Temperature transmitter equipped with an antistatic UV-resistant thermoplatic housing with low thermal conductivity and high reflection. RS485 with MODBUS-RTU protocol digital output. Connection via screw terminals.

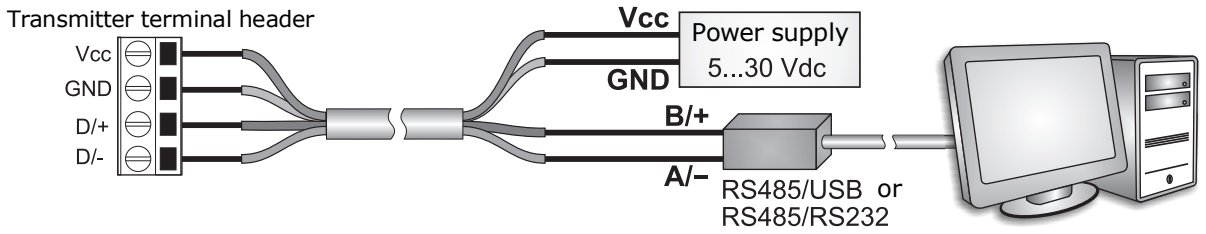
## TECHNICAL CHARACTERISTICS

| | |
|---|---|
| **Temperature** | |
| Sensor | Pt100 1/3 DIN |
| Measuring range | -40…+80 °C |
| Resolution | 0.1 °C |
| Accuracy | ± 0.2 °C ± 0.15% of the measured value |
| Long term stability | 0.2 °C / year |
| **General characteristics** | |
| Output | RS485 (1 Unit Load) with MODBUS-RTU protocol, not isolated |
| Power supply | 5…30 Vdc |
| Consumption | 4 mA typical @ 12 Vdc |
| Dimensions | Ø 26 x 185 mm (probe body, excluding cable gland) |
| Degree of protection | IP 54 |
| Operating temperature/humidity | -40…+80 °C / 0…100% RH |
| Material | ASA |

## SETTING THE RS485 COMMUNICATION PARAMETERS OF THE TRANSMITER

Before connecting the transmitter to the RS485 network, an address must be assigned and the communication parameters be set, if different from the factory preset.

The setting of the parameters is performed by connecting the transmitter to the PC by using a RS485/USB (e.g. **RS48**) or RS485/RS232 converter. If a RS485/USB converter is used, it is necessary to install the related USB drivers in the PC. The transmitter has to be powered separately.




**NOTES ON THE INSTALLATION OF UNSIGNED USB DRIVER:** before installing unsigned USB driver into operating systems starting from Windows 7, it is necessary to restart the PC by disabling the driver signing request. If the operating system is 64-bit, even after installation the request of driver signing have to be disabled each time the PC is restarted.



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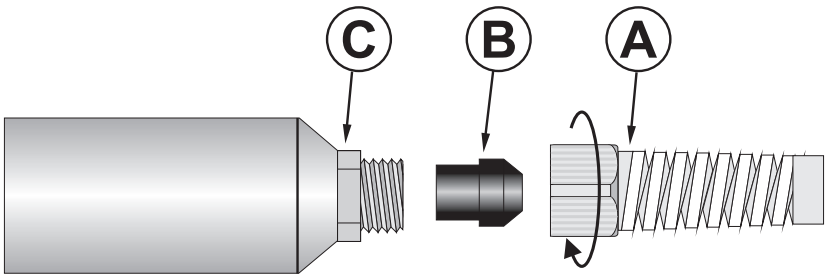
Follow these procedures to access the transmitter terminal board: unscrew grommet "A", take off rubber bulb "B" and unscrew bottom "C". Insert the cable through A, B and C elements and connect it to the terminal board. Hold the cable firmly while screwing grommet "A" to avoid twisting.




