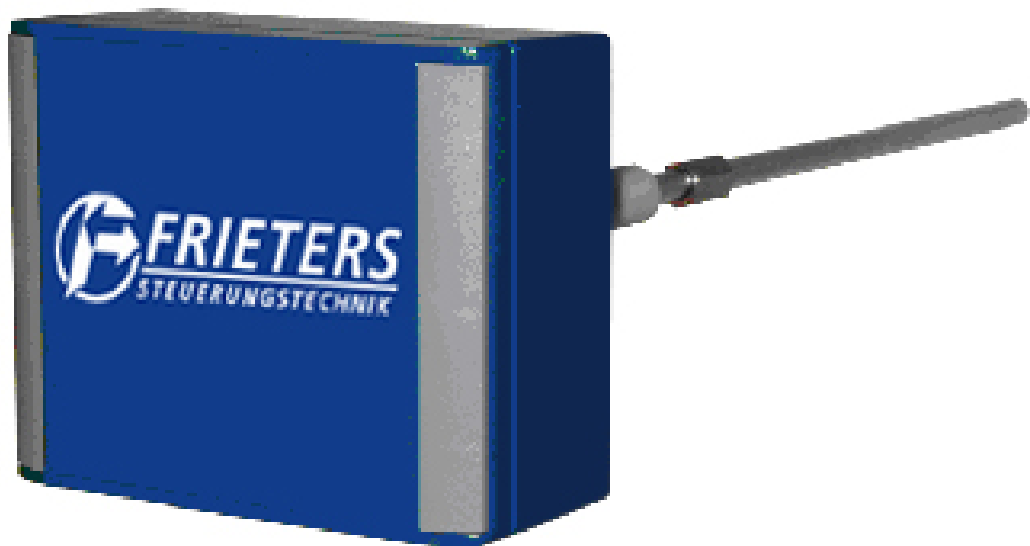


# **FIKTECH**

## **Residual Dust FRE 06**



## **Operation manual**

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## General remarks

### 1.1 General advices

The product described by this manual has left the factory in a safety-related proper and checked state. In order to keep this state and to achieve a perfect and safe product running it is only allowed to be used in that way described by the manufacturer. Moreover the perfect and safe running of this device demands a correct transportation, storage and installation as well as a careful operation and maintenance.

This manual contains the necessary information for the determined use of the described product. It is directed towards technically-qualified staff who have been specially educated or have knowledge about measuring and control technology - called automation technology further on.

The knowledge and the technically – correct realisation of the safety hints and warnings contained in this manual are the precondition for safe installation and putting into operation as well as for safety during operation and maintenance of the product described. Only professional staff have the required knowledge to interpret as well as to realise in each case the safety hints and warnings correctly due to the general description in this manual.

This manual is within the scope of delivery even if the option for a separated order respectively delivery had been planned due to logistic reasons. In order to preserve clarity neither all details for all types of the described product are contained, nor each possible case of installation, operation, maintenance and use in systems can be considered. If you need further information or if problems arise which are not treated explicitly in this manual please contact the respective agency of Dr. Födisch Umweltmesstechnik AG being responsible for you.

### 1.2 Advices for handling the manual

In the manual it is described how you can mount, put into operation, control and maintain the measuring device. Please pay especially attention to texts of **warning and advices**.

### 1.3 Warning advices

Safety hints and warnings serve the avoidance of dangers for life and health of users or staff respectively damages to property. In the manual they are marked by here defined signal words. Moreover they are marked by symbols at the place of their appearance. The used signal words mean in this manual and on the product itself the following :



#### **Warning**

means, that death, heavy injuries and / or substantial damages to property **can** occur, if necessary precautions are not taken.



#### **Attention**

means, that an undesired event or state can occur, if the corresponding advice is ignored.

## Advice



is an important information about the product itself, its handling or that manual chapter to be pointed out.

## 1.4 Approved Use

The product described in this manual has been developed, manufactured, tested and documented taking into account the appropriate safety standards. No danger therefore exists in the normal case with respect to damage to property or the health of persons if the handling guidelines and safety information described for configuring, assembly, approved use and maintenance are observed. This device has been designed such that safe isolation is guaranteed between the primary and secondary circuits. Low voltages which are connected must also be generated using safe isolation. Correct and safe operation of this analyser is additionally dependent on proper transport, storage, installation and assembly, as well as careful operation and maintenance.

