Installation and operating manual GB/en

EASYLAB controller

Serie TCU3

TROX® TECHNIK

The art of handling air

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1 General information

About this manual

This manual enables operating and service personnel to correctly install the EASYLAB TCU3 controller and to use it safely and efficiently.
The TCU3 electronic controller is used with a VAV terminal unit; both products together form a functional unit.

Depending on the scope of order, the electronic controller can be equipped with optional expansion modules (EM-xx) at the factory (retrofitting possible).

This operating and installation manual is intended for use by fitting and installation companies, in-house technicians, technical staff, instructed persons, and qualified electricians or air conditioning technicians.

It is essential that these individuals read and fully understand this manual before starting any work. The basic prerequisite for safe working is to comply with the safety notes and all instructions in this manual.

The local regulations for health and safety at work and general safety regulations also apply.

This manual must be given to the system owner when handing over the system. The system owner must include the manual with the system documentation. The manual must be kept in a place that is accessible at all times.

Illustrations in this manual are mainly for information and may differ from the actual design. Discrepancies cannot be used to make any claims against the manufacturer.

In addition to this manual, the following documents apply

- Operating manual
  - EasyConnect configuration software
- Installation manual for VAV terminal unit(s)
- Installation manuals for EASYLAB components
  - Expansion module EM-AUTOZERO
  - Expansion module EM-LIGHT
  - Expansion module EM-TRF/EM-TRF-USV
  - Expansion module EM-LON
  - Expansion module EM-BAC-MOD
  - Expansion module EM-BAC-IP
  - Control panel BE-LCD
  - Control panel BE-SEG
  - Face velocity transducer VS-TRD
  - Sash distance sensor DS-TRD
- General wiring documents
- Project-specific wiring documents

All documents can be downloaded from *www.troxtechnik.com*.

Project-specific information is provided together with the order confirmation or delivered together with the product.

TROX Technical Service

To ensure that your request is processed as quickly as possible, please keep the following information ready:

- Product name
- TROX order number
- Delivery date
- Brief description of the fault

Online	*www.troxtechnik.com*
Phone	+49 2845 202-400

Limitation of liability

The information in this manual has been compiled with reference to the applicable standards and guidelines, the state of the art, and our expertise and experience of many years.

The actual scope of delivery may differ from the information in this manual for bespoke constructions, additional order options or as a result of recent technical changes.

The obligations agreed in the order, the general terms and conditions, the manufacturer's terms of delivery, and the legal regulations in effect at the time the contract is signed shall apply.

Defects liability

For details regarding defects liability please refer to Section VI, Warranty Claims, of the Delivery and Payment Terms of TROX GmbH.

The Delivery and Payment Terms of TROX GmbH are available at *www.troxtechnik.com*.

Copyright

Safety notes

Symbols are used in this manual to alert readers to areas of potential hazard. Signal words express the degree of the hazard.

Comply with all safety instructions and proceed carefully to avoid accidents, injuries and damage to property.

DANGER!

Imminently hazardous situation which, if not avoided, will result in death or serious injury.

WARNING!

Potentially hazardous situation which, if not avoided, may result in death or serious injury.

CAUTION!

Potentially hazardous situation which, if not avoided, may result in minor or moderate injury.

NOTICE!

Potentially hazardous situation which, if not avoided, may result in property damage.

ENVIRONMENT!

Environmental pollution hazard.

Safety signs on the controller

The following symbols and signs are usually found in the work area. They apply to the very location where they are found.

	Electric shock hazard! Disconnect the power supply before you open the device. Only skilled qualified electricians are allowed to work in areas marked as having electrical voltage. Unauthorised persons must not enter areas, open cabinets or work on components where an electrical voltage is present and which are hence marked with this symbol.
	General warning
	Read the operating and installation manual before commissioning and before you open the casing.
	Functional earth

WARNING!

Danger due to illegible signage!

Over time, stickers and signs may fade or become otherwise illegible, meaning that hazards cannot be identified and necessary operating instructions cannot be followed. There is then a risk of injury.

– Ensure that all of the safety, warning and operating information is clearly legible.
– Replace illegible signs or stickers immediately.

2 Safety and correct use

General safety notes

DANGER!

Risk of injury from the damper blade of the VAV terminal unit

The damper blades of VAV terminal units close or open extremely quickly (∡ 90° within 3 seconds) and may crush your hands and arms.

Connect ducts to both ends of a VAV terminal unit; if one end cannot be ducted, at least fit a perforated plate to prevent people from reaching into the terminal unit.

CAUTION!

Risk of injury from the casing cover falling shut

An open casing cover may suddenly fall shut and crush your fingers.

– Secure an open casing cover with a bracket.
– Wear protective gloves.

NOTICE!

Risk of damage to property due to large temperature differences

If any electronic components have been kept in an unheated area, condensation may form and damage the electronic components beyond repair.

– Before you start commissioning, make sure that all devices have warmed up to ambient temperature. Only after about 2 hours will the system have reached room temperature.

NOTICE!

Risk of damage to property due to electrostatic charge

Electrostatic charge can damage the electronics.

– Avoid skin contact with any components or printed circuits.
– Touch an equipotentially bonded metal surface before you touch any printed circuit boards.
– Wear conductive footwear and antistatic clothing.

NOTICE!

In an emergency

Immediately disconnect the power supply to the controller. Emergencies include, for example, a damaged mains cable, a damaged casing, the ingress of a liquid or foreign matter, a smell or smoke.

Have the device checked by the manufacturer before you put it into operation again.

Correct use

Only use the device for its intended correct use and in compliance with the safety precautions and information in this manual in order to avoid danger to persons and property.

The correct use of this device encompasses:

- The electronic control of volume flow rates for supply or extract air and for fume cupboards in combination with a TROX air terminal unit.
- Indoor use for ventilation and air conditioning systems, especially for laboratories.
- The controller is typically used in a group of several controllers for complete room control, but it may also be used as a single controller.
- For error-free operation, the installation orientation of the controller must be observed; possible installation orientations are indicated on the installation orientation label on the device.

