Zertifiziertes QM-System
DIN EN ISO 9001
Zertifikat-Nr. 01017

Humidity/Temperature Measuring Instrument

for industrial applications,
capacitive method of measurement

measuring • monitoring • analysing

AFK-E

- Measuring range: 0 ... 100% rH, -40 ... +180 °C
- Maximum accuracy up to 180 °C
- High degree of resistance of sensor to chemicals
- Output of measured values (rH, °C) deviated values (dew point, absolute humidity etc.) via RS232
- Pressure-tight version 0.01 ... 20 bar abs.
- Display
- Sensor coating
- Including factory calibration

A2

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Humidity/Temperature Measuring Instrument
for industrial applications, capacitive method of measurement Model AFK-E

Description

The measuring instruments AFK-E have been designed for the accurate measurement of humidity and temperature in industrial applications. They allow measurements in the range 0 ... 100% rH and between -40 °C ... +180 °C.

A capacitive humidity sensor element with excellent longterm stability, minimum hysteresis and high chemical resistance forms the basis for this highly accurate transmitter series.

The values for humidity and temperature are displayed on two analogue outputs. A scalable and selectable current signal in the range 4 - 20 mA or any voltage signal between 0 and 10 V are available for selection.

This flexibility is achieved with cutting-edge microprocessor technology, whereby the scaling and selection of the output signal is carried out with a user-friendly graphic interface running under MS Windows. The factory setting can thus be changed easily on site by the user.

In addition to measured values for humidity and temperature, the transmitters supplies the following values:

- Dew-point temperature
- Freezing point temperature
- Wet-bulb temperature
- Water-vapour partial pressure
- Mixing ratio
- Absolute humidity
- Specific enthalpy

The measured values are also output to an RS232 serial port for further processing by software.

Application Examples

Control

- Humidity of clean rooms
- Air-conditioning cabinets
- Cheese ageing rooms

Drying

- Ceramics
- Bricks
- Wood
- Pharmaceutical products
- Pasta & noodles

Warehousing

- Medicines
- Fruit and vegetables

Technical Details

Characteristic data of humidity sensor

Measuring range:	0...100 % rH (notice operating range of humidity sensor)

Accuracy

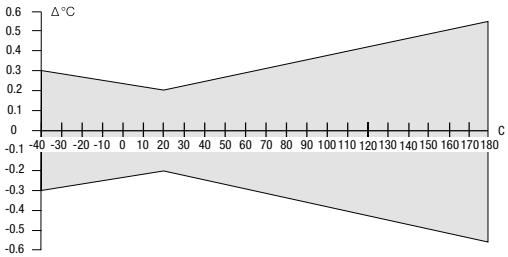
(including hysteresis, non-linearity and repeatability)

at -15 ... +40 °C / <90% rH:	±(1.3 + 0.3% of reading) % rH
at -15 ... +40 °C / >90% rH:	±2.3% rH
at -25 ... +70 °C:	±(1.4 + 1% of reading) % rH
at -40 ... +180 °C:	±(1.5 + 1.5% of reading) % rH
Temperature dependence of electronics:	typically ±0,01% rH/°C
Response time $t_{10/90}$ at 20 °C	
• without filter:	<6 s
• with st. steel sintered filter:	30 s
• with PTFE filter:	14 s
• with metal screen:	<15 s

Characteristic data of temperature sensor

Measuring range:	-40 ... +180 °C
Sensor:	Pt 1000 (DIN EN 60751, category A)

Accuracy:



Temperature dependence of electronics:	typically 0.005 °C/ °C

Electrical characteristic data

Analogue outputs (selectable and scalable):	0 - 5 V	< 1.0 mA
	0 - 10 V	< 1.0 mA
	4 - 20 mA R_L	< 500 Ω
	0 - 20 mA R_L	< 500 Ω
Supply voltage:	SELV 8...35 V_{DC} SELV 12...30 V_{AC}	
• with optional plug-in power supply unit:	100 - 240 V_{AC}	

Alarm outputs

An alarm module is available for control and alarm purposes, which may be configured with the configuration software and USB interface cable.

The user thus has the option of setting the measurand to be monitored (RH, T, Td,...) and the threshold hysteresis for each relay.

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Max. switched voltage/
max. switched current: 250 V_{AC} / 6 A; 28 V_{DC} / 6 A
Minimum load: >100 mA / 12 V

Current consumption

- 2 x voltage output: typically 40 mA für 24 $V_{DC/AC}$
- 2 x current output: typically 80 mA

with plug-in power supply unit:

