

TROX GmbH

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## 1. Areas of application

In highly sensitive areas like laboratories and hospitals, the top priority is protection of personnel. The complex requirements of these areas are fulfilled by ventilation systems. The monitoring and display of system parameters are indispensable here.

TROX's TFM/TPM product series comprises monitoring devices for both new buildings and those being renovated. They monitor the significant parameters of fume cupboards and check on the correct room pressures. They operate on the basis of a microprocessor which handles a programme for monitoring the protective function which cannot be lost. The system data is stored in the EEPROM which is effectively protected from power failure.

The TFM type monitors the volume flows of the supply/exhaust air or the air intake velocity (face velocity) at fume cupboards in accordance with DIN12924 or EN 14175-2. The TFM-1 has an internal transmitter of reliable long-term stability for differential pressure detection whilst the TFM-2, in contrast, has an analogue input for the volume flow actual value or air intake sensor connection.

The TPM uses the analogue input to connect a room pressure transmitter or ring balance manometer. Parameters are downloaded in an installed condition. Parameters are not downloaded at the works.

Depending on application, the condition of the fume cupboard or room pressure is indicated by the user terminal through an acoustic and visual alarm. In case of an alarm there is both a visual display and an acoustic signal. A potential-free contact (change-over contact) allows an alarm message to be transferred to the GLT.

## 2. Functionality

Proper aerodynamic functioning of a fume cupboard must be monitored in accordance with EN 14175-2 (possibly with DIN12924 in the case of refurbishment of existing systems) by a fume cupboard function indicator. Given a fault, both a visual and acoustic alarm are to go off. It must be possible to turn off the acoustic alarm. The TFM-1 and TFM-2 units are designed for these applications.

Room pressure control is frequently used in laboratory buildings with more extensive safety requirements. As the correct pressures cannot be felt, the user should be able to actually see the correct room pressure. The TPM is used to monitor the correct room pressures.

A distinction is made between 3 different unit types:

- TFM-1: Monitoring fume cupboard through differential pressure measurement by means of a measuring rod (included in delivery) or volume flow meter (to be ordered separately) for establishing the volume flow actual values.
- TFM-2: Monitoring fume cupboard with measurement recording through external actual value signal, for instance, by means of an on-site volume flow controller or a velocity sensor.  
A velocity sensor can be obtained as an option.
- TPM: Monitoring pressure-controlled rooms by means of an on-site or optional room pressure transmitter or a ring balance manometer.  
A room pressure transmitter can be obtained as an option.

The following unit combinations are available:

1. TFM-1 (with internal transmitter)
2. TFM-2/TPM (with analogue input for test data recording)

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### 3. Safety instructions

These assembly and operating instructions are to be carefully read through and noted before the TFM/TPM monitoring device is installed and commissioned.

- Only technical personnel are to undertake assembly and wiring.
- Attention is to be given to the accepted technical engineering rules and safety and accident prevention regulations in assembly, wiring and commissioning matters.

#### 3.1 Electrical connection

- The electrical equipment is to be connected by an electrician with due attention paid to the protection steps.
- The following regulations and codes are to be observed:
  - VDE regulations*
  - Provisions of the local EVU*
  - The manufacturer's wiring instructions and terminal connection diagrams*
- Check whether the supply voltage specified on the rating plate matches the local mains voltage.
- Fuse TFM/TPM monitoring device with one's own circuit
- Electrical work is only to be carried out on the device with power off.
- Keep to the five VDE 0100 rules of safety when working on electrical equipment.

#### 3.2 Fail-safe operations

- Do not place the TFM/TPM monitoring unit immediately in operation on transferring it from a non-heated room into a warm one. Condensation could form which might lead to damage in the electronics. Some 2 hours are needed for the unit to acclimatise.
- The unit must be placed in a dry room either on a firm, even surface or fixed to a secure wall.
- Always disconnect the unit from the voltage supply should objects or liquid get inside or should smoke or a smell be noticed. In such an eventuality have the unit examined by the manufacturer.

