

2

**ISOTECH**



**The Source for Calibration Professionals**

## **Calibration Solutions for**

- *Temperature Sensors*
- *Infrared Thermometers*
- *Thermocouple Referencing Systems*

Temperature Calibration Equipment & Services

# Isotech Catalogues...

## Temperature Calibration Equipment and Services

This volume of our catalogue includes our calibration solutions intended for industrial temperature sensors including Precision Thermometers, Blackbody Sources and Thermocouple Referencing Equipment. Volume 1 is also available with a range of laboratory equipment including ITS-90 Fixed Points, Comparison Equipment, Thermometers and Thermometry Bridges.

**1 ISOTECH**  
The Source for Calibration Professionals

**2 ISOTECH**  
The Source for Calibration Professionals

**Solutions for Primary and Secondary Laboratories**

**Calibration Solutions for**  
- Temperature Sensors  
- Infrared Thermometers  
- Thermocouple Referencing Systems  
- Temperature Calibration Equipment & Services

**ITS-90 Fixed Points**  
Argon to Silver

| K        | °C        |
|----------|-----------|
| 1234.51  | 961.18    |
| 909.473  | 688.323   |
| 688.877  | 418.527   |
| 505.079  | 231.929   |
| 429.7485 | 156.5885  |
| 302.9146 | 29.7646   |
| 273.15   | 0.01      |
| 234.3158 | -38.8344  |
| 91.8555  | -130.3445 |

**Reference Chart**  
Thermocouple Tolerances IEC 60584:2013

| Class | Temp. Range (°C)                                 | Max. Error (°C)         | Max. Error (mV)         |
|-------|--------------------------------------------------|-------------------------|-------------------------|
| B     | Class 1: 600 to 1000°C<br>Class 2: 600 to 1000°C | ±0.002 (1) / ±0.005 (2) | ±0.002 (1) / ±0.005 (2) |
| E     | Class 1: -50 to 600°C<br>Class 2: -50 to 600°C   | ±0.004 (1) / ±0.008 (2) | ±0.004 (1) / ±0.008 (2) |
| J     | Class 1: -40 to 1200°C<br>Class 2: -40 to 1200°C | ±0.004 (1) / ±0.008 (2) | ±0.004 (1) / ±0.008 (2) |
| K     | Class 1: -40 to 1200°C<br>Class 2: -40 to 1200°C | ±0.004 (1) / ±0.008 (2) | ±0.004 (1) / ±0.008 (2) |
| N     | Class 1: -40 to 1200°C<br>Class 2: -40 to 1200°C | ±0.004 (1) / ±0.008 (2) | ±0.004 (1) / ±0.008 (2) |
| R     | Class 1: 0 to 1800°C<br>Class 2: 0 to 1800°C     | ±0.001 (1) / ±0.002 (2) | ±0.001 (1) / ±0.002 (2) |
| S     | Class 1: 0 to 1800°C<br>Class 2: 0 to 1800°C     | ±0.001 (1) / ±0.002 (2) | ±0.001 (1) / ±0.002 (2) |
| T     | Class 1: -40 to 1200°C<br>Class 2: -40 to 1200°C | ±0.004 (1) / ±0.008 (2) | ±0.004 (1) / ±0.008 (2) |

**Platinum Resistance Thermometers**  
Tolerances for Thermometers IEC 60751 - 2008

| Class | Temp. Range (°C) | Max. Error (°C)         | Max. Error (mV)         |
|-------|------------------|-------------------------|-------------------------|
| AA    | -250 to +650     | ±0.005 (1) / ±0.010 (2) | ±0.005 (1) / ±0.010 (2) |
| A     | -250 to +650     | ±0.010 (1) / ±0.020 (2) | ±0.010 (1) / ±0.020 (2) |
| B     | -250 to +650     | ±0.020 (1) / ±0.040 (2) | ±0.020 (1) / ±0.040 (2) |
| C     | -250 to +650     | ±0.040 (1) / ±0.080 (2) | ±0.040 (1) / ±0.080 (2) |

**Also available online at**  
[www.isotech.co.uk](http://www.isotech.co.uk)

**Selection Guide**  
Stirred Liquid Baths

**Selection Guide**  
Industrial Temperature Calibration

**Request a Reference Poster**  
<http://www.isotech.co.uk/get-data>

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The company is always willing to give technical advice and assistance where appropriate.

Equally because of the program of continual development and improvement, we reserve the right to amend or alter characteristics and design without prior notice.

This publication is for information only.

# Introduction

## Industrial Temperature Calibration

...our knowledge, product quality and integrity are the reasons for buying from Isotech

This catalogue describes Isotech products designed for Industrial Temperature Calibration. It has equipment for calibrating industrial sensors of widely varying size, temperature range, accuracies and type. In this book calibration solutions exist for accuracies from 1°C to less than 0.001°C, temperature ranges from below -100°C to 1200°C, from handheld to bench top devices. Products include Dry Block Calibrators, Liquid Baths, High Temperature Furnaces, Precision Temperature Indicators, Temperature Sensors with supporting services, UKAS Calibration and software.

### ■ Benefit from Isotech's premier UKAS Calibration Laboratory

Many manufacturers of temperature calibration equipment do not operate accredited laboratories. At Isotech we remain unique in that in addition to manufacturing equipment we also operate a full scale UKAS accredited laboratory calibrating both our own equipment and a full range of temperature equipment for our clients, from industrial thermocouples to primary standards.

### ■ Benefit from Experience

Isotech fully understand the calibration needs of our customers. We design and specify products accordingly. Isotech make available full evaluation reports with uncertainty

calculations and publish uncertainty graphs. Dry Blocks from other manufacturers are sometimes specified in interesting ways, such as Minimum Operating Temperature -30°C but with an ambient of 5°C, Isotech labs and workshops are kept close to 20°C! We don't specify performances of thermometers only at 0°C we also tell you what it is like at high temperatures. Isotech understand the difference between resolution and accuracy, between accuracy and uncertainty, between "specmanship" and the firm evidence an auditor would expect to see.

As well as solutions for industrial sensors we have a full range of laboratory equipment and provide Primary Standards and Equipment to National Metrology Institutes all around the world

### ■ Solutions for Temperature Laboratories

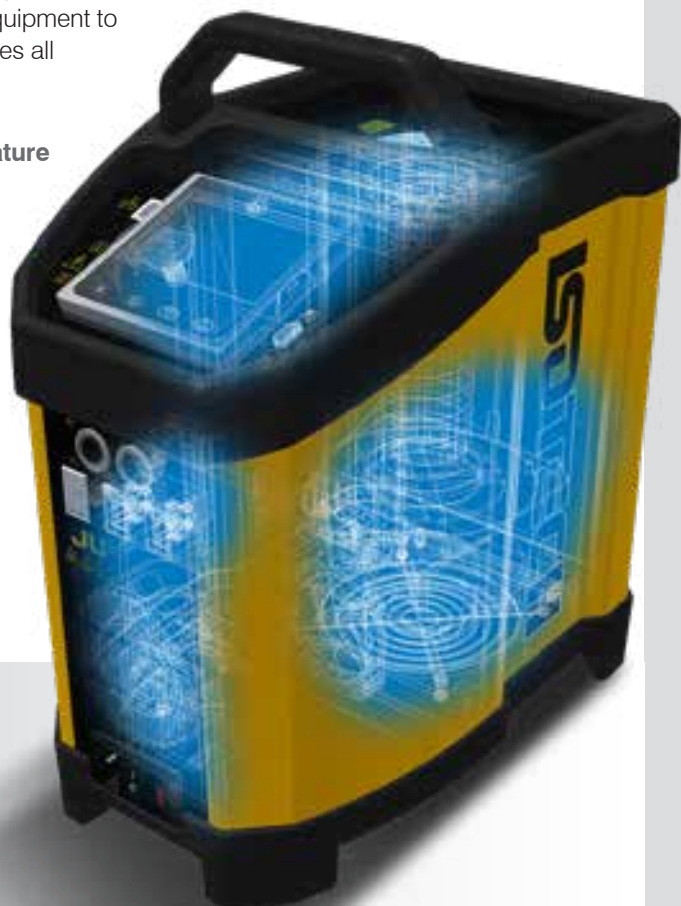
A separate publication "*Volume 1: Solutions for Primary & Secondary Laboratories*" contains details of our laboratory equipment including Fixed Point Cells, Thermometry Bridges, SPRTs, Comparison Calibration Equipment and Software.

### ■ Isotech Innovation

Isotech is renowned for innovation introducing a number of industry firsts, and in 2017 was awarded the prestigious Queen's Award for Enterprise in the Innovation section for the co-development of the microK thermometry bridge.

### ■ UKAS Accredited Laboratory (ISO/IEC 17025:2005)

Benefit from Isotech's experience and expertise, our laboratory was first accredited in 1985. The Isotech team of calibration engineers are available for pre and post sales support.



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

# The world's leading National Metrology Institutes choose Isotech - *shouldn't you?*

## ■ Industrial Calibrators from low temperature to 1200°C

Isotech's range of calibrators for industrial probes includes a selection of multi-function calibrators, such as the ISOCAL-6 Family, designed to calibrate all types of thermometers, including resistance thermometers, thermocouples, surface sensors, and infrared thermometers.

To meet the changing demands of the industry, Isotech has introduced the Model 547, a professional thermocouple calibration furnace with a 450mm deep calibration volume, expanding the capabilities of its calibrator range. Additionally, a series of ultra-rugged calibrators provides enhanced durability for use in demanding environments.

A range of Dry Block Calibrators offers a variety of volumes, from a compact handheld device with a 25 x 115mm block to a larger bench-top unit with a 50 x 300mm block, ensuring flexibility for different calibration needs.

## ■ ITS-90 Fixed Points -38.8344°C to 961.78°C

A range of Slim Fixed Point cells provide calibration uncertainties to less than 1mK, 0.001°C. These cells are lower cost, more robust and easier to use than the larger cells used by National Metrology Institutes. The affordable prices justify the use of ITS-90 Primary Standards to a wider range of laboratories.

The new ITS-90 Isothermal Towers are integrated devices combining cell and apparatus in an innovative design, the ultimate in simple to use high performance ITS-90 fixed point calibration.

## ■ Thermometer Read Outs -250°C to 2315°C

For Reference Platinum Resistance Thermometers and Thermocouples there is a range of precision thermometers and thermometry bridges offering performance to 1mk, 0.001°C.

There is also a Surface Temperature Thermometer that uses a thermally compensated probe to permit high accuracy surface measurement.

## ■ Reference Probes -200°C 1300°C

A range of probes covering from -200°C to 1300°C exist for use alongside the calibration products and for general purpose applications.

## ■ Software

Isotech have software to totally automate the calibration of temperature sensors, from recording the sensor output to printing certificates and calculating coefficients.

## ■ Blackbody Sources

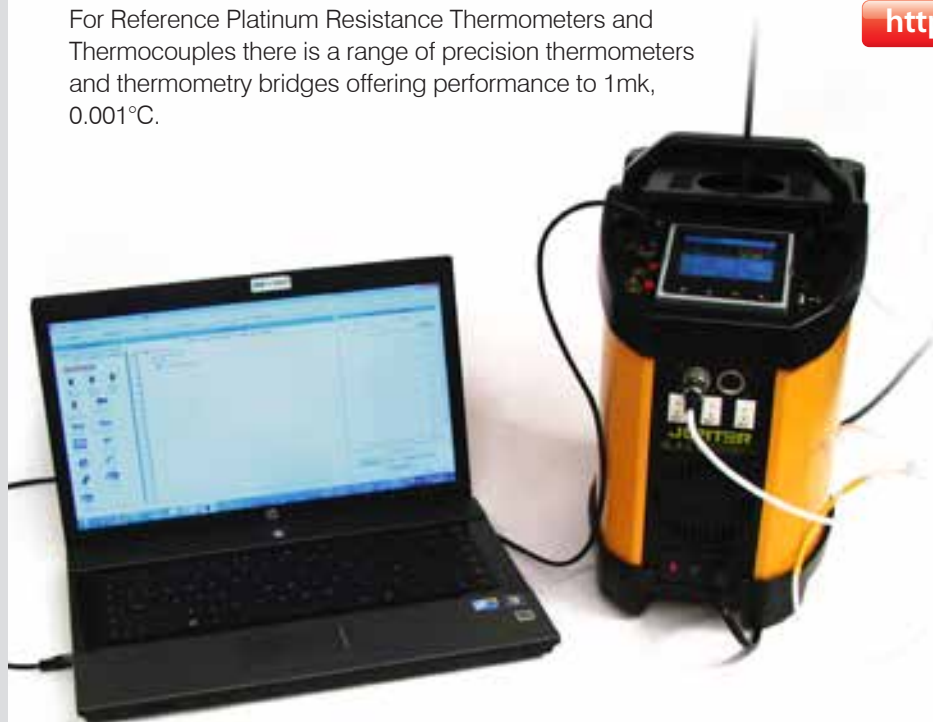
For calibrating infrared thermometers, a dedicated series of blackbody sources are available covering up to 1300°C. Our range includes models designed specifically for tympanic thermometers and human body temperature calibration. Additionally, a selection of Blackbody Cells, from Gallium at 29.7646°C to Silver at 961.78°C, allows calibration to ITS-90 Fixed Points.

## ■ Thermocouple Referencing

Models include those for use with Laboratory Standard Thermocouples to industrial systems and multi channel reference systems suitable for the largest of installations applications including power stations, boiler rooms, environmental monitoring and research.

*For temperature calibration equipment for laboratories refer to our separate publication, "Solutions for Primary & Secondary Laboratories".*

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



# A Guide to Industrial Temperature Calibration: **Traceable Calibration**

For best practice, the thermometer (or thermometers) under test are placed into the calibration volume alongside a calibrated standard. This is so that the test thermometers "can be related to appropriate standards, generally international or national standards, through an unbroken chain of comparisons". This "traceability" meets the requirements of quality systems including that of ISO 9000.

Using the Calibrator itself as the Reference (or standard) raises a number of issues, such as how is temperature difference between the test thermometer and the calibrator display determined - how can this 'uncertainty value' be known?

International Guidelines have been published from EURAMET, "Guidelines on the Calibration of Temperature Block Calibrators" Calibration Guide 13. Isotech Calibrators meet the calibration capacity requirements of this guide.

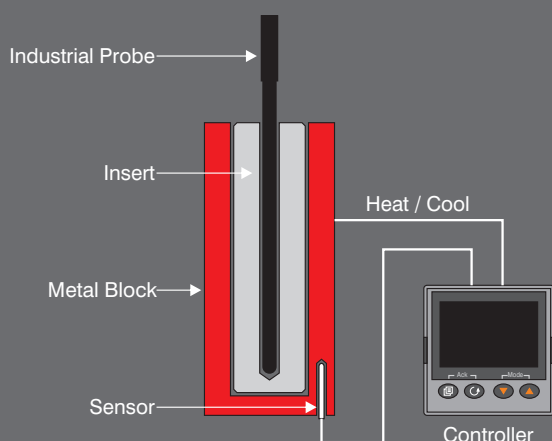
We recommend that a reference probe is used, the same method as used in secondary temperature laboratories. For less demanding calibration, and the quick testing of sensors, the Calibrator can be used without a reference probe, refer to the units Evaluation Report for typical performance data.



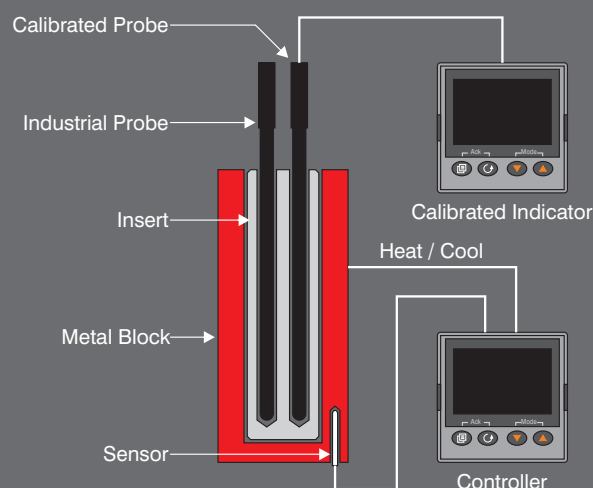
## Pre-purchase check list

- 1 Does the supplier have an accredited laboratory?**  
*UKAS accreditation, "the means by which, in the public interest, the integrity and competence of independent evaluators is confirmed and declared". Isotech can issue a UKAS certificate with the performance expressed in the manner that you will need, not to some confusingly expressed specification that is made with no confirmation of integrity and competence.*
- 2 Experience**  
*Does the producer have experience? Do they understand the difference between accuracy and uncertainty? Can they tell you how to calculate the uncertainty of a probe being calibrated in the block? Isotech can.*
- 3 Expandable**  
*Can the Dry Block be used with other sensors? Are there accessories available for future expansion? With Isotech products they are.*
- 4 PC Support**  
*Can it be connected to a computer? Is there software available, can it be automated? Isotech Dry Block Calibrators have a range of software options.*
- 5 Documented**  
*Is the bath fully documented? Can you download a full evaluation report from the Web Site? Does it come with a comprehensive handbook and tutorial? Is training available? Isotech provide all of these free of charge.*
- 6 Practical**  
*Isotech Dry Blocks are practically designed with a strong metal case, and are a compact portable size. If you are going to carry it around don't forget to check the size and weights. It is surprising how large some other blocks are, even though they take the same number of probes. Beware if the specification does not include the weight.*
- 7 Value**  
*Check the prices, all the above come at an amazingly competitive price when you choose **Isotech**.*

## Dry Block Calibrator of Poor Design



## Dry Block Calibrator Meeting ISO9000 Requirements



# Alternative methods of using Isotech Portable Calibrators

## ■ A Basic Dry Block Calibrator

The thermometer under test is compared to the dry block controller value.  
Useful for moderate temperature ranges and quick testing.

**Thermometer  
under test**



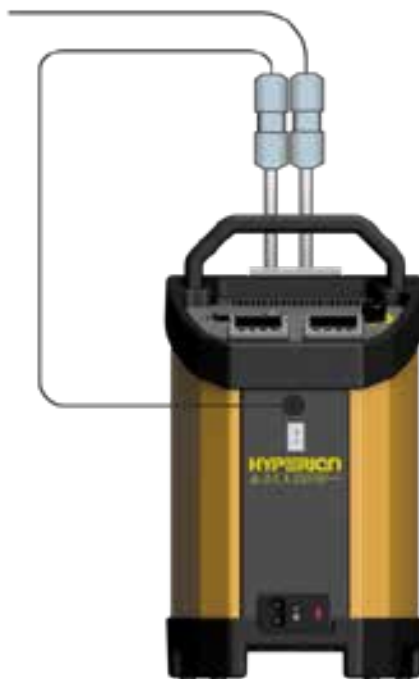
A control system with digital display shows the set and measured value from the calibration volume.

## ■ An ISO 9000 Calibration System

A thermometer under test is compared to a calibrated standard, for true traceability and clearly meets the requirements of ISO9000

**Thermometer  
under test**

**Calibrated  
Standard**

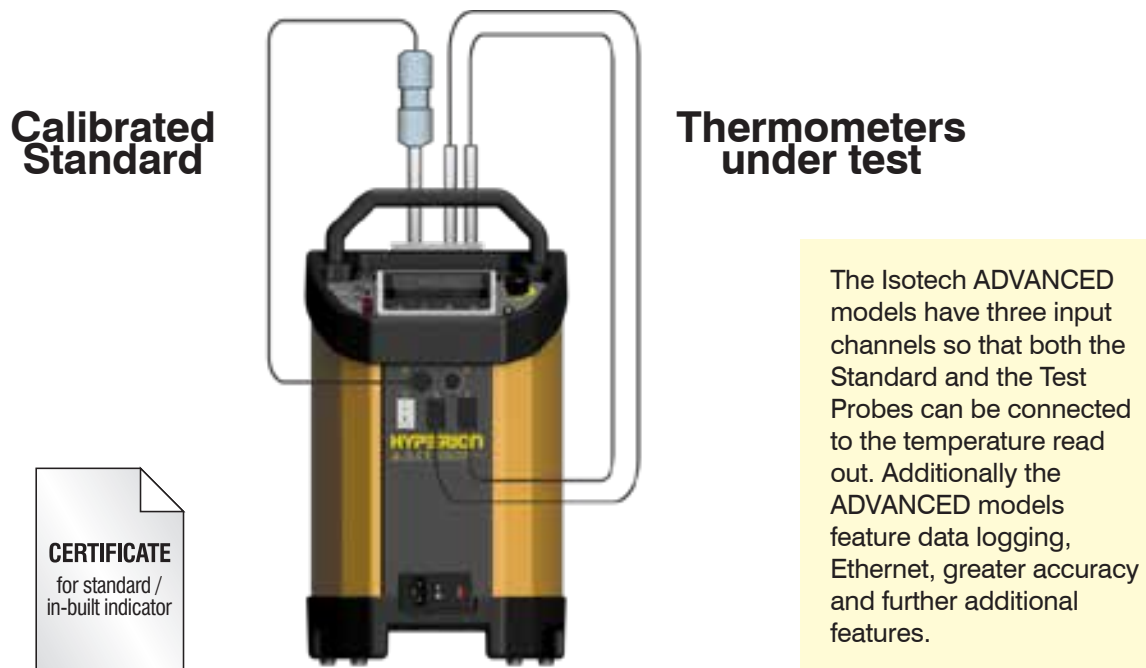


**CERTIFICATE**  
for standard /  
in-built indicator

In addition to the temperature control system with its display the Isotech SITE model includes a separate temperature read out for the Standard (Reference) probe.

## ■ Isotech ADVANCED Calibrator

Isotech ADVANCED models have inputs for both the test thermometer and a calibrated standard.



## ■ Using an External Indicator

Similar to the previous configuration but an external indicator is used - one instrument can be used with many calibration baths - the bath or baths do not need a calibration certificate, but they need an evaluation report.



## ■ An example of Multiple Sensor Calibration

You can add a scanner for multi-probe calibration - the system can then be automated.



**Isotech** - award winning flexible solutions for all sensor types from  $-45^{\circ}\text{C}$  to  $1200^{\circ}\text{C}$

By adding different accessories the 4000 Series can be used in up to six different modes - Dry Blocks, Liquid Baths, Ice Bath, Surface Sensor Calibrator, IR Thermometer Calibrator and even with ITS-90 Fixed Point

|                                                                                                            |  |  |  |  |  |  |  |  |
|------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
|                                                                                                            | Isocal-6                                                                            |                                                                                     |                                                                                     |                                                                                     |                                                                                     | Dry Block Calibrators                                                                 |                                                                                       |                                                                                       |
|                                                                                                            | HYPERION                                                                            | DRAGO                                                                               | EUROPA                                                                              | VENUS                                                                               | CALISTO                                                                             | GEMINI                                                                                | JUPITER                                                                               | PEGASUS                                                                               |
| <b>Specifications</b>                                                                                      |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                       |                                                                                       |                                                                                       |
| Metal Block Bath        | ✓                                                                                   | ✓                                                                                   | ✓                                                                                   | ✓                                                                                   | ✓                                                                                   | ✓                                                                                     | ✓                                                                                     | ✓                                                                                     |
| Stirred Liquid Bath     | ✓                                                                                   | ✓                                                                                   | ✓                                                                                   | ✓                                                                                   | ✓                                                                                   |                                                                                       |                                                                                       |                                                                                       |
| Stirred Ice/Water Bath  | ✓                                                                                   |                                                                                     | ✓                                                                                   | ✓                                                                                   |                                                                                     |                                                                                       |                                                                                       |                                                                                       |
| Blackbody Source        | ✓                                                                                   | ✓                                                                                   | ✓                                                                                   | ✓                                                                                   | ✓                                                                                   | ✓                                                                                     | ✓                                                                                     | ✓                                                                                     |
| Surface Sensor          | ✓                                                                                   | ✓                                                                                   | ✓                                                                                   | ✓                                                                                   | ✓                                                                                   |                                                                                       | ✓                                                                                     |                                                                                       |
| ITS-90 Fixed Point      | ✓                                                                                   | ✓                                                                                   | ✓                                                                                   | ✓                                                                                   | ✓                                                                                   |                                                                                       |                                                                                       |                                                                                       |
| <b>Temperature Range (<math>^{\circ}\text{C}</math>)</b>                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                       |                                                                                       |                                                                                       |
| 1200 $^{\circ}$                                                                                            |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                       |                                                                                       | 150 $^{\circ}\text{C} \rightarrow 1200^{\circ}\text{C}$                               |
| 1100 $^{\circ}$                                                                                            |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                       |                                                                                       |                                                                                       |
| 1000 $^{\circ}$                                                                                            |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                       |                                                                                       |                                                                                       |
| 900 $^{\circ}$                                                                                             |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                       |                                                                                       |                                                                                       |
| 800 $^{\circ}$                                                                                             |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                       |                                                                                       |                                                                                       |
| 700 $^{\circ}$                                                                                             |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                       |                                                                                       |                                                                                       |
| 600 $^{\circ}$                                                                                             |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                       |                                                                                       |                                                                                       |
| 500 $^{\circ}$                                                                                             |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                       |                                                                                       |                                                                                       |
| 400 $^{\circ}$                                                                                             |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                       |                                                                                       |                                                                                       |
| 300 $^{\circ}$                                                                                             |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                       |                                                                                       |                                                                                       |
| 200 $^{\circ}$                                                                                             |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                       |                                                                                       |                                                                                       |
| 100 $^{\circ}$                                                                                             |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                       |                                                                                       |                                                                                       |
| 0 $^{\circ}$                                                                                               | -25 $^{\circ}\text{C} \rightarrow 140^{\circ}\text{C}$                              | 30 $^{\circ}\text{C} \rightarrow 250^{\circ}\text{C}$                               | -45 $^{\circ}\text{C} \rightarrow 140^{\circ}\text{C}$                              | -35 $^{\circ}\text{C} \rightarrow 140^{\circ}\text{C}$                              | 30 $^{\circ}\text{C} \rightarrow 250^{\circ}\text{C}$                               | 35 $^{\circ}\text{C} \rightarrow 700^{\circ}\text{C}$                                 | 35 $^{\circ}\text{C} \rightarrow 660^{\circ}\text{C}$                                 |                                                                                       |
| -100 $^{\circ}$                                                                                            |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                       |                                                                                       |                                                                                       |

# Isotech 4000 Series

## Available in three different versions

Isotech calibrators are available in three different versions; they all feature the same rugged casing with award winning calibration volumes. The range of features varies with the ADVANCED offering extra performance in terms of resolution and temperature stability. All models have common block sizes, interchangeable options and benefits providing calibration volumes with superior temperature uniformity and capacity for industrial probes.

Choose to suit your application:

MODEL

### BASIC



#### ■ Features

- Calibrate the entire loop by using a heat source rather than an electrical simulator, a test instrument and sensor can be calibrated as a system
- Simple To Use and Outstanding Value
- Rugged Case
- Calibrate all Sensor Types
- Ramp to Set Temperature
- Supply Voltage Power Correction and Digital Filtering
- PC Interface and Software

MODEL

### SITE



#### ■ Features

*As Basic but adds independent temperature indicator for reference probe*

- Accepts Platinum Resistance Thermometers, Process Inputs Including 4 - 20mA, Thermocouples including Types K,N,R,S,L,PL2,T,J and E.
- Thermostat Testing, Stand Alone or with PC
- Configurable Units °C, °F or K

**MODEL**

# ADVANCED

## ■ Best performance

- Benefit from advanced temperature controller that provides best performance
- Resolution to 0.001°C - Superior Stability
- Control parameters automatically optimised with temperature

## ■ View easily in all conditions

- Large Bright Colour Display
- Similar to Smartphone
- Crystal clear display with full colour graphics

## ■ Thermostat testing

- Test Two Thermostats Simultaneously

## ■ View from anywhere

- 21st Century Connectivity with Ethernet and inbuilt webserver
- Connect to the network and view the calibrator from anywhere, on your Notepad, Tablet or Smartphone



## ■ Save time and money

### AUTOMATIC TEMPERATURE CYCLING

- Program the ADVANCED with the temperature points you need, store commonly used ranges. The calibrator can then automatically follow these points and log your data

## ■ Safely store and secure all the data you need

- Massive Internal Memory can safely store all your data
- Store a lifetime of data on a USB Drive
- Choose Open CSV Files or Tamper Proof Data with Secure File Format for Data Security

## ■ Supports five languages

- English, French, German, Italian and Spanish
- Simple to use with clear user interface

## ■ Connect more probes

### UP TO 3 INPUT CHANNELS

- Inbuilt reference system with two universal inputs for PRT, Thermocouple or Process Input and a third thermocouple input
- Input types: Process Inputs including 4-20mA, PRT, and Thermocouple Types B, C, D, E, J, K, L, N, R, S, T, U

## ■ Offset elimination

- Connect a reference probe to one of the external probe inputs and the calibrator can trim the block temperature to remove offsets
- Block adjusted to reference probe value
- Remove offsets
- Use in combination with automatic cycling

## ■ The software you need

- PC tools for reviewing data with support for secure file format, managing temperature programs, easy configuration and data logging.



# Introduction: 4000 Series

The 4000 series includes the Isocal-6 multifunction calibration system

The award winning ISOCAL-6 consists of a range of temperature calibrators designed to calibrate all temperature sensors. As a multi function temperature calibrator it can be used as a Dry Block with accessories added to allow use as a Stirred Liquid Bath, a Blackbody Source, a Surface Temperature Calibrator, an ITS-90 Fixed Point System and for low temperatures a Stirred Ice Bath.

The ISOCAL-6 is a complete temperature calibration laboratory in a simple easy to use package.

A system designed to expand with you, to fulfill all future calibration needs. Giving the flexibility to add accessories when needed and meet current budgetary demands.

**1**

## Metal Block Bath

A Metal Block Bath, (Dry Block Calibrator) provides fast and clean calibration of thermocouples, PRTs and other industrial temperature sensors. Isotech blocks use a combination of multi zone and advanced materials technology to ensure constant temperature zones to enable high accuracy calibration. Interchangeable 35mm diameter blocks allow several sensors to be calibrated simultaneously with fast heat up and cool down. For larger probes blocks are available up to 65mm diameter and with immersion depth of up to 300mm. An unmatched combination of leading performance and calibration capacity.

**2**

## Stirred Liquid Bath

Remove the metal block and the Isocal-6 can be converted to a stirred liquid bath. Liquid bath operation allows angled or awkward shaped probes to be calibrated. Accuracies are improved over Dry Blocks alone and with a suitable reference probe performance of 0.005°C is achievable. In stirred liquid bath mode a reference probe should be used.

**3**

## Stirred Ice / Water Bath

The ISOCAL-6 models that operate below 0°C can be used to provide a 0°C stirred ice / water bath. This provides a simple low cost way of checking that standards have not drifted in between calibrations.

4

## Blackbody Source



Adding the blackbody target allows the testing of infrared thermometers. Low cost non-contact IR thermometers are increasingly being used in industry and the ISOCAL-6 is ideal to test and check these devices. The IR thermometer is focused on the target and compared to a reference probe in the block pocket.

5

## Surface Sensor Calibrator



With the Surface Sensor Kit the test sensor is compared to a platinum resistance thermometer located just below the surface of the block. Again save the cost of buying additional equipment by adding accessories as required to expand the ISOCAL-6 for new calibration applications.

6

## ITS-90 Fixed Point Apparatus



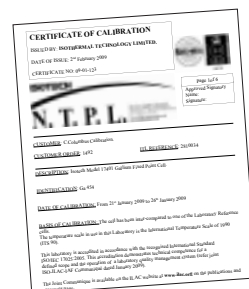
For the best possible performance with uncertainties to  $0.0005^{\circ}\text{C}$  (0.5mK) add an ITS-90 Fixed Point Cell. The most popular is the B8 Water Triple Point Cell, it is surprisingly affordable and simple to use - the triple point can be both created and maintained in the apparatus without the need for any other equipment or supplies.

# 4000 Series

## Calibration Options

Isotech's UKAS accredited calibration laboratory was established in 1980 and has grown to be a full scale laboratory providing calibration to the smallest of uncertainties. Isotech certificates are formally recognised in over 70 countries and carry the ILAC-MRA logo.

We can provide different certificates, reporting the temperature only (UKAS-TEMP), additionally we can include the inbuilt temperature indicator channels calibrating by electrical simulation, (UKAS-SYST) or we can just calibrate the input channels (UKAS-SIM).



| The following Calibration Options are Available |                                                                                                                     | Code      |
|-------------------------------------------------|---------------------------------------------------------------------------------------------------------------------|-----------|
| BASIC, SITE and ADVANCED                        | 5 point calibration for block temperature; includes reference probe values when ordered with Site or ADVANCED       | UKAS-TEMP |
| ADVANCED                                        | 5 point calibration for block temperature and reference probe (when ordered) and electrical simulation of indicator | UKAS-SYST |
| ADVANCED                                        | Calibration of input channels, electrical simulation only                                                           | UKAS-SIM  |

## Included Software

| Model          | Software                                                                          | Connection |
|----------------|-----------------------------------------------------------------------------------|------------|
| BASIC and SITE | <b>Cal Notepad and I-Cal Easy LOG:</b> Log and Monitor Calibrator                 | Serial     |
| ADVANCED       | <b>I-Cal Easy LOG:</b> Log and Monitor Calibrator                                 | Ethernet   |
| ADVANCED       | <b>Review Lite:</b> Manage Log Data, supports secure data format                  | Ethernet   |
| ADVANCED       | <b>Set Point Program Editor:</b> Manage ADVANCED set point programs               | Ethernet   |
| ADVANCED       | <b>Isotech ADVANCED Block Configuration Utility:</b> Fast configuration from a PC | Ethernet   |

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

## Isotech Innovation

**We have been providing calibration solutions for more than 30 years, from Primary Standards for National Metrology Institutes through to handheld calibrators for service engineers.**

Our portable calibrators have set a number of world firsts, the first Dry Blocks to feature an independent inbuilt temperate indicator and the first Dry Blocks to reach -100°C. The award winning ISOCAL-6 was the first calibrator to offer both Dry Block and Liquid Bath use. It remains the only device to offer six modes of calibration.

### Isotech Dry Block Range - expanded and upgraded

- New Rugged Lightweight Outer Cases
- Custom moulded components brings lighter and stronger Portable Calibrators
- New ADVANCED model - more features than ever before

**The ADVANCED Models include automatic temperature cycling which saves time and money with the calibrator automatically logging data over a series of calibration points**



# Temperature Cycling and Logging

## Features of the ADVANCED models

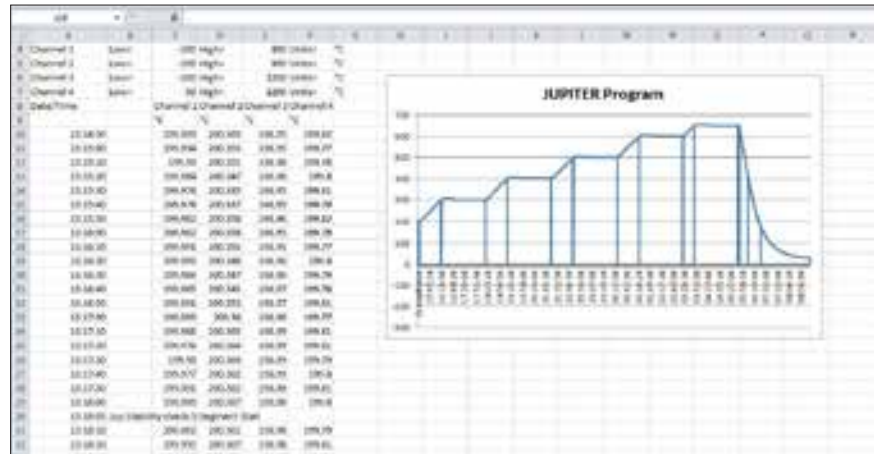
### Automatic Temperature Cycling

- Save Time
- Save Money
- Store up to 100 Programs

Calibration temperatures and dwell times can be combined into 'programs' for the ADVANCED calibrator to follow, up to 100 programs can be stored, with each program having up to 25 segments.

Programs can be edited from the front panel or on a PC with Set Point Program Editor.

As the program runs all measurements are recorded to the large internal memory.



*Automatic temperature cycling saves time and money with the calibrator automatically logging data over a series of calibration points*

### Data Logging

- Large Internal Memory to Store Your Data
- Creates CSV Files For Spreadsheets
- Creates Secure Tamper Proof Data to aid compliance to standards

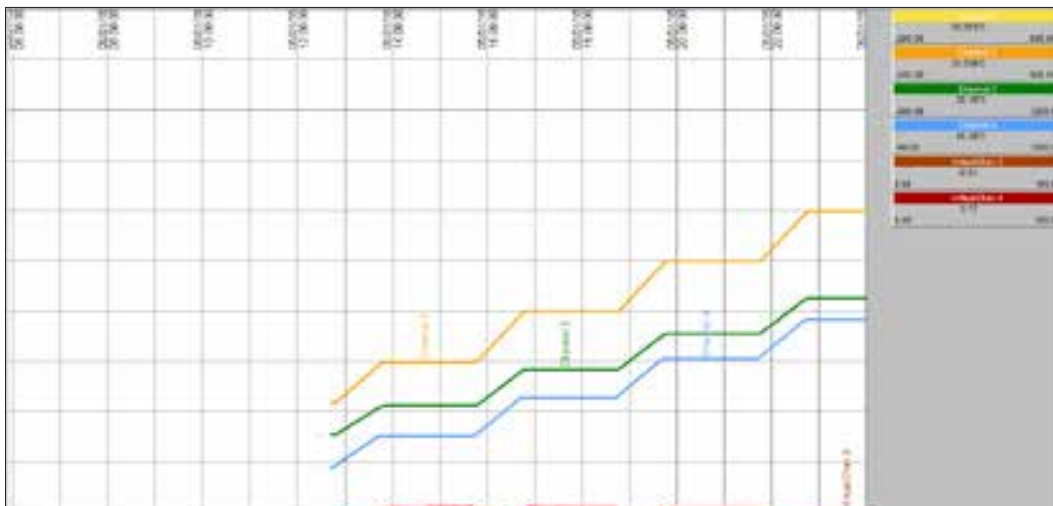
The ADVANCED models log data to internal memory, the data is logged in a CSV format that can readily be opened and edited.

Data is also recorded in a secure tamper proof format as a binary 'UUH File'. These files can be opened with Review Lite software – download from our website. If the records

are found to have been tampered with then Review Lite will reject the record as corrupt.

Data files can be shared automatically across the network via FTP, transferred manually via USB or 'pulled' into Review's database.

For users working in regulated industries these features, when used in conjunction with company procedures and other equipment or process, aids compliance to standards such as FDA 21 CFR 11 and AMS2750E.





# ISOCAL - 6 Range Hyperion • Drago

- Multi Function: Six Modes including Dry Block and Liquid Bath
- 65mm Volume: Ideal Liquid Bath
- Calibrate entire measurement loop - using a heat source rather than an electrical simulator, a test instrument and sensor can be calibrated as a system

The Hyperion and Drago have large calibration volumes, 65mm x 160mm deep, which makes them ideal to use as portable liquid baths. Stirred liquid baths are suitable for temperature sensors of all types, sizes and shapes. Liquid Baths can provide smaller calibration uncertainties than dry blocks and when used with suitable reference thermometers, accuracies of up to 0.005°C can be achieved.

These models are part of the award winning Isocal-6 family and with a reference probe can be used with different accessories for Dry Block, Infrared, Surface Calibration and even with ITS-90 Fixed Point Cells for uncertainties to 0.001°C. In Dry Block Mode, the large 65mm diameter block allows for the calibration of either larger probes or for calibrating many sensors simultaneously.

As a Liquid bath the sensors can be placed directly into the stirred liquid thus avoiding the need for specially drilled blocks. If the liquid is directly in the block then the controller only model, or Basic (B) model, can be selected. However, instead of putting liquids directly in the block liquid containers can be used to facilitate rapid change of fluids. For greater accuracy, or when using a liquid container, Dry Block Insert, Blackbody Target or the Surface Sensor Kit a separate reference thermometer should be used to compensate for the varying offset between the controller and the accessory temperature.

An ideal arrangement would be to include the handheld Isotech TTI-10 or the bench top Isotech milliK Precision Thermometer and Model 935-14-16 Semi Standard Platinum Resistance Thermometer.



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

Alternatively the SITE or ADVANCED model can be selected; the SITE includes a temperature indicator for a reference probe. The ADVANCED also includes inputs for test thermometers, automatic temperature cycling, logging and additional sophisticated features.

All models include I-Cal Easy LOG software and the ADVANCED models additionally include software to manage logged data and configure the unit, see page 14 for more details.



| PARAMETER                                           | Model                                                                      |                                  |
|-----------------------------------------------------|----------------------------------------------------------------------------|----------------------------------|
|                                                     | Hyperion 4936                                                              | Drago 4934                       |
| Temperature Range                                   | -25°C to 140°C <sup>1</sup>                                                | 30°C to 250°C <sup>2</sup>       |
| ADVANCED Range                                      |                                                                            |                                  |
| Stability: Dry Block / Liquid Bath                  | ±0.005°C                                                                   | 50°C ±0.005°C / 150°C ±0.03°C    |
| Display Resolution                                  | 0.001°C over whole range                                                   | 0.001°C over whole range         |
| Accuracy: RTD Input Channels                        | ±0.1°C across range                                                        |                                  |
| Accuracy: Thermocouple Input Channels               | E,J,K,N: ±0.2°C @ 660°C   R: ±0.6°C   S: ±0.7°C @ 660°C   T ±0.2°C @ 150°C |                                  |
| CJC Accuracy                                        | ±0.35°C                                                                    |                                  |
| BASIC / SITE Range                                  |                                                                            |                                  |
| Stability                                           | ±0.03°C                                                                    | ±0.03°C                          |
| Display Resolution                                  | 0.01°C from -19.99 to 99.99°C then 0.1C: 0.01°C Over PC Interface          |                                  |
| COMMON Specifications                               |                                                                            |                                  |
| Stability                                           | Blackbody   ±0.3°C   Surface Sensor   ±0.5°C   ITS-90 Cells   ±0.0005°C    |                                  |
| Display Accuracy <sup>3</sup>                       | 0.15°C                                                                     | 0.15°C                           |
| Uniformity - Radial, Liquid Bath Mode               | <0.009°C                                                                   | <0.007°C                         |
| Uniformity - Axial, Liquid Bath Mode (40mm)         | <0.011°C                                                                   | <0.013°C                         |
| Uniformity - Radial, Dry Block Mode (Between Wells) | <0.008°C                                                                   | <0.008°C                         |
| Uniformity - Axial, Dry Block Mode (40mm)           | <0.040°C                                                                   | <0.040°C                         |
| Heating Time                                        | -20°C to 140°C: 40 Mins                                                    | 30°C to 250°C: 40 Mins           |
| Cooling Time                                        | 140°C to 20°C: 90 Mins<br>20°C to -25°C: 80 Mins                           | 250°C to 100°C: 80 Mins          |
| Insert Size                                         | 65 x 160mm                                                                 |                                  |
| Insert Types                                        | Standard 8 x 8mm + 2 x 4.5mm, Undrilled or Custom Drilled                  |                                  |
| Power                                               | 115 or 230Vac 50/60Hz 200 Watts                                            | 115 or 230Vac 50/60Hz 1000 Watts |
| Dimensions                                          | 384H (including handle) x 212W x 312D mm                                   |                                  |
| Weight                                              | 12kg                                                                       | 8kg                              |

(1) In ambient of 20°C: Minimum Temperature is 45°C Below Ambient, Absolute Minimum -35°C

(2) In ambient of 20°C

(3) Dry Block Mode only: Comparing 4.5mm Well to Display Value.

|                                                       | ADVANCED                                                                                               | SITE                                                                                 | BASIC                                                                                 |
|-------------------------------------------------------|--------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
|                                                       |                     |  |  |
| Digital Display of Set and Nominal Block Temperature  | Yes                                                                                                    | Yes                                                                                  | Yes                                                                                   |
| PC Interface                                          | Ethernet + USB Host                                                                                    | Serial                                                                               | Serial                                                                                |
| Test Thermostats                                      | Yes - Two Inputs                                                                                       | Yes - Single Input                                                                   | No                                                                                    |
| Independent Temperature Indicator for Reference Probe | Yes                                                                                                    | Yes                                                                                  | No                                                                                    |
| Additional Inputs for Units Under Test                | Up to 3: Two universal inputs for PRT, Thermocouple or Process inputs and a further Thermocouple input | No                                                                                   | No                                                                                    |
| Automatic Temperature Cycling                         | Yes                                                                                                    | No                                                                                   | No                                                                                    |
| Data Logging                                          | Yes - Export to USB                                                                                    | No                                                                                   | No                                                                                    |
| Offset Elimination                                    | Yes - block can follow reference input                                                                 | No                                                                                   | No                                                                                    |
| Choose English, French, Italian or Spanish Language   | Yes - on full colour display                                                                           | No                                                                                   | No                                                                                    |
| In Built Web Server                                   | Yes                                                                                                    | No                                                                                   | No                                                                                    |
| Tamper Proof Data                                     | Yes - Suitable for life science, automotive and aerospace applications                                 | No                                                                                   | No                                                                                    |

# ISOCAL-6

## LIQUID & DRY BLOCK



### Metal Block Bath

Dry Block Calibrator provides fast and clean calibration of thermocouples, PRTs and other industrial sensors. Isotech blocks use a combination of multi zone and advanced materials technology to ensure constant temperature zones for high accuracy calibration.



### Stirred Liquid Bath

Remove the metal block to convert to a stirred liquid bath. Liquid bath operation allows angled or awkward shaped probes to be calibrated. Accuracies are improved over Dry Blocks alone and with a suitable reference probe performance of 0.005°C is achievable.



### Stirred Ice / Water Bath

The ISOCAL-6 models that operate below 0°C can be used to provide a 0°C stirred ice / water bath. This provides a simple low cost way of checking that standards have not drifted in between calibrations.



### Blackbody Source

Adding the blackbody target allows the testing of infrared thermometers. Low cost non-contact IR thermometers are increasingly being used in industry and the ISOCAL-6 is ideal to test and check these devices. The IR thermometer is focused on the target and compared to a reference probe in the block pocket.



### Surface Sensor Calibrator

With the Surface Sensor Kit the test sensor is compared to a platinum resistance thermometer located just below the surface of the block. Again save the cost of buying additional equipment by adding accessories as required to expand the ISOCAL-6 for new calibration applications.

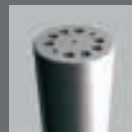


### ITS-90 Fixed Point Apparatus

For the best possible performance with uncertainties to 0.0005°C (0.5mK) add an ITS-90 Fixed Point Cell. The most popular is the B8 Water Triple Point Cell, it is surprisingly affordable and simple to use - the triple point can be both created and maintained in the apparatus without the need for any other equipment or supplies.

*World's First  
Multi-Functional  
Baths*  
**SIX FUNCTIONS**

## Hyperion / Drago Accessories



### Dry Block Mode with Inserts

**936-06-01a** Standard Insert is: 8 x 8mm + 2 x 4.5mm all 157mm Deep. All Inserts have a 4mm tapped hole to suit supplied extractor tool.

### Alternative Inserts

**936-06-01b** Blank Insert  
**936-06-01c** Special Insert.



### Stirred Liquid Mode with Liquid Container Kit **936-06-02**

Allows liquid bath use, includes container, magnetic stirrer, probe guide and sealing cap.



### Stirred Ice Bath Mode with Liquid Container Kit

Uses same liquid kit to provide 0°C reference as a stirred ice bath.

### Thermometer Support Kit **936-06-08**

Supports up to eight thermometers into liquid. Suits probes 5mm - 8mm in diameter.

|                  |         |               |    |
|------------------|---------|---------------|----|
| <b>936-06-07</b> | C10 Oil | -35°C – 140°C | 1L |
| <b>580-06-09</b> | C20 Oil | 20°C – 200°C  | 1L |
| <b>915/09</b>    | VH Oil  | 150°C – 250°C | 1L |



### Infrared Calibration Mode with Blackbody Target **936-06-03**

Use optional Probe 936-14-61DB.



### Surface Sensor Calibration with Surface Sensor Kit **936-06-04**

Includes an Insert and an angled platinum resistance thermometer.



### ITS-90 Fixed Point Cells

**B8** Water Triple Point Cell (Hyperion)  
**17401** Slim Gallium Slim Cell  
**936-06-09** Cell Holder Assembly



### Calibration

Includes three point traceable calibration certificate for block temperature

### UKAS Calibration

UKAS Calibration available to order, legally traceable in more than 70 countries.



### Standard Probe **935-14-61/DB**

Platinum Resistance Thermometer. 4mm diameter.



### Current Loop Interface **935-06-161**

24VDC Power Supply and Terminal Box. Powers 4-20mA Current Transmitters with 4mm terminal posts for easy connection.

