Гигрометры DELTA OHM серии HD9008, HD9009, HD9007
Технические характеристики

HD9008... - HD9009... - HD9007

HD9007A-1

HD9007A-2

HD9008..., HD9009... SERIES
TEMPERATURE AND HUMIDITY TRANSMITTERS
HD9007
MULTIPLE RADIATION SHIELD

HD9008…and **HD9009**… are single block RH and temperature (or only RH or only temperature) microprocessor transmitters, temperature configurable.

They are available in different versions:

- **HD9008.1:** 2-wire with 4…20mA output (only RH)
- **HD9008TRR:** 2-wire with 4…20mA output for RH and temperature
- **HD9008TR.2**: 2-wire with 4…20mA output for RH and Pt100 direct
- **HD9008T7AC**: 2-wire with 4…20mA output (only temperature)
- **HD9008T7S - HD9008T17S**: with RS485 MODBUS-RTU output
- **HD9009TRR:** 0…1V standard voltage output (other ouputs available on demand) for RH and temperature
- **HD9009TR.1 - HD9009TR.2**: 0…1V standard voltage output for RH and Pt100 direct

Sensors

The humidity sensor is a capacitor which dielectric is made up by an hygroscopic polymer. As water dielectric constant is approximately 80, you'll get a strong change in capacity as the humidity content of this polymer changes. The advantages of this kind of sensor are: good linearity, insensitivity to temperature changes, fast response time and long-lasting life. The sensor temporary looses its accuracy if some condensation develops on its surface (the transmitted value is higher than the real one because of an increase in effective capacity).

The temperature sensor is a Platinum resistance thermometer (100Ω @0°C). The Pt100 resistance variation is transformed into a current or voltage signal, linear to temperature.

Installation and assembly

Accuracy in measuring does not depend on the transmitter position. However, it is suggested to install the transmitter with the sensor faced downwards (where possible) to reduce dust deposit on the sensor protection filter. The transmitter shall not be mounted next to doors, in draughtiness, in areas with scarce air circulation, or near a heat source, as heating air involves a decrease of relative humidity (the quantity of available water vapour being equal).
Protection degree is IP54.
Ensure that the sensor is compatible with the atmosphere where it is installed.
Follow these procedures to access the transmitter terminal board (see picture below):
   - 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.
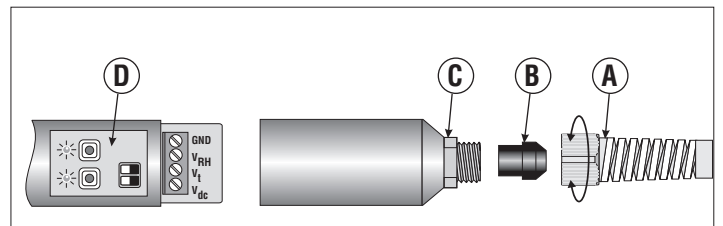
Signal Transmission - models with analog output

The electronic circuit design provides the signal to increase linearly as humidity and temperature raise.
In presence of cables transmitting high currents or machines causing electromagnetic noises, the transmitter connection cables have to be placed in a separate raceway, or far from them, to prevent these noises. It is always recommended to use a shielded cable for the connections of instruments.

Connections

Fig.2 and fig.3 show the connection diagrams of the models with analog output. R_{RH} and $R_{°C}$ represent the current input of any device connected to the 4…20mA loop, that is: an indicator, a controller, a data logger or a recorder. In fig.2, *Vin%HR* and *Vin°C* symbols have the same meaning. Compared to the figures shown, the wiring diagram of the HD9008T7AC model has only the temperature output, while in the diagram of the models HD9008.1, HD9008TR.2, HD9009TR.1 and HD9009TR.2 the analog output will be present only for the measurement of relative humidity.
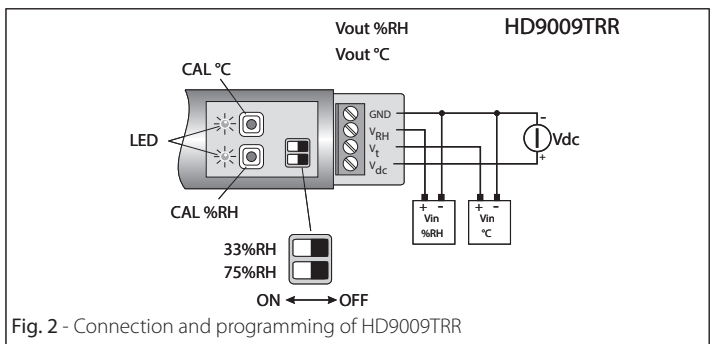

