# PTS31 Ring Lug NTC Temperature Sensor

Glass-encapsulated 3,000 Ω NTC thermistor in a bolt-on ring lug · built for high-vibration HVAC and refrigeration equipment



NTC THERMISTOR | 3,000 Ω AT 25 °C | IP65

## FEATURES

- Glass-encapsulated NTC thermistor, 3,000 Ω at 25 °C
- ±0.2 °C accuracy from 0 to 70 °C
- β (25/85 °C) = 3976 K; -4.4 %/°C at 25 °C
- Ring lug with Ø0.265 in mounting hole for bolt-on surface sensing
- Lug-style encapsulation for protection against water ingress
- Designed for high-vibration environments
- 20 AWG stranded tinned-copper leads, XLINK PVC insulation
- Flying leads or AMP (TE) 1/4 in quick-connect terminations
- Cable lengths of 1.5, 4, 6 and 8 ft
- IP65 · media: air and gas

## DESCRIPTION

The PTS31 is a ring-lug NTC temperature sensor designed for temperature measurement in high-vibration environments. The glass-encapsulated thermistor sits inside a lug-style terminal that adds protection against water ingress, and you bolt it directly to the surface you need to monitor.

We build the PTS31 on a low-cost automated manufacturing process, so it is a cost-effective choice for OEM volumes. Choose the cable length and termination that fit your harness — see ordering information on page 6.

## APPLICATIONS

- Commercial refrigeration
- HVAC
- Semiconductor
- Liquid and gas chromatography
- Commercial ovens

### MAXIMUM ENVIRONMENTAL RATINGS

| | | | |
|---|---|---|---|
| Operating Temperature | **-50 to 150 °C · -58-302 °F** | Ingress Protection | **IP65** |
| Storage Temperature | **-55 to 150 °C · -67-302 °F** | Media | **Air and gas** |

# Operational characteristics

T = 25 °C unless noted

| PARAMETER | SYMBOL | MIN | TYP | MAX | UNITS |
|---|---|---|---|---|---|
| Resistance at 25 °C | $R_{25}$ | — | 3,000 | — | Ω |
| Temperature accuracy, 0 to 70 °C (note 1) | — | −0.2 | — | +0.2 | °C |
| Beta constant, 25/85 °C | β | — | 3976 | — | K |
| Temperature coefficient at 25 °C | $\alpha_{25}$ | — | −4.4 | — | %/°C |
| Operating temperature | $T_{OP}$ | −50 | — | 150 | °C |
| Storage temperature | $T_{ST}$ | −55 | — | 150 | °C |
| Ingress protection | — | | IP65 | | — |

**NOTES**
1) Accuracy is specified from 0 to 70 °C. Outside this band, use the nominal resistance table on page 4. 2) Resistance values in this datasheet are nominal values for the 3,000 Ω (25 °C) curve.

## Electrical connections

| LEAD | CONNECTION |
|---|---|
| Lead 1 | Thermistor |
| Lead 2 | Thermistor |

The PTS31 is a two-lead resistive sensor. The NTC is not polarized, so either lead can go to either side of your measurement circuit.

## Terminations

| CODE | TERMINATION |
|---|---|
| 0 | Flying leads |
| 1 | AMP (TE) female, 1/4 in |
| 2 | AMP (TE) male, 1/4 in |

## Assembly · quick-connect version

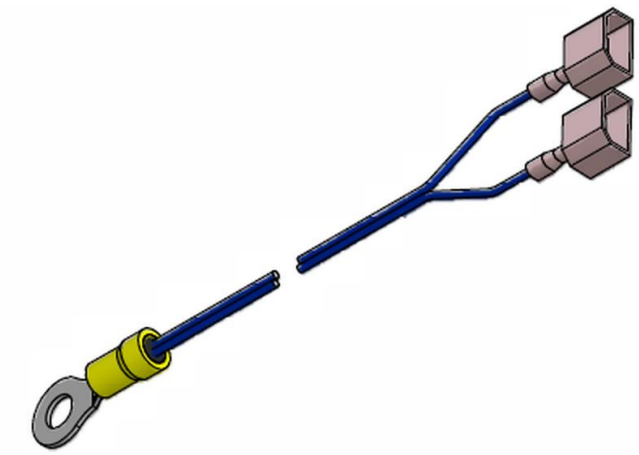


Fig. 1 — PTS31 with ring lug and 1/4 in fully insulated quick connects.

