

# Reference Probes - Semi Standards Thermocouples

- Wide Temperature Ranges
- Noble Metal & Type N for best life, stability and reproducibility
- Can be supplied with UKAS calibration

These thermocouples are suitable for use as references in Isotech Dry Blocks and for use with temperature indicators. Details of our laboratory grade Standard Thermocouples with separate cold junctions can be found in our publication "*Solutions for Primary and Secondary Laboratories*".

These semi standards are lower cost and suitable for a variety of industrial applications.

The 935-14-91 is constructed from Platinum and Platinum Rhodium alloys and can be used to 1300°C.

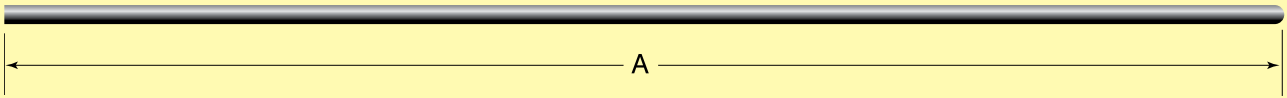
Recommended for the Pegasus 1200 and general purpose applications. It has 1M of compensating cable terminated with a miniature thermocouple plug. The 935-14-88 is similar to the 14-91 but is made entirely from precious metals, with platinum wires all the way to the miniature plug.

There is a range of high quality mineral insulated metal sheathed (MIMS) Type N thermocouples. These devices are lower cost than the noble metal types and can be bent to a desired shape if required. They are suitable for use in Isotech Dry Blocks and for general purpose measurement and calibration applications.

The system accuracy or uncertainty will depend on the application and what instrument they are used with. The table shows the uncertainties that we can offer with optional UKAS calibration from our accredited laboratory.



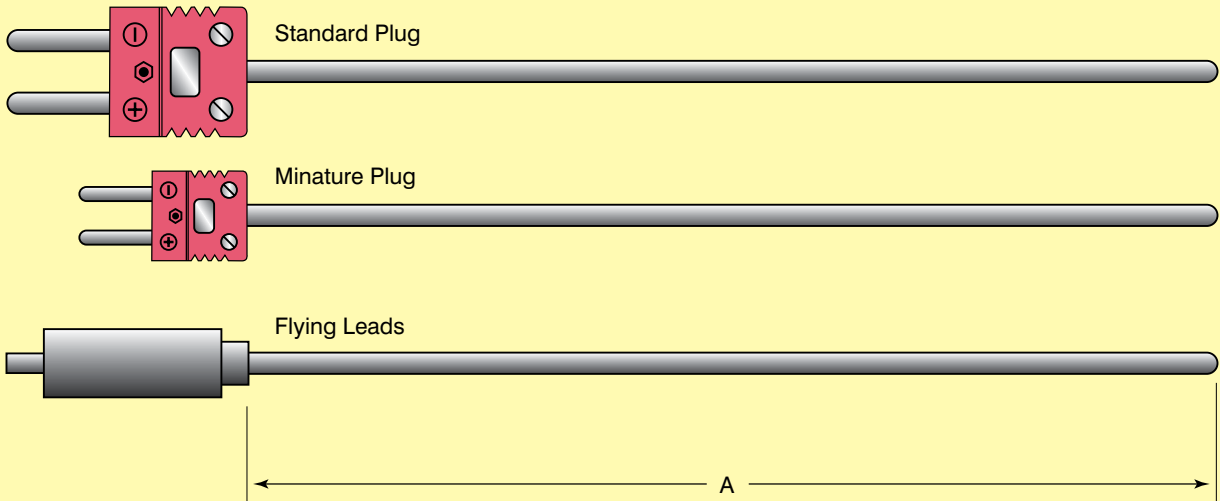
<http://www.isotech.co.uk>



■ **Noble Metal Thermocouples**

Platinum wire for best performance, ceramic sheath construction. Carry case included.

