Humidity Sensor type FG120
and combined

Humidity-Temperature Sensor type TFG120
with Polyga® humidity measuring element for the measurement of relative air humidity and temperature for rooms

FG120...
TFG120...

Type overview

passive sensors

FG120	**Humidity Sensor** with resistance output up to 10kOhms
TFG120	**Humidity-temperature Sensor** with resistance output up to 10kOhms

Description of the sensor :

The Polyga® humidity measuring element consists of several synthetic fabric bands each with 90 individual fibres with a diameter of 3 µm each. In their untreated state, the synthetic fibres are not hygroscopic - their hygroscopic properties are acquired by means of a special process which allows the synthetic fibres to absorb moisture. The molecular structure of the individual fibres is arranged lengthways. When water is absorbed, the molecular chains alter, the outward result being a change in length. A loss of water has a converse effect on the fibre. If the fibre is in equilibrium with the air humidity, there is neither absorption nor a loss of water. The length at this point serves as a gauge for the relative humidity.
If the measuring element is exposed to an air humidity of 100%rh, a film of water forms on the surface of the element (dew point). The physical effect is one as if the measuring element had been immersed in water. The measuring element is saturated. An ideal fixed point is thus attained for adjusting or controlling the sensors. The measuring element is waterresistant. Once administered to the Galltec measuring element, the hygroscopic properties remain stable, the sensitivity remaining until it becomes destroyed by extraneous influences. Regeneration as with fine-measuring elements is not necessary, but does not cause any harm.

Design of the sensor

The expanding action (predominantly lengthways) of the fibres is picked up by means of an electronic sensing system and converted by a potentiometer into a resistance signal.
The fan-shaped measuring element is protected in the housing. The sensors are designed for pressureless systems.
The unit should be installed in a location where condensation cannot enter into the housing. The mounting position is optional, preferably with ventilation slots at right angles to direction of airflow.

The TFG120 sensors have built-in temperature sensors (mainly Pt100) for simultaneous measurement of temperature.

Mounting instructions

The room sensor should be mounted on a vertical wall about 1.5m above the floor. Ensure that the housing can not be deformed because of rough walls. Do not fit above radiators, near windows or doors, on areas exposed to intense vibration or direct sunlight, exterior walls or chimneys. Under no circumstances must the sensors be mounted into a wall or niche. The sensors should be protected from dripping water or splashes.
Ensure that no external air can flow into the interior of the housing via the concealed cable lead. Do not use a silicon sealing compound to seal the cable lead.
The sensors should be mounted such that air in the room can flow upwards unimpeded through the ventilation slots in the housing cover.

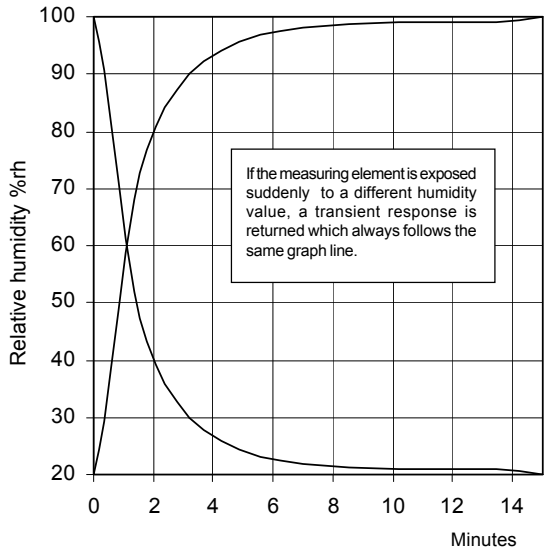
Ageing

In order to maintain their long-term stability, it is important that the measuring elements undergo a special ageing process, details of which cannot be given here.

Reaction of the sensor

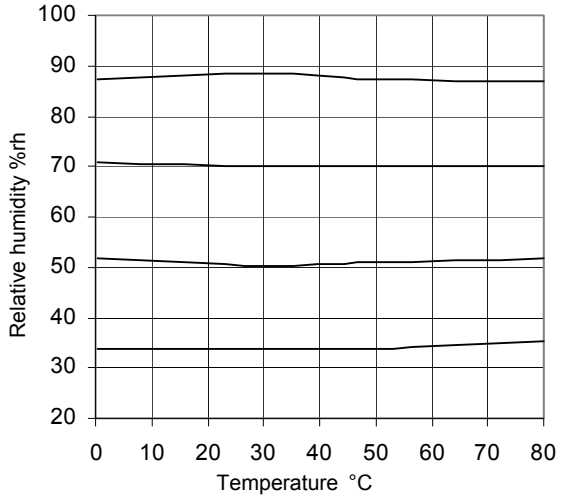
Due to the law of diffusion, there is a time delay before the fibres are saturated during water absorption. This is a decisive factor when determining the reaction time. Thus, for one individual fibre with a diameter of 3 µm, a short saturation time (several seconds) can be measured. Empirical investigations show that bundled or woven fibres, as are used here in the Galltec sensor, give rise to a longer period prior to saturation. This is because the individual fibres impede each other during water absorption and/or water loss, and the ensuing humidity does not register until later. Measurements have shown that, at a wind speed of 2m / sec. the half-life period is 1.2 mins. This represents an effective period of approx. 30 - 40 mins.

