

HD2301.0



HD2301.0 HYGRO- THERMOMETER HANDHELD - READ ONLY

HD2301.0 is a portable instrument with LCD display. It measures relative humidity and temperature using combined probes. Temperature only is measured by Pt100 or Pt1000 immersion, penetration, air or contact probes. When the humidity/temperature combined probe is connected, the instrument calculates and displays the absolute humidity, the dew point, the partial vapour pressure. The probes are fitted with an automatic detection module, with the factory calibration data already stored inside.

The Max, Min and Avg function calculate the maximum, minimum or average values.

Other functions include: the relative measurement REL, the HOLD function, and the automatic turning off (excludable)

The instruments have IP67 protection degree.



Technical specifications	
Measurement of relative humidity	
Measurement range	0...100%RH
Resolution	0.1%RH
Accuracy	±0.1%RH
Drift after 1 year	0.1%RH/year
Measurement of temperature	
Pt100 measurement range	-200...+650 °C
Pt1000 measurement range	-200...+650 °C
Resolution	0.1°C
Accuracy	±0.1°C
Drift after 1 year	0.1°C/year
Measuring unit	°C - °F - %RH - g/m³ - hPa
Power	
Batteries	3 1.5V type AA batteries
Autonomy	200 hours with 1800 mAh alkaline batteries
Power absorbed with instrument off	< 20µA
Connections	
Input module for the probes	8-pole male DIN45326 connector
Operating conditions	
Operating temperature	-5...50 °C
Storage temperature	-25...65°C
Working relative humidity	0...90%RH without condensation
Protection degree	IP67
General characteristics	
Dimensions (Length x Width x Height)	140x88x38mm
Weight	160g (complete with batteries)
Materials	ABS
Display	2 rows 4½ digits plus symbols Visible area: 52x42mm

ORDERING CODES

HD2301.0: The kit is composed of the instrument HD2301.0, 3 1.5V alkaline batteries, operating manual, case. Probes must be ordered separately.

For all suitable probes, see from pag.9 onwards

Accessories

HD75: Saturated solution at 75.4%RH@20 °C for calibration of relative humidity probes, fixing adapter M24x1.5, M12x1.

HD33: Saturated solution at 33.0%RH@20 °C for calibration of relative humidity probes, fixing adapter M24x1.5, M12x1.

HD11: Saturated solution at 11.0%RH@20 °C for calibration of relative humidity probes, fixing adapter M24x1.5, M12x1.

Protection for humidity probes Ø 26, thread M24x1,5

P1: Technopolymer and 34µm stainless steel grid protection. Operating temperature: -40...80 °C.

P2: Technopolymer and 20µm sintered PE protection Operating temperature: -40...80 °C.

P3: 20µm sintered bronze protection Operating temperature: -40...150 °C.

P4: 20µm sintered PE protection. Operating temperature: -40...80 °C.

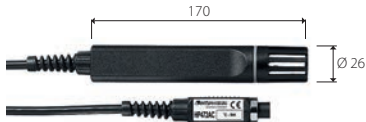
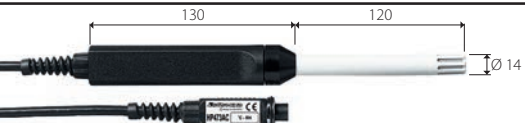
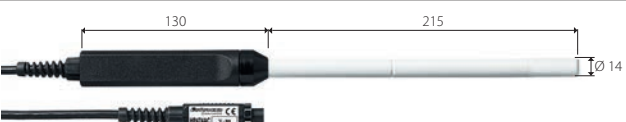
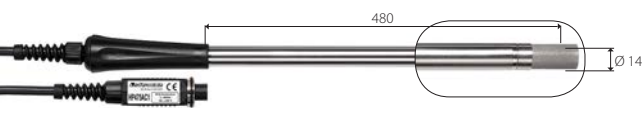
Protection for humidity probes Ø 14, thread M12x1

P6: 10µm sintered stainless steel protection. Operating temperature: -40...180 °C.

P7: 20µm PTFE protection. Operating temperature: -40...150 °C.

