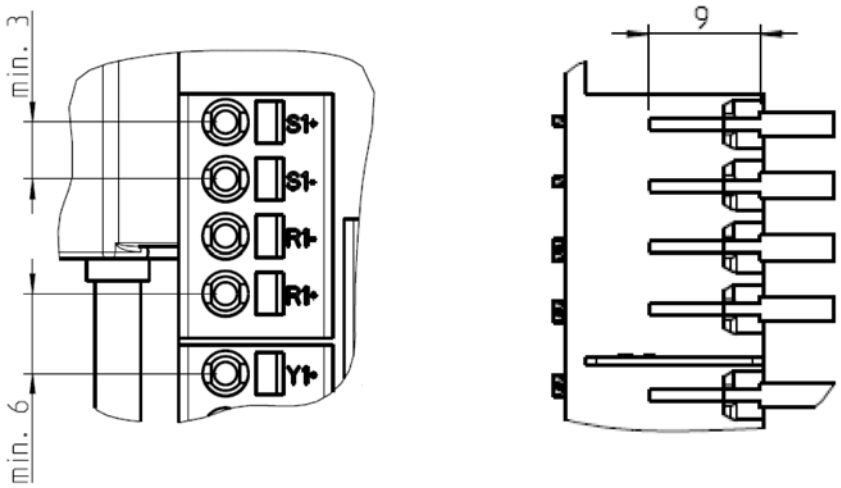


Fig.21

6.5 Visual Display

6.5.1 Illuminated dome

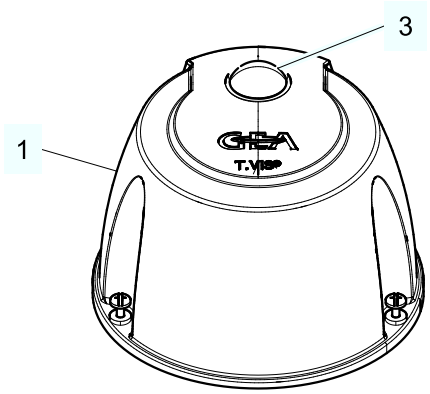


Fig.22

Key	
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!

6.6 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.

Notice

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.

Notice

Magnetic fields can affect the proximity switch system.

Measured values can be changed.

► Protect the control top from external magnetic fields.

Notice

The vent plug E2 is a safety element.

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

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

Notice

The permanent magnet on the switch bar is fragile.

Damage to the permanent magnet.

► Protect the permanent magnet against impact stress.

Notice

Magnetic fields resulting from the permanent magnet on the switch bar

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

► Protect the components against the magnetic fields from the switch bar.

Explosive Atmospheres!

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 6.6 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 grounded 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.

Please ensure that the T.VIS E-20 is installed as described in chapter 6.6.

Make sure that the valve is grounded via the piping.

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

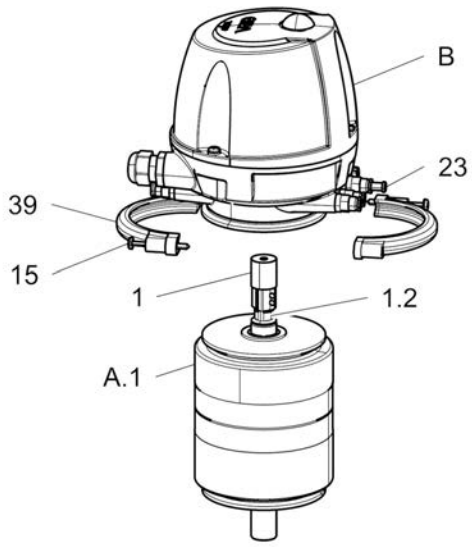


Fig.23

Notice

The permanent magnet on the switch bar is fragile.

Damage to the permanent magnet.

► Protect the permanent magnet against impact stress.

Notice

Magnetic fields resulting from the permanent magnet on the switch bar

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

► Protect the components against the magnetic fields from the switch bar.

Requirement:

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

Carry out the following steps:

1. Check that the switch bar (1) is firmly in place. If required, tighten with jaw wrench AF 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.

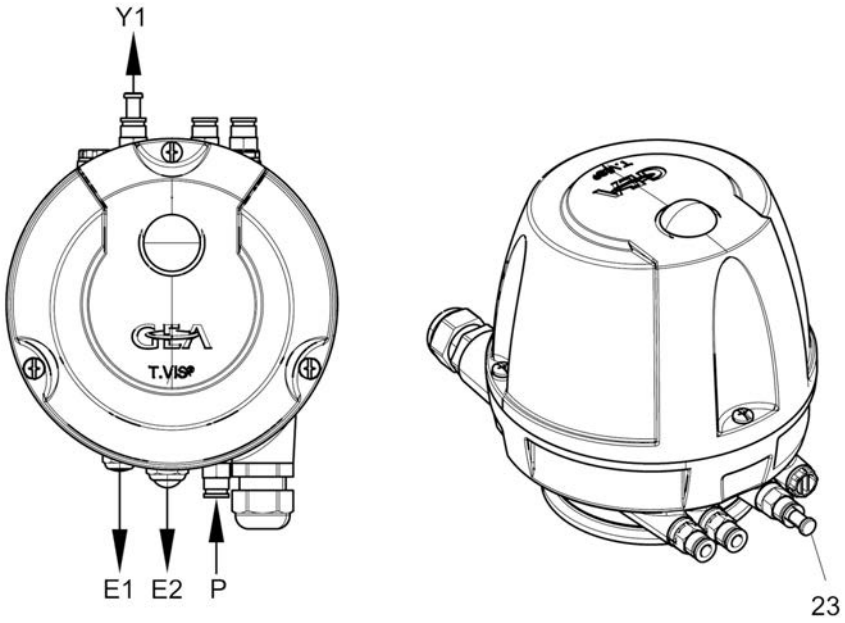


Fig.24

6. Carry out commissioning, see Chapter 7, Page 79.

→ Done.

6.6.2 Mounting to a Butterfly Valve T-smart 8000

Requirement:

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

Notice

The permanent magnet on the switch bar is fragile.

Damage to the permanent magnet.

► Protect the permanent magnet against impact stress.

Notice

Magnetic fields resulting from the permanent magnet on the switch bar

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

► Protect the components against the magnetic fields from the switch bar.

Carry out the following steps:

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

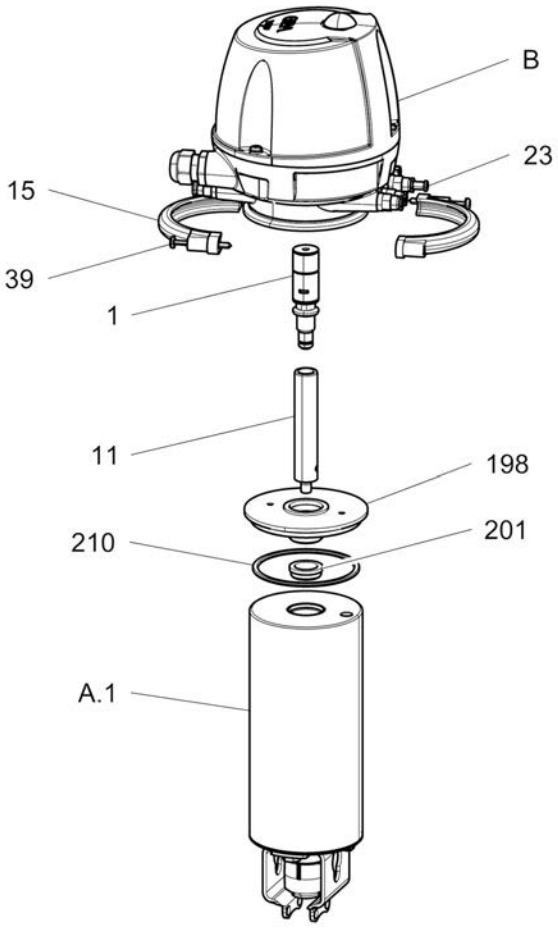


Fig.25

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 the air connection Y1 with a sealing plug (23) since the control top T.VIS E-20 has an inner air duct.

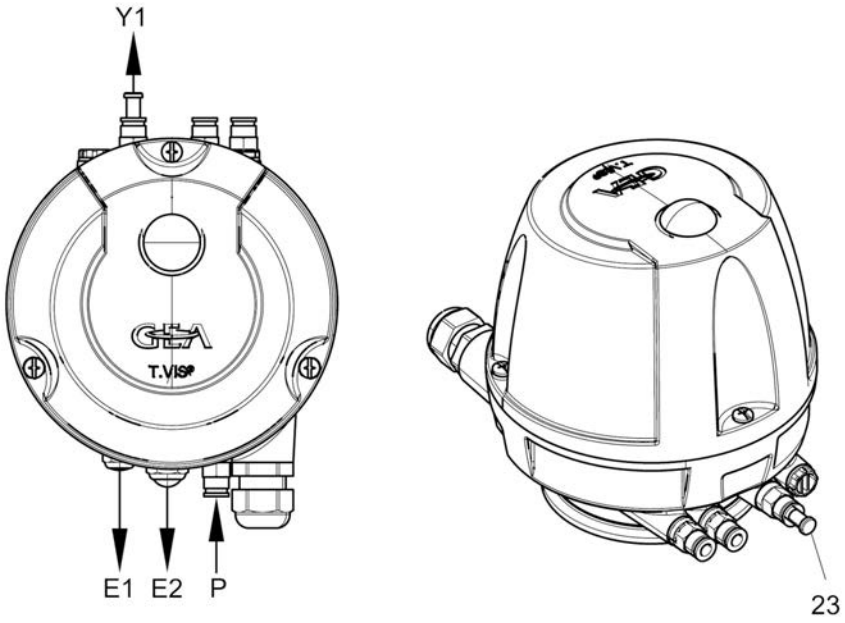


Fig.26

9. Carry out commissioning, see Chapter 7, Page 79.

→ Done.

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

Requirement:

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

Notice

The permanent magnet on the switch bar is fragile.

Damage to the permanent magnet.

► Protect the permanent magnet against impact stress.

Notice

Magnetic fields resulting from the permanent magnet on the switch bar

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

► Protect the components against the magnetic fields from the switch bar.

