GUIDE

Venus-4951

Isotech

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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?

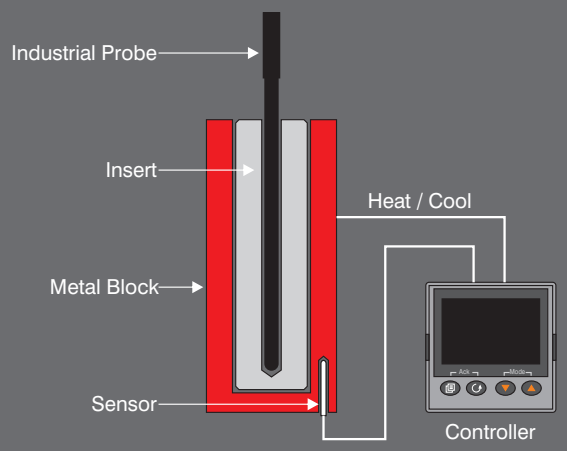
International Guidelines have been published from EURAMET, "Guidelines on the Calibration of Temperature Block Calibrators" Calibration Guide 13. Isotech Calibrators meet the calibration capacity requirements of this guide.

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.

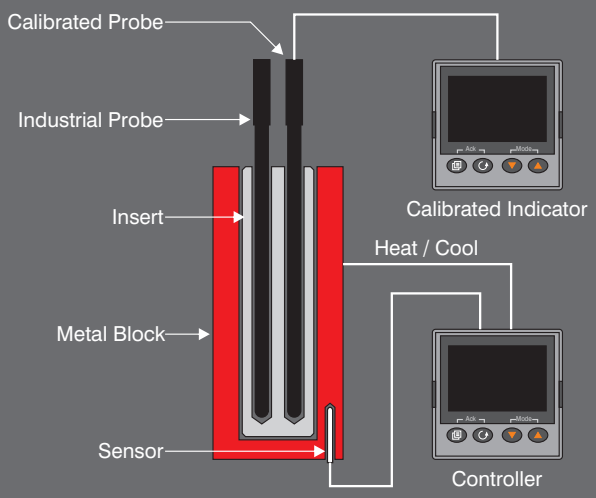
Pre-purchase check list

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**

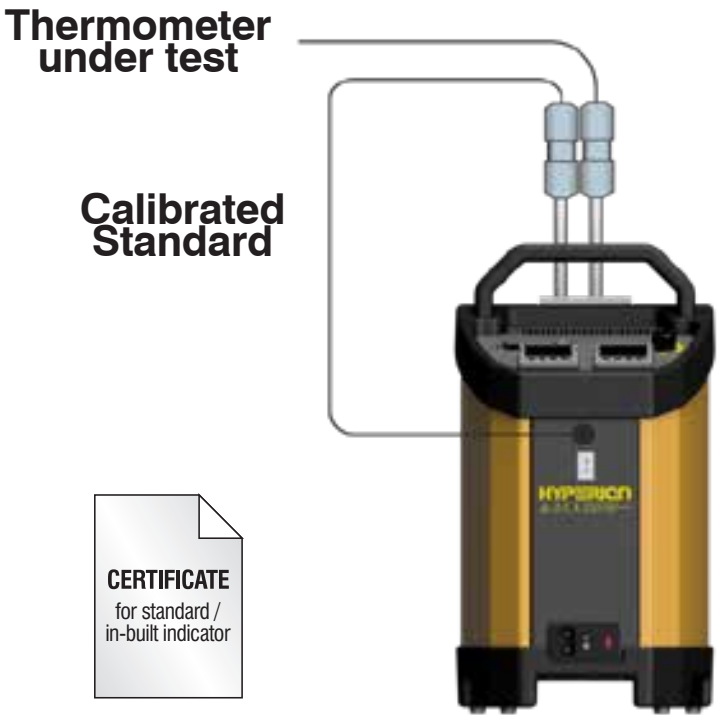
A Basic Dry Block Calibrator

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

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

An ISO 9000 Calibration System

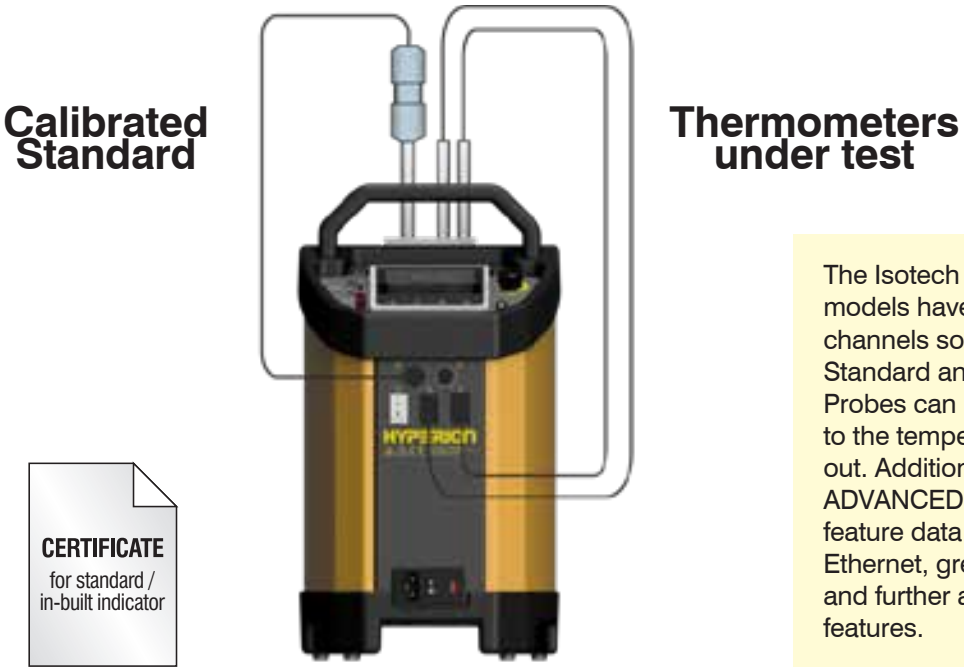
A thermometer under test is compared to a calibrated standard, for true traceability and clearly meets the requirements of ISO9000



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.



The Isotech ADVANCED models have three input channels so that both the Standard and the Test Probes can be connected to the temperature read out. Additionally the ADVANCED models feature data logging, Ethernet, greater accuracy and further additional features.

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.

System Connections

Isotech - award winning flexible solutions for all sensor types from -45°C to 1200°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

	Ø 65mm	Ø 65mm	Ø 35mm	Ø 35mm	Ø 35mm	Ø 65mm	Ø 35mm	Ø 33.5mm
	Isocal-6					Dry Block Calibrators		
	HYPERION	DRAGO	EUROPA	VENUS	CALISTO	GEMINI	JUPITER	PEGASUS
Specifications								
Metal Block Bath	✓	✓	✓	✓	✓	✓	✓	✓
Stirred Liquid Bath	✓	✓	✓	✓	✓			
Stirred Ice/Water Bath	✓		✓	✓				
