# Thermistor standards probes

- Accuracy to ± 0.002 °C
- Affordable system accuracy to ± 0.004 °C or better
- NIST-traceable calibration included from manufacturer; accredited Hart calibration optional

If you want a high-accuracy probe with excellent stability at a great price, the Model 5640-series Thermistor Standards Probes give you all three in a great package. Why pay for an SPRT when you can get ± 0.001 °C accuracy from 0 °C to 60 °C in a calibrated thermistor probe for about one-third the cost of an uncalibrated SPRT alone?

Each probe uses an ultra-stable glass thermistor enclosed in a thin-wall stainless steel tube. The basic semiconductor element is a bead of manganese, nickel, and cobalt oxides mounted on 0.1 mm platinum wires. For long-term stability, the thermistor is aged at various temperatures for 16 weeks. During the aging process, verification of the probe's stability is done to ensure performance to published specs.

The 5640, 5641, and 5642 thermistor probes are designed for the temperature range of 0 °C to 60 °C. The 5643 and 5644 probes span the 0 °C to 100 °C temperature range. They offer stability of either ± 0.002 °C or ± 0.005 °C. These stability levels are guaranteed for one full year.

Precision calibration, traceable to NIST, is provided with each probe. A computer-generated table in increments of 0.01 °C is furnished with each calibration based on the formula:

$$R = \exp\left(A + \frac{B}{T} + \frac{C}{T^2} + \frac{D}{T^3}\right)$$

The constants for the formula are obtained from a polynomial regression performed on the calibration data obtained. Over the range of 0 °C to 60 °C, calibration is performed at the triple point of water (0.01 °C) and 15 °C, 25 °C, 30 °C, 37 °C, 50 °C and 60 °C. For the 0 °C to 100 °C temperature range, the additional calibration points of 80 °C and 100 °C are used.

Each probe is individually calibrated and includes a report of calibration from the manufacturer. Contact Hart for calibration in Hart's NVLAP accredited lab.

Thermistor standards are rugged, precision sensors suitable for use as secondary or working temperature standards for laboratory metrology applications. Because they generally are not affected by shock and vibration, you can use them in the most difficult field environments without worrying about calibration integrity.

Combine these probes with Hart's 1560 *Black Stack* thermometer to read directly in °C, °F, or K. This combination gives you resolution of 0.0001 degrees and total system accuracy is better than ± 0.004 °C.

Compare the cost of a 5640 calibrated probe and a *Black Stack* thermometer to the cost of one uncalibrated SPRT. Between 0 °C and 100 °C, nothing beats the value of the 5640 Series Thermistors.

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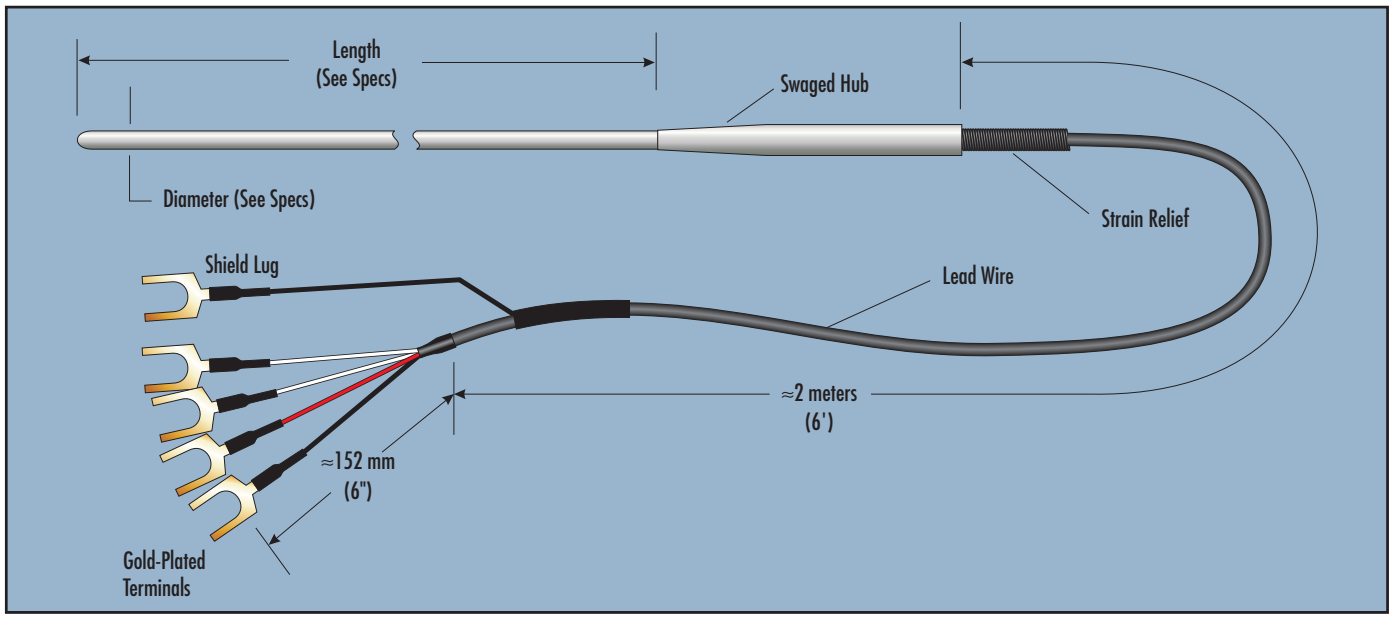


