senseca

HD48… SERIES, HD 49… SERIES

HD48…SERIES, HD49…SERIES
PASSIVE OR ACTIVE TRANSMITTERS -
TEMPERATURE, RELATIVE HUMIDITY AND TEMPERATURE,
DEW POINT AND TEMPERATURE

HD48… and HD49… series of transmitters measure temperature, relative humidity and the dew point temperature.

Versions with only standard analog output or with only RS485 output with MODBUS- RTU protocol are available. The models with analog output provide a signal suitable for transmission to a remote display, recorder or PLC. The models with RS485 output are suitable for connection to a PC or PLC.

The models of the **HD48… series are active transmitters** and accept both direct and 24Vac alternating power supply; they have standard current (4…20 mA) or voltage (0…10V) outputs, or a serial RS485 output, depending on the model. The models of the **HD49… series are passive** transmitters and thus suitable to be inserted in a 4…20 mA current loop.

Both series of transmitters are designed for temperature and humidity control in conditioning and ventilation applications (HVAC/BEMS) in the following sectors: pharmacy, museums, clean rooms, ventilation ducts, industrial and civil sectors, crowded places, canteens, auditoria, gyms, high-density farms, greenhouses, etc.

The transmitters measure relative humidity with a well proven temperature compensated capacitive sensor that assures precise and reliable measurements in the course of time. Both HD48… and HD49… series are available in two probe temperature ranges: standard -20…+80 °C and extended -40…+150 °C for the most critical applications.

A stainless steel 10 μm filter protects the sensors against dust and particles (other filters are available for different applications).

The transmitters are factory calibrated and no further adjustments are required.

Each series is available in different versions:

- with horizontal probe for duct mounting (HD48…TO…, HD49… TO…),
- with vertical probe for wall mounting (HD48…TV…, HD49… TV…);
- with remote probe connected to the transmitter by means of a cable (HD48…TC…, HD49…TC…). Cable lengths available are 2, 5 and 10 m.

The probes can be supplied in two different lengths: 135 mm or 335 mm.

Various accessories are available for the installation: for example to fix the probe to the duct, it can be used the HD9008.31 flange, a ⅜" universal biconical connection or a PG16 metal cable gland (Ø 10…14 mm). A 4-digit optional display ("L" model) allows to display the measured parameters in a continuous or sequential mode.

Technical specifications		
	STANDARD RANGE	EXTENDED RANGE
Relative Humidity		
Sensor	Capacitive	
Measuring range	0…100 %RH	
Accuracy @T=15…35℃	±1.5 %RH (0…90 %RH), ±2.0 %RH (90…100 %RH)	
Accuracy @ rest of T range	±(1.5+1.5% of the measure) %RH	
Repeatability	0.4 %RH	
Sensor working temperature	-20…+80 ℃	-40…+150 ℃
Temperature		
Measuring range	-20…+80 ℃	-40…+150 ℃
Sensor	NTC 10kΩ	Pt100 class A
Accuracy	±0.3 ℃ (0…+70 ℃) ±0.4 ℃ (-20…0 ℃, +70…+80 ℃)	±0.3 ℃
Repeatability	0.05 ℃	0.05 ℃
Dew Point		
Sensor	Parameter calculated from relative humidity and temperature	
Measuring range	-20…+80 ℃ DP	
Accuracy	See table 1	
Repeatability	0.5 ℃ DP	
Type of output (according to the model)		
HD**4807**T…	Temperature	4…20 mA (-20…+80 °C), R_L < 500Ω 22 mA outside the measuring range
HD**4807**ET…	Temperature	4…20 mA (-40…+150 °C), R_L < 500Ω 22 mA outside the measuring range
HD**48**V07T…	Temperature	0…10 Vdc (-20…+80 °C), R_L > 10kΩ 11 Vdc outside the measuring range
HD**48**V07ET…	Temperature	0…10 Vdc (-40…+150 °C), R_L > 10kΩ 11 Vdc outside the measuring range
HD**48**S07T… HD**48**S07ET…	Temperature	Only RS485 with MODBUS-RTU protocol
HD**4907**T…	Temperature	4…20 mA (-20…+80 °C), $R_{L max}$ = (Vdc-12)/0.022 22 mA outside the measuring range
HD**4907**ET…	Temperature	4…20 mA (-40…+150 °C), $R_{L max}$ = (Vdc-12)/0.022 22 mA outside the measuring range
HD**4801**T… HD**4801**ET…	Relative Humidity	4…20 mA (0…100 %RH), R_L < 500Ω 22 mA outside the measuring range
HD**48**V01T… HD**48**V01ET…	Relative Humidity	0…10 Vdc (0…100n %RH), R_L > 10kΩ 11 Vdc outside the measuring range
HD**48**S01T… HD**48**S01ET…	Relative Humidity	Only RS485 with MODBUS-RTU protocol
HD**4901**T… HD**4901**ET…	Relative Humidity	4…20 mA (0…100 %RH), $R_{L max}$ = (Vdc-12)/0.022 22 mA outside the measuring range
HD**4817**T…	Relative Humidity	4…20 mA (0…100 %RH), R_L < 500Ω 22 mA outside the measuring range
	Temperature	4…20 mA (-20…+80 °C), R_L < 500Ω 22 mA outside the measuring range

