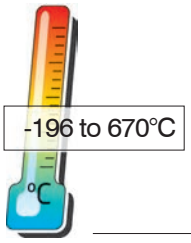


Reference Probes - Semi Standards
Platinum Resistance Thermometers

- High Accuracy Reference Thermometers
- Superior Stability Platinum Coil Elements
- Wide Range and Cost Effective

These Isotech industrial platinum resistance thermometers are ideal for both laboratory and portable use. This range is suitable for use as working standards in Dry Blocks and Liquid Baths or as high accuracy sensors for our range of precision thermometers and bridges.

All of these thermometers are metal sheathed and are both less fragile and more affordable than the Isotech range of true Standard Platinum Resistance Thermometers that are normally used in laboratories. Details of these are to be found in our publication *"Solutions for Primary and Secondary Laboratories"*.

All these semi-standards use handmade, high stability platinum coil elements and offer wide temperature ranges with high accuracy and low drift. After assembly, the complete thermometers undergo annealing and a proprietary thermal processing before the stability is checked over multiple temperature cycles.

We recommend UKAS accredited calibration for each semi-standard PRT to suit the particular operating range and application. The calibration uncertainty can be as low as 10mK over narrow temperature ranges and typically 50mK at 660°C. (See table for details) With UKAS accredited calibration, these highly reproducible thermometers can be used with a performance that is much better than the tolerance classes of IEC 60751. Isotech are always happy to offer help and advice as to the most appropriate calibration for different applications.

The performance of Isotech Semi-standards benefits from having short length platinum coils. The internal sensing element lengths are at a maximum of 25mm while other manufacturers that use longer sensing elements will require deeper immersion depth or work with larger stem conduction losses.

We recommend a minimum thermometer length of 225mm for use up to 250°C and 350mm long for higher temperatures. This allows the devices to be calibrated with good immersion lengths in oil baths or ITS-90 fixed point cells. For some applications, shorter lengths are needed and we have a range that is ideal for Dry Block Calibrators. Short thermometer calibration with Dry Blocks often cannot be calibrated to the same uncertainties as longer probes.

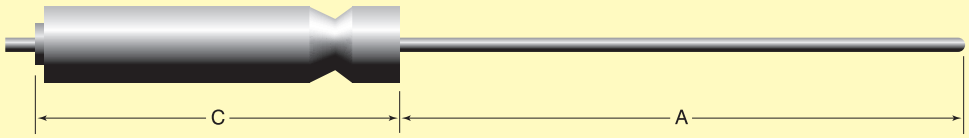
After manufacture all Isotech Semi Standard PRTs are thermally pre-conditioned to provide optimal stability.

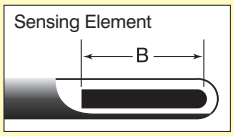
Universal Specifications

Ro	100Ω ± 0.05 Ω
Alpha	0.003850 ± 0.000005
Standard	IEC 60751
Stability	0.010 Ω/year
Recommended Current	1mA
Self Heating at 1mA	0.004°C
Calibration	Optional UKAS Calibration at extra cost. See table for typical uncertainties
Connection	Four Wire
Max. Handle Temperature	80°C

■ **Isotech Semi Standard Reference** Probes

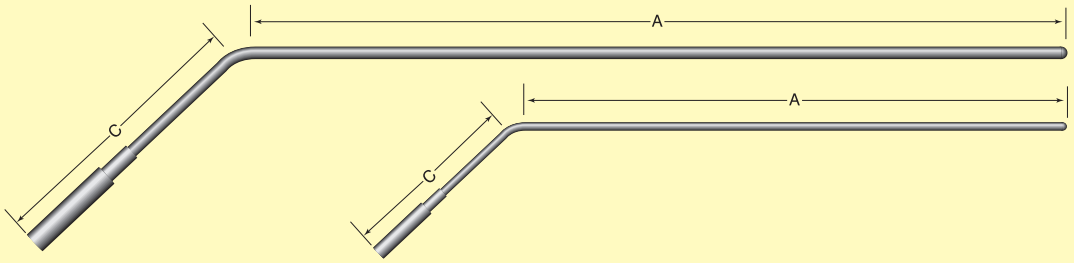
A range of high stability superior resistance thermometers for use as industrial standards with precision thermometers and for use with Dry Blocks and Calibration Baths.