Incorrect use

Do not use the controller in an installation orientation or for areas of application that are not described in this manual.

Do not use the controller outdoors, in wet areas, or in areas with potentially explosive atmospheres.

Residual risks

Power failure

If the power fails, the damper blade of the VAV terminal unit remains in the position at that time; the controller will resume operation once power returns.

For safety related applications you may use expansion module EM-TRF-USV, which ensures uninterruptible power supply. If the emergency power unit has been correctly connected and charged, it will supply power for the set operating times (↳Technical Data for EM-TRF-USV).

Monitoring function

- Alarm signal in the event of insufficient volume flow rate, ↳ *on page 11*
- Alarm signal in the event of insufficient room pressure, ↳ *on page 11*
- Alarm signal in the event of volume flow rate in shut-off position, ↳ *on page 11*

For safety related applications you should check whether then safety measures are required, such as alarms. You may use the alarm relay for switching operations.

3 Technical data

Technical data		
Supply voltage	24 V AC ±15% 50-60 Hz 24 V DC ±15% ⚠ Do not use 24 V AC and 24 V DC power supplies at the same time! Optional: 230 V AC mains supply, only with the EM-TRF expansion module; optional: 230 V AC mains supply with UPS, only with the EM-TRF USV expansion module	
Power rating	The maximum power required depends on the construction of the controller. Typical constructions with different equipment result in the following values:	
	Fume cupboard controller with control panel	35 VA
	Room controller	29 VA
	Room controller with room control panel	33 VA
	Including all expansion modules	40 VA max.
Connecting cable	Double-stack terminal blocks for cables with a cross section up to 2.5 mm² ⚠ The 24 V supply voltage may be connected for a maximum of 5 controllers.	
Micro fuse	2.5 A, slow blow, 250 V, as glass fuse 5 x 20 mm	
Volume flow rate measurement	Differential pressure transducer with room air induction to protect the measurement point Optional: Automatic zero point correction only with expansion module EM-AUTOZERO	
Actuator	Fast-running high-precision actuator, ∠ 90°: 3 s	
Flow rate setting time	≤ 2 s, depending on duct pressure	
Controller recovery time after supply voltage failure	< 500 ms	
Plug and play communication system	With automatic detection of the connected equipment and equipment functions:	
	Communication cable: 300 m max.	
	Number of controllers: max. 24 per segment	
Temperature range	Operation: 0 to +50 °C	
	Storage: -10 to +70 °C	
Humidity	<90% no condensation	
Area of application	Enclosed spaces	
Protection level	IP20	
IEC protection class	III (protective extra-low voltage)	

Dimensions

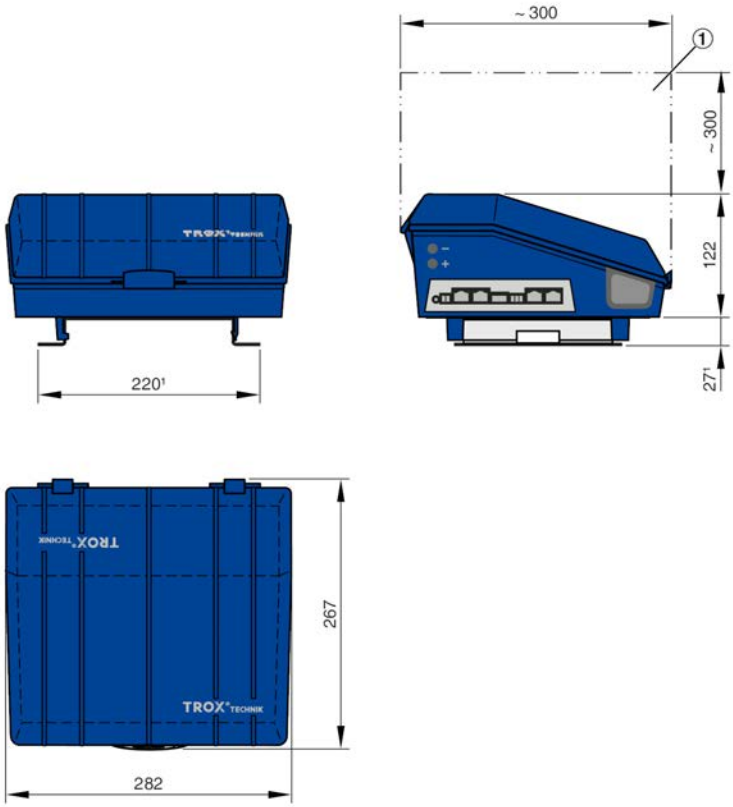


Fig. 1: Dimensions

① Keep clear to provide access
1 When combined with TAM, TVRK, TVR, TVA, TVZ, TVJ or TVT

4 Transport, storage and packaging

Delivery check

Check delivered items immediately after arrival for transport damage and completeness. In case of any damage or an incomplete shipment, contact the shipping company and your supplier immediately.

A complete shipment includes:

- Electronic controller in a closed two-part casing, including:
  - Bracket for the cover
  - 2 cable glands, plastic (black)
  - 2 cable clips for strain relief (reusable)
  - Flow rate transducer (with tubes connected)
  - 2-pin plug connector for connection X1
  - 3-pin plug connector for connection X5 (sensor AI)
  - Network patch cable, 5 m, S-FTP green (only for fume cupboard controllers, equipment function FH-xxx)
- Expansion modules as ordered (see delivery note)
- Operating and installation manual

TCU3 is usually factory mounted to a TROX VAV terminal unit.

If any expansion modules have been ordered, the controller is factory fitted with these modules and shipped as a complete unit.

Transport on site

- If possible, take the controller in its transport packaging up to the installation location.
- Do not remove the protective wrapping until just before installation.

Storage

For temporary storage please note:

- Leave the device in its packaging and do not expose it to the effects of weather.
- Store the product in a dry place and away from direct sunlight
- Temperature -10 to +70 °C, humidity 90% max. (no condensation)

Packaging

Properly dispose of packaging material.