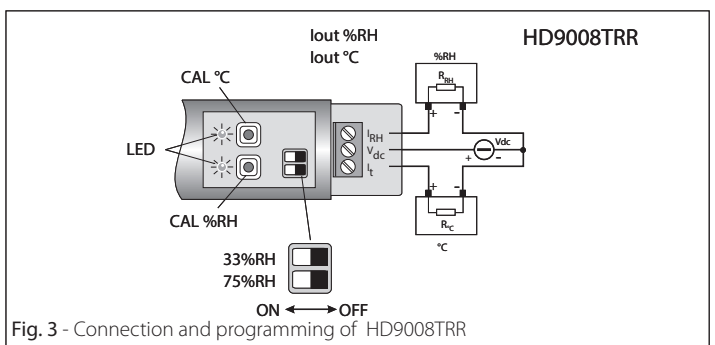Fig. 2 - Connection and programming of HD9009TRR

Fig. 3 - Connection and programming of HD9008TRR

Programming

The instrument can be reprogrammed by means of a key, and no jumper or potentiometer actions are required.

Humidity Sensor Calibration

The humidity input can be recalibrated by using two saturated solutions: the first one at 75%, the second one at 33%; the 0%RH…100%RH relative humidity range is fixed, 4mA (or 0Vdc) correspond to 0%RH, 20mA (or 1Vdc) correspond to 100%RH.

The user can re-calibrate the RH probe holding the 0%…100%RH range.

The following accessories are needed:
- for HD9008.1, HD9008TRR and HD9008TR.2 models: a 10...30Vdc continuous voltage power supply, a precision ammeter with a 0…25mA min. range.
- for HD9009TRR, HD9009TR.1 and HD9009TR.2: a 5…35Vdc continuous voltage power supply, a precision voltmeter with a 0…1Vdc min. range.
- for HD9008T17S: a 5…30Vdc continuous voltage power supply, an RS485/USB converter or an RS485/232 converter. For the calibration procedure of this model, please refer to the dedicated instuctions on the website.

The calibration of the humidity sensor is carried out at two fixed points: at 75.4%RH (**always as first point**) and at 33%RH (**second point**).

Procedure:

