

Introduction to SPRTs and Standard Thermocouples

The **ITS-90** specifies the use of platinum resistance thermometers over the range -259°C to 962°C

Between the triple point of equilibrium hydrogen (13,8033 K) and the freezing point of silver (961,78°C) T_{90} is defined by means of platinum resistance thermometers calibrated at specified sets of defining fixed points and using specified interpolation procedures.

And

An acceptable platinum resistance thermometer must be made from pure, strain-free platinum, and it must satisfy at least one of the following two relations:

$$W(29,7646^{\circ}\text{C}) \geq 1,118\ 07 \quad (8a)$$

$$W(-38,8344^{\circ}\text{C}) \leq 0,844\ 235 \quad (8b)$$

An acceptable platinum resistance thermometer that is to be used up to the freezing point of silver must also satisfy the relation:

$$W(961,78^{\circ}\text{C}) \geq 4,2844 \quad (8c)$$

In practise Standard Platinum Resistance Thermometers, SPRTs, are constructed to cover sub ranges of the ITS-90 and SPRTs are available in different construction types.

Isotech offer the 670 family as SPRTs recommended for Primary Applications and the 909 Family for Secondary Laboratories.

These families span from -200°C to 670°C, for higher temperatures, up to 961.78°C the freezing point of Silver Isotech offer the 96178 HTSPRT.

Standard Thermocouples

Whilst no longer a part of the temperature scale thermocouples are widely used in calibration laboratories. Isotech can supply Standard Thermocouples to 1600°C, either in platinum / platinum rhodium or platinum /gold materials.

The 670 Family

Ultra Stable SPRTs - The 670SQ Range

This new quartz sheathed SPRT range from Isotech is the ultimate SPRT for the most exacting measurements over the range of -200°C to 670°C. The same ultra stable element is now available in metal sheaths.

The Model **670SH** covers -80°C to 670°C

The Model **670SL** covers -200°C to 165°C

909 Family

Working Standards - The 909 Range

In addition to our popular quartz sheathed 909 SPRT covering the temperature range -200°C to 670°C. Isotech have introduced two new metal sheathed versions for 2007.

The **909H** works from -80°C to 670°C and can be provided with either 25.5 Ohm or 100 Ohm Ro to ITS-90.

The **909L** works from -200°C to 165°C and also is available with Ro 25.5 or 100 Ohms to ITS-90.

UKAS Calibration Options

All of the SPRTs described on this datasheet can be accompanied by one of three UKAS Calibration options.

1. **By comparison**, accuracies of just a few milliKelvins, ideal for the 935 series of semi-standard PRTs.
2. **Standard Fixed Point Calibration**, suitable for most SPRTs including the 909 Range.
3. **Premium Fixed Point Calibration**, suitable only for most stable SPRTs such as the 670 Range and the 96178

Thermocouples

Model 1600 Platinum / Platinum Rhodium

Available as Type R or Type S these thermocouples are housed in a 99.7% recrystallized alumina sheath, 300 or 600 mm long and can be used to 1600°C

Platinum / Gold Thermocouple

This model offers smaller uncertainties than Type R or S using only pure metals in the construction. An economical alternative to HTSPRTs.

NPL Platinum / Palladium Thermocouple

This model manufactured by the National Physical Laboratory (NPL) was developed to operate reliably and accurately to 1500°C and offers superior stability to conventional platinum / platinum rhodium thermocouples. They now can be purchased from Isotech.

<http://www.isotech.co.uk>

SPRT Uncertainties -
Refer to page 19 for details of calibration uncertainties