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INSTRUCTION MANUAL FOR

# HP/FP/LP/TP

PROGRAMMABLE TEMP. & HUMI. CHAMBERS



**PLEASE READ THIS MANUAL CAREFULLY BEFORE OPERATION**

3, Hagavish st. Israel 58817 Tel: 972 3 5595252, Fax: 972 3 5594529 [mrc@mrclab.com](mailto:mrc@mrclab.com)

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# Warning

Before connection the power to Mains supply and operating the equipment check the following:

1. Make sure that Mains supply is correctly grounded
2. Use only distilled water

Non-implementation of the requirement in this warning revokes the warranty of the goods

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## Foreword :

Thank you for purchasing and applying the product of “multi-layered constant temperature and humidity experimenter machine” manufactured by OTC;

Ltd. This manual illustrates in detail in addition to walking you through how to install, operate and maintain as well as use the steps to observe and follow the simplified troubleshoot methods.

Please finish reading this manual in detail and operate according to the manual illustration of standard operation. This can enable smooth operation as well as safely complete test requirements. Please follow each and every detail so as to prevent any equipment malfunctions resulted from inappropriate human operation. Accurately carry out the regular maintenance procedures can lengthen the lifespan of equipment operation.

Prior the rollout of any company product, it must undergo rigorous QA and inspections by this company. If there is any problem or operation difficulty, please contact our dealer or directly with us.

## Products specification :

2-1 **Characteristics** : Two or three multi-layered piled up style, it can cut down the space occupation.

2-2 **Control system** : BTHC (Balanced Thermo & Humidity Control) adopts the P.I.D output from microcomputer to control SSR, heating as well as adding humidity to balance the losses from temperature and humidity. It can singularly apply the constant temperature or humidity control and independently control at each layer.

2-3 **Property** : Air cooling style in the 25°C environment. Water cooling style with water cooling temperature of 25°C without external loading :

a **Temperature range : H-Type** : 0~100(150)°C [ HG-40、HG-50、HG-60 ]

**F-Type** : -20~100(150)°C [ FG-40、FG-50、FG-60 ]

**L-Type** : -40~100(150)°C [ LG-40、LG-50、LG-60 ]

b **Temperature control stability** :  $\pm 0.2^{\circ}\text{C}$

c **Average temperature distribution** :  $\pm 1.0^{\circ}\text{C}$

d **Temperature rising time span** : Approximately averaging at  
2°C/min

e **Temperature decreasing time span** : Approximately  
averaging at 1°C/min

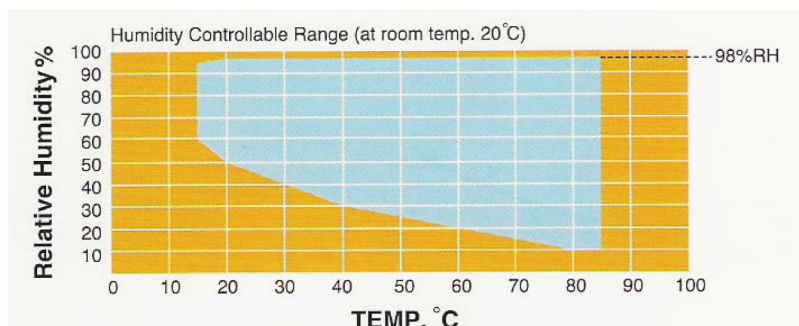
f **Humidity range** : 20%~98%RH

g **Humidity control stability** :  $\pm 2.5\% \text{RH}$

h **Average distribution** :  $\pm 3.0\%$

i **Control Humidity range for temperature and humidity** :

As depicted in Fig. )



Temp. & humi. Control range

2-4、Construct：

a、Size：

<b>Model</b>	(W*H*D) mm	(W*H*D) mm
	<b>Internal size</b>	<b>External size</b>
HP、FP、LP-40	400*500*400	930*1310*810
HP、FP、LP、TP-50	500*600*500	1030*1410*910
HP、FP、LP、TP-55	600*750*600	1120*1455*1000
HP、FP、LP、TP-60	700*850*700	1230*1660*1210
HP、FP、LP、TP-80	1000*1000*800	1530*1810*1310
HP、FP、LP、TP-100	1000*1000*1000	1530*1810*1510

b、Material of internal box：Stainless steel plate (SUS304#)

c、Material of external box：Stainless steel plate (SUS304#)

d、Material for heat preservation：Rockwool and hardened Polyurethane Bubbling

e、Heater：Stainless steel SUS316# Fin tail heat sink in seamless pipe type

f、Humidifier：Stainless steel SUS304# MA model heater，Surface distillation type

g、- Circulation system：

1、Induction motor

2、Stainless steel with extra long axis

3、Siroco Fan

h、Chamber door：Each independent layer with single piece door and independent window