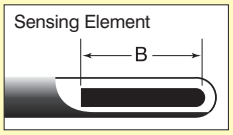




Model	Range	Diameter	Length (A)	Sensing Length (B)	Handle (C)	Cable	Application
935-14-112	-50°C to 250°C	3mm	225mm	6mm	No Handle	2m PTFE	General Purpose/TTI-10
935-14-61	-50°C to 250°C	4mm	300mm	6mm	19 x 120mm	2m PTFE	Fast Response, Low Stem Conduction
935-14-13	-196°C to 250°C	6mm	350mm	25mm	25 x 115mm	2m PTFE	Low Temperature
935-14-113	-100°C to 250°C	6mm	350mm	25mm	19 x 120mm	2m PTFE	General Purpose
935-14-16	-100°C to 450°C	6mm	450mm	25mm	19 x 120mm	2m PTFE	General Purpose
935-14-116	-100°C to 450°C	6mm	350mm	25mm	19 x 120mm	2m PTFE	General Purpose
935-14-72	-50°C to 670°C	6mm	375mm	25mm	No Handle	2m PTFE	Fits Jupiter / Gemini Carry Case
935-14-98	-50°C to 350°C	4mm	300mm	8mm	No Handle	2m PTFE	Low Stem Conduction
935-14-95L	-200°C to 165°C	6mm	480mm	25mm	25 x 115mm	2m PTFE	Working Standard
935-14-95H	-80°C to 670°C	6mm	480mm	25mm	19 x 120mm	2m PTFE	Working Standard

■ **Angled** Probes - *angled head provides maximum clearance at top of calibration bath*





Model	Range	Diameter	Length (A)	Sensing Length (B)	(C)	Cable	Application
935-14-82	-50°C to 250°C	4mm	165mm	6mm	50mm	1.5m PTFE	Europa - Venus - Calisto
935-14-85	-50°C to 250°C	6mm	385mm	25mm	35mm	0.54 m PTFE	Oceanus-6