1. To access the panel board, unscrew grommet "A" (see fig. 1) and hold the cable firmly to avoid twisting. Take off the rubber bulb and unscrew the bottom of the instrument.
2. Connect the wires to provide the instrument with power supply, as shown in the connection diagrams of fig. 4 (HD9008TRR) and of fig.5 (HD9009TRR).
3. Insert the probe in the container with the saturated solution at 75%RH and wait 30 minutes at least. Probes and solutions have to be at the same temperature.
4. Turn 75%RH dip-switch on ON.
5. Press the CAL%RH key and hold it down for 5 seconds, at least, until the corresponding LED does not flash. Now the key can be released: the LED will remain on. A built-in sensor compensates the temperature difference of the solution compared with 20°C.
6. Turn the 75%RH dip-switch on OFF.
7. Put the probe in the container with the saturated solution at 33%RH and wait for 30 minutes, at least. Probes and solutions have to be at the same temperature.
8. Turn the 33%RH dip-switch on ON.
9. Press the CAL%RH key and hold it down for 5 seconds, at least, until the corresponding LED is not off. Now the key can be released.
   If the solution is at 20°C, the output will equal 9.28mA (in HD9008TRR and HD9008TR.2 models) and 0.330V (in HD9009TRR, HD9009TR.1 and HD9009TR.2 models).
10. Turn the 33%RH dip-switch on OFF again.
11. Re-close the instrument: re-screw the bottom, put the rubber bulb again at its place and screw the grommet: hold the cable firmly to avoid twisting it.
12. The calibration of the RH probe is finished.
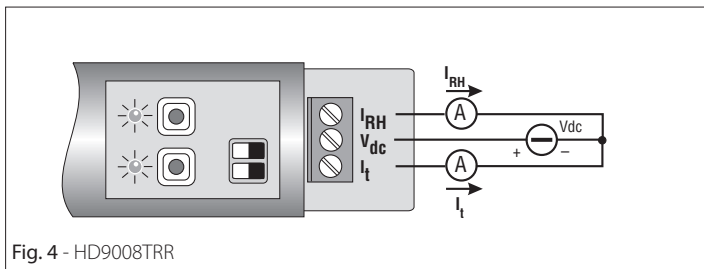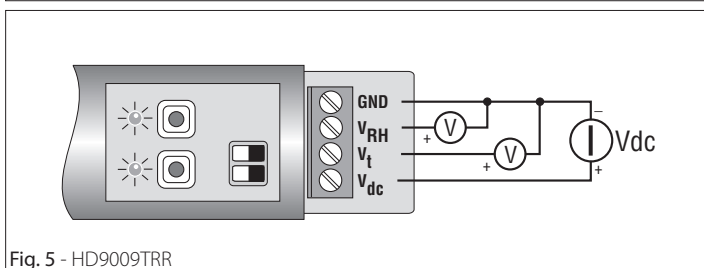

Fig. 4 - HD9008TRR

Fig. 5 - HD9009TRR

Saturated reference solutions are available for RH calibration. Calibration is suggested every 12/18 months for instruments with continuous operation, according to the environment they are working in. Check that the sensor and the atmosphere where it is employed be compatible, above all in case of aggressive environments (they might corrode the sensor).
Note: the first calibration point has to be always at 75%RH

Programmig of temperature operating range (models HD9008TRR, HD9008T7AC, HD9009TRR)

Temperature standard configuration is -40…+80°C corresponding to 4…20mA (for HD9008TRR and HD9008T7AC) and 0…1Vdc (for HD9009TRR). The user can configure the temperature output in ranges different from the standard one. These should however be included in the -40°C…+80°C range with a minimum amplitude of 25°C. Two LEDs give alarm indications (temperature exceeding set range, sensor breakage or short-circuit) and help the operator when programming.

The following accessories are needed:
- for HD9008TRR and HD9008T7AC models: a 10…30Vdc continuous voltage power supply, a precision ammeter with 0…25mA minimum range.
- for HD9009TRR model: a 5…35Vdc continuous voltage power supply, a precision voltmeter with 0…1Vdc minimum range.
- Pt100 simulator or a set of precision resistances.

Procedure:

1. To access the panel board, unscrew grommet "A" (see figure 1) and hold the cable firmly to avoid twisting. Take the rubber bulb off and unscrew the bottom of the instrument.
2. Unscrew the sensor protection filter.
3. Unsolder the Pt100 sensor (the narrowest one) and in place of it, solder the output wires of a Pt100 simulator or those of a precision resistance, as shown in figures 6 and 7. Then wait a few seconds for the junction to get cold.
4. Set the Pt100 simulator at the temperature corresponding to the scale lower value. For example, if you want to configure the -10°C…+80°C range, the simulator has to be set at -10°C; the equivalent resistance value will be 96.09Ω. If the calibration is carried out with a fixed resistance, connect a 96.09Ω fixed resistance to the terminals to which the sensor was soldered.
5. Wait 10 seconds until the measurement becomes steady, press the "CAL °C" key (calibration) and hold it down for minimum 5 seconds, until the LED first flashes (once) and then remains on.
6. Set the Pt100 simulator at the temperature value corresponding to the full scale. According to the above example, the simulator will be set at +80°C; the equivalent resistance value will be 130.89Ω; if the calibration is carried out with a fixed resistance, a 130.89Ω fixed resistance will have to be connected to the terminals to which the sensor was soldered.
7. Wait 10 seconds until the measurement becomes steady, press the "CAL °C" key (calibration) and hold it down for minimum 5 seconds, until the LED is off. When you release the key, the LED will flash twice to confirm that programming took place.
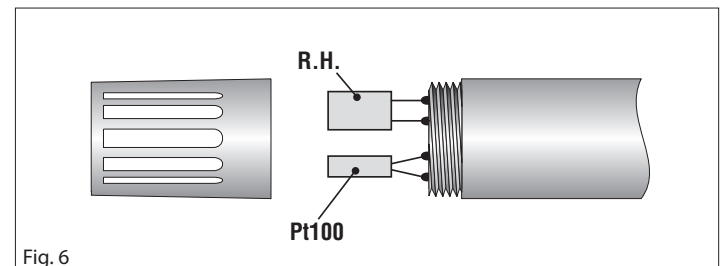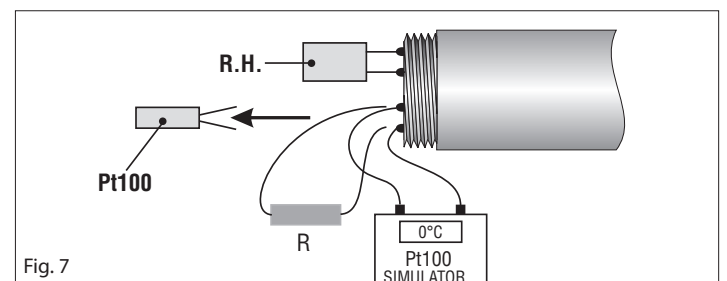

Fig. 6

Fig. 7

8. Check that the configuration corresponds to the requested specifications, by setting the simulator (or connecting the precision resistances) at the values corresponding to the lower and full scale value and by checking the output with the ammeter (HD9008TRR-HD9008T7AC) or with the voltmeter (HD9009TRR).
9. Solder again the temperature sensor.
10. Insert again the sensor protection filter, screw the bottom, put the rubber bulb again at its place and screw the grommet holding the cable firmly to avoid twisting.
11. The temperature output programming is over.

An out-of-standard temperature operating range can be requested when placing the order.

Note: probes work in the -40°C…+80°C temperature range. Outside this range data are not correct; electronics is designed to operate in this range.

Technical specifications

		HD9008.1	HD9008TRR	HD9008TR.2	HD9008T17S	HD9008T7S	HD9008T7AC	HD9009TRR	HD9009TR.1	HD9009TR.2
Operating temperature		-40…+80 °C								
Output		analog	analog	analog Pt100	RS485 MODBUS-RTU	RS485 MODBUS-R-TU	analog	analog	analog Pt100	analog Pt100
Power Supply		10...30 Vdc	10…30 Vdc	10…30 Vdc	5…30 Vdc		10…30 Vdc	5…35 Vdc		
HUMIDITY	Sensor	Capacitive				/		Capacitive		
	Measuring Range	0…100 %RH				/		0…100 %RH		
	Accuracy	±1,5 % (0…90 %RH) / ±2 % (90…100 %RH) @ T=15…35 °C ± (1,5 + 1,5% of the measure)% @ T= remaining range				/		±1,5% (0…90 %RH) / ±2 % (90…100 %RH) @ T=15…35°C ± (1,5 + 1,5% of the measure)% @ T= remaining range		
	Response time at 63% of final variation	3 min; 6 s without filter without thermal jump				/		3 min; 6 s without filter without thermal jump		
	Output signal	0% RH = 4.0 mA 100% RH = 20.0 mA		RS485 MODBUS-RTU		/		0 %RH = 0.00 Vdc 100 %RH = 1.00 Vdc (*)		
	Load Resistance	$R_{Lmax} = \dfrac{(Vdc - 10)}{22mA}$			/			$R_{inMIN}=10k\Omega$		
TEMPERATURE	Measuring Range - Standard Configuration (**)	/	-40…+80 °C							
	Accuracy	/	± 0,2 °C ± 0,15 % of the mesure							
	Response time at 63% of final variation	/	3 min; 6 s without filter							
	Output Signal	/	-40°C = 4.0mA +80°C = 20.0mA	Pt100 direct 4 wire	MODBUS	MODBUS	-40 °C = 4.0 mA +80 °C = 20.0 mA	-40°C = 0.00 Vdc +80°C = 1.00 Vdc (*)	Pt100 direct 2 wire	Pt100 direct 4 wire
	Load Resistance	/	$R_{Lmax} = \dfrac{(Vdc - 10)}{22mA}$	/	/	/	$R_{Lmax} = \dfrac{(Vdc - 10)}{22mA}$	$R_{inMIN}=10k\Omega$	/	/
Dimensions (excluding cable gland)		Ø 26 x 185 mm								
CABLE DIMENSIONS	Maximum Lenght **for analog output connection** (***)	200m		200m (only RH ouput)	depending on Baud Rate and wire gauge		200m	10m	10m (only RH output)	
	Wire minimum section	20 AWG - 0.5 mm²								
	Cable maximum diameter	Ø 5mm								
(*) For HD9009TRR models, 0…5Vdc, 1…5Vdc, 0…10Vdc voltage outputs can be provided on ordering for at least 5 pcs. (**) Out-of-standard measuring ranges have to be requested when ordering or have to be re-programmed with a Pt100 simulator. (***) Use shielded cables.										