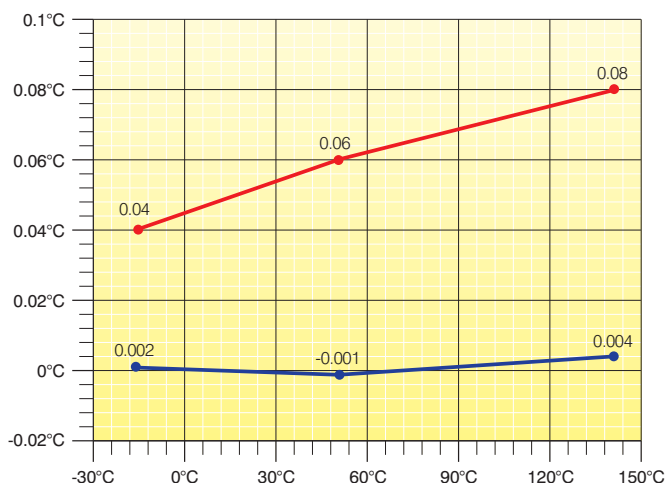


### Carrying Case **931-22-112**

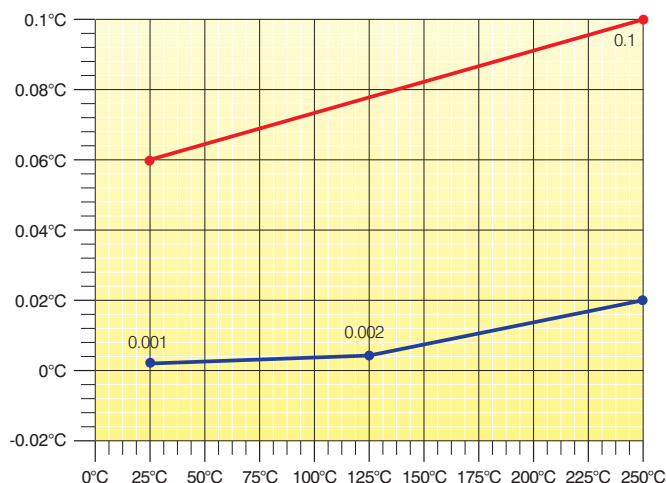
Sturdy case with room for accessories. Features wheels and pull out handle.

# Isocal-6 Performance and Use

**Hyperion Performance - Dry Block**



**Drago Performance - Dry Block**

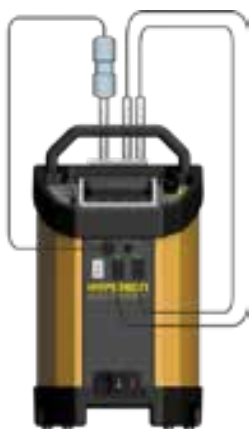


- Audit Calibration (Similar Sensors) S model with UKAS option  
 ■ Radial Homogeneity

See Evaluation Reports for full details  
<http://www.isotech.co.uk>

## Alternative Methods of Calibrating with an Isocal-6

**Advanced Model**



### ADVANCED Model

- Digital Display of Set and Nominal Block Temperature
- Inbuilt three channel indicator for reference probe and units under test
- Advanced features including automatic Temperature Cycling and Logging
- Best Practice calibration with established traceability and uncertainty

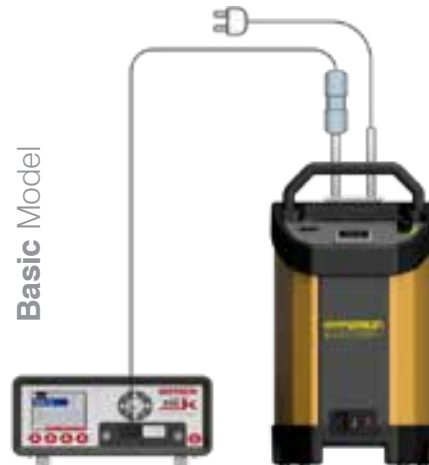
**Site Model**



### SITE Model

- Digital Display of Set and Nominal Block Temperature
- Inbuilt single channel indicator for reference probe
- Best Practice calibration with established traceability and uncertainty

**Basic Model**

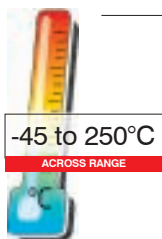


### BASIC Model

- For Quick and Easy Testing
- Digital Display of Set and Nominal Block Temperature
- Use with a separate external indicator to compensate for gradients and loading



**UKAS Calibration** available for these systems - *International Traceability - Best Practice* See page 14



# ISOCAL - 6 Range

## Europa Venus Calisto

- Multi Function: Six Modes including Dry Block and Liquid Bath
- Fast Response 35mm x 160mm Calibration Volume
- Calibrate Whole Measurement Loop

These models will calibrate temperature probes from -45°C to 250°C with unrivalled flexibility. As a traditional Dry Block, several thermometers can be quickly calibrated.

Accessories are available to convert to a stirred liquid bath, for surface sensor calibration, to calibrate infrared thermometers and even to use as an ITS-90 Fixed Point System with calibration uncertainties as small as 0.0005°C. With excellent stability and distributed heating cooling zones for good uniformity these calibrators offer proven thermal performance.

These award winning calibrators are easy to use and are available in three versions - the Basic, the Site and the ADVANCED. The Basic has a digital display of set and nominal temperature, the Site additionally includes an in-built independent temperature indicator for a reference probe. The ADVANCED controller has inputs for reference and test thermometers with a further range of sophisticated features including automatic temperature cycling, secure data logging and full colour high resolution display.

All models include I-Cal Easy LOG software and the ADVANCED models additionally include software to manage logged data and configure the unit, see page 14 for more details.

These models meet the calibration capacity requirements of EURAMET calibration Guide 13 "EA Guidelines on the Calibration of Temperature Block Calibrators"



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



| Parameter                                          | Model                                                                          |                               |                              |
|----------------------------------------------------|--------------------------------------------------------------------------------|-------------------------------|------------------------------|
|                                                    | Europa 4520                                                                    | Venus 4951                    | Calisto 4953                 |
| Temperature Range                                  | -45°C to 140°C <sup>(1)</sup>                                                  | -35°C to 140°C <sup>(2)</sup> | 30°C to 250°C <sup>(3)</sup> |
| ADVANCED Range                                     |                                                                                |                               |                              |
| Stability: Dry Block / Liquid Bath                 | ±0.01°C                                                                        | ±0.01°C                       | ±0.02°C                      |
| Display Resolution                                 | 0.001°C over whole range                                                       | 0.001°C over whole range      | 0.01°C over whole range      |
| Accuracy: RTD Input Channel                        | ±0.1°C across range                                                            |                               |                              |
| Accuracy: Thermocouple Input Channel               | E,J,K,N: ±0.2°C @ 660°C   R: ±0.6°C   S: ±0.7°C @ 660°C   T ±0.2°C @ 150°C     |                               |                              |
| CJC Accuracy                                       | ±0.35°C                                                                        |                               |                              |
| BASIC/SITE Range                                   |                                                                                |                               |                              |
| Stability                                          | ±0.03°C                                                                        | ±0.03°C                       | ±0.03°C                      |
| Display Resolution                                 | 0.01°C from -19.99 to 99.99°C then 0.1°C: 0.01°C Over PC Interface             |                               |                              |
| COMMON Specification                               |                                                                                |                               |                              |
| Stability                                          | Blackbody ±0.3°C Surface Sensor ±0.5°C ITS-90 Cells ±0.0005°C                  |                               |                              |
| Display Accuracy <sup>4</sup>                      | 0.15°C                                                                         | 0.15°C                        | 0.25°C                       |
| Uniformity - Between Wells Dry Block Mode (Radial) | <0.008°C                                                                       | <0.008°C                      | <0.02°C at 250°C             |
| Uniformity - Lower 40mm (Axial) Dry Block Mode     | <0.040°C                                                                       | <0.040°C                      | <0.25°C                      |
| Uniformity - Radial Liquid Bath Mode               | <0.02°C                                                                        | <0.02°C                       | <0.011°C at 250°C            |
| Uniformity - Lower 40mm (Axial) As Liquid Bath     | <0.026°C                                                                       | <0.026°C                      | <0.02°C at 250°C             |
| Heating Time                                       | -30°C to 140°C: 15 Mins                                                        | -30°C to 140°C: 15 Mins       | 25°C to 250°C: 15 Mins       |
| Cooling Time                                       | 140°C to 0°C: 15 Mins                                                          | 140°C to 0°C: 15 Mins         | 250°C to 30°C: 25 Mins       |
| Calibration Volume                                 | 35 x 160mm                                                                     |                               |                              |
| Standard Insert                                    | 6 pockets, 2 x 4.5mm, 2 x 6.4mm, 1 x 8.0mm, 1 x 9.5mm diameter, all 157mm deep |                               |                              |
| Insert Types                                       | Choice of Three - See Accessories                                              |                               |                              |
|                                                    | Ethernet - supporting software and USB Host                                    |                               |                              |
| CJC Accuracy:                                      | 0.35°C                                                                         |                               |                              |
| Dimensions                                         | 384H (including handle) x 212W x 312D mm                                       |                               |                              |
| Power                                              | 300 Watts                                                                      | 150 Watts                     | 300 Watts                    |
| Voltage                                            | 115Vac or 230 Vac 50/60Hz                                                      |                               |                              |
| Weight                                             | 14kg                                                                           | 10.2kg                        | 8kg                          |

(1) In ambient of 20°C: Minimum Temperature is 65°C Below Ambient, Absolute Minimum -55°C

(2) In ambient of 20°C: Minimum Temperature is 55°C Below Ambient, Absolute Minimum -45°C

(3) In ambient of 20°C

(4) Dry Block Mode only: Comparing 4.5mm Well to Display Value.

|                                                       | ADVANCED                                                                                               | SITE                                                                                 | BASIC                                                                                 |
|-------------------------------------------------------|--------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
|                                                       |                     |  |  |
| Digital Display of Set and Nominal Block Temperature  | Yes                                                                                                    | Yes                                                                                  | Yes                                                                                   |
| PC Interface                                          | Ethernet + USB Host                                                                                    | Serial                                                                               | Serial                                                                                |
| Test Thermostats                                      | Yes - Two Inputs                                                                                       | Yes - Single Input                                                                   | No                                                                                    |
| Independent Temperature Indicator for Reference Probe | Yes                                                                                                    | Yes                                                                                  | No                                                                                    |
| Additional Inputs for Units Under Test                | Up to 3: Two universal inputs for PRT, Thermocouple or Process inputs and a further Thermocouple input | No                                                                                   | No                                                                                    |
| Automatic Temperature Cycling                         | Yes                                                                                                    | No                                                                                   | No                                                                                    |
| Data Logging                                          | Yes - Export to USB                                                                                    | No                                                                                   | No                                                                                    |
| Offset Elimination                                    | Yes - block can follow reference input                                                                 | No                                                                                   | No                                                                                    |
| Choose English, French, Italian or Spanish Language   | Yes - on full colour display                                                                           | No                                                                                   | No                                                                                    |
| In Built Web Server                                   | Yes                                                                                                    | No                                                                                   | No                                                                                    |
| Tamper Proof Data                                     | Yes - Suitable for life science, automotive and aerospace applications                                 | No                                                                                   | No                                                                                    |

# ISOCAL-6

## LIQUID & DRY BLOCK



### Metal Block Bath

Dry Block Calibrator provides fast and clean calibration of thermocouples, PRTs and other industrial sensors. Isotech blocks use a combination of multi zone and advanced materials technology to ensure constant temperature zones for high accuracy calibration.



### Stirred Liquid Bath

Remove the metal block to convert to a stirred liquid bath. Liquid bath operation allows angled or awkward shaped probes to be calibrated. Accuracies are improved over Dry Blocks alone and with a suitable reference probe performance of 0.005°C is achievable.



### Stirred Ice / Water Bath

The ISOCAL-6 models that operate below 0°C can be used to provide a 0°C stirred ice / water bath. This provides a simple low cost way of checking that standards have not drifted in between calibrations.



### Blackbody Source

Adding the blackbody target allows the testing of infrared thermometers. Low cost non-contact IR thermometers are increasingly being used in industry and the ISOCAL-6 is ideal to test and check these devices. The IR thermometer is focused on the target and compared to a reference probe in the block pocket.



### Surface Sensor Calibrator

With the Surface Sensor Kit the test sensor is compared to a platinum resistance thermometer located just below the surface of the block. Again save the cost of buying additional equipment by adding accessories as required to expand the ISOCAL-6 for new calibration applications.

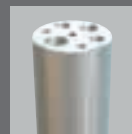


### ITS-90 Fixed Point Apparatus

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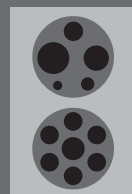
*World's First  
Multi-Functional  
Baths*  
**SIX FUNCTIONS**

## Europa Venus Calisto Accessories



### Dry Block Mode with Inserts

**951-02-15** An Insert is included: (2 x 4.5mm, 2 x 6.4mm, 1 x 8mm & 1 x 9.5mm) x 157mm Deep. All Inserts have a 4mm tapped hole to suit supplied extractor tool.



### Alternative Inserts

**951-06-07** Alternative Insert type B 13mm, 10mm, 8mm, 5mm and 3.5mm dia. holes, all 157mm deep

**951-06-08** Alternative Insert type C 8mm, 6 x 6.5mm dia. holes, all 157mm deep

**951-02-15a** Blank Insert without pockets for local machining. Includes M4 tapped hole for supplied extractor tool.

**951-02-15c** Custom insert. Isotech can provide custom drilled pockets, minimum of 3mm separation between holes.

*Contact Isotech with your requirements*



### Stirred Liquid Mode with Liquid Container Kit **951-06-01**

Allows liquid bath use, includes container, magnetic stirrer, probe guide and sealing cap.



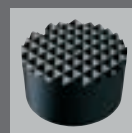
### Stirred Ice Bath Mode with Liquid Container Kit

Uses same liquid kit to provide 0°C reference as a stirred ice bath (Not Calisto)

### Thermometer Support Kit **921-02-06**

Allows three thermometers to be suspended in the bath, including liquid in glass types.

|                  |         |               |      |
|------------------|---------|---------------|------|
| <b>520-05-01</b> | C10 Oil | -35°C – 140°C | 0.1L |
| <b>951-06-06</b> | C20 Oil | 20°C – 200°C  | 0.1L |
| <b>953-04-01</b> | VH Oil  | 150°C – 250°C | 0.1L |



### Infrared Calibration Mode with Blackbody Target **951-06-04**

Use optional Probe **935-14-82/DB** placed in the auxiliary block pocket for use as a reference.



### Surface Sensor Calibration with Surface Sensor Kit **951-06-02**

Includes angled platinum resistance thermometer.



### ITS-90 Fixed Point Cells **17724M**

**Slim Mercury Cell** (Europa Only).  
**B8 Water Triple Point Cell** (Venus and Europa)

**17401M** Slim Gallium Cell (Europa, Venus and Calisto)



### Standard Probe **935-14-82/DB**

Platinum Resistance Thermometer. Probe diameter 4mm, recommended pocket size 4.5mm. Angled head feature avoids sensors in block.



### Current Loop Interface **935-06-161**

24VDC Power Supply and Terminal Box. Powers 4-20mA Current Transmitters with 4mm terminal posts for easy connection.

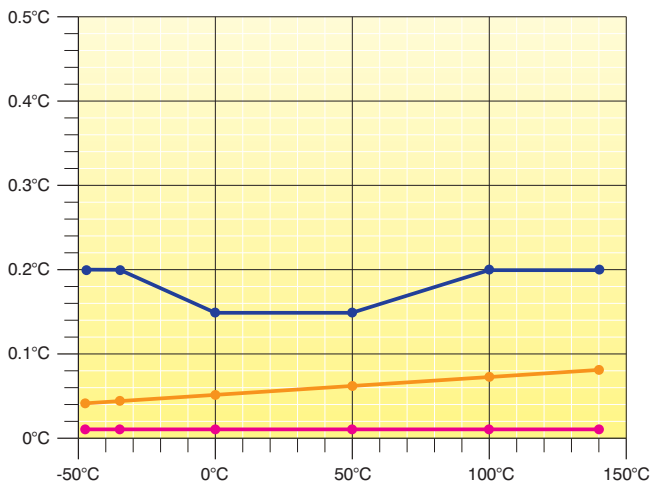


### Carrying Case **931-22-111**

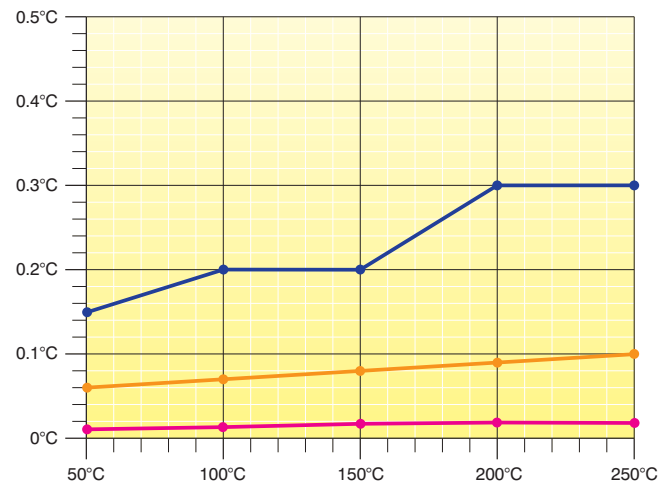
Sturdy case with room for accessories. Features wheels and pull out handle.

# Isocal-6 Performance and Use

## Venus and Europa



## Calisto

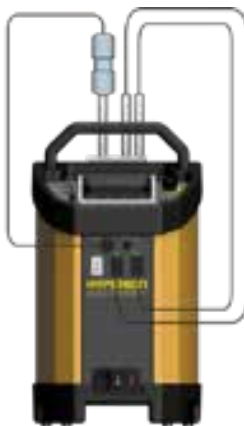


- Uncertainty with Reference Probe with optional UKAS Calibration
- Audit Calibration: Method comparing a PRT to UKAS Calibrated model
- Radial Homogeneity. Use for similar probes and external indicator

See Evaluation Reports for full details  
<http://www.isotech.co.uk>

## Alternative Methods of Calibrating with an Isocal-6

Advanced Model



### ADVANCED Model

- Digital Display of Set and Nominal Block Temperature
- Inbuilt three channel indicator for reference probe and units under test
- Advanced features including automatic Temperature Cycling and Logging
- Best Practice calibration with established traceability and uncertainty

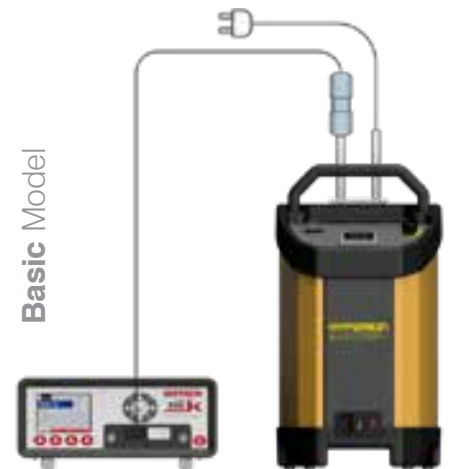
Site Model



### SITE Model

- Digital Display of Set and Nominal Block Temperature
- Inbuilt single channel indicator for reference probe
- Best Practice calibration with established traceability and uncertainty

Basic Model



### BASIC Model

- For Quick and Easy Testing
- Digital Display of Set and Nominal Block Temperature
- Use with a separate external indicator to compensate for gradients and loading



**UKAS Calibration** available for these systems - *International Traceability - Best Practice* See page 14



35 to 660°C

# Dry Block Calibrator Jupiter

- Wide Operating Range to 660°C
- Fast Response
- Calibrate Whole Measurement Loop

The Jupiter Dry Block range offers industry-leading performance in an easy to use portable package - ideal for the calibration of thermocouples and platinum resistance thermometers. It has been designed for fast heating and cooling for convenient field use. For flexibility surface sensor and infrared thermometer accessories can be added.

The standard insert can hold up to six thermometers. For larger blocks see the Gemini range.

These award winning calibrators are easy to use and are available in three versions - the Basic, the Site and the ADVANCED. The Basic has a digital display of set and nominal temperature, the Site additionally includes an in-built independent temperature indicator for a reference probe. The ADVANCED controller has inputs for reference and test thermometers with a further range of sophisticated features including automatic temperature cycling, secure data logging and full colour high resolution display.

Isotech is a world leader in temperature calibration, providing many nations with their Primary Standards and operates a full scale UKAS accredited calibration laboratory. We can offer a range of calibration options to meet your requirements.

Benefit from our experience and understanding in calibration at all levels, our evaluation reports, our tutorials and uncertainty calculations.

These models meet the calibration capacity requirements of EURAMET calibration Guide 13 "EA Guidelines on the Calibration of Temperature Block Calibrators"

All models include I-Cal Easy LOG software and the



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

ADVANCED models additionally include software to manage logged data and configure the unit, see page 14 for more details.



| Parameter                            | Model                                                                          |
|--------------------------------------|--------------------------------------------------------------------------------|
|                                      | <b>Jupiter 4852</b>                                                            |
| Temperature Range                    | 35°C to 660°C                                                                  |
| <b>ADVANCED Range</b>                |                                                                                |
| Stability                            | ±0.015°C @ 100°C    ±0.025°C @ 650°C                                           |
| Display Resolution                   | 0.01°C over whole range                                                        |
| Accuracy: RTD Input Channel          | ±0.20°C across range                                                           |
| Accuracy: Thermocouple Input Channel | E,J,K,N: ±0.2°C @ 660°C    R: ±0.6°C    S: ±0.7°C @ 660°C    T ±0.2°C @ 150°C  |
| CJC Accuracy                         | ±0.35°C                                                                        |
| <b>BASIC/SITE Range</b>              |                                                                                |
| Stability                            | ±0.02°C @ 100°C    ±0.03°C @ 650°C                                             |
| Display Resolution                   | 0.01°C from 30.00 to 99.99°C then 0.1°C: 0.01°C Over PC Interface              |
| <b>COMMON Specifications</b>         |                                                                                |
| Display Accuracy <sup>1</sup>        | 0.5°C                                                                          |
| Blackbody Source                     | ±0.3°C                                                                         |
| Surface Sensor Calibrator            | ±0.5°C                                                                         |
| Cools from 650°C to 150°C            | in 60 minutes                                                                  |
| Heats from 30°C to 650°C             | in 20 minutes                                                                  |
| Best Performance                     | See Graph                                                                      |
| Calibration volume                   | 35mm diameter by 148mm deep                                                    |
| Standard Insert                      | 6 pockets, 2 x 4.5mm, 2 x 6.4mm, 1 x 8.0mm, 1 x 9.5mm diameter, all 140mm deep |
| Indicator units                      | °C, °F, K                                                                      |
| Power                                | 115Vac or 230Vac 50/60Hz 1000 Watts                                            |
| Dimensions                           | 384H (including handle) x 212W x 312D mm                                       |
| Weight                               | 8.5kg                                                                          |

(1) Dry Block Mode only: Comparing 6.5mm Well to Display Value.

|                                                       | ADVANCED                                                                                               | SITE                                                                                 | BASIC                                                                                 |
|-------------------------------------------------------|--------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
|                                                       |                     |  |  |
| Digital Display of Set and Nominal Block Temperature  | Yes                                                                                                    | Yes                                                                                  | Yes                                                                                   |
| PC Interface                                          | Ethernet + USB Host                                                                                    | Serial                                                                               | Serial                                                                                |
| Test Thermostats                                      | Yes - Two Inputs                                                                                       | Yes - Single Input                                                                   | No                                                                                    |
| Independent Temperature Indicator for Reference Probe | Yes                                                                                                    | Yes                                                                                  | No                                                                                    |
| Additional Inputs for Units Under Test                | Up to 3: Two universal inputs for PRT, Thermocouple or Process inputs and a further Thermocouple input | No                                                                                   | No                                                                                    |
| Automatic Temperature Cycling                         | Yes                                                                                                    | No                                                                                   | No                                                                                    |
| Data Logging                                          | Yes - Export to USB                                                                                    | No                                                                                   | No                                                                                    |
| Offset Elimination                                    | Yes - block can follow reference input                                                                 | No                                                                                   | No                                                                                    |
| Choose English, French, Italian or Spanish Language   | Yes - on full colour display                                                                           | No                                                                                   | No                                                                                    |
| In Built Web Server                                   | Yes                                                                                                    | No                                                                                   | No                                                                                    |
| Tamper Proof Data                                     | Yes - Suitable for life science, automotive and aerospace applications                                 | No                                                                                   | No                                                                                    |



**UKAS Calibration** available for these systems - *International Traceability - Best Practice* See page 14

# Dry Blocks

## FAST RESPONSE



### Metal Block Bath

The Jupiter is supplied with an insert suitable for a wide range of sensors as standard.



### Blackbody Source

Add the Blackbody accessory to allow calibration of infrared thermometers.



### Surface Sensor Calibrator

The Jupiter can calibrate surface sensors by adding the surface sensor kit.

## Jupiter Accessories



### Metal Block Insert 852-07-11

Standard Insert included.  
Size: 2 x 4.5mm, 2 x 6.4mm, 1 x 8mm and 1 x 9.5mm all 140mm deep

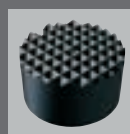
### Alternative Inserts

**852-09-03** Alternative Insert type B 13mm, 10mm, 8mm, 5mm and 3.5mm diameter holes, all 140mm deep

**852-09-04** Alternative Insert type C 8mm, 6 x 6.5mm diameter holes, all 140mm deep

**852-07-07** Blank Insert without pockets for local machining. Includes M4 tapped hole for supplied extractor tool.

**852-07-07C** Custom Insert. Isotech can provide custom drilled pockets, minimum of 3mm separation between holes. Contact Isotech with your requirements.



### Blackbody Kit 852-09-05

Includes a Blackbody target and Sensor.



### Surface Sensor Kit 852-07-15

Includes angled thermocouple.

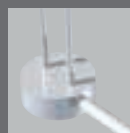


### Calibration

Includes three point traceable calibration certificate for block temperature

### UKAS Calibration

Recommended: Options for block temperature and reference thermometer inputs (simulation). Legally traceable in more than 70 countries.



### Air Cooling 853-04-02

For use with an air supply this accessory allows air to be blown into the block for rapid cooling.



### Standard Probe 935-14-72/DB

Platinum Resistance Thermometer for use up to 660°C. Probe diameter 6mm, recommended pocket size 6.5mm.



### Current Loop Interface 935-06-161

24VDC Power Supply and Terminal Box. Powers 4-20mA Current Transmitters with 4mm terminal posts for easy connection.



### Carrying Case 931-22-111

Sturdy case with room for accessories. Features wheels and pull out handle.



# The world's leading National Metrology Institutes choose Isotech - shouldn't you?

**Isotech manufacture the widest range of temperature calibration equipment from hand held thermometers to Primary Standards. With Isotech solutions you can expand your equipment no matter what the requirement.**

Isotech have been pioneering the latest developments in Temperature Metrology for more than 30 years, benefit from our know how, experience and global network.

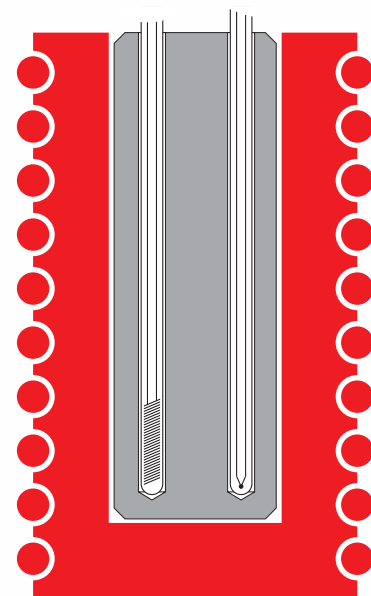
## Jupiter Benefits

- The Jupiter calibration block features uniform heating with a custom wound heater over an extended length of the block. The block itself is made from copper which has a very high thermal conductivity; much

superior to the aluminium bronze alloys used elsewhere. A propriety process is used to protect the copper from oxidising. This combination of materials and expert knowledge delivers superior performance.

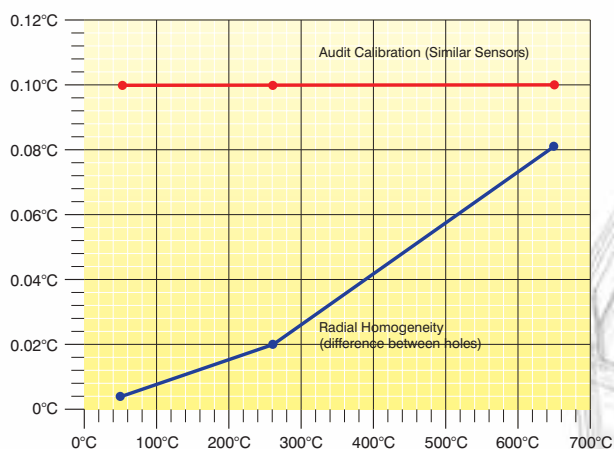
### 660°C Operation

- The Jupiter ADVANCED operates to a maximum of 660°C; matched to the upper limit of the high temperature Isotech Semi Standard Platinum Resistance Thermometers. This allows maximum accuracy with no risk to exceeding the temperature limit of the PRT. This gives greater accuracy than extending the range beyond 660°C and having to use an inferior thermometer or thermocouple.



*Superior uniformity by using copper block with extended length heating*

### Jupiter



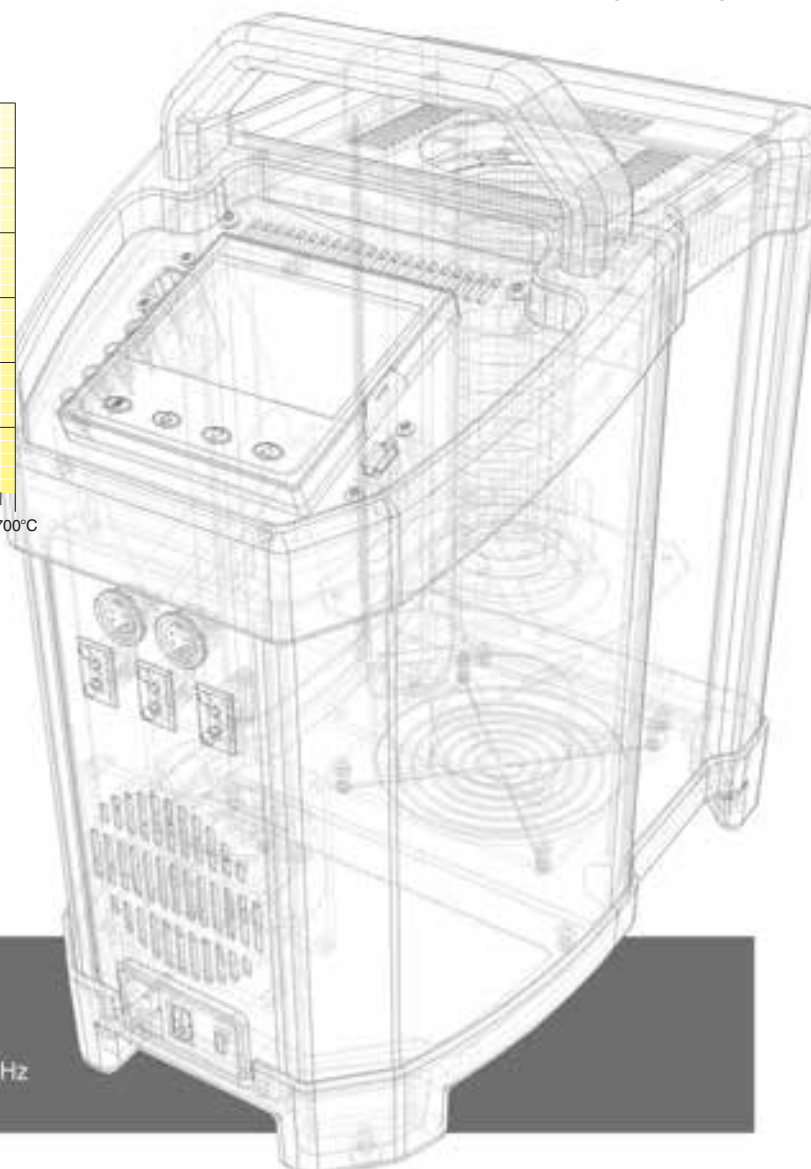
■ Audit Calibration (Similar Sensors)

■ Radial Homogeneity

See Evaluation Reports for full details  
<http://www.isotech.co.uk>

### How To Order

- 1 - Select Desired Options and Accessories
- 2 - Supply Voltage:  
Specify either 115Vac 50/60Hz or 230Vac 50/60Hz





35 to 700°C

# Dry Block Calibrator Gemini

- Calibrate Large Diameter Probes
- High Capacity Blocks 64 x 160mm
- Calibrate Whole Measurement Loop

The Gemini range of Dry Blocks have high capacity allowing a large number of probes to be calibrated together. They are also suitable to accept large diameter probes with the block volume of a nominal 64 x 160mm.

Whilst the large block takes longer to heat and cool than the Jupiter it can calibrate thermocouples, resistance thermometers, thermostats and sensors that are too large for the smaller blocks.

These award winning calibrators are easy to use and are available in three versions – the Basic, the Site and the ADVANCED. The Basic has a digital display of set and nominal temperature, the Site additionally includes an in-built independent temperature indicator for a reference probe. The ADVANCED controller has inputs for reference and test thermometers with a further range of sophisticated features including automatic temperature cycling, secure data logging and full colour high resolution display.

All models include I-Cal Easy LOG software and the ADVANCED models additionally include software to manage logged data and configure the unit, see page 14 for more details.

Available with a fixed block with four 8mm and four 19.5mm pockets or the LRI version which has a removable block. With the LRI model, blocks can be drilled to custom configurations.

Isotech is a world leader in temperature calibration, providing many nations with their Primary Standards and operates a full scale UKAS accredited calibration laboratory. We can offer a range of calibration options to meet your requirements.



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

These models meet the calibration capacity requirements of EURAMET calibration Guide 13 "EA Guidelines on the Calibration of Temperature Block Calibrators"



| Parameter                                       | Model: Gemini 4857                                                   |                               |  |
|-------------------------------------------------|----------------------------------------------------------------------|-------------------------------|--|
|                                                 | 550                                                                  | 700                           |  |
| Temperature Range                               | 35°C to 550°C                                                        | 50°C to 700°C                 |  |
| ADVANCED Range                                  |                                                                      |                               |  |
| Absolute Stability over 30 mins                 | ±0.01°C @ 100°C   ±0.015°C @ 300°C   ±0.03°C @ 550°C                 |                               |  |
| Display Resolution                              | 0.01°C over whole range                                              |                               |  |
| Accuracy: RTD Input Channel                     | ±0.20°C across range                                                 |                               |  |
| Accuracy: Thermocouple Input Channel            | E,J,K,N: ±0.2°C @ 660°C R: ±0.6°C S: ±0.7°C @ 660°C T ±0.2°C @ 150°C |                               |  |
| CJC Accuracy                                    | ±0.35°C                                                              |                               |  |
| BASIC/SITE Range                                |                                                                      |                               |  |
| Absolute Stability over 30 mins                 | ±0.02°C @ 50°C   ±0.03°C @ 250°C   ±0.04°C @ 550°C                   |                               |  |
| Display Resolution                              | 0.01°C from 30.00 to 99.99°C then 0.1°C: 0.01°C Over PC Interface    |                               |  |
| COMMON Specifications                           |                                                                      |                               |  |
| Display Accuracy <sup>1</sup>                   | 0.5°C                                                                |                               |  |
| Cools from 550°C to 275°C<br>from 550°C to 60°C | 35 mins (LRI: 132 mins)<br>345 mins (LRI: 420 mins)                  | -<br>-                        |  |
| Heats from 30°C to 550°C<br>from 50°C to 700°C  | 35 mins (LRI: 60 mins)<br>-                                          | -<br>110 mins (LRI: 120 mins) |  |
| Best Performance                                | See Graph                                                            |                               |  |
| Calibration volume                              | 65mm diameter x 160mm deep                                           |                               |  |
| Indicator units                                 | °C, °F, K                                                            |                               |  |
| Voltage                                         | 115Vac or 230Vac 50/60Hz                                             |                               |  |
| Power                                           | 600 Watts (LRI: 1000 Watts)                                          |                               |  |
| Dimensions                                      | 384H (including handle) x 212W x 312D mm                             |                               |  |
| Weight                                          | 8.5kg                                                                | 14kg                          |  |

(1) Dry Block Mode only: Comparing 6.5mm Well to Display Value.

|                                                       | ADVANCED                                                                                               | SITE                                                                                 | BASIC                                                                                 |
|-------------------------------------------------------|--------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
|                                                       |                     |  |  |
| Digital Display of Set and Nominal Block Temperature  | Yes                                                                                                    | Yes                                                                                  | Yes                                                                                   |
| PC Interface                                          | Ethernet + USB Host                                                                                    | Serial                                                                               | Serial                                                                                |
| Test Thermostats                                      | Yes - Two Inputs                                                                                       | Yes - Single Input                                                                   | No                                                                                    |
| Independent Temperature Indicator for Reference Probe | Yes                                                                                                    | Yes                                                                                  | No                                                                                    |
| Additional Inputs for Units Under Test                | Up to 3: Two universal inputs for PRT, Thermocouple or Process inputs and a further Thermocouple input | No                                                                                   | No                                                                                    |
| Automatic Temperature Cycling                         | Yes                                                                                                    | No                                                                                   | No                                                                                    |
| Data Logging                                          | Yes - Export to USB                                                                                    | No                                                                                   | No                                                                                    |
| Offset Elimination                                    | Yes - block can follow reference input                                                                 | No                                                                                   | No                                                                                    |
| Choose English, French, Italian or Spanish Language   | Yes - on full colour display                                                                           | No                                                                                   | No                                                                                    |
| In Built Web Server                                   | Yes                                                                                                    | No                                                                                   | No                                                                                    |
| Tamper Proof Data                                     | Yes - Suitable for life science, automotive and aerospace applications                                 | No                                                                                   | No                                                                                    |



**UKAS Calibration** available for these systems - *International Traceability - Best Practice* See page 14

# Dry Blocks

## LARGE VOLUME



### Gemini Fixed Block

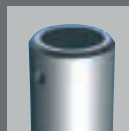
Four 8mm Pockets  
Four 19.5mm Pockets



### Gemini LRI Removable Block

Eight 8mm Pockets  
Can be custom drilled

## Gemini Accessories



### Metal Block Sleeves

#### Gemini 550

Set of four Sleeves to suit the block.  
Optional single hole sizes 4, 6, 8, 10, 12, 14mm diameter all 150mm deep.

**857-07-01** Undrilled sleeves for local machining.

**857-07-03** 1 sleeve with 2 holes 4.5mm x 150mm deep.

#### Gemini 700

Set of four Sleeves to suit the block.  
Optional single hole sizes 4, 6, 8, 10, 12, 14mm diameter all 150mm deep.

**857-07-02** Blank sleeves for local machining.

**857-07-04** 1 sleeve with 2 holes 4.5mm x 150mm deep.

*Note: The use of sleeves will introduce an additional thermal gradient into the block. This can be avoided by using the LRI model with a block drilled for specific probes.*

### Removable Inserts

#### Gemini 550 LRI

**976-07-01a** Included as Standard  
Removable insert with eight 8mm pockets

**976-07-01b** Blank Insert

Insert without pockets for local machining

**976-07-01c** Custom Insert

Contact Isotech with your requirements

#### Gemini 700 LRI

**976-07-02a** Included as Standard  
Removable block with eight 8mm pockets

**976-07-02b** Blank Insert

Insert without pockets for local machining

**976-07-02c** Custom Insert

Contact Isotech with your requirements



### Calibration

Includes three point traceable calibration certificate for block temperature

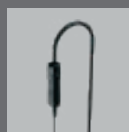
#### UKAS Calibration

Recommended: Options for block temperature and reference thermometer inputs (simulation). Legally traceable in more than 70 countries.



### Current Loop Interface

**935-06-161** 24VDC Power Supply and Terminal Box. Powers 4-20mA Current Transmitters with 4mm terminal posts for easy connection.



### Standard Probe

**935-14-72/DB** Platinum Resistance Thermometer for use up to 650°C.

**935-14-63** Type N Thermocouple for use up to 700°C.



### Carrying Case

**931-22-111** - Gemini 550 / 700

**931-22-112** - Gemini 550 LRI / 700 LRI

Sturdy case with room for accessories. Features wheels and pull out handle.



# The world's leading National Metrology Institutes choose Isotech - shouldn't you?

Isotech manufacture the widest range of temperature calibration equipment from hand held thermometers to Primary Standards. With Isotech solutions you can expand your equipment no matter what the requirement.

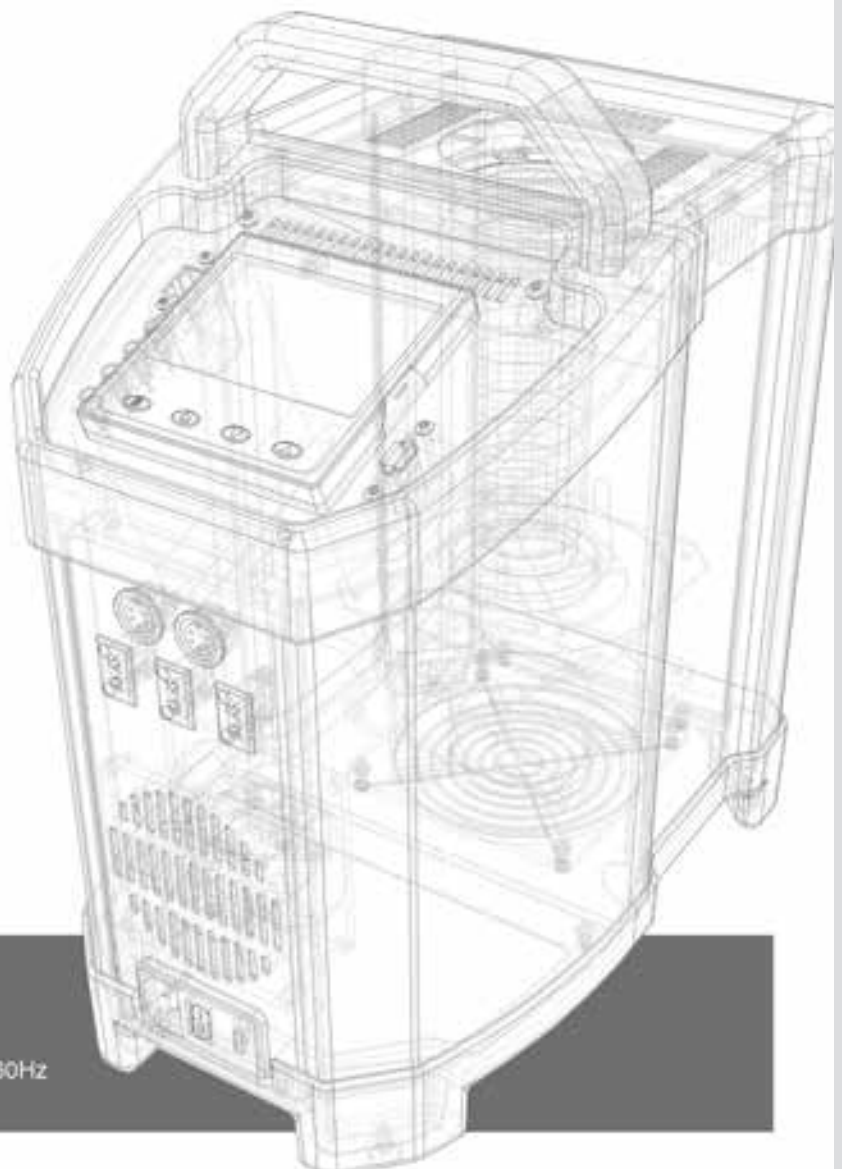
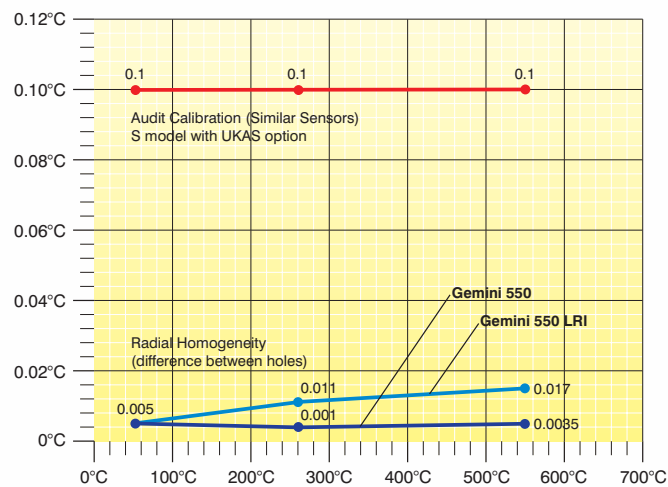
Isotech have been pioneering the latest developments in Temperature Metrology for more than 30 years, benefit from our know how, experience and global network.

## Gemini Benefits

- The Gemini has a large block with sufficient mass to accommodate larger sensors or a larger number of sensors. The fixed block has four 19.5mm pockets and four 8mm pockets.
- The LRI model with its removable block can be custom drilled. Whilst the larger block takes longer to heat than the fast response models they do allow larger probes to be accommodated and can be used with custom blocks to simulate applications, allowing probes that would otherwise be unsuitable for Dry Block calibration to be evaluated.



### Gemini



#### How To Order

- 1 - Select Desired Options and Accessories
- 2 - Supply Voltage:  
Specify either 115Vac 50/60hz or 230Vac 50/60Hz



150 to 1200°C

# Dry Block Calibrator

## Pegasus

- High Temperature Thermocouple Calibration Furnace
- Custom Furnace Design with Optimised Profile
- Calibrate Whole Measurement Loop

The Pegasus range offers extreme high temperature calibration in an easy to use portable package - ideal for the calibration of high temperature thermocouples. It has been designed for fast heating and finds applications in the glass, electrical power, automotive and material processing industries.

A Blackbody target can be added for the calibration of infrared thermometers.

The standard insert has four 8mm pockets 80mm deep. The metal insert is strategically placed beneath 50mm of insulation to provide optimal performance over the radiant temperature range.

The optional Blackbody target is used with a specially angled Type R thermocouple that sits immediately behind the target area.

These award winning calibrators are easy to use and are available in three versions – the Basic, the Site and the ADVANCED. The Basic has a digital display of set and nominal temperature, the Site additionally includes an in-built independent temperature indicator for a reference probe. The ADVANCED controller has inputs for reference and test thermometers with a further range of sophisticated features including automatic temperature cycling, secure data logging and full colour high resolution display.

The B model should be used with an external reference probe and indicator, such as the milliK. The thermocouples



under test should be calibrated by comparison to the external probe.

All models include I-Cal Easy LOG software and the ADVANCED models additionally include software to manage logged data and configure the unit, see page 14 for more details.



**UKAS Calibration** available for these systems - *International Traceability - Best Practice* See page 14



| Parameter                                     | Model                                                                              |
|-----------------------------------------------|------------------------------------------------------------------------------------|
|                                               | <b>Pegasus 4853</b>                                                                |
| Temperature Range                             | 150°C to 1200°C                                                                    |
| <b>ADVANCED Range</b>                         |                                                                                    |
| Stability                                     | ±0.05°C @ 150°C ±0.08°C @ 1200°C                                                   |
| Display Resolution                            | 0.01°C over whole range                                                            |
| Input Channel Accuracy: Thermocouple          | E,J,K,N: ±0.2°C @ 660°C R: ±0.6°C S: ±0.7°C @ 660°C T ±0.2°C @ 150°C               |
| CJC Accuracy                                  | ±0.35°C                                                                            |
| Accuracy: RTD Input Channel                   | ±0.20°C across range; 0°C - 660°C                                                  |
| <b>BASIC / SITE Range</b>                     |                                                                                    |
| Stability                                     | ±0.1°C @ 150°C ±0.2°C @ 1200°C                                                     |
| Display Resolution                            | 0.1°C from 150°C to 999.9°C then 1°C: 0.01°C Over PC Interface                     |
| <b>COMMON Specifications</b>                  |                                                                                    |
| Blackbody Source                              | ±0.3°C                                                                             |
| Cools from 1200°C to 800°C<br>1200°C to 200°C | in 50 minutes*<br>in 180 minutes*<br>*substantially reduced by the cooling adaptor |
| Heating Rate                                  | 25°C / minute                                                                      |
| Best Performance                              | See Graph                                                                          |
| Calibration volume                            | 33.5mm diameter by 130mm deep                                                      |
| Standard Insert                               | 4 x 8mm Pockets all 80mm deep + 50mm top insulator                                 |
| Indicator units                               | °C, °F, K                                                                          |
| Power                                         | 115Vac or 230Vac (50 / 60 Hz) 800 Watts                                            |
| Dimensions                                    | 384H (including handle) x 212W x 312D mm                                           |
| Weight                                        | 13kg                                                                               |

|                                                       | ADVANCED                                                                                               | SITE                                                                                 | BASIC                                                                                 |
|-------------------------------------------------------|--------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
|                                                       |                     |  |  |
| Digital Display of Set and Nominal Block Temperature  | Yes                                                                                                    | Yes                                                                                  | Yes                                                                                   |
| PC Interface                                          | Ethernet + USB Host                                                                                    | Serial                                                                               | Serial                                                                                |
| Test Thermostats                                      | Yes - Two Inputs                                                                                       | Yes - Single Input                                                                   | No                                                                                    |
| Independent Temperature Indicator for Reference Probe | Yes                                                                                                    | Yes                                                                                  | No                                                                                    |
| Additional Inputs for Units Under Test                | Up to 3: Two universal inputs for PRT, Thermocouple or Process inputs and a further Thermocouple input | No                                                                                   | No                                                                                    |
| Automatic Temperature Cycling                         | Yes                                                                                                    | No                                                                                   | No                                                                                    |
| Data Logging                                          | Yes - Export to USB                                                                                    | No                                                                                   | No                                                                                    |
| Offset Elimination                                    | Yes - block can follow reference input                                                                 | No                                                                                   | No                                                                                    |
| Choose English, French, Italian or Spanish Language   | Yes - on full colour display                                                                           | No                                                                                   | No                                                                                    |
| In Built Web Server                                   | Yes                                                                                                    | No                                                                                   | No                                                                                    |
| Tamper Proof Data                                     | Yes - Suitable for life science, automotive and aerospace applications                                 | No                                                                                   | No                                                                                    |

# Dry Blocks

## HIGH TEMPERATURE



### Metal Block Bath

The Pegasus includes an insert suitable for high temperature calibration of thermocouples.



