



-196 to 670°C

- Three Stem Lengths
- Wide Operating Range
- Proven Design

This economically-priced Standard Platinum Resistance Thermometer, Model 909, is the workhorse of calibration laboratories all over the world. During 2007 we reviewed our range of SPRTs and now have new models in the 909 family, the 909L and 909H. The wide temperature ranges and economic pricing make this thermometer ideal for the secondary laboratory. For smaller uncertainties to suit the Primary Laboratory refer to the Model 670 SPRTs.

The resistance element is of pure platinum, coiled and mounted in a strain free construction. The former is of pure alumina material and all parts have been pre-aged to eliminate contamination and strain. All joints are welded to minimize resistance changes. The leads are brought to a handle assembly where they are connected to a low loss cable, 2M long and screened.

The 909Q has a quartz sheath while the 909L and 909H have metal sheaths. Whilst metal sheathed thermometers appear more robust than the quartz glass models it should be noted that ALL SPRTs are fragile devices and must be handled with care.

Three thermometer lengths are available, standard length 480mm, extra length 550mm or maximum length 600mm.

Quartz glass thermometers have the advantage that the internal components are visible and can be inspected and continue to be our recommended models. The low temperature models have excellent immersion characteristics and a significant cost saving when compared to the higher temperature models.

The Model 909 is supplied with a calibration certificate giving R_{TPW} and W_{ga} . Alternatively we can provide a complete UKAS calibration certificate, see table opposite. For transportation and storage the Model 909 is supplied in its own attractive carrying case.

Working SPRTs 909 Family



Model	909	
R_{TPW}	25.5Ω	100Ω
Nominal Resistance	25.5Ω at 0°C	
Recommended Max. Current mA	1	0.5
Nominal Sensitivity	0.1 Ω/°C	0.4 Ω/°C
Resistance Ratio	$W_{ga} > 1.11807$ as required by ITS-90	
Self-heating	1mK / 25 microwatts	
Stability	Depends upon the temperature range of use. Typical annual stability, see the table on the next page.	
Internal leads	4 wire-platinum	
External Leads	Silver-plated multi-strand wires in a low-loss insulation cable terminating in gold-plated terminals.	

How to Order

Model 909 Specify model, resistance and length.

State with UKAS Calibration or without UKAS Calibration. at Fixed Points or by Comparison.

SPRT Calibration with ITS-90 Fixed Points: Standard Service
ISOTECH UKAS Calibration Uncertainties (k=2)

Suitable for Primary and Working SPRTS - Isotech 670 & 909 families and other SPRTS of similar stability

FIXED POINT Fixed Point	°C	Range 1	Range 2	Range 3	Range 4	Range 5	Range 6
Typical Uncertainties ±							
BP Nitrogen	-195.798	10mK		10mK	10mK	10mK	10mK
TP Mercury	-38.8344	2mK	2mK	2mK	2mK	2mK	2mK
TP Water	0.01	1mK	1mK	1mK	1mK	1mK	1mK
MP Gallium	29.7646		1mK				
FP Indium	156.5985			3mK	3mK		
FP Tin	231.928				3mK	3mK	3mK
FP Zinc	419.527					3.5mK	3.5mK
FP Aluminium	660.323						10mK

Note: TP = Triple Point MP = Melting Point
 FP = Freezing Point BP = Boiling Point

Note: The 100Ω 909 has a maximum temperature of 550°C and so cannot be UKAS certified over Range 6. Please contact Isotech if calibration is required above Zinc.

The latest schedule can be found on the Isotech website or at www.ukas.org.



Model	Range (°C)	Ratio Wga	Outer Sheath	Construction	Nominal Diameter	Stem Length	Sensor Length	Notes
909Q 25.5Ω	-200 to 670	>1.11807	Quartz	Sealed with dry oxygen / argon mix	7.5mm	480mm 550mm 600mm	65mm	Isotech recommended secondary standard SPRT
909Q 100Ω	-200 to 550	>1.11807	Quartz	Sealed with dry oxygen / argon mix	7.5mm	480mm 550mm 600mm	65mm	100 Ohm secondary standard SPRT
909H 25.5Ω	-80 to 670	>1.11807	Metal	Sealed	6mm	480mm 550mm 600mm	65mm	Internal alumina tube protects sensor from contamination
909H 100Ω	-80 to 550	>1.11807	Metal	Sealed	6mm	480mm 550mm 600mm	65mm	Internal alumina tube protects sensor from contamination
909L 25.5Ω	-200 to 165	>1.11807	Metal	Sealed with dry oxygen / argon mix	6mm	480mm 550mm 600mm	65mm	Optimised for low temperatures, less stem conduction due to internal construction
909L 100Ω	-200 to 165	>1.11807	Metal	Sealed with dry oxygen / argon mix	6mm	480mm 550mm 600mm	65mm	Optimised for low temperatures, less stem conduction due to internal construction

Introduction to Standard Thermocouples

■ Thermocouples

Isotech 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.

Isotech Gold / Platinum Thermocouple

This model offers smaller uncertainties than Type R or S using only pure metals in the construction and can be considered as an 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, with NPL calibration (UKAS) with an uncertainty of $\pm 0.2^\circ\text{C}$, from 0°C to 1100°C rising linearly to $\pm 0.55^\circ\text{C}$ at 1330°C or $\pm 0.7^\circ\text{C}$ at 1500°C.

■ Calibration Options

Comparison Calibration

The Model 1600 includes UKAS calibration to 1100°C, with options to extend this to 1200°C or 1300°C. The thermocouples are calibrated using comparison techniques in the Isotech 877 Furnace. Uncertainties for models with a cold junction (recommended) are $\pm 0.7^\circ\text{C}$ to 1100°C.



Fixed Point Calibration at the National Physical Laboratory (NPL)



For lower uncertainty calibration Isotech can supply the Model 1600 with ISO 17025 (UKAS) accredited fixed point calibration up to 1330°C or even 1500°C benefiting from NPL's newly developed high temperature metal-carbon eutectic fixed points. The uncertainty is then $\pm 0.3^\circ\text{C}$ to 1100°C rising to $\pm 0.55^\circ\text{C}$ at 1330°C or $\pm 0.7^\circ\text{C}$ at 1492°C. The fixed points used are Zinc, Silver and the eutectic point of either Cobalt-Carbon or Palladium-Carbon alloys.

The Platinum/Gold Thermocouple can be supplied calibrated with uncertainties of $\pm 0.07^\circ\text{C}$ from 0°C to 400°C and $\pm 0.05^\circ\text{C}$ from 400°C to 1000°C using the fixed points of Zinc, Aluminium and Silver.

These calibrations are performed by NPL who established the world-first ISO 17025 (UKAS) accredited calibration services using metal-carbon eutectic fixed-point cells.

www.npl.co.uk/temperature-humidity

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