



Operating Instructions

Control modul T.VIS[®] A-8

Made by GEA Tuchenhagen

Edition 28/10/2011

Part no. 430-567

English



Product	Control modul T.VIS [®] A-8
Document	Operating Instructions Issue 28/10/2011 Part no. 430-567 English
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Notes for the Reader

The present Operating Instructions is part of the user information for the control module. The Operating Instructions contains all the information you need to transport, install, commission, operate and carry out maintenance for the control module.

Binding Character of This Operating Instructions

This Operating Instructions contains the manufacturer's instructions to the owner of the control module and to all persons who work on or use the control module regarding the procedures to follow.

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

Store the Operating Instructions in such a way that it is accessible to the owner and the operating staff during the entire life cycle of the control module. When the location is changed or the control module is sold make sure you also provide the Operating Instructions.

Notes on the Illustrations

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

Symbols and Highlighting

In this 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 cause serious damage to health, or even death.

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



EXPLOSION HAZARD

Warning: Explosions.

Failure to observe the warning may result in a severe explosion.

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



WARNING

Warning: Serious Injuries.

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

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

NOTE

Warning: Damage to property.

Non-observance of the warning note can cause serious damage to the control module or in the vicinity of the control module.

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

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

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.

TIP

Further useful information.

Abbreviations and Terms

Abbreviation	Explanation
A	Output
approx.	approximately
°C	Unit of measurement of temperature [degree Celsius]
CAN_H	Communication DeviceNet
CAN_L	Communication DeviceNet
COM	Communication
DIN	German standard issued by DIN (Deutsches Institut für Normung e.V, German Institute for Standardization)
EN	European Standard
E	Input
EEPROM	Electrically Erasable Programmable Read-Only-Memory the data of which is maintained in the event of a power failure.
ext.	external
GEA	GEA AG group of companies GEA stands for Global Engineering Alliance
IP	Protection class
LED	Light-emitting diode
LEFF®	Low Emission Flip Flop Low emission clock pulse circuit
L+	Positive conductor
L-	Negative conductor
mA	Unit of measurement of current [milliampere]
max.	maximum
mm	Unit of measurement of length [millimetre]
M	metric
MB	<u>M</u> ega <u>B</u> yte
NC	<u>N</u> ot <u>c</u> onnected
Nm	Unit of measurement of work [newton metre] UNIT OF TORQUE 1 Nm = 0.737 lbft Pound-Force (lb) + Feet (ft)
NOT element	Logic element
NPN	Current sinking, negative logic

Abbreviation	Explanation
PA	Polyamide
PC	Personal Computer
PE-LD	Low-density polyethylene
PNP	Current sourcing, positive logic
Prox.	Proximity switch
RAM	Storage capacity = <u>R</u> ead and <u>M</u> emory
SET-UP	Self-learning installation During commissioning and maintenance, the SET-UP procedure carries out all the necessary settings for the generation of messages.
PLC	<u>P</u> rogrammable <u>L</u> ogic <u>C</u> ontroller
a/f	Indicates the size of spanners [width across flats]
T.VIS	Tuchenhagen Valve Information System
TPE	Thermoplastic elastomer
U	Voltage
V+	Supply +DeviceNet
V-	Supply -DeviceNet
V AC	Volt alternating current
V DC	Volt direct current
W	Unit of measurement of power [Watt]
Inch OD	Pipe dimension acc. to British standard (BS), Outside Diameter
Inch IPS	US pipe dimension Iron Pipe Size

Safety

Safety Note

The control module is operationally reliable. It was built according to state-of-the-art standards.

Nevertheless, the control module can pose dangers, especially if

- the control module is not used in accordance with its intended use,
- the control module is not used correctly,
- the control module is operated under impermissible operating conditions.

Operator's Duties

In your capacity as operator of the facility you bear a particular responsibility for the proper and safe handling of the control module in your facility. Only use the control module when it is in perfect condition to prevent danger to persons and property.

This Operating Instructions contains the information you and your staff need for the safe and reliable operation during the entire service life of the control module. Be sure to read this 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 allow qualified staff to work on the control module.
- The operator must authorize the staff to carry out the relevant tasks.
- Working areas and the entire environment of the control module must be neat and clean.
- The staff must wear suitable work clothing and personal protective equipment. As the operator of the facility make sure that work clothing and personal protective equipment are used.
- Instruct the staff with regard to any properties of the product which might pose a health risk and the preventative measures to be taken.
- Have a qualified first-aider on call during the operation, who can initiate the necessary first-aid measures in case of an emergency.
- Clearly define processes, lines of authority and responsibilities associated with the control module. Everybody must know what to do in case of an emergency. Instruct the staff in this respect at regular intervals.
- The signs relating to the control module must always be complete and legible. Check, clean and replace the signs as necessary at regular intervals.

TIP

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

Qualification of Staff

This section contains information about the qualifications that staff working on the control module must have.

Operating and maintenance staff must

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

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

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

The following minimum qualifications are required:

- Vocational training as a skilled worker who can work on the control module independently.
- Sufficient instruction to work on the control module under the supervision and direction of a qualified specialist.

Each member of staff must meet the following requirements to be allowed to work on the control module:

- Personal qualification for the relevant task.
- Sufficient professional qualification for the relevant task.
- Instructed with regard to the function of the control module.
- Instructed with regard to the operating sequences of the control module.
- Familiar with the safety devices and their function.
- Familiar with this Operating Instructions, especially with the safety instructions and the information which is relevant for the task on hand.
- Familiar with the basic regulations with regard to occupational health and safety and accident prevention.

For work to be carried out on the control module the following user groups are distinguished:

User groups

Staff	Qualifications
Operating staff	<p>Adequate instruction and sound knowledge in the following areas:</p> <ul style="list-style-type: none"> • Function of the control module • Operating sequences of the control module • What to do in case of an emergency • Lines of authority and responsibilities with respect to the task.
Maintenance staff	<p>Adequate instruction as well as sound knowledge of the design and function of the control module.</p> <p>Sound knowledge in the following areas:</p> <ul style="list-style-type: none"> • Mechanical equipment • Electrical equipment • Pneumatic system <p>Authorization with regard to safety engineering standards to carry out the following tasks:</p> <ul style="list-style-type: none"> • Setting devices into operation • Earthing of devices • Marking of devices <p>The relevant certificate of qualification must be submitted before work can be carried out on ATEX certified machines.</p>

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.

Instructions for the Safe Operation

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

General Principles:

To ensure the safe operation of the control module the following principles apply:

- The Operating Instructions must be kept ready to hand at the control module's place of use. It must be complete and in clearly legible form.
- Only use the control module for its intended use.
- The control module must be functional and in good working order. Check the condition of the control module before starting work and at regular intervals.
- Wear tight-fitting work clothing for all work on the control module.
- Ensure that nobody can get hurt on the parts of the control module.
- Immediately report any faults or noticeable changes on the control module to the person responsible.
- Observe the accident prevention regulations and all local regulations.

Installation

For installation, the following principles apply:

- Only properly qualified staff is allowed to install, assemble and set the control module into operation.
- 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.
- During assembly, the control module's safety devices might not be working effectively.
- Reliably secure machine parts which have already been connected against inadvertently being switched on.

Commissioning/Setup Mode

For commissioning, the following principles apply:

- Take protective measures against dangerous contact voltages in accordance with pertinent regulations.
- The control module 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 module, residual risks must be reassessed.

Setting into Operation

For setting into operation, the following principles apply:

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

Operation

For operation, the following principles apply.

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

Shutting down

For shutting down, the following principles apply:

- Switch off the compressed air.
- Switch off the control module via 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 „Transport and Storage“ (Page 19).

Maintenance and Repair

Before starting and maintenance and repair work on the electrical devices of the control module, carry out 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
- Cover or safeguard any adjacent live parts.

For maintenance and repair, the following principles apply:

- Observe the intervals specified in the maintenance schedule.
- Only allow qualified staff to carry out maintenance or repair work on the valve.
- Before starting any maintenance or repair work, the control module must be switched off and secured against being switched back on. 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 valve. 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 valve 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 allow qualified staff to disassemble the control module.
- Before starting disassembly, the control module must be switched off and secured against being switched back on. 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 valve. 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 „Storage“ (Page 20).

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.

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

Signage

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

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

Signs on the control module

Sign	Meaning
	General hazard warning
	Warning Crushing

Residual Risk

Hazard Areas

Please observe the following notes:

- In the event of malfunctions, shut down the control module (disconnect from the power and air supply) and secure it against being used.
- Before starting any service, maintenance or repair work, disconnect the control module 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 module 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.

Residual Dangers

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

Residual dangers on the control module and measures

Danger	Cause	Measure
Danger to life	Inadvertent switch-on of the control module	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 Cover or safeguard any adjacent live parts.
Damage to property	The permanent magnet on the switch bar is fragile.	Protect against impact stress.
	Magnetic fields can delete data carriers and affect or destroy electronic or mechanical components.	Avoid any influence of external magnetic fields on the proximity switch system.
	Welding work can cause loss of data.	Do not carry out any welding work in the vicinity of the control module.
	Sensitive electrical connections.	Do not take the cap off the base.

Transport and Storage

Scope of Supply

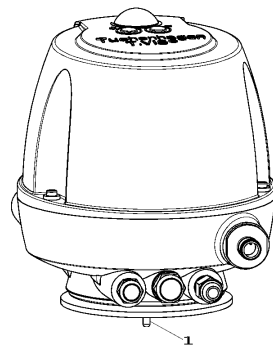
On receipt of the control module check whether

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

Transport

For transport, the following principles apply:

- Only use suitable lifting gear and slings for transporting the package units/control modules.
- Observe the pictograms on the package.
- The control modules must be protected from animal and vegetable fats.
- The synthetic materials of the control modules are fragile. Take care when transporting the control module. Do not grip sensitive parts of the cleaner to lift or push the cleaner or to support yourself.
- The proximity switch on the control module is a sensitive component and must be handled with care.



Control module with proximity switch (1)

Storage

If, during transport or storage, the control module is going to be exposed to temperatures $\leq 0^{\circ}\text{C}$, it must be dried and suitable measures be taken to protect it from damage.

TIP

We recommend that the control module should be stored at a temperature of $\geq 5^{\circ}\text{C}$ for a period of 24 hours prior to any handling so that any ice crystals formed by condensation water can melt.

Intended Purpose

Designated Use

The programmable T.VIS A-8 control module can be used for the pneumatic and electrical connection of all Tuchenhausen process valves with VARIVENT adaptation. Using the device for any other purpose is considered contrary to its designated use.

The T.VIS A-8 control module is available as

- Position indicator without solenoid valve
- Control module with solenoid valve

The T.VIS A-8 control module consists of a base and a cap. The complete unit is mounted on the actuator or adapter of the process valve provided for this purpose using two clamps.

Due to the internal air guiding system, the control air can pass directly from the control module into the actuator on suitable process valves. For process valves which do not allow the air to be guided internally, the control module has a connection option for supplying the air externally via a hose.

Pay attention that the axial hole in the actuator piston can be introduced without being damaged.

The control modules must be protected from animal and vegetable fats. VESTAMID control modules can be used as an option.

The T.VIS A-8 control module must not be used in areas which require ATEX approval.

TIP

The manufacturer will not accept any liability for damage resulting from any use of the control module which is not in accordance with its designated use. The risk of such misuse lies entirely with the operator of the facility.

Requirements for the Operation

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

Improper Operating Conditions

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

Operating the control module is not permitted if

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

Conversion Work

You should never make any technical modifications to the control module. Otherwise you will have to undergo a new conformity process in accordance with the EC Machinery Directive on your own.

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

Function

Operation Principle

The T.VIS A-8 control module works with a microprocessor integrated in the cap, which contains the software for the operation, visualization as well as the intelligent position detection. The valve stroke is detected by a contactless path measuring system integrated in the control module and the information is supplied to the microprocessor.

Position Indicator

In its function as position indicator the T.VIS A-8 indicates the status of the process valve locally by coloured LEDs under the illuminated dome after programming.

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

- 24V DC switching output
- AS interface data bit
- DeviceNet data bit.

For programming, the process valve must be moved once to its end positions by an external solenoid valve.

Control module

In its function as a control module, the positions are signalled in the same manner as for the position indicator function, with the difference being that the solenoid valve 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 module.

To provide compressed air support to the actuator spring, a pneumatic NOT logic element can be used.

The control signals are given autonomously by the microprocessor during automatic end position programming or by the user's process control system in the operating status.

In manual mode, the main actuator can be controlled using the buttons in the cap in order to move the process valve to its end positions by manual operation.

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

Buttons in the Cap

Automatic end position programming and manual mode are generally activated using the buttons in the cap. For safety reasons, the buttons are only enabled within a specific time window after activation of the operating voltage. During this time window, functions can be started. The buttons are automatically locked again after the allowed time has expired.

During automatic end position programming, the control module autonomously detects the number of solenoid valves fitted in the control module and carries out the required programming steps fully automatically.

After end position programming the following is also possible:

- Changing the tolerance ranges manually,
- factory setting to set the attenuation of feedback signals to inactive,
- the LEFF function can be activated on double-seat valves with lifting actuator.

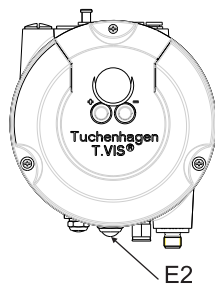
It is also possible to change the colours for visualizing the end positions using the "colour variant" function, which results in the outputs for the feedback signals being switched.

Safety Air Exhaust

To provide protection against excess pressure which can build up in the inside of the control module, 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.

This vent plug is a safety device that must be handled as such. Do not cover the vent plug.



