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Датчики влажности и температуры FK80J GALLTEC +MELA. Техническое описание



Description of the sensors

The sensors FK80J (humidity only) / TFK80J (humidity and temperature) measure the air humidity by means of a humidity-dependant condenser. The capacitive humidity measuring element, produced using thinfilm technology, consists of a base plate, on which the electrodes are housed and a hygroscopic polymer layer above it. The hygroscopic polymer layer absorbs water molecules from the medium to be measured (air) or releases them, thereby altering the capacity of the condenser. In a tandem-arranged electronic device, the change in capacity is processed via integrated signal preprocessing into signals **0...20mA or 0...10VDC or 4...20mA**.

The measuring element is protected by a protective guard. The sensors are designed for pressureless systems - the measuring medium is non-corrosive air.

The TFK80J sensors also contain a semi-conductor temperature sensor for simultaneous temperature measurement. Its measured values are likewise converted into standardised signals **0...20mA or 0...10VDC or 4...20mA**.

The temperature coefficient as well as the self-heating of the electronic may vary according to the location and the application (especially with sensors where electronic and measuring system are integrated in one housing).

Maintenance - Application instructions - Influence of dirt

In a clean environment, the measuring element is maintenance-free. Depending on their type and concentration, aggressive media containing solvents can cause incorrect readings or cause the sensor to fail. Direct sunlight should be avoided. Substances deposited on the sensor element (e. g. resin aerosols, paint aerosols, smoke deposits etc.) are harmful as they eventually form a water-repellent film (this applies to all humidity sensors with hygroscopic measuring elements).

Please consult "**application instructions for the sensing elements**" (product info sheet no. A 1) or check with the manufacturer for further information which you need to bear in mind when using humidity sensors with capacitive sensing elements.

Humidity Sensor FK80J and

Humidity-Temperature Sensor TFK80J

with capacitive measuring element
with current or voltage output,

0...20mA / 0...10VDC or 4...20mA to determine relative air humidity and temperature, duct version

Technical Data

measuring range **humidity** 0...100%rh
measuring element capacitive FE09
accuracy at 23°C (73,4°F) ±2.0%rh (40...60%rh)
at 23°C (73,4°F) ±2.5%rh (otherwise)
includes linearity and repeatability

influence of temperature < 0.15%rh per K
working range 5...95%rh
measuring medium air, pressureless, non-aggressive
Response time (at calm air) < 20 s
output **humidity** 0...10V or 0...20mA (4wire)
..... or 4...20mA (2wire)

measuring range **temperature**
..... 0...+50°C, -10...90°C¹⁾, -30...60°C, 0...100°C¹⁾
measuring element Pt100 class B
accuracy at 0...10V ±0.2 K ±0.36 °F
at (0)4...20mA ±0.3 K ±0.54 °F
working range -30...+80°C (-22...176°F)
output **temperature** 0...10V or 0...20mA (4wire)
..... or 4...20mA (2wire)

Other temperature outputs

NTC; PTC; KTY; LMx35; Pt100; Pt1000; Ni1000; AD592; LM34;
BALCO 1kΩ; SILICON 2kΩ;
SEMICONDUCTOR 559 mVDC @23°C (75°F)
Thermistors @ 25°C (77°F) 1,8kΩ; 2,252kΩ; 3kΩ; 5kΩ; 10kΩ;
1,8kΩ (Type II; III, CSI); 20kΩ; 100kΩ

power supply 15...30VDC / 24VAC± 10%
electromagnetic compatibility EMC
resistance to interference EN 50 082-2
interference emission EN 50 081-2

max. load $R_L(\Omega) = \frac{\text{supply} - 10 \text{ VDC}}{0.02 \text{ amps}}$
(current output only)
min load (voltage output only) 10 kΩ
power consumption < 5 mA
permissible ambient temperature -40...+80°C (-40...176°F)
at the housing -10...+60°C (14...140°F)
admitted air speed 15 m/sec (50 ft/sec)

Minimum air speed (across the sensor):

output 0...10V, 2x 0...1V ≥0.5m/s
4...20mA, 2x 0...10V ≥1m/s
2x 4...20mA ≥1.5m/s

probe length 200mm (7,87")
probe material aluminium, electrolytically oxidized
for channel mounting perforation in the case
mounting position as you like
contacting connecting terminals in the housing
connecting terminal conductor cross sections
..... 1.5mm² (0,023"²)

housing polystyrol-ABS
protective system IP64
weight approx. 0.3 kg (0.6 lbs)

¹⁾ please observe working range

Overview of capacitive sensors power supply 15...30V DC (24V AC $\pm 10\%$)

