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(Photos are for reference only, please in kind prevail）

Technical Proposal for Programmable Temperature and Humidity Test Chamber

Model: **KMH-150S（air cold）**

Manufacturer: **KOMEG Technology Ind Co., Limited**

Issued By: **Engineering Department**

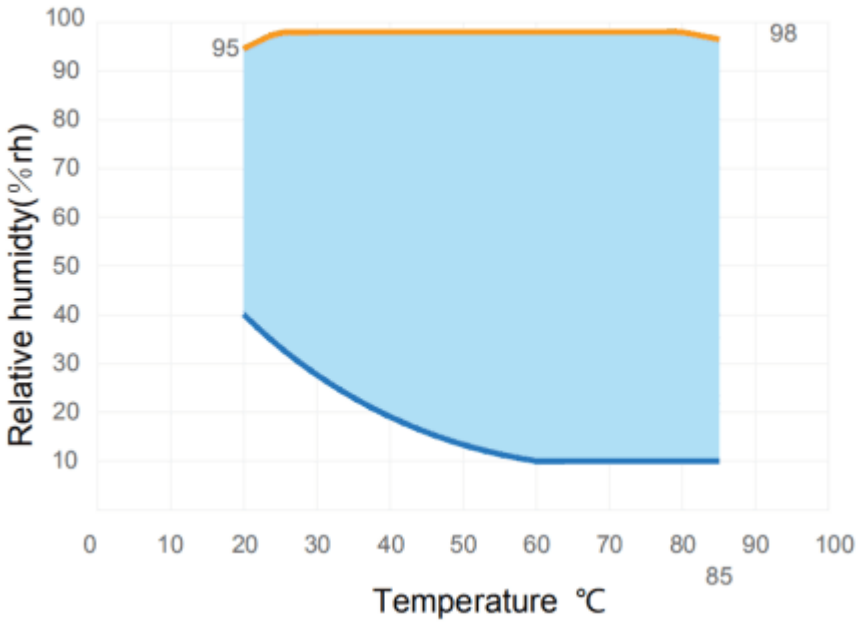
1. Use and sample restrictions

1.1	Product Usage	Able to accurately simulate a wide range of complicated natural environments, and is suitable for reliability test in industrial products. Meet GB5170.2.3.5.6-95 standard requirements of environmental testing equipment and test methods for the basic parameters of electric and electronic products under the condition of humidity, low temperature, high temperature, and constant heat. *Note that other uses may result in personal injury and damage to the equipment!
1.2	Sample limit	Testing and storage of samples of flammable, explosive and volatile substances Testing and storage of corrosive substance samples Testing or storage of biological samples Test and storage of strong electromagnetic emission source samples
1.3	Sample requirements	In order to make your test data more realistic and effective, the test chamber should be used reasonably while satisfying the following principles: The total mass of the load is not more than 80Kg per cubic meter of studio volume The total volume of the load is not more than 1⁄5 of the working chamber volume In any section perpendicular to the dominant wind direction, the sum of the load areas should be no more than 1⁄3 of the cross-sectional area of the working chamber. Do not block the flow of airflow when the load is placed

2. Volume and size

2.1	Volume	About 150L
2.2	Inner size	W 600 mm*H 600 mm*D 460 mm
2.3	Outer size	W 800 mm*H 1635 mm*D 1485 mm((Not including the protruding part)) Tips: For external dimensions, please confirm the three views according to the final design!
2.4	Floor area	About 1.2m^2; （Confirm after signing the contract）

3. The main technical parameters

3.1 Test Conditions	Equipment cooling method: air-cooled Measured at room temperature +25 ° C under no load, Temperature and humidity performance measurement comply with related regulation of IEC60068-3-5 standard; Sensors placed in the air outlet.
3.2 Temp. range	-70℃～+150℃
3.3 Temp Constancy	±0.5℃
3.4 Temp Uniformity	≦2.0℃
3.5 Temp Deviation	≦±2.0℃
3.6 Heating and cooling rate	Heating rate: -70℃～+100℃， full range average About 60min no load Cooling rate: +20℃～-70℃， full range average About 80min No load
3.7 Load situation	without
3.8 Humidity range	10～98%R.H
3.9 Temperature and humidity range	
3.10 Humidity deviation	±3.0%RH（＞75%RH） ±5.0%RH（≤75%RH）