2、Window：W250\*H250mm，5 layers of vacuum glass

3、Lighting in the box：18W PL lamp，electric lamp lighting device

i、 - Freezing system :

1、 All sealed air cooling system : H、 F-Type : One element type ,  
L、 T-Type : Two element type

2、 Freezer : All sealed type assembled and imported from Europe and USA

3、 Coolant : Adopted environmental friendly coolant

4、 Condenser : Air cooling by fan

5、 Evaporator : Fin type evaporator, auto adjustment with attached load carrying capacity

6、 Attached equipment : Dry filter、 Solenoid Valve、 Expansion valve

2-5、 - Temperature and humidity control :

a、 Accuracy of the controller : Temp.  $\pm 0.1^{\circ}\text{C}$  +1digit F.S、 Humd.  $\pm 1\%$  +1digit F.S

b、 Controller sensitivity : Temp.  $\pm 0.1^{\circ}\text{C}$ 、 Humd.  $\pm 0.1\% \text{RH}$

c、 Sensor : Temp. -PT100 $\Omega$  Platinum Resistance Thermometer、 Humd. -PT100 $\Omega$  Platinum Resistance Thermometer, dry and wet ball conversion transmitter

Controller possesses the function of sectional OFFSET calibration.

e、 Controller possesses three sets of PID controlling parameters, and can execute Auto Tuning algorithm

2-6、 - Safety protection device :

- a、 Overheat protection device : K-Type, the temperature controller generates the input signal, when overheating, it automatically cut off the power for electrical heater, and the orange colored lamp OVER TEMP. on the control panel will lit.
  
- b、 Safety protection for humidifier : It possesses the electricity cutoff device preventing from heating without water inside, and liquid expansion type for protecting from overheating. When humidifier is overheated, it automatically cut off power for humidifier.
  
- c、 Cooling and freezing system : Protection device for overheating and overloading.
  
- d、 Main power switch : Protection device for leakage current and overloading
  
- e、 Control loop for fuse protection

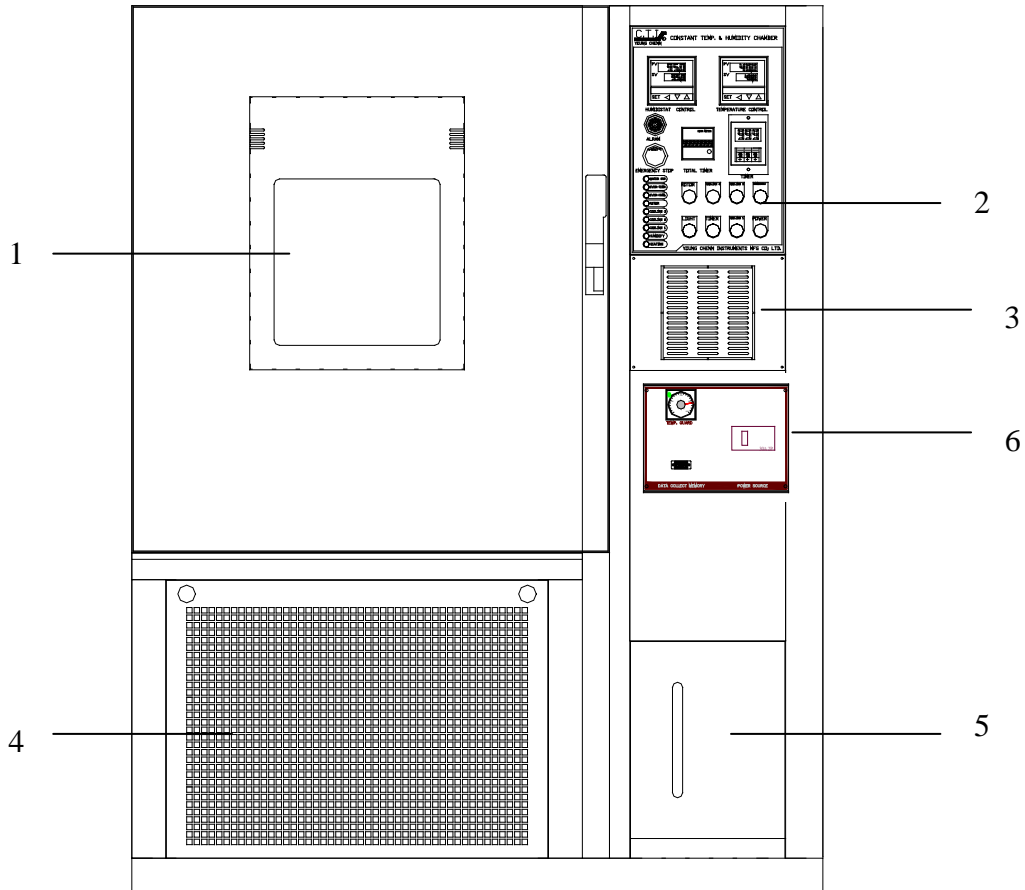
2-7、 - Water supply system :

