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## Humidity-Sensor type FG120

and combined

## Humidity-Temperature-Sensor type TFG120

with "Polyga<sup>®</sup>" humidity measuring element for the measurement of relative air humidity and temperature for rooms

### Description of the sensor :

The "Polyga<sup>®</sup>" 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<sup>®</sup> 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.

**ATTENTION:** The guarantee is no longer valid if the interior of the measuring element has been accessed.



FG120...  
TFG120...

### 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 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.

### Maintenance

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 break down. Substances deposited on the sensor are damaging as they form a water-repellent film. Such substances are resin aerosols, lacquer aerosols, smoke deposits etc. Contaminated protective guards should be changed.

### 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.

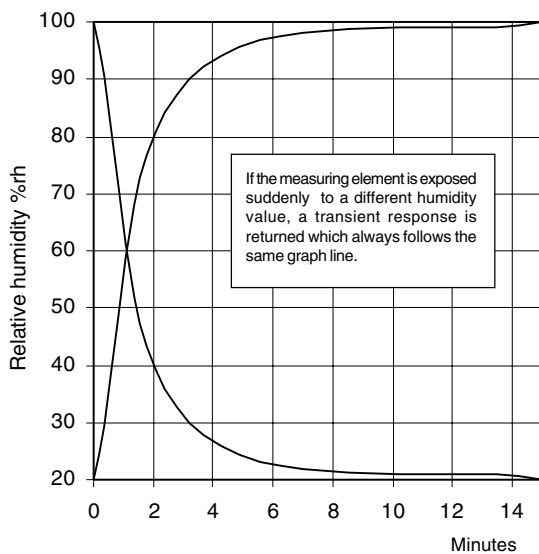
**Reaction of the sensor**

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 our 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.

50° 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 50° C only applies, however, if no harmful substances (acids, solvents etc.) are present in the medium.

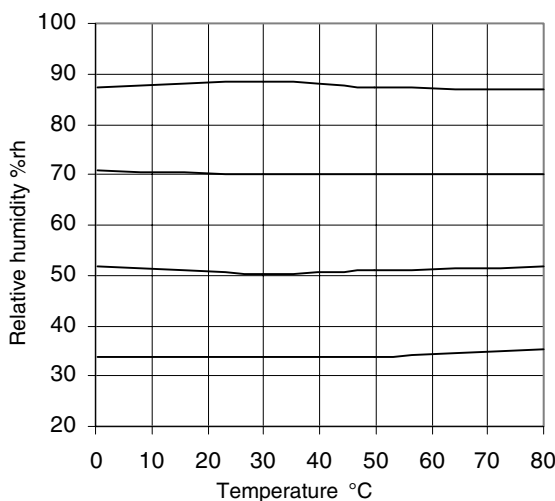
The temperature coefficient as well as the self-heating may vary according to the location and the application (especially with sensors where electronic and measuring system are integrated in one housing).

**Half-life period**



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

**Thermal behaviour**



**Technical 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 20°C 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 for passive sensors**

- 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

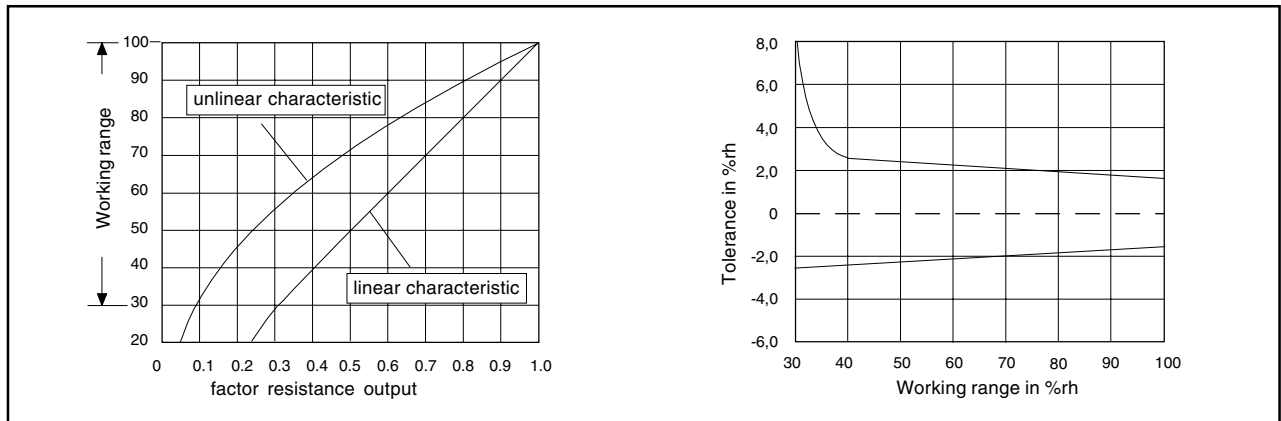
- Temperature Output 2 (TFG120)** ..... Pt100 ref. DIN EN 60751
- permissible load for air 1m/sec and t=0.1K ..... 2 mA

"subject to technical modifications"

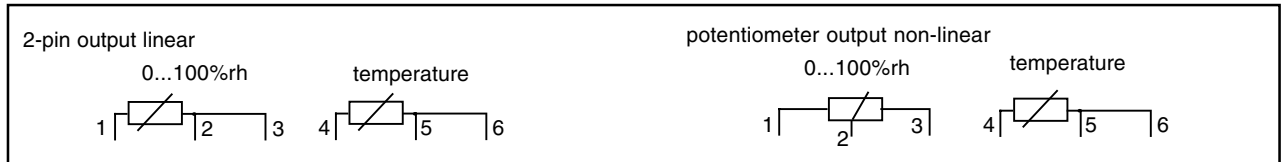
**Overview of passive sensors**

| 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       | 52410100 |
|        | 0...100%rh        | 0...200 Ohm      |                   |          | max 42V      | 2wire       | 52410200 |
|        | 0...100%rh        | 0...1000 Ohm     |                   |          | max 42V      | 2wire       | 52410300 |
|        | 0...100%rh        | 100...138,5 Ohm  |                   |          | max 42V      | 2wire       | 52410400 |
|        | 0...100%rh        | 50...30...50 Ohm |                   |          | max 42V      | 3wire       | 52410500 |
|        | 0...100%rh        | 5...100...5 Ohm  |                   |          | max 42V      | 3wire       | 52410600 |
| TFG120 | 0...100%rh        | 0...100 Ohm      | +5...+50°C        | Pt100    | max 42V      | 2wire       | 52400150 |
|        | 0...100%rh        | 0...200 Ohm      | +5...+50°C        | Pt100    | max 42V      | 2wire       | 52400250 |
|        | 0...100%rh        | 0...1000 Ohm     | +5...+50°C        | Pt100    | max 42V      | 2wire       | 52400350 |
|        | 0...100%rh        | 100...138,5 Ohm  | +5...+50°C        | Pt100    | max 42V      | 2wire       | 52400450 |
|        | 0...100%rh        | 5...100...5 Ohm  | +5...+50°C        | Pt100    | max 42V      | 3wire       | 52400650 |
|        |                   |                  |                   |          |              |             |          |

**Humidity and tolerance diagram**



**Connection diagram for passive sensors with resistance output**



**Dimensions diagram**