Carry out the following steps:

1. Screw switch bar (1) into the actuator (A) and tighten with a pin punch Gm 5.0, torque 22 Nm (15.4 lbft).

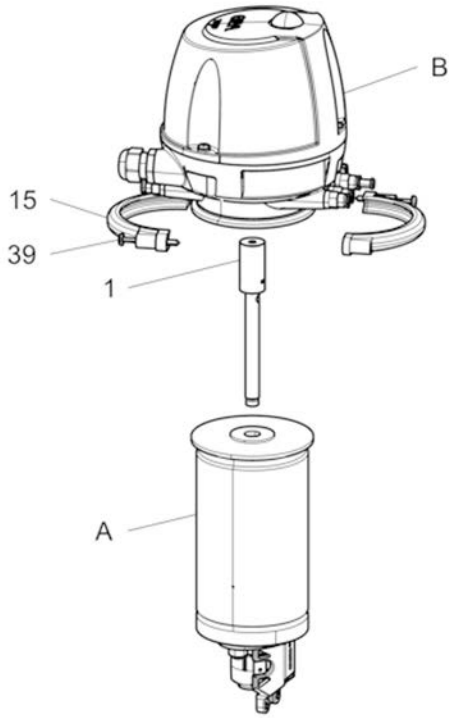


Fig.27

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.

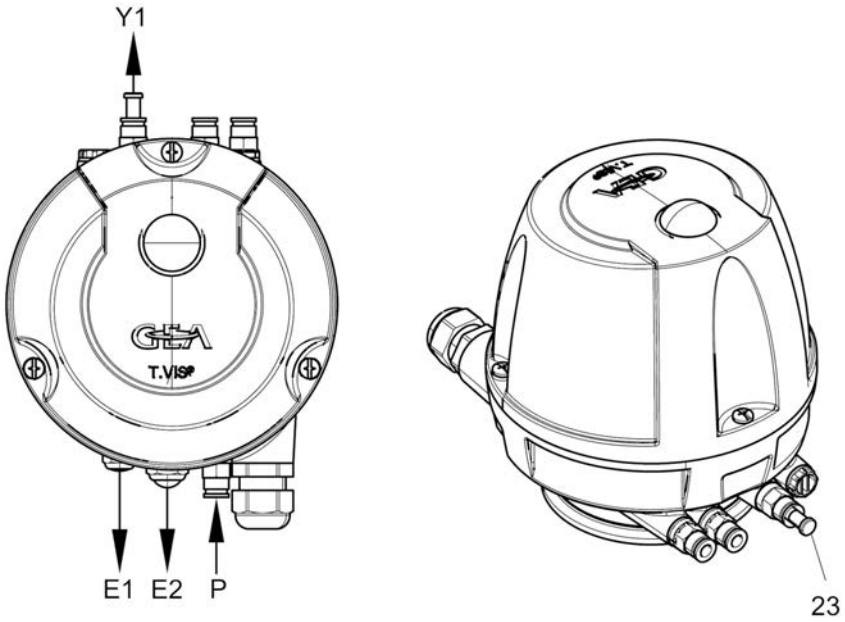


Fig.28

6. Carry out commissioning, see Chapter 7, Page 79

→ Done.

6.6.4 Mounting to ECOVENT Valves N_ECO and W_ECO

Requirement:

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

Notice

The permanent magnet on the switch bar is fragile.

Damage to the permanent magnet.

► Protect the permanent magnet against impact stress.

Notice

Magnetic fields resulting from the permanent magnet on the switch bar

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

► Protect the components against the magnetic fields from the switch bar.

Carry out the following steps:

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

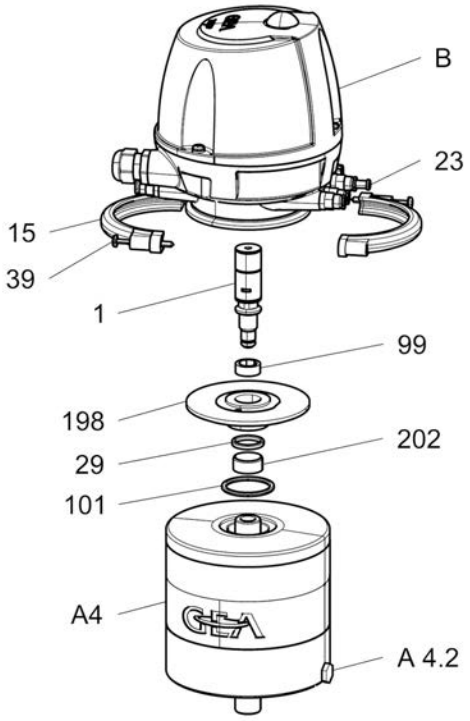


Fig.29

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 module (B), connection A.4.2 on the actuator is closed.

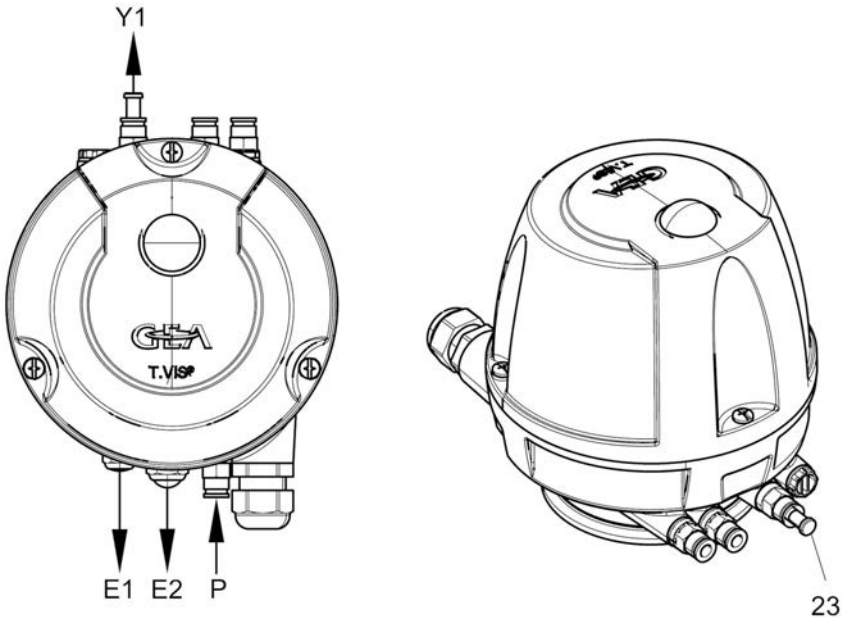


Fig.30

7. Carry out commissioning, see Chapter 7, Page 79.

→ Done.

6.6.5 Mounting to VESTA Valve H_A/M

Requirement:

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

Notice

The permanent magnet on the switch bar is fragile.

Damage to the permanent magnet.

► Protect the permanent magnet against impact stress.

Notice

Magnetic fields resulting from the permanent magnet on the switch bar

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

► Protect the components against the magnetic fields from the switch bar.

Carry out the following steps:

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

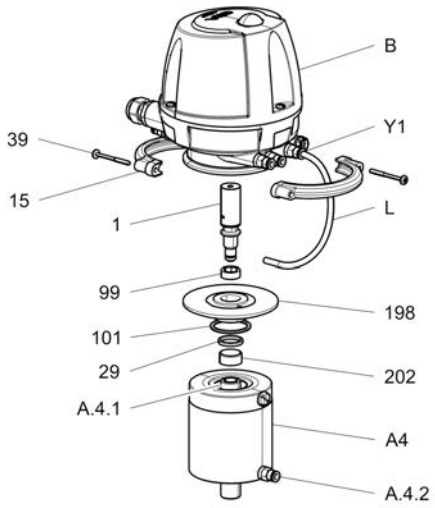


Fig.31

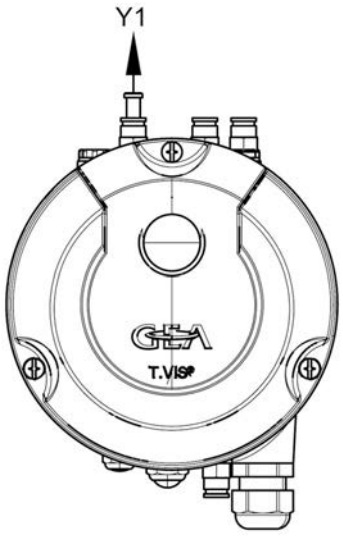


Fig.32

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 7, Page 79.

→ Done.

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

Requirement:

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

Notice

The permanent magnet on the switch bar is fragile.

Damage to the permanent magnet.

► Protect the permanent magnet against impact stress.

Notice

Magnetic fields resulting from the permanent magnet on the switch bar

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

► Protect the components against the magnetic fields from the switch bar.

Carry out the following steps:

