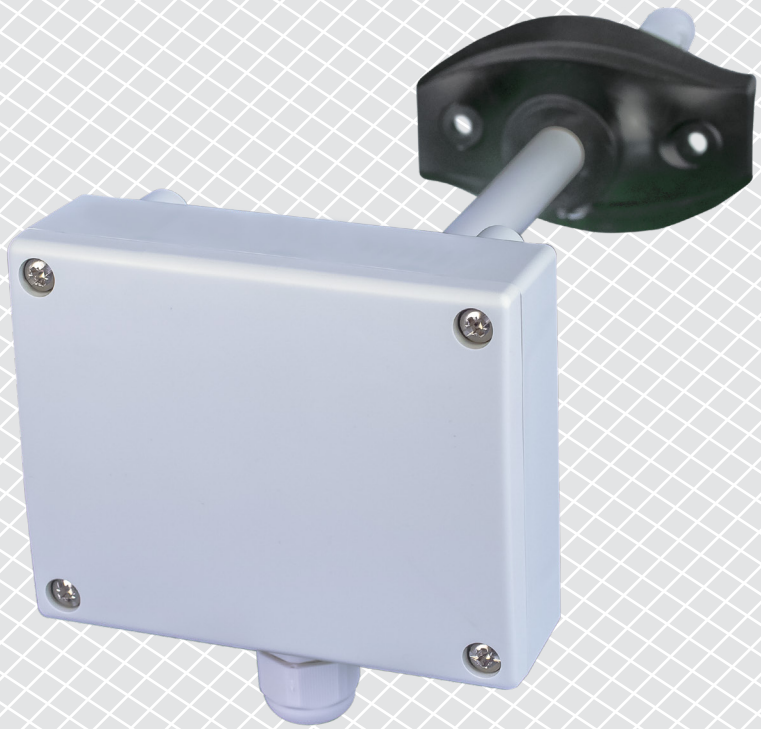
DSMFM-4 | MULTIFUNCTIONAL DUCT TRANSMITTER

Mounting and operating instructions



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SAFETY AND PRECAUTIONS

Read all the information in this manual, in the datasheet and in the Modbus Register Map before working with the product. For personal and equipment safety and for optimum product performance, make sure you fully understand the content before installing, using or servicing this product.

For safety and licensing (CE) reasons, unauthorised conversions and / or modifications of the product are inadmissible.

The product should not be exposed to abnormal conditions, such as extreme temperatures, direct sunlight or vibrations. Long-term exposure to chemical vapours in high concentration can affect the product performance. Make sure the work environment is as dry as possible and avoid condensation.

All installations must comply with local health and safety regulations and local electrical standards and approved codes. This product should only be installed by an engineer or a technician with expert knowledge of the product and safety precautions.

Avoid contact with energised electrical parts. Always disconnect the power supply before connecting, servicing or repairing the product.

Always check that you are connecting the correct power supply to the product and use wires of the correct characteristics and cross-section. Make sure all screws and nuts are properly tightened and fuses (if any) are in place.

Consideration should be given to recycling the equipment and packaging. These should be disposed of in accordance with local and national laws and regulations.

If there are questions that are not answered, contact your technical support or consult a professional.

PRODUCT DESCRIPTION

The DSMFM-4 is a multifunctional duct transmitter, which measures temperature, relative humidity, CO_2 concentration levels and barometric pressure. Based on the temperature and relative humidity measurements, the dew point is calculated. They have a wide range of supply voltage: 24 VDC / PoM or 24 VAC ± 10%. The transmitter can be connected via a pluggable terminal block. All parameters are accessible via Modbus RTU.

ARTICLE CODES

Code	Imax	Supply voltage	Connection
DSMFM-4	40 mA	24 VDC / PoM 24 VAC ± 10%	pluggable terminal block

INTENDED AREA OF USE

- Monitoring temperature, relative humidity, CO_2 level and barometric pressure (BP) in air ducts
- Air monitoring in buildings with these kinds of ventilation systems:
  - exhaust ventilation;
  - supply ventilation;
  - balanced ventilation;
  - energy recovery ventilation.