## PROCEDURE FOR SETTING THE PARAMETERS

1. Start with the transmitter not powered.
2. Start a standard serial communication program, such as Hyperterminal. Set the COM port number to which the transmitter will be connected, set the Baud Rate to 57600 and the communication parameters as follows:

   Data Bits: 8 Parity: None Stop Bits: 2

3. Switch the transmitter on and wait to receive the **&** character, then send (within 10 s from power on) the **@** command and press **Enter**.

   *Note*: if the transmitter does not receive the **@** command within 10 seconds from power on, the RS485 MODBUS mode is automatically activated. In such a case, it is necessary to switch off and on again the transmitter.

4. Send the command **CAL USER ON**.

   *Note*: the command CAL USER ON is disabled after 5 minutes of inactivity.

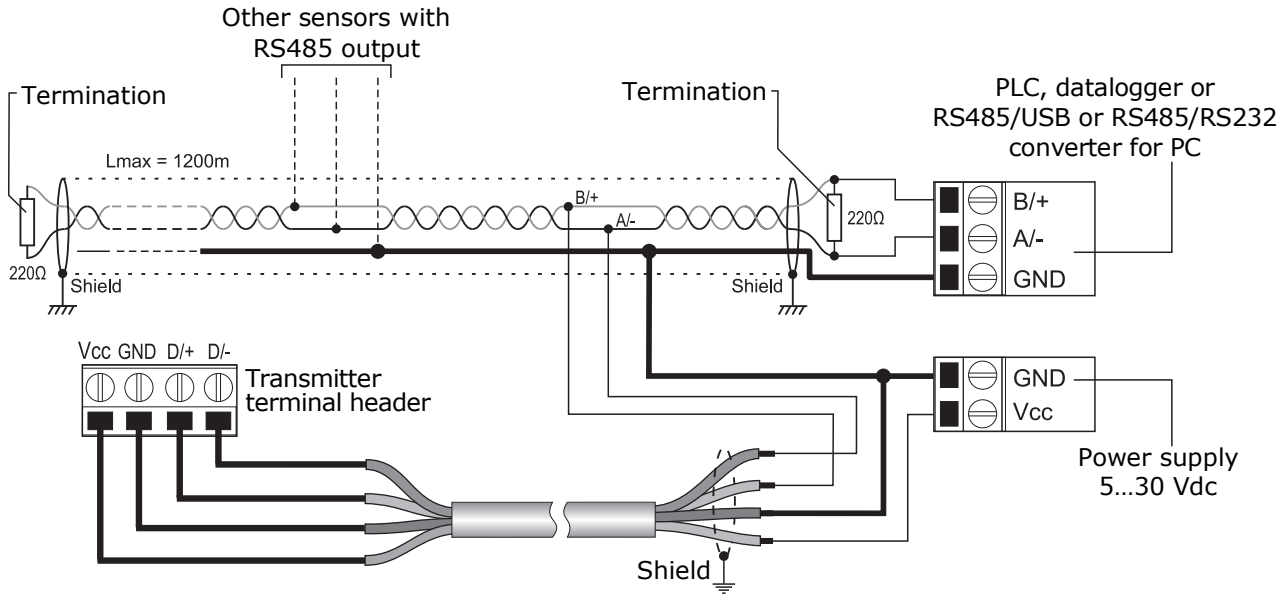
5. Send the serial commands in the following table to set the RS485 MODBUS parameters:

| Command | Response | Description |
|---|---|---|
| CMAnnn | &\| | Set RS485 address to nnn<br>Ranging from 1 to 247. Preset on 1 |
| CMBn | &\| | Set RS485 Baud Rate<br>n=0 ⇒ 9600<br>n=1 ⇒ 19200<br>Preset on 1 ⇒ 19200 |
| CMPn | &\| | Set RS485 transmission mode<br>n=0 ⇒ 8-N-1 (8 data bits, no parity, 1 stop bit)<br>n=1 ⇒ 8-N-2 (8 data bits, no parity, 2 stop bits)<br>n=2 ⇒ 8-E-1 (8 data bits, even parity, 1 stop bit)<br>n=3 ⇒ 8-E-2 (8 data bits, even parity, 2 stop bits)<br>n=4 ⇒ 8-O-1 (8 data bits, odd parity, 1 stop bit)<br>n=5 ⇒ 8-O-2 (8 data bits, odd parity, 2 stop bits)<br>Preset on 2 ⇒ 8-E-1 |
| CMWn | &\| | Set receiving mode after RS485 transmission<br>n=0 ⇒ Violate protocol and go in Rx mode right after Tx<br>n=1 ⇒ Respect protocol and wait 3.5 characters after Tx<br>Preset on 1 ⇒ Respect the protocol |