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

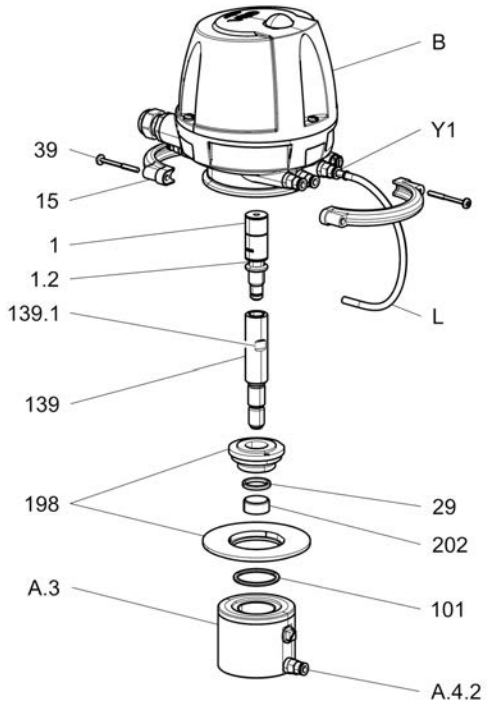


Fig.33

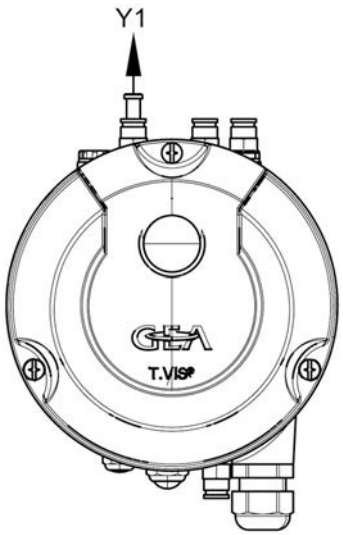


Fig.34

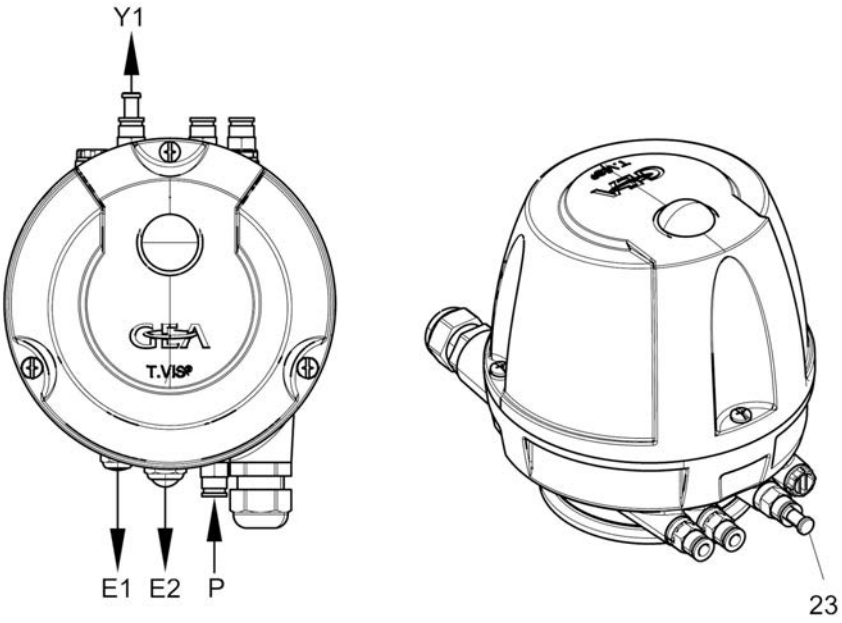
2. Screw the adapter T.VIS E/SHO (139) into the actuator with jaw wrench on wrench surface (139.1) and tighten.
3. Screw the installation base (198) into the actuator (A.3) via the adapter T.VIS E/SHO (139) and tighten using a face spanner (408-133).

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 7, Page 79.

→ Done.

6.6.7 Fitting to an ASEPTOMAG Valve



Requirement:

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

Notice

The permanent magnet on the switch bar is fragile.

Damage to the permanent magnet.

► Protect the permanent magnet against impact stress.

Notice

Magnetic fields resulting from the permanent magnet on the switch bar

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

► Protect the components against the magnetic fields from the switch bar.

Carry out the following steps:

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

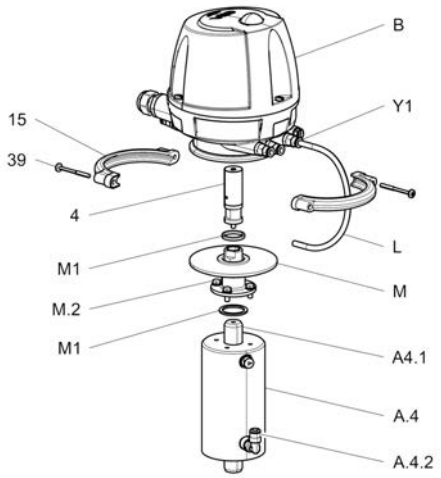


Fig.35

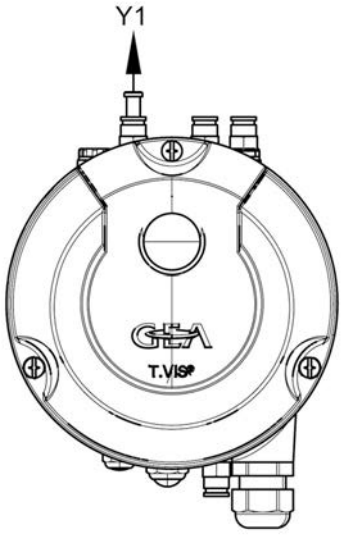


Fig.36

2. Screw the switch bar (4) Mat. 221-589.87, into the piston rod (A4.1) and tighten with jaw wrench AF 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 7, Page 79.

→ Done.

6.6.8 Fitting to FLOWVENT Valve

Requirement:

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

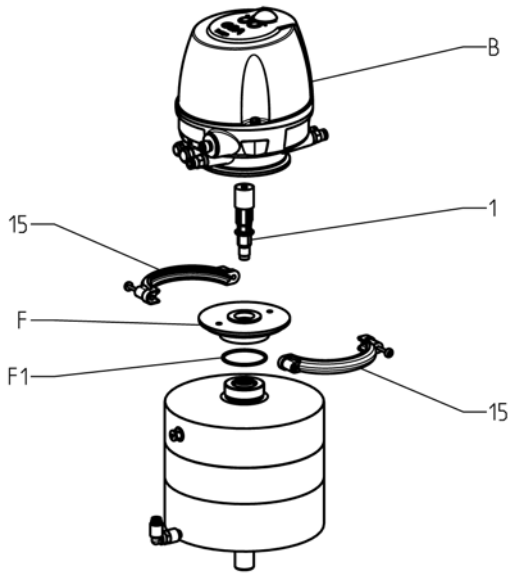


Fig.37

Carry out the following steps:

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 AF 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 7, Page 79.

8. Fit the cap and tighten the screws to 1 Nm (0.7 lbft).

→ Done.

6.6.9 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 a predecessor model with a control top T.VIS E-20 the switch bar must always be replaced!

7 Start-up

7.1 Safety precautions

Initial commissioning

For initial commissioning, the following principles apply:

- Take protective measures against dangerous contact voltages in accordance with pertinent regulations.
- The control top must be completely assembled and correctly adjusted. All screw connections must be securely tightened. All electrical cables must be installed correctly.
- Reliably secure machine parts which have already been connected against inadvertently being switched on.
- After conversion of the control top, residual risks must be reassessed.

Commissioning

For commissioning, the following principles apply:

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

7.2 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 on the Control Air

Carry out the following steps

1. Switch on the control air supply

→ Done

Power on

Carry out the following steps:

1. Switch on the operating voltage.

→ Done

7.3 Checking Valve Actuation

Carry out the following steps:

1. Check the valve functions by activating the solenoid valves using the manual operating element on the solenoid valves: Use a screwdriver to turn the screw (S) 0 from 0 to 1.
2. Switch all of the solenoid valves on and off again one after the other in the order Y1, Y2 and Y3 – if fitted.

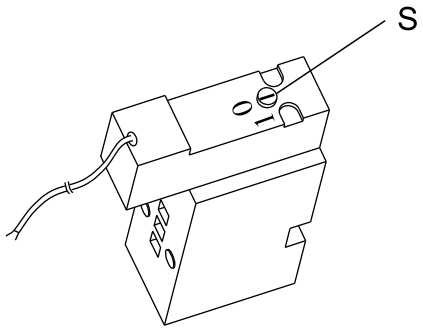


Fig.38

→ Y1 – main actuator

→ Y2 – valve disk lifting

→ Y3 – double-disk lifting

→ Done

7.4 Service Function

If maintenance must be conducted on a process valve that is fitted with a control top T.VIS E-20, the valve core must be pulled out of the housing. For this purpose, the valve disk pretension of the process valve must be relieved by actuating the main actuator.

Another option with the cap removed is the manual override on the solenoid valve, see “Control top with solenoid valves” Section 3.2.3, Page 31.

7.5 Adjusting sensors on the control top

Adjusting the sensors

⚠ 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.

Hint!

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

Notice

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 Tab. 1 must be added after the sensor has been recorded.

Tab.1 Tolerance setting

Adjustment of sensor tolerance Δ S using spindles A and B	
Valve type	**Spindle [turn] from start of illumination**
Seat valve	1
Bellows valve	0.5
Valve with air support: Y1 NC/ Y2 NO actuated via DO	1.5
Butterfly valve	6

Hint!

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

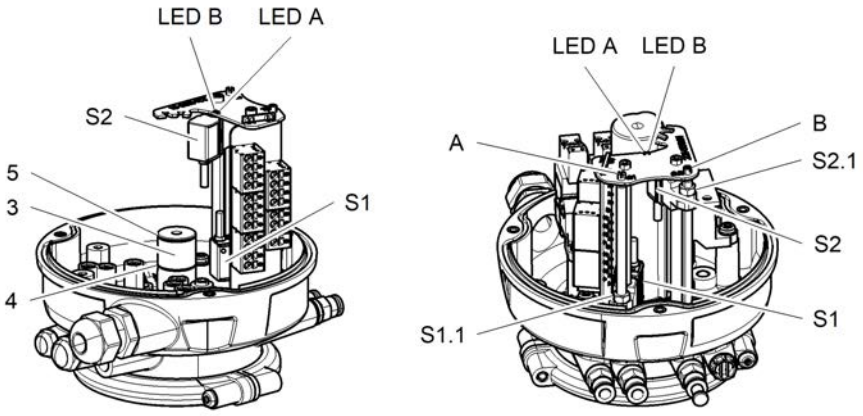


Fig.39: Control top shown without pneumatic block

7.5.1 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": non-actuated position of the valve is spring-closing
- VARIVENT valve type U with actuator selection "A or NO": non-actuated position of the valve is spring-opening
- VESTA valves with actuator selection "Z or NC": non-actuated position of the valve is spring-closing

Assignment:		
Sensor *1	**LED colour**	**Spindle**
S1	Green	A
S2	Yellow	B
*1 see wiring diagram at the terminal strip		

Valve is not actuated!

Adjusting sensor S1

Carry out the following steps:

1. Loosen lock nut M5 S1.1 using jaw wrench AF 8 in counter-clockwise direction
2. To adjust sensor S1, turn the sensor position on spindle A into the lower area in accordance with Fig. 35. 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 spindle in Fig. 36).
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 Table 1 (green line in fig.36).

→ The light intensity of LED A changes.

5. Loosen lock nut M5 S1.1 using jaw wrench AF 8 in clockwise direction.

→ Sensor S1 is adjusted with tolerance.

