RHT-WM-485-LCD Transmitter and
RHT-DM-485-LCD Transmitter

TEMPERATURE AND HUMIDITY TRANSMITTER – INSTRUCTIONS MANUAL V1.0x A

1   INTRODUCTION

The **RHT-WM-485-LCD** and **RHT-DM-485-LCD** transmitters include high precision and stability sensors for measuring temperature and relative humidity. They are microprocessed devices and, therefore, allow being entirely configured through a RS485 interface, using the Modbus RTU commands. The *DigiConfig* allows the configuration of all transmitter features as well as its diagnostic procedure.

The transmitter can be configured or displaying the values of measured temperature and **Relative Humidity** or the values of measured temperature and **Dew Point**.

1.1   Identification

The identification label is fixed on the transmitter body. Check if the features described on this label are in accordance with your order.

The **RHT-WM-485-LCD** model is intended for wall mounting, while the **RHT-DM-485-LCD** model comes with a probe tip rod for installation in ducts or through walls.

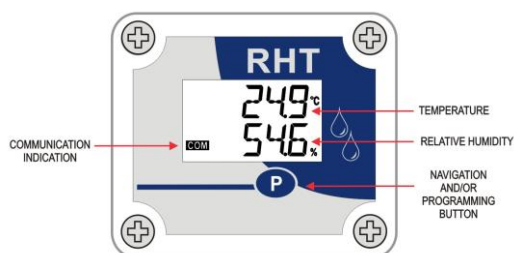The following elements are located at the front side of the transmitter:

Figure 1 – Transmitter front

Communication Indicator (COM): Indicates when the device is receiving data from the Modbus network.

Button   P   (Programming): Button used for configuration of the communication parameters and for screen changing.

Temperature: Value of measured temperature.

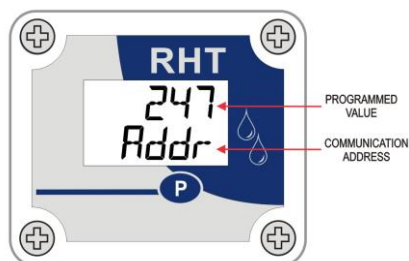**Relative Humidity**: Value of measured relative humidity.

Figure 2 – Second transmitter screen

Communication Address: Value programmed for identifying the transmitter of the Modbus network. Programmable between **1** and **247**.

2   SPECIFICATIONS

Operating temperature of the transmitter	From 0 °C to 70 °C Sensor and Rod (**RHT-DM**): See **Figure 3**.
Electromagnetic compatibility	EM 61326:2000
Sensor measuring range	Temperature: –40.0 °C to 100.0 °C. Relative Humidity (RH): 0.0 to 100.0 % RH. (No Condensing) Dew Point: –40.0 °C and 100.0 °C
Measurement accuracy	See **Figure 3**. **Note**: a small measurement error can be eliminated adjusting the **OFFSET** parameter of the software.
Measuring resolution	Temperature: 0.1 °C. 14 bits (16383 levels) Relative Humidity (RH): 0.1 %. 12 bits (4095 levels)
Response time	Temperature: up to 30s in slow air movement. Humidity: up to 8s in smooth air movement (20 to 80 % RH).
Sampling interval	3 seconds
Power supply	12 Vdc to 30 Vdc, consumption < 16 mA
Case	Polycarbonate
Protection class	Product appropriate for applications which require protection class up to **IP65**. Electronic module case: IP65; Sensor capsule: IP40
Dimensions	60 x 70 x 35 mm
DigiConfig software operation environment	Configuration Software for Windows 98, NT, 2000, XP and Vista. Menus in Portuguese, English or Spanish. Configures, reads and exhibits data on the screen.

