


Operating Manual FS750E



Dust monitoring with analog output for the detection of filter malfunctions

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Operating Manual for FS750E

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Disclaimer

We have checked the content of the printed document for compliance with the described hardware and software. Nevertheless, deviations cannot be excluded and consequently we cannot assume any guarantee for complete accordance. The data in this printed document are checked regularly. Corrections and additions are made in the following version in each case. We would be grateful for any suggestions for improvement.

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Subject to technical modifications

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1 Classification of the safety instructions

This manual contains instructions that you have to observe for your personal safety as well as to avoid material damage. These instructions are highlighted using a triangular warning sign and shown as follows, depending on the degree of risk.



HAZARD

means that death or severe physical injury will occur if the appropriate precautionary measures are not taken.



WARNING

means that death or severe physical injury may occur if the appropriate precautionary measures are not taken.



CAUTION

with a triangular warning sign means that minor physical injury may occur if the appropriate precautionary measures are not taken.

CAUTION

without a triangular warning sign means that material damage may occur if the appropriate precautionary measures are not taken.



ATTENTION

means that an undesired result or state may ensue if the corresponding instruction is not followed.



NOTE

denotes important information about the product, handling of the product or the respective part of the documentation, is aimed at drawing special attention to the latter and should be complied with.


In addition to the instructions in this manual, the generally applicable safety and accident prevention regulations must be observed.

If the information contained in this document should not be sufficient in any specific case, you can obtain more detailed information from our telephone service.

Please read this manual carefully prior to installation and commissioning.

CE mark

This product meets the specifications according to the EMC Directive 2014/30/EU and the Low Voltage Directive 2014/35/EU.

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2 General Instructions

This device left the plant in flawless condition in terms of its safety features. To preserve this condition and ensure safe operation of the device, the user has to observe the instructions and warning notes indicated in this operating manual.

NOTE



For the sake of clarity the manual does not contain complete detailed information on all product types and can therefore not take into account every conceivable case with respect to installation, operation and maintenance.

Should you wish further information or should special problems arise that are not treated in sufficient detail in the manual, you can obtain the necessary information by telephone. Moreover, we point out that the content of the manual shall not constitute part of or amend a previous or existing contract, agreement or legal relationship. All obligations of Mütec Instruments GmbH shall result from the respective contract of purchase, which also contains the complete and solely valid warranty terms. These contractual warranty terms shall neither be extended nor limited by the information contained in the manual. The content reflects the technical state of the art regarding printing. It is subject to technical modifications in the course of further development.

DISCLAIMER

All modifications to the device fall within the responsibility of the user unless expressly specified otherwise in the operating manual.


QUALIFIED PERSONNEL

are persons who are familiar with installation, assembly, repair and operation of the product and have the qualifications necessary for their work, such as:

- Training, instruction and/or authorization to operate and maintain equipment/systems in accordance with the standards of safety technology for electrical circuits, high pressures and corrosive as well as hazardous media.
- In the case of equipment with explosion protection: training, instruction and/or authorization to perform work on electrical circuits for potentially explosive equipment.
- Training or instruction in accordance with the standards of safety technology regarding care and use of appropriate safety equipment.

CAUTION

Potentially electrostatic components may be destroyed by voltage that is far below the limits of human perception. Such voltage occurs even when you touch a component or electrical connections of a component and are not electrostatically discharged. The damage that occurs to a component because of overvoltage usually cannot be detected immediately and does not become noticeable until after a longer operating period.

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3 Introduction

The dust indicator FS750E is intended for the use at the clean air side to detect dust behind a filter. In this way, filter cracks, fractures or assembly errors are reported automatically and reliably.

The FS750E is suitable for all piping and metallic channels, whose length exceed 3 times the diameter.

Installation is quick and easy by welding a threaded sleeve. The sensor rod is inserted into the pipe and fixed by the thread.

The sensor rod length should be at least 1/3 of the pipe diameter and must not touch the opposite wall. A distance of min. 20mm is recommended between the rod end and the opposite wall.

The measurement system is based on the triboelectric effect: Particles collide permanently with each other or with other materials, e.g. the wall. Because of this process the particles will be charged in a natural way. If these electrically charged particles are flying next to the sensor rod of FS750E or even touch it, the particles are detected via the charge transfer.