| Model		Specification
HD4817ET…	Relative Humidity	4…20 mA (0…100 %RH), $R_L < 500\Omega$ / 22 mA outside the measuring range
	Temperature	4…20 mA (-40…+150 °C), $R_L < 500\Omega$ / 22 mA outside the measuring range
HD48V17T…	Relative Humidity	11 Vdc outside the measuring range
	Temperature	0…10 Vdc (-20…+80 °C), $R_L > 10k\Omega$ / 11 Vdc outside the measuring range
HD48V17ET…	Relative Humidity	0…10 Vdc (0…100 %RH), $R_L > 10k\Omega$ / 11 Vdc outside the measuring range
	Temperature	0…10 Vdc (-40…+150 °C), $R_L > 10k\Omega$ / 11 Vdc outside the measuring range
HD48S17T… HD48S17ET…	Relative Humidity	Only RS485 with MODBUS-RTU protocol
	Temperature	
HD4917T…	Relative Humidity	4…20 mA (0…100 %RH), $R_{Lmax} = (Vdc-12)/0.022$ / 22 mA outside the measuring range
	Temperature	4…20 mA (-20…+80 °C), $R_{Lmax} = (Vdc-12)/0.022$ / 22 mA outside the measuring range
HD4917ET…	Relative Humidity	4…20 mA (0…100 %RH), $R_{Lmax} = (Vdc-12)/0.022$ / 22 mA outside the measuring range
	Temperature	4…20 mA (-40…+150 °C), $R_{Lmax} = (Vdc-12)/0.022$ / 22 mA outside the measuring range
HD4877T…	Dew Point	4…20 mA (-20…+80 °C DP), $R_L < 500\Omega$ / 22 mA outside the measuring range
	Temperature	4…20 mA (-20…+80 °C), $R_L < 500\Omega$ / 22 mA outside the measuring range
HD48V77T…	Dew Point	0…10 Vdc (-20…+80 °C DP), $R_L > 10k\Omega$ / 11 Vdc outside the measuring range
	Temperature	0…10 Vdc (-20…+80 °C), $R_L > 10k\Omega$ / 11V dc outside the measuring range
HD48S77T…	Dew Point	Only RS485 with MODBUS-RTU protocol
	Temperature	
HD4977T…	Dew Point	4…20 mA (-20…+80 °C DP), $R_{L\,max} = (Vdc-12)/0.022$ / 22 mA outside the measuring range
	Temperature	4…20 mA (-20…+80 °C), $R_{Lmax} = (Vdc-12)/0.022$ / 22mA outside the measuring range

Power supply and electrical connections

	HD48…	HD49…
Power supply	18…40 Vdc or 24 Vac ±10% / 12…30 Vdc for MODBUS output	12…40 Vdc
Consumption	- 4 mA@24V (models with voltage output) / - 4 mA@24V with open output, 20 mA@24V with 12 mA output (models with current output) / - 2 mA@24V models with serial RS485 output	
Electrical connections	Screw type terminal block, max 1,5mm², M16 cable gland for input cable	

