

ODXT

OUTDOOR
TEMPERATURE
SENSOR / SWITCH

Mounting and operating instructions

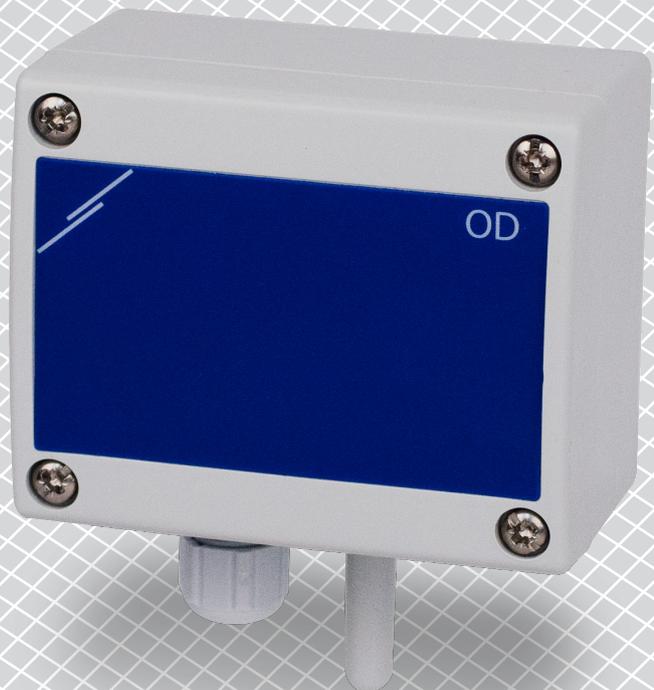


Table of contents

SAFETY AND PRECAUTIONS	3
PRODUCT DESCRIPTION	4
ARTICLE CODES	4
INTENDED AREA OF USE	4
TECHNICAL DATA	4
STANDARDS	5
OPERATIONAL DIAGRAMS	5
WIRING AND CONNECTIONS	5
MOUNTING & OPERATING INSTRUCTIONS IN STEPS	6
MODBUS REGISTER MAPS	9
VERIFICATION OF INSTALLATION INSTRUCTIONS	10
TRANSPORT AND STORAGE	10
WARRANTY AND RESTRICTIONS	10
MAINTENANCE	10

SAFETY AND PRECAUTIONS



Read all the information, the datasheet, 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 treat the product as if it is live. 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 our technical support or consult a professional.

PRODUCT DESCRIPTION

The ODXT series are combined outdoor temperature sensors / switches with 4 pre-defined and one user-definable ranges via Modbus. They feature with Modbus RTU (RS485) communication and have a relay output and an analog / modulating output (0–10 VDC / 0–20 mA / PWM). They are temperature compensated and provide long-term stability and enhanced performance of the sensor / switch.