Connections and Operation

Establishing Hose Connections

To ensure reliable operation, the compressed air hoses must be cut exactly square.

Requirement

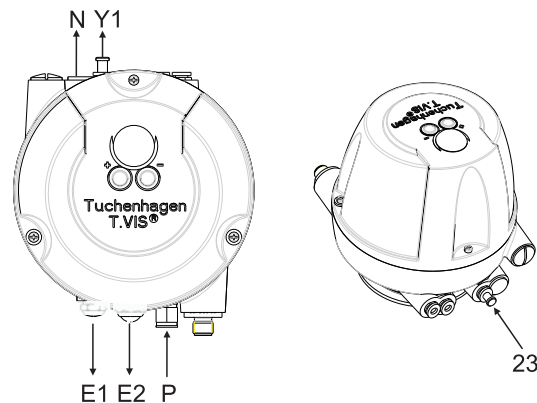
- A hose cutter.

Carry out the following steps:

1. Shut off the compressed air supply.
 2. Use the hose cutter to cut the pneumatic hoses square.
 3. Push the air hose into the air connector on the control module.
 4. Re-open the compressed air supply.
- ✓ Done.

Pneumatic Connections

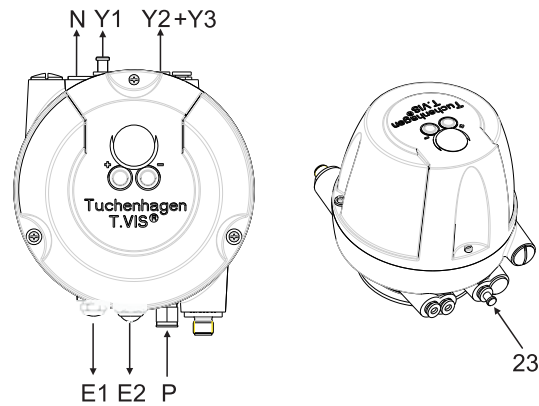
Control Module with 1 Solenoid Valve or Without Solenoid Valve



E1	Exhaust air of the main stroke Y1 with sound absorber Optional: Exhaust air throttle Connection E1 must not be closed!
E2	Safety vent against excess pressure and exhaust air of lifting actuators Y2 and Y3 via sound absorber Optional: non-return valve Connection E2 must not be closed!
P	Central air supply with integrated filter Optional: Intake air throttle
N	Air connection for spring force backup only with logic element NOT
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 plug (23) make sure that the relevant air connection is depressurized!

On most of the GEA Tuchenhausen valve types, solenoid valve P1 internally guides the main control air through the switch bar into the main actuator. The external air connection Y1 is provided in addition.

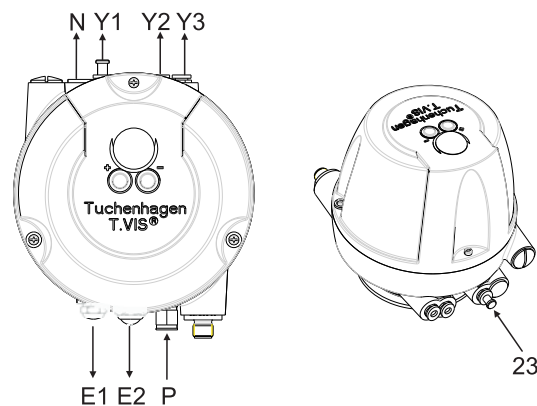
Control module with 2 solenoid valves



E1	Exhaust air of the main stroke Y1 with sound absorber Optional: Exhaust air throttle Connection E1 must not be closed!
E2	Safety vent against excess pressure and exhaust air of lifting actuators Y2 and Y3 Optional: non-return valve Connection E2 must not be closed!
P	Central air supply with integrated filter Optional: Intake air throttle
N	Air connection for spring force backup only with logic element NOT
Y1	Air connection for external main stroke connection with plug (23)
Y2 or Y3	Air connection for lifting the valve disk or 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 plug (23) make sure that the relevant air connection is depressurized!

On most of the GEA Tuchenhausen valve types, solenoid valve P1 internally guides the main control air through the switch bar into the main actuator. The external air connection Y1 is provided in addition.

Control module with 3 solenoid valves

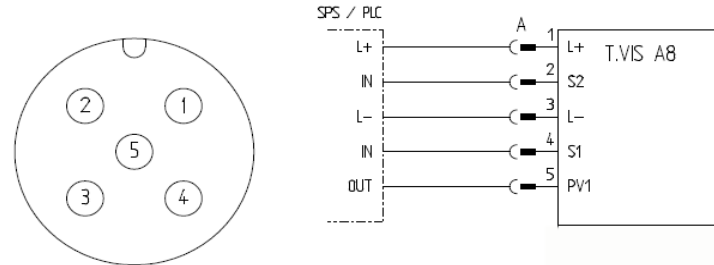


E1	Exhaust air of the main stroke Y1 with sound absorber Optional: Exhaust air throttle Connection E1 must not be closed!
E2	Safety vent against excess pressure and exhaust air of lifting actuators Y2 and Y3 Optional: non-return valve Connection E2 must not be closed!
P	Central air supply with integrated filter Optional: Intake air throttle
N	Air connection for spring force backup only with logic element NOT
Y1	Air connection for external main stroke connection with plug (23)
Y2	For VARIVENT® valves with lifting actuator: Air connection for lifting the valve disk For STERICOM® double-seal valves: Lift down (air connection at actuator top)
Y3	For VARIVENT® valves with lifting actuator: Air connection for lifting the double-disk For STERICOM® double-seal valves: Lift up (air connection at actuator bottom)
23	Plug Control air pressure can be present at the plugs for the air connections! Before removing a plug (23) make sure that the relevant air connection is depressurized!

On most of the GEA Tuchenhausen valve types, solenoid valve P1 internally guides the main control air through the switch bar into the main actuator. The external air connection Y1 is provided in addition.

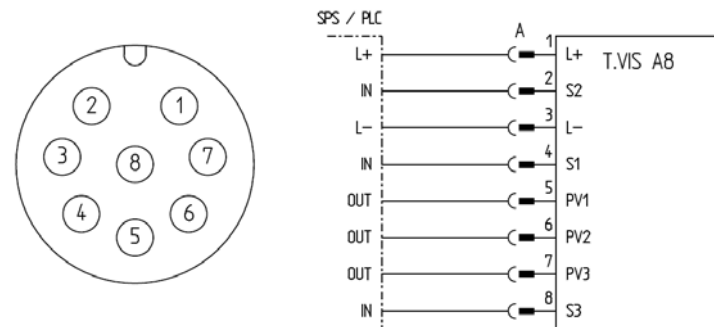
Electrical Connections

Electrical 24 V DC Wiring



5-pole M12 connector A-coded: device connector and view of male connector
Matching cable socket part no. 508-963, see „Accessories“ (Page 65)

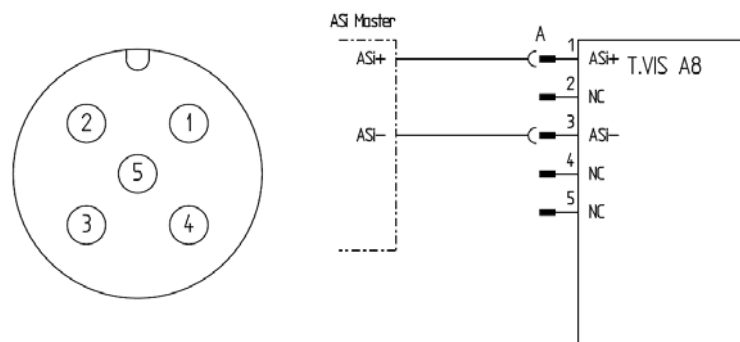
1	L+	U_V L+24 V DC supply voltage
2	S2	Feedback of actuated position*
3	L-	U_V L- reference potential
4	S1	Feedback of non-actuated position
5	PV1	Actuation of solenoid valve Y1
* For assignment for green colour variant, see „Colour Changeover“ (Page 32)		



8-pole M12 connector A-coded: device connector and view of male connector
Matching cable socket part no. 508-061, see „Accessories“ (Page 65)

1	L+	U_V L+24V DC supply voltage
2	S2	Feedback of actuated position*
3	L-	U_V L- reference potential
4	S1	Feedback of non-actuated position
5	PV1	Actuation of solenoid valve Y1
6	PV2	Actuation of solenoid valve Y2
7	PV3	Actuation of solenoid valve Y3
8	S3	Feedback (external proximity switch)
* For assignment for green colour variant, see „Colour Changeover“ (Page 32)		

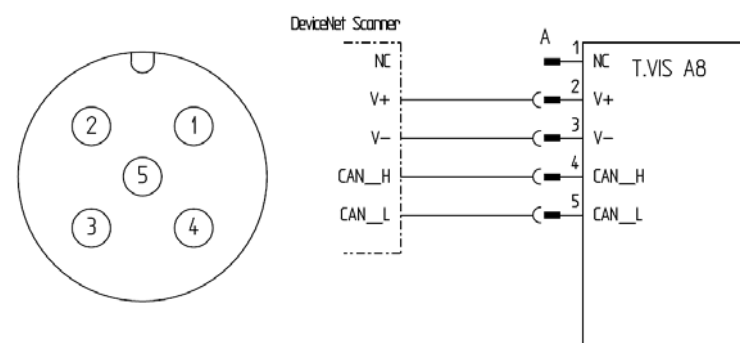
Electrical AS-Interface Wiring



5-pole M12 connector A-coded: device connector and view of male connector
Matching cable sockets part nos. 508-963, 508-027 and 508-028, see „Accessories“ (Page 65)

1	AS-I+
2	NC
3	AS-I-
4	NC
5	NC

Electrical DeviceNet Wiring

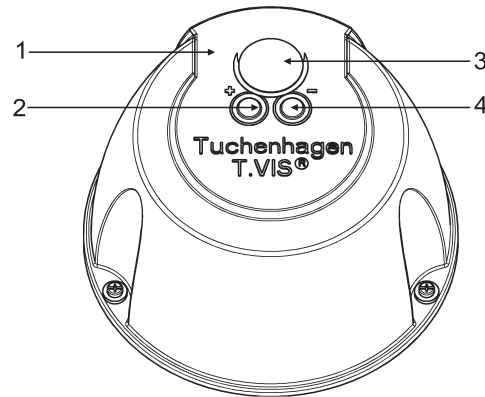


5-pole M12 connector A-coded: device connector and view of male connector
Matching cable sockets part no. 508-963, see „Accessories“ (Page 65)

1	NC
2	V+
3	V-
4	CAN_H
5	CAN_L

Visual Display

Luminous Cap



1	Cap
2	+ button
3	Luminous cap
4	- button

The following statuses are visualized by the luminous cap:

- Valve in non-actuated position: green*, see „Colour Changeover“ (Page 32)
- Valve in actuated position: yellow
- Valve disk lifting (without LEFF): flashing yellow
- Double-disk lifting (without LEFF): steady green light*, see „Colour Changeover“ (Page 32)
- Valve disk VT or double-disk DT LEFF: flashing yellow/green
- Valve disk moving to the non-actuated position: flashing green*
- Valve disk moving to the actuated position: flashing yellow*
- Programming mode active: red
- Fault/malfunction: rapidly flashing red
- Default, standard version
Control module unprogrammed: flashing 3 times - pause - flashing 3 times - pause
Default, special version:
Control module unprogrammed: flashing 2 times - pause - flashing 2 times - pause

If no signal is displayed for a period of more than 5s, this indicates a power failure!

Colour Changeover

The "colour changeover" function allows you to change green to yellow and yellow to green.

Carry out the following steps:

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



TIP

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

Commissioning the Control module without solenoid valve

Activating the Control module

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

Requirement

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

Carry out the following steps:

1. Check the function of the external solenoid valve.
2. Switch on the power supply.
3. Press the relevant buttons to switch to programming mode, see „Operating Overview“ (Page 39).
4. Wait at least 5 seconds after starting the programming function before activating the external solenoid valve and keeping it activated until the process valve has reliably reached its actuated end position.

5. Deactivate the solenoid valve. During this period, the luminous cap is lit red.
 - ➔ After completion of end position programming, the colours in the luminous cap change cyclically. Here you can select switching point tolerances and attenuations which deviate from the factory setting, see chapter „Operating Overview“ (Page 39).
 - ➔ If no selection is made within 30 seconds, the setting last selected is automatically adopted. The process valve moves to the non-actuated position, which is visualized by a steady light in the selected colour.
- ✓ Position indication is activated.

Checking Position Indication

Carry out the following steps:

- ➔ Activate and deactivate the external solenoid valve in order to check the proper function of the T.VIS feedback signals.
- ✓ This completes commissioning.

Commissioning the Control module with solenoid valve

Activating the Control module

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

As the T.VIS A-8 is able to identify its solenoid valve configuration and assumes that the process valve is equipped accordingly, the so-called 'default, special version' must be selected prior to the SETUP if the actual use deviates from the configuration.

NOTE

Solenoid valve Y3 for the main stroke of an external process valve is connected.

The main stroke of the external process valve is briefly activated during the SETUP.

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

Carry out the following steps:

1. Switch on the compressed air supply.
2. Switch on the power supply.

3. Press the relevant buttons to switch to programming mode, see „Operating Overview“ (Page 39).
 - ➔ While the programming routine runs automatically, the solenoid valves in the control module are activated and deactivated, which causes the process valve to automatically move to the positions in succession. During this period, the luminous cap is continuously lit red. After completion of end position programming, the colours in the luminous cap change cyclically.
 - ➔ In deviation from the factory setting you can select switching point tolerances, attenuations and the LEFF function (only if the valve is LEFF compatible), also refer to „Operating Overview“ (Page 39).
 - ➔ If no selection is made within 30 seconds, the setting last selected is automatically adopted and visualized in accordance with the colours selected. The process valve moves to the non-actuated position.
- ✓ The control module is activated.