| Model  | Diameter | Length (A) | Range       | Application                 | Type |
|--|----------|------------|-------------|-----------------------------|------|
| 935-14-91/R  | 5mm      | 300mm      | 0 to 1300°C | Pegasus                     | R    |
| 935-14-91/S  | 5mm      | 300mm      | 0 to 1300°C | General Purpose             | S    |
| <b>Termination:</b> 1M extension cable to miniature plug |          |            |             |                             |      |
| 935-14-88/R  | 5mm      | 300mm      | 0 to 1300°C | Working industrial standard | R    |
| 935-14-88/S  | 5mm      | 300mm      | 0 to 1300°C |                             | S    |
| <b>Termination:</b> 1M platinum cable to miniature plug  |          |            |             |                             |      |



■ **Type N Thermocouples**

Recommended base metal thermocouple, low cost metal sheathed.

| Model     | Diameter | Length(A) | Termination                | Range       | Application               | Type |
|-----------|----------|-----------|----------------------------|-------------|---------------------------|------|
| 935-14-63 | 3mm      | 300mm     | 1M Cable<br>Miniature Plug | 0 to 1300°C | Gemini 700<br>Jupiter 650 | N    |
| 935-14-64 | 3mm      | 300mm     | Miniature<br>Plug          | 0 to 1300°C | General<br>Purpose        | N    |
| 935-14-65 | 3mm      | 300mm     | Standard<br>Plug           | 0 to 1300°C | General<br>Purpose        | N    |
| 935-14-66 | 3mm      | 500mm     | 1M Cable<br>Miniature Plug | 0 to 1300°C | General<br>Purpose        | N    |
| 935-14-67 | 3mm      | 500mm     | Miniature<br>Plug          | 0 to 1300°C | General<br>Purpose        | N    |
| 935-14-68 | 3mm      | 500mm     | Standard<br>Plug           | 0 to 1300°C | General<br>Purpose        | N    |

## Isotech UKAS Calibration Uncertainties ( $k=2$ )

| Item | Measured Quantity<br>Instrument or Gauge | Temperature Range      | ( $k=2$ )<br>Best measurement capability<br>expressed as an uncertainty ( $\pm$ ) |
|------|--|------------------------|---|
| 1    | Temperature<br>Platinum Thermocouples    | -50°C to 0°C           | 0.5K  |
|      |  | 0°C to 50°C            | 0.45K   |
|      |  | 50°C to 660°C          | 0.4K  |
|      |  | 660°C to 1100°C        | 0.7K  |
|      |  | Above 1100°C to 1300°C | 1.7K  |
| 2    | Other Thermocouples                      | -196°C                 | 0.3K  |
|      |  | -80°C to 300°C         | 0.25K   |
|      |  | Above 232°C to 420°C   | 0.3K  |
|      |  | Above 420°C to 660°C   | 0.4K  |
|      |  | Above 660°C to 1100°C  | 0.8K  |
|      |  | Above 1100°C to 1300°C | 2.2K  |



The latest schedule can be found on the Isotech website or at [www.ukas.org](http://www.ukas.org).



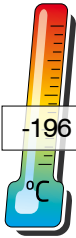
**UKAS Calibration** available for these systems - *International Traceability - Best Practice*



|                   |  |
|-------------------|--|
| <b>Model</b>      | <b>Refer to Chart</b>  |
| Temperature Range | Refer to Chart   |
| Calibration       | A UKAS Calibration Certificate can be provided at extra cost |
| Dimensions        | Refer to Chart   |

### How to Order

Please Specify Model Type (for example 935-14-65)  
Please state whether UKAS Certification is required



-196 to 670°C

# Reference Probes - Semi Standards Platinum Resistance Thermometers

- High Stability Reference Probes
- Wide Temperature Ranges
- High Stability Platinum Coil Elements

These industrial platinum resistance thermometers are ideal for field and lab use. Suitable for use as working standards in Dry Blocks and Liquid Baths or as high accuracy probes for our range of True Temperature Indicators.

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

All the thermometers use handmade coil wound platinum sensing elements to give high accuracy and low drift. Isotech's UKAS accredited lab can calibrate to the smallest of uncertainties.

Calibration should be specified to suit the particular operating range and application. Isotech can advise on which service is appropriate to match the temperature range and application.