Half-life period



Transient response of the measuring element between 20 and 100%rh

Thermal behaviour



50º C is given as the maximum temperature value. Higher temperatures can only be tolerated for a short period of time. The eventual result is a change in the molecular structure which causes a constant error. The maximum temperature of 50º C only applies, however, if no harmful substances (acids, solvents etc.) are present in the medium.

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

Technical Data

Physical data

humidity measuring range ..... 0...100%rh
measuring accuracy
...>40%rh ..... ±2.5%rh
...<40%rh ...according to tolerance diagram
working range ..... 35...100%rh
temperature measuring accuracy ..... +/-0.5°C
working range ..... -10...+60°C
measuring medium ..... air, pressureless, non-aggressive
permissible ambient temperature ..... 0...50°C
mean temperature coefficient ..... -0.1%/K at 20ºC and 50%rh
adjustment ..... at average air pressure 430m NN
permissible air speed 15m/sec
half-life period at v=2m/sec..... 1.2 min
fixing ..... slots in housing base
mounting position ..... optional, preferably with ventilation slots at right angles to direction of airflow
connecting terminals ..... for conductor cross sections 0.5mm²
cable connection..... by flush device box
EMC-tested ..... to EN 50 081-2, to EN 50 081-2
housing ..... impact resistant plastic, light grey
protective system IP20
weight ..... approx. 0.2 kg

Electrical data

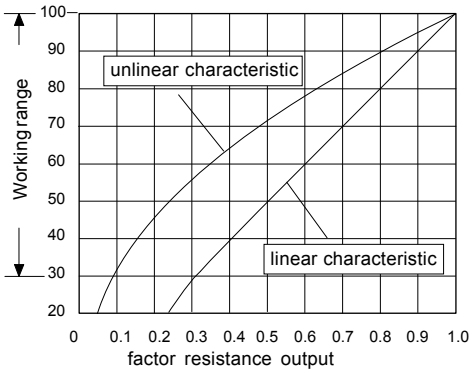
Humidity Output 1 ..... 0...100 ohms linear 2-wire
..... 0...200 ohms linear 2-wire
..... 0...1000 ohms linear 2-wire
..... 100...138.5 ohms linear 2-wire
.....5..100..5 ohms unlinear 3-wire
further resistance ranges on request
permissible load ..... 1.0 watt
max. voltage 42V
insulation resistance ..... 10 Mohms

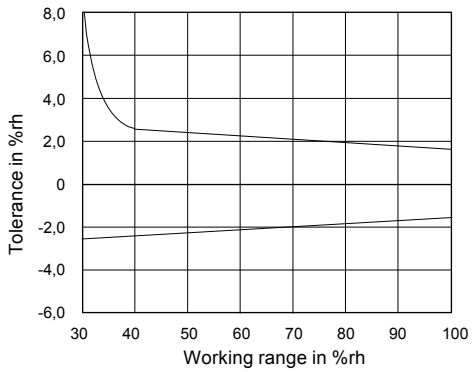
(only for TFG120)
Temperature Output 2 ..... Pt100 ref. DIN EN 60751
permissible load for air 1m/sec and t=0.1K ..... 2 mA

Overview of passive sensors

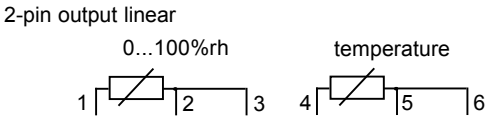
Type	Humidity		Temperature		power supply	wire-system	Item no.
	measuring range 1	output 1	measuring range 2	output 2			
FG120	0...100%rh	0...100 Ohm			max 42V	2wire	45010100
	0...100%rh	0...200 Ohm			max 42V	2wire	45010200
	0...100%rh	0...1000 Ohm			max 42V	2wire	45010300
	0...100%rh	100...138,5 Ohm			max 42V	2wire	45010400
	0...100%rh	50...30...50 Ohm			max 42V	3wire	45010500
	0...100%rh	5...100...5 Ohm			max 42V	3wire	45010600
TFG120	0...100%rh	0...100 Ohm	+5...+50°C	Pt100	max 42V	2wire	45700150
	0...100%rh	0...200 Ohm	+5...+50°C	Pt100	max 42V	2wire	45700250
	0...100%rh	0...1000 Ohm	+5...+50°C	Pt100	max 42V	2wire	45700350
	0...100%rh	100...138,5 Ohm	+5...+50°C	Pt100	max 42V	2wire	45700450
	0...100%rh	5...100...5 Ohm	+5...+50°C	Pt100	max 42V	3wire	45700650

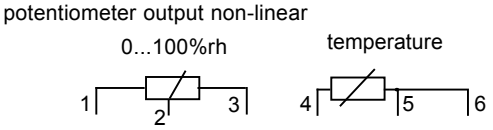
Humidity and tolerance diagram





Connection diagram for passive sensors with resistance output





Dimensions diagram