- a、 Below the machine platform, there attaches a set of stainless steel water tank, which can recollect the water from dehumidifying process back into the water tank.
  
- b、 The attached filter is used for the filtering process when the water from the tank is pumped up to the machine platform.



– Outward manual :

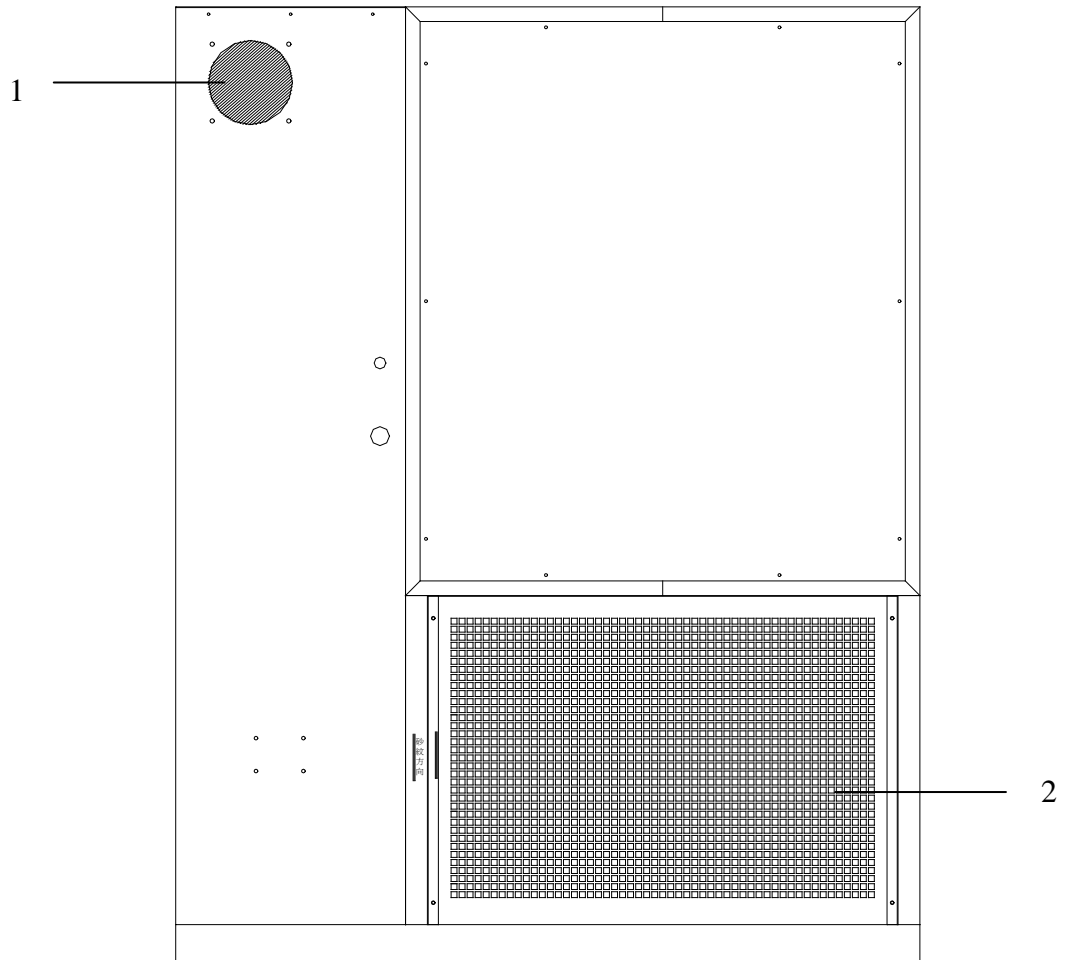
3-1 、 – Instruments front view :



Front view

- 1.Window
- 2.Controller panel
- 3.Reserved space for recording machine's fastening plate
4. Condenser
- 5.Water tank under the machine platform
- 6.Main electric power switch

3-2 、 – Instruments back view :



-Back view

- 1.Heat dissipation fan for electric control box
- 2.Rear heat dissipation net

3-3 )- Instruments right flank view :

