ELECTROLYTIC HUMIDITY SENSOR EFS-10

4 016138 323856

Order No. 15 65 45

Characteristic features

- **Electrolytic Humidity sensor**
- **Measuring range 20 … 95% at 0 … 60 °C**
- **Simple evaluation**
- **Compact size**
- **No calibration needed**
- **Economic design**

Typical areas of application

- **Climate monitoring**
- **Consumer applications**
- **Office equipment**
- **Building instrumentation**
- **Cooling and air conditioning systems**
- **Air humidifiers, air dryer**

Features

The humidity sensor EFS 10 is an electrolytic type polymer sensor for measurement of relative humidity. The sensor converts the prevailing humidity value into impedance, which can be electronically measured.

The physical measurement principle is based on the characteristics of a hygroscopic material whose conductivity changes as a function of humidity in the environment.

The humidity measuring range is right from 20 to 95% rH. The measurement of impedance should be done with an AC current (without DC-offset). The recommended operating frequency is 1 kHz for a measuring voltage of maximum $1V_{eff}$.

The sensors of one production batch are identical in characteristics and hence, for medium precision requirements, calibration can be skipped. Because of this advantage, these sensors are ideally suited for price sensitive consumer applications.

The sensors are resistant to common household chemicals including cigarette smoke. However, the suitability for a certain application should be checked by the user before hand.

An evaluation kit is available against order number EFS10-EVA, which simplifies development of customised measurement circuits for the humidity sensors. The evaluation kit consists of a test circuit board for the humidity sensor with a voltage supply of 0..10 V. The circuit is documented in detail and circuit diagram with description of circuit is covered in the scope of supply.

Technical Data

Humidity sensor EFS-10	
Measurement principle	Electrolytic
Humidity-operating range	20 ... 95% rH. without condensation
Temperature-operating range	0 ... 60 °C
Hysteresis	< 2% rH.
Response time t_{90}	approx. 120 sec
Impedance	1.5 kOhm – 3 MOhm
Rating	0.2 mW max.
Measuring voltage	1 V_{eff}, (2.8V_{SS} for sine wave)
Signal waveform	AC voltage (without DC offset)
Measuring frequency	0.1 … 5 kHz, nominal 1 kHz
Dimensions (B x L x D)	5.0 x 10.0 x 1.6 mm
Connector	SIL 30 mm, or customer specific

For further information, visit our website: www.hygrosens.com

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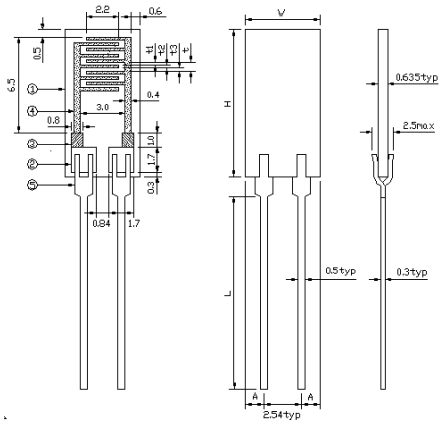
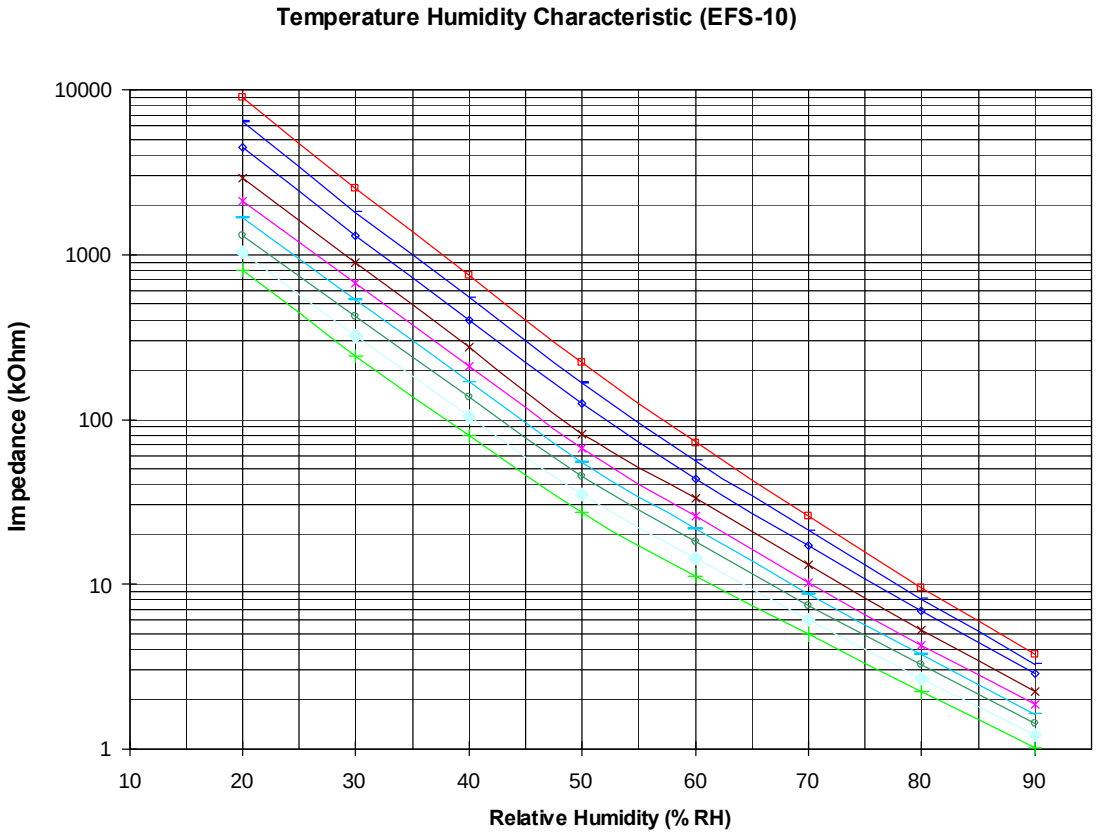
Impedance characteristics