FK80J DC-Version	0...100%rh	0...10V DC			15...30V DC / 24 V AC	3/4 wire	58014700
	0...100%rh	4...20 mA			15...30V DC	2 wire	58014800
	0...100%rh	0...20 mA			15...30V DC	3/4 wire	58013000
TFK80J	0...100%rh	0...10V DC	-30...+60°C	0...10V DC	15...30V DC / 24 V AC	3/4 wire	58574747
	0...100%rh	0...10V DC	0...100°C*	0...10V DC	15...30V DC / 24 V AC	3/4 wire	58544747
	0...100%rh	0...10V DC	0...+50°C	0...10V DC	15...30V DC / 24 V AC	3/4 wire	58524747
	0...100%rh	0...10V DC	-10...+90°C	0...10V DC	15...30V DC / 24 V AC	3/4 wire	58624747
	0...100%rh	4...20mA	0...50°C	4...20mA	15...30V DC	2wire	58524848
	0...100%rh	4...20mA	-30...+60°C	4...20mA	15...30V DC	2wire	58574848
	0...100%rh	4...20mA	-20...+80°C	4...20mA	15...30V DC	2wire	58264848
	0...100%rh	4...20mA	-10...+90°C	4...20mA	15...30V DC	2wire	58624848
	0...100%rh	4...20mA	0...100°C*	4...20mA	15...30V DC	2wire	58544848
	0...100%rh	0...20mA	0...+50°C	0...20mA	15...30V DC	3/4 wire	58523030
	0...100%rh	0...20mA	-10...+90°C**	0...20mA	15...30V DC	3/4 wire	58623030
	0...100%rh	0...20mA	-30...+60°C	0...20mA	15...30V DC	3/4 wire	58573030
	0...100%rh	0...20mA	0...100°C*	0...20mA	15...30V DC	3/4 wire	58543030
Speciality		0...20 mA	Pt100	Resistance	15...30V DC	3/4 wire	58703050
FK80JPt100		0...10V DC	Pt100	Resistance	15...30V DC	3/4 wire	58704650
		4...20 mA	Pt100	Resistance	15...30V DC	2wire	58704850

Overview of capacitive sensors power supply 24V AC $\pm 10\%$

FK80J AC-version	0...100%rh	0...10V DC			15...30V DC / 24 V AC	3/4 wire	58014700
	0...100%rh	0...20 mA			24 V AC	4 wire	58014200
TFK80J	0...100%rh	0...10V DC	0...+50°C	0...10V DC	15...30V DC / 24 V AC	3/4 wire	58524747
	0...100%rh	0...10V DC	-30...+60°C	0...10V DC	15...30V DC / 24 V AC	3/4 wire	58574747
	0...100%rh	0...10V DC	-10...+90°C	0...10V DC	15...30V DC / 24 V AC	3/4 wire	58624747
	0...100%rh	0...10V DC	0...100°C*	0...10V DC	15...30V DC / 24 V AC	3/4 wire	58544747
	0...100%rh	0...20mA	0...+50°C	0...20mA	24 V AC	4 wire	58524242
	0...100%rh	0...20mA	-30...+60°C	0...20mA	24 V AC	4 wire	58574242
	0...100%rh	0...20mA	-10...+90°C	0...20mA	24 V AC	4 wire	58624242
	0...100%rh	0...20mA	0...100°C*	0...20mA	24 V AC	4 wire	58544242

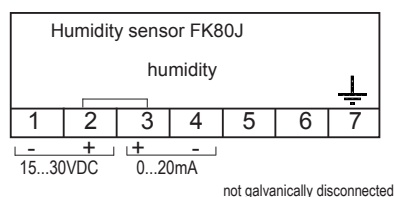
* observe max. temperature range

** suitable for EDJ controller

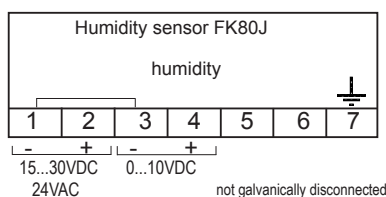
Connection diagram

EMC-information: use shielded signalling lines and earth the shielding!

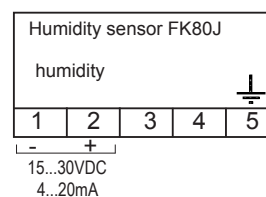
3/4-wire system



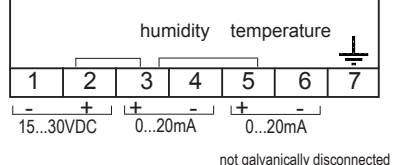
3/4-wire system



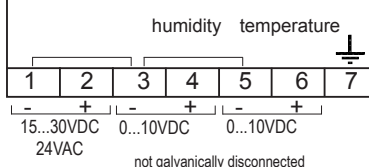
2-wire system



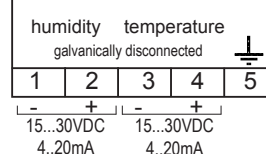
Humidity temperature sensor TFK80J



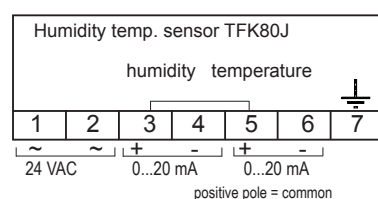
Humidity temperature sensor TFK80J



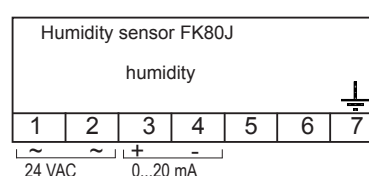
Hum. temp. sensor TFK80J



4-wire system (AC version)



4-wire system (AC version)



The electrical connection must only be carried out by properly qualified personnel.

