Sensors • Humidity, Temperature and Dewpoint Probe

PMA2170

Measures Ambient Humidity from 0 to 100% and Temperature from -10 to +60 °C

Applications

- Laboratory and Industrial Measurements
- Environmental Monitoring
- Museum Monitoring
- Heating and Air-Conditioning
- Agriculture

Features and Benefits

- Wide Temperature & Humidity Range
- Instantaneous Dewpoint Reading
- High Accuracy
- Excellent Long-Term Stability
- Selectable Units
- Fast Response
- Interchangeable Sensor

The PMA2170 is an accurate smart probe for measuring relative humidity and ambient temperature when used in conjunction with the PMA2100 Personal Measurement Assistant.

A memory chip is embedded into the probe to store the signal processing and unit conversion program for the probe. This program is automatically transferred to the PMA2100 upon connection of the probe yielding immediate readings without the necessity of configuring the meter. This approach guarantees full interchangeability of the probes and high degree of traceability. A number of unit conversion algorithms is also programmed into the probe simplifying its use.

The relative humidity is the ratio of the actual vapor pressure to the saturation vapor pressure at the air temperature, expressed in percents. Relative humidity displays an inverse relationship with absolute temperature.

The Dewpoint calculating program is also included in the memory capsule. The Dewpoint is the temperature the air would have if it were cooled , at constant pressure and water vapor content, until saturation (or condensation) occurred.

A temperature compensated capacitive sensor is used in the PMA2170 to achieve high accuracy and long term stability over a broad range of environmental conditions. The sensor exhibits low hysteresis. A membrane filter and housing protect the sensor form from contaminants. The humidity sensitive capacitive elements for this probe are manufactured to very tight specifications and factory-calibrated allowing simple replacement, should the sensor get damaged. No additional calibration is necessary.

Humidity is a very important factor for the comfort of humans and animals, operating sensitive electronic equipment, working with high voltage or static sensitive components. Fabrics, adhesives and paper change their properties with the ambient humidity Even some precision mechanisms might be affected by humidity.

SOLAR® LIGHT

Comfortable room relative humidity at 20-25°C is around 50% RH. It may vary from 38% RH in class-10 clean rooms to 60% RH in hospital operating rooms.

Calibration

The temperature sensor is calibrated by comparison with a reference thermometer. The capacitive humidity sensitive elements are factory calibrated by their manufacturer, Vaisala Corporation.

The calibration accuracy of the humidity sensor is checked in the test chamber partially filled with saturated water solution of various salts, known to produce certain relative humidity above its surface when in equilibrium. The following salts can be used:

Salt	RH [%] at 20°C
Lithium Chloride (LiCl)	11.3%
Magnesium Nitrate (Mg(NO3)2)	54.4%
Sodium Chloride (NaCl)	75.5%

Specifications	
Humidity Range	0 to 100% RH
Temperature Range	10 to +60 °C
Humidity Accuracy	±1°C
Stability	Better than 1% / Year
Self Heating Power	Less than 100µW
Display Resolution	0.1°F, 0.1°C, 0.1K, 0.1%RH
Cable	1ft, Retractable to 5 ft. (0.3m/1.5m)
Diameter	1" Handle, 0.5" Sensor
Length	11" with Handle
Weight	10 oz.
Ordering Information	
PMA2170	Humidity and temperature probe
See PMA2160 thermistor probes for high accuracy temperature measurements and PMA2165	

References

[1] Fraden J., "AIP Handbook of Modern Sensors Physics, Design and Applications"

SL/Sensors/PMA2170_09/2014

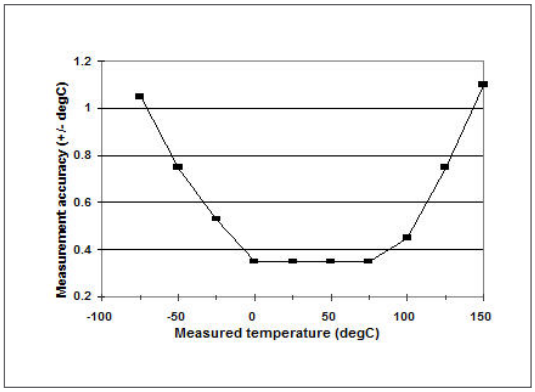

Fig. 1. PMA2170 Accuracy of Temperature Measurement

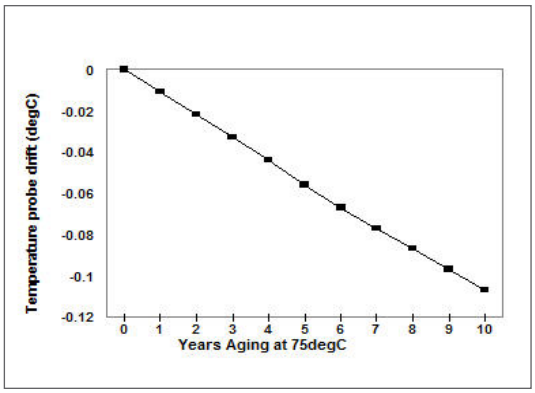

Fig. 2. PMA2170 Typical Long-Term Drift of the Thermistor Sensor