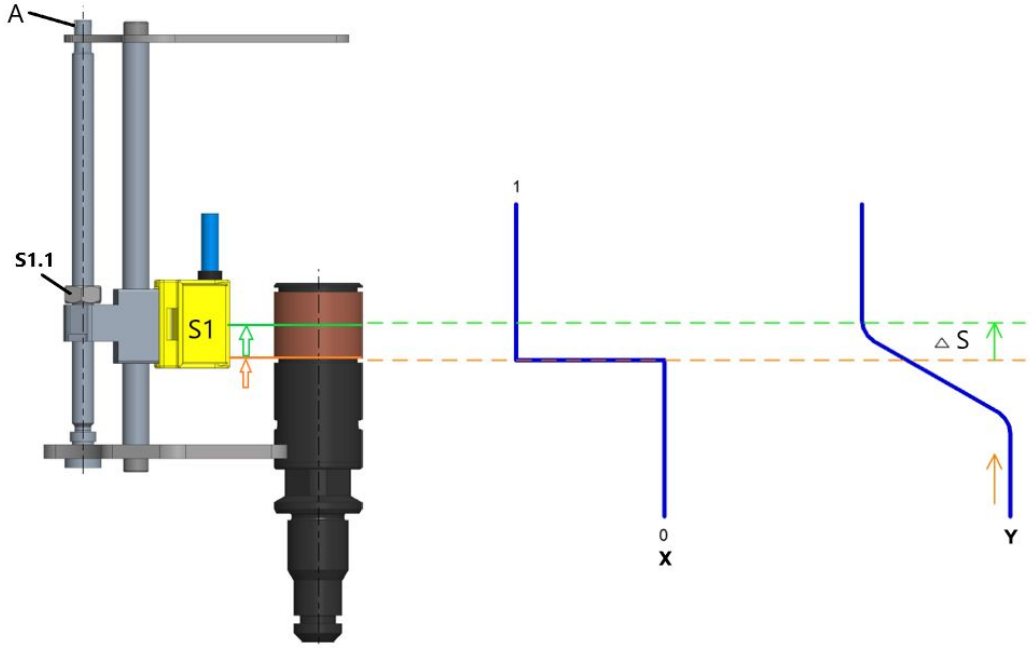


Fig.40: X = signal curve sensor / Y = current course curve (LED brightness)

Move the valve to the actuated end position (see “Control top with solenoid valves” page 26)

Adjusting sensor S2

Carry out the following steps:

1. Loosen lock nut M5 S2.1 using jaw wrench AF 8 in counter-clockwise direction.
2. To adjust sensor S2, turn the sensor position on spindle B into the upper area in accordance with Fig. 35. 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 in Fig. 37).

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 Table 1 to add the necessary tolerance allowance (green line in Fig. 37).

→ The light intensity of LED B changes.

5. Loosen lock nut M5 S2.1 using jaw wrench AF 8 in clockwise direction.

→ Sensor S2 is adjusted with tolerance.

→ Reset valve actuation, LED B goes out and LED A lights up green.

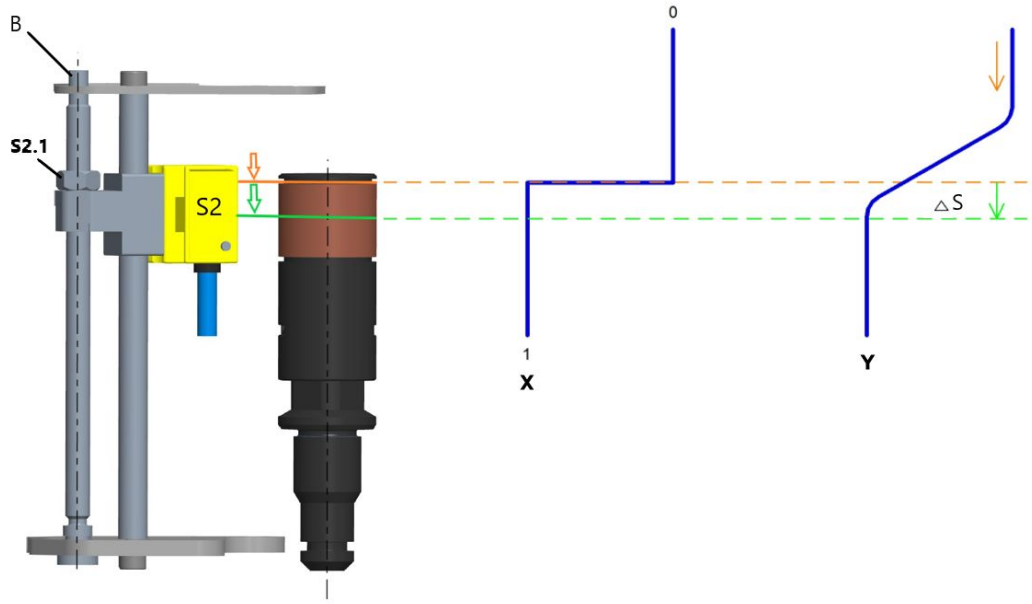


Fig.41: X = signal curve sensor / Y = current course curve (LED brightness)

7.5.2 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": non-actuated position of the valve is spring-closing
- VARIVENT valve type U with actuator selection "Z or NC": non-actuated position of the valve is spring-opening
- VESTA valves with actuator selection "A or NO": non-actuated position of the valve is 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:

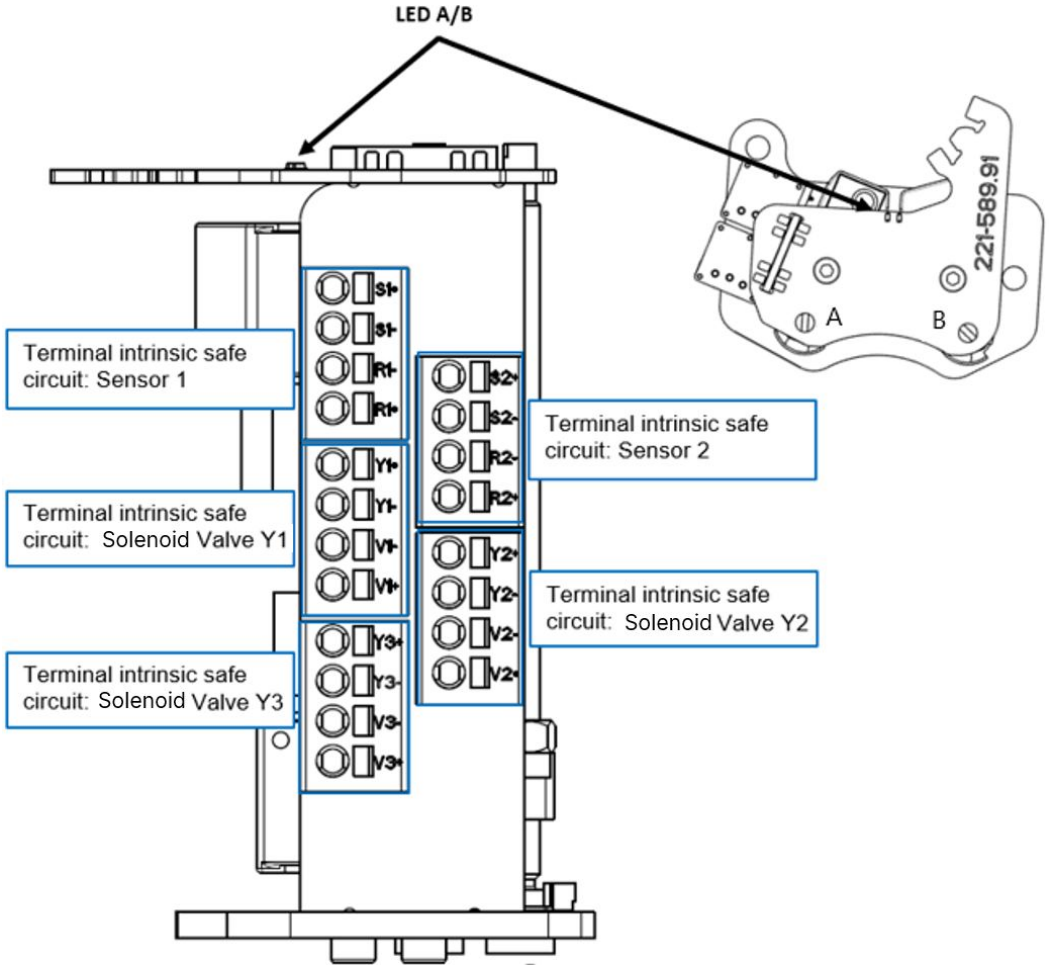


Fig.42

Assignment:		
Sensor *1	**LED colour**	**Spindle**
S1	Green	B
S2	Yellow	A
*1 see wiring diagram at the terminal strip		

Table 2			
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)

Table 2			
Description of the function of the terminal strips			
Intrinsically safe circuit	**Terminal strip**	**Designation**	**Functional description**
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 in accordance with Table 2

Requirement:

→ Switch off the supply voltage

Carry out the following steps:

1. Loosen both wires of sensor S1 and S2 from the terminal strip S1+/S1- and S2+/S1- 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.

Valve is not actuated!

Adjusting sensor S1

Carry out the following steps:

1. Loosen lock nut M5 S1.1 using jaw wrench AF 8 in counter-clockwise direction.
2. To adjust sensor S1, turn the sensor position on spindle B into the upper area in accordance with Fig. 35. 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 in Fig. 39).
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 Table 1 to add the necessary tolerance allowance (green line in Fig. 39).

   → The light intensity of LED A changes.
5. Loosen lock nut M5 S1.1 using jaw wrench AF 8 in clockwise direction.

   → Sensor S1 is adjusted with tolerance.

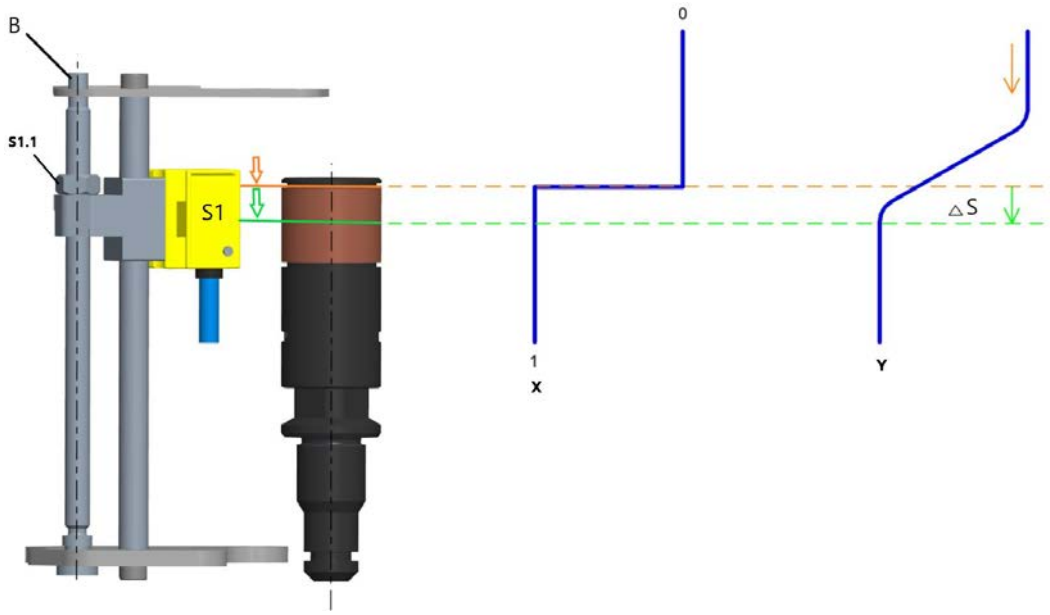


Fig.43: X = signal curve sensor / Y = current course curve (LED brightness)

Move the valve to the actuated end position (see “Control top with solenoid valves” page 26)!