#### 3.3 Appropriate use

- The **TFM-1** monitoring device is solely for monitoring volume flows on, in particular, fume cupboards in accordance with EN 14175 Section 2 or DIN 12924.
- The **TFM-2** monitoring device is for monitoring volume flows or air intake velocity (face velocity) on, in particular, fume cupboards in accordance with EN 14175 Section 2 or DIN 12924.

- The **TPM** monitoring device is for monitoring room pressures in pressure-regulated rooms.
- The monitoring units are not to be used in potentially explosive atmospheres.
- The units are not to be used in damp rooms.

### 4. Specifications

#### Distribution voltage:

24V AC +/- 15%, 50/60Hz  
Double-decker terminal strip for looping  
Plug-in terminals 0.5mm<sup>2</sup>–1.5mm<sup>2</sup> rigid and flexible

#### Power consumption:

3.5VA

#### Type of protection:

IP 20

#### Differential pressure transmitter (only TFM-1):

Measuring principle:	static
Measuring range:	5–280Pa
Sensor bursting pressure:	500mbar

#### Inputs:

- 1 analogue input 0–10V DC  
Plug, threaded terminal end 0.14mm<sup>2</sup>–1.5mm<sup>2</sup> rigid and flexible
- 3 digital inputs for potential-free switch contacts  
Plug-in terminals 0.5mm<sup>2</sup>–1.5mm<sup>2</sup> rigid and flexible
- 2 RJ sockets 10-pole for user terminal connection

#### Outputs:

- 1 digital alarm output (change-over contact)  
Plug-in terminals 0.5mm<sup>2</sup>–1.5mm<sup>2</sup> rigid and flexible
- 3 digital outputs (closers)  
Plug-in terminals 0.5mm<sup>2</sup>–1.5mm<sup>2</sup> rigid and flexible

#### Housing:

Steel sheet housing white powder-coated RAL 9002  
Dimensions: W x L x H = 21 x 26 x 8cm  
Weight 1.6kg

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## 5. Scope of supply

### TFM-1:

- Basic unit in the IP 20 sheet metal housing (W x L x H = 21 x 26 x 8cm)
- User terminal with 4m of cable and manufactured RJ plug
- Differential pressure measuring rod (Fig. 1)
- 1m of transparent hose
- 1m of blue hose
- 2 T-bar for hose connection
- 2 end caps

### TFM-2/TPM:

- Basic unit in IP 20 sheet metal housing (W x L x H = 21 x 26 x 8cm)
- User terminal with 4m of cable and manufactured RJ plug
- TFM-2 film for user terminal
- TPM film for user terminal

### 5.1 Assembly and setting up instructions

- The TFM-1 monitoring unit is to be either installed horizontally (cover at top) on the fume cupboard cover or vertically at the fume cupboard wall. **Any other type of assembly changes the output signal of the differential pressure transmitter.**
- Following assembly, zeroing of the differential pressure transmitter is to be done on commissioning the TFM-1. (see TROXMConnect parametering instruction)
- The TFM-2 & TPM monitoring unit can be installed on any firm base.
- Install the basic unit (TFM/TPM) in such a way that no vibration is transferred to the housing.
- Ensure during assembly work that no sawdust, dirt or foreign matter gets into the housing or differential pressure transmitter.
- The user terminal and function display are to be clearly fixed at the fume cupboard to be monitored.
- **(Only TFM-2/TPM)** Depending on the application, either the TFM-2 or TPM user terminal films included in the scope of supply must be glued onto the user terminal basic unit.
- With TFM-1 the differential pressure measuring rod (Fig. 1) is to be inserted into the ventilation duct to be monitored. To this end, a 30mm diameter opening and two 4.2mm fastening drill holes in the duct are needed. The measuring rod is delivered 240mm long and, if needed, must be shortened to the right length for the ventilation duct.
- Note the air flow direction (arrow) and connection of the measurement hoses (+,-).

- Alternatively, a suitable other measuring point can be used.