### Blackbody Source

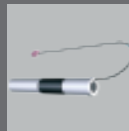
Add the Blackbody accessory to allow calibration of infrared thermometers.

## Pegasus Accessories



### Metal Block Insert

Standard Insert Included  
Four 8mm pockets. Pocket depth 80mm + 50mm insulator. Effective depth 130mm.  
**853-06-02** Blank Insert  
Insert without pockets for local machining  
**853-06-02b** Custom Insert  
Contact Isotech with your requirements



### Blackbody Kit 853-06-03

Includes a Blackbody target and Sensor

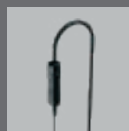


### Calibration

Includes three point traceable calibration certificate for block temperature

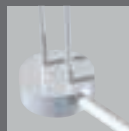
### UKAS Calibration

Recommended: Options for block temperature and reference thermometer inputs (simulation). Legally traceable in more than 70 countries.



### Standard Probe 935-14-91

Type R Platinum Thermocouple for use up to 1200°C.



### Air Cooling 853-04-02

For use with a compressor this accessory allows air to be blown into the block for rapid cooling.



### Ceramic Insulators 853-06-04

Spare insulation pack Includes 2 x standard tops and 2 x standard bottoms.



### Current Loop Interface 935-06-161

24VDC Power Supply and Terminal Box. Powers 4-20mA Current Transmitters with 4mm terminal posts for easy connection.



### Carrying Case 931-22-111

Sturdy case with room for accessories. Features wheels and pull out handle.



# The world's leading National Metrology Institutes choose Isotech - shouldn't you?

## Pegasus Benefits

The Pegasus features a small tube furnace to allow operation to 1200°C in a portable case. With a ceramic furnace construction temperature gradients are larger than with lower temperature metal blocks.

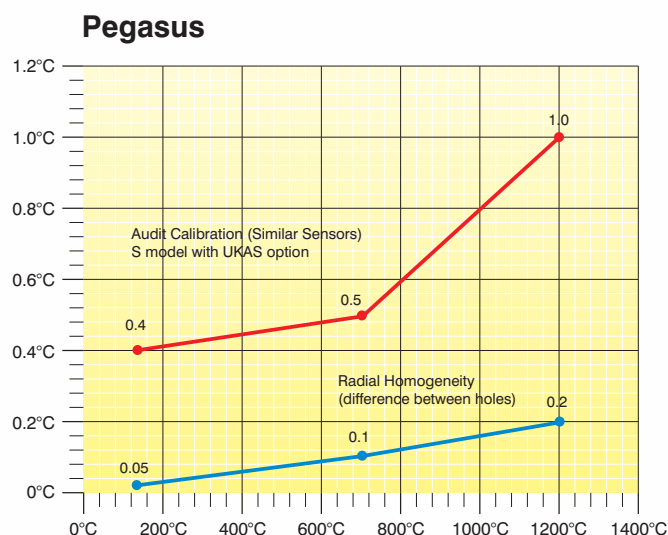
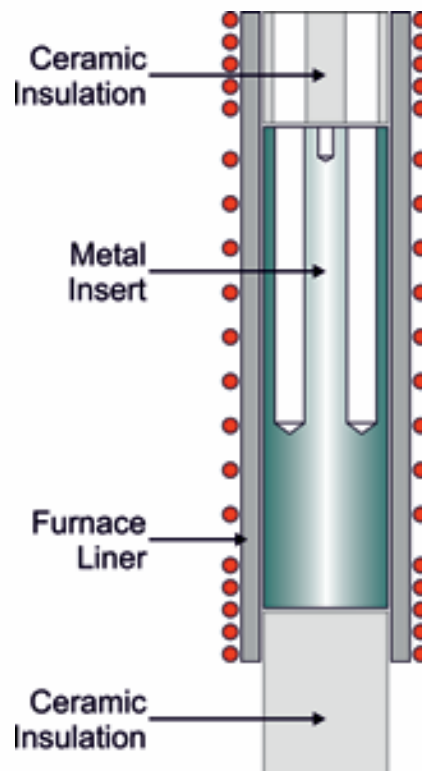
The Isotech furnace benefits by using a specially wound furnace tube assembly. They are manufactured in our factory with the turns concentrated at the ends of the furnace, where the heat losses are greatest. This gives an

improved temperature profile and lower uncertainty.

Insulators are provided for the top and bottom of the furnace which further improve temperature uniformity.

The effective immersion depth is 130mm, 80mm in the metal insert and then a further 50mm in the furnace tube.

*Benefit from Isotech's design and experience*



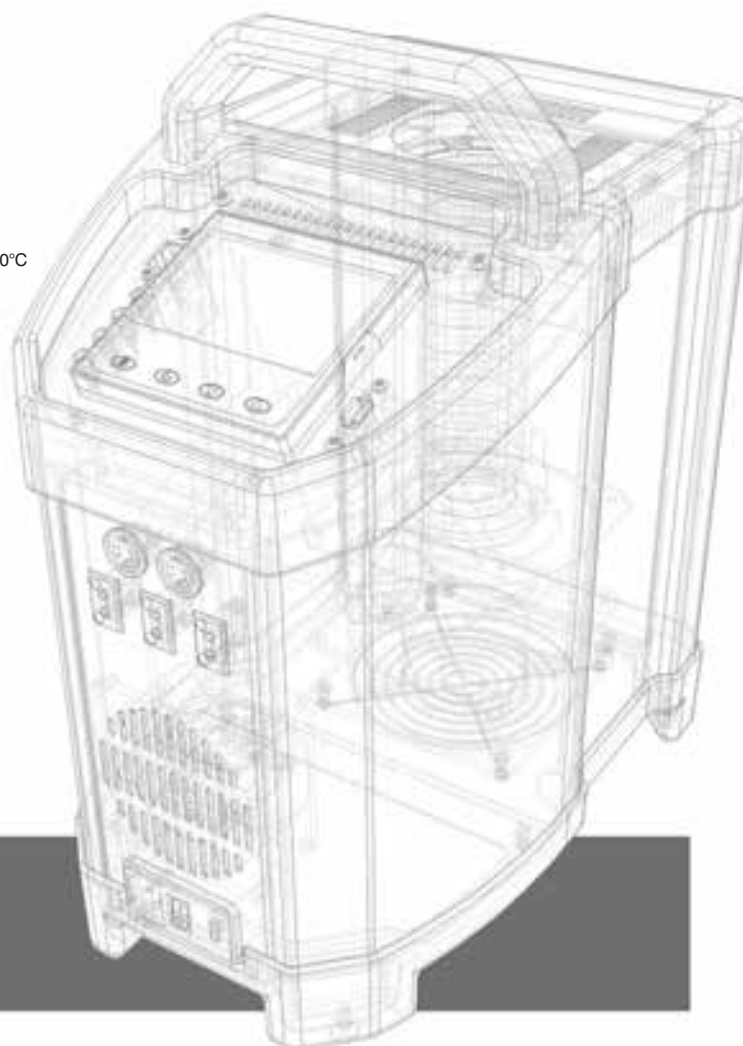
■ Audit Calibration (Similar Sensors)

■ Radial Homogeneity

See Evaluation Reports for full details  
<http://www.isotech.co.uk>

### How To Order

- 1 - Select Desired Options and Accessories
- 2 - Supply Voltage:  
Specify either 115Vac 50/60Hz or 230Vac 50/60Hz





150 to 1100°C

# Dry Block Calibrator

## Pegasus-T [Special Application]

- Designed for Short Sensors
- Dynamic Heating Zone
- Customised Calibration Blocks

The Pegasus range offers extreme high temperature calibration in an easy to use portable package - ideal for the calibration of high temperature thermocouples. It has been designed for fast heating and finds applications in the glass, electrical power, automotive and material processing industries.

The Pegasus-T is the latest member of the Pegasus family developed for sensors that are simply too short to be calibrated in the Pegasus 4853 or other conventional calibration furnaces.

The advanced control system allows the user to select optimal performance for sensors immersed at 25mm, 35mm or 50mm with three independent control loops. It also has built in over-temperature protection to protect the heater wire from overtemperature thus increasing life expectancy.

### ■ Immersion Depth

Calibration engineers understand that to get the best accuracy temperature sensors should be immersed deeply into a calibration bath or furnace and compared to a reference thermometer.

### ■ Calibrate Short Sensors

But how to calibrate very short sensors such as those used in the automotive industry? These sensors are too short to go into conventional furnaces. The Isotech Pegasus 4853 has an immersion depth of 130mm which will suit many sensors but what if the sensor is very short, 25mm to 50mm? Large furnaces are unsuitable and calibrating these types of device provides a significant measurement challenge.

### ■ Dynamic Heating Zone

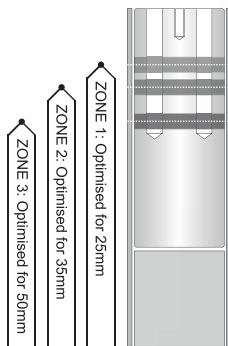
The new Pegasus-T has been developed for this very challenge and features a dynamic heating zone for short immersion probes providing a calibration source for sensors that are too short for other furnaces. It is being trialled and adopted at a number of customer sites in Europe and Asia and is now released for general sale.



# Flexible operation to suit your sensor types

## ■ Dynamic Heating Zone

Pegasus-T allows you to choose an internal control sensor at the same depth the sensors under test, selecting from three internal noble metal control sensors or using an external control sensor placed at the same depth as the sensor under test.



## ■ Control from an External Sensor

Switch from the internal control sensor to an external Type R thermocouple that can be placed alongside the test sensor.



## ■ Independent Reference Channel

Type R thermocouple input, can be used for external control or with a reference probe for an independent temperature measuring loop, option for UKAS calibration.

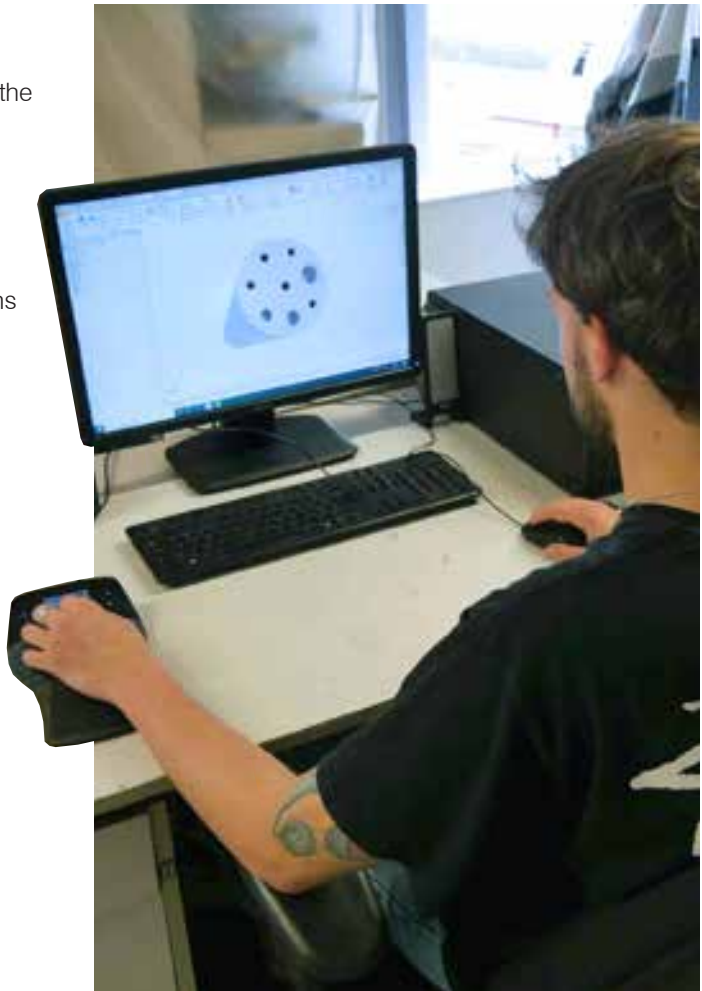


## Accuracy

With short immersion probes there can be large errors as the sensor cannot be immersed deeply enough to allow it to reach the same temperature as the calibration block and there is a temperature gradient at the edge of the block. Tests show that the Pegasus-T is more useful than alternatives but there will always be a need to experiment and evaluate to determine the uncertainty for the conditions of use. It can be helpful to use a reference sensor of the same type as the units under test.

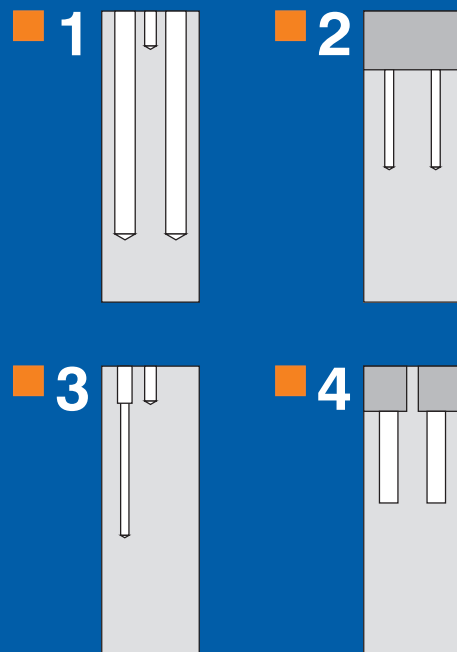
## Calibration Blocks

The Pegasus-T is supplied without an insert as most applications will require drilling to suit your requirement. Our CAD Designers can produce designs for your approval before manufacture in our workshop. Alternatively we can provide blank inserts for you to manufacture or a pre-drilled insert with 6 x 5mm pockets, 100mm Deep.



## Special Inserts

We can design and manufacture inserts to suit your sensors...



\*All inserts shown in half section

# Advanced Features

Fully featured high resolution display with advanced control features including multi loop control with autotune, adjustable temperature alarm

## ■ Temperature Programmer

Create, Edit and Store automatic programs for temperature stepping

## ■ Reference Channel Input

Can be used for external control or as a reference input. A Type R Thermocouple, Model 935-14-91 is included with each Pegasus-T

## ■ Ethernet Interface

Free Software, I-Cal Easy Log - web download

## ■ Offset Elimination

Connect the external reference probe and the calibrator can trim the block temperature to remove offsets

## ■ USB Port

Export logged data to a USB Key, controller data is continuously logged



## Specification:

| Parameter                     | Pegasus-T                                                     |
|-------------------------------|---------------------------------------------------------------|
| Temperature Range             | 150°C to 1100°C                                               |
| Stability                     | ±0.05°C at 150°C ±0.08°C at 1100°C                            |
| Display Resolution            | 0.1°C over whole range                                        |
| Cools from 1200°C to 800°C    | in 50 Minutes*                                                |
| 1200°C to 200°C               | in 180 Minutes*                                               |
|                               | *Substantially reduced by using the optional cooling adaptor  |
| Heating Rate                  | 25°C/minute                                                   |
| Calibration Volume            | 33.5mm Diameter by 100mm Deep                                 |
| Automatic Temperature Cycling | Yes                                                           |
| PC Interface                  | Ethernet and USB Host                                         |
| Independent Reference Channel | Yes: Can be used for external control or as a reference input |
| Datalogging                   | Yes: Export to USB                                            |
| In Built Webserver            | Yes                                                           |
| Indicator Units               | °C, °F, K                                                     |
| Power                         | 115Vac or 230Vac (50/60 Hz) 800 Watts                         |
| Dimensions                    | 302H x 200W x 268D mm                                         |
| Weight                        | 13kg                                                          |

**NOTE:** Due to our program of continual development and improvement, we reserve the right to amend or alter characteristics and design without prior notice

**CAUTIONARY NOTE:** The operating life of the heater will vary with both the maximum operating temperature and the duty cycle. Units being used 24/7 at high temperatures may require a maintenance schedule for heater replacement



200 to 1200°C

# Thermocouple Calibration Furnace

## Model 547

- High Accuracy Thermocouple Calibration
- Calibrates both Laboratory & Industrial Thermocouples
- Options for Blackbody Calibration

The Model 547 is the professional solution for accurate and contamination-free temperature calibration, designed to meet the needs of professionals in a wide range of industries, from industrial to laboratory.

The furnace can be equipped with a blackbody target, making it ideal for calibrating infrared thermometers. For even higher accuracy, it also offers the option to use blackbody cells, ensuring ultimate precision and lowest calibration uncertainties.

The Model 547 is also designed to accommodate open-ended multi-zone thermocouples, making it an ideal choice for calibration professionals in the semiconductor industry.

With a focus on safety and convenience, the Model 547 has been “designed by metrologists for metrologists”.

When used in combination with our companion products for checking thermocouple homogeneity, laboratory standard thermocouples, cold/reference junction equipment, and software to automate thermocouple calibration, it is a complete solution for all your temperature calibration needs, that no other company can rival.

Invest in the Model 547 Thermocouple Calibration Furnace and experience the ultimate in temperature calibration accuracy and convenience.



### ■ Wide Temperature Range

Operates efficiently from 200°C to 1200°C with exceptional stability and uniformity.

### ■ Versatile Calibration Options

Suitable for various thermocouple types, including laboratory standards and industrial sensors, with support for infrared thermometer calibration using blackbody targets.

### ■ Advanced Calibration Corrections

Switchable correction curves for deep and short immersion calibrations. Customise up to 16 correction points per immersion type, ensuring precise calibration across the full range. This feature improves accuracy and flexibility for all calibration requirements.

### ■ Rapid Heating and Cooling

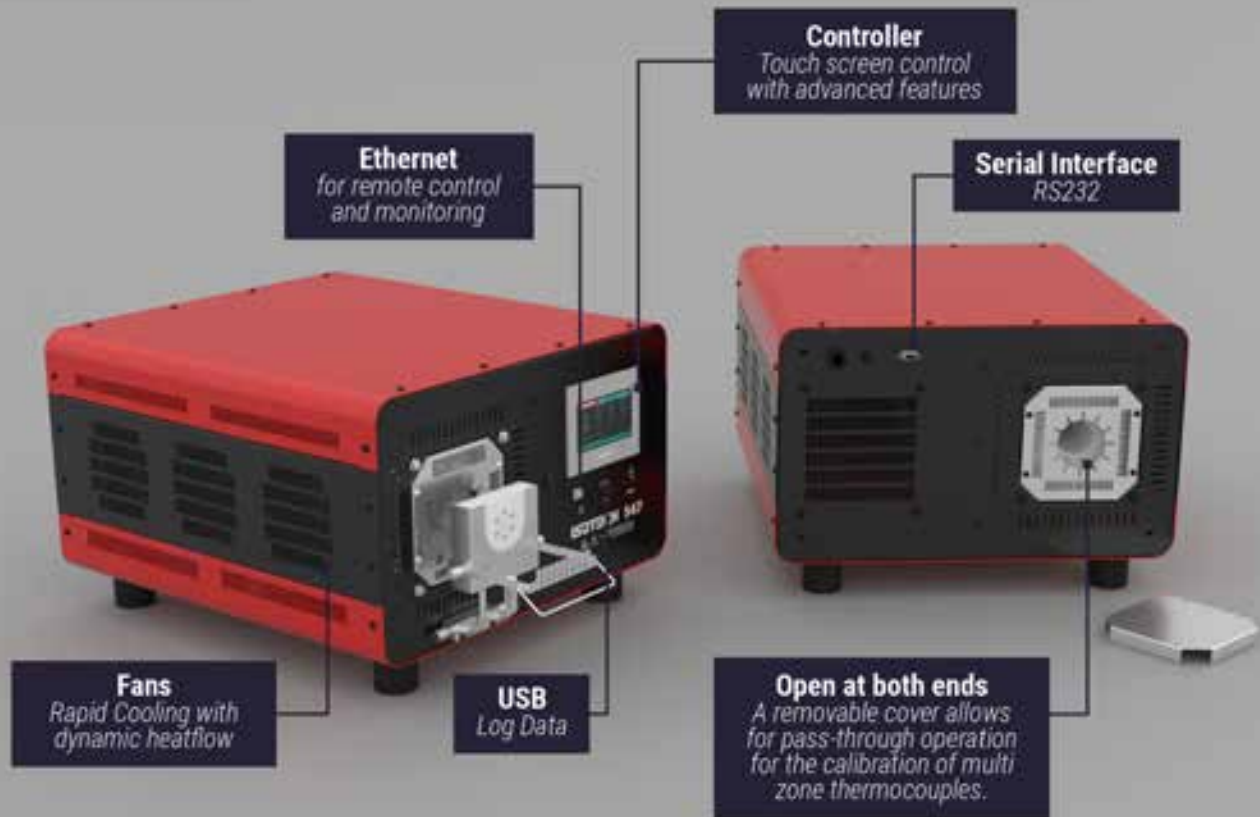
Heats from 50°C to 1200°C in just 45 minutes and cools from 1200°C to 300°C in 90 minutes.

### ■ Automated Calibration Capability

Expandable for automated processes with software integration, allowing for efficient and precise calibration management.

### ■ User-Friendly Interface

Features a 4.5" touchscreen display for easy control and advanced three-zone temperature regulation.



|                           |                                                                |
|---------------------------|----------------------------------------------------------------|
| <b>Model</b>              | 547                                                            |
| <b>Temp Range</b>         | 200°C to 1200°C                                                |
| <b>Stability</b>          | <0.08°C over the entire range                                  |
| <b>Uniformity</b>         | @200°C $\pm 0.2^\circ\text{C}$ @1200°C $\pm 0.3^\circ\text{C}$ |
| <b>Display</b>            | 4.5" Touchscreen                                               |
| <b>Display Resolution</b> | 0.1°                                                           |
| <b>Heating Time</b>       | 50°C to 1200°C in 45 minutes                                   |
| <b>Cooling Time</b>       | 1200°C to 300°C in 90 minutes                                  |
| <b>Calibration Volume</b> | 46mm diameter x 450mm deep                                     |
| <b>Minimum Immersion</b>  | 180mm                                                          |
| <b>Interface</b>          | Ethernet, Serial (RS232), USB Host                             |
| <b>Power</b>              | 3kW                                                            |
| <b>Dimensions</b>         | W510mm x H325mm x L660mm                                       |
| <b>Weight</b>             | 55kg                                                           |

# Model 547 - Accessories (Inserts)

## Choice of Alumina or Metallic Inserts

Alumina: metal free inserts - avoid contaminating laboratory standard thermocouples

Metal: high temperature alloy inserts for high capacity industrial sensor calibration

## Inserts with Sensor Pockets or Through Holes

Drilled with Sensor Pockets: for calibrating laboratory standard and industrial sensors

Drilled with Through Holes: for calibrating multi zone thermocouples



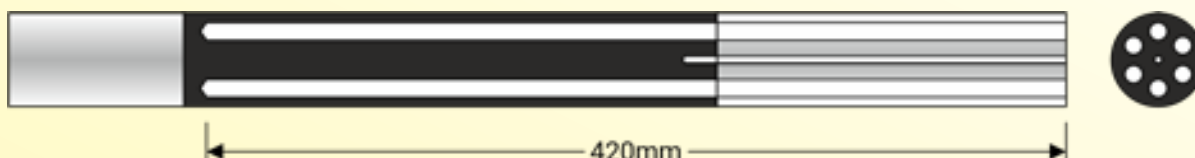
| Metallic Insert | 547-07A        | 547-07B        | 547-07C       | 547-07D                         |
|-----------------|----------------|----------------|---------------|---------------------------------|
| Insert Diameter | 45mm           | 45mm           | 45mm          | Custom Insert<br>Please Specify |
| Insert Length   | 130mm          | 260mm          | 260mm         |                                 |
| Insert Type     | Sensor Pockets | Sensor Pockets | Through Holes |                                 |
| Holes           | 6 x 8mm holes  | 6 x 8mm holes  | 6 x 8mm holes |                                 |

| Ceramic Insert  | 547-07E        | 547-07F        | 547-07G       | 547-07H                         |
|-----------------|----------------|----------------|---------------|---------------------------------|
| Insert Diameter | 45mm           | 45mm           | 45mm          | Custom Insert<br>Please Specify |
| Insert Length   | 130mm          | 260mm          | 260mm         |                                 |
| Insert Type     | Sensor Pockets | Sensor Pockets | Through Holes |                                 |
| Holes           | 6 x 8mm holes  | 6 x 8mm holes  | 6 x 8mm holes |                                 |

Short Insert



Long Insert



Drilled Through Insert

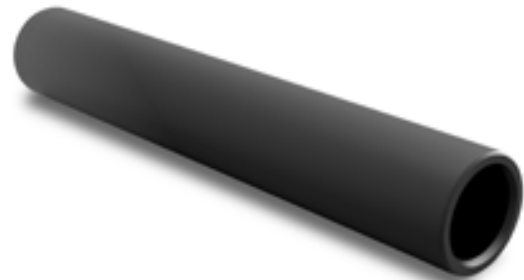


# Model 547 - Accessories (Blackbody)

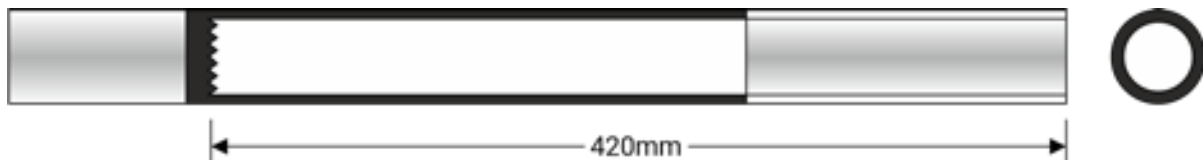
## Infrared Thermometer Calibration

Calibrate Infrared Thermometers using the options of Blackbody Target or Blackbody Fixed Point Cells

| Blackbody Target | 547-07I  |
|------------------|----------|
| Target Diameter  | 45mm     |
| Target Length    | 273mm    |
| Aperture         | Standard |



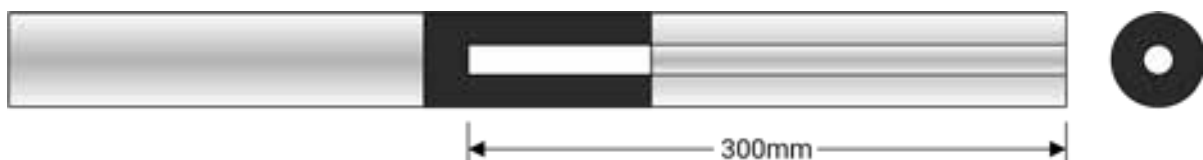
Blackbody Target



| Blackbody Cell | 547-07J   | 547-07K    | 547-07L   |
|----------------|-----------|------------|-----------|
| Cell Type      | Zinc      | Aluminium* | Silver*   |
| Temperature    | 419.527°C | 660.323°C  | 961.780°C |
| Aperture       | 10mm      | 10mm       | 10mm      |

\* These cells are required to be surrounded by gas for protection at higher temperatures, see Model 984

Blackbody Cell (Zinc / Aluminium / Silver)



# An Introduction to Fast Calibrators

This section focuses on the equipment needed for the rapid checking, testing and calibration of instrumentation and temperature sensors.

Service engineers and those working on site will appreciate the benefits of simple and fast temperature calibration. An engineer forced to carry a calibrator up a ladder or into a confined space will value the handheld QuickCal.

The Products Featured in this section have:

- Outstanding Value
- Compact Size with true handheld models
- Wide Operating Ranges
- Fast Response

## Quick-Cals

There are two Quick-Cal models, handheld, portable and capable of operating from  $-12^{\circ}\text{C}$  to  $350^{\circ}\text{C}$

## Fast-Cals

Fast-Cals work from  $-35^{\circ}\text{C}$  to  $650^{\circ}\text{C}$  in three ranges,  $-35^{\circ}\text{C}$  to  $140^{\circ}\text{C}$ ,  $30^{\circ}\text{C}$  to  $350^{\circ}\text{C}$  and  $35^{\circ}\text{C}$  to  $650^{\circ}\text{C}$ .

During 2004, 20 experienced engineers from many parts of the world specified their ideal products for Industrial Calibration. Fast-Cal realizes their top ten requirements of:

- 1 Rugged
- 2 Lightweight
- 3 Easy to use on site
- 4 Low cost/high benefit ratio,
- 5 Fast response, high stability
- 6 Time saving features
- 7 Multiple sensor testing
- 8 Software
- 9 Modern design
- 10 Compliant with latest regulations.

## Rugged 786 & 787

For even greater durability in demanding environments, the rugged 786 and 787 models offer exceptional resistance to mechanical stress while maintaining precision. Designed for both field and laboratory use, these calibrators provide stability, efficiency, and confidence in measurement—ideal for engineers requiring robust, reliable performance in tough conditions and extreme environments, including ambient temperatures as low as  $-29^{\circ}\text{C}$ .

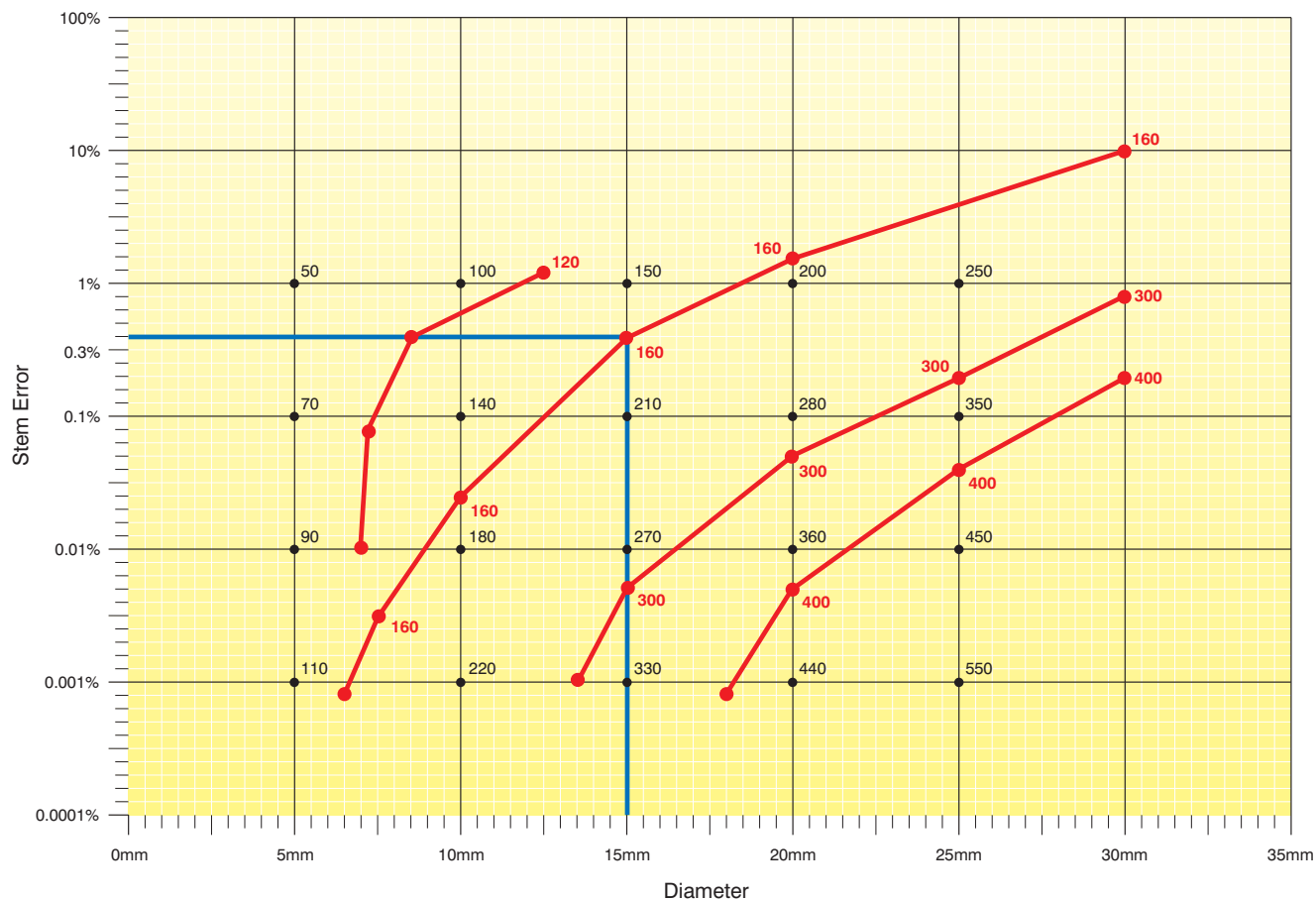


## ■ Immersion depth is very important

When selecting a Dry Block Calibrator depth of immersion is very important. The chart below provides guidance in selecting a bath for immersion depth. Note that sensors with

a long sensing length will require greater immersion. The chart is general and applies equally to all dry blocks - not to a particular model or manufacturer.

**Immersion Depths** for various diameter thermocouples or thermistors in a dry block bath



Example shows 0.3% stem error for a 15mm diameter thermocouple immersed 160mm in a dry block.

**Note 1** For sensors immersed in stirred liquids the diameter of sensor can be doubled, or the minimum depth halved.

**Note 2** The sensing length must be added to the above immersion depth calculation

**N.B.** The above gives a good guide, however each sensor will be slightly different.

For full information on immersion depth visit the technical library on the Isotech website.

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



# Temperature Test Unit Quick-Cal

- Fast
- Compact
- Two models -12°C to 350°C

Isotech's Quick Cal range of testers are ideally suited to the less exacting applications where our larger, better specified baths are unnecessary.

The Low Temperature Quick Cal covers the temperature range of -12°C to +140°C, making it ideal for the medical, sterilisation and food industries.

The High Temperature Quick Cal covers the temperature range from 30°C to 350°C.

Both have interchangeable inserts, so you don't have to buy another calibrator each time you find a new diameter sensor to calibrate. The Low Temperature Quick Cal is particularly exciting since it can work from a small 12 volt battery, making it truly portable, alternatively a mains supply is available with 100V - 240V, 50/60Hz input.

The Low Temperature Quick Cal comes complete with two inserts, one blank and one drilled 6.8mm diameter 120mm deep. Alternatively we can provide pre-drilled inserts to suit your needs. Each calibration well is 13mm diameter and 120mm deep.

The High Temperature Quick Cal has a single larger well and interchangeable inserts, 25mm in diameter by 120mm deep. Blank and other special drillings are available to order. The High Temperature Quick Cal is supplied 100-130 or 200-250V AC, 50/60Hz.

The manual which accompanies the Quick Cal contains helpful advice on how to get the best from your calibrator. Accessories for the above include a carry case, alternative inserts and a rechargeable battery for the Low Temperature Quick Cal.



Quick-Cal Low



Quick-Cal High

**Specification**

|                                           |                                                                                                                                  |
|-------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------|
| <b>Model</b>                              | <b>Low Temperature Quick-Cal</b>                                                                                                 |
| <b>Temperature Range</b>                  | -12°C to +140°C<br>In an ambient of 20°C<br>The Quick-Cal will achieve lower temperature if used in a lower ambient temperature  |
| <b>Set Point Resolution</b>               | 0.1°C over range                                                                                                                 |
| <b>Accuracy</b>                           | ±0.1 to ±0.4°C using Comparison Techniques<br>±0.4°C against display temperature with a single probe in the 6.8mm drilled sleeve |
| <b>Stability</b>                          | ±0.05°C                                                                                                                          |
| <b>Time to Set Point</b>                  | 9 minutes from 0°C to 100°C                                                                                                      |
| <b>Additional Time for best stability</b> | Typically 5 minutes                                                                                                              |
| <b>Calibration volume</b>                 | Two 13mm diameter pockets 120mm deep. Supplied with two sleeves, one blank and one drilled 6.8mm diameter 120mm deep             |
| <b>Voltage</b>                            | 15Vdc or 100-240V, Switch mode power supply (50 / 60 Hz)                                                                         |
| <b>Power</b>                              | 70 Watts                                                                                                                         |
| <b>Dimensions</b>                         | Height 65mm<br>Width 152mm<br>Depth 175mm<br>Weight 1.5kg                                                                        |

**Specification**

|                                           |                                                                                                                                                                                                                      |
|-------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Model</b>                              | <b>High Temperature Quick-Cal</b>                                                                                                                                                                                    |
| <b>Temperature Range</b>                  | +30°C to +350°C<br>In an ambient of 20°C                                                                                                                                                                             |
| <b>Set Point Resolution</b>               | 0.1°C over range                                                                                                                                                                                                     |
| <b>Accuracy</b>                           | ±0.1 to ±0.4°C using Comparison Techniques<br><100°C ±0.4°C against display temperature with a single probe in the 4.5mm pocket<br>>100°C ±1.5°C against display temperature with a single probe in the 4.5mm pocket |
| <b>Stability</b>                          | ±0.05°C                                                                                                                                                                                                              |
| <b>Time to Set Point</b>                  | 9 minutes from Ambient to 350°C                                                                                                                                                                                      |
| <b>Additional Time for best stability</b> | Typically 5 minutes                                                                                                                                                                                                  |
| <b>Calibration volume</b>                 | 25mm diameter 120mm deep<br>Supplied with insert, 5 pockets, 8mm, 6.5mm, 6.5mm, 4.5mm, 4.5mm, all 115mm deep                                                                                                         |
| <b>Voltage</b>                            | 100-130V or 200-240V, (50 / 60 Hz)                                                                                                                                                                                   |
| <b>Power</b>                              | 350 Watts                                                                                                                                                                                                            |
| <b>Dimensions</b>                         | Height 65mm<br>Width 152mm<br>Depth 175mm<br>Weight 1.5kg                                                                                                                                                            |

**How To Order**

Specify Model, Low or High Temp, Supply Voltage, Accessories and if UKAS Calibration is required.

**Extra Sleeves**

- 560-06-01A** Standard Sleeve  
**560-06-01B** Blank Sleeve  
**560-06-01C** Special Sleeve (maximum bore 10mm)

**Carrying Case**

**931-22-100**

**UKAS Calibration**

UKAS Calibration available to order, legally traceable in more than 70 countries.

**Fahrenheit Operation**

Unit can be supplied for °F Operation

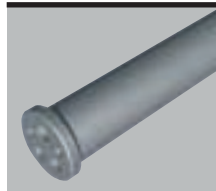
**Rechargeable Battery & Charger**

Battery is 12V 12Ah.

*On full charge battery: 60 minutes when cooling, 90 minutes when heating*

*Longer life available with larger batteries - consult Isotech*

*Temperature Range is -10°C to 123°C with battery operation*

**Extra Inserts**

- 550-06-01A** Standard Insert  
**550-06-01B** Blank Insert  
**550-06-01C** Special Insert

**Carrying Case**

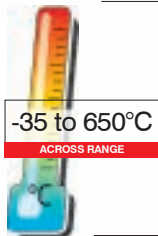
**931-22-100**

**UKAS Calibration**

UKAS Calibration available to order, legally traceable in more than 70 countries.

**Fahrenheit Operation**

Unit can be supplied for °F Operation



# Industrial Temperature Calibrators

## Fast-Cal

- 25 x 148mm Calibration Volume
- Rugged
- Lightweight
- Easy to use on Site

### Fast-Cal - the product range you designed !

During early 2004, 20 experienced engineers from many parts of the world were asked to produce their ideal specification for industrial calibration. Their top ten requirements, in order of priority, are: *Rugged, Lightweight, Easy to use on site, Low cost/high benefit ratio, Fast response, high stability, Time saving features, Multiple sensor testing, Software, Modern design, Compliant with the latest regulations.*

### Fast-Cals are available in Basic or Complete models

#### ■ A Basic Dry Block Calibrator

The thermometer under test is compared to the dry block controller value. Useful for moderate temperature ranges and quick testing.

#### ■ An ISO 9000 Calibration System

A thermometer under test is compared to a calibrated standard, for true traceability and clearly meets the requirements of ISO9000. Complete models include a semi-standard probe.



| Model No.                          | Low                            | Medium                        | High                          |
|------------------------------------|--------------------------------|-------------------------------|-------------------------------|
| Range at 20°C                      | -35 to +140°C <sup>(1)</sup>   | 30 to 350°C                   | 35 to 650°C                   |
| Stability                          | 0.02°C                         | 0.03°C                        | 0.03 to 0.05°C                |
| Accuracy - Basic                   | ±0.2°C                         | ±0.3°C                        | ±1°C (500°C)<br>±2°C (650°C)  |
| Accuracy - Complete <sup>(2)</sup> | ±0.15°C                        | ±0.2°C                        | ±0.5°C                        |
| Heating Time                       | -30 to +140°C<br>In 15 minutes | 50 to 350°C<br>In 15 minutes  | 50 to 650°C<br>In 20 minutes  |
| Cooling Time                       | +140 to 0°C<br>In 15 minutes   | 350 to 100°C<br>In 40 minutes | 650 to 300°C<br>In 20 minutes |
| Calibration Capacity               | 148mm depth<br>25mm Ø          | 148mm depth<br>25mm Ø         | 148mm depth<br>25mm Ø         |
| Power                              | 150W                           | 750W                          | 750W                          |
| Traceable Certificate              | Included                       | Included                      | Included                      |
| UKAS Certificate                   | Extra                          | Extra                         | Extra                         |
| PC Communications                  | Included                       | Included                      | Included                      |
| Software                           | Included                       | Included                      | Included                      |
| 4-20mA Input                       | Complete Models                | Complete Models               | Complete Models               |
| Ramps and Dwells                   | Yes with Software              | Yes with Software             | Yes with Software             |
| Dimensions                         | 228 x 248 x 143mm              | 228 x 248 x 143mm             | 228 x 248 x 143mm             |
| Weight                             | 6.60kg                         | 6.35kg                        | 6.35kg                        |

(1) In ambient of 20°C: Minimum Temperature is 55°C Below Ambient, Absolute Minimum -45°C.

(2) When used with a suitable Isotech Semi Standard PRT.

## How To Order

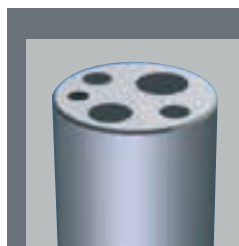
Specify Model, Basic or Complete, Supply Voltage, Accessories and if UKAS Calibration is required.

### Features (Basic & Complete)

Rugged, hard-wearing stainless steel case  
 Hygienic with no paint to chip or flake  
 No membrane keypads  
 Lightweight - less than 6.6kg  
 Thermal Switch Test - Complete Model with Software  
 Easy to use on site, effortless transporting  
 Fast response - high stability  
 Built-in Insert holder for ultra fast changes and restarts  
 Removable inserts, drilled to your requirements  
 PC interface  
 Additional software available for automatic calibration  
 Certificate traceable to National Standards  
 Five point UKAS Certification available  
 Mains power variance immunity

| LOW | MEDIUM | HIGH |
|-----|--------|------|
| ✓   | ✓      | ✓    |
| ✓   | ✓      | ✓    |
| ✓   | ✓      | ✓    |
| ✓   | ✓      | ✓    |
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| ✓   | ✓      | ✓    |
| ✓   | ✓      | ✓    |
| ✓   | ✓      | ✓    |
| ✓   | ✓      | ✓    |

**Note:** The Complete model can capture a thermostat trip temperature either as a stand alone unit or with a PC and the included software.



### Low, Medium & High

Standard Insert is:  
 2 x 4.5mm + 1 x 6.5mm +  
 1 x 8mm x 140mm Deep.  
 All Inserts have a 4mm  
 tapped hole to suit  
 supplied extractor tool.

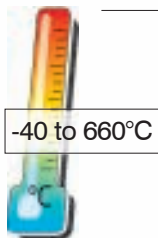
### Extra Inserts

In addition to the standard insert, specially drilled or blank inserts are also available.

|          | Low & Medium      | High              |
|----------|-------------------|-------------------|
| Standard | <b>907-02-03</b>  | <b>907-02-03d</b> |
| Custom   | <b>907-02-03c</b> | <b>907-02-03g</b> |
| Blank    | <b>907-02-03b</b> | <b>907-02-03f</b> |

Carrying Case  
included





# Rugged Temperature Calibrators

## Model 786 & 787

### Low & High-Temperature Calibration Without Compromise

The Model 786 (-40°C to +140°C) excels in cold rooms, freezers, and sub-zero environments, maintaining accuracy where others fail. Its active environmental control ensures performance in extreme cold. The Model 787 calibrates up to 660°C, ideal for aerospace, automotive, and manufacturing industries. Both models offer exceptional stability and reliability.

### Built for Portability & Durability

Encased in an IP56-rated shell, they resist dust, moisture, and impact. A removable lid provides secure accessory storage. Designed for rugged use, they withstand rough transit, vibration, and tight spaces, ensuring reliable field performance.

### Precision & Efficiency

Both models offer Basic, Site, and ADVANCED interfaces for fast, responsive calibration. Features include:

- High accuracy and speed
- Rugged IP56 enclosures for harsh environments
- Military-grade durability
- Portable, self-contained design with accessory storage
- Advanced data logging and reference input

From extreme cold to high heat, the Model 786 and 787 deliver unmatched accuracy, efficiency, and reliability.



