

HD 4807T..., HD 48V07T..., HD 48S07T..., HD 48O1T..., HD 48V01T..., HD 4817T..., HD 48V17T..., HD 4877T... HD 48V77T..., HD 4907T..., HD 4901T..., HD 4917T..., HD 4977T...

PASSIVE OR ACTIVE TEMPERATURE, RELATIVE HUMIDITY, RELATIVE HUMIDITY AND TEMPERATURE, TEMPERATURE AND DEW POINT TRANSMITTERS

 $\mbox{HD48..}$ and $\mbox{HD49..}$ 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...20mA) 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...20mA current loop. The HD48.. and HD49.. 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 HD48.. and HD49.. transmitters measure relative humidity with a well proven temperature compensated capacitive sensor that assures precise and reliable measurements in the course of time. The transmitters of the 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 20µm 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 three different versions: with horizontal probe for duct mounting (HD48...TO..., HD49...TO...), with vertical probe for wall mounting (HD48...TV..., HD49...TV...) or with remote probe connected to the transmitter by means of a cable (HD48...TC..., HD49...TC...), cable lengths available are 2, 5 and 10m or for the measure of compressed air in pipelines (HD48...TP480, HD49...TP480). The probes can be supplied in two different lengths (135mm or 335mm).

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 3/8" universal biconical connection or a PG16 metal cable gland ($\oslash 10...14$ mm). A 4-digit optional display ("L" model) allows to display the measured parameters in a continuous or sequential mode.

Technical specifications

Technical specifications	Technical specifications							
	STANDAI	RD RANGE	EXTENDED RANGE					
Relative Humidity								
Sensor	Capacitive 1,00% P.U.							
Measuring range Accuracy @T=1535°C	0100%RH ±1.5% RH (090%RH), ±2.0% RH (90100%RH)							
Accuracy @ rest of T range	±1.5% RH (090%RH), ±2.0% RH (90100%RH) ±(1.5+1.5% of the measure) %RH							
Repeatability	±(1.5+1.5% of the lifeasure) %RH 0.4%RH							
Sensor working temperature	-20	.+80°C	-40+150°C					
Temperature	<u>'</u>							
Measuring range	-20	.+80°C	-40+150°C					
Sensor		10kΩ	Pt100 class A					
Accuracy	±0.3°C (±0.4°C (-200	0+70°C) °C, +70+80°C)	±0.3°C					
Repeatability	0.0	05°C	0.05°C					
	Dew Point							
Sensor Magazina ranga	Parameter ca		ve humidity and temperature					
Measuring range Accuracy		-20+80 See table 1						
Repeatability		0.5°C						
Type of output (according	to the model)	0.0 0						
Models	Temperature	420mA ((-20+80°C), R _L < 500Ω					
HD4807T Models	Temperature	420mA (side the measuring range $\pm 40 + 150$ °C), $R_L < 500$ Ω					
HD4807ET Models	·	22mA outs	side the measuring range (-20+80°C), $R_1 > 10k\Omega$					
HD48V07T Models	Temperature	11Vdc outs	Side the measuring range (-40+150°C), R _I > 10kΩ					
HD48V07ET	Temperature		side the measuring range					
Models HD48S07T HD48S07ET	Temperature	•	with MODBUS-RTU protocol					
Models HD4907T	Temperature	420mA (-20+ 22mA outs	-80°C), R _L Max = (Vdc-12)/0.022 side the measuring range					
Models	Temperature	420mA (-40+	150° C), R ₁ Max = (Vdc-12)/0.022					
HD4907ET Models HD4801T	Relative Humidity	420mA	side the measuring range (0100%RH), R _L < 500Ω					
HD4801ET Models	,		side the measuring range (0100%RH), R _i > 10kΩ					
HD48V01T HD48V01ET Models	Relative Humidity	11Vdc outs	side the measuring range					
HD48S01T HD48S01ET	Relative Humidity		with MODBUS-RTU protocol					
Models HD4901T HD4901ET	Relative Humidity		0%RH), R _L Max = (Vdc-12)/0.022 side the measuring range					
Models	Relative Humidity		$(0100\%RH), R_L < 500\Omega$ side the measuring range					
HD4817T	Temperature	420mA ($(-20+80^{\circ}C)$, $R_{\rm L} < 500\Omega$ side the measuring range					
	Relative Humidity	420mA	$(0100\%RH), R_L < 500\Omega$					
Models HD4817TV	,		side the measuring range (0+60°C), R ₁ < 500Ω					
-	Temperature	22mA outs	side the measuring range (0100%RH), R _i < 500Ω					
Models	Relative Humidity	22mA outs	side the measuring range					
HD4817ET	Temperature	420mA (- 22mA outs	-40+150°C), $R_L < 500\Omega$ side the measuring range					
Models	Relative Humidity	010Vdc 11Vdc outs	$(0100\%RH), R_L > 10k\Omega$ side the measuring range					
HD48V17T	Temperature	010Vdc	$(-20+80^{\circ}C), R_1 > 10k\Omega$					
	Relative Humidity	010Vdc	side the measuring range $(0100\%RH)$, $R_L > 10k\Omega$					
Models HD48V17ET		11Vdc outs 010Vdc (side the measuring range -40+150°C), R _i > 10kΩ					
Models	Temperature Relative Humidity	11Vdc out	side the measuring range					
HD48S17T HD48S17ET	Temperature		with MODBUS-RTU protocol					
Models	Relative Humidity	22mA outs	0%RH), R _L Max = (Vdc-12)/0.022 side the measuring range					
HD4917T	Temperature	420mA (-20+	.80°C), R _L Max = (Vdc-12)/0.022 side the measuring range					
Modele	Relative Humidity	420mA (0100	0%RH, R ₁ Max = $(Vdc-12)/0.022$					
Models HD4917TV	Temperature	420mA (0+6	side the measuring range 60°C), R _L Max = (Vdc-12)/0.022					
	·	22mA outs 420mA (0100	side the measuring range DWRH), R _I Max = (Vdc-12)/0.022					
Models HD4917ET	Relative Humidity	22mA outs	side the measuring range					
IIU4317El	Temperature	22mA outs	150°C), R _L Max = (Vdc-12)/0.022 side the measuring range					
Models	Dew Point	22mA oùts	20+80°C DP), R, < 500Ω side the measuring range					
HD4877T	Temperature	420mA	$(-20+80^{\circ}\text{C}), R_{\perp} < 500\Omega$ side the measuring range					
Madala	Dew Point	010Vdc (-	$20+80^{\circ}$ C TD), $R_{i} > 10$ k Ω					
Models HD48V77T		010Vdc	side the measuring range $(-20+80^{\circ}\text{C})$, $R_{i} > 10\text{k}\Omega$					
Models	Temperature Dew Point	11Vdc outs	side the measuring range					
HD48S77T	Temperature	-	with MODBUS-RTU protocol					
Models	Dew Point	22mA outs	0° C DP), R _L Max = (Vdc-12)/0.022 side the measuring range					
HD4977T	Temperature	420mA (-20+	80°C), R. Max = (Vdc-12)/0.022 side the measuring range					
Mandala	Dew Point	420mA (-4	$40+60^{\circ}$ C DP), $R_{i} < 5000$					
Models HD4877T480		420mA (side the measuring range (-40+60°C), R ₁ < 500Ω					
	Temperature	22mA outs	side the measuring range					