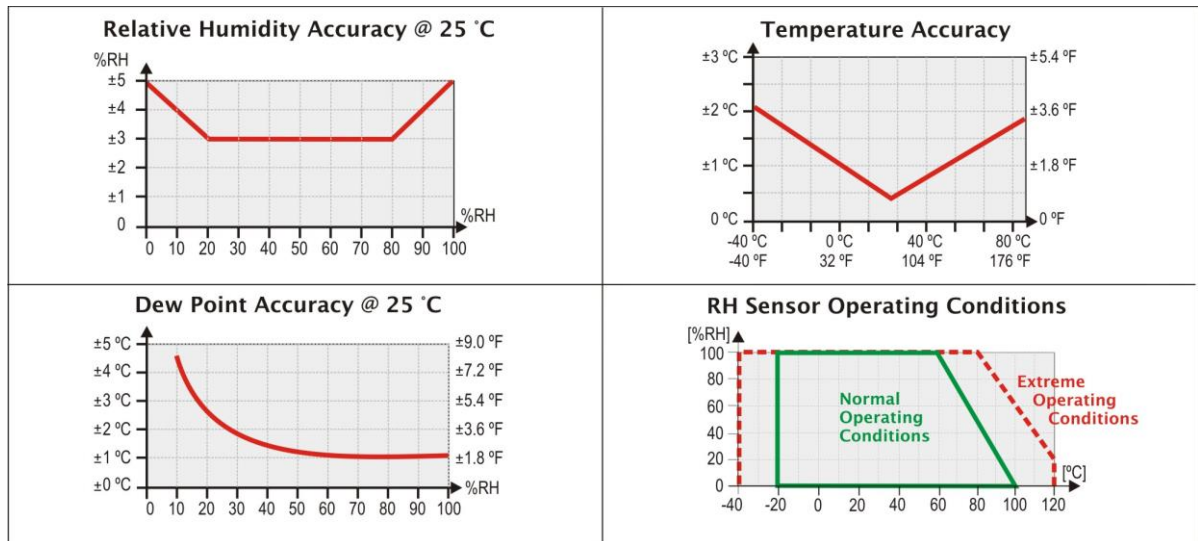**2.1 Measurement Accuracy and Operational Limits of the Sensors:**

Figure 3 - Accuracy of humidity and temperature measurement

3   MECHANICAL INSTALLATION

The **RHT-DM-485-LCD** (*Duct Mount*) model transmitter must be installed with a flange. This flange is first screwed onto the duct wall, and the transmitter probe is then inserted into the flange central hole and locked. **Figure 4** below shows flange dimensions and holes. Available in stainless steel or polyamide 6.6.
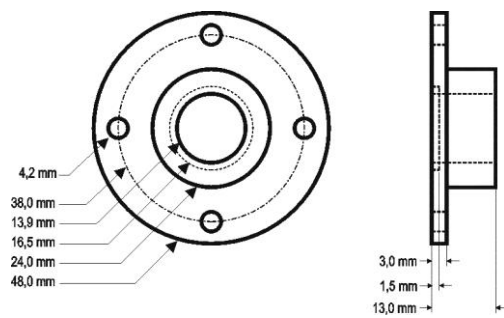

Figure 4 - Flange for fixation of the **RHT-DM-485-LCD** model

The probe is made in stainless steel, with standard lengths of **150 mm** or **250 mm**.
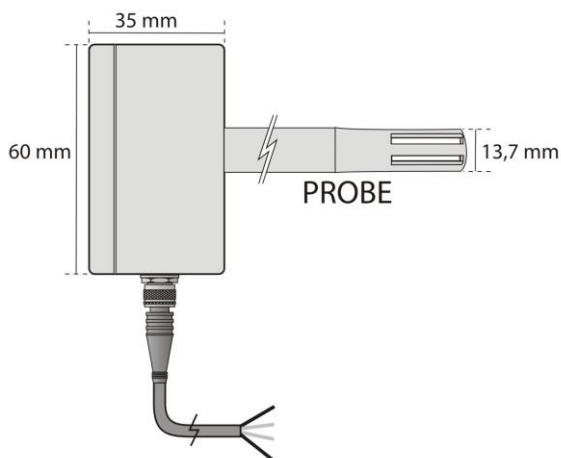