Adjusting sensor S2

Carry out the following steps:

1. Loosen lock nut M5 S2.1 using jaw wrench AF 8 in counter-clockwise direction.
2. To adjust sensor S2, turn the sensor position on spindle B into the lower area in accordance with Fig. 35. 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 in Fig. 40).
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 Table 1 (green line in Fig. 40).

   → The light intensity of LED B changes.
5. Loosen lock nut M5 S2.1 using jaw wrench AF 8 in clockwise direction,

→ Sensor S2 is adjusted with tolerance.

→ Reset valve actuation, LED B goes out and LED A lights up green.

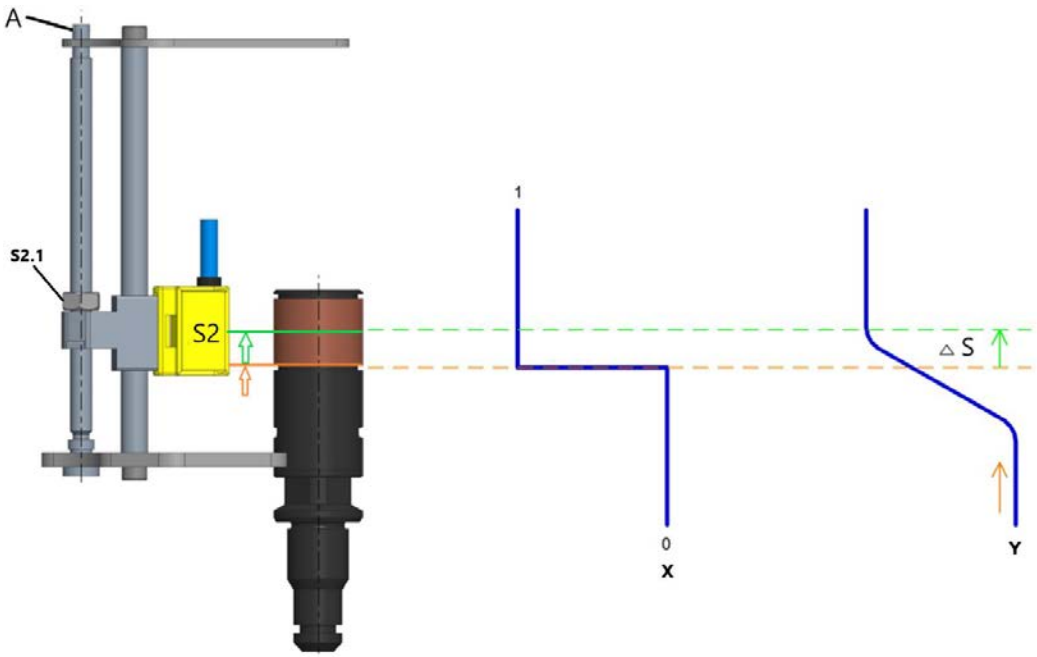


Fig.44: X = signal curve sensor / Y = current course curve (LED brightness)

8 Operation and control

8.1 Safety precautions

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

For operation, the following principles apply:

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

9 Cleaning

9.1 Cleaning

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!

10 Servicing

Hint!

Please check the components on a regular basis. Depending on the degree of contamination 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 valves, filters, silencers and membranes.

If the functionality is no longer guaranteed due to a high degree of contamination or defects in components, replace with original spare parts before restarting the equipment.

10.1 Safety instructions

Maintenance and repair

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

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

For maintenance and repair, the following principles apply:

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

- Check pipes are firmly secured, also check for leaks and damage.
- Check that all emergency stop devices are working correctly.

Disassembly

For disassembly, the following principles apply:

- Only qualified personnel are allowed to dismantle the component.
- The component must be switched off and secured against being switched back on before it is dismantled. Work may only be started once any residual energy has been discharged.
- Disconnect all power and utility lines.
- Markings, e.g. on lines, must not be removed.
- Do not climb on the component. Use suitable access aids and working platforms.
- Mark the lines (if unmarked) prior to disassembly to ensure they are not confused when re-assembling.
- Protect open line ends with blind plugs against ingress of dirt.
- Pack sensitive parts separately.
- For longer periods of standstill, observe the storage conditions, see .

10.2 Inspections

Checking parts are firmly secured

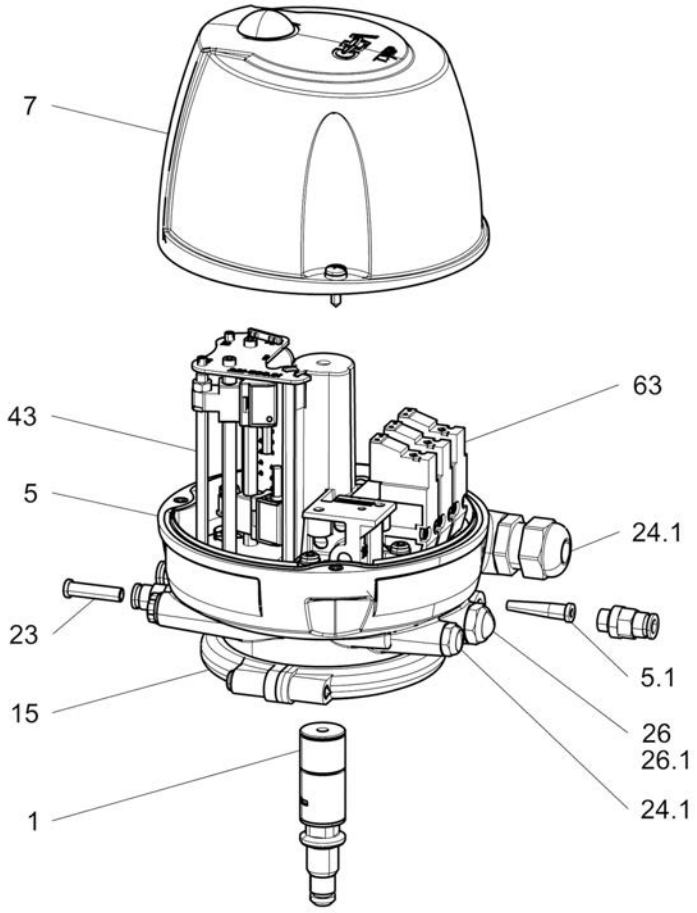


Fig.45

1. Air hose connections
2. Cable connections at the sensor module
3. Screw connection between sensor module (43) and base (5)
4. Clamp (15)
5. Lock nut on the sensor
6. Screw connection to the base (5) and in the sensor module terminal strip (43)
7. Cap nut of the cable gland (24.1)
8. Screw connection between cap (7) and base (5).
9. Check the housing for mechanical damage.
10. Plug (23)

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.

→ Done

10.3 Disassembly

10.3.1 Removing the Control Top from the Valve

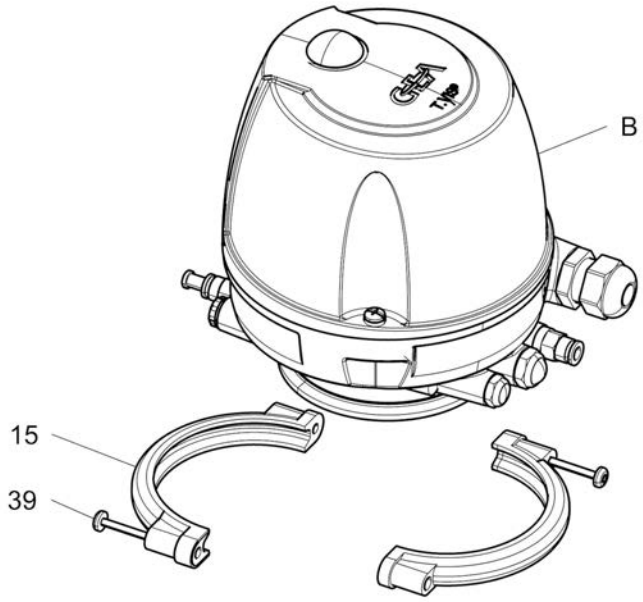


Fig.46

Requirement:

- Make sure that the solenoid valve is not actuated.

Hint!

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

Carry out the following steps:

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

→ Done

10.3.2 Disassembly the Control Top into its

Components 10.3.2.1 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 control plates (65).

10.3.2.2 Removing the Cap

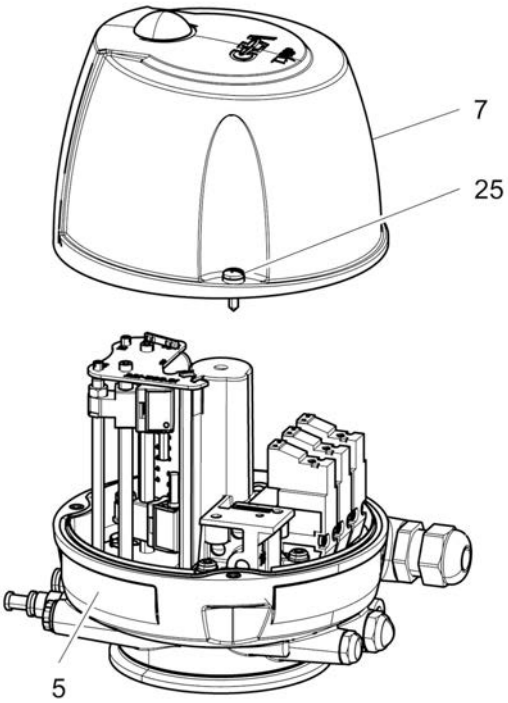


Fig.47

Danger

Electrical voltage

Danger to life

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

Carry out the following steps:

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

→ Done

10.3.2.3 Removing the Solenoid Valves and the Valve Plate

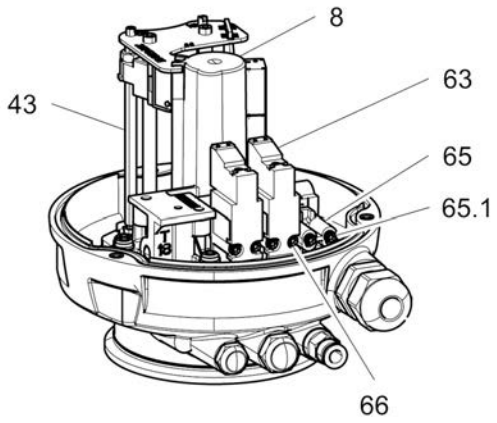


Fig.48

Requirement:

- 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 valves specified in chapter “Technical data”.