Models	11Vdc outs		40+60°C DP), R _L > 10 kΩ ide the measuring range			
HD48V77T480	Temperature	010Vdc (-40+60°C DP), R _L > 10kg 11Vdc outside the measuring range				
Models	Dew Point	Only RS485 with MODBUS-RTU protocol				
HD48S77T480	Temperature	· ·				
Models	Dew Point	420mA (-40+60°C DP), R _L Max = (Vdc-12)/0.02 22mA outside the measuring range				
HD4977T480	Temperature	420mA (-40+60°C), R _L Max = (Vdc-12)/0.02 22mA outside the measuring range				
Power supply and electrica	Power supply and electrical connections					
	HD48		HD49			
Power supply	1640Vdc or 24 Vac ±10%		1240Vdc			
Electrical connections	Screw type terminal block, max 1,5mm², M16 cable gland for input cable					
General specifications						
ElectronicsTV probes working temperature	0+60°C					
TO,TC Probes working	STANDARD RANGE		EXTENDED RANGE			
temperature	-20	+100°C	-40+150°C			
T480 probes working temperature	-40+60°C					
Storage temperature	-20+80°C					
electronics protection class	IP66					
Case dimensions	80x84x44					

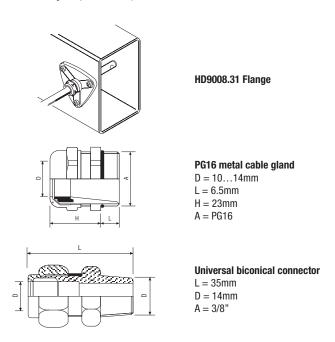
Table 1 -Accuracy of dew point measurement:

		TD °C								
		-20	-10	0	10	20	30	40	60	80
	-20	≤±1								
	-10	≤±1	≤±1							
၁့	0	≤±1	≤±1	≤±1			DP LIMIT			
Ħ	10	<u>≤±3</u>	≤±1	≤±1	≤±1	DF LIWIT				
rat	20	<u>≤±4</u>	<±2	≤±1	≤±1	≤±1				
Temperature	30		<u>≤±3</u>	≤±1,5	≤±1	≤±1	≤±1			
e.	40				≤±2	< <u>+1</u> < <u>+1</u> < <u>+1</u>				
_	60	NOT	SPECIF	EIED	≤±5	≤±2,5 ≤±2 ≤±1 ≤±1				
	80						<u><±4</u>	<u>≤±2</u>	≤±1	≤±1

For example at 20°C a Dew Point value of 0°C DP is measured with an accuracy better than 1°C DP.