ORDERING CODES

HD9008.1: Meteorological relative humidity transmitter with 2-wire 4…20 mA ouput. Relative humidity measuring range 0…100 %RH. Probe Ø26 mm, L=185mm. Power supply 10…30 Vdc.

HD9008TRR: Dual meteorological temperature and relative humidity transmitter with 2-wire 4…20 mA ouputs. Configurable temperature measuring range (standard configuration -40 ℃…+80 ℃); relative humidity measuring range 0…100 %RH. Probe Ø26 mm, L=185 mm. Power supply 10…30 Vdc.

HD9008TR.2: Meteorological temperature and relative humidity transmitter. It measures the temperature with 4-wire Pt100 sensor. Measuring range: relative humidity 0…100 %RH, 4mA correspond to 0 %RH, 20 mA correspond to 100 %RH. Power Supply 10…30 Vdc. Probe Ø26 mm L= 185 mm.

HD9008T7S: Meteorological temperature transmitter. It measures the temperature with 1/3 DIN Pt100 sensor. Measuring range: -40 ℃…+80 ℃. Power supply 5…30 Vdc. RS485 MODBUS-RTU output. Probe Ø26 mm, L= 185 mm.

HD9008T17S: Meteorological temperature and relative humidity transmitter. It measures the temperature with 1/3 DIN Pt100 sensor. Relative humidity measuring range: 0…100 %RH. Temperature measuring range: -40 ℃…+80 ℃. Power supply 5…30 Vdc. RS485 MODBUS-RTU output. Probe Ø26 mm, L= 185 mm.

HD9008T7AC: Meteorological temperature transmitter with 2-wire current output 4…20 mA. It measures the temperature with 1/3 DIN Pt100 sensor. Configurable temperature measuring range (standard configuration -40 ℃…+80 ℃). Power supply 10...30 Vdc. Probe Ø 26 mm, L = 185 mm.

HD9009TRR: Dual meteorological temperature and relative humidity transmitter with two 0…1 Vdc outputs. Configurable temperature measuring range (standard configuration -40 ℃…+80 ℃); relative humidity measuring range 0…100%RH. Power supply 5…35 Vdc. Probe Ø26 mm, L=185mm.

HD9009TR.1: Meteorological temperature and relative humidity transmitter. Voltage output 0…1 Vdc for relative humidity and 2-wire Pt100 sensor for temperature. Measuring range for relative humidity 0…100 %RH. Power supply 5…35 Vdc, 2mA. Probe Ø 26 mm L= 185 mm.

