

# 5616 Secondary Reference PRT

## Highlights

### Durable, accurate sensor for use in the factory, field or lab

- Temperature range: –200 °C to 420 °C
- Excellent stability:  $\pm 10 \text{ mK}$
- Calibrated accuracy  $\pm 0.011 \text{ }^\circ\text{C}$  at 0 °C
- Reference-grade platinum sensing element
- NIST-traceable calibration included

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.

## Description

The temperature range of the 5616 covers –200 °C to 420 °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. Fluke Calibration defines this range (called "short-term repeatability") as 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's drift is  $\pm 0.007 \text{ }^\circ\text{C}$  at the triple point of water when exposed up to its maximum temperature (420 °C) for 100 hours. These specifications are given at  $k=2$  and therefore include a 95 % 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 PTFE-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 Fluke Calibration's [1523/1524 Handheld Reference Thermometer](#), [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 °C increments. Compare the 5616 to other Secondary Reference PRTs. You'll like its price, but you'll love its performance.

## Specifications

Specifications	
Parameter	Value
Temperature range	–200 °C to 420 °C
Nominal resistance at 0.01 °C	100 Ω $\pm 0.5 \Omega$
Temperature coefficient	0.003925 Ω/Ω/°C nominal
Calibrated Accuracy <sup>[1]</sup> ( $k=2$ )	$\pm 0.012 \text{ }^\circ\text{C}$ at –200 °C $\pm 0.011 \text{ }^\circ\text{C}$ at 0 °C $\pm 0.028 \text{ }^\circ\text{C}$ at 420 °C
Short-term repeatability <sup>[2]</sup>	$\pm 0.007 \text{ }^\circ\text{C}$ at 0.010 °C
Drift <sup>[3]</sup>	$\pm 0.007 \text{ }^\circ\text{C}$ at 0.010 °C
Hysteresis	$\pm 0.010 \text{ }^\circ\text{C}$ maximum
Sensor length	50.8 mm (2.0 in)

<b>Sensor location</b>	9.5 mm ± 3.2 mm from tip (0.375 in ± 0.125 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>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 mΩ/°C																
<b>Lead-wire cable type</b>	PTFE-jacketed cable, PTFE 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																
<p><sup>[1]</sup>Includes calibration uncertainty and 100 hr drift.  <sup>[2]</sup>Three thermal cycles from min to max temp, includes hysteresis, 95 % confidence (k=2)  <sup>[3]</sup>After 100 hrs at max temp, 95 % confidence (k=2)  <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</p>																	
<p><b>Calibration Uncertainty</b></p> <table> <thead> <tr> <th>Temperature</th> <th>Expanded Uncertainty (k=2)</th> </tr> </thead> <tbody> <tr> <td>-197 °C</td> <td>0.012 °C</td> </tr> <tr> <td>-80 °C</td> <td>0.012 °C</td> </tr> <tr> <td>-38 °C</td> <td>0.011 °C</td> </tr> <tr> <td>0 °C</td> <td>0.009 °C</td> </tr> <tr> <td>156 °C</td> <td>0.011 °C</td> </tr> <tr> <td>230 °C</td> <td>0.013 °C</td> </tr> <tr> <td>420 °C</td> <td>0.021 °C</td> </tr> </tbody> </table> <p><b>Note:</b> Laboratories may periodically reevaluate their uncertainties. Calibration uncertainties depend on the calibration process, the standards used, and the instrument performance.</p>		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
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## Models and Accessories

Model Name	Description
5616-12-X	Secondary Reference PRT, 6.35 mm x 298 mm (0.250 x 11.75 in), -200 °C to 420 °C  (Calibration traceable to NIST standards included)  X = termination. Specify "A (INFO-CON for 914X), "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).

## Accessories common to all models:

Accessory	Description
<a href="#">2601</a>	Probe Carrying Case, Plastic



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