3.11 Humidity uniformity	±3.0%RH（No-load）
3.12 Humidity deviation	±2.0%RH
3.13 Noise	≦67 (dB) （The noise detection device is measured 1m away from the door of the device）
3.14 Meet the test standard	GB-2423.1-2008(IEC68-2-1) Test A: Low Temperature Test GB-2423.2-2008(IEC68-2-2) Test B: High Temperature Test GJB360.8-2009(MIL-STD.202F) High Temperature Life Test GJB150.3-2009(MIL-STD-810D) High Temperature Test GJB150.4-2009(MIL-STD-810D) Low Temperature Test GB2423.3-2008(IEC68-2-3) Test Ca: Constant Heat Test GB2423.4-2008(IEC68-2—30) Test Db: Damp Heat Alternative Test GJB150.9-2009(MIL-STD-810D) Damp Heat Test

4. Chamber Structure

4.1 Structural features	Overall chamber structure The test chamber was composed of three parts as below: Insulation box, separate refrigeration units, and electrical control cabinet.
4.2 Thermal insulation structure	Outer spray plastic anti-corrosion electrolysis plate - intermediate insulation layer is temperature resistant foam insulation material - inner chamber SUS304 stainless steel plate
4.3 Outer chamber material	High-quality anti-corrosion electrolytic board, surface electrostatic powder baking paint, color is KOMEG standard color
4.4 Inner chamber material	SUS304 stainless steel plate, thickness = 1.0 mm; the inner liner is fully welded.
4.5 Insulation	Hard polyurethane foam insulation layer, thickness = 100mm, flame retardant grade B2
4.6 Door	Single door (full size) left open, The door frame is equipped with two silicone rubber sealing strips and anti-condensation electric heating device to prevent external dew condensation;

4.7 Observation window	There is an observation window on the door (size W 330×H 450mm) Multi-layer vacuum glass window with electronic defogging film for heat and sweat protection, and prevents condensation.
4.8 Control panel	Temperature (wet) control touch screen display, start switch, emergency stop switch, buzzer
4.9 Unit part	include：Refrigeration unit, drain pipe, cooling fan, power distribution control cabinet; Humidification and hydration waterway control system
4.10 Distribution Cabinet	Switchboard ; Cooling fan Total power leakage circuit breaker
4.11 Standard configuration	Lead hole: diameter ϕ50mm 2 with silicone plug on both sides (confirm after contract signing), Sample holder: 2 layers of drawer type stainless steel sample holder, bearing 20KG/layer Window light: 1 type (DC 24V LED light) (installed on the window, the switch is set on the external PLC touch screen, and has a delay automatic shutdown function); Moving casters (with foot cups) 4

5. Air conditioning system

5.1 Feature	Adjustment and control: forced convection temperature regulation and humidity adjustment; independent cold end and hot end PID regulation, heat and cooling can be continuously adjusted to avoid energy waste caused by cooling capacity and heating amount
5.2 Air circulation	High-power fan driven by an external motor with a stainless steel shaft, fan motor place external ; The air is driven by the motor and flows through the heater and the refrigerating evaporator. After being fully heated/cooled to the required temperature value, the air circulates inside the chamber and heat exchanges the test piece by convection
5.3 Fan motor	Low-voltage asynchronous high temperature long axis motor

5.4 Centrifugal wind wheel

Multi-blade centrifugal circulation fan, aluminum alloy blade

5.5 Heater

Skid-mounted heater, SSR control, with independent over-temperature protection temperature switch

When the heater is energized, the surface temperature will rise. After the convective air passes through the heating wire, the temperature rises, and the heat is extended to the air in the box and the test piece to play the role of heating and heating.