## Warning



This analyser is an electrical unit. Following removal of the housing or guard, or after opening the system cabinet, certain parts of the device/system are accessible which may carry dangerous voltages. Therefore only suitably qualified personnel may work on this device. These must be thoroughly acquainted with all sources of danger and the maintenance measures as described in this manual.

## 1.5 Qualified Personnel

Severe personal injury and/or extensive damage to property may occur following unqualified work on the device/system or the failure to observe the warnings described in the instructions or on the device/system cabinet. Therefore only suitably qualified personnel may work on this device/system.

Qualified persons in the sense of the safety information present in this instructions or on the product itself are persons who

- ⇒ are either familiar as configuring engineers with the safety concepts of automation technology
- ⇒ or have been trained as operators in the use of automation technology equipment and are acquainted with the contents of these instructions which refer to operation
- ⇒ or have been appropriately trained as commissioning and/or maintenance personnel for such automation technology equipment or are authorised to energise, ground and tag circuits and devices/systems in accordance with established safety practices.

## 1.6 Warranty Information

Your attention is drawn to the fact that the contents of these instructions are not part of a previous or existing agreement, commitment or statutory right and do not change these. All commitments are contained in the respective sales contract which also contains the complete and solely applicable warranty conditions. These warranty conditions in the contract are neither extended nor limited by the contents of this manual.

## 1.7 Supply and Delivery

The respective scope of delivery according to the valid contract is listed on the shipping documents accompanying the delivery. When opening the packaging, please check that the delivery is complete and undamaged. Please retain the packaging material if it is necessary to return the device.

### 1.7.1 Scope of supply

The filter controller FRE 06 consists in standard of the following components:

⇒ 1 probe

⇒ 1 1"- weld in sleeve with screwing

⇒ 1 manual

Optional accessories

⇒ power supply unit (110/230 VAC in 24 VDC)



#### **Advice:**

Depending on the order configuration deviations in the technical design are possible.

## 1.8 Standards and Regulations

The harmonised European standards have been applied as far as possible to the specification and production of this device. If no harmonised European standards have been applied, the standards and regulations for the Federal Republic of Germany apply.

## 1.9 Declaration of Conformity

### CE-symbol:

The filter controller FRE 06 complies with the requirements of the EU guidelines listed below.

### EMC guideline:

The filter controller FRE 06 complies with the requirements of the EU guideline 89/336/EEC Electromagnetic compatibility.

The filter controller FRE 06 is designed for use in industrial applications.

Requirements for:	
Emitted interference	Interference immunity
EN 50081-1	EN 61000-6-2

Emitted interference	Interference field intensity according to	EN 55022 (CISPR 22)
Emitted interference	Interference voltage according to	EN 55022 (CISPR 22)
Interference immunity	ESD according to	EN 61000-4-2
Interference immunity	HF radiated according to	EN 61000-4-3
Interference immunity	Burst according to	EN 61000-4-4
Interference immunity	Surge according to	EN 61000-4-5
Interference immunity	HF streamed into according to	EN 61000-4-6
Interference immunity	Power loss	EN 61000-4-11

### Declaration of conformity

In line with the above-mentioned EU guidelines, the EU declarations of conformity are available at the following address for inspection by appropriate authorities:

## Safety advices

### 1.10 General remarks

#### Warning:



Operate the measuring device FRE 06 only in perfect state and under strict observance of the safety hints!