Resting particles, such as deposits etc., do not affect the measurement. Therefore a subsequent installation into existing exhaust ducts is possible without any problems.

The device cannot be used for material which forms an electrically conductive layer between the sensor rod and inner wall by abrasion or adhesions.

The emerging particle load is output as an analog 4-20mA signal. Three conditions of particle load are additionally signalized by different LED colors at the sensor.

Features

- Maintenance free
- Analog output of the particle load as a 4-20mA signal
- Condition indication by different LED colors
- Protection class IP65
- Compact form
- Easy installation

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4 System Design

The system FS750E consists of a dust monitor and a DIN-rail transmitter.

The sensor is connected to the transmitter via a 4-wire cable. The measured value of the particle load is then transferred to the transmitter and is available as 4-20mA signal at the analog output.

5 General information on construction and operation

Safety instructions

If the device can no longer be operated safely, it must be put out of operation and secured to prevent unintentional operation. The reasons for this may include:

- Visible damage to the device
- Failure or malfunction
- Storage or operation outside the approved temperature range
- Moisture inside the device
- Severe transport stress

Before the device is put into operation again, a professional routine test must be performed in accordance with DIN EN 61010, Part 1. This test should be performed by the manufacturer.

Intended use

The FS750E based on the triboelectric effect detects malfunction at filters, e.g. filter breaks or assembly errors.

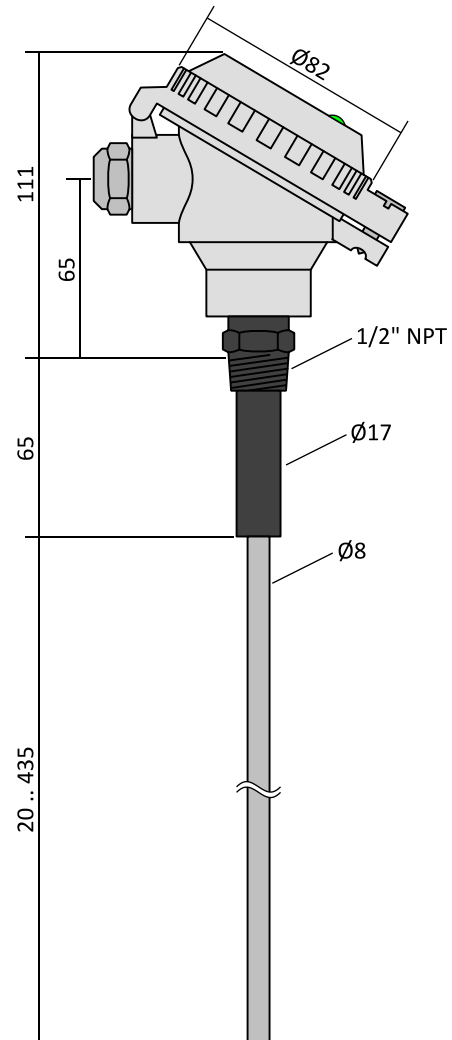


Figure 1: Dimensions (in mm)

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6 Mounting Instructions

6.1 Selection of the mounting position

The inlet and outflow zone for FS750E should not be less than 3 times the nominal diameter.

After fixing the threaded sleeve in a 90° angle to the tube axis, the mounted weld must close the gap between the sleeve and the pipe wall reliably.

The quality of the weld can be tested with a subsequent pressure test. The drilling of the tube wall for the required measurement window is performed with an 18 mm drill bit. Therefor the previously welded sleeve serves as a drilling template. After drilling, the borehole on the inner pipe wall needs to be trimmed as much as possible to ensure that material deposits cannot take place.

6.2 Sensor Mounting

For mounting sleeve need to be threaded on the tube in a 90° angle to the tube axis

The length of the sensor rod should be at least 1/3 of the inner diameter of the pipe. The sensor rod must not come in contact with the opposite wall or with other metallic parts. Therefore it is recommended to keep a minimum distance of 20mm between the opposite wall and the end of the sensor rod.