ARTICLE CODES

Code	Supply
ODXTG	15–24 VAC ±10 % 18–34 VDC
ODXTF	18–34 VDC

INTENDED AREA OF USE

- Temperature control in HVAC applications
- For outdoor use

TECHNICAL DATA

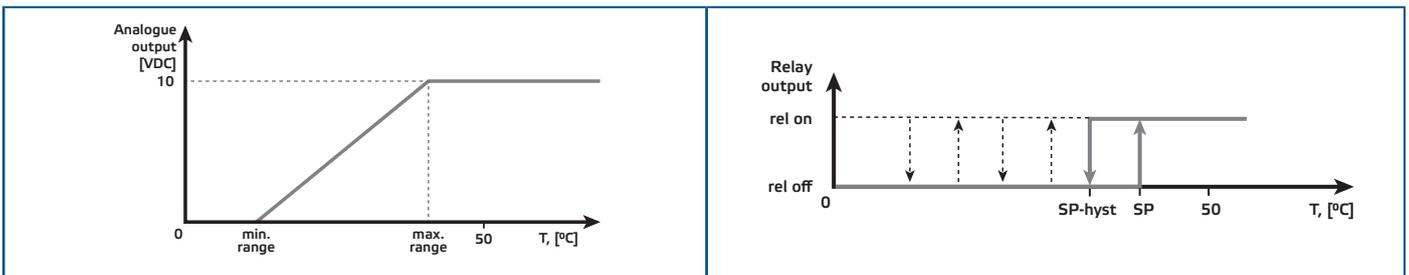
- Analog output: 0–10 VDC / 0–20 mA / PWM (open collector)
- Relay output: C/O (230 VAC / 2 A)
- Power consumption:
 - ▶ no load: max. 25 mA
 - ▶ full load: max. 55 mA
- Load resistance:
 - ▶ 0–10 VDC mode > 2 kΩ
 - ▶ 0–20 mA mode < 500 Ω
 - ▶ PWM mode > 2 kΩ (frequency 1 kHz)
- Selectable temperature ranges: -55–45 °C / -40–60 °C / -30–70 °C / -20–80 °C
- Free selectable temperature range via Modbus: -55–80 °C
- Selectable switching point: via Modbus
- Selectable hysteresis: 1 / 2 / 3 / 4 °C (5 °C only via Modbus)
- Maximum power consumption:
 - ▶ ODXTF: 0,96 W
 - ▶ ODXTG: 1,32W
- Nominal power consumption in normal operation:
 - ▶ ODXTF: 0,72 W
 - ▶ ODXTG: 0,95 W
- I_{max}:
 - ▶ ODXTF: 40 mA
 - ▶ ODXTG: 55 mA
- Enclosure: plastic ABS, grey (RAL 7035)
- Protection standard: IP65 (according to EN 60529)
- Operating ambient conditions:
 - ▶ temperature: -55–80 °C
 - ▶ rel. humidity: < 95 % rH (non-condensing)
- Storage temperature: -55–80 °C

STANDARDS

- Low Voltage Directive 2006/95/EC
- EMC Directive 2004/108/EC: EN 61326
- WEEE Directive 2012/19/EU
- RoHs Directive 2011/65/EU



OPERATIONAL DIAGRAMS



WIRING AND CONNECTIONS

Wiring and connections			
Article type	ODXTF	ODXTG	
Vin	18–34 VDC	18–34 VDC	15–24 VAC ±10%
GND	Ground	Common ground*	AC ~*
A	Modbus RTU (RS485), signal A		
/B	Modbus RTU (RS485), signal /B		
AO1	Analog / modulating output 1 for temperature measurement (0–10 VDC / 0–20 mA / PWM)		
GND	Ground AO1	Common ground*	
NO1	Normally open contact		
COM1	Common contact		
NC1	Normally closed contact		
Connections	Cable cross section: max. 1,5 mm ²		
	Cable gland clamping range: 3–6 mm		

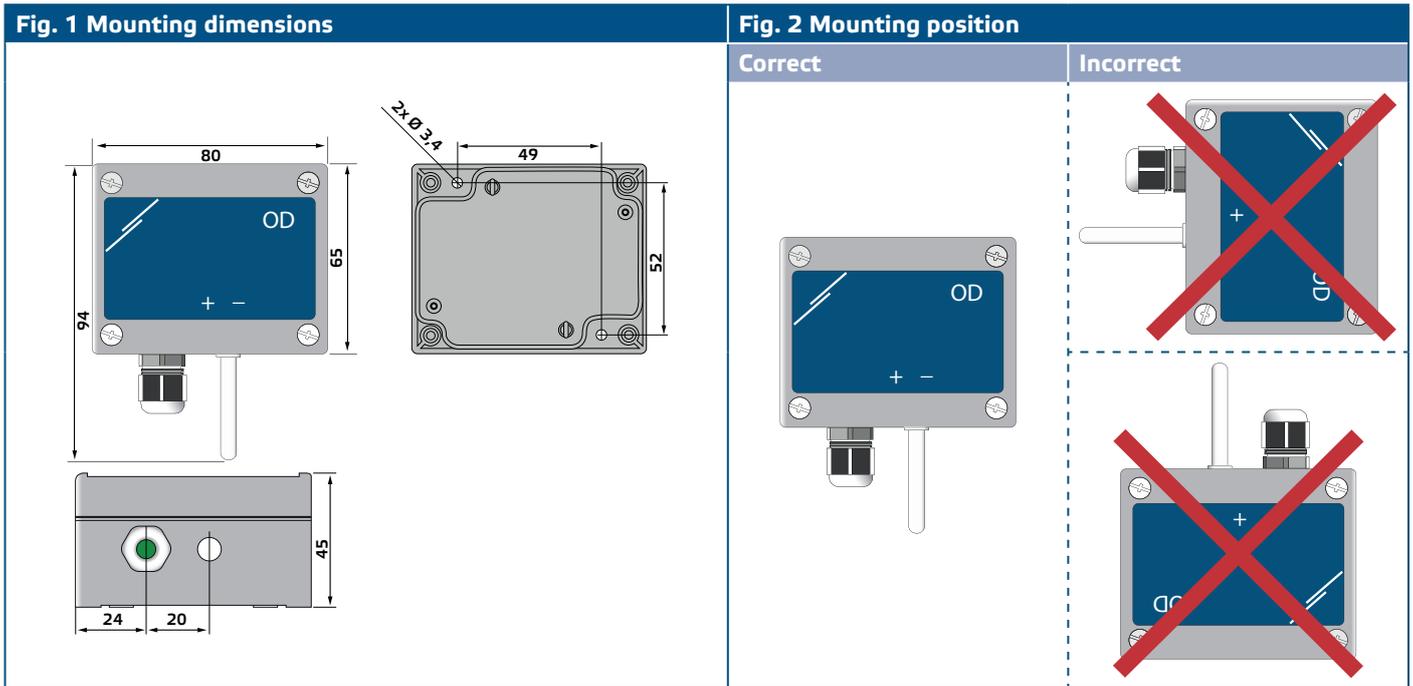
***Caution:** Never connect the common ground of G type articles to other devices powered by a DC voltage. If an AC power supply is used with a unit on a Modbus network, the GND terminal should NOT BE CONNECTED to other units on the network or via the CNVT-USB-RS485 converter. This may cause permanent damage to the communication semiconductors and / or the computer!