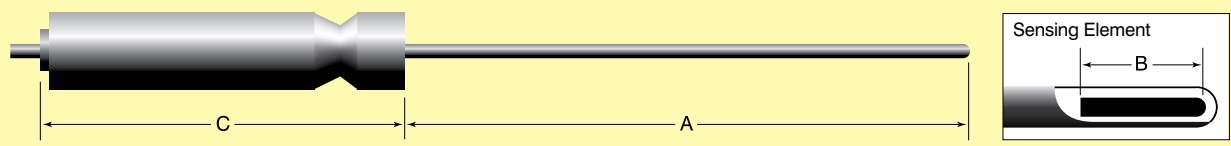
<http://www.isotech.co.uk>



## Universal Specifications

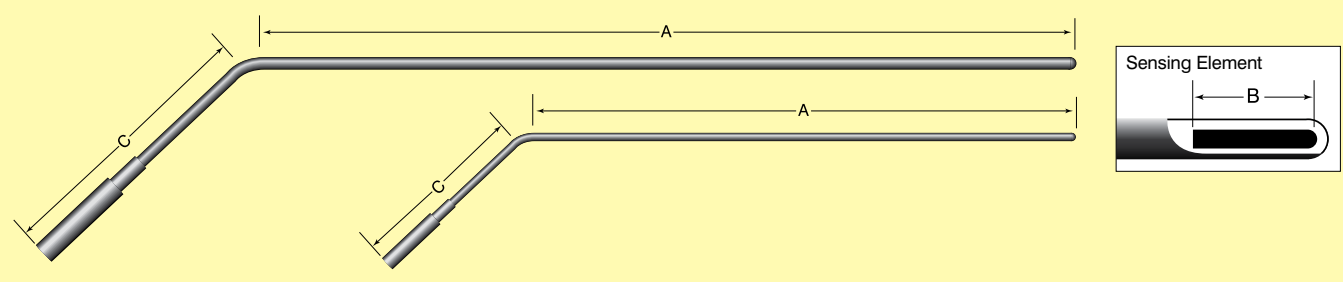
|                         |   |
|-------------------------|---|
| Ro                      | 100Ω ± 0.05 Ω   |
| Alpha                   | 0.003850 ± 0.000005   |
| Standard                | IEC 60751   |
| Stability               | 0.010 Ω/year  |
| Recommended Current     | 1mA   |
| Self Heating at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

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



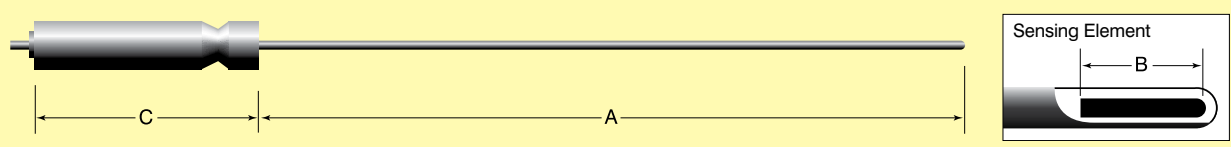
■ **General Purpose Probes**

| 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/Fits milliK Case   |
| 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                |



■ **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                |



■ **Working Industrial Standards**

These thermometers use premium grade wire wound elements to IEC-751 and the same internal construction as our working Standard SPRTs. The 95L is optimised for low temperature with minimum stem conduction. The 95H is optimised for high temperature operation. Both models employ strain free construction.

| Model      | Range           | Diameter | Length (A) | Sensing Length (B) | Handle (C) | Cable   |
|------------|-----------------|----------|------------|--------------------|------------|---------|
| 935-14-95L | -200°C to 165°C | 6mm      | 480mm      | 25mm               | 25 x 115mm | 2m PTFE |
| 935-14-95H | -80°C to 670°C  | 6mm      | 480mm      | 25mm               | 19 x 120mm | 2m PTFE |

**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

## Typical Uncertainties of PRT Semi Standards with Range

| Temperature | Uncertainty mK |             |                         |            |                                       |                          |
|-------------|----------------|-------------|-------------------------|------------|---------------------------------------|--------------------------|
|             | Model          | 935-14-95L* | 935-14-61*<br>935-14-13 | 935-14-13* | 935-14-95H*<br>935-14-72<br>935-14-16 | 935-14-95H*<br>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         | 15                                    | 20                       |
| 232         |                | N/A         | 15                      | 15         | 20                                    | 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*

Resistance at 0°C

