Thermocouple Probes
With Mounting Threads and M12 Connectors

Standard Sizes

- Type J and K Thermocouple Calibrations
- Single and Dual Element Configurations
- Ungrounded Junctions
- -50 to 90°C (-58 to 194°F) Connector Temperature Range
- 304 Stainless Steel Probe (Type J) and Inconel 600 Probe (Type K)
- Available in ⅛ or ¼" Diameters
- Many Standard Lengths Available
- Stainless Steel Transition with M12 Connector

To Order Visit omega.com/m12probes for Pricing and Details

<table>
<thead>
<tr>
<th>Model Number</th>
<th>Probe Length</th>
<th>Thermocouple Calibration</th>
<th>Sheath Material</th>
<th>Mounting Thread</th>
</tr>
</thead>
<tbody>
<tr>
<td>M12JSS-(*)-U-6-A</td>
<td>6&quot;</td>
<td>J</td>
<td>304 SST</td>
<td>None</td>
</tr>
<tr>
<td>M12JSS-(*)-U-6-B</td>
<td>6&quot;</td>
<td>J</td>
<td>304 SST</td>
<td>½ NPT</td>
</tr>
<tr>
<td>M12JSS-(*)-U-6-C</td>
<td>6&quot;</td>
<td>J</td>
<td>304 SST</td>
<td>¾ NPT</td>
</tr>
<tr>
<td>M12JSS-(*)-U-6-D</td>
<td>6&quot;</td>
<td>J</td>
<td>304 SST</td>
<td>½ NPT</td>
</tr>
<tr>
<td>M12KIN-(*)-U-6-A</td>
<td>6&quot;</td>
<td>K</td>
<td>Inconel 600</td>
<td>None</td>
</tr>
<tr>
<td>M12KIN-(*)-U-6-B</td>
<td>6&quot;</td>
<td>K</td>
<td>Inconel 600</td>
<td>¾ NPT</td>
</tr>
<tr>
<td>M12KIN-(*)-U-6-C</td>
<td>6&quot;</td>
<td>K</td>
<td>Inconel 600</td>
<td>¾ NPT</td>
</tr>
<tr>
<td>M12KIN-(*)-U-6-D</td>
<td>6&quot;</td>
<td>K</td>
<td>Inconel 600</td>
<td>¾ NPT</td>
</tr>
</tbody>
</table>

(*) Insert probe diameter “18” for ⅛ or “14” for ¼" diameter.

For dual element, add “-DUAL” to the model number and multiply price by.

For longer probe lengths add the required length in inches to the model number and an additional cost per inch to the price for Type J 304 SST, or add an additional cost per inch for Type K Inconel 600 sheaths.

Ordering Examples: M12JSS-18-U-6-B, Type J thermocouple, ¼" diameter by 6" long with 304 stainless steel sheath, stainless steel transition with ⅛ NPT fitting and M12 connector.

M12KIN-14-U-6-C-DUAL, Type K ungrounded dual element thermocouple, ¼" diameter by 6" long with Inconel 600 sheath, stainless steel transition with ¾ NPT fitting and M12 connector.

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Thermocouple Probes
With M12 Molded Connectors

**Metric Sizes**

- Type J and K Thermocouple Calibrations
- Single and Dual Element Configurations
- Ungrounded Junctions
- -50 to 90°C (-58 to 194°F) Connector Temperature Range
- 304 Stainless Steel Probe (Type J) and Inconel 600 Probe (Type K)
- Imperial and Metric Diameters
- Many Standard Lengths Available

