

THT-G557

TEMPERATURE AND HUMIDITY CHAMBER OPERATION MANUAL



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MN-THT-G557-E

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Foreword

Thank you for choosing our company's products. We not only provide your company with high-quality products but also offer reliable after-sales service.

To ensure user safety and instrument integrity, please thoroughly review this manual before operation and carefully observe all usage precautions. This manual details the instrument's design principles, compliance standards, construction, operating procedures, calibration, maintenance, potential malfunctions and troubleshooting methods, electrical diagrams, and more. Any "test specifications" or "standards" referenced herein are provided for reference only.

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1. Overview

1.1 Product Application

The high-low temperature alternating humidity test chamber is essential testing equipment for aviation, automotive, home appliances, scientific research, and other fields. It is used to test and determine the parameters and performance of electrical, electronic, and other products and materials after exposure to high-temperature, low-temperature, alternating humidity, or constant humidity environmental changes. It is suitable for institutions such as schools, factories, military facilities, research institutes, and other organizations.

1.2 Working Principle

Testing is conducted by controlling temperature and humidity. Since humid environments affect material properties, the combination of high/low temperature cycling and humidity comprehensively evaluates the stability of composite materials.

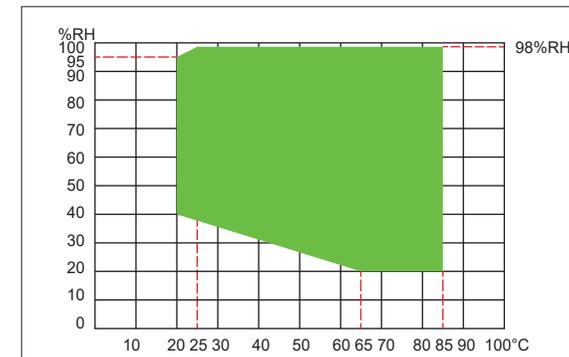
1.3 Test Sample Restrictions

This testing equipment strictly prohibits testing of flammable, explosive, or volatile substances; storing highly corrosive substances; storing biological specimens; storing samples emitting strong electromagnetic fields; storing radioactive samples; or storing highly toxic substances!!!

2. Technical Specifications

Code	THT-G557
Chamber dimension (L×W×H)	1000×1000×1000mm
Chamber volume	1000L
Temperature range	-40°C~150°C
Humidity range	20%RH~98%RH
Temperature deviation	±2°C
Temperature fluctuation	±0.5°C
Temperature uniformity	≤2°C
Humidity deviation	±3%RH (>75%RH), ±5%RH (≤75%RH)
Humidity fluctuation	±3%RH
Humidity uniformity	≤5%RH (>75%RH), ≤7%RH (≤75%RH)
Heating rate	≥3°C/min (no-load)
Cooling rate	≥1°C/min (no-load)
Material	inside: stainless steel plate, outside: cold-rolled steel plate with powder coating
Cooling system	air-cooled
Operating environment	temperature: 5°C~30°C, humidity: ≤85%RH
Power supply	AC380V, 3Ø, 50Hz
Power	14.5kW
External dimension (L×W×H)	1200×2030×2100mm
Weight	616kg

humidity control range diagram



3. Instrument Description

3.1 Cabinet Structure Layout

3.1.1 Structure: Integrated design with front chamber, bottom refrigeration unit, rear electrical cabinet, and control panel on left door side. Wide-opening door; rear inner wall houses air duct system: blower motor, centrifugal fan blades, heater, evaporator. Integrated structure: front section as working chamber, bottom section as refrigeration unit, rear section housing electrical control cabinet, control panel positioned on left side of door. Wide-opening door; rear inner wall houses air duct system: blower motor, centrifugal fan blades, heater, evaporator.

3.1.2 The test chamber utilizes cold-rolled steel plates, precision laser-cut and CNC-bent into shape, then argon arc welded, ground, and polished. The steel surface undergoes comprehensive acid washing for rust removal followed by high-temperature baking paint treatment. Compared to conventional surface spraying, this process yields a more aesthetically pleasing appearance while enhancing corrosion and rust resistance. Steel plate thickness: 1.2mm.