Fig. 1

## 6. Installation TFM/TPM

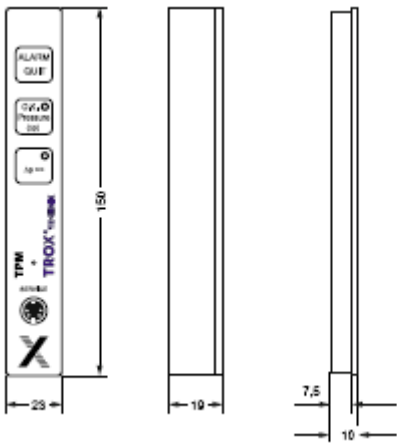
- Opening the two snap locks at the housing fronts allows the cover plate to be removed.
- Insert the user terminal included in the supply with 4m of cable and manufactured plug into the *CON 1* connection on the PCB (see Fig. 2). Beforehand insert the cable through the pre-punched cable entry fittings at the housing (twisting stub and PG screwed assembly not included in the scope of supply).
- **(Only TFM-1)** The TFM-1 basic unit is to be connected to the differential pressure measuring rod by using the hoses included in the supply (colourless, blue) and both the mitred angle sections. In so doing, ensure that the + and – hose connection is correct at both ends of the components. Alternatively a suitable other measuring point can be used. **The hoses must be slipped on tightly and are not to be kinked.**
- **(Only TFM-2 option velocity monitoring)** Please observe the separate assembly instruction on the FCC-E-Pic transmitter (MI-7.4/1/D/1) for assembly of the optional velocity transmitter (FCC-E-Pic/TRM).

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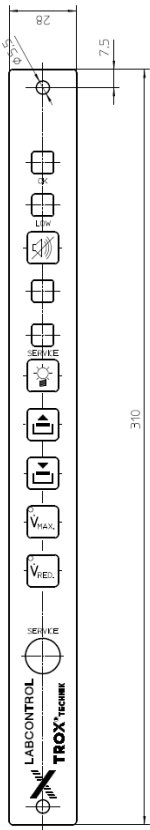
## 7. Dimensional drawings TFM/TPM

### 7.1 Standard user terminal dimensions



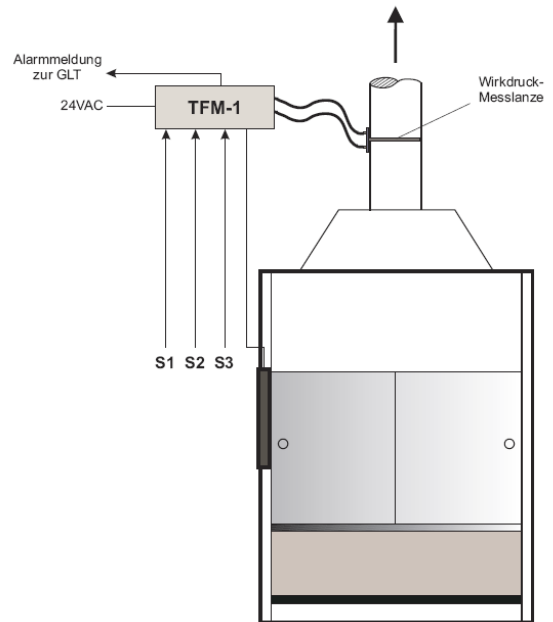
### 7.2 Dimensions – User terminal AF-1

TFM-1/TFM-2 (optional):



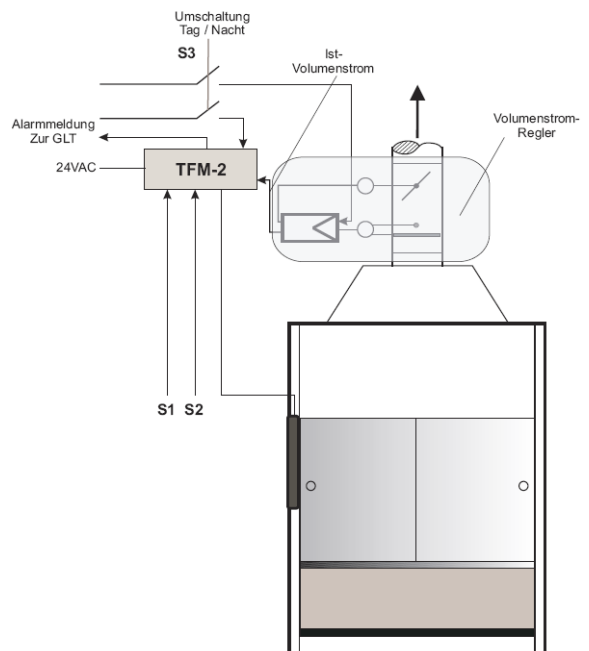
### 7.3 Dimensions – TFM/TPM basic unit

## 8. TFM-1 function diagram



- S1 Changeover monitoring set value
- S2 Sash window contact
- S3 Monitoring active/inactive (also valid for TFM-2)