Figure 5 – Dimensions of the **RHT-DM-485-LCD** model

The **RHT-WM-485-LCD** (*Wall Mount*) model is designed for wall mounting. Removing the transmitter cover gives the user access to two bores for fixing the base, as shown in **Figure 6**. **The transmitter must be fixed with the sensor capsule directed downwards in order to assure the specific accuracy and protection level.**
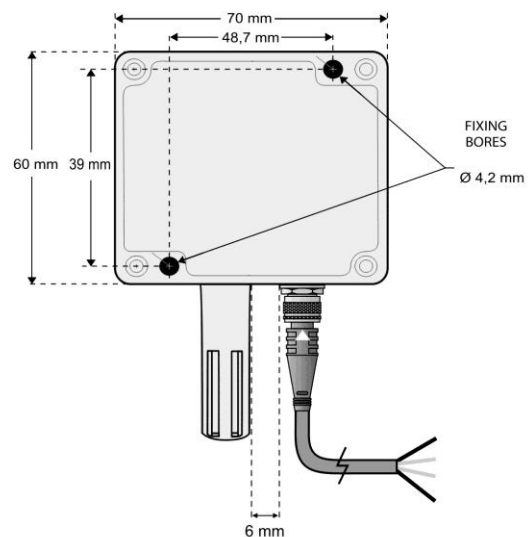

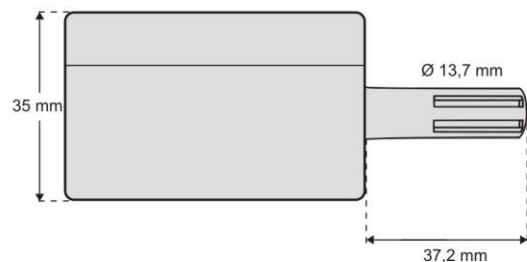**Figure 6** - Fixing bores and dimensions of the **RHT-WM-485-LCD** model

Figure 7 – Dimensions of the **RHT-WM-485-LCD** model

4   ELECTRICAL INSTALLATION

ELECTRICAL CONNECTIONS

The **Figure 8** below shows the necessary electrical connection. The terminals 1, 2, 3 and 4 are intended for connection.

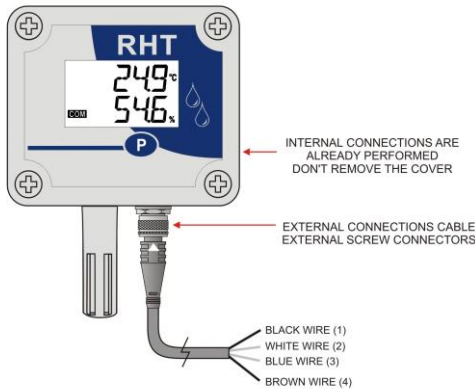| 1	**- VCC**				Power supply	Black wire
2	**+ VCC**				Power supply	White wire
3	D1	D	D+	A	Bi-directional data line.	Blue wire
4	D0	$\overline{D}$	D-	B	Bi-directional inverted data line.	Brown wire

Figure 8 – Electrical connections

> ⚠ Be careful when connecting the power supply wires to the **RHT-WM-485-LCD** or **RHT-DM-485-LCD Transmitter**. If the positive wire from the power source is connected, even momentarily, to one of the communication connection terminals, the transmitter may be damaged.

RECOMMENDATIONS FOR INSTALLATION

- Small electric signal conductors must pass through the system plant separated from the actuating conductors or from high current or voltage lines, if possible, inside grounded conduits.

- The power supply of the instruments must be provided from a proper network for instrumentation.

- In control and monitoring applications it is essential to consider what can happen if any part of the system should fail.

- We recommend the use of RC FILTERS (47Ω and 100nF, series) in parallel with contactor and solenoid coils etc.

5   CONFIGURATION / OPERATION

The user will receive the transmitter perfectly calibrated, without the need for any adjustments. The configuration performed at the factory has the following characteristics:

Addr (Communication Address) = 247

baVd (Communication speed) = 1200

par (Parity) = Par

Stop Bit = 1

The *DigiConfig* for Windows® is a software used for configuration of the **RHT-WM-485-LCD** and **RHT-DM-485-LCD** transmitters. For its installation, run the "*DigiConfigSetup.exe*" file from the CD-ROM which comes with the transmitter and follow the instructions as shown.