⚠ Caution!

Risk of burns from the solenoid valve as a result of long switch-on time and high ambient temperature

Risk of burns from the solenoid valve

► Allow to cool before disassembly.

Carry out the following steps:

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 control plate (65) from the pneumatic block (8).

→ Solenoid valves and valve plates are removed.

→ Done

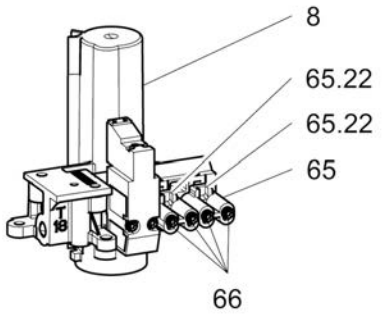


Fig.49

10.3.2.4 Removing the sensor module

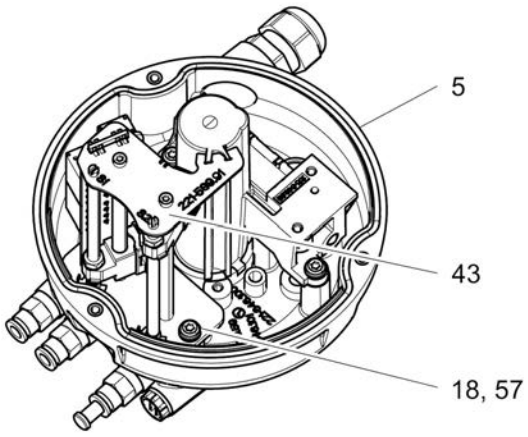


Fig.50

Carry out the following steps:

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).

→ Sensor module is removed.

10.3.2.5 Removing the pneumatic block

Requirement:

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

Carry out the following steps:

1. Undo the screws (57.1, 57.2).

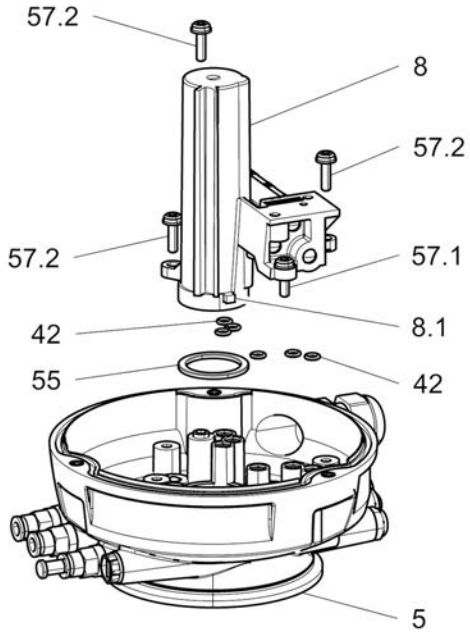


Fig.51

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

→ The pneumatic block is removed.

→ Done

10.4 Installation

Explosive Atmospheres!

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.

Hint!

Assembly is done in reverse order.

Tighten the screws and connections as indicated in the table

No.	Designation	Tightening torque	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	

No.	Designation	Tightening torque	Comments
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	

10.4.1 Install pneumatic and external connections

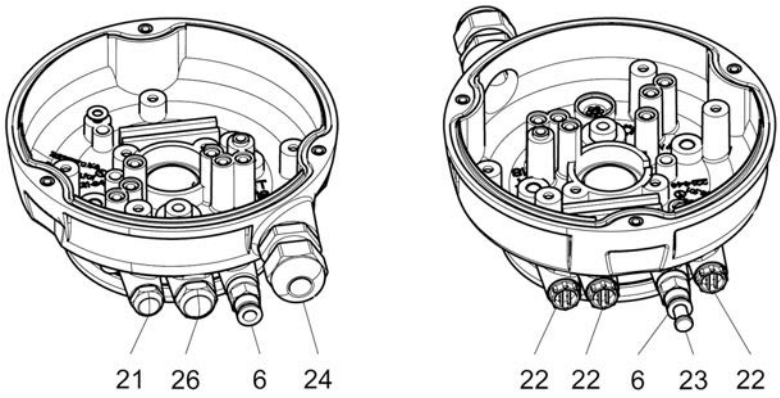


Fig.52

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

Carry out the following steps:

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.

→ Done

10.4.2 Fitting the Pneumatic Block

Requirement:

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

Hint!

Use the following pneumatic block type on ASEPTOMAG valves:
Pneumatic block T.VIS-15/ 3PV/ASG material no. 221-646.92

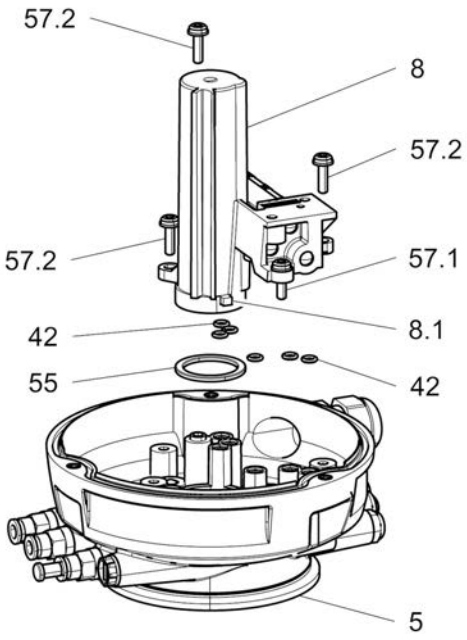


Fig.53

Carry out the following steps:

1. Fit the 6 O-rings (42) into the base (5).
2. Fit the O-ring (55).
3. Fitting the pneumatic block (8):
   First tighten screw (57.1), then screw (57.2): tightening torque 1.5 Nm (1.0 lbft).

→ The pneumatic block has been installed

→ Done

10.4.3 Mounting the sensor module

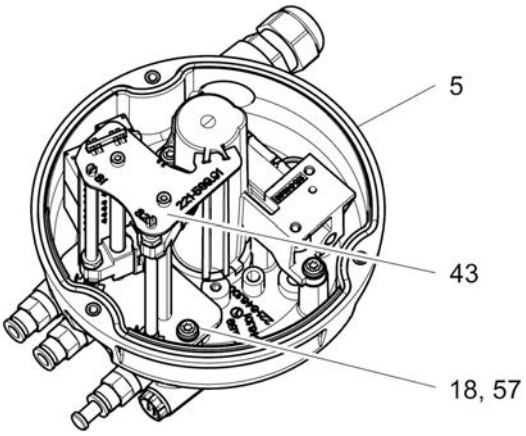


Fig.54

Carry out the following steps:

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.

→ The sensor module is mounted.

→ Done

10.4.4 Mount solenoid valves and valve plates

Requirement:

- Note the assignment of cables between solenoid valve and sensor module -connect solenoid valve Y1 to terminal Y1+/Y1-.
- Only use the solenoid valves specified in the chapter "Technical data".

Hint!

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

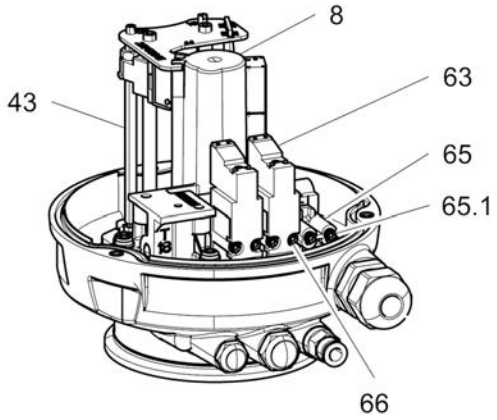


Fig.55

Carry out the following steps:

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

→ The solenoid valves and the valve plates are mounted.

→ Done

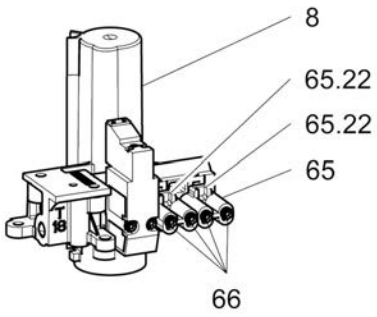


Fig.56

10.4.5 Connect internal wiring

Explosive Atmospheres!

Connection of internal intrinsically safe circuits

The internal intrinsically safe circuits must be connected to the terminal strip in their correct position.

► The terminal strip assignments and designations from chapter 6.4.3 must be observed.

Explosive Atmospheres!

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 grounded parts.
► Check distance between intrinsically safe circuits of at least 6.0 mm.

Explosive Atmospheres!

Polarity of the 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 6.4.3 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)

Carry out the following steps:

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.

→ Done

10.5 Maintenance

10.5.1 Replacing the Seals on the Base

Only use sound absorber (21, 26) or exhaust air throttle (21.1) types specified in chapter “Technical data” . Do not grease these spare parts before fitting them.

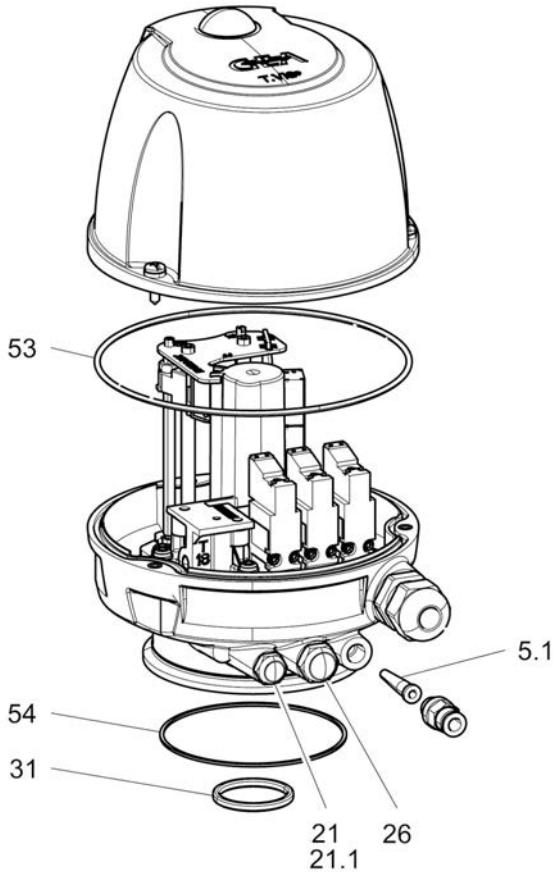


Fig.57

⚠ Caution!

