

# 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  $R_0$  to ITS-90.

The **909L** works from -200°C to 165°C and also is available with  $R_0$  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