P8: PBT and 10µm stainless steel grid protection. Operating temperature: -40...120 °C.

COMBINED DEW POINT AND TEMPERATURE PROBES WITH SICRAM MDOULE

CODE	SENSORS	RANGE RH - TEMP	DIMENSIONS
HP472ACR	RH Pt100	0...100% RH -20 °C...+80 °C	
HP473ACR			
HP474ACR		0...100% RH -40 °C...+150 °C	
HP475ACR			
HP475AC1R			
HP477DCR			
HP478ACR		0...100% RH -40 °C...+150 °C	
HP480 / HP481	Pt100	0...100%RH -40...+60 °C	For the technical specifications of these probes please see page 12-13

PROBES COMMON CHARACTERISTICS

Relative humidity

Sensor	Capacitive
Temperature drift @ 20 °C	Max 0.02%RH/°C
Response time %RH at constant temperature	10 sec (10÷80%RH; air speed=2m/s) at constant temperature

Temperature with sensor Pt100

Temperature drift @20 °C	0.003%/°C
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Accuracy

%RH	±1.5% RH (0...90%RH) ±2.0% RH (90...100%) @ T=15...35°C ±(1.5 + 1.5% of the displayed value)% RH in the remaining temperature range
Temperature	± 0.3°C

PROBES PROTECTION

	P1	P2	P3	P4	P6	P7	P8
Operating Temperature	-40...80 °C	-40...80 °C	-40...150 °C.	-40...80 °C	-40...180 °C	-40...150 °C	-40...120 °C
Material	Technopolymer and 34µm stainless steel grid protection	Technopolymer and 20µm sintered PE protection	20µm sintered bronze protection	20µm sintered PE protection	10µm sintered stainless steel protection	20µm PTFE protection	PBT and 10µm stainless steel grid protection
View							
Technical Spec.	suitable for probes Ø 26 - thread M 24x1,5				suitable for probes Ø 14 - thread M 12x1		

HD75, HD33, HD11



HD75, HD33, HD11

RH CALIBRATION - SALT SATURATED SOLUTION

For checking, setting up or calibrating instruments with relative humidity sensors

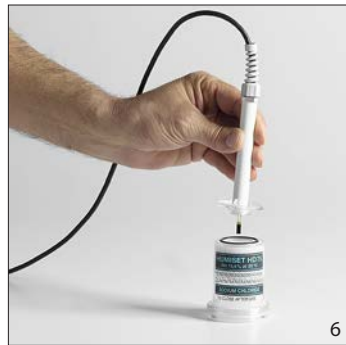
Before starting

1. Make sure that inside the chamber containing the saturated salt solutions there are at the same time:
 - solid salt
 - liquid solution or wet salt
2. The instrument and the saturated solutions to be used are to be kept in an environment at stable temperature while checking or calibrating them.
3. Wait for at least a couple of hours at stable temperature so that the instrument and the salt solutions reach thermal equilibrium with the environment.
4. Unscrew the cap of the first saturated salt solution to be used for checking or calibrating the instrument. Use:
 - for probes with thread M24X1,5, the bottle threaded hole M24X1,5 directly;
 - for probes with thread M12X1, the supplied adapter M24X1,5 / M12X1.
5. If there is any liquid inside the measurement chamber, dry it with clean absorbent paper. The uncertainty of the solution or measurement is not influenced by any liquid left inside the measurement chamber.
6. Screw the probe to the bottom of the thread; do not touch the sensitive element with your hands or any other object or liquid.
7. The temperature of the salt solution and that of the sensor must be the same or very close. Once the sensor is inserted, wait for at least 30 minutes.
8. Connect the probe to the instrument or transmitter. Power or turn them on as per instructions.
9. After 30 minutes, start the calibration procedure for the first calibration point according to the instruction manual of the specific instrument.
10. Once you have checked, set up or calibrated the first point, take the probe out of the bottle and put the cap back on the bottle. Make sure you do not mix it up with that of other saturated solutions.
11. Repeat points 1, 2, 3 and 4 to perform the second calibration point with the second saturated solution.