- ⇒ The filter controller FRE 06 is only allowed to be connected to the supply voltage written on the type plate (Standard: 24 VDC).
- ⇒ The FRE 06 has to be secured by 2 A on input side..
- ⇒ Before opening any component of the device the dust measuring device FRE 06 has to be made free of voltage by pulling the power connector.
- ⇒ Neither it is allowed to use the FRE 06 in potential explosive rooms nor to measure in explosive gaseous mixtures.
- ⇒ Cables and gas pipes should be assembled in a way that a danger of accident by stumbling or getting caught on the pipes can be excluded.
- ⇒ Parts of the probe can get into contact with hot measuring gas and can, therefore, be heated up. Therefore please never touch these parts without temperature-resistant gloves or under voltage.
- ⇒ The FRE 06 as whole as well as the single components are only allowed to be operated in the original state. If elements are changed the manufacturer's original parts shall be used.
- ⇒ Changes in the configuration of the FRE 06 , that means the mis-adjustment of parameters which usually are not at the user's disposal, can endanger the safety and functioning of the filter controller and are done at one's own risk! Therefore changes in configuration shall be executed by authorised service technicians or by manufacturer's staff.
- ⇒ Coverings of FRE 06 are only allowed to be removed in the state free of voltage.
- ⇒ Elements are device-typically configured and, therefore, cannot be changed among various FREs.

#### Attention:



Installation, operation, maintenance and all kind of repair have to be done solely by skilled staff considering the corresponding regulations. (Zentralverband der Elektrotechnik- und Elektroindustrie e.V.).



## Structure and function

### 1.11 Structure

The dust measuring device FRE 06 consists of:

⇒ 1 in-situ-probe

⇒ 1 weld-in sleeve

#### 1.11.1 Probe

The probe FRE 06 consists of a probe rod and a probe head. The probe rod is assembled in a sleeve and an insulator which insulate it electrically from the case.

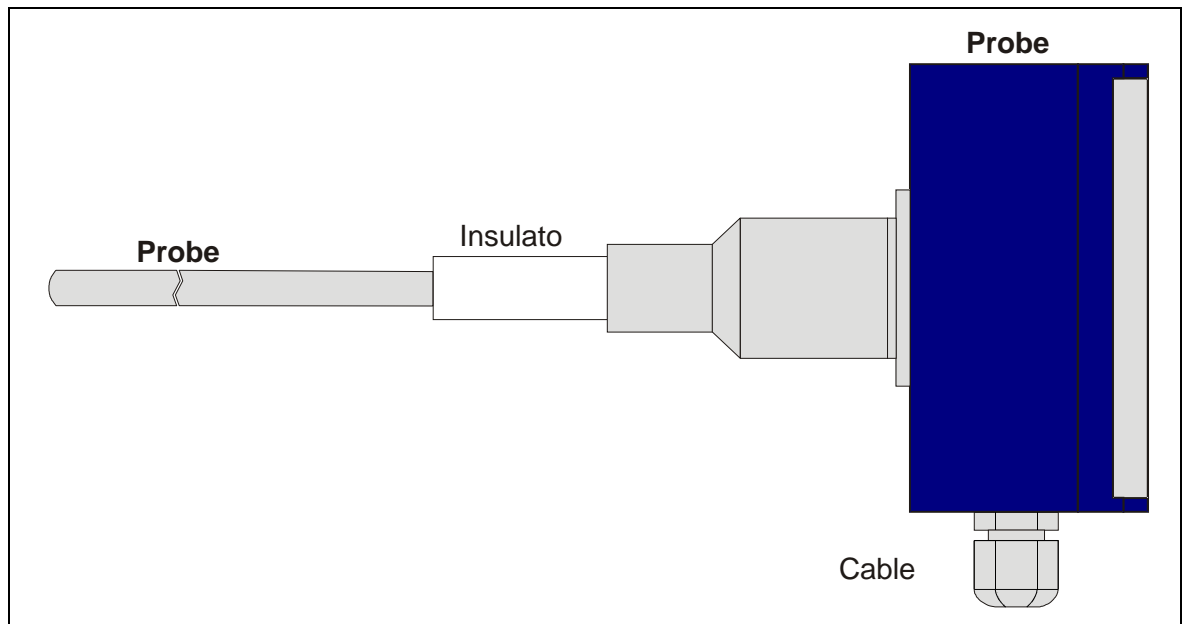


figure 0-1: side view FRE 06

The probe rod is made as round rod.

### 1.12 Function

The filter controller FRE 06 is a highly sensitive system for continuous, triboelectric in-situ filter monitoring. The qualitative monitoring of the exhaust gas is done hereby.