Checking the Control module

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

Carry out the following steps:

- ➔ Activate the solenoid valves via PLC in order to check the proper function of the T.VIS feedback signals.
- ✓ This completes commissioning.

TIP

The solenoid valve can also be activated and deactivated in manual mode using the operating buttons, see „Operating Overview“ (Page 39).

Service Function

If maintenance is to be carried out on a process valve equipped with T.VIS A-8, the valve insert must be pulled out of the body. For this purpose, the valve disk pretension of the process valve must be relieved by actuating the main actuator. This is made possible by the Service function, see „Operating Overview“ (Page 39).

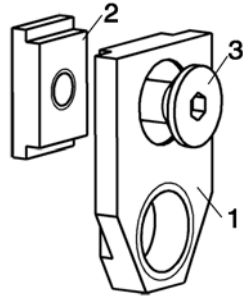
Adjusting the Proximity Switch in the Lantern on Double-Disks Without Balancer on Valves D, R, Y, B

Fitting the proximity switch holder

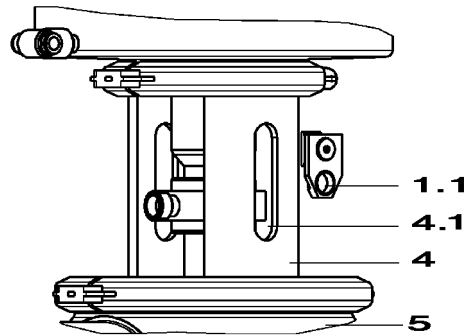


Carry out the following steps:

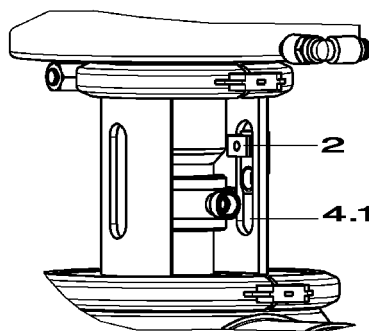
1. Preassemble sliding piece (1), countersunk screw (3) and nut NI (2).



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



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



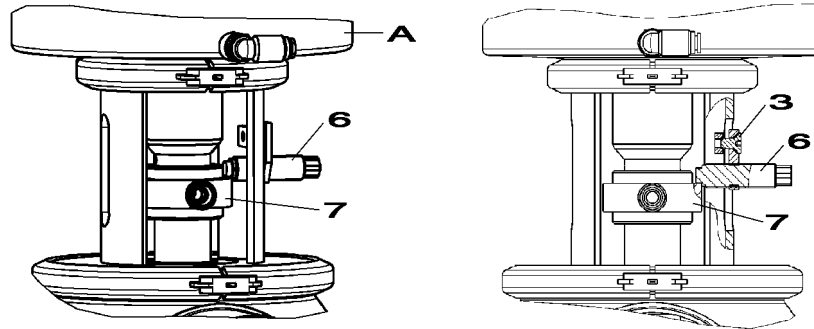
Done.

Adjusting the
proximity switch
holder



Carry out the following steps:

1. Screw the adjusting screw (6) into the proximity switch holder down to the cleaning connection (7).



2. By slightly slackening the countersunk screw, position the proximity switch holder in the slot in the lantern so that the point of the adjusting screw (6) rests on the shoulder of the cleaning connection in the direction of the actuator (A).
3. Fix the proximity switch holder in position with the countersunk screw.

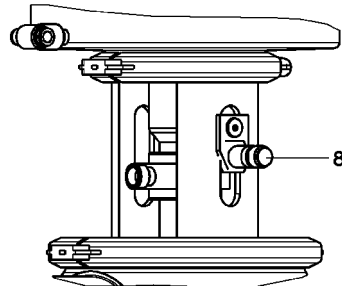
Done.

Fitting the proximity
switch



Carry out the following steps:

1. Remove the adjusting screw.
2. Screw proximity switch M12 (8) into the proximity switch holder until the cleaning connection is reached.



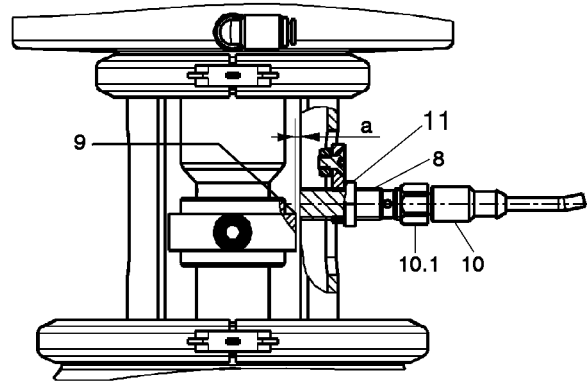
Done.

Adjusting the
proximity switch



Carry out the following steps:

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



2. Tighten the lock nut.
3. Secure the connector (10), which has already been electrically connected to the control module, to the proximity switch using the cap nut M12 (10.1).
 - The LED on the proximity switch must now be lit in operating mode.

Done.

Checking the
function



Carry out the following steps:

- Check the feedback function by actuating solenoid valve Y3.
 - The LED must go out.
- ✓ The proximity switch has now been adjusted and checked.

Operation

Settings in Programming Mode

Setting the Position Tolerance for the Main Stroke

If the tolerance is not set in accordance with the intended purpose, this can result in malfunctions of the valve. GEA Tuchenhausen will not accept any liability for damage resulting from improper setting: the risk lies entirely with the operator of the facility.

Tolerance	Size	Setting for
Tolerance 1	0.3 mm	Valves with bellows
Tolerance 2	0.5 mm	Seat valves (factory setting)
Tolerance 3	0.8 mm	Valves with logic element NOT Control air for spring force backup
Tolerance 4	2.0 mm	butterfly valves

Signal Attenuation for Position Feedback

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

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

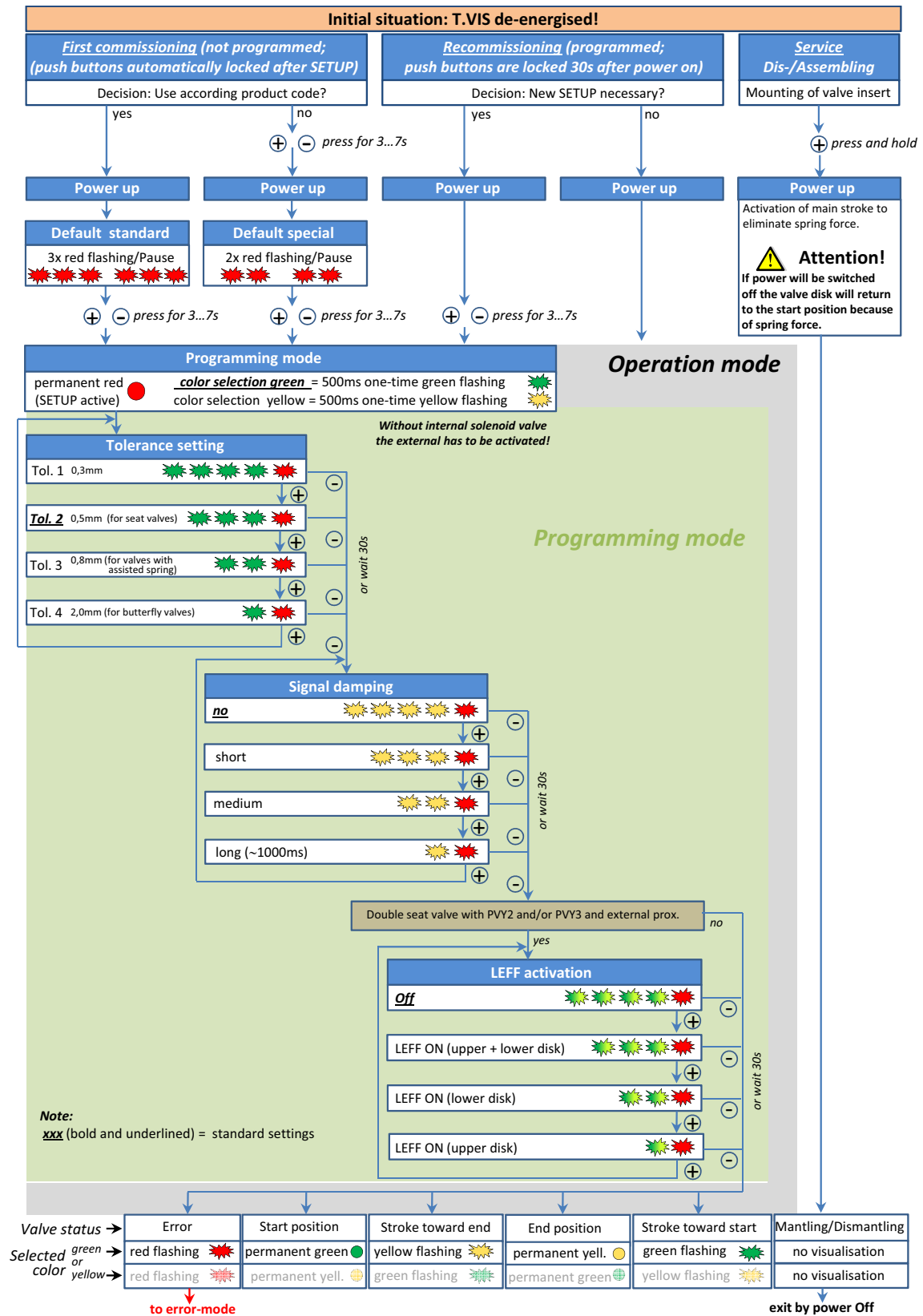
For the reliable monitoring of the valve seat seal GEA Tuchenhausen recommends the factory setting without signal attenuation. GEA Tuchenhausen will not accept any liability for damage resulting from the use of signal attenuation. The risk lies entirely with the operator of the facility.

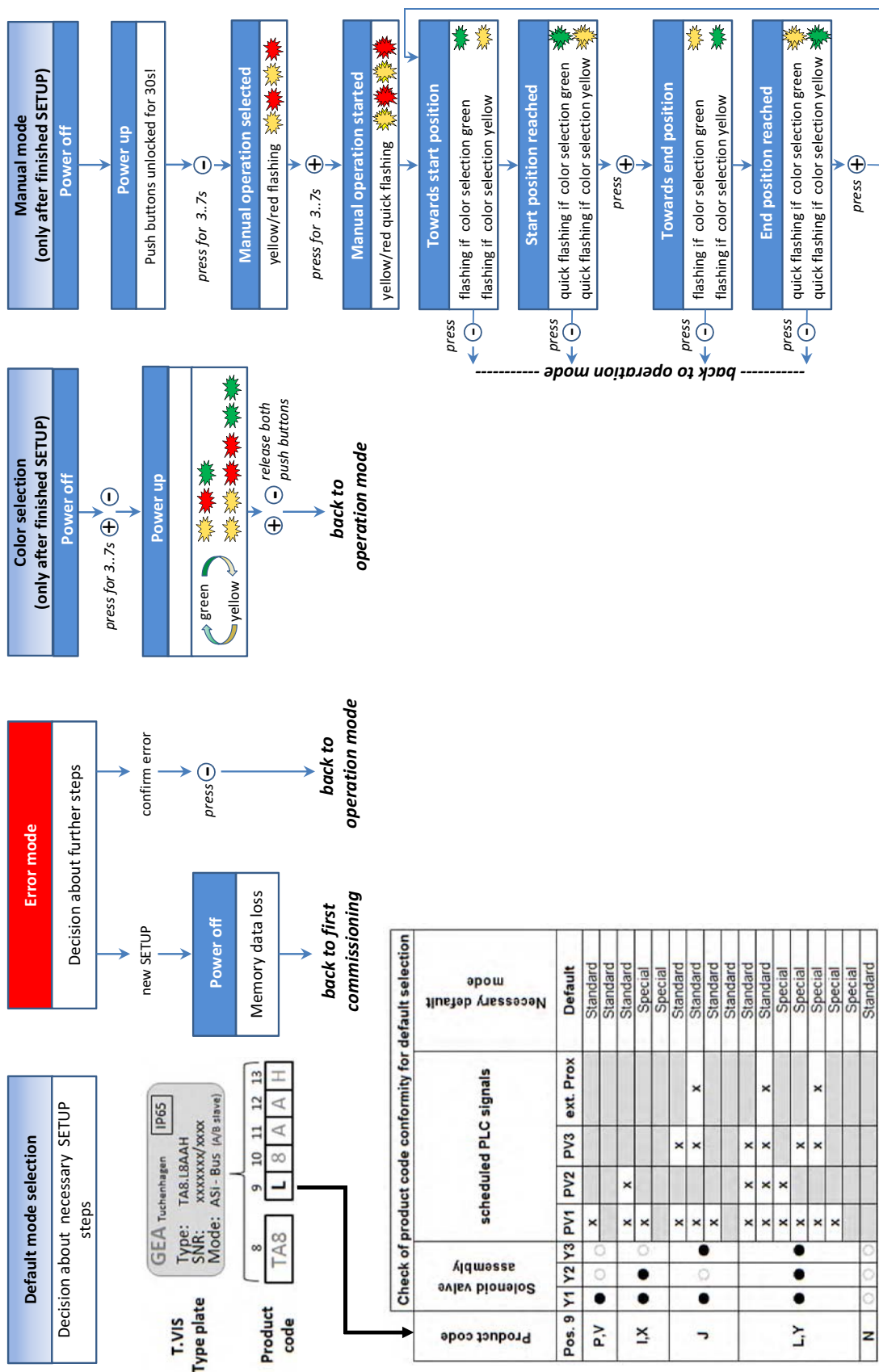
Setting the LEFF Function

The LEFF function achieves steady pulsing (opening and closing) of the valve disks during the typical lifting operation for cleaning the isolation chamber on mixproof valves. For this purpose, solenoid valves Y2 and Y3 are actuated in succession by the PLC. Simultaneous actuation is not possible. This also applies to the operating mode.