Notes and warnings:

- I. Keep salt solutions in the dark at a temperature of about 20 °C.
- II. Salt solutions are effective and can be used as long as there is salt to be melted as well as liquid inside them. As a rule, in 33% RH solution make sure that there is some solid salt left, while in 75%RH solution make sure that there is some liquid left or salt is wet.
- III. For better results, the temperature of the probe and that of the saturated solution must be as close as possible. Do not forget that plastic materials are bad conductors of heat. Any difference of tenths of degree between the sensor and the saturated salt solution leads to errors of RH points.
- IV. Do not touch the sensitive element with your hands or other objects. Scratches and dirt alter the instrument measurement and may damage the sensor.
- V. The measurement chamber must be closed, otherwise the equilibrium cannot be reached.
Thoroughly screw the probe to the bottle.
- VI. The check or calibration sequence for Delta OHM instruments or transmitters is always as follows:
first solution: 75% RH
second solution: 33%RH
third solution: 11% RH (if any)
No sequence is compulsory for checking the sensor.
- VII. To calibrate or set up the instrument, follow the instruction manual of the instrument that you are using.
- VIII. If you check, set up or calibrate the instrument at a temperature of other than 20 °C, see the following table to find out the equilibrium relative humidity reference value of the salt solution corresponding to the working temperature. In this table, you will find the saturated salt relative humidity variation when temperature changes.

Temp. °C	Lithium Chloride	Magnesium Chloride	Sodium Chloride
0	11.23 ± 0.54	33.66 ± 0.33	75.51 ± 0.34
5	11.26 ± 0.47	33.60 ± 0.28	75.65 ± 0.27
10	11.29 ± 0.41	33.47 ± 0.24	75.67 ± 0.22
15	11.30 ± 0.35	33.30 ± 0.21	75.61 ± 0.18
20	11.31 ± 0.31	33.07 ± 0.18	75.47 ± 0.14
25	11.30 ± 0.27	32.78 ± 0.16	75.29 ± 0.12
30	11.28 ± 0.24	32.44 ± 0.14	75.09 ± 0.11
35	11.25 ± 0.22	32.05 ± 0.13	74.87 ± 0.12
40	11.21 ± 0.21	31.60 ± 0.13	74.68 ± 0.13
45	11.16 ± 0.21	31.10 ± 0.13	74.52 ± 0.16
50	11.10 ± 0.22	30.54 ± 0.14	74.43 ± 0.19
55	11.03 ± 0.23	29.93 ± 0.16	74.41 ± 0.24
60	10.95 ± 0.26	29.26 ± 0.18	74.50 ± 0.30
65	10.86 ± 0.29	28.54 ± 0.21	74.71 ± 0.37
70	10.75 ± 0.33	27.77 ± 0.25	75.06 ± 0.45
75	10.64 ± 0.38	26.94 ± 0.29	75.58 ± 0.55
80	10.51 ± 0.44	26.05 ± 0.34	76.29 ± 0.65
85	10.38 ± 0.51	25.11 ± 0.39	
90	10.23 ± 0.59	24.12 ± 0.46	
95	10.07 ± 0.67	23.07 ± 0.52	
100	9.90 ± 0.77	21.97 ± 0.60	



HP480, HP481



HP480, HP481 - PROBES FOR TEMPERATURE, RELATIVE HUMIDITY AND DEW POINT MEASUREMENT IN PIPES.

Compressed air is used for several purposes, many of which require compressed air with a low humidity level, and so comes the need to know the dew point (DP) of water vapour in the compressed air that circulates in the system. The **HP480** and **HP481** probes are designed specifically for this purpose.

