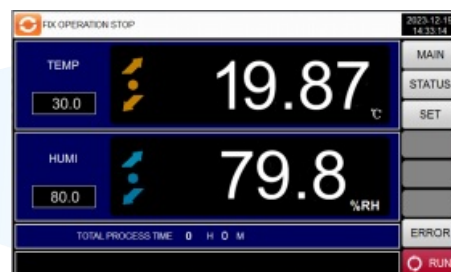


High-Low Temperature & Humidity Cabinet (Climate Chamber)

These new programmable cabinets with a precise system of temperature and humidity control, which provide various necessary environmental simulative conditions for industrial research and biotechnology tests. Widely applied in sterile tests and stability check-up of pharmaceuticals, textile and food processing as well as tests in material performance, packing and lifetime of industrial products.

Biuged launched the latest generation climate chambers which has the following updates compared to previous products or competitors products:

- ① The refrigeration control system adopts an electronic expansion valve to control the cold end balance, which, under the same test conditions, can save at least 40% power compared to products using thermal balance methods. It also reduces water consumption by more than 60%.
- ② 408L chambers and above are equipped with Copeland scroll compressors, offering greater cooling capacity and lower noise levels. The remaining models use European-made low-temperature refrigeration compressors.
- ③ Can choose electronic humidity sensors optional to control and display the relative humidity of the working room, more convenient, more accurate. This new design avoids many inconveniences and issues come from the previous method of using PT 100 platinum resistance for wet and dry bulb measurements. For example there is no need to regularly replace the wet bulb fabric, and some users may forget to replace it or hang it incorrectly, resulting in wrong humidity readings or the inability to control humidity during the test.



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Structure and Features

1. Structure

◆ **Chamber Inner Material:** Made of SUS304# stainless steel plate, cut with precision laser cutting equipment and formed with CNC bending machines, then fully welded with argon arc welding, polished, and finished. The steel plate thickness is 1.2 mm. Both sides of the inner chamber are equipped with sample tray support indexing racks, allowing adjustment of the spacing between sample trays.

◆ **Chamber Outer Material:** Made of 1.2 mm cold-rolled steel plate (SUS304# stainless steel plate is also optional), cut with precision laser cutting equipment and formed with CNC bending machines, then welded with argon arc welding, polished, and finished. After overall acid washing and rust removal, the steel plate surface is treated with high-temperature baking paint, offering a more aesthetically pleasing appearance and enhanced anti-corrosion and rust-proof performance compared to conventional surface spraying.

◆ **Chamber Door:** Single-opening door with explosion-proof handle. Anti-condensation electric heating device. Observation window with anti-condensation function (size 230 × 270 mm, made of transparent electrically heated film laminated tempered glass) and observation window lighting. Door sealing uses specially customized high-temperature resistant, non-toxic, ultra-flexible silicone sealing strips.

◆ **Air Circulation System:** Built-in air plenum, circulation ducts, and stainless steel circulation fan. Air is evenly distributed from the top through louvered windows and diffusers, dispersing the temperature and humidity conditioned in the mixing chamber into the test space. This effectively ensures uniform temperature and humidity on the surface of test samples.

◆ **Insulation System:** Insulation material made of rigid polyurethane foam + fiberglass wool, with a thickness of 100 mm. This provides superior thermal insulation compared to ordinary insulation materials, saving energy and reducing the impact on the ambient temperature around the equipment.

◆ **Drain Hole:** A drain hole is located at the bottom of the inner chamber to quickly discharge condensed water.

◆ **Pressure Relief Port:** A pressure relief port is installed near the edge of the top of the chamber to automatically release pressure when internal air expands.

◆ **Test Port:** One ϕ 50 mm test port is located at the center of the left side of the chamber, complete with corresponding thermal insulation accessories and a dedicated sealing plug.

2. Electrical Control System

◆ **Controller:** 7-inch high-definition (resolution 1024 × 600) TFT true-color LED touch screen, separately controlling temperature and humidity inside the chamber, directly displaying set values (SV) and actual values (PV).

① Editable program capacity: Up to 100 groups; each program can consist of 1 to 100 segments, totaling 1,000 segments. Dedicated program editing interface allows input of 4 segment temperature, humidity, and time parameters per page.

② Functions: Editing, clearing, inserting, etc. During program execution, functions such as segment skipping and holding are available.

③ Screen features: Adjustable backlight, settable backlight duration, screen display protection with timed or manual shutdown settings. Functions include program copying, connection, editing experiment titles, PID automatic calculation, and FUZZY control.

④ Power failure recovery mode: Stop/Cold start/Hot start.

⑤ Features: Scheduled startup and shutdown, date and time adjustment, key and screen lock (LOCK) function, standby image viewing capability.