General characteristics

Standard filter	PBT and 10 µm stainless steel grid protection (P8), 20 µm PTFE (P7) only for extended range	
TV probe working temperature	-20…+80 °C	
…TO,…TC Probes working temperature	STANDARD RANGE	EXTENDED RANGE
	-20…+80 °C	-40…+150 °C
Electronics working temperature	-20…+60 °C	
Storage temperature	-20…+80 °C	
Electronics protection class	IP66	
Materials	ABS, polycarbonate	
Weight	from approx. 120 gr. (TV) to approx. 900 gr. (TC2.10)	
Case dimensions	80 x 84 x 44 (lenght x width x height)	

Table 1 - Accuracy of dew point measurement:

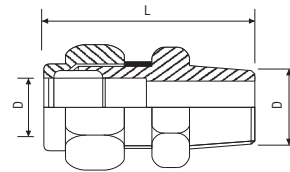|		°C DP								
		-20	-10	0	10	20	30	40	60	80
Temperature °C	-20	≤±1								
	-10	≤±1	≤±1							
	0	≤±1	≤±1	≤±1		DP LIMIT				
	10	≤±3	≤±1	≤±1	≤±1					
	20	≤±4	≤±2	≤±1	≤±1	≤±1				
	30		≤±3	≤±1,5	≤±1	≤±1	≤±1			
	40				≤±2	≤±1	≤±1	≤±1		
	60	NOT SPECIFIED			≤±5	≤±2,5	≤±2	≤±1	≤±1	
	80						≤±4	≤±2	≤±1	≤±1

Installation notes

To fix the probe inside a ventilation duct, a pipe, etc., use for example the HD9008.31 flange, a PG16 metal cable gland (Ø10…14mm) or a ⅜" universal biconical connection.
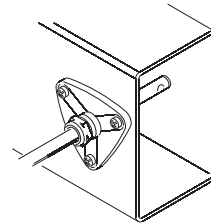
HD9008.31 Flange
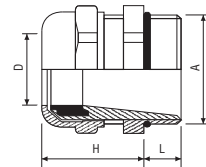
PG16 metal cable gland
D = 10…14 mm
L = 6.5 mm
H = 23 mm
A = PG16


Universal biconical connector
L = 35 mm
D = 14 mm
A = ⅜"

## Electrical connections

HD48… series with analog output

Power the instrument as shown in the below connection schemes, the power supply terminals are marked as +Vcc and GND.
Depending on the model, the output signal is available between:

• Ta and AGND terminals for the transmitters of the HD4807T…and HD48V07T… series.
• RH% and AGND terminals for the transmitters of the HD4801T.. and HD48V01T.. series.
• RH% and AGND, Ta and AGND terminals for the transmitters of the HD4817T… and HD48V17T… series.
• DP and AGND, Ta and AGND terminals for the transmitters of the HD4877T… and HD48V77T… series.
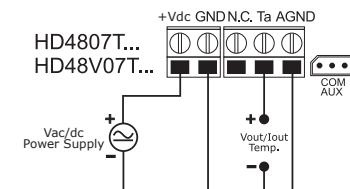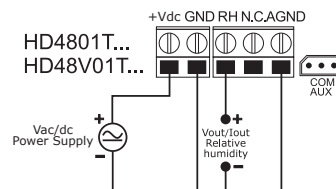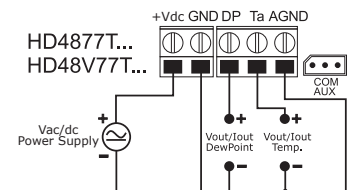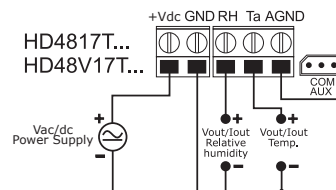
HD48…series with RS485 output