5 Product description

Volume flow control

Fig. 2: Example

1 VAV terminal unit, e.g. TVR
2 Differential pressure sensor
3 Electronic controller TCU3
4 Actuator
5 Sticker showing installation orientations

The electronic controller is used in combination with an air terminal unit to control variable supply or extract air volume flow rates or for room pressure control.

The controller includes a diaphragm pressure transducer that transforms the differential pressure (effective pressure) into an electric signal. The controller compares the actual value with the setpoint value and alters the control signal of the actuator if there is a difference between the two values.

Volume flow rate monitoring

The controller monitors the volume flow rate. If the actual value deviates by more than 4% (can be configured) from the setpoint value, a signal is emitted:

- The red LEDs (on opposite sides of the controller casing) blink continuously.
- The alarm relay of the controller drops out (wire break-proof).
- If necessary, external alarm signal ↳ *External signaling of setpoint deviation*

Pressure monitoring

The target pressure is monitored by the controller, if the actual value deviates from the configured pressure deviation, the following signal is emitted:

- The red LEDs (on opposite sides of the controller casing) blink continuously.
- The alarm relay of the controller drops out (wire break-proof).
- If necessary, external alarm signal ↳ *External signaling of setpoint deviation*

Shut-off monitoring

The controller monitors the damper blade position; if a volume flow is detected although the damper blade is in shut-off mode (override control), an alarm is emitted:

- The red LEDs (on opposite sides of the controller casing) blink continuously.
- The alarm relay of the controller drops out (wire break-proof).
- If necessary, external alarm signal ↳ *External signaling of setpoint deviation*

External signaling of setpoint deviation

The monitoring signals can be forwarded externally (only with optional equipment)

Monitoring of volume flow rate or room pressure

- Display on the control panel (BE-SEG and/or BE-LCD):
  - Red light and sound (flow rate below setpoint)
  - Yellow light (flow rate above setpoint)
- Signaling to the higher-level system (only with expansion module EM-LON, EM-IP or EM-BAC-MOD)

Monitoring shut-off:

- Display on the control panel (BE-SEG and/or BE-LCD):
  - Yellow light (flow rate above setpoint)
- Signaling to the higher-level system (only with expansion module EM-LON, EM-IP or EM-BAC-MOD)

When installed, the controller is usually not accessible and the LEDs are not visible; for safety related applications, however, signals should be made visible (with an alarm relay, by others).

Interfaces and signal lamps on the controller casing

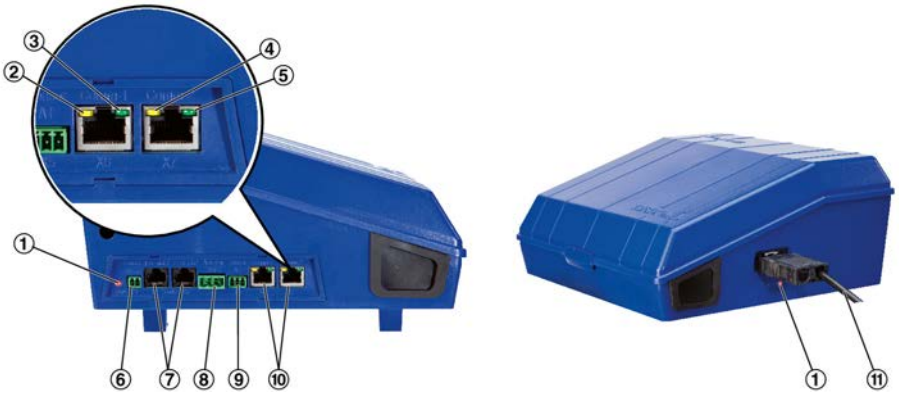


Fig. 3: Controller casing

Status LEDs

No.	Colour	Name	LED	Description
1	Red	Error	LED on	Up to 3 s: Switch-on procedure. Permanently: Switch-on procedure error
			LED blinking	Error; for detailed diagnosis use EasyConnect software
			LED blinking slowly	Undefined equipment function; for detailed diagnosis use EasyConnect software
			LED off	Normal operation; if no. 5 is also off ⇒ Equipment not ready for operation
2	Yellow	Cable termination	LED on	Cable termination is active
			LED off	Cable termination is inactive
3	Green	Not used		
4	Yellow	Data reception in progress	LED on	Data is being received from several controllers
			LED on with brief interruptions	Data is being received from few controllers
			LED off	No data reception from other devices
5	Green	Controller operation (heartbeat)	LED blinking slowly	Normal controller operation
			LED flickering	Controller operation; PC communication with EasyConnect configuration/diagnosis software
			LED off	Device not ready

External interfaces

No.	Name	Connection point for	Description
6	Contact 500 mm (X1)	Sash	Connection for a volt-free switch contact used to monitor the maximum operational sash opening (to EN 14175, only for fume cupboard controllers)
7	Terminal-1 (X2)	Control panel 1	Connection point for: ■ EasyLAB control panel, e.g. type BE-SEG-xx, BE-LCD-01 ■ PC with EasyCONNECT software with – BlueCon adapter – Special configuration cable
	Terminal-2 (X3)	Control panel 2	
8	Actuator (X4)	Actuator	The damper actuator is factory fitted if the actuator is part of the supply package (not for TAM).
9	Sensor (X5)	Analogue input AI5	On a fume cupboard controller: Equipment function FH-VS ⇒ face velocity transducer; can otherwise be used for the connection of variable extract air or supply air volume flows with a 0-10 V DC signal. (Characteristic can be configured)
10	Comm-1 (X6)	Communication 1	RJ45 socket for SF-UTP network patch cables
	Comm-2 (X7)	Communication 2	
11		Fume cupboard lighting	230 V AC socket, switching with control panel Only for use with expansion module EM-LIGHT. Max. switch rating of TCU3 relays: 250 V AC 8 A; switch-on current 12 A.
For details on the electrical data for each connection see *Appendix 'List of terminal connections' on page 29*			