LEFF activation	
Off	Factory setting
Valve disk and double-disk	For lifted mixproof valves with solenoid valves Y2 and Y3 and external proximity switch in the lantern
Valve disk	For lifted mixproof valves with solenoid valve Y2
Double-disk	For lifted mixproof valves with solenoid valve Y3 and external proximity switch in the lantern

Operating Overview

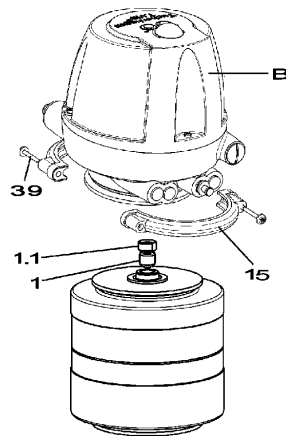




Mounting and Dismantling

This chapter describes how the T.VIS A-8 control module is mounted to and removed from actuators of different valve types.

Mounting to VARIVENT Valve or STERICOM Valve Types N_A/D, N_A(08), T_A(08)



Requirement

- Pay attention not to kink the air hoses when mounting the control module.
- The axial hole in the actuator piston rod must be long enough to accommodate the stroke length to ensure that the proximity switch can be introduced without being damaged.

NOTE

The permanent magnet on the switch bar is fragile.

Damage to the permanent magnet.

→ Protect the permanent magnet against impact stress.

NOTE

Magnetic fields can affect the proximity switch system.

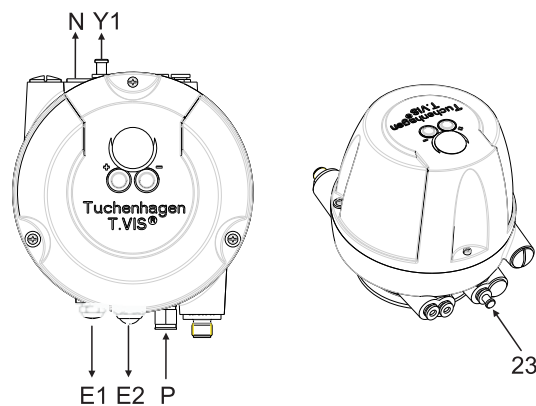
Measured values can be changed.

→ Protect the control module from external magnetic fields.

Carry out the following steps:

1. Check that the switch bar (1) is firmly in place. If necessary, tighten at (1.1) using an a/f 15 open end spanner, tightening torque 2 Nm (1.4 lbft).
2. Fit the control module (B) over the switch bar (1) and on the actuator (A.1).

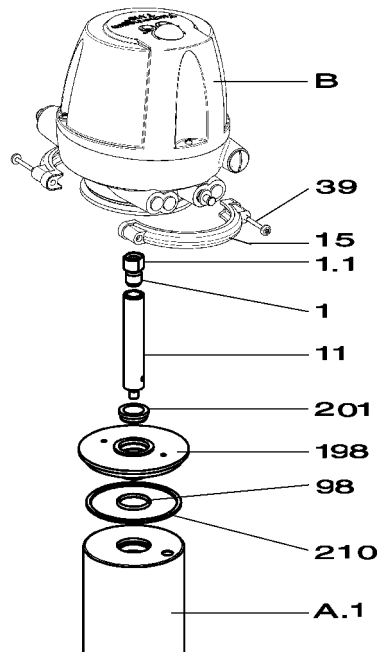
3. Fix the clamps (15) by tightening the screws (39) to a torque of 1 Nm (0.7 lbft).
4. Align the pneumatic and electrical connections in accordance with the valve block configuration.
5. Close air connection Y1 with a plug (23), as the air is guided inside the T.VIS A-8 control module.



6. Carry out commissioning, see „Connections and Operation“ (Page 25).

✓ Done.

Mounting to T-smart Butterfly Valve



Requirement

- Pay attention not to kink the air hoses when mounting the control module.
- The axial hole in the actuator piston rod must be long enough to accommodate the stroke length to ensure that the proximity switch can be introduced without being damaged.

NOTE

The permanent magnet on the switch bar is fragile.

Damage to the permanent magnet.

→ Protect the permanent magnet against impact stress.

NOTE

Magnetic fields can affect the proximity switch system.

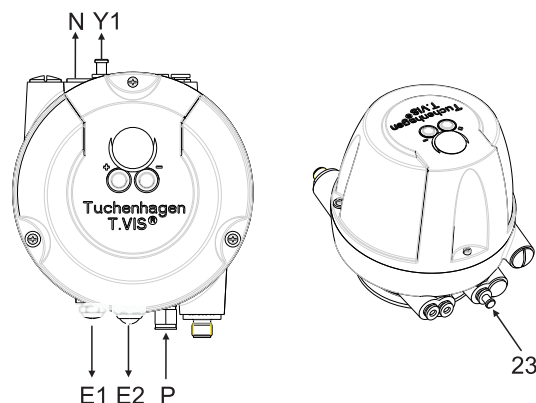
Measured values can be changed.

→ Protect the control module from external magnetic fields.

Carry out the following steps:

1. Fit the bearing (201) into the locking screw (198).
2. Mount the O-rings (210, 98).
3. Use a face spanner to screw the locking screw (198) into the actuator (A.1).
4. Screw switch bar (1) and switch bar (11) into the actuator.
5. Fit the control module (B) over the switch bar (1) and on the actuator.

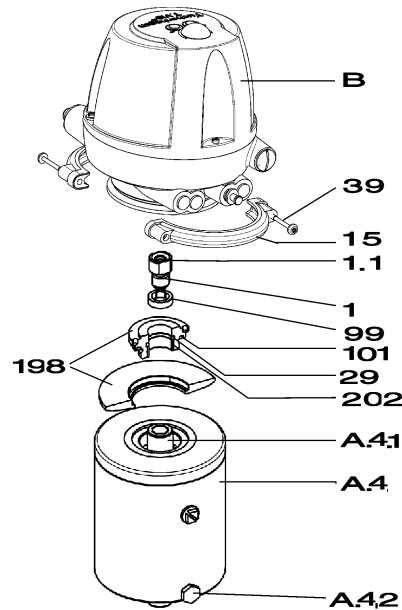
6. Fix the clamps (15) by tightening the screws (39) to a torque of 1 Nm (0.7 lbft).
7. Align the pneumatic and electrical connections in accordance with the valve block configuration.
8. Close air connection Y1 with a plug (23), as the air is guided inside the T.VIS A-8 control module.



9. Carry out commissioning, see „Connections and Operation“ (Page 25).

✓ Done.

Mounting to ECOVENT Valves N_ECO and W_ECO



Requirement

- Pay attention not to kink the air hoses when mounting the control module.
- The axial hole in the actuator piston rod must be long enough to accommodate the stroke length to ensure that the proximity switch can be introduced without being damaged.

NOTE

The permanent magnet on the switch bar is fragile.

Damage to the permanent magnet.

→ Protect the permanent magnet against impact stress.

NOTE

Magnetic fields can affect the proximity switch system.

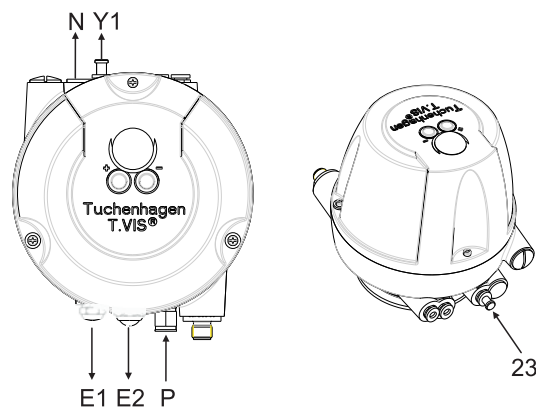
Measured values can be changed.

→ Protect the control module from external magnetic fields.

Carry out the following steps:

1. Complete the T.VIS mounting base (198) with O-rings (29, 101) and a plain bearing (202).
2. Screw the mounting base (198) into the actuator (A4) and tighten using a face spanner.
3. Screw the switch bar (1) with ring (99) into the piston rod (A4.1) and tighten by applying an a/f 15 open end spanner at (1.1), tightening torque 2 Nm (1.4 lbft).
4. Fit the control module (B) over the switch bar (1) and on the actuator.

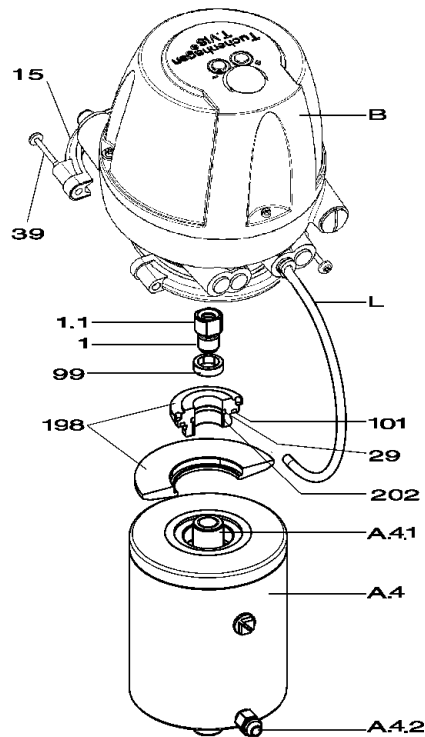
5. Fix the clamps (15) by tightening the screws (39) to a torque of 1 Nm (0.7 lbft).
6. Align the pneumatic and electrical connections in accordance with the valve block configuration.
7. As the air is guided inside the T.VIS control module (B), connection A 4.2 on the actuator and air connection Y1 (23) on the control module are closed.



8. Carry out commissioning, see „Connections and Operation“ (Page 25).

✓ Done.

Mounting to VESTA XL Valve H_A/M



Requirement

- Pay attention not to kink the air hoses when mounting the control module.
- The axial hole in the actuator piston rod must be long enough to accommodate the stroke length to ensure that the proximity switch can be introduced without being damaged.

NOTE

The permanent magnet on the switch bar is fragile.

Damage to the permanent magnet.

→ Protect the permanent magnet against impact stress.

NOTE

Magnetic fields can affect the proximity switch system.

Measured values can be changed.

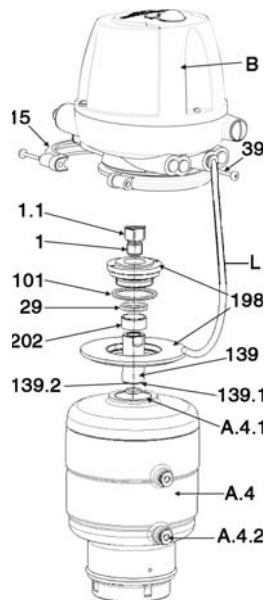
→ Protect the control module from external magnetic fields.

Carry out the following steps:

1. Complete the T.VIS mounting base (198) with O-rings (29, 101) and a plain bearing (202).
2. Screw the mounting base (198) into the actuator (A4) and tighten using a face spanner.

3. Screw the switch bar (1) with ring (99) into the piston rod (A4.1) and tighten by applying an a/f 15 open end spanner at (1.1), tightening torque 2 Nm (1.4 lbft).
 4. Fit the control module (B) over the switch bar (1) and on the actuator.
 5. Fix the clamps (15) by tightening the 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 XL valves, connect the air connection (Y1) on the control module to connection A4.2 on the actuator with an air hose (L).
 8. Carry out commissioning, see „Connections and Operation“ (Page 25).
- ✓ Done.

Mounting to VESTA XL Valve H_A



Requirement

- Pay attention not to kink the air hoses when mounting the control module.
- The axial hole in the actuator piston rod must be long enough to accommodate the stroke length to ensure that the proximity switch can be introduced without being damaged.

NOTE

The permanent magnet on the switch bar is fragile.

Damage to the permanent magnet.

→ Protect the permanent magnet against impact stress.

NOTE

Magnetic fields can affect the proximity switch system.

Measured values can be changed.

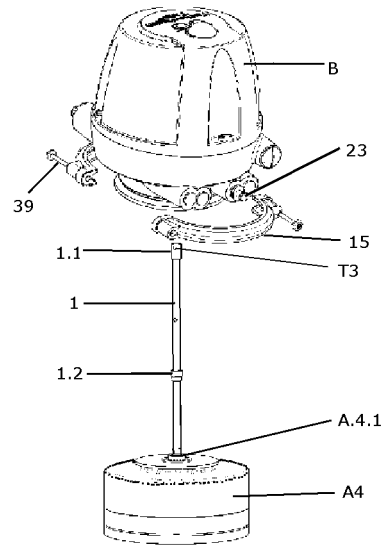
→ Protect the control module from external magnetic fields.

Carry out the following steps:

1. Place O-rings (139.2) in the adapter (139) at the bottom side of the thread (139.1).
2. Screw the adapter into the actuator (A4.1) and tighten using an a/f 17 open end spanner.
3. Complete the T.VIS mounting base (198) with O-rings (29, 101) and a plain bearing (202).
4. Screw the mounting base (198) into the actuator (A4) and tighten using a face spanner.