⑥ Display: Current program number, segment, remaining time, cycle count, operation time, and graphical curve display.

⑦ Additional functions: Fault alarm with cause and handling prompts; power failure protection; upper and lower temperature limit protection.

⑧ Language options: Chinese and English. Two operation modes: Program mode / Constant mode.

⑨ Display resolution: Temperature 0.01°C; Humidity 0.1%; Time 1 minute.



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◆ **Connectivity:** Can be connected to a computer for centralized monitoring, data collection, and curve display. Interfaces: RS-232, RS-485, TCP/IP, optional CAN. Supports various human-machine interactions based on MODBUS communication protocol, VNC functionality, optional mobile APP, and remote monitoring.

◆ **Recording Capability:** Recording intervals can be set from 5 seconds to 999 seconds. Continuous 24-hour operation can store over three years of data (sampling rate: once per minute).

◆ **Circulation Fan:** Uses a high-temperature resistant long-shaft motor installed outside the workspace, with the shaft extending into the chamber and a stirring fan wheel mounted at the end. Special insulation measures and heat dissipation systems enhance motor safety.

◆ **Heater:** Nickel-chromium alloy heating wire, highly efficient with an ultra-long service life.

◆ **Heating Control Method:** The temperature controller sends commands based on set temperature and signals from the temperature sensor inside the test chamber. The heating output is regulated via a logic circuit controlling SSR modules. This method is reliable, contactless, spark-free, long-lasting, noiseless, free of electromagnetic interference, with fast switching speed, strong anti-interference capability, compact size, vibration and impact resistance, explosion-proof, moisture-proof, and corrosion-resistant. It enables direct driving of high-current loads with minimal control signals.

3. Refrigeration Control System

◆ **Refrigeration Method:** To ensure cooling rate and minimum temperature requirements, the test chamber employs a dual-stage cascade refrigeration system. The cascade system includes a high-temperature stage refrigeration cycle and a low-temperature stage refrigeration cycle, with heat exchange achieved through an evaporative condenser. Air-cooled finned condensers and cooling fans dissipate heat.

◆ **Refrigeration System Features:**

- ① All system pipelines undergo leak testing with pressurized air at 22 kg.
- ② Heating and cooling systems are completely independent.
- ③ Equipped with proprietary technology to prevent damage from reverse flow of high-temperature and high-pressure air into the refrigeration system.
- ④ All refrigeration system operations are fully controlled by a microcomputer controller.
- ⑤ A water collection tray is installed under the compressor to collect condensed water from frost formation.
- ⑥ The compressor includes a PTC temperature sensor for over-temperature protection.
- ⑦ The compressor includes an oil pressure protector for compressor oil pressure protection.
- ⑧ High and low-pressure protection devices monitor refrigerant pressure during operation. If pressure exceeds the system's maximum limit or falls below the set minimum, an alarm is triggered immediately, and the power is cut off until the fault is resolved.
- ⑨ The refrigeration system uses all imported brand components, ensuring reliable quality and system stability.

◆ **Components:** European imported low-temperature refrigeration compressor, air-cooled finned condenser, finned tube heat exchanger, and high-temperature copper-brazed plate heat exchanger (small surface area, low energy loss, high heat exchange efficiency).

◆ **Refrigerant:** Environmentally friendly refrigerants R404a/R23 are used as the cooling medium in the refrigeration system.

4. Humidification and Dehumidification System

◆ **Humidification and Dehumidification Method:** External humidification method; dehumidification achieved by compressor startup; P.I.D control adjusts humidification to achieve the required humidity.

◆ **Water Supply Device:** Large water tank (with built-in micro water pump; water is replenished only in the tank, and the pump automatically supplies water to the humidification boiler based on water level). Water quality requirement: resistivity $\geq 500 \Omega \cdot m$.



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◆ **Water Replenishment Method:** The device is equipped with a water replenishment port and a water level observation window. Water can be replenished when the water level is low (automatic water supply is also available as an option, requiring an on-site pure water machine and water supply pipeline).

5. Safety Protection System

- ◆ **Refrigeration System:** Compressor overheating, overload, overpressure, and over-temperature protection.
- ◆ **Test Chamber:** Extreme over-temperature protection, automatic pressure balance protection, and anti-water accumulation protection at the bottom.
- ◆ **Humidification System:** Dry heating protection for humidification heat pipes, abnormal water shortage protection, and short-circuit protection for heating pipes.
- ◆ **Heating System:** Extreme over-temperature protection for heating pipes and short-circuit protection for heating pipes.
- ◆ **Power Supply:** Total power overload and short-circuit protection; control circuit overload or short-circuit protection.
- ◆ **Circulation Fan:** Fan overload, fan short-circuit, and fan reverse rotation protection.