**Model Number**

<table>
<thead>
<tr>
<th>Model Number</th>
<th>Probe Length</th>
<th>Thermocouple Calibration</th>
<th>Sheath Material</th>
<th>Mounting Thread</th>
</tr>
</thead>
<tbody>
<tr>
<td>M12JSS-(*)-U-200-A</td>
<td>200 mm</td>
<td>J</td>
<td>304 SST</td>
<td>None</td>
</tr>
<tr>
<td>M12JSS-(*)-U-200-E</td>
<td>200 mm</td>
<td>J</td>
<td>304 SST</td>
<td>M8x1</td>
</tr>
<tr>
<td>M12JSS-(*)-U-200-F</td>
<td>200 mm</td>
<td>J</td>
<td>304 SST</td>
<td>M10x1</td>
</tr>
<tr>
<td>M12KIN-(*)-U-200-A</td>
<td>200 mm</td>
<td>K</td>
<td>Inconel 600</td>
<td>None</td>
</tr>
<tr>
<td>M12KIN-(*)-U-200-E</td>
<td>200 mm</td>
<td>K</td>
<td>Inconel 600</td>
<td>M8x1</td>
</tr>
<tr>
<td>M12KIN-(*)-U-200-F</td>
<td>200 mm</td>
<td>K</td>
<td>Inconel 600</td>
<td>M10x1</td>
</tr>
</tbody>
</table>

(*) Insert “M3” for 3 mm or “M6” for 6 mm probe diameter.
For dual elements, add “-DUAL” to model number for additional cost.
For longer lengths, enter the required length in millimeters to the model number and additional cost per 25 mm to the price for 304 SST sheathed Type J or additional cost per 25 mm for Inconel 600 sheathed Type K thermocouples.

**Ordering Examples:**
- **M12JSS-M3-U-200-E**, Type J thermocouple with 3 mm diameter, 200 mm long 304 stainless steel sheath, stainless steel transition and M12 connector.
- **M12KIN-M3-U-200-A-DUAL**, dual element Type K thermocouple with 3 mm diameter, 200 mm long Inconel 600 sheath, stainless steel transition and M12 connector.

To Order Visit omega.com/m12probes for Pricing and Details

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A-152
Thermistor Probes
With M12 Connections

TH-21 Series

- Maximum Continuous Use, 200°C (392°F) [Short Term Use to 250°C (482°F)] for Sensing End, 85°C (185°F) Maximum at Connector
- Excellent Long Term Stability
- Tolerance: ±0.2°C From 0 to 70°C (32 to 158°F)
- Available in 2252, 3K, 5K and 10K Ω Resistances at 25°C (77°F)

The TH-21 Series thermistor probes are constructed with the 55000 Series glass encapsulated thermistor elements which provide excellent stability and accuracy. With a maximum continuous temperature rating of -80 to 200°C (-112 to 392°F), and intermittent operation to 250°C (482°F), these thermistor sensors can be used in applications previously out of reach of epoxy coated thermistor sensors. The probes can be ordered in any length but we highly recommend a minimum immersion depth of 1.5". Short probes run the risk of error due to stem conduction effects.

Specifications
Temperature Range: -50 to 200°C (-58 to 392°F)
Thermistor Sensor: Refer to Table 1 on next page
Operating Current: 12 micro-amps
Insulation Resistance: 100 MΩ minimum at 100 Vdc at ambient temperature
Response Time: Approximately 7 seconds (50%), 8 seconds (63.2%), 14 seconds (90%) in water flowing at 0.91 m (3') per second
External Materials: 316L stainless steel sheath and housing except connector insert
IP Rating: IP67 with mating connector installed

Resistance Vs. Temperature Characteristics
The Steinhart-Hart Equation has become the generally accepted method for specifying the resistance vs. temperature relationship for thermistors. The Steinhart-Hart equation for temperature as a function of resistance is as follows:

\[
\frac{1}{T} = A + B \ln(R) + C [\ln(R)]^3
\]

where: A, B and C are constants derived from three temperature test points.

\[
R = \text{Thermistor's resistance in } \Omega
\]

To determine the thermistor resistance at a specific temperature point, the following equation is used:

\[
R = e^{(\beta-(\alpha/2))1/3 - ((\beta+(\alpha/2))1/3}
\]

where:
\[
\alpha = \frac{(A-(1/T))/C}{B((3C)^3 + (\alpha^2/4))}
\]

The A, B and C constants for each of our thermistor selections can be found in Table 1. Using these constants with the above equations, you can determine the temperature of the thermistor based on its resistance, or determine a thermistor's resistance at a particular temperature.