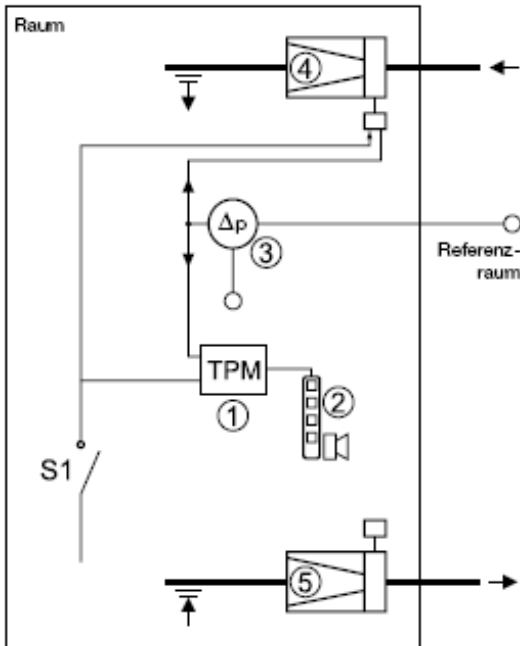
## 8.1 TFM-2 function diagram



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## 8.2 TPM function diagram



- ① TPM
- ② Bedienterminal .....
- ③ Membran-Drucktransmitter
- ④ VWS-Regler Zuluft (Druck)
- ⑤ VWS-Regler Abluft
- ⊕1 Schalter für Druckumkehr

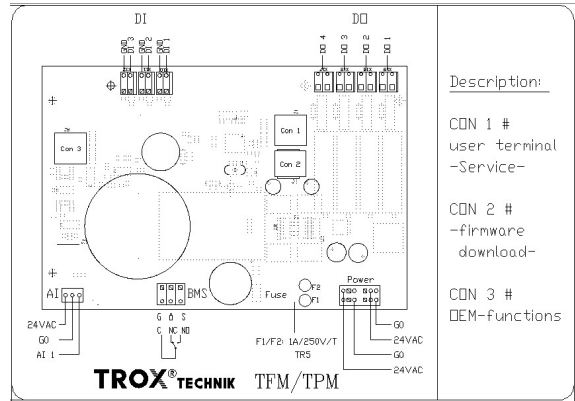
## 8.3 Electrical installation

The electrical connection is to be carried out by an electrician with due attention paid to the protection steps and VDE regulations.

The TFM/TPM monitoring device is to be supplied with 24V AC and put onto the (power) double-decker terminal shown in Fig. 2. A number of monitoring devices can be connected to a 24V AC supply given that the transformer and cables are adequately dimensioned. The specified power consumption does not take into account the optionally connectable devices (FCC-E-Pic/TRM or volume flow controller). They will have to be considered separately.

Please refer to the following wiring diagrams for the scope of electrical connection in respect of more product-specific possibilities.

The following PCB drawing with its connections is also in the unit covers.



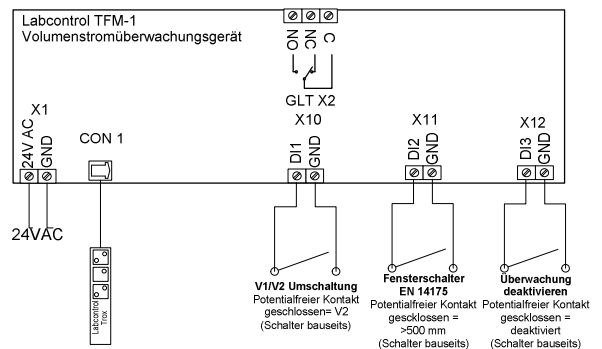
Description:

- CON 1 # user terminal -Service-
- CON 2 # -firmware download-
- CON 3 # DEM-functions

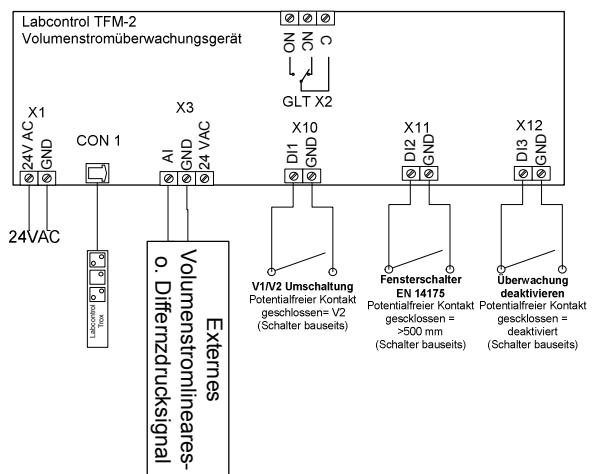
Abbildung 1

## 9. Wiring diagrams

### 9.1 TFM-1 connection scope



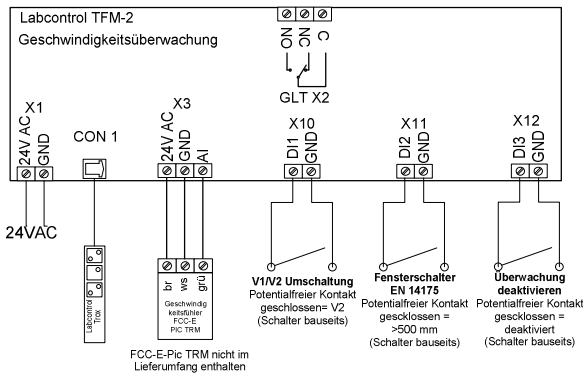
### 9.2 TFM-2 connection scope – Volume flow



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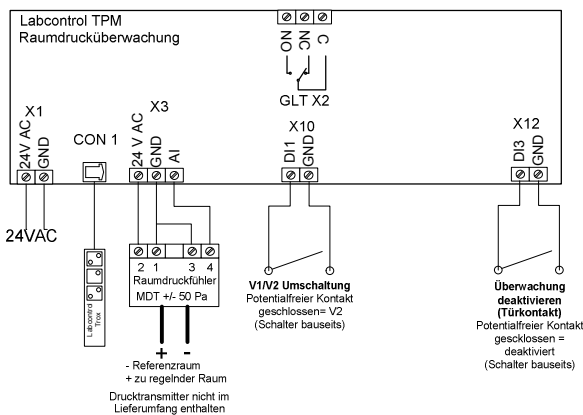
### 9.3 TFM-2 connection scope – Velocity



- Using suitable comparison measurement to check on the function of the volume flow
- Examination of the readings as to plausibility
- Examination of the visual and acoustic alarm devices Especially with TFM-1 by removing the measurement hoses
- Testing and possible correction of special functions:  
(V const. circuits, alarm suppressions on devices)
- If necessary, cleaning the measuring sensor to keep it in operation (only TFM-1)

Nobody is more familiar with the system than the manufacturer. That is why we can detect and possibly adjust or re-adjust the actual state of the laboratory ventilation and can demonstrate its proper condition following maintenance.

### 9.4 TPM connection scope



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## 10. Maintenance information

Regular maintenance and upkeep raise the operational readiness, operational reliability and service life of high-grade technical equipment. In accordance with ZH 1/119, we recommend maintenance to be carried out once a year.

BG-Chemie prescribes a yearly maintenance of fume cupboards in the laboratory directive – ZH 1/119 Item 11.5. Furthermore, an examination of the fume cupboard and other ventilation equipment in laboratories by a specialist at least once a year is laid down in No.: 1.5 BGR 120; § 39 Para. 3 BGV A1; § 53 Para. 2 ArbStättV. This maintenance includes the following work:

- Examination of the measurement hoses as to damage or kinks and a tight fit at the measuring system and the sensor (only TFM-1)
- Zeroing only with TFM-1