The use of dew point measurement in order to limit moisture in compressed air distribution systems has many advantages:

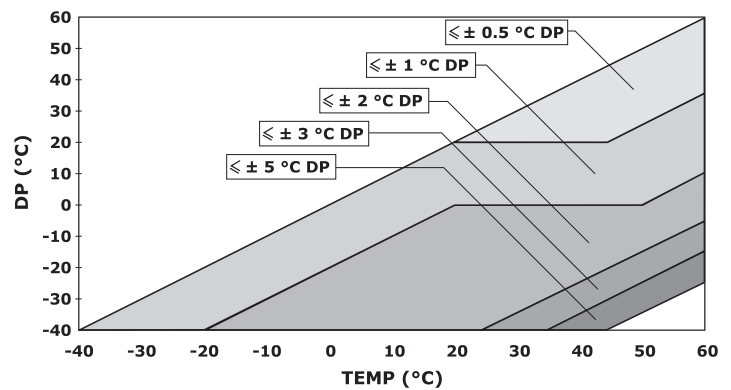
- prevents corrosion of metal pipes;
- in cold areas, prevents the formation of ice inside the pipes leading to obstruction of the pipes themselves;
- prevents bacterial growth in plants for medical use
- reduces maintenance costs of pneumatic drives, maintaining the proper lubrication of moving parts;
- improves the quality of products coming into contact with air, for example in the drying process of granulates.

Typical installation HP480

The probe can be installed in any position. The connection to the compressed air can be achieved with a threaded connection or with a quick connection.

The connection allows for quick installation and removal of the probe without stopping the system. There are 3 different couplings supplied: 1/4" Italian, German and American standard.

The probe is equipped with a filter made of sintered steel, stainless steel measuring chamber and control valve of the air flow. Suitable for measurement of compressed air with dew point up to class 3 according to standard ISO8573-1.



Graph 1: accuracy of the dew point measurement (DP)

Typical installation HP481

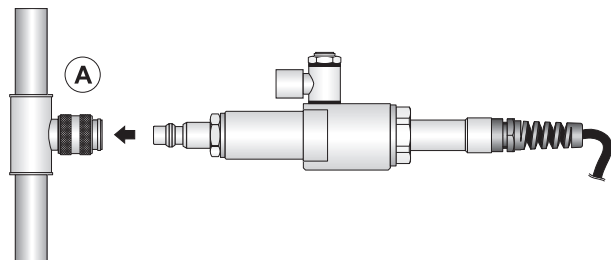
HP481 is a combined relative humidity and temperature probe suitable for in-line installation. The probe can be used in pressurized pipes, or in which vacuum is required. It is equipped with a G 1/2" threading for the connection to the system and can be installed in any position. The probe is equipped with a sintered steel filter.

Connections

The probes can be connected to the pipe in three ways:

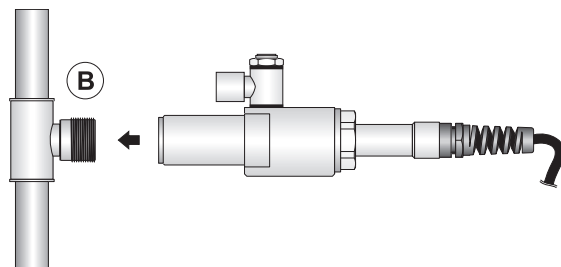
- by using the measuring chamber with a quick coupling (only HP480);
- by using the measuring chamber with a threaded G 1/4" connection (only HP480);
- directly (without measuring chamber) with a threaded G 1/2" connection.

Connection with measuring chamber and quick coupling:



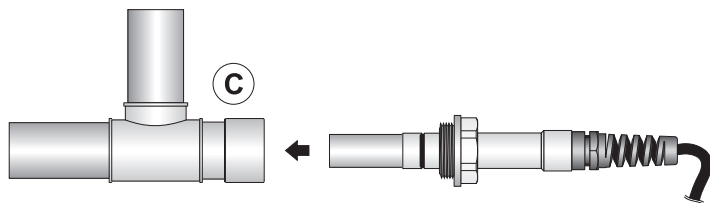
To connect with quick coupling, you can use one of the standard 1/4" couplings provided. Other couplings than those supplied can be used, provided that they have a G 1/4" thread on the side that fits into the probe.

Connection with measuring chamber and threaded connection:



For the connection by threaded coupling, the connection must have an external G 1/4" thread on the side which will be placed in the probe. The connection must be airtight. When installing or removing the probe, it is necessary to depressurize the system.