3.1.3 The inner chamber utilizes SUS304 stainless steel plates, precision-cut with laser equipment and formed using CNC press brakes. Full TIG welding followed by grinding and polishing completes the construction. Plate thickness: 1.2mm. Sample rack support trays with adjustable indexing brackets are installed on both sides of the inner chamber.

3.1.4 Insulation consists of polyurethane rigid foam + glass fiber wool, with a 100mm insulation layer. This provides superior thermal performance compared to standard insulation wool, offering excellent energy savings and minimizing impact on the surrounding ambient temperature.

3.1.5 The refrigeration unit is located at the bottom of the test chamber, housing the refrigeration system, heat dissipation fan, drainage device, etc.;

3.1.6 One Φ100mm test port is provided at the center of each side of the chamber, equipped with corresponding thermal insulation accessories and dedicated sealing plugs.

3.2 Main View Description (see Figure 1)

3.2.1 Equipment Program Controller: Used to control equipment temperature, humidity, saturated bucket temperature, brine temperature, spray cycles, misting test cycles, and duration. Refer to the control operation manual for details.

3.2.2 Test Chamber Over-Temperature Protection: Prevents chamber temperature from exceeding set limits. During operation, configure this over-temperature threshold 5–10°C higher than the test temperature. To set: Press SET, then use the shift key to move the cursor to the desired digit. Adjust the value with the up/down arrows, then press SET to confirm.

3.2.3 Power Switch: Press to activate the controller display. The unit awaits operational commands.

3.2.4 Emergency Stop Button: Press to immediately disconnect power in critical situations.

3.2.5 Humidity Water Tank Release Handle: Pull outward to remove the water tank for refilling.

3.2.6 Water Level Inspection Port: Observe tank water level status.

3.2.7 Mobile casters: Used for moving and supporting the test chamber;

3.2.8 Equipment tri-color indicator light: Reflects the operational status of the equipment;

3.2.9 Equipment observation window illumination light;

3.2.10 Equipment observation window: Used to monitor product status during testing.



Figure 1

3.3 Left View Overview (see Figure 2)

- 3.3.1 Power distribution cabinet door lock;
- 3.3.2 Equipment power circuit breaker cover plate, with internal power circuit breaker installation;
- 3.3.3 Equipment test port, primarily used for equipment inspection or power-on test leads. When installation requires leads, open the test port cover, thread the leads through, and seal any excess openings with a soft rubber plug or cotton cloth. If leads are not required, simply secure the port cover tightly;
- 3.3.4 Cabinet door hinges;
- 3.3.5 RS-232 communication port: For connecting to a computer.



Figure 2

3.4 Rear View Overview (see Figure 3)

- 3.4.1 Electrical cabinet cooling fan;
- 3.4.2 Equipment refrigeration module cabinet door—keep closed during normal operation, open for maintenance;
- 3.4.3 Equipment power supply cable—connect this cable to the power source during installation. Note terminal markings: L1/L2/L3 are live power lines, N is neutral, G/PE is ground. Power supply lines must meet maximum power requirements;
- 3.4.4 Equipment water inlet: Connect to external water supply pipe;
- 3.4.5 Equipment drain outlet: Extend to floor drain during installation;
- 4.6 Equipment overflow outlet: Extend to floor drain during installation.



Figure 3

3.5 Internal Chamber Structure Overview (see Figure 4)

- 3.5.1 Equipment test chamber pressure relief port;
- 3.5.2 Equipment temperature and humidity sensors: the upper sensor measures temperature, the lower sensor measures humidity, and the right sensor serves as an over-temperature protection thermostat. During operation, the two upper sensors must not have gauze suspended over them. The lower sensor has a wet-bulb gauze suspended from its probe, with the other end of the gauze extending into the water basin;
- 3.5.3 Flat mesh sample rack for placing large test specimens;
- 3.5.4 Equipment test port, primarily for device inspection or power-on test leads. When leads are required during installation, open the test port cover, thread the leads through, and seal any excess opening with a soft rubber plug or cotton cloth. If leads are not needed, simply close the port cover securely;
- 3.5.5 Height-adjustable support bracket for the sample rack to regulate sample elevation;
- 3.5.6 Fixed mounting bracket for the sample rack;
- 3.5.7 Door frame sealing strip;
- 3.5.8 Door frame drainage port.



