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Capacitive hygrothermal transducers with intelligent interchangeable probes

- For measuring relative humidity and temperature
- Measurement over the entire humidity range from 0 to 100% rH
- For operating temperatures from -40 to +80°C
- Intelligent interchangeable probes are easy to exchange without readjusting the device electronics
- With separate measurement probes option for humidity and temperature
- 2m, 5m or 10m long adapter cable for probe extension
- Special rugged metal housing, can be used in clean rooms
- Integrated LC Display (optional)
- With standardized current or voltage outputs
- For versatile applications in the pharmaceutical industry and for greenhouse, clean room, storage and coldstore applications

Plug-in measurement probes that can be interchanged within seconds are the main feature of this new series. Because the calibration data is directly stored in the probe, probes can be exchanged without any loss of accuracy. Highly-accurate calibration procedures and state-of-the-art microprocessor technology also ensure reliable measurement and high measuring accuracy over the entire field of application. The outstanding long-term stability is based on years of experience with the capacitive humidity sensors being used.

For applications in higher ambient temperatures, where space is at a premium or just to extend the probes, simply adapt the 2m, 5m or 10m long adapter cables available as options between the measurement probe and the transducer.

The usual voltage outputs 0 - 1V, 0 - 5V, 0 - 10V or 4 - 20mA (2-wire) current outputs are available as output signals and temperature scaling can be customized ex-factory to the required ranges (see order details).

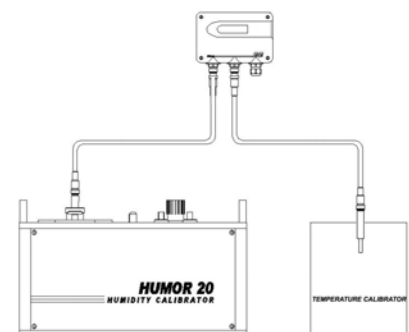
An integrated LC Display option allows the current humidity and temperature values to be shown alternately.

On-site calibration of humidity and temperature

The loop calibration of humidity and temperature values recommended by the FDA (Food and Drug Administration) in the pharmaceutical and biological engineering industries can easily be performed by means of the rH and T measurement probes that can also be supplied separately, as an option. Function keys are attached to the inside to make it simple to implement a necessary adjustment to the two analog outputs, when required.

Reference probes

Reference probes are available as accessories to allow you to test the function and accuracy of the measuring loop. The two reference probes can be fitted instead of the interchangeable measurement probes and output fixed humidity and temperature values. Reference probes are supplied together with a test report and simulate a high humidity value and a low temperature value and vice versa (probe 1: 90% rH/5°C and probe 2: 10% rH/45°C). This makes it possible to test the two analog outputs at the top and bottom end of the scaling.



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Technical data

Humidity

Sensing element

Type: HC105 capacitive (SMD version, condensation permitted),
largely maintenance free in normal, clean air

Measuring/working range

0 to 100 % rH

Medium

air, unpressurized, not corrosive

Accuracy

(incl. hysteresis, non-linearity
and repeat accuracy)

$\pm(1.5 + 0.5 \times \text{measured value})$ % rH; (at <90 % rH; -15 to +40 °C)
 ± 2.5 % rH; (at >90 % rH; -15 to +40 °C)
 $\pm(1.7 + 1.5 \times \text{measured value})$ % rH; (at -40 to +80 °C)

The tolerance data includes the uncertainty of the factory calibration with an expansion factor $k = 2$ (double the standard deviation). The tolerance is calculated to EA-4/02, taking GUM (Guide to the Expression of Uncertainty in Measurement) into consideration.