HD9009TR.2: Meteorological temperature and relative humidity transmitter. Voltage output 0…1 Vdc for relative humidity and 4-wire Pt100 sensor for temperature. Measuring range for relative humidity 0…100 %RH. Power supply 5…35 Vdc, 2 mA. Probe Ø 26 mm L= 185 mm.

HD9007A-1: 12-ring protection L=190 mm complete with mounting brackets

HD9007A-2: 16-ring protection L=240 mm complete with mounting brackets

HD75: saturated salt solution 75% RH with adapter M 24x1,5

HD33: saturated salt solution 33% RH with adapter M 24x1,5

HD9008.21.1: holder for vertical sensor. Wall distance 250mm, hole Ø26 mm

HD9008.21.2: holder for vertical sensor. Wall distance 125mm, hole Ø26 mm.

HD9008.21.2   HD9008.21.1

HD9007
MULTIPLE RADIATION SHIELD

Characteristics:

Antistatic UV-resistant thermoplastic material with low thermal conductivity and high reflection.

White powder-painted, anticorodal aluminium support bracket. Stainless steel U-bar mounting bracket for shafts from 25 to 44mm.
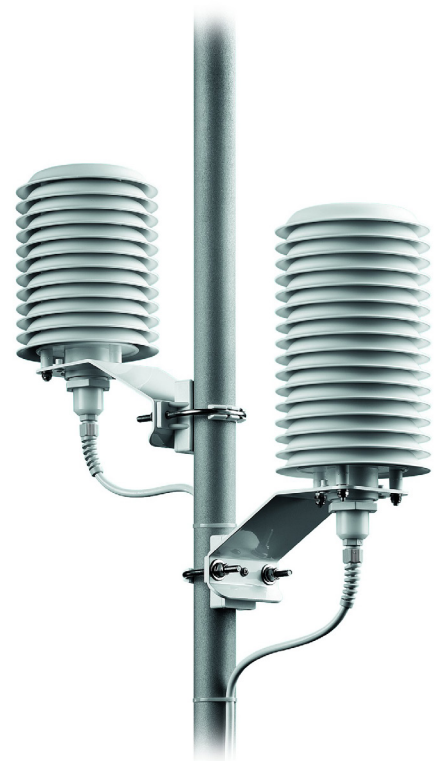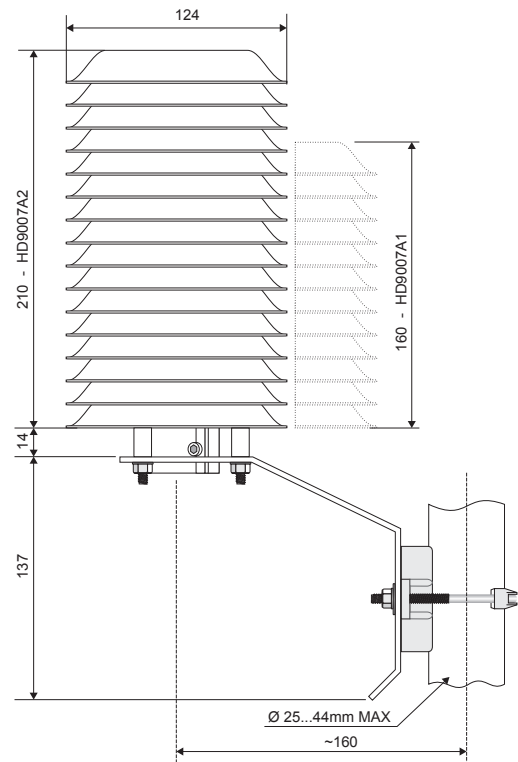
Dimensions: external Ø 124 mm.

Height, excluding bracket: HD9007A-1:   190 mm, weight 640 gr.
                                          HD9007A-2:   240 mm, weight 760 gr.
Sensor fixing ring nuts: Ø 25 mm ÷ Ø 27 mm.

HD9007 ring-shield is suitable to protect temperature and RH/temperature sensors used in weather stations from solar radiations, rain and wind.

Архангельск (8182)63-90-72
Астана (7172)727-132
Астрахань (8512)99-46-04
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Череповец (8202)49-02-64
Ярославль (4852)69-52-93

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