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The A, B and C constants for each of our thermistor selections can be found in Table 1. Using these constants with the above equations, you can determine the temperature of the thermistor based on its resistance, or determine a thermistor's resistance at a particular temperature.
Table 1 Steinhart-Hart Constants

<table>
<thead>
<tr>
<th>Thermistor</th>
<th>Resistance at 25°C</th>
<th>A Constant</th>
<th>B Constant</th>
<th>C Constant</th>
</tr>
</thead>
<tbody>
<tr>
<td>2252</td>
<td>2252 Ω</td>
<td>1.4705x10⁻³</td>
<td>2.3780x10⁻⁴</td>
<td>1.0389x10⁻⁷</td>
</tr>
<tr>
<td>3K</td>
<td>3000 Ω</td>
<td>1.4052x10⁻³</td>
<td>2.3692x10⁻⁴</td>
<td>1.0125x10⁻⁷</td>
</tr>
<tr>
<td>5K</td>
<td>5000 Ω</td>
<td>1.2870x10⁻³</td>
<td>2.3585x10⁻⁴</td>
<td>9.4346x10⁻⁸</td>
</tr>
<tr>
<td>10K</td>
<td>10,000 Ω</td>
<td>1.1275x10⁻³</td>
<td>2.3441x10⁻⁴</td>
<td>8.6482x10⁻⁸</td>
</tr>
</tbody>
</table>

For lengths other than 6”, change “-0600” in model number to required length and add additional cost per inch greater than 6”, -(0.75) -inch increase = 0.7500. For ¼” probe diameters, change “-½” in model number to “-1/4”, no additional cost. For 3K, 5K or 10K Ω thermistor elements change “-2252” to desired resistance. For dual element ¼” or 6 mm diameter versions, add “-DUAL” to the end of the model number (not available in ¼” or 3 mm diameter probes), for an additional cost.

Ordering Examples: TH-21A-2252-1/4-0600-M12, ¼” diameter probe 6” long with 2252 Ω element, no mounting thread, with M12 connector. TH-21D-2252-1/4-0600-M12, ¼” diameter probe 6” long with Pt100, Class A element, ¼ NPT mounting thread, with M12 connector.

Standard

To Order

<table>
<thead>
<tr>
<th>Model No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>TH-21A-2252-1/4-0600-M12</td>
<td>Straight sheath, 2252 Ω, ¼” diameter, 6” long, M12 male connector</td>
</tr>
<tr>
<td>TH-21B-2252-1/4-0600-M12</td>
<td>Straight sheath with ½ NPT mounting, 2252 Ω, ¼” diameter, 6” long, M12 male connector</td>
</tr>
<tr>
<td>TH-21C-2252-1/4-0600-M12</td>
<td>Straight sheath with ⅜ NPT mounting, 2252 Ω, ¼” diameter, 6” long, M12 male connector</td>
</tr>
<tr>
<td>TH-21D-2252-1/4-0600-M12</td>
<td>Straight sheath with ¼ NPT mounting, 2252 Ω, ¼” diameter, 6” long, M12 male connector</td>
</tr>
</tbody>
</table>

Metric

<table>
<thead>
<tr>
<th>Model No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>TH-21A-2252-M6-0150-M12</td>
<td>Straight sheath 2252 Ω, 6 mm diameter, 150 mm long, M12 male connector</td>
</tr>
<tr>
<td>TH-21E-2252-M6-0150-M12</td>
<td>Straight sheath with M8x1 mounting, 2252 Ω, 6 mm diameter, 150 mm long, M12 male connector</td>
</tr>
<tr>
<td>TH-21F-2252-M6-0150-M12</td>
<td>Straight sheath with M10x1 mounting, 2252 Ω, 6 mm diameter, 150 mm long, M12 male connector</td>
</tr>
<tr>
<td>TH-21G-2252-M6-0150-M12</td>
<td>Straight sheath with G½” mounting thread, 2252 Ω, 6 mm diameter, 150 mm long, M12 male connector</td>
</tr>
<tr>
<td>TH-21H-2252-M6-0150-M12</td>
<td>Straight sheath with G¾” mounting thread, 2252 Ω, 6 mm diameter, 150 mm long, M12 male connector</td>
</tr>
</tbody>
</table>