MOUNTING & OPERATING INSTRUCTIONS IN STEPS

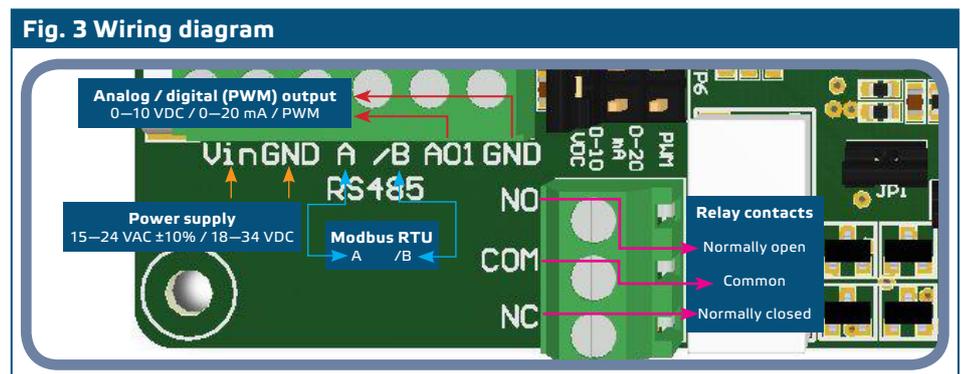
Before you start mounting the ODXT sensor / switch, read carefully **“Safety and Precautions”**. Choose a smooth surface for installation (a wall, panel and etc.).

Follow these steps:

1. Unscrew the front cover of the enclosure to remove it.
2. Fix the enclosure onto the surface by means of suitable fasteners while adhering to the mounting dimensions shown in **Fig. 1 Mounting dimensions** and the correct mounting position shown in **Fig. 2 Mounting position**.



3. Insert the cables through the cable gland and do the wiring adhering to the wiring diagram (see **Fig. 3**) and the information from section **“Wiring and connections”**.

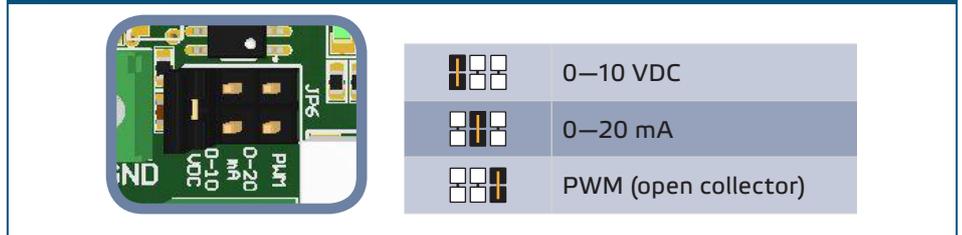


ATTENTION

If an AC power supply is used with any of the units in a Modbus network, the GND terminal should NOT BE CONNECTED to other units on the network or via the CNVT-USB-RS485 converter. This may cause permanent damage to the communication semiconductors and / or the computer.