Interfaces and signal lamps in the controller casing

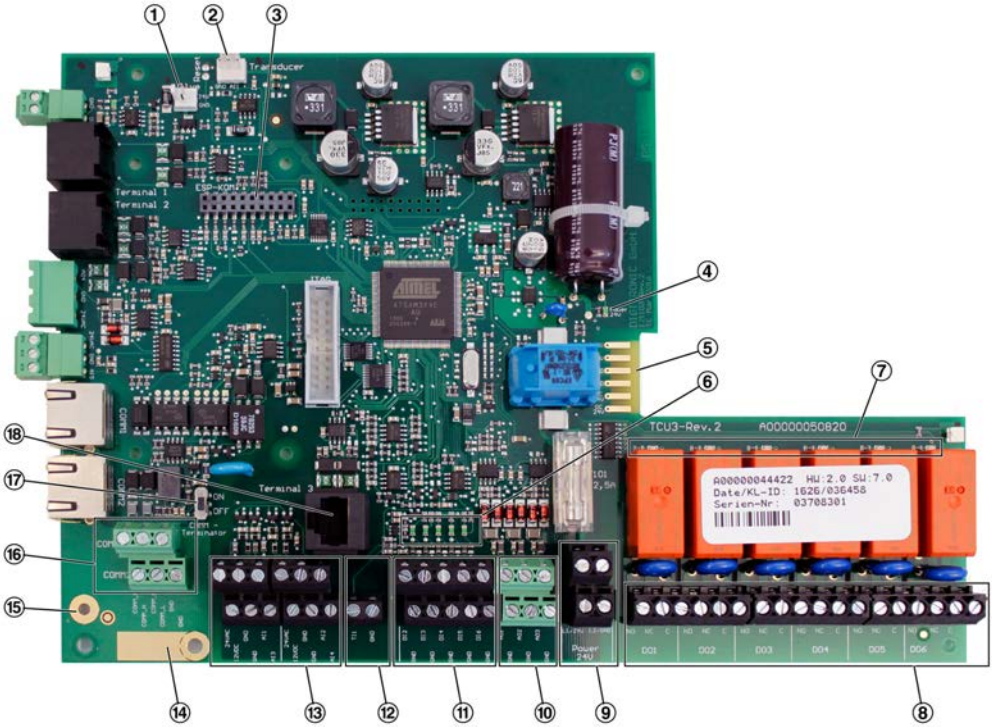


Fig. 4: Interfaces and signal lamps on the PCB

No.	Name	Description	
1	Valve connection	Connection point for expansion module EM-AUTOZERO	
2	Analogue input 1 (AI1)	Connection point for the integral diaphragm pressure transducer, analogue voltage 0-10 VDC, 10 mA max.	
3	Expansion slot 1 (ESP-KOM)	Connection for expansion modules to connect the controller to higher-level systems: ■ EM- LON: BUS communication LonWorks FT10 ■ EM-BAC-MOD: BUS communication BACNet MS/TP or MODBUS RTU ■ EM-IP: BUS communication BACnet IP or MODBUS IP as well as web server	
4	Power 24 V	LED on	24 V supply voltage OK

No.	Name	Description	
		LED off	24 V supply voltage failed / sagging
5	Connection of mains supply	Connection for EM-TRF and EM-TRF-USV expansion modules	
6	Status display for digital inputs DI1…DI6	LED on	Digital input DI is active
		LED off	Digital input DI is not active
7	Status display for digital outputs DO1…DO6	LED on	Digital output DO is active
		LED off	Digital output DO not active
8	Terminal block DO1…DO6	Digital outputs 1...6	Changeover relays
			max. 250 V AC 8 A, switch-on current 12 A max.
9	Terminal block, 24 V	Supply voltage 24 V AC or 24 V DC ⚠ Do not use 24 V AC and 24 V DC power supplies at the same time!	
10	Terminal block AO1... AO3	Analogue outputs 1...3	Can be configured for 0-10 V DC, 10 mA max.
11	Terminal block DI2…DI6	Digital inputs 2...6	For volt-free switch contacts 5 V DC xx mA
12	Terminal block TI1	Input for temperature sensor PT1000 (only for fume cupboards from software version V8) Input for temperature sensor PT1000 (not supported)	
13	Terminal block AI1…AI4	Analogue inputs 1...4	Can be configured for 0-10 V DC, 10 mA max.
14	Clip / connection	Strain relief / connection for communication cable shield	
15	⏚ Functional earth	Connection point for the functional earth to improve electromagnetic compatibility (EMV)	
16	COMM-1 connection COMM-2 connection	Alternative terminals for the communication cable; in general, however, connection points Comm-1 (X6) and Comm-2 (X7) should be used (*on page 13*/10). SF-UTP network cable	
17	COMM terminal resistor	Switch ON	Communication cable termination is active
		Switch OFF	Communication cable termination is inactive
18	Terminal 3	Connection for TROX HPD actuator ⚠ Do not connect PD here	
For details on the electrical data for each connection see *'List of terminal connections' on page 29*			

6 Installation

Installation orientation

The installation orientation of the controller is critical because of the diaphragm pressure transducer; approved installation orientations are shown on a sticker (Fig. 5) on the controller casing.

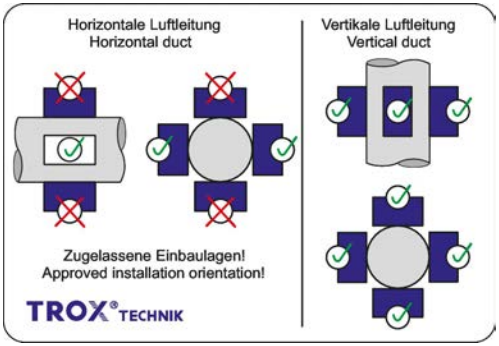


Fig. 5: Sticker showing the installation orientation

Installation orientation OK
Installation orientation not OK

Install the controller only as follows:

- On horizontal ducts (left side of the sticker)
  - Only on the side of a duct

    Do not install the controller above or below a duct and neither anywhere in between.
- On vertical ducts (right side of the sticker)
  - Any installation orientation

