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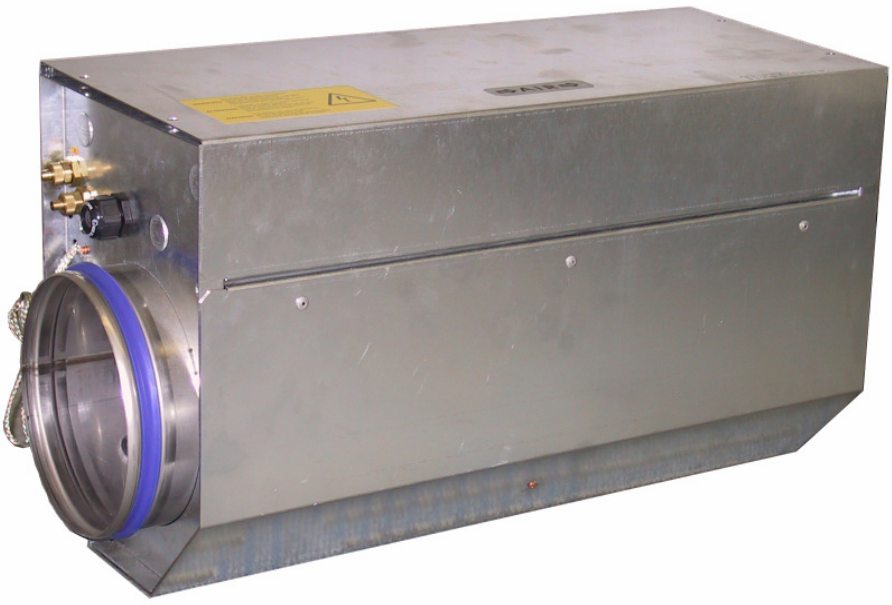
Ex VAV Controller TVR-Ex – TES/F
Shut off damper Ak-Ex – T0S/F
Assembly and Operating Instructions

Assembly and Operating Instructions TVR-Ex – TES/TEF and Ak-Ex – T0S/T0F



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Ex VAV Controller TVR-Ex – TES/F Shut off damper Ak-Ex – T0S/F Assembly and Operating Instructions

Before assembly and operating of the components please read this instruction manual

Table of contents

Subject:		Page
1	Explanation of graphic symbols	2
2	Range of application of these assembly and operating instructions	2
3	Intended use	2
4	Personnel qualifications	2
5	Accident prevention information	2
5.1	Accident prevention regulations	3
5.2	EN/DIN/VDE Standards	3
6	Delivery and storage	3
7	Transport on site	3
8	Assembly	3
8.1	Assembly area of controller	3
8.2	Assembly area of pressure adapter	4
8.3	Assembly area of electronic controller	4
9	Safety	4
9.1	Safety information	4
9.2	Wiring	4
9.3	Residual hazards	5
10	Functional characteristics	6
11	Maintenance	6
12	Technical data	6
13	Wiring diagram	7
14	Maintenance information	8

1 Explanation of graphic symbols

 Caution for person and components damage

 Caution for voltage

 Advise for basic information's

2 Range of application of these assembly and operating instructions

- Transportation and storage
- Assembly
- Electrical installation
- Commissioning
- Maintenance

3 Intended use

The TVR-Ex/xxx/D2/TES/ type variable flow volume control units and the shut off damper AK-Ex/xxx/T0S/F are designed for use in ventilation systems in Group II potentially explosive atmospheres as per ATEX for zones 1 and 2.

These units are not suitable for

- use outdoors
- use in wet areas
- use in non-approved Ex zones

4 Personnel qualifications

- Only use specially trained and qualified personnel
- Personnel must be informed of the specific requirements relating to the potentially explosive atmosphere

5 Accident prevention information

Applicable regulations as well as the recognised codes of engineering practice must be observed when performing assembly, electrical installation, commissioning, repair and maintenance work on the TVR-Ex / AK-Ex controllers.