5. Screw the switch bar (1) into the adapter (139) and tighten by applying an a/f 15 open end spanner at (1.1), tightening torque 2 Nm (1.4 lbft).
 6. Fit the control module (B) over the switch bar (1) and on the actuator.
 7. Fix the clamps (15) by tightening the screws (39) to a torque of 1 Nm (0.7 lbft).
 8. Align the pneumatic and electrical connections in accordance with the valve block configuration.
 9. As internal air guiding is not possible on VESTA XL valves, connect the air connection (Y1) on the control module to connection A4.2 on the actuator with an air hose (L).
 10. Carry out commissioning, see „Connections and Operation“ (Page 25).
- ✓ Done.

Mounting to Mixproof Valves Type R, T_R with Lifting Actuator



Requirement

- Pay attention not to kink the air hoses when mounting the control module.
- The axial hole in the actuator piston rod must be long enough to accommodate the stroke length to ensure that the proximity switch can be introduced without being damaged.

NOTE

The permanent magnet on the switch bar is fragile.

Damage to the permanent magnet.

→ Protect the permanent magnet against impact stress.

NOTE

Magnetic fields can affect the proximity switch system.

Measured values can be changed.

→ Protect the control module from external magnetic fields.

Carry out the following steps:

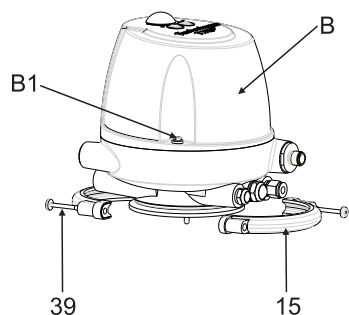
1. Screw the sliding piece (1.2) into the piston rod A 4.1 of the actuator A.4 using a 12 mm slotted screw driver, tightening torque 2 Nm (1.4 lbft).
2. Insert the switch bar (1) through the sliding piece into the piston rod A 4.1 and use a T-bar or pin punch, Ø4, (T3) to tighten at 1.1.
3. Fit the control module (B) over the switch bar (1) and on the actuator.
4. Fix the clamps (15) by tightening the 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.

6. Close air connection Y1 with a plug (23), as the air is guided inside the T.VIS A-8 control module.

7. Carry out commissioning, see „Connections and Operation“ (Page 25).

✓ Done.

Removing the Control Module from the Valve



Requirement

- Make sure no solenoid valve is electrically activated.

NOTE

The control module (B) contains sensitive parts

Components are easily damaged

→ Do not remove the safety screws (B1).

Carry out the following steps:

1. Undo the screws (39).

2. Remove the clamps (15).

3. Pull off the control module (B) upwards. The green LED goes out and the red LED lights up.

✓ Done.

Malfunctions

Remedy faults

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

Malfunction, Cause, Remedy

Malfunction	Signalling	Cause	Remedy
Programming is not possible after connecting the supply voltage.	No LED is lit	No voltage at connector 1 (PINs 1 and 3) Polarity of PINs 1 and 3 mixed up Service function activ	Check the electrical connection for correct wiring Connect PIN 1 and PIN 3 correctly Disconnect the plug
SETUP cannot be activated	Green or yellow	Time window no longer active	Disconnect from the power supply again and carry out the operation within 30 s
Manual operation cannot be activated	Green or yellow	Time window no longer active	Disconnect from the power supply again and carry out the operation within 30 s
After connecting the supply voltage, green/yellow is indicated immediately	Green or yellow	Unit has at least been programmed once	Reprogram in order to adjust to the process conditions: Press the + and - buttons at the same time for 3 7 s, see „Operating Overview“ (Page 39)
Valve opens very slowly	Time exceeded in PLC	Fault in the compressed air supply or filter clogged up	Clean or replace the filter Open the intake air throttle further.

Malfunction, Cause, Remedy (continued)

Malfunction	Signalling	Cause	Remedy
Programming cannot be completed	Rapidly flashing red light	End positions cannot be reached	
		due to missing control air pressure or	Check the control air pressure: Observe the minimum pressure for the process valve indicated on the type plate
		due to incorrectly fitted switch bar	Check and tighten the fitted adapter, see „Replacing the Seals on the Base“ (Page 57)
		Throttle settings are incorrect	Open the intake air throttle further
		The control module configuration is not suitable for the valve, i.e. the number of solenoid valves does not correspond to the number of actuators	Open the exhaust air throttle further Use a suitable control module or Select default, special version
		Air hoses for the lifting actuators mixed up	Correct the connections
		External proximity switch connected but set incorrectly	Set the proximity switch correctly
No feedback signal is pending at the PLC although one of the end positions has been reached		The minimum stroke when lifting the valve disk has not been reached.	Correct the lifting stroke
	Red LED flashing	T.VIS A-8 in factory setting and not yet programmed	Programming in accordance with „Operating Overview“ (Page 39)
	Red LED permanently lit	T.VIS A-8 currently in programming mode	Wait until programming mode ends
	Red LED flashing rapidly	Fault on T.VIS A-8:	
		Programmed position has been overrun (possibly as a result of deformation of the bellows) or LEFF function faulty	Check the bellows and reprogram the unit if necessary in accordance with the „Operating Overview“ (Page 39) Acknowledge the fault using the - button and check the LEFF requirements: air pressure, external proximity switch In addition to the LEFF function, pulsing is programmed in the PLC.

Carry out Reset – back into Default Standard

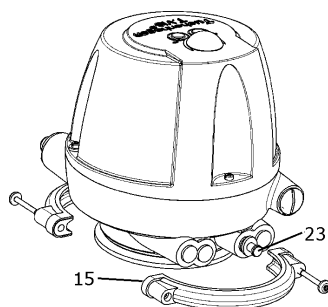
Carry out the following steps:

1. Remove the T.VIS A-8 control module from the valve.
 - LED flashing fast in red
2. Switch off the operating voltage.
 - LED off, data loss in the memory
3. Set the control module into operation, see „Commissioning the Control module without solenoid valve“ (Page 32) or „Commissioning the Control module with solenoid valve“ (Page 33).



Maintenance

Inspections



Carry out the following steps:

1. Check that the electrical connectors are properly secured.
2. Check that the air hose connections are firmly secured.
3. Check that the clamp (15) is firmly in place.
4. Check that the plug (23) is firmly in place.
5. Check the sound absorber, filter, non-return valve and the exhaust air throttle for soiling.
6. Check the housing for mechanical damage.

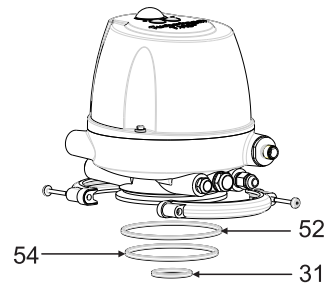
✓ Done.

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.

Replacing the Seals on the Base

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

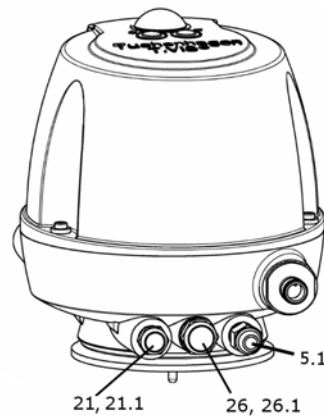


Carry out the following steps:

➔ Take out the O-rings (31, 52, 54) and replace them with new ones.

✓ Done.

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



Requirement

- Only use a non-return valve (26.1) and sound absorber (26) as specified in chapter „Spare Parts Lists“.

Carry out the following steps:

1. Check that the control air can exit freely from the sound absorbers (21, 26), non-return valve (26.1), filter (5.1) and the exhaust air throttle (21.1) and replace the parts if necessary.
2. Do not grease the spare parts before fitting them.

✓ Done.

Disposal

Dispose of the control module at the end of its life cycle in an environmentally friendly manner. Observe the statutory waste disposal regulations applicable at the place of installation.

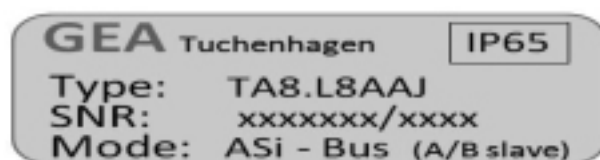
The control module is made of the following materials:

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

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

Technical Data

Type Plate



Control module type plate

Code/Type	T A 8	L	8	A	A	J
Item in the order code	8	9	10	11	12	13

Explanation of the items in the order code

Item in the order code	Designation	Explanation
8	Feedback position	
	T A 8	T.VIS A-8 Control Module
9	Control module type	
	N	without solenoid valve
	P	1 solenoid valve
	I	2 solenoid valves Y1=main stroke; Y2= valve disk lifting
	J	2 solenoid valves Y1=main stroke; Y3= lifting of double disk or external process valve
	L	3 solenoid valves
	V	1 solenoid valve, 1 NOT element (T.VIS A-8)
	X	2 solenoid valves, 1 NOT element (T.VIS A-8)
	Y	3 solenoid valves, 1 NOT element (T.VIS A-8)
10	Feedback signals	
	8	T.VIS A-8
	9	T.VIS A-8 with 1 proximity switch in the lantern

Explanation of the items in the order code (continued)

Item in the order code	Designation	Explanation
11	Type of interface/mode	
	A	AS-Interface (A/B slave)
	B	24 V DC 3-wire PNP
	D	DeviceNet
12	Solenoid valve	
	A	24 V DC 0.85 W
13	Screw connection (cable/air) for air hose Ø6/4 mm	
	J	5-pin connector M12/5-wire/M20x1.5 24 V DC; AS-Interface; DeviceNet
	H	8-pin connector M12/8-wire/M20x1.5 24 V DC
	for air hose Ø6.35/4.31 mm	
	P	5-pin connector M12/5-wire/M20x1.5 24 V DC; AS-Interface; DeviceNet
	I	8-pin connector M12/8-wire/M20x1.5 24 V DC

General Technical Data

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

Technical data: temperatures and compressed air supply

Designation	Description
Ambient temperature	-20 to +60 °C
Control air	acc. to ISO 8573-1:2001
- Solid particle content:	Quality class 6 (recommended) Particle size max. 5µm Particle density max. 5 mg/m ³
- Water content:	Quality class 4 max. dew point +3 °C If the unit is used at higher altitudes or at low ambient temperatures, the dew point must be adapted accordingly.
- Oil content:	Quality class 3, preferably oil free max. 5 mg oil in 1m ³ air
Air hose	
- Metric	Material PE-LD Outside dia. 6 mm Inside dia. 4 mm

Technical data: temperatures and compressed air supply (continued)

Designation	Description
- Inch	Material PA Outside dia. 6.35 mm Inside dia. 4.3 mm
Control air pressure	max 8 bar, min 2 bar
Sound pressure level using sound absorber	max. 72 dB

Technical data: materials

Designation	Description
Housing	Noryl GFN2 / optionally VESTAMID®
Seals	NBR / EPDM
Operating elements	TPE

Technical data: electrical data

Designation	Description
Protection class	IP65/67 (EN 60529)
Installation position	any position
EC EMC directives	89/336/EEC
Immunity for industrial environments	EN 61000-6-2
EC Low Voltage Directive	73/23/EEC
Electrical wiring configuration	– 5pol. M12 circular connector only for – 8pol. M12 circular connector only for 24 V version with 2 to 3 solenoid valves
Switch point tolerance	adjustable: 0.3; 0.5; 0.8; 2.0 mm
Signal attenuation of feedback group	none; short; medium; long

Specification of 24V Version

Technical data: power supply

Designation	Description
Supply voltage U_V	24 V DC (+20%... -12.5%)
Current consumption	
- No-load current	≤ 25 mA
- One solenoid valve	35...45 mA
- Max. feedback load	200 mA
Total	approx. 265 mA

Technical data: inputs

Designation	Description
Control voltage	max. 28.8 V DC High = ≥ 13 V DC Low = ≤ 6 V DC
Control current	≤ 10 mA

Technical data: outputs

Designation	Description
Output voltage	High = $U_V - \leq 1$ V Low = ≤ 5 V
Max. current per output	100 mA short circuit proof
Switching frequency (resistive + inductive loads ≤ 25 mH)	2 Hz

AS-Interface Specifications

Technical data: power supply

Designation	Description
Supply voltage U_V	26.5...31 V DC
Current consumption - No-load current - One solenoid valve	≤ 25 mA 35...45 mA
Total	approx. 65 mA

Technical data: inputs as seen from the AS-Interface master

Bit	Function	Signal
DI0*	Feedback Main stroke	1 = valve in non-actuated position 0 = valve outside tolerance for non-actuated position
DI1*	Feedback Main stroke	1 = valve in actuated position 0 = valve outside tolerance for actuated position
DI2	Feedback Double-disk	1 = double-disk closed 0 = double-disk not closed
DI3		not assigned
* For assignment for green colour variant, see „Colour Changeover“ (Page 32)		

Technical data: outputs as seen from the AS-Interface master

Bit	Function	Signal
D00	Activation of solenoid valve Y1	1 = solenoid valve activated 0 = solenoid valve not activated
DI1	Activation of solenoid valve Y2	1 = solenoid valve activated 0 = solenoid valve not activated
DI2	Activation of solenoid valve Y3	1 = solenoid valve activated 0 = solenoid valve not activated
DI3	reserved for A/B identification	

Designation	Description
AS-i-Specification	V3.0
Configuration IO-Code / ID-Code / ID2-Code	7.A.E.
Reverse voltage protection	yes

DeviceNet Specifications

Technical data: power supply

Designation	Description
Supply voltage U_V without solenoid valve	11...26 V DC
Supply voltage U_V with solenoid valve	21...26 V DC
Current consumption - No-load current - Solenoid valve	≤ 35 mA 35...45 mA
Total	approx. 75 mA

Technical data: inputs

Bit	Function	Signal
I-0*	Feedback Main stroke	1 = valve in non-actuated position 0 = valve outside tolerance for non-actuated position
I-1*	Feedback Main stroke	1 = valve in actuated position 0 = valve outside tolerance for actuated position
I-2	Double-disk feedback	1 = double-disk in non-actuated position 0 = double-disk not in non-actuated position Or no external sensor present.