Connect the instrument as shown in the below connection schemes, the power supply terminals are marked as +Vcc and GND.
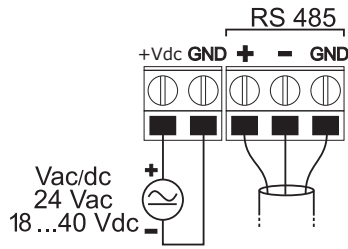
Thanks to RS485 output, several instruments can be connected to form a network. The instruments are connected in a sequence through a shielded cable with twisted pair for signals and a third wire for the ground.
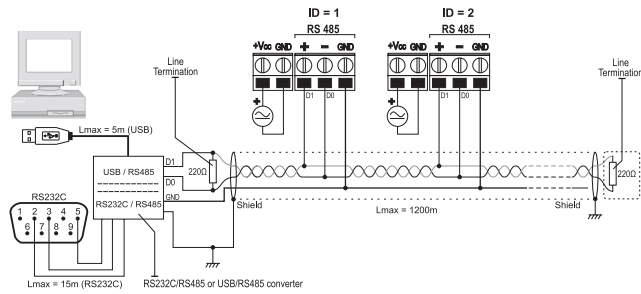

Line termination must be set at the two network ends. To polarize the line during nontransmission periods, resistor are connected between signal and power supply lines. The maximum number of devices that can be connected to the (Bus) line RS485 depends on the load characteristics of the devices to be connected.

The standard RS485 requires that the total load does not exceed 32 Unit Loads. The load of a HD48S… transmitter is equal to ¼ of the unit load.

If the total load is more than 32 unit loads, divide the net in segments and insert a signal repeater between one segment and the next one. At the beginning and at the end of each segment a line termination must be connected.

The instrument has a built in line termination that can be connected or removed through a short jumper placed next to the terminal block. If the instrument is the last or the first device of a network group, connect the termination placing the short jumper between the "RT" and "240 ohm" indications. If the instrument is not at the end of a network group, remove the termination placing the short jumper between the "RT" and "OPEN" indications
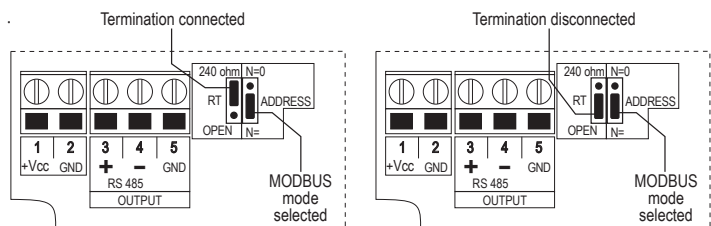

The cable shield must be connected to both line ends. The cable should have the following features:

- Characteristic impedance: 120 ohm
- Capacity: less than 50pF/m
- Resistance: less than 100 ohm/km
- gauge: 0,22 mm^2 (AWG24) at least.

The cable maximum length depends on baud rate and cable characteristics. Typically, the maximum length is 1200m. The data line must be kept separated from any power lines in order to prevent interferences on the transmitted signal. For connection to a PC, a RS232/RS485 or a USB/RS485 converter must be used. To operate with the MODBUS-RTU protocol be sure that the ADDRESS short jumper is between "ADDRESS" and "N=" indications.

Each transmitter of the network is univocally identified by an address. The address must be between 1 and 247. There must not be any other transmitters connected with the same address. The address must be configured before connecting the instrument to the network. To set the instrument address use the software HD48STCAL downloadable from the website and the RS48 cable with built in USB/RS485 adapter. To configure the instrument it is necessary to move the ADDRESS short jumper between the "ADDRESS" and "N=0" indications to select the setup mode. After the configuration, move the short jumper back between the "ADDRESS" and "N=" indications.
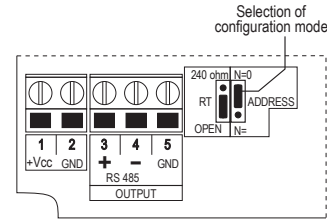
HD48S… - Setting the RS485 communication parameters of the transmitter with a standard communciation program