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5.1 Accident prevention regulations

- General regulations (VGB 1)
- Accident prevention regulations for electrical systems and operating equipment (BGV A2)

5.2 DIN/VDE/EN standards

- The requirements stipulated by DIN VDE 0100, Part 610, additionally apply to the initial inspection
- Generally, the following regulations must be observed when operating the system
  - DIN EN 50110-1 (VDE 0105 Part 1)
  - DIN EN 50110-2 (VDE 0105 Part 2)
  - DIN VDE 0105-100 (VDE 0105 Part 100)
  - DIN EN 60079-14 (VDE 0165 Part 1)
  - The system must comply with applicable lightening protection requirements
  - All applicable national and international standards and regulations for potentially explosive atmospheres must be observed.

6 Delivery and storage

- Immediately after delivery, check the unit to ensure it is complete and has not incurred any transport damage. If the delivery is incomplete or if transport damage has been incurred, immediately inform the haulage company and your Trox contact.
- Do not expose the unit (even when packed) directly to the effects of weather. Protect against moisture and direct sunlight.
- Do not store the unit at temperatures above 60C.

7 Transport on site

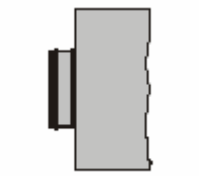
Do not carry the units at the control components but rather at the edges of the housing.

The differential pressure sensor in the pipe socket is an important measuring instrument for system operation and must therefore be handled with the utmost care. Therefore, do not pull at the pipes of the sensor.

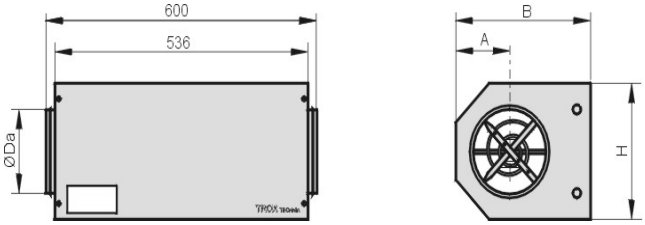
8 Assembly

The TVR-Ex flow volume controller or the Shut off damper AK-Ex is supplied only with the duct connection variant – spigot with sealing system (see illustration below).

TVR-Ex with sealing system



Main dimensions of TVR-Ex controller



D	dDa	A	B	C
125	124	128.5	290	221
160	159	111.0	290	221
200	199	181.5	380	311
250	249	156.5	380	311

8.1 Assembly site of controller

- The assembly site must be selected such a way that the control components and inspection openings remain accessible.
- Observe arrow indicating direction of air flow.
- With installation upstream and downstream of bends, dampers or any other obstructions, take into account the aerodynamic and acoustic effects.
- User-defined mounting position
- Leave at least 300mm space next to the cover plate of the TVR-Ex / AK-Ex in order to open it.

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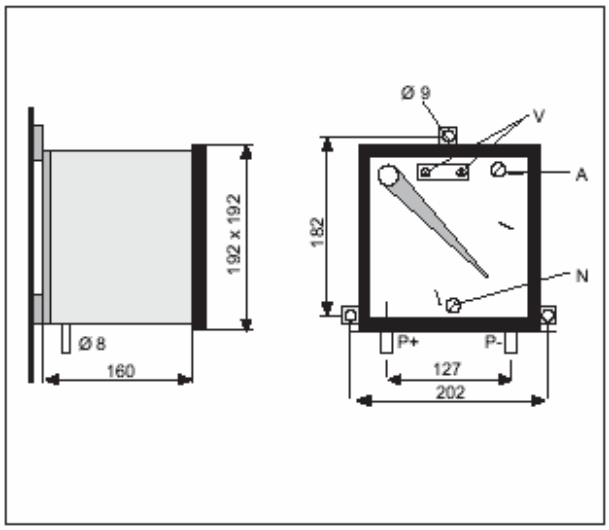
- Earthing straps on both ends are to be used to provide an electrically conductive connection between the system ducting and the controller in order to establish the necessary equipotential bonding.
- The controller is to be connected to the equipotential bonding of the building.