Blackbody Source	✓	✓	✓	✓	✓	✓	✓	✓
Surface Sensor	✓	✓	✓	✓	✓		✓	
ITS-90 Fixed Point	✓	✓	✓	✓	✓			
Temperature Range (°C)								
1200°								150°C → 1200°C
1100°								
1000°								
900°								
800°								
700°								
600°						35°C → 700°C		
500°							35°C → 660°C	
400°								
300°								
200°								
100°		30°C → 250°C			30°C → 250°C			
0°	-25°C → 140°C		-45°C → 140°C	-35°C → 140°C				
-100°								

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

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MODEL

ADVANCED

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

Best performance

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

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

View easily in all conditions

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

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

Thermostat testing

- Test Two Thermostats Simultaneously

The software you need

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

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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.

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

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°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.

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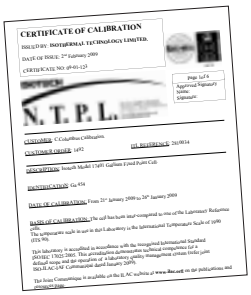
4000 Series

Calibration Options


CERTIFICATE OF CALIBRATION

INSTITUTE: INTERNATIONAL TECHNOLOGY LIMITED.

DATE OF ISSUE: 2nd January 2009

CERTIFICATE NO: 08-01-123

ISOTECH

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Approved Signatory

Initial

Signature

N. T. P. L.

CUSTOMER: C.Calibration Calibration.

CUSTOMER ORDER: 1492 IT. REFERENCE: 2009014

DESCRIPTION: Isotech Model 114H Gallium Fixed Point Cell.