4. Customise the settings to the desired ones:
 - 4.1 To select the analog / digital output mode, use the jumper shown in **Fig. 4 Analog / digital output selection jumper**.

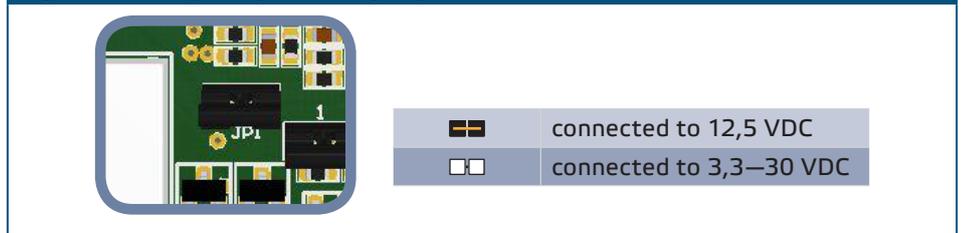
Fig. 4 Analog / digital output selection jumper



- ▶ Place the jumper onto pins 0–10 VDC for 0–10 VDC mode of the analog / digital output.
 - ▶ Place the jumper onto pins 0–20 mA for 0–20 mA mode of the analog / digital output.
 - ▶ Place the jumper onto pins PWM for PWM mode.
- The factory setting is 0–10 VDC.

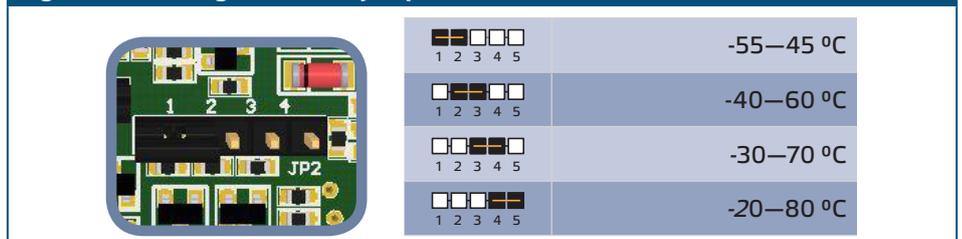
4.2 To change the PMW output voltage, remove jumper JP1 (see **Fig. 5**) and do the wiring as per the wiring diagram shown in **Fig. 1**. By default the pull-up resistor is connected to 12,5 VDC and the JP1 jumper is onto the pins.

Fig. 5 Internal pull-up resistor jumper



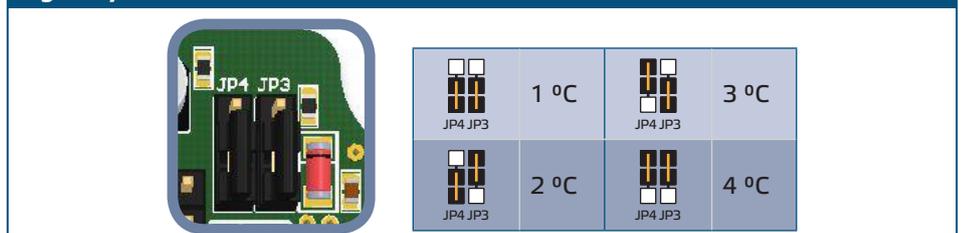
4.3 To select the sensor range, use jumper JP2. See **Fig. 6 Sensor range selection jumper** and the provided information. The factory setting is -55–45 °C.

Fig. 6 Sensor range selection jumper



4.4 To select a hysteresis value, use jumpers JP3 and JP4. The factory setting is 4 °C. See **Fig. 7** and the possible jumper combinations.

Fig. 7 Hysteresis selection JP3 & JP4



5. Make sure you have carried out correct installation. Follow the steps described in “**Verification of installation instructions**” section.