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 parameters setting is performed as follows:

- If you have the RS48 cable, install the drivers in the PC.
- Connect the transmitter to a PC USB port using the cable RS48 (or alternatively through another USB/RS485 converter available, ensuring that their drivers are installed in the PC).
- Move the ADDRESS jumper between the sign "ADDRESS" and "N = 0" to select the configuration mode.
- Start a communication program such as Hyperterminal, and set the serial communication parameters as follows (the instrument is connected to a COM port type):

  Baud rate: 115200
  Parity: None
  Data Bits: 8
  Stop Bits: 2

- Send the serial commands given in the following table to set the RS485 MODBUS parameters:

Command	Response	Description
MA nnn	&	Set RS485 address Ranging from 1 to 247 Preset on 1
MB n	&	Set RS485 Baud Rate n=0 ⇨ 9600 n=1 ⇨ 19200 Preset on 1 ⇨ 19200
MP n	&	Set RS485 transmission mode n=0 ⇨ 8-N-1 (8 data bits, no parity, 1 stop bit) n=1 ⇨ 8-N-2 (8 data bits, no parity, 2 stop bits) n=2 ⇨ 8-E-1 (8 data bits, even parity, 1 stop bit) n=3 ⇨ 8-E-2 (8 data bits, even parity, 2 stop bits) n=4 ⇨ 8-O-1 (8 data bits, odd parity, 1 stop bit) n=5 ⇨ 8-O-2 (8 data bits, odd parity, 2 stop bits) Preset on 2 ⇨ 8-E-1
MW n	&	Set receiving mode after RS485 transmission n=0 ⇨ Violates the protocol and gets in listen mode immediately after the transmission n=1 ⇨ Respects the protocol and waits 3.5 characters after the transmission Preset on 1 ⇨ Respects the protocol

- You can check the parameter setting and read the information of the instrument by sending the following serial commands:

Command	Response	Description
G0		Transmitter Model
G2		Serial number of the transmitter
G3		Firmware Version
G4		Firmware Date

Command	Response	Description
L1	Address	Read RS485 address
L2	Baud Rate (0,1)	Read RS485 Baud Rate 0 ⇨ 9600 1 ⇨ 19200
L3	Tx Mode (0,1,2,3,4,5)	Read RS485 transmission mode 0 ⇨8-N-1 1⇨8-N-2 2 ⇨8-E-1 3 ⇨8-E-2 4⇨8-O-1 5⇨8-O-2
L4	Rx Mode (0,1)	Read receiving mode after RS485 transmission 0 ⇨ Violates the protocol and gets in listen mode immediately after Tx 1 ⇨ Respects the protocol and waits 3.5 characters after Tx
P0	&	Ping

- When finished, reposition the ADDRESS jumper between the indications "ADDRESS" and "N =" to restore the MODBUS mode.

Reading of the measures with the MODBUS-RTU protocol when the instrument is in operating conditions (installed in a network)

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 quantities available with the appropriate register address:

Address	Quantities	Format
0	Temperature in °C (x10)	16-bit integer
1	Temperature in °F (x10)	16-bit integer
2	Relative Humidity in % (x10)	16-bit integer
3	Dew Point in °C (x10)	16-bit integer
4	Dew Point in °F (x10)	16-bit integer
5	State register Bit 0 = 1 ⇨ temperature measurement error Bit 1 = 1 ⇨ humidity measurement error Bit 2 = 1 ⇨ dew point calculation error Bit 3 = 1⇨ configuration data error	16-bit integer

HD49… series

Follow the connection schemes shown below, the maximum load resistance that can be connected to each 4…20 mA output depends on the power supply Vcc applied, according to the relation:
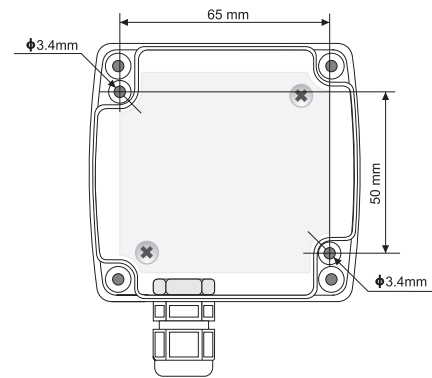
R_{Lmax} = (Vdc-12)/0.022, e.g. if Vdc=24Vdc the max load is R_{Lmax} =545 ohm.