Figure 4

4. Installation Requirements and Conditions

4.1 Installation Conditions

- 4.1.1 The installation location should consider the unit's heat dissipation efficiency and facilitate inspection and maintenance;
- 4.1.2 Maintain a minimum clearance of 60 cm between this equipment and walls or any other machinery;
- 4.1.3 Install on a level, vibration-free surface (verify with a spirit level);
- 4.1.4 Ambient temperature must be maintained between 10°C and 30°C with ≤85% RH for optimal and stable operation. If ambient temperature fluctuates drastically (e.g., by 5°C or more within minutes), temperature/humidity control and cooling speed cannot be reliably maintained;
- 4.1.5 Keep the unit away from heat sources and flammable/explosive materials;
- 4.1.6 Avoid direct sunlight exposure and ensure adequate indoor air circulation;
- 4.1.7 Avoid installation in dirty or dusty environments;
- 4.1.8 Keep electrical wiring and drainage piping as short as possible.

4.2 Installation Requirements

- 4.2.1 After transporting the unit to the installation site, unpack it and inspect for damage and completeness of accessories. Once confirmed, rotate the unit's leveling feet to secure it firmly and level it (use a spirit level to adjust the feet if the floor is uneven).
- 4.2.2 Connect the machine to the power source according to its specifications. Ensure adequate power capacity. Do not connect multiple machines to the same power source simultaneously, as voltage drops may impair machine performance or cause malfunctions and shutdowns.

4.3 Precautions

- 4.3.1 If connecting the grounding wire to a water pipe, the pipe must be a metal pipe that is properly grounded. (Not all metal pipes provide effective grounding.)
- 4.3.2 Do not connect the grounding wire to oil or gas pipes;
- 4.3.3 Install a ground fault circuit interrupter (GFCI) on a wall near the machine for maintenance access. Ensure the power distribution cable diameter meets maximum current requirements and includes a dedicated grounding wire.

4.4 Humidification Water Installation

- 4.4.1 First, fill the water tank with purified or distilled water to approximately 90% capacity;
- 4.4.2 Verify that the maintenance valve is closed;
- 4.4.3 After powering on for about 5 minutes, monitor the water tank level. The water level controller must maintain a level above half capacity at all times (viewable through the observation port at the front bottom of the unit);
- 4.4.4 For water replenishment, add purified or distilled water to the tank when the level is low. The water level difference will trigger automatic refilling;
- 4.4.5 For automatic water supply installation, connect the water source to the machine's automatic inlet port. Ensure the water supply pressure is ≥2 kgf/cm²;
- 4.4.6 Drain pipe installation: Connect the unit's drain outlet to an outdoor location. Ensure the drain pipe is not kinked and that the outdoor drain outlet is not higher than the unit's drain outlet.

5. Pre-Operation Precautions

5.1 Verify power supply and grounding (ensure power cord is properly installed per specifications and grounding is securely connected).

5.2 Confirm the laboratory over-temperature protector is set 5–10°C above the operating temperature. This constitutes the safety range for this equipment.

5.3 Humidification System Verification

(1) Check that the wet-bulb over-temperature switch is set to 150°C, the unit's safety protection range

(2) Water Supply Verification

- ① Water reservoir level is sufficient;
- ② Water tank lid is securely closed;
- ③ Water in the tank is clean and free of debris;
- ④ Is the humidification gauze free from hardening or yellowing?
- ⑤ Is the machine's automatic water inlet connected to the water source and maintaining water supply? Water pressure must be ≥ 2 kgf/cm².

(3) Wet-Bulb Gauze Verification

- ① Is the gauze positioned correctly (placed at the front end of the humidity sensor and hung on the lower temperature sensor rod, with the other end submerged in the water tray)?
- ② Is it sufficiently moistened (water is present in the supply tray; if the water level is normal but the gauze remains dry, replace it with new gauze)?