INSTRUCTION: Ga 454

DATE OF CALIBRATION: From 21st January 2008 to 24th January 2009

BASIS OF CALIBRATION: The cell has been step compared to one of the Laboratory Reference cells.

The temperature scale in use in this Laboratory is the International Temperature Scale of 1990 (ITS 90).

This laboratory is accredited to compliance with the recognized International Standard ISO/IEC 17025:2005. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (ISO 9001 ISO/IEC 17025 General and Related Requirements).

The Joint Competence is available on the ILAC website at www.ilac.org on the publications and resources page.

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	**Cal Notepad and I-Cal Easy LOG**: Log and Monitor Calibrator	Serial
ADVANCED	**I-Cal Easy LOG**: Log and Monitor Calibrator	Ethernet
ADVANCED	**Review Lite**: Manage Log Data, supports secure data format	Ethernet
ADVANCED	**Set Point Program Editor**: Manage ADVANCED set point programs	Ethernet
ADVANCED	**Isotech ADVANCED Block Configuration Utility:** 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

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Temperature Cycling and **Logging**
Features of the **ADVANCED** models

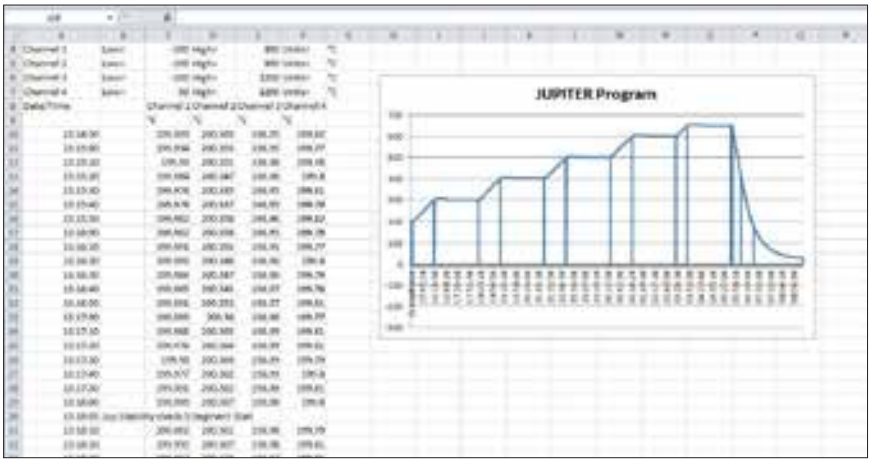
Automatic Temperature Cycling

- 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.



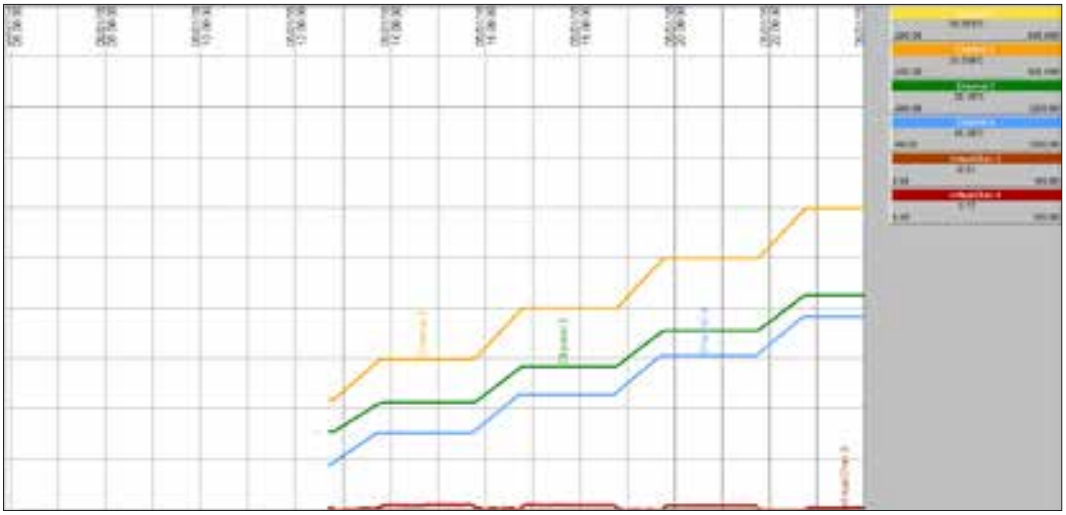
Automatic temperature cycling saves time and money with the calibrator automatically logging data over a series of calibration points

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.