Thermistor Probes
With M12 Connections

TH-21 Series

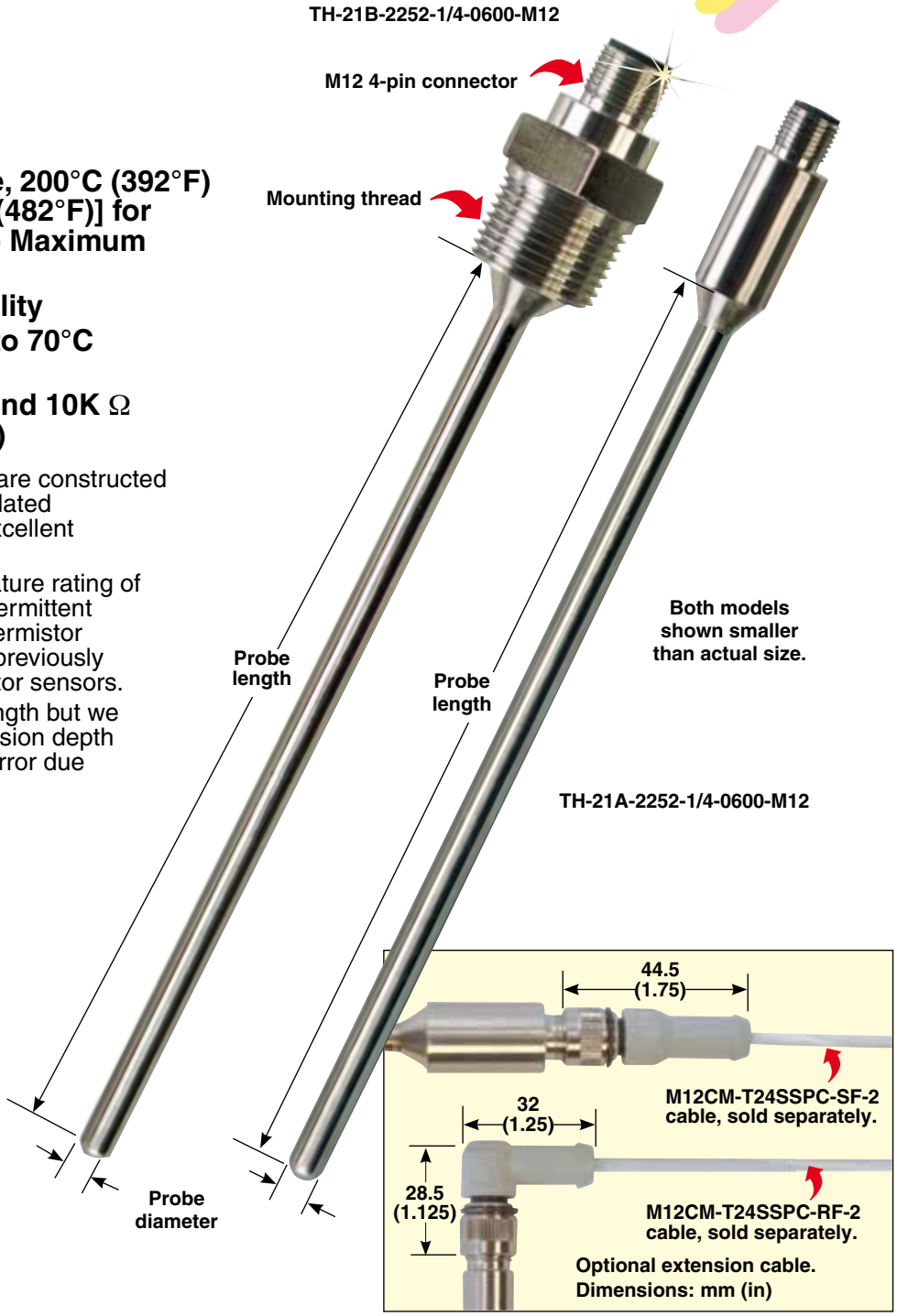
NIST RoHS
Optional

- **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:

$$1/T = A + B\,[Ln(R)] + C\,[Ln(R)]^3$$

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

R = Thermistors resistance in Ω
T = Temperature in Kelvins K (°C + 273.15)

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 = ((A-(1/T))/C)
beta = SQRT(((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 thermistors resistance at a particular temperature.