TECHNICAL DATA

- Supply voltage:
  - 24 VDC / PoM (acceptable voltage range: 18—34 VDC);
  - 24 VAC ± 10%.
- Selectable temperature range: -30—70 ºC
- Selectable relative humidity range: 0—100 %
- Selectable CO_2 range: 0—2.000 ppm
- Barometric pressure range: 300—1.250 hPa
- Accuracy:
  - Temperature: ± 0,4 ºC;
  - Relative humidity: ± 2,5 % rH;
  - CO_2: ± 30 ppm + 3 %.
- Imax: 40 mA
- Replaceable CO_2 sensor element
- Minimum recommended airflow velocity: 1 m/s
- Enclosure and probe material:
  - ASA, grey (RAL9002)
- Protection standard: IP54 (enclosure), IP20 (probe)
- Internal storage conditions:
  - temperature: -10—60 ºC
  - relative humidity: 5%—80% rH

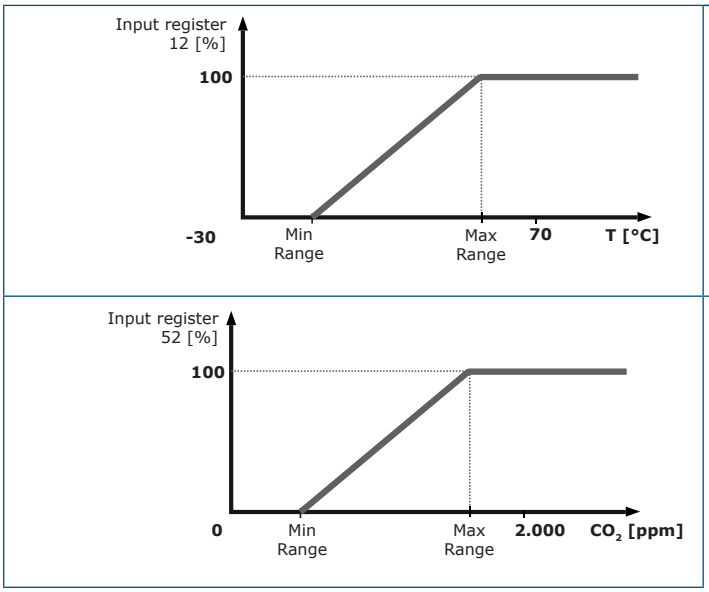
STANDARDS

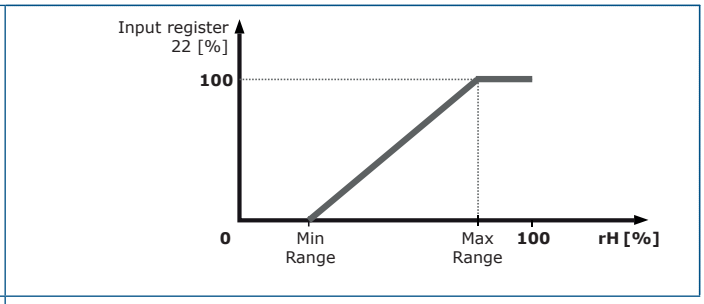
- Low Voltage Directive 2014/35/EU:
  - EN 60529:1991 Degrees of protection provided by enclosures (IP Code) Amendment AC:1993 to EN 60529;
  - EN 60730-1:2011 Automatic electrical controls for household and similar use - Part 1: General requirements.
- Electromagnetic Compatibility (EMC) Directive 2014/30/EU:
  - EN 60730-1:2011 Automatic electrical controls for household and similar use - Part 1: General requirements;
  - EN 61000-6-1:2007 Electromagnetic compatibility (EMC) - Part 6-1: Generic standards - Immunity for residential, commercial and light industrial environments;

- EN 61000-6-3:2007 Electromagnetic compatibility (EMC) - Part 6-3: Generic standards - Emission standard for residential, commercial and light-industrial environments Amendments A1:2011 and AC:2012 to EN 61000-6-3;
- EN 61326-1:2013 Electrical equipment for measurement, control and laboratory use - EMC requirements - Part 1: General requirements;
- EN 61326-2-3:2013 Electrical equipment for measurement, control and laboratory use - EMC requirements - Part 2-3: Particular requirements Test configuration, operational conditions and performance criteria.

- Commission Delegated Directive (EU) 2015/863 of 31 March 2015 amending Annex II to Directive 2011/65/EU of the European Parliament and of the Council as regards the list of restricted substances
- WEEE 2012/19/EU

OPERATIONAL DIAGRAMS





MOUNTING & OPERATING INSTRUCTIONS

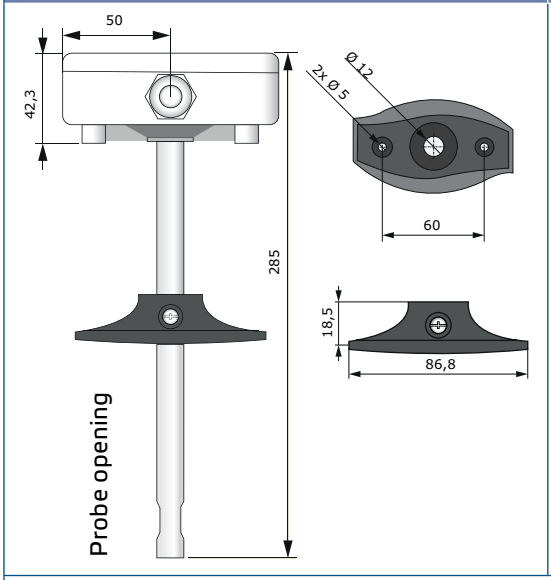
Before you start mounting the unit read carefully **"Safety and Precautions"**.

Follow these steps:

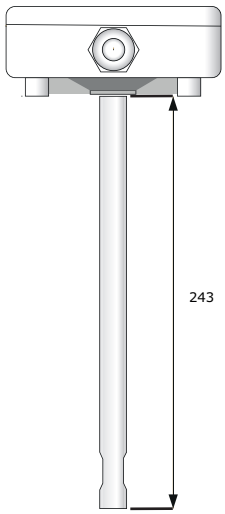
1. When preparing to mount the unit, bear in mind that the probe opening is facing the airflow and the edge of the tube is right in the middle of the duct. Always use the flange to install the sensor on round ducts. It is possible to install the sensor without the flange on rectangular ducts (if necessary), see **Fig. 1** and **Fig. 2** below.

Fig. 1 Mounting dimensions

With flange



Without flange



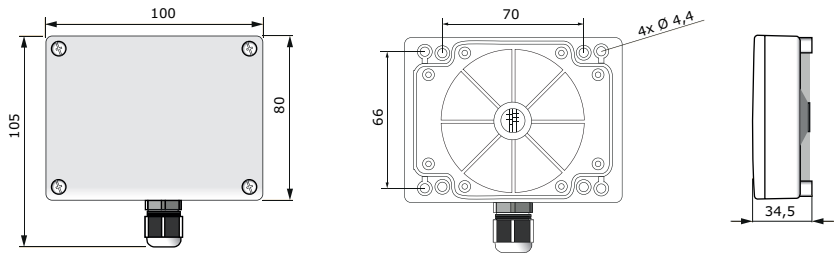
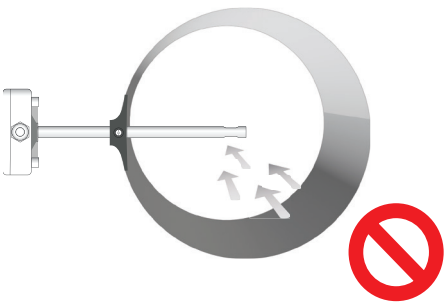


Fig. 2 Mounting position

Correct

Incorrect

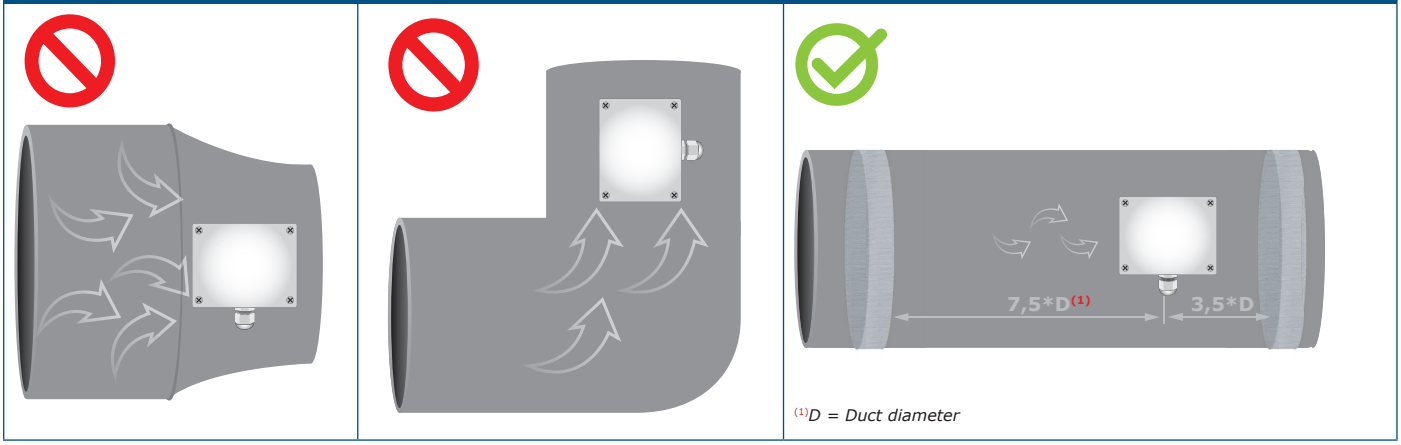


2. Having selected the appropriate mounting location, proceed with the following steps:

2.1 Drill a tight-sealing Ø 13 mm hole into the duct.

2.2 Fix the flange onto the duct outer surface using the self-drilling screws delivered with the unit. If you do not intend to use the flange, insert the probe and fix the enclosure onto the duct. Mind the airflow direction (see **Fig. 3** below).

Fig. 3 Mounting requirements



(1)D = Duct diameter

ATTENTION

The unit must not be installed in turbulent air zones. Ensure sufficiently long settling zones upstream and downstream of the tapping point. A settling zone consists of a straight section of pipe or duct with no obstructions. Avoid installation near filters, cooling coils, fans, etc. The sensor will achieve the optimal result when the measurement is taken at least 7,5 duct diameters downstream and at least 3 duct diameters upstream from any turns or flow obstructions.

ATTENTION

Installation of the unit near high EMI-emitting devices may lead to faulty measurements. Use shielded wiring in areas with high EMI.

2.3 Install the probe at the desired depth and; in case you use the flange, fix it via the plastic white screw in the flexible flange.

2.4 Unscrew the cover of the unit to remove it and insert the connecting cables through the cable gland of the unit.

2.5 Do the wiring according to the connection diagram (see **Fig. 4**) adhering to the information from section **"Wiring and connections"**.

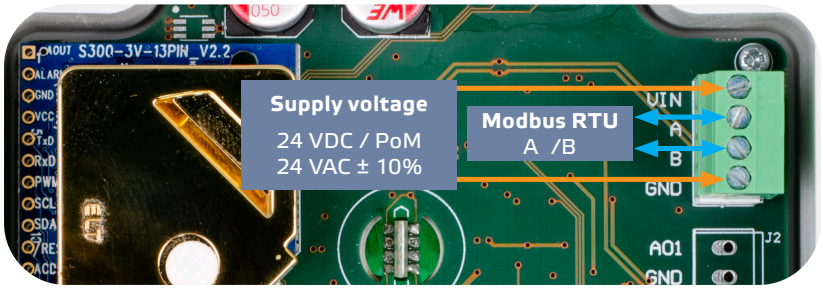
3. Close the enclosure and fix it with the screws. Tighten the cable gland to retain the IP rating of the enclosure.
4. Switch on the power supply.
5. Customise the factory settings to the desired ones via the Modbus registers map. For the default factory setting, see the *Modbus register map.*

NOTE

For the complete Modbus register data, refer to the product Modbus Register Map, which is a separate document attached to the article code on the website and contains the registers list. Products with earlier firmware versions may not be compatible with this list.