The table shows the impedance value(in K-ohms) of the sensor element as a function of relative humidity and temperature.

Temp. [°C]	Relative Humidity [%]							
	20	30	40	50	60	70	80	90
10	9000	2500	740	220	72.00	25.80	9.50	3.72
15	6364	1803	543	166	55.64	20.94	8.07	3.26
20	4500	1300	398	125	43.00	17.00	6.85	2.85
25	2890	900	270	81	33.00	13.00	5.30	2.20
30	2100	670	210	66	25.50	10.20	4.28	1.85
35	1652	530	168	54	21.54	8.69	3.71	1.62
40	1300	420	135	45	18.20	7.40	3.22	1.41
45	1020	317	103	35	14.28	6.02	2.67	1.20
50	800	240	79	27	11.20	4.90	2.22	1.02

Dimensional drawing





Application examples of the electrolytic humidity sensor EFS-10

The following circuit processes the sensor signal and delivers a calibrated voltage signal of 0 ..10V at the output. This low cost circuit can be adjusted by offset and by gain value and is suitable for applications in control systems for buildings.

The voltage supply is a very stable unit with two Bandgap reference diodes and ensures a perfect 5.0 V supply to the measuring unit. The center tapping of 2.5V serves as a virtual reference point for the operational amplifiers.

Two operational amplifiers U3A and U3B together form an amplitude stabilised sine wave generator, which oscillates at approx. 1 kHz. C8 separates out the DC offset and feeds the sensor.

The Operational amplifier U2B compensates the logarithmic behaviour of sensor elements over the diode characteristics. The diode in the sensor element (Type 1N4148 or equivalent) also additionally contributes for the purpose of temperature compensation. The operational amplifier U2A is a peak value rectifier. The linearised and temperature compensated humidity dependent voltage is available at C7. The following instrument amplifier with U1A, U1B and U1D is meant for separate adjustment of offset and gain. The offset value is fixed at 33 % rH (calibration cell with saturated MgCl salt filling). The subsequent adjustment of ramp doesn't affect the offset setting, since the pivot point of gain adjustment is at 3.3 V (33 %).

An evaluation kit as per ordering number EFS10-EVA is available for the circuit. This contains fully equipped calibrated electronics with humidity sensor, complete documentation and also a brochure n “Humidity measuring system“ with physical background knowledge of thermodynamics.

The salt-reference-cells, necessary for humidity calibration, can be procured under the ordering number REFSET. This product is also supplied with extensive documentation and instructions for usage.