

Hygro and hygrothermo transducers (capacitive) for climatic applications

- to measure relative humidity and temperature
- for indoor and air duct mounting
- special rod model for laboratory or variable application
- with current or voltage outputs
- with fast-response capacitive humidity sensor

Correct measurement of air humidity in climatic applications is very important, as is that of other variables, e.g. temperature. Optimum adjustment of humidity in climatic installations, for example, can contribute to significant savings in energy consumption and to improvement in personal comfort.

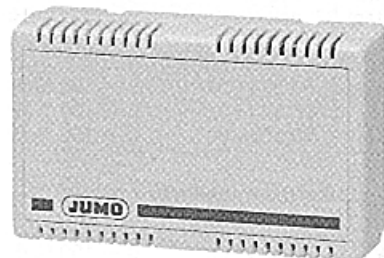
Hygro and hygrothermo transducers with capacitive humidity sensor are specially designed for such applications, e.g. in ventilating and air conditioning systems as well as for climatic monitoring indoors.

The method is based on the capacity change of a capacitor with changes in the dielectric. The humidity sensor consists of a support plate carrying the electrodes and covered by a hygroscopic polymer layer. This polymer layer absorbs water molecules from the medium being measured (air) or gives them off, and as a result changes the capacity of the capacitor. An electronic circuit converts the capacity corresponding to humidity and produces a standard current or voltage output signal. Due to the small intrinsic mass of the sensor and its special construction it is possible to achieve very fast response.

The transducer ensures reliable humidity measurement in the working range of 10 — 95 % rH. Versions with an additional temperature measuring range are available for wider applications. Temperature is measured with a fast-response thin-film Pt 100 temperature sensor to EN 60 751.

Instrument versions are available with output signals of 4 — 20 mA, 0 — 20 mA or 0 — 10 V corresponding to the humidity range 0 — 100 % rH and the different temperature ranges (see page 2 / 5).

Different constructional styles ensure simple and reliable installation to suit application and location.



Indoor version



Duct version



Rod version

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MEASUREMENT AND CONTROL

Data Sheet 90.7020

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Indoor version

Hygro transducer

Item	Type	Humidity		Temperature		Supply	Sales No.
		range*	output 1	range**	output 2		
1	90.503-F01	0 — 100 % rH	4 — 20 mA	—	—	15 — 24 V DC	90 / 00315097 ●
	90.503-F02	0 — 100 % rH	0 — 10 V	—	—	15 — 24 V DC	90 / 00315098
	90.503-F03	0 — 100 % rH	0 — 20 mA	—	—	15 — 24 V DC	90 / 00315099

Hygrothermo transducer

2	90.503-F05	0 — 100 % rH	4 — 20 mA	-30 to +60 °C	4 — 20 mA	15 — 24 V DC	90 / 00332708 ●
	90.503-F06	0 — 100 % rH	4 — 20 mA	0 — 50 °C	4 — 20 mA	15 — 24 V DC	90 / 00315100
	90.503-F07	0 — 100 % rH	0 — 10 V	0 — 50 °C	0 — 10 V	15 — 24 V DC	90 / 00315101
	90.503-F08	0 — 100 % rH	0 — 20 mA	0 — 50 °C	0 — 20 mA	15 — 24 V DC	90 / 00315102

Duct version

Hygro transducer

3	90.503-F11	0 — 100 % rH	4 — 20 mA	—	—	15 — 30 V DC	90 / 00315103 ●
	90.503-F12	0 — 100 % rH	0 — 10 V	—	—	15 — 30 V DC	90 / 00315104
	90.503-F13	0 — 100 % rH	0 — 20 mA	—	—	15 — 30 V DC	90 / 00315105

Hygrothermo transducer

4	90.503-F21	0 — 100 % rH	4 — 20 mA	-30 to +60 °C	4 — 20 mA	15 — 30 V DC	90 / 00332698 ●
	90.503-F22	0 — 100 % rH	4 — 20 mA	-10 to +90 °C	4 — 20 mA	15 — 30 V DC	90 / 00332699
	90.503-F23	0 — 100 % rH	4 — 20 mA	0 — 100 °C	4 — 20 mA	15 — 30 V DC	90 / 00332700
	90.503-F16	0 — 100 % rH	4 — 20 mA	0 — 50 °C	4 — 20 mA	15 — 30 V DC	90 / 00315106 ●
	90.503-F17	0 — 100 % rH	0 — 10 V	0 — 50 °C	0 — 10 V	15 — 30 V DC	90 / 00315107
	90.503-F18	0 — 100 % rH	0 — 20 mA	0 — 50 °C	0 — 20 mA	15 — 30 V DC	90 / 00315108