Temperature dependence of the electronics

± 0.006 % rH/°C

Response time rH

(with stainless steel mesh filter)

typ. <15s

(at 20 °C/ $t_{0.9}$)

Temperature

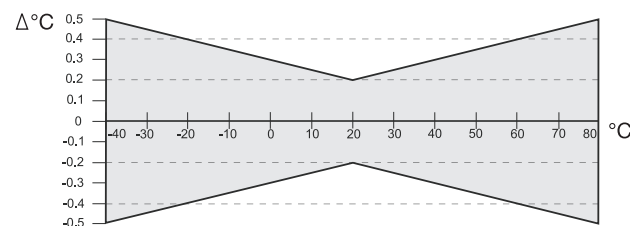
Sensing element

Pt1000 thin film temperature sensor
tolerance class A to DIN EN 60 751

Measuring range

-40 to +60 °C, measurement probes directly on the hygrothermal transducer
-40 to +80 °C, remote measurement probes, by means of the adapter cable

Measuring accuracy



Temperature dependence of the electronics

± 0.007 °C/°C

Response time T

(with stainless steel mesh filter)

typ. <3mins ($t_{0.63}$), with combined measurement probe (rH+T)
typ. <6mins ($t_{0.63}$), for separate T measurement probe

Analog outputs

0 to 100 % rH/xx to yy °C
(for T scaling, see order details)

0 to 1V
0 to 5V/0 to 10V
4 to 20mA (two-wire)

$(-0.5\text{mA} < I_L < 0.5\text{mA})$
 $(-1\text{mA} < I_L < 1\text{mA})$
 $(R_L < 500\text{ohms})$

Temperature sensitivity of the analog outputs

max. $0.2 \frac{\text{mV}}{^\circ\text{C}}$ or $1 \frac{\mu\text{A}}{^\circ\text{C}}$

Electrical data

Supply for

0 to 1V
0 to 5V
0 to 10V
4 to 20mA

10 to 35V DC or 9 - 29V AC
12 to 35V DC or 15 - 29V AC
15 to 35V DC or 15 - 29V AC
10 to 35V DC

Burden (I output)

$$R_L < \frac{U_V - 10V}{0.02A} [\Omega]$$

Power consumption

typically 10mA for DC

typically 20mA_{eff} for AC

Electromagnetic compatibility

EN 61 000-6-3
EN 61 000-6-2

CE

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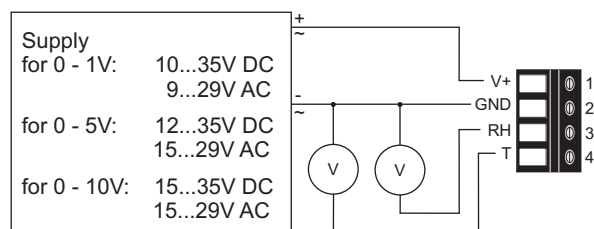


General information

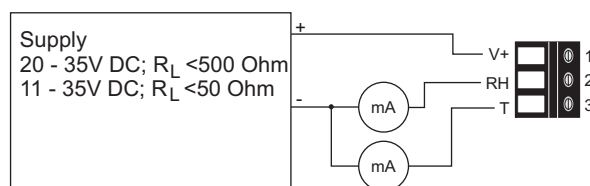
Housing	Al Si 9 Cu 3
Probes	stainless steel 1.4305 (reference probes made of PC plastic)
Dimensions	Housing: 163(135)mm x 90mm x 50mm (W x H x D) (rH/T) probe: 13mm x 91mm (D x L) (T) probe (separate): 12(6)mm x 93mm (D x L)
Cable gland	M 16 x1.5 (Lumberg connector option (RSF 50/11))
Terminals	Screw terminals for cable cross-sections up to 2.5mm ²
Housing protection class	IP65 (IP10 for rear cable entry, IP40 for plain wall mounting)
Ambient temperatures	Measurement probe: -40 to +60°C (+80°C with adapter cable) Electronics: -40 to +60°C Storage temperature: -40 to +60°C
Sensor protection	PTFE filter, pore size: 50µm High chemical resistance, response time $t_{0.1/0.9}$: typ. 14s Stainless steel mesh filter (standard), for average pollution, high mechanical strength, suitable for high humidity applications, response time $t_{0.1/0.9}$: typ. 7s
Weight	approx. 800g

