

# Thermistor Probes With M12 Connections

## TH-21 Series



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:

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

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

R = Thermistors resistance in Ω

T = Temperature in Kelvins K (°C + 273.15)

TH-21B-2252-1/4-0600-M12

M12 4-pin connector

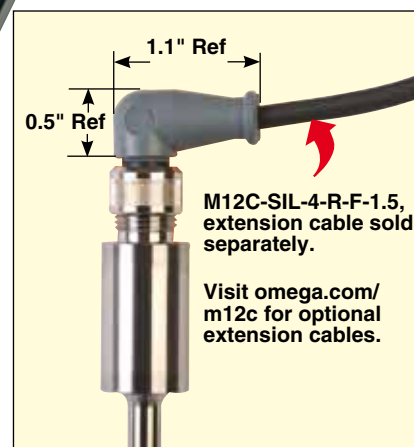
Mounting thread

Probe length

Probe length

Both models  
shown smaller  
than actual size.

TH-21A-2252-1/4-0600-M12



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:

$$\alpha = ((A - (1/T))/C)$$

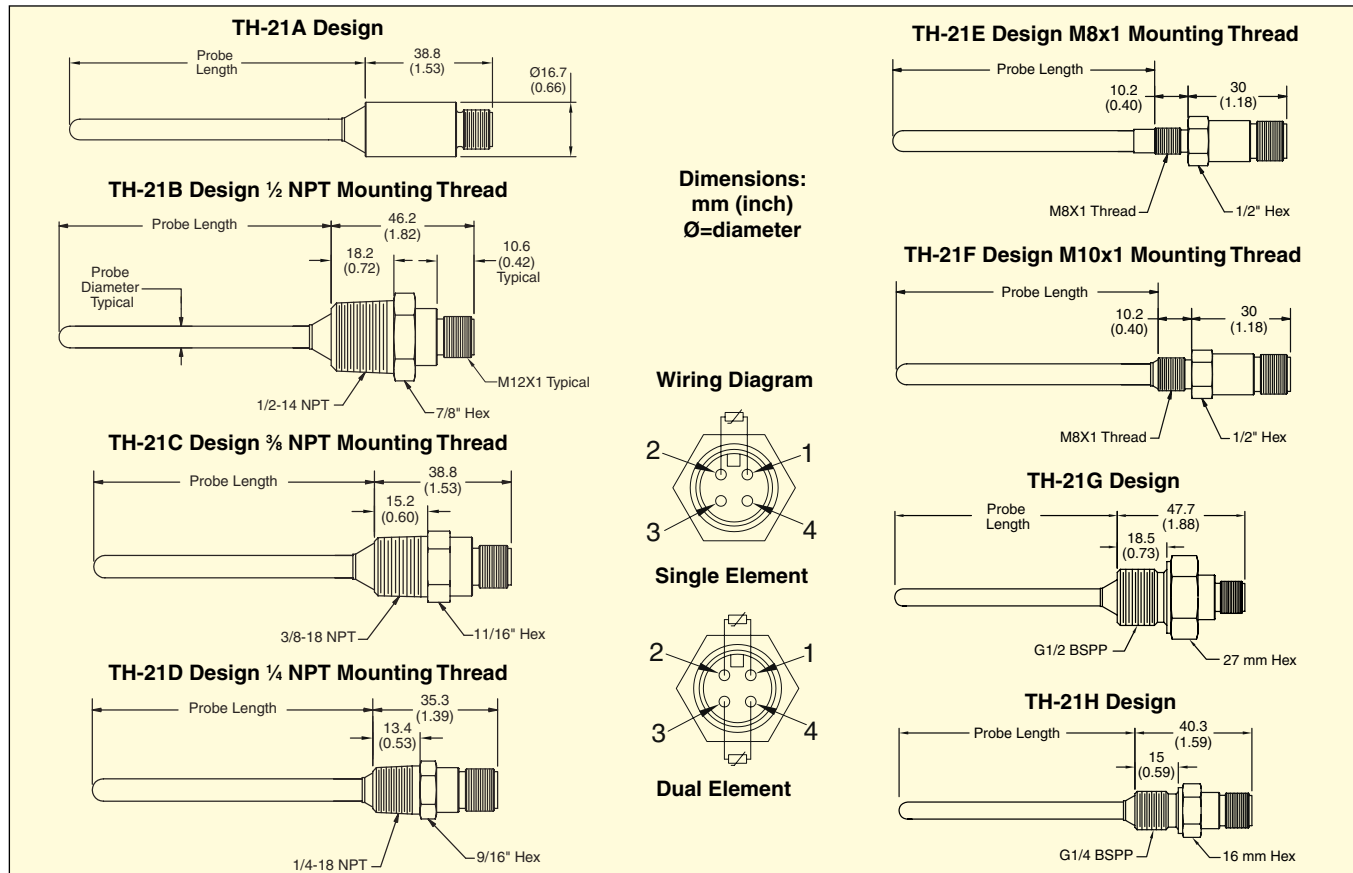
$$\beta = \text{SQRT}(((B/(3C))^3) + (\alpha^2/4))$$

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.



**Table 1 Steinhart-Hart Constants**

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



## Standard

To Order	
Model No.	Description
TH-21A-2252-1/4-0600-M12	Straight sheath, 2252 Ω, 1/4" diameter, 6" long, M12 male connector
TH-21B-2252-1/4-0600-M12	Straight sheath with 1/2 NPT mounting, 2252 Ω, 1/4" diameter, 6" long, M12 male connector
TH-21C-2252-1/4-0600-M12	Straight sheath with 3/8 NPT mounting, 2252 Ω, 1/4" diameter, 6" long, M12 male connector
TH-21D-2252-1/4-0600-M12	Straight sheath with 1/4 NPT mounting, 2252 Ω, 1/4" 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 G1/2 mounting thread, 2252 Ω, 6 mm diameter, 150 mm long, M12 male connector
TH-21H-2252-M6-0150-M12	Straight sheath with G1/4 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, 4 1/2" = 0450).

For 1/8" 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 1/4" or 6 mm diameter versions, add "-DUAL" to the end of the model number (not available in 1/8" or 3 mm diameter probes), for an additional cost.

**Ordering Examples:** TH-21A-2252-1/4-0600-M12, 1/4" diameter probe 6" long with 2252 Ω element, no mounting thread, with M12 connector.

TH-21D-2252-1/4-0600-M12, 1/4" diameter probe 6" long with Pt100, Class A element, 1/4 NPT mounting thread, with M12 connector.