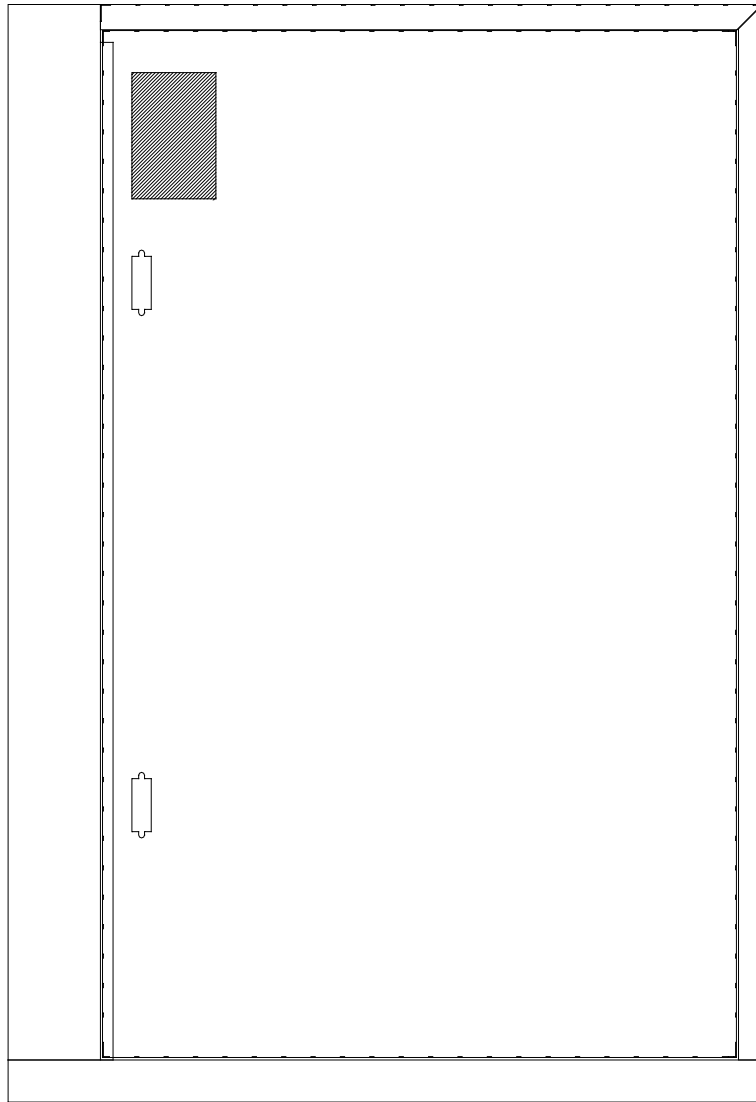
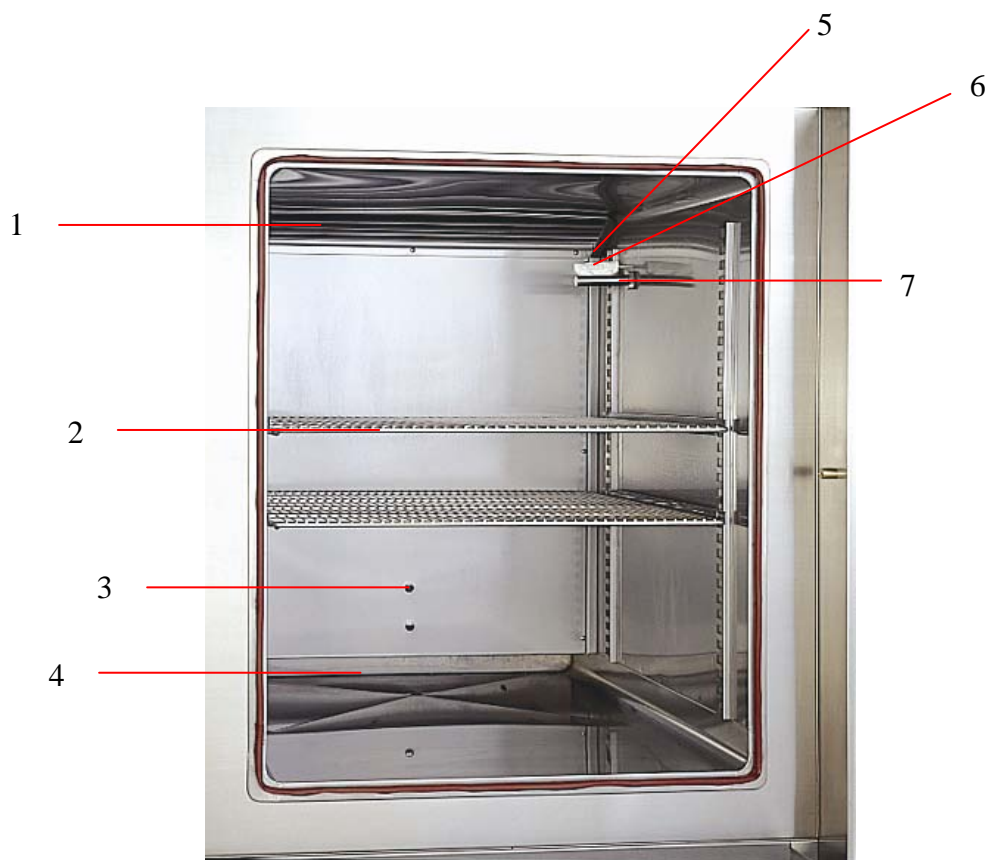


