



EMD-4000B

Humidity Sensor



The EMD-4000B is a bulk resistance-type humidity sensor based on the impedance change of a thin-film polymer due to water vapor absorption. The polymer is deposited on Bismuth alloy terminals, which are set on a ceramic substrate. The sensor is excited by a low voltage alternating current and the impedance measured as a function of relative humidity.

The thin-film polymer consists of chemical functional groups that disassociate into ionic species as water vapor is absorbed. This results in increased electrical conductance through the sensor or a decrease in impedance. The impedance is an inverse exponential function of the surrounding humidity.

Features

- Excellent interchangeability
- Standard Accuracy 5%
- Economical
- Recovers from condensation
- Good resistance to chemical vapors
- Fast response
- Low hysteresis

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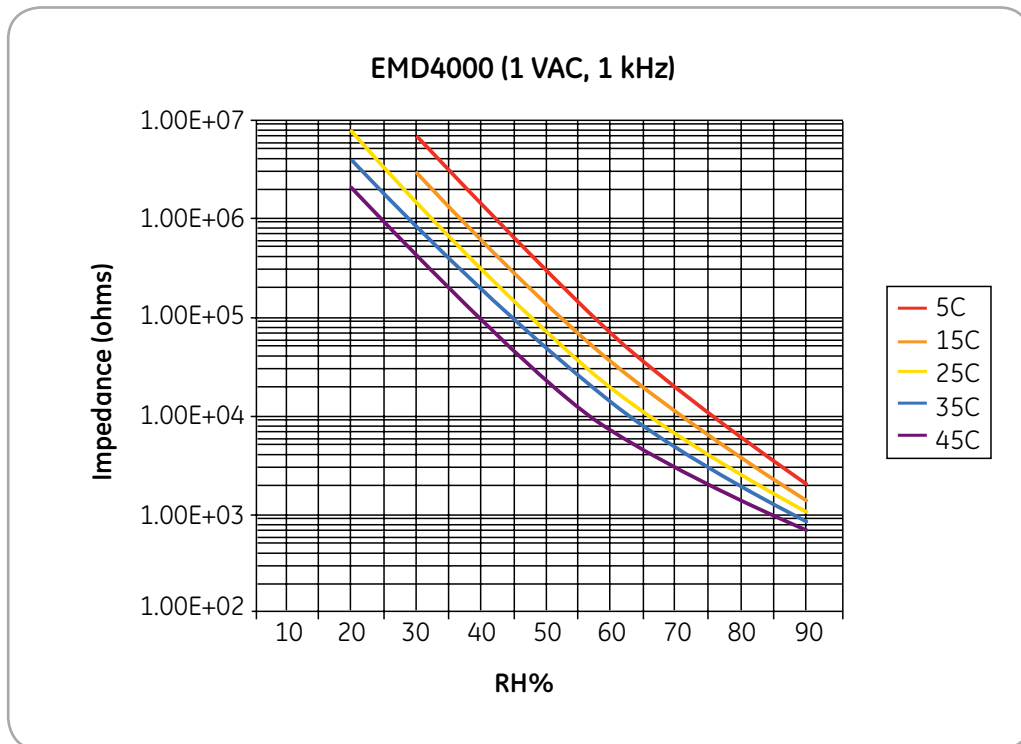
The EMD-4000B is capable of withstanding environments where organic vapors are present. It recovers from condensing environments and may be used at temperatures up to 185°F (85°C). The EMD-4000B is also capable of in situ measurement of soluble water in organic liquids such as transformer oil, gasoline, toluene, acetone, and other compounds of varying hydrogen bond strengths.

Manufacturers (OEMs) with requirements to incorporate humidity sensors in HVAC controls, data loggers, appliances, automotive applications and consumer products.

The EMD-4000B is highly repeatable and interchangeable. The sensor is manufactured in high yields to $\pm 5\%$ RH or better tolerances. This results in a sensor that can be used in many designs without the need for humidity calibration, where the measuring circuit can be calibrated with external reference resistors. The EMD-4000B exhibits a well defined standard response curve as a function of humidity and temperature and has low hysteresis and fast response.

