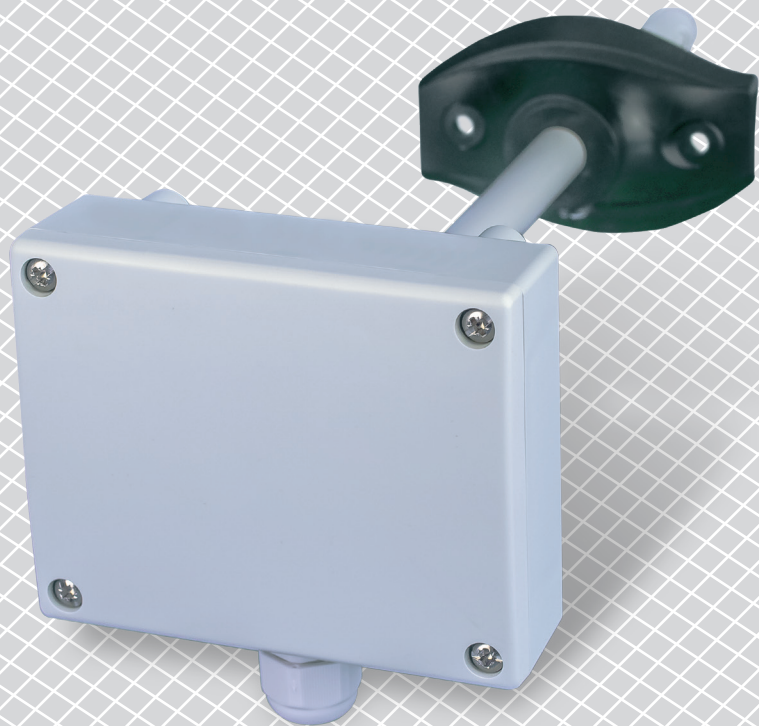


# DXTH | DUAL DUCT SENSOR / SWITCH FOR TEMPERATURE AND HUMIDITY

## Mounting and operating instructions



## Table of contents

<b>SAFETY AND PRECAUTIONS</b>	<b>3</b>
<hr/>	
<b>PRODUCT DESCRIPTION</b>	<b>4</b>
<hr/>	
<b>ARTICLE CODES</b>	<b>4</b>
<hr/>	
<b>INTENDED AREA OF USE</b>	<b>4</b>
<hr/>	
<b>TECHNICAL DATA</b>	<b>4</b>
<hr/>	
<b>STANDARDS</b>	<b>4</b>
<hr/>	
<b>OPERATIONAL DIAGRAMS</b>	<b>5</b>
<hr/>	
<b>WIRING AND CONNECTIONS</b>	<b>5</b>
<hr/>	
<b>MOUNTING &amp; OPERATING INSTRUCTIONS IN STEPS</b>	<b>6</b>
<hr/>	
<b>MODBUS REGISTER MAPS</b>	<b>9</b>
<hr/>	
<b>VERIFICATION OF INSTALLATION INSTRUCTIONS</b>	<b>11</b>
<hr/>	
<b>TRANSPORT AND STOCK KEEPING INFORMATION</b>	<b>11</b>
<hr/>	
<b>WARRANTY INFORMATION AND RESTRICTIONS</b>	<b>11</b>
<hr/>	
<b>MAINTENANCE</b>	<b>11</b>
<hr/>	

## SAFETY AND PRECAUTIONS



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 DXTH series are dual duct 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
DXTHG	15–24 VAC $\pm$ 10 % 18–34 VDC	3 - wire
DXTHF	18–34 VDC	4 - wire