# Application information

### Package
The NTC thermistor is glass encapsulated and crimped into an AMP (TE) ring terminal. The lug-style construction protects the element against water ingress and stands up to high vibration.

### Mounting
Bolt the ring lug directly to the surface you want to measure through its Ø0.265 in hole.

### Sensing element
A 3,000 Ω (25 °C) NTC thermistor on resistance curve “Z”, with a β (25/85 °C) of 3976 K and a temperature coefficient of -4.4 %/°C at 25 °C.

### Accuracy
±0.2 °C from 0 to 70 °C. Use the resistance table on page 4 for nominal values across the full -50 to 150 °C table range.

### Lead wire
20 AWG stranded tinned copper with XLINK PVC insulation, in cable lengths of 1.5, 4, 6 and 8 ft.

### Terminations
Flying leads, or AMP (TE) 1/4 in fully insulated quick connects in female or male versions.

### Media
Air and gas. Ingress protection is rated IP65.

### Converting resistance
Read the sensor as a resistance and convert to temperature with the table on page 4, or with the β approximation: $1/T = 1/T_{25} + \ln(R/R_{25}) / \beta$, with T in kelvin. The β fit is closest between 25 and 85 °C.

| 3,000 Ω | ±0.2 °C | 3976 K | IP65 |
|---|---|---|---|
| Resistance at 25 °C | Accuracy, 0 to 70 °C | β, 25/85 °C | Ingress protection |

## Resistance vs. temperature

Nominal resistance of the 3,000 Ω (25 °C) NTC thermistor, curve “Z”. Resistance falls as temperature rises.

| TEMP (°C) | R (KΩ) | TEMP (°C) | R (KΩ) |
|---|---|---|---|
| -50 | 200.250 | 60 | 0.7461 |
| -40 | 100.680 | 70 | 0.5250 |
| -30 | 53.010 | 80 | 0.37680 |
| -20 | 29.091 | 85 | 0.32130 |
| -10 | 16.590 | 90 | 0.27486 |
| 0 | 9.795 | 100 | 0.20361 |
| 10 | 5.970 | 110 | 0.15306 |
| 20 | 3.747 | 120 | 0.11661 |
| 25 | 3.0000 | 125 | 0.10227 |
| 30 | 2.4168 | 130 | 0.08997 |
| 40 | 1.5975 | 140 | 0.07026 |
| 50 | 1.0803 | 150 | 0.05547 |

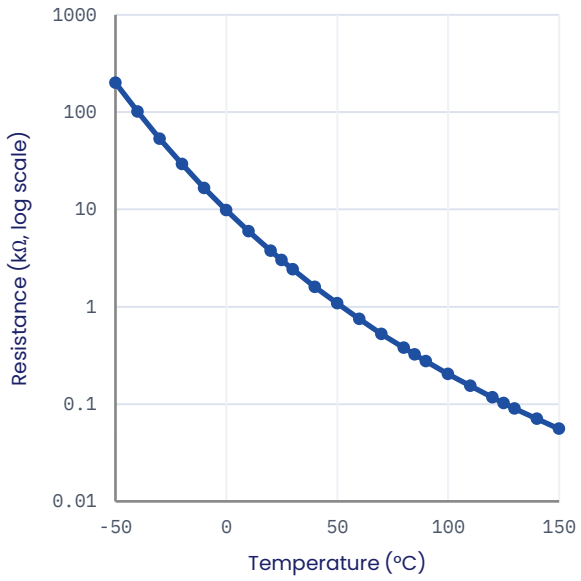



Fig. 2 — Nominal resistance vs. temperature (values from the table).