* For assignment for green colour variant, see „Colour Changeover“ (Page 32)

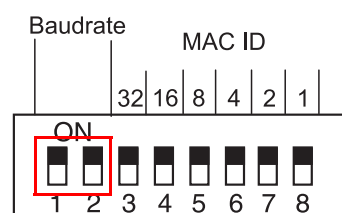
Technical data: outputs

Bit	Function	Signal
O-0	Activation of solenoid valve Y1	1 = solenoid valve activated 0 = solenoid valve not activated
O-1	Activation of solenoid valve Y2	1 = solenoid valve activated 0 = solenoid valve not activated
O-2	Activation of solenoid valve Y3	1 = solenoid valve activated 0 = solenoid valve not activated
O-3		not assigned

Technical data: LED displays for module and network status

Designation	Description
Green	Operation
Flashing green	Communication time-out or module faulty
Flashing red	Power-up test
Flashing orange	Baud rate detection
Red	Communication not possible

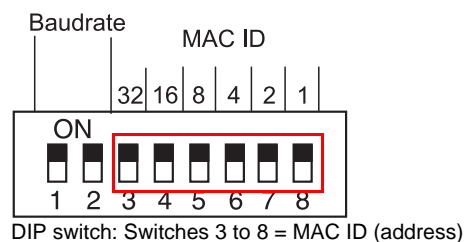
DIP Switch



DIP switch: Switches 1 and 2 = baud rate

Switches 1 and 2 = baud rate

DIP 1	DIP 2	Baud rate
OFF	OFF	125 kBaud
ON	OFF	250 kBaud
OFF	ON	500 kBaud
ON	ON	selectable via software Delivery state



Switches 3 to 8 = MAC ID (address)

DIP 3	DIP 4	DIP 5	DIP 6	DIP 7	DIP 8	MAC ID
OFF	OFF	OFF	OFF	OFF	OFF	0
ON	OFF	OFF	OFF	OFF	OFF	1
OFF	ON	OFF	OFF	OFF	OFF	2
...
OFF	ON	ON	ON	ON	ON	62
ON*	ON	ON	ON	ON	ON	63

* Factory setting

Accessories

Accessories must be ordered separately

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

Tools

Tool	Material no.
Hose cutter	407-065
Hex key, size 3	408-112
Pin-type face spanner, pin dia. 4	9065837
Open end spanner a/f 23	
Open end spanner a/f 16x18	408-138

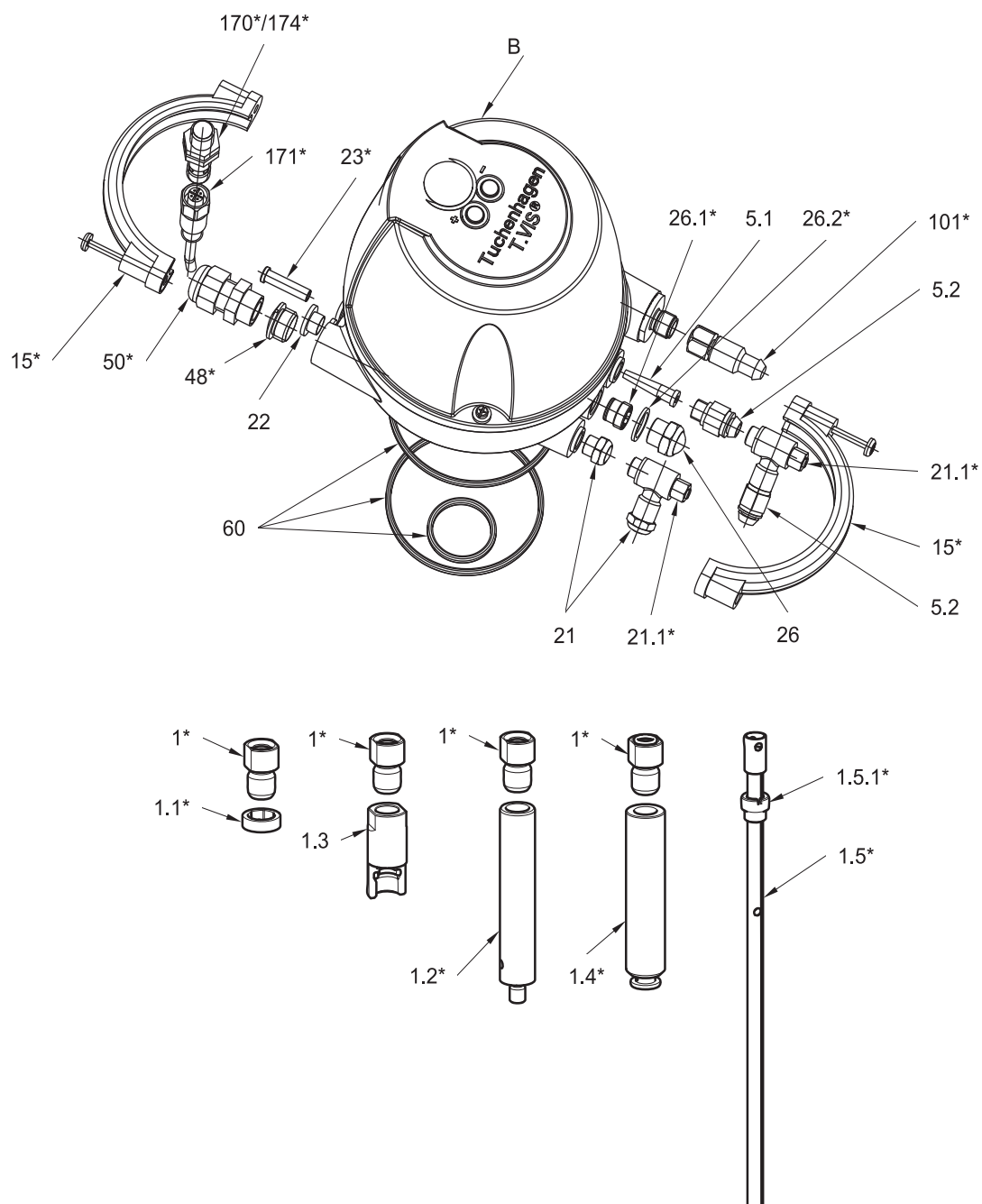
Tool	Material no.
Open end spanner a/f 15	408-035
Open end spanner a/f 17	408-036
Pin punch Ø4	

Lubricant

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

Spare Parts Lists

Control Module T.VIS® A-8



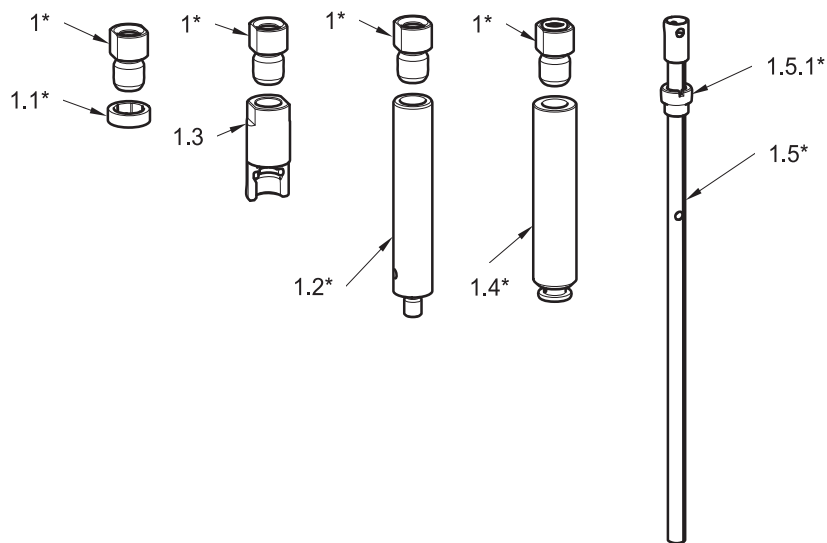
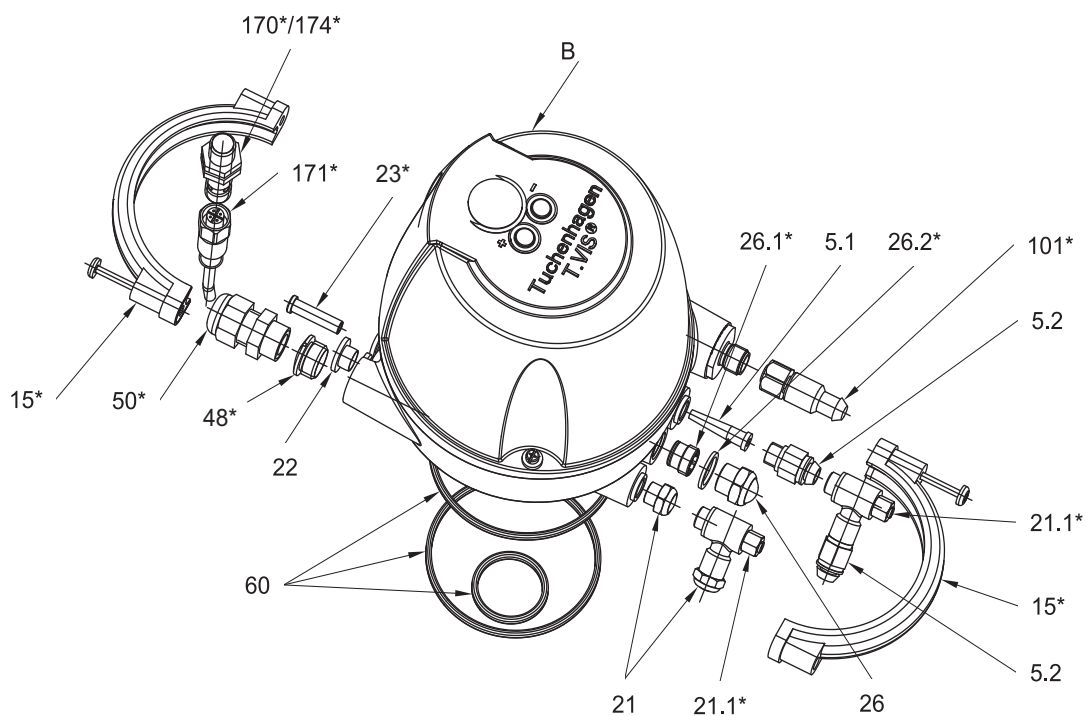
26.1 Always fit the non-return valve without greasing!

Item	Designation	Material	Without NOT logic element				
			0 PV	1 PV	2 PV (Y1+Y2)	3 PV	2 PV (Y1+Y3)
B	T.VIS® A-8 Control Module 24V DC compl. with metric air connections		TA8N.BAJ on request	TA8P.BAJ on request	TA8I.BAH on request	TA8L.BAH on request	TA8J.BAH on request
B	T.VIS® A-8 Control Module 24V DC compl. with inch air connections		TA8N.BAP on request	TA8P.BAP on request	TA8I.BAI on request	TA8L.BAI on request	TA8J.BAI on request
B	T.VIS® A-8 Control Module AS-Interface compl. with metric air connections		TA8N.AAJ on request	TA8P.AAJ on request	TA8I.AAJ on request	TA8L.AAJ on request	TA8J.AAJ on request
B	T.VIS® A-8 Control Module AS-Interface compl. with inch air connections		TA8N.AAP on request	TA8P.AAP on request	TA8I.AAP on request	TA8L.AAP on request	TA8J.AAP on request
B	T.VIS® A-8 Control Module DeviceNet compl. with metric air connections		TA8N.DAJ on request	TA8P.DAJ on request	TA8I.DAJ on request	TA8L.DAJ on request	TA8J.DAJ on request
B	T.VIS® A-8 Control Module DeviceNet compl. with inch air connections		TA8N.DAP on request	TA8P.DAP on request	TA8I.DAP on request	TA8L.DAP on request	TA8J.DAP on request
5.1	Filter	PE / sintered	221-003869	221-003869	221-003869	221-003869	221-003869
5.2	Screw- / metr. in plug / inch connection	Brass / nickel-plated	933-330 933-144	933-330 933-144	933-330 933-144	933-330 933-144	933-330 933-144
15*	Clamp incl. screw	GRIVORY	221-320.93	221-320.93	221-320.93	221-320.93	221-320.93
21	Sound absorber 1/8"	Brass / nickel-plated	933-958	933-958	933-958	933-958	933-958
22	Round plug	HD-PE	922-284	922-284	922-284	922-284	922-284
23*	Sealing / metr. plug / inch	PP PP	922-281 922-280	922-281 922-280	922-281 922-280	922-281 922-280	922-281 922-280
26	Sound absorber 1/4"	Brass / nickel-plated	933-967	933-967	933-967	933-967	933-967
48*	Locking screw	PA	508-250	508-250	508-250	508-250	508-250
50*	Cable gland	PA	508-914	508-914	508-914	508-914	508-914
60	Set of seals	--	221-589.68	221-589.68	221-589.68	221-589.68	221-589.68