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 3/8" universal biconical connection.



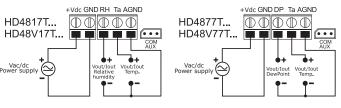
Electrical connections

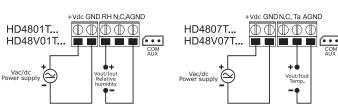
HD48.. series with analog output

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:

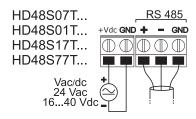
- \bullet Ta and AGND terminals for the transmitters of the HD4807T..and HD48V07T... series.
- $\bullet\,$ RH% and AGND terminals for the transmitters of the HD4801T.. and HD48V01T.. series.
- RH% and AGND, Ta and AGND terminals for the transmitters of the HD4817T.. and HD48V17T.. series.
- DP and AGND, Ta and AGND terminals for the transmitters of the HD4877T.. and HD48V77T.. series.



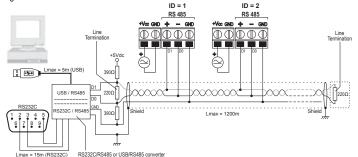


HD48...series with RS485 output

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 mass.



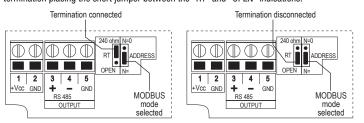
Line termination must be set at the two network ends. To polarize the line during non-transmission periods, resistors are connected between signal and power supply lines.

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 $\frac{1}{2}$ 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 mm² (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 HD48STCAL kit. The kit includes the RS48 cable with built in USB/RS485 adapter and a CD-ROM for Windows® operating systems. 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.

In MODBUS mode it is possible to read the measured values by the instrument through the 04h functioning code (Read Input Registers). Table 2 represents the available quantities with its relative register address.

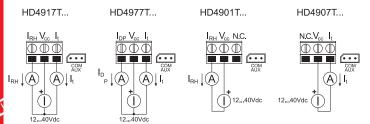
Table 2 - Modbus Registers

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

HD49.. series

Follow the connection schemes shown below, the maximum load resistance that can be connected to each 4...20mA output depends on the power supply Vcc applied, according to the relation:

 R_1 Max = (Vdc-12)/0.022, e.g. if Vdc=24Vdc the max load is R_1 Max =545 ohm.



Relative humidity probe calibration

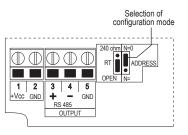
The HD48.. and HD49.. transmitters are supplied factory calibrated and ready to use. If necessary, it is possible to calibrate the relative humidity sensor using the saturated salt solutions **HD75** (75% RH saturated salt solution) and **HD33** (33% RH saturated salt solution) and connecting the instrument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

The **HD48TCAL** kit includes the CP27 with incorporated convertor USB/RS232 for the transmitters connection to the PC and a CD-ROM for Windows operating systems, that guides the user in the relative humidity probe calibration procedure.

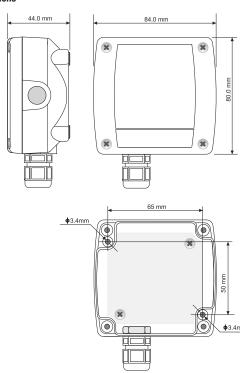
For RS485 output models use the **HD48STCAL**. The kit includes the **RS48** with incorporated convertor USB/RS232 for the transmitters connection to the PC and a CD-ROM for Windows operating systems, that guides the user in the relative humidity probe calibration procedure. To calibrate the instrument it is necessary to move the ADDRESS short jumper between the "ADDRESS" and "N=0" indications to select the setup mode. After the calibration, move the short jumper back between the "ADDRESS" and "N="



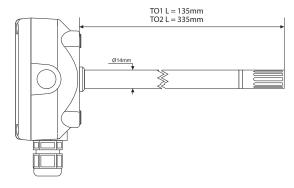




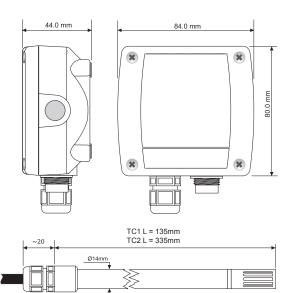
Case dimensions



Probe dimensions: TO series



TC series



Ordering codes \mathbf{L} = with LCD display **HD49** Cable length 2 = 2m5 = 5m**10** = 10m Note: T480 version is available only with a cable 2m long. Probe type **T01** = 135mm **T02** = 335mm TC1 = 135mmTC2 = 335mmTV = wall mounting Probe L=92mm T480 = for compressed air No sign = standard range -20...+80°C (-40...+60°C for the T480 version) E = extended range -40...+150°C (models TV excluded) **07** = temperature output **01** = %RH output