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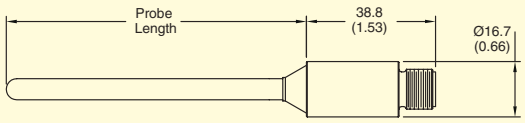
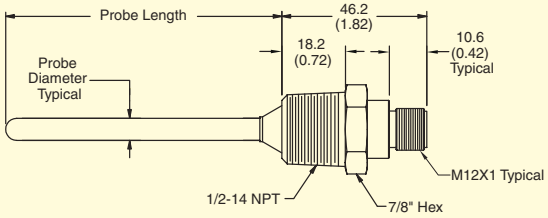
Table 1 Steinhart-Hart Constants

Thermistor	Resistance at 25°C	A Constant	B Constant	C Constant
2252	2252 Ω	$1.4705x10^{-3}$	$2.3780x10^{-4}$	$1.0389x10^{-7}$
3K	3000 Ω	$1.4052x10^{-3}$	$2.3692x10^{-4}$	$1.0125x10^{-7}$
5K	5000 Ω	$1.2870x10^{-3}$	$2.3585x10^{-4}$	$9.4346x10^{-8}$
10K	10,000 Ω	$1.1275x10^{-3}$	$2.3441x10^{-4}$	$8.6482x10^{-8}$

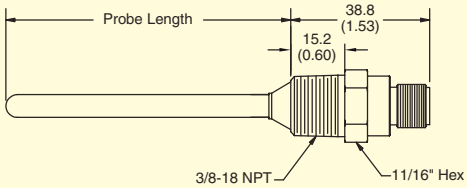
TH-21A Design



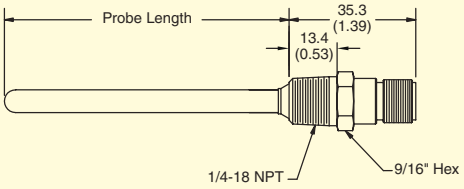
TH-21B Design ½ NPT Mounting Thread



TH-21C Design ⅜ NPT Mounting Thread

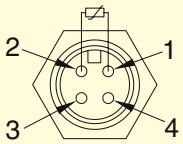


TH-21D Design ¼ NPT Mounting Thread

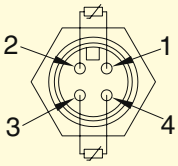


Dimensions: mm (inch) Ø=diameter

Wiring Diagram

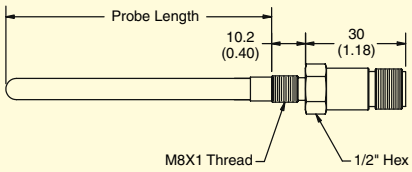


Single Element

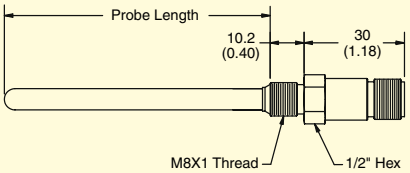


Dual Element

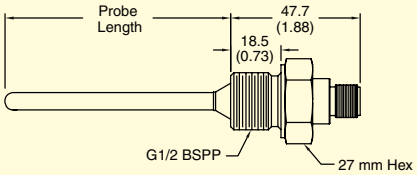
TH-21E Design M8x1 Mounting Thread



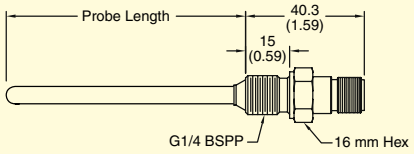
TH-21F Design M10x1 Mounting Thread



TH-21G Design



TH-21H Design



Standard

To Order	
Model No.	**Description**
TH-21A-2252-1/4-0600-M12	Straight sheath, 2252 Ω, ¼" diameter, 6" long, M12 male connector
TH-21B-2252-1/4-0600-M12	Straight sheath with ½ NPT mounting, 2252 Ω, ¼" diameter, 6" long, M12 male connector
TH-21C-2252-1/4-0600-M12	Straight sheath with ⅜ NPT mounting, 2252 Ω, ¼" diameter, 6" long, M12 male connector
TH-21D-2252-1/4-0600-M12	Straight sheath with ¼ NPT mounting, 2252 Ω, ¼" diameter, 6" long, M12 male connector

Metric

Model No.	Description
TH-21A-2252-M6-0150-M12	Straight sheath 2252 Ω, 6 mm diameter, 150 mm long, M12 male connector
TH-21E-2252-M6-0150-M12	Straight sheath with M8x1 mounting, 2252 Ω, 6 mm diameter, 150 mm long, M12 male connector
TH-21F-2252-M6-0150-M12	Straight sheath with M10x1 mounting, 2252 Ω, 6 mm diameter, 150 mm long, M12 male connector
TH-21G-2252-M6-0150-M12	Straight sheath with G½ mounting thread, 2252 Ω, 6 mm diameter, 150 mm long, M12 male connector
TH-21H-2252-M6-0150-M12	Straight sheath with G¼ mounting thread, 2252 Ω, 6 mm diameter, 150 mm long, M12 male connector

*For lengths other than 6", change **"-0600"** in model number to required length and add additional cost per inch greater than 6", (example: 9" = 0900, 4½" = 0450).*
*For ⅛" probe diameters, change **"-1/4"** in model number to **"-1/8"**, 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 ⅛" 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.*