



**Description of the sensor**

The exchangeable digital sensor „PMU\_G“ is equipped with our tried and tested humidity sensor element FE09/4. Protected by a PTFE pocket filter, the measuring element measures the air humidity. The pocket filter consists of porous vapour-permeable material and protects the sensor element from most dirt, dust and pollutants.

The electronics and the plug contacts on the back are extrusion-coated with plastic to make them watertight. The plug contacts comply with protection category IP40.

The capacitive humidity measuring element, produced using thin-film 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.

The electronics set off the humidity values measured in this way against the calibration values it has stored and emits them via the plug contacts in the form of calibrated, digital ASCII protocol. The sensor head is also equipped with a temperature probe Pt1000 1/3DIN which is used for both acquiring the air temperature and also for temperature compensation in the humidity measurement by the PMU\_G.

Through this calibration in the sensor head and output as a digital signal, the PMU\_G sensor heads can be exchanged at any time and do not require an expert to do so. This does not disrupt the system functioning.

**Digital Humidity-Temperature Sensor PMU\_G**

with asynchronous ASCII transmission protocol, calibrated model for relative humidity and temperature in exchangeable, plug-in design.

**Humidity**

measuring range ..... 0..100%rh  
 measuring accuracy 10...90%rh ..... ±1,5%rh <sup>1)2)</sup>  
     at <10%rh >90%rh ..... ±0,8%rh/%rh additional  
     at <10°C >40°C ..... ±0,0075%rh/K additional  
 resolution ..... 0,01%rh (readout)  
 hysteresis ..... <1,0%rh  
 response time t<sub>63</sub> (v=2m/s with filter) ..... < 15 sec  
 protection against dust ..... PTFE pocket filter

**Temperature**

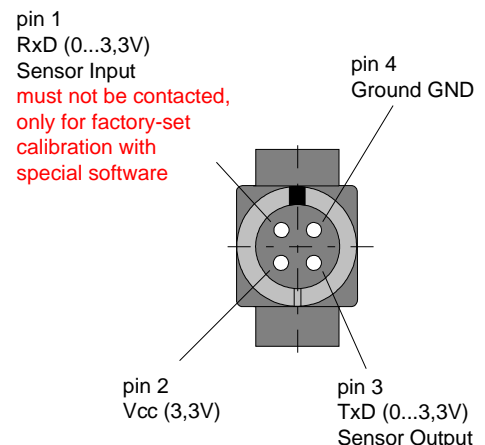
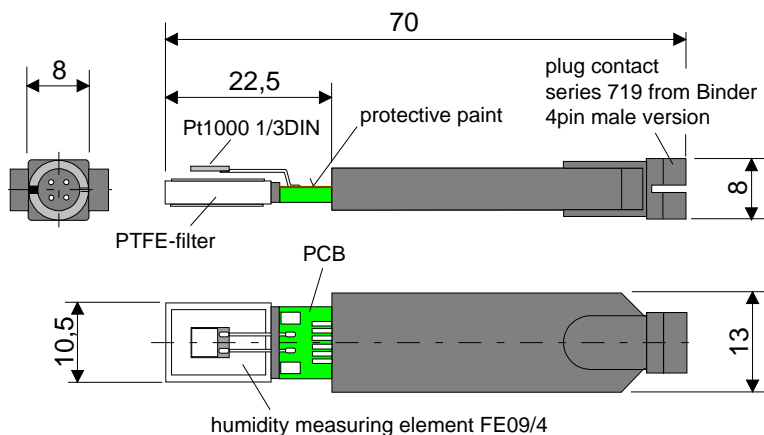
measuring range ..... -25...70°C  
 measuring accuracy ..... ±0,2K @ 25°C  
     ..... ±0,3K (<15°C >30°C)  
 response time t<sub>63</sub> at 2m/s ..... 15 s  
 measuring element ..... (Pt1000 1/3DIN)  
 resolution ..... 0,01°C (readout)

**General**

ambient temperature ..... -25...70°C  
 measuring medium ..... air, pressureless, non-aggressive  
 output ..... ASCII (Galltec-protocol)  
 housing ..... plastic  
 electromagnetic compatibility ..... to EN61326  
 minimum air speed across the measuring head ..... 0,3 m/s  
 protective system sensor ..... IP64  
 protective system plug ..... IP40  
 mounting position ..... optional  
 contacting ..... 4Pin flange plug series 719 from Binder  
 Power input ..... max 15 mW  
 Further information .... product info sheet no. A0;no. A1;no. B1.1  
 Relative humidity - Definitions - Physical laws

<sup>1)</sup> Depending on the respective conditions of use, the sensor head (PMU) will require regular recalibration.