Diagram viewed from the right

3-4 – Inner chamber explain

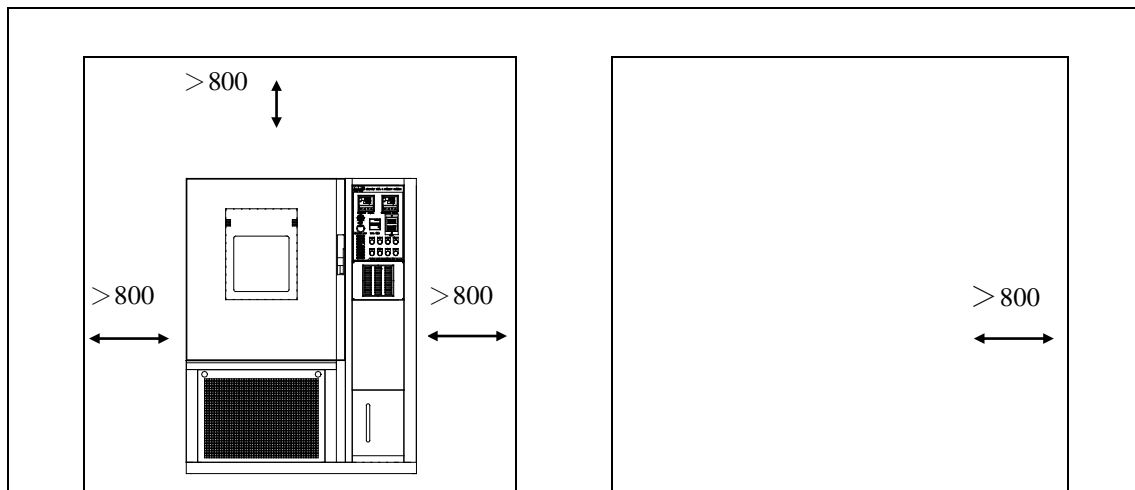


- Internal installation diagram

1. - Circulate Ventilation exit
2. - Canopy plate in stainless steel
3. - Observant exit for evaporator
4. - Air duct circulate
5. - Temperature measurement stick
6. - Wet ball cloth + measurement stick
7. - Wet ball water cup

– Install manual :

4-1 、 – Install site signify view



Installation location should take into consideration of heat dissipation and ease to inspect and maintain for the machine platform :

1. Peripheral temperature should be maintained within  $25^{\circ}\text{C} \pm 5^{\circ}\text{C}$ , the machine platform can then be expected with most optimum operation. If the peripheral temperature is too high, it would impact the heat dissipation for compressor, thus, temperature control and the speed to lower the temperature cannot be controlled in a stable way, and it would cut down the lifespan for the compressor as well.
2. Please install and place on the horizontal ground. It would facilitate internal water drainage to prevent from unnecessary internal water accumulation.
3. There should be at least 80 cm and above in spacing distance between the wall and any other machinery, as depicted in the diagram above.
4. Machine platform installation location should stay away from the sun, in addition, maintain indoor air ventilation.
5. Machine platform should be situated away from heat sources as well as flammable and materials prone to be explosive.

4-2、 – Electricity supply explain

Please follow the procedures as follow for electricity distribution process. Pay attention to the capacitance and do not have multiple machines connected to one identical electric source. It would prevent from producing voltage drops which could impact the machine’s functionality even cause malpractice with machine being stopped. Please use the dedicated loop arrangements.

1.

Electric power distribution voltage according to specification in the table :

	AC 220V 1Φ2W		50Hz
	AC 220V 3Φ3W		60Hz
	AC 380V 3Φ3W		
	AC 380V 3Φ4W		

2.

