

# 5616 Secondary Reference PRT

## Technical Data



You won't find another NIST-traceable reference temperature sensor that matches the accuracy and temperature range of the 5616 for the same price.

The 5616-12 is a 100-ohm platinum resistance thermometer (PRT) with excellent short-term repeatability and comes with an unaccredited NIST-traceable calibration.

The temperature range of the 5616 covers  $-200\text{ }^{\circ}\text{C}$  to  $420\text{ }^{\circ}\text{C}$ , and its high-purity platinum element and durability make it great for calibrating in the lab or in the field. When choosing a reference with a platinum element, there are two things you want to look at carefully: the short-term repeatability and the long-term drift. When PRTs are thermally cycled over their temperature range as they would be during a calibration, their resistance at the triple point of water can move up and down within an expected range. Hart Scientific defines this range (called "short-term repeatability") as

- Temperature range:  $-200\text{ }^{\circ}\text{C}$  to  $420\text{ }^{\circ}\text{C}$
- Excellent stability:  $\pm 10\text{ mK}$
- Reference-grade platinum sensing element
- NIST-traceable calibration included

the repeatability at the triple point of water during three thermal cycles. 5616s are among the best performing in their class with short-term repeatability better than  $\pm 0.010\text{ }^{\circ}\text{C}$  ( $\pm 0.004\text{ }^{\circ}\text{C}$  is typical). In addition, the 5616 is specified to drift no more than  $\pm 0.010\text{ }^{\circ}\text{C}$  at the triple point of water when exposed up to its maximum temperature ( $420\text{ }^{\circ}\text{C}$ ) for 100 hours. These specifications are given at  $k=3$  and therefore include a 99.8 % confidence level.

The 5616's sealed INCONEL® 600 sheath is 298 mm (11.75 in) long and 6.35 mm (0.250 in) in diameter. The probe's Teflon®-jacketed cable is made of silver plated copper that ends with four-wire leads, which eliminate the effects of

lead-wire resistance on measurements.

Use the 5616 with Hart's 1560 *Black Stack*, 1529 Chub-E4, or 1502A Tweener thermometer readouts.

Each sensor comes with a manufacturer's report of calibration. The report includes the expanded uncertainty ( $k=2$ ) at seven calibration temperature points, ITS-90 calibration coefficients, and a temperature vs. resistance table presented in  $1\text{ }^{\circ}\text{C}$  increments.

Compare the 5616 to other Secondary Reference PRTs. You'll like its price, but you'll love its performance.

## Specifications

Parameter	Value
<b>Temperature range</b>	-200 °C to 420 °C
<b>Nominal resistance at 0.01 °C</b>	100 Ω ± 0.5 Ω
<b>Temperature coefficient</b>	0.003925 Ω/Ω/°C nominal
<b>Accuracy<sup>[1]</sup></b>	See footnote
<b>Short-term repeatability<sup>[2]</sup></b>	± 0.010 °C at 0.010 °C (see footnote)
<b>Drift<sup>[3]</sup></b>	± 0.010 °C at 0.010 °C (see footnote)
<b>Hysteresis</b>	± 0.010 °C maximum
<b>Sensor length</b>	50.8 mm (2.0 in)
<b>Sensor location</b>	6.0 mm ± 2.5 mm from tip (0.24 in ± 0.10 in)
<b>Sheath diameter tolerance</b>	± 0.08 mm (± 0.003 in)
<b>Sheath material</b>	INCONEL® 600
<b>Minimum insulation resistance</b>	500 MΩ at 23 °C
<b>Transition junction temperature range<sup>[4]</sup></b>	-50 °C to 150 °C (see footnote)
<b>Transition junction dimensions</b>	76.2 mm x 9.5 mm (3.00 in x 0.375 in)
<b>Minimum immersion length<sup>[5]</sup> (&lt; 5 mK error)</b>	102 mm (4.0 in)
<b>Maximum immersion length</b>	254 mm (10 in)
<b>Response time<sup>[5]</sup></b>	8 seconds typical
<b>Self heating (in 0 °C bath)</b>	60 mW/°C
<b>Lead-wire cable type</b>	Teflon®-jacketed cable, Teflon® insulated conductors, 24 AWG stranded, silver plated copper
<b>Lead-wire length</b>	182.9 cm ± 2.5 cm (72.0 in ± 1.0 in)
<b>Lead-wire temperature range</b>	-50 °C to 150 °C
<b>Calibration</b>	NIST-traceable calibration

<sup>[1]</sup>“Accuracy” is a difficult term when used to describe a resistance thermometer. The simplest way to derive basic “accuracy” is to combine the probe drift specification and calibration uncertainty with readout accuracy at a given temperature.

<sup>[2]</sup>Three thermal cycles from min to max temp, includes hysteresis, 99.8 % confidence

<sup>[3]</sup>After 100 hrs at max temp, 99.8 % confidence

<sup>[4]</sup>Temperatures outside this range will cause irreparable damage. For best performance, transition junction should not be too hot to touch.

<sup>[5]</sup>Per ASTM E 644

Calibration Uncertainty	
Temperature	Expanded Uncertainty (k=2)
-197 °C	0.012 °C
-80 °C	0.012 °C
-38 °C	0.011 °C
0 °C	0.009 °C
156 °C	0.011 °C
230 °C	0.013 °C
420 °C	0.021 °C

**Note:** Laboratories may periodically reevaluate their uncertainties. Calibration uncertainties depend on the calibration process, the standards used, and the instrument performance.

## Ordering Information

**5616-12-X** Secondary Reference PRT, 6.35 mm x 298 mm (0.250 x 11.75 in), -200 to 420 °C

**2601** Probe Carrying Case

*X = termination. Specify “B” (bare wire), “D” (5-pin DIN for Tweener Thermometers), “G” (gold pins), “I” (INFO-CON for 1521 or 1522 Handheld Thermometers), “J” (banana plugs), “L” (mini spade lugs), “M” (mini banana plugs), or “S” (spade lugs).*

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