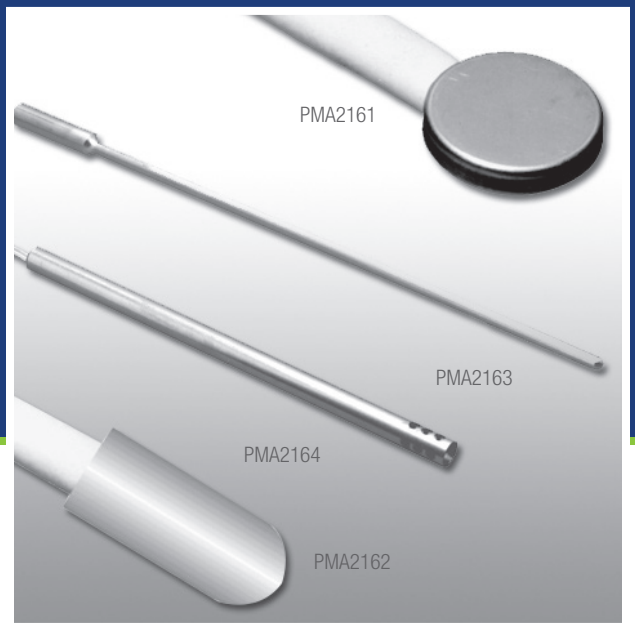
Sensors • Thermistor Temperature Probe Interface

PMA2160



Measures Temperature in a Range of -40 to +150°C with High Accuracy and Stability

Applications

- Laboratory and Industrial Temperature Measurements
- Environmental Monitoring
- Clinical Studies
- Temperature Sensor Calibration

Features and Benefits

- Wide Temperature Range
- 0.35°C Accuracy
- Excellent Long-Term Stability
- Interchangeable Probes
- Probes for Various Media Available
- Selectable Units
- Fast Response
- Small Size

The PMA2160 is an interface that permits a thermistor temperature probe to be attached to the PMA2100 meter. The thermistor probes are factory calibrated so they can be easily interchanged without compromising accuracy of the measurement. Therefore a single interface can be used with all the thermistor probes listed and new probes can be purchased without additional calibrations. The probes attach to the PMA2160 interface via RJ12 connector (Fig.3).

Thermistor is device that changes its electrical resistance in response to changes in ambient temperature. Since the resistance is easily measured the thermistors are commonly used as temperature transducers. They can be manufactured in very small sizes thus reducing their thermal capacity and in consequence reducing response time. Relatively high temperature coefficients can be achieved making the thermistors suitable for high resolution measurements.

The relationship between temperature and resistance of the thermistor is highly non-linear. However, using the Steinhart-Hart formula programmed into the PMA2160 interface, the PMA2100 linearizes this relationship and calculates temperature to the accuracy of 0.35°C. The Steinhart-Hart formula has wide industry acceptance for computation of temperature.

The particular thermistor used in PMA probes has a negative temperature coefficient and a very good aging characteristic. Self heating is controlled by limiting the current to less than 100 µA, which in turn limits the power dissipated the thermistor to approx. 100 µW.

The PMA2160 family of temperature probes measure temperature using the combination of thermistor probes and the PMA2160 interface to the PMA2100 (Fig. 3). The interface and probes can be purchased as a kit or separately, and one interface can accept any of the thermistor probes offered. Measurements of surface temperature, liquids, or gases can be easily interchanged by connecting the proper thermistor probe to the interface. The interface contains a memory capsule which holds a program that the

SOLAR® LIGHT

PMA2100 can read and execute. This program contains all of the necessary information to convert the thermistors resistance into a temperature as well as unit conversions and all setup information for the PMA2100.

The Surface temperature probe (PMA2161) can be used in situations where the temperature of a solid mass is needed, as in a semiconductors heat-sink or to monitor skin temperature. Measurements of soil temperature can be achieved using the stainless steel immersion probe (PMA2163), Air or gas temperatures can be obtained using the stainless steel air/gas probe (PMA2164), and for general purpose temperature measurements the PMA2162 or PMA 2163 probes can be used.