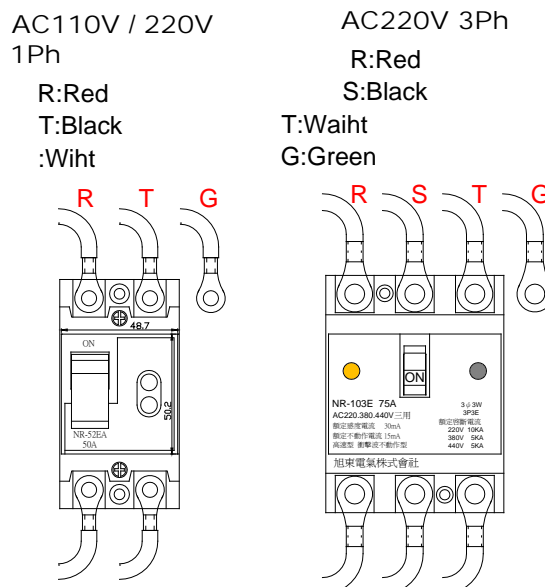
Suitable caliber of electric chord : (Electric chord length in 3M)

	2.0~2.5mm <sup>2</sup>		8.0~10.0mm <sup>2</sup>
	3.5~4.0mm <sup>2</sup>		14~16mm <sup>2</sup>
	5.5~6.0mm <sup>2</sup>		22~25mm <sup>2</sup>

3.

When this machine’s electric cable is connected to power source, the white color is the GROUNDING cable during single phase power distribution, and the red black color is the power source.

Three phase distribution is depicted as in diagram :



Inspection prior operation :

### 5-1 Device inspection

#### 1. Confirmation of electric power and the grounding cable

it should be installed according to the specified voltage and amperage, and the grounding cable must be installed properly.

#### 2. Water supply confirmation

Ensure adequate water amount in the storage tank

Ensure water level inside the humidifier tank is accurate

Ensure water level for humidifier tank is accurate

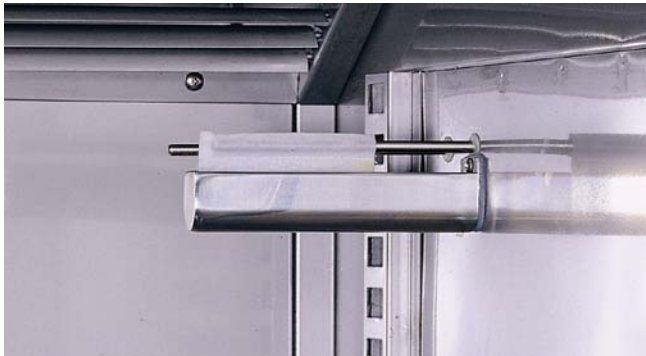
Ensure water level inside the wet ball cup is accurate

#### 3. Confirmation for the wet ball cloth

Is the wet ball cloth clean?(Replacement is recommended for every three months)

Is the water absorption capability adequate?

Is the installation location accurate?(The tip of the test rod should be sealed)



#### 4. Confirmation for water drainage pipe

Inspect to ensure the drainage outlet at the lower back of the inner tank is not clogged.