<sup>2)</sup> greater precision on request



## Function and implementation of the digital humidity temperature sensor PMU\_G

The exchangeable digital sensor head measures the current temperature and the relative humidity in the direct surroundings.

### Output

After contacting and supply via Vcc & GND, the sensor head automatically transmits the measurement protocol via the TxD pin. Every 3-4 seconds the respective current measurement value is re-issued at 9600 Baud. Between the individual measurement protocols (ASCII output), the TxD pin is at 3.3VDC (High Level).

Symbol	Parameter	Min	Max	Unit
Vcc	Supply Voltage	3,2	3,4	V
Vss	Supply Voltage GND	0	0	V
Vol	Output low voltage	Vss	Vss + 0,6V (I <sub>OL</sub> = 6mA)	V
Voh	Output high voltage	Vcc - 0,6V (I <sub>OH</sub> = -3,4mA)	Vcc	V
Ioh	Output source current		2mA @ Vcc = 3V	
Iol	Output sink current		2mA @ Vcc = 3V	

The above table shows the electrical signals of the digital sensor head PMU-G. The customer must provide a stable, regulated distribution voltage of +3.3VDC.

### ASCII output protocol:

The sensor continuously transmits the measurement data on the TxD pin (3) as ASCII protocol. It starts with @, has got a "; " as a separation sign and ends with "CR" and "LF".

@T;<sign><temperature>;<alarm code>;F;<humidity>;<alarm code>;<serial number>;<check sum><CR><LF>

Example: @T;+021.37;A00;F;038.92;A00;12345678;38<CR><LF>

#### Check sum:

The check sum is calculated as follows:

255 - (Sum (dec) Modulo256) = Check sum (dec) = Check sum (hex) → ASCII

Example: Check sum = 255-(1991 Modulo256) = 255-199 = 56 = 38(hex)  
Check sum = 38(hex) → ASCII output "3" u. "8"

#### Alarm codes:

##### Temperature channel:

- A00 = no alarm, the temperature value is within the limits
- A01 = temperature range exceeded  
(the ASCII output range output value is limited to "+70.00°C ")
- A02 = below temperature range  
(the ASCII output range output value is limited to "-25.00°C ")
- A03 = sensor breakage or no sensor available
- A04 = short circuit at PT1000 (resistance < 500?)

##### Humidity channel:

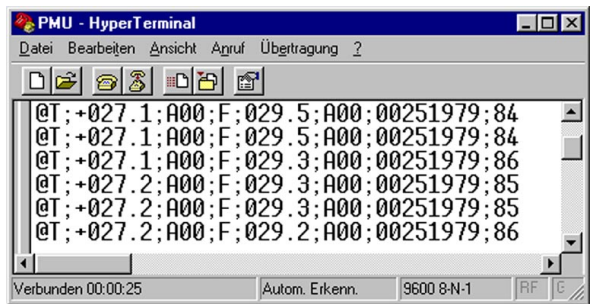
- A00 = no alarm, the humidity value is within the limits
- A01 = humidity range exceeded (=100% RH)
- A02 = below humidity range (=0% RH)
- A03 = sensor breakage or no sensor available
- A04 = humidity sensor defective

**Please note:**

- > Short leads (max. 1m) between PMU\_G and the analysis electronics (provided by customer;
- > PMU\_G must be contacted, powered and analysed via hardware and software by customer;
- > The PMU\_G is not a „stand alone“ device and must be checked together with the analysis electronics in accordance with the EMC guidelines;
- > The PMU\_G does not have an internal polarity reversal protection. Please ensure that the plug contact is only connected to the correct voltage level;
- > When exchanging the PMU\_G, standard precautions must be taken to ensure that electrostatic damage is avoided.

**Output via the Hyper Terminal**

In connection with a separate signal level converter (RS232), the PMU-G can be read via the Hyper Terminal programme in Windows. The picture opposite shows the character string of the data issued by the PMU.



**Output via Visual PMU**

For recording data and for online display purposes, the visualisation programme „Visual PMU“ by Galltec+Mela is available.

**Connector versions for contacting the PMU-G**

Manufacturer: Firma Binder (<http://binder-connector.de>)

Binder No.	Version	Model	
09-9766-20-04	female	Soldered connection for printed-circuit boards	
09-9766-30-04	female	soldered pins	
09-9764-70-04	female	for cable connection with mains lead cleat	
09-9764-00-04	female	for cable connection	