Hot and Cold Chamber



Model : HCC Series

Hot and cold chamber is built with top-notch corrosion-resistant stainless steel chambers and housings, ensuring durability and easy maintenance. They maintain consistent and accurate temperatures, meeting industry standards seamlessly. These chambers are the cornerstone of reliable temperature testing and sample storage, supporting various research and industrial applications with efficiency and precision.

A hot & cold chamber can be used to perform tests according to international standards such as IEC, JIS, ASTM, ISO, and DIN, depending on the specific test method being followed.

Hot and cold test chambers are designed to provide reliable lab testing results by providing dedicated support in testing the samples in a cool or heated environment.

Key Feature

- Advanced safety protection system
- Engineered with a rugged industrial exterior and precision TIG-welded stainless-steel inner chamber for unmatched durability, thermal stability, and long-term reliability with German technology machines.
- Precise Temperature control with High Repeatability
- Smart refrigeration system for reliable and economical operation
- High Density Insulation wool which provides superior thermal stability, resists extreme temperatures, blocks moisture absorption.
- Equipped with a high-temperature bearing fan motor designed for continuous operation under extreme thermal conditions, ensuring reliable airflow circulation, low vibration, and extended service life.
- Optimizing Air flow and temperature distribution using CFD analysis.
- Heavy duty solenoid valve engineered for higher operating temperatures, ensuring long service life,
- Precision copper tube bending using automated bending machines improves structural strength and minimizes joint stress, significantly reducing the risk of refrigerant leakage compared to manual bending.
- High-resolution smart HMI interface with user-friendly navigation enables precise parameter setting, program management, alarm monitoring, and data visualization.

Specifications

- Temperature Range: -40°C to +180°C
- Temperature Accuracies: ±0.1°C to +1.2°C measured at control sensor Resolution: 0.1°C
- Temperature Uniformity*: < 1000 Litres: ≤1.5°C. 1000 to 2000 Litres: <2.0°C. > 2000 Litres: <2.5°C.
- Temperature Rate of Change: Heating & Cooling: 5°C/min average as per IEC 60068 3-5 for above temperature range Measured at control sensor between +155°C to -20°C in an empty chamber
- Heating & Cooling: 3°C/min linear from +120°C to -20°C in an empty chamber
- Noise level: Below 75 dBA (measured at 1-meter distance)
- Internal Material: 1.2mm Thickness Stainless Steel
- External Material: 1.2mm Thickness Cold Rolled steel Sheet/ Powder Coated
- Heat Insulating Material: 125mm Thickness Glass Wool Insulation
- Fan: Axial Fan
- Condenser: Air Cooled with R449A, Refrigerant
- Evaporator: Fin and Tube heat exchanger

Refrigeration Section (A -Cooled)

- Fixed-speed and variable-speed scroll and reciprocating compressors for achieving low-temperature performance.
- Additional isolation suspension channels with anti-vibration pads are provided to further minimize vibration and noise levels from the compressor system.
- Utilizes eco-friendly, non-CFC refrigerants such as R-449A in an air-cooled refrigeration configuration.
- Evaporator heat exchanger coils are made from oxidation-resistant materials, with fully collared and bullet-expanded tubes for enhanced heat transfer efficiency.
- Equipped with an automatic bypass control system based on suction pressure and temperature, ensuring stable performance under variable and no-load conditions while maintaining precise temperature control.
- Efficient oil return management system to protect compressors from lubrication failure and ensure long operational life

Heating System

- Inconel sheathed / bare nichrome air heaters are used to achieve the desired temperature efficiently and reliably.
- Heaters are strategically positioned within the conditioning section to prevent direct heat radiation onto the test specimens.
- Heater output is controlled using zero-crossing relays/thyristors, ensuring precise
- temperature control and superior system stability.
- Heaters are electrically isolated using high insulation resistance isolators, preventing earth leakage and enhancing operational safety

Instrumentation and Control

- 7" resistive analog colour touch screen with WVGA (800 x 480 pixels) resolution, supporting 16M colours and LED backlight for clear visibility.
- Up to 4 fully isolated serial communication ports (2 x RS-232 and RS-422/485) for flexible connectivity.
- 10/100 Base-TX Ethernet port for external device communication and remote operation.
- 3 user-programmable soft keys with LED indication for quick access to frequently used functions.
- Supports up to 99 programs, each with 99 segments and up to 999 repeat cycles for complex test profiles.
- Nested looping capability within programs and segments to meet diverse testing requirements.
- Graphical program editing interface for faster configuration and easy program visualization.
- Auto PID tuning across the full operating temperature range based on test profile requirements. Real-time trend display with user-defined scaling for monitoring performance.
- Three-level security access for controlled user permissions.
- Digital pressure monitoring for refrigeration compressor gases, Subsystem/component lifecycle tracking with runtime hour display.
- Calibration due alerts to ensure measurement accuracy and compliance.
- Advanced compressor diagnostics, including monitoring of oil level, discharge temperature winding temperature suction temperature, and run hours, with automatic report generation

Safety and Control

- Electromagnetic interference (EMI) filter on incoming power supply for noise suppression.
- Surge protection system for safeguarding against voltage spikes.
- MPCB protection for all individual three-phase power devices.
- MCB protection for all individual single-phase power devices.
- Comprehensive input power protection including single phasing, phase reversal, under-voltage, and over-voltage protection.
- High and low temperature mechanical safety protection (floating type) for reliable hardware-level safety.
- High and low temperature software safety limits for enhanced operational control.
- Over-temperature thermal protection for heaters to prevent overheating.
- Mechanical high/low pressure safety protection for the refrigeration system.
- Software-based high/low pressure protection for additional refrigeration safety.
- Built-in winding thermal protection for compressors (applicable for semi-hermetic compressors only).
- Compressor oil level protection (OPS) for lubrication safety (applicable for semi-hermetic compressors below 10 HP).
- Compressor high discharge temperature protection to prevent overheating and damage.