5. Confirm the protective device for humidifier is set at 110°C.

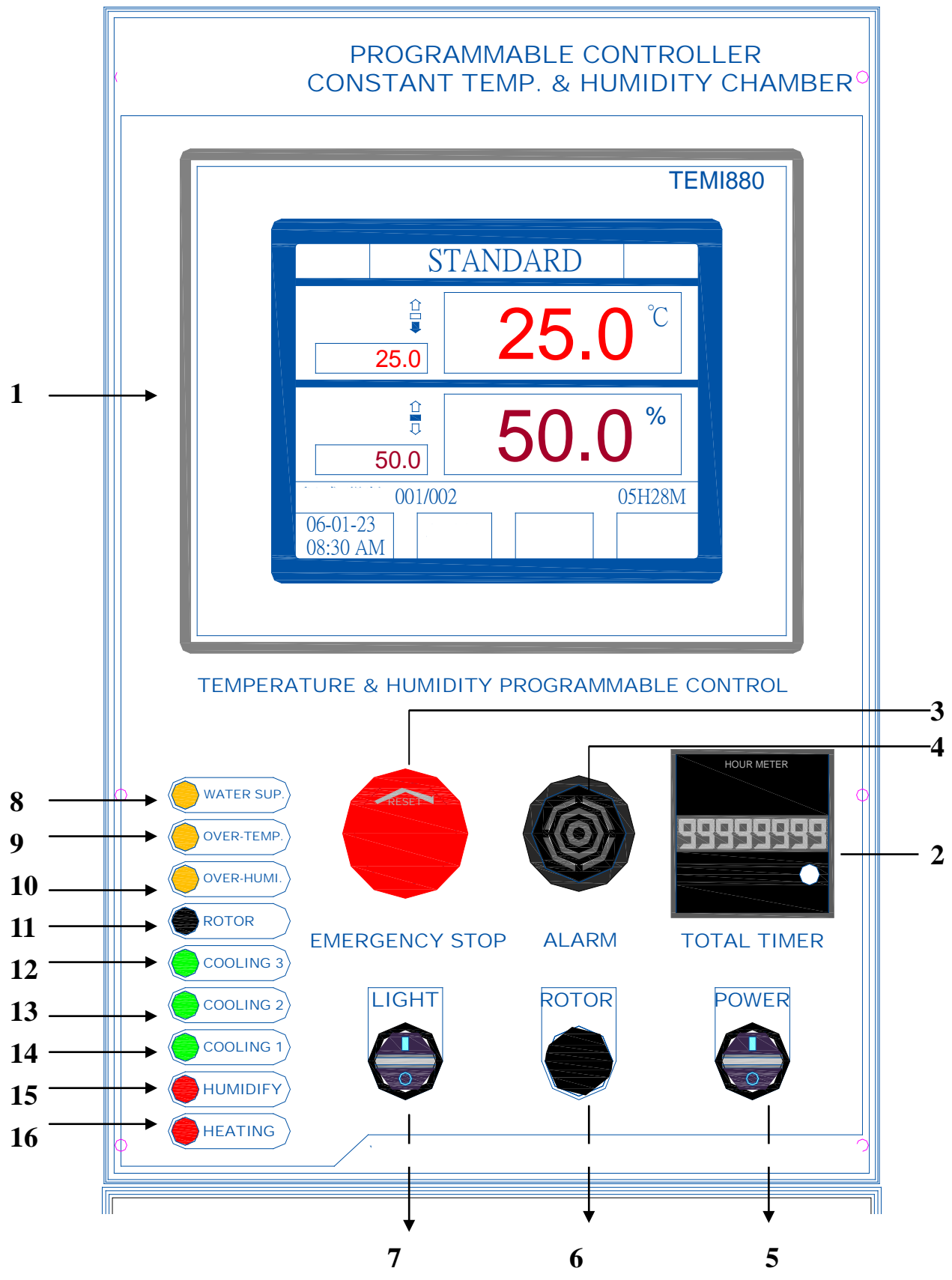
6. Confirm the protective device for extremity is set at +20°C.

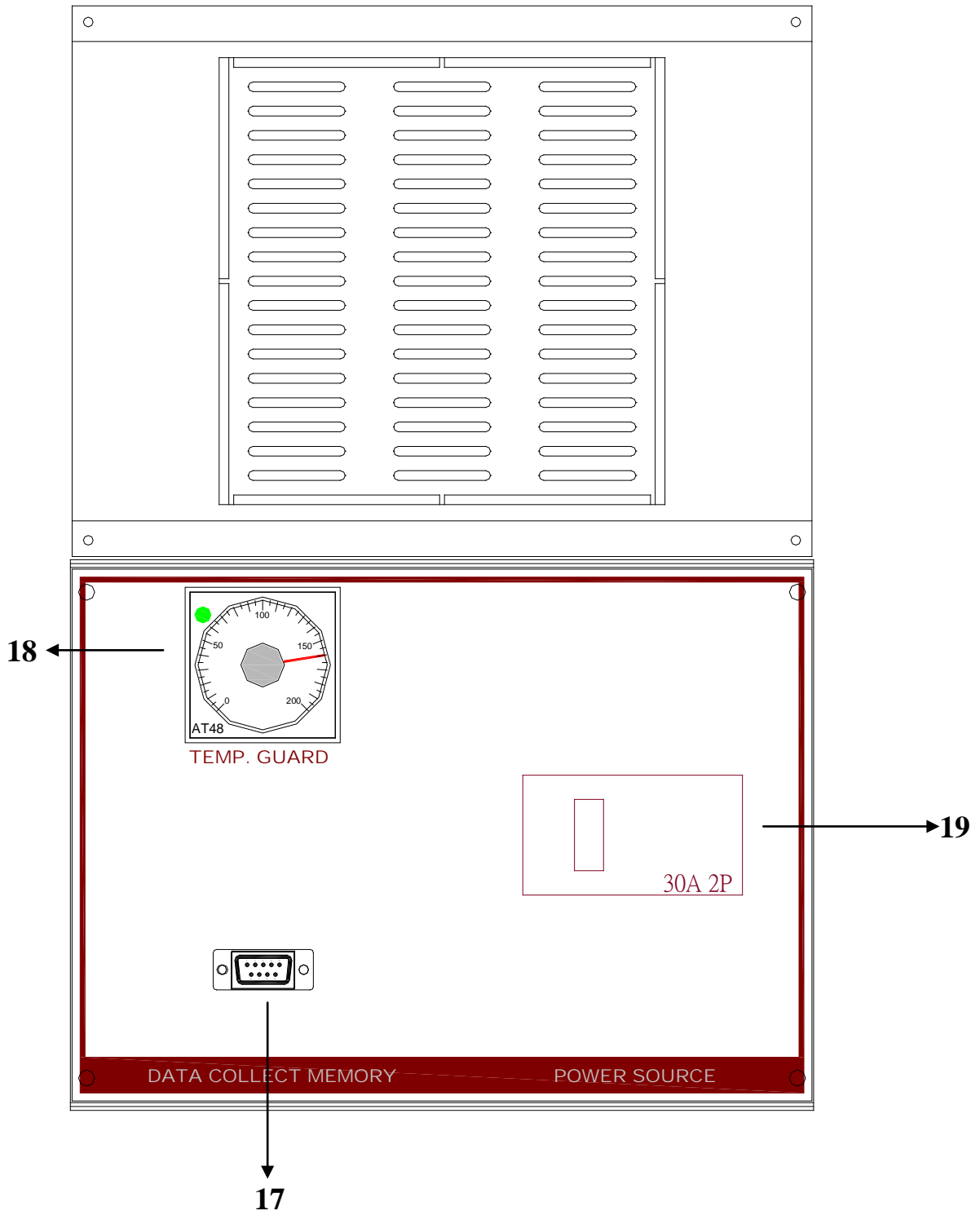
7. Shut all the test access openings at the left side and the upper location for both the inner and outer boxes.