The heating power is precisely controlled by the PID algorithm and the output power is regulated by a solid state relay.

5.6 Cooling method

Direct cooling

The refrigeration system provides sufficient low temperature refrigerant to the heat exchanger so that the temperature of the heat exchanger is lower than the air temperature. The heat in the air is absorbed by the heat exchanger and taken out of the chamber, causing the air temperature to drop and cooling.

The cooling power is precisely controlled by the PID algorithm, and the flow rate and cooling capacity of the refrigerant are regulated by a solenoid valve.

5.7 Humidifier

Stainless steel is humidified and heated, humidified in the chamber through a copper tube, and the low-pressure steam generator is equipped with a softening filter, a heater, a pressure switch, a safety valve, etc.;

The liquid water is added to the pressurized steam (high temperature and high humidity) in the humidifier, and the steam is sprayed into the chamber to

increase the humidity inside the chamber.

The humidification power is precisely controlled by the PID algorithm, and the copper tube solenoid valve regulates the flow and cooling capacity of the steam.

5.8 Dehumidifier (Optional micro dryer)

This is accomplished by a dehumidification evaporator coil that provides sufficient low temperature refrigerant to the heat exchanger such that the temperature of the heat exchanger is lower than the dew point temperature of the cabinet air.

The moisture in the air will condense on the surface of the heat exchanger, and moisture will be released from the air, causing the overall humidity of the air to drop.

Dehumidification is precisely controlled by the PID algorithm, and the flow rate and cooling capacity of the refrigerant are regulated by a solenoid valve. The micro-dryer removes moisture from the inner chamber by passing dry air to the inner chamber to prevent condensation.

6. Cooling System

6.1 Characteristics

This machine is a mechanical compression refrigeration method

Intelligent cooling control: PID control solenoid valve output cooling capacity or PID control heater according to temperature and load demand inside the chamber (cooling is not heated, heating is not cooling).

Traditional refrigeration control method	This machine intelligent energy saving control method
Refrigeration compressor start and stop control temperature (temperature fluctuations, seriously affecting compressor life, technology has been eliminated) refrigeration compressor constant operation + heating output balance control (causing cooling capacity and heating phase offset to achieve temperature dynamic balance, wasting a lot of Electric energy);	According to the temperature demand inside the chamber, PID control solenoid valve switch output cooling capacity or PID control heating beeper (cooling is not heated, heating is not cooling) In the low temperature working state, the heater does not participate in the work, and the refrigerant supply amount is adjusted by PID, and the three-way flow regulation of the refrigeration pipeline, the cold bypass pipeline, and

the hot bypass pipeline is realized, and the temperature of the working chamber is automatically constant.

6.2	The refrigerant	Environmentally friendly refrigerant R448a &R508B
6.3	Cooling method	Air cooled condenser
6.4	Compressor	France TECUMSEH compressor or German Copeland compressor.

6.6	Air condenser	Air-cooled high efficiency copper tube fin type forced convection heat exchange condenser

6.7	Evaporator	Efficient multi-stage hydrophilic membrane fin evaporator

6.8	Auxiliary device	High-precision expansion valves, solenoid valves, oil separators, desiccants and other components are imported from internationally renowned brands.


6.9 Refrigeration process

The refrigeration system is designed with fully automatic protection measures. The superheating of the compressor during the high temperature cooling phase is prevented by injecting the liquid refrigerant into the compressor suction line. Fully implement nitrogen protection welding, double-stage rotary vane pump vacuum to ensure clean and reliable inside the refrigeration system. The bottom of the compressor is designed with a water tray, and the condensed water is discharged to the outside of the tank through the drain pipe at the rear of the tank.