> ***Alternative installation orientation***
>
> *The installation orientations shown on the sticker apply to the controller at the time of shipping. They depend on the position of the diaphragm pressure transducer in the controller casing. If you install the controller above or below a duct, you have to adapt the position of the diaphragm pressure transducer* ↬ *17.*

Alternative installation position of the diaphragm pressure transducer

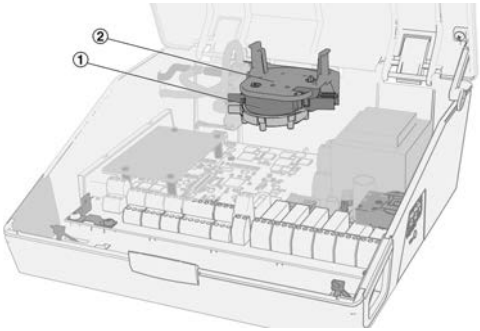
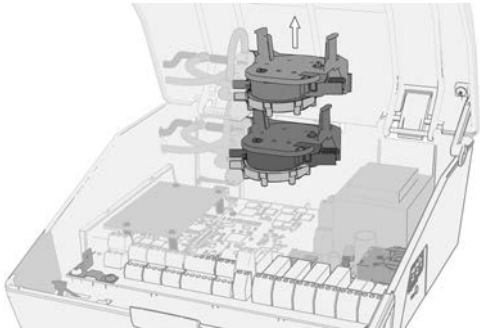


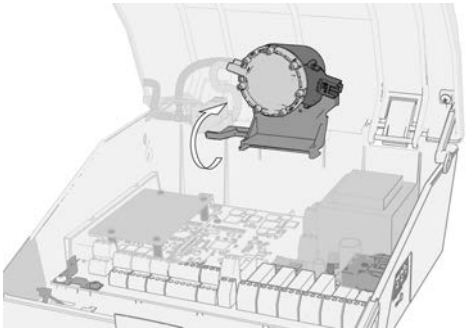
Fig. 6: Original position of the diaphragm pressure transducer at the time of shipping

The diaphragm pressure transducer (Fig. 6/1) and its holder (Fig. 6/2) are factory fitted in such a way that the installation orientations of the controller correspond to the sticker.

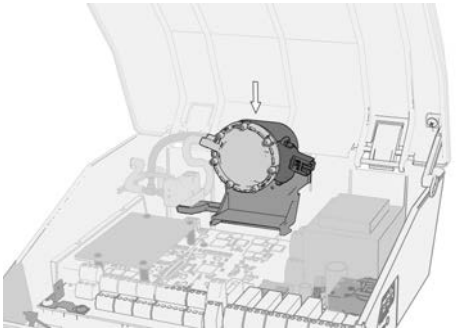
If necessary, you can adapt the controller for installation above or below a duct. To do so, you have to turn the diaphragm pressure transducer by 90°.



1. ▸ Grasp the diaphragm pressure transducer together with the holder and carefully lift it out of the casing. Be careful so as not to kink the pneumatic measuring tubes or to inadvertently disconnect any wires or cables.



2. ▶ Turn the diaphragm pressure transducer by 90°.



3. ▶ Insert the holder with the diaphragm pressure transducer again.

> *If the position of the diaphragm pressure transducer has been adapted, the controller must not be installed on the side of horizontal or vertical ducts.*

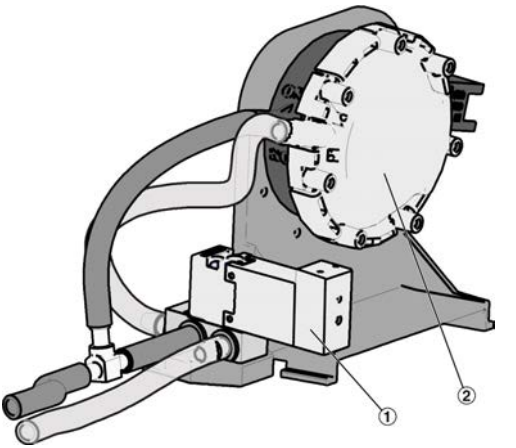


Fig. 7: Tubing

4. ▶ Check all connections and make sure that the tubes and wires of the transducer are properly connected and have not been kinked.

   Connect any disconnected wires on the PCB:

Valve (1)	-	Connection to *'Valve'* (Fig. 4/1)
Diaphragm pressure transducer (2)	-	Connection to *'Transducer'* (Fig. 4/2)

   Replace loosened tubing:

Blue tube	-	Connection to – (Minus)
transparent tube	-	Connection to + (Plus)

Wall installation

For restricted spaces you can detach the controller from the VAV terminal unit and install it on the wall next to the terminal unit or anywhere else nearby; to fix the controller on a wall, you can use a mounting bracket (Part no. E346GL3).

Do not extend the actuator cable or any measuring tubes.

Be sure to install the controller according to the sticker showing the correct installation orientations ↳ *17*.

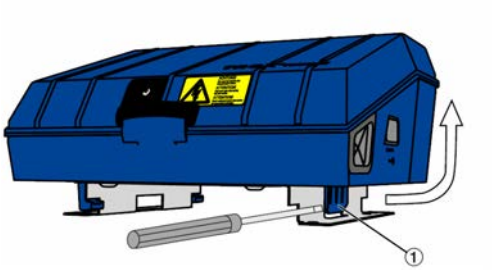
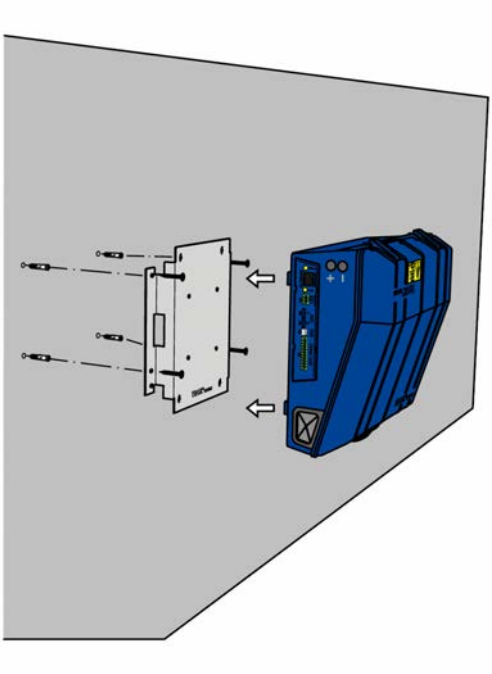