The measuring gas is measured triboelectricly in the exhaust gas flow by means of the probe rod of PFM 02 C (⇒ 1.12.1 measuring principle page 10).

The signal resulting from the derived current is a degree of the exhaust gas' dust content.

The micro controller integrated inside of the control unit produces a dust proportional signal which is provided as 4 ... 20 mA – signal.

## 1.12.1 Measuring principle

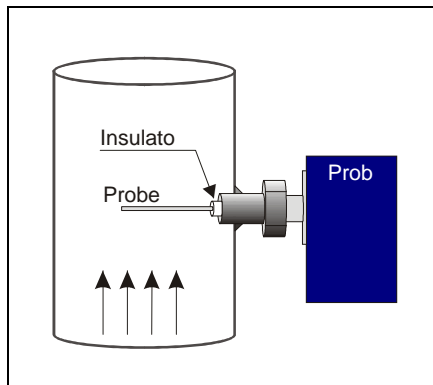


figure 0-2: measuring principle

### Triboelectricity:

#### Function:

In case of contacting 2 solid bodies by friction or touching an electrical charge transfer is caused. The charge difference arises due to the exchange of electrons by atoms on the surfaces. So a boundary layer with positive and negative surface charge within a very low molecular distance from each other is formed.

This charge difference, also called charge fluctuation, is the base for triboelectric dust meters which use the charge exchange between measuring probe and nearby streaming or direct impacting dust particles.

The triboelectric signal depends on the mechanical and electric properties of the dusts.

$$cal \sim c_{i.B.}$$

$C_{i.B.}$	= dust concentration [mg/m <sup>3</sup> ]
Cal	= triboelectric measuring signal [V]
At constant velocity!	

## Installation

### 1.13 Selection of the measuring point

The place of installation of the probe respectively the place of sampling has to fulfil the requirements of local valid guidelines ( in Germany: VDI 2066 page 1). In case of doubts it is recommended to let have determined the measuring point by a responsible measuring institute (in Germany according to §§ 26/28 BImSchG). We recommend to realise at least 3 times the diameter of the exhaust gas channel as entry and exit section.

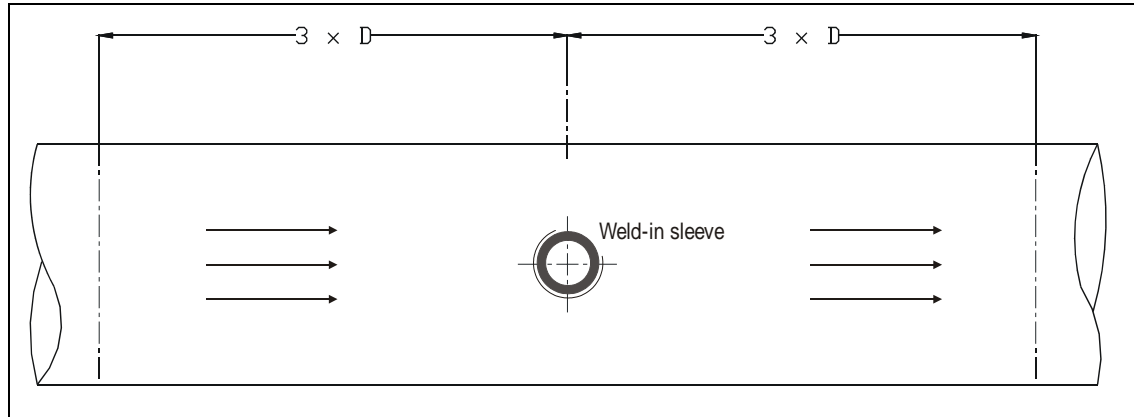


figure 0-1: entry and exit section

Basically it has to be considered that the dust and smoke gas distribution must prevail as homogeneously as possible at the measuring point in order to get a representative measuring of the dust content across the channel cross – section.



#### Attention:

The weld-in sleeve's place of installation has to be grounded – *potential equalization!*

### 1.14 Installation of the weld-in sleeve

The weld-in sleeve of the FRE 06 is installed according to ⇒ figure 0-2: weld-in sleeve . The installation position of the probe is horizontal or vertical from top.