HD4917T…   HD4977T…   HD4901T…   HD4907T…
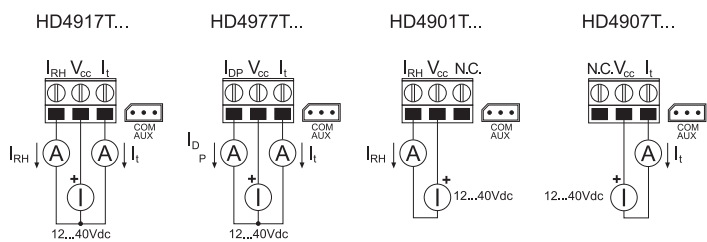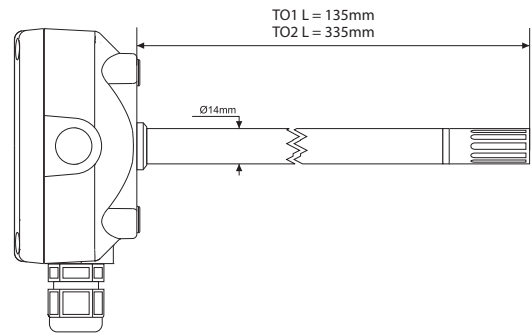
Relative humidity probe calibration

The HD48… and HD49… transmitters are supplied factory calibrated and ready to use. If necessary, it is possible to calibrate the relative humidity sensor using the saturated salt solutions HD75 (75 %RH saturated salt solution) and HD33 (33 %RH saturated salt solution) by connecting the instrument to the PC and using the HD48TCAL software.
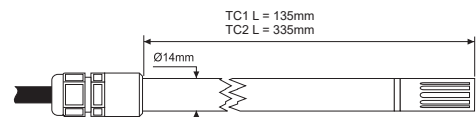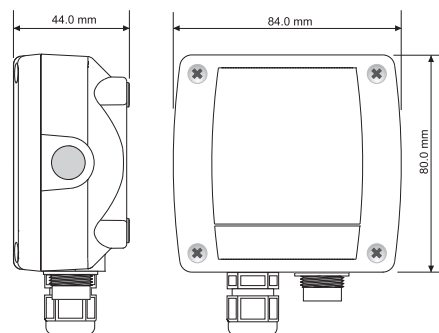
Fixing holes

Dimensions

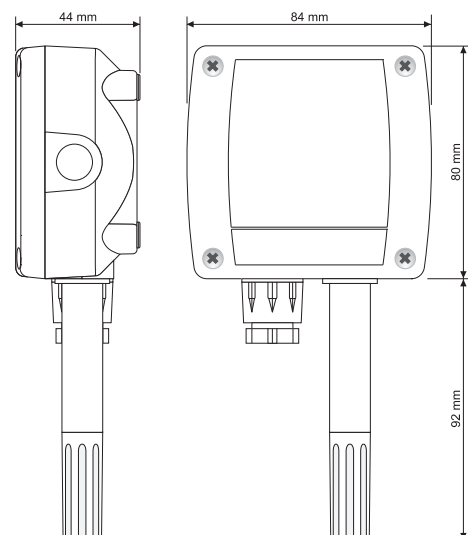TO series

TO1 L = 135mm
TO2 L = 335mm
Ø14mm

TC series

44.0 mm   84.0 mm   80.0 mm

TC1 L = 135mm
TC2 L = 335mm
Ø14mm

TV series

44 mm   84 mm   80 mm   92 mm

ORDERING CODES:

HD48

			Display **Blank** = without display **L** = with LCD display
			Cable length (only for TC models) **2** = 2 m **5** = 5 m **10** = 10 m

Probe length
TO1 = 135 mm   **TO2** = 335 mm
TC1 = 135 mm   **TC2** = 335 mm   **TV** = vertical wall mounting

Measuring range
Blank = standard range –20…+80 °C
E = extended range –40…+150 °C (**except TV models**)

Measured quantities
07 = Temperature
01 = Relative Humidity
17 = Temperature and Relative Humidity
77 = Temperature and Dew Point

Output
Blank = analog output 4…20 mA
V = analog output 0…10 Vdc
S = RS485 MODBUS-RTU output only
Note: the models with analog output have an output for each measured quantity.

