Hygro and Hygrothermal Transducers (Capacitive) for Air Conditioning Applications

- **For measuring relative humidity and temperature**
- **For versatile climatic applications and ventilation**
- **Available in indoor, wall-mounted, and duct version**
- **Compact rod versions with connecting cable or robust terminal head**
- **With current and voltage outputs as well as passive temperature output**
- **Optional indoor and wall-mounted version with two-line LCD display available**

Designed for the most frequently used ventilation and air conditioning applications, these measuring probes are characterized in particular by their easy installation, robust form, and reliable humidity measurement technology.

The relative humidity is recorded by means of a humidity-dependent capacitor. The capacitive sensor element consists fundamentally of a carrier plate upon which electrodes are placed and a hygroscopic layer of polymer over this. This polymer film absorbs or releases water molecules from the medium being measured (air), thereby changing the capacity of the capacitor. A downstream electronic circuit converts the capacity corresponding to air humidity, and produces a standardized current or voltage signal.

The measuring probes are only designed for atmospheric pressure systems and non-aggressive gases. They are non-condensing and guarantee a reliable humidity measurement for each working range. Versions are available with an additional temperature duct for extended application.

The measured values are transferred by way of standardized output signals with 4 to 20 mA, 0 to 1 V, or 0 to 10 V at the subsequent electronics. Some versions are also optionally available with a passive Pt100 temperature output, which rules out costs for extended electronics.

The new indoor and wall-mounted case was specifically designed to meet the requirements of the user with regard to ease of assembly and maintenance, as well as looking to optimize measurement technology. A separate, removable case bottom section with predefined mounting holes, which are also suitable for flush-mounted socket assembly, ensures, amongst other things, very simple installation of the indoor version. The simple but practical sealing system also enables easy opening and closing of the device without requiring a great effort. The robust wall case with increased IP65 humidity protection accounts for this requirement. For example, only a single screw is necessary here in order to secure the device.

Both new variants can be delivered with a two-line LCD display, which enables the simultaneous display of current humidity and temperature measured values in the range of -30 to +60 (+80) °C depending on the version.

Technical data

Humidity (RH)

Humidity sensor	Capacitive (thin-film, non-condensing)
Measuring range	0 to 100 % RH
Working range	0 to 100 % RH; wall-mounted version 5 to 95 % RH; rod and duct version 10 to 90 % RH; indoor version
Measuring accuracy	±2.5 % RH; indoor version in humidity range from 40 to 60 % RH ±3.0 % RH; residual range ±2.0 % RH; wall-mounted version in humidity range of 10 to 90 % RH ±2.5 % RH; residual range ±2.0 % RH; duct version in humidity range of 40 to 60 % RH ±2.5 % RH; residual range ±2.0 % RH; rod version in humidity range from 5 to 95 % RH
Temperature influence	±0.05 % RH per K; indoor and wall-mounted version (based on 23 °C) < 0.15 % RH per K; duct version (at < 10 °C, > 40 °C) < 0.10 % RH per K; rod version (at < 10 °C, > 40 °C)
Measurement medium	Air, atmospheric pressure, non-aggressive
Humidity output (active) (for connection diagram, see operating manual)	4 to 20 mA 0 to 1 V (not possible with duct version) 0 to 10 V
Air velocity	Min. 0.5 m/s (1.5 m/s for rod version with current output) Max. 15 m/s (wall-mounted version 10 m/s)
Response time	Half-period: 10 s to 1.2 min at v = 2 m/s (depending on design type and filter used, excluding indoor version)

Temperature (T)

Sensing element	Pt100 or Pt1000 thin-film temperature sensor according to DIN EN 60751 (depending on version)
Measuring range	See order details (only scaling, observe max. admissible ambient temperature)
Working range	-30 to +60 °C; indoor version -30 to +80 °C; wall-mounted, duct, and rod version
Measuring accuracy	±0.25 K; indoor version at voltage output ±0.4 K; indoor version at current output (10 to 40 °C)
	±0.2 K; wall-mounted version at voltage output ±0.3 K; wall-mounted version at current output (10 to 40 °C) ±0.3 K; duct and rod version
Temperature influence	±0.01 K/K (at < 10 °C, > 40 °C)
Temperature output (active) (for wire system, see wiring diagrams)	DC 0 to 1 V (not for duct version) DC 0 to 10 V 4 to 20 mA
Temperature output (passive)	Pt100 (only with duct and rod version, see order details)

