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## WMO Temperature, Platinum PT100 sensor quality

Recommended current: 0.5 mA  
 Meas. element resistance: 100 Ω  
 $\alpha = 0.00385$



- long-term stability
- high accuracy
- wide measuring range
- compact construction
- supports 4-wire connections
- supports 3-wire connections

## MeteoPT100

IP68 platinum PT100 temperature probe for meteorological and industrial use. Features a high quality platinum element encapsulated in waterproof housing with a stainless steel probe. Exceeds WMO accuracy and long term stability requirements for accurate air, water and general non-corrosive fluid/liquid temperature. Features a 4-wire connection which eliminates all effects of wire connection on sensor accuracy for the highest levels of available precision.

Features a 5m shielded cable. Cable length can be customized per user requirements.

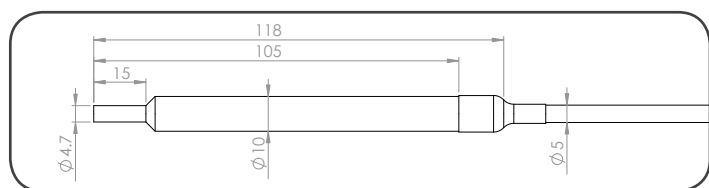
Type	Accuracy	Full scale accuracy	Stability	Resolution	Measuring range**	Operating range**	Response* $\tau_{63\%}$	Meets WMO
Type 1/5 analog Temperature probe	$\pm 0.06^\circ\text{C}$ (at 0°C)	$\pm 0.1^\circ\text{C}$ (-50°C...70°C)	$< 0.01^\circ\text{C}$ per year	Unlimited (analog sensor)	-50°C...80°C	-50°C...80°C	5-30s	yes
Type 1/10 analog Temperature probe	$\pm 0.03^\circ\text{C}$ (at 0°C)	$\pm 0.08^\circ\text{C}$ (-50°C...70°C)	$< 0.01^\circ\text{C}$ per year	Unlimited (analog sensor)	-50°C...80°C	-50°C...80°C	5-30s	yes

Sensor Pt100 RTD Class F0.1 IEC 60751

\*  $\tau_{63\%}$  sensor response time listed will vary based on measured fluid properties: density, heat capacity and flow speed.

\*\* The standard sensor probe is supplied with a PVC cable for use in temperatures  $< 80^\circ\text{C}$ . If the cable is secured without the possibility of moving and flexing, it can be safely used in temperatures down to  $-50^\circ\text{C}$ . If the cable is free hanging and able to move or flex, the lower temperature limit of  $-20^\circ\text{C}$  should be respected. Other cables for extended temperature range installations are available per request.

## 4-wire connection = measurement stability

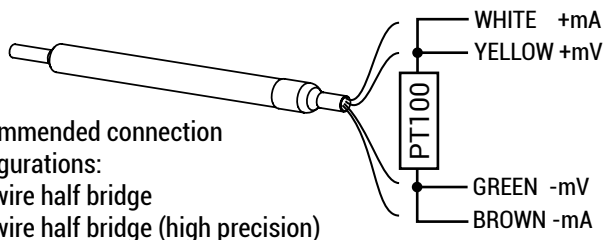


Relationship between resistance and temperature for PT100:

- $+1^\circ\text{C}$  temperature change causes 0.385 ohm resistance increase so that  $0^\circ\text{C} = 100 \Omega$  and  $100^\circ\text{C} = 138.5 \Omega$

Linearization equation for this PT100:  $T = A0 + A1 \cdot R + A2 \cdot R^2$

- T = temperature in  $^\circ\text{C}$ , R = resistance in  $\Omega$
- $A0 = -246$
- $A1 = 2.362$
- $A2 = 0.0009813$



Recommended connection configurations:

- 3-wire half bridge
- 4-wire half bridge (high precision)
- 4-wire half bridge (most accurate, temperature compensation of sensor cable wires) - two wires carry the sense current and two measure the voltage across the sensor element.
- 3-wire half bridge (join Green & Brown wires) - operates on the assumption that the resistance & temperature of each of the three wires is the same. Current loss on the wires is not compensated and affects voltage loss and measurement accuracy. Long wire lengths are not recommended for 3-wire connections.

For applications where industrial toughness, WMO accuracy and long-term stability is important.

## PLATINUM ACCURACY & LONG-TERM STABILITY

Mechanically strong, with high quality platinum element for superb long-term accuracy.





