

SINCE 1889



Forced Convection Constant Temperature Oven

Model: DKT410C/DKT610C/DKT810C

- First Edition -

- Thank you for purchasing "Forced Convection Constant Temperature Oven, DKT Series" of Yamato Scientific Chongqing Co., Ltd.
- To use this unit properly, read this "Instruction Manual" thoroughly before using this unit. Keep this instruction manual around this unit for referring at anytime.



WARNING

Carefully read and thoroughly understand the important warning items described in this manual before using this unit.

Yamato Scientific Chongqing Co., Ltd.

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1. Safety precautions

Explanation of Symbols

A Word Regarding Symbols

Various symbols are provided throughout this text and on equipment to ensure safe operation. Failure to comprehend the operational hazards and risks associated with these symbols may lead to adverse results as explained below. Become thoroughly familiar with all symbols and their meanings by carefully reading the following text regarding symbols before proceeding

 **Warning** Signifies a situation which may result in serious injury or death (Note 1.)


 **Caution** Signifies a situation which may result in minor injury (Note 2) and/or property damage (Note 3.)


(Note 1) Serious injury is defined as bodily wounds, electrocution, bone breaks/fractures or poisoning, which may cause debilitation requiring extended hospitalization and/or outpatient treatment.


(Note 2) Minor injury is defined as bodily wounds or electrocution, which will not require extended hospitalization or outpatient treatment.

(Note 3) Property damage is defined as damage to facilities, equipment, buildings or other property.

Symbol Meanings

 Signifies warning or caution.
Specific explanation will follow symbol.

 Signifies restriction.
Specific restrictions will follow symbol.

 Signifies an action or actions which operator must undertake.
Specific instructions will follow symbol.

1. Safety precautions

Table of illustrated symbols

WARNING



General



Danger!: High Voltage



Danger!: High Temperature



Danger!: Moving Parts



Danger!: Blast Hazard

CAUTION



Caution: Shock Hazard!



Caution: Burn Hazard!

Prohibit



General



No Open Flame



Do Not Disassemble



Do Not Touch

Compulsion



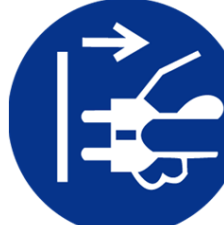
General



Connect Ground Wire



Level Installation



Disconnect Power



Inspect Regularly

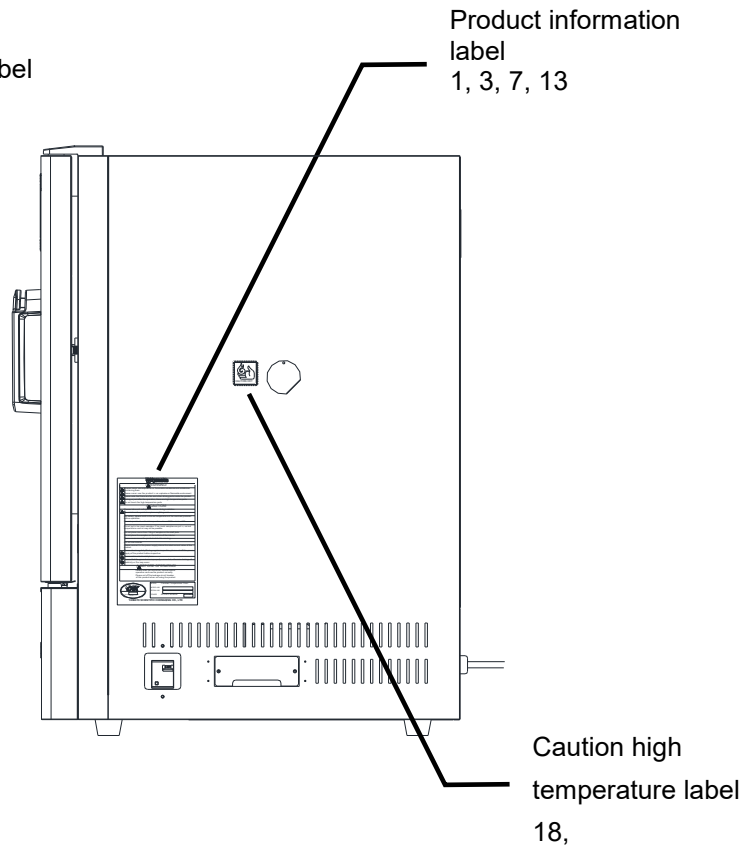
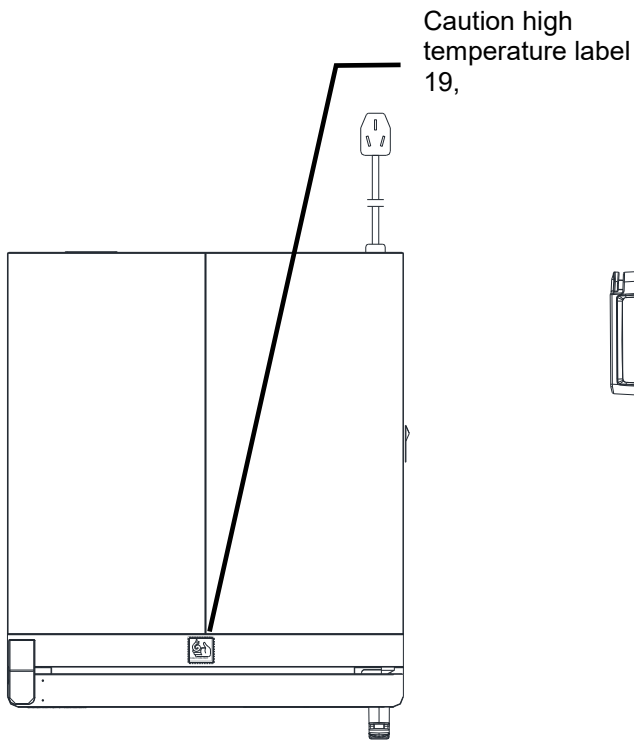
1. Safety precautions

Residual risk map

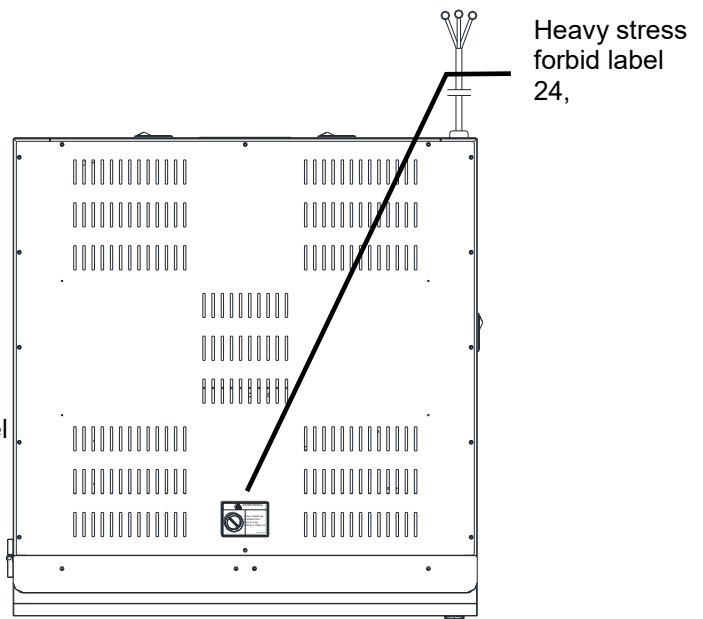
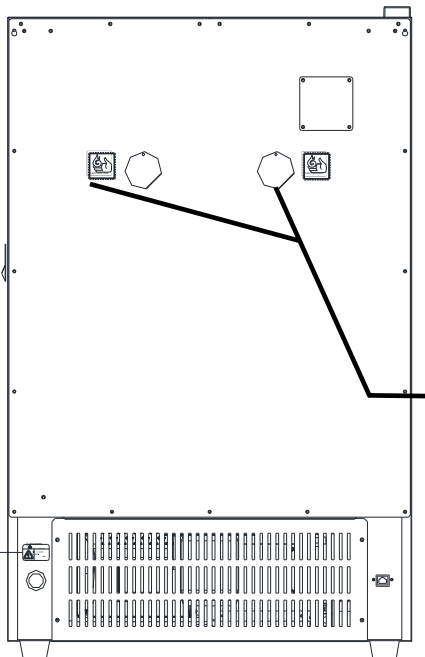
These figures indicate positions of caution labels.

The numbers shown in the figure indicate the numbers listed in the "List of residual risks" in this manual.

For details of individual residual risks, see the "List of residual risks".



Voltage caution label 8, 9,



※ When the trademark falls off, the content disappears, etc., or the hazard label becomes unclear, please contact our company to send new labels. (paid)

1. Safety precautions

List of residual risks

List of residual risks (instructions for risk avoidance)

This list summarizes residual risks to avoid personal injuries or damages to properties during or related to the use of equipment.

Be sure to fully understand or receive instructions on how to use, maintain and inspect equipment before starting operation.

Loading/Installation				
No.	Degree of risks	Risk description	Protective measures taken by the user	Relevant sections
1	WARNING	Fire/Electric shock	1. Choose proper place for installation	Section 2.1
2	CAUTION	Injury	2. Use loading/unloading tools when moving and installing, and be sure to have more than 2 persons when moving by manpower.	Section 2.2
3	CAUTION	Injury	3. Install the equipment in a flat area.	Section 2.3
4	CAUTION	Injury	4. Implement safety measures when installing the equipment.	Section 2.4
5	CAUTION	Injury	5. Implement appropriate safety measures after installation.	Section 2.5
6	WARNING	Explosion/fire	6. Never operate in a atmosphere where flammable or explosive gas is present.	Section 2.6
7	WARNING	Injury	7. Do not operate in a place where there is liquid splashing.	Section 2.7
8	CAUTION	Fire/Electric shock	8. When connecting power cables, pay attention to the color of each core wire.	Section 2.8
9	WARNING	Fire/Electric shock	9. Connect the power supply to dedicated switchboard.	Section 2.9
10	WARNING	Fire/Electric shock	10. Do not modify.	Section 2.10
11	WARNING	Injury	11. Do not overlap equipment	Section 2.11
12	WARNING	Fire/Electric shock	12. Take care for handling of the power cord.	Section 2.12
13	WARNING	Fire/Electric shock	11. Must connect grounding wire properly.	Section 2.13

During use				
No.	Degree of risks	Risk description	Protective measures taken by the user	Relevant sections
14	PROHIBIT	Affect sample/damage	1. Do not place too much samples on a single shelf plate.	Section 5.1
15	PROHIBIT	Affect sample/damage	2. Do not place the samples too close.	Section 5.2
16	CAUTION	Explosion/fire	3. Do not place the samples on the bottom of the chamber (diffuser plate)	Section 5.3
17	PROHIBIT	Explosion/fire	4. Please be careful not to use the following samples.	Section 5.4
18	CAUTION	Burn	5. Open the exhaust port when using.	Section 5.5
19	CAUTION	Burn	6. Use with the door fully closed.	Section 5.6

