



-80 to -180°C

Cryostat Model 459

- Extreme Low Temperature Calibration
- High Stability

When we considered low temperature comparison calibration, we had to take into account Health and Safety considerations, both of the liquids used in compressors to generate low temperatures and also the liquids used in the calibration volume itself. The cost of chillers increases considerably for very low temperatures. We concluded that using chillers for very low temperatures was expensive, unsafe and unreliable.

Our solution is a simple heated metal block design using a single, safe surrounding liquid, liquid nitrogen.

An apparatus immersed in liquid nitrogen will cool to approximately -195°C. Our design, using a controller and heater, permits the cryostat to be set at any temperature above liquid nitrogen temperature.

The Cryostat comprises an insulated machined copper equalizing block inside an 80mm diameter tube 480mm long, attached via a flange to a lid giving access for three thermometers, a vacuum port and a Lemo connector for the temperature sensor and heater. A cable runs to a controller which sets the temperature. An RS422 connector permits the calibration to be automated using one of our Software programs.

Evaluation

The most used range for the Isotech Cryostat is between -80°C to -180°C. This temperature range is selected because Oxygen condenses at -186°C and if this is then accidentally boiled off it can cause a health and safety issue. The performance of the Cryostat actually improves as the temperature is lowered because the temperature difference between Cryostat and it's surrounding liquid nitrogen is smaller. The measurements were made with two model 670 thermometers.

Method

The apparatus should be immersed into the Model 459-01-03 Container which must be ordered separately.

The cryostat can then be used in different ways

- A: Without being vacuumed: benefit here is no vacuum pump is required
- B: Connecting a vacuum pump to the vacuum flange: evacuating the apparatus after reaching temperature will minimise temperature gradients and give optimal performance. A vacuum pump is needed and periodically used to maintain the vacuum.
- C: The apparatus can be vacuumed and then back filled with dry nitrogen. This eliminates any moisture and improves thermal conductivity. A vacuum pump, manifold and source of dry nitrogen is required.

Isotech can offer both a hand operate and an electrically operated vacuum pump.



The Cryostat includes an external temperature control system that connects via 2M leads to the Cryostat Assembly.

Recommended Container for Cryostat

Model	459
Cryostat Temperature:	-80°C to -180°C
Stability (30 mins)	±0.005°C
<i>(as measured by one of the 670 thermometers in the bottom of one of the pockets of the cryostat)</i>	
Calibration Tubes: Three x 7.5mm	Diameter: 466mm Deep
Homogeneity	±0.005°C pocket to pocket
Vertical Profile (over bottom 50mm)	±0.005°C at -80°C ±0.01°C at -150°C
Immersion Depth	460mm
Neck Diameter	120mm
Compatibility	Liquid Nitrogen Containers
Nitrogen Capacity	35 litres
How to Order	
459 Cryostat	
Accessories	
459-01-01 Hand Vacuum Pump	
459-01-02 Electric Vacuum Pump	
459-01-03 35 Litre Cryostat Container	
459-01-04 25 Litre Container for topping up	