

Extended Range Metal-Sheath SPRT



- Measures temperatures as high as 670 °C
- Inconel and platinum sheaths guard against contamination
- Less than 8 mK/year drift
- Fifth wire provides shielded ground

SPRTs designed by Hart Scientific are known for their outstanding reliability and minimal long-term drift. They have been calibrated by national (and other primary) laboratories and proven repeatedly to outperform competitive models. Now Hart's 5699 Extended Range Metal-Sheath SPRT combines all the advantages of a Hart-designed sensor with the protective sheathing materials that allow your SPRT to be used in virtually any furnace or bath with temperatures as high as 670 °C.

Designed and manufactured by our primary standards metrologists, the strain-free sensing element in the 5699 meets all ITS-90 requirements for SPRTs and minimizes long-term drift.

After one year of regular usage, drift is less than 0.008 °C (< 0.003 °C is typical). Even lower drift rates are possible depending on care and handling. A fifth wire for grounding is added to the four-wire sensor to help reduce electrical noise, particularly for AC measurements. Finally, you can get an improved version of an old industry-standard Inconel-sheathed SPRT.

The 5699 is constructed with a 0.219-inch-diameter Inconel sheath for high durability and fast response times. Inside the sheath, the sensing element is protected by a thin platinum housing that shields the sensor from contamination from free-floating metal ions found within

metal environments at high temperatures. Reduced contamination means a low drift rate—even after hours of use in metal-block furnaces at high temperatures.

If you choose not to calibrate the 5699 yourself, a wide variety of options is conveniently available from Hart's own primary standards laboratory, including fixed-point calibrations covering any range between -200 °C and 661 °C.

Maximize your SPRT's performance

Amazingly high accuracies can be obtained from a good SPRT if it is handled correctly. Expanded uncertainties as low as a few tenths of a millikelvin at 0 °C are possible provided you do the following:

- Avoid physical shock or vibration to your SPRT. An SPRT is a delicate instrument, highly susceptible to mishandling.
- Make a measurement at the triple point of water after each measurement. Use the resistance ratio (W) rather than the absolute resistance to calculate the temperature.
- Measure at two different input currents and extrapolate the results to determine the value at zero power. This will eliminate the often-ignored effects of self-heating.

At Hart, we use SPRTs every day. We design them, build them, calibrate them, use them as standards, and know what it takes to make a reliably performing instrument. Why buy from anyone else?

Specifications

Temperature Range	-200 °C to 670 °C
Nominal R_{TPW}	25.5Ω (±0.5Ω)
Current	1 mA
Resistance Ratio	$W(302.9146K) \geq 1.11807$ $W(234.3156K) \leq 0.844235$
Sensitivity	0.1Ω/°C
Drift Rate	< 0.008 °C/year (< 0.003 °C/year typical)
Repeatability	< 1 mK
Self-heating at TPW	< 0.001 °C under 1 mA current
Reproducibility	±0.001 °C or better
R_{TPW} Drift After Thermal Cycling	< 0.001 °C
Diameter of Pt Sensor Wire	0.07 mm (0.003 in)
Lead Wires	Four sensor wires plus grounding wire
Protective Sheath	Inconel Diameter: 5.56 mm ±0.13 mm (0.219 in ±0.005 in) Length: 482 mm (19 in)
Insulation Resistance	> 100 MΩ at 661 °C > 1000 MΩ at 20 °C

Ordering Information

5699-S Extended Range Metal-Sheath SPRT[†]

[†]Maple carrying case included

See page 162 for SPRT calibration options.

See page 36 for optional readouts.