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Humidity Sensor FK80J

with capacitive measuring element
with current or voltage output **0...20mA / 0...10VDC or 4...20mA** to determine relative air humidity in air channels

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 in air channels

Technical Data

measuring range **humidity**	0..100%RH
sensing 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
temperature effect	typ. less 0,15%RH per °C /°F
operating range	5...95%RH
measuring medium	air, pressureless, non-corrosive
Response time (at calm air)	< 20 s
signal output **humidity**	0...10V or 0...20mA or 4...20mA

measuring range **temperature**	
	0...+50°C; 32...+122 °F
	-10...90°C[1]; 14...194°F
	-30...60°C; -22...+140°F
	0...100°C[1]; 32...+212°F
sensing element	Pt100 Class B
accuracy at 0...10V	±0.2 K ±0.36 °F
at (0)4...20mA	±0.3 K ±0.54 °F
operating range	-30...+80°C (-22...176°F)
signal output **temperature**	0...10V or 0...20mA or 4...20mA

0ther signal output temperature
NTC; PTC; KTY; LMx35; Pt100; Pt1000; Ni1000; AD592; LM34; BALKO 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..30V DC / 24VAC ± 10%
electromagnetic compatibility EMC	
resistance to interference	EN 50 082-2
interference emission	EN 50 081-2
load (current output only)	$\Omega = \frac{\text{supply - 10 VDC}}{\text{0,02 Amps}}$ ±50Ω
min load (voltage output only)	10 kΩ
power consumption	less 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 "subject to technical modifications"

Description of the sensors

The sensors FK80J (humidity only) / TFK80J (humidity and temperature) measure the air humidity by means of a humidiy-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 avove 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

The measuring element is maintenance free when the surrounding air is clean. Agents that are corrosive and contain solvents, depending upon the type and concentration of the agent, can result in faulty measurements and cause the measuring element to breake down. Direct sunlight should be avoided. Substances deposited on the sensor are damaging as they eventually form a water-repellent film (this applies to all humidity sensors with hygroscopic measuring elements). Such substances are resin aerosols, lacquer aerosols, smoke deposits etc.

This information is based on current knowledge and is intended to provide details of our products and their possible applications. It does not, therefore, act as a guarantee of specific properties of the products described or of their suitability for a particular application. It is our experience that the equipment may be used across a broad spectrum of applications under the most varied conditions and loads. We cannot appraise every individual case. Purchasers and/or users are responsible for checking the equipment for suitability for any particular application. Any existing industrial rights of protection must be observed. The perfect quality of our products is guaranteed under our General Conditions of Sale. Issue : October 2006 valid until 31.12.2006 FK80_E. Subject to modifications, current version available at www.galltec.de. This issue supersedes all previous technical leaflets.

Overview of *capacitive* sensors power supply 15...30V DC (24V AC ±10 %)