Item	Designation	Material	With NOT logic element		
			1 PV	2 PV	3 PV
B	T.VIS® A-8 Control Module 24V DC compl. with metric air connections		TA8V.BAJ on request	TA8X.BAH on request	TA8Y.BAH on request
B	T.VIS® A-8 Control Module 24V DC compl. with inch air connections		TA8V.BAP on request	TA8X.BAI on request	TA8Y.BAI on request
B	T.VIS® A-8 Control Module AS-Interface compl. with metric air connections		TA8V.AAJ on request	TA8X.AAJ on request	TA8Y.AAJ on request
B	T.VIS® A-8 Control Module AS-Interface compl. with inch air connections		TA8V.AAP on request	TA8X.AAP on request	TA8Y.AAP on request
B	T.VIS® A-8 Control Module DeviceNet compl. with metric air connections		TA8V.DAJ on request	TA8X.DAJ on request	TA8Y.DAJ on request
B	T.VIS® A-8 Control Module DeviceNet compl. with inch air connections		TA8V.DAP on request	TA8X.DAP on request	TA8Y.DAP on request
5.1	Filter	PE / sintered	221-003869	221-003869	221-003869
5.2	Screw-in plug / metr. connection / inch	Brass / nickel-plated	933-330 933-144	933-330 933-144	933-330 933-144
15*	Clamp incl. screw	GRIVORY	221-320.93	221-320.93	221-320.93
21	Sound absorber 1/8"	Brass / nickel-plated	933-958	933-958	933-958
22	Round plug	HD-PE	--	--	--
23*	Sealing / metr. plug / inch	PP PP	922-281 922-280	922-281 922-280	922-281 922-280
26	Sound absorber 1/4"	Brass / nickel-plated	933-967	933-967	933-967
48*	Locking screw	PA	508-250	508-250	508-250
50*	Cable gland	PA	508-914	508-914	508-914
60	Set of seals	--	221-589.68	221-589.68	221-589.68

Item	Designation	Material	Material no.	Application
1*	Switch bar incl. magnet and O-ring	PVC-U	221-589.39	Standard for all valves with the exception of valves type R with lifting actuator
1.1*	Ring T.VIS® / ECO	Noryl GFN2	221-002396	In addition to item 1, only for ECOVENT valves and VESTA XL H_A/M valves
1.2*	Switch bar	1.4301	224-000214	In addition to item 1, adapter only for T-smart butterfly valves
1.3*	Switch bar incl. O-ring	1.4305	221-589.57	In addition to item 1, adapter only for VESTA XL H_A valves
1.4*	TME/T.VIS adapter	1.4305	221-573.06	In addition to item 1, only for butterfly valves ECOVENT-S
21.1*	Throttle valve G 1/8"	Brass / nickel-plated	603-042	To reduce the closing speed of the main stroke (exhaust air outlet with sound absorber item 21)
21.2*	Throttle valve G 1/8"	Brass / nickel-plated	603-042	To reduce the opening speed of the main stroke (connection via screw-in plug connection item 5.2)
26.1*	Non-return valve	Brass / nickel-plated	602-060	Only for protection class IP 67 in addition to the sound absorber, item 26
26.2*	Flat seal	PVC	928-676	Only with non-return valve item 26.1
170*	Proximity switch M12x1 / standard valves	A2	505-098	Used in the lantern for monitoring the double-disk
¹⁾ 171*	Circular connector M12 with cable		508-026	Only with proximity switch 505-098
¹⁾ 174*	Prox. sw. holder compl.	1.4301	221-105.26	Only with proximity switch 505-098
1.5*	Switch bar LFT-R compl. T.VIS A-8 incl. magnet and sliding piece for valves type R with lifting actuator			
1.5.1*	Sliding piece T.VIS A-8 / part no. 221-619.02			
<u>Use on standard actuators:</u>				
B and C / 125 / material no. 221-618.07				
D and E (BD5) / 200 / material no. 221-618.08				
D5 and E5 / 205 / material no. 221-618.09				
D6 / 166 / material no. 221-618.10				
E6 and S6 / 256 / material no. 221-618.11				
<u>Accessories (to be ordered separately):</u>				
Item 101* cable socket, right-angle M12 / 5 poles / A coded / material no. 508-963, electrical supply connection				
Item 101* cable socket, straight M12 / 8 poles / A coded / material no. 508-061, electrical supply connection				
Item 101* cable socket, straight M12 with 1.0 m cable and ASI insulation displacement terminal / material no. 508-027, electrical supply connection				
Item 101* cable socket, straight M12 with 2.0m cable and ASI insulation displacement terminal / material no. 508-028, electrical supply connection				
* Items marked * are not included in the control module cpl. and must be ordered separately.				
¹⁾ Items 171 and 174 must also be ordered if the proximity switch (item 170) is ordered separately.				

Control Module T.VIS® A-8 / PA 12



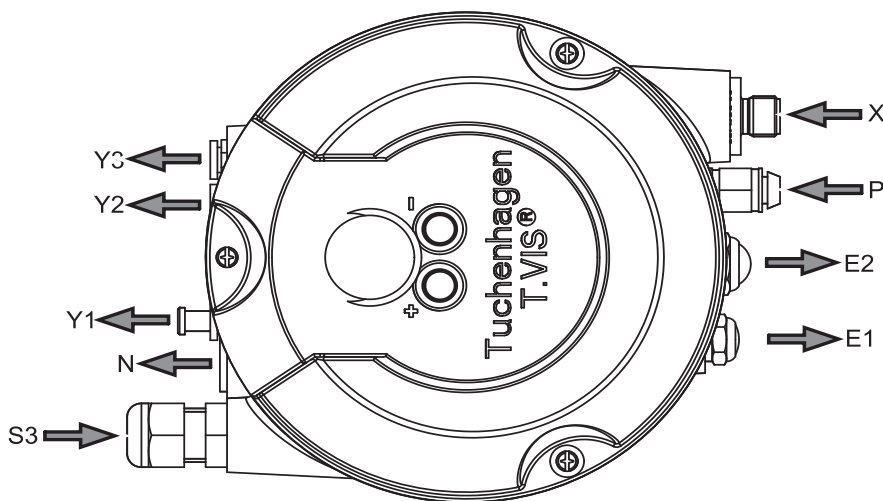
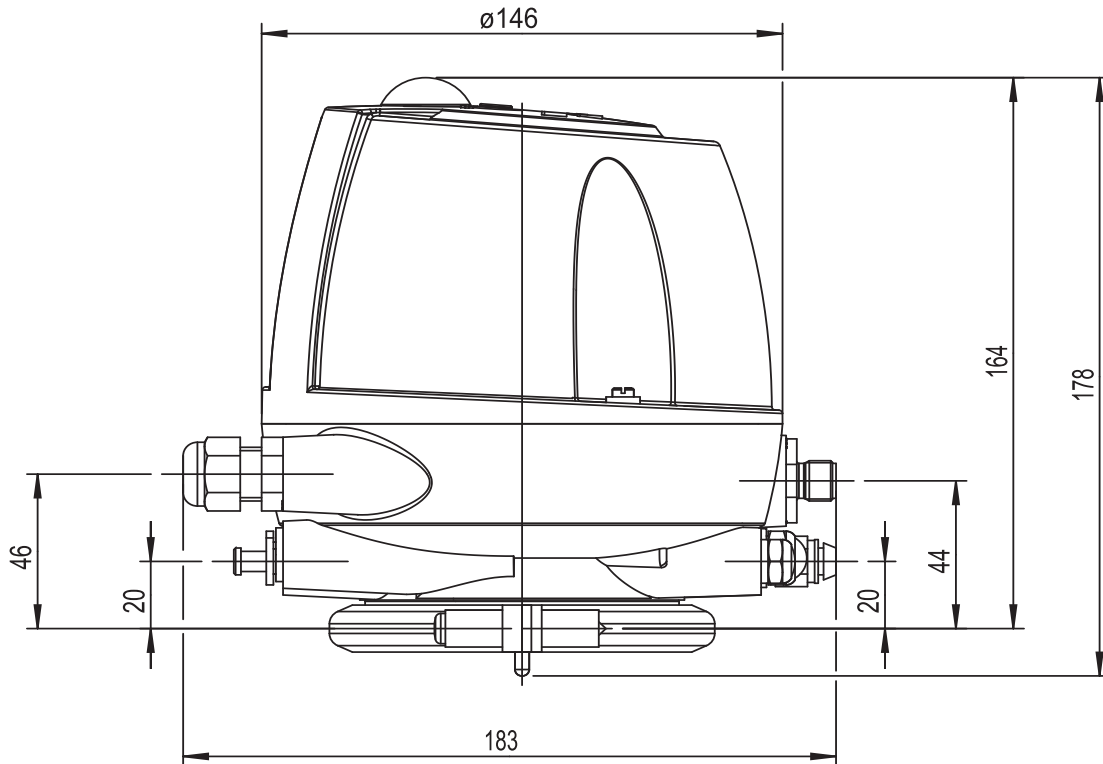
26.1 Always fit the non-return valve without greasing it!

Item	Designation	Material	Without NOT logic element				
			0 PV	1 PV	2 PV (Y1+Y2)	3 PV	2 PV (Y1+Y3)
B	Control Module T.VIS A-8 24V DC compl. with metric air connections		TA8N.BAJ/43 on request	TA8P.BAJ/43 on request	TA8I.BAH/43 on request	TA8L.BAH/43 on request	TA8J.BAH/43 on request
B	Control Module T.VIS A-8 24V DC compl. with inch air connections		TA8N.BAP/43 on request	TA8P.BAP/43 on request	TA8I.BAI/43 on request	TA8L.BAI/43 on request	TA8J.BAI/43 on request
B	Control Module T.VIS A-8 AS-Interface compl. with metric air connections		TA8N.AAJ/43 on request	TA8P.AAJ/43 on request	TA8I.AAJ/43 on request	TA8L.AAJ/43 on request	TA8J.AAJ/43 on request
B	Control Module T.VIS A-8 AS-Interface compl. with inch air connections		TA8N.AAP/43 on request	TA8P.AAP/43 on request	TA8I.AAP/43 on request	TA8L.AAP/43 on request	TA8J.AAP/43 on request
B	Control Module T.VIS A-8 DeviceNet compl. with metric air connections		TA8N.DAJ/43 on request	TA8P.DAJ/43 on request	TA8I.DAJ/43 on request	TA8L.DAJ/43 on request	TA8J.DAJ/43 on request
B	Control Module T.VIS A-8 DeviceNet compl. with inch air connections		TA8N.DAP/43 on request	TA8P.DAP/43 on request	TA8I.DAP/43 on request	TA8L.DAP/43 on request	TA8J.DAP/43 on request
5.1	Filter	PE / sintered	221-003869	221-003869	221-003869	221-003869	221-003869
5.2	Screw-in plug / metr. connection / inch	Brass / nickel- plated	933-330 933-144	933-330 933-144	933-330 933-144	933-330 933-144	933-330 933-144
15*	Clamp incl. screw	GRIVOR Y	221-320.93	221-320.93	221-320.93	221-320.93	221-320.93
21	Sound absorber 1/8"	Brass / nickel- plated	933-958	933-958	933-958	933-958	933-958
22	Round plug	HD-PE	922-284	922-284	922-284	922-284	922-284
23*	Sealing / metr. plug / inch	PP PP	922-281 922-280	922-281 922-280	922-281 922-280	922-281 922-280	922-281 922-280
26	Sound absorber 1/4"	Brass / nickel- plated	933-967	933-967	933-967	933-967	933-967
48*	Locking screw	PA	508-250	508-250	508-250	508-250	508-250
50*	Cable gland	PA	508-914	508-914	508-914	508-914	508-914
60	Set of seals	--	221-589.68	221-589.68	221-589.68	221-589.68	221-589.68

Item	Designation	Material	With NOT logic element		
			1 PV	2 PV	3 PV
B	Control Module T.VIS A-8 24V DC compl. with metric air connections		TA8V.BAJ/43 on request	TA8X.BAH/43 on request	TA8Y.BAH/43 on request
B	Control Module T.VIS A-8 24V DC compl. with inch air connections		TA8V.BAP/43 on request	TA8X.BAI/43 on request	TA8Y.BAI/43 on request
B	Control Module T.VIS A-8 AS-Interface compl. with metric air connections		TA8V.AAJ/43 on request	TA8X.AAJ/43 on request	TA8Y.AAJ/43 on request
B	Control Module T.VIS A-8 AS-Interface compl. with inch air connections		TA8V.AAP/43 on request	TA8X.AAP/43 on request	TA8Y.AAP/43 on request
B	Control Module T.VIS A-8 DeviceNet compl. with metric air connections		TA8V.DAJ/43 on request	TA8X.DAJ/43 on request	TA8Y.DAJ/43 on request
B	Control Module T.VIS A-8 DeviceNet compl. with inch air connections		TA8V.DAP/43 on request	TA8X.DAP/43 on request	TA8Y.DAP/43 on request
5.1	Filter	PE / sintered	221-003869	221-003869	221-003869
5.2	Screw-in plug / metr. connection / inch	Brass / nickel-plated	933-330 933-144	933-330 933-144	933-330 933-144
15*	Clamp incl. screw	GRIVORY	221-320.93	221-320.93	221-320.93
21	Sound absorber 1/8"	Brass / nickel-plated	933-958	933-958	933-958
22	Round plug	HD-PE	--	--	--
23*	Sealing / metr. plug / inch	PP PP	922-281 922-280	922-281 922-280	922-281 922-280
26	Sound absorber 1/4"	Brass / nickel-plated	933-967	933-967	933-967
48*	Lockingscrew	PA	508-250	508-250	508-250
50*	Cablegland	PA	508-914	508-914	508-914
60	Set of seals	--	221-589.68	221-589.68	221-589.68