Connection diagrams

Voltage output



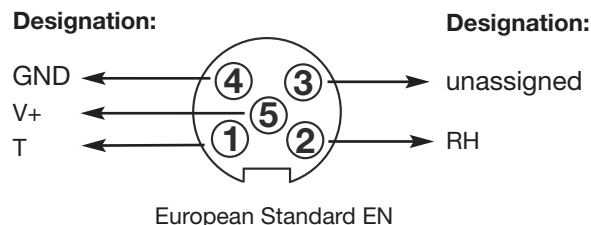
Current output



Connection diagrams for a Lumberg connection

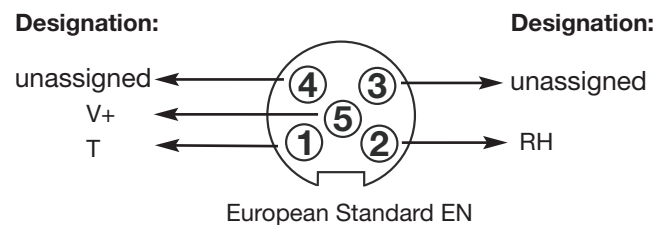
Voltage output

Connector for supply and analog outputs
 (front view)



Current output

Connector for supply and analog outputs
 (front view)



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User information

Mounting

Mount the humidity transducer somewhere in the room that is representative for measuring humidity, on walls or on equipment and systems. Avoid siting it near radiators, windows and doors (when measuring indoors, also avoid outside walls) and on powerfully vibrating surfaces or in direct sunlight. The transducer must be protected against dirt, as well as falling or splashing water. Although condensation and splashwater will not damage the transducer, they can cause faulty readings until the probe element has dried out. Dust is not usually damaging, either, but it does reduce the dynamic response.

Maintenance notes

The capacitive humidity sensing element is largely maintenance free in normally clean air. Corrosive media and those containing solvents, can cause faulty readings and even failure. Deposits that ultimately form a water-repellent film on the sensing element, are also harmful. Dirty protective filters must be replaced in good time. You must not touch the surface of the humidity sensor with your hands. Use a soft brush to clean the sensor. Distilled water can also be used for rinsing, but solvents or cleaning agents must not be used. Once the transducer is completely dry, correct measured values should reappear.

Sensor coating

With some industrial processes, heavily polluted and/or corrosive environments can impair the function of the humidity sensor and the measured values may show signs of drift. The sensor coating, available as an option, offers better protection against this (see order details), as it greatly reduces the impact and noticeably improves the long-term stability of the transducer.

Test and calibration

Humidity sensor check sets can be used to test the accuracy of the humidity transducers from time to time. This process is described in more detail in DIN 50 008, IEC publication 260, ISO/R 483-1966. The basic principle is, that an aqueous, saturated saline solution creates a corresponding climate in an enclosed airspace. Sensor check sets with 33% rH, 55% rH and 76% rH values are available ex-stock as accessories. Calibration intervals depend heavily on the particular application. But we recommend that a check is carried out at least once a year.

Warning

Interfering with internal parts will invalidate any warranty claim.



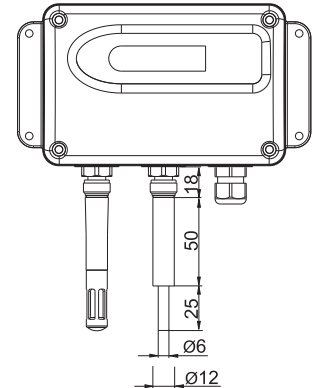
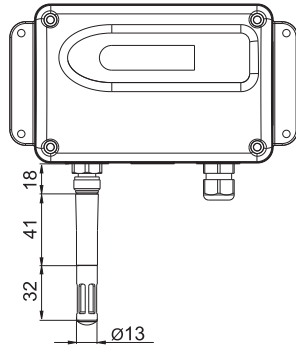
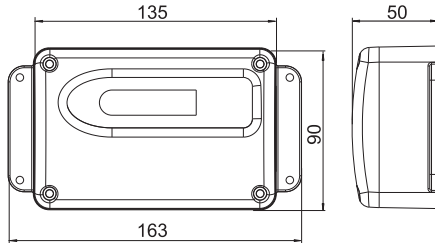
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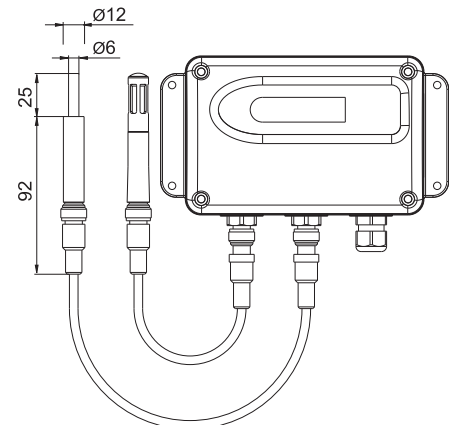
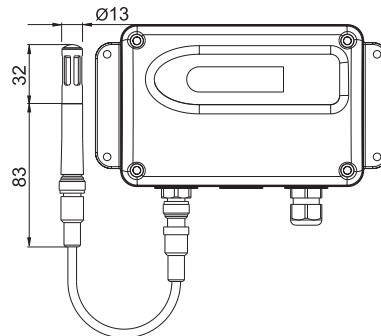
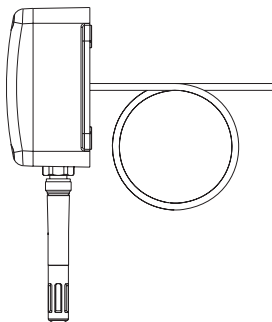
Dimensions



