

# RXTH

DUAL ROOM SENSOR / SWITCH  
FOR TEMPERATURE AND  
RELATIVE HUMIDITY

Mounting and operating instructions



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## SAFETY AND PRECAUTIONS

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Read all information, the datasheet, mounting instructions and wiring scheme 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 to the product are not permitted.



The product must not be exposed to abnormal conditions, such as: extreme temperatures, direct sunlight or vibrations. Chemical vapours with high concentration in combination with long exposure times can affect the product performance. Make sure the work environment is as dry as possible; check for condensation spots.



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



Avoid contacts with energised electrical parts; always treat the product as if it is life. Always disconnect the power source before connecting the power cables, servicing or repairing the product.



Always verify that you apply appropriate power supply to the product and use wires with appropriate 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 disposed 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 RXTH series are dual room sensors / switches which measure temperature and relative humidity. For each, there are 4 pre-defined ranges acting as measurement windows plus 1 user-definable range. These units are equipped with Modbus RTU (RS485) communication and have an analogue and a relay output for each measuring unit.

## ARTICLE CODES

Code	Supply	Connection
RXTHG	15–24 VAC ± 10 % 18–34 VDC	3 - wire
RXTHF	18–34 VDC	4 - wire

## INTENDED AREA OF USE

- Monitoring and maintaining temperature and relative humidity in HVAC applications
- For indoor use only