*Low Temperature  
Rugged Calibrator*



*High Temperature  
Rugged Calibrator*

| Parameter                            | Model                                                                                       |                                                                                             |
|--------------------------------------|---------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------|
|                                      | 786                                                                                         | 787                                                                                         |
| Temperature Range                    | -40°C to +140°C                                                                             | +35°C to +660°C                                                                             |
| <b>ADVANCED Range</b>                |                                                                                             |                                                                                             |
| Stability                            | ±0.008°C                                                                                    | ±0.03°C                                                                                     |
| Display Resolution                   | 0.01°C over whole range                                                                     | 0.01°C over whole range                                                                     |
| Input Channel Accuracy: Thermocouple | E,J,K,N: ±0.2°C @ 660°C R: ±0.6°C S: ±0.7°C @ 660°C T ±0.2°C @ 150°C                        |                                                                                             |
| CJC Accuracy                         | ±0.35°C                                                                                     |                                                                                             |
| Input Channel Accuracy: RTD          | ±0.1°C across range                                                                         | ±0.2°C across range                                                                         |
| <b>BASIC / SITE Range</b>            |                                                                                             |                                                                                             |
| Stability                            | ±0.01°C                                                                                     | ±0.03°C to ±0.05°C                                                                          |
| Display Resolution                   | 0.01°C from -19.99°C to 99.99°C then 0.1°C (0.01°C over PC Interface)                       | 0.01°C from 0.00°C to 99.99°C then 0.1°C (0.01°C over PC Interface)                         |
| <b>COMMON Specifications</b>         |                                                                                             |                                                                                             |
| Display Accuracy                     | 0.15°C                                                                                      | ±1°C (500°C) ±2°C (650°C)                                                                   |
| Radial Uniformity                    | <0.008°C                                                                                    | <0.08°C                                                                                     |
| Axial Uniformity                     | <0.09°C                                                                                     | <0.5°C                                                                                      |
| Heating Time                         | See Graph                                                                                   | See Graph                                                                                   |
| Cooling Time                         | See Graph                                                                                   | See Graph                                                                                   |
| Ingress Protection                   | IP56 - With Lid Fitted                                                                      |                                                                                             |
| Storage Temperature                  | -30°C to +71°C                                                                              |                                                                                             |
| Humidity                             | 0 to 90% (non-condensing)                                                                   |                                                                                             |
| Insert Dimensions                    | 29.4mm Diameter x 203mm Deep                                                                | 25.4mm Diameter x 152mm Deep                                                                |
| Insert Pockets                       | 4.50mm, 6.50mm, 8.00mm, 9.50mm, all 195mm deep, M4 tapped hole for supplied extractor tool. | 4.50mm, 4.50mm, 6.50mm, 8.00mm, all 148mm deep, M4 tapped hole for supplied extractor tool. |
| Power                                | 85-264 Vac, 50/60Hz, 360 Watts                                                              | 110 or 230 Vac, 50/60Hz, 800 Watts                                                          |
| Dimensions                           | H 350mm W 400mm D 275mm                                                                     |                                                                                             |
| Weight (nominal)                     | 16.8kg                                                                                      | 18kg                                                                                        |

|                                                       | ADVANCED                                                                                               | SITE                                                                                 | BASIC                                                                                 |
|-------------------------------------------------------|--------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
|                                                       |                     |  |  |
| Digital Display of Set and Nominal Block Temperature  | Yes                                                                                                    | Yes                                                                                  | Yes                                                                                   |
| PC Interface                                          | Ethernet + USB Host                                                                                    | Serial                                                                               | Serial                                                                                |
| Test Thermostats                                      | Yes - Two Inputs                                                                                       | Yes - Single Input                                                                   | No                                                                                    |
| Independent Temperature Indicator for Reference Probe | Yes                                                                                                    | Yes                                                                                  | No                                                                                    |
| Additional Inputs for Units Under Test                | Up to 3: Two universal inputs for PRT, Thermocouple or Process inputs and a further Thermocouple input | No                                                                                   | No                                                                                    |
| Automatic Temperature Cycling                         | Yes                                                                                                    | No                                                                                   | No                                                                                    |
| Data Logging                                          | Yes - Export to USB                                                                                    | No                                                                                   | No                                                                                    |
| Offset Elimination                                    | Yes - block can follow reference input                                                                 | No                                                                                   | No                                                                                    |
| Choose English, French, Italian or Spanish Language   | Yes - on full colour display                                                                           | No                                                                                   | No                                                                                    |
| In Built Web Server                                   | Yes                                                                                                    | No                                                                                   | No                                                                                    |
| Tamper Proof Data                                     | Yes - Suitable for life science, automotive and aerospace applications                                 | No                                                                                   | No                                                                                    |

# Rugged Calibrators for Harsh Environments



DUST  
PROTECTION



WATER  
PROTECTION



ALTITUDE  
PROTECTION



EXTREME AMBIENT  
PROTECTION



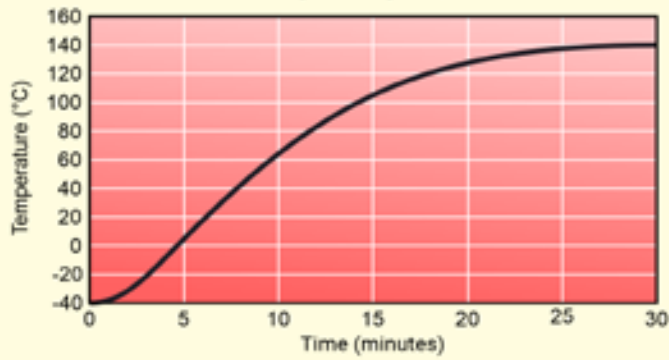
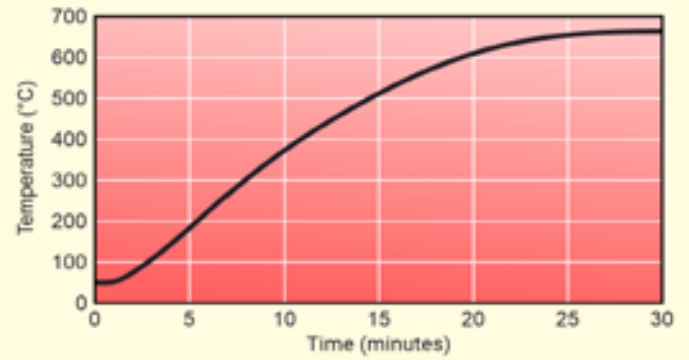
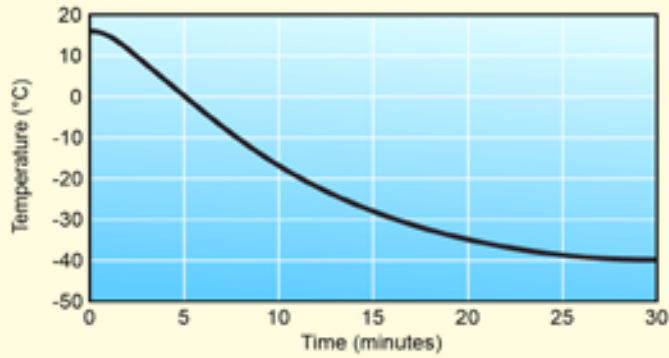
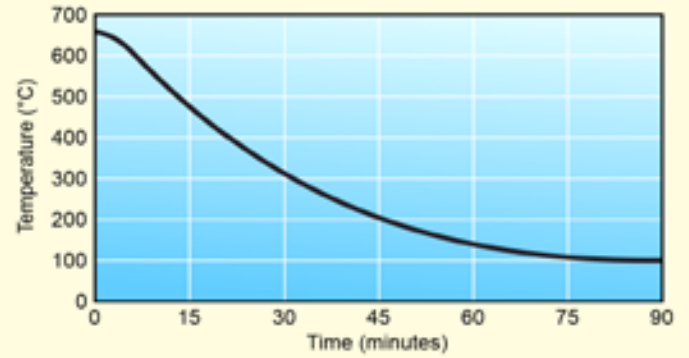
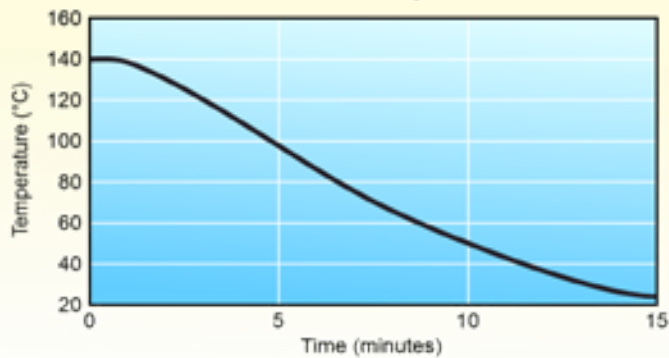
IMPACT  
PROTECTION



At Isotech we appreciate that operating in challenging environments often necessitates tools that can endure harsh conditions. **These rugged calibrators were designed (to US Navy specifications,)** where a range of custom dry block temperature calibrators, constructed to military standards, and capable of operation even when the ambient temperature was well below 0°C.

Rising to this challenge, and outperforming all international competitors, we developed what we believe to be the World's most rugged Dry Block Calibrator. Our efforts and commitment were well-rewarded, the Navy has already procured hundreds of these calibrators and their continued trust in our design emphasise the quality and reliability of our products.

Recognizing the potential benefits for a broader audience we have made these rugged, precision units available for general use, featuring our standard interface options, with capabilities to suit a wider range of industries.

**786 Heat Up Graph (-40°C to 140°C)****787 Heat Up Graph (35°C to 660°C)****786 Cool Down Graph (15°C to -40°C)****787 Cool Down Graph (660°C to 100°C)****786 Cool Down Graph (140°C to 20°C)**

# Introducing Absolute Calibration with ITS-90 Fixed Point Cells

For calibration to the smallest of uncertainties thermometers are calibrated by placing them into a series of Fixed Point Cells. For example pure aluminum freezes at 660.323°C so by first melting a cell containing pure aluminum, then placing a thermometer into it as the metal changes state, from a liquid to a solid, a very precise calibration point is realized.

This absolute or fixed point calibration is performed by National Metrology Institutes providing primary standards and directly realizing the International Temperature Scale, ITS-90. Isotech's solutions for Primary Standards are found in a separate publication, *"Volume 1: Solutions for Primary & Secondary Laboratories."*

Isotech also offer a range of ITS-90 Fixed Point systems that are less expensive, easier to use and more robust than the larger cells used by the international NMIs.

For some countries, where the local industry needs are less demanding Slim Cells are used by NMIs and Isotech can offer UKAS calibration with uncertainties from 0.5mk to 2mk over the range -38°C to 660°C.

Users in industrial and secondary laboratories benefit from using Slim Cells to calibrate to smaller uncertainties than is possible with dry blocks or liquid baths. The Isotech Slim Water Triple Point Cell is comparable in cost to a specially drilled metal insert, putting it in the reach of all calibration engineers. Using a Water Triple Point Cell allows cost effective checking of standards

between calibrations, and to help determine when a thermometer needs recalibration. Water triple point cells have uncertainties less than 0.001°C at a very modest cost.

In order to use an ITS-90 Fixed Point Cell, apparatus is needed, it must create a zone of constant temperature around the cell so that the cell can melt or freeze uniformly. Isotech equipment uses multi zone heating or for optimal performance a heat pipe or heat siphon. To calibrate a thermometer it must be sufficiently immersed that further immersion would make no temperature change to the thermometer.

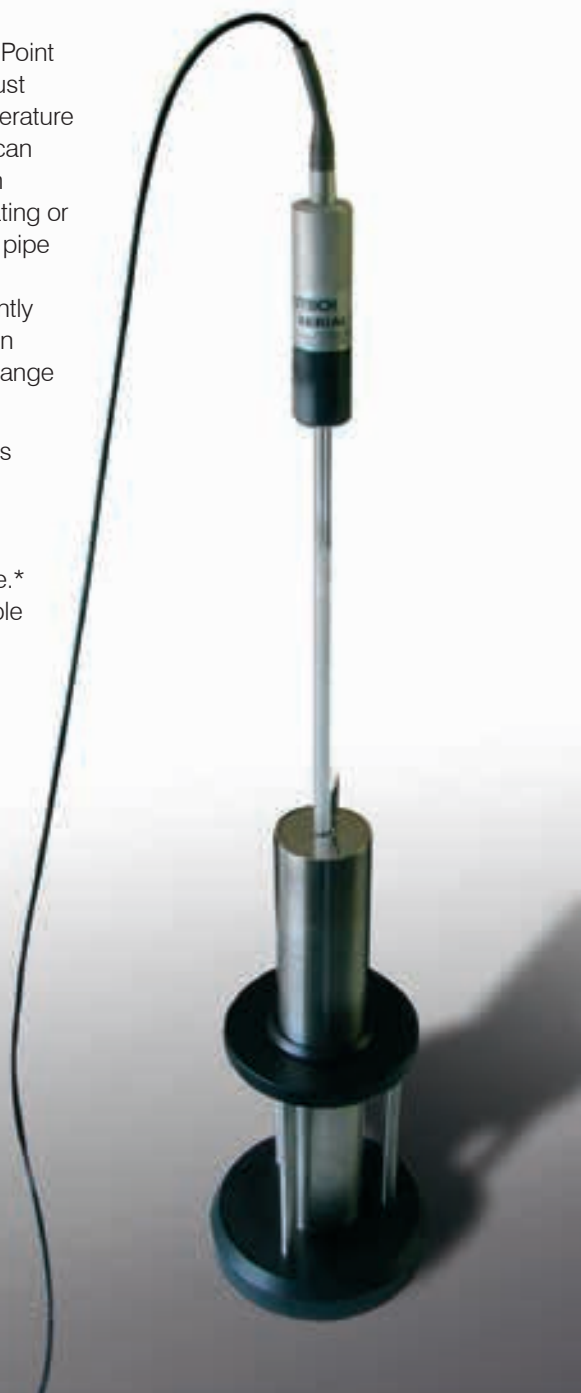
A new innovation from Isotech is the Isothermal Tower, which combines apparatus, a heat siphon, fixed point cell and an immersion compensation device.\* The Isothermal Towers are simple to use integrated devices providing optimal performance.

There are also ranges of apparatus that can accept a range of cells, see table opposite. These models can also be used without cells, including use as Dry Blocks

for immersion depths of up to 300mm - ideal for larger sensors.

*\* Patents applied for*

| Fixed Point | State        | Temperature °C |
|-------------|--------------|----------------|
| Argon       | Triple Point | -189.3442      |
| Mercury     | Triple Point | -38.8344       |
| Water       | Triple Point | 0.010          |
| Gallium     | Melt Point   | 29.7646        |
| Indium      | Freeze Point | 156.5985       |
| Tin         | Freeze Point | 231.928        |
| Zinc        | Freeze Point | 419.527        |
| Aluminium   | Freeze Point | 660.323        |
| Silver      | Freeze Point | 961.78         |



## Equipment

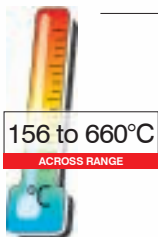
The ITS-90 Cell needs equipment in order to melt, freeze or maintain it. Many combinations of Isotech equipment can be used; liquid baths, dry blocks and furnaces.

Isotech have a range of Dry Blocks that allow the fixed points to be easily realized at an affordable price.

The combination allows you to calibrate at a "Point On The Temperature Scale" hence the name POTTs.

| Point                  | Temperature | Suitable Apparatus                       |                                                                                                                                                                             |
|------------------------|-------------|------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Mercury                | -38.8344°C  | Europa                                   |                                                                                          |
| B8 Water Triple Point  | 0.01°C      | Europa<br>Venus                          |                                                                                          |
| B12 Water Triple Point | 0.01°C      | Oceanus                                  |                                                                                          |
| Gallium                | 29.7646°C   | Europa<br>Venus<br>Calisto               |                                                                                         |
| Indium                 | 156.5985°C  | Medusa 510<br>Medusa 511<br>ISOTower 490 |   |
| Tin                    | 213.928°C   | Medusa 510<br>Medusa 511<br>ISOTower 491 |   |
| Zinc                   | 419.527°C   | Medusa 510<br>Medusa 511<br>ISOTower 492 |   |
| Aluminium              | 660.323°C   | Medusa 510<br>Medusa 511<br>ISOTower 493 |   |
| Silver                 | 961.78°C    | Oberon                                   |                                                                                        |
| Copper                 | 1084.62°C   | Oberon                                   |                                                                                        |

ISOTowers are integrated devices including the ITS-90 Fixed Point Cell



# ITS-90 Isothermal Towers

## ISOTower

- High accuracy
- Fast to temperature
- Simple to use
- Patented

The most accurately defined temperatures are those defining points (fixed points) of ITS-90.

The leading Primary Laboratories use large fixed point cells in deep calibration furnaces that utilise Heat Pipes to eliminate temperature gradients. This combination of cell and furnace gives the smallest of uncertainties.

In the patented Isothermal Towers the fixed point cell and heat pipe (or heat siphon) have been combined to produce the ideal realisations for calibrating standard thermometers.

Thermometers can only be calibrated accurately if they are immersed sufficiently.

In Isothermal Towers a heated block (Immersion Compensator, patent applied for) sits on top the heat siphon/cell to fully compensate for the immersion characteristics of the unit under test.

The Isothermal Towers performance has been fully evaluated against the most detailed and demanding requirements ever written: CCT/2000-13.

All Isothermal Towers; Indium, Tin, Zinc and Aluminium meet all the requirements of CCT/2000-13 allowing laboratories to realise the smallest uncertainties, at a fraction of the cost of conventional Metrology Furnaces with Primary Standard Cells

You can purchase three Isothermal Towers; Tin, Zinc and Aluminium for a similar price as one conventional cell and heat pipe apparatus!



Isothermal Towers are simple to use, and very robust. Operation is risk free, as a combined apparatus there is no need to handle a fragile cell. No need for specialist training courses. Isothermal Towers remove the mystery from fixed point calibration.

Easily set to provide a melt or freeze of 24 hours or more, lending themselves for automatic calibration and providing your lab with an all day long plateau.



### Perfect Audit Item

As an audit item, an accreditation authority can send the device to laboratories for intercomparison.

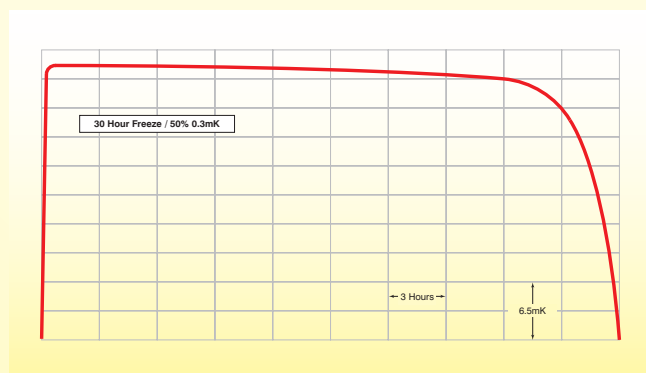
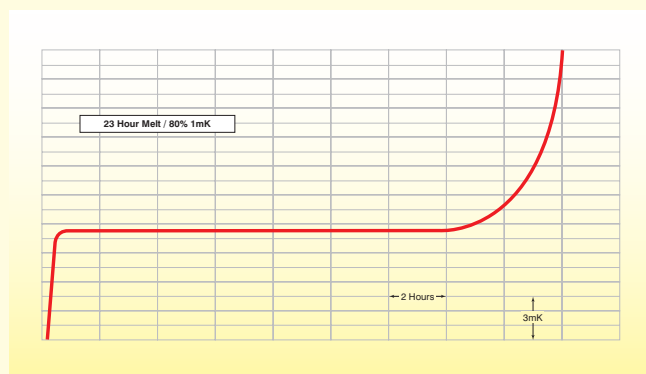
Because the cell, apparatus and immersion compensator are a single entity, the performance is unambiguous unlike existing systems where cell and apparatus are often separated during intercomparison. Accreditation authorities love them.

### Available to Hire

Additionally Isothermal Towers are available to hire from Isotech and a growing number of Isotech Distributors to allow laboratories to audit themselves by intercomparing their cells and standard thermometers to a UKAS calibrated Isothermal Tower.

### Transportable

ITS-90 Isothermal Towers are transportable by carrier; there are no fragile glass parts!

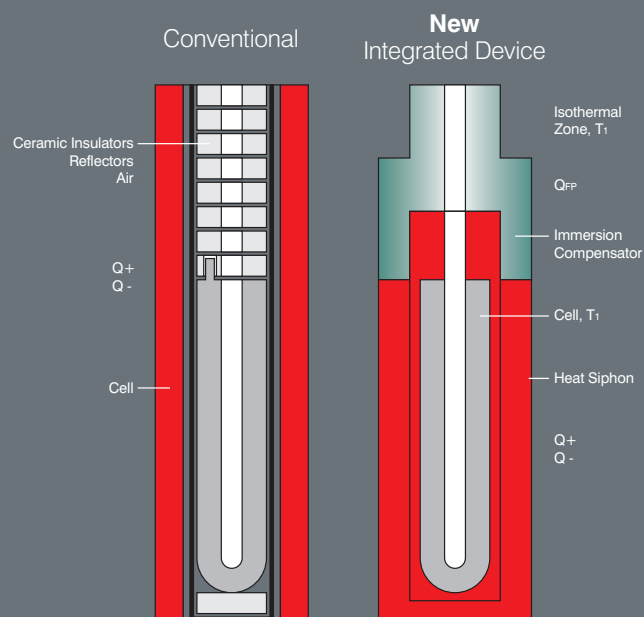


#### ■ Isothermal Towers include a traceable calibration certificate.

This includes a graph of one freeze, one melt plateau and a certificate of purity for the metal inside the siphonic cell.

As an option, UKAS calibration is available to one of two services, see table over for the uncertainties.

Full data available at [www.isotech.co.uk/isotower](http://www.isotech.co.uk/isotower)



A fixed point cell is not long enough to eliminate heat conductance along the thermometer calibrated in it. Currently, using long furnaces, heat shunts and reflective baffles an attempt is made to reduce these losses.

The ISOTower uses a combined metal clad fixed point cell and heat siphon, which when heated provides an isothermal environment for the metal within to change state. The outer wall of the cell becomes the inner wall of the heat siphon with cost as well as performance benefits.

Additionally an Immersion Compensator is used to compensate for the stem conduction problems caused when a thermometer under test is not sufficiently immersed into a fixed point cell.

## Benefits of the ISOTower over a conventional Quartz Cell and Apparatus

### ISOTower

- Robust - no glass parts
- Easily Transported
- Integrated Device - known immersion characteristics
- Uniquely integrated cell, apparatus and correction for thermometer stem conduction
- Simple and safe to use with increased confidence in results

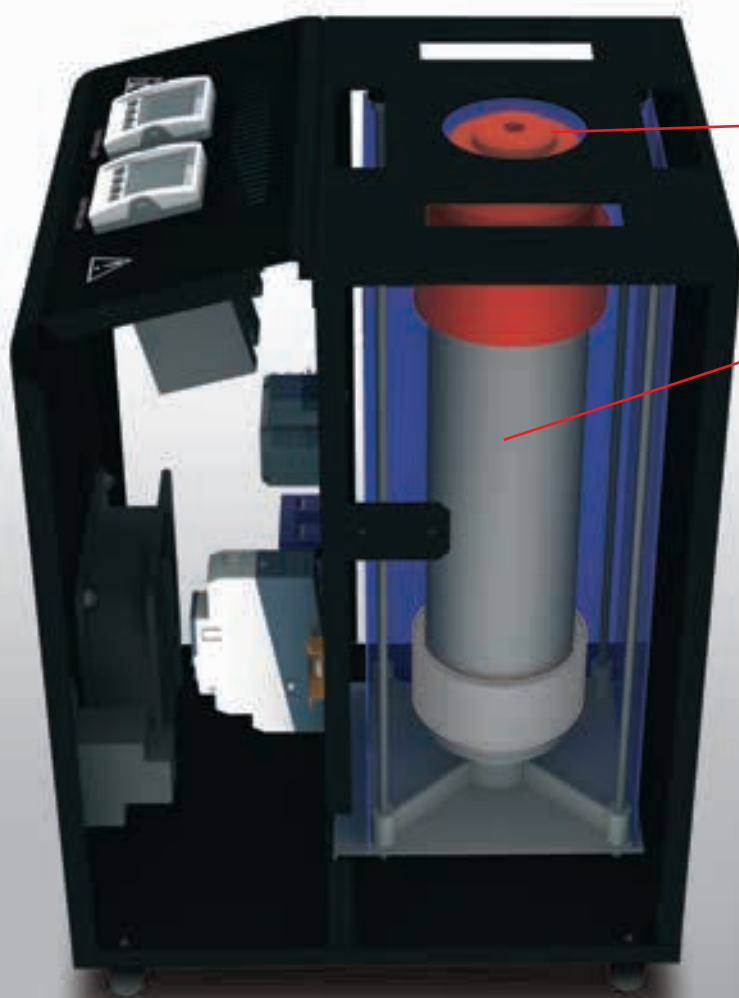
### Conventional Quartz Cell and Apparatus

- Fragile and Risk of Breakage
- Difficult and expensive to Transport
- Cell certified separate from apparatus, stem conduction unknown

**Specification**

| Model                                              | 490                                 | 491       | 492       | 493       |
|----------------------------------------------------|-------------------------------------|-----------|-----------|-----------|
| ITS-90 Point                                       | Indium                              | Tin       | Zinc      | Aluminium |
| Temperature                                        | 156.5985°C                          | 231.928°C | 419.527°C | 660.323°C |
| Metal Purity                                       | 6N                                  | 6N        | 6N        | 6N        |
| Plateau Duration                                   | Up to 30 hrs                        |           |           |           |
| UKAS Uncertainty: Premium Service*                 | ±0.6mK                              | ±0.8mK    | ±1mK      | ±2mK      |
| UKAS Uncertainty: Standard Service*                | ±2mK                                | ±2mK      | ±2mK      | ±6mK      |
| Pocket Diameter                                    | 8 mm                                |           |           |           |
| Total Immersion Depth                              | 290 mm                              |           |           |           |
| Depth of metal surface to bottom of reentrant tube | 180 mm                              |           |           |           |
| PC Interface                                       | Supplied with PC Cable and Software |           |           |           |
| Power                                              | 900 Watts                           |           |           |           |
| Voltage                                            | 110 Vac or 230 Vac 50/60Hz          |           |           |           |
| Dimensions                                         | H 430 mm x W 310 mm x D 300 mm      |           |           |           |
| Weight                                             | 15kg                                |           |           |           |

\* UKAS Calibration is Optional, Uncertainties apply to whole system



The ISOTowers are protected by two patents.

■ **Immersion Compensator**

Fully compensates for the immersion characteristics of the thermometer under test.

■ **Siphonic Cell**

*A combined Fixed Point Cell and Heat Pipe*

The outer wall of the fixed point cell is the inner wall of the heat pipe or siphon, thus integrating the cell and its apparatus, giving a guaranteed performance from the cell.



156 to 1084°C

# Slim Fixed Point Cells

## Sealed

- Ultra Pure >99.9999% 6N
- 35 Year Plus History
- For Optimal Realisations

### Water

The Isotech B8 30 130 Cell is small enough to fit into portable Dry Blocks such as the Venus and Europa models. For the larger blocks like the Oceanus Isotech recommend the B 12 46 210 with its increased immersion depth

### Gallium and Mercury Cells

Like the B8 Cell the Slim Gallium Cell can be used in portable blocks like the Venus and Europa, or in stirred liquid baths. The Hydra and Orion have accessories available to support the cells.

### Indium to Copper

Isotech's Slim Cells have been in constant use since their introduction in 1990. The cells have always been made from the highest quality graphite and 6N (99.9999%) pure metals.

After further investment in the lab, and gaining smaller uncertainties from UKAS, we reviewed and further refined our range of metal clad cells to give better accuracy and performance. The new professional ranges of cells have more metal inside providing an active immersion depth in the metal of 160mm.

### Metal Clad

Isotech produced the first metal clad cells in 1990 and have much experience in the manufacture and calibration of high quality proven metal clad cells.

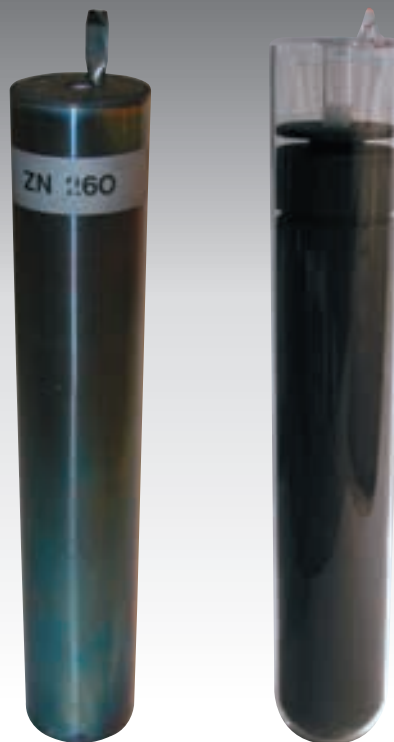
Metal clad cells are recommended for all points from Indium to Aluminium.

### Quartz Clad

These cells are recommended for Silver and Copper points, whilst available for the lower temperature points the metal clad versions are recommended as they are more robust, have the same performance and are more cost effective.

### Equipment for Slim Cells

The Slim Cells can be used in the same apparatus as the larger cells, and the greater immersion depth will give the lowest uncertainties.



Cost effective dedicated desktop apparatus like the POTTS, "Points on the Temperature Scale" can be used to automatically bring the cell to the plateau. These simple to use systems conveniently provide long flat plateau for low uncertainty calibration of thermometers.

### UKAS certification of our Slim Cells

The metal clad fixed point cells are intercompared to our reference cells for smallest uncertainties. Isotech now offer two UKAS services depending on the amount of measurements we make on the cell under test.

In our standard and recommended service we perform one melt, one freeze and one intercomparison. In our premium service, in order to reduce uncertainties we perform two or three melts, two or three freezes and two intercomparisons.

The two optional UKAS services with the uncertainties are tabulated below:

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

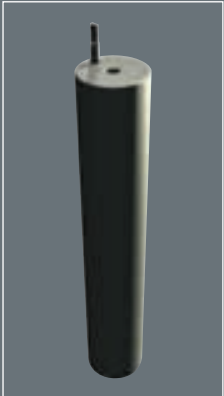
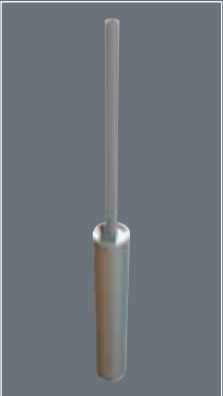
| Cell      | Premium Service<br>UKAS Schedule Note 4 | Standard Service<br>UKAS Schedule Note 5 |
|-----------|-----------------------------------------|------------------------------------------|
| Mercury   | $\pm 0.5\text{mK}$                      | $\pm 1\text{mK}$                         |
| Water     | $\pm 0.1\text{mK}$ (B12)                | $\pm 0.5\text{mK}$                       |
| Gallium   | $\pm 0.5\text{mK}$                      | $\pm 1\text{mK}$                         |
| Indium    | $\pm 0.6\text{mK}$                      | $\pm 2\text{mK}$                         |
| Tin       | $\pm 0.8\text{mK}$                      | $\pm 2\text{mK}$                         |
| Zinc      | $\pm 1\text{mK}$                        | $\pm 2\text{mK}$                         |
| Aluminium | $\pm 2\text{mK}$                        | $\pm 6\text{mK}$                         |
| Silver    |                                         | $\pm 10\text{mK}$                        |



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

| Available Types    |             |                          |                                     |                  |             |
|--------------------|-------------|--------------------------|-------------------------------------|------------------|-------------|
| Cells              | Temperature | Uncertainty <sup>1</sup> | Additional Uncertainty <sup>2</sup> | Model Metal Clad | Model       |
| Water              | 0.01°C      | ±0.5mk                   | ±0.3mk                              | N/A              | B8 30 130   |
| Water              | 0.01°C      | ±0.1mk                   | ±0.3mk                              | N/A              | B12 40 210  |
| Water              | 0.01°C      | ±0.1mk                   | ±0.3mk                              | N/A              | B12 46 210  |
| Gallium            | 29.7646°C   | ±0.5mk                   | ±0.3mk                              | 17401M           | N/A         |
| Mercury            | -38.8344°C  | ±0.5mk                   | ±0.1mk                              | 17724M           | N/A         |
| Higher Temperature |             |                          |                                     |                  | Quartz Clad |
| Indium             | 156.5985°C  | ±0.6mk                   | ±0.7mk                              | 17668ML          | 17668QS     |
| Tin                | 231.928°C   | ±0.8mk                   | ±0.8mk                              | 17669ML          | 17669QS     |
| Zinc               | 419.527°C   | ±1mk                     | ±1.5mk                              | 17671ML          | 17671QS     |
| Aluminium          | 660.323°C   | ±2mk                     | ±3mk                                | 17672ML          | 17672QS     |
| Silver             | 961.78°C    | ±10mk                    |                                     | N/A              | 17673QS     |
| Copper             | 1084.62°C   |                          |                                     | N/A              | 17674QS     |

Isotech cells are of the highest purity available. Open cells conform to CCT/2000-13. Sealed cells are sealed to one atmosphere with 6N pure argon at the freeze temperature.

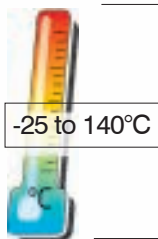
| Metal                                                                                                                                                                     | Quartz                                                                               | Slim Gallium                                                                                 | Slim Mercury                                                                        | Water Triple                                                                           |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------|
|                                                                                         |    |            |  |    |
| <ul style="list-style-type: none"> <li>Robust</li> <li>Protected Against Contamination and Ambient Pressure Effects</li> <li>Easily Transportable Between Labs</li> </ul> | <ul style="list-style-type: none"> <li>Silver and Copper points available</li> </ul> | <ul style="list-style-type: none"> <li>Robust</li> <li>Fits in Isotech Dry Blocks</li> </ul> | <ul style="list-style-type: none"> <li>Robust</li> <li>Fits in Europa-6</li> </ul>  | <ul style="list-style-type: none"> <li>Low cost</li> <li>Fits in Dry Blocks</li> </ul> |

| Nominal Dimensions |              |             |             |                |
|--------------------|--------------|-------------|-------------|----------------|
| Cell               | Outside Dia. | Inside Dia. | Height      | Material Depth |
| Slim Metal         | 37mm         | 8mm         | 220mm       | 160mm          |
| Slim Quartz        | 38mm         | 8mm         | 226mm       | 160mm          |
| Slim Mercury       | 35mm         | 9mm         | 235 + 140mm | 130mm          |
| Slim Gallium       | 35mm         | 10mm        | 200 + 45mm  | 140mm          |
| Water B8 30 130    | 30mm         | 8mm         | 160mm       | 130mm          |
| Water B12 40 210   | 40mm         | 12mm        | 365mm       | 210mm          |
| Water B12 46 210   | 46mm         | 12mm        | 365mm       | 210mm          |

A free report is available, [www.isotech.co.uk/pdfs/SlimCells.pdf](http://www.isotech.co.uk/pdfs/SlimCells.pdf)

*N.B. Other SPRTs may give different results depending on the stem conduction properties.*

- The uncertainty applies when the cells are sufficiently immersed in deep apparatus.*
- When these cells are used in bench-top apparatus the additional uncertainty should be included for stem conduction effects. The value is typical for the 670 SPRT, others SPRTs may give different results depending on the stem conduction properties.*



-25 to 140°C

- 50 x 300mm Calibration Volume
- Use with Water and Gallium Fixed Points
- Can also be used as a Dry Block, Liquid Bath...
- -25°C to 140°C

The Oceanus-6<sup>PLUS</sup> has all the advantages of the Isocal-6 models but with a substantially larger calibration volume, 50mm diameter by 300mm deep. The Oceanus-6 can be used as a Dry Block, a Liquid Bath, a Blackbody Source for infrared thermometers, a Surface Sensor Calibrator and for performance to a few mK (0.001°C) ITS-90 Fixed Points. The Oceanus-6<sup>PLUS</sup> is available in two models, the BASIC (B) and the SITE (S). The B model includes a sophisticated temperature controller with a dual display for Set Temperature and Dry Block Temperature.

The S model includes a built in digital thermometer to which an external standard thermometer can be connected, for Dry Block use this will give greater accuracy eliminating temperature gradient and loading errors.

For Liquid Bath, Surface Sensor or Blackbody use an external thermometer should always be used - either with the S model or the B model and a separate stand-alone indicator. For Lab use the Oceanus-6<sup>PLUS</sup> can be used with a laboratory performance temperature indicator such as one of the Isotech True Temperature Indicators with performance, for similar sensors, down to hundredths of a degree. The Oceanus-6<sup>PLUS</sup> offers unprecedented accuracies of  $\pm 0.0002^\circ\text{C}$  (2 Sigma) at the Water triple point and the Gallium melt temperature of  $29.7646^\circ\text{C}$  and up to  $\pm 0.005^\circ\text{C}$  in the stirred liquid bath option (by comparison).

# ISOCAL - 6 Range

## Oceanus-6

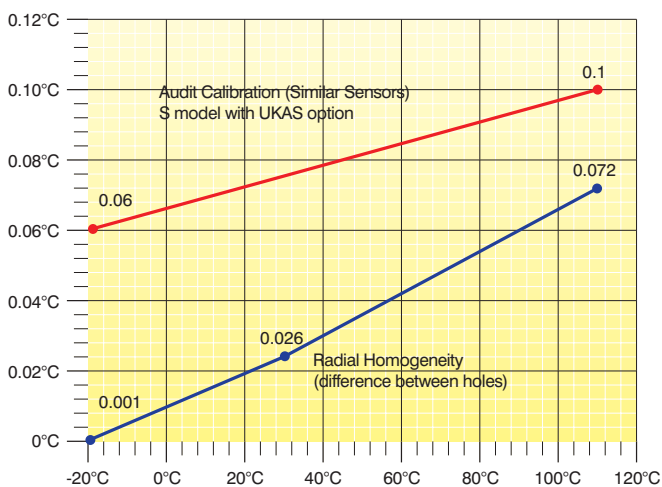

<http://www.isotech.co.uk/industrial/>


## Specification

|                                           |                                                                                                                                                                                                                                                                                                    |                           |                                                                                                                 |
|-------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|-----------------------------------------------------------------------------------------------------------------|
| <b>Model</b>                              | <b>Oceanus-6</b>                                                                                                                                                                                                                                                                                   | <b>Display Resolution</b> | 0.01 -19.99 to 99.99<br>0.1 100.0 to 140.0<br>PC can display 0.01 across whole range with the software included |
| <b>Temperature Range</b>                  | 45°C below ambient to +140°C                                                                                                                                                                                                                                                                       | <b>Indicator units</b>    | °C, °F, K                                                                                                       |
| <b>Absolute stability over 30 minutes</b> | Dry Block Bath $\pm 0.03^{\circ}\text{C}$<br>Stirred Liquid Bath $\pm 0.025^{\circ}\text{C}$<br>Ice/Water Bath $\pm 0.001^{\circ}\text{C}$<br>Blackbody Source $\pm 0.3^{\circ}\text{C}$<br>Surface Sensor Calibrator $\pm 0.5^{\circ}\text{C}$<br>ITS-90 Fixed Point $\pm 0.0002^{\circ}\text{C}$ | <b>Power</b>              | 108 to 130V (50 / 60 Hz) or 208 to 240V (50 / 60 Hz)<br>300 Watts                                               |
| <b>Computer Interface</b>                 | Included with Software                                                                                                                                                                                                                                                                             | <b>Dimensions</b>         | Height 430mm<br>Width 310mm<br>Depth 300mm                                                                      |
| <b>Cools from</b>                         | 20°C to -10°C in 90 minutes                                                                                                                                                                                                                                                                        | <b>Weight</b>             | 17kg                                                                                                            |
| <b>Heats from</b>                         | -10°C to 80°C in 60 minutes                                                                                                                                                                                                                                                                        |                           |                                                                                                                 |
| <b>Calibration volume</b>                 | 50mm diameter by 300mm deep                                                                                                                                                                                                                                                                        |                           |                                                                                                                 |
| <b>Standard Insert</b>                    | 6 pockets, all 8.0mm diameter and 250mm deep                                                                                                                                                                                                                                                       |                           |                                                                                                                 |

## Isocal-6 Performance and Use

**580 Oceanus 6**



### Calibration and Uncertainty

A certificate, traceable to National Standards, is included as standard. Recommended is an optional UKAS five-point calibration.

The accuracy will depend very much on the mode of use and the types of sensor to be used. Please contact Isotech for tutorials and uncertainty calculations and comprehensive evaluation reports. The 580 Oceanus-6<sup>PLUS</sup> meet the Calibration Capacity requirements of EURAMET/cg-13/v.01, "Guidelines on the Calibration of Temperature Block Calibrators".

### Features (Basic & Site)

#### Oceanus 6+

|                                  |                       |
|----------------------------------|-----------------------|
| Dry Block                        | ✓                     |
| Stirred Liquid bath Option       | ✓                     |
| Stirred Ice Bath Operation       | ✓                     |
| Surface Sensor Option            | ✓                     |
| Infrared Calibration Option      | ✓                     |
| ITS-90 Fixed Point Cells         | <i>Water, Gallium</i> |
| Additional 8mm Pre-heat Pocket   | ✓                     |
| Configurable Units: °C, °F and K | ✓                     |
| Supply Voltage Power Correction  | ✓                     |

### Additional Features (Site)

#### Oceanus 6+

|                                         |   |
|-----------------------------------------|---|
| Independant Temperature indicator       | ✓ |
| Universal Input Types PT100             | ✓ |
| Thermocouples Types K,N,R,S,L,PL2,T,J,E | ✓ |
| Linear Process Inputs Including 4-20 mA | ✓ |
| Stand Alone Thermostat Testing          | ✓ |
| Thermostat Testing With PC              | ✓ |
| Five Point Digital Probe Matching       | ✓ |
| Configurable Units: °C, °F and K        | ✓ |

# Isocal-6 Ultimate Flexibility - Oceanus

Calibrate all sensor types - Thermocouples, PRT's, Thermistors, Thermostats, Infrared, Surface Sensors...



**1 Metal Block Insert 580-06-03**  
Standard Insert included

**Alternative Inserts**

**580-06-04** Blank Insert without pockets for local machining. Includes M4 tapped hole for supplied extractor tool.

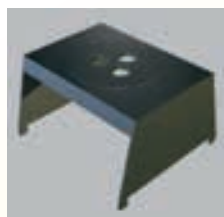
**580-06-05** Custom insert. Isotech can provide custom drilled pockets, minimum of 3mm separation between holes. Contact with your requirements.

**580-06-06** Adjustable Equalising Block. Six pockets 8mm x 157mm deep.



**2 Stirred Liquid Mode with Liquid Container Kit 580-06-07**  
Allows liquid bath use, includes container, magnetic stirrer, probe guide and sealing cap.

**3 Stirred Ice Bath Mode with Liquid Container Kit**  
Uses same liquid kit to provide 0°C reference as a stirred ice bath



**Additional Accessories for use with the above kit**

**Thermometer Support Kit 580-06-00** Allows three thermometers to be suspended in the bath, including liquid in glass types

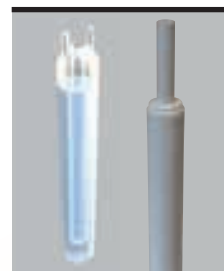
**C10 Oil 936-06-07** 1 Litre  
(-35°C to +140°C)



**4 Infrared Calibration Mode with Blackbody Target 580-02-12** Use optional Probe **935-14-85** placed in the auxiliary block pocket for use as a reference.



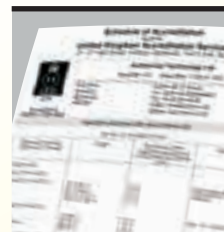
**5 Surface Sensor Calibration with Surface Sensor Kit 580-06-08** Includes angled platinum resistance thermometer.



**6 ITS-90 Fixed Point Cells**

**B12/46/210** Water Triple Point Cell

**17401** Gallium Cell



**UKAS Calibration**

UKAS Calibration available to order, legally traceable in more than 70 countries.



**Standard Probe 935-14-85/DB** Platinum Resistance Thermometer for use up to 250°C.

6mm diameter Angled head feature avoids sensors in block.



**Carrying Case 931-22-58** Sturdy case accommodates the unit with room for accessories

## How To Order

Specify Model, Basic or Site, Supply Voltage, Accessories and if UKAS Calibration is required.



30 to 700°C

# Dry Block Calibrator

## 510 Medusa & 511 Medusa 3

- 45 x 285mm Calibration Volume
- Use for Comparison and Fixed Point Calibration
- Use with very long thermometers

Isotech have a wide range of Dry Blocks to suit probes requiring a large immersion depth. These products feature large and deep calibration volumes. As such they are less portable than the earlier Dry Blocks, but have higher capacities and retain outstanding temperature uniformity, this uniformity is so good that these larger products are also apparatus for Secondary Laboratories to realize the Fixed Points of ITS-90.

Medusa 510 has a maximum operating temperature of 550°C. The Medusa Model 511 can be used to 700°C and features three zone control. In addition to the main heating zone there are additional top and bottom heaters which compensate for the end losses creating a constant temperature zone across the well.

For Comparison Calibration the Medusa should be used with an insert, the standard insert has six 8mm pockets 250mm deep. Also available is an insert 44mm diameter x 170mm deep which is suspended from the top of the block so that the height is user adjustable. For flexibility the Medusa can also be used with accessories for infrared thermometers and surface sensors. The Medusa is available in two models, the BASIC (B) and the SITE (S). The B model includes a sophisticated temperature controller with a dual display for Set Temperature and Dry Block Temperature.

The S model includes a built-in digital thermometer to which an external standard thermometer can be connected giving greater accuracy, eliminating temperature gradient and loading errors. Also included in the site model is a timer which can set the bath between two temperatures, and automate ITS-90 fixed point operation. For Surface Sensor and Blackbody use an external thermometer is recommended. For laboratory accuracy the Medusa can be used with a high-end temperature indicator such as an Isotech TTI model.

Includes as standard: Windows Software, Computer Interface and a Ramp to Set Point Feature. Increased resolution of  $\pm 0.01$  available throughout the range via the PC interface and from 0.01 to +99.99 locally on the auto-ranging front display. The controller features multi-point block to display correction giving good absolute accuracy.

The S model has universal sensor input allowing Platinum Resistance Thermometers, Thermocouples (types K, N, R, S, L, B, PL2, T, J and E) along with Linear Process Inputs including 4-20mA current transmitters to be displayed on the in-built indicator. The indicator can be programmed with up to five calibration points to provide high accuracy digital probe matching. The indicator and controller are both addressable over the communications link.



### Fixed Point Cells Available

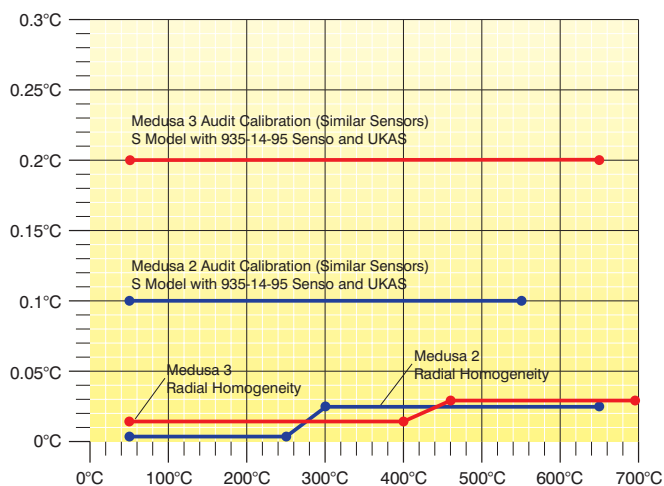
| Material  | Temperature |
|-----------|-------------|
| Gallium   | 29.7646°C   |
| Indium    | 156.5985°C  |
| Tin       | 231.928°C   |
| Zinc      | 419.527°C   |
| Aluminium | 660.323°C   |

## Specification

| Model                              | 510 Medusa                                                                                                   | 511 Medusa 3                                                                                                        |
|------------------------------------|--------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------|
| Temperature Range                  | 30°C to 550°C                                                                                                | 50°C to 700°C                                                                                                       |
| Absolute stability over 30 minutes | Metal Block Bath<br>Blackbody Source<br>Surface Sensor Calibrator<br>ITS-90 Fixed Point                      | $\pm 0.03^{\circ}\text{C}$<br>$\pm 0.1^{\circ}\text{C}$<br>$\pm 0.5^{\circ}\text{C}$<br>$\pm 0.001^{\circ}\text{C}$ |
| Computer Interface                 | Included with Software                                                                                       |                                                                                                                     |
| Cools from                         | 550°C to 30°C in 5 hours                                                                                     |                                                                                                                     |
| Heats from                         | 30°C to 550°C in 90 minutes                                                                                  |                                                                                                                     |
| Uncertainties                      | Refer to Uncertainties Graph                                                                                 |                                                                                                                     |
| Calibration volume                 | 45mm diameter by 285mm deep                                                                                  |                                                                                                                     |
| Standard Insert                    | Six 8mm pockets all 250mm deep                                                                               |                                                                                                                     |
| Display Resolution                 | (0.01) to 99.99<br>(0.1) 100.0 to 650.0<br>PC can display 0.01 across whole range with the software included |                                                                                                                     |
| Indicator units                    | °C, °F, K                                                                                                    |                                                                                                                     |
| Power                              | 108 to 130V or 208 to 240V 50 / 60Hz<br>1000 Watts                                                           | 1800 Watts                                                                                                          |
| Overall dimensions                 | Height 430mm<br>Width 310mm<br>Depth 300mm                                                                   |                                                                                                                     |
| Weight                             | 17kg                                                                                                         | 25kg                                                                                                                |

## Performance and Use

### 510 Medusa



### Calibration and Uncertainty

A certificate, traceable to National Standards, is included as standard. Recommended is an optional UKAS five-point calibration.

The accuracy of the Medusa will depend very much on the mode of use, see the Uncertainty Graph for typical uncertainties. NTPL calculate the uncertainties to UKAS requirements. The Medusa meets the Calibration Capacity requirements of EA-10/13, "EA Guidelines on the Calibration of Temperature Block Calibrators."

### Features (Basic & Site)

| Features (Basic & Site)          | Medusa |
|----------------------------------|--------|
| Dry Block                        | ✓      |
| Surface Sensor Option            | ✓      |
| Infrared Calibration Option      | ✓      |
| ITS-90 Fixed Point Cells         | ✓      |
| Additional 8mm Pre-heat Pocket   | ✓      |
| Configurable Units: °C, °F and K | ✓      |
| Supply Voltage Power Correction  | ✓      |

### Additional Features (Site)

| Additional Features (Site)              | Medusa |
|-----------------------------------------|--------|
| Independant Temperature indicator       | ✓      |
| Universal Input Types PT100             | ✓      |
| Thermocouples Types K,N,R,S,L,PL2,T,J,E | ✓      |
| Linear Process Inputs Including 4-20 mA | ✓      |
| Stand Alone Thermostat Testing          | ✓      |
| Thermostat Testing With PC              | ✓      |
| Five Point Digital Probe Matching       | ✓      |

# 510 Medusa & 511 Medusa 3

Calibrate all sensor types - Thermocouples, PRT's, Thermistors, Thermostats, Infrared, Surface Sensors...