Electrical data

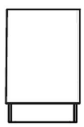
Voltage supply	
Indoor and wall-mounted version	DC 6 to 30 V or AC 6 to 26 V (at 0 to 1 V) DC 15 to 30 V or AC 13 to 26 V (at 0 to 10 V) DC 10 to 25 V (indoor version at 4 to 20 mA) DC 10 to 30 V (wall-mounted version at 4 to 20 mA)
Duct version	DC 15 to 30 V AC 24 V (also at 0 to 10 V)
Rod version	DC 12 to 30 V DC 15 to 30 V (at 0 to 10 V) DC 6 to 30 V (at 0 to 1 V)
Burden (I output)	$R_L(\Omega) = \frac{\text{Voltage supply - DC 10 V}}{0{,}02\ \text{A}} \pm 50\ \Omega$
Load resistance (U output)	> 10 kΩ (at 0 to 10 V), > 2 kΩ (at 0 to 1 V)
Consumption	Typically 7 mA at voltage output, < 1 mA at 0 to 1 V (per measuring range with four-wire system)
Electromagnetic compatibility CE	According to EN 61326-1 and EN 61326-2-3

Construction

Case	
Indoor version	ABS plastic, signal white (RAL 9003)
Wall-mounted version	PC plastic
Duct version	ABS plastic with attached aluminum probe, painted
Rod version	Form J aluminum terminal head, probe as in duct version, optionally with 1.5 m connecting cable
Dimensions	
Indoor version	81 × 81 × 25.7 mm
Wall-mounted version	83 × 83 × 40 mm (probe Ø 12 × 50 mm)
Duct version	248 × 120 × 48 mm (probe Ø 20 × 200 mm)
Rod version	Probe Ø 20 × 122 mm)
Cable entry	
Indoor version	Opening on the underside or rear side (flush-mounted socket assembly optional)
Wall-mounted version	via cable gland M16 × 1.5
Duct version	via cable gland M20 × 1.5
Rod version	via cable gland M16 × 1.5 (for version with form J terminal head)
Terminals	For conductor cross sections of up to 1.5 mm^2
Wiring diagrams	Please use the terminal connection from the operating manual included in the scope of delivery (according to version). For planning activities, the operating manuals are also available online to download as pdf files at www.jumo.net.
Protection type	
Indoor version	IP30
Wall-mounted version	IP65 (IP30 probe (standard), with PTFE IP65 sinter filter)
Duct version	IP64 (IP30 probe (standard), with PTFE IP65 sinter filter)
Rod version	IP65 (IP30 probe (standard), with PTFE IP65 sinter filter)
Operating temperature	
Indoor version	-30 to +60 °C
Wall-mounted version	-30 to +80 °C
Duct version	-40 to +80 °C at the probe head (filter area) -10 to +60 °C at the case
Rod version	-20 to +60 °C -40 to +80 °C at the probe head (filter area)

Installation position	For duct and rod version, install probe tube at an angle or vertically downwards, if possible. For indoor version, position vent openings downwards if possible. Install the measuring probe in a way that prevents ingress of water. Mount directly via openings in the case or using optional installation accessories.
Weight	
Indoor or wall-mounted version	Approx. 200 g
Rod or duct version	Approx. 150 to 350 g, depending on version

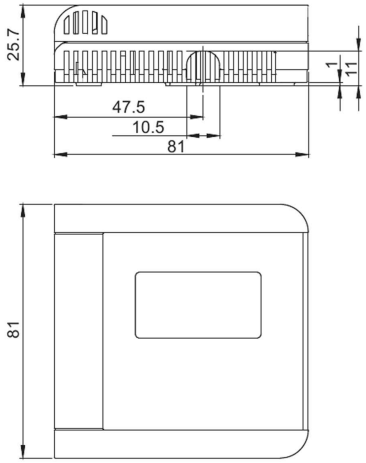
Filters

Plastic-grid power-line filter "ZE17"		Ø 20 × 25 mm, thread M18 × 1 Standard: with duct and rod version. Protects against coarse contamination, quick-response, response time approx. 1 min (v = 1.5 m/s).
Plastic-grid membrane filter "ZE20"		Ø 20 × 25 mm, thread M18 × 1 for outdoor use, better protection from aerosols, up to v = 10 m/s, response time approx. 1.5 min (v = 1.5 m/s)
Stainless steel sinter filter "ZE21"		Ø 20 × 25 mm, thread M18 × 1 for extreme operating conditions, at a high air velocity up to 20 m/s and increased dust accumulation, response time approx. 1.5 min (v = 1.5 m/s)
PTFE filter "ZE18"		Ø 20 × 25 mm, thread M18 × 1 Sinter filter made from fine-pored PTFE for sensor tubes of 20 mm for extreme operating conditions. **Note:** When using this filter, the EMC Directive EN 50082-2 is not fulfilled for certain sensors. Response time approx. 3 min (v = 1.5 m/s)
Plastic-grid membrane filter "ZE08"		Ø 12 × 33 mm, thread M10 × 0.75 Standard: for wall-mounted version. For outdoor use up to v = 10 m/s. Protection from aerosols and dust. Response time approx. 1.5 min (v = 1.5 m/s)
PTFE filter "ZE05"		Ø 12 × 35 mm, thread M10 × 0.75 Sinter filter made from fine-pored PTFE for probe tubes of 12 mm. For extreme operating conditions. Response time approx. 3 min (v = 1.5 m/s)