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

10.5.2 Maintenance of Sound Absorber, Filter, Non-Return Valve and Throttles

Carry out the following steps:

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.

→ Done

10.5.3 Mounting cap

Explosive Atmospheres!

Ensure that the base and cap is 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.

Carry out the following steps:

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

→ Done

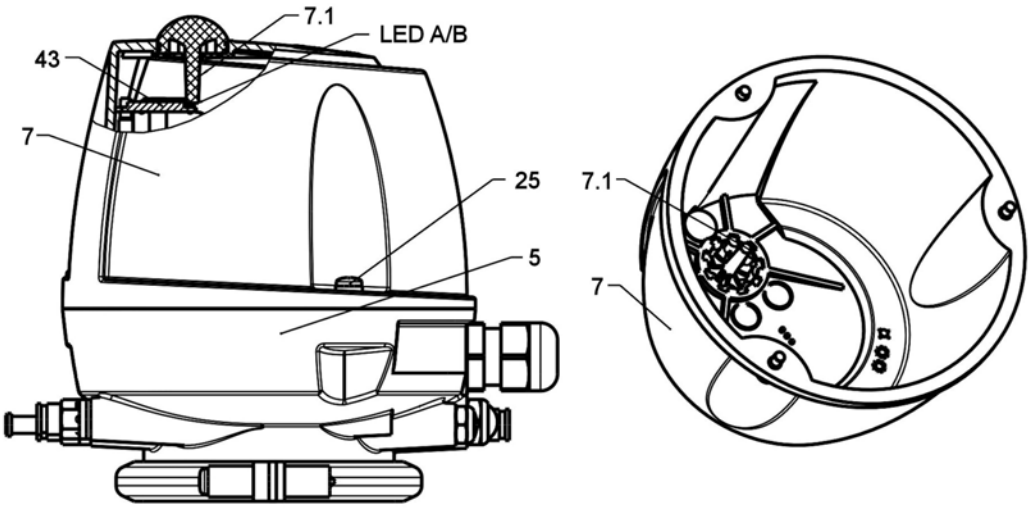


Fig.58

11 Alarms

11.1 Malfunctions and remedies

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

Malfunction, signalling, cause, remedy			
Malfunction	**Signalling**	**Cause**	**Remedy**
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 the manual override device on the solenoid valve activated.	Cancel the 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	Feedback signals for the non-actuated and actuated positions to the PLC not connected.	Correct wiring, see “Electrical connection”

12 Decommissioning

12.1 Safety instructions

For shutting down, the following principles apply:

- Switch off the compressed air.
- Switch off the component with the main switch.
- Padlock the main switch (if fitted) in the off position to prevent it from being switched back on. The key to the padlock must be deposited with the person responsible until the machine is restarted.
- For longer periods of standstill, observe the storage conditions, see Chapter 4, Page 34.

12.2 Disposal

12.2.1 General notes

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

The component consists of the following materials:

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

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

13 Spare parts list - control top T.VIS E-20

Hint!

This product is designed for use in potentially explosive areas and is subject to the applicable certification. Accordingly, and especially for safety reasons, individual spare parts are only available for selected components. In the event of need for repair or spare parts please contact GEA Tuchenhagen GmbH.

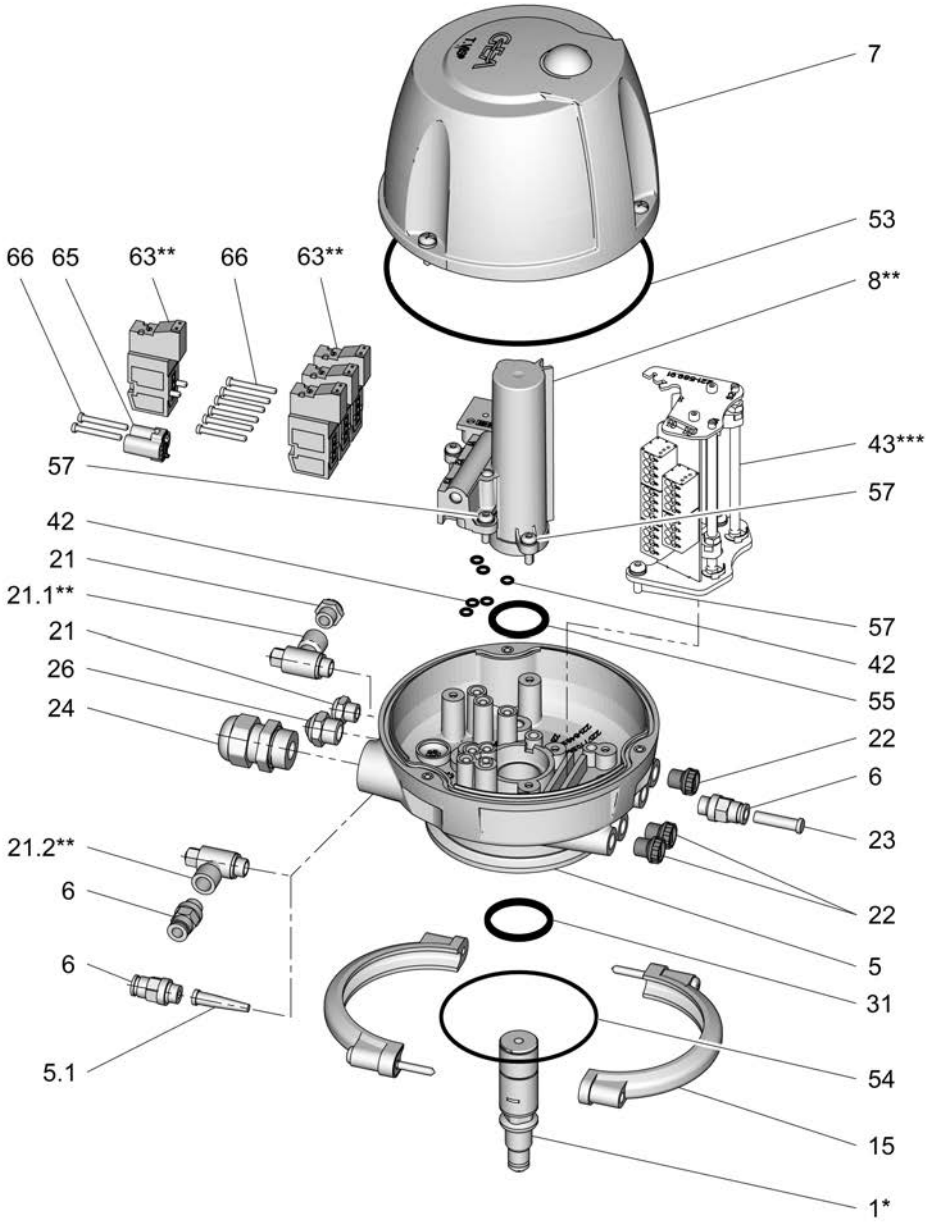


Fig.59

Control Top T.VIS® A-20 with cable connection and air connection with metric connections					
Order code				TE20R...E	
Item	Designation	Material	TE20N...E	TE20I...E	TE20L...E
				TE20J...E	
1*	Switch bar T.VIS M-15 and T.VIS E-20 see separate spare parts list 221ELI010734DE				
5	Base T.VIS E-20	PA12 CF20/ GF10	221-770.59	221-770.59	221-770.59
5.1	Filter	PE	221-003869	221-003.869	221-003869
6	Screw-in plug connection G1/8"-6/4	MS CV	933-176	933-176	933-176
7	Cap T.VIS E-20 incl. light dome	PA12 CF20/ GF10+PA12 TR90	221-646.91	221-646.91	221-646.91
8**	Pneumatic block 3PV	PA12 CF20/ GF10	221-646.89	221-646.89	221-646.89
15	Clamp connection KU	PA6T HTV-5H1	221-507.08	221-507.08	221-507.08
21	Sound absorber G1/8"	MS CV	933-175	933-175	933-175
22	Locking screw G1/8"	PE-HD	922-369	922-369	922-369
23	Locking screw Ø 6.0	PP-GF30	922-281	922-281	922-281
24	Cable gland HSK-K-EX-Active M20x1.5/l=9/ -20°C to +85°C with O-ring	PA6+NBR	508-919	508-919	508-919
26	Sound absorber G1/4"	MS CV	933-174	933-174	933-174
31	O-ring 29x3 / -25°C to 100°C	NBR N7027	930-041	930-041	930-041
42	O-ring 4x1.5	FKM	930-169	930-169	930-169
43***	Sensor module T.VIS E-20 with 2 sensors	PA6 + PCB (Isola DE104)+PA12	221-589.91	221-589.91	221-589.91
53	O-ring 135x2.5 / -30°C to 100°C	NBR N7022	930-833	930-833	930-833
54	O-ring 78x1.5 / -30°C to 100°C	NBR N7036	930-117	930-117	930-117
55	O-ring 26x3 / -30°C to 100°C	NBR N7003	930-038	930-038	930-038
57	Thread-forming screw	A2	514-750	514-750	514-750
63**	Solenoid valve 24VDC/EX incl. seal / -10° to +50°C	PA/POM +NBR70	--	512-174	512-174
65	Valve plate incl. seal	PPO GFN2 + NBR70	221-589.27	221-589.27	--
66	Thread-forming screw	A2	514-761	514-761	514-761
** see table with options					