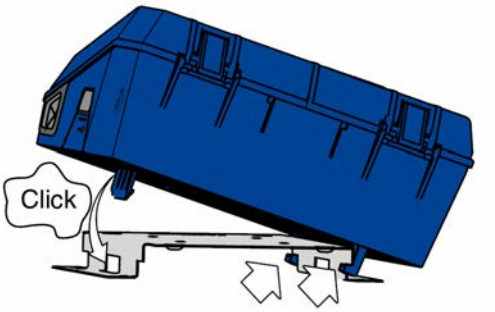
Fig. 8: Detaching the controller

1. ▸ Use a screwdriver to flip up the lug (1) and lift the controller.

   In some cases, e.g. with TVLK, the controller is factory fitted to the terminal unit without a bracket.



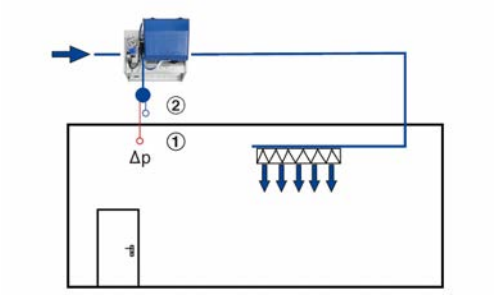
2. ▸ Use suitable screws ∅ 4 mm to fix the mounting bracket to the wall.



3. ▸ Press the controller casing as shown onto the mounting bracket until it clicks into place.

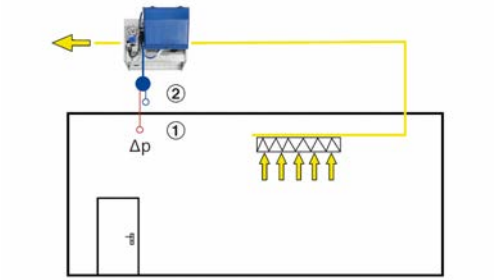
Tube connection on the pressure transducer

Room pressure control – supply air



Measuring point	Tube connection PT699	
	Positive Room pressure	Negative Room pressure
1	+	–
2	–	+

Room pressure control – extract air



Measuring point	Tube connection PT699	
	Positive Room pressure	Negative Room pressure
1	+	–
2	–	+

7 Wiring

Safety instructions

Personnel:

- Skilled qualified electrician

DANGER!

Danger of death due to electric current!

Danger of electric shock! Do not touch any live components!

– Switch off the supply voltage and secure it against being switched on accidentally before working on the unit.
– Ensure that no voltage is present.
– Work on the electrical system must only be carried out by skilled qualified electricians.

CAUTION!

Risk of damage to the controller

For wiring please note:

– Do not connect the 24 V supply if the EM-TRF or EM-TRF-USV expansion module has been installed.
– Do not connect 230 V and 24 V supply voltages at the same time.
– Do not connect Terminals 1 + 2 with Comm 1 + 2.
– Never connect 24 V AC and 24 V DC supply voltage at the same time.
– Never connect the PC or Comm 1 + 2 to the connection (Fig. 4/18 - Terminal 3).

Notes on wiring

Use only cables that are designed for the supply voltage for which they will be used. The length and cross section as well as any contact resistance may increase voltage losses. The power rating of each unit must also be considered. A skilled qualified electrician has to select the correct cable types and sizes. This job must only be carried out by specialist electrical companies.

- For the electrical connection comply with any applicable regulations and follow the code of good practice. Be sure to comply with the applicable guidelines for working on electrical and electronic equipment as well as with any applicabe local regulations.
- The connection data can be found on the rating plate or in the wiring diagrams.
- Protect any connecting cables from physical damage.
- Feed cables through the cable glands on the controller casing.
- Ensure that the device can be de-energised (all phases) for maintenance so that no voltage is present. This requires separators (e.g. fuses or RCBOs) near the controller; the contact gap should be at least 3 mm.

Additional information on wiring

See the following wiring documents:

- Wiring example, *28*
- List of terminal connections, *29*
- General wiring instructions Serie TCU3 (separate document)
- Project-specific wiring documents, if any

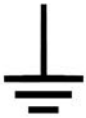
Limited voltage supply

With a supply voltage of 24 V AC/DC, a maximum of 5 electronic controllers may be connected through the double terminals to limit the currents on the circuit board and the terminals.

Polarity of the power supply

When connecting the supply voltage, the polarity at 24 V AC and 24 V DC must be observed for all controllers!

Functional earth



The controller is fitted with a functional earth connection. It is used to improve electromagnetic compatibility (EMC)

We recommend you to connect the device to equipotential bonding in order to improve electromagnetic compatibility.

Strain relief

Use the cable clips in the casing for all connection cables inside the casing.

Cabling

Be careful so as not to kink or disconnect the measuring tubes on the VAV air terminal unit.

8 Commissioning

Checking / adjusting the configuration settings

Controller parameters are factory set as ordered.

Carry out commissioning based on any project-specific data and the project-specific wiring documents..

Connection with configuration cable

Fig. 9: PC connection via various interfaces

1 Connection to terminal-1/-2 (Service X2 / X3)
2 Connection to the service socket of the BE-LCD control panel
3 Connection to the service socket of the BE-SEG control panel

1. ▶ Using a PC or notebook and the TROX EasyConnect configuration software, you can verify the configuration settings and adjust them if necessary.

To do this, connect the computer and the controller with the configuration cable (USB-RS485) to one of the interfaces shown above.

The required cables and adapters as well as the software license are available as accessories (part no. B588NF4).