Hygrothermo transducer, high-temperature version for air temperatures up to 120 °C

5	90.503-F24	0 — 100 % rH	4 — 20 mA	0 — 120 °C	4 — 20 mA	15 — 30 V DC	90 / 00332709 ●
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Rod version

Hygrothermo transducer

6	90.503-F30	0 — 100 % rH	4 — 20 mA	-20 to +80 °C	4 — 20 mA	15 — 30 V DC	90 / 00315109 ●
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Accessories

for duct and rod versions only

7	Plastic grille (to special order)	—
	Sintered filter (to special order)	—
	Humidity Sensorcheck 33 % rH	90 / 00332758
	Humidity Sensorcheck 55 % rH	90 / 00332759
	Humidity Sensorcheck 76 % rH	90 / 00332760

Notes:

Information on other transducers with different temperature ranges, supply voltages and output signals are available on request.

Power supplies for rail mounting see Data Sheet 95.6010.

Recommended supply units: Type TN-22 / 02,055 (1 channel) and TN-67 / 02,055 (4 channels).

* Note working range

** Note permitted ambient temperature

● Available from stock



Technical data

Humidity

Sensing element
capacitive

Measuring / working range
0 / 10 — 100 / 95 % rH
(see diagram page 4 / 5)

Accuracy
± 3.5 % rH
(between 0 — 60 °C)

Medium
air, atmospheric pressure, not corrosive,
not condensing

Response times
50 % time
at v = 2 m / sec: 10 sec approx.
with sintered filter
at v = 2 m / sec: 1.2 min approx.

Temperature coefficient
at 20 °C and 50 % rH
0.05 % rH / °C

Humidity output
current / voltage signal
0 — 20 mA or 0 — 10 V
in 4-wire circuit
and
4 — 20 mA
in 2-wire circuit

Temperature

Sensing element
Pt 100 temperature sensor
to EN 60 751 Class B

Measuring ranges
indoor version:
- 30 to +60 °C or 0 — 50 °C
Duct version:
- 30 to +60 °C, - 10 to +90 °C,
0 — 50 °C, 0 — 100 °C
or
0 — 120 °C
on high-temperature version
Rod version:
- 20 to +80 °C

Accuracy
indoor version:
± 0.8 °C
duct version:
± 0.8 °C
or
± 0.5 °C
on high-temperature version
rod version:
± 0.5 °C

Temperature output
current / voltage signal
0 — 20 mA or 0 — 10 V
in 4-wire circuit
and
4 — 20 mA
in 2-wire circuit

Electrical data

Supply
15 — 24 V DC / 15 — 30 V DC
(see table page 2 / 5)
(24 V AC to special order)

**Max. burden resistance
for current output**
500 Ω

**Min. burden resistance
for voltage output**
10 k Ω

Maximum current uptake
25 mA approx. per channel

Linearity
better than 0.5 %

Output signals
(0) 4 — 20 mA / 0 — 10 V

Electromagnetic compatibility
interference immunity EN 50 082-2
interference emission EN 50 081-2

Construction

Case
indoor version:
high impact strength plastic, light grey
duct version:
ABS plastic
with fitted aluminium shaft
rod version
aluminium shaft with 2 m connecting cable

Permitted ambient temperature
indoor version:
- 10 to +60 °C
duct version:
- 30 to +80 °C on shaft
- 10 to +60 °C on case
or
- 20 to +120 °C on shaft
- 10 to + 60 °C on case
on high-temperature version
rod version:
- 20 to +80 °C

Permitted air velocity
15 m / sec max.

Protection
indoor version:
IP20
duct version:
IP64
rod version:
IP 20

Operating position:
unrestricted, preferable probe vertical down-
wards. On indoor version the ventilation slots
at right angles to the air flow.

