



125 to 1090°C

# Furnaces Dual and Heat Pipe

- Essentially Gradient Free
- Simple to use
- Long Plateau Length

### The Furnace Core

A heatpipe provides the ideal conditions for the creation and maintenance of freeze points from ITS-90. The core is essentially free from gradients meeting the recommendations of CCT/2000-13, "Optimal Realization of the Defining Points of the ITS-90..."

The heat pipe 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.

Three temperature ranges are available

- Low Temperature 125°C to 250°C Water
- High Temperature 400°C to 1000°C Potassium
- Very High Temperature 500°C to 1090°C Sodium

An advanced proportional electronic control system with digital filtering controls the furnace temperature. Power feedback is used to stabilise against supply voltage changes.

Two entirely independent over-temperature safety circuits are provided.

### Dual Furnaces

In addition to heat pipes described above the Dual Furnaces incorporate a second furnace which, because of its unique design, will safely (and without contamination) pre- and post-condition the thermometers.

To complete the apparatus, a further pre-warming tube (with a temperature approximately equal to that of the heat-pipe) made of a unique and gas-tight material, is provided, together with a storage rack for 4 thermometers.



### Method of operation

The cell is melted, when melting is complete, the heat-pipe temperature is readjusted to be 0.5°C below the freeze temperature of the cell. A cold rod introduced into the cell's re-entrant tube initiates the freeze, to give a plateau that will last for between 12 and 24 hours.

With the Dual Furnace the thermometers are removed from their storage rack and placed in the pre-conditioning furnace. The furnace is slowly heated to the Cell temperature.

The thermometers are protected from contamination by a slow air flux around them.

One by one the thermometers are transferred into the cell for 20 to 30 minutes for calibration and thence back to the conditioning furnace.

When all the thermometers have been calibrated, the conditioning furnace is slowly cooled back to 400°C whence the thermometers can safely be removed into room temperature.

### Accessories

Accessories include equalizing blocks, a fan assembly to keep thermometer handles cool, a thermometer holder and internal and external isolating transformers.

### Cooling Coil

The Potassium and Sodium models have a cooling coil in the lid with connections to circulate tap water to keep the furnace lid cool protecting the SPRT and reducing heat load into the lab.

The Isotech Medium Temperature Furnace is designed specifically to realize and maintain the freeze plateaux of Isotech Indium, Tin, Zinc and Aluminium Cells, for the calibration of thermometers on ITS-90. It can also be used with an insert, as an annealing facility of the highest order for SPRTs or as a comparison calibration facility.



Model	Temperature Range	Heatpipe	Cells	Conditioning Furnace	Equalizing Block
17707	125°C - 250°C	Water	In and Sn	Included	410-02-18
17702W	125°C - 250°C	Water	In and Sn	Heatpipe Only	410-02-18
17706	400°C - 1000°C	Potassium	Zn, Sn, Al, Ag	Included	420-02-15
17702P	400°C - 1000°C	Potassium	Zn, Sn, Al, Ag	Heatpipe Only	420-02-15
17705	500°C - 1090°C	Sodium	Al, Ag Cu	Included	420-02-15
17702S	500°C - 1090°C	Sodium	Al, Ag Cu	Heatpipe Only	420-02-15

Uncertainty	< 1mk (with cells)	PC Interface	Included as standard
Uniformity	< 10mk over length of fixed point sample	Resolution	0.1 (Over Whole Range)
Control	0.1°C Resolution	Core Size	52 x 432mm
Communications	Included as standard	Dimensions	Height 960mm Width 600mm Depth 560mm Weight Dual 119kg / Heatpipe 115kg