



# TRH-MINI

## HUMIDITY AND TEMPERATURE SENSOR



### Engineering manual

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## FOREWORD



This manual contains the information necessary for the installation of the product, we therefore recommend that the utmost attention is paid to the following instructions and to save it.

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Ascon Tecnologic and its legal representatives do not assume any responsibility for any damage to people, things or animals deriving from violation, wrong or improper use or in any case not in compliance with the instrument features.



Whenever a failure or a malfunction of the device may cause dangerous situations for persons, thing or animals, please remember that the plant must be equipped with additional electromechanical devices which will guarantee safety.

### Disposal



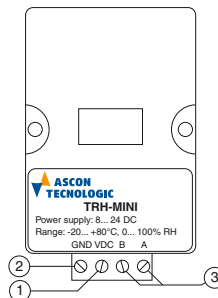
The appliance (or the product) must be disposed of separately in compliance with the local standards in force on waste disposal.

## INSTRUMENT DESCRIPTION

### General description

The Humidity and Temperature sensor adopt high quality digital sensors, with reliable performance, high precision, small year drift, fast response. It is suitable for temperature and humidity measurement of communication rooms, offices, workshops, warehouses, hospitals, HVAC, and building automation etc.. The Relative Humidity and the Temperature measurements can be read through the RS485 Modbus RTU communications port. The sensor can be mounted horizontally (on the ceiling) or vertically (on the wall) using 2 screws or a DIN rail. The connections are really easy: only 4 wires to complete the installation.

### Instrument description



1. +8... 24 VDC Power terminal;
2. GND Power supply ground terminal;
3. A, B RS485 Modbus RTU terminals.

## INSTALLATION INFORMATION

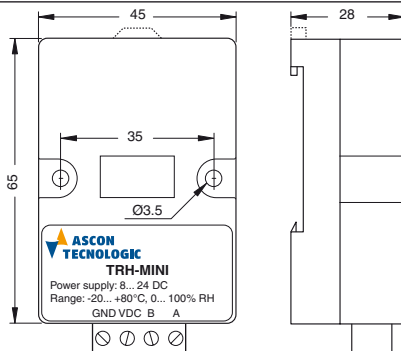
### Mounting requirements

This instrument is intended for permanent installation, for indoor use only, in an electrical panel which encloses the rear housing, exposed terminals and wiring on the back.

Select a mounting location having the following characteristics:

1. It should be easily accessible;
2. There is minimum vibrations and no impact;
3. There are no corrosive gases;
4. There are no water or other fluids (i.e. condensation).

### Dimensions



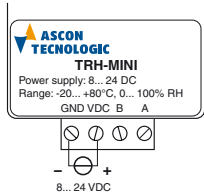
Electrical connections

Carry out the electrical wiring by connecting only one wire to each terminal and according to the following diagrams:

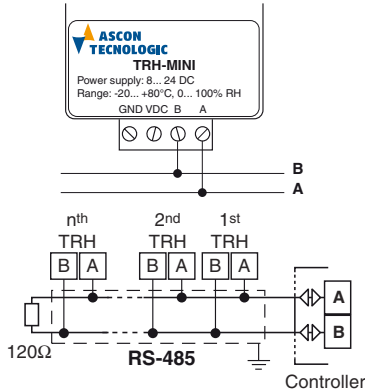
General notes about wiring

- 1. Do not run input wires together with power cables.
- 2. When a shielded cable is used, it should be connected at one point only.

Power supply



Serial Interface



- Notes:
- 1. RS-485 interface allows to connect up to 30 devices with one remote master unit.
  - 2. The cable length must not exceed 1.5 km at 9600 baud.