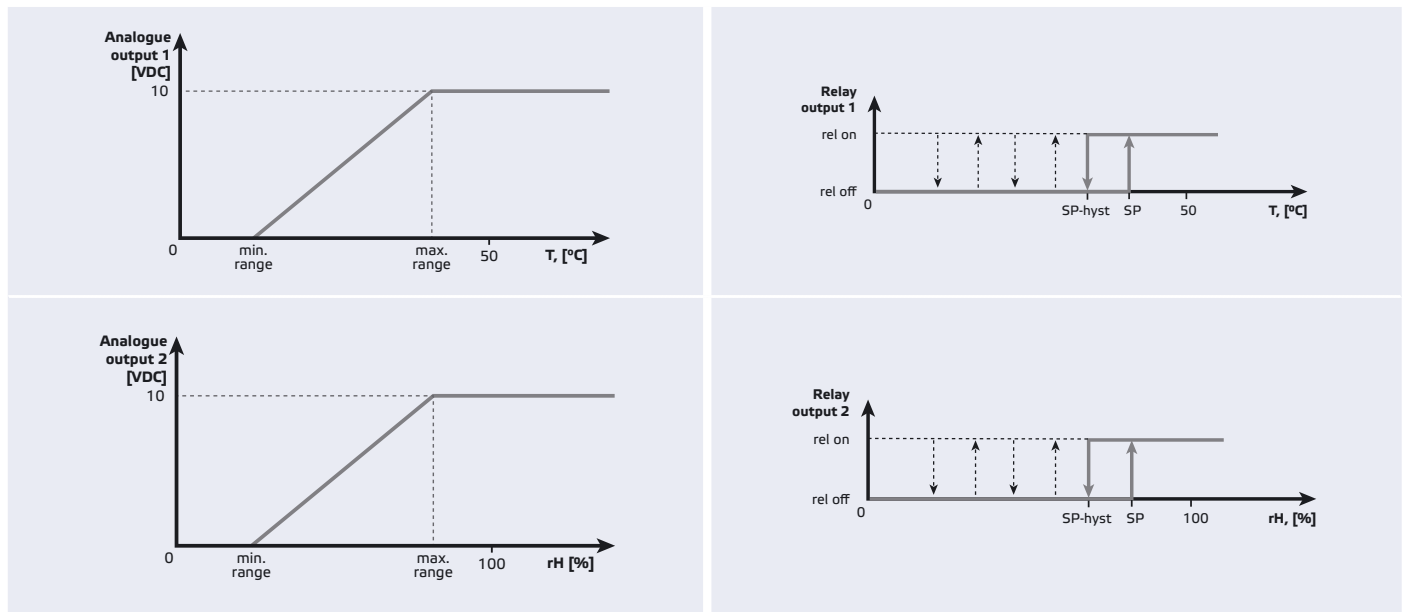
## TECHNICAL DATA

- 2 analogue outputs: 0–10 VDC / 0–20 mA
- 2 relay outputs, C/O (230 VAC / 2 A)
- Power consumption:
  - ▶ no load: max. 40 mA
  - ▶ full load: max. 80 mA
- Load resistance:
  - ▶ 0–10 VDC mode > 500 Ω
  - ▶ 0–20 mA mode < 500 Ω
- Selectable temperature ranges: 0–30 °C / 10–40 °C / 20–50 °C / 0–50 °C
- Free selectable temperature range via Modbus: 0–50 °C
- Selectable rel. humidity ranges: 20–90 % rH / 0–60 % rH / 0–80 % rH / 0–100 % rH
- Free selectable rel. humidity range via Modbus: 0–100 % rH
- 2 selectable switching points: by trimmers or via Modbus
- Fixed temperature hysteresis: 2 °C
- Fixed rel humidity hysteresis: 5 % rH
- Enclosure:
  - ▶ rear lid: plastic ABS, black (RAL9004)
  - ▶ front cover: ASA, ivory (RAL9010)
- Protection standard: IP30 (according to EN 60529)
- Operating ambient conditions:
  - ▶ temperature: 0–50 °C
  - ▶ rel. humidity: < 100 % rH (non-condensing)
- Storage temperature: -25–50 °C

## STANDARDS

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

## OPERATIONAL DIAGRAMS



## WIRING AND CONNECTIONS

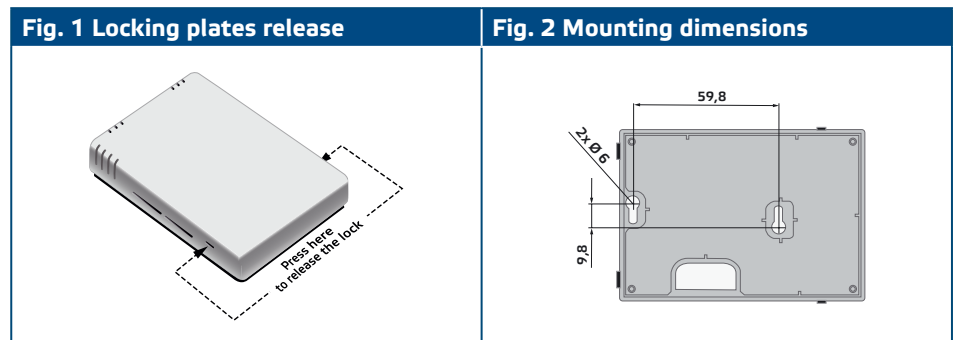
Vin	Positive DC voltage / AC ~
GND	Ground / AC ~
A	Modbus RTU (RS485) signal A
/B	Modbus RTU (RS485) signal /B
Ao1	Analogue output (0–10 VDC / 0–20 mA)
GND	Ground
Ao2	Analogue output (0–10 VDC / 0–20 mA)
GND	Ground
NO1	Normally open contact
COM1	Common contact
NC1	Normally closed contact
NO2	Normally open contact
COM2	Common contact
NC2	Normally closed contact
Connections	Cable cross section: max. 1,5 mm <sup>2</sup>

## MOUNTING & OPERATING INSTRUCTIONS IN STEPS

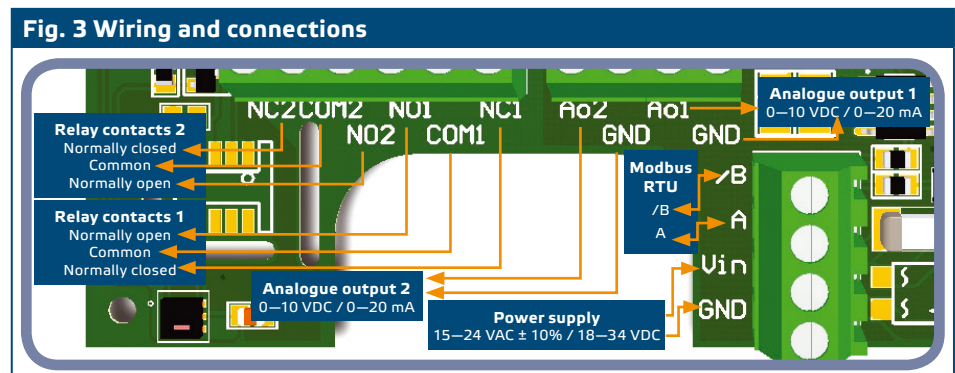
Before you start mounting the RXTH dual room sensor / switch, read carefully "Safety and Precautions". Choose a smooth surface for an installation location (a wall, panel and etc.).