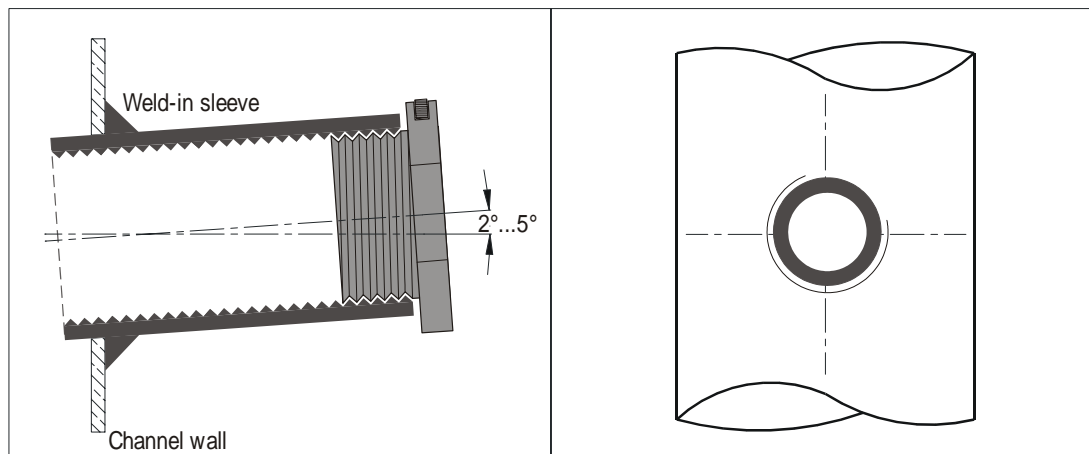


figure 0-2: weld-in sleeve

## 1.15 Assembly of the probe

The probe is put in the weld-in sleeve and mounted by the socket spanner (contained in the scope of delivery) according to ⇒ figure 0-3: installation rule.

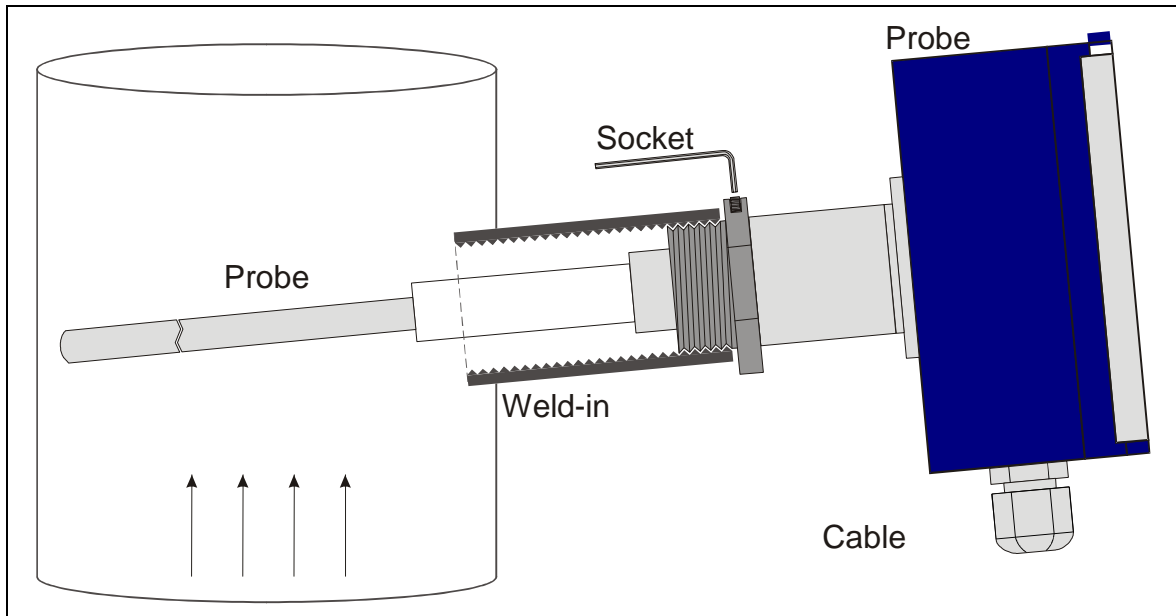


figure 0-3: installation rule

## 1.16 Electric Connection

The electric connections of FRE 06 are inside of the probe head. The terminal clamps are arranged in 2 terminal strips which can be seen after removal of the cover. For that both decorative panels on the keyboard's left and right side shall be taken away. Then 4 screws have to be removed ( the cover is protected against possible falling down).