FK80J DC-version	0...100%RH 0...100%RH 0...100%RH	0...10VDC 4...20mA 0...20mA				15...30VDC / 24 VAC 15...30VDC 15...30VDC	3/4wire 2wire 3/4wire	**58014700** **58014800** **58013000**
TFK80J	0...100%RH 0...100%RH 0...100%RH 0...100%RH	0...10VDC 0...10VDC 0...10VDC 0...10VDC	-30...+60°C 0...100°C* 0...+50°C -10...+90°C	-22...+140°F 32...+212°F** 32...+122 °F 14...194°F**	0...10VDC 0...10VDC 0...10VDC 0...10VDC	15...30VDC / 24 VAC 15...30VDC / 24 VAC 15...30VDC / 24 VAC 15...30VDC / 24 VAC	3/4wire 3/4wire 3/4wire 3/4wire	**58574747** **58544747** 58524747 58624747
	0...100%RH 0...100%RH 0...100%RH 0...100%RH 0...100%RH	4...20mA 4...20mA 4...20mA 4...20mA 4...20mA	0...50°C -30...+60°C -20...+80°C -10...+90°C 0...100°C*	32...+122 °F -22...+140°F -4...+176°C 14...194°F** 32...+212°F	4...20mA 4...20mA 4...20mA 4...20mA 4...20mA	15...30VDC 15...30VDC 15...30VDC 15...30VDC 15...30VDC	2wire 2wire 2wire 2wire 2wire	**58524848** **58574848** **58264848** 58624848 58544848
	0...100%RH 0...100%RH 0...100%RH 0...100%RH	0...20mA 0...20mA 0...20mA 0...20mA	0...+50°C -10...+90°C** -30...+60°C 0...100°C*	32...+122 °F 14...194°F** -22...+140°F 32...+212°F**	0...20mA 0...20mA 0...20mA 0...20mA	15...30VDC 15...30VDC 15...30VDC 15...30VDC	3/4wire 3/4wire 3/4wire 3/4wire	**58523030** **58623030** 58573030 58543030
Speciality FK80JPt100	0...100%RH 0...100%RH 0...100%RH	0...20mA 0...10VDC 4...20mA	PT100 PT100 PT100	Pt100 Pt100 Pt100	Resistance Resistance Resistance	15...30VDC 15...30VDC 15...30VDC	3/4wire 3/4wire 2wire	58703050 58704650 58704850
TFK80xxx	0...100%RH	0...10VDC 4...20mA	NTC; PTC; KTY; LMx35; Pt1000; Ni1000; AD592; LM34; BALKO 1kΩ; SILICON 2kΩ; SEMICONDUCTOR 559 mVDC @23°C (75°F) Thermistoren @ 25°C (77°F) 1,8kΩ; 2,252kΩ; 3kΩ; 5kΩ; 10kΩ; 1,8kΩ (Type II; III, CSI); 20kΩ; 100kΩ					

Overview of *capacitive* sensors power supply 24V AC ±10 %

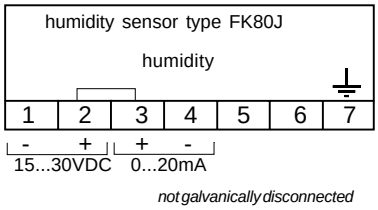
FK80J AC-version	0...100%RH 0...100%RH	0...10VDC 0...20mA				15...30VDC / 24VAC 24VAC	3/4wire 4wire	**58014700** 58014200
TFK80J	0...100%RH 0...100%RH 0...100%RH 0...100%RH	0...10VDC 0...10VDC 0...10VDC 0...10VDC	0...+50°C -30...+60°C -10...+90°C 0...100°C*	32...+122 °F -22...+140°F 14...194°F** 32...+212°F	0...10VDC 0...10VDC 0...10VDC 0...10VDC	15...30VDC / 24 VAC 15...30VDC / 24 VAC 15...30VDC / 24 VAC 15...30VDC / 24 VAC	3/4wire 3/4wire 3/4wire 3/4wire	58524747 **58574747** 58624747 **58544747**
	0...100%RH 0...100%RH 0...100%RH 0...100%RH	0...20mA 0...20mA 0...20mA 0...20mA	0...50°C -30...+60°C -10...+90°C 0...100°C*	32...+122 °F -22...+140°F 14...194°F** 32...+212°F	0...20mA 0...20mA 0...20mA 0...20mA	24VAC 24VAC 24VAC 24VAC	4wire 4wire 4wire 4wire	58524242 58574242 58624242 58544242