D-2
RTD Sensor with M12 Connector for Process Control and Test and Measurement Applications

✓ All Welded 316L Stainless Steel Housing
✓ Available With or Without a Mounting Thread, M8x1 and M10x1 Mounting Threads Available
✓ Class A, Pt100 or Pt1000 4-Wire Platinum RTD Elements per IEC60751 Standard
✓ Integral 4-Pin M12 Connector for Easy Connection
✓ Fast Response Time (3.5 Seconds or Less 63% Response in Water)
✓ 6 mm Diameter Standard (3 and 10 mm Dia Available)

PR-21 Series Starts at $60

Metric

<table>
<thead>
<tr>
<th>Model Number</th>
<th>Price</th>
<th>Element</th>
<th>Length (mm)</th>
<th>Mounting Thread</th>
</tr>
</thead>
<tbody>
<tr>
<td>PR-21A-3-100-A-M6-0160-M12-1</td>
<td>$60</td>
<td>Pt100, Class A</td>
<td>160</td>
<td>None</td>
</tr>
<tr>
<td>PR-21A-3-100-A-M6-0260-M12-1</td>
<td>64</td>
<td>Pt100, Class A</td>
<td>260</td>
<td>None</td>
</tr>
<tr>
<td>PR-21A-3-100-A-M6-0360-M12-1</td>
<td>68</td>
<td>Pt100, Class A</td>
<td>360</td>
<td>None</td>
</tr>
<tr>
<td>PR-21E-3-100-A-M6-0160-M12-1</td>
<td>70</td>
<td>Pt100, Class A</td>
<td>160</td>
<td>M8x1</td>
</tr>
<tr>
<td>PR-21E-3-100-A-M6-0260-M12-1</td>
<td>74</td>
<td>Pt100, Class A</td>
<td>260</td>
<td>M8x1</td>
</tr>
<tr>
<td>PR-21E-3-100-A-M6-0360-M12-1</td>
<td>78</td>
<td>Pt100, Class A</td>
<td>360</td>
<td>M8x1</td>
</tr>
<tr>
<td>PR-21F-3-100-A-M6-0160-M12-1</td>
<td>70</td>
<td>Pt100, Class A</td>
<td>160</td>
<td>M10x1</td>
</tr>
<tr>
<td>PR-21F-3-100-A-M6-0260-M12-1</td>
<td>74</td>
<td>Pt100, Class A</td>
<td>260</td>
<td>M10x1</td>
</tr>
<tr>
<td>PR-21F-3-100-A-M6-0360-M12-1</td>
<td>78</td>
<td>Pt100, Class A</td>
<td>360</td>
<td>M10x1</td>
</tr>
</tbody>
</table>

For 1000 Ω, Class A elements, change “100” to “1000” in model number, no additional price.
For lengths longer than 360 mm, change “0360” in model number to required length in mm and add $1 per 25 mm to price (example: 500 mm = 0500, 425 mm = 0425).
For 3 mm probe diameters, change “M6” in model number to “M3” for 3 mm, no additional cost.