## Is self-heating important to consider in your application?

Measurement current supplied to the sensor will cause self-heating. Will this cause a significant measurement error?

Example:

- 1mA of sense current through a PT100 (100ohm resistor) will generate 100  $\mu$ W of heat.
- For a 5mm x 10mm long sensing element this equates to 0.57W/m<sup>2</sup>.
- To reduce self heating error to less than 0.1C, a convection heat transfer coefficient greater than 5.7W/m<sup>2</sup>/°C is required. In low wind conditions in traditional multi-plate solar screens, self heating will be a problem. In a helical shield, this situation is mitigated.

Self heating error is reduced in EasyLogGSM data logger by reducing current to 0.5mA and measurement time to 250ms. For 1 sec measurement intervals, this reduces self-heating to 25% of the original value and to 5% of the original value for 10 second intervals.

## How important is accuracy of your data logger analog input?

1 mA sense current creates a signal of only 100 mV. Because the change in resistance per degree is so small ( $\alpha = 0.00385 \Omega/^\circ\text{C}$ ), even a small error in the data logger analog input measurement of the voltage across the sensor will produce a significant error in temperature measurement.

- 100  $\mu$ V (0.0001V) voltage measurement error will cause 0.385 °C error in the temperature.
- 1  $\mu$ A (0.000001Amp) error in sense current will cause 0.385 °C temperature measurement error.

Hence, it is very important to have a high quality analog input that is temperature stable on your data logger data logger.

## Should I use a shielded cable?

PT100 sensors have low signal levels ( $\mu$ V) which are prone to interference. It is important to keep PT100 sensor cables away from other electric cables and electrical machinery that may emit electrical EMI noise. The supplied screened/shielded cable grounded at one end helps reduce noise. On long cables, please check that your data logger is designed to handle the extra resistance of the wires.

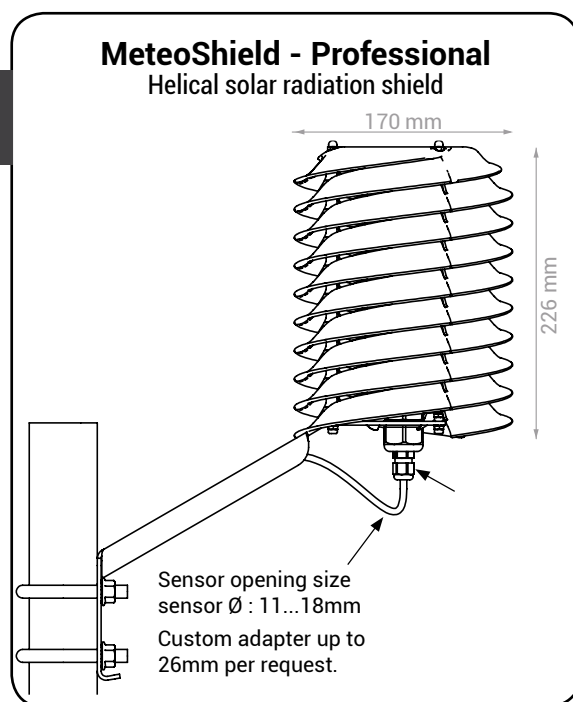
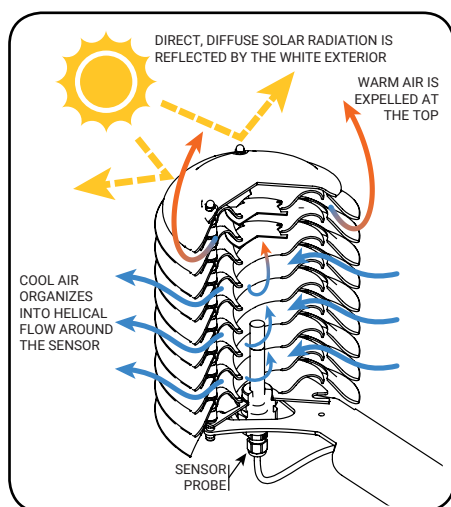
## Double-Helix for ultimate air temperature accuracy

Helical radiation shield shape ventilates better than multi-plate radiation shields while maintaining better sensor protection from dirt, sand, dust, rain, snow and ice.

### BENEFITS:

- Reduces sensor self-heating through increased convection
- Cleaner sensor = long-term measurement stability

Helix performs better than many fan-ventilated radiation shields in high reflectivity environments such as over snow, water, pavement or building walls.



Reach your Gold Standard of measurement with BARANI sensors. ISO:9001 quality.

