

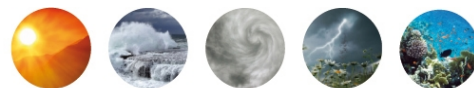


## Air Temperature and/or Humidity Sensor

### **Mod. TA and UTA and UR**

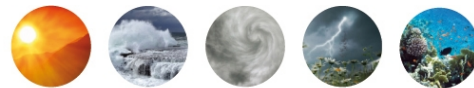


Manual



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## 1.1 Packaging and mounting

The sensor is placed in its original packaging already mounted.





## 1.2 Functioning and features

The sensor has the same shape for all the measurement configurations (only air temperature, only relative humidity, both of them).

Temperature is measured with a platinum thermistor Pt100 1/3DIN (100Ω@0°C) sensible to temperature variations in accordance to the response curve described in DIN 43760 norms. Pt100 resistance measure is converted, through **4-wire connection**, in an electrical signal normalized in current or voltage, linearly variable with temperature.

To measure humidity there is a thin film electronic transducer, whose capacitance varies linearly with the air relative humidity within a range of 2% (1% on demand). The sensor capacitance variation is converted in an electrical signal normalized in current or voltage, linearly variable with air relative humidity.

Transducers are fixed inside a series of screens that protect them from direct solar radiation and UV radiation, developed and long tested on field. The shielding is designed so as to guarantee a natural ventilation of the sensitive element. The white painting – reflective, cancels the heating effect due to the shielding on the sensitive element, providing higher accuracy measures. The sensor is realized according to **WMO** norms (World Meteorological Organization).

<i>Sensor type</i>	<i>Wind speed</i>
<b>Type</b>	TA, UTA, UR
<b>Compliance</b>	WMO
<b>Temperature measuring range (humidity):</b>	-40 ÷ +80°C; (0÷100%)
<b>Security range:</b>	-40 ÷ +60°C; (0÷100%)
<b>Temperature transducer type (humidity)</b>	thermistor Pt100 DIN 43760 classe 1/3DIN; capacitive film
<b>Supply</b>	10÷30Vdc
<b>Temperature electrical output (humidity)</b>	Pt100 4 wires, (0÷1Vdc); 0-2Vdc; 4-20mA; RS485; ModBus
<b>Output impedance</b>	60÷200 Ohm
<b>Protections</b>	Electrical Discharger
<b>Temperature accuracy (humidity)</b>	±0.1°C ; ± 1% f.s.
<b>Temperature sensibility (humidity)</b>	DIN 43760 class 1/3DIN; 0,5%
<b>Temperature Resolution (humidity)</b>	0.1 °C; 0,05%
<b>Temperature linearity (humidity)</b>	0.2 °C; 1.5% in the interval 20...90%
<b>Temperature repeatability (humidity)</b>	0.1 °C; 0,1%
<b>Time constant in the air (dynamic characteristics) for temperature (humidity)</b>	< 10s (63% of variance in the sampling interval) < 12s (63% of variance in the sampling interval)
<b>Operation intervals</b>	temperature -40 ÷ +85°C; relative humidity 0÷100%; wind speed 50m/s with gusts 60m/s
<b>Made of</b>	Anodized anticorodal aluminum or painted, stainless steel screws
<b>Weight</b>	680 g
<b>Size</b>	ø162 mm; h220 mm
<b>Consumption (max)</b>	6mA@12Vdc

Features written in the table can be modified. For updating always see the latest version of the datasheet.



### 1.3 Available electrical outputs and interfacing

The sensor is usually available with 4 different outputs (pre-configured in factory), that correspond to 4 order codes, respectively (named XXX the sensor code):

#### Only Temperature

XXX – N : Sensor with natural output, that is Pt100 –only for temperature [ see table DIN43760]

XXX – A : Sensor with voltage output 0-2Vdc = -40...+60°C [ $^{\circ}\text{C} = \{(V \cdot 100)/2 - 40\}$  ]

XXX – B : Sensor with current output 4-20mA = -40...+60°C not self-powered [ $^{\circ}\text{C} = \{100 \cdot (\text{mA} - 4) / 16 - 40\}$ ]

XXX – C : Sensor with digital output RS485 or ModBus- see below.

#### Only Humidity

XXX – A : Sensor with voltage output 0-1Vdc = 0...100% [%Rh =  $V \cdot 100$  ]

XXX – B : Sensor with current output 4-20mA = 0...100% not self-powered [%Rh =  $\{100 \cdot (\text{mA} - 4) / 16\}$ ]

XXX – C : Sensor with digital output RS485 or ModBus- see below.

For combined UTA sensor, also outputs are combined. For connections to IP68 connector, see the sensor datasheet. The supply includes the solder connector or a cable with ends for terminal block.

In case of sensors with digital output, there are two cases:

- **RS485 Interface (Half duplex)**

- Standard communication settings are:

baudrate:	<b>9600</b>
parity:	<b>N</b>
data bit:	<b>8</b>
stop bit:	<b>1</b>

- Data request command for Temperature is: **001CR**

- Data request command for Humidity is: **002CR** ( xxx represents the sensor ID always expressed in 3 digits by putting 0 for numbers less than 100, or 10, example 001;  
CR = Carriage Return;  
if set at 000 answer all sensors on the same line 485, example 000CR).  
See § 1.8

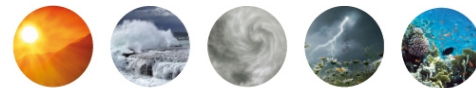
**NOTE:** The ID to measure temperature an humidity is different and successive, ID 001 and 002 If not differently specified

- The response to any sensor request is the measure value in the programmed engineering unit (ex. °C or %Rh), so isn't necessary calculate the value again.