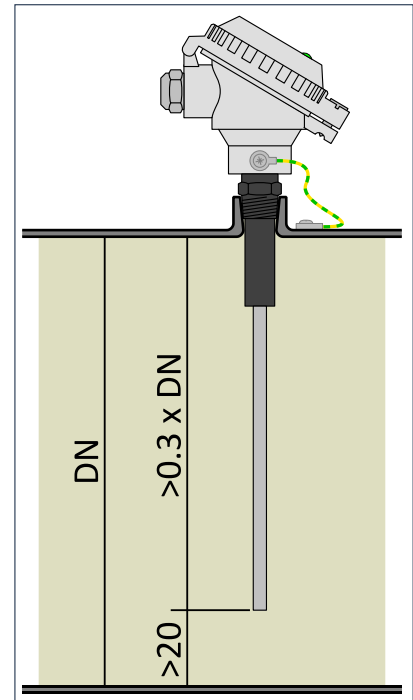


Figure 2a: Sensor mounting

For proper device operation it is mandatory, to establish the earthing connection between the sensor enclosure and the installation location (pipe).

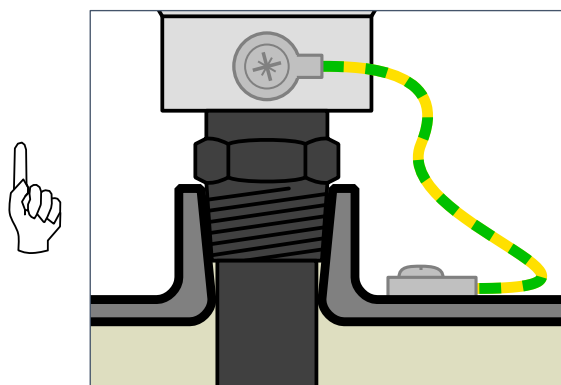


Figure 2b – Earthing connection

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6.3 Transmitter Mounting

Mount the transmitter on a 35 mm DIN rail according to EN 60715. Install the module in a suitable housing to meet the requirements for the protection class. The DIN-rail transmitter should always be installed in a control cabinet or in a dry room.

The mounting and removal is shown in figure 3.

Mounting: Snap-on foot below (left part of drawing). Removal: With a screwdriver (right part of drawing).