Control Top T.VIS® E-20 with metric cable connection and air connections with inch connections					
Order code				TE20R...N	
Item	Designation	Material	TE20N...N	TE20I...N	TE20L...N
				TE20J...N	
1*	Switch bar T.VIS M-15 and T.VIS E-20 see separate spare parts list 221ELI010734DE				
5	Base T.VIS E-20	PA12 CF20/ GF10	221-770.59	221-770.59	221-770.59
5.1	Filter	PE	221-003869	221-003.869	221-003869
6	Screw-in plug connection G1/8"- 6.35	MS CV	933-173	933-173	933-173
7	Cap T.VIS E-20 incl. light dome	PA12 CF20/ GF10+PA12 TR90	221-646.91	221-646.91	221-646.91
8**	Pneumatic block 3PV	PA12 CF20/ GF10	221-646.89	221-646.89	221-646.89
15	Clamp connection KU	PA6T HTV-5H1	221-507.08	221-507.08	221-507.08
21	Sound absorber G1/8"	MS CV	933-175	933-175	933-175
22	Locking screw G1/8"	PE-HD	922-369	922-369	922-369
23	Locking screw Ø 6.35	PP-GF30	922-280	922-280	922-280
24	Cable gland HSK-K-EX-Active M20x1.5/l=9/ -20°C to 85°C with O-ring	PA6+NBR	508-919	508-919	508-919
26	Sound absorber G1/4"	MS CV	933-174	933-174	933-174
31	O-ring 29x3 / -25°C to 100°C	NBR N7027	930-041	930-041	930-041
42	O-ring 4x1.5	FKM	930-169	930-169	930-169
43***	Sensor module T.VIS E-20 with 2 sensors	PA6 + PCB (Isola DE104)+PA12	221-589.91	221-589.91	221-589.91
53	O-ring 135x2.5 / -30°C to 100°C	NBR N7022	930-833	930-833	930-833
54	O-ring 78x1.5 / -30°C to 100°C	NBR N7036	930-117	930-117	930-117
55	O-ring 26x3 / -30°C to 100°C	NBR N7003	930-038	930-038	930-038
57	Thread-forming screw	A2	514-750	514-750	514-750
63**	solenoid valve 24VDC/EX incl. seal / -10°C to 50°C	PA/POM +NBR70	--	512-174	512-174
65	Valve plate incl. seal	PPO GFN2 +NBR70	221-589.27	221-589.27	--
66	Thread-forming screw	A2	514-761	514-761	514-761
** see table with options					

Item	Designation	Material	Material no.	Options
8**	Pneumatic block 3PV/ASG	PA12 CF20/ GF10	221-646.92	to be used in control top T.VIS E-20 for ASEPTOMAG valves
21.1**	Throttle valve G 1/8	Brass/nickel-plated	603-042	to reduce the closing speed main stroke (air outlet with sound absorber pos. 21)
21.2**	Throttle valve G 1/8	Brass/nickel-plated	603-042	to reduce the opening speed main stroke (connection with screw-in plug connection pos. 6)
63**	solenoid valve 12VDC/EX incl. seal / -10° to +50°C	PA/POM +NBR70	512-177	for use in control top T.VIS E-20 with electrical connection 12VDC/EX

Hint!

Positions 5.1; 6; 21; 21.1; 22; 23; 26 are not relevant for the warranty of the housing seal!

Not all parts are available as a spare part. In the event of need for repair or replacement please contact GEA Tuchenhagen GmbH.

***** Not available as spare part**

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

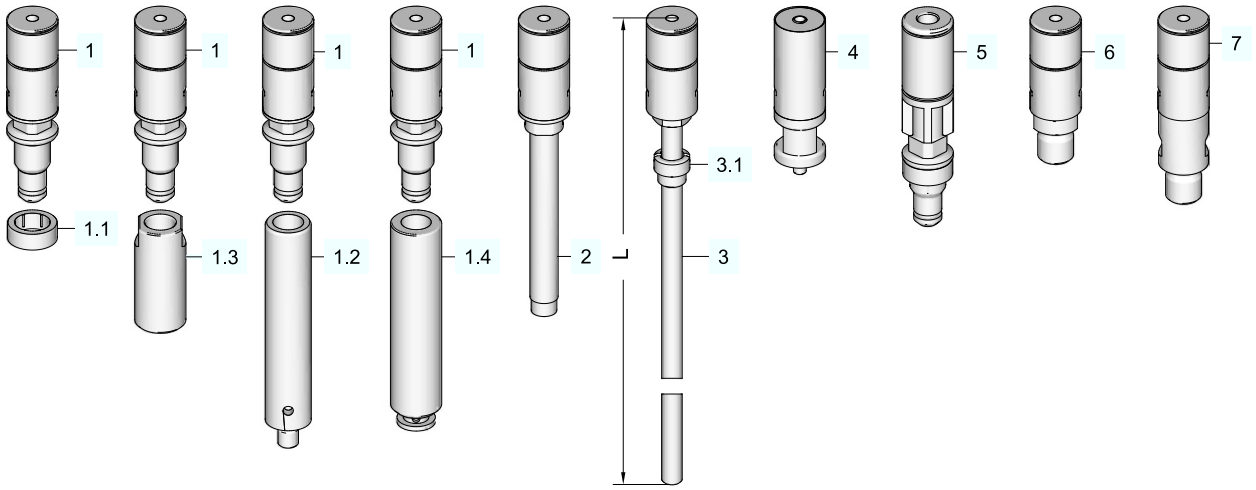


Fig.60

Item	Designation	Material	Material no.	Application
1	Switch bar	PA6/GK30	221-589.80	Standard for all valves with the exception of butterfly valves T-smart 7, valves with lifting actuator R; T_R; L; M_O(06); MT/T_R(08); M/2.0 and ECOVENT valves N_ECO and W_ECO
1.1	Ring T.VIS®/ECO	Noryl/GFN2	221-002396	In addition to item 1 and 5 for ECOVENT-valves and VESTA XL H_A/M-valves
1.2	Switch bar	1.4301	224-000214	In addition to item 1, adapter only for T-smart 8000 butterfly valves
1.3	Switch bar incl. O-ring	1.4305	221-589.57	In addition to item 1, adapter only for valves type XL H_A
1.4	TME/T.VIS adapter	1.4305	221-573.06	In addition to item 1, only for butterfly valves ECOVENT-S
2	Switch bar BFV-7	1.4301/PA6	224-001697	For butterfly valves T-smart 7 and 9
3	Switch bar LFT-R	1.4301/PA6	see type	For valves with lifting actuator R; T_R; L; M_O(06); MT/T_R(08); M/2.0
4	Switch bar M-15 ASG	1.4305/PA6	221-589.87	For all GEA ASEPTOMAG valves
5	Switch bar M-15	PA6	221-589.79	for ECOVENT-valves N_ECO and W_ECO
6	Switch bar M-15 N_V	1.4305/PA6	221-589.89	only for VARIVENT long-stroke valves with ZEF/V and ZFD/V actuator
7	Switch bar FLOWVENT/T.VIS	1.4404/PA6	822-100.49	only for FLOWVEN seat valves

Type		**125**	**200**	**205**	**166**	**256**
Use on standard actuators		**see dimension sheet 221MBL010829**				
Item	Designation	Material no.				
3	Switch bar LFT-R cpl. incl. slider	221-618.25	221-618.26	221-618.27	221-618.28	221-618.29
L = Length		287	317	347	406	453
3.1	Sliding piece	221-619.04				

15 Dimension sheet - control top T.VIS® E-20

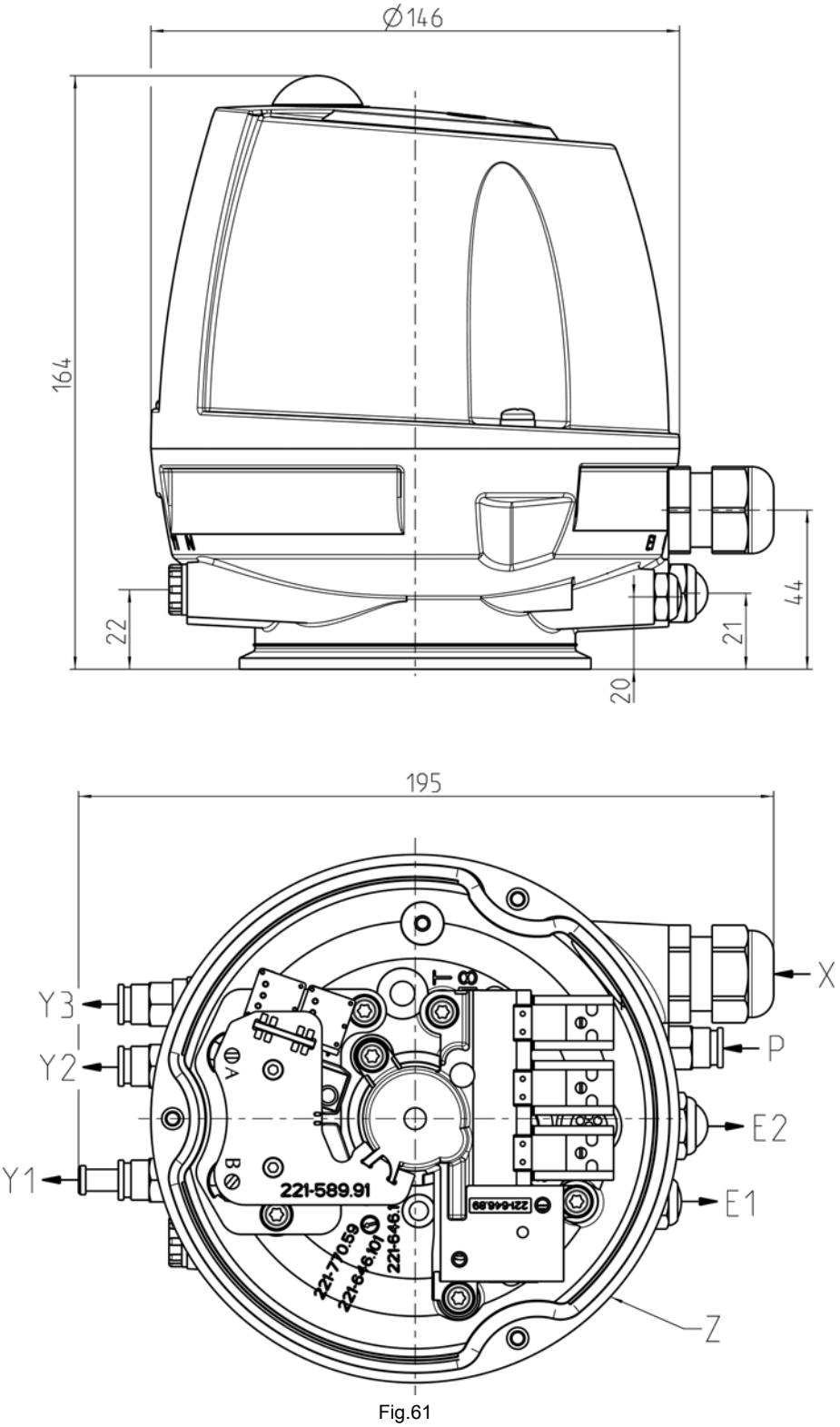


Fig.61

Assignment of Y1, Y2, Y3, E1, E2 and P refer to the Operating Instructions Control Top T.VIS E-20
X= supply voltage, electric actuation and feedback
Z = View without cap

16 Appendix

16.1 Lists

16.1.1 Abbreviations and terms

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

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

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