Weight
200 — 300 g depending on version

Dimensions

indoor version:
115 mm x 70 mm x 43 mm
duct version:
272 mm x 120 mm x 80 mm
or
300 mm x 120 mm x 80 mm
for high-temperature version
rod version:
20 mm dia., 220 mm long

Maintenance notes

Humidity sensing element

The capacitive humidity sensing element requires no maintenance in normal clean ambient air. Corrosive media or those containing solvents may cause faulty readings or complete failure. Deposits forming a water-repellent film on the sensor are liable to result in faulty operation. Dirty protective filters have to be replaced. The surface of the humidity sensor must not be touched. The sensor can only be cleaned by rinsing with distilled water. Correct measurement is restored again after complete drying. On the indoor and rod versions a soft brush may be used for cleaning.

Installation notes for Indoor version

The indoor sensor should be mounted on a vertical wall approx. 1.5 m above floor level. Installation above heating radiators, close to windows or doors, on surfaces subject to strong shock or vibration, on surfaces exposed to direct sunlight, on external walls and on chimneys should be avoided. The sensors have to be protected against dripping and splashing water. It is important that no air can pass into the interior of the case through cable entries underneath the plaster. Silicone sealants must not be used for sealing the cable entry. The sensor should be mounted so that room air can pass freely from the bottom upwards through the air slits in the case cover.

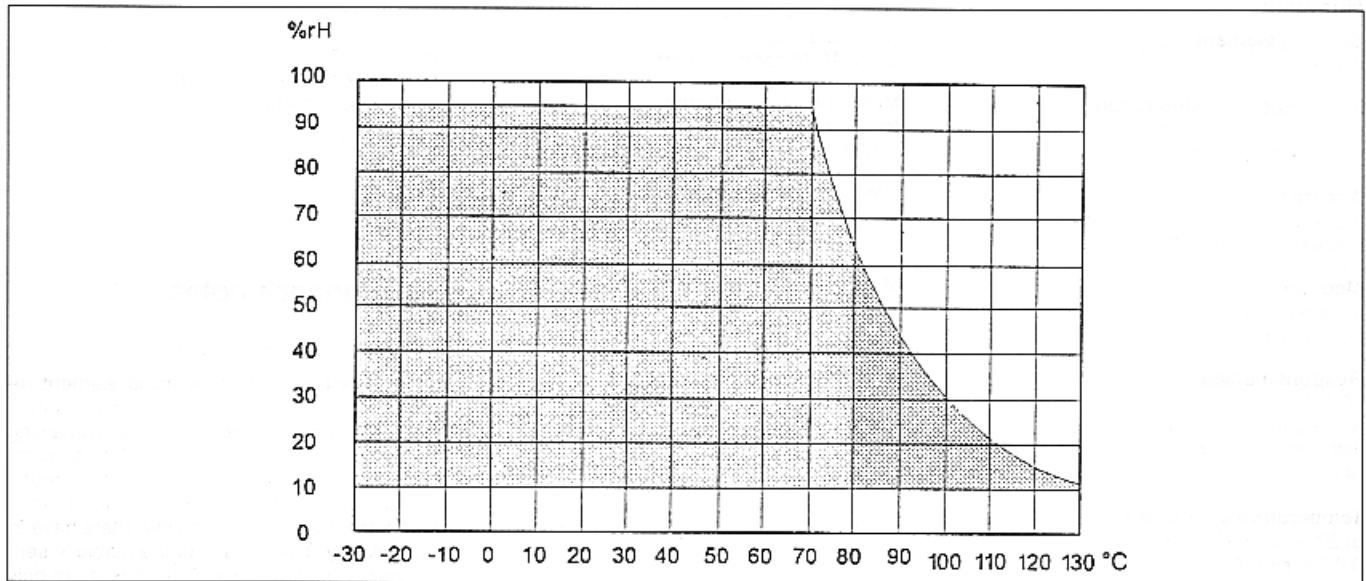
WARNING:

Contact with internal parts invalidates any warranty claim.