1. Safety precautions

List of residual risks

During use				
No.	Degree of risks	Risk description	Protective measures taken by the user	Relevant sections
20	CAUTION	Injury	7. Odors may occur before initial use.	Section 5.7
21	WARNING	Explosion/fire	8. Please use at proper temperature.	Section 5.8
22	PROHIBIT	Fire/Electric shock	9. Make this equipment to be fully ventilated.	Section 5.9
23	PROHIBIT	Fire	10. Do not open the inside of the equipment.	Section 5.10
24	PROHIBIT	Injury	11. Do not place items on the equipment.	Section 5.11
25	CAUTION	Fire/Electric shock	12. When there is thunder	Section 5.12
26	WARNING	Fire/Electric shock	13. About the power outage reset	Section 5.13
27	WARNING	Injury	14. When opening and closing the door	Section 5.14
28	PROHIBIT	Fire/Electric shock	15. Do not drop metal pieces into the	Section 5.15
29	WARNING	Injury	16. Please do not operate the operation matters not recorded in the instruction	Section 5.16

Daily inspection/maintenance				
No.	Degree of risks	Risk description	Protective measures taken by the user	Relevant sections
30	WARNING	Fire/Electric shock	During inspection and maintenance, be sure to unplug the power cord.	Chapter 8
31	WARNING	Burn	Perform the maintenance after the equipment returns to normal temperature.	Chapter 8
32	WARNING	Fire/Electric shock	Do not disassemble the equipment.	Chapter 8

When you are not going to use the unit for a long time or when discarding the unit				
No.	Degree of risks	Risk description	Protective measures taken by the user	Relevant sections
33	WARNING	Fire/Electric shock	Please cut off the power supply and unplug the power cord.	Chapter 9
34	CAUTION	Injury, locked in	Do not place the equipment where children may play around.	Chapter 9
35	CAUTION	Injury, locked in	Please remove the handle and hinges so that the door cannot be locked.	Chapter 9

2. Before operation

Precautions when installing

1. Choose proper place for installation

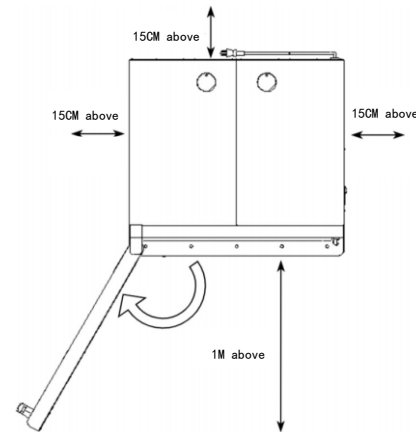


Do not install this Equipment in the place where:

- the location is rough, dirty or un-leveled.
- flammable gas, explosive gas or corrosive gas will be generated.
- the ambient temperature will be more than 35°C or less than 5°C.
- the equipment will contact with liquid.
- the ambient temperature will fluctuate largely.
- there is excessive humidity and dust.
- there is direct sunlight.
- there is constant vibration.
- directly exposed to the outside with a risk of ice or dew formation.
- the power supply is instable.



Install the equipment at the place with sufficient space as specified as below.



In order to obtain the stable control, install the equipment in a place where the ambient temperature is near normal temperature ($23 \pm 5^\circ\text{C}$) and the air conditioner and fan cannot blow it.

2. Use loading/unloading tools when moving and installing, and be sure to have more than 2 persons when moving by manpower.



The weight of this equipment is approximately

DKT410C	80KG
DKT610C	100KG
DKT810C	140KG

Use loading/unloading tools when moving and installing.
Be sure to have more than 2 persons when moving by manpower.

3. Install the equipment in a flat area.



Install the equipment in a flat area. If it is installed on rough and/or slope floor, vibration or noise will be occurred, and unexpected trouble and malfunction may occur.

4. Implement safety measures when installing the equipment.



Earthquakes or unexpected impacts may cause the unit to fall down or move and cause a personal injury. We recommend implementing safety measures such as installing the unit at a place with minimum human traffic.
DKT810C is equipped with casters, please make sure that the casters are locked properly.

5. Implement appropriate safety measures after installation.



Earthquakes or impacts may cause the unit to fall down or move and cause a personal injury. Implement appropriate measures against falling down for safety.

2. Before operation

Precautions when installing

6. Never operate in a atmosphere where flammable or explosive gas is present.



Never operate this equipment in a atmosphere where flammable or explosive gas is present. This Equipment is not explosion-proof. Spark may be discharged by switching ON and OFF, and then it may cause fire or explosion.
Refer to P.51 "15. List of dangerous substances" for flammable and explosive gases.

7. Do not operate in a place where there is liquid splashing.



Do not operate this equipment in a place where there is liquid splashing. If the liquid enters the equipment, it may cause accident, malfunction, electric shock, fire, etc.

8. When connecting power cables, pay attention to the color of each core wire.



Before connecting the power cable, ensure that the protection switch on the power device is OFF.
Select a plug or terminal that meets the power capacity according to the connected power device.
(Refer to the right table)

Core wire color	Indoor wiring
Black	Phase wire (live wire)
White	Neutral wire (zero wire)
Green	Ground wire

9. Connect the power supply to dedicated switchboard.



Please use the appropriate switchboard and power socket meeting the power capacity.

Power capacity:

DKT410C	AC220V Single phase 50/60Hz 10.5A (Protection switch overcurrent protection: 16A)
DKT610C	AC220V Single phase 50/60HZ 12.5A (Protection switch overcurrent protection: 16A)
DKT810C	AC220V Single phase 50/60HZ 17.5A (Protection switch overcurrent protection: 20A)

The operating voltage range is rated voltage $\pm 10\%$, voltage range that guarantees the performance is rated voltage $\pm 5\%$, the frequency is rated frequency $\pm 1\%$.

※ There could be the case that the unit does not run even after turning ON the power. Inspect whether the voltage of the main power is lowered than the specified value, or whether other device(s) uses the same power line of this unit. Please take measures such as using a special power line for this unit.

Power cord · End treatment

Model	Power cord specification	Power side end treatment
DKT410C/DKT610C	3 core 2.0mm ² (※1)	O-type terminal (model: RNB2-4)
DKT810C	3 core 3.31mm ² (※1)	O-type terminal (model: RNB3-4)

※ The power cord length outside the unit is about 3m.

※1 Nominal cross-section area of the conductor.

10. Do not modify.



In order to avoid failure, it is absolutely prohibited for customer to modify the equipment.

11. Do not overlap equipment.



Overlapping equipment can result in a high center of gravity with a risk of collapse.

2. Before operation

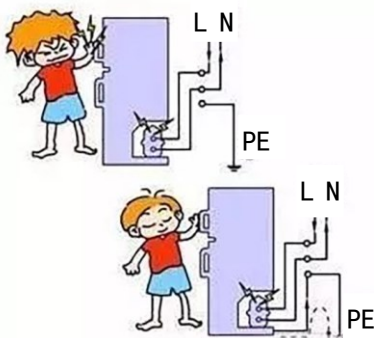
Precautions when installing

12. Take care for handling of the power cord.

- Do not entangle the power cord. This will cause overheating and possibly a fire.
- Do not bend or twist the power cord, or apply excessive tension to it. This may cause a fire and electrical shock.
- Do not connect too many wires to a multi-hole socket or extend wires using a cord reel. Otherwise, heat is generated or a fire may result. Also, the voltage may drop or temperature control performance may be degraded.
- Do not lay the power cord under a desk or chair, and do not allow it to be pinched in order to prevent it from being damaged and to avoid a fire or electrical shock.
- Keep the power cord away from any heating equipment such as a room heater. The cord's insulation may melt and cause a fire or electrical shock.
- If the power cord is damaged (core wire exposed, broken, etc.), immediately cut off the main power supply, turn off the main switch, and entrust the seller to replace the power cord. If left unchecked, it will lead to fire and electric shock accidents.
- Connect the power cord to a appropriate outlet.

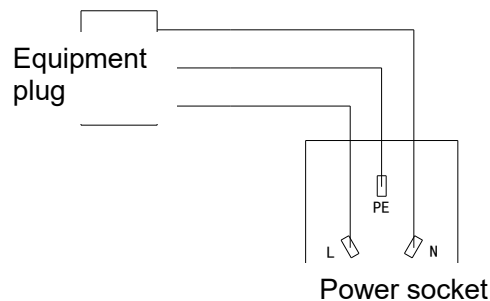
13. Must connect grounding wire properly.

- Must connect grounding wire (green core wire of the power cord) properly to grounding line or terminal in order to avoid electrical shock due to electrical leakage.
- Do not connect the grounding wire to the gas pipe or water pipe. Otherwise, a fire may occur.
- Never connect grounding wire to telephone grounding line or to lightning conductor. Otherwise, a fire or electric shock may occur.
- Do not use the multi-hole socket because of the risk of heating.



Connect the power supply to the equipment.
The grounding wire of the power supply must be correctly connected. The ground resistance of the grounding wire of the power supply must be 4Ω or less.

