Silver Point SPRT
Model 96178

- Unique Aspirated Design
- High Stability
- Ultra High Purity Quartz

Isotech has produced over 200 high temperature thermometers which have been sold world-wide for use up to the silver point. As a consequence of our pre-delivery testing alone we have probably made more silver point calibrations than anyone else in the world.

No one fully appreciates all the mechanisms at work when a coil of pure platinum wire inside a quartz envelope is taken to 1000°C and back. However, endless hours of study at National and International level, plus our own significant work at Isotech, have enabled us to design, build and test a superior Silver-Point Thermometer. This, we feel, is a significant contribution to better high temperature calibration.

First, the 96178 can breathe, a valve in the handle can be opened to allow oxygen depleted or moist air to escape from inside the sheath and replacement by fresh air containing 20% oxygen. The valve is normally opened at elevated temperatures and closed to prevent moisture ingress before water triple point measurements are performed.

Second, the 96178 is the only thermometer ever designed with platinum heat radiation shields built into the sheath, to prevent heat radiating up inside the sheath.

Third, a new ultra pure quartz, developed for the semiconductor industry at a cost of between 20 and 30 million pounds, has been adopted for use in the construction of the 96178. This new thermometer exemplifies our commitment to achieve the highest possible quality and minimum of contamination.

How the thermometer is handled is most important for its stability and a purchaser will receive a comprehensive manual and tutorial with each 96178.

Under some circumstances, provided the interior of the thermometer is undamaged we can replace the outer quartz sheath. Please consult us if a replacement is required.

To exploit fully the accuracy of the 96178, a user will need a furnace for warming and annealing the thermometer as well as one to house the silver-point/aluminum-point cells.

A Dual Calibration Furnace from Isotech combines these two features together with all the special accessories and handling know-how we have discovered.

Model No	96178
Temperature Range	0°C to 1000°C
Resistance Value	Ro = 0.25Ω (others to special request)
Resistance Ratio	Wga>1.11807
Dimensions	Length 650mm Diameter 7.5mm

Drift during use

a. Smallest	When taken to 970°C slowly over 1 to 2 hours and cooled slowly again (overnight) to 450°C, the triple point of water resistance will repeat to better than a temperature equivalent of 0.0005°C.
b. Largest	When thermally shocked from 970°C to 20°C the triple point of water resistance will increase by a temperature-equivalent of up to 35mK; this is mostly recoverable upon annealing at 650°C for a few hours and then cooling slowly (overnight) to 450°C.
Long term drift	Most changes occur during heating and cooling. If this process is done carefully, long term stabilities of a few mK per year can be expected, with reproducibility at the silver point of 3 to 5 mK.

How to order

Model 96178/0.25

State “with UKAS calibration” or “without UKAS calibration”.

Refer to introduction for Calibration Uncertainties.

Isotech Note

Why choose 0.25Ω for HTSPRTs?

Note1: It is necessary to make the former on which the platinum is wound of high-purity quartz. Even quartz does not provide absolute isolation at the high temperature end of the range. The former, or mandrel, is thus a shunt resistance across the platinum winding, and because of the uncertainty of the contacts between platinum and quartz, it is uncertain and unstable in magnitude. The practical solution is to reduce the element resistance so that the shunt resistance produces a smaller network effect. For example, for a 25.5Ω thermometer, suppose that the shunt resistance were 20 MΩ. Then the network resistance is 25.499967Ω. But we require measurement assurance of better than 1 part per million, so this won't do, even if the shunt were a constant (calibratable) value, which it is not. For a 0.25Ω thermometer, a 20 MΩ shunt gives a network resistance of 0.24999997Ω, which is tolerable. The cost, and there is a cost, is increased difficulty on the electrical measurement side, particularly in the face of noise, which is present at high temperatures.

Note2: Gases, like Iron, Chromium, Nickel under reducing conditions, can penetrate the quartz sheath and poison the platinum.

It is necessary to purchase not only the 96178, but items such as the Dual Furnace to ensure that your high temperature thermometer does not become contaminated.

Only Isotech offers a comprehensive solution to the measurement and use High Temperature Thermometry.

Note3: Our know-how and expertise in the field of High Temperature Thermometry has been written down and is available in the Isotech Journal of Thermometry.