**CURVE CONSTANTS**

$R_{25}$ = 3,000 Ω
β (25/85 °C) = 3976 K
$\alpha_{25}$ = −4.4 %/°C
Accuracy: ±0.2 °C, 0 to 70 °C

# Mechanical dimensions — inches

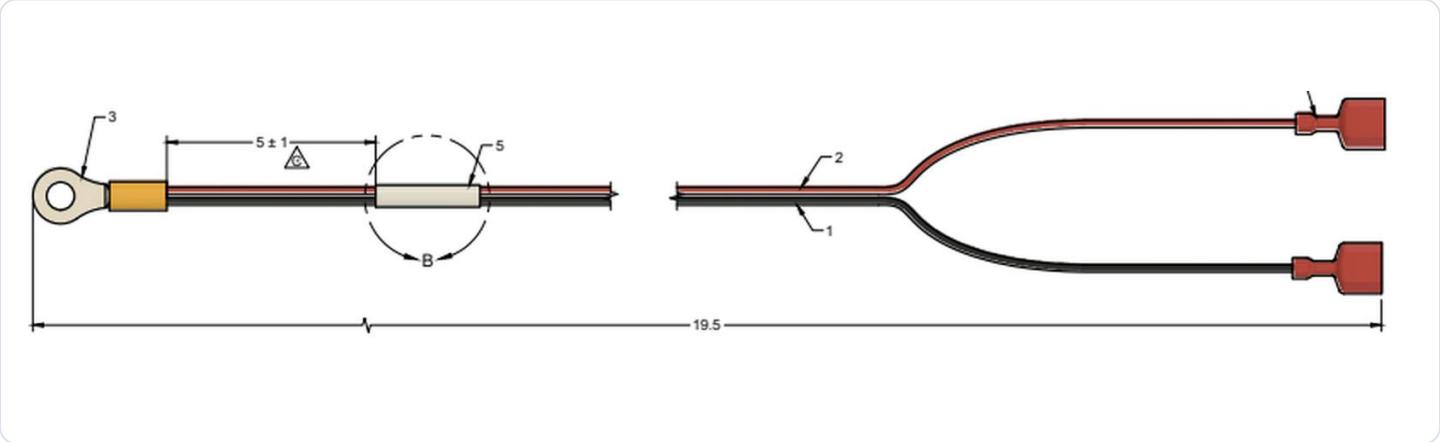



Fig. 3 — PTS31 dimensions. Numbered callouts identify the assembly components.

## Key dimensions

| FEATURE | INCHES |
|---|---|
| Overall length | 19.5 |
| Ring terminal to item 5 | 5 ± 1 |

## Construction

| | |
|---|---|
| Sensing element | Glass-encapsulated NTC, 3,000 Ω at 25 °C, curve “Z” |
| Ring terminal | AMP (TE) ring terminal, Ø0.265 in hole |
| Lead wire | 20 AWG stranded tinned copper, XLINK PVC |
| Terminations | AMP (TE) 1/4 in fully insulated quick connects, or flying leads |

# Ordering information — part-number configuration

PTS31 – 0 – 3K

PTS31 — MODEL
0 — CABLE LENGTH / CONNECTION
3K — RESISTANCE AT 25 °C

## Code fields

| FIELD | CODE |
|---|---|
| Model | PTS31 |
| Cable length | 0 = 1.5 ft · 1 = 4 ft · 2 = 6 ft · 3 = 8 ft |
| Connection | 0 = Flying leads · 1 = AMP female · 2 = AMP male |
| Resistance at 25 °C | 3K = 3,000 Ω |

**EXAMPLE**

**PTS31-0-3K** → 3,000 Ω at 25 °C NTC · ring lug

## Configure your PTS31

Cable lengths and terminations are configurable for OEM volumes. Talk to an engineer to spec your part.

**REQUEST A QUOTE**
sales@phoenixsensors.com
(480) 462-1810

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