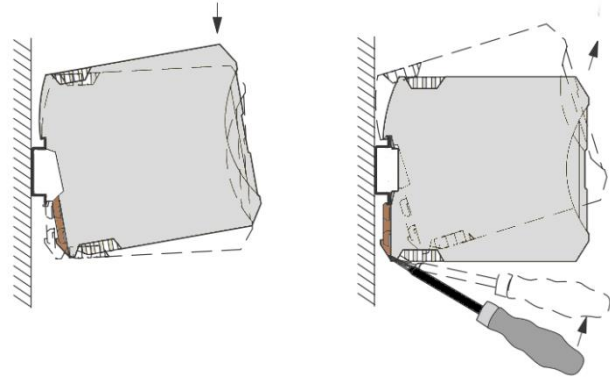


Figure 3: Transmitter mounting

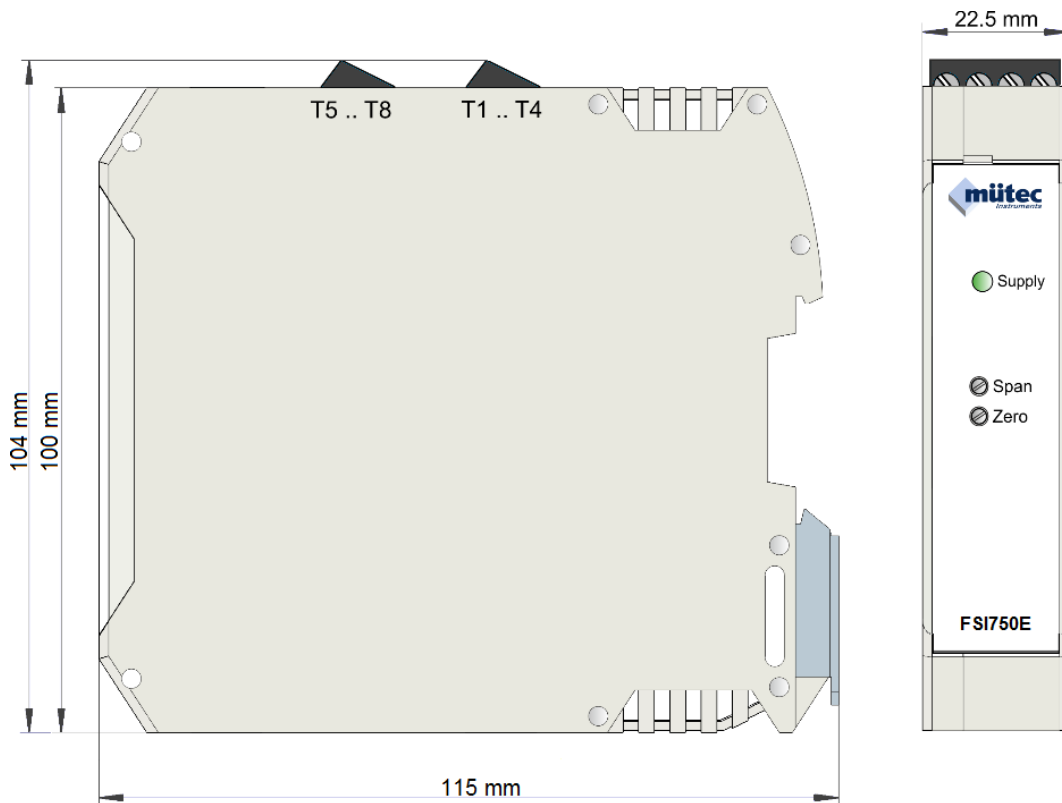


Figure 4: Dimensions

7 Electrical Connection

7.1 Connecting the Sensor

The dust monitor and the DIN-rail transmitter are electrically connected via the 4-wire connection cable. The sensor is supplied with a pre-assembled cable (length 3,0 m, Ø 4.4 mm, 4 x 0.14 mm², insulation: PVC or special halogen-free compound). The 4 wires of the connection cable are depicted in figure 5 a). Connect the shield with the ground rail (DIN rail)

7.2 Connecting the Transmitter

The terminal assignment of the transmitter is shown in figure 5 b). It has to be supplied with 24V DC. For the analog 4-20mA output, use terminal pin T2 and the shared ground on pin T4. Shielded connection cables should be used. Connect the shield with the ground rail (DIN rail). As an alternative, unshielded connection cables can be used, if the cable length does not exceed 3m and the transmitter is mounted within a control cabinet.

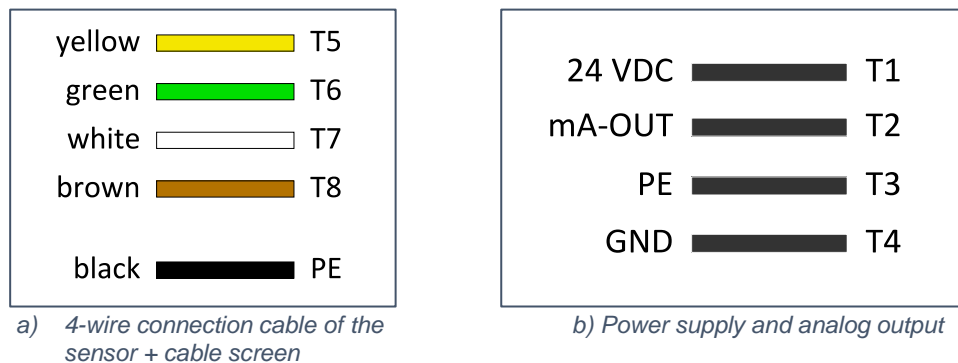


Figure 5: Terminal assignment

8 Commissioning, Calibration and Operation

8.1 Commissioning

After connecting the transmitter to the 24V power supply, it starts the power on procedure for a few seconds. During this time, the sensor LED flashes blue. The power on procedure is signaled with 3mA at the analog output. Subsequently the device is ready to use and the measurement value of particle load is output in the 4-20mA range.

8.2 Calibration

The FS750E is pre-calibrated by the manufacturer. The entire measuring range is mapped to the output range 4-20mA. There are two adjustment options for an individual customization of the analog output range.

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1. Sensor Adjustment

The amplification factor of the sensor can be adjusted by the gain switch (see figure 6).