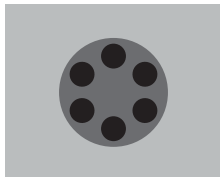
## 510 Metal Block Insert

**510-06-01** Standard Insert included

**510-06-02** Blank Insert without pockets for local machining

**510-06-03** Special Insert. Contact Isotech with your requirements

**510-06-04** Adjustable Equalising Block



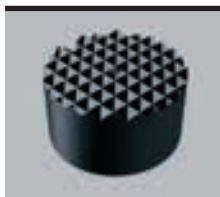
## 511 Metal Block Insert

**511-06-01** Standard Insert Included

**511-06-02** Blank Insert without pockets for local machining

**511-06-03** Special Insert. Contact Isotech with your requirements

**511-06-04** Adjustable Equalising Block



## Blackbody Kit

**510-06-05** For 510. Includes a Blackbody target and Sensor.

**511-06-05** For 511. Includes a Blackbody target and Sensor.

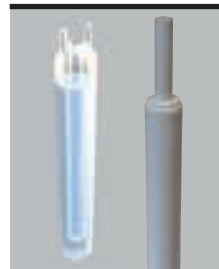


## 510 Surface Sensor Calibration with Surface Sensor Kit

**510-06-06** Includes an insert and an angled thermocouple.

## 511 Surface Sensor Calibration with Surface Sensor Kit

**511-06-06** Includes an insert and an angled thermocouple.



## ITS-90 Fixed Point Cells

**ITL17401M** Gallium Slim Cell (510)

**ITL17668ML** Indium Slim Cell

**ITL17669ML** Tin Slim Cell

**ITL17671ML** Zinc Slim Cell

**ITL17672ML** Slim Aluminium Cell (511)

**510-05-00** Cell Basket for 510

**510-05-01** Cell Basket for 511



## UKAS Calibration

UKAS Calibration available to order, legally traceable in more than 70 countries.



## Standard Probe

**935-14-95H/DB** Platinum Resistance Thermometer for use up to 650°C.



## Carrying Case

**931-22-58** Sturdy case accommodates the unit with room for accessories

## How To Order

Specify Model, Basic or Site, Supply Voltage, Accessories and if UKAS Calibration is required.



450 to 1100°C

# POTTS Oberon

- 50 x 300mm Calibration Volume
- Compact Heatpipe Furnace
- Suits Aluminium, Silver or Copper Fixed Points
- Can be used for comparison and infrared calibration

Model 426 is for Aluminium, Silver or Copper slim fixed point cells as well as for comparison calibration. Heatpipes provide the ideal conditions for the creation and maintenance of slim ITS-90 cells.

The furnace core is a specially-designed stress-free isothermal heat pipe, which provides a very low thermal gradient along the core working length.

The heatpipe is designed so that the inner wall is not subject to thermal expansion stresses from the outer wall before the heat pipe reaches conduction temperature. The working fluid is permanently and safely sealed within the plasma-arc welded enclosure.

The Oberon can be used with Blackbody Fixed Point Cells.



*Oberon for Aluminium or Copper Slim Fixed Point Cells*

| Model               | 426                                                          | Accessories                         |                                                                      |
|---------------------|--------------------------------------------------------------|-------------------------------------|----------------------------------------------------------------------|
| Temperature Range   | 450°C to 1100°C                                              | Metal Block Bath                    | 426-06-05 Adjustable Equalising Block. Six pockets 8mm x 160mm deep. |
| Stability           | ±0.05°C                                                      | ITS-90 Fixed Point                  | ITL M 17672QS / 17672ML Aluminium Quartz / Metal Clad Slim Cell      |
| Display resolution  | 0.1°C                                                        | Apparatus                           | ITL M 17673QS Silver Quartz Clad Slim Cell                           |
| Cavity size         | 50mm diameter<br>300mm deep                                  |                                     | ITL M 17674QS Copper Quartz Clad Slim Cell                           |
| Time to temperature | 4 hours                                                      | Inconel Basket including insulators | 426-04-00                                                            |
| Communications      | Ethernet and USB Host                                        | 230/110V Transformer                | 935-19-43                                                            |
| Power               | 110 Vac, 1.5kW, 50/60Hz<br>(230 Vac Transformer available)   |                                     |                                                                      |
| Dimensions          | Height 410mm<br>Width 415mm<br>Depth 280mm<br>Weight 30.5kgs |                                     |                                                                      |

#### How to order

426 Oberon High Temperature Furnace  
Please specify voltage required

# Precision Thermometers

Isotech have a range of innovative precision thermometers to match the calibration requirements of all labs, from the most demanding of National Metrology Institutes through to the needs of those calibrating industrial sensors.

## Precision Thermometers

Isotech have a range of precision thermometers, from a two channel handheld thermometer, the TTI-10 to a bench mounting thermometer with performance to 1mK (0.001°C) at a ground breaking new price.

## True Surface Temperature Measuring System

This is a true temperature indicator for use with surface temperature measurement, ideal for use with the Small Hot-Plate Model 983.

## Semi Standard Resistance Thermometers and Thermocouples

This section includes a range of "Semi Standard" thermometers that can be used with the TTI's. These precision semi standards are more rugged and affordable than the standard thermometers and ideal for industrial applications.

## Fixed Resistors

Isotech have a miniature resistor with an ultra low temperature coefficient, model 836, with accuracies of  $\pm 0.005\%$  and temperature coefficients of less than 1ppm. These resistors offer an outstanding cost to performance ratio and will find use alongside a model from our TTI range and in other areas of industrial calibration.



In addition to Precision Thermometers a range of Thermometry Bridges are available. The microK range have accuracies of  $< \pm 0.1\text{ppm}$  to suit Primary and Secondary Laboratories.

Details are in Catalogue 1: Solutions for Primary and Secondary Laboratories.

## Thermometer Selection Guide

| Model     | SPRTs | PRTs | Thermistors | Thermocouples | Accuracy at 0°C | Features                                                |
|-----------|-------|------|-------------|---------------|-----------------|---------------------------------------------------------|
| TTI-10    |       | ■    |             |               | 0.01°C          | Handheld, two channel                                   |
| TTI-22    | ■     | ■    |             |               | 0.001°C         | Sets new Standard for Price to Performance Ratio        |
| milliK    | ■     | ■    | ■           | ■             | 0.003°C         | SPRTs, PRTs, Thermistors and Thermocouples              |
| Model 954 |       |      |             |               |                 | 8 Channel PRT Switch for TTI-22 and TTI-7 PLUS          |
| Model 958 |       |      |             |               |                 | 8 Channel Thermocouple Switch for TTI-22 and TTI-7 PLUS |



### True Surface

Temperature Measuring System

- Indicates True Surface Temperature
- 30°C to 350°C
- Resolution 0.1°C



### Semi Standard

Resistance Thermometers and Thermocouples

- Ideal for Industrial Applications
- Can be supplied with UKAS
- Choice of temperature ranges and sizes



### Fixed

Resistors

- Wide range of Values
- Oil Filled
- Precise and Stable for Industrial References



-200 to 850°C

# Handheld Thermometer

## TTI-10

- High Accuracy Handheld Thermometer
- High Resolution, to 0.001°C
- Perfect Standard for use with Isocal-6, Fast-Cal & Dry Blocks

The TTI-10 is a high accuracy handheld temperature indicator with two platinum resistance thermometer inputs. The high precision makes the instrument particularly suitable as a portable reference thermometer to use alongside Isotech temperature calibrators such as the Fast-Cal, Isocal-6 and Dry Block ranges. It is also suited for high accuracy measurements in industrial and scientific applications.

TTI-10 brings laboratory level performance of up to 10mK (0.01°C) and resolution up to 0.001°C in a portable handheld instrument. Battery life is typically 20 hours from a 9V PP3 battery and a protective rubber boot offers protection in field use.

The instrument can capture the minimum, maximum and average values over up to 4000 measurements with a logging rate selectable in the range of 1 second to 30 minutes.

The TTI-10 has an easy to use "learning calibration mode" that allows the TTI-10 to be system calibrated with a Platinum Resistance Thermometer simply by comparing it to a calibrated standard thermometer, no need to calculate coefficients or data, simply enter the reference probe temperature or temperatures and the TTI-10 does the work for you.

The USB interface allows connection to Isotech Cal Notepad software with its charting and logging features.

TTI-10 supports Isotech Semi Standard Platinum Resistance probes with system uncertainties (probe and instrument) as low as 20mK. We recommend the 935-14-61 and 935-14-16 probes detailed below and have special calibration deals available. Other probes and ranges are available, refer to Semi Standards – Platinum Resistance Thermometers in catalogue.



**Input Connectors**  
Highest quality latching metal 'Lemo' connectors.



**Rubber Sleeve**  
The TTI-10 Handheld Thermometer is supplied with a protective rubber boot.

## Specifications

|                           |                                                                              |
|---------------------------|------------------------------------------------------------------------------|
| Input Channels            | Two: 100 Ohm PRT, EN 60751 (Pt100), Four Wire                                |
| Range                     | -200°C to +850°C                                                             |
| Units                     | °C, °F and Ohms                                                              |
| Resolution                | 0.001°C from -199.999°C to +199.999°C remaining range 0.01°C                 |
| Accuracy: Instrument Only | ±0.012°C from -80°C to 199.999°C<br>±0.02°C ±0.0015% RDG from 200°C to 660°C |
| Logging                   | Record Average, Min and Max over 4000 measurements                           |
| Measuring interval        | Adjustable: 1 second to 30 minutes                                           |
| PC Interface              | USB - Cable Included                                                         |

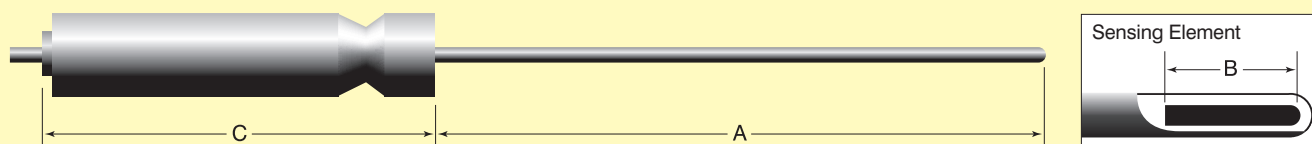
|                     |                                                                      |
|---------------------|----------------------------------------------------------------------|
| Connectors          | High Quality Latching Metal: Lemo:                                   |
| Working temperature | 0°C to +40°C                                                         |
| Display             | 2-line LCD<br>Display Single Channel or Dual Channels Simultaneously |
| Housing             | Plastic (ABS) supplied with protective rubber boot                   |
| Weight              | 300g                                                                 |
| Power Supply        | 9V battery PP3 (or via USB Cable)                                    |
| Battery Life        | Typically 20 Hours                                                   |
| Dimensions          | 200 x 85 x 40 mm (LxWxH)                                             |

## Options

|                                               |                                                                                                                           |
|-----------------------------------------------|---------------------------------------------------------------------------------------------------------------------------|
| Semi Standard PRT<br>935-14-112-TTI           | Isotech Semi Standard Platinum Resistance Thermometer:<br>Fast Response, 2m Cable Length, four wire with Lemo plug fitted |
| UKAS System Calibration<br>TTI-10-14-112-SYST | Recommended: -50°C to 199.999°C<br>Four Point System Calibration, Uncertainty across range 0.025°C (25mK)                 |
| Semi Standard PRT<br>935-14-61-TTI            | Isotech Semi Standard Platinum Resistance Thermometer:<br>Fast Response, 2m Cable Length, four wire with Lemo plug fitted |
| UKAS System Calibration<br>TTI-10-14-61-SYST  | Recommended: -50°C to 199.999°C<br>Four Point System Calibration, Uncertainty across range 0.02°C (20mK)                  |

|                                               |                                                                                                                          |
|-----------------------------------------------|--------------------------------------------------------------------------------------------------------------------------|
| Semi Standard PRT<br>935-14-116-TTI           | Isotech Semi Standard Platinum Resistance Thermometer: General Purpose, 2m Cable Length, four wire with Lemo plug fitted |
| UKAS System Calibration<br>TTI-10-14-116-SYST | Recommended: 0°C to 420°C<br>Four Point System Calibration, Uncertainty across range 0.04°C (40mK)                       |

Carrying Case  
931-22-101



### ■ Recommended Probes (Fit TTI-10 Carry Case)

| Model          | Maximum Range   | Diameter | Length (A) | Sensing Length (B) | Handle (C) | Cable   | Application                        |
|----------------|-----------------|----------|------------|--------------------|------------|---------|------------------------------------|
| 935-14-112/TTI | -50°C to 250°C  | 3mm      | 225mm      | 6mm                | No Handle  | 2m PTFE | Fast Response, Low Stem Conduction |
| 935-14-61/TTI  | -50°C to 250°C  | 4mm      | 300mm      | 6mm                | 19 x 120mm | 2m PTFE | Fast Response, Low Stem Conduction |
| 935-14-116/TTI | -100°C to 450°C | 6mm      | 350mm      | 25mm               | 19 x 120mm | 2m PTFE | General Purpose                    |



-270 to 1820°C

# Precision Thermometer

## milliK

- Wide Range of Sensors, SPRTs, PRTs, Thermistors, Thermocouples and 4-20mA Transmitters
- High Accuracy,  $< \pm 5\text{ppm}$  for PRTs,  $\pm 2\mu\text{V}$  for Thermocouples and  $\pm 1\mu\text{A}$  for Transmitters
- Logs and Controls Isotech Temperature Sources  
Massive logging capacity - supports Dry Blocks and Liquid Baths

The milliK Precision Thermometer from Isotech sets a new standard for the high accuracy measurement and calibration of Platinum Resistance Thermometers, Thermistors, Thermocouples and Process Instrumentation (4-20mA) over the range  $-270^{\circ}\text{C}$  to  $1820^{\circ}\text{C}$ .

In addition to low uncertainty measurements from Reference Standards and Industrial sensors, the milliK can control Isotech temperature sources, sequencing through a programmable list of temperature set points and log data to internal memory or a USB drive.

The milliK has two input channels for sensors and a third channel for current. It can be expanded to become a measuring system with up to 33 channels reading SPRTs, RTDs, Thermistors, or Thermocouples with the option to control calibration baths and log readings accurately.

### Benefiting You

The milliK sets a new standard for value, versatility and accuracy -  $< \pm 5\text{ppm}$  over range for PRTs,  $\pm 2\mu\text{V}$  for Thermocouples and  $\pm 1\mu\text{A}$  for current transmitters, see table.

Supporting a wide range of sensors and functions it replaces individual devices making it a cost effective calibration solution.

A robust design and operation from AC or DC power allows the milliK to be used in the laboratory, test room or out in the field.

The milliK can display in  $^{\circ}\text{C}$ ,  $^{\circ}\text{F}$ , K, Ohms, mV and mA with numeric and graphical display modes. The large back lit display makes configuring the instrument and setting the scrolling strip charts intuitive. The USB port allows for the use of a mouse, keyboard or USB Drive.

### Built on World Leading Technology

In 2006 Isotech launched the microK range of thermometry bridges which quickly established themselves as the instrument of choice for National Metrology Institutes and Primary Laboratories with innovative features, accuracy and versatility.

In response to industry demands for greater accuracy, the milliK now brings the same design philosophy used in the microK to those outside the Primary Laboratory. Users calibrating industrial sensors in the laboratory, pharmaceutical plants, food and beverage plants, aerospace, power industries and service companies will welcome the milliK as a solution to increase measurement confidence, ensure high accuracy traceable calibration, improve quality as well as ensure safety and lower energy consumption.



*The Isotech milliK  
High Accuracy Measurement  
Controls Calibration Baths  
Logs Data*

### No Compromise Design

The design team have considered industrial users and applications in order to avoid measurement errors and problems encountered in some instruments from other manufacturers:

- **Eliminates Thermal EMF Errors in PRTS**  
Fast current reversal technology and solid state switching eliminate thermal EMF effects avoiding the errors that occur with fixed DC instruments.
- **Lead Wire Correction**  
PRT lead wire errors are eliminated for up to 30m of four core screened cable. Also supports lead wire correction for three wire PRTs.
- **Galvanic Isolation**  
Not only are the two sensor channels galvanically isolated, the 4 - 20mA input is also separately isolated. The benefits of the advanced design are no ground loops, improved safety and noise immunity.

### High Resolution

The display resolution is  $0.0001^{\circ}\text{C}$  (0.1mK) made possible by using a powerful Sigma Delta Analogue to Digital converter to achieve a true measuring resolution of just  $28\mu\Omega$  equivalent to  $0.00007^{\circ}\text{C}$  (0.07mK) for PRT inputs.

### Expandable

The milliKanner adds eight channels, and each can be configured individually as a SPRT, PRT, Thermistor or Thermocouple input. A maximum of four milliKanners can be added, providing up to 32 channels - all controlled from the milliK touch screen or an RS232 connection.

## Reliable

Like the award winning microK range, the milliK is all solid state. There are no mechanical relays, switches or potentiometers which would reduce reliability.

## Input Connectors

No compromise design ruled out lower cost problematic connectors and the SPRT / PRT inputs are via the highest quality gold plated push / pull self latching circular connectors overcoming the problems seen elsewhere where thermometers have been designed to a budget.

## Outstanding CJC Performance and Flexibility

Again, the no compromise design philosophy led to a specially developed rugged thermocouple connector made from alumina and incorporating a digital temperature sensor for optimal cold junction accuracy.

Three CJC modes allow thermocouple operation with internal automatic compensations, external 0°C reference systems or the milliK can measure the

junction with a probe on an unused channel, useful for automated systems.

## 21st Century Design

Utilising a powerful internal operating system and fast 32 Bit processor the milliK has the power and capacity to overcome the memory limitations of older instruments.

## Store Probe Data

There is sufficient memory for an almost unlimited number of standard probes, allowing the storing of calibration data for both resistance thermometers and thermocouples. The digital matching of probe data allows the instrument to show the true temperature. The instrument will warn if a probes calibration time has expired.

## Data Logging

Older instruments are limited to a maximum number of logged data points, the milliK is limited only by storage space. The internal memory can store more than six months of data, and with a low cost USB Memory stick the milliK can log continuously for a lifetime

## Data Management

Probe data and logged measurements can be exported to a USB Memory drive at the push of a button. Additionally, the instrument is future proof with future software updates applied from a USB drive.

## Connectivity and Communications

With USB host, two serial interfaces and Ethernet it is easy to communicate with the milliK whether it is on the bench next to a PC or remotely using a LAN or WAN connection. These interfaces are fitted as standard.

The milliK includes a PC lead and software.

## Open Calibration

The milliK is readily calibrated against resistance and voltage standards. There are no internal adjustments and the calibration commands are simply sent via RS232 or from the front panel (password protected). The procedure is open and fully documented unlike some other instruments where there is no choice but to return to the manufacturer.



### 1 The milliK can connect to Isotech temperature sources

Dry Blocks (Basic & Site only), Liquid Baths and Furnaces

Can cycle the bath through a series of temperatures logging the data - all without a PC.



### 2 Wide range of sensors

The milliK can use Standard Reference probes and read from industrial sensors being calibrated, including 4 - 20mA transmitters - all to high accuracy.



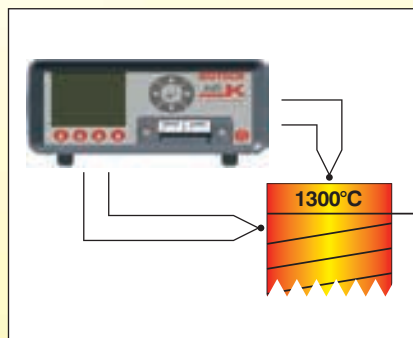
### 3 Expandable

The milliK can be expanded to have a maximum of 33 high accuracy channels. The milliKanner has eight expansion channels, with each channel configurable for SPRT, PRT, Thermistor or Thermocouple input type.



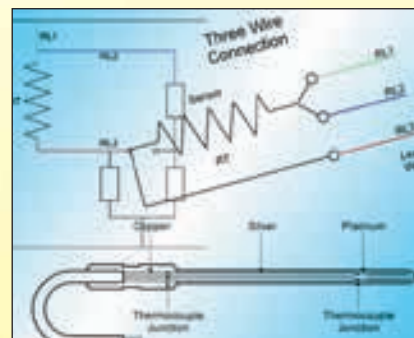
### 4 Logs

The milliK can record time stamped data to internal memory or a USB Memory Drive.



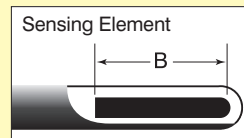
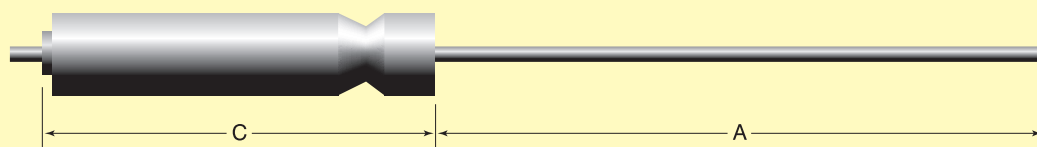
### 5 Safety

The milliK inputs are galvanically isolated, with the 4 - 20mA input separately isolated avoiding problems with high voltage pick up common when using thermocouples in high temperature furnaces.



### 6 Designed to eliminate and protect against real world problems

The milliK eliminates thermal EMF errors, compensates for lead wire resistance and warns if a probe is out of calibration.



#### ■ Recommended Probes (Fit milliK Case)

| Model          | Maximum Range   | Diameter | Length (A) | Sensing Length (B) | Handle (C) | Cable   | Application                        |
|----------------|-----------------|----------|------------|--------------------|------------|---------|------------------------------------|
| 935-14-61/TTI  | -50°C to 250°C  | 4mm      | 300mm      | 6mm                | 19 x 120mm | 2m PTFE | Fast Response, Low Stem Conduction |
| 935-14-116/TTI | -100°C to 450°C | 6mm      | 350mm      | 25mm               | 19 x 120mm | 2m PTFE | General Purpose                    |

For further options and details, see Reference Probes - Semi Standards, pages 76-81.

For laboratory standard thermometers we recommend for SPRTs the Isotech Model 909Q and for thermocouples the Model 1600 Type R, see Catalogue 1: Solutions from Primary & Secondary Laboratories.



Optional Carrying Case  
Part number: 931-22-102

- The choice for high accuracy temperature measurement - expandable for multi-channel operation
- Higher Accuracy than DAQ Systems
- Ideal for industrial sensor calibration alongside Dry Block and Liquid Baths.
- Expandable to 33 channels with no loss of accuracy



milliK shown with  
optional channel  
expander



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

## Specifications

|                |                                                                 |
|----------------|-----------------------------------------------------------------|
| Input Channels | 3                                                               |
| Channels 1+2   | SPRTs, PRTs, Thermistor and Thermocouples                       |
| Channel 3      | Process Inputs 4 - 20mA<br>Isolated 24VDC Power Supply Included |

|        |                |         |
|--------|----------------|---------|
| Ranges | SPRTs:         | 0-115Ω  |
|        | PRTs:          | 0-460Ω  |
|        | Thermistors:   | 0-500kΩ |
|        | Thermocouples: | ±115mV  |
|        | 4-20mA:        | 0-30mA  |

|               |                      |
|---------------|----------------------|
| Display Units | °C, °F, K, Ω, mV, mA |
|---------------|----------------------|

|                |         |             |
|----------------|---------|-------------|
| Accuracy       | Initial | Over 1 year |
| SPRTs/PRTs:    | 5ppm    | 7ppm        |
| Thermistors:   | 50ppm   | 150ppm      |
| Thermocouples: | 2μV     | 4μV         |
| 4-20mA:        | 0.01%   | 0.02%       |

|                      |         |             |
|----------------------|---------|-------------|
| Temperature Accuracy | Initial | Over 1 year |
| SPRTs/PRTs (at 0°C): | 3mK     | 4mK         |
| (over full range):   | 5mK     | 7mK         |
| Thermistors:         | 50ppm   | 150ppm      |

| Thermocouples:  | Ice Point Ref |         | Internal CJC |         |
|-----------------|---------------|---------|--------------|---------|
|                 | Initial       | 1 Year  | Initial      | 1 Year  |
| Type B @ 1000°C | ±0.12°C       | ±0.14°C | ±0.12°C      | ±0.14°C |
| Type E @ 600°C  | ±0.02°C       | ±0.05°C | ±0.10°C      | ±0.20°C |
| Type J @ 600°C  | ±0.03°C       | ±0.05°C | ±0.12°C      | ±0.23°C |
| Type K @ 600°C  | ±0.04°C       | ±0.06°C | ±0.13°C      | ±0.25°C |
| Type L @ 600°C  | ±0.03°C       | ±0.05°C | ±0.12°C      | ±0.23°C |
| Type N @ 600°C  | ±0.04°C       | ±0.06°C | ±0.10°C      | ±0.19°C |
| Type R @ 1000°C | ±0.09°C       | ±0.12°C | ±0.14°C      | ±0.21°C |
| Type S @ 1000°C | ±0.10°C       | ±0.14°C | ±0.16°C      | ±0.24°C |
| Type T @ 200°C  | ±0.02°C       | ±0.03°C | ±0.10°C      | ±0.18°C |
| Au-Pt @ 600°C   | ±0.06°C       | ±0.08°C | ±0.10°C      | ±0.15°C |

|            |                    |           |
|------------|--------------------|-----------|
| Resolution | Resistance (PRTs): | 0.00001Ω  |
|            | (Thermistors):     | 0.001Ω    |
|            | Voltage:           | 0.00001mV |
|            | Current:           | 0.001mA   |
|            | Temperature:       | 0.0001°   |

|                         |                |                                            |
|-------------------------|----------------|--------------------------------------------|
| Temperature Conversions | PRTs:          | IEC60751(2008), Callendar-van Dusen, ITS90 |
|                         | Thermocouples: | IEC584-1 1995 (B,E,J,K,N,R,S,T), L, Au-Pt  |
|                         | Thermistors:   | Steinhart-Hart, polynomial                 |

|                 |              |                                      |
|-----------------|--------------|--------------------------------------|
| Sensor Currents | SPRTs/PRTs:  | 1mA and 1.428mA<br>±0.4% (reversing) |
|                 | Thermistors: | 5μA (reversing)                      |

|                   |             |                 |
|-------------------|-------------|-----------------|
| Keep-Warm Current | SPRTs/PRTs: | 1mA and 1.428mA |
|-------------------|-------------|-----------------|

|                  |                |                                                   |
|------------------|----------------|---------------------------------------------------|
| Input Connectors | SPRTs/PRTs:    | LemoEPG.1B.306.<br>HLN 6-pin gold plated contacts |
|                  | Thermocouples: | Miniature Thermocouple socket (ASTM E 1684-05)    |
|                  | 4-20mA:        | 4mm sockets                                       |

|            |                                          |
|------------|------------------------------------------|
| Interfaces | 10/100MBit Ethernet (RJ45 socket)        |
|            | USB (2.0) host                           |
|            | 2 x RS232 (9-pin D-type plug, 9600 Baud) |

|         |                                                                |
|---------|----------------------------------------------------------------|
| Display | 89mm / 3.5" QVGA (320 x 240) colour TFT LCD with LED backlight |
|---------|----------------------------------------------------------------|

|                      |                     |                                        |
|----------------------|---------------------|----------------------------------------|
| Operating Conditions | Operating:          | 0-45°C / 32-113°F,<br>0-99% humidity   |
|                      | Full Specification: | 15-30°C / 50-85 °F,<br>10-90% humidity |

|            |                                                                                                           |
|------------|-----------------------------------------------------------------------------------------------------------|
| Statistics | In Addition to Instantaneous Display user can select mean of 2 - 100 measurements with Standard Deviation |
|------------|-----------------------------------------------------------------------------------------------------------|

|                  |                                              |
|------------------|----------------------------------------------|
| Measurement Time | PRTs (4-wire): 0.4s                          |
|                  | (3-wire): 0.7s                               |
|                  | Thermistors: 0.4s                            |
|                  | Thermocouples (ice point): 0.4s              |
|                  | (internal CJC): 0.7s<br>(external CJC): 1.0s |

|              |                                                                                                               |
|--------------|---------------------------------------------------------------------------------------------------------------|
| Cable Length | Limited to 10Ω per core and 10nF shunt capacitance (equivalent to 100m of typical 4-core screened PTFE cable) |
|--------------|---------------------------------------------------------------------------------------------------------------|

|         |                                                                              |
|---------|------------------------------------------------------------------------------|
| Logging | Capacity to store > 180 Days of time stamped measurements to internal memory |
|---------|------------------------------------------------------------------------------|

|                    |                                                      |
|--------------------|------------------------------------------------------|
| Recommended Probes | Isotech Semi Standard PRTs<br>Isotech Model 909 SPRT |
|--------------------|------------------------------------------------------|

|       |                                                                   |
|-------|-------------------------------------------------------------------|
| Power | 88-264V (RMS), 47-63Hz (universal),<br>6W maximum or 4 x AA cells |
|-------|-------------------------------------------------------------------|

|            |                                                      |
|------------|------------------------------------------------------|
| Dimensions | 255mm x 255mm x 114mm / 10" x 10" x 4.5" (W x D x H) |
|------------|------------------------------------------------------|

|        |              |
|--------|--------------|
| Weight | 2.25kg / 5lb |
|--------|--------------|

|                        |            |
|------------------------|------------|
| Optional Carrying Case | 931-22-102 |
|------------------------|------------|

**NOTE:** Due to our program of continual development and improvement, we reserve the right to amend or alter characteristics and design without prior notice.



-270 to 1820°C

# Channel Expander millisKanner

- Expands milliK to a maximum of 33 Channels
- Supports SPRTs, PRTs, Thermistors and Thermocouples
- Universal Inputs for Flexibility

The millisKanner channel expander has eight input channels, and each can be configured individually for SPRT, PRT, Thermistor or Thermocouple input. This gives ultimate flexibility with no need for separate devices for resistance or thermocouple inputs. A maximum of four devices can be added to the milliK providing 33 sensor inputs as well as the 4 - 20mA Process Input.

With no loss of accuracy and total flexibility a milliK system can be configured to suit a wide range of reference thermometers and units under test. This adaptable system saves on cost with no need for separate dedicated expansion modules and the flexibility maximises the usefulness of each channel.

A solid state design avoids mechanical relays and provides high reliability. The inputs are isolated with galvanic isolation between the contacts and the PSU and also from the control circuitry which allows for better measurements and lower noise.



The millisKanner is controlled from the milliK with plug and play operation.

For use as a standalone switch for PRTs, the device has UP / DOWN touch buttons or can be operated via RS232. The temperature of the input thermocouple connectors can be read directly over RS232 to facilitate reference junction compensation.



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

|                    |                                                                                              |                        |                                                 |
|--------------------|----------------------------------------------------------------------------------------------|------------------------|-------------------------------------------------|
| Model              | millisKanner                                                                                 | Max devices per milliK | 4                                               |
| Channels           | 8                                                                                            | Power                  | 5V DC at 100mA<br>(mains power supply provided) |
| Channel Indication | LED                                                                                          | CJC Sensor             | Digital                                         |
| Input Connectors   | Terminal Post, accepts 4mm<br>plugs, spades and bare wires<br>Miniature Thermocouple Sockets | Size                   | 255 x 255 x 80mm                                |
| Control            | Automatic:<br>Plug and Play from the milliK<br>Manual:<br>UP / DOWN buttons or RS232         | Weight                 | 2.3kg                                           |

UP TO  
**x4**  
expandable

- Add up to 4 millisKanners
- Expand to a maximum of 33 Channels
- Same Accuracy - no loss in performance
- No Need for Multiple Modules - each channel can be selected for 3 or 4 Wire PRTs, SPRTs, Thermocouples or Thermistors



*millisKanner  
shown here  
with milliK,  
order separately*

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



-250 to 962°C

# True Temperature Indicator

## TTI - 22

- Accuracy to 0.001°C, 1mK
- Warns if calibration due date exceeded
- No mechanical relays, long life

Quite simply the Isotech TTI-22 High Accuracy Thermometer sets new standards in the price to performance ratio for industrial and secondary resistance thermometry. If you need high accuracy at an affordable price you have to look at the TTI-22.

The TTI-22 has an accuracy of 0.001°C and a resolution of 0.0001°C (0.00004 Ohms). It has two input channels, is lightweight (1.8kg) and will operate for more than 10 hours from two small AA cells. It has both RS232 and Ethernet ports.

Simple to use, supporting both Industrial 100 Ohm probe and SPRTs to ITS-90, 25.5 and 100 Ohm. Up to 30 probe calibrations can be stored along with the calibration expiry date so the instrument can warn when the calibration time has been exceeded.

Built in statistics calculation can show you both the measured and average values along with the standard deviation over previous measurements.

The Isotech TTI-22 is ideal as a reference standard alongside liquid calibration baths, for the smallest uncertainty calibration with Dry Blocks or for demanding stand alone measurement applications.

Previously this level of performance was confined to specialist laboratories with expensive thermometry bridges; TTI-22 delivers 5 to 10 times the performance of comparably priced instruments.

- The TTI-22 uses the same patented measurement technique as the earlier TTI-2.
- Each measurement performs a zero point and gain correction.
- The switched polarity DC measuring current (0.4mA) eliminates thermal EMFs.
- Surface mount construction ensures long term reliability.



*Simple to use  
High Accuracy  
High Resolution*

| Model                      | TTI-22                                                                                                                                                   |
|----------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------|
| Inputs                     | 2 channel<br>Pt100 (BS EN 60751 / IEC 751) or<br>25.5/100Ω SPRT to ITS-90                                                                                |
| Measuring Current          | 0.41mA                                                                                                                                                   |
| Self Heating Test Current  | 0.29mA (0.41mA / √2)                                                                                                                                     |
| Measuring Time             | 1.44 seconds for both channels                                                                                                                           |
| Measuring Range            | -250 to 960°C (0 to 440 Ohm)                                                                                                                             |
| Resolution                 | Temperature: 0.0001°C, 0.1mK<br>Resistance: 0.00004Ω, 40 μΩ                                                                                              |
| Uncertainty of Measurement | Temperature: 0.001°C, 1mK 100 Ohm PRT<br>Resistance: 0.4mΩ @ 20°C<br><i>Instrument only, uncertainty with sensor dependant on range and sensor type.</i> |
| Reference Resistor         | Internal 380Ω<br>TCR ±0.3ppm / °C<br>Stability ±5ppm / year                                                                                              |
| Interface                  | RS232, Ethernet, built-in web server<br>provides simple temperature display                                                                              |
| Ambient Temp. Range        | 10°C to 30°C                                                                                                                                             |
| Power Supply               | 7.5VDC, 250mA power adaptor or 2 x AA<br>batteries (typically > 10 hours operating time)                                                                 |
| Case Dimensions            | Width: 190mm<br>Height: 112mm<br>Depth: 240mm<br>Weight: 1.8kg                                                                                           |

The TTI-22 continually compares the connected sensor to a highly stable precision internal reference resistor. For a Pt100 at 0°C the annual stability for absolute measurement is typically  $\pm 1.3\text{mK}$  ( $5\text{ppm} \times 100\Omega = 0.5\text{m}\Omega / 1.3\text{mK}$ ).

For comparison calibration, when a reference probe is compared to a calibrated standard, the long term stability is not important as any change of value is cancelled in the comparison. The temperature coefficient is  $0.3\text{ppm} / ^\circ\text{C}$  and the measuring time, for both channels, is just 1.44 seconds.

The instrument can be configured to measure ratio of the measured

resistance of the two input channels, a technique familiar to users of older style thermometry bridges.

The overall uncertainty of the instrument and probe together will be determined by the model of probe and the temperature range. For the majority of applications the contribution of the instrument uncertainty will be negligible compared to the uncertainty of the calibrated probe.

Recommended probes include the Isotech 909/100 and 670SQ /100, 935-14-16, 935-14-95L and H.

The TTI-22 includes Cal Notepad software for easy monitoring and logging of data. It is fully compatible with Isotech I-Cal Easy which can automate comparison calibration.



931-22-106 Optional Carrying Case



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



# Terminal Adaptor

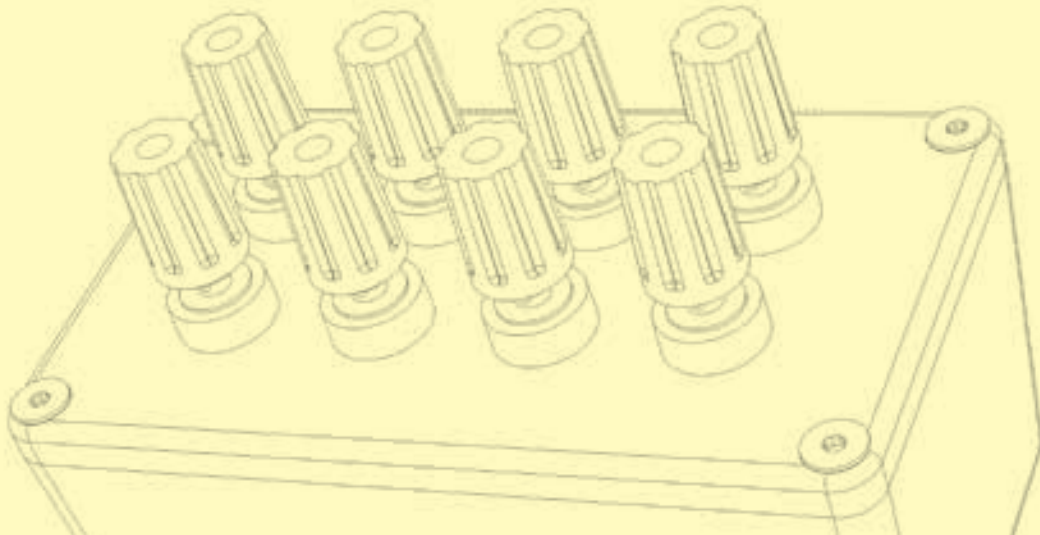
## Model 956

- Time Saving
- Accepts Bare Wire, Spades or Banana Plugs
- Suits a wide range of Isotech instruments

Our TTI range use high quality 'Lemo' connectors for the Pt100 inputs. This simple accessory provides 4mm Terminal Posts for the connection of bare wires, spade terminals or 4mm plugs - useful if a lot of probes are going to be used with the instrument.

The adaptor connects to the TTI via two flexible cables, terminated with the appropriate Lemo connector.

New compact design.



### Specifications

|            |                               |
|------------|-------------------------------|
| Dimensions | Height 65mm                   |
|            | Width 115mm                   |
|            | Depth 105mm (including plugs) |
| Weight     | 0.4kg                         |

### How to Order

956 Terminal Adaptor suits milliK, TTI-6, TTI-7 or TTI-10  
956/TTI-22 Terminal Adaptor for TTI-22

# Miniature Fixed Resistor

## Model 836

- Wide range of Values
- Oil Filled
- Precise and Stable for Industrial References

Isotech produces a miniature resistor with ultra-low temperature coefficient and ultra-high stability.

This is achieved because the resistors are oil filled and hermetically sealed.

The function of hermetic sealing is to eliminate the ingress of moisture and oxygen both of which play a role in both short and long term degradation of unsealed resistors. A further enhancement in both short and long term stability is achieved by oil filling. The oil also acts as a thermal conductor allowing the device to accept short periods of overload without degradation.

With accuracies of  $\pm 0.005\%$  and long term drift of less than 5ppm, these devices are virtually secondary standards that can be carried in sets for daily or periodic calibration of factory systems.

### Resistance Values

We keep in stock the following standard values:  
10 $\Omega$ , 25 $\Omega$ , 100 $\Omega$ , 1000 $\Omega$ , 10,000 $\Omega$

### UKAS Calibration

For the highest quality traceability we recommend that the 836 be UKAS Certified.

| Measured Quantity<br>Instrument or<br>Gauge Range | Frequency | Best measurement<br>Capability expressed<br>as an Expanded<br>Uncertainty ( $k=2$ ) |
|---------------------------------------------------|-----------|-------------------------------------------------------------------------------------|
| <b>DC Resistance</b>                              |           |                                                                                     |
| 0.1 $\Omega$ to 1000 $\Omega$                     |           | $\pm 10\text{ppm}$                                                                  |
| 1 k $\Omega$ to 100 k $\Omega$                    |           | $\pm 12\text{ppm}$                                                                  |
| <b>AC Resistance</b>                              |           |                                                                                     |
| 0.1 $\Omega$ to 400 $\Omega$                      | 75 Hz     | $\pm 10\text{ppm}$                                                                  |
| 400 $\Omega$ to 1000 $\Omega$                     | 75 Hz     | $\pm 12\text{ppm}$                                                                  |

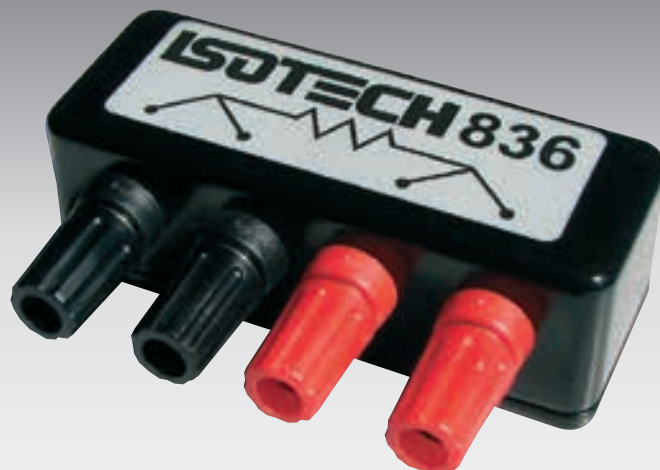
The latest schedule can be found on the  
Isotech website or at [www.ukas.org](http://www.ukas.org).



#### Please Note:

We offer other Resistor Ranges including the models 456, the SRA and the SRB ranges.

For more information please contact Isotech, or visit our website  
[www.isotech.co.uk](http://www.isotech.co.uk)



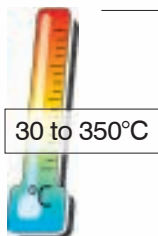
| Model                                         | 836 Miniature Fixed Resistor                                                                                                                                     |
|-----------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Power Rating                                  | 0.5 watt                                                                                                                                                         |
| Nominal Temperature Coefficient of Resistance | +0.6ppm/ $^{\circ}\text{C}$ (0 $^{\circ}\text{C}$ to +25 $^{\circ}\text{C}$ )<br>-0.6ppm/ $^{\circ}\text{C}$ (+25 $^{\circ}\text{C}$ to +60 $^{\circ}\text{C}$ ) |
| Resistance Tolerance                          | (Initial Resistance Accuracy)<br>$\pm 0.005\%$                                                                                                                   |
| Resistance Range                              | 5 ohms to 3.3 megaohms                                                                                                                                           |
| Current Noise                                 | <0.010 $\mu\text{V}$ (RMS) / Volt of applied voltage                                                                                                             |
| Thermal EMF                                   | 0.1 $\mu\text{V}/^{\circ}\text{C}$ maximum<br>0.05 $\mu\text{V}/^{\circ}\text{C}$ typical                                                                        |
| Connections                                   | Screw Terminal Posts                                                                                                                                             |
| Stability                                     | Typically 1ppm per year at 1mA                                                                                                                                   |
| Dimensions                                    | Height 30mm<br>Width 89mm<br>Depth 58mm (including terminals)                                                                                                    |
| Weight                                        | 90g                                                                                                                                                              |

#### How to Order

836 Miniature Fixed Resistor

Please state Ohms Value Required

Please state if UKAS Certification is required



# Surface Measurement

## Model 944

- Indicates True Surface Temperature
- 30°C to 350°C
- Resolution 0.1°C

The fundamental problem with surface temperature measurement is that it is subject to large stem conduction errors, also because heat conducted from the surface of the hot-plate causes a localised cold spot to be created which means that the temperature indicated by the hot plate is not necessarily the temperature at the point of measurement.

An ideal system would not disturb the heat-flux from the hot-plate.

During 1993 such a system was described (ref. "Progress in Contact Thermometry" 1993 B. D. Foulis) and Isotech have the inventors permission to make and market the device World-wide.

### Principal of Operation

A fine wire type N thermocouple is used as the surface temperature sensor, a second junction 2 to 3mm along the thermocouple, senses the temperature difference due to heat flux along the sensor.

A heater heats the thermocouple stem until the temperature gradient is zero, thus creating a measurement without stem conduction, or disturbance of the hot-plate's surface.

The 944 can be used with the Isotech Small Hot Plate model 983. A traceable calibration certificate is available to order.



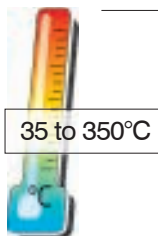
| Model                 | 944 True Surface Temperature Measurement System                 |                         |
|-----------------------|-----------------------------------------------------------------|-------------------------|
| Temperature Range     | 30°C to 350°C                                                   |                         |
| Resolution of display | 0.1°C or 0.1°F                                                  |                         |
| Stability             | ±1°C                                                            |                         |
| Accuracy              | ±2°C with TRACEABLE Certification<br>±5°C without Certification |                         |
| Probe Assembly        | Probe Diameter                                                  | 7.5mm                   |
|                       | Probe Length                                                    | 150mm                   |
|                       | Lead Length                                                     | 850mm                   |
| Power Supply          | 100V - 120V, 50 / 60Hz or<br>200V - 240V, 50 / 60Hz             |                         |
| Dimensions            | Height                                                          | 90mm                    |
|                       | Width                                                           | 153mm                   |
|                       | Depth                                                           | 265mm (excluding plugs) |
| Weight                | 4kg                                                             |                         |

### How to Order

Model 944 & Probe 935-14-81

Please state supply voltage required

Please state if Calibration is required



# Surface Sensor Calibrator

## Small Hot Plate

- Low Cost Portable Hot Plate
- PC Interface and Software
- Stable to  $\pm 0.1^\circ\text{C}$

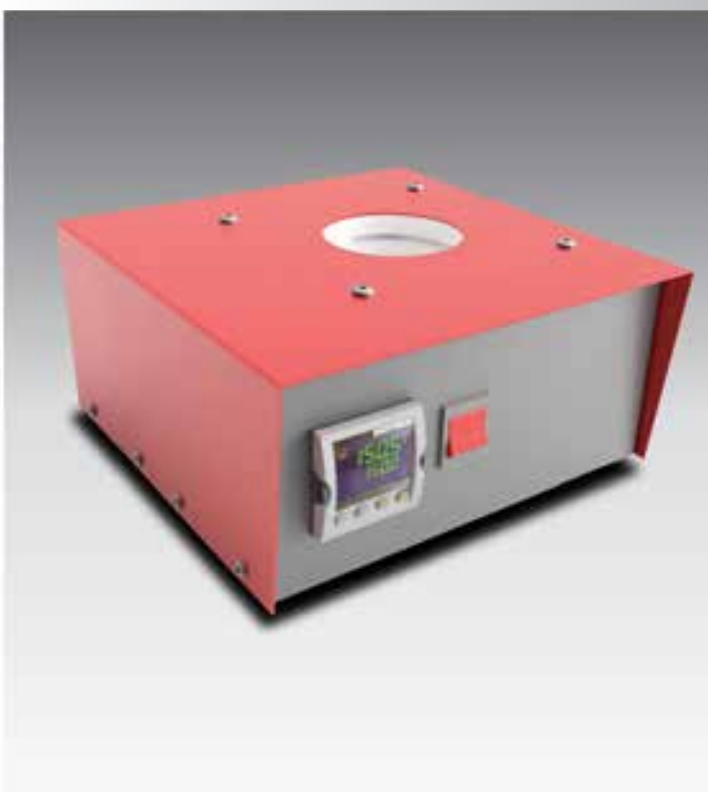
The Isotech Small Hotplate is a lightweight portable calibration system purpose designed for surface mounted sensors. The flat surface plate is made from precision-machined aluminum. The sensor to be tested is simply placed on the surface, for higher accuracy a calibrated surface sensor can be placed alongside and the two compared.

Good thermal contact is ensured by the flat disc that is recessed to allow the optional use of a heat transfer paste or fluid. Uniform heat distribution is achieved with a flat spiral heater clamped to an integrating block below the surface of the plate. The typical accuracy that can be achieved  $1^\circ\text{C}$  but this will be influenced by the type of sensor to be calibrated.

The internal control sensor is located immediately below the plate's surface.

A protective cover that can fit over the block is included along with a comprehensive handbook.

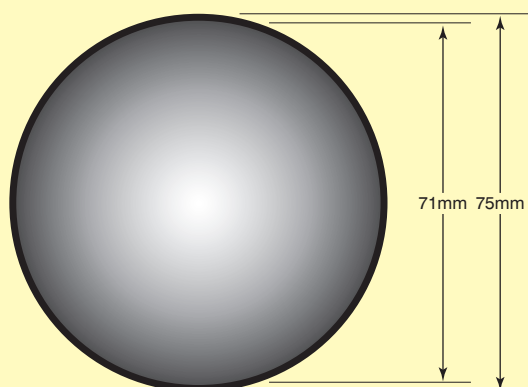
The temperature range is from  $35^\circ\text{C}$  to  $350^\circ\text{C}$ , which is set by an advanced, but easy to use temperature controller. The controller has 0.01 resolution below  $100^\circ\text{C}$  ( $0.1^\circ$  above  $100^\circ$ ). A PC interface is included as standard along with an RS232 converter lead and Windows software.