## INTENDED AREA OF USE

- Monitoring and maintaining temperature and relative humidity in ducts

## TECHNICAL DATA

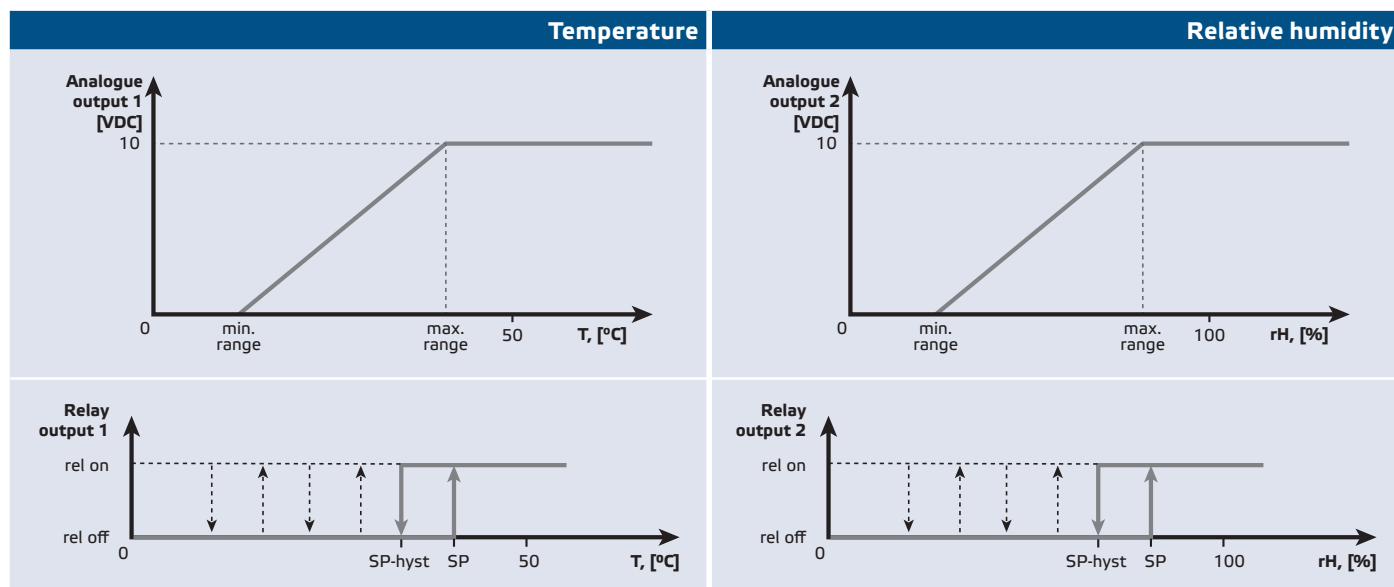
- 2 analogue outputs: 0–10 VDC / 0–20 mA
- 2 relay outputs: C/O (230 VAC / 2 A)
- Power consumption:
  - ▶ no load: max. 40 mA
  - ▶ full load: max. 80 mA
- Load resistance:
  - ▶ 0–10 VDC mode  $> 500 \Omega$
  - ▶ 0–20 mA mode  $< 500 \Omega$
- Selectable temperature ranges: 0–30 °C / 10–40 °C / 20–50 °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 and tubing:
  - ▶ ASA, grey (RAL9002)
  - ▶ IP54 (according to EN 60529)
- Fixing flange:
  - ▶ PE, black (RAL9004)
  - ▶ IP20 (according to EN 60529)
- Operating ambient conditions:
  - ▶ temperature: 0–50 °C
  - ▶ rel. humidity:  $< 100$  % rH (non-condensing)
- Storage temperature: -40–60 °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

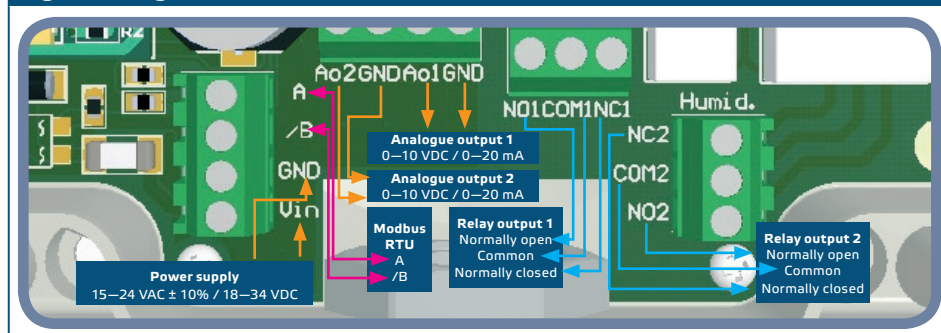
Vin	Positive DC voltage / AC ~
GND	Ground / AC ~
A	Modbus RTU (RS485) signal A
/B	Modbus RTU (RS485) signal /B
Ao1	Analogue output (0–10 VDC / 0-20 mA)
GND	Ground
Ao2	Analogue output (0–10 VDC / 0-20 mA)
GND	Ground
NO1	Normally open contact
COM1	Common contact
NC1	Normally closed contact
NO2	Normally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

## MOUNTING & OPERATING INSTRUCTIONS IN STEPS

Before you start mounting the DXTH duct sensor / switch read carefully “*Safety and Precautions*”.