Use a three-hole grounding socket



When there is no ground terminal

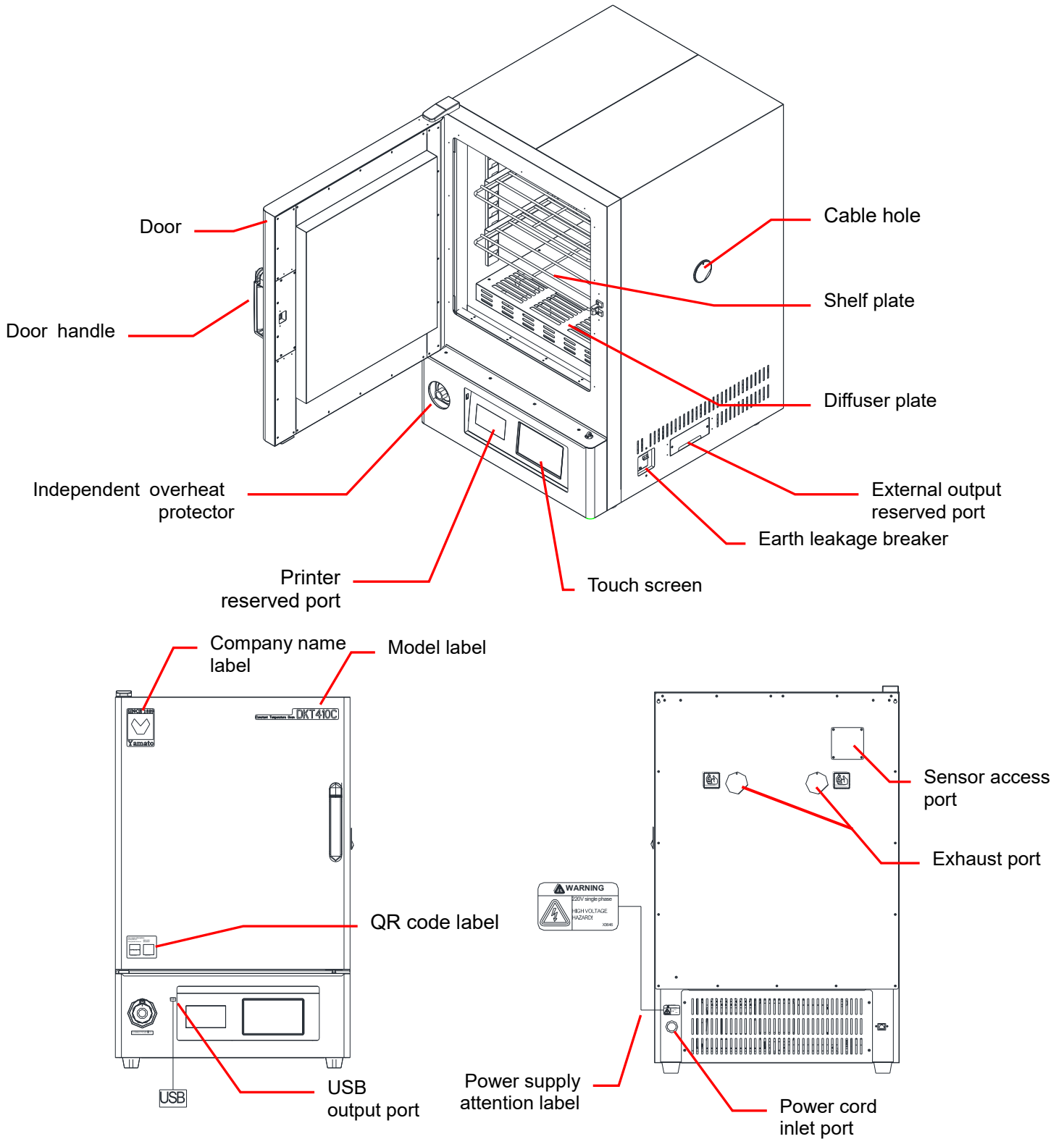
- If need to do grounding work, please consult with the dealer or our company's sales department.

DKT810C does not have a plug and requires a single-phase 220V power supply. If need to connect the power cord, please entrust the nearest electrical installation company. For installation work, please ground according to the technical standards of electrical equipment.

3. Part names and functions

Main body

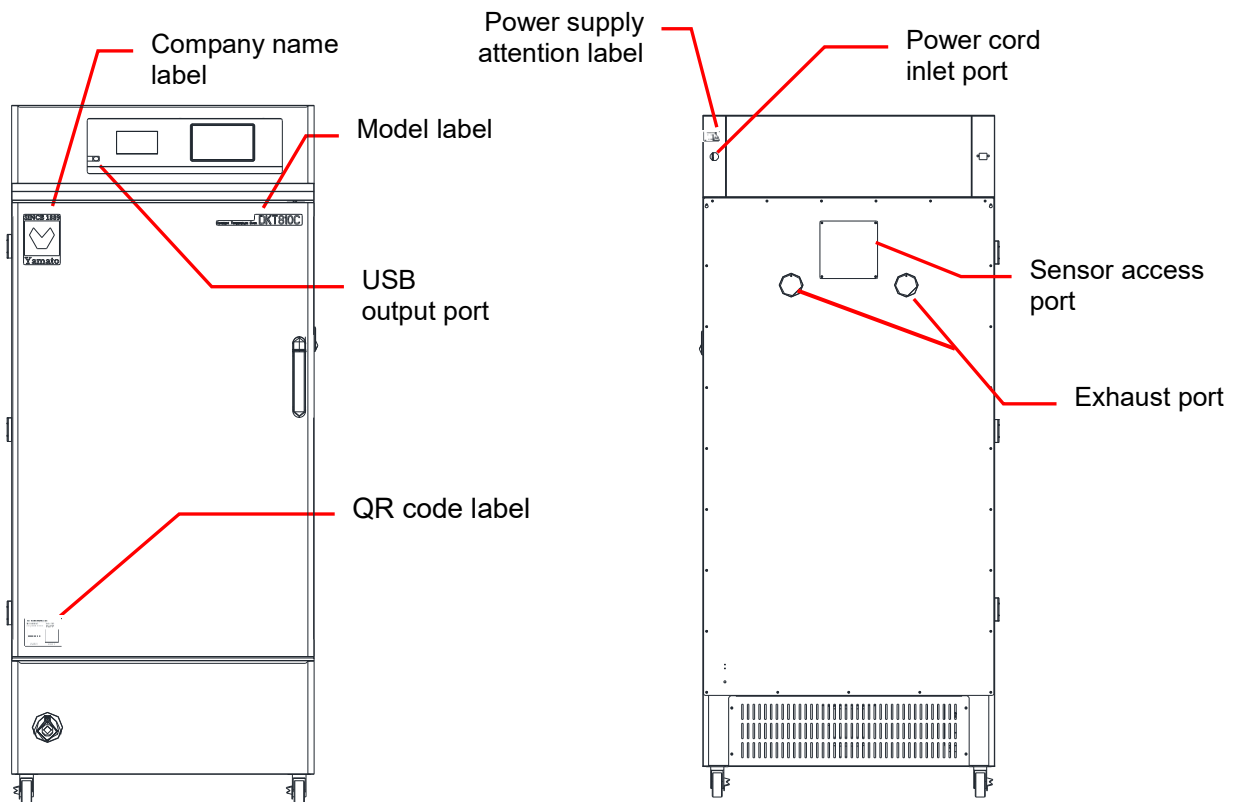
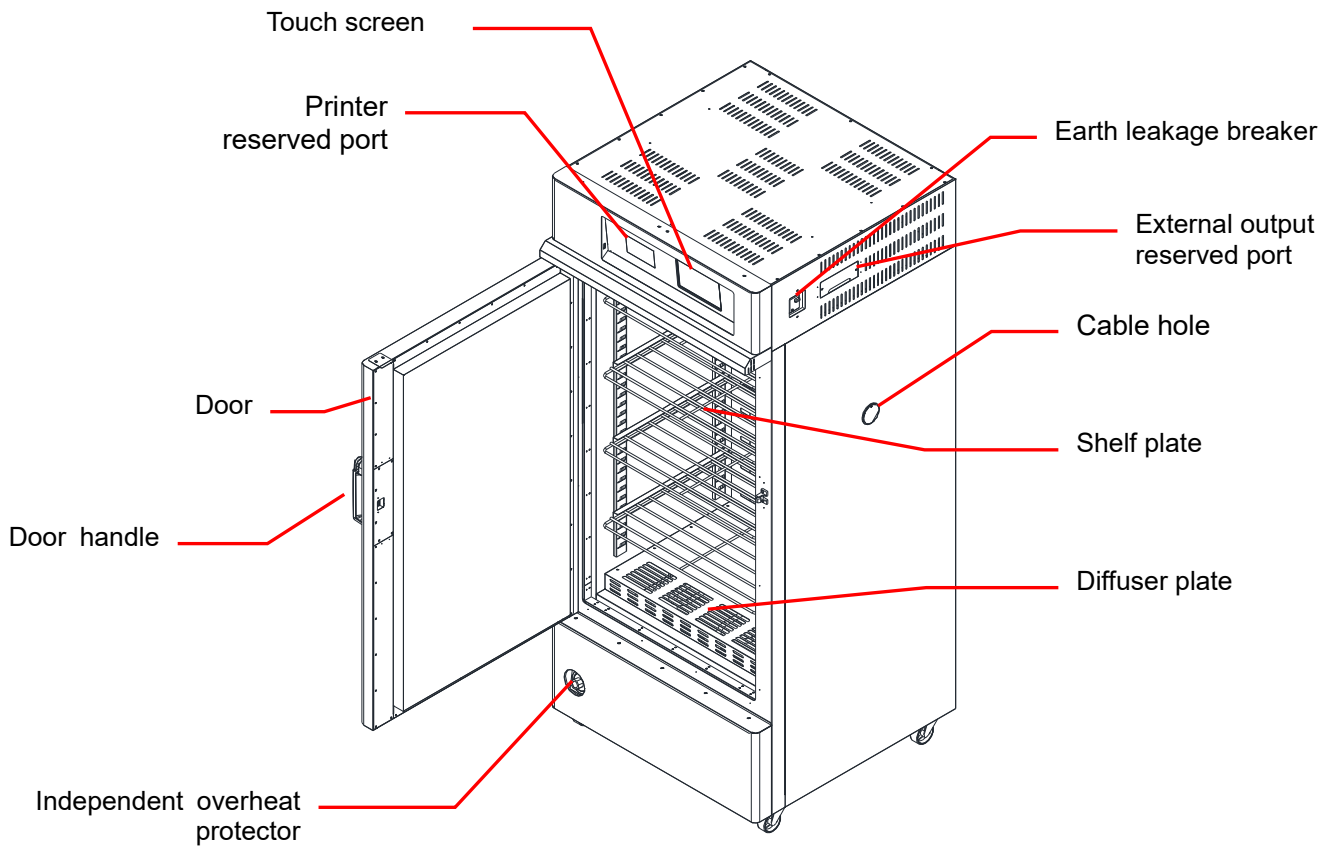
DKT410C/DKT610C