- 2 x voltage output: typically 15 mA
- 2 x current output: typically 15 mA

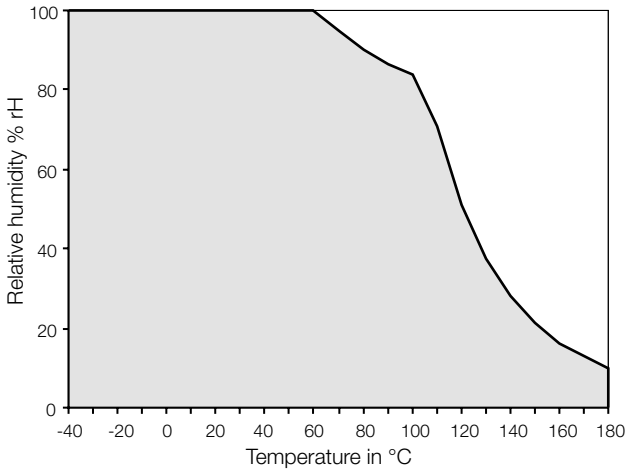
General characteristic data

Resistance to pressure

- Standard version: atmospheric
- Pressure-tight version: 0.01...20 bar abs. (½" Swagelok screwing)

Housing: aluminium, fixed wall mounting integrated
Electr. connection: screw terminals to max. 1.5 mm²
Sensor protection: stainless steel sintered filter (PTFE filter and metal screen optional)
Cable lengths: 2 m, 5 m, 10 m, 20 m (PTFE cable up to 200 °C)
Operating temperature/storage temperature electronics: -40...+60 °C without display -20...+50 °C with display
Electromagnetic compatibility according to: EN61326-1 industrial environment, EN61326-2-3
Protection class: IP65

Operating range of humidity sensor*



* The grey area indicates the allowed measuring area for the humidity sensor. Operating points outside this area do not cause damage to the element, however the specified measuring accuracy cannot be guaranteed.

Communication

Microsoft™ Windows XP™ or higher.
USB Interface for PC communication.

Calculated Functions

The folllowing calculated functions are given out from the transmitter AFK-E out of the measured values for temperature and relative humidity:

Measurement		Standard ranges	max. adjustable ranges
Relative humidity	**rH**	0...100 % rF	0...100 % rF
Temperature	**T**	-40...180 °C	-40...180 °C
Dew-point temperature	**Td**	-40...100 °C	-40...100 °C
Freezing point temperature	**Tf**	-40...0 °C	-40...0 °C
Wet-bulb temperature	**Tw**	0...100 °C	0...100 °C
Water-vapour partial pressure	**e**	0...1000 mbar	0...1100 mbar
Mixing ratio	**r**	0...500 g/kg	0...999 g/kg
Absolute humidity	**dv**	0...600 g/m³	0...700 g/m³
Specific enthalpy	**H**	-40...1500 kJ/kg	-50...2800 kJ/kg

These values can be indicated on the display (option) and are also available as analogue outputs. For software processing the measuring values are in addition given out via a serial RS232 interface.

Options

Pressure resistant measuring sensor

The pressure resistant measuring sensor can be operated at a maximum pressure of 20 bar. For mounting this measuring sensor a pressure tight duct with a ½" thread is enclosed in the shipment.

Measured value display

The two line LCD can display two measured or two calculated values.

Sensor coating

For strongly contaminated or corrosive atmosheres special coated sensors are available. By means of the polymeric-coating the sensors get a drastically improvement of their chemical resistance and therefore a considerable increase of the long-term stability of the measuring transmitter. Especially for drying processes the use of the coating has been proved and tested.

Cable length

The connection cable between sensor and transmitter is available in the following lengths:

2, 5, 10 and 20 mm.

Accessories

Dustproof filter covers

- **Stainless steel sintered filters:** for tough industrial applications where the detecting sensors are exposed to strong mechanical and thermal stresses; serviceable to 180 °C.

Model AFZ-E1

- **PTFE filter:** for chemically aggressive environments and high temperatures, serviceable to 180 °C (not with pressure-tight version)

Model AFZ-E2

- **Metal screen:** with high humidity, danger of moisture condensation or with rapidly alternating humidity cycles, serviceable to 120 °C (not with pressure-tight version)

Model AFZ-E3

- **External plug-in power supply unit with 1.5 m cable:** for direct connection to a supply voltage of 100 ... 240 V_{AC}.

Model AFZ-E4

- **Stainless steel mounting flange:** for installation of humidity sensor in the duct

Model AFZ-E6

Hole circle: Ø 46 mm
Boreholes: 4 x 6 mm

- **Dripping water protection cap (85 mm):** for protection of the sensor element from condensed water in case of hanging mounted sensor

Model AFZ-E8

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Resistance table for humidity transmitter AFK-E (without sensor coating »P«)

Chemical product	Formula	Gas rate up to	Harmless	Negative effect
Ammonia	NH_3	500 ppm	x	
Chlorinew	Cl_2	0.5 ppm	x	
Chlorine methane	CH_3Cl			x
Ethanol (liquid for cleaning)	CH_3CH_2OH	100 ppm	x	
Ethylene oxide	C_2H_4O	2 ppm	x	
Hydrofluoric acid	HF			x
Formaldehyde	HCHO	6 mg/m³	x	
Freon 113	$C_2Cl_3F_3$	5000 ppm, 39 g/m³	x	
Isopropanol (liquid, for cleaning)	$(CH_3)2CHOH$	100 ppm	x	
Carbon monoxide	CO	100 000 ppm	x	
Methanol (liquid, for cleaning)	CH_3OH	40 ppm	x	
Ozone	O_3	2 mg/m³	x	
Hydrochloric acid	HCL			x
Sulphur dioxide	SO_2	100 ppm	x	
Hydrogen sulphide	H_2S	500 ppm	x	
Nydrogen oxide	NO_2	20 ppm	x	
UV-light	at 300-400 nm and 2J/cm²-duration of exposure approx. 5 min	ultraviolet endangered sensor areas are protected via metal layer	x	
Hydrogen peroxide	H_2O_2	use protection filter cap H_2O_2	x	