Follow these steps:

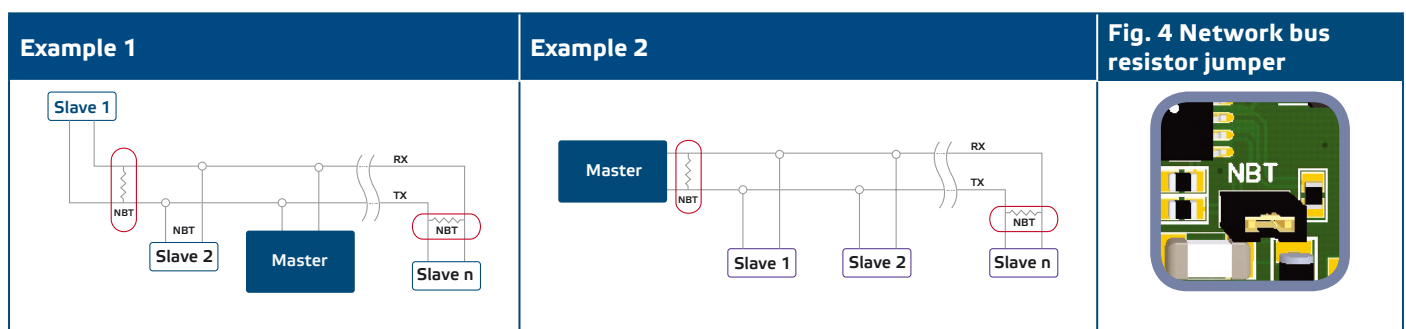
1. Open the white cover by releasing the locking plates on both sides of the cover and remove it. (See **Fig. 1** *Locking plates release*.)
2. Insert the cables through the cable opening of the enclosure rear lid. (See **Fig. 2** *Mounting dimensions*.)



3. Do the wiring according to the wiring diagram (see **Fig. 3**) using the legend information from section "Wiring and connections".



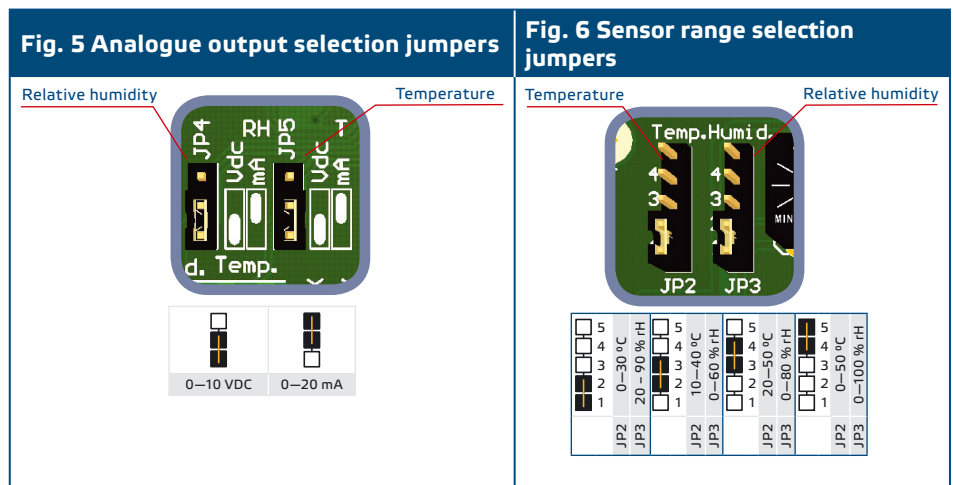
4. Check if your unit starts or terminates the network (see **Example 1** and **Example 2**). If it does not, remove the NBT jumper (see **Fig. 4**).