3. Part names and functions

Main body

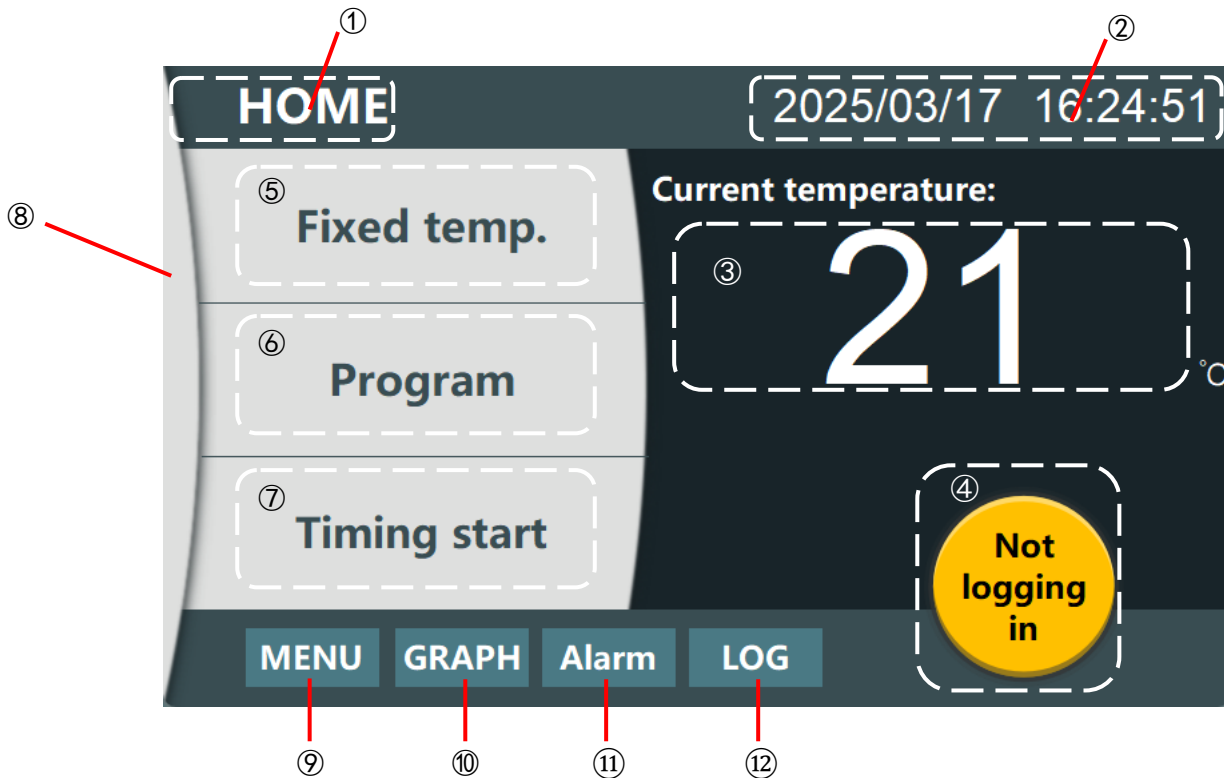
DKT810C



3. Part names and functions

Operation panel

Main screen

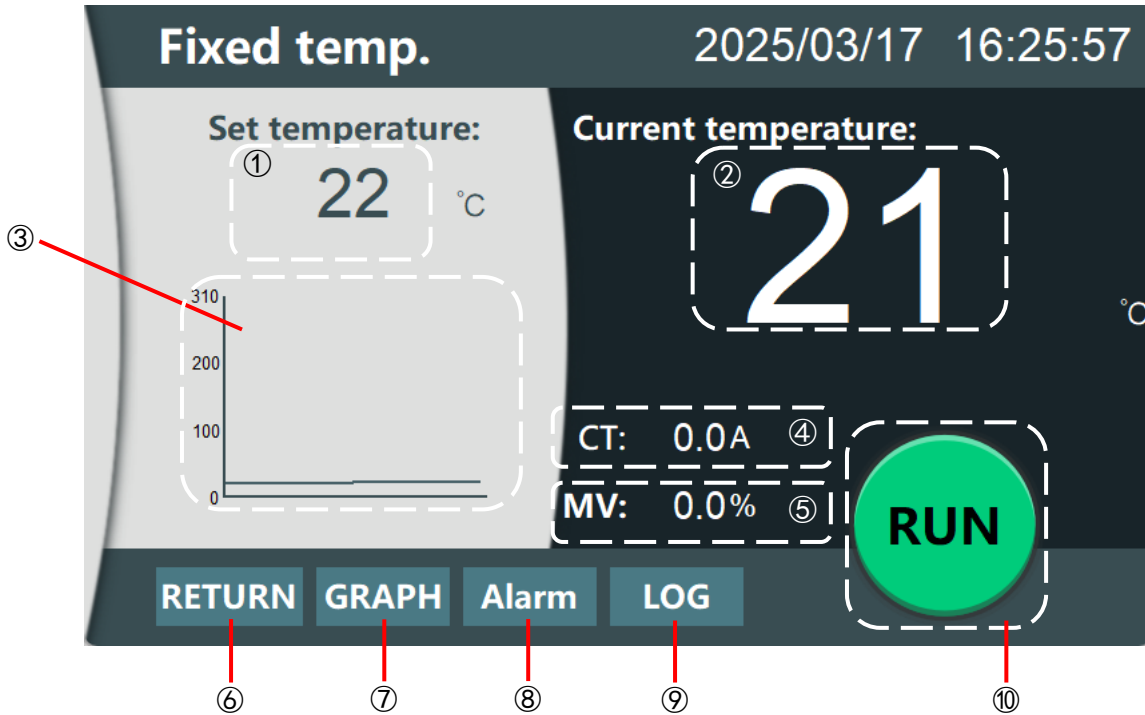


No.	Name	Operation / Action
①	Display screen information	Display the current screen information.
②	Date and time display	Display the current date and time.
③	Measured temperature display	Display the temperature in the chamber.
④	User login button	If the user does not log in, it displays not log in. After the user logs in according to his/her authority, it displays the corresponding authority name. (1. Operator 2. Engineer 3. Administrator)
⑤	Fixed temp. run button	Switch to the fixed temp. running interface.
⑥	Program run button	Switch to the program running interface (run the program according to the user setting profile)
⑦	Timing run button	Switch to the timing running interface (start the equipment at a scheduled time)
⑧	Multiple status indicator lamp	Run: green, program end: yellow, error: red
⑨	Setting button	Switch to the setting interface (language switchover, system time modification, temperature compensation and other parameters setting)
⑩	Profile button	Switch to the profile screen (view the historical profiles)
⑪	Alarm button	Switch to the alarm screen (view the historical alarms)
⑫	Log button	Switch to the log screen (view the historical operation records)

3. Part names and functions

Operation panel

Fixed temp. running interface

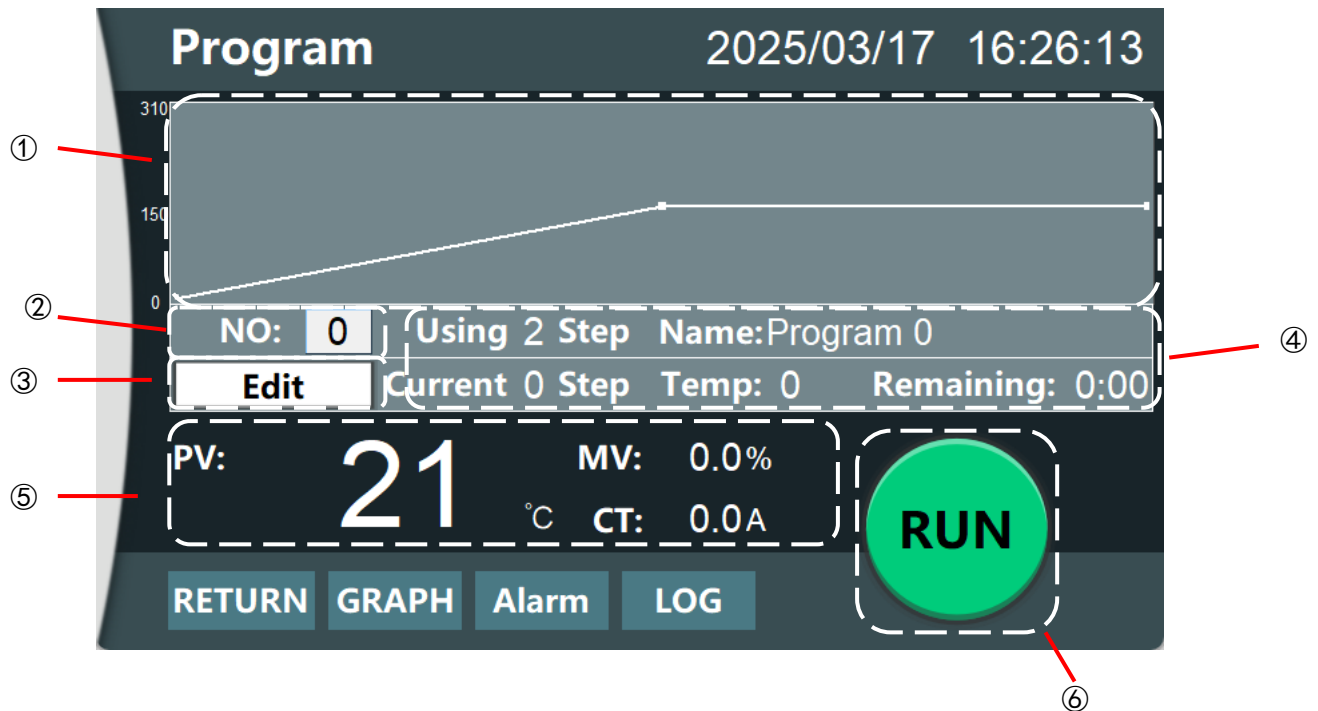


No.	Name	Operation / Action
①	Temperature setting of fixed temp. operation	Set the fixed temp. operating temperature (set range 0-310°C)
②	Measured temperature display	Display the temperature in the chamber.
③	Display the set temperature profile	When starting, the equipment draws a temperature profile in real time according to the chamber temperature and the setting temperature, indicating the process of temperature rising and being constant.
④	Heating pipe current value	Display the real-time heating pipe current value measured by the current transformer.
⑤	temperature controller output power	Display the control power of temperature controller output (0-100%).
⑥	Return button	Return to the main screen
⑦	Profile button	Switch to the profile screen (view the historical profiles)
⑧	Alarm button	Switch to the alarm screen (view the historical alarms)
⑨	Log button	Switch to the log screen (view the historical operation records)
⑩	Run button	Start/Stop the equipment heating.