DigiConfig is provided with a complete help file, giving all the information necessary for its full use. For using the help feature, start the application and select the "*Help*" menu or press the "*F1*" key.

If you do not have the CD-ROM which comes together with the product, access the *website* in order to obtain the installer for *DigiConfig* and the additional manuals.

5.1   SCREENS OF THE TRANSMITTER

Indication screen for the measured values in the transmitter:
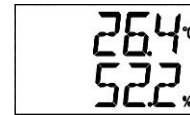
1ª Screen: Main

For configuring the communication parameters, press the 🅿 button (± 5 seconds) until the screen starts blinking, then release the button and press it again in order to increment. When the desired value appears, release the button and wait until the screen stops blinking (± 10 seconds). In order to access the next screens, press the 🅿 button.

Configuration screen for the *Modbus Address* – Defines the address of the module within the Modbus network. Values between 1 and 247.

2ª Screen: Modbus Address

Configuration screen for the Baud-Rate - Defines the Modbus communication speed. Valid values 1,200, 2,400, 4,800, 9,600, 19,200, 38,400, 57,600 and 115,200.

3ª Screen: Baud-Rate

Configuration screen for the *Parity* - Defines the parity code used for Modbus communication. Value **0** (none), **1** (odd) and **2** (even).
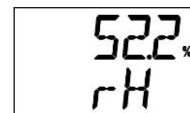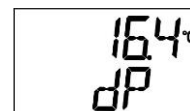

4ª Screen: Parity

Read-only screens of the values measured by the transmitter:

5ª Screen: Temperature

6ª Screen: Relative Humidity

7ª Screen: Dew Point

6 SERIAL COMMUNICATION

The transmitter is provided with RS485 serial communication, operating as a slave within the Modbus RTU network. The configuration of the transmitter is performed through the serial (RS485) interface. For configuring the communication parameters you can use the programming **P** button.

In this section you will find the instructions necessary to perform the data reading without using the *DigiConfig* software. In order to assure correct configuration of the transmitter, always use the *DigiConfig* software. After being configured, the input data may be accessed by any other software capable for Modbus RTU communication.

6.1 MODBUS COMMANDS

The Modbus RTU commands (functions) listed in the table below are implemented. For further information with respect to each of these commands and the Modbus protocol in general, please access the site www.modbus.org.

READ HOLDING REGISTERS – 0x03

This command can be used for reading the value of one or several holding registers, according to the "Holding Registers Table".

WRITE HOLDING REGISTERS – 0x06

This command can be used for writing in a holding register, according to the "Holding Registers Table".

6.2 DESCRIPTION OF SOME REGISTERS

REGISTER 2 – BAUD-RATE

Defines the Modbus communication speed. The transmitter comes factory-configured with a Baud-Rate of 1200.

Code	Baud-rate
0	1.200
1	2.400
2	4.800
3	9.600
4	19.200
5	38.400
6	57.600
7	115.200

REGISTER 3 – MODBUS ADDRESS

Defines the address of the transmitter within the Modbus network. Values between 1 and 247. The transmitter comes factory-configured with address 247.

REGISTER 4 – PARITY

Defines the parity code used for Modbus communication. The transmitter comes factory-configured with parity *even*.

Code	Parity
0	None
1	Odd
2	Even

HOLDING REGISTERS TABLE

The specified addresses correspond to the low-level physical addresses, where zero (0) corresponds to the PLC 40001 address. The *minimum* and *maximum* columns show the range of values valid for each parameter. The *R/W* column indicates if the parameter is for reading and writing (R/W) or for reading only (R).