Direct connection (without measuring chamber) only for HP481 and threaded connection:



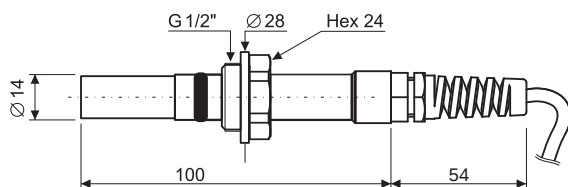
For direct connection of the probe, use a fitting with internal G 1/2" thread on the side which will be placed in the probe. The connection must be airtight. When installing or removing the model HP480, it is necessary to depressurize the system. Ensure that the probe does not obstruct the normal flow of air through the distribution line.

In all modes of installation, it is recommended that you place in the plant, upstream of the sensor, a safety valve to be closed manually in case of maintenance of the probe.

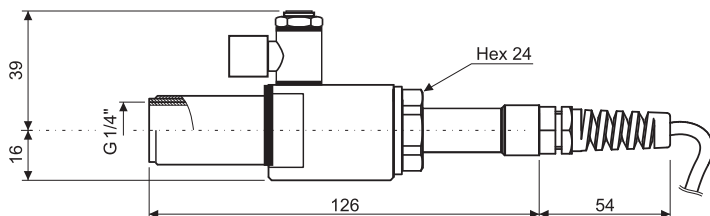
Periodically check the cleanliness of the sintered filter of the probe, in order to maintain optimum response characteristics of the probe. The filter can be washed with a detergent that leaves no traces.

DIMENSIONS

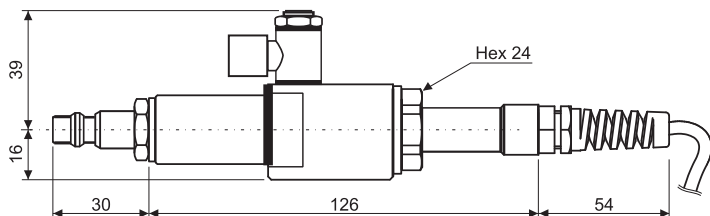
Dimensions (mm) of the probe without measuring chamber:



Dimensions (mm) of the probe with measuring chamber, without quick coupling (only HP480):



Dimensions (mm) of the probe with measuring chamber and quick coupling (only HP480):



ORDERING CODES

HP480: Interchangeable temperature and relative humidity probe, complete with SICRAM module. Connection cable 2m. Equipped with 15μ sintered AISI 316 stainless steel filter, measuring chamber, air flow regulation valve, and three 1/4" quick couplings (standard Italian, German, and American).

HP481: Interchangeable temperature and relative humidity combined probe, complete with SICRAM module. Connection cable 2 m. Equipped with 15μ sintered AISI 316 stainless steel filter, G 1/2" threading.

Technical specifications	HP480	HP481
Relative humidity		
Sensor	capacitive	
Measuring range	0...100%RH	
Accuracy (@ T = 15...35 °C)	± 1,5%RH (0..90%RH), ± 2%RH (remaining field)	
Accuracy (@ T = -40...+60 °C)	± (1,5 + 1,5% of the measured value)%RH	
Long term stability	< 1%RH/year	
Temperature		
Sensor	Pt100	
Measuring range	-40...+60 °C	
Accuracy	± 0,25 °C	
Dew point		
Sensor	Parameter calculated from the measurement of temperature and relative humidity	
Measuring range	-40...+60 °C DP	
Accuracy (@ T = 20 °C)	± 2 °C DP (-40...0 °C DP) ± 1 °C DP (0...+20 °C DP)	
Accuracy (@ T = -40...+60 °C)	see graph 1	
General features		
Connection	G ½" or G ¼" or quick coupling	G ½"
Regulation of the air flow	From 0,2 to 3 l/min	
Cable length	2m	2m (other lenghts on request)
Filter	Sintered 15µ AISI 316 steel	
Material of the measuring chamber	AISI 304 stainless steel	
Operating temperature of the probe	-40...+80 °C	
Operating pressure of the probe	0...16 bar	-1...16 bar
Protection degreee	IP65	
Compatibility with ethylene oxide (C2H4O)	The maximum allowed concentration in continuous operation which causes a deviation within 2% is 3 ppm	