8.2 Assembly site of pressure adapter

The pressure adapter (ring balance) is to be installed in the vicinity of the TVR-Ex controller, on the wall or ceiling. Care must be taken to ensure the measuring instrument is installed in the specified mounting position. The piping of the ring balance is to be connected with the corresponding connections to the TVR-Ex controller. Further technical details are defined in the data sheet supplied with this unit. *Not in use by AK-Ex*

Ring balance dimensions

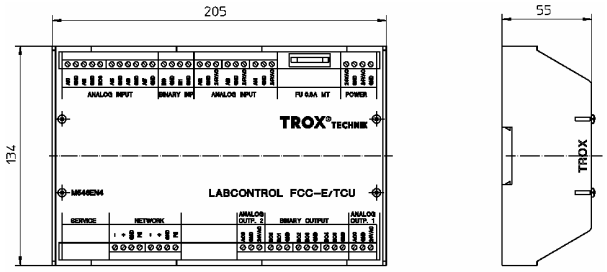


Weight = 3.5kg

8.3 Assembly site of electronic controller and transducer

The electronic controller and the EXL-IMU transducer are supplied separately and must be installed on a top hat rail in a control cabinet outside the potentially explosive atmosphere. Further technical details are defined in the data sheet supplied with this unit. *Not in use by AK-Ex.*

Transducer dimensions
W x H x D = 45 x 75 x 110mm
Weight = 190g
Electronic controller dimensions



9 Safety

- Only specially trained and qualified personnel are permitted to perform the assembly, wiring and commissioning.
- In view of the injury hazard at edges and burrs, always wear gloves when performing transport and assembly operations.
- Install units correctly and secure mounting elements with locknuts. Subject the mounting elements only to the dead weight of the unit. Mount and secure adjacent components and connection ducts separately.
- Recognised codes of engineering practice, especially the safety requirements and accident prevention regulations must be observed when performing all assembly, wiring and commissioning procedures.

9.1 Safety information

- Disconnect the distribution voltage (all poles) before opening or removing the units.

9.2 Wiring

- Electrical connection must be performed by a qualified electrician while observing all safety measures and standards.
- The following regulations must be observed.
  - VDE guidelines
  - Regulations of the local power supply company
  - Wiring guidelines and project-specific connection diagrams
  - The standards stipulated under DIN/VDE/EN standards

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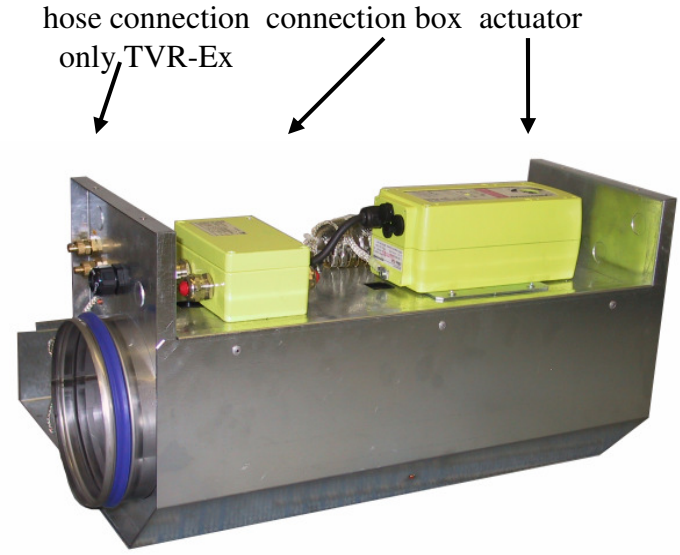
- The distribution voltage connections and control signal units are combined in an explosion-protected power distribution box. The power distribution box is installed in the controller housing.
- The pressure adapter (ring balance) is to be connected via an intrinsically safe line and wired to the transducer. The specific requirements relating to intrinsic safety must be observed, corresponding to Section 12.2.2 of EN 60079-14 (VDE 0165, Part1).
- The cables and ducts used must conform to ATEX standards. The type of protection of the unit must not be impaired by the connection of cables and ducts. Irrespective of the type of protection, only cables and ducts are to be used that are tested and certified in compliance with Annex B of DIN EN 50014 (VDE 0170/0171, Part 1).
- Unused openings for cables and duct inlets to electrical components in the potentially explosive atmosphere must be closed off with certified blanking plugs.
- Cable and duct connections must be located in a housing that is certified for the corresponding zone. This housing for connecting the actuator is included in the scope of delivery of the TVR-Ex / AK-Ex. The use of lots terminals connections in this housing is not permitted.
- Further requirements relating to the installation of cable and ducts in potentially explosive atmospheres are defined in DIN EN 60079-14 (VDE 0165, Part 1), Section 9, e.g. relating to flexible ducts for mobile operating equipment.