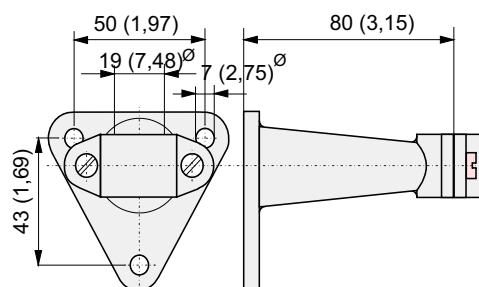
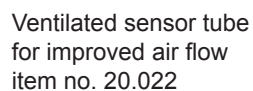


To clean the measuring element, its surface can be rinsed, however should only be moistened with water drops; immersing into distilled water is possible

Correct measuring values will be regained as soon as the measuring element has been dried completely. Dry dust can simply be blown off the measuring element. Don't use compressed air for this purpose.

Contact with the inner parts nullifies the guarantee.

Accessories



Checking calibration

It is possible to use sensor checks in order to test the humidity sensors from time to time for accuracy. The physical process is described in detail in **DIN 50 008, IEC Publikation 260, ISO/R 483-1966**. In the air space above an aqueous saturated saline solution an ambient climate is formed whose air humidity is dependant on the water vapour pressure of the saline solution.

The Galltec+Mela sensor checks are designed so that a foil permeable to vapour is positioned between the saline solution and the air space (space in which the measuring element is located). This makes carrying out the sensor checks a very straightforward procedure as follows:

Remove the protective cap of the sensor check while opening the PG screw and introduce the sensor duct up to the mark. Tie the sensor in the PG screw. Please make sure that the sensor check is well tight and air-sealed while caring out your measurement. If you are using a sensor with a "Polyga" measuring element, ensure particularly that the lid of the sensor is well tight and that the cable duct is well sealed.

Sensor check

°C	5	10	15	20	25	30
%rh	34	34	34	33	33	33

33%rh

Screw the check firmly onto the humidity sensor. Wait for 2 hours. Ensure that the temperature is kept constant. Take humidity reading according to temperature.

After a certain period of time, a constant humidity builds up between the saline solution and the air space in which the humidity measuring element is located. Depending on the type of saline solution and the sensor check, humidity values range from 33%RH to 98%RH. The standard values of the Galltec+Mela sensor checks are 33%RH, 55%RH, 76%RH and 98%RH. We recommend a compensation period of about 2 during this period. Temperature fluctuations se

Sensor check

55%rh

°C	5	10	15	20	25	30
%rh	58	57	56	55	53	52

Screw the check firmly onto the humidity sensor. Wait for 2 hours. Ensure that the temperature is kept constant. Take humidity reading according to temperature.

Sensor check

76%rh

Screw the check firmly onto the humidity sensor. Wait for 2 hours. Ensure that the temperature is kept constant. Take humidity reading according to temperature.

°C	5	10	15	20	25	30
%rh	76	76	76	76	76	75

recommend a compensation period of about 2 hours. Please ensure that there are no major fluctuations in temperature during this period. Temperature fluctuations severely disturb the equilibrium.

The equilibrium moisture content is dependent on the temperature - according to the type of salt. The corresponding values are given in a correction table located on the sensor check.

It is important that you replace the sealing cap of the sensor check after use, otherwise the water of the saline solution will evaporate and the check will become unusable.

Guide to installation

Interference is often to be encountered during installation. The correct installation procedure can prevent interference to a very large extent. However, some ground rules should be observed.

To avoid interference, suppression should be carried out in accordance with VDE 0875 and VDE 0874.

(VDE - this is assumed to be the *Vorschriftenwerk Deutscher Elektrotechniker* - regulations governing German electrical engineers).

Fundamentally, interference must be removed at its source, where suppressor material is most effective. Interference can, however, also result from electromagnetic fields via signalling lines. The EMV law determines the corresponding protective measures. All Galltec+Mela equipment is designed in accordance with European standards EN 50081-2 and EN 50082-2 (for industrial locations). In addition, further protective measures must be observed.

Unavoidable sources of interference should be kept at a good distance from the control systems.

Data and signalling lines should not be used in parallel with control, networking and power lines.

For data and signalling lines, shielded cable should be used, and the shielding must be applied to the earth terminal. Ensure that earth circuits and fault currents do not arise as a result of a second earth connection.

For equipment with a network connection, it is recommended that a separate network circuit is used.

During the switch process, electrical power consumers such as switch contactors, magnetic valves etc. produce induction voltages that can cause interference. In the trade there is an abundance of protective and suppressor component parts that are most effective when applied directly to the source of the trouble. A suitable suppressor has the added advantage that components such as relays, microswitches etc. have a longer service life.

Further difficulties during installation can arise if signalling lines are joined together with common lines. It is essential to check whether this is permissible. Interference is particularly likely when installing using equipment of different makes. Here, too, the trade offers isolating amplifiers that overcome the problem.

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