## Specifications

| Model | Diameter x Length | Range | Drift °C/Year | Accuracy (Mfr.)† 0–60 °C | 60–100 °C | Wires | Nominal Resistance at 25 °C |
|---|---|---|---|---|---|---|---|
| 5640 | 6.35 x 229 mm (0.25 x 9 in) | 0 °C–60 °C | ± 0.005 °C | ± 0.0015 °C | n/a | 4 | 4.4 kΩ |
| 5641 | 3.18 x 114 mm (0.125 x 4.5 in) | 0 °C–60 °C | ± 0.002 °C | ± 0.001 °C | n/a | 4 | 5 kΩ |
| 5642 | 3.18 x 229 mm (0.125 x 9 in) | 0 °C–60 °C | ± 0.002 °C | ± 0.001 °C | n/a | 4 | 4 kΩ |
| 5643 | 3.18 x 114 mm (0.125 x 4.5 in) | 0 °C–100 °C | ± 0.005 °C | ± 0.0015 °C | ± 0.0025 °C | 4 | 10 kΩ |
| 5644 | 3.18 x 229 mm (0.125 x 9 in) | 0 °C–100 °C | ± 0.005 °C | ± 0.0015 °C | ± 0.0025 °C | 4 | 10 kΩ |

†Does not include long-term drift, resistance traceability adds additional ± 0.0025 %.

## Ordering Information

| | |
|---|---|
| **5640-X** | Standards Thermistor Probe |
| **5641-X** | Standards Thermistor Probe |
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*X = termination. Specify "B" (bare wire), "D" (5-pin DIN for Tweener Thermometers), "G" (gold pins), "I" (INFO-CON for 1521 or 1522), "J" (banana plugs), "L" (mini spade lugs), "M" (mini banana plugs), "P" (INFO-CON for 1523 or 1524), or "S" (spade lugs).*

### Thermistors make great reference thermometers!

Contrary to some traditional belief, reference-grade thermistors do indeed make great temperature standards. Consider:

- Stability. Today's glass-encapsulated thermistors are well sealed to prevent sensor oxidation and drift. In fact, standards-level thermistors usually won't drift more than a few millidegrees in a year.
- Accuracy. Thermistors are easier (than PRTs) to read accurately because of their larger base resistance and large change in resistance-per-degree. It's common to get meaningful and repeatable readings from a thermistor with resolution of 0.0001 °C.
- Durability. While a bare thermistor bead can be fairly delicate, a properly constructed stainless steel-sheathed thermistor probe can be more rugged than a PRT or SPRT.

For about the same cost of a secondary level PRT, you can buy a well-calibrated standards thermistor probe with accuracy and stability that rivals an SPRT. You can also save wear and tear on your SPRT by using a thermistor over the 0 °C to 100 °C temperature range.

See the article *Thermistors: the under appreciated temperature standards* on page 86 for a more detailed examination on this subject.