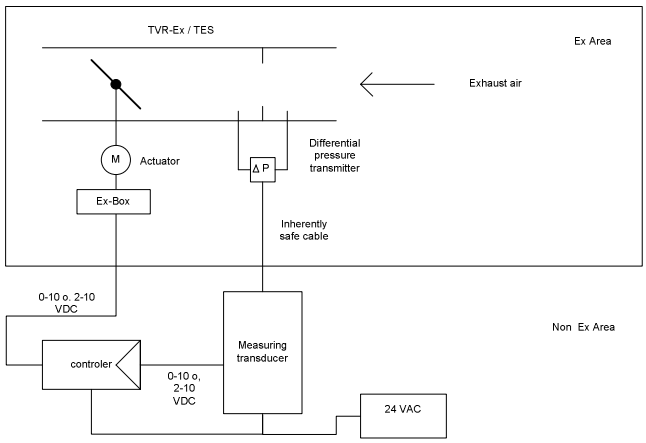
⚠ 9.3 Residual hazards

- Despite complying with the specified regulations, electromagnetic fields may cause malfunctions to occur in the controller under rare and unfavourable conditions. In the majority of cases, this problem can be remedied by shielding or repositioning the controller.
- Predictable damage that could be caused by the failure of control components should be averted in critical cases by implementing corresponding measures.

TVR-Ex / AK-Ex duct module



Functional diagram



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10 Functional characteristics

The TVR-Ex flow volume controller with the TES/TEF component consists of the duct module including the Ex connection box and Ex actuator. The control system also features a pressure adapter, a transducer as well as the electronic controller. The differential pressure is registered by the sensor in the air flow and, with the aid of the pressure adapter and transducer, it is converted into a variable that can be interpreted by the electronic controller. The controller compares the target value and actual value and correspondingly regulates the required volume flow irrespective of the duct pressure.
Special features for use as fume cupboard:
When used as a fume cupboard controller, an Ex display unit supplied by the laboratory equipment manufacturer can be additionally controlled by 24 VAC signals for the purpose of visually and acoustically signalling operating statuses and alarm signals. Connections are defined in the following general wiring and project-specific wiring diagrams.

11 Maintenance

Caution: When working on the controller, it should be disconnected from the power supply before opening the housing cover.
The housing cover is connected by means of a PE conductor to the housing. When servicing the controller, open the housing cover and disconnect the PE conductor. The PE conductor must be reconnected before closing the cover plate.
Particular care must be taken when disconnecting and connecting the conductor to ensure that self-locking cable lugs are used. When disconnecting, the lock must be released by pressing the release element.

- Apart from the Ex box, Ex units may only be opened by the manufacturer.
- In terms of their function, the actuator, pressure adapter (ring balance), transducer, electronic controller and the duct module are maintenance-free.
- The screws holding the controller should be checked once a year.
- If the control system is to be used in laboratories, the BG-Chemie (German Employer's Liability Insurance Association for the Chemical Industry) stipulates an annual maintenance inspection of fume cupboards in the guidelines governing laboratories ZH 1/119 Point 11.5. In addition, No. 11.5 of BGR 120, § 39 Sec. 3 BGV A1, § 53 Sec. 2 ArbStättV stipulates that an inspection of the extractor system and of any other ventilation facilities in laboratories must be performed at least once per year by a qualified inspector.

12 Technical data

12.2 Control system

- Suitable for all types of gasses, mist, vapours in zone 1 and 2
- Operating temperature:
  - between 10C and 50C
  - Type of enclosure – exterior housing IP42
- ATEX certification
  - ⟨Ex⟩ II 2 G c II T5/T6
- Total power intake approx. 145 VA
- Electronic controller
  - Power intake = 20 VA
  - 24 VAC voltage supply
  - IP20
- Ex actuator
  - Power intake = max. 120 VA
  - Voltage supply 24–230 VAC

  The start-up current is 3 to 5 times higher than the nominal current with a pulse of a few ms power intake including start-up current.
  - IP65
- Transducer and pressure adapter
  - Voltage supply 24 VAC
  - Power intake 3.6 W
  - IP40 (transducer = IP20)
  - Ambient temperature 0–60C

For further technical data, please refer to the datasheets supplied with the components included in the scope of delivery.