Checking and calibration

Humidity Sensorchecks can be used to test the transducer (at least once a year) for accuracy of the humidity measurement. The procedure is described in DIN 50 008, IEC Publication 260, ISO/R 483-1966. The basic principle consists of an appropriate climate being produced above an aqueous saturated salt solution. Sensorchecks with values of 33 % rH, 55 % rH and 76 % rH are available as accessories.

Permitted working range

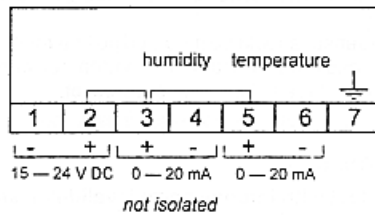
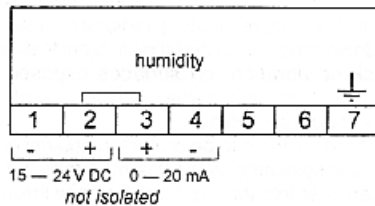


Connection diagram

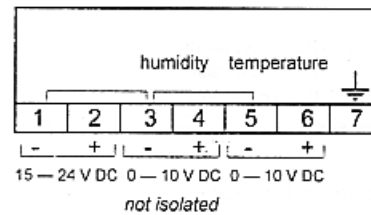
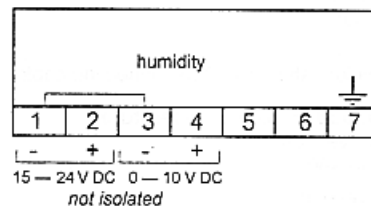
Connection diagrams for indoor, duct and high-temperature versions

EMC Note: use screened signal cable and earth the screen!

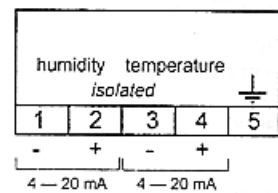
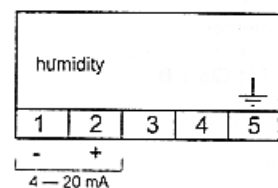
4-wire system 0 — 20 mA***



3/4-wire system 0 — 10 V DC**

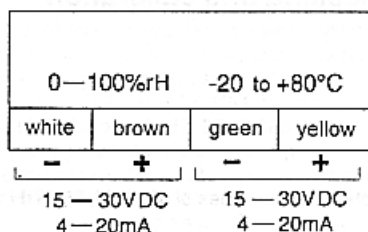


2-wire system 4 — 20 mA*



Connection diagram for rod version

2-wire system 4 — 20 mA*



- * isolated
- ** not isolated, negative is linked
- *** not isolated, positive is linked

mm	inch	mm	inch
4.5	0.18	80	3.15
5	0.20	98	3.86
20	0.79	107	4.21
22	0.87	115	4.53
35	1.38	120	4.72
35.3	1.39	200	7.87
43	1.69	272	10.71
54	2.13	300	11.8
68	2.68	2000	78.7
70	2.76		