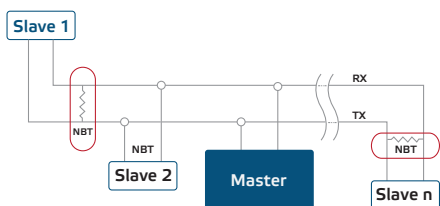
1. Open the cover and insert the connecting cables through the cable gland of the unit.
2. Do the wiring according to the wiring diagram (see **Fig. 1**) using the legend information from section “*Wiring and connections*”.

**Fig. 1 Wiring and connections**

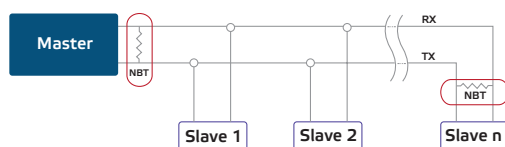


3. Check if your unit starts or terminates the network (see **Example 1** and **Example 2**). If it does not, remove the JP1 (NBT) jumper (see **Fig. 2**).

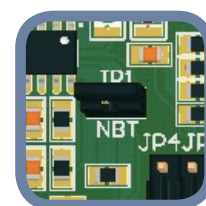
**Example 1**



**Example 2**



**Fig. 2 Network bus resistor jumper**

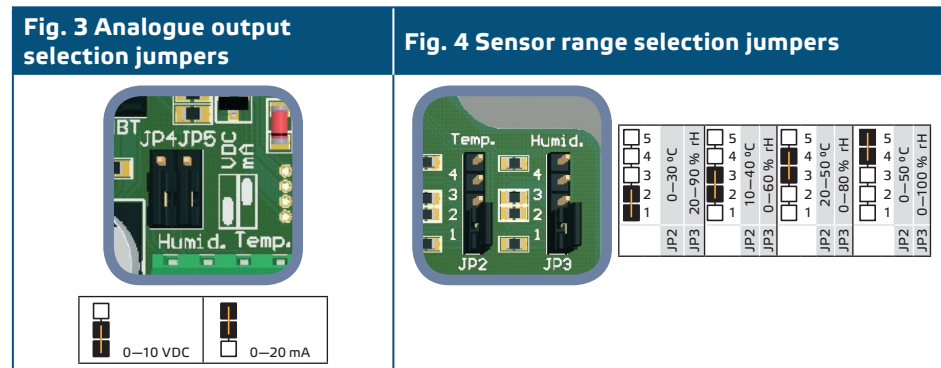


### ATTENTION

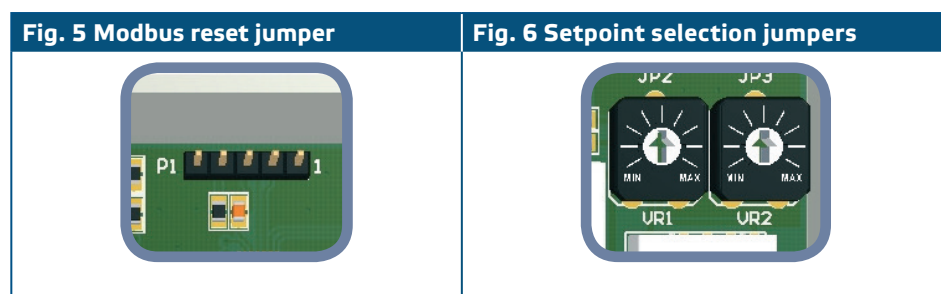
*If an AC power supply is used with any of the units in a Modbus network, the GND terminal should NOT BE CONNECTED to other units on the network or via the CNVT-USB-RS485 converter. This may cause permanent damage to the communication semiconductors and / or the computer!*

## 4. Adjust the standalone settings:

- 4.1 To select the analogue output modes, use jumper JP4 for temperature and jumper JP5 for rel. humidity. (See **Fig. 3 Analogue output selection jumpers**.)
- 4.2 To select a temperature range, use jumper JP2. To select the rel. humidity range, use jumper JP3. (See **Fig. 4** and the enclosed information.)