13 Wiring diagram

Refer to project-specific wiring diagrams

15 Maintenance information

Routine care and maintenance will increase the operational readiness, operational reliability and service life of high-grade technical equipment. Based on ZH 1/119, we recommend maintenance inspections to be performed once a year.
BG-Chemie stipulates an annual maintenance inspection of fume cupboards in the guidelines governing laboratories ZH 1/119 Point 11.5 In addition, No. 11.5 of BGR 120, § 39 Sec. 3 BGV A1, § 53 Sec. 2 ArbStättV stipulates that an inspection of the extractor system and any other ventilation facilities in laboratories must be performed at least once per year by a qualified inspector.
The following jobs are carried out as part of this maintenance work:

Functional inspection of the volume flow as required.
Intake velocity and, if necessary, correction of set control parameters of all controllers included in the Trox scope of delivery.
Plausibility check of measured values
Check and, if necessary, correction of special functions
(V const switching operations, alarm suppression on monitoring units)
Inspection of visual and acoustic alarm generators
Inspection and, if necessary, correction of subsequent control circuits (room balancing)
If necessary, cleaning of measurement sensors to maintain operation.
Documentation including measurement reports

Necessary readjustments and reparameterisation are performed, to a large extent, together with this maintenance work so as to ensure the system remains at the highest levels in terms of safety and reliability.

No-one knows the system better than the manufacturer. We can therefore effectively establish the actual condition of the laboratory ventilation system, adapt or readjust it as required and verify that the laboratory ventilation system is operating correctly after maintenance.

Subject to technical modifications.

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TÜV Rheinland Group

(1) **TYPE-EXAMINATION CERTIFICATE**

(Translation)

(2) Equipment and Protective Systems intended for Use in Potentially Explosive Atmosphere - **Directive 94/9/EC**

(3) Type-Examination Certificate Number

TÜV 05 ATEX 7218 X

(4) **Equipment:** Variable Volume Flow Control TVRX / AKX

(5) **Manufacturer:** Gebrüder Trox GmbH

(6) **Address:** Heinrich –Trox-Platz

(7) This equipment and any acceptable variation thereto are specified in the schedule to this certificate and the documents therein referred to.

(8) The TÜV CERT-Zertifizierungsstelle for ex-protected products of TÜV Industrie Service GmbH, TÜV Rheinland Group certifies this equipment has been found to comply with the Essential Health and Safety Requirements that related to the design of Category 3 equipment, which is intented for use in potentially explosive atmosphere. These the Essential Health and Safety Requierements are given in Annex II to European Union Directive 94/9/EC of 23 March 1994.

The examination and test results are recorded in the confidential report: 194/218.00.05

(9) Compliance with the Essential Health and Safety Requirements, with the exception of those listed in the schedule of this certificate, has been assessed by reference to:

EN 1127-1 **EN 13463-1:2001** **EN 13463-5:2003**

(10) IF the sign "X" is placed after the certificate number, it indicates that the equipment is subject to special conditions for safe use specified in the schedule to this certificate.

(11) This Type-examination certificate relates only to the design, examination and tests of the specified equipment in accordance with Directive 94/9/EC. Further requirements of the Directive may apply to the manufacturing process and supply of this equipment. These are not covered by this certificate.

(12) The marking of the equipment shall include the following:

Ex II 2 G **c II T5 / T6**

TÜV CERT-Zertifizierungsstelle für Explosionsschutz

Köln, 14.12.05

Dipl.-Ing. K. Wettingfeld

This Type Examination Certificate without signature and stamp shall not be valid.

This Type Examination Certificate may only be circulated without alterations. German version is valid.
Extracts or alterations must be approved by TÜV CERT-Zertifizierungsstelle of TÜV Industrie Service GmbH.
TÜV Rheinland Group, Am Grauen Stein 51105 Köln, Tel. +49 (0) 221 806-0 Fax. + 49 (0) 221 806 114