Termination Options

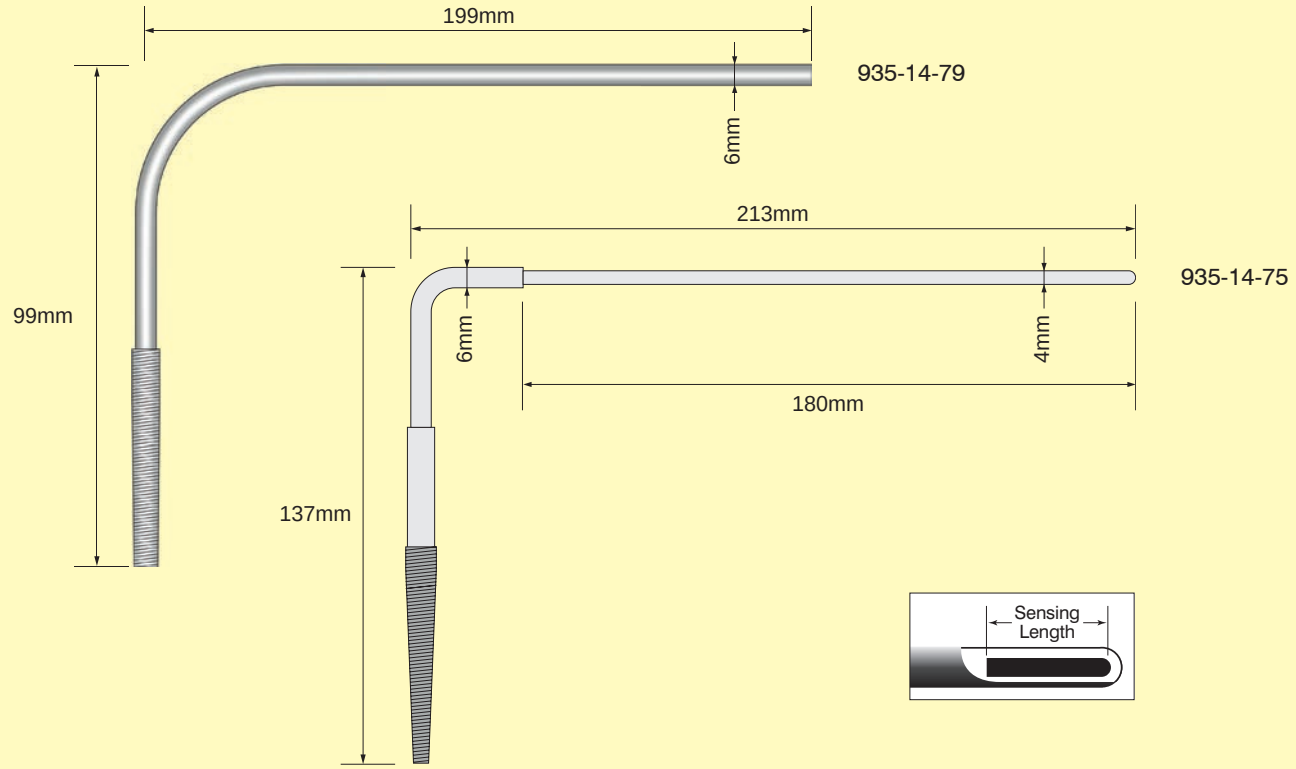
Bare Wire (BW)
TTI suits milliK and TTI-1 to TTI-7, TTI-b – suits TTI-22
DB Connector for Dry Block Calibrator Site Indicator

How to Order

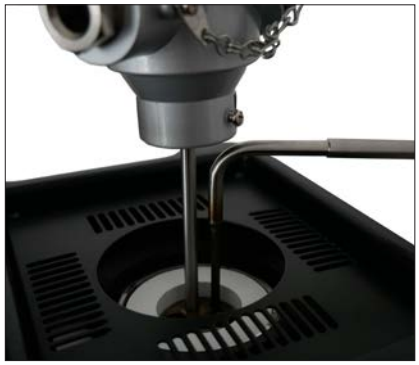
Please Specify Model Type and Termination Option
(for example 935-14-13/BW)
Please state whether UKAS Certification is required

■ **Angled** Probes - *90° bend provides maximum clearance at top of calibration bath*

These additions to our range have been introduced as a result of customer demand. They are primarily for use in our Portable Temperature Calibrators for applications where the units under test have a terminal head fitted that would otherwise obstruct a longer reference thermometer. Using the same construction and features as other Isotech Semi-Standards, they also offer low drift and high accuracy. These sensors should be calibrated as part of the Portable Calibrator.



Model	Range	Sensing Length	Cable	Application
935-14-75	-50°C to 250°C	6mm	2m PTFE	Suitable for Europa, Venus & Calisto portable calibrators
935-14-79	0 to 660°C	25mm	2m PTFE	Suitable for Gemini & Jupiter portable calibrators



Termination Options

Bare Wire (BW)
DB Connector for Dry Block Calibrator Site Indicator

How to Order

Please Specify Model Type and Termination Option (for example 935-14-78/BW)
These probes can be UKAS calibrated with the Dry Block Calibrators

Typical Uncertainties of PRT Semi Standards with Range

Temperature	Uncertainty mK				
Model	**935-14-95L***	**935-14-61* 935-14-112**	**935-14-13 935-14-113***	**935-14-16 935-14-116**	**935-14-95H* 935-14-72**
-196	25	N/A	25	N/A	N/A
-80	20	N/A	20	25	25
-50	15	15	15	20	20
0	10	10	10	15	15
50	10	10	10	15	15
156	10	10	10	20	20
232	N/A	15	15	25	25
420	N/A	N/A	N/A	40	40
550	N/A	N/A	N/A	N/A	50
660	N/A	N/A	N/A	N/A	50

*Preferred Models

The above uncertainties do not include long term drift
Typical Stability of correctly used semi standard is 0.01°C/year at 0°C
Actual uncertainty of a probe determined at time of calibration

Isotech have generated a long history of many of our semi-standards.

Here are a few documented facts:

The 935-14-95 model has the widest temperature range and in consequence is likely to suffer the largest changes in characteristics.

Guy Snelling sent the following email about the 935-14-95.

ISOTECH

I thought that you might like to see the calibration history of one of our probes from the past 12 years.

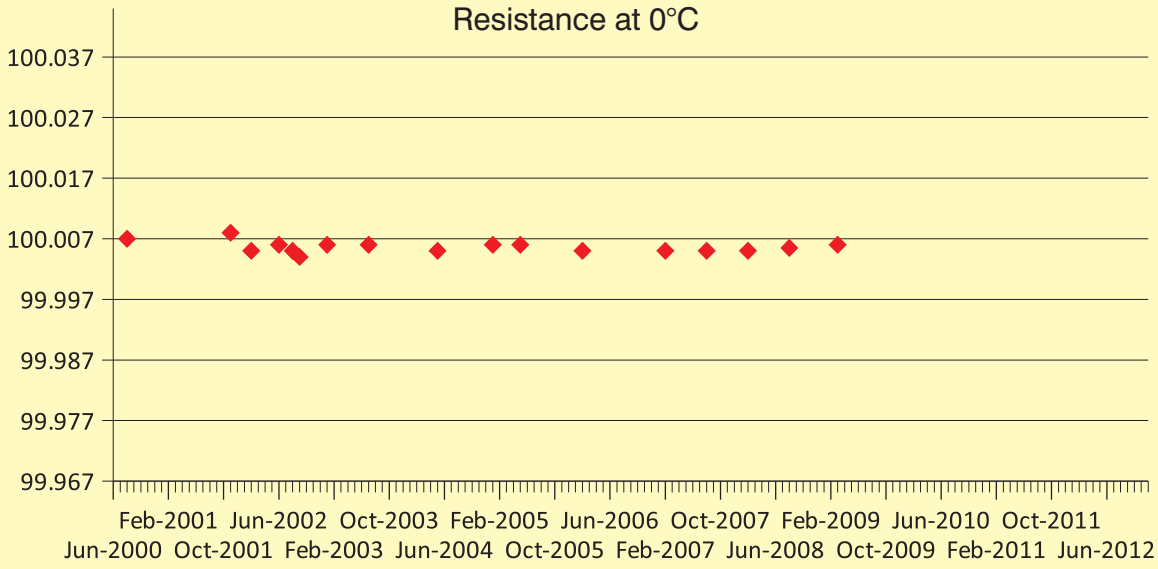
You may recall that we purchased this probe to use as a laboratory standard when our company was still young. This particular probe is still in daily use and is regularly taken to 600°C in our dry block calibrator. While we handle it with care, being in daily use for 12 year it has take the occasional mild knock and accidental abuse - I believe that it was even taken to close to 700°C once, although I wasn't involved so I can't testify to the temperature reached.

You'll see from the attached history of the calibration by our NMI that the probe has remained stable and accurate, and bearing in mind the daily variations in temperature that it has undergone, these results are testimony to the high quality of this product.

John, you are to be congratulated on developing and producing such a fine measuring instrument, and feel free to use us as a product reference any time.

Kind regards,

Guy Snelling
Temperature Metrologist
InterCal (South Africa)

UKAS Calibration
available for these systems
International Traceability - Best Practice

UKAS CALIBRATION 0175