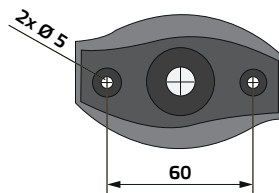
- 4.3 To reset the Modbus settings, put and hold jumper P1 for 20 seconds. (See **Fig. 5 Modbus reset jumper**.)
- 4.4 To select the temperature setpoint for relay 1 switching, use trimmer VR1. To select the rel. humidity setpoint for relay 2 switching, use trimmer VR2 (see **Fig. 6**).



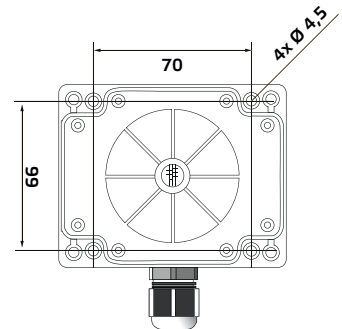
## 5. Mount the unit outside a duct with the tube mounted inside the duct but fixed outside it.

- 5.1 Drill a tight-sealing hole according the correct tube section (Ø 13 mm).
- 5.2 Fix the flexible flange (**Fig. 7**) on the duct outer surface using the self-drilling screws, delivered with the unit. Then install the tube inside the flexible flange. Mind the airflow direction.
- 5.3 Install the tube at the desired depth in the duct using the screw in the flexible flange.
- 5.4 Install and connect the cables with a “drip loop”. You can also fix the unit outside the duct via the mounting holes and as per the drawing shown in **Fig. 8**.

**Fig. 7 Fixing flange**



**Fig. 8 Mounting dimensions**



**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 15 cm (5,9") minimal distance between the sensor lines and the 230 VAC power lines.*



**ATTENTION**

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

**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		Off On
11	Temperature output value for temperature measurement	signed int.	Value of the analogue output for temperature - Ao1	0—1.000	0 = 0 % 1.000 = 100 %
12	Relative humidity output value for relative humidity measurement	signed int.	Value of the analogue output for relative humidity - Ao2	0—1.000	0 = 0 % 1.000 = 100 %
13	Relay 1 status, temperature setpoint	signed int.	Relay 1 status for the temperature setpoint. When it is On, the contact between COM1 and NO1 is closed.	0—1	0 = Off 1 = On
14	Relay 2 status, relative humidity setpoint	signed int.	Relay 2 status for the relative humidity setpoint. When it is On, the contact between COM1 and NO1 is closed.	0—1	0 = Off 1 = On
15	Temperature range	signed int.	Temperature working range selected by jumper or according to holding registers 7, 11, 13 and 14.	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 according to holding registers 7, 12, 15 and 16.	1—5	1 = 20—90 % rH 2 = 0—60 % rH 3 = 0—80 % rH 4 = 0—100 % rH 5 = Custom
17	Temperature setpoint relay 1	signed int.	Temperature setpoint relay 1 selected by trimmer or holding registers 7 and 17	0—500	500 = 50,0 °C
18	Relative humidity setpoint relay 2	signed int.	Relative humidity setpoint relay 2 selected by trimmer or holding registers 7 and 18	0—1.000	1.000 = 100,0 % rH
19	Temperature hysteresis relay 1	signed int.	Temperature hysteresis for relay 1 switching		20 = 2,0 °C
20	Relative humidity hysteresis relay 2	signed int.	Relative humidity hysteresis for relay 2 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> )	DXTHX=1036		
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	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, 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 relay 1	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 relay 2	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	Analogue output 1 overwrite value for temperature, Ao1	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	0 = 0 % 1.000 = 100 %
22	Analogue output 2 overwrite value for relative humidity, Ao2	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	0 = 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 if both LEDs (LEDTX and LEDRX) blink after you switch on your unit. (See **Fig. 9** *Communication detection indication*.) If they do, your unit has detected Modbus network. If they do not, check the connections again.

**Fig. 9** Communication detection indication



### ATTENTION

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

## TRANSPORT AND STOCK KEEPING INFORMATION

Avoid shocks and extreme conditions; stock in original packing.

## WARRANTY INFORMATION 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 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.