Address	Description	Minimum	Maximum	R/W
0	Serial number (word high)	0	65535	R
1	Serial number (word low)	0	65535	R
2	Baud-Rate	0	7	R/W
3	Modbus Address	1	247	R/W
4	Parity	0	2	R/W
5	Firmware release	0	999	R
6	Indication mode	0	3	R/W
7	Temperature value (ºC or ºF). *	-400	1000	R
8	Relative humidity value (%). *	0	1000	R
9	Dew point value (ºC or ºF). *	-400	1000	R
10	Configuration of measurement unit	0	1	R/W
11	Disables configuration via button	0	1	R/W
12	User offset for temperature *	-100	100	R/W
13	Reserved	0	0	R
14	User offset for humidity *	-100	100	R/W
15	Reserved			
16	Error value	-9999	9999	R/W
17	Title	-	-	R/W
18	Title	-	-	R/W
19	Title	-	-	R/W
20	Title	-	-	R/W
21	Title	-	-	R/W
62	Model	0	11	R

* For the ranges indicated above consider with one decimal place. Example: -100 means -10.0

REGISTER 6 – INDICATION MODE

Defines the indication mode on the display of the sensor values readout. The transmitter comes factory-configured with indication of temperature and relative humidity.

Code	Description
0	Indicates temperature and relative humidity.
1	Indicates temperature and dew point.
2	Indicates relative humidity and dew point.
3	Indicates temperature only.

REGISTER 7 – TEMPERATURE VALUE (ºC or ºF)

REGISTER 8 – RELATIVE HUMIDITY VALUE (%)

REGISTER 9 – DEW POINT VALUE (ºC or ºF)

Shows the measured value in engineering units. The decimal point is fixed at one place, the value is exhibited without the decimal point and must be considered by the reading software.

REGISTER 10 – CONFIGURATION OF MEASUREMENT UNIT

Defines the measurement unit for the temperature and the dew point. The transmitter comes factory-configured for degrees Celsius (°C).

Code	Unit
0	ºC
1	ºF

REGISTER 11 – DISABLES CONFIGURATION VIA BUTTON

Defines the changes of configuration via button.

Code	Description
0	Factory-configured default value
1	Disables the configuration change of communication parameters via button.

REGISTER 12 – USER OFFSET FOR TEMPERATURE

Defines the user offset value in engineering units for the temperature. The transmitter comes factory-configured with the offset value equal to zero.

REGISTER 14 – USER OFFSET FOR HUMIDITY

Defines the user offset value in engineering units for the relative humidity. The transmitter comes factory-configured with the offset value equal to zero.

REGISTER 16 – ERROR VALUE

Shows the error value which is transmitted when the sensor has a problem. The transmitter comes factory-configured with the value -9999.

7 SPECIAL CARE

The transmitter is an electronic module and, therefore, will need some special care when handling it:

– When you open the transmitter to fix it, avoid any contact with the electronic circuit due to the risk of damage caused by static electricity.

– Take maximum care when connecting the wires.

– When you close the case, the cover must be replaced correctly, thus assuring the sealing quality of this model.

7.1 TAKING CARE WITH THE SENSORS

The calibration of the humidity sensor may be changed if it is exposed to contaminant vapors or extreme humidity and temperature conditions for long time periods. For accelerating the calibration recovery follow the procedure as described below:

• Remove the sensor from the capsule.

• If there are solid particles on the sensor, wash it with water.

• Place the sensor within a 80 °C (+/- 10°C) oven for 24 hours.

• Keep the sensor in a place at a temperature between 20 and 30 °C and humidity over 75% RH for 48 hours.

• Place the sensor back in the capsule.

IMPORTANT

The sensor used in this transmitter may be damaged or become out of calibration if it is exposed to chemical agents contaminated atmosphere. Hydrochloric Acid, Nitric Acid, Sulphuric Acid and Ammonia in high concentrations may damage the sensor. Acetone, Ethanol and Propylene Glycol may cause a reversible measurement error.

8 WARRANTY

The manufacturer will grant to the owner of his equipment, duly identified through the purchase invoice, a twelve-month warranty under the following terms:

• The warranty period will begin at the issue date of the invoice.

• Within the warranty period, all costs regarding labor and components used for repair of defects occurred under normal use conditions, will be free of charge.

• For any necessary repair, send the module, together with the shipping invoices for repair purpose, to our factory's address. Expenses and risks for sending and returning shall be borne by the purchaser.

• Any repair of defects caused by mechanical impact or exposure of the equipment to improper temperature and humidity conditions will be charged even during the warranty period.