7. Control System

7.1 Feature

Adjustment and control: forced convection temperature regulation and humidity adjustment; independent cold end and hot end PID regulation, heat and cooling can be continuously adjusted to avoid energy waste caused by cooling capacity and heating amount

7.2 Controller

KOMEG 7 inch color touch screen intelligent fuzzy controller

*Operating system: KOMEG KM-5166 cold output version

7.3 Display

Temperature and humidity settings (SV) Actual (PV) value can be displayed directly,
Execution of the program can display numbers, Paragraphs, remaining time and cycles, running time display,
Program editing and graphic curve display,
Fixed or program operation status display,
7-inch TFT display screen. Resolution: 800*480

7.4 Resolution

Temperature: + 0.01 ℃; Humidity: + 0.1%; Time: 0.01min

7.5 Setting range

Temperature: －100～200 ℃ (note that it is not the performance range of

equipment);

Temperature can be adjusted based on the working temp of the equipment(the upper limit +5 ℃, the lower limit -5 ℃)

Humidity: 0～100 %RH.

7.6 Program capacity

The operating time can be set up to 999999 h 59 m(Set 0 to constant operation without time limit)
Available program capacity: max 269 groups ,13450steps
Available memory capacity: 50step/group
Repeatable command: Each command can be cycles to 32000.

7.7 Communication interface

Data collection when connected to a computer
Can be used as monitoring and remote control system,
Multiple machines synchronization control available.
RS-232、RS-485 and network port LAN

7.8 Control switch

1）Emergency stop switch

2）Start (power) switch

（Physical objects may be different）

8. Security system

8.1 Over temperature protection

The test chamber is independently adjustable electronic over-temperature protection device.

8.2 Cooling

Compressor overload overheating, high voltage protection, motor overcurrent

System	protection.
8.3 Circulation fan	Overheat protection relay, overload protection.
8.4 Heater	Air conditioning channel limit over temperature protection: mechanical double metal sheet principle of over temperature protector 
8.5 Humidification system	Humidification heating tube over-temperature protection (dry burning), abnormal water supply, and abnormal drainage protection.
8.6 Main power switch	Phase sequence protection, phase loss protection, equipment leakage protection, overload and short circuit protection
8.7 Control circuit	Overload and short circuit protection
8.8 Alarm action	When the above protection occurs, the device stops running and an audible and visual alarm is issued, and the fault location, its cause and solution are displayed on the meter.

9. Use site conditions

9.1 Use environment	1. Ambient temperature: 5℃-35℃; 2. Relative humidity: ≦85%R.H 3. Atmospheric pressure：80kPa~106kPa 4. Flat, vibration-free ground; 5. Choose good ventilation, no direct sunlight or direct radiation from other heat sources; 6. There is no strong airflow around: when the surrounding air needs to flow, the airflow should not be blown directly onto the cabinet.; 7. No strong electromagnetic field around; 8. No high concentration of dust and corrosive substances around
9.2 Power Specifications	1. Power supply 380V AC(±10%) Three-phase + ground wire, grounding resistance≤4Ω; Power switch use 4P 40A air switch

2. Machine maximum power: About 6.5 KW

3. Maximum operating current: About 32 A

4. Power frequency: 50±0.5Hz

9.3 Ground protection: Grounding resistance≦4Ω 。

9.4 Drainage interface: Pagoda connector plug ϕ10 inner diameter silicone hose

Note: Guide the condensate out of the chamber.

9.5 Power wiring

1. This machine comes standard with a power cord of 3 meters;

2. The customer needs to prepare a special fuseless switch for this device;

10. Main Material List

Compressor	France TECUMSEH compressor or German Copeland compressor.
Oil separator	American Emerson
Plate heat exchanger	Germany GEA
Condenser	Guangzhou Yongqiang
Evaporator	Guangzhou Yongqiang
Dry filter	Denmark DANFOSS
Capillary tube	KOMEG
Expansion valve	Denmark DANFOSS
Magnetic valve	USA SPORLAN or Italy Castel
Controller	KOMEG
Circuit breaker	France Schneider
AC contactor	France Schneider
Thermal relay	France Schneider
Phase sequence relay	Carlo Gavazzi
Intermediate relay	Omron or Carlo Gavazzi
Solid-state relay	Carlo Gavazzi

11. Equipment outline drawing