17 = Temperature and %RH outputs

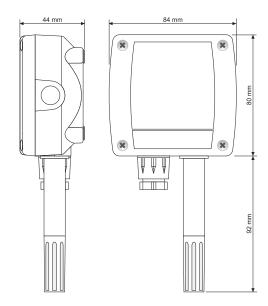
No sign = 4...20mA analogue output

77 = Temperature and dew point outputs

V = 0...10Vdc analog output (only HD48.. models) **S** = only RS485 output with MODBUS-RTU protocol

Note: Versions with analogue output have one analogue output for each measured quantity.

TV series





Ordering code examples

HD4801TV: Wall mounting digital active relative humidity transmitter.

Relative humidity range 0...100%RH.

Analog output: 4...20mA (0...100%RH).

Probe working range -20...+80°C. Power supply 16...40Vdc or 24Vac.

HD4917T01: Digital passive (current loop) temperature and relative humidity transmitter for duct mounting. AISI304 steel probe, diameter 14mm and stem length 135mm, joined to the electronics enclosure.

Relative humidity range 0...100%RH, temperature range -20...+80°C

Analog outputs: 4...20mA (0...100%RH) for RH and 4...20mA (-20...+80°C) for temperature. Probe working range -20...+80°C. Power supply 12...40Vdc.

HD4817TC25L: Digital active temperature and relative humidity transmitter with LCD display. AISI304 steel probe, diameter 14mm and stem length 335mm, connected to the electronics enclosure through a 5m cable.

Relative humidity range 0...100%RH, temperature range -20...+80°C

Analog outputs: 4...20mA (0...100%RH) for RH and 4...20mA (-20...+80°C) for temperature. Probe working range -20...+80°C. Power supply 16...40Vdc or 24Vac.

HD48V17ETC25: Digital active temperature and relative humidity transmitter, extended range. AISI304 steel probe, diameter 14mm and stem length 335mm, connected to the electronics enclosure through a 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 16...40Vdc or 24Vac.

HD48S17TC25L: Digital active temperature and relative humidity transmitter with LCD display. AISI304 steel probe, diameter 14mm and stem length 335mm, connected to the electronics enclosure through a 5m cable.

Relative humidity range 0...100%RH, temperature range -20...+80°C.

Only RS485 output with MODBUS-RTU protocol. Probe temperature working range -20...+80°C. Power supply 16...40Vdc or 24Vac.

HD4877T02: Digital active temperature and dew point transmitter for duct mounting. AISI304 steel probe, diameter 14mm and stem length 135mm, joined to the electronics enclosure.

Dew point range -20...+80°C DP, temperature range -20...+80°C

Analog outputs: 4...20mA (-20...80°C DP) for DP and 4...20mA (-20...+80°C) for temperature. Probe working range -20...+80°C. Power supply 16...40Vdc or 24Vac.

HD4977T02: Digital passive (current loop) temperature and dew point transmitter for duct mounting. AISI304 steel probe, diameter 14mm and stem length 335mm, joined to the electronics enclosure.

Dew point range -20...+80°C DP, temperature range -20...+80°C

Analog outputs: 4...20mA (-20...+80°C DP) for DP and 4...20mA (-20...+80°C) for temperature. Probe working range -20...+80°C. Power supply 12...40Vdc.

Accessories

HD48TCAL: The kit includes the CP27 connection cable with built-in USB/RS232 converter and CD-ROM for Windows operating systems that guides the user in the relative humidity probe calibration procedure. The cable is complete of USB connector on the PC side and a COM AUX connector on the instrument side. The kit is suitable only for analog output models.

HD48STCAL: The kit includes the RS48 cable with built-in USB/RS485 converter and CD-ROM for Windows operating systems that guides the user in the relative humidity probe calibration procedure. The cable is complete of USB connector on the side of the PC and of 3 separate wires on the instrument part. The kit is suitable only for RS485 output models.

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, complete of screw adaptors for probes with Ø 14mm and Ø 26mm.

HD33: 33% RH saturated solution for the verification of the relative humidity sensor, complete of screw adaptors with Ø 14mm and Ø 26mm.

HD9008.31: Wall flange with cable gland to fix Ø 14mm probes.

PG16: AlSI304 steel cable gland for Ø 14mm probes.

P6: 10µ sintered stainless steel protection for Ø 14mm probes.

P7: 20µ PTFE protection for Ø 14mm probes.

P8: Stainless steel grid 20µ and Pocan for Ø 14mm probes.