Item	Designation	Material	Material no.	Application
1*	Switch bar incl. magnet and O-ring	PVC-U	221-589.39	Standard for all valves with the exception of valves type R with lifting actuator
1.1*	Ring T.VIS® / ECO	Noryl GFN2	221-002396	In addition to item 1, only for ECOVENT valves and VESTA XL H_A/M valves
1.2*	Switch bar	1.4301	224-000214	In addition to item 1, adapter only for T-smart butterfly valves
1.3*	Switch bar incl. O-ring	1.4305	221-589.57	In addition to item 1, adapter only for VESTA XL H_A valves
1.4*	TME/T.VIS adapter	1.4305	221-573.06	In addition to item 1, only for butterfly valves ECOVENT-S
21.1*	Throttle valve G 1/8"	Brass / nickel-plated	603-042	To reduce the closing speed of the main stroke (exhaust air outlet with sound absorber item 21)
21.2*	Throttle valve G 1/8"	Brass / nickel-plated	603-042	To reduce the opening speed of the main stroke (connection via screw-in plug connection item 5.2)
26.1*	Non-return valve	Brass / nickel-plated	602-060	Only for protection class IP 65 in addition to the sound absorber, item 26
26.2*	Flat seal	PVC	928-676	Only with non-return valve item 26.1
170*	Proximity switch M12x1 / standard valves	A2	505-098	Used in the lantern for monitoring the double-disk
¹⁾ 171*	Circular connector M12 with cable		508-026	Only with proximity switch 505-098
¹⁾ 174*	Prox. switch holder cpl.	1.4301	221-105.26	Only with proximity switch 505-098
1.5*	Switch bar LFT-R cpl. T.VIS A-8 incl. magnet and sliding piece for valves type R with lifting actuator			
1.5.1*	Sliding piece T.VIS A-8 / material no. 221-619.02			
	<u>Use on standard actuators:</u>			
	B and C / 125 / material no. 221-618.07			
	D and E (BD5) / 200 / material no. 221-618.08			
	D5 and E5 / 205 / material no. 221-618.09			
	D6 / 166 / material no. 221-618.10			
	E6 and S6 / 256 / material no. 221-618.11			
	<u>Accessories (to be ordered separately):</u>			
	Item 101* cable socket, right-angle M12 / 5 poles / A coded / material no. 508-963, electrical supply connection			
	Item 101* cable socket, straight M12 / 8 poles / A coded / material no. 508-061, electrical supply connection			
	Item 101* cable socket, straight M12 with 1.0 m cable and ASI insulation displacement terminal / material no. 508-027, electrical supply connection			
	Item 101* cable socket, straight M12 with 2.0m cable and ASI insulation displacement terminal / material no. 508-028, electrical supply connection			
	Items marked * are not included in the control module cpl. and must be ordered separately.			
	¹⁾ Items 171 and 174 must also be ordered if the proximity switch (item 170) is ordered separately.			

Dimension Sheet Control Module T.VIS® A-8




For assignment of N, Y1, Y2, Y3, E1, E2 and P refer to operating manual 430-568

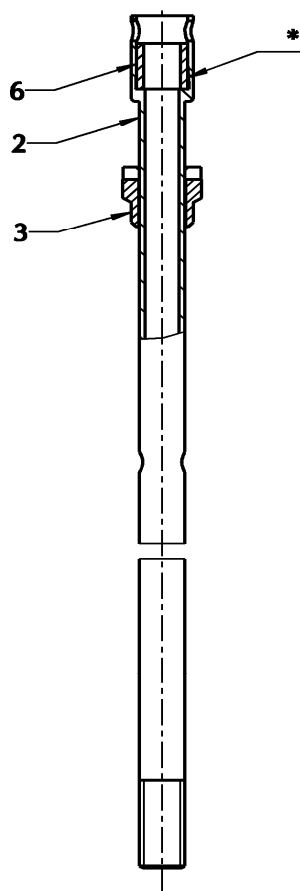
X - supply voltage, electric actuation and feedback

S3 - electrical connection for external proximity switch

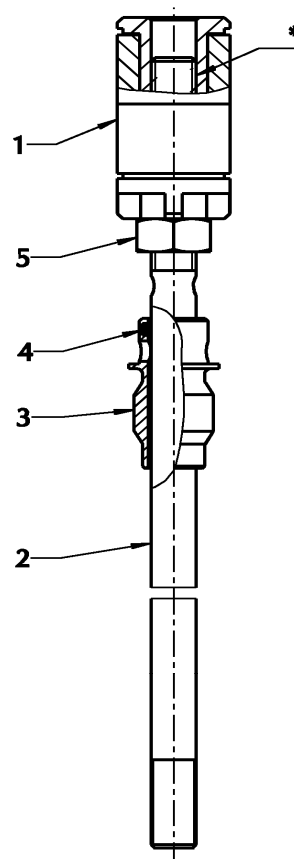
Spare Parts Lists – Switch bar LFT-R

Datum/date: 2011-05-26 Seite / Page 1 von / of 1 221ELI008224G_0.DOC	Ersatzteilliste / Spare parts list Schaltstange LFT-R T.VIS A-8 und M-1 für Ventile mit Lift / Ventil Typ R; T_R; L; M_O (06); MT/T_R (08) Switch bar LFT-R T.VIS A-8 and M-1 for Valve with Lift Valve type R; T_R; L; M_O (06); MT/T_R (08)	
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Schaltstange LFT-R T.VIS A-8
switch bar LFT-R T.VIS A-8



Schaltstange LFT-R T.VIS M-1
switch bar LFT-R T.VIS M-1



* Gesichert mit UHU Endfest 300 / Secured with UHU Endfest 300

Schaltstange LFT-R T.VIS A-8 / switch bar LFT-R T.VIS A-8						Schaltstange LFT-R T.VIS M-1 / switch bar LFT-R T.VIS M-1					
Typ / type		125	200	205	166	256	125	200	205	166	256
Pos. item	Benennung / Designation	Sach-Nr. / Part no.									
	Schaltstange kpl. / switch bar kpl.	221-618.07	221-618.08	221-618.09	221-618.10	221-618.11	221-618.02	221-618.03	221-618.04	221-618.06	221-618.05
1	Schaltstange / switch bar LFT-RM7	--	--	--	--	--	221-618.01	221-618.01	221-618.01	221-618.01	221-618.01
2	Schaltstange LFT-R / switch bar LFT-R	221-615.06	221-615.08	221-615.09	221-615.07	221-615.10	221-615.01	221-615.02	221-615.03	221-615.05	221-615.04
3	Gleitstück / slide	221-619.02	221-619.02	221-619.02	221-619.02	221-619.02	221-619.01	221-619.01	221-619.01	221-619.01	221-619.01
4	Führungsring / rod guide ring	--	--	--	--	--	935-085	935-085	935-085	935-085	935-085
5	Sechskantmutter / hex. nut	--	--	--	--	--	910-018	910-018	910-018	910-018	910-018
6	Magnet / magnet	221-589.41	221-589.41	221-589.41	221-589.41	221-589.41	--	--	--	--	--

*Sicherheitshinweise siehe Datenblatt für "UHU Endfest 300" /
see safety specification in data sheet for "UHU Endfest 300".

Dimension sheet – Switch bar LFT-R

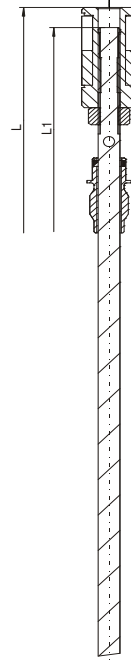
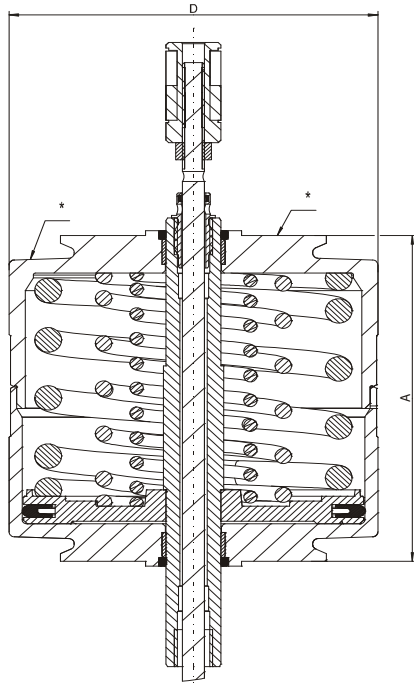
Datum/date: 2011-05-24

Seite / Page 1 von / of 2

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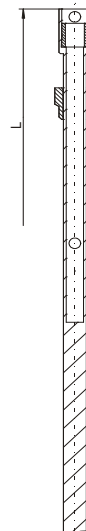
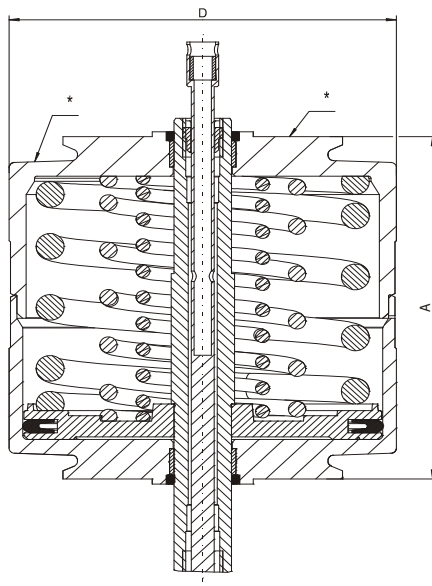
Maßblatt / Dimension sheet

Schaltstange LFT-R T.VIS A-8 und M-1 für Ventile mit Lift
Ventil Typ R; T_R; L; M_O (06); MT/T_R (08)




Schaltstange LFT-R
T.VIS M-1

* Antriebskennzeichnung Typ



Schaltstange LFT-R
T.VIS A-8

* Antriebskennzeichnung Typ

Datum/date: 2011-05-24 Seite / Page 2 von / of 2 221MBL008208G_0.DOC	Maßblatt / Dimension sheet Schaltstange LFT-R T.VIS A-8 und M-1 für Ventile mit Lift Ventil Typ R; T_R; L; M_O (06); MT/T_R (08)	
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Antrieb / actuator				Schaltstange T.VIS A-8 switch bar T.VIS A-8		Schaltstange T.VIS M-1 switch bar T.VIS M-1		
Typ / type	Material-Nr. / part no.	Antrieb / actuator		Material-Nr. / part no.	Länge / length L	Material-Nr. / part no.	Länge / length	
		A	D				L	L1
AA	221-118.01	95	99	-	-	-	-	-
BA	221-120.01	130	110	221-618.07	253	221-618.02	308	300
BB	221-118.02	130	110	221-618.07	253	221-618.02	308	300
BD	221-119.02	130	110	221-618.07	253	221-618.02	308	300
CA	221-181.01	130	135	221-618.07	253	221-618.02	308	300
CB	221-120.02	130	135	221-618.07	253	221-618.02	308	300
CD	221-118.03	130	135	221-618.07	253	221-618.02	308	300
CF	221-119.03	130	135	221-618.07	253	221-618.02	308	300
DB	221-181.02	160	170	221-618.08	283	221-618.03	338	330
DD	221-120.03	160	170	221-618.08	283	221-618.03	338	330
DF	221-118.04	160	170	221-618.08	283	221-618.03	338	330
DG	221-119.04	160	170	221-618.08	283	221-618.03	338	330
DH	221-265.05	160	170	221-618.08	283	221-618.03	338	330
ED	221-181.03	160	210	221-618.08	283	221-618.03	338	330
EF	221-120.04	160	210	221-618.08	283	221-618.03	338	330
EG	221-118.05	160	210	221-618.08	283	221-618.03	338	330
EH	221-119.05	160	210	221-618.08	283	221-618.03	338	330
BD5	221-119.06	140	110	221-618.08	283	221-618.03	338	330
DD5	221-183.01	160	170	221-618.09	313	221-618.04	368	360
DF5	221-184.01	170	170	221-618.09	313	221-618.04	368	360
DG5	221-185.01	170	170	221-618.09	313	221-618.04	368	360
ED5	221-183.05	160	210	221-618.09	313	221-618.04	368	360
EF5	221-183.02	170	210	221-618.09	313	221-618.04	368	360
EG5	221-184.02	170	210	221-618.09	313	221-618.04	368	360
EH5	221-185.02	170	210	221-618.09	313	221-618.04	368	360
DF6Z	221-585.11	199	170	221-618.10	365	221-618.06	422	412
SG6Z	221-585.01	246	260,5	221-618.11	413	221-618.05	470	464
SH6Z	221-585.02	246	260,5	221-618.11	413	221-618.05	470	464
SK6Z	221-585.03	246	260,5	221-618.11	413	221-618.05	470	464
SM6Z	221-585.04	246	260,5	221-618.11	413	221-618.05	470	464
SN6Z	221-585.05	246	260,5	221-618.11	413	221-618.05	470	464
EF6Z	221-585.07	246	210	221-618.11	413	221-618.05	470	464
EG6Z	221-585.08	246	210	221-618.11	413	221-618.05	470	464
EH6Z	221-585.09	246	210	221-618.11	413	221-618.05	470	464
EK6Z	221-585.10	246	210	221-618.11	413	221-618.05	470	464
SG6A	221-586.01	246	260,5	221-618.11	413	221-618.05	470	464
SH6A	221-586.02	246	260,5	221-618.11	413	221-618.05	470	464
SK6A	221-586.03	246	260,5	221-618.11	413	221-618.05	470	464
SM6A	221-586.04	246	260,5	221-618.11	413	221-618.05	470	464
SN6A	221-586.05	246	260,5	221-618.11	413	221-618.05	470	464
EF6A	221-586.07	246	210	221-618.11	413	221-618.05	470	464
EG6A	221-586.08	246	210	221-618.11	413	221-618.05	470	464
EH6A	221-586.09	246	210	221-618.11	413	221-618.05	470	464
EK6A	221-586.10	246	210	221-618.11	413	221-618.05	470	464



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