Transducer housing

Hygrothermal transducer for wall mounting with one plug-in rH+T measurement probe

Hygrothermal transducer for wall mounting with two plug-in rH+T measurement probes



Hygrothermal transducer for wall mounting with rear cable entry

Hygrothermal transducer for wall mounting with one remote rH+T measurement probe

Hygrothermal transducer for wall mounting with two remote rH+T measurement probes

Measurements in mm.

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Order details

(1) Basic type	
907027/20	Hygrothermo transducer wall model with combined measurement probe (rH+T)
907027/21	Hygrothermo transducer wall model with separate measurement probe (rH+T)
(2) Version	
2	Humidity and temperature (rH+T)
(3) Ausgang	
005	4 ... 20mA
051	0 ... 1V
057	0 ... 5V
065	0 ... 10V
(4) Line insertion	
10	Line screw connection (M16x1.5), fitted on the bottom
20	Line lead-through, open on the rear (clean room wall mounting)
(5) Type of filter	
800	PTFE filter
889	Stainless steel mesh filter (standard)
(6) Display	
0	Without display (standard)
1	With integrated display
(7) Electrical connection	
00	Connection terminals (standard)
91	Lumberg connector (not available for basic type 907027/21)
(8) Sensor protection	
1	With coating (standard)
(9) Temperature unit	
0	°C (standard)
1	°F
(10) Measuring ranges	
09	0 ... 100 % rH; -20 ... +60°C
10	0 ... 100 % rH; -20 ... +80°C (standard)
14	0 ... 100 % rH; -40 ... +60°C
15	0 ... 100 % rH; -40 ... +80°C
21	0 ... 100 % rH; -30 ... +60°C
22	0 ... 100 % rH; -30 ... +70°C
32	0 ... 100 % rH; 0 ... 60°C
34	0 ... 100 % rH; 0 ... 50°C
38	0 ... 100 % rH; 0 ... 80°C
99	Special measuring range

Order code (1) (2) (3) (4) (5) (6) (7) (8) (9) (10)
Order example 907027/20 - 2 - 005 - 10 - 889 - 1 - 00 - 1 - 0 - 14

Stock versions

Order code	Part no.
907027/20-2-005-10-889-0-00-1-0-10	00556339
907027/21-2-005-10-889-0-00-1-0-10	00556653

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Accessories

Designation	Part no.
Humidity sensor check: 33 % rH, magnesium chloride	00332758
Humidity sensor check: 53% rH, magnesium nitrate	00332759
Humidity sensor check: 76% rH, sodium chloride	00332760
Stainless steel grid filter (standard)	00503576
PTFE filter	00503575
PUR extension cable (shielded); machine plug M12 x 1, 2 m	00503577
PUR extension cable (shielded); machine plug M12 x 1, 5 m	00503578
PUR extension cable (shielded); machine plug M12 x 1, 10 m	00503579
Single measuring probe (T), stainless steel housing	00504581
Combination measuring probe (rH+T), stainless steel housing, grid filter (standard)	00561059
Combination measuring probe (rH+T), stainless steel housing, PTFE filter	00550909
Reference set (with 2 probes (rH+T), fixed simultaneous values)	00504582
Duct installation kit "HA010209"	00515032
LC display, including metal housing cover	00504576