### Notes:

*A similar model but with a black high emissivity surface is available.*

*Many of the dry block calibrators featured within this book have accessories available for surface sensor calibration.*



**Hotplate  
Dimensions**

| Model              | 983 Small Hot Plate                                                                                    |
|--------------------|--------------------------------------------------------------------------------------------------------|
| Temperature Range  | $35^\circ\text{C}$ to $350^\circ\text{C}$                                                              |
| Stabilisation Time | 10 minutes                                                                                             |
| Cools from         | $350^\circ\text{C}$ to $100^\circ\text{C}$ in 125 minutes                                              |
| Heats from         | $50^\circ\text{C}$ to $350^\circ\text{C}$ in 20 minutes                                                |
| Uncertainties      | Dependant on sensors and method of use<br>$1^\circ\text{C}$ typical                                    |
| Calibration volume | Flat Plate 71mm diameter                                                                               |
| Display Resolution | 0.01 to 99.99<br>0.1 100 to 350.0<br>PC can display 0.01 across whole range with the software included |
| Units              | $^\circ\text{C}$ , $^\circ\text{F}$ , K                                                                |
| Power              | 100 to 115V (50 / 60 Hz) or<br>200 to 230V (50 / 60 Hz)<br>200 Watts                                   |
| Dimensions         | Height 115mm<br>Width 230mm<br>Depth 225mm                                                             |
| Weight             | 3.9kg                                                                                                  |

### How to Order

983 Small Hot Plate

Please specify voltage required



-196 to 670°C

# 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.*

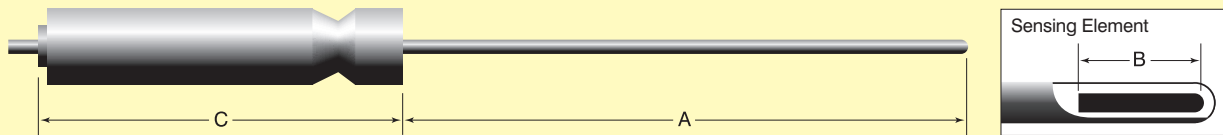


## Universal Specifications

|                         |                                                                                    |
|-------------------------|------------------------------------------------------------------------------------|
| 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<br>Calibration at extra cost.<br>See table for typical uncertainties |
| Connection              | Four Wire                                                                          |
| Max. Handle Temperature | 80°C                                                                               |

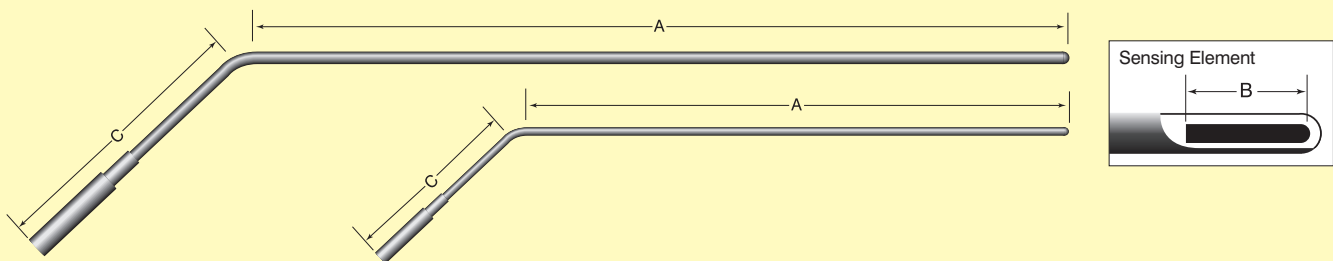
## ■ Isotech Semi Standard Reference Probes

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

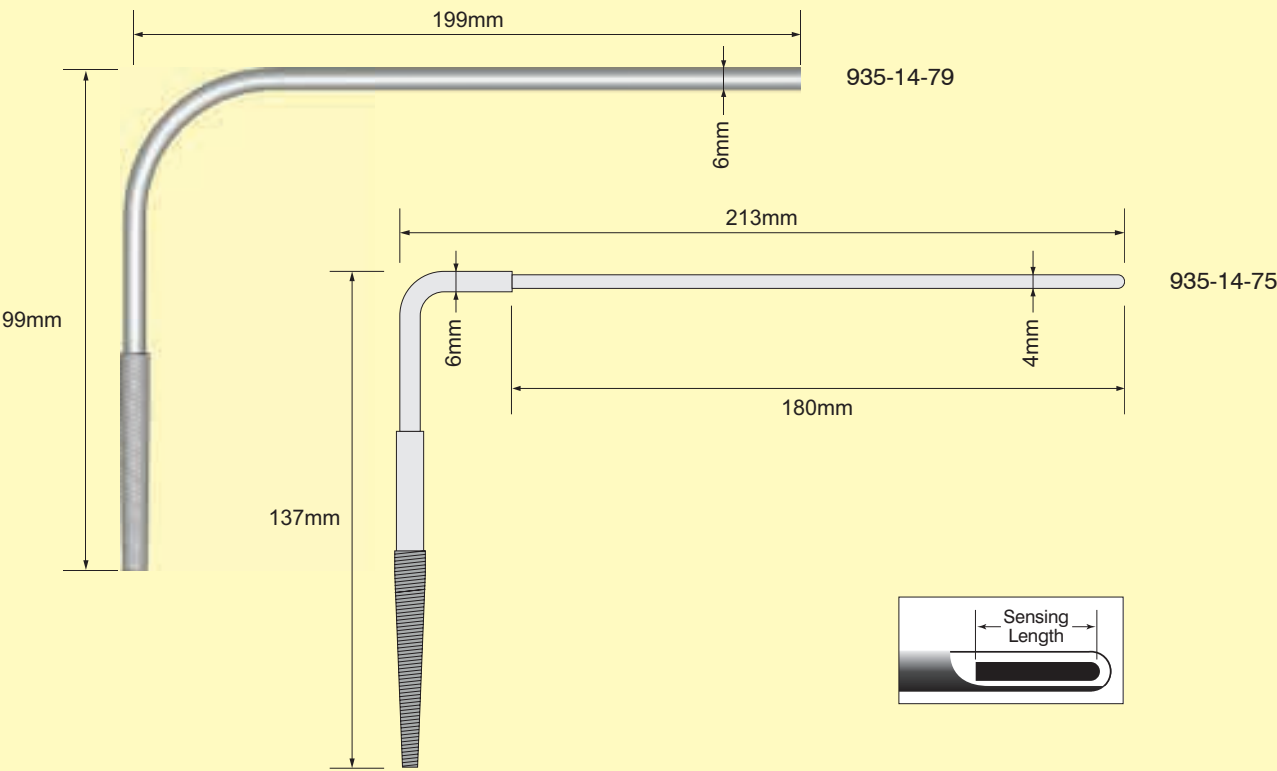
Bare Wire (BW)  
TTI suits milliK and TTI-1 to TTI-7, TTI-b – suits TTI-22  
DB Connector for Dry Block Calibrator Site Indicator

### 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*<br>935-14-112 | 935-14-13<br>935-14-113* | 935-14-16<br>935-14-116 | 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                       | 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.

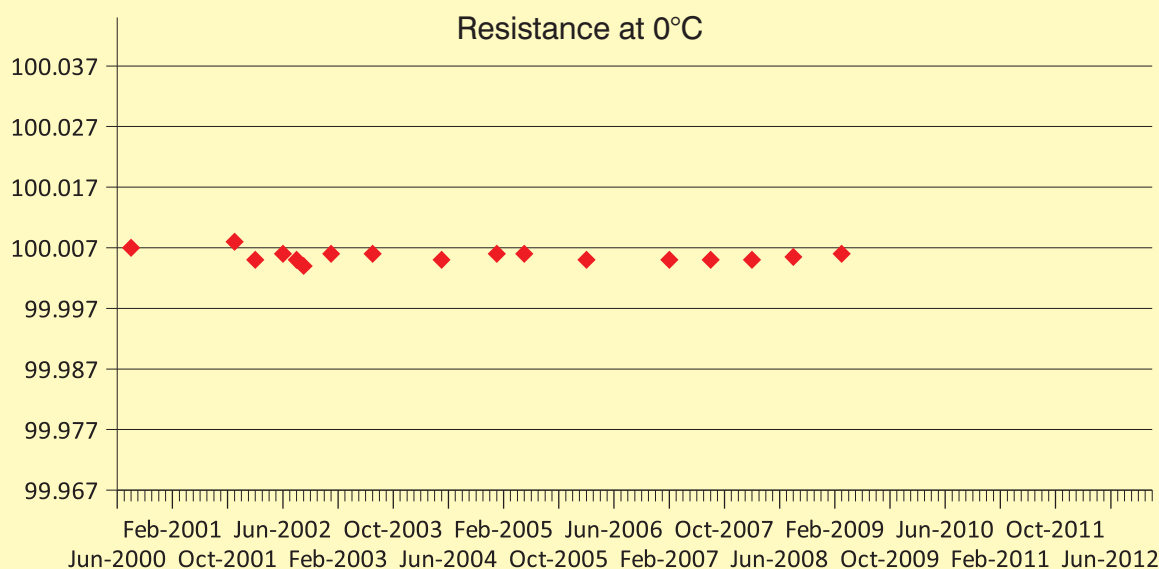
Kind regards,

**Guy Snelling**

Temperature Metrologist  
InterCal (South Africa)



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





0 to 1300°C

# 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.

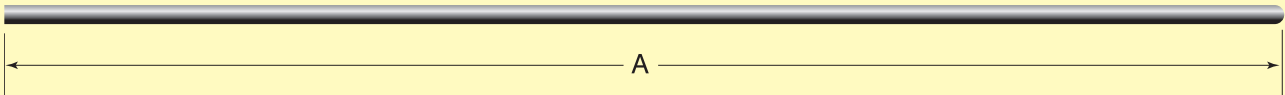
The 935-14-91 is constructed from Platinum and Platinum Rhodium alloys and can be used to 1300°C.

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.

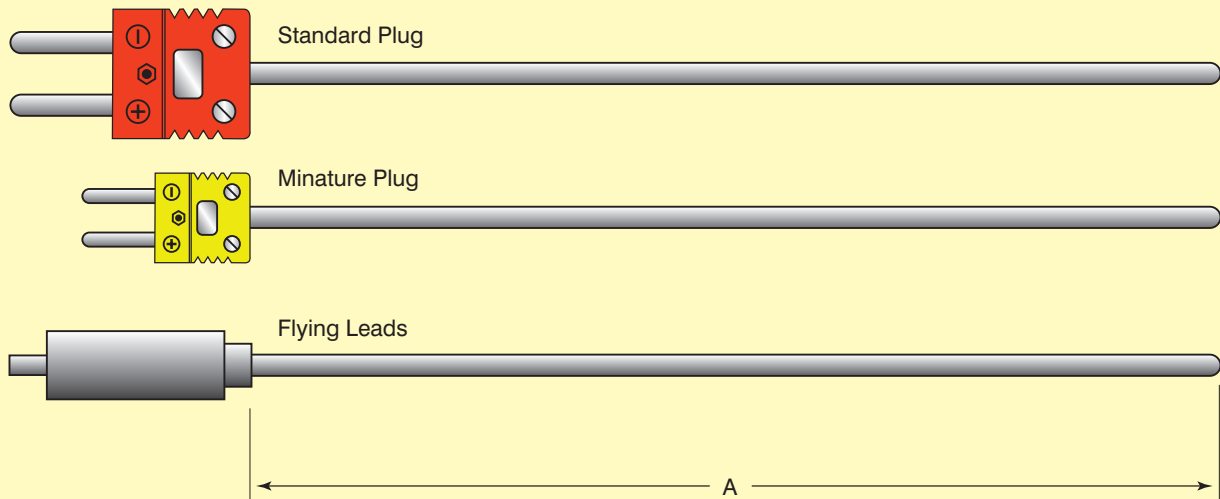

<http://www.isotech.co.uk>



### ■ 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, General Purpose    | 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 Miniature Plug | 0 to 1200°C | Gemini 700<br>Jupiter 650 | N    |
| 935-14-64 | 3mm      | 300mm     | Miniature Plug          | 0 to 1200°C | General Purpose           | N    |
| 935-14-65 | 3mm      | 300mm     | Standard Plug           | 0 to 1200°C | General Purpose           | N    |
| 935-14-66 | 3mm      | 500mm     | 1M Cable Miniature Plug | 0 to 1200°C | General Purpose           | N    |
| 935-14-67 | 3mm      | 500mm     | Miniature Plug          | 0 to 1200°C | General Purpose           | N    |
| 935-14-68 | 3mm      | 500mm     | Standard Plug           | 0 to 1200°C | General 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

# Introduction to Temperature Calibration Software

## Software

Isothermal Technology's range of calibration software saves you time and lowers calibration costs. Isotech have a tested solution to calculate coefficients for industrial probes, for SPRTs, fit thermocouple error curves and fully automate the calibration of sensors.

### ITS-90 Software

Icarus is software for the ITS-90 Laboratory to calculate between resistance and temperature for SPRTs. It allows for the calculation of coefficients and the printing of charts and certificates, *see our publication "Solutions for Primary and Secondary Laboratories"*

### Cal NotePad

Isotech calibration equipment is supplied with Cal NotePad. This software allows equipment to be controlled remotely,

monitored and the logging of data which can be imported into spreadsheet software. Cal NotePad supports the connection of both an Isotech Furnace, Bath, Block and an Isotech TTI Temperature Indicator.

### I-Cal Easy Software

Both Cal Notepad and I-Cal Easy LOG are available at no cost to users of Isotech equipment.

I-Cal Easy LOG can be upgraded to the full version 'I-Cal Easy' to enable the automatic calibration of temperature sensors, from controlling the calibration run to printing certificates and calculating coefficients. When I-Cal Easy LOG is first installed it allows all the features of I-Cal Easy to be used over a 30 day evaluation period. After 30 days it can be used in LOG mode indefinitely.

| Software Comparison Chart                           | Cal Notepad | I-Cal Easy LOG | I-Cal Easy  |
|-----------------------------------------------------|-------------|----------------|-------------|
| Connect to Isotech Equipment                        | ✓           | ✓              | ✓           |
| Included with Isotech Equipment                     | ✓           | ✓              | <i>Demo</i> |
| Monitor and Record Data                             | ✓           | ✓              | ✓           |
| Supports Isotech Scanner and Switchboxes            | ✗           | ✓              | ✓           |
| Automatic Sensor Calibration                        | ✗           | ✗              | ✓           |
| Print Certificates                                  | ✗           | ✗              | ✓           |
| Design Custom Certificates                          | ✗           | ✗              | ✓           |
| Calculate Coefficients for IEC-751 (Cvd) and IST-90 | ✗           | ✗              | ✓           |
| Produce Thermocouple Tables                         | ✗           | ✗              | ✓           |



*Demonstration versions of our software are available to download for evaluation:*

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

## CAL *NotePad*

# Calibration Software Cal NotePad

- Easy to use
- Interface to Isotech Block Baths & Temperature Indicators
- Log Chart and Export data - Control Calibration Bath - Read Standard

The purpose of Cal NotePad (CNP) is to automatically log and display the temperature of an Isotech calibration bath together with the unit under test. Cal NotePad can be used with baths (or indicators) without PC interfaces by the user typing in values from the keyboard. The Cal NotePad can be used to identify the operator and the unit under test. With the click of a button data is logged with time information, it is also possible to log continually.

The calibration bath temperature can be changed from the PC or from the calibration bath's controller - Cal NotePad will display the temperature changes as they occur on the re-scalable chart display.

For traceable calibration the unit under test should be compared to a calibrated standard thermometer. Cal NotePad can record the actual temperature of the bath from either the in-built indicator of an Isotech SITE model or from a variety of external instruments see list. If the external instrument has two channels e.g. Isotech TTI then the unit under test may be connected to channel B for logging with CNP. Alternatively the value can be typed in from the keyboard. Similarly the calibration bath controller value, actual temperature, SITE indicator value or unit under test value may also be entered manually.

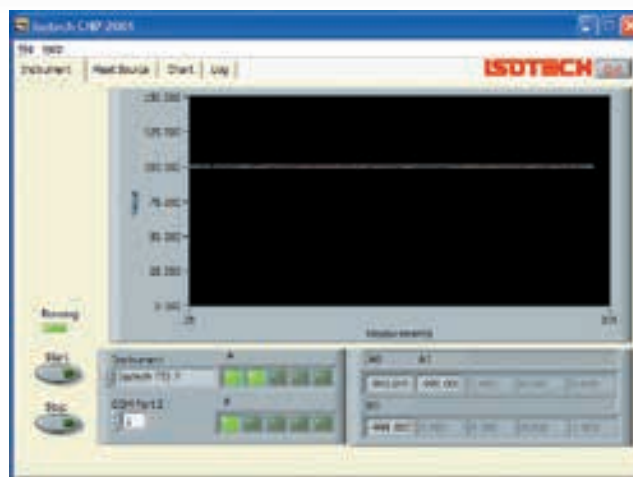
Then the manually entered data is combined with that gathered automatically and the resultant file can be opened in an external application such as Excel for the preparation of reports, certificates etc.

Cal NotePad is designed for ease of use, it will give a chart of the system. When the operator determines the system is stable - easily seen from the chart, then clicking a button will record time, operator, serial numbers of unit under test along with controller and indicator values.

Cal NotePad can be used for semi-automatic calibration, see I-Cal Easy for a fully automated calibration solution.



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



### System Requirements

Laptop or Desktop  
Windows 10/11  
Serial Ports: RS232 or Adapters

### CNP is compatible with the following Isotech calibration equipment:-

Calibration Baths, Furnaces, Dry Block and POTT models with a serial interface.

### Temperature Indicators:

Isotech milliK, TTI-1, TTI-2, TTI-5, TTI-6, TTI-7, TTI-10 and TTI 22

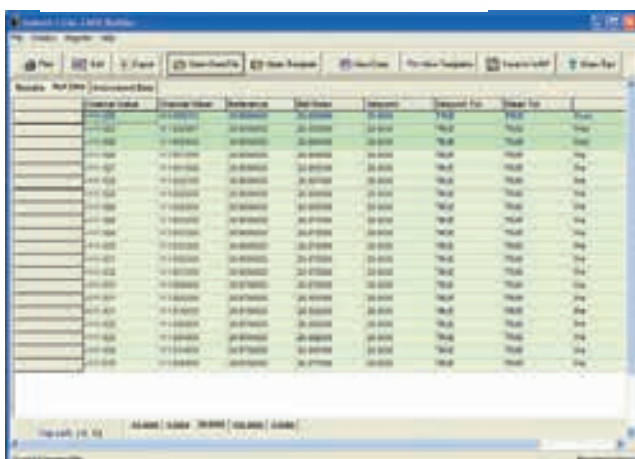
- Fully Automatic Calibration
- Design and Print Certificates
- Calculate Coefficients
- Prints PRT and TC tables
- Supports more equipment
- Try the full version free for 30 days

I-Cal Easy lets you use a built-in template or design your own certificate. Add text, data fields and graphics on single or multiple pages, then publish the calibration data to the certificate. Do you want to include or calculate coefficients? Then drag your data to the ITS-90 or Callendar Van Dusen calculators. For thermocouples use the powerful regression calculator to fit error curves.

Evaluate I-Cal Easy free for 30 Days. After the evaluation period the software continues to function as I-Cal Easy LOG which allows remote monitoring and logging. The advanced features including automatic calibration and certificate printing are disabled until a license is purchased but the remote monitoring and logging features remain available indefinitely.



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



I-Cal Easy supports the TTI-7, TTI-22, microK and Isotech Dry Blocks, Liquid Baths and Calibration Furnaces. Additional support for other and third party instruments is available, contact Isotech for details.

I-Cal Easy provides a powerful but easy to use automatic calibration system. A graphical setup lets you drag and drop instruments and equipment onto the appropriate PC port - no need to create config files. In addition to the comprehensive manual balloon tips guide you as to the operation of each control. Once familiar with the system this balloon help feature can be turned off.

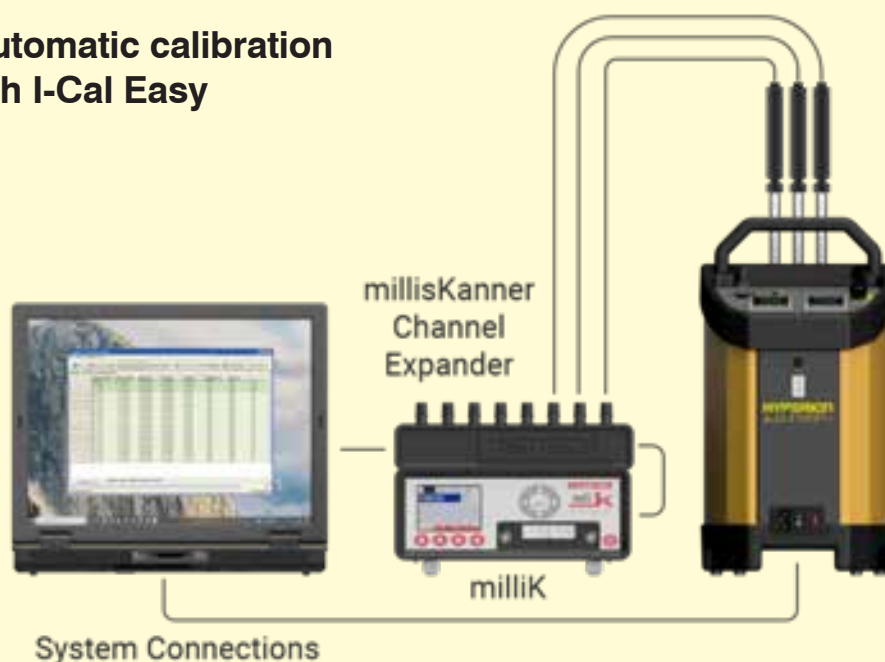
The criteria for stability can be set to suit all types of equipment; Dry Blocks, Liquid Baths and High Temperature Furnaces. Once the system is stable choose how many measurements to take at each calibration point and have the average value appear on the certificate. Create one or multiple page certificates, as many as required to suit different customers and different types of calibration, Thermocouple, Industrial PRTs and SPRTs. Drag and drop data and text fields onto the certificate, link to logos and other graphic elements.

The in-built calculator will calculate coefficients for both IEC 751, ITS-90

and for thermocouples you can choose what order of regression to fit an error curve. Try the demo version and see how easy it is to drag data to the calculator and export the results straight to a certificate.

Judge for yourself how this compares to any other software. The demonstration version will run without restriction for 30 days and enable you to learn how to use I-Cal Easy and save time by rapidly producing certificates to your own requirements. Try it and see why we are confident that I-Cal Easy is the market leader.

## Build an automatic calibration system with I-Cal Easy



*The number of sensors that can be calibrated depends upon the equipment used. Calibrate up to 16 sensors with two switch boxes, expandable to 32.*

### System Requirements

|                  |                                                                                                                                                                              |
|------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Computer         | Laptop or Desktop                                                                                                                                                            |
| Operating System | Windows 10/11                                                                                                                                                                |
| Display          | 1024 x 768 or greater                                                                                                                                                        |
| Optional Camera: | Check for supported types                                                                                                                                                    |
| Serial Ports     | Serial Ports A maximum of three ports are required. One for the Dry Block, one for the TTI and one for the switchboxes. (Two switchboxes can be operated from a single port) |

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

# Introduction to Blackbody Sources

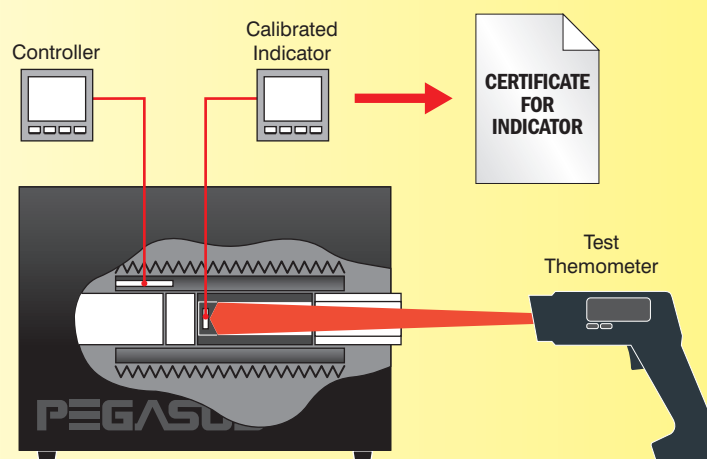
This section contains dedicated blackbody sources for low uncertainty calibration of infrared thermometers. A range of portable primary blackbody sources combine high emissivity with excellent temperature uniformity. The cylindrical cavity design minimises the effects of air movement and ambient changes.

Many of the sources can be used with high purity ITS-90 Fixed Point cells where the thermometer is calibrated against the freezing temperature of a pure metal.

## How To Calibrate Infrared Thermometers

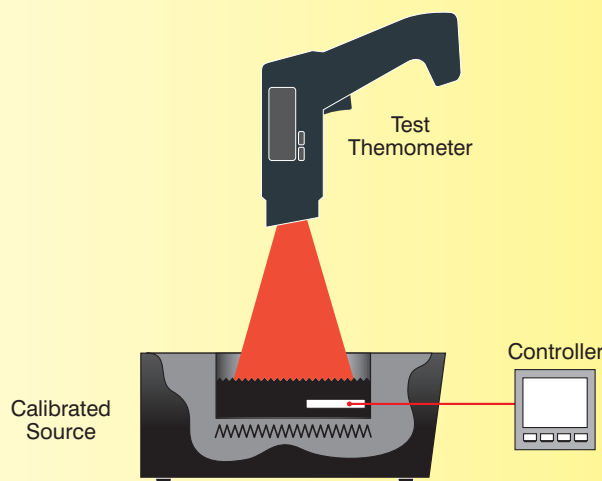
### 1 With a Primary Standard Source

The temperature source has an emissivity approaching unity and sufficient uniformity so that the test thermometer can be compared to a traceable contact thermometer.



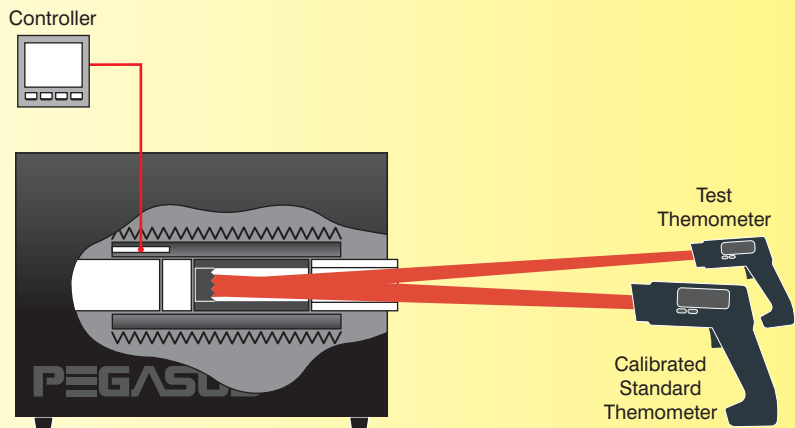
### 2 Calibration using a secondary standard source

With this method the blackbody is calibrated with a standard thermometer and the test thermometer is compared to the source.



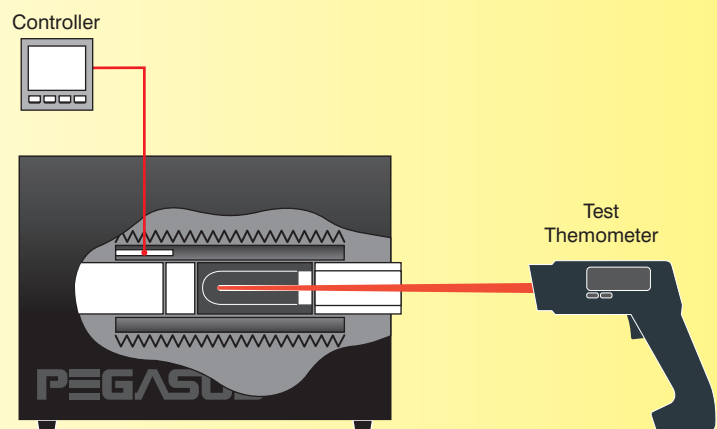
### 3 Calibration using a transfer standard source

With this method the test thermometer is compared to a standard radiation thermometer.



### 4 Using ITS-90 Fixed Point Cells

The test thermometer is calibrated, not against a source or other thermometer, but against a fixed temperature from an ITS-90 Fixed Point Cell. For example by melting a quantity of pure Gallium to obtain a fixed temperature of 29.7646°C



#### ■ Blackbody

A *blackbody* has been defined as either a source with zero reflectivity or a source emitting the maximum possible radiation (at all wave lengths) for its temperature.

#### ■ Emissivity

*Emissivity* is the ratio of the radiation emitted by a surface to that emitted by a black body at the same temperature.

Isotech has a range of sources having a high emissivity combined with thermal uniformity for use as Primary Standard Sources for low uncertainty calibration wavelength independent calibration.



# Types of Equipment

## Primary Black Body Sources

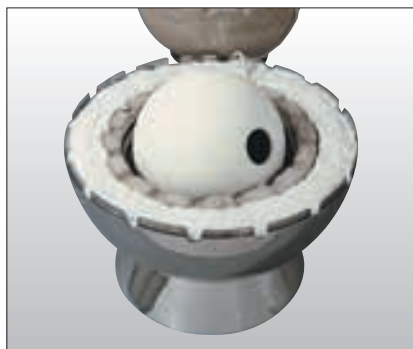
### ■ Hyperion R, Gemini R, Medusa R, Oberon R.

Black body sources covering the range from  $-10^{\circ}\text{C}$  to  $1100^{\circ}\text{C}$ .  
Can also be used with fixed point cells.  
Aperture sizes ranging from 20 to 65mm.



### ■ Cyclops

Temperature range from  $100^{\circ}\text{C}$  to  $1300^{\circ}\text{C}$ .



## Special Applications

### Model 989 / 991

Blackbodies for Thermal Image Systems and Tympanic Thermometers



Cover human body temperatures

### Model 975

Secondary Source  
Emissivity 0.95



### Model 550-02

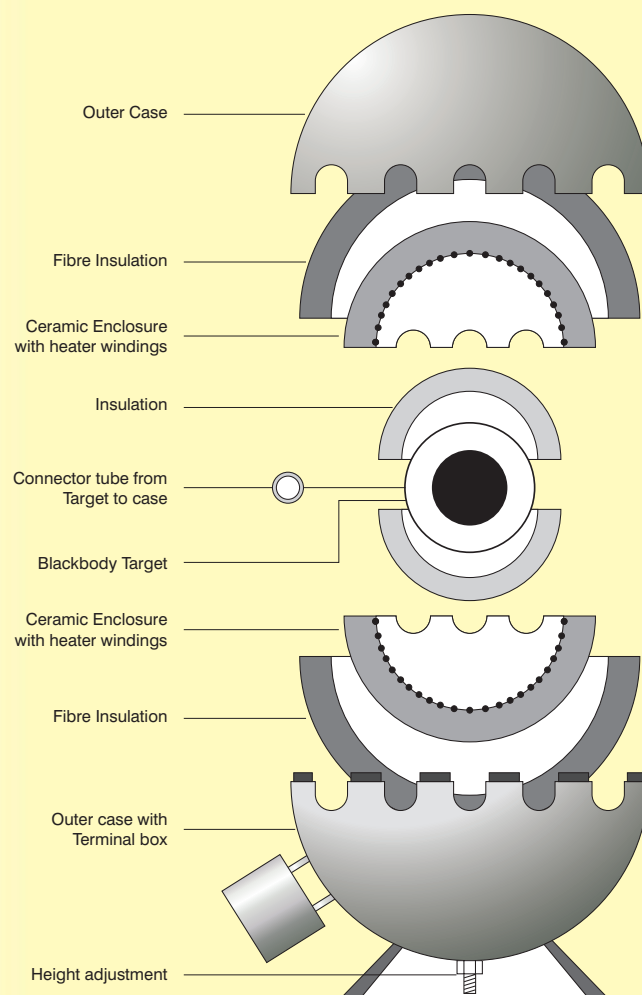
Low Cost  
 $50 - 350^{\circ}\text{C}$



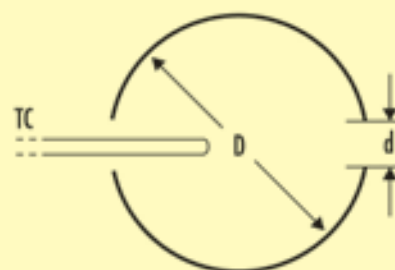
## Calibration of Simple Low Cost Infrared Thermometers.

Many of Isotech's calibrators for PRTs and Thermocouples can also be used for testing simple Infrared devices, see Isocal-6 or Dry Block sections.

## Cyclops Blackbody Source



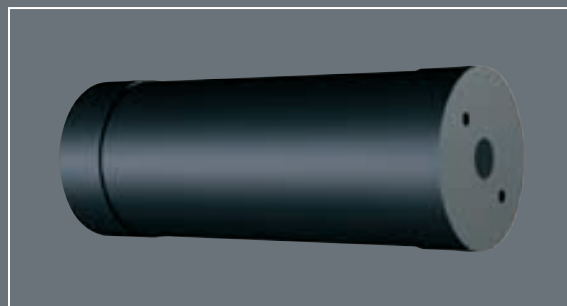
Effective emissivity of cavity in relation to temperature indicated by the thermocouple (TC)



# Isotech Blackbody Fixed Point Cells

## ■ Primary Standard Cells

| Point      | Part Number | Temperature | Apparatus |
|------------|-------------|-------------|-----------|
| Indium     | 998-06-00A  | 156.60°C    | Medusa R  |
| Tin        | 998-06-00B  | 231.93°C    | Medusa R  |
| Zinc       | 998-06-00C  | 419.53°C    | Medusa R  |
| Aluminium* | 998-06-00D  | 660.32°C    | Oberon R  |
| Silver*    | 998-06-00E  | 961.78°C    | Oberon R  |
| Copper*    | 998-06-00G  | 1084.62°C   | Oberon R  |



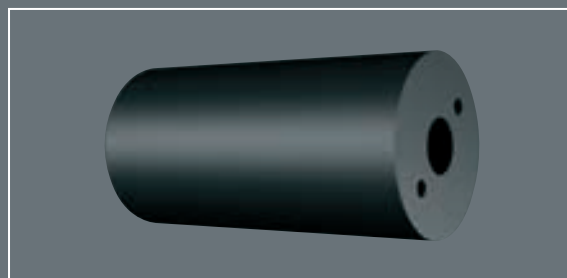
## ■ Medium Temperature “Hockey Puck” Cells

| Point   | Part Number | Temperature | Apparatus  |
|---------|-------------|-------------|------------|
| Gallium | 982-05-01   | 29.7646°C   | Hyperion R |
| Gallium | 431-03-00   | 29.7646°C   | Gemini R   |
| Indium  | 976-05-00A  | 156.60°C    | Gemini R   |
| Tin     | 976-05-00B  | 231.93°C    | Gemini R   |
| Zinc    | 976-05-00C  | 419.53°C    | Gemini R   |



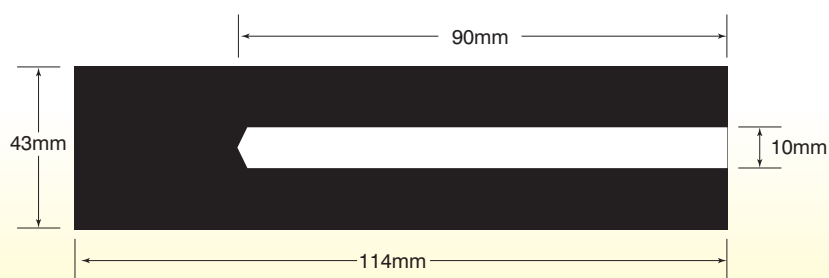
## ■ High Temperature Cells for the Pegasus R

| Point      | Part Number | Temperature | Apparatus |
|------------|-------------|-------------|-----------|
| Indium     | 970-06-00A  | 156.60°C    | Pegasus R |
| Tin        | 970-06-00B  | 231.93°C    | Pegasus R |
| Zinc       | 970-06-00C  | 419.53°C    | Pegasus R |
| Aluminium* | 970-06-00D  | 660.32°C    | Pegasus R |
| Silver*    | 970-06-00E  | 961.78°C    | Pegasus R |

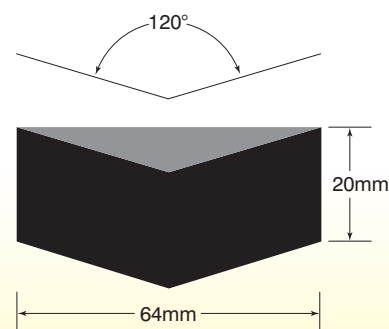


\* These cells are required to be surrounded by gas for protection at high temperatures (See model 984)

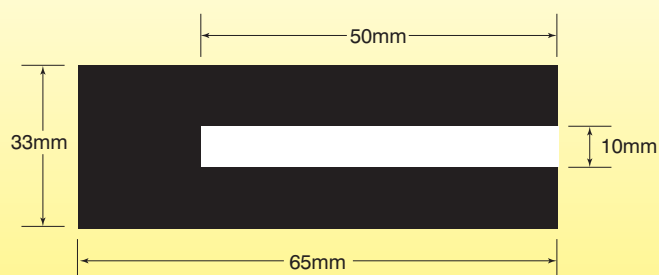
Gallium Cells for Medusa R or Hyperion R to special order.  
Cells are provided with Certificate of Metal Analysis.



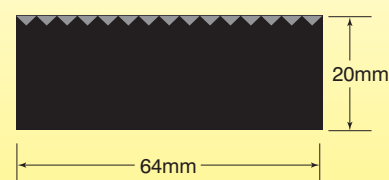
**Primary Standard Cell**



**Hockey Puck Cells**



**Pegasus R Cell**



**Gallium Cell**

# Gas Flow System

## Model 984

- Designed for Isotech Blackbody Cells
- Protect High Temperature Cells
- Gas flow interruption alarm

The higher temperature Isotech Blackbody Fixed Point Cells consist of high purity metals within a graphite body. Graphite reacts with air to form Carbon Dioxide. The rate of the reaction is temperature dependant. The effect is small at low temperatures but increases at higher temperatures.

For Indium and Tin cells the effect is small and for Indium, Tin and Zinc cells in general no attention needs to be made. Yet for Aluminium, Silver and Copper Cells the oxygen must be excluded or the cells would be quickly damaged.

The Model 984 Gas Flow System connects between an inert gas supply, such as Argon or Nitrogen and the Cell in its apparatus.

The Model 984 has a regulator and a flow meter optimised to easily set the flow to 12 litres/hour (0.2 l / min) and features an audible alarm should the gas flow be interrupted.



|                           |                                                                            |
|---------------------------|----------------------------------------------------------------------------|
| <b>Model</b>              | <b>984</b>                                                                 |
| Input - Output Connectors | Genevac 16KF                                                               |
| Maximum Flow              | 16 litres/hour                                                             |
| Alarm                     | Audible                                                                    |
| Power                     | 15W                                                                        |
| Voltage                   | 12Vdc                                                                      |
| Dimensions                | Height 240mm<br>Width 120mm<br>Depth 220mm<br>(excluding connection pipes) |
| Weight                    | 2.5kg                                                                      |

### How To Order

Model 984 Gas Flow System  
Supplied with external power supply, 2 x connecting pipes and fittings



-20 to 125°C

- Low Temperature Radiation Pyrometer Primary Source
- 50mm Diameter Cavity
- 0.995 Emissivity

The Hyperion R Portable Blackbody Calibration Source allows for calibration of non contact infrared thermometers over the temperature range -20°C to 125°C.

One application is the calibration of non-contact medical thermometers. With the sudden step increase in the demand to check and calibrate medical thermometers we have supplied many units for both portable and laboratory testing relating to the coronavirus outbreak.

It is suitable for use as a primary radiation source for infrared thermometers from sub zero to 125°C.

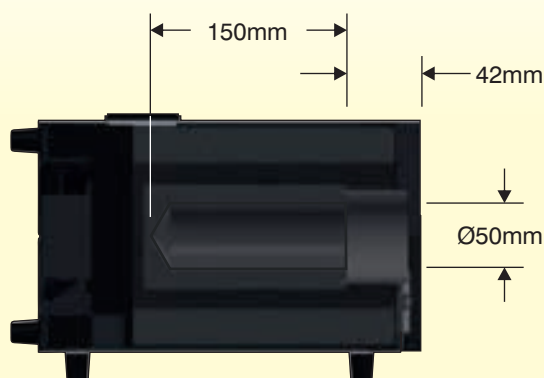
Laboratory performance and low uncertainty calibrations are ensured by the combination by high emissivity and excellent temperature uniformity.

The digital temperature controller allows the block temperature to be set to any value from -20°C to 125°C.

Traceability of the radiance temperature is established by a separate, built-in temperature indicator and included platinum resistance thermometer.

A three point traceable calibration certificate is included. UKAS calibration of the resistance thermometer is available, as is radiometric calibration.

Uniformity of the block is ensured by using distributed thermoelectric heat pumps with the benefit of solid state, vibration free cooling.



**Hyperion R**  
Blackbody Dimensions

# Blackbody Source Hyperion R



|                    |                                                                                   |
|--------------------|-----------------------------------------------------------------------------------|
| <b>Model</b>       | <b>982</b>                                                                        |
| Temperature Range  | -20°C to 125°C*<br>*In an ambient of 20°C, minimum temperature 40°C below ambient |
| Emissivity         | Greater than 0.995                                                                |
| Stability          | ±0.1°C                                                                            |
| Display Resolution | 0.01°C to 0.1°C                                                                   |
| Aperture Diameter  | 50mm                                                                              |
| Cavity Depth       | 150mm                                                                             |
| PC Interface       | Included                                                                          |
| Power              | 200 Watts typical                                                                 |
| Voltage            | Universal Input<br>80-264 V 50/60Hz                                               |
| Dimensions         | H 310mm<br>W 265mm<br>D 200mm                                                     |
| Weight             | 8.3kg                                                                             |

## Options

|                                                             |           |
|-------------------------------------------------------------|-----------|
| Orifice Plates 10, 20, 30, 40mm (Restricts Cavity Aperture) | 812-01-06 |
| Carrying Case                                               | 931-22-64 |

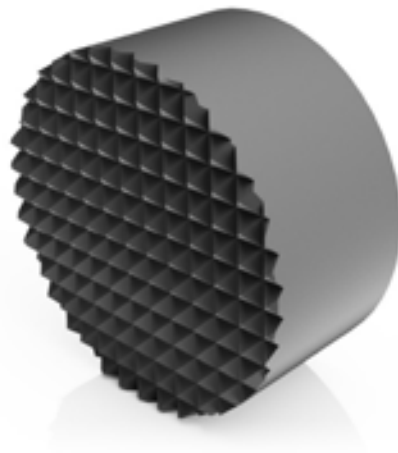
## How To Order

Model 982 Hyperion R  
Please state any special calibration requirement

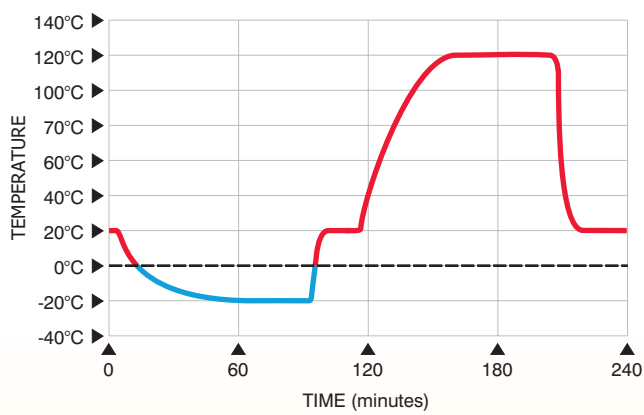
## Choose **Hyperion R** for:

- Superior Performance - isothermal cavity offers higher emissivity than flat plates
- Low Uncertainty Calibration Source for IR Thermometers and Thermal Imagers
- Calibration in the laboratory, on-site or in production

## Gallium Fixed Point Cell



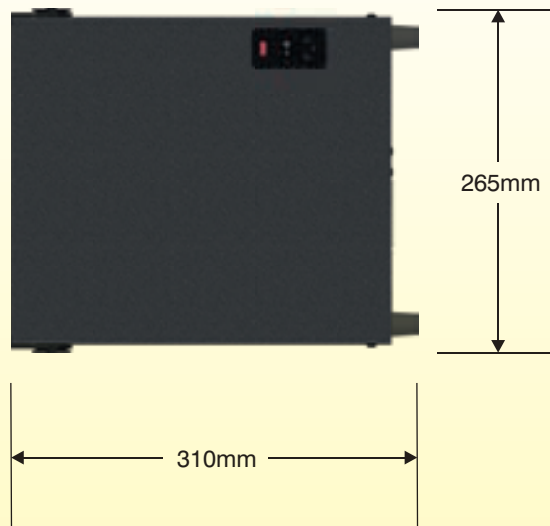
### Heat Up / Cool Down



Following requests from researchers looking to improve the accuracy of infrared measurements, we have introduced a Gallium Fixed Point Cell, Model 982-05-01.

The cell contains high purity Gallium, 99.99999% (7N). It is placed into the Hyperion R cavity and heated until the metal melts at 29.7646°C.

As the Gallium melts, the temperature remains constant with the "melt plateau" providing a stable, precise constant reference temperature. After all the metal has melted, the cell can be simply frozen by lowering the Hyperion R temperature, no additional equipment is necessary.





30 to 550°C

- 30°C to 550°C
- Emissivity > 0.995
- 65mm Diameter Cavity

The Gemini R 550 Portable Blackbody Calibration Source allows for calibration of noncontact infrared thermometers over the temperature range 30°C to 550°C.

It is suitable for use as a primary radiation source for infrared thermometers.

Laboratory performance and low uncertainty calibrations are ensured by the combination by high emissivity and excellent temperature uniformity.

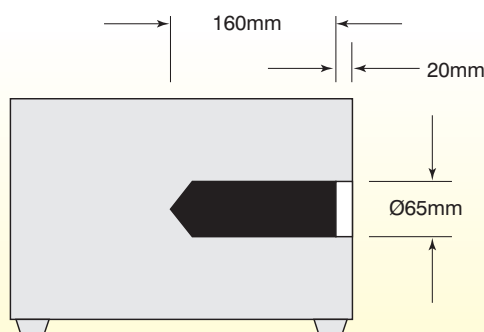
The digital temperature controller allows the block temperature to be set to any value from 30°C to 550°C.

Traceability of the radiance temperature is established by a separate, built-in temperature indicator and included platinum resistance thermometer.

A three point traceable calibration certificate is included. UKAS calibration of the resistance thermometer is available, as is radiometric calibration.

Uniformity of the block is ensured by using distributed heating technology.

For the smallest of uncertainties the Gemini R may be used with Isotech ITS-90 Fixed Point Cells, Gallium 29.7646°C, Indium 156.5985°C, Tin 231.928°C and Zinc 419.527°C. The cells are provided with a certificate of metal purity.



**Gemini R**

### ■ Test Report

The variation seen on the controller's temperature indication over a 5 minute period was  $\pm 0.2^\circ\text{C}$ . Similar variations were detected by a radiation thermometer looking into the cavity.

Using a portable radiation thermometer having a target diameter of 13mm, the 65mm target was surveyed.

Maximum temperature differences of  $\pm 1^\circ\text{C}$  were found for set temperatures in the range 100°C to 500°C.

Temperatures along the inner 100mm of the 160mm long cavity were measured at 400°C and 500°C, using a hand held fibre-optic radiation probe. Maximum temperature differences of  $\pm 4^\circ\text{C}$  were found.

The temperature, as shown on the controller, agrees with the cavity temperature as measured by a radiation thermometer, where calibration is traceable to National Standards, to within  $\pm 2^\circ\text{C}$ .