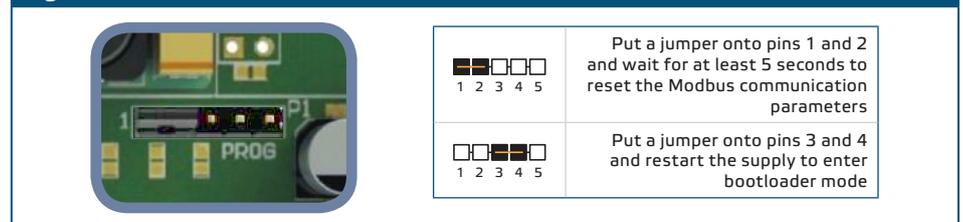
6. Close the enclosure and secure it with the screws
7. Switch on the power supply.
8. The ODST is now ready to use in Standalone mode, i.e. as an autonomous device. However, if you intend to use the additional options provided by the device, you need Sentera's free 3SModbus software or the Sensistant configuration and monitoring tool. You can download 3SModbus software platform from the website of Sentera. For all default factory settings see **Table Modbus register maps**.
9. If necessary, customise the other factory settings to the desired ones through the 3SModbus software or Sensistant.
10. Select the desired relay switching point through Modbus.

Bootloader and Modbus registers reset

Thanks to the bootloader functionality, the sensor firmware can be updated via Modbus RTU communication. To enter 'Boot mode', put a jumper onto pins 3 and 4 of the P1 header and restart the power supply (see **Fig. 8**). Once 'Boot mode' is activated, the firmware can be updated via SM Boot application (part of 3SModbus software suite) or Sensistant.

To reset the Modbus settings, place and hold the jumper as shown in **Fig. 8** for 20 seconds.

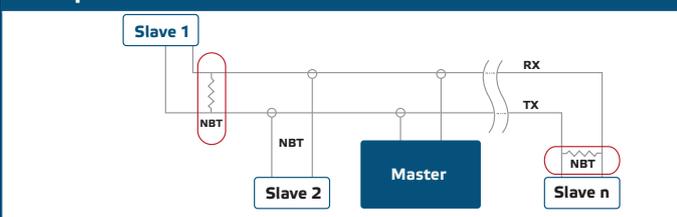
Fig. 8 P1 header



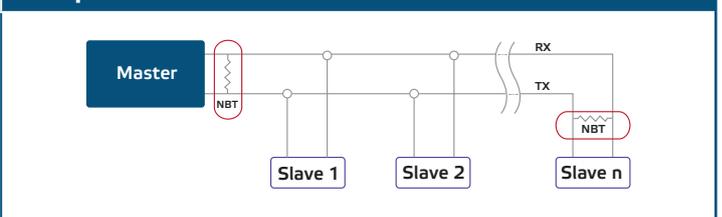
Optional settings

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 20*).

Example 1



Example 2



NOTE

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

MODBUS REGISTER MAPS

INPUT REGISTERS						
		Data type	Description	Data	Values	
1	Temperature level	signed int.	Actual temperature level	-550–800	250 =	25,0 °C
2-10			Reserved, returns 0			
11	Output value	unsigned int.	Value of the analog output	0–1.000	0 = 1.000 =	0 % 100 %
12	Relay status	unsigned int.	Relay status. When it is On , the contact between COM1 and NO1 is closed.	0–1	0 = 1 =	Off On
13	Temperature range	unsigned int.	Temperature working range selected by jumper or holding register	1–5	1 = 2 = 3 = 4 = 5 =	-55–45 °C -40–60 °C -30–70 °C -20–80 °C Custom
14	Setpoint	signed int.	Setpoint selected by holding register	-550–800	250 =	25,0 °C
15	Hysteresis	unsigned int.	Hysteresis for the relay switching selected by jumpers or a holding register	1–5	1 = 2 = 3 = 4 = 5 =	1 °C 2 °C 3 °C 4 °C 5 °C
16	Setpoint out of range	unsigned int.	Flag that shows if the temperature setpoint is out of the working range	0–1	0 = 1 =	No Yes
17-19			Reserved, returns 0			
20	Sensor communication lost	unsigned int.	Flag that shows if the communication with sensor module is lost	0–1	0 = 1 =	No Yes