* observe max. temperature range ** suitable for EDJ controller

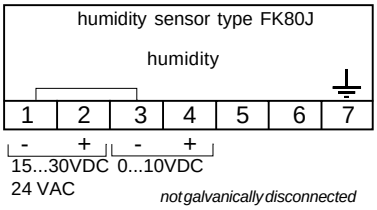
Connection diagram

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

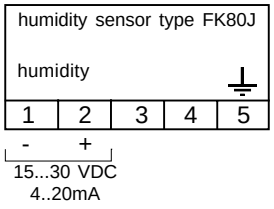
3/4-wire system

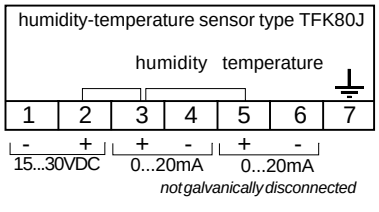


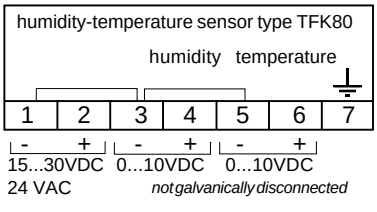
3/4-wire system

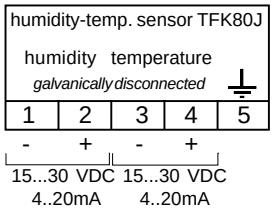


2-wire system

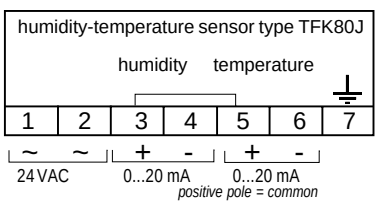




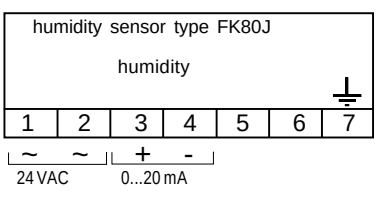




4-wire system (AC version)