# Blackbody Source Gemini R



|                    |                                           |
|--------------------|-------------------------------------------|
| <b>Model</b>       | <b>976</b>                                |
| Temperature Range  | 30°C to 550.0°C                           |
| Emissivity         | Greater than 0.995                        |
| Stability          | $\pm 0.1^\circ\text{C}$                   |
| Display Resolution | 0.01°C to 99.99;<br>0.1°C from 100 to 550 |
| Heating Time       | 45 minutes                                |
| Aperture Diameter  | 65mm                                      |
| Cavity Depth       | 160mm                                     |
| PC Interface       | included                                  |
| Power              | 1000 Watts typical                        |
| Voltage            | 100-130 or 208-240 Vac<br>50/60Hz         |
| Dimensions         | H 310mm<br>W 265mm<br>D 200mm             |
| Weight             | 10kg                                      |

### Options

|                                                                    |            |
|--------------------------------------------------------------------|------------|
| Fixed Point Cell                                                   |            |
| Gallium Hockey Puck Cell                                           | 431-03-00  |
| Indium Hockey Puck Cell                                            | 976-05-00A |
| Tin Hockey Puck Cell                                               | 976-05-00B |
| Zinc Hockey Puck Cell                                              | 976-05-00C |
| Orifice Plates 10, 20, 30, 40, 50mm<br>(Restricts Cavity Aperture) | 976-01-05  |
| Carrying Case                                                      | 931-22-64  |

### How To Order

Model 976 Gemini R  
State Supply Voltage  
Please state any special calibration requirement



150 to 1200°C

- 150°C to 1200°C
- Compact 20mm Diameter Cavity
- Emissivity > 0.995 Cavity 20 x 65mm

The Pegasus R is a compact furnace for calibrating radiation pyrometers.

The temperature of the furnace is set on a controller, whilst an independent indicator, whose sensor fits into the cavity, indicates the actual radiance temperature. The sensor can be removed for external calibration or the complete system can be calibrated.

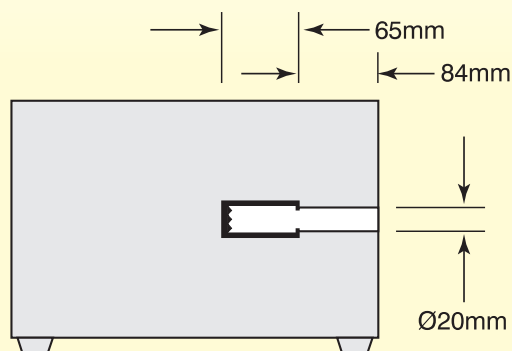
The cavity diameter is 20mm, the depth 65mm. Emissivity is 0.995. The cavity is removable and a fixed point cell may be put in its place. The cavity inside the fixed point cell is 10mm in diameter by 65mm deep to the tip of a 120° cone.

#### Blackbody target radiation source for use with Pegasus R.

For calibration radiation thermometers in the wavelength range 0.9 to 14 micrometres. A blackbody radiation source 'based on a design study by England's National Physical Laboratory (NPL)' for Isothermal Technology Ltd is housed, with suitable insulation, in the Pegasus tube furnace. The aperture is 20mm in diameter.

A Pegasus blackbody source has been calibrated at NPL (Nat. Physical Laboratory) with an uncertainty of  $\pm 2^\circ\text{C}$  and the calibration was found to be reproducible after a period of about 2 months. A scan across the aperture at 444°C showed that the source was uniform to better than 0.3°C.

Traceability may be established with a UKAS certificate for the in-built indicator and supplied probe (935-14-115).



**Pegasus R**

# Blackbody Source Pegasus R



|                          |                                                   |
|--------------------------|---------------------------------------------------|
| <b>Model</b>             | <b>970</b>                                        |
| Temperature Range        | 150°C to 1200°C                                   |
| Emissivity               | 0.995                                             |
| Stability                | $\pm 0.1^\circ\text{C}$                           |
| Display resolution       | 0.1°C to 999.9;<br>1°C from 1000 to 1200          |
| Cavity size              | 20mm diameter<br>65mm deep                        |
| Heating Rate             | 25°C/minute                                       |
| PC Interface             | Included                                          |
| Power                    | 800W typical<br>100-130 or 208-240 Vac<br>50/60Hz |
| Dimensions               | Height 310mm<br>Width 265mm<br>Depth 200mm        |
| Weight                   | 13 kg                                             |
| <b>Options</b>           |                                                   |
| Indium Blackbody Cell    | 970-06-00A                                        |
| Tin Blackbody Cell       | 970-06-00B                                        |
| Zinc Blackbody Cell      | 970-06-00C                                        |
| Aluminium Blackbody Cell | 970-06-00D                                        |
| Silver Blackbody Cell    | 970-06-00E                                        |
| Probe                    | 935-14-40                                         |
| Carrying Case            | 931-22-64                                         |
| Gas Flow System          | 984-00-00                                         |

#### How to order

Model 970 Pegasus R

Please state supply voltage required

Please state any special calibration requirement



30 to 550°C

- 30°C to 550°C
- Emissivity > 0.995 Cavity 45 x 285mm
- Accepts Isotech Primary Blackbody Cells

The Medusa R Blackbody Calibration Source allows for calibration of noncontact infrared thermometers over the temperature range 30°C to 550°C.

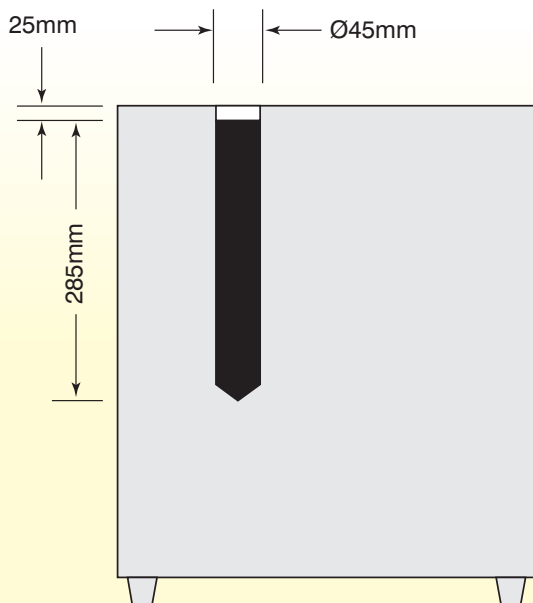
It is suitable for use as a radiation source for infrared thermometers. The cavity is 45 x 285mm deep and suitable for use with the larger Isotech fixed point cells.

Laboratory performance and low uncertainty calibrations are ensured by the combination by high emissivity and excellent temperature uniformity.

The digital temperature controller allows the block temperature to be set to any value from 30°C to 550°C.

Uniformity of the large block is ensured by using distributed heating technology.

For the smallest of uncertainties the Medusa R may be used with Isotech ITS-90 Fixed Point Cells, Indium 156.5985°C, Tin 231.928°C and Zinc 419.527°C. The cells are provided with a certificate of metal purity.



**Medusa R**

# Blackbody Source Medusa R



|                    |                                           |
|--------------------|-------------------------------------------|
| <b>Model</b>       | <b>999</b>                                |
| Temperature Range  | 30°C to 550.0°C                           |
| Emissivity         | Greater than 0.995                        |
| Stability          | ±0.1°C                                    |
| Display Resolution | 0.01°C to 99.99;<br>0.1°C from 100 to 550 |
| Heating Time       | 45 minutes                                |
| Aperture Diameter  | 45mm                                      |
| Cavity Depth       | 285mm                                     |
| PC Interface       | included                                  |
| Power              | 1000 Watts typical                        |
| Voltage            | 100-130 or 208-240 Vac<br>50/60Hz         |
| Dimensions         | H 480mm<br>W 425mm<br>D 260mm             |
| Weight             | 17kg                                      |

## Options

|                               |            |
|-------------------------------|------------|
| Fixed Point Cells             |            |
| Indium Large Primary Cell     | 998-06-00A |
| Tin Hockey Large Primary Cell | 998-06-00B |
| Zinc Large Primary Cell       | 998-06-00C |

## How To Order

Model 999 Medusa R  
State Supply Voltage  
Please state any special calibration requirement



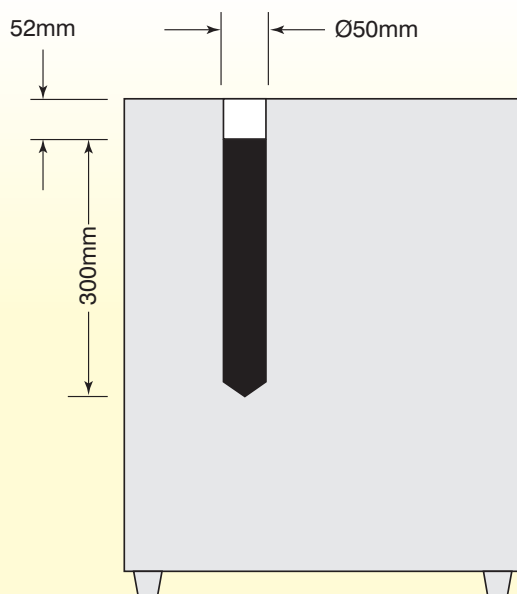
450 to 1100°C

- 450°C to 1100°C
- For High Temperature Blackbody Fixed Points
- Utilises a Sodium Heatpipe

The Oberon R uses a Sodium Heat Pipe to ensure an exceptionally low temperature gradient along the furnace core. It is ideal for the realization of Aluminium, Silver or Copper ITS-90 Fixed Points.

It may be used as a blackbody source over the range 450°C to 1100°C.

The furnace heater is of the non-inductive bird-cage design insulated by twin bore alumina tubes. The heatpipe is designed so that the inner wall is not subject to thermal expansion stresses from the outer wall before the heat pipe reaches conduction temperature. The working fluid is permanently and safely sealed within the plasma-arc welded enclosure.



**Oberon R**

# Blackbody Source Oberon R



|                                              |                                                                                               |
|----------------------------------------------|-----------------------------------------------------------------------------------------------|
| <b>Model</b>                                 | <b>426</b>                                                                                    |
| Temperature Range                            | 450°C to 1100°C                                                                               |
| Emissivity                                   | greater than 0.995                                                                            |
| Stability                                    | ±0.05°C                                                                                       |
| Display resolution                           | 0.1°C to 999.9;<br>1°C from 1000 to 1090                                                      |
| Cavity size                                  | 50mm diameter<br>300mm deep                                                                   |
| Time to temperature                          | 4 hours                                                                                       |
| PC Interface                                 | Included                                                                                      |
| Supply                                       | 110Vac, 3kW, 50/60Hz CTE<br>(230Vac and 110Vac to 110Vac<br>Isolating Transformers available) |
| Dimensions                                   | Height 410mm<br>Width 415mm<br>Depth 280mm                                                    |
| Weight                                       | 30.5kgs                                                                                       |
| <b>Options</b>                               |                                                                                               |
| Aluminium Primary Blackbody Fixed Point Cell | 998-06-00D                                                                                    |
| Silver Primary Blackbody Fixed Point Cell    | 998-06-00E                                                                                    |
| Copper Primary Blackbody Fixed Point Cell    | 998-06-00G                                                                                    |
| Gas Flow System                              | 984-00-00                                                                                     |
| 230v/110v Transformer                        | 935-19-43                                                                                     |
| 110v/110v Transformer                        | 935-19-48                                                                                     |

## How to order

Model 426 Oberon R

Please state voltage required

Please state any special calibration requirement



100 to 1300°C

# Blackbody Source Cyclops

- Spherical Blackbody Source
- Wide Temperature Range 100°C to 1300°C
- Can be adapted for Thermocouple Calibration

The Cyclops Model 878 is a spherical blackbody source. It consists of an inner black sphere that sits inside a spherical furnace and is suitable for use as a radiation source for infrared thermometers.

## Key Features and Design

### Precision-Engineered Inner Sphere:

The inner black sphere, with a nominal diameter of 230mm, serves as the primary radiation source. It is accessed via an optical sighting tube, allowing precise alignment for infrared thermometers. The blackbody design ensures high emissivity, creating a stable and uniform radiation field, which is critical for accurate IR sensor calibration.

### Choice of Aperture Sizes:

The furnace assembly is available with two aperture size options:

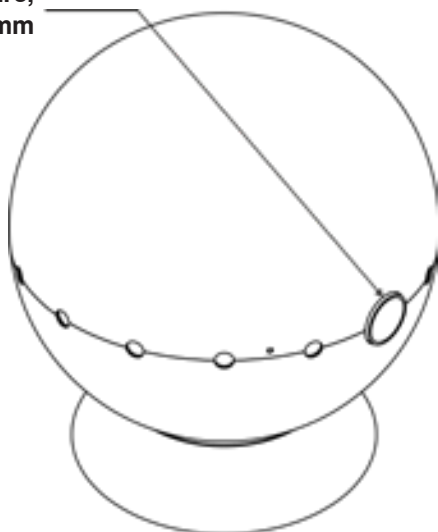
17mm aperture – Ideal for applications requiring high precision and a narrow field of view.

45mm aperture – Suitable for broader measurement needs, accommodating a wider range of infrared thermometers and sensors.

### Optimized Furnace Construction:

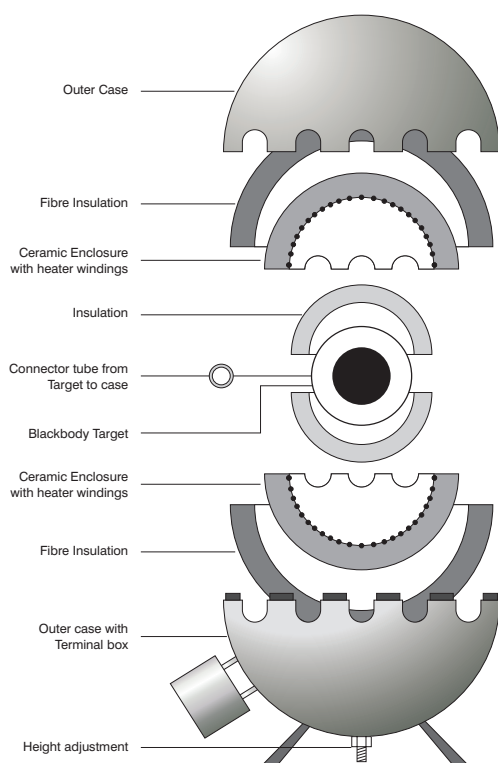
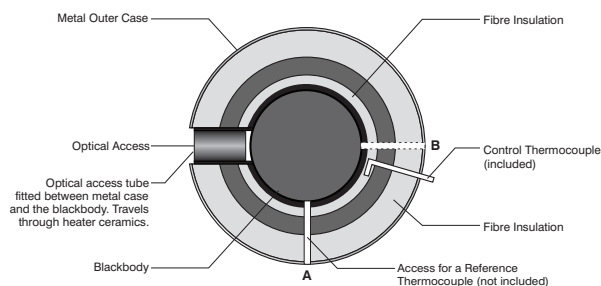
The spherical furnace is designed to maintain consistent temperature distribution across the inner sphere whilst minimising thermal gradients

Aperture,  
17 or 45mm



|                                                                        |                                          |
|------------------------------------------------------------------------|------------------------------------------|
| <b>Model</b>                                                           | <b>878</b>                               |
| Temperature Range                                                      | 100°C to 1300°C                          |
| Emissivity                                                             | Greater than 0.999                       |
| Stability                                                              | ±0.1°C                                   |
| Display resolution                                                     | 0.1°C to 999.9;<br>1°C from 1000 to 1300 |
| Time to temperature                                                    | 1.5 hours to 700°C<br>4 hours to 1300°C  |
| PC Interface                                                           | included                                 |
| Power                                                                  | 3kW typical                              |
| Voltage                                                                | 100-130 or 208-240 Vac<br>50/60Hz        |
| Dimensions                                                             | 425mm Diameter                           |
| Weight                                                                 | 25 kg                                    |
| <b>Options</b>                                                         |                                          |
| Ceramic Equalising Block to accept up to 8 thermocouples<br>878-02-08. |                                          |

**Cyclops** Assembly Diagram Plan View (shown in section)



## Performance Through Design

The Cyclops Model 878 spherical blackbody source is purpose-built to deliver high performance for the calibration of infrared thermometers and imagers.

Its unique construction comprises a series of concentric elements, each contributing to thermal stability and uniform emissivity.

The outer shell, made from spun metal, ensures mechanical strength and houses the internal insulation and heating components.

A layer of high-efficiency ceramic fibre insulation minimises heat loss and contributes to uniformity and thermal stability.

Nested within is a spherical ceramic mantle containing the heater windings, designed to distribute heat evenly.

At the centre lies the blackbody sphere, which serves as the radiating target. Its geometry and surface finish are optimised for high emissivity and uniform temperature.

The result is a blackbody source that meets the demands of both research and industrial calibration labs, delivering precision, efficiency, and ease of use in a compact system.



The external control system uses power feedback to stabilise against supply voltage changes providing greater stability. A digital filter circuit ensures high integrity of measurement, correcting for drift and noise.



## How to Order

Model 878 Cyclops. Please state supply voltage required  
Please state target diameter either 17mm standard or 45mm to special order.

Reference Thermocouple Access Point is at position A as Standard, specify if required at point B.

State Target Diameter 17 or 45mm



20 to 50°C

- Improves accuracy of Fever Detection Systems
- Covers 20°C to 50°C with Fast Thermal Response
- Check Non-Contact Thermometers

Isotech first introduced the Model 988 to assist in relation to the SARS outbreak during the early 2000s. It was used to increase the accuracy of thermal imagers measuring human skin temperature in temperature screening of applications. It can also be used to check non-contact clinical thermometers. Following the increased demand in relation to COVID-19, Isotech have now introduced an updated blackbody source, Model 989.

Model 989 has the same performance as the earlier 988 but is smaller and has two easy mounting points fitted allowing for easy mounting. When used in conjunction with IR cameras the device can easily be suspended from above or below using standard tripod mounting brackets.

The upgraded controller can either be locked to a single temperature or it can be adjusted over a new wider temperature range of 20°C to 50°C. Model 989 also has a PC interface fitted as standard. It allows the temperature to be both monitored and adjusted from a PC.

This blackbody source meets the demand for a simple, cost effective but high accuracy device for the calibration of thermal imagers and infrared thermometers that are used at temperatures around that of the human body.

Unlike heat only devices, this model uses a solid state thermoelectric heat pump so that the block can be both cooled and heated. This brings two benefits, the blackbody can maintain its set point in high ambient temperature conditions and it can also operate below the ambient temperature.



Optional  
Extension  
Tubes

# Blackbody Source

## Model 989



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

Response time is very fast, typically less than five minutes to achieve the required temperature (see graphs). The Model 989 can be used either horizontally or vertically.

The device features a high emissivity ridged plate that is 70mm in diameter. The temperature of the plate can be set from 20°C to 50°C to a resolution of 0.01°C.

To reduce sensitivity to air drafts and ambient temperature effects, a stainless steel tube can be fitted in front of the plate with evaluation showing this has advantage over an open plate design.

The longer tube length is 210mm while the shorter tube length is 40mm long and is particularly useful for checking medical thermometers.

For applications where the unit is used at a single fixed temperature, e.g. 38°C, the set temperature on the controller can be locked to prevent accidental change or tampering. The operating unit can be changed from Celsius to Fahrenheit.

**Easy Mount:**  
camera screw mount  
(1/4"-20 UNC thread)

**70mm Diameter  
High Emissivity  
Blackbody**

**External  
Thermometer  
Reference Pocket**

**Super Stable  
Controller**  
- can be adjusted in  
0.01°C steps, and  
locked if required

**Easy Mount:**  
camera screw mount  
(1/4"-20 UNC thread)



**Simple Operation:**  
switch on and within  
minutes the 989 is  
stable and ready

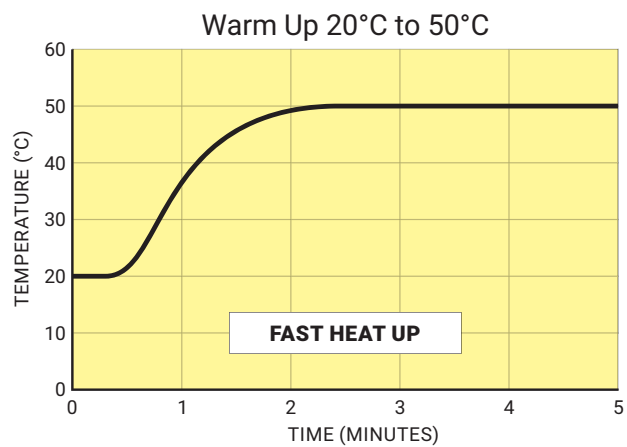
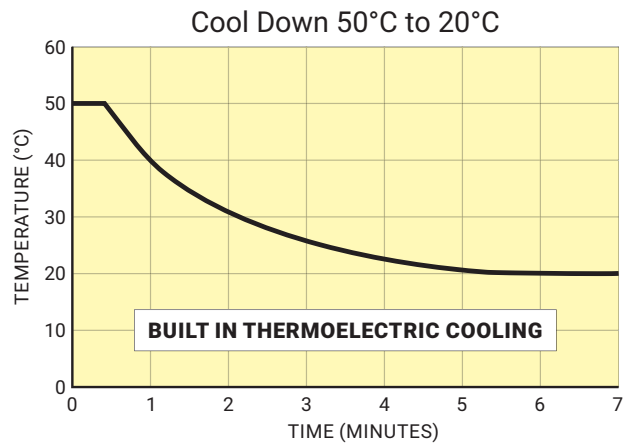
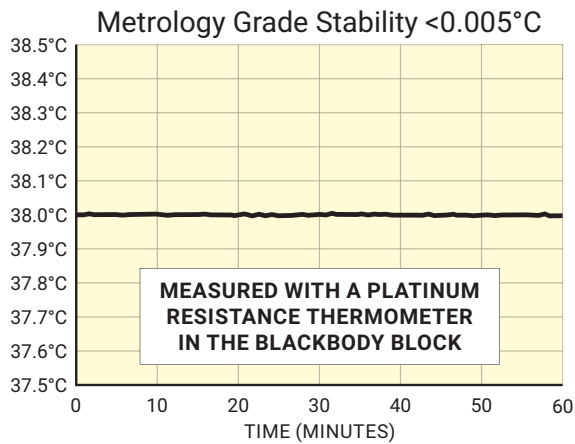
**PC Interface included:**  
free software to monitor,  
optional communications cable



**Safe low  
voltage  
operation:**  
main power  
supply included,  
universal input

|                             |                                                                |                     |                                                                                                                   |
|-----------------------------|----------------------------------------------------------------|---------------------|-------------------------------------------------------------------------------------------------------------------|
| <b>Model</b>                | <b>989</b>                                                     |                     |                                                                                                                   |
| Temperature Range           | 20°C to 50°C                                                   | Dimensions          | H 200mm (7.87")                                                                                                   |
| Resolution                  | ±0.01°C                                                        |                     | W 135mm (5.31")                                                                                                   |
| Target Size                 | 70mm Diameter<br>using Extension Tube<br>54mm Diameter         | Weight              | D 170mm (6.70")                                                                                                   |
| Emissivity                  | 0.97 ±0.02                                                     |                     | 4kg                                                                                                               |
| Combined Accuracy/Stability | ±0.2°C (0.3°F)                                                 | <b>How to Order</b> |                                                                                                                   |
| PC Interface                | Included, RS422 (optional<br>RS232 convertor lead)             | Model 989           | Blackbody Source<br>Universal voltage input 80-264 V<br>supplied as standard                                      |
| Units                       | °C, °F, K                                                      |                     |                                                                                                                   |
| Block Stability             | <0.01°C                                                        | <b>Accessories</b>  |                                                                                                                   |
| Display                     | Three Colour LCD,<br>Temperature and Set<br>Temperature        | 935-16-112          | RS422 to RS232<br>Converter Lead                                                                                  |
| Set Point Lock              | Set temperature can be<br>locked and password<br>protected     | 935-14-82/BW        | Isotech 935-14-82<br>Calibration Probe                                                                            |
| Automatic Start Up          | No user intervention<br>required                               | 989/01              | Calibration Kit: Isotech<br>TTI-10 with 935-14-82/TTI<br>Probe and UKAS System<br>Calibration, Uncertainty 0.02°C |
| Set Point Ramp Rate         | Included: switch on to<br>control heating and<br>cooling rates | 989/02              | Short Tube: 40mm                                                                                                  |
| Self Test                   | Automatic - Scrolling text<br>diagnostic display               | 989/03              | Long Tube: 210mm                                                                                                  |
| Power                       | 60 Watts                                                       |                     |                                                                                                                   |
| Voltage                     | 12 Vdc                                                         |                     |                                                                                                                   |

## Fast Operation



## Featuring Easy Mount System

**Can be bench mounted**



**Can be used vertically**



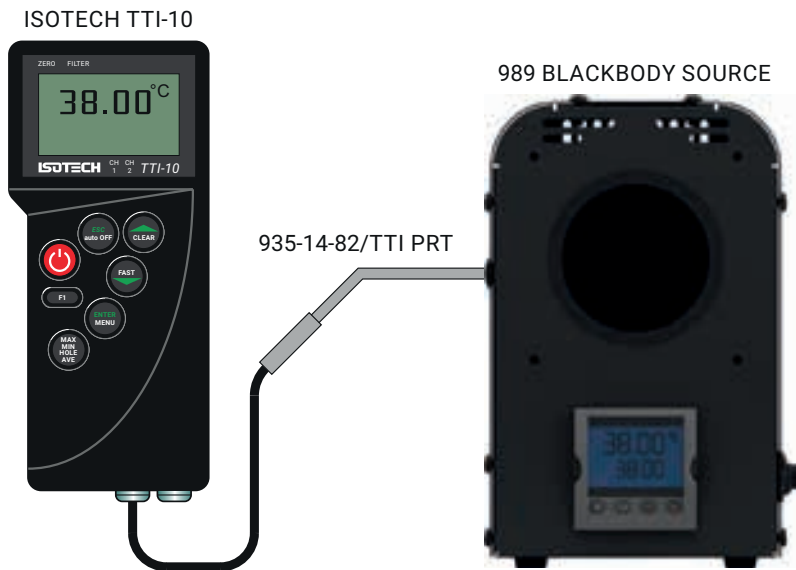
**Can be mounted from the top**



**Can be mounted from below**

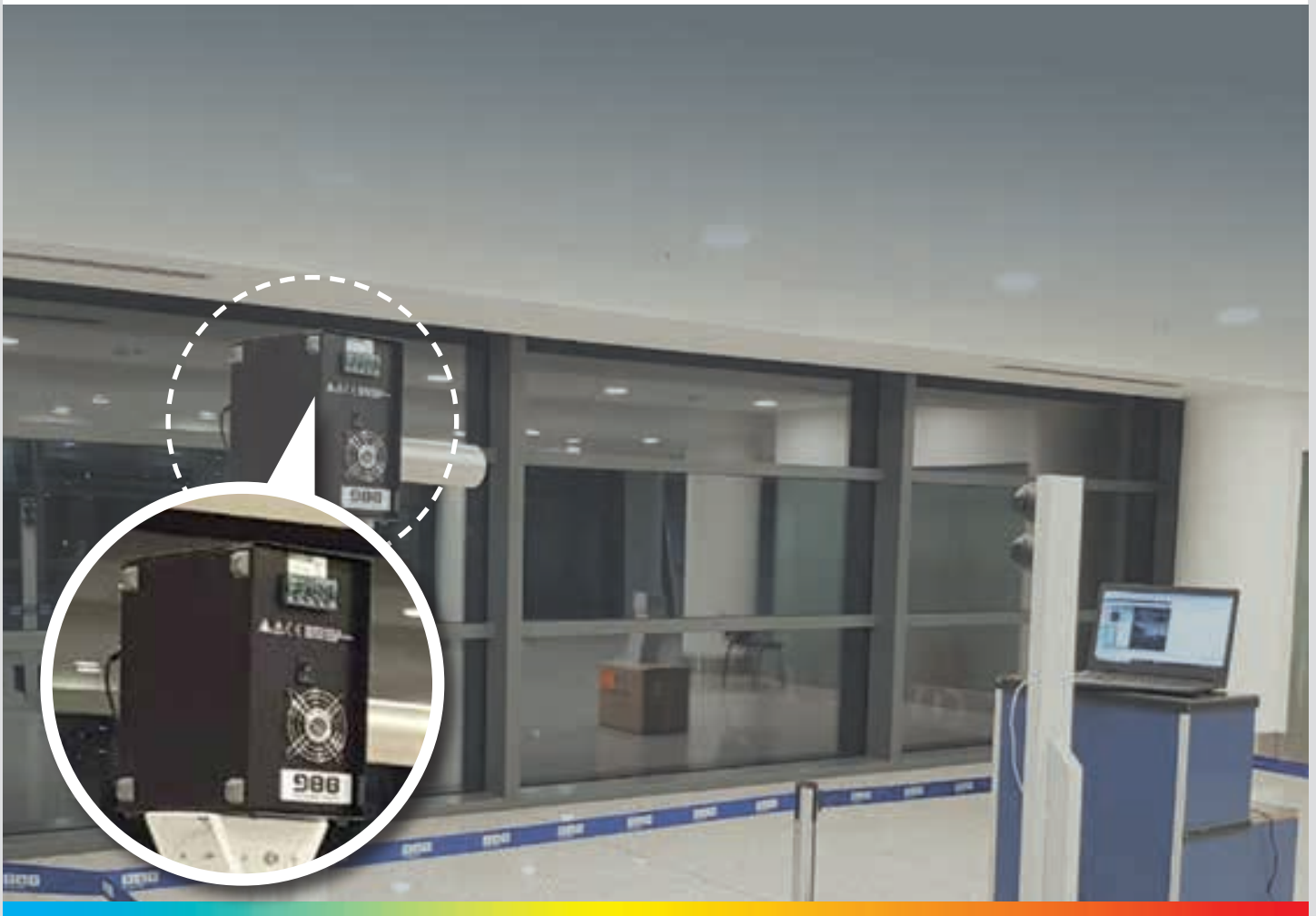


## Model 989/01 - Blackbody Source



Model 989 features a reference thermometer pocket that is located in the blackbody block just below the surface. If desired a calibrated platinum resistance thermometer can be added for traceability. Isotech can provide either ISO 17025, UKAS Calibrated Model 938-14-82/TTI Semi Standard Thermometer or TTI-10 High Accuracy Digital Readout with a Model 938-14-82/TTI Thermometer, UKAS Calibrated, Uncertainty 0.02°C, 20mK.

The reference thermometer pocket also allows for easy checking and recalibration of the model 989 Blackbody.





20 to 50°C

# Tympanic Thermometer Checker

## Model 991

- **Cost-Effective** - A fraction of the cost of a full laboratory setup
- **Portable** - Easy to use in clinics and field settings, with compact equipment
- **User-Friendly** - No specialised training needed, perfect for quality control and checks

Addressing Calibration Challenges Traditional calibration methods using stirred water baths are cumbersome, expensive, and not easily portable, creating logistical and financial burdens for medical facilities, especially those needing to perform frequent calibrations or validations outside a laboratory setting.

Calibrating Tympanic Thermometers Traditional Calibration Methods According to ISO 80601-2-56:2017 Part 2-56: Particular requirements for basic safety and essential performance of clinical thermometers for body temperature measurement, clinical thermometers, both contact and infrared types, are recommended to be calibrated using a stirred water bath. This method ensures a stable and thermally uniform medium, making it the preferred approach. However, the cost and size of the equipment can be a barrier, especially when full accuracy is not critical.

For Full Accuracy Requirements: for effective calibration, the water bath must:

- Maintain thermal uniformity within 0.01 °C.
- Ensure stability within  $\pm 0.02$  °C.

Additionally, the reference thermometer must:

- Be in good thermal contact with the blackbody source
- Have a calibration uncertainty of 0.02 °C ( $k=2$ ).

Equipment meeting these standards is available from Isotech, although it requires significant investment and is suited to a laboratory environment. Some thermometer manufacturers offer dedicated calibration devices for their models, but these may not be compatible with other brands.

Isotech's Portable Solution Model 991 Temperature Checker: To address these challenges, Isotech has introduced a portable checker for validating tympanic thermometers. This innovative solution alleviates the pain points associated with traditional calibration methods:



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

**Cost-Effective:** Priced at less than a tenth of a full laboratory setup, it provides an affordable alternative without compromising essential accuracy for most practical purposes.

**Compact and Portable:** Its small size and simplicity make it convenient for use in various settings, including in-field and in-clinic, eliminating the need for cumbersome water baths.

**User-Friendly:** The device is straightforward to operate, requiring no specialized training, making it accessible for a wide range of users.



|                                               |                                                          |
|-----------------------------------------------|----------------------------------------------------------|
| <b>Model</b>                                  | 991                                                      |
| <b>Temp Range</b>                             | 20°C to 50°C                                             |
| <b>Resolution</b>                             | ±0.01°C                                                  |
| <b>Aperture Size</b>                          | 12mm Diameter                                            |
| <b>Emissivity (1)</b>                         | ≈0.999                                                   |
| <b>Controller Accuracy: Temperature Range</b> | 0.5°C from 20°C to 42°C                                  |
| <b>Extended Temperature Range</b>             | 0.7°C from 42°C to 50°C                                  |
| <b>PC Interface</b>                           | Included, RS422 (optional RS232 convertor lead)          |
| <b>Units</b>                                  | °C, °F, K                                                |
| <b>Temperature Stability (2)</b>              | <0.01°C                                                  |
| <b>Display</b>                                | Three Colour LCD, Temperature and Set Temperature        |
| <b>Set Point Lock</b>                         | Set temperature can be locked and password protected     |
| <b>Automatic Start Up</b>                     | No user intervention required                            |
| <b>Set Point Ramp Rate</b>                    | Included: switch on to control heating and cooling rates |
| <b>Self Test</b>                              | Automatic: Scrolling text diagnostic display             |
| <b>Power</b>                                  | 60 Watts                                                 |
| <b>Voltage</b>                                | 12 Vdc                                                   |
| <b>Dimensions</b>                             | H 200mm x W 135mm x D 170mm                              |
| <b>Weight</b>                                 | 2.3kg                                                    |

(1) Calculated NPL Report, calculated with commercial software

(2) Determined by a contact thermometer inserted into the calibration block



50 to 350°C

- 50°C to 350°C
- Emissivity > 0.95
- 70mm Ridged Plate Target

When the high accuracy of the Gemini R is not necessary this product offers a cost effective solution for the calibration and testing of infrared thermometers.

The Greybody Model 975 gives fast accurate results with a larger sensing area. A temperature sensor sits just under the target surface and controls the temperature of the source. A custom designed surface sensor is used to set the controller calibration and a traceable certificate is supplied with each source.

# Greybody Source

## Model 975


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


| Model              | 975 Greybody                                 |
|--------------------|----------------------------------------------|
| Temperature Range  | 50°C to 350°C                                |
| Display Resolution | 0.01°C    50 to 99.99<br>0.1°C    100 to 350 |
| Heating time       | 35 minutes                                   |
| Target Size        | Ridged Plate, 70mm Diameter                  |
| Stability          | ±0.2°C                                       |
| Accuracy           | ±2                                           |
| Emissivity         | >0.95                                        |
| Power              | 180 Watts                                    |
| Voltage            | 100-130 or 208-240 Vac                       |
| PC Interface       | Included                                     |
| Dimensions         | H 115mm<br>W 230mm<br>D 225mm                |
| Weight             | 3.9kg                                        |

### How to Order

Model 975 Greybody Source  
Please state voltage required



30 to 350°C

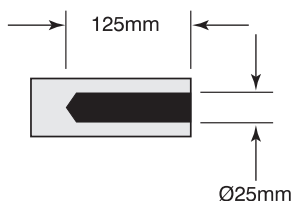
# Blackbody Source

## QuickCal Blackbody

- 30°C to 350 °C
- Emissivity > 0.99
- Controller Resolution 0.1°C

When the high accuracy of the Gemini R is not necessary this product offers a cost effective solution for the calibration and testing of infrared thermometers. The Quick Cal Blackbody is ideal for rapid and portable checking of infrared thermometers.

It features a cylindrical cavity 25mm diameter by 115mm deep.



**Quick-Cal**



931-22-100 Optional Carrying Case



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

|                    |                                                                          |
|--------------------|--------------------------------------------------------------------------|
| <b>Model</b>       | <b>550 QuickCal Blackbody</b>                                            |
| Temperature Range  | 30°C to 350°C                                                            |
| Display Resolution | 0.1°C                                                                    |
| Heating time       | 9 minutes                                                                |
| Target Size        | 25 x 115mm Cavity with end cone                                          |
| Stability          | ±0.2°C                                                                   |
| Accuracy           | ±0.5                                                                     |
| Emissivity         | >0.99<br>Surface coating 0.98 - cavity gives overall emissivity of >0.99 |
| Power              | 300 Watts                                                                |
| Voltage            | 100-130 or 208-240 Vac                                                   |
| Dimensions         | H 65mm<br>W 152mm<br>D 175mm                                             |
| Weight             | 1.5kg                                                                    |

### How to Order

Model 550-02 Blackbody Source  
Please state voltage required  
Optional Carry Case 931-22-71

# Thermocouple Referencing Techniques

Isotech has a world leading range of thermocouple referencing equipment. From laboratory models for standard thermocouples through to large scale installations used in power stations, aeronautical, industrial and research institutes.

## Types of Equipment

### Automatic Ice Point

The junctions are maintained at a fixed temperature of 0°C

#### Features

- Provides 0°C reference as adopted by thermocouple tables
- Reference from one to a 100 Junctions
- Will reference any type or combination of thermocouple types
- Can be bench or rack mounted.

### Constant Temperature Ovens

The junctions are maintained at a fixed temperature typically in the range 40 to 75°C

#### Features

- The junctions are maintained at a fixed elevated temperature.
- Reference up to 100 Junctions
- Will reference any type or combination of thermocouple types
- Can be provided as bench, rack mounted or in a weatherproof wall mounting case to IP66

### Isothermal Systems

The junctions are not maintained at a fixed temperature, but are held in a thermal reservoir with an output signal which is fed to the instrumentation system.

#### Features

- The junctions float at ambient temperature in an isothermal block - no loading errors
- Can be fully passive with no power requirement
- Will reference any type or combination of thermocouple types
- Can be provided as bench, rack mounted or in a weatherproof wall mounting case to IP66

## Types of Housing



**Bench Mounting**



**Wall Mounted**

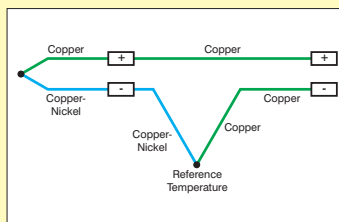


**Rack Mounted**

## Types of Junction

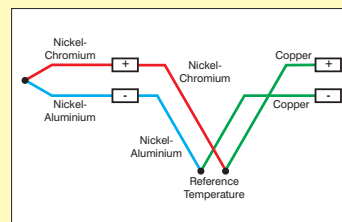
### Single Junction

This is particularly useful with Type T thermocouples. With Type T one leg is copper, so only the Copper / Constantan wire needs to be processed thermally.



### Double Junction

This is the most commonly used method. The input signal being connected to the "double junction" with the output on copper wires.

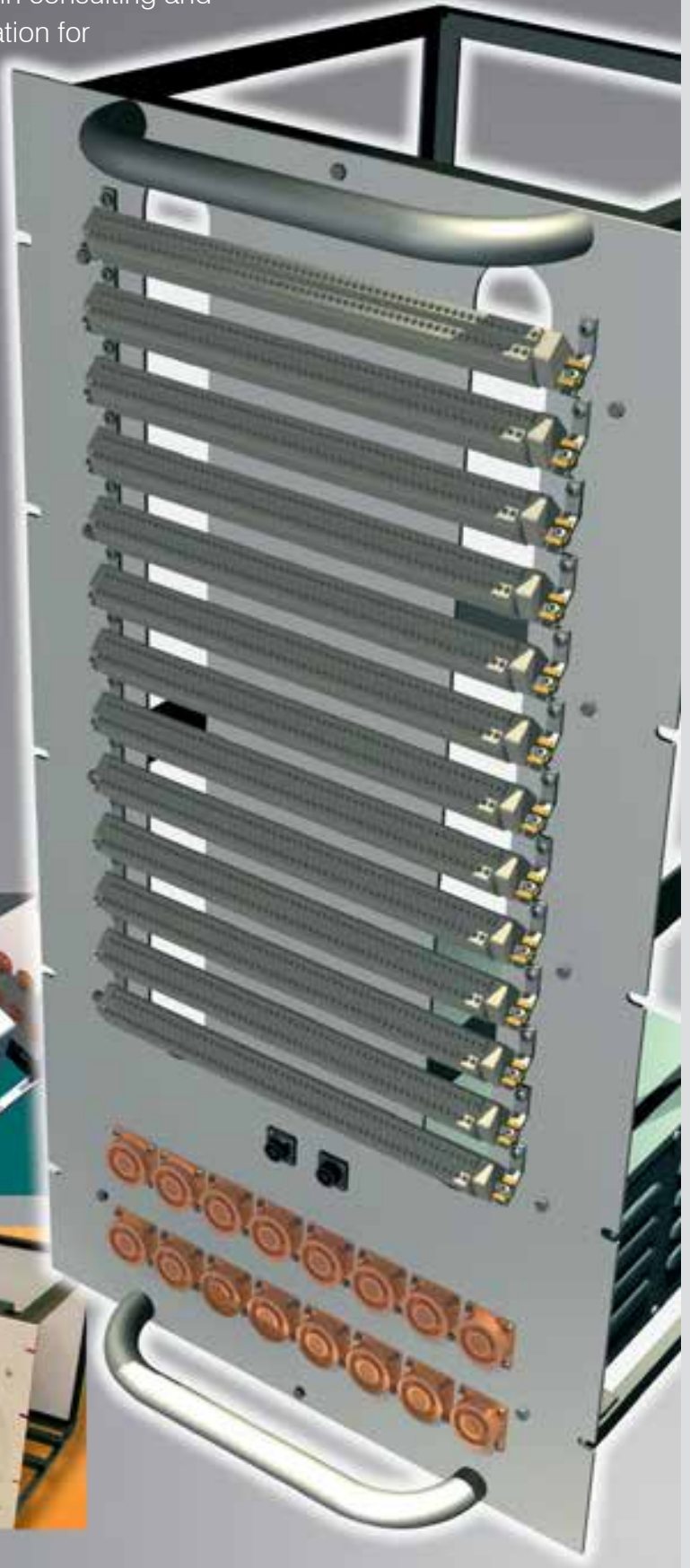


# Isotech Custom Engineering

Isotech have more than 30 years experience in consulting and designing referencing systems. With a reputation for outstanding reliability, long term support and excellence Isotech can provide systems from a single, to several thousand junctions.



*Solutions for Aeronautical, Power Stations,  
Environmental Monitoring, Space,  
Boiler Rooms, Maritime...*





0 to 70°C

# Thermocouple Probes

## Cold Junction

- Looms for Compensation Units
- Saves on On Site Wiring
- Maintains Accuracy of Unit

Probes are suitable for use with all Isotech thermocouple reference units or may be used with any other equipment including ice flasks and ice point reference units.

They can be supplied to suit a single thermocouple, or up to ten double junctions in a single assembly.

These probes are normally specified to order, or are made to match the reference equipment to which they will be fitted. Normal lead length, L2, is 1M but can be specified at the time of order along with the probe length, L1.

All wire material is to the highest grade available and PTFE insulated, numbered and colour coded for the appropriate thermocouple type.

Double junctions are most commonly supplied (four wire connections per junction). Single junctions (two wire connections per junction) can also be supplied.

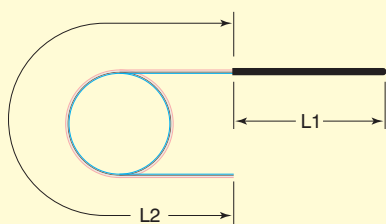
For Types R & S cold junctions are most commonly made from low cost compensating cable but can be supplied in platinum material to special order.

Standard thermocouple Types are, K, E, J, T, N, U, S and R.

Other materials available on request

For Isotech reference units simply advise which model the junctions are for, and the types and number required. For custom junctions the following information is required.

|                              |  |
|------------------------------|--|
| Number of Junctions Required |  |
| Thermocouple Type            |  |
| Single or Double Junction    |  |
| Length of Probe, L1          |  |
| Length of Lead, L2           |  |
| Maximum Probe Diameter       |  |



### Standard Combinations Available

#### Code Single Junction Probes

|   |                                               |
|---|-----------------------------------------------|
| K | Nickel Chromium vs Nickel Aluminium           |
| E | Nickel Chromium vs Copper Nickel (Constantan) |
| J | Iron vs Constantan                            |
| T | Copper vs Constantan                          |
| N | Nicrosil vs Nisil                             |
| U | Copper vs Cupronic                            |
| S | Platinum vs Platinum 10% Rhodium              |
| R | Platinum vs Platinum 13% Rhodium              |

#### Code Double Junction Combinations examples

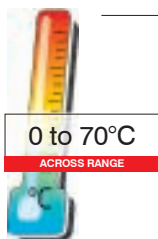
|     |                                |
|-----|--------------------------------|
| K   | Nickel Chromium vs Copper      |
| K   | Nickel Aluminum vs Copper      |
| J   | Iron vs Copper                 |
| J   | Constantan vs Copper           |
| U   | Cupronic vs Copper             |
| S/R | Platinum vs Copper             |
| S   | Platinum 10% Rhodium vs Copper |
| R   | Platinum 13% Rhodium vs Copper |

("U" is a substitute metal alloy combination for Pt/Pt Rh types in the range 0 to 50°C).

Other materials are available on request.

### How to order

Model 880 Cold Junction Probes are normally specified for each order. Please discuss your exact requirements with us before ordering.



# Thermocouple Reference Unit

## TRU Model 938

- Suitable for Laboratory or High Capacity Applications
- Works in high ambients up to 65°C
- Reliable Solid State Design

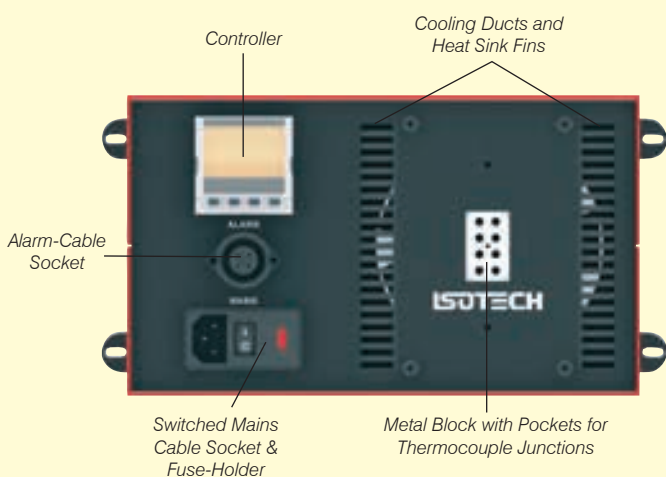
The TRU (Thermocouple Reference Unit) supplies a stable and accurate 0°C, or elevated reference temperature.

It is a self-contained all solid-state unit using Peltier technology which provides maintenance free operation.

The TRU features rapid temperature shift even from high ambient temperatures and is stable within 10 minutes from switch on.

An alarm will be activated should the reference temperature deviate by more than 0.2°C.

The 938 can be ordered with a choice of one of two block types. B1 is recommended for laboratory use and has 6 pockets 6.2mm x 130mm deep and a 4.2mm pocket and can accommodate up to 36 junctions. Block B2 is for higher capacity applications and can accommodate up to 100 junctions with 8 8.2mm pockets x 76mm deep and a 4.2 pocket for an optional monitoring PRT.



|                  |                                                                                                     |
|------------------|-----------------------------------------------------------------------------------------------------|
| <b>Model</b>     | <b>938</b>                                                                                          |
| Operating Temp.  | 0°C (or 45° to 70°C)                                                                                |
| Ambient Range °C | 2°C to 65°C                                                                                         |
| Stability        | ±0.03°C, Errors introduced by thermocouple loading can be removed by adjusting controller offset    |
| Stabilising Time | 10 minutes from 44°C                                                                                |
| Capacity         | B1 6 x 6.2mm Pockets + 4.2mm pocket 130mm deep<br>or B2 8 x 8.2mm Pockets + 4.2mm pocket 76mm deep. |
| Alarm Facilities | Non-latching relay rated 5 Amps 240V                                                                |
| Power            | 100 Watts typical<br>100-130 or 208-240 VAC 50/60Hz                                                 |
| Dimensions       | Height 228mm<br>Width 253mm<br>Depth 148mm                                                          |
| Weight           | 5.5kg                                                                                               |

### Accessories

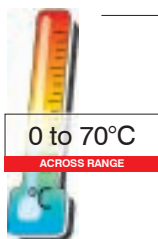
- 935-14-54 Platinum Resistance Thermometer suits Block B1: Includes UKAS Calibration at 0.01°C
- 935-14-55 Platinum Resistance Thermometer suits Block B2: Includes UKAS Calibration at 0.01°C
- 935-17-32 Fan Filter - recommended for high dust environments

### How to order

TRU Model 938

Normally uniquely specified for each order.

Please discuss your exact requirements with us before ordering.



# Thermocouple Reference Unit

## TRU Model 937

- Up to 100 Channels
- Compact, Pre Wired Thermocouples
- Operates in High Ambients

The TRU 937 (Temperature Reference Unit) supplies a stable and accurate 0°C or elevated Reference Temperatures between 45°C and 70°C.

It is a self-contained all solid state unit using peltier technology which provides maintenance free operation. The TRU 937 features rapid cool down from high ambient temperatures and is stable within 10 minutes from switch on.