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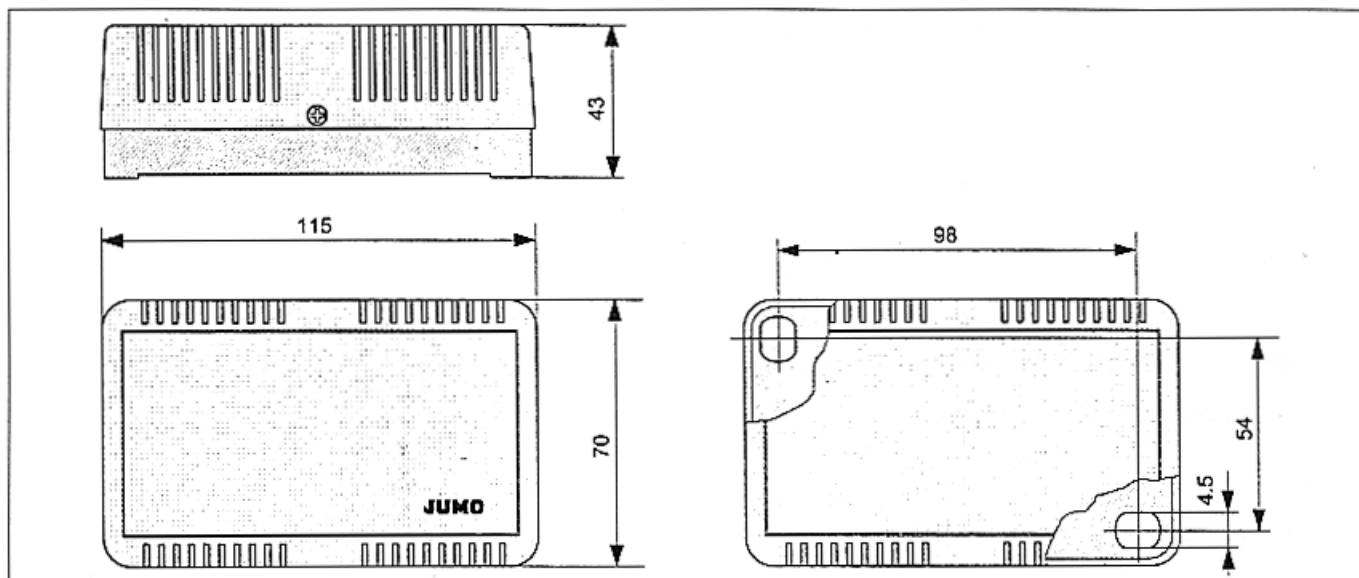
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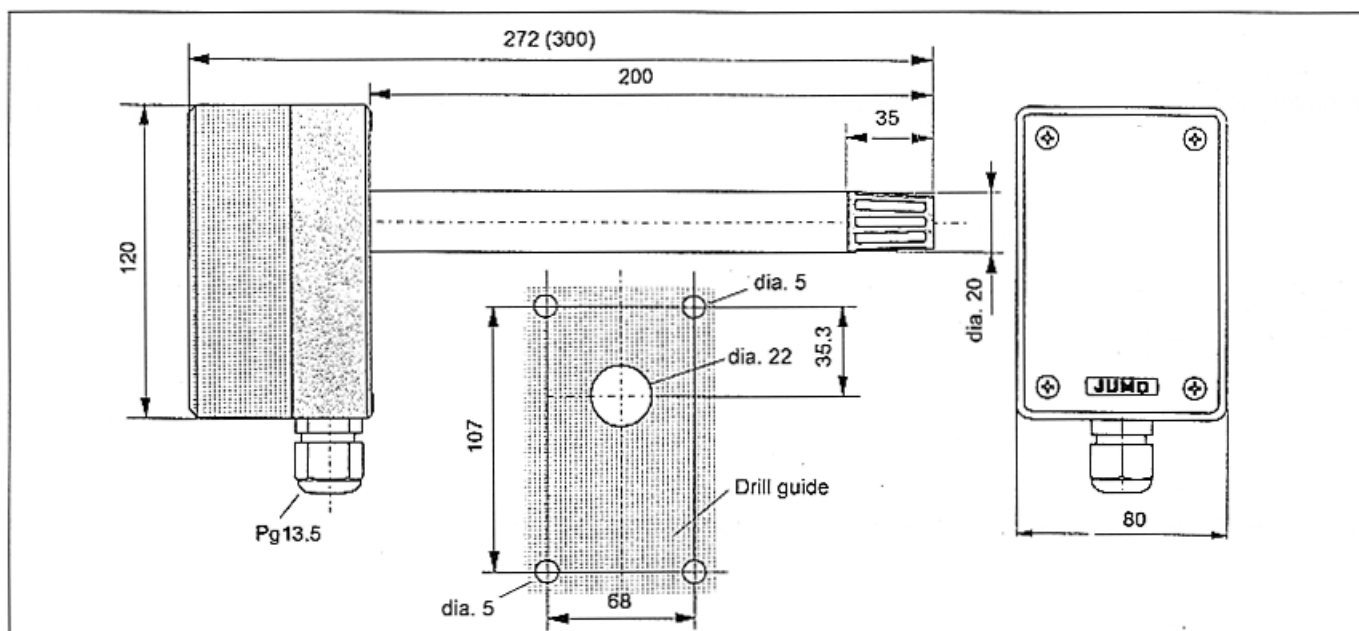


Dimensions

Indoor version



Duct version or high-temperature version



Rod version

