

DSMFX-2R | MULTIFUNCTIONAL DUCT TRANSMITTER

Mounting and operating instructions

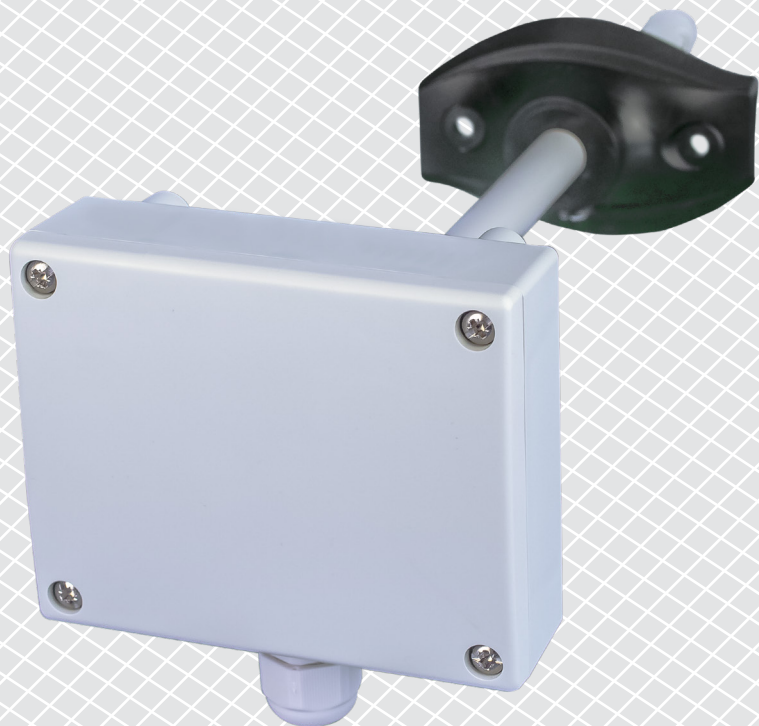


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SAFETY AND PRECAUTIONS



Read all the information, the datasheet, Modbus map, mounting and operating instructions and study the wiring and connection diagram before working with the product. For personal and equipment safety, and for optimum product performance, make sure you entirely understand the contents before installing, using, or maintaining this product.



For safety and licensing (CE) reasons, unauthorised conversion 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; avoid condensation.



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



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



Always verify that you apply appropriate power supply to the product and use appropriate wire size and characteristics. Make sure that all the screws and nuts are well tightened and fuses (if any) are fitted well.



Recycling of equipment and packaging should be taken into consideration and these should be disposed of in accordance with local and national legislation / regulations.



In case there are any questions that are not answered, please contact your technical support or consult a professional.

PRODUCT DESCRIPTION

The DSMFX-2R series are multifunctional duct transmitters which measure temperature, relative humidity and CO₂ concentration level. Based on the temperature and relative humidity measurements, the dew-point temperature is calculated. The series features a wide range of low voltage power supply and three analogue / modulating outputs. All parameters are accessible via Modbus RTU.

ARTICLE CODES

Code	Supply	Maximum power consumption	Nominal power consumption	I _{max}
DSMFG-2R	18–34 VDC	2,6 W	1,3 W	145 mA
DSMFF-2R	15–24 VAC ± 10 % / 18–34 VDC	2,1 W (VAC) / 2,6 W (VDC)	1,3 W (VAC) / 1,48 W (VDC)	155 mA (VAC) / 145 mA (VDC)

INTENDED AREA OF USE

- Monitoring duct temperature, relative humidity and CO₂ level in HVAC applications

TECHNICAL DATA

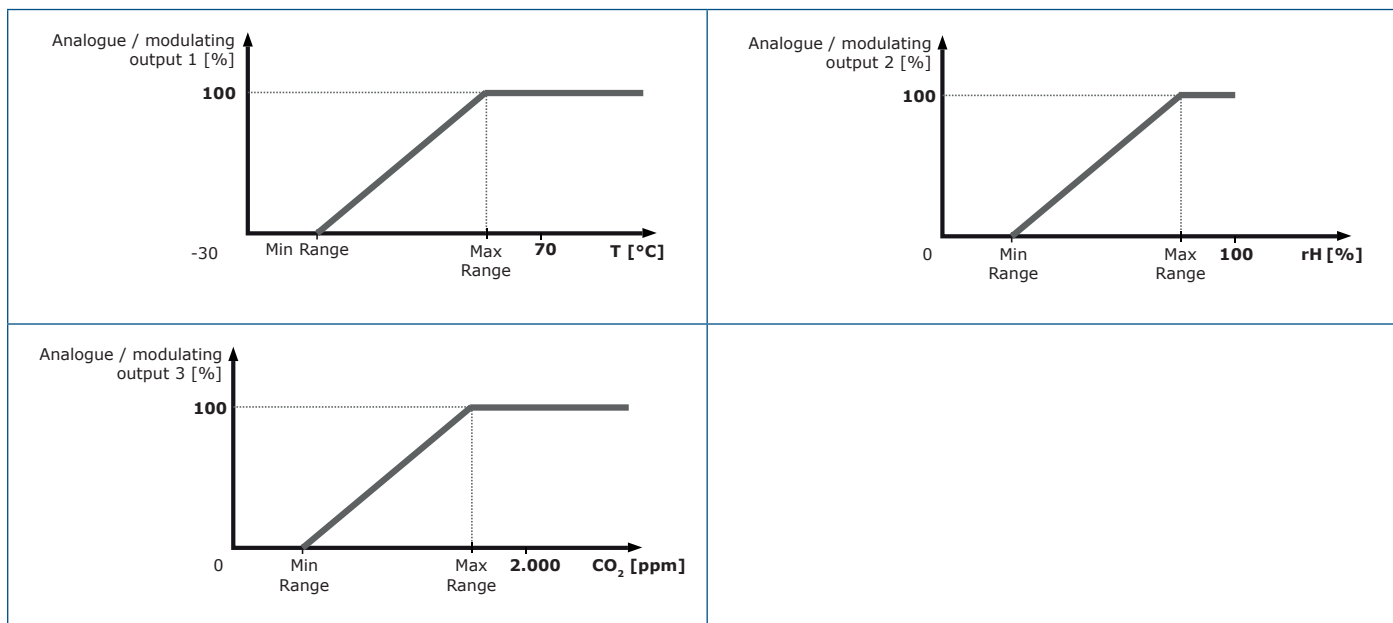
- 3 analogue / modulating outputs:
 - ▶ 0–10 VDC mode: min. load 50 kΩ ($R_L \geq 50 \text{ k}\Omega$)
 - ▶ 0–20 mA: max. load 500 Ω ($R_L \leq 500 \Omega$)
 - ▶ PWM (open-collector type): PWM Frequency: 1 kHz, min. load 50 kΩ ($R_L \geq 50 \text{ k}\Omega$); PWM voltage level 3,3 VDC or 12 VDC
- Selectable temperature range: -30–70 °C
- Selectable relative humidity range: 0–100 %
- Selectable CO₂ range: 0–2.000 ppm
- Accuracy: ±0,4 °C (-30–70 °C); ±3 % rH (0–100% rH); ±30 ppm CO₂ (0–2.000 ppm CO₂), depending on the selected parameter
- Replaceable CO₂ sensor element
- Minimum airflow velocity required: 1 m/s
- Enclosure and probe material:
 - ▶ ASA, grey (RAL9002)
- Protection standard: enclosure: IP54, probe: IP20
- Typical field of use:
 - ▶ temperature: -30–70 °C
 - ▶ rel. humidity: 0–100 % rH, (non-condensing)
 - ▶ CO₂: 400–2.000 ppm
- Storage temperature: -10–60 °C

STANDARDS

- EMC Directive 2014/30/EC:
 - ▶ 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 for transducers with integrated or remote signal conditioning
- RoHS Directive 2011/65/EC



OPERATIONAL DIAGRAMS



WIRING AND CONNECTIONS

Article type	DSMFF-2R	DSMFG-2R	
VIN	18—34 VDC	18—34 VDC	15—24 VAC ±10%
GND	Ground	Common ground	AC ~
A	Modbus RTU (RS485), signal A	Modbus RTU (RS485), signal A	
/B	Modbus RTU (RS485), signal /B	Modbus RTU (RS485), signal /B	
AO1	Analogue / modulating output 1 for temperature measurement (0—10 VDC / 0—20 mA / PWM)	Analogue / modulating output 1 for temperature measurement (0—10 VDC / 0—20 mA / PWM)	
GND	Ground AO	Common ground	
AO2	Analogue / modulating output 2 for relative humidity measurement (0—10 VDC / 0—20 mA / PWM)	Analogue / modulating output 2 for relative humidity measurement (0—10 VDC / 0—20 mA / PWM)	
GND	Ground AO	Common ground	
AO3	Analogue / modulating output 3 for CO ₂ measurement (0—10 VDC / 0—20 mA / PWM)	Analogue / modulating output 3 for CO ₂ measurement (0—10 VDC / 0—20 mA / PWM)	
GND	Ground AO	Common ground	
Connections	Spring contact terminal blocks, cable cross section: 1,5 mm ²		



CAUTION

The -F version of the product is not suited for 3-wire connection. It has separate grounds for power supply and analogue output. Connecting both grounds together might result in incorrect measurements. Minimum 4 wires are required to connect -F type sensors.

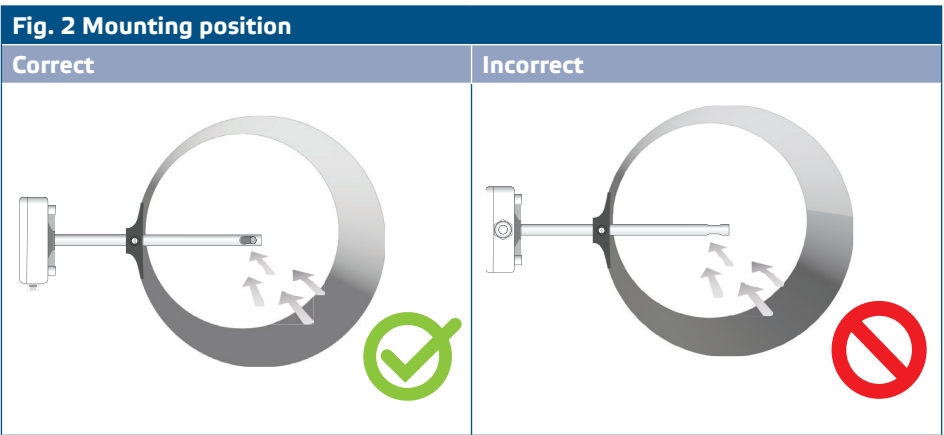
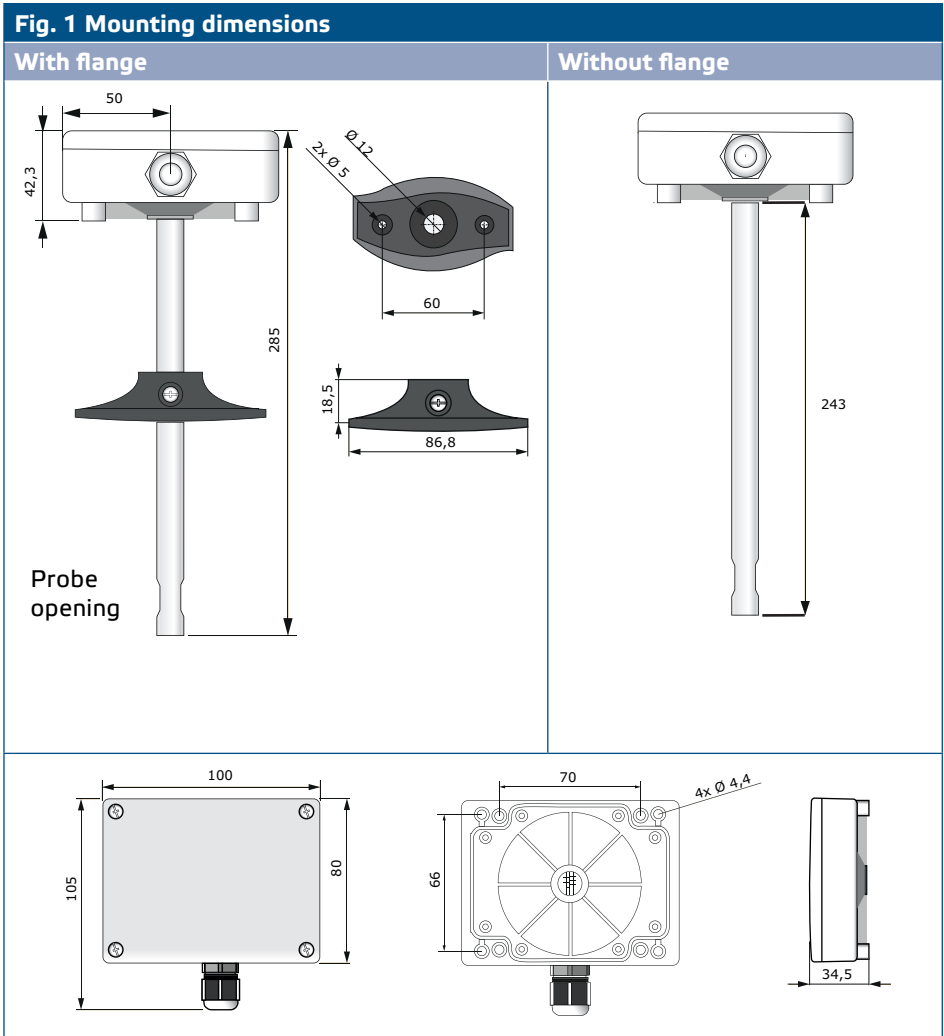
The -G version is intended for 3-wire connection and features a 'common ground'. This means that the ground of the analogue output is internally connected with the ground of the power supply. For this reason, -G and -F types cannot be used together on the same network. Never connect the common ground of -G type articles to other devices powered by a DC voltage. Doing so might cause permanent damage to the connected devices.

MOUNTING & OPERATING INSTRUCTIONS IN STEPS

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

Follow these steps:

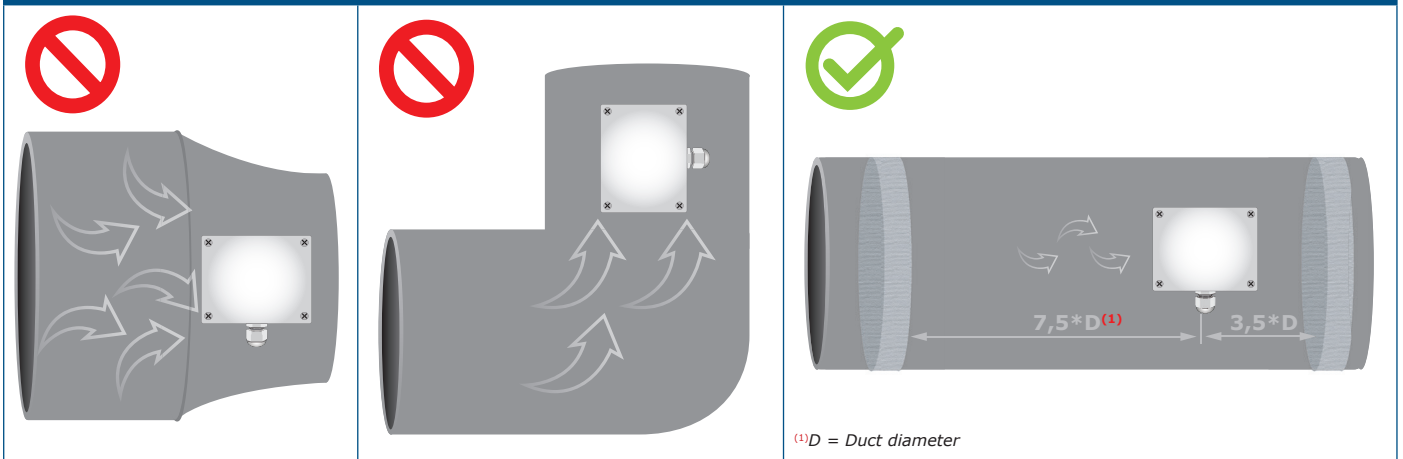
1. When preparing to mount the unit, bear in mind that the probe opening must be positioned in the centre of the duct. Always use the flange to install the sensor on round ducts. It is possible to install the sensor without the flange on rectangular ducts (if necessary), see **Fig. 1** and **Fig. 2**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



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. 2** and **Fig. 3**).