Insertable in Argon and N_2-Gas with coated sensor

Order Details (Example: **AFK-E 2S 1 K 02 N**)

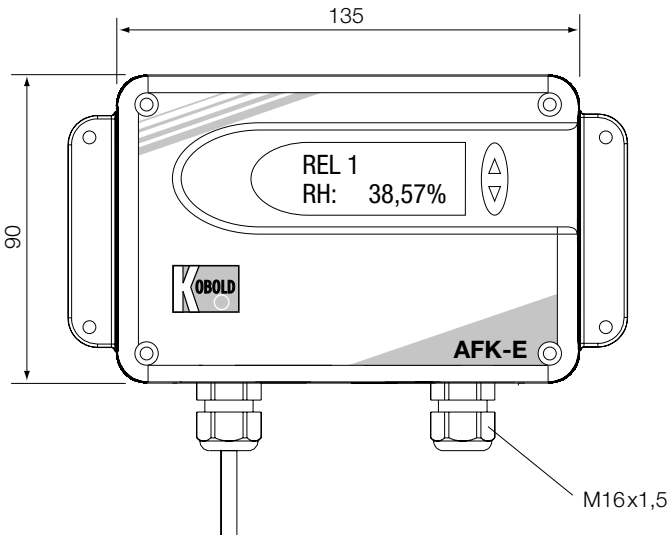
Model	Description	Pressure resistance	Display	Sensor coating	Cable length	Calibration
AFK-E	Humidity measuring instrument	**2S** = atmospheric **2D** = p_{max} 20 bar	**1** = without display **2** = with display	**K** = not Polymer coated **P** = Polymer coated	**02** = 2 m **05** = 5 m **10** = 10 m **20** = 20 m	**N*** = standard ±2 % rH (0 ... 90 % rH)

* Factory certificate according to EN 10204 (3 points at 23 °C) is in delivery scope

Order Details Accessories (Example: **AFZ-E 1**)

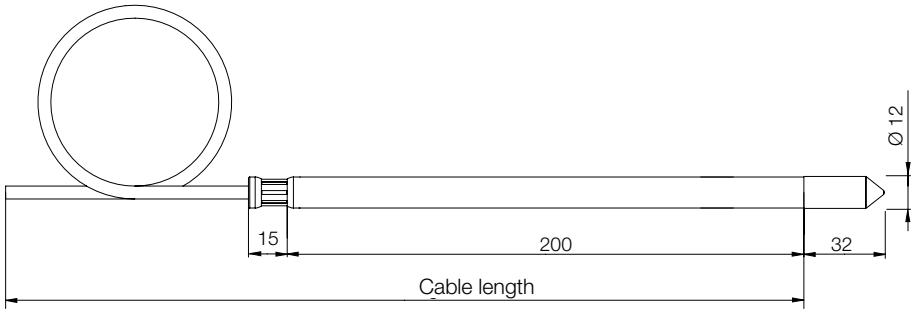
Model	Accessories
AFZ-E	**1** = stainless steel sintered filter **2** = PTFE filter **3** = metal screen **4** = external plug-in power supply unit **6** = stainless steel mounting flange **8** = dripping water protection cap

Dimensions [mm]

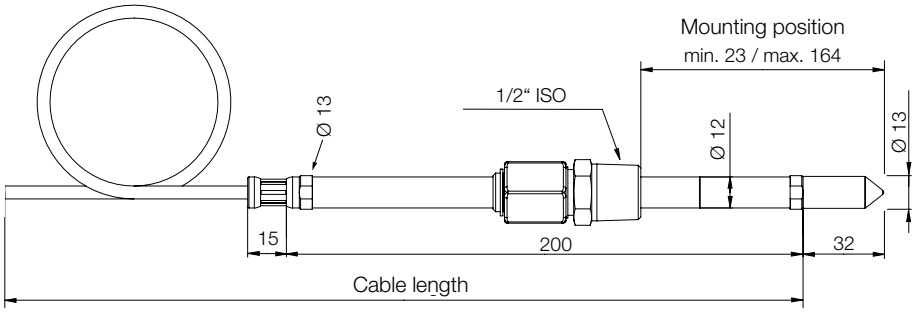


Housing depth:
66.5 mm
Mounting holes:
150 x 57 mm,
Ø 4.2 mm

Pressure rating (2S = pressureless)



Pressure rating (2D = 20 bar)



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