(4) Humidifier water level verification

- ① Check water level 3-5 minutes after filling the humidifier bucket; water should cover the humidification tube by approximately 1 cm;
- ② Verify water cleanliness in the humidifier bucket (drain water periodically to maintain cleanliness);
- ③ Drain pipe verification (ensure proper connection and closed drain valve).

Note: Remove the gauze when performing temperature tests only. If the gauze has been operated at temperatures above 100°C, replace it before conducting subsequent temperature and humidity tests. Failure to do so may result in loss of moisture absorption capacity. When replacing the gauze, wash your hands first (all gauze is sterilized during packaging).

6. Operating Procedures

6.1 Ensure all power connections are correct before turning on the main power switch on the machine's side panel.

6.2 Turn on the power switch (POWER) on the control panel. The controller will display information, and operations can then be performed on the controller. (Refer to the controller manual for details)

6.3 Set the chamber's over-temperature protector:

- For long-term operation at a fixed single temperature during testing, set this protector 5°C above the test temperature.
- For cyclic testing at multiple temperatures, set it 5°C above the highest test temperature.

- Adjust directly using the "+" or "-" buttons to the desired temperature; no confirmation is needed—the display will auto-confirm.

6.4 Click the setpoint to configure temperature and humidity, then click Run to start.

7. Usage Precautions

7.1 To observe internal conditions during testing, activate the viewing window light to monitor changes without opening the chamber door;

7.2 Regularly maintain and clean the refrigeration unit's condenser (once monthly);

7.3 The interior chamber should be cleaned regularly;

7.4 Ensure the unit is securely grounded to prevent electrostatic induction;

7.5 Avoid switching the refrigeration unit off and on again within three minutes;

7.6 Regularly inspect the circuit breaker and over-temperature protector, which safeguard both test specimens and operators;

7.7 Correctly install the wet-bulb gauze to ensure accurate relative humidity measurement;

7.8 Strictly prohibit testing explosive, flammable, or highly corrosive substances;

7.9 Thoroughly review the controller manual and related documentation before operating this unit;

7.10 When testing powered specimens inside the chamber, use an external power source for specimen control; do not directly use the unit's power supply.

8. Simplified Troubleshooting Chart

Fault Condition	Possible Cause	Resolution
Chamber temperature fails to reach setpoint	Chamber temperature setpoint too low	Set temperature controller to required temperature
	Heating system failure; electromagnetic contactor failure; controller failure; solenoid valve damage	Contact maintenance personnel for repair, or contact our company
	Chamber overtemperature protector set too low	Adjust overtemperature protector
Compressor malfunction	Compressor failure	Contact our company for resolution
Circulation fan malfunction	Circulation fan failure	Contact our company for resolution
Water tank low on water	Insufficient water in tank	Add purified water to tank
Test chamber overheating	Test chamber overheat protection set too low	Readjust
	Test chamber excessively high	Contact our company for resolution
Humidification Abnormal	Humidification protection set too low	Readjust
Inverted Phase Abnormal	Inverted phase in power supply	Check power phase sequence and voltage
Unable to run program	Temperature controller operating mode error	Change operating mode
	Test execution program error	Select the program group to execute

9. Regular Maintenance and Cleaning Procedures

- 9.1 The humidification water tank should be cleaned regularly (at least once per month);
- 9.2 The interior chamber of the test chamber should be cleaned regularly (drain all water from the chamber after each test);
- 9.3 The condenser of the refrigeration unit should be cleaned regularly (at least once per month);
- 9.4 The electrical control components of the unit should be dusted regularly (at least once every six months);
- 9.5 The main power switch of the unit should be tested regularly (at least once every six months);
- 9.6 Regularly test the machine's over-temperature protector (at least once every six months);
- 9.7 Regularly inspect electrical components for loose mounting screws (at least once every six months);
- 9.8 Keep the machine's exterior clean at all times;
- 9.9 Regularly clean the machine's water tank (at least once per month);
- 9.10 The machine's temperature control must be calibrated regularly (once per year).
- 9.11 The machine's wet-bulb gauze must be replaced regularly, at least once per month or immediately if it turns yellow or hardens.
- 9.12 The machine's water supply filter cartridge must be replaced regularly, at least once per month.
- 9.13 The machine's water supply must be replaced regularly, at least once every two years.