3. Part names and functions

Operation panel

Program run screen

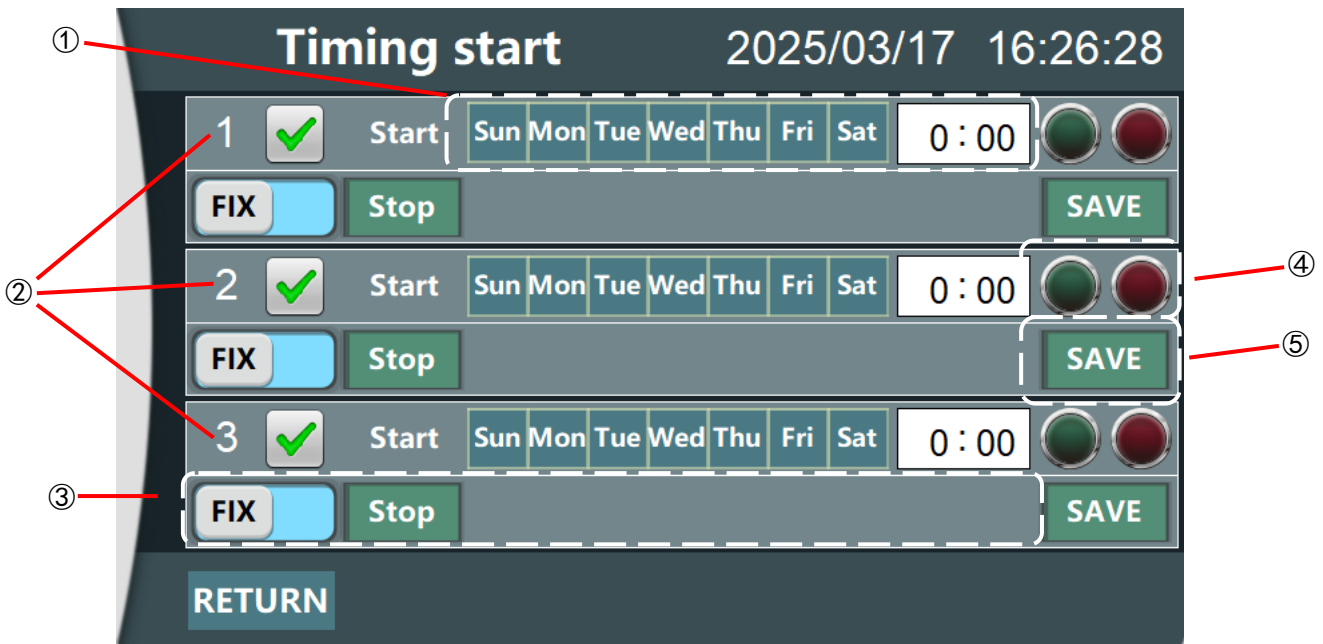


No.	Name	Operation / Action
①	Setting program temperature profile box	When the user selects a program number that has been edited, the box will automatically draw a profile of this program and update the running temperature in real time during the heating operation to determine whether the temperature slope is the same as the set temperature.
②	Select a operational program number	Select an edited program number (0-99 program numbers).
③	Program edit button	Press this button to jump to the program editing screen (program editing cannot be performed during operation).
④	Information display box for the selected program	When the program number is selected, the box will display the using segment numbers and the program name. When the equipment is running, the current running segment, the target temperature and the remaining time of this segment will be updated synchronously.
⑤	Chamber status display box	PV shows the current chamber temperature, MV shows the current heater output power (percent), and CT shows the current heater current.
⑥	Run/Stop operation button	Start/Stop the equipment heating.

3. Part names and functions

Operation panel

Time start/stop operation screen



No.	Name	Operation / Action
①	Set the date and time of the timing start	The equipment can be started multiple times at the same time every week. For example, the equipment is set to start at 5:00 AM on Monday and Tuesday, if the equipment is stopped at this time, it starts to run in the corresponding mode. For the specific setting method, please refer to P.31 "Auto start".
②	Use the time timer	A total of 3 time timers are available, click <input checked="" type="checkbox"/> button to stop/start the timer.
③	Mode selection and timer stop/start selection	On the second line of each timer, set the running mode of the timing start <input type="checkbox"/> FIX, (either fixed temp. or program mode). Click <input type="button" value="Stop"/> button to start the date and time of the timing stop. Similar to the timing start, the equipment is set to stop at 6:00 AM on Wednesday, if the equipment is running at this time, it stops. For the specific setting method, please refer to P.32 "Auto stop". ※Before setting the timing stop, set a timing start time.
④	Success or failure indicator lamp of timer save	Click <input type="button" value="SAVE"/> button, will indicate whether the save is successful. <input type="radio"/> indicates success, <input type="radio"/> indicates failure.
⑤	Timer setting value save button	After setting the timer start or timer stop, need to click <input type="button" value="SAVE"/> button to take effect. <input type="radio"/> indicates saving successfully. After saving successfully, click <input type="button" value="SAVE"/> again, <input type="button" value="SAVE"/> button goes off, <input type="radio"/> indicator lamp goes off, the timer takes effect.

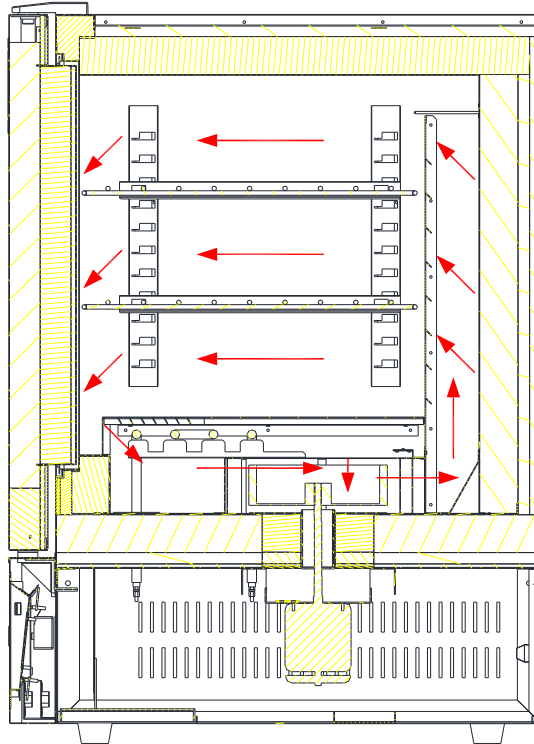
4. Equipment summary

Equipment summary and operating principle

Forced air circulation system

Air circulation inside the chamber provides good temperature distribution inside the chamber, making it ideal for general drying processes.

The operating principle of this equipment is explained below.



5. Use cautions

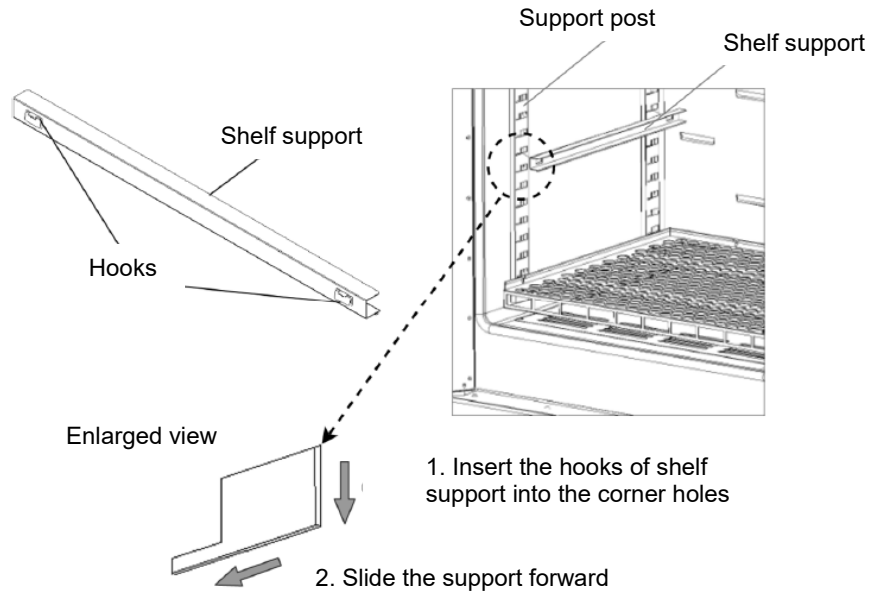
Installation method

How to install the shelf plate

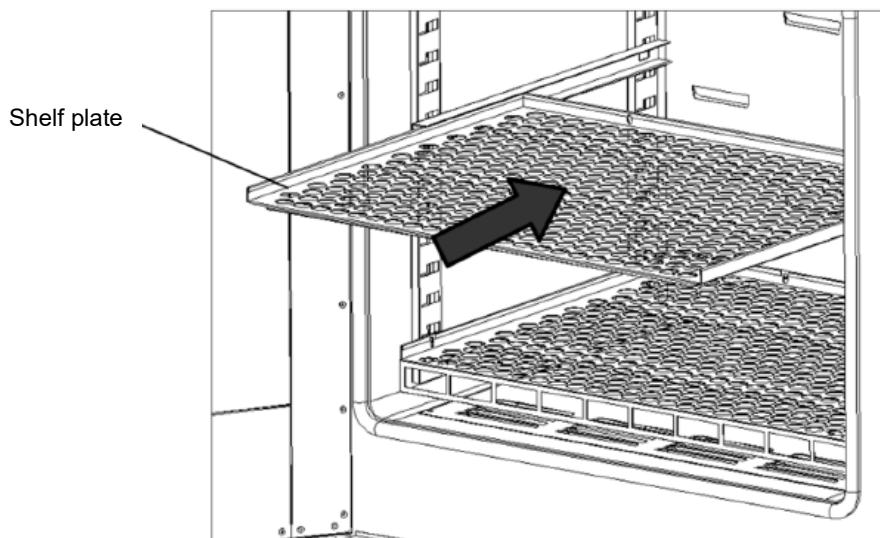


Do not remove the bottom shelf plate as it is secured with screws. There are sharp protrusions on the chamber interior, shelf support and shelf support post, so be careful not to get injured. In particular, working with bare hands is dangerous. Please wear gloves.

- ① Install the shelf supports to the left and right support posts inside chamber as per the desired height.



- ② Push and slide the shelf plate to the end in chamber.
※ Pay attention to the height of the left and right shelf supports.
- ③ Make sure that the shelf plate is properly in place and does not rattle or fall.



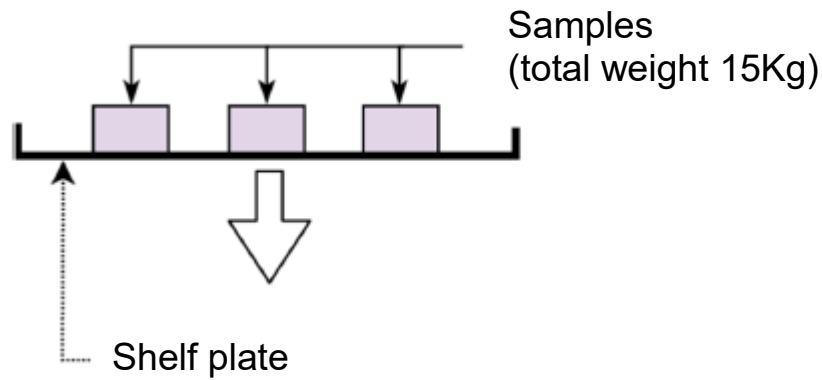
5. Use cautions

Warnings and cautions

1. Do not place too much samples on a single shelf plate.



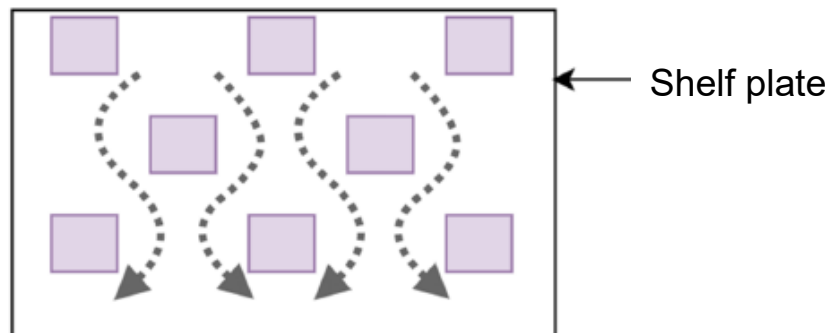
The load-bearing capacity of each shelf plate is approximately 15Kg on average. Do not place heavy samples, for multiple samples, should be spread out as much as possible.