Fig. 3 Mounting requirements



ATTENTION

Installation requirements: 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

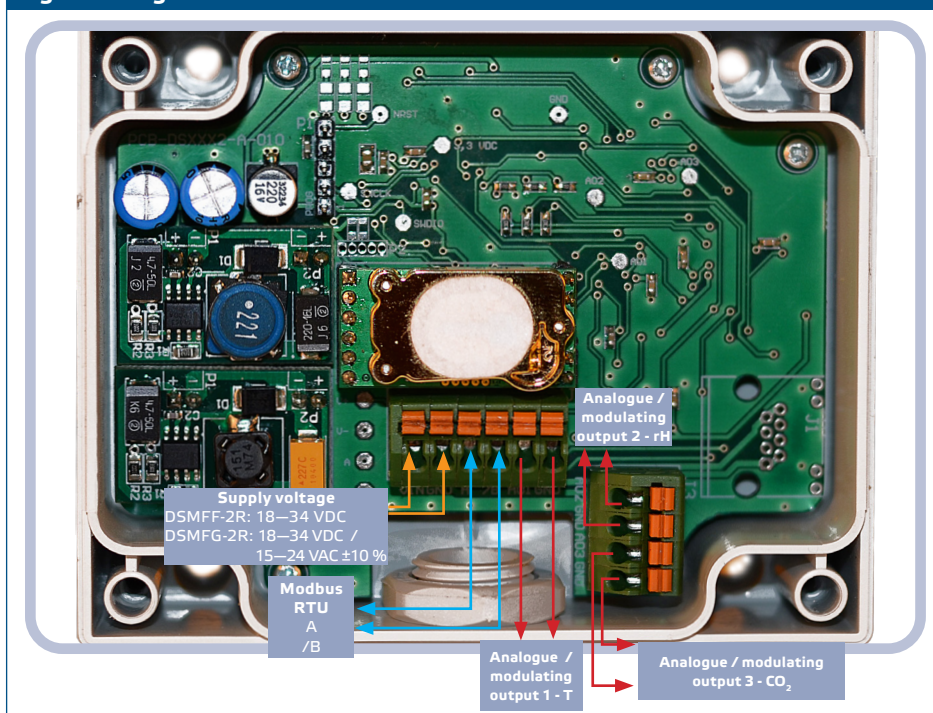
Installation of the unit near high EMI-emitting devices may lead to faulty measurements. Use shielded wiring in areas with high EMI.



ATTENTION

Keep at least 15 cm distance between the sensor lines and the 230 VAC power lines.

- 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 wiring diagram (see **Fig. 4**) adhering to the information from section **"Wiring and connections"**.

Fig. 4 Wiring and connections**ATTENTION**

Always use two separate transformers: one for the sensor and one for the controller.

**ATTENTION**

Do not exceed the maximum power supply rating! Measure before installation! Unregulated 24 VAC supply units provide higher nominal output voltage and activate the integrated fuse protection.

**ATTENTION**

We advise you not to use G and F-type articles together on the same network. If G and F-type articles are used together on the same network, make sure you use separate power supplies for the two types. Always connect different article types to separate AC transformers or use the same article version.

- 3.** Close the enclosure and fix the cover.
- 4.** Switch on the power supply.
- 5.** Customise the factory settings to the desired ones via the 3SModbus software or Sensistant (if necessary). For the default factory setting refer to the product Modbus register map.

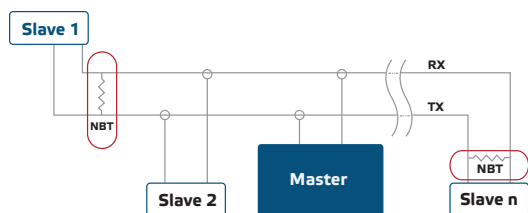
**NOTE**

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.

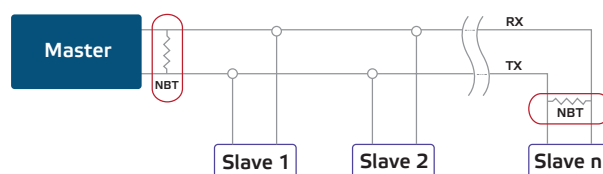
Optional settings

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

**NOTE**

For detailed information and settings, refer to the product Modbus register map, which is attached to the article code on our website.

Calibration procedure:

Sensor calibration is not necessary.
In the unlikely event of CO₂ sensor element failure, this component can be replaced.
All sensor elements are calibrated and tested in our factory.

Bootloader

Thanks to the bootloader functionality, the unit firmware can be updated via Modbus RTU communication. With 3SM boot Application (part of 3SM Center software suite), 'boot mode' is automatically activated and the firmware can be updated.

**NOTE**

Make sure the power supply does not get interrupted during "bootload" procedure, otherwise you risk losing unsaved data.

VERIFICATION OF INSTALLATION INSTRUCTIONS

If your unit does not function as expected, please check the connections.

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.