**6.** You can check the parameters setting by sending the following serial commands:

| Command | Response | Description |
|---|---|---|
| RMA | *Address* | Read RS485 address |
| RMB | *Baud Rate* (0,1) | Read RS485 Baud Rate<br>0 ⇒ 9600 , 1 ⇒ 19200 |
| RMP | *Tx Mode* (0,1,2,3,4,5) | Read RS485 transmission mode<br>0 ⇒ 8-N-1<br>1 ⇒ 8-N-2<br>2 ⇒ 8-E-1<br>3 ⇒ 8-E-2<br>4 ⇒ 8-O-1<br>5 ⇒ 8-O-2 |
| RMW | *Rx Mode* (0,1) | Read receiving mode after RS485 transmission<br>0 ⇒ Violate protocol and go in Rx mode right after Tx<br>1 ⇒ Respect protocol and wait 3.5 characters after Tx |

## OPERATING MODE CONNECTION




In the RS485 connection, the instruments are connected through a twisted-pair shielded cable for signals and a third wire for ground. Line terminations should be placed at the two ends of the network. The maximum number of devices that can be connected to the RS485 line (Bus) depends on the load characteristics of the devices to be connected. The RS485 standard requires that the total load does not exceed 32 unit loads. The load of an HD9008.T7S transmitter is equal to 1 unit load. If the total load is greater than 32 unit loads, divide the network into segments and add a signal repeater between a segment and the successive one. Line termination should be applied at both ends of each segment.

## OPERATING MODE

The transmitter enters RS485 MODBUS-RTU mode after 10 seconds from power on. In the first 10 seconds from power on the transmitter does not reply to requests from the MODBUS master unit. After 10 seconds, it is possible to send MODBUS requests to the transmitter.

In MODBUS mode, you can read the values measured by the instrument through the function code 04h (Read Input Registers). The following table lists the information available with the appropriate register address:

| Address | Quantity | Format |
|---|---|---|
| 0 | Temperature in °C (x10) | 16-bit Integer |
| 1 | Temperature in °F (x10) | 16-bit Integer |
| 5 | Status register<br>bit 0 = 1 ⇒ temperature measurement error<br>bit 3 = 1 ⇒ configuration data error<br>bit 4 = 1 ⇒ program memory error | 16-bit Integer |

## INSTALLATION

For wall-mounted installation, the HD9008.21.1 (distance from wall 250 mm) and HD9008.21.2 (distance from wall 125 mm) supports are available.

For outdoor installation, use the HD9007A-1 or HD9007A-2 ring-shield to protect the probe from solar radiations, rain and wind.

## ORDERING CODES

**HD9008.T7S** Temperature transmitter, Pt100 sensor. RS485 MODBUS-RTU output. Measuring range -40...+60 °C. Power supply 5…30 Vdc. Thermoplastic housing. Dimensions ∅26 x 185 mm. Connection via screw terminals.

**RS48** PC connecting cable for the MODBUS parameters configuration. With built-in RS485/USB converter. Free wires on instrument side and A-type USB connector on PC side.

**HD9008.21.1** Holder for vertical probes. Distance from wall 250 mm. Hole Ø 26 mm.

**HD9008.21.2** Holder for vertical probes. Distance from wall 125 mm. Hole Ø 26 mm.

**HD9007A-1** 12-ring protection from solar radiations. Supplied with mounting bracket.

**HD9007A-2** 16-ring protection from solar radiations. Supplied with mounting bracket.





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