The measurements can be displayed in units of degrees Celsius (°C), degrees Fahrenheit (°F), or in Kelvin (K). Unit conversions are as follows:

- T[°C] =T[K] - 273.16
- T[°F] = 1.8 * T[°C] + 32

Calibration

The thermistor temperature probes are factory tested to be within 0.35°C from nominal within temperature range of 0 to 70°C. Bi-annual calibration check is required. The probe should be replaced if exposed to temperatures beyond the specified working range.

Specifications	
Temperature Range	PMA2161: -40 to +150°C
	PMA2162: -40 to +80°C
	PMA2163: -40 to +150°C
	PMA2164: -40 to +150°C
Diameter	PMA2161: Size: 0.375" dia., 0.125" High
	PMA2162 Size: 0.155" dia., 0.375" Long
	PMA2163 Size: 0.125" dia., 6.0" Long
	PMA2164 Size: 0.5" dia., 6.0" Long
Accuracy	±0.35°C within 0-70°C (Fig 2)
Stability	Better than 0.02°C/Year
Self Heating Power	Less than 100µW
Display Resolution	0.1°F, 0.1°C, 0.1K
Units	°F, °C, K
Cable	4 ft. Straight Cable (1.2m)

Ordering Information	
PMA2160	Thermistor Probe Interface
PMA2160 interface and the probe itself. For example: PMA2161K. See PMA2165 thermocouple probe for high temperature measurements.	

References

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

SL/Sensors/PMA2160_09/2014

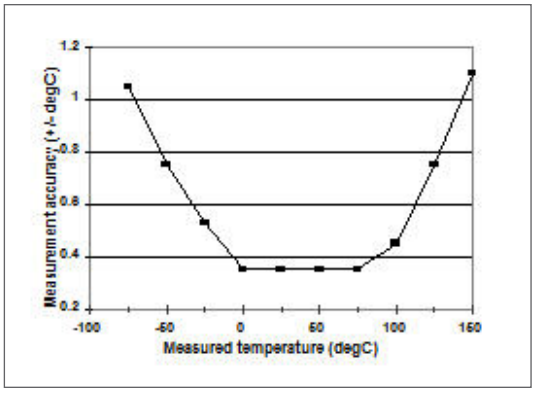


Fig. 1. PMA2160 Accuracy of Temperature Measurement

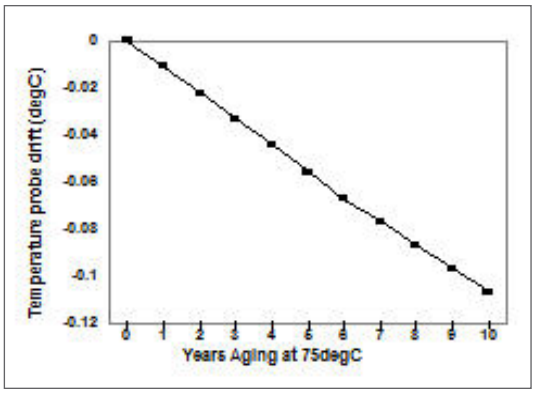


Fig. 2. PMA2160 Typical Long-Term drift of the Thermistor Sensor

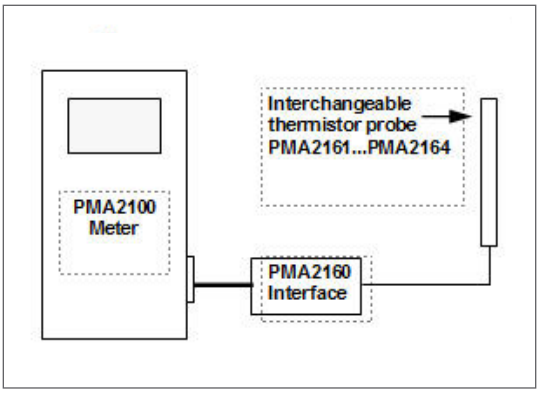


Fig.3. PMA2160 Thermistor Probe Connected to the PMA2100 Meter