6. Installation Environmental Requirements

☆ Floor and Load-Bearing Capacity

- ① **Solid and Level:** The floor must be horizontal and sturdy (typically a concrete floor), capable of supporting the weight of the equipment and its fully loaded samples (which can weigh several tons), to prevent resonance or tilting during operation.
- ② **Levelness:** After installation, the unit must be calibrated with a spirit level to ensure absolute horizontal alignment. Otherwise, compressor operation and internal temperature/humidity uniformity may be adversely affected.

☆ Ambient Temperature and Humidity

☆ **Temperature:** It is recommended to install the unit in an environment with a constant temperature or minimal temperature fluctuation, ideally between 15°C and 30°C. Excessively high ambient temperatures increase the load on the refrigeration system, affecting the cooling rate and minimum achievable temperature. Excessively low temperatures may lead to frost formation or difficulty starting the unit.

☆ **Humidity:** The ambient relative humidity should be below 85% to prevent moisture absorption, condensation, or rusting of electrical components.

☆ Ventilation and Heat Dissipation

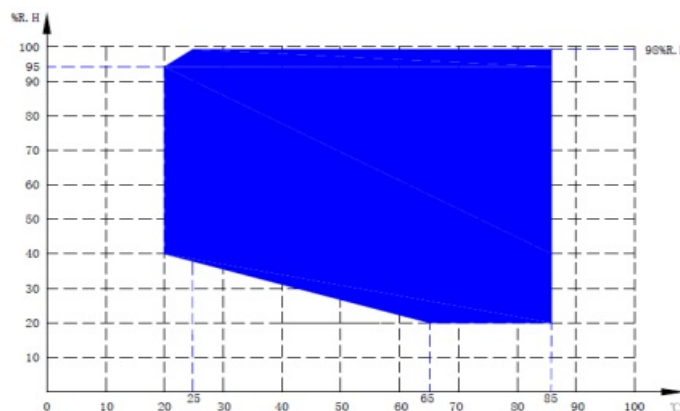
☆ **Adequate Space Ventilation:** The heat-generating components of the equipment especially the compressor and condenser in air-cooled models require sufficient space for heat dissipation. A stuffy environment can lead to reduced refrigeration efficiency, alarms, or even shutdowns.

③ **Avoid Heat Sources:** Keep the unit away from ovens, furnaces, windows with direct sunlight, or other high-power heat-generating equipment.

☆ **Cleanliness:** Dust-Free and Free of Corrosive Gases: The environment should be free from excessive dust, metal particles, salt spray, and strong acidic or alkaline gases to prevent corrosion of the chamber, clogging of heat dissipation pathways, or contamination of samples.

Main Technical Parameters:

- ★ Temperature Uniformity: $\pm 2^{\circ}\text{C}$
- ★ Humidity Uniformity: $\pm 2\% \text{RH}$
- ★ Temperature Stability: $\pm 0.5^{\circ}\text{C}$
- ★ Humidity Stability: $\leq 2\% \sim 3\% \text{Rh}$ ($\geq 75\% \text{RH}$)
or $\leq \pm 5\% \text{RH}$ ($\leq 75\% \text{Rh}$)
- ★ Temperature Increasing Rate: $\geq 1^{\circ}\text{C} / \text{min}$
(no-load, average value during the whole test)
- ★ Temperature Decreasing Rate: $1^{\circ}\text{C} / \text{min}$
(no-load, average value during the whole test)
- ★ Power Supply: 220V/380V; 50Hz
- ★ Total Power: 5.5kW



Ordering Information	Temperature Range	Humidity Range	Total Power/ Max. Current	Working Room Size (W×H×D, mm)	Overall Size (W×H×D, mm)
BGD 897/100B	-20 ~ 150°C	20 ~ 98%	4.6KW/16A	400 × 500 × 500	900 × 1400 × 1150
BGD 897/100C	-40 ~ 150°C				
BGD 897/100D	-60 ~ 150°C		5.5KW/22A	500 × 750 × 600	1000 × 1650 × 1250
BGD 897/225B	-20 ~ 150°C				
BGD 897/225C	-40 ~ 150°C				
BGD 897/225D	-60 ~ 150°C				
BGD 897/608B	-20 ~ 150°C		11KW/12A (380V; 3 phase and 4 wires)	800 × 950 × 800	1300 × 1850 × 1400

Biuged also acceptany customized climate chamber (different size and temperature) !!

Note: Temperture and relative humidity influence each other, for Biuged Climate chambers, controllable area is remarked by blue area asabove picture