Alternatively: BlueCon Bluetooth adapter

Fig. 10: PC connection via various interfaces

1 Connection to terminal-1/-2 (Service X2 / X3)
2 Connection to the service socket of the BE-LCD control panel
3 Connection to the service socket of the BE-SEG control panel

2. ▶ You can also establish a wireless connection (Bluetooth) between the controller and your PC. To do this, plug the BlueCON module into one of the interfaces shown above. This requires a Bluetooth interface on the PC or notebook (either integral hardware or external, e.g. with a USB stick).

Zero point correction of the diaphragm pressure transducer

3. ▸ Zero point correction of the diaphragm pressure transducer is required as part of commissioning (not required for controllers with expansion module EM-AUTOZERO).

   The EasyConnect software recognises the system configuration and guides you through the required steps. Zero point correction: Remove the two measuring tubes (blue and white) (1) from the angled pieces (2) on the sensor tube or from the T pieces (3) on the controller.

   Zero point correction can alternatively also be carried out with the EasyCon APP.

   When the zero point correction is finished, reconnect the measuring tubes.

Adaptation of the actuator (only for fast-running actuator TUS)

4. ▸ VAV terminal units with a TROX actuator NMQ24A-SR TR (M466EQ0) have to be adjusted as part of commissioning. This ensures that any incorrect position, e.g. due to shipping or installation, is corrected. To adjust the actuator, press the green 'Adaption' button. The status LED lights up (orange) and the actuator is moved to its end position. When adjustment is complete, the status LED goes off.

Adaptation of the actuator (only for fast-running actuator TROX TUSD)

5. ▸ For air terminal units with TROX type HPD actuator (A00000067751), adaptation must be carried out during commissioning. This ensures that any incorrect position, e.g. due to shipping or installation, is corrected.

   To do this, press the *'diagnostics ➔ push button Adaption'* in the EasyConnect software.

For adaptation, the actuator moves to the end positions and then automatically switches to control mode.

Functional test

6. ▶ To complete commissioning, perform a functional test of the controller using the Easy-Connect software, taking into account the project specifications for the required operating modes.

   Compare the volume flow rate setpoint value for each operating mode with the actual value and document the results. Check if alarms are emitted and signaled with the functional test.

9 Maintenance

Safety

The system owner is responsible for operational reliability.

DANGER!

Danger of death due to electric current!

Danger of electric shock! Do not touch any live components!

- Switch off the supply voltage and secure it against being switched on accidentally before working on the unit.
- Ensure that no voltage is present.
- Work on the electrical system must only be carried out by skilled qualified electricians.

Operation and maintenance

The electronic components of the controller do not require maintenance. Special maintenance requirements may apply to the VAV terminal unit depending on where it is installed.

For example, the function of fume cupboard controllers should be checked once a year according to DIN 12924, EN 14175, BGR 120 (Rules for safety and health protection/laboratories) and the German TRGS 526 (Technical Rules for Hazardous Substances).

Zero point correction

To ensure continued accuracy of volume flow measurements, zero point correction of the diaphragm pressure transducer is required in regular intervals (not required for controllers with expansion module EM-AUTOZERO). Carry out manual zero point correction at least once per year as part of a functional test or maintenance. Zero point correction is automatically carried out in regular intervals for controllers with expansion module EM AUTOZERO.

1. ▸ For manual zero point correction remove the two measuring tubes (blue and white) (1) from the angled piece (2) on the sensor tube or from the T pieces (3) on the controller.
2. ▸ Connect the controller to your PC (EasyConnect software is required), see ↬ *22*.
3. ▸ Start zero point correction with the EasyConnect software, *'Diagnosis – I/O'* function.
4. ▸ When the zero point correction is finished, reconnect the measuring tubes.

   Blue - Connection to – (Minus)

   White - Connection to + (Plus)

Replacing the fuse

If the glass fuse has blown, replace it only after the error has been diagnosed and solved. Replacement fuse ↬ *on page 8*.

10 Decommissioning

Removing the electronic controller

DANGER!

Danger of electric shock! Do not touch any live components!

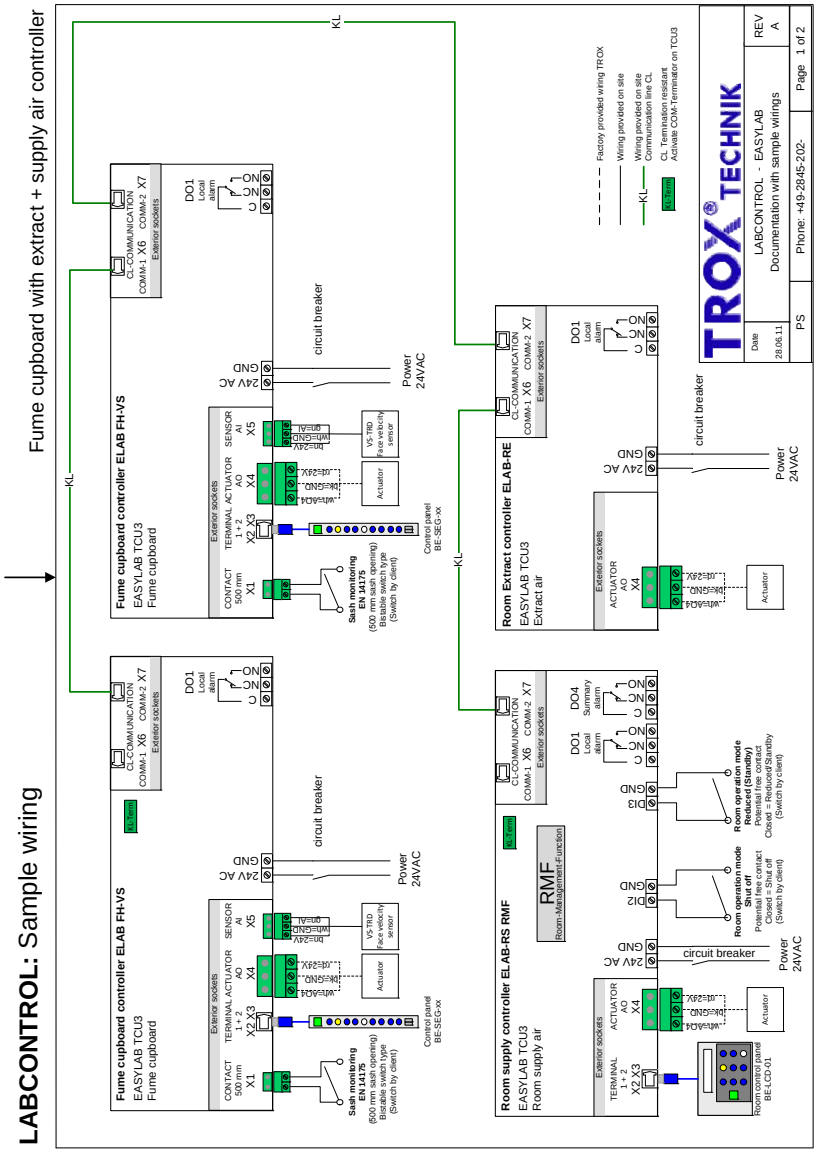
Electrical equipment carries a dangerous electrical voltage.

