DOCUMENT

POTTS-Medusa-Series

Isotech

Distributed by AKRIBIS

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 of 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

AKRIBIS · www.akribis.info · contacto@akribis.info

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 Venus	
B12 Water Triple Point	0.01°C	Oceanus	
Gallium	29.7646°C	Europa Venus Calisto	
Indium	156.5985°C	Medusa 510 Medusa 511 ISOTower 490	
Tin	213.928°C	Medusa 510 Medusa 511 ISOTower 491	
Zinc	419.527°C	Medusa 510 Medusa 511 ISOTower 492	
Aluminium	660.323°C	Medusa 510 Medusa 511 ISOTower 493	
Silver	961.78°C	Oberon	
Copper	1084.62°C	Oberon	

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