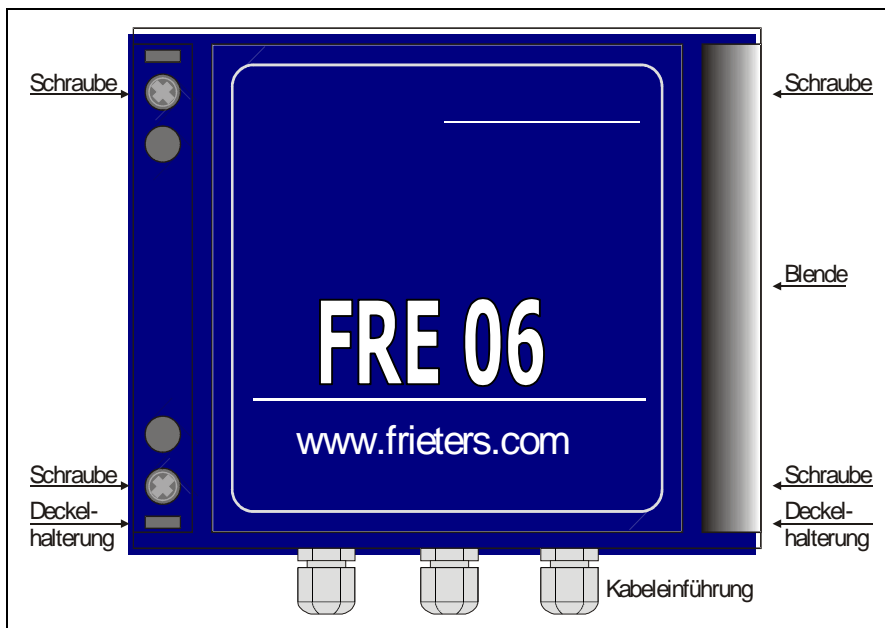


figure 0-4: probe head

## 1.16.1 Operating Voltage (24 VDC)

The terminal clamps are plug-in terminals. For connecting the cable no special tool is required.