WIRING AND CONNECTIONS

Fig. 4 Connection diagram

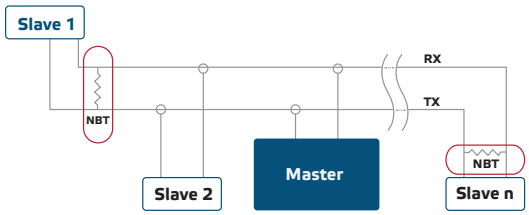


Pluggable terminal block	
VIN	24 VDC,PoM / 24 VAC ± 10%
GND	Common ground
A	Modbus RTU (RS485), signal A
/B	Modbus RTU (RS485), signal /B
Connection type	Cat5 or EIB cable

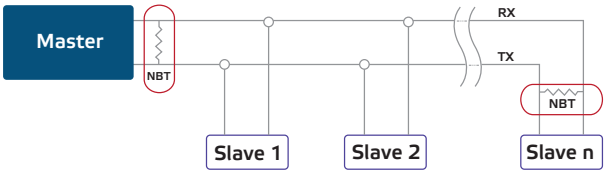
Optional settings

To assure correct communication, the NBT needs to be activated in only two devices on the Modbus RTU network. If necessary, enable the NBT resistor via 3SModbus or Sensistant (*Holding register 9*).

Example 1



Example 2



NOTE

On a Modbus RTU network, two bus terminators (NBTs) need to be activated.

CAUTION

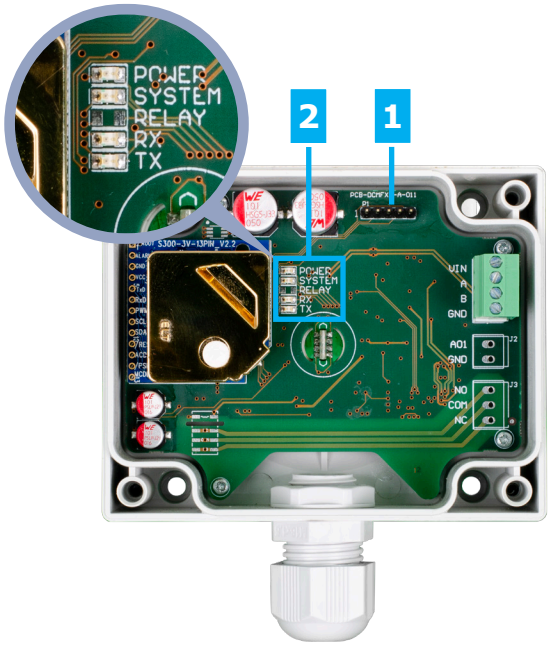
Do not expose to direct sunlight!

OPERATING INSTRUCTIONS

Calibration procedure:

No calibration procedure needed for the temperature, relative humidity and barometric pressure measurements!
The removable CO_2 sensor has an option of using the ABC (Automatic Baseline Correction) algorithm. By default, this option is turned on. Enabling the ABC algorithm allows you to restore sensor accuracy after a long period of exploitation and compensates the baseline drift. The algorithm should be used in applications where carbon dioxide concentrations will drop to outside ambient conditions (400 ppm) periodically. It keeps the weekly lowest measured value (in ticks, not ppm) and interprets it in 400 ppm. However, devices, using the ABC algorithm should not be used in such applications as greenhouses, hospitals and other environments with constant sources or absorbers of CO_2. Since the baseline is a reference, calibrated by the manufacturer, the ABC algorithm performs an initial calibration of the sensor two days after the device is connected. Then, the algorithm performs recalibration processes on the 5th and the 7th day after the device is turned on. So, by the third week, the sensors will achieve a maximum accuracy of ± (30 ppm + 3%).

Settings and LED indications



1 - PROG header, P1		■■□□□ 1 2 3 4 5	Put a jumper onto pins 1 and 2 and wait for at least 5 seconds to reset the Modbus communication parameters
		□□■■□ 1 2 3 4 5	Put a jumper onto pins 3 and 4 and restart the power supply to enter bootloader mode
2 - LED indications	POWER	On	The device is successfully supplied
	SYSTEM	On	Device is powered, system is operating normally
		Slow blinking	Indicates that the device is powered, but there's an error in the system
		Fast blinking	Indicates that the device has entered bootloader mode
	RX	Blink once	Indicates that the unit has received a request through the Modbus communication from the Master unit
	TX	Blink once	Indicates that the Modbus response from the device is transmitted

TROUBLESHOOTING

NOTE

Every described below step is independent and different issues and situations should be taken in consideration. The troubleshooting steps are described in the most simple way from the easiest to the most complex steps to help and guide our customers to solve the appeared issues. But if none of these troubleshooting points can solve the problem, please, contact a Sentera technical specialist.