– Only skilled qualified electricians are allowed to work on the electrical system.
– Switch off the power supply before working on any electrical equipment.

1. ▶ Interrupt the voltage supply to the controller.
2. ▶ Disconnect tubes and wires.
3. ▶ Detach the controller from the mounting bracket, *on page 19*.
4. ▶ Dispose of the controller in compliance with legal requirements.

Appendix

A Wiring example



B List of terminal connections

Anschluss / Connection		Arderquerschnitt / Wire cross section	Adernzahl / No. of wires	Länge / Length	Max. Spannung / Max. voltage	Max. Strom / Max. current	Max. Isolationsspannung Klemme / Breakdown voltage of terminal
X4	Actuator (AO4)	0.2 – 2.5 mm² / 12 – 30 AWG	3	1 m / 3.3 ft	10 VDC	10 mA	1.6 KV
X1	Contact 500 mm	0.2 – 2.5 mm² / 12 – 30 AWG	2x2x0.8	max. 100 m / 330 ft	5 VDC	10 mA	1.6 KV
X2	Terminal-1	26AWGx4P	8	max. 40 m / 131 ft	24 VDC	200 mA	1000 VAC
X3	Terminal-2	26AWGx4P	8	max. 40 m / 131 ft	24 VSC	200 mA	1000 VAC
X5	Sensor AI5	0.2 – 2.5 mm² / 12 – 30 AWG	3 x 0.34	max. 10 m / 33 ft	24 / 10 VDC	10 mA	1.6 KV
X6 / X7	Com-1 / Com-2	26AWGx4P	8	max. 300 m / 984 ft	-	-	1000 VAC
DO1	NO/NC/C	0.2 – 2.5 mm² / 12 – 30 AWG	2 x 0.75	-	230 VAC	8A	1000 V
DO2	NO/NC/C	0.2 – 2.5 mm² / 12 – 30 AWG	2 x 0.75	-	230 VAC	8A	1000 V
DO3	NO/NC/C	0.2 – 2.5 mm² / 12 – 30 AWG	2 x 0.75	-	230 VAC	8A	1000 V
DO4	NO/NC/C	0.2 – 2.5 mm² / 12 – 30 AWG	2 x 0.75	-	230 VAC	8A	1000 V
DO5	NO/NC/C	0.2 – 2.5 mm² / 12 – 30 AWG	2 x 0.75	-	230 VAC	8A	1000 V
DO6	NO/NC/C	0.2 – 2.5 mm² / 12 – 30 AWG	2 x 0.75	-	230 VAC	8A	1000 V
DI2	DI2 - GND	0.14 – 1.5 mm² / 16 – 26 AWG	2 x 0.75	max. 40 m / 131 ft	5V	10 mA	1.6 KV
DI3	DI3 - GND	0.14 – 1.5 mm² / 16 – 26 AWG	2 x 0.75	max. 40 m / 131 ft	5V	10 mA	1.6 KV
DI4	DI4 - GND	0.14 – 1.5 mm² / 16 – 26 AWG	2 x 0.75	max. 40 m / 131 ft	5V	10 mA	1.6 KV
DI5	DI5 - GND	0.14 – 1.5 mm² / 16 – 26 AWG	2 x 0.75	max. 40 m / 131 ft	5V	10 mA	1.6 KV
DI6	DI6 - GND	0.14 – 1.5 mm² / 16 – 26 AWG	2 x 0.75	max. 40 m / 131 ft	5V	10 mA	1.6 KV
AI 1	AI1 -GND	0.14 – 1.5 mm² / 16 – 26 AWG	3 x 0.75	max. 10 m / 33 ft	24 / 10 VDC	10 mA	1.6 KV
AI 2	AI2 -GND	0.14 – 1.5 mm² / 16 – 26 AWG	2 x 0.75	max. 10 m / 33 ft	10 VDC	10 mA	1.6 KV
AI 3	AI3 -GND	0.14 – 1.5 mm² / 16 – 26 AWG					1.6 KV
AI 4	AI4 -GND	0.14 – 1.5 mm² / 16 – 26 AWG					1.6 KV
AO1	AO1 - GND	0.14 – 1.5 mm² / 16 – 26 AWG	2 x 0.75	max. 10 m / 33 ft	10 VDC	10 mA	1.6 KV
AO2	AO2 - GND	0.14 – 1.5 mm² / 16 – 26 AWG					1.6 KV
AO3	AO3 - GND	0.14 – 1.5 mm² / 16 – 26 AWG					1.6 KV
TI1	TI1 -GND	0.2 – 1.5 mm² / 16 – 26 AWG	-	max. 10 m / 33 ft			2.5 KV
Power 24V	L1/24-L2/GND	0.2 – 2.5 mm² / 12 – 30 AWG	2 x 1.5	-	24 VAC / 24 VDC	2 A	1.6 KV