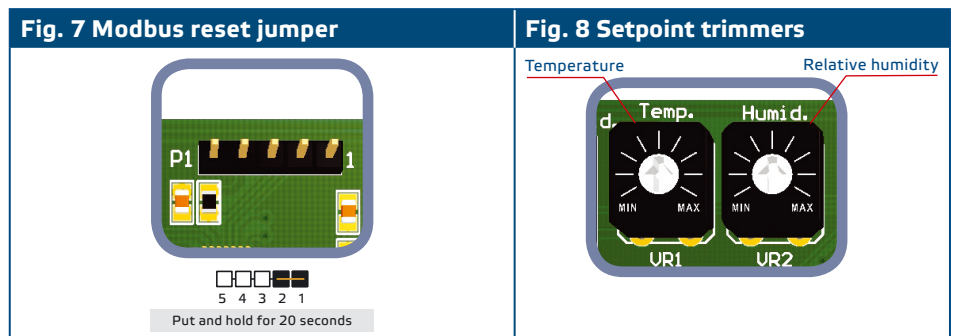
**ATTENTION**

*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!*

5. Adjust the standalone settings:
  - 5.1 To select the relative humidity analogue output mode, use jumper JP4. To select the temperature analogue output mode, use jumper JP5. (See Fig. 5 Analogue output selection jumpers.)
  - 5.2 To select a temperature range, use jumper JP2. To select the relative humidity range, use jumper JP3 (see Fig. 6 and the enclosed information).



- 5.3 To reset the Modbus settings, put and hold jumper P1 for 20 seconds. (See Fig. 7 Modbus reset jumper.)
- 5.4 To select the temperature setpoint for relay 1 switching, use trimmer VR1. To select the relative humidity setpoint for relay 2 switching, use trimmer VR2 (Fig.8).



6. Close the enclosure and fix the cover.
7. Switch on the power supply.

 **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**

*If a G-type article is using the same AC power supply source (transformer) as F-type article, a SHORT CIRCUIT may result when the power supply and analogue signal terminals are connected to the same common ground! In this case always connect different article types to separate AC transformers or use the same article version.*

8. Customise the factory settings to the desired ones through 3SModbus software (if necessary). For the default factory setting see **Table Modbus register maps**.



## MODBUS REGISTER MAPS

INPUT REGISTERS					
		Data type	Description	Data	Values
1	Temperature level	signed int.	Actual temperature level		500 = 50,0 °C
2	Relative humidity level	unsigned int.	Actual relative humidity level		1.000 = 100,0 % rH
3	Dew point	signed int.	Calculated dew point		200 = 20,0 °C
4-10			Reserved, returns 0		
11	Temperature output value	signed int.	Value of the analogue output for temperature - Ao1	0-1.000	0 = 0 % 1.000 = 100 %
12	Relative humidity output value	signed int.	Value of the analogue output for relative humidity - Ao2	0-1.000	0 = 0 % 1.000 = 100 %
13	Temperature relay status	signed int.	Status of the relay for temperature. When it is On, the contact between COM1 and NO1 is closed.	0-1	0 = Off 1 = On
14	Relative humidity relay status	signed int.	Status of the relay for relative humidity. When it is On, the contact between COM2 and NO2 is closed.	0-1	0 = Off 1 = On
15	Temperature range	signed int.	Temperature working range selected by jumper or a holding register	1-5	1 = 0-30 °C 2 = 10-40 °C 3 = 20-50 °C 4 = 0-50 °C 5 = Custom
16	Relative humidity range	signed int.	Relative humidity working range selected by jumper or holding register	1-5	1 = 20-90 % rH 2 = 0-60 % rH 3 = 0-80 % rH 4 = 0-100 % rH 5 = Custom
17	Temperature setpoint	signed int.	Temperature setpoint selected by trimmer or holding register	0-500	250 = 25,0 °C
18	Relative humidity setpoint	signed int.	Relative humidity setpoint selected by trimmer or holding register	0-1.000	500 = 50,0 % rH
19	Temperature hysteresis	signed int.	Hysteresis for temperature relay switching		20 = 2,0 °C
20	Relative humidity hysteresis	signed int.	Hysteresis for relative humidity relay switching		50 = 5,0 % rH
21	Temperature setpoint out of range	signed int.	Flag that shows if the temperature setpoint is out of the working range	0-1	0 = No 1 = Yes
22	Relative humidity setpoint out of range	signed int.	Flag that shows if the relative humidity setpoint is out of the working range	0-1	0 = No 1 = Yes
23-29			Reserved, returns 0		
30	Sensor communication lost	unsigned int.	Flag that shows if the communication with the sensor module is lost	0-1	0 = No 1 = 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 1 = 9.600 2 = 19.200 3 = 38.400 4 = 57.600
3	Modbus parity mode	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> )	RXTH = 1021	
5	HW version	unsigned int.	Hardware version of the device ( <i>Read only</i> )	XXXX	0 x 0110 = HW version 1.10
6	FW version	unsigned int.	Firmware version of the device ( <i>Read only</i> )	XXXX	0x0120 = FW version 1.20
7	Operating mode	unsigned int.	Enables Modbus control and disables the jumpers and trimmers	0-1	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 = Disabled 1 = Enabled
9-10			Reserved, returns 0		
11	Temperature range	signed int.	Selects the temperature working range. <i>Always settable. Active only if holding register 7 is set to 1.</i>	1-5	1 1 = 0-30 °C 2 = 10-40 °C 3 = 20-50 °C 4 = 0-50 °C 5 = Custom
12	Relative humidity range	signed int.	Selects the relative humidity working range. <i>Always settable. Active only if holding register 7 is set to 1.</i>	1-5	1 1 = 20-90 % rH 2 = 0-60 % rH 3 = 0-80 % rH 4 = 0-100 % rH 5 = Custom
13	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>	0-Max	0 100 = 10,0 °C
14	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-500	500 500 = 50,0 °C
15	Minimum custom relative humidity range	signed int.	Minimum value of the custom relative humidity range. <i>Always settable. Active only if holding register 7 is set to 1 and register 12 is set to 5.</i>	0-Max	0 200 = 20,0 % rH
16	Maximum custom relative humidity range	signed int.	Maximum value of the custom relative humidity range. <i>Always settable. Active only if holding register 7 is set to 1 and register 12 is set to 5.</i>	Min-1.000	1.000 1.000 = 100,0 % rH
17	Temperature setpoint	signed int.	Selects the setpoint for the temperature relay switching. <i>Always settable. Active only if holding register 7 is set to 1.</i>	0-500	250 250 = 25,0 °C
18	Relative humidity setpoint	signed int.	Selects the setpoint for the relative humidity relay switching. <i>Always settable. Active only if holding register 7 is set to 1.</i>	0-1.000	500 500 = 50,0 % rH
19-20			Reserved, returns 0		
21	Temperature output overwrite value	signed int.	Overwrite value for the temperature analogue output. <i>Always settable. Active only if holding registers 7 and 8 are set to 1.</i>	0-1.000	0 1.000 = 0 % 1.000 = 100 %
22	Relative humidity output overwrite value	signed int.	Overwrite value for the relative humidity analogue output. <i>Always settable. Active only if holding registers 7 and 8 are set to 1.</i>	0-1.000	0 1.000 = 0 % 1.000 = 100 %
23-30			Reserved, returns 0		