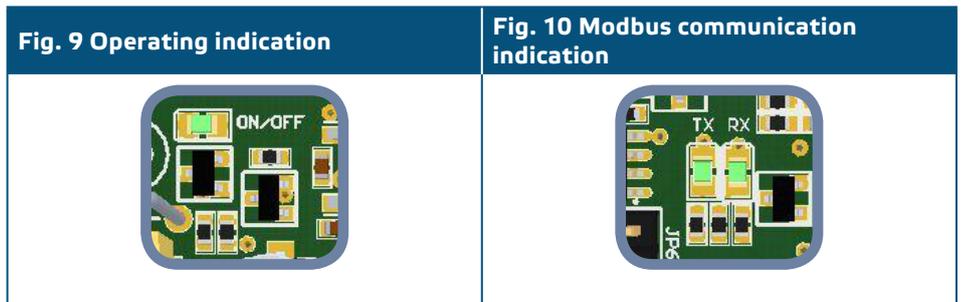
HOLDING REGISTERS						
		Data type	Description	Data	Default	Values
1	Device slave address	unsigned int.	Modbus device address	1–247	1	
2	Modbus baud rate	unsigned int.	Modbus communication baud rate	1–4	2	0 = 4.800 1 = 9.600 2 = 19.200 3 = 8.400 4 = 57.600 5 = 115.200 6 = 230.400
3	Modbus parity	unsigned int.	Parity check mode	0–2	1	0 = 8N1 1 = 8E1 2 = 8O1
4	Device type	unsigned int.	Device type (<i>Read only</i>)	ODXTX = 1066		
5	HW version	unsigned int.	Hardware version of the device (<i>Read only</i>)	XXXX		0 x 0100 = HW version 1.0
6	FW version	unsigned int.	Firmware version of the device (<i>Read only</i>)	XXXX		0 x 0100 = SW version 1.0
7	Operating mode	unsigned int.	Enables Modbus control and disables the jumpers and trimmers	0–1	0	0 = Standalone mode 1 = Modbus mode
8	Output overwrite	unsigned int.	Enables the direct control over the outputs. <i>Always settable. Active only if holding register 7 is set to 1.</i>	0–1	0	0 = Disabled 1 = Enabled
9-10			Reserved, return 0			
11	Temperature range	unsigned int.	Selects the temperature working range. <i>Always settable. Active only if holding register 7 is set to 1.</i>	1–5	1	1 = -55–45 °C 2 = -40–60 °C 3 = -30–70 °C 4 = -20–80 °C 5 = Custom
12	Minimum custom temperature range	signed int.	Minimum value of the custom temperature range. <i>Always settable. Active only if holding register 7 is set to 1 and register 11 is set to 5.</i>	-550–Max	0	100 = 10,0 °C
13	Maximum custom temperature range	signed int.	Maximum value of the custom temperature range. <i>Always settable. Active only if holding register 7 is set to 1 and register 11 is set to 5.</i>	Min–800	500	500 = 50,0 °C
14	Setpoint	signed int.	Selects setpoint for the relay switching. <i>Always settable. Active only if holding register 7 is set to 1.</i>	-550–800	250	250 = 25,0 °C
15	Hysteresis	unsigned int.	Selects the hysteresis for the relay switching. <i>Always settable. Active only if holding register 7 is set to 1.</i>	1–5	4	1 = 1 °C 2 = 2 °C 3 = 3 °C 4 = 4 °C 5 = 5 °C
16-20			Reserved, return 0			
21	Analog output overwrite value	signed int.	Overwrite value for the analog output. <i>Always settable. Active only if holding registers 7 and 8 are set to 1.</i>	0–1.000	0	0 = 0 % 1.000 = 100 %
22-28			Reserved, return 0			
29	Modbus registers reset	unsigned int.	Resets Modbus Holding registers to default values. When finished this register is automatically reset to '0'	0–1	0	0 = Idle 1 = Reset Modbus registers
30	Modbus network resistor termination (NBT)	unsigned int.	Sets the unit as and end unit of the line / or not by connecting NBT	0–1	0	0 = NBT disconnected 1 = NBT connected

If you want to find out more about Modbus over serial line, please visit: http://www.modbus.org/docs/Modbus_over_serial_line_V1_02.pdf

VERIFICATION OF INSTALLATION INSTRUCTIONS

Check the status of the green ON/OFF LED after you switch on the power supply. (See **Fig. 9**.) It should give out continuous green light. If this is not the case, check the connections again.

Check if both LEDs (TX and RX) blink after you switch on your unit. (See **Fig. 10 Modbus communication indication**.) If they do, your unit has detected Modbus network. If they do not, check the connections again.



ATTENTION

The status of all the LEDs can be checked only when the unit is energised. Take the relevant safety measures!

Make sure that the communication with the sensor module is detected after you switch on the power supply. Check the status of input register 20 and in case it is lost, contact authorised technical support or your sales representative.

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.