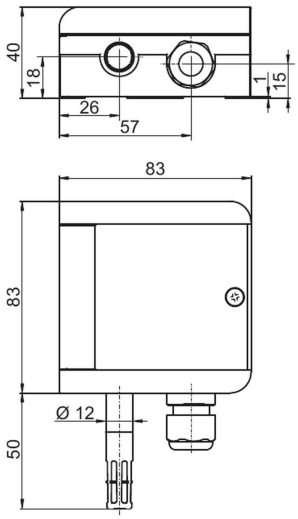
Notes for the user

Installation	Install the humidity transducers at a location that is representative for humidity measurement, indoors, on walls, or on devices and systems. Avoid installing near to radiators, windows, and doors (also exterior walls for indoor measurements), or on surfaces subject to heavy impacts/vibration or exposed to direct sunlight. Protect the measuring probes against dirt, dripping, and splashing water. Although condensation and splashing water are not harmful to the transducer, they can cause the sensor element to dry out and produce faulty readings. Dust generally has no damaging effect, but can impair the dynamic behavior of the measuring probe. The specified minimum air velocities and the burden matched to the operating voltage for the current output should be adhered to. Deviations from this can lead to additional errors in measurement being made, as a result of self-heating. To ensure that the interference immunity of the measuring probe is maintained, installation should be carried out according to the protective measures of the EMC legislation.
Maintenance information for humidity sensing element	The capacitive humidity sensing element requires no maintenance in normal clean ambient air. Aggressive media or those containing solvents may cause faulty readings or even failure. Deposits forming a water-repellent film on the sensing element are liable to cause faulty operation. Contaminated protective filters must be replaced. Do not touch the surface of the humidity sensor. The sensor may be cleaned using distilled water in the case of devices with an offset measuring probe. The correct measured values are readjusted when the device has completely dried out. With the indoor version, a soft brush can be used for cleaning.
Checking and calibration	To check the measuring probe for accuracy of humidity measurements (recommended once annually), humidity sensor checks can be implemented. The procedure is described in more detail in DIN 50008, IEC Publication 260, ISO/R 483-1966. The basic principle consists of an appropriate climate being produced above an aqueous, saturated salt solution. Humidity sensor checks with values of 33 % RH, 53 % RH, and 76 % RH are available in the accessories. 
Caution: Any manipulations of the internal components will lead to warranty claims becoming null and void.	

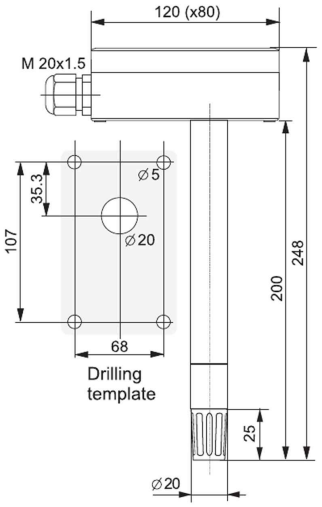
Dimensions



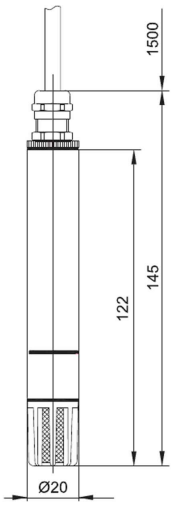
Indoor version
(For drilling pattern, see packaging)



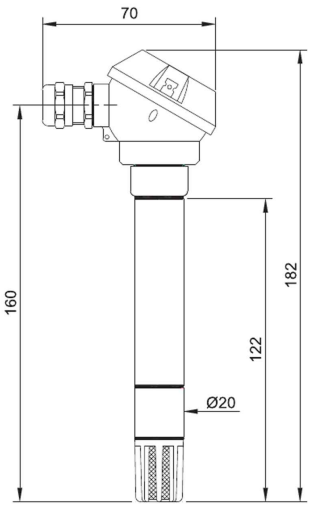
Wall-mounted version
(For drilling pattern, see packaging)