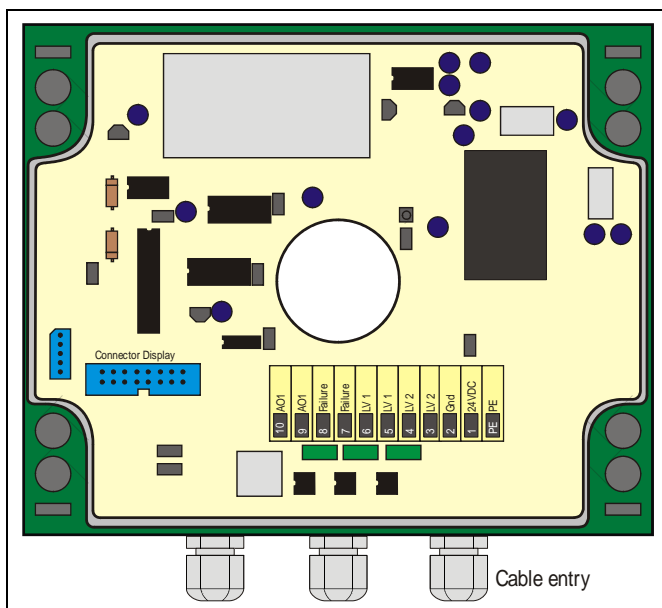


figure 0-5: Electric connection

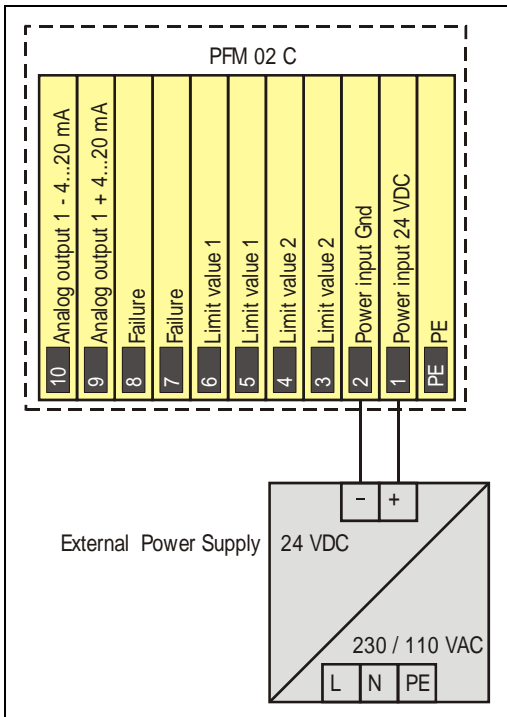


figure 0-6: terminal strip: feeding, status signals and analogue outputs

The operating voltage 24VDC is connected to terminal clamp 1 and 2. Additionally it is possible to connect the cable shield respectively a potential compensation to terminal clamp PE.



**Advice:**

For connecting another operating voltage (110 VAC or 230 VAC) the optional power supply unit shall be used.

### 1.16.2 Status signals

The status signals are made as potential-free contacts. The following status signals are provided at FRE 06:

Signal	Position of contact
⇒ Error/ Maintenance ⇒ 0 Error messages and error elimination Page 17	Normally closed, in case of Error/Maintenance opened
⇒ Limit value 1 (60 %)	Opener
⇒ Limit value 2 (80 %)	Opener

Table 0-1: Status signals

## 1.16.3 Analogue output

The analogue outputs of the FRE 06 are made as 4 ... 20 mA outputs. The following signal can be provided by FRE 06:

⇒ Analogue output -> dust in [%]

## Putting into operation and shutdown

### 1.17 Putting into operation

- ⇒ switch on pre-fuse
- ⇒ check measuring values for plausibility

### 1.18 Shutdown

- ⇒ switch off pre-fuse



**Attention:**

Danger of burning – parts of the probe can be heated up strongly by the measuring gas!

## Maintenance

### 1.19 Maintenance



**Advice:**

Warranty claims can only be granted when maintenance works had been done according to the instructions.

The maintenance works aim at:

- ⇒ Preserving the measuring exactness of FRE 06,
- ⇒ Granting the operating safety,
- ⇒ Increasing the lifetime of the measuring device.

Moreover maintenance works are a basis for warranty payments.

#### 1.19.1 Maintenance works

Minimum period	activity
6 months	⇒ Cleaning of the probe

Table 0-1: Maintenance works



## 1.20 Cleaning

The dust measuring device FRE 06 has to be cleaned at least every 6 months. The frequency of cleaning works to be done depends on the chosen measuring position respectively the measuring media (especially the dust content) and on the environmental and climatic conditions.

For all cleaning works at FRE 06 it is valid:



**Attention:**

De-install and clean only in switched off and cooled down state!

### Error messages and error elimination

The FRE 06 provides status signals for monitoring, signalisation of error states and for error search.

The status signal error is supplied as potential-free contact in case of an error.

Error message	Activities
⇒ Error	⇒ Check ambient temperature ⇒ Clean probe rod ⇒ Call responsible service staff ⇒ Send device back

## Technical Data

Feeding	24 VDC, appr. 3 W
Degree of protection	1
Ready for operation	after 5 to 15 minutes
<b>Probe</b>	
dimensions (B x H x T)	160 x 130 x 400 mm
Probe length	290 mm
Immersion depth	300 mm
weight	appr. 2,1 kg
Kind of protection	IP 65
Ambient temperature	- 20 °C ... + 50 °C
<b>Measuring ranges</b>	
dust (qualitative)	0 ... 100 %
<b>Electric connections</b>	
Analogue signal	4 ... 20 mA
load	max. 500 Ω
Status signals	max. 24 VDC at 0,1 A
⇒ Error	Normally closed (in case of error opened)
⇒ Limit value 1 (60 %) / 2 (80 %)	Normally closed
Cable entry	2 x M20 x 1,5

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