After finishing installation of the product, if the device is still not operating, please, check if there are not any serious external damages to the enclosure, as they may cause failure of the electronics of the device. Then proceed with the following steps:

- Open the enclosure of the product and check for any damaged wires or serious damages on the PCB.
- Check if the 24 V power supply is connected to the correct terminal on the terminal block.
- Check the connections and if the proper wires are connected to the right terminals (the Modbus communication wire, the power supply wire and etc.).
- Check if the cable pin out is correct.

No Modbus RTU communication:

The communication through the Modbus RTU is very important to be always checked. If there's no available Modbus RTU communication, the chosen device cannot be connected to the network and, therefore, to other devices or the SenteraWeb cloud-platform. Possible problem (s):

- Device is not detected on a Modbus network by a Master device in the relevant network;
- On-board "RX" LED, which indicates that the device is receiving any Modbus requests, does not blink occasionally;
- On-board "TX" LED, which indicates that the device is responding to Modbus Master device requests, does not blink occasionally.

Steps to solve the described problem:

- Check if the communication parameters have the correct settings (baudrate, parity).
- Check if the device's slave ID match the ID, expected by Modbus Master device.
- Check if the device's slave ID **doesn't match the ID of any other devices**, connected to the same network.
- Check if this device responds to the broadcast read command (slave ID = 0, read first 4 Holding registers).
- Check if the RS485 communication line is correctly wired on both sides (A to A, B to B).
- Check if the cables length does not exceed 1.000 meters. If so, this would directly have an impact on the Modbus communication.
- Connect the device to isolated Modbus network without other slave devices and check the communication.

Problems with CO_2 module and CO_2 measurements:

Possible problem (s):

- Sensor problem status in Input register 54.
- Questionable value in Input register 51 (e.g. 0 ppm).
- Sensor fault status in Input register 1.
- Sensor warning status in Input register 2.
- Slowly flashing SYSTEM LED.

Steps to solve the described problem:

- Disconnect the device from power supply for at least 15 seconds and connect again.
- Verify that CO_2 module is securely seated in its connector.
- Carefully disconnect the module, then reconnect it.
- Try connecting another module of the same type.

Problems with temperature and humidity measurements:

Possible problem (s):

- Sensor problem status in Input register 14.
- Sensor problem status in Input register 24.
- Questionable value in Input register 11.
- Questionable value in Input register 21.
- Sensor fault status in Input register 1.
- Sensor warning status in Input register 2.
- Slowly flashing SYSTEM LED.

Steps to solve the described problem:

- Disconnect the device from power supply for at least 15 seconds, and then connect it again.
- Verify that the openings on any device part mounted inside the air duct are not clogged.
- Verify that there are no water drops inside the device part mounted in the air duct.

Other possible issues:

- Supply voltage fault status in Input register 1.
- Supply voltage warning status in Input register 2.
- Questionable value in Input register 3.
- Sensor preheating status, shown in Input registers 14, 24, 54 and 144, that persists for more than 1 minute after the device powered on.

Steps to solve the described problem:

- Check if the relevant cable is connected to this device.
- Check if the cable is properly connected to the power supply.
- Check if the device is successfully supplied with 24 volts.

VERIFICATION OF INSTALLATION

If your unit does not function as expected, please check the connections, the supply voltage and the Modbus settings. Please, avoid locations with direct sunlight. Do not connect the power supply to the input and output terminals. During operation, the unit should be closed.

TRANSPORT AND STORAGE

Avoid shocks and extreme conditions; stock in original packing.

WARRANTY AND RESTRICTIONS

Two years from the delivery date against defects in manufacturing. Any modifications or alterations to the product after the date of publication relieve the manufacturer of any responsibilities. The manufacturer bears no responsibility for any misprints or mistakes in this data.

MAINTENANCE

In normal conditions this product is maintenance-free. If soiled, clean with a dry or damp cloth. In case of heavy pollution, clean with a non-aggressive product. In these circumstances the unit should be disconnected from the supply. Pay attention that no fluids enter the unit. Only reconnect it to the supply when it is completely dry.