Control panel operation manual :

6-1、Programmber Temp.Humi.Chamber Operate Panel :





## -CONSTANT TEMP. AND HUMI. CHAMBER

### Operate instruction

#### 7-1、 Component function :

##### 1. (TEMPERATURE CONTROL) :

temp.and humi. Controller : set temp.and humi.of test condition.

##### 2.(TOTAL TIMER) :

add.timer : total working time

##### 3.(EMERGENCY STOP) :

Emergency Stop : It is used for emergency shutdown for the machine platform.

Press button, it will shutoff the power supply for the machine platform. If needs to restore, turn in direction of “RESET” arrow, it can restore the machine back to the state of operation.

##### 4.(ALARM) :

ALARM : After the experimentation is complete, the alarm will be sounded for the duration of 10 seconds.

##### 5.(POWER) :

power switch : switch power on or off

##### 6. (ROTOR) :

Rotor switch: this advice is optional; it works only when the machine has the function of rotor.

##### 7. (LIGHT) :

room lighting switch : the power of room lighting switch

##### 8.(WATER SUP.) :

WATER SUP.: When humidifier is low on water, this lamp will lit and the electric power for the humidifier will be shutoff automatically.

##### 9.(OVER-TEMP.) :

100°C-TYPE SET 110°C, 150°C-TYPE SET160  
°C) °

OVER-TEMP. : When this lamp is lit, it signifies the internal box is over heated, and exceeds the temperature range designated by the overheat protection device. And the heater will be automatically turned

off. Please check the setting for overheat protection device is appropriate. (Settings at factory rollout : 100°C-TYPE SET 110°C, 150°C-TYPE SET160°C)

10.(OVER-HUMI) :

OVER-HUMI : When this lamp is lit, the humidifier is overheat. And the electric power supply for humidifier will be shutoff automatically. (Factory rollout setting for overheat protection device is at 110°C)

11.(ROTOR) :

Rotor indicator light: this advice is optional; it works only when the machine has the rotor. The indicator light turns on when the rotor power open

12. Cooling indicator light COOL3: running indicator of super low temperature compressor (only on -70°C type).

13. Cooling indicator light COOL2: running indicator of cooling compressor (only on -40°C type).

14. cooling1 indicator : cooling compressor of the high temperature segment is running

15.(HUMIDIFY) :

humidify indicator : humidifying when it light

16.(HEATING) :

heating indicator: : heating when it light.

17.(RS232) : RS232

Computer connect port: plug RS232 for connecting the computer.

18.(TEMP. GUARD) :

Protector of over temperature: for setting the protection of over temperature, 20°C higher than the temperature used.

19.(POWER SOURCE) ◦

Power switch.