An alarm will be activated should the reference temperatures deviate by more than the user definable span. Thermocouple Reference Junctions are located in a reference block and connected to their marked input and output terminals in an isothermal enclosure. The uniform temperature throughout the enclosure ensures that no thermoelectric EMFs are generated at the terminals.

One advantage of the TRU 937 is that the user need not be concerned with the supply and installation of reference junctions since it is only necessary to connect the thermocouple compensation cables to the input terminals and the measuring instrument to the output terminals of the TRU 937.

There are two models, the TRU 937/50 with up to 50 junctions with a single terminal cover door, and the TRU 937/100 which has doors on the front and rear, as shown in the photograph.



**Note:**

*Thermocouple Referencing to ISO9000 at 0°C in Ambients up to 65°C or elevated reference temperatures between 45°C and 70°C  
References up to 100 Thermocouples  
Pre-wired Thermocouples, Compact Design*



|                          |                                                                                                  |
|--------------------------|--------------------------------------------------------------------------------------------------|
| <b>Model</b>             | <b>937</b>                                                                                       |
| Operating Temp.          | 0°C (or 45° to 70°C)                                                                             |
| Ambient Range            | 2°C to 65°C                                                                                      |
| Stability                | ±0.03°C, Errors introduced by thermocouple loading can be removed by adjusting controller offset |
| Stabilising Time         | 10 minutes from 44°C                                                                             |
| Capacity                 | Up to 100 Double Junction Channels                                                               |
| Input/Output Connections | Klippon Terminals, type 1.5 AKZ                                                                  |
| Alarm facilities         | Non-latching relay rated 5 Amps 240V                                                             |
| Power                    | 100 Watts typical<br>100-130 or 208-240 VAC 50/60Hz                                              |
| Dimensions               | Height 265mm<br>Width 253mm<br>Depth TRU 937/100 312mm<br>Depth TRU 937/50 230mm                 |
| Weight                   | TRU 937/100 11kg<br>TRU 937/50 8kg                                                               |

**Accessories**

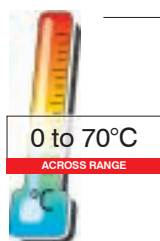
- 935-14-55 Platinum Resistance Thermometer suits Block B2: Includes UKAS Calibration at 0.01°C
- 935-17-32 Fan Filter - recommended for high dust environments

**How to order**

TRU Model 937

Normally uniquely specified for each order.

Please discuss your exact requirements with us before ordering.



# Thermocouple Reference Unit

## TRUrac Model 847

- Rack Mounted
- Large Capacity
- Approved for Power Station Use

The TRUrac is a 0°C or elevated temperature thermocouple reference system mounted in a 19" chassis. It has been developed for situations where ambient temperature can be up to 65°C.

The reference temperature is normally set to 0°C or between 45°C and 70°C. For other temperatures please contact Isotech.

An alarm will be activated should the reference temperatures deviate by more than 0.2°C.

Inside the rack case is a high stability thermal block which has a capacity of up to 100 thermocouple channels, the probe wires being terminated at the rear of the unit on rail mounted screw terminals.

To special order a second thermal block may be fitted to allow a capacity of 200 channels in a single unit.

The customer simply connects their thermocouple wires and copper output wires to these terminals. All the thermocouple cold junctions are inserted into a metal oven block which is accurately temperature controlled.



|                          |                                                                                                  |
|--------------------------|--------------------------------------------------------------------------------------------------|
| <b>Model</b>             | <b>847</b>                                                                                       |
| Operating Temp.          | 0°C (or 45° to 70°C)                                                                             |
| Ambient Range            | 2°C to 65°C                                                                                      |
| Stability                | ±0.03°C, Errors introduced by thermocouple loading can be removed by adjusting controller offset |
| Stabilising Time         | 10 minutes from 44°C                                                                             |
| Capacity                 | Up to 100 Double Junction Channels                                                               |
| Input/Output Connections | Klippon Terminals, type 1.5 AKZ                                                                  |
| Alarm facilities         | Non-latching relay rated 5 Amps 240V                                                             |
| Power                    | 100 Watts typical<br>100-130 or 208-240 VAC 50/60Hz                                              |
| Dimensions               |                                                                                                  |
| 50 to 100 Channels       | Height 400mm<br>Width 483mm<br>Depth 312mm                                                       |
| Weight                   | 24kg                                                                                             |
| <b>Accessories</b>       |                                                                                                  |
| 935-14-54                | Platinum Resistance Thermometer<br>Includes UKAS Calibration at 0.01°C                           |
| 935-17-32                | Fan Filter - recommended for high dust environments                                              |

### How to order

Should be specified uniquely on each order.  
Please discuss your exact requirements with us before ordering.

### Note:

*Rack mounted Temperature Thermocouple Referencing System  
Large Capacity, Approved for Power Station Use.  
Reference temperatures set to 0°C or between 45°C and 70°C.*



45 to 70°C

# Thermocouple Reference Unit

## Hotbox Model 830

- Water Proof Cased
- Large Capacity - up to 200 junctions
- Suitable for Power Station Use

The Hotbox is housed in a robust waterproof enclosure to IP66 incorporating bottom gland plate. Fixing lugs for wall mounting are provided. Easy access to terminal rails and oven assembly is via a hinged door.

All the thermocouple cold junctions are inserted into a metal oven block which is accurately temperature controlled.

A safety switch is fitted to cut off supplies if the temperature rises 10°C above the set point.



|                         |                                                     |
|-------------------------|-----------------------------------------------------|
| <b>Model</b>            | <b>830</b>                                          |
| Referencing Temp        | 45°C - 70°C                                         |
| Accuracy                | ±0.1°C                                              |
| Long Term Stability     | ±0.05°C per 1000 Hours                              |
| Temperature Gradient    | ±0.1°C between Junctions                            |
| Stabilisation Time      | 120 minutes                                         |
| Max Ambient Temperature | 50°C                                                |
| Thermocouple            | 0 to 100 channels                                   |
| Capacity                | Double junction referencing                         |
| Power                   | 250 Watts typical<br>100-130 or 208-240 VAC 50/60Hz |
| Dimensions              | Height 600mm<br>Width 600mm<br>Depth 300mm          |
| Weight                  | 40kg                                                |

### Note:

Numerous special versions are available and can be supplied either in their existing form or modified to customers' requirements.

### Accessories

935-14-08 Platinum Resistance Thermometer.  
Includes UKAS calibration.

### How to order

Model 830  
Hotboxes are normally uniquely specified for each order.  
Please discuss your exact requirements with us before ordering.



-20 to 70°C

# Thermocouple Reference Unit

## Isobox Model 842

- Water Proof Cased
- Large Capacity
- Approved for Power Station Use

The function of this reference unit differs from other cased systems in that the temperature of the metal block in which the thermocouple and copper leads are inserted, actually varies with ambient temperature. A separate output signal is produced which is proportional to the difference between the environmental temperature and the actual reference temperature. The output signal can be fed directly into a computer/data logger to give accurate compensation over a large ambient range. A thermal reservoir, heavily insulated, contains the reference junction probes. The reservoir temperature slowly follows the ambient temperature; an electrical compensation device is thermally integrated with the reservoir and thus senses the reservoir temperature. The device produces an output proportional to the difference between the reservoir temperature and the reference temperature (usually 0°C).

This is the signal the computer/data logger uses to compensate for the temperature of the reference probes junctions.

The output signal can be in the form of a DC mV output, 4-20 mA or from a platinum resistance thermometer. Please discuss prior to order.

Units are housed in robust weatherproof enclosures to IP66 incorporating bottom gland plate. Fixing lugs for wall mounting are provided. Easy access to terminal rails and block assembly is via a lockable hinged front door.



|                      |                                                                                                                             |
|----------------------|-----------------------------------------------------------------------------------------------------------------------------|
| <b>Model</b>         | <b>842</b>                                                                                                                  |
| Referencing Temp     | Effectively 0°C                                                                                                             |
| Accuracy             | ±0.1°C per 10° ambient span                                                                                                 |
| Long Term Stability  | ±0.05°C per 1000 Hours                                                                                                      |
| Temperature Gradient | ±0.1°C between Junctions                                                                                                    |
| Stabilisation Time   | 10 minutes                                                                                                                  |
| Ambient Temperature  | -20°C to +70°C                                                                                                              |
| Thermocouple         | 0 to 100 channels                                                                                                           |
| Capacity             | Double junction referencing                                                                                                 |
| Power                | 10 Watts typical<br>100-130 or 208-240 VAC 50/60Hz<br>Low level D.C.<br>Consumption 6VA typical<br>Passive Option Available |
| Dimensions           | Height 600mm<br>Width 600mm<br>Depth 300mm                                                                                  |
| Weight               | 40kg                                                                                                                        |

### Note:

Numerous special versions are available and can be supplied either in their existing form or modified to customers' requirements.

### How to order

#### Model 842

Isoboxes are normally uniquely specified for each order. Please discuss your exact requirements with us before ordering.

### Note:

Waterproof Cased Ambient Temperature Thermocouple Referencing System.  
Large Capacity up to 100 Thermocouples.  
Wide Ambient Range.  
Approved for Power Station Use.



-20 to 70°C

# Thermocouple Reference Unit

## Isorac Model 844

- Rack Mounted Ambient Referencing System
- Large Capacity
- Approved for Power Station Use

The function of this reference unit differs from other rack mounted systems in that the temperature of the metal block in which the thermocouple and copper leads are inserted actually varies with ambient temperature. A separate output signal is produced which is proportional to the difference between the environmental temperature and the actual reference temperature. The output signal can be fed directly into a computer/data logger to give accurate compensation over a large ambient range.

A thermal reservoir, heavily insulated, contains the reference junction probes.

The reservoir temperature slowly follows the ambient temperature; an electrical compensation device is thermally integrated with the reservoir and thus senses the reservoir temperature.

The device produces an output proportional to the difference between the reservoir temperature and the reference temperature (usually 0°C). This is the signal the computer/data logger uses to compensate for the temperature of the reference probes junctions.

The output signal can be in the form of a DC mV output, 4-20 mA or from a platinum resistance thermometer. Please discuss prior to order.



|                       |                                                                                                                             |
|-----------------------|-----------------------------------------------------------------------------------------------------------------------------|
| <b>Model No.</b>      | <b>844</b>                                                                                                                  |
| Reference Temperature | Effectively 0°C                                                                                                             |
| Temperature Gradient  | ±0.1°C between Junctions                                                                                                    |
| Stability             | ±0.05°C per 1000 Hours                                                                                                      |
| Ambient Range         | -20°C to +70°C                                                                                                              |
| Accuracy              | ±0.1°C per 15°C ambient span                                                                                                |
| Stabilisation Time    | 10 mins                                                                                                                     |
| Thermocouple Capacity | 0 to 100 channels<br>double junction referencing                                                                            |
| Power                 | 10 Watts typical<br>100-130 or 208-240 VAC 50/60Hz<br>Low level D.C.<br>Consumption 6VA typical<br>Passive Option Available |
| Dimensions            |                                                                                                                             |
| Up to 50 channels     | Height 255mm<br>Width 483mm<br>Depth 312mm                                                                                  |
| Weight                | 17.2kg                                                                                                                      |
| 50 to 100 channels    | Height 309mm<br>Width 483mm<br>Depth 312mm                                                                                  |
| Weight                | 20.4kg                                                                                                                      |

Numerous special versions are available and can be supplied either in their existing form or modified to customers requirements.

### How to order

Model 844

Isoracs are normally uniquely specified for each order.

Please discuss your exact requirements with us before ordering.

### Note:

*Rack Mounted Ambient Temperature Referencing System.*

*19" Rack Mounting.*

*Large capacity up to 100 Thermocouples.*

*Approved for Power Station Use.*

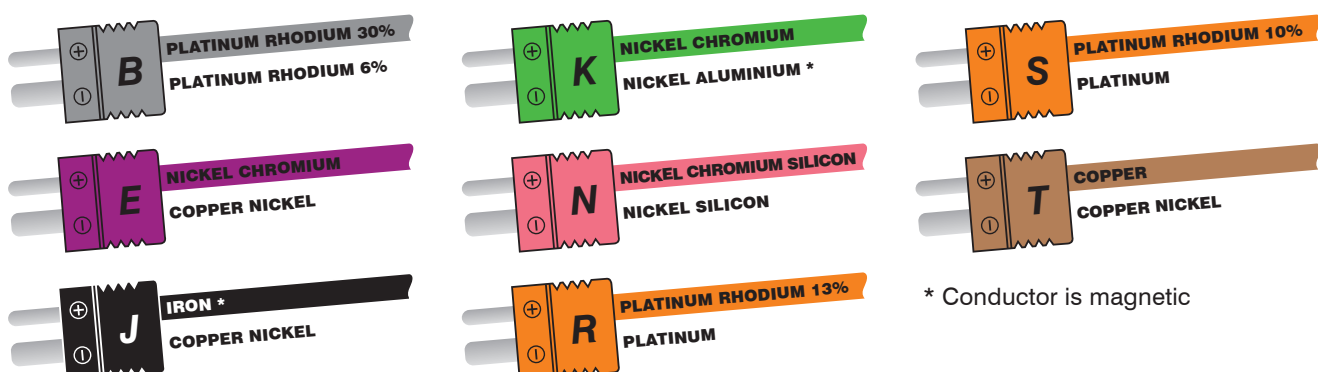
# Reference Chart

## Thermocouple Tolerances - IEC 60584 2013

|          |         |       |          |                                                                                                          |                            |
|----------|---------|-------|----------|----------------------------------------------------------------------------------------------------------|----------------------------|
| <b>B</b> | Class 1 | -     | -        | -                                                                                                        |                            |
|          | Class 2 | 600   | +1700°C: | $\pm 0.0025 \cdot t$                                                                                     | or $\pm 1.5^\circ\text{C}$ |
|          | Class 3 | 600   | +1700°C: | $\pm 0.005 \cdot t$                                                                                      | or $\pm 4.0^\circ\text{C}$ |
| <b>E</b> | Class 1 | - 40  | +800°C:  | $\pm 0.004 \cdot t$                                                                                      | or $\pm 1.5^\circ\text{C}$ |
|          | Class 2 | - 40  | +900°C:  | $\pm 0.0075 \cdot t$                                                                                     | or $\pm 2.5^\circ\text{C}$ |
|          | Class 3 | - 200 | +40°C:   | $\pm 0.015 \cdot t$                                                                                      | or $\pm 2.5^\circ\text{C}$ |
| <b>J</b> | Class 1 | - 40  | +750°C:  | $\pm 0.004 \cdot t$                                                                                      | or $\pm 1.5^\circ\text{C}$ |
|          | Class 2 | - 40  | +750°C:  | $\pm 0.0075 \cdot t$                                                                                     | or $\pm 2.5^\circ\text{C}$ |
|          | Class 3 | -     | -        | -                                                                                                        |                            |
| <b>K</b> | Class 1 | - 40  | +1000°C: | $\pm 0.004 \cdot t$                                                                                      | or $\pm 1.5^\circ\text{C}$ |
|          | Class 2 | - 40  | +1200°C: | $\pm 0.0075 \cdot t$                                                                                     | or $\pm 2.5^\circ\text{C}$ |
|          | Class 3 | - 200 | +40°C:   | $\pm 0.015 \cdot t$                                                                                      | or $\pm 2.5^\circ\text{C}$ |
| <b>N</b> | Class 1 | - 40  | +1000°C: | $\pm 0.004 \cdot t$                                                                                      | or $\pm 1.5^\circ\text{C}$ |
|          | Class 2 | - 40  | +1200°C: | $\pm 0.0075 \cdot t$                                                                                     | or $\pm 2.5^\circ\text{C}$ |
|          | Class 3 | - 200 | +40°C:   | $\pm 0.015 \cdot t$                                                                                      | or $\pm 2.5^\circ\text{C}$ |
| <b>R</b> | Class 1 | 0     | +1600°C: | $\pm 1$ for $t < 1100^\circ\text{C}$<br>$\pm [1 + 0.003 \times (t - 1100)]$ for $t > 1100^\circ\text{C}$ |                            |
|          | Class 2 | 0     | +1600°C: | $\pm 0.0025 \cdot t$                                                                                     | or $\pm 1.5^\circ\text{C}$ |
| <b>S</b> | Class 1 | 0     | +1600°C: | $\pm 1$ for $t < 1100^\circ\text{C}$<br>$\pm [1 + 0.003 \times (t - 1100)]$ for $t > 1100^\circ\text{C}$ |                            |
|          | Class 2 | 0     | +1600°C: | $\pm 0.0025 \cdot t$                                                                                     | or $\pm 1.5^\circ\text{C}$ |
| <b>T</b> | Class 1 | - 40  | +350°C:  | $\pm 0.004 \cdot t$                                                                                      | or $\pm 0.5^\circ\text{C}$ |
|          | Class 2 | - 40  | +350°C:  | $\pm 0.0075 \cdot t$                                                                                     | or $\pm 1.0^\circ\text{C}$ |
|          | Class 3 | - 200 | +40°C:   | $\pm 0.015 \cdot t$                                                                                      | or $\pm 1.0^\circ\text{C}$ |

t = temperature, degree Celsius, larger value applies

## Thermocouple Colour Coding - IEC 60584-3



# About the Laboratory

Isotech's UKAS accredited calibration laboratory, Northern Temperature Primary Laboratory (NTPL), was established in 1980 and has grown to be a full scale laboratory providing calibration to the smallest of uncertainties. Isotech was the first UKAS laboratory to be accredited to calibrate ITS-90 Fixed Point Cells. Our accredited uncertainties are now smaller than many the scope of other accredited laboratories and smaller than most National Measurement Institutes.

NTPL comprises of three physically separate laboratories, A Primary Laboratory, A Secondary Laboratory and Calibration laboratory for Industrial Products

## Summary of Accreditation

### Electrical

Bridges and similar instruments, resistance  
Calibrators, temperature simulation  
Resistance boxes  
Resistors, AC  
Resistors, DC  
Temperature indicators, electrical calibration  
Voltmeters, DC

### Temperature

Block calibrators  
Fixed point cells  
Resistance thermometers, calibration by comparison  
Resistance thermometers, fixed point calibrations  
Temperature indicators and recorders, electrical calibration without sensor  
Temperature indicators and recorders, with temperature sensor(s)  
Thermocouples, base metal types, e.g. K, N, T  
Thermocouples, gold/platinum  
Thermocouples, platinum/rhodium types, e.g. S, R



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

NTPL calibrate both Isotech equipment and devices from other manufacturers to the smallest of calibration uncertainties. The latest UKAS schedule can be downloaded from our website, a brief summary follows.



## ■ Calibration of Thermometers

| Measured Quantity<br>Instrument or Gauge | Range          | Best Measurement<br>Capability Expressed as<br>an Expanded Uncertainty<br>( <i>k</i> =2) | Remarks                                                                                                                     |
|------------------------------------------|----------------|------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------|
| Calibration by comparisons               | -80°C to -40°C | 7.0mk                                                                                    |                                                                                                                             |
|                                          | -40°C to 50°C  | 4.0mk                                                                                    |                                                                                                                             |
|                                          | 50°C to 156°C  | 5.0mk                                                                                    |                                                                                                                             |
|                                          | 156°C to 300°C | 6.5mk                                                                                    |                                                                                                                             |
|                                          | 300°C to 420°C | 20mk                                                                                     |                                                                                                                             |
|                                          | 420°C to 660°C | 35mk                                                                                     |                                                                                                                             |
| Calibration at Fixed Points (See Note 1) |                |                                                                                          |                                                                                                                             |
| BP Nitrogen                              | -195.798°C     | 2mK                                                                                      | Note 1: Suitable only for<br>HT/SPRTs with high stability.<br>Includes extrapolation to zero<br>power and immersion checks. |
| TP Argon                                 | -189.3442°C    | 0.50mK                                                                                   |                                                                                                                             |
| TP Mercury                               | -38.8344°C     | 0.24mK                                                                                   |                                                                                                                             |
| TP Water (See Note 2)                    | 0.01°C         | 0.07mK                                                                                   |                                                                                                                             |
| MP Gallium                               | 29.7646°C      | 0.15mK                                                                                   | Note 2: Suitable for most<br>SPRTs using nominal current.                                                                   |
| FP Indium                                | 156.5985°C     | 1.0mK                                                                                    |                                                                                                                             |
| FP Tin                                   | 231.928°C      | 1.0mK                                                                                    |                                                                                                                             |
| FP Zinc                                  | 419.527°C      | 1.2mK                                                                                    |                                                                                                                             |
| FP Aluminium                             | 660.323°C      | 2.0mK                                                                                    |                                                                                                                             |
| FP Silver                                | 961.78°C       | 7mK                                                                                      |                                                                                                                             |

## ■ Calibration of Thermocouples

| Measured Quantity<br>Instrument or Gauge | Range            | Best Measurement<br>Capability Expressed as<br>an Expanded Uncertainty<br>( <i>k</i> =2) | Remarks                                                                     |
|------------------------------------------|------------------|------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------|
| Platinum thermocouples                   |                  |                                                                                          |                                                                             |
| Calibration by comparisons               | -50°C to 0°C     | 0.5°C                                                                                    | Thermocouples without a cold<br>junction will have increased<br>uncertainty |
|                                          | 0°C to 50°C      | 0.45°C                                                                                   |                                                                             |
|                                          | 50°C to 660°C    | 0.4°C                                                                                    |                                                                             |
|                                          | 660°C to 1100°C  | 0.7°C                                                                                    |                                                                             |
|                                          | 1100°C to 1300°C | 1.7°C                                                                                    |                                                                             |
| Calibrations at fixed points             |                  |                                                                                          |                                                                             |
| FP Tin                                   | 231.928°C        | 0.4°C                                                                                    |                                                                             |
| FP Zinc                                  | 419.527°C        | 0.4°C                                                                                    |                                                                             |
| FP Aluminium                             | 660.323°C        | 0.4°C                                                                                    |                                                                             |
| FP Silver                                | 961.78°C         | 0.4°C                                                                                    |                                                                             |
| Other thermocouples                      |                  |                                                                                          |                                                                             |
|                                          | -196°C           | 0.3°C                                                                                    |                                                                             |
|                                          | -80°C to 0°C     | 0.25°C                                                                                   |                                                                             |
|                                          | 0°C to 50°C      | 0.1°C                                                                                    |                                                                             |
|                                          | 50°C to 300°C    | 0.25°C                                                                                   |                                                                             |
|                                          | 300°C to 420°C   | 0.30°C                                                                                   |                                                                             |
|                                          | 420°C to 660°C   | 0.4°C                                                                                    |                                                                             |
|                                          | 660°C to 1100°C  | 0.8°C                                                                                    |                                                                             |
|                                          | 1100°C to 1300°C | 2.2°C                                                                                    |                                                                             |

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



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

# Isotech Training Course

## From Industry to ITS-90

### Isotech Training – Global Experts in Calibration Training

Isotech is a globally recognised leader in temperature metrology and calibration training. With decades of expertise, Isotech provides high-quality training programs trusted by laboratories, research institutions, and industries worldwide. These programs ensure professionals can effectively use Isotech calibration equipment while maintaining the highest standards of accuracy.

### Comprehensive Training Solutions

Isotech offers a range of training programs tailored to different needs:

#### On-Site Training & New Installations

Isotech experts travel worldwide to deliver hands-on training for new equipment installations, ensuring teams are fully prepared to operate and maintain calibration systems.

#### Standalone Training Courses

Independent training courses are available, covering fundamental principles and advanced calibration techniques to enhance industry knowledge and skills.

#### Webinars & Online Training

Webinars provide flexible learning opportunities, keeping professionals updated on the latest developments in calibration, metrology standards, and best practices.

#### Customised Training

Training courses can be tailored to meet the specific requirements of organizations, ensuring relevance and practical application for both small teams and large departments.

### Why Choose Isotech Training?

Global Expertise – Led by internationally recognized specialists in temperature calibration.

Hands-On Learning – Practical, application-based training using real-world calibration scenarios.

Flexible Delivery – Offered on-site, online, or as customized programs.

Trusted by Industry Leaders – Utilized by top-tier laboratories and organizations worldwide.

For more details on upcoming courses or to schedule a custom training session, visit [isotech.co.uk/training](http://isotech.co.uk/training) or contact Isotech directly.



# Reference Chart

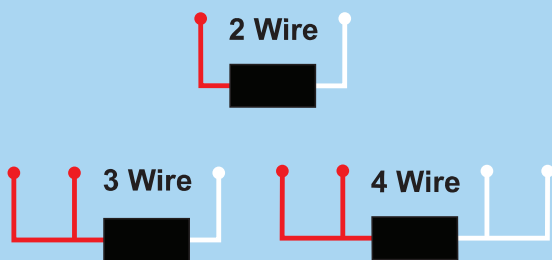
## Platinum Resistance Thermometers - Tolerances for Thermometers IEC 60751 - 2008

| Tolerance Class | Valid Temperature Range °C |                | Tolerance Values °C       |
|-----------------|----------------------------|----------------|---------------------------|
|                 | Wire Wound Resistors       | Film Resistors |                           |
| AA              | -50 to +250                | -50 to +250    | $\pm(0.1 + 0.0017   t  )$ |
| A               | -100 to +450               | -30 to +300    | $\pm(0.15 + 0.002   t  )$ |
| B               | -196 to +600               | -50 to +500    | $\pm(0.3 + 0.005   t  )$  |
| C               | -196 to +600               | -50 to +600    | $\pm(0.6 + 0.01   t  )$   |

### Minimum Calibration Points to Enable Coefficients to be calculated for a Platinum Resistance Thermometer

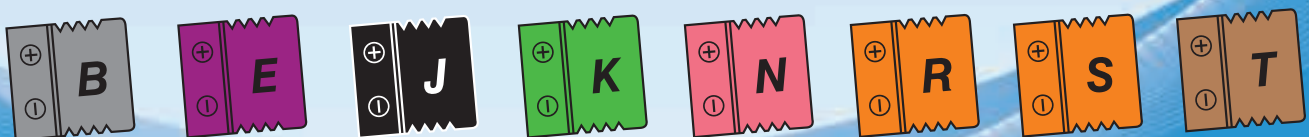
| <i><b>IPRTs</b></i>    | <i><b>Required Points</b></i>                      |         |                                     |       | <i><b>Number of Points</b></i> |
|------------------------|----------------------------------------------------|---------|-------------------------------------|-------|--------------------------------|
| Temp > 0°C             | 0°C and two positive values                        |         | Rt=Ro(1 + At + Bt²)                 |       | 3                              |
| Temp < 0°C<br>to > 0°C | 0°C, two positive values and<br>one negative value |         | Rt=Ro[1 + At + Bt² + C(t-100°C) t³] |       | 4                              |
| <i><b>ITS-90</b></i>   | <i><b>Required Points</b></i>                      |         |                                     |       |                                |
| 0.01 – 29.76°C         | 0.01°C                                             | 29.76°C |                                     |       | 2                              |
| 0.01 – 156°C           | 0.01°C                                             | 156°C   |                                     |       | 2                              |
| 0.01 – 232°C           | 0.01°C                                             | 156°C   | 232°C                               |       | 3                              |
| 0.01 – 419°C           | 0.01°C                                             | 232°C   | 419°C                               |       | 3                              |
| 0.01 – 660°C           | 0.01°C                                             | 232°C   | 419°C                               | 660°C | 4                              |
| 0.01 – 962°C           | 0.01°C                                             | 232°C   | 419°C                               | 660°C | 5                              |
| -38 – 29.76°C          | -38°C                                              | 0.01°C  | 29.76°C                             |       | 3                              |
| -189 – 0.01°C          | -189°C                                             | -38°C   | 0.01°C                              |       | 3                              |

### Platinum Resistance Thermometer Identification



### Summary Table of some ITS-90 Fixed Points

| Substance | Temp. K  | Temp. °C  | State  |
|-----------|----------|-----------|--------|
| Argon     | 83.8058  | -189.3442 | Triple |
| Mercury   | 234.3156 | -38.8344  | Triple |
| Water     | 273.16   | 0.01      | Triple |
| Gallium   | 302.9146 | 29.7646   | Melt   |
| Indium    | 429.7485 | 156.5985  | Freeze |
| Tin       | 505.078  | 231.928   | Freeze |
| Zinc      | 692.677  | 419.527   | Freeze |
| Aluminium | 933.473  | 660.323   | Freeze |
| Silver    | 1234.93  | 961.78    | Freeze |


**ISOTECH**

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# Industrial Platinum Resistance Thermometer Tables - R(0) = 100.00Ω

IEC 60751 Ed2 2008

| °C ITS 90 | 0      | 1      | 2      | 3      | 4      | 5      | 6      | 7      | 8      | 9      | 10     | °C ITS 90 |
|-----------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|-----------|
| -200      | 18.52  |        |        |        |        |        |        |        |        |        |        | -200      |
| -190      | 22.83  | 22.40  | 21.97  | 21.54  | 21.11  | 20.68  | 20.25  | 19.82  | 19.38  | 18.95  | 18.52  | -190      |
| -180      | 27.10  | 26.67  | 26.24  | 25.82  | 25.39  | 24.97  | 24.54  | 24.11  | 23.68  | 23.25  | 22.83  | -180      |
| -170      | 31.34  | 30.91  | 30.49  | 30.07  | 29.64  | 29.22  | 28.80  | 28.37  | 27.95  | 27.52  | 27.10  | -170      |
| -160      | 35.54  | 35.12  | 34.70  | 34.28  | 33.86  | 33.44  | 33.02  | 32.60  | 32.18  | 31.76  | 31.34  | -160      |
| -150      | 39.72  | 39.31  | 38.89  | 38.47  | 38.05  | 37.64  | 37.22  | 36.80  | 36.38  | 35.96  | 35.54  | -150      |
| -140      | 43.88  | 43.46  | 43.05  | 42.63  | 42.22  | 41.80  | 41.39  | 40.97  | 40.56  | 40.14  | 39.72  | -140      |
| -130      | 48.00  | 47.59  | 47.18  | 46.77  | 46.36  | 45.94  | 45.53  | 45.12  | 44.70  | 44.29  | 43.88  | -130      |
| -120      | 52.11  | 51.70  | 51.29  | 50.88  | 50.47  | 50.06  | 49.65  | 49.24  | 48.83  | 48.42  | 48.00  | -120      |
| -110      | 56.19  | 55.79  | 55.38  | 54.97  | 54.56  | 54.15  | 53.75  | 53.34  | 52.93  | 52.52  | 52.11  | -110      |
| -100      | 60.26  | 59.85  | 59.44  | 59.04  | 58.63  | 58.23  | 57.82  | 57.41  | 57.01  | 56.60  | 56.19  | -100      |
| -90       | 64.30  | 63.90  | 63.49  | 63.09  | 62.68  | 62.28  | 61.88  | 61.47  | 61.07  | 60.66  | 60.26  | -90       |
| -80       | 68.33  | 67.92  | 67.52  | 67.12  | 66.72  | 66.31  | 65.91  | 65.51  | 65.11  | 64.70  | 64.30  | -80       |
| -70       | 72.33  | 71.93  | 71.53  | 71.13  | 70.73  | 70.33  | 69.93  | 69.53  | 69.13  | 68.73  | 68.33  | -70       |
| -60       | 76.33  | 75.93  | 75.53  | 75.13  | 74.73  | 74.33  | 73.93  | 73.53  | 73.13  | 72.73  | 72.33  | -60       |
| -50       | 80.31  | 79.91  | 79.51  | 79.11  | 78.72  | 78.32  | 77.92  | 77.52  | 77.12  | 76.73  | 76.33  | -50       |
| -40       | 84.27  | 83.87  | 83.48  | 83.08  | 82.69  | 82.29  | 81.89  | 81.50  | 81.10  | 80.70  | 80.31  | -40       |
| -30       | 88.22  | 87.83  | 87.43  | 87.04  | 86.64  | 86.25  | 85.85  | 85.46  | 85.06  | 84.67  | 84.27  | -30       |
| -20       | 92.16  | 91.77  | 91.37  | 90.98  | 90.59  | 90.19  | 89.80  | 89.40  | 89.01  | 88.62  | 88.22  | -20       |
| -10       | 96.09  | 95.69  | 95.30  | 94.91  | 94.52  | 94.12  | 93.73  | 93.34  | 92.95  | 92.55  | 92.16  | -10       |
| 0         | 100.00 | 99.61  | 99.22  | 98.83  | 98.44  | 98.04  | 97.65  | 97.26  | 96.87  | 96.48  | 96.09  | 0         |
| 0         | 100.00 | 100.39 | 100.78 | 101.17 | 101.56 | 101.95 | 102.34 | 102.73 | 103.12 | 103.51 | 103.90 | 0         |
| 10        | 103.90 | 104.29 | 104.68 | 105.07 | 105.46 | 105.85 | 106.24 | 106.63 | 107.02 | 107.40 | 107.79 | 10        |
| 20        | 107.79 | 108.18 | 108.57 | 108.96 | 109.35 | 109.73 | 110.12 | 110.51 | 110.90 | 111.29 | 111.67 | 20        |
| 30        | 111.67 | 112.06 | 112.45 | 112.83 | 113.22 | 113.61 | 114.00 | 114.38 | 114.77 | 115.15 | 115.54 | 30        |
| 40        | 115.54 | 115.93 | 116.31 | 116.70 | 117.08 | 117.47 | 117.86 | 118.24 | 118.63 | 119.01 | 119.40 | 40        |
| 50        | 119.40 | 119.78 | 120.17 | 120.55 | 120.94 | 121.32 | 121.71 | 122.09 | 122.47 | 122.86 | 123.24 | 50        |
| 60        | 123.24 | 123.63 | 124.01 | 124.39 | 124.78 | 125.16 | 125.54 | 125.93 | 126.31 | 126.69 | 127.08 | 60        |
| 70        | 127.08 | 127.46 | 127.84 | 128.22 | 128.61 | 128.99 | 129.37 | 129.75 | 130.13 | 130.52 | 130.90 | 70        |
| 80        | 130.90 | 131.28 | 131.66 | 132.04 | 132.42 | 132.80 | 133.18 | 133.57 | 133.95 | 134.33 | 134.71 | 80        |
| 90        | 134.71 | 135.09 | 135.47 | 135.85 | 136.23 | 136.61 | 136.99 | 137.37 | 137.75 | 138.13 | 138.51 | 90        |
| 100       | 138.51 | 138.88 | 139.26 | 139.64 | 140.02 | 140.40 | 140.78 | 141.16 | 141.54 | 141.91 | 142.29 | 100       |
| 110       | 142.29 | 142.67 | 143.05 | 143.43 | 143.80 | 144.18 | 144.56 | 144.94 | 145.31 | 145.69 | 146.07 | 110       |
| 120       | 146.07 | 146.44 | 146.82 | 147.20 | 147.57 | 147.95 | 148.33 | 148.70 | 149.08 | 149.46 | 149.83 | 120       |
| 130       | 149.83 | 150.21 | 150.58 | 150.96 | 151.33 | 151.71 | 152.08 | 152.46 | 152.83 | 153.21 | 153.58 | 130       |
| 140       | 153.58 | 153.96 | 154.33 | 154.71 | 155.08 | 155.46 | 155.83 | 156.20 | 156.58 | 156.95 | 157.33 | 140       |
| 150       | 157.33 | 157.70 | 158.07 | 158.45 | 158.82 | 159.19 | 159.56 | 159.94 | 160.31 | 160.68 | 161.05 | 150       |
| 160       | 161.05 | 161.43 | 161.80 | 162.17 | 162.54 | 162.91 | 163.29 | 163.66 | 164.03 | 164.40 | 164.77 | 160       |
| 170       | 164.77 | 165.14 | 165.51 | 165.89 | 166.26 | 166.63 | 167.00 | 167.37 | 167.74 | 168.11 | 168.48 | 170       |
| 180       | 168.48 | 168.85 | 169.22 | 169.59 | 169.96 | 170.33 | 170.70 | 171.07 | 171.43 | 171.80 | 172.17 | 180       |
| 190       | 172.17 | 172.54 | 172.91 | 173.28 | 173.65 | 174.02 | 174.38 | 174.75 | 175.12 | 175.49 | 175.86 | 190       |
| 200       | 175.86 | 176.22 | 176.59 | 176.96 | 177.33 | 177.69 | 178.06 | 178.43 | 178.79 | 179.16 | 179.53 | 200       |
| 210       | 179.53 | 179.89 | 180.26 | 180.63 | 180.99 | 181.36 | 181.72 | 182.09 | 182.46 | 182.82 | 183.19 | 210       |
| 220       | 183.19 | 183.55 | 183.92 | 184.28 | 184.65 | 185.01 | 185.38 | 185.74 | 186.11 | 186.47 | 186.84 | 220       |
| 230       | 186.84 | 187.20 | 187.56 | 187.93 | 188.29 | 188.66 | 189.02 | 189.38 | 189.75 | 190.11 | 190.47 | 230       |
| 240       | 190.47 | 190.84 | 191.20 | 191.56 | 191.92 | 192.29 | 192.65 | 193.01 | 193.37 | 193.74 | 194.10 | 240       |
| 250       | 194.10 | 194.46 | 194.82 | 195.18 | 195.55 | 195.91 | 196.27 | 196.63 | 196.99 | 197.35 | 197.71 | 250       |
| 260       | 197.71 | 198.07 | 198.43 | 198.79 | 199.15 | 199.51 | 199.87 | 200.23 | 200.59 | 200.95 | 201.31 | 260       |
| 270       | 201.31 | 201.67 | 202.03 | 202.39 | 202.75 | 203.11 | 203.47 | 203.83 | 204.19 | 204.55 | 204.90 | 270       |
| 280       | 204.90 | 205.26 | 205.62 | 205.98 | 206.34 | 206.70 | 207.05 | 207.41 | 207.77 | 208.13 | 208.48 | 280       |
| 290       | 208.48 | 208.84 | 209.20 | 209.56 | 209.91 | 210.27 | 210.63 | 210.98 | 211.34 | 211.70 | 212.05 | 290       |
| 300       | 212.05 | 212.41 | 212.76 | 213.12 | 213.48 | 213.83 | 214.19 | 214.54 | 214.90 | 215.25 | 215.61 | 300       |
| 310       | 215.61 | 215.96 | 216.32 | 216.67 | 217.03 | 217.38 | 217.74 | 218.09 | 218.44 | 218.80 | 219.15 | 310       |
| 320       | 219.15 | 219.51 | 219.86 | 220.21 | 220.57 | 220.92 | 221.27 | 221.63 | 221.98 | 222.33 | 222.68 | 320       |
| 330       | 222.68 | 223.04 | 223.39 | 223.74 | 224.09 | 224.45 | 224.80 | 225.15 | 225.50 | 225.85 | 226.21 | 330       |
| 340       | 226.21 | 226.56 | 226.91 | 227.26 | 227.61 | 227.96 | 228.31 | 228.66 | 229.02 | 229.37 | 229.72 | 340       |

# Industrial Platinum Resistance Thermometer Tables - R(0) = 100.00Ω

| °C ITS 90 | 0      | 1      | 2      | 3      | 4      | 5      | 6      | 7      | 8      | 9      | 10     | °C ITS 90 |
|-----------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|-----------|
| 350       | 229.72 | 230.07 | 230.42 | 230.77 | 231.12 | 231.47 | 231.82 | 232.17 | 232.52 | 232.87 | 233.21 | 350       |
| 360       | 233.21 | 233.56 | 233.91 | 234.26 | 234.61 | 234.96 | 235.31 | 235.66 | 236.00 | 236.35 | 236.70 | 360       |
| 370       | 236.70 | 237.05 | 237.40 | 237.74 | 238.09 | 238.44 | 238.79 | 239.13 | 239.48 | 239.83 | 240.18 | 370       |
| 380       | 240.18 | 240.52 | 240.87 | 241.22 | 241.56 | 241.91 | 242.26 | 242.60 | 242.95 | 243.29 | 243.64 | 380       |
| 390       | 243.64 | 243.99 | 244.33 | 244.68 | 245.02 | 245.37 | 245.71 | 246.06 | 246.40 | 246.75 | 247.09 | 390       |
| 400       | 247.09 | 247.44 | 247.78 | 248.13 | 248.47 | 248.81 | 249.16 | 249.50 | 249.85 | 250.19 | 250.53 | 400       |
| 410       | 250.53 | 250.88 | 251.22 | 251.56 | 251.91 | 252.25 | 252.59 | 252.93 | 253.28 | 253.62 | 253.96 | 410       |
| 420       | 253.96 | 254.30 | 254.65 | 254.99 | 255.33 | 255.67 | 256.01 | 256.35 | 256.70 | 257.04 | 257.38 | 420       |
| 430       | 257.38 | 257.72 | 258.06 | 258.40 | 258.74 | 259.08 | 259.42 | 259.76 | 260.10 | 260.44 | 260.78 | 430       |
| 440       | 260.78 | 261.12 | 261.46 | 261.80 | 262.14 | 262.48 | 262.82 | 263.16 | 263.50 | 263.84 | 264.18 | 440       |
| 450       | 264.18 | 264.52 | 264.86 | 265.20 | 265.53 | 265.87 | 266.21 | 266.55 | 266.89 | 267.22 | 267.56 | 450       |
| 460       | 267.56 | 267.90 | 268.24 | 268.57 | 268.91 | 269.25 | 269.59 | 269.92 | 270.26 | 270.60 | 270.93 | 460       |
| 470       | 270.93 | 271.27 | 271.61 | 271.94 | 272.28 | 272.61 | 272.95 | 273.29 | 273.62 | 273.96 | 274.29 | 470       |
| 480       | 274.29 | 274.63 | 274.96 | 275.30 | 275.63 | 275.97 | 276.30 | 276.64 | 276.97 | 277.31 | 277.64 | 480       |
| 490       | 277.64 | 277.98 | 278.31 | 278.64 | 278.98 | 279.31 | 279.64 | 279.98 | 280.31 | 280.64 | 280.98 | 490       |
| 500       | 280.98 | 281.31 | 281.64 | 281.98 | 282.31 | 282.64 | 282.97 | 283.31 | 283.64 | 283.97 | 284.30 | 500       |
| 510       | 284.30 | 284.63 | 284.97 | 285.30 | 285.63 | 285.96 | 286.29 | 286.62 | 286.95 | 287.29 | 287.62 | 510       |
| 520       | 287.62 | 287.95 | 288.28 | 288.61 | 288.94 | 289.27 | 289.60 | 289.93 | 290.26 | 290.59 | 290.92 | 520       |
| 530       | 290.92 | 291.25 | 291.58 | 291.91 | 292.24 | 292.56 | 292.89 | 293.22 | 293.55 | 293.88 | 294.21 | 530       |
| 540       | 294.21 | 294.54 | 294.86 | 295.19 | 295.52 | 295.85 | 296.18 | 296.50 | 296.83 | 297.16 | 297.49 | 540       |
| 550       | 297.49 | 297.81 | 298.14 | 298.47 | 298.80 | 299.12 | 299.45 | 299.78 | 300.10 | 300.43 | 300.75 | 550       |
| 560       | 300.75 | 301.08 | 301.41 | 301.73 | 302.06 | 302.38 | 302.71 | 303.03 | 303.36 | 303.69 | 304.01 | 560       |
| 570       | 304.01 | 304.34 | 304.66 | 304.98 | 305.31 | 305.63 | 305.96 | 306.28 | 306.61 | 306.93 | 307.25 | 570       |
| 580       | 307.25 | 307.58 | 307.90 | 308.23 | 308.55 | 308.87 | 309.20 | 309.52 | 309.84 | 310.16 | 310.49 | 580       |
| 590       | 310.49 | 310.81 | 311.13 | 311.45 | 311.78 | 312.10 | 312.42 | 312.74 | 313.06 | 313.39 | 313.71 | 590       |
| 600       | 313.71 | 314.03 | 314.35 | 314.67 | 314.99 | 315.31 | 315.64 | 315.96 | 316.28 | 316.60 | 316.92 | 600       |
| 610       | 316.92 | 317.24 | 317.56 | 317.88 | 318.20 | 318.52 | 318.84 | 319.16 | 319.48 | 319.80 | 320.12 | 610       |
| 620       | 320.12 | 320.43 | 320.75 | 321.07 | 321.39 | 321.71 | 322.03 | 322.35 | 322.67 | 322.98 | 323.30 | 620       |
| 630       | 323.30 | 323.62 | 323.94 | 324.26 | 324.57 | 324.89 | 325.21 | 325.53 | 325.84 | 326.16 | 326.48 | 630       |
| 640       | 326.48 | 326.79 | 327.11 | 327.43 | 327.74 | 328.06 | 328.38 | 328.69 | 329.01 | 329.32 | 329.64 | 640       |
| 650       | 329.64 | 329.96 | 330.27 | 330.59 | 330.90 | 331.22 | 331.53 | 331.85 | 332.16 | 332.48 | 332.79 | 650       |
| 660       | 332.79 | 333.11 | 333.42 | 333.74 | 334.05 | 334.36 | 334.68 | 334.99 | 335.31 | 335.62 | 335.93 | 660       |
| 670       | 335.93 | 336.25 | 336.56 | 336.87 | 337.18 | 337.50 | 337.81 | 338.12 | 338.44 | 338.75 | 339.06 | 670       |
| 680       | 339.06 | 339.37 | 339.69 | 340.00 | 340.31 | 340.62 | 340.93 | 341.24 | 341.56 | 341.87 | 342.18 | 680       |
| 690       | 342.18 | 342.49 | 342.80 | 343.11 | 343.42 | 343.73 | 344.04 | 344.35 | 344.66 | 344.97 | 345.28 | 690       |
| 700       | 345.28 | 345.59 | 345.90 | 346.21 | 346.52 | 346.83 | 347.14 | 347.45 | 347.76 | 348.07 | 348.38 | 700       |
| 710       | 348.38 | 348.69 | 348.99 | 349.30 | 349.61 | 349.92 | 350.23 | 350.54 | 350.84 | 351.15 | 351.46 | 710       |
| 720       | 351.46 | 351.77 | 352.08 | 352.38 | 352.69 | 353.00 | 353.30 | 353.61 | 353.92 | 354.22 | 354.53 | 720       |
| 730       | 354.53 | 354.84 | 355.14 | 355.45 | 355.76 | 356.06 | 356.37 | 356.67 | 356.98 | 357.28 | 357.59 | 730       |
| 740       | 357.59 | 357.90 | 358.20 | 358.51 | 358.81 | 359.12 | 359.42 | 359.72 | 360.03 | 360.33 | 360.64 | 740       |
| 750       | 360.64 | 360.94 | 361.25 | 361.55 | 361.85 | 362.16 | 362.46 | 362.76 | 363.07 | 363.37 | 363.67 | 750       |
| 760       | 363.67 | 363.98 | 364.28 | 364.58 | 364.89 | 365.19 | 365.49 | 365.79 | 366.10 | 366.40 | 366.70 | 760       |
| 770       | 366.70 | 367.00 | 367.30 | 367.60 | 367.91 | 368.21 | 368.51 | 368.81 | 369.11 | 369.41 | 369.71 | 770       |
| 780       | 369.71 | 370.01 | 370.31 | 370.61 | 370.91 | 371.21 | 371.51 | 371.81 | 372.11 | 372.41 | 372.71 | 780       |
| 790       | 372.71 | 373.01 | 373.31 | 373.61 | 373.91 | 374.21 | 374.51 | 374.81 | 375.11 | 375.41 | 375.70 | 790       |
| 800       | 375.70 | 376.00 | 376.30 | 376.60 | 376.90 | 377.19 | 377.49 | 377.79 | 378.09 | 378.39 | 378.68 | 800       |
| 810       | 378.68 | 378.98 | 379.28 | 379.57 | 379.87 | 380.17 | 380.46 | 380.76 | 381.06 | 381.35 | 381.65 | 810       |
| 820       | 381.65 | 381.95 | 382.24 | 382.54 | 382.83 | 383.13 | 383.42 | 383.72 | 384.01 | 384.31 | 384.60 | 820       |
| 830       | 384.60 | 384.90 | 385.19 | 385.49 | 385.78 | 386.08 | 386.37 | 386.67 | 386.96 | 387.25 | 387.55 | 830       |
| 840       | 387.55 | 387.84 | 388.14 | 388.43 | 388.72 | 389.02 | 389.31 | 389.60 | 389.90 | 390.19 | 390.48 | 840       |
| 850       | 390.48 |        |        |        |        |        |        |        |        |        |        | 850       |

The temperature/resistance relationships used in this standard are as follows:

for the range -200°C to 0°C.

$$R_t = R_0 [1 + At + Bt^2 + C(t - 100)^\circ\text{C}^3]$$

for the range of 0°C to 850°C.

$$R_t = R_0 (1 + At + Bt^2)$$

For the quality of platinum commonly used for industrial resistance thermometers the values of the constants in these equations are:

$$A = 3.9083 \times 10^{-3} \text{ }^\circ\text{C}^{-1}$$

$$B = -5.775 \times 10^{-7} \text{ }^\circ\text{C}^{-2}$$

$$C = -4.183 \times 10^{-12} \text{ }^\circ\text{C}^{-4}$$



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