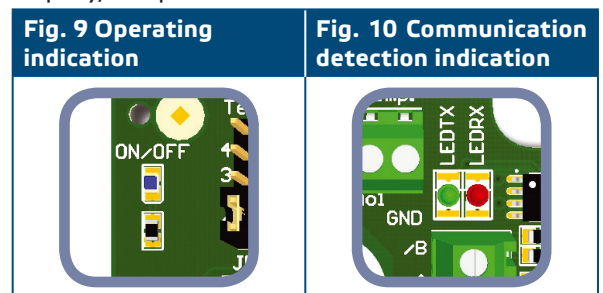
If you want to find out more about Modbus over serial line, please visit: [http://www.modbus.org/docs/Modbus\\_over\\_serial\\_line\\_V1\\_02.pdf](http://www.modbus.org/docs/Modbus_over_serial_line_V1_02.pdf)

## VERIFICATION OF INSTALLATION INSTRUCTIONS

- Check the status of the blue ON/OFF LED after you switch on the power supply. (See **Fig. 9 Operating indication**.) The ON/OFF LED should blink during the initialization period (30 s) at equal intervals of 2 s for 2 s. Then it should give out continuous blue light. If this is not the case, check the connections again. If the LED blinks rapidly: it is possible that:
  - ▶ you use improper power supply. Check it.
  - ▶ the communication with the sensor module is not detected.

Check the status of register 30 and if it is lost, contact authorised technical support or your sales representative.

- Check if both LEDs (LEDTX and LEDRX) blink after you switch on your unit. (See **Fig. 10 Communication detection indication**.) If they do, your unit has detected Modbus network. If they blink rapidly, it is possible that:



### **ATTENTION**

*The status of both LEDs (LEDTX and LEDRX) can be checked only when the unit is energised. Take the relevant safety measures!*

### **ATTENTION**

*In case of lost communication with the sensor module, the analogue outputs will rise to maximum and the relays will switch on. The sensor status can be checked in input register 30!*

## TRANSPORT AND STOCK KEEPING INFORMATION

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Avoid shocks and extreme conditions; stock in original packing.

## WARRANTY INFORMATION AND RESTRICTIONS

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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

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In normal conditions this product is maintenance-free. If soiled, clean with a dry or dampish 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.