TECHNICAL CHARACTERISTICS

Technical specifications

Characteristic	Relative Humidity	Temperature
Measuring range	0... 100%	-20... +80
Resolution	0.1% RH	0.1°C
Accuracy	±3% RH	±0.5°C

Note: When the sensor is external the temperature range is -40... +120°C

Electrical specifications

Characteristic	Value
Supply voltage	8... 24 VDC
Power consumption	< 30 mA

General specifications

Characteristic	Value
External dimensions	45 x 65 x 28 (L x H x D)
Mounting	DIN Rail 2 screws Ø3 mm max.
Weight	About 60 g
Work area	10... 20 m <sup>2</sup> , with air circulation
Installation position	Horizontal or vertical
Working temperature	-20... 70°C
Ambient humidity	5... 95% (with no condensation)
Case material	PC + ABS

Serial communications

Characteristic	Value
Interface type	Isolated RS485
Voltage levels	According to EIA standard
Protocol type	MODBUS RTU
Byte format	8 bit with no parity
Stop bit	1 (one)
Baud rate	Programmable between 1200... 38400 baud
Address	Programmable between 1... 247

HOW TO ORDER

TRH-MINI Relative Humidity and Temperature sensor.

RS485 COMMUNICATIONS

Code system

8 bit binary, hexadecimal 0... F, each word (8 bit) contains 2 hexadecimal characters.

Modbus RTU bits per byte in the protocol

- 1 Start bit;
- 8 Data bits (the less important bit must be sent as first);
- No parity;
- 1 Stop bit.

Error detection domain

CRC-16 (Cyclic Redundancy Check), the lowest is in front, the highest byte behind.

Communication speed

1200, 2400, 4800, 9600, 19200 baud per second.

The baud rate and the instrument address must be set using the communications protocol.

### Functional domain code in Modbus RTU protocol

Function code	Name	Description
03	Read holding register	Reads the data measured
06	Preset single register	Sets the communications address and the baud rate

#### Function code 03 - Read holding register

Reads the measured data. Data start address: 0000... 0001.

Data length: 0001... 0002, out of range is invalid; data start address + data length is not greater than 2, out of range is invalid.

**Note:** The date that read is 16 bit data, high byte is in front, low byte behind.

Data definition: See function code 03H and data comparison table

E.g. 1 Reading the Measured Data

Com-mand	01	03	00 00	00 02	CRC	
	ADDR	Function	Start address	# of registers	CRC check	
Response	01	03	04	00 EA	02 95	CRC 11 bytes
	ADDR	Function	Byte count	Temp. (°C)	RH (%RH)	CRC check

Calculation of the measured values: the output value is Data number divided by 10 defines the Temperature in °C or the the Relative Humidity in %RH.

In the example:

- The temperature masured value is: 00 EA (Hex.), the actual value is  $0\ 0EA/10 = 23.4^{\circ}C$ . The negative values are represented by the complement;
- The Relative Humidity measured value is: 02 95 (Hex.) and its actual value is  $02\ 95/10 = 66.1\%RH$ .

#### Function code 03H and data comparison table

Address	Data content	Data description
0000	Temperature	Temperature value: 2 bytes (high byte is in front, low byte is behind)
0001	Humidity	Relative Humidity value: 2 bytes (high byte is in front, low byte is behind)

### Function code 06 - Preset single register

Sets the Communications Address and the baud rate.

Data start address: 00 00;

Data Length: 00 01, if not equal to 00 01 the communication command is invalid.

E.g. 2 Preset the Communication address (changes from 1 to 2) and the baud rate to 9600 bps).

Com-mand	01	06	00 00	00 01	02	02 06	CRC
	ADDR	Function	Start address	# of registers	Byte count	Preset data	CRC check
Response	01	06	00 00	00 01	CRC		
	ADDR	Function	Start address	# of registers	CRC check		

#### Function code 03H and data comparison table

Address	Data content	Data description
0000	Addr	The higher bits identify the sensor communication Address, the address range is 01... F7 (Hex.) = 1... 247
	bps	The lower 8 bits are the communications baud rate, the speed range is: 03... 07 (Hex.) = 1200... 19200 bps