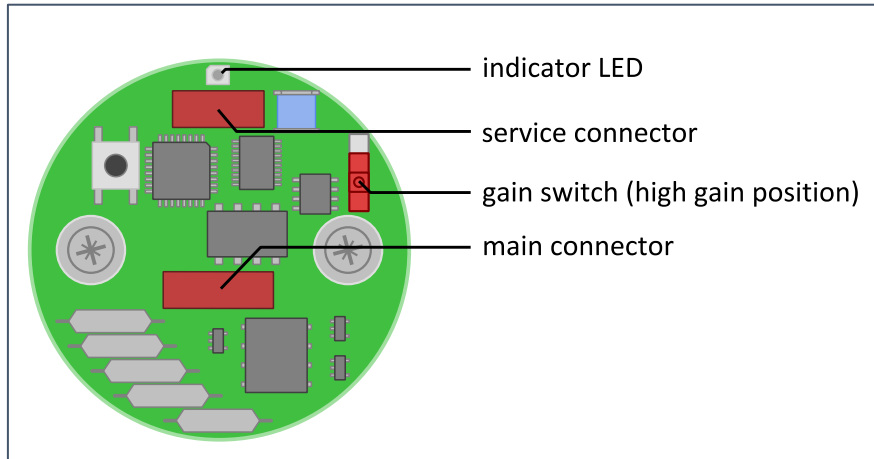


Figure 6: View of sensor board

2. Transmitter Adjustment

The analog output range of the DIN-rail transmitter can be adjusted with the potentiometers *ZERO* and *SPAN*. In center position, the *ZERO* potentiometer maps the lower measuring range to a current output of 4mA. By adjusting the potentiometer to the lower or upper end, the current output is increased or decreased by up to 4mA respectively.

If the *SPAN* potentiometer is in center position, the upper measuring range is mapped to a current output of 20mA. By adjusting the potentiometer to the lower or upper end, the current output is increased or decreased by up to 4mA respectively.

However, the current output is limited to a maximum range of 3.8mA to 20.5mA.

8.3 Operation

The emerging particle load is continuously captured and output as an analog value, corresponding to the previously adjusted settings.

In case of a communication error between sensor and transmitter, the device outputs 3mA.

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9 Technical Data

9.1 Flow-Sensor FSS750E

Housing material:	Aluminum
Material sensor rod:	V2A / V4A (option)
Isolator:	PPS
Protection class:	IP65
Weight:	700g
Tightening torque - mounting:	40Nm
Storage temperature:	-20°C to +70°C (not condensing)
Operating temperature:	-20°C to +70°C
Process temperature:	-20°C to +150°C
Process pressure:	0 to 2 bar
Supply voltage:	24 VDC (18 VDC ... 26 VDC)
Power consumption:	max. 50 mA
Power:	< 2 W
Hysteresis:	fixed
Filter time:	fixed
Connection cable:	pre-assembled



If the maximum permissible temperature is exceeded, the warranty expires.

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Constant current:	4 ... 20 mA
Output value:	max. 20.5 mA
Load:	max. 750 Ω
Load influence:	$\leq 0,02$ %
Damping:	filter 1st order, fixed

Power supply


DC voltage:	24 VDC, -20 % to +30 %
Power consumption:	max. 2 W
Power-LED/green:	good-condition of power supply

Housing

Material:	Polyamide
Color:	light grey
Protection class:	IP20
Width x length x height: (with connection terminal blocks)	22,5 x 115 x 108 mm
Inflammability class acc. to UL 94:	V0
Housing type for mounting:	35 mm DIN rails
Weight with terminal blocks:	approx. 100 g

Connection terminal

Solid (minimum/maximum):	0,2 mm ² /2,5 mm ²
Stranded wire (minimum/maximum):	0,2 mm ² /2,5 mm ²
AWG/kcmil (minimum/maximum):	24/14
Stripping length:	7 mm
Connection method:	plugable screw connection
Tightening torque:	0,5 ... 0,6 Nm

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10 Service and maintenance

When using the measuring device at abrasive materials, the product stream exposed areas must be regularly checked for their dimensions. The loss of material must not be more than 1mm.

The transmission of the devices remains reliable and stable over a long period, neither regular adjustments nor maintenances are required.

11 Fault Elimination

Remove the device as soon as a disturbance of the device is detected. Send the device to the manufacturer for maintenance.

12 Disposal

The disposal of packaging and used parts must be done in accordance with the provisions of the country in which the equipment is installed. In particular, electronic components that are to be disposed of, are classified as hazardous!