The EMD-4000B is priced for Original Equipment

Response Curves



EMD-4000B Specifications

%RH Range at 77°F (25°C)

20% to 95%

Operating Temperature

41°F to 140°F (5°C to 60°C)

Storage

0% to 95% RH, -40°F to 185°F (-40°C to 85°C)

Accuracy

- ±5% RH standard
- ±3% RH available on request

Repeatability

±0.5% RH

Impedance

72K Ω at 77°F (25°C), 50% RH with 1 VAC at 1 KHz excitation

Response Time

<1 minute for 63% step change in non moving air

Hysteresis

<1% RH at 77°F (25°C) for step change from 30% to 98% RH then back to 30% RH

Temperature Dependence

0.5% RH/°F (°C, average)

Ordering Information

Part Number - EMD4000B

Bulk resistance-type humidity sensor 5%

Long Term Drift

0.1% RH/year typical in clean, chemical free air

Dimensions

0.2 in (5.1 mm) wide x 0.4 in (10.2 mm) high x 0.02 in (0.51 mm) thick

Leads: 0.4 in (10.2 mm) long x 0.15 in (3.81 mm) wide x 0.01 in (0.25 mm) thick on 0.1 in (2.54 mm) centers

Exposure to Saturated Chemical Vapors

- Toluene, 25,200 ppm/3 days: <2% RH drift
- Hexane, 152,000 ppm/3 days: <2% RH drift
- Methanol, 127,000 ppm/3 days: <5% RH drift

Transformer Oil; 60K Ω at 30 ppm at 77°F (25°C)

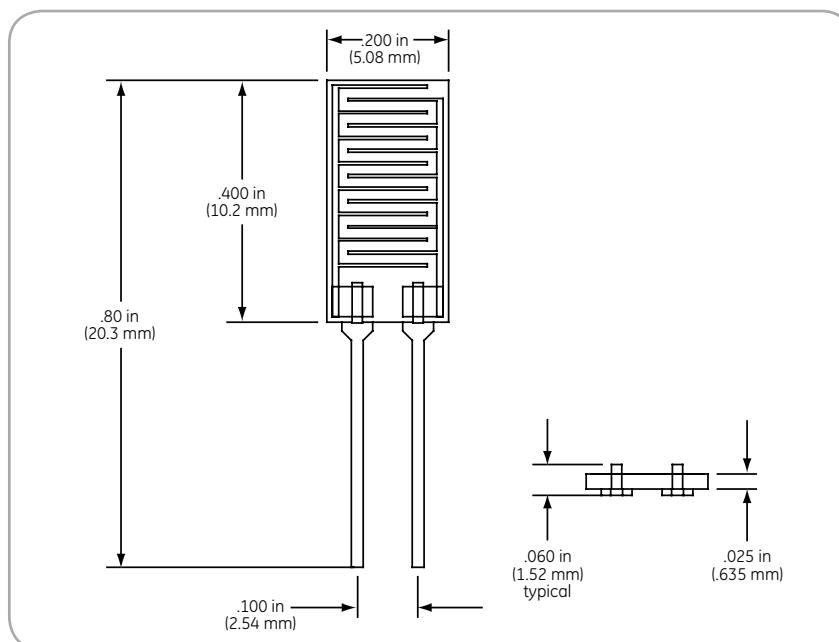
- 3 months at 77°F (25°C): <5% drift, 2% RH typical
- 1 month at 185°F (85°C): <5% drift, 2% RH typical

Water Vapor Saturation

100% RH/77°F (25°C)/1000 hours storage; <3% RH drift typical; 1/16 in (1.59 mm) water droplet covering entire sensor surface for 10 minutes followed by drying via air ventilation; <5% drift

Caution

DC current should never be applied to the EMD-4000B humidity sensor. Application of direct current will polarize the sensor and cause an irreversible shift. Only a symmetrical AC excitation current should be applied. Tellaire recommends that application of a low level AC excitation (1 VAC, 1 KHz typical) to minimize self-heating effects.



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