Ordering Example: PR-21A-3-100-A-M6-0260-M12-1, 6 mm diameter probe, 260 mm long with Pt100, Class A element, no mounting thread, with M12 connector, $64.
PR-21F-3-100-A-M6-0160-M12-1, 6 mm diameter probe, 160 mm long with Pt100, Class A element, M10x1 mounting thread, with M12 connector, $70.
**Sanitary Temperature Sensors**

**RTD Sensor with M12 Connector for Process Control and Test and Measurement Applications**

PR-21 Series

**Starting at $60**

- All Welded 316L Stainless Steel Housing
- Available With or Without Mounting Thread (\(\frac{1}{4}, \frac{3}{8}\) and \(\frac{1}{2}\) NPT Mounting Threads Available)
- Class A, Pt100 or Pt1000 4-Wire Platinum RTD Elements per IEC60751 Standard
- Integral 4-Pin M12 Male Connector for Easy Connection
- Fast Response Time (3.5 Seconds or Less 63% Response in Water)
- \(\frac{1}{4}\)" Diameter Standard, Optional \(\frac{3}{8}\)" Diameter Available

**Accuracy**

IEC CLASS AA (±0.15ºC @ 0ºC)

**To Order (Specify Model Number)**

<table>
<thead>
<tr>
<th>Model Number</th>
<th>Price</th>
<th>Element</th>
<th>Length (in)</th>
<th>Mounting Thread</th>
</tr>
</thead>
<tbody>
<tr>
<td>PR-21A-3-100-A-1/4-0600-M12-1</td>
<td>$60</td>
<td>Pt100, Class A</td>
<td>6.00</td>
<td>None</td>
</tr>
<tr>
<td>PR-21B-3-100-A-1/4-0600-M12-1</td>
<td>70</td>
<td>Pt100, Class A</td>
<td>6.00</td>
<td>(\frac{1}{4}) NPT</td>
</tr>
<tr>
<td>PR-21C-3-100-A-1/4-0600-M12-1</td>
<td>70</td>
<td>Pt100, Class A</td>
<td>6.00</td>
<td>(\frac{3}{8}) NPT</td>
</tr>
<tr>
<td>PR-21D-3-100-A-1/4-0600-M12-1</td>
<td>70</td>
<td>Pt100, Class A</td>
<td>6.00</td>
<td>None</td>
</tr>
<tr>
<td>PR-21A-3-1000-A-1/4-0600-M12-1</td>
<td>60</td>
<td>Pt1000, Class A</td>
<td>6.00</td>
<td>None</td>
</tr>
<tr>
<td>PR-21B-3-1000-A-1/4-0600-M12-1</td>
<td>70</td>
<td>Pt1000, Class A</td>
<td>6.00</td>
<td>(\frac{1}{4}) NPT</td>
</tr>
<tr>
<td>PR-21C-3-1000-A-1/4-0600-M12-1</td>
<td>70</td>
<td>Pt1000, Class A</td>
<td>6.00</td>
<td>(\frac{3}{8}) NPT</td>
</tr>
<tr>
<td>PR-21D-3-1000-A-1/4-0600-M12-1</td>
<td>70</td>
<td>Pt1000, Class A</td>
<td>6.00</td>
<td>(\frac{1}{2}) NPT</td>
</tr>
</tbody>
</table>

For lengths other than 6", change “0600” in model number to required length and add $1 per inch greater than 6" (example: 9" = 0900, 4½" = 0450).

For \(\frac{3}{8}\)" probe diameters, change “1/4" in model number to “1/8"”, no additional cost.

Ordering Examples:
- PR-21A-3-100-A-1/4-0600-M12-1, \(\frac{1}{4}\)" diameter probe 6" long with Pt100, Class A element, no mounting thread, with M12 connector, $60.
- PR-21D-3-1000-A-1/4-0600-M12-1, \(\frac{1}{4}\)" diameter probe 6" long with Pt1000, Class A element, \(\frac{3}{8}\) NPT mounting thread, with M12 connector, $70.

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  Conductivity Instrumentation, Dissolved Oxygen Instrumentation, Environmental Instrumentation, pH Electrodes and Instruments, Water and Soil Analysis Instrumentation

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  Displacement Transducers, Dynamic Measurement Force Sensors, Instrumentation for Pressure and Strain Measurements, Load Cells, Pressure Gauges, Pressure Reference Section, Pressure Switches, Pressure Transducers, Proximity Transducers, Regulators, Strain Gages, Torque Transducers, Valves

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