



Belz Instruments Pvt. Ltd.

(An ISO 9001:2015 Certified Company)

Indigenous
Technology

Patent Application
No. : 202411030964

Ultra Low Temperature Bath

CRYO TEM

Range : -196°C to +50°C



Innovative Design

Stability : $\pm 0.025^{\circ}\text{C}$
(More than 30 minutes)

Axial Uniformity : $\pm 0.025^{\circ}\text{C}$
(within 50mm in isothermal Zone)

Calibrate with Confidence...

Temperature measurement plays a critical role in ensuring smooth operation, safety and efficiency of products and processes in various industries like food and beverages, Pharmaceuticals, cold chain logistics, healthcare facilities research and scientific applications, HVAC and refrigeration system. Accurate temperature monitoring helps to prevent spoilage, maintain product integrity and comply with regulatory standards, ultimately contributing to the overall success and efficiency of operations in these industries.

Reference Standard Platinum Resistance Thermometers (SPRTs) are calibrated at fixed points as per the International Temperature Scale of 1990 (ITS-90) and are then used for traceable calibration of Industrial Platinum Resistance Thermometers (IPRTs) and Platinum Resistance Thermometers (PRTs) in the range of -200°C to 660°C using a comparison method.

Calibration carried out by the fixed-point method as per ITS-90 is very time-consuming, expensive, and expertise-dependent. Hence, for fast and economical calibrations, the comparison method using sources such as liquid baths or dry block calibrators is employed in accredited labs and industries.

While there are many indigenous manufacturers of baths/dry blocks for negative temperatures up to -40°C, very few manufacturers cater to the range up to -100°C, and those available are often imported at exorbitant costs. Moreover, no commercial source is available for the range of -196°C to -100°C.

Belz has addressed these challenges and, after rigorous R&D efforts spanning over a decade, has innovated a Ultra Low Temperature Bath, "CRYOTEM." This bath utilizes liquid Nitrogen (LN2) as a cooling medium to provide a continuous, stable temperature in the range of -196°C to +50°C at a significantly lower cost."

The Ultra Low Temperature Bath “CRYOTEM” Specifications :

Temperature Range	: -196°C to +50°C
Temperature Set Point	: -196°C, -180°C to +50°C
Cooling Medium	: Liquid Nitrogen (LN2)
Liquid Nitrogen Consumption	: 3 Liters excluding topup (after soaking) to cover 5 set points over the range -196°C to +50°C
Stability (30 Minutes)	: $\pm 0.025^{\circ}\text{C}$
Axial Uniformity (within 50mm of Isothermal Zone)	: $\pm 0.025^{\circ}\text{C}$
Minimum Sensor Length (DUC)	: 350 mm
Immersion Depth (in isothermal block)	: > 200 mm
Temperature Sensor Size (Dia)	: 1 mm to 10 mm (Customizable)
Data Logging	: USB Port (for Back up)
Display on HMI	: Set Value, Process Value, Ambient Temp, Real Time clock, LN2 Level indicator, DUC Temperature sensor indicator.
Input Supply	: 220 V AC $\pm 10\%$, 50 Hz 110V AC $\pm 10\%$, 60 Hz (Optional)
Power Consumption	: < 200 Wh
Dimension & weight	: H: 800 mm, L: 350 mm, W: 400 mm, Wt: 38Kg (approx)

Advantages of “CRYOTEM”:

Dry Block	: Sensor under calibration is isolated from cooling medium, to avoid contamination of sensor. Hence makes it suitable for pharmaceutical, food and beverages, aviation, energy industries.
Immersion Depth (200mm) precision	: Ensures 20 to 30 times immersion depth for sensor diameter up to 8mm can be calibrated without any immersion error.
Sensor Length (350mm)	: Sensor length of 350mm and above can be calibrated with a stability and uniformity of $\pm 0.01^{\circ}\text{C}$. Shorter sensors up to 200mm can also be calibrated with courser stability and uniformity.
Power Consumption	: Less than 200 Wh, can be operated on uninterrupted power supply conveniently.
Environment Friendly	: Uses environment friendly liquid nitrogen (LN2) which is safe, non-toxic and odorless for cooling, instead of refrigeration system which release potent - Green House Gases (GHS).
Waste Recycling	: Liquid Nitrogen (LN2) is produced as waste / byproduct in Oxygen production plants is available in bulk at a very low cost. Thus, using liquid nitrogen as cooling medium in our system is a waste recycling process and also helps in saving carbon footprint.
Ultra low Temperature Source	: A single system can handle all of your calibration requirements in the range -196°C to +50°C, thus avoiding procurement, handling, maintenance, calibration time on multiple sources to cover this range.

Illustration & specifications are subject to change without prior notice.

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