

# PAN Series of NTC Thermistor Temperature Sensing Probes



Ametherm's PAN series of NTC thermistor temperature sensing probes are manufactured from a specially-formulated metal oxide ceramic material that is exceedingly accurate in sensing temperature. Available in a variety of housings with custom design capabilities, these NTC thermistor temperature sensing probes are not only easy to mount within all form factors, but also have an extremely fast response time as well as high accuracy which can be specified up to  $\pm 0.2^{\circ}\text{C}$ .

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## Understanding NTC Thermistor Temperature Sensor Characteristics

NTC thermistor electrical properties combine to describe the resistance versus temperature response of the thermistor sensor. Understanding this is important to the selection of the best thermistor sensor for a given application. Specifications for all PAN series have the following properties:

### Nominal Resistance @25°C ( $\Omega$ )

- Provides the reference required for the calculation of a sensor's resistance at any other temperature within its usable temperature range.
- Allows selection of the correct sensor for a point matched or curve matched application.

### Temperature Coefficient of Resistance Alpha, $\alpha$ ( $\%/^{\circ}\text{C}$ )

- Rate of change of zero-power resistance with respect to temperature.
- Indicates the slope, or sensitivity, of the thermistor's resistance versus temperature response and is expressed as percent per degree and expressed as  $\%/^{\circ}\text{C}$ .

### Resistance Tolerance (5%, 3%, 2%, 1%)

- Found by multiplying the given temperature by the Temperature Coefficient of Resistance.

### Temperature Tolerance (1.0°C, 0.5°C, 0.2°C, 0.1°C)

- Expresses deviation in degrees C from the nominal RT curve of a thermistor.
- Temperature tolerance is consistent across a specific curve-matched temperature range.
- Resistance Tolerance is usually specified for point-matched thermistors.

### Thermal Time Constant (Secs)

- Duration required for the thermistor to change 63.2% of the difference between an initial temperature and a final body temperature when subject to a step function change in temperature under zero power conditions.

### Temperature Accuracy (°C)

- Calculated as Resistance Tolerance divided by Temperature Coefficient (Alpha). Given the same Alpha, better tolerance yields better accuracy.

### Maximum Power Rating (mW)

- Maximum power in milliwatts which the thermistor will dissipate for an extended period while maintaining the acceptable stability of its characteristics.

### Beta Tolerance (1.0%)

- For all PAN Series NTC Thermistor Sensors

### Dissipation Constant (mW/°C)

- Ratio of change in thermistor's power dissipation to the change in body temperature under specific ambient temperature and expressed as milliwatts per degree C.

### Material Constant Beta, $\beta$ (°K)

- Indicates the shape of the RT curve and is a measure of resistance at one temperature compared to resistance at another temperature.
- Calculated using the Beta equation, it is expressed in degrees Kelvin (°K).
- Beta equation requires two RT data sets and is sufficiently accurate for most industrial requirements.

- Unless otherwise noted, Beta is calculated using 25°C to 85°C temperature range.

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## Calculating Resistance-Temperature

Either the Steinhart-Hart ( $^{\circ}\text{K}$ ) or Beta ( $\beta$ ) Equation may be used for calculations. Steinhart-Hart being more involved of the two but also more accurate as three RT data sets are required instead of two.

[Find calculators for both equations here.](#)

## PAN Thermistor Temperature Sensor Series Specifications

The PAN (Probe Assembly NTC) series houses five-part types, each with a different ending alpha character where:

E = Epoxy

R = Ring Lug

W = Threaded Metal Tubing and Hex

H = Closed-End Metal Tubing

T = Threaded tip and hex

Trailing the alpha code is six numbers. These represent the resistance value and beta value.

PANT 104425

PANT 10 4 425

First three numbers of beta value (followed by zero)

Number of zeros following first two digits

Resistance @ 25°C

Series name with alpha specific ending

## PAN Thermistor Temperature Sensor Series List

[PANE Series](#) (Probe Assembly / Epoxy)

Epoxy dip coated NTC thermistor soldered between jacketed Teflon / PVC wires

[PANR Series](#) (Probe Assembly / Ring Lug)

Epoxy dip coated NTC thermistor potted in tinned copper ring lug

[PANW Series](#) (Probe Assembly / Threaded Metal Tubing & Hex)

NTC thermistor potted at the tip of durable stainless steel alloy tube with tapered thread hex screw

[PANH Series](#) (Probe Assembly / Closed-End Metal Tubing)

NTC thermistor inside durable stainless steel alloy tube and epoxy filled

[PANT Series](#) (Probe Assembly / Threaded Tip & Hex)

NTC thermistor potted inside aluminum hex screw with straight threads

Now that you know a little more about the PAN series feel free to check out each product individually. There are always [free samples available](#) when you find the one that fits your project best and if you are unsure [reach out to our engineers](#) and they can help you determine which PAN thermistor temperature sensor is right for you.