

Choosing a Temperature Probe

Temperature Range

Thermocouples are suitable for use from -200 to 2000°C, linearity varies according to type and temperature range generally but falls between thermistor and RTD characteristics.

Platinum RTDs are suitable for use from -50 to 550°C when longterm stability and repeatability is required. They offer virtually linear response and are interchangeable to DIN specifications.

Thermistors are suitable from -40 to 200°C when accuracy and high sensitivity are required. Response is nonlinear but can be linearized over short ranges (50°C or less) or computed by microprocessor.

Accuracy

Thermocouples offer the widest range and are more cost effective, but the least sensitive and accurate of these sensor types.

Thermistors have less stability and repeatability, but are more sensitive than RTDs; They typically more expensive compared to RTDs.

RTDs offer the best stability and repeatability, but are less sensitive than thermistors.

Speed of Response

Sensor response time depends strongly on the mounting enclosure. A bare, unenclosed sensor will always respond faster than one in a tube or probe assembly, but is also more susceptible to damage.

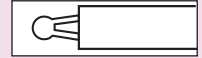
System Error

This is important when you select a probe and meter to make a complete measurement system. For example: if a meter has an accuracy of $\pm 0.7^\circ\text{F}$ and a probe has an error limit of $\pm 1.8^\circ\text{F}$ at 400°F, the combined system accuracy will be $(\pm 0.7) + (\pm 1.8) = \pm 2.5^\circ\text{F}$ at 400°F.

Probe Types

Thermocouple Junctions:

Exposed Junction has the fastest response time—ideal for measuring rapid temperature changes. Do not use with corrosive fluids or atmospheres.



Ungrounded Junction has a welded junction insulated from the protective sheath and is electrically isolated. Longer response time.



Grounded Junction has a junction welded to tip of sheath. Wires are completely sealed from contaminants. Good response time.



Thermistor 400-Series and 500-Series Probes

The 400-series probes have a resistance of 2252 Ω at 25°C and maintain a tolerance of $\pm 0.1^\circ\text{C}$ in the range of 32 to 167°F (0 to 75°C). The 500-series probes are recommended where small size is a requirement.

RTD Two-, Three-, and Four-Wire Configurations

The two-wire configuration is good for any application where the sensor is connected directly to the receiver to prevent lead length resistance errors. Select the three-wire configuration when there is a significant distance between the sensor and the receiver. The four-wire configuration offers the most accurate measurement. One pair of leads provides the excitation current to the RTD while the other pair of leads measures the voltage across it.





Digi-Sense® Industrial High-Temperature Flexible Thermocouple Probes



Get into tight spaces

Bend probes to easily determine your pipe temperature. Probes are insulated with tightly packed powdered MgO in 12" or 25" long sheaths. Type J and type K probes feature Inconel® sheaths. Type T probes feature 316 SS sheaths. Feature color-coded ANSI miniconnectors: type J-black, type K-yellow, type T-blue, and type E-purple; or stripped ends.

| Type | Temperature range | | Accuracy | |
|------|------------------------------------|--------------------------------|--|--|
| | For 0.020" and 0.040" dia probes†† | For 0.063" dia probes†† | For probes with miniconnector | For probes with stripped ends |
| J | -300 to 500°F (-185 to 260°C) | -310 to 825°F (-190 to 440°C) | $\pm 5.9^\circ\text{F}$ ($\pm 3.3^\circ\text{C}$), or $\pm 0.4\%$ of rdg above 32°F (0°C); $\pm 2.0\%$ of rdg below 32°F (0°C) | $\pm 2.0^\circ\text{F}$ ($\pm 1.1^\circ\text{C}$), or $\pm 0.4\%$ of rdg above 32°F (0°C); $\pm 2.0\%$ of rdg below 32°F (0°C) |
| K | -418 to 1290°F (-250 to 700°C) | -418 to 1690°F (-250 to 920°C) | | |
| T | -418 to 500°F (-250 to 260°C) | -418 to 500°F (-250 to 260°C) | $\pm 2.7^\circ\text{F}$ ($\pm 1.5^\circ\text{C}$), or $\pm 0.4\%$ of rdg above 32°F (0°C); $\pm 0.8\%$ of rdg below 32°F (0°C) | $\pm 0.9^\circ\text{F}$ ($\pm 0.5^\circ\text{C}$), or $\pm 0.4\%$ of rdg above 32°F (0°C); $\pm 0.8\%$ of rdg below 32°F (0°C) |

| Junction | Dimensions† | Type J | | Type K | | Type T | | Photo |
|---|-----------------------------------|-----------------------------|--------|-----------------------------|--------|-----------------------------|--------|---|
| | | Cat. no. | Price* | Cat. no. | Price* | Cat. no. | Price* | |
| 12"L probes with miniature stainless steel handles. Use in applications where space is limited or the probe needs to be bent. | | | | | | | | |
| Exp | Sheath: 12"L x 0.020" dia† | GH-93630-00 | | GH-93631-00 | | GH-93632-00 | |  |
| Grd | Cable: 3-ft, 24 gauge (0.020 dia) | GH-93630-01 | | GH-93631-01 | | GH-93632-01 | | |
| Ung | Miniconnector | GH-93630-02 | | GH-93631-02 | | GH-93632-02 | | |
| Exp | Sheath: 12"L x 0.040" dia† | GH-93630-10 | | GH-93631-10 | | GH-93632-10 | | |
| Grd | Cable: 3-ft, 14 gauge (0.020 dia) | GH-93630-11 | | GH-93631-11 | | GH-93632-11 | | |
| Ung | Miniconnector | GH-93630-12 | | GH-93631-12 | | GH-93632-12 | | |
| 25"L probes with miniature stainless steel handles. Use in applications where space is limited or the probe needs to be bent. | | | | | | | | |
| Exp | Sheath: 25"L x 0.063" dia† | GH-93630-20 | | GH-93631-20 | | GH-93632-20 | |  |
| Grd | Cable: 3-ft, 24 gauge (0.020 dia) | GH-93630-21 | | GH-93631-21 | | GH-93632-21 | | |
| Ung | Miniconnector | GH-93630-22 | | GH-93631-22 | | GH-93632-22 | | |
| 12"L probes with miniature stainless steel handles. Use in applications where space is limited or the probe needs to be bent. | | | | | | | | |
| Grd | Sheath: 12"L x 0.040" dia† | GH-93630-41 | | GH-93631-41 | | GH-93632-41 | |  |
| | Cable: 3-ft, 14 gauge (0.020 dia) | | | | | | | |
| Ung | Stripped leads | GH-93630-42 | | GH-93631-42 | | GH-93632-42 | | |
| 25"L probes with miniature stainless steel handles. Use in applications where space is limited or the probe needs to be bent. | | | | | | | | |
| Grd | Sheath: 25"L x 0.063" dia† | GH-93630-51 | | GH-93631-51 | | GH-93632-51 | |  |
| Ung | Cable: 3-ft 24 gauge (0.020 dia) | | | | | | | |
| Ung | Stripped leads | GH-93630-52 | | GH-93631-52 | | GH-93632-52 | | |

†Temperature range is for the probe tip only. The handle material may be affected if the probe is rated higher than the handle depending on exposure time, application, and handle material. Stainless steel handles are rated to 450°F (232°C). ††Overall probe sheath lengths may vary up to $\pm 0.25"$. *Discounts: Save 10% on 6-10 probes of any assortment, 15% on 11-24 probes, and 20% on 25-50 probes.

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