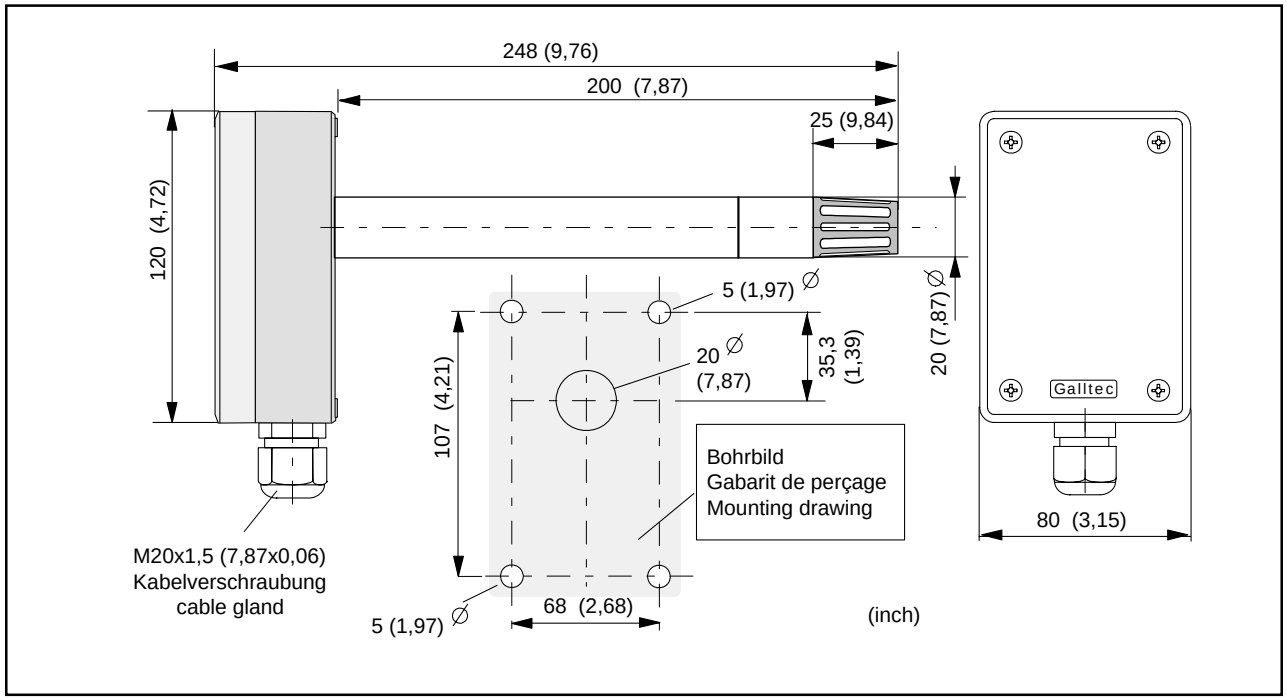


4-wire system (AC version)

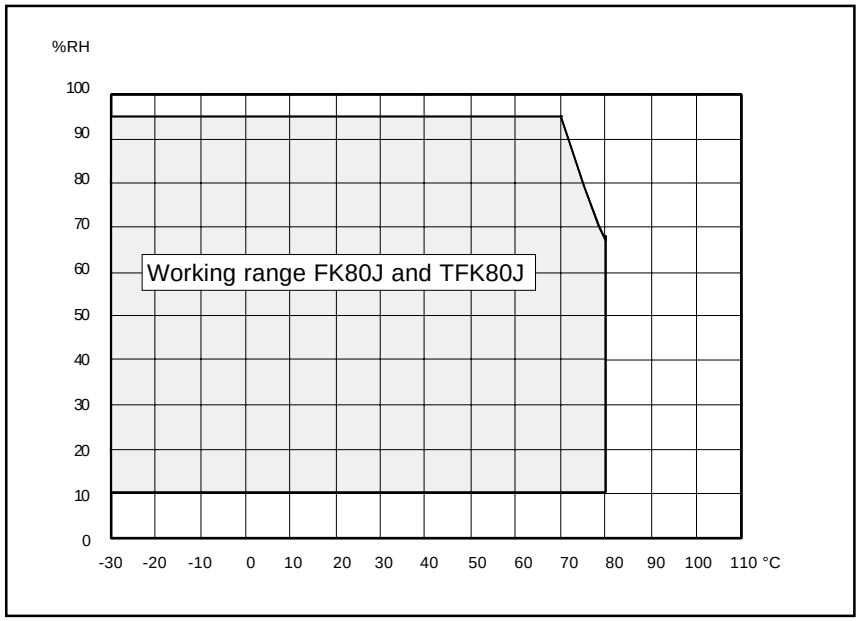


⚠ The electrical connection must only be carried out by properly qualified personnel.

Dimensions diagram



Working range



Cleaning-instruction

The surface of the measuring element must not be touched.

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

Solvents cannot be used for this purpose.

Correct measuring values will be regained as soon as the measurring element is dry.

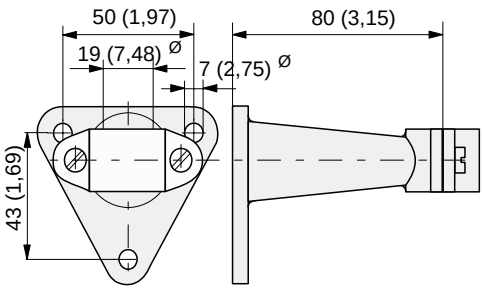
The measuring elements can also be blown off carefully; do not use compressed air.

On manipulation of the interior parts warranty will expire

Accessories

Ventilated sensor tube
for improved air flow
item no. 20.022

Console for wall mounting item no. 20.009



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 solutaion 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 **33%RH**

°F	34	37	40	43	45	48
°C	5	10	15	20	25	30
%RH	34	34	34	33	33	33

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 **55%RH**

°F	34	37	40	43	45	48
°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**

°F	34	37	40	43	45	48
°C	5	10	15	20	25	30
%RH	76	76	76	76	76	75

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 and98%RH. We 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 sesnsor 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.