- **RS485-MODBUS Interface (Half duplex)**

- Standard communication settings are:

baudrate:	<b>9600</b>
parity:	<b>N</b>
data bit:	<b>8</b>
stop bit:	<b>1</b>



- The sensor answers to MODBUS RTU command only with **FUNCTION CODE 0x03** (Read Holding Register), on the same ID of the RS485; the protocol allows the reading of the measure value, which is stored in two MODBUS registers with the **IEE754 representation**. The floating point value is represented with 32 bit, occupying two MODBUS registers of 16 bit.
- Modbus addresses to be used are:

**40002 - 40003 (2 registers required with a single command)**

### **1.4 Calibration**

For temperature, after having assembled the sensor, it is functionally tested, connecting it to the proper measurer, where there is also connected another temperature sensor, used as a reference tool.

The testing is made comparing the measures acquired by the two sensors, that mustn't differ of a value higher than the tested sensor accuracy. The reference sensor is periodically sent to an Accredia center, to be certified with 5 points calibration, in the range  $-40 \div +80^{\circ}\text{C}$ .

For humidity, the testing is made with two points verification, dipping the sensor in reference solutions of 33%Rh and 75%Rh. These solutions are certified by an Accredia center.

Alternately, the testing can be made using a humidity sensor as reference, and the deviation of the sensor measurement from the one acquired by the reference sensor mustn't differ of a value higher than the tested sensor accuracy. The reference sensor is periodically sent to an Accredia center, to be certified with various measure points calibration, on the isotherm at  $23^{\circ}\text{C}$ . For temperature is also possible a calibration in liquid baths.

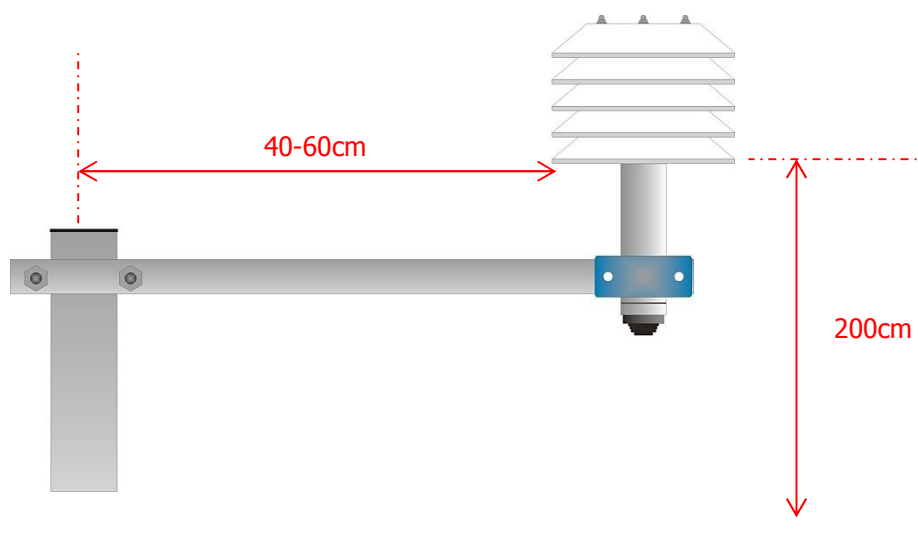
### **1.5 Cleaning and maintenance**

The sensors don't require maintenance, only the periodic check of calibration with reference instruments. The humidity transducer is affected by a degradation of the sensitive element depending on the time it has been used outside and the air pollution: in high pollution conditions the probe should be replaced after 8-12 months, while in normal conditions it can provide reliable data for more than 18-24 months.



## 1.6 Installation

The sensor must be installed far from irradiating systems because can be influenced by reflected heat of the sun and from obstacles that can block natural ventilation. For humidity and temperature measurements, the sensor is installed at about 2m height, following WMO directives.

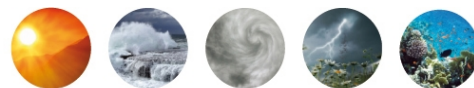


## 1.7 Validity of certificates

Unless otherwise indicated, the sensor warranty is 24 months from the manufacturing date, while the validity of the certification is 12 months from first use if stored in a depot suitably to the characteristics written on the datasheet.

## 1.8 ID's sensor for serial communication

ID for RS485*	Measure
1	Temperature
2	Humidity
3	Global Solar adiation
4	Wind Direction
5	Evaporation
6	Hydrometic Level
7	Phreatic Level
8	Battery Voltage
9	Wind Speed
10	Rain Fall
11	Net Solar Radiation
12	Snow Level
13	Pressure
14	Voltage
15	Evapotranspiration
16	Leaf wetness
17	pH
18	Conductivity



19	Counter (digital)
20	Cracks measure
21	Inclinometer
22	Load Cell
23	Redox
24	Oxygen Solution
25	Turbidity
26	Extensimeter
27	Linear Moving
28	Frequency
29	CH <sub>4</sub>
30	THC
31	NMHC
32	Current
33	Flow
34	CO
35	NO
36	NO <sub>x</sub>
37	NO <sub>2</sub>
38	O <sub>3</sub>
39	SO <sub>2</sub>
40	Energy

\* Check if it is the latest table