Duct version



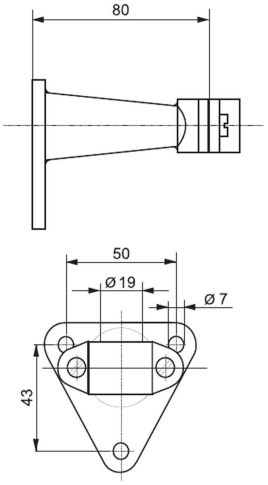
Rod version
with connecting cable



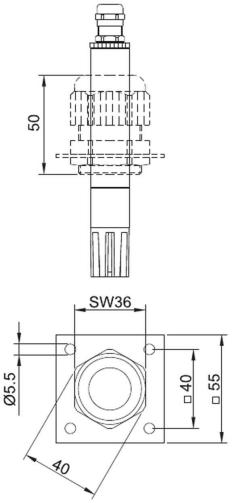
Rod version
with form J terminal head

Measurements in mm

Dimensions



Support frame (holder for wall mounting) for duct and rod version



Mounting plate "ZA20" with clamping screw connection for duct and rod version

Measurements in mm

Order details

						(1)	**Basic type**	
					907020/11		Hygro transducer/hygrothermal transducer – indoor version	
					907020/20		Hygro transducer/hygrothermal transducer – wall-mounted version	
					907020/30		Hygro transducer/hygrothermal transducer – duct version	
					907020/40		Hygro transducer/hygrothermal transducer – rod version with 1.5 m connecting cable	
					907020/41		Hygro transducer/hygrothermal transducer – rod version with form J terminal head	
						(2)	**Version**	
x	x	x	x	x	1		Humidity	
x	x	x	x	x	2		Humidity and temperature	
			x	x	3		Humidity and temperature (passive temperature)	
						(3)	**Measuring range**[a]	
x	x	x	x	x	00		0 to 100 % RH	
			x		10		0 to 100 % RH; -20 to +80 °C	
		x			21		0 to 100 % RH; -30 to +60 °C	
x	x		x	x	22		0 to 100 % RH; -30 to +70 °C	
x	x	x			34		0 to 100 % RH; 0 to 50 °C	
x	x	x			36		0 to 100 % RH; 0 to 100 °C	
						(4)	**Output**	
x	x	x	x	x	005		4 to 20 mA; 4 to 20 mA[b]	
			x	x	006		4 to 20 mA; Pt100 (passive)[b]	
x	x		x	x	051		0 to 1 V; 0 to 1 V[b]	
			x	x	052		0 to 1 V; Pt100 (passive)[b]	
x	x	x	x	x	065		0 to 10 V; 0 to 10 V[b]	
			x	x	066		0 to 10 V; Pt100 (passive)[b]	
						(5)	**Extra codes**	
x	x	x	x	x	000		without	
x	x				793		LCD display (two-line)	
				x	819		Coupling plug (without connecting cable)	

[a] Please observe the humidity and permissible ambient temperatures for the working range (see technical data)!
[b] A second output is only available with combination devices (humidity and temperature).

	(1)		(2)		(3)		(4)		(5)
Order code		-		-		-		/	
Order example	907020/11	-	1	-	00	-	005	/	000

Stock versions

Order code	Part no.
907020/11-1-00-005/000	00609642
907020/11-2-34-005/000	00609648
907020/11-2-34-005/793	00609649
907020/20-1-00-005/000	00609651
907020/20-2-22-005/000	00609653
907020/20-2-22-005/793	00609654
907020/30-1-00-005/000	00315103
907020/30-1-00-065/000	00315104
907020/30-2-21-005/000	00332698
907020/30-2-21-065/000	00403752
907020/30-2-34-005/000	00315106
907020/30-2-34-065/000	00315107
907020/30-2-36-005/000	00332700
907020/40-1-00-005/000	00403753
907020/40-1-00-065/000	00403755
907020/40-2-22-005/000	00403754
907020/40-2-22-065/000	00402259
907020/41-1-00-005/000	00473743
907020/41-1-00-065/000	00473744
907020/41-2-22-005/000	00473745
907020/41-2-22-065/000	00473746

Accessories

Item	Part no.
Humidity sensor check: 33 % RH	00332758
Humidity sensor check: 53 % RH	00332759
Humidity sensor check: 76 % RH	00332760
Stainless steel sinter filter "ZE21" Ø 20 × 25 mm, thread M18 × 1	00352114
Plastic-grid power-line filter "ZE17" Ø 20 × 25 mm, thread M18 × 1	00367344
Plastic-grid membrane filter "ZE20" Ø 20 × 25 mm, thread M18 × 1	00403756
PTFE filter "ZE18" Ø 20 × 25 mm, thread M18 × 1	00511063
Plastic-grid membrane filter "ZE08" Ø 12 × 33 mm, thread M10 × 0.75	00609659
PTFE filter "ZE05" Ø 12 × 35 mm, thread M10 × 0.75	00609660
Mounting plate "ZA20" with clamping screw connection for duct and rod version	00403757
Support frame (holder for wall mounting) for duct and rod version	60171300