HD49

			Display **Blank** = without display **L** = with LCD display
			Cable length (only for TC models) **2** = 2 m **5** = 5 m **10** = 10 m

Probe length
TO1 = 135 mm   **TO2** = 335 mm
TC1 = 135 mm   **TC2** = 335 mm   **TV** = vertical wall mounting

Measuring range
Blank = standard range –20…+80 °C
E = extended range –40…+150 °C (**except TV models**)

Measured quantities
07 = Temperature
01 = Relative Humidity
17 = Temperature and Relative Humidity
77 = Temperature and Dew Point

Example

HD4807TV: Wall mounting digital active temperature transmitter. Temperature range: -20…+80 °C. Analog output: 4…20 mA (-20…+80 °C). Probe working range -20…+80 °C. Power supply 18…40 Vdc or 24 Vac.

HD48V17ETC25: Digital active temperature and relative humidity transmitter, extended range. AISI304 steel probe, diameter 14 mm and stem length 335mm, with 5m cable. Relative humidity range 0…100% RH, temperature range -40…+150 °C. Analog outputs: 0…10V (0…100 %RH) for RH and 0…10V (-40…+150 °C) for temperature. Probe working range -40…+150 °C. Power supply 18…40 Vdc or 24Vac.

Accessories

RS48: Cable for RS485 serial connection with buit-in USB/RS485 converter.
CP27: Connection/converter cable from COM AUX serial port to USB.
HD75: 75 %RH saturated solution for the verification of the relative humidity sensor.
HD33: 33 %RH saturated solution for the verification of the relative humidity sensor.
HD9008.31: Wall flange with cable gland to fix Ø14 mm probes.

Protection for humidity probes Ø 14, thread M12x1

P7: 20 µm PTFE protection. Operating temperature: -40…150 °C.
P8: PBT and 10 µm stainless steel grid protection. Operating temperature: -40…120 °C.

WARRANTY

The manufacturer is required to respond to the "factory warranty" only in those cases provided by Legislative Decree 6 September 2005 - n. 206. Each instrument is sold after rigorous inspections; if any manufacturing defect is found, it is necessary to contact the distributor where the instrument was purchased from. During the warranty period (24 months from the date of invoice) any manufacturing defects found will be repaired free of charge. Misuse, wear, neglect, lack or inefficient maintenance as well as theft and damage during transport are excluded. Warranty does not apply if changes, tampering or unauthorized repairs are made on the product. Solutions, probes, electrodes and microphones are not guaranteed as the improper use, even for a few minutes, may cause irreparable damages. The manufacturer repairs the products that show defects of construction in accordance with the terms and conditions of warranty included in the manual of the product. For any dispute, the competent court is the Court of Padua. The Italian law and the "Convention on Contracts for the International Sales of Goods" apply

TECHNICAL INFORMATION

The quality level of our instruments is the result of the continuous product development. This may lead to differences between the information reported in the manual and the instrument you have purchased. We reserves the right to change technical specifications and dimensions to fit the product requirements without prior notice.

DISPOSAL INFORMATION

Electrical and electronic equipment marked with specific symbol in compliance with 2012/19/EU Directive must be disposed of separately from household waste. European users can hand them over to the dealer or to the manufacturer when purchasing a new electrical and electronic equipment, or to a WEEE collection point designated by local authorities. Illegal disposal is punished by law.

Disposing of electrical and electronic equipment separately from normal waste helps to preserve natural resources and allows materials to be recycled in an environmentally friendly way without risks to human health.

CE ♻ RoHS