

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

^[1]“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.

^[2]Three thermal cycles from min to max temp, includes hysteresis, 99.8 % confidence

^[3]After 100 hrs at max temp, 99.8 % confidence

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

^[5]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).