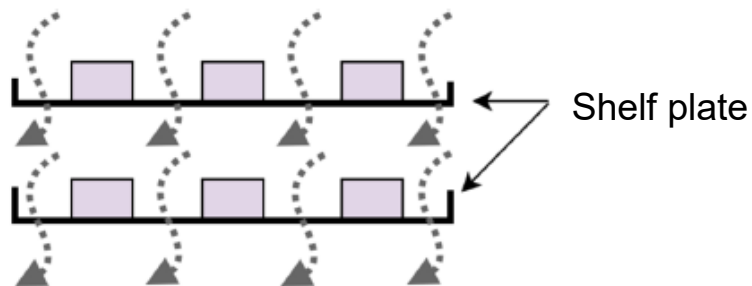
2. Do not place the samples too close.



To ensure temperature control, leave at least 30% of the shelf space. Placing the samples too close may result in decreased temperature performance and abnormal overheating.



Leave at least 30% of the shelf space




Be careful not to place too much samples


5. Use cautions

Warnings and cautions


3. Do not place the samples on the bottom of the chamber (diffuser plate)

	<ul style="list-style-type: none">• If the samples are used directly at the bottom of the inner chamber, the temperature performance may be affected. In addition, it will not only produce corrosion, damage, rust and other problems for the inner chamber, but also may burn the samples and cause a risk of fire. Please never place the samples on the bottom of the inner chamber.• There is a sensor installed on the inner wall of the chamber. Please do not make the samples touch the wall.• Please place the samples on the shelf plate.
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4. Please be careful not to use the following samples.

	<ol style="list-style-type: none">① Samples containing flammable or explosive ingredients<ul style="list-style-type: none">• This equipment does not have explosion-proof structure, do not use this equipment to dry the samples containing flammable or explosive ingredients.② Corrosive samples<ul style="list-style-type: none">• Please be careful not to use corrosive samples. Although the main part of this equipment uses stainless steel SUS304 material, it still may be corroded by corrosive substances such as strong acids. In addition, the sealing strip may also be corroded by organic solvents such as acids, alkalis, and oils. Therefore, please pay special attention.
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5. Open the exhaust port when using.

	<p>The exhaust ports are set at the back of the unit body. Usually, 2 exhaust ports are used in the open state. When using, please pay attention to adjust the opening degree according to the water content of the samples.</p> <p>※ High-temperature steam will be erupted from the exhaust port. It may cause burns and other accidents, so do not observe at the exhaust port or touch the exhaust port with your hand.</p>
--	--


6. Use with the door fully closed.

	<ul style="list-style-type: none">• Make sure that the locking mechanism on the right side of the door is fully locked before operation.• If the door is opened for use, it will not only fail to control the temperature normally, but also cause the danger of abnormal overheating of the heater. Be sure to use it with the door closed.• After running, please do not open the door for cooling the samples quickly. Because the heat generating from the chamber will cause the deformation of the control panel, as well as the controller failure. <p>※ During operation, if this equipment is opened, it will stop heating and prompt that the door is opened.</p>
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7. Odors may occur before initial use.

	<p>When used for the first time, once high temperature occurs, odor may occur, which is caused by the decomposition of the material components contained in the insulating material, and is not a machine fault. It is best to operate at the highest temperature before use.</p>
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8. Please use at proper temperature.

	<p>The temperature control range is RT +15°C~300°C. It is absolutely prohibited to use at temperatures outside the temperature control range. If the equipment is used outside the operating temperature range, the equipment failures and accidents may occur.</p>
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5. Use cautions

Warnings and cautions

9. Make this equipment to be fully ventilated.



Please do not make the side and back vents of this equipment to be blocked. In this way, it will not only cause the internal temperature to rise, the performance to decrease, but also lead to accidents, failures, fires and so on.

10. Do not open the inside of the equipment.



Do not open the fixed control panel, cover, etc., and do not operate in the open state. It may cause accidents, electric shock, fire, etc.

11. Do not place items on the equipment.



Please do not place items on this equipment, as it may collapse, cause injury, etc.

12. When there is thunder



When there is thunder, disconnect the unit body power supply and the main power supply immediately. If not disconnect, the lightning stroke may cause a fire.

13. About the power outage reset



When the equipment stops due to power failure during operation, after the power supply is restored, the equipment will keep the mode before power failure. If the mode before power failure cannot be automatically restored, disconnect the leakage protector.

14. When opening and closing the door



When opening or closing the door, please pay attention to the opening range (space) of the door, and keep your hand and face away from it. The hands and face may be injured.

15. Do not drop metal pieces into the equipment



Please do not drop clips, staples, screws and other metal pieces into the chamber. If the metal pieces fall into the chamber, please stop operation. It may cause accidents, electric shock, fire, etc.

16. Please do not operate the operation matters not recorded in the instruction manual.



Please do not operate the operation matters not recorded in the instruction manual. It may lead to unpredictable accidents.

6. Operation preparations

Operation modes and functions

Operation modes for this equipment are defined in the table below:

No.	Name	Description	Page
1	Fixed temp. operation Used for continuous operation at a set temperature		P24
2	Program operation Set the program in the program editing interface according to the user's process profile. (It can set 100 programs, each program has 30 segments)		P26
3	Timer mode (auto start) Used to start the equipment at a set time in timer mode. Multiple times can be set on the same timer.		P31
4	Timer mode (auto stop) Used to stop the equipment at a set time in timer mode. Multiple times can be set on the same timer.		P32

※ The operation mode cannot be changed when the equipment is running. To change the mode, stop the operation first and then change the mode.

6. Operation preparations

Operation modes and functions

Operation functions for this equipment are defined in the table below:

No.	Name	Description	Page
5	Overheat protector	<p>This function is to prevent abnormal overheating of unit.</p> <ul style="list-style-type: none"> ● Automatic overheat prevention function: The automatic overheat prevention function is associated with the set temperature of the equipment. If the chamber temperature exceeds the set temperature by +12°C, the heating controller will stop working. When the chamber temperature is lower than the set temperature by +12°C, the heating controller will start (error code is not displayed). ● Independent overheat protector: When the chamber temperature reaches the set temperature of the independent overheat protector, the heater power circuit is disconnected. The error code ER19 is displayed on the screen. 	P23
6	Alarm record	Display and query alarms	P33
7	Operation log	Display and query operation logs	P33
8	Temp. profile	Display and query temperature profile	P34
9	Temp. calibration offset function	This function can be used to correct the measured temperature of the controller. Positive or negative compensation can be applied to the entire temperature range of the equipment.	P35
10	Three-level authority function	<p>It can effectively manage the operation authority of the equipment and record, each level of authority has its own specified operating range, and can be selected according to the function when setting the three-level authority.</p> <p>The specific authorities are as follows:</p> <ol style="list-style-type: none"> 1. Operator authority: program start/stop, select program. 2. Engineer authority: log in to edit, modify the running program, modify the temperature time and edit the program time. 3. Administrator authority: After login, you can create new personnel and logout personnel, modify the system parameters and background parameters. 	P36
11	Power failure recovery mode select function	<p>When a power failure occurs during operation and then the power is restored, you can use this function to select to "stop operation" or "continue operation".</p> <p>If select to continue operation, the equipment starts running from the state before the power failure.</p>	P37
12	Language switch setting	You can change the language of the display panel. (Japanese/Chinese/English)	P39
13	Date setting	Date setting can be changed.	P39
14	Time setting	Time setting can be changed.	P39
15	LCD brightness setting	Change the LCD brightness of the operation panel.	P40
16	Automatic logout time of user	Set the automatic logout time when the user does not operate the screen.	P40
17	Equipment serial number	Set the equipment serial number.	P40

6. Operation preparations

Operation diagram of operation modes



7. Operation procedures

Setting of independent overheat protector

This equipment features an independent overheat protector (manual reset) as safety countermeasure.

Set temperature range and functions

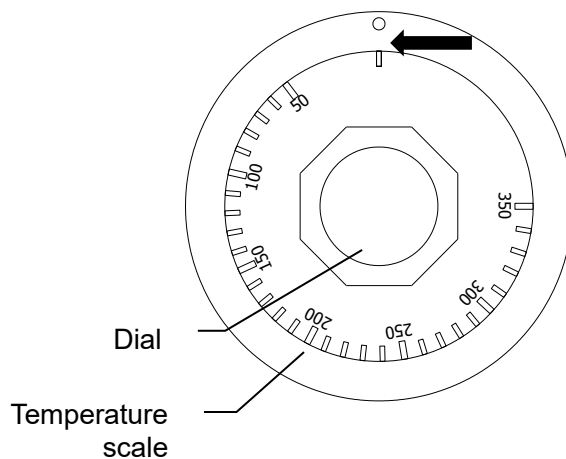
The effective temperature setting range of independent overheat protector is "50°C~350°C".

When the temperature near the heater continues to rise due to some abnormality and reaches the set temperature of the independent overheat protector, the heater power is cut off, **the multiple status indicator lamp on the touch screen lights on red**, the error code Er.19 is displayed, and a buzzer sounds. Once activated, error will not be cancelled unless the earth leakage breaker is turned off, and then back on. (The buzzer sound disappears after **restarting the equipment**)

Readjust the temperature set value of the independent overheat protector to a proper temperature, turn the breaker "OFF (○)", and then turn it "ON (|)" again.

Set temperature of independent overheat protector

Turn the dial of independent overheat protector to align the target temperature scale with the arrow mark. (Refer to the figure below)



OVERHEAT PREVENTION

Caution

- ① The temperature setting of the independent overheat protector should be set based on the value added to the operating set temperature listed for each operating temperature range below. **(Factory setting is 350°C)**

Operating set temperature	40~150°C: set temperature +40°C
	151~200°C: set temperature +50°C
	201~260°C: set temperature +60°C
	270~300°C: set 350°C

If the above settings malfunction, add about 10°C.

- ② The sensor of independent overheat protector is installed near the heater to detect the overheat errors caused by malfunctions as soon as possible. Since the temperature near the heater is higher than the chamber temperature, the temperature setting value of the independent overheat protector is higher.
- ③ The independent overheat protector has a characteristic of fluctuating operating temperature depending on the room temperature, so a margin setting is required.
- ④ If air circulation is obstructed due to overloading of samples, the independent overheat protector may be activated. In this case, reduce the samples amount to secure enough space, and rearrange samples as uniformly as possible.
- ⑤ If the set value of the independent overheat protector is lower than it should be, the independent overheat protector may activate during operation or the temperature rising, the equipment may not treat the samples properly.

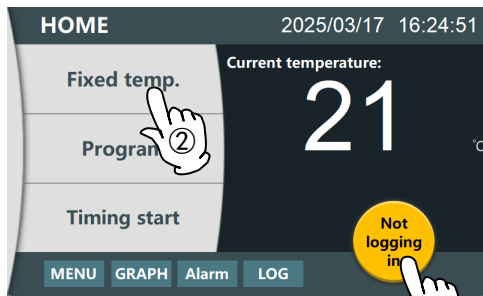
7. Operation procedures

Fixed temperature operation

Fixed temperature operation is used for "after starting operation, the chamber temperature is kept to the set temperature and maintained until the operation stops".

In fixed temperature operation, long press the RUN button to start the machine, the chamber temperature will automatically adjust to the set temperature, and continue to run at the set temperature, until long press the STOP button to stop the machine. The chamber inside cools down naturally after stopping operation.

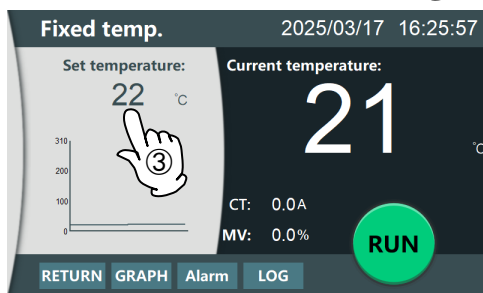
Start method of fixed temperature operation



1. Turn on the power (turn the breaker ON)

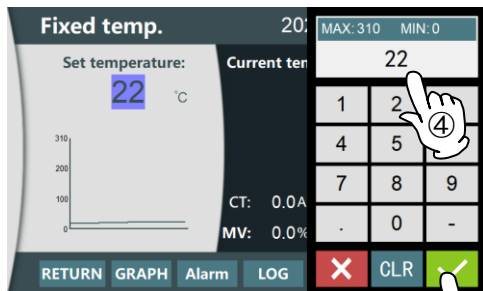
Turn on the power for about 4 seconds to display the main screen.

- ① Click the "Not login" button and enter the password to log in to the corresponding authority (operator authority).
- ② Click the "Fixed temperature operation" button.



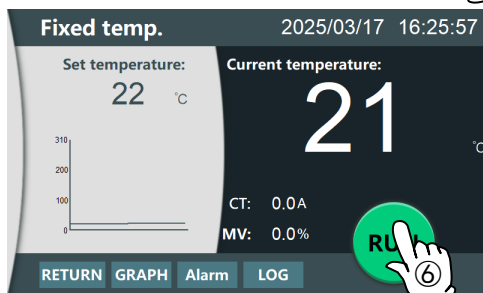
2. Set the temperature parameter

- ③ Enter the "Fixed temperature operation" screen, and click the set temperature box.
- ④ Enter the target temperature. (※DKT series input temperature range is 0-300°C)
- ⑤ Click the OK button to determine the set temperature, and the temperature profile on the left will automatically update according to the set temperature.



3. Start the fixed temperature operation

- ⑥ Click the RUN button to start the fixed temperature operation.

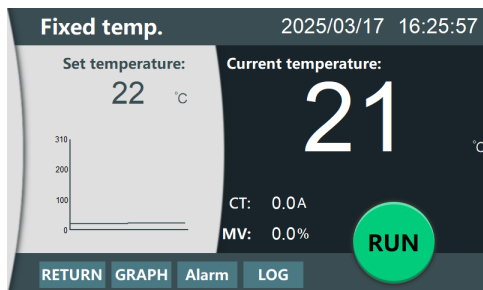
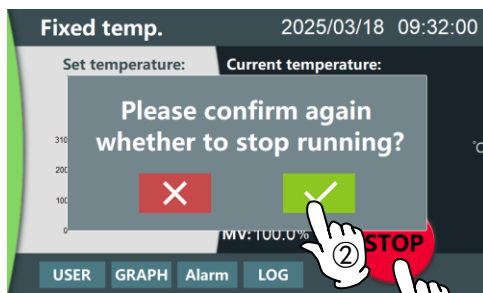
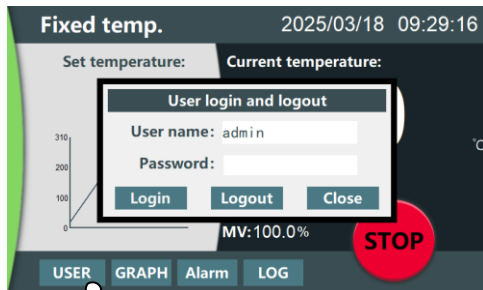


7. Operation procedures

Fixed temperature operation

Fixed temperature operation is used for "after starting operation, the chamber temperature is kept to the set temperature and maintained until the operation stops".

Stop method of fixed temperature operation



1. Click the STOP button to stop the fixed temperature operation.

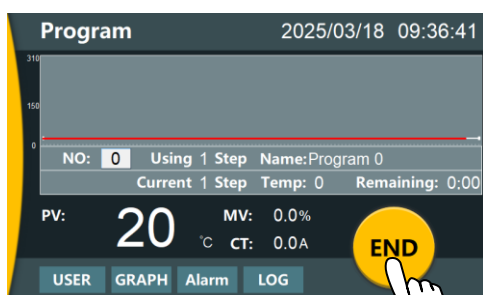
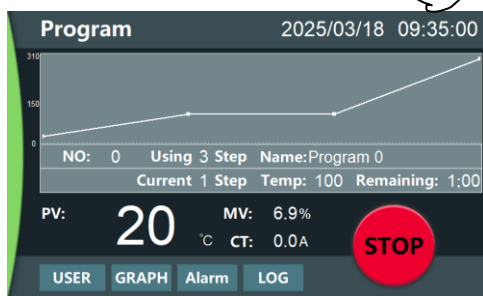
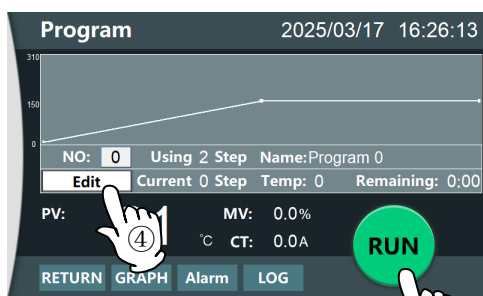
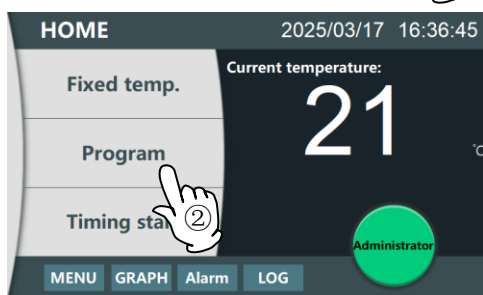
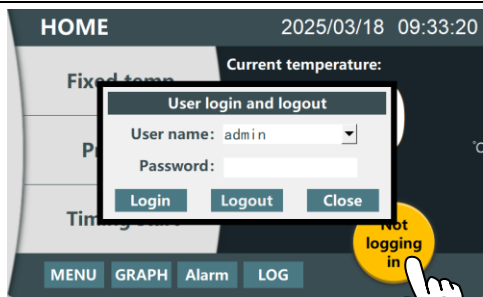
- ① Click the User button on the fixed temperature operation screen, enter the password to log in to the corresponding authority (operator authority).
- ② Click the STOP button, and click the OK button on the pop-up box.
- ③ Return to the fixed temperature operation screen.

7. Operation procedures

Program operation

Program operation is used for "the temperature rises or falls at a constant rate according to the set temperature and time relationship."

Start method of program operation



1. Turn on the power (turn the breaker ON)

Turn on the power for about 4 seconds to display the main screen.

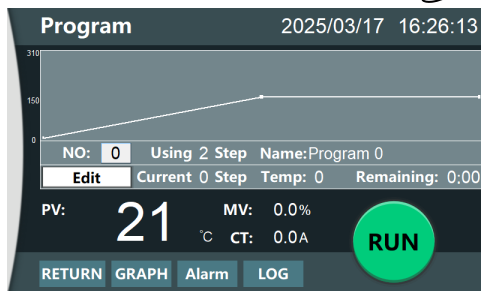
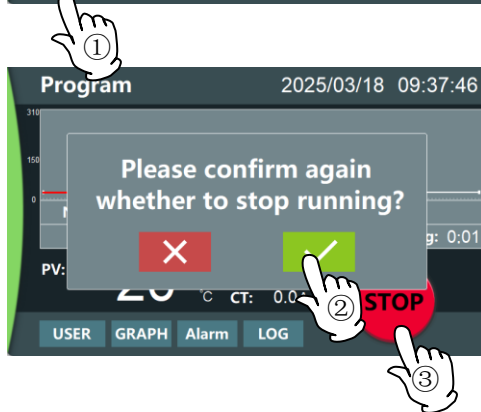
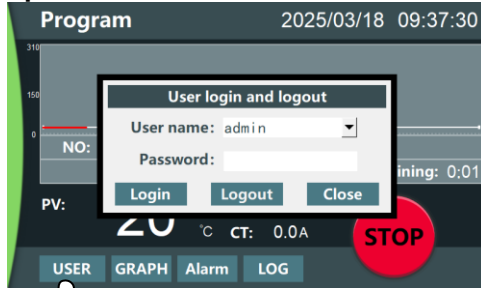
- ① Click the "Not login" button and enter the password to log in to the corresponding authority (operator authority).
- ② Click the "Program operation" button.
- ③ With the programming content on P.28 of the instruction manual, confirm the pre-edited program segment numbers, the temperature and time of each segment, etc. After the program is edited, select the program number that needs to be run, and the program information display box will synchronously update the segment number and program name of the selected program number.
- ④ Click the RUN button to run the program.
- ⑤ After the program is finished, it will automatically end.
- ⑥ Click the END button to return to the program operation screen.

7. Operation procedures

Program operation

Program operation is used for "the temperature rises or falls at a constant rate according to the set temperature and time relationship."

Manual stop method of program operation



1. Click the STOP button to stop the program operation.

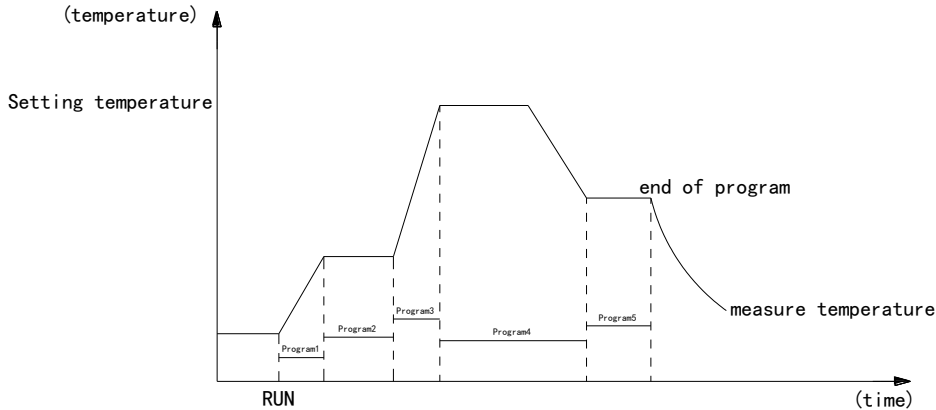
- ① Click the User button on the program operation screen, enter the password to log in to the corresponding authority (operator authority).
- ② Click the STOP button, and click the OK button on the pop-up box.
- ③ Return to the program operation screen.

7. Operation procedures

Program operation (program edit)

Program operation is used for "the temperature rises or falls at a constant rate according to the set temperature and time relationship."

As shown in the figure, long press the RUN/STOP button to start the program, the chamber temperature rises or falls at a constant rate according to the temperature and time relationship set by the program segments. The program starts from program segment 1 and runs backward successively. After running all the program segments, the program operation automatically stops (the illustrated program consists of 6 segments).



Maximum number of programs

Maximum 100 programs, 30 segments per program.

• Before program input

When the program is running, it is initially necessary to edit the program.

- ① Check the temperature rise/fall capability of the unit. Set the time within the capability above.
For example, with the unit which has capability of increasing or decreasing temperature by 50°C within 15 minutes, about 30 minutes is needed to increase or decrease temperature by 100°C from current temperature.
- ② If want to edit in the controller, please confirm in advance whether the number of segments is full and there are available programs.
- ③ With the programming content on P.29 of the instruction manual, confirm the pre-edited program segment numbers, the temperature and time of each segment, etc.

• DKT series rise and fall time

The temperature rise and fall time of DKT series are roughly as follows: The values are the times to reach each temperature. (For example, the temperature rise time of DKT410C from 100°C to 150°C takes about 17 minutes). However, because the constant temperature time to reach each set temperature needs to be added, so please be sure to set the appropriate time and make the test runs.

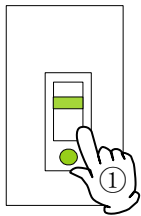
Condition: RT 23°C No load Exhaust ports fully closed (Unit: minute)

	DKT410C		DKT610		DKT810C	
	Rise time	Fall time	Rise time	Fall time	Rise time	Fall time
310°C	54	-	49	-	53	-
200°C	26	25	27	5	25	48
150°C	17	26	18	20	18	42
100°C	10	39	12	30	10	65
50°C	5	50	5	60	5	107

7. Operation procedures

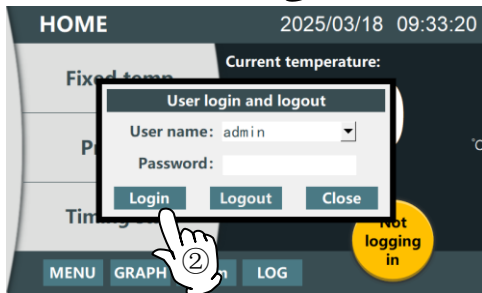
Program operation (program edit)

• Programming							Here use the following program patterns to illustrate.									
1. Program pattern example																
Temperature																
200°C																
100°C																
0°C																
Program segment	1	2	3	4	5	6										
Temp. °C	100	100	150	150	100	100										
Time	0.25	0.30	0.15	1.30	0.25	3.00										



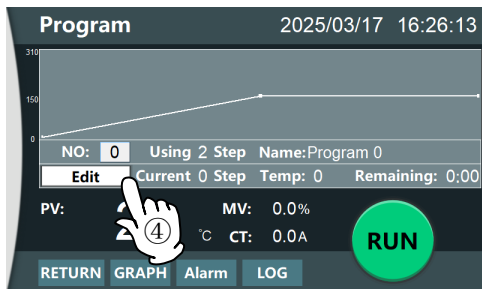
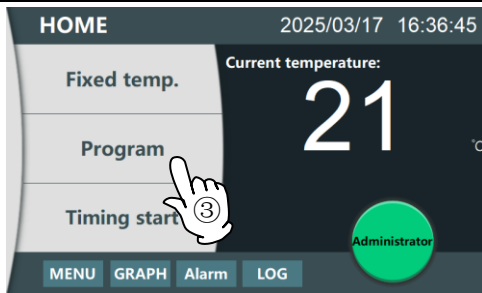
2. Turn on the power (turn the breaker ON)

- ① Turn on the power for about 4 seconds to display the main screen.
- ② Click the "Not login" button and enter the password to log in to the corresponding authority (engineer authority).



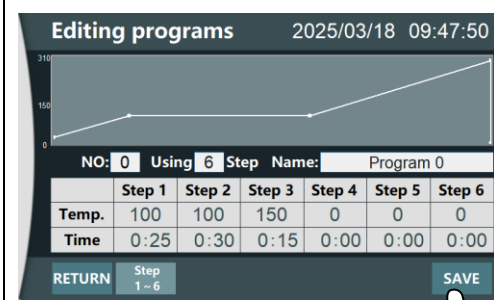
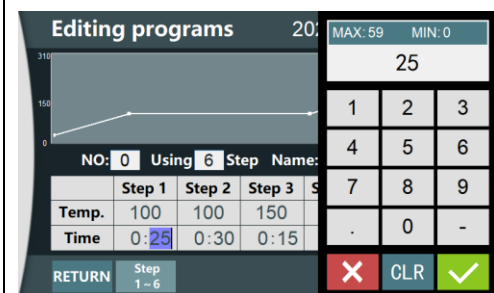
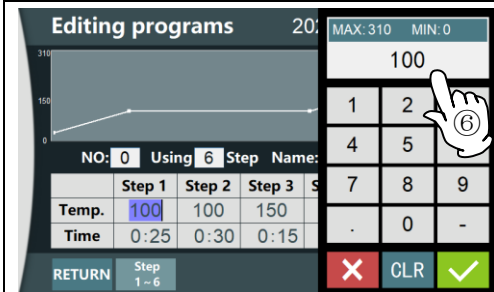
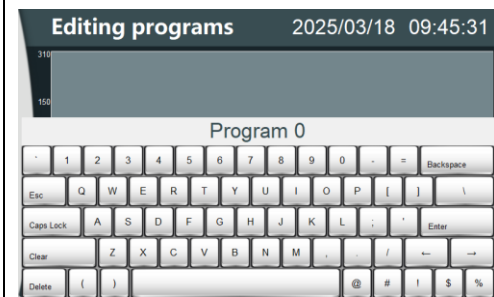
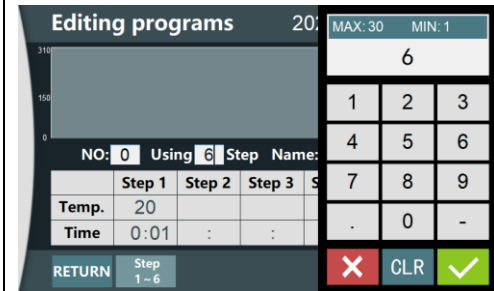
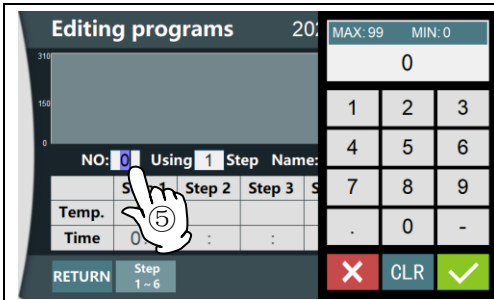
3. Enter the program edit screen.

- ③ Click the "Program operation" button to enter the program operation screen.
- ④ Click the "Program edit" button to enter the program edit screen.



7. Operation procedures

Program operation (program edit)



4. Create a new program number and edit the program example.

- ⑤ Select the program number and edit the segment number to use and the program name. Follow the example to select the program number 1 and the segment number 9.
 - ※ Up to 99 programs can be selected, each program has 30 segments, the time of each segment up to 99hr 59min).
 - ※ An screen will only display the program time and temperature of 6 segments, when the selected program segment is greater than 6, the remaining program segment will be displayed at the bottom of the screen, click the corresponding program segment for editing.

- ⑥ Edit the time and temperature of each program segment in turn, take the segment 1 as an example, the target temperature is 100°C and the time is 25min, then the temperature column of the segment 1 is filled in 100, and the time column is filled in 25min. Fill in the temperature target values and running times of the subsequent 5 segments in turn.

- ※ DKT set temperature range is 0~300°C

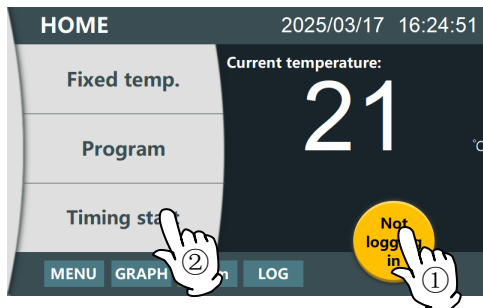
- ⑦ Click the "Save" button and return to the program operation screen.

7. Operation procedures

Timer mode (auto start)

Timer mode (auto start) is used for "when the equipment needs to start at a particular time".
Timer mode (auto start) is used to set the time to start the equipment in timer mode. Multiple times can be set on the same timer.

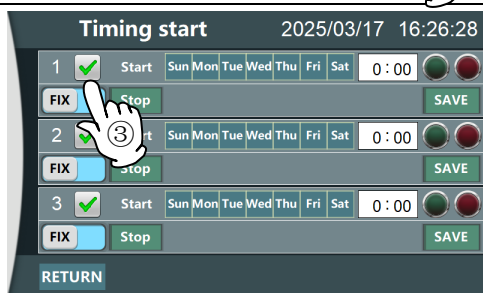
Setting of timer mode (auto start)



1. Turn on the power (turn the breaker ON)

Turn on the power for about 4 seconds to display the main screen.

- ① Click the "Not login" button and enter the password to log in to the corresponding authority (administrator authority).
- ② Click the "Timer operation" button.



2. Set timer parameters

- ③ Enter the "Timer operation" screen, click button to start a timer.

※ 3 timers are available.

- ④ Select the start mode, which can be selected from two modes: fixed temperature and program.

- ⑤ Set the start time, the timer is the date selection and time setting mode, if want to set the equipment to start

at 9:10 on Monday, set the date first, light the timer button and enter 9:10 in the time setting box. Click "Save", the green lamp lighting up indicates saving successfully. After setting the timer start or timer stop, need to click **SAVE** button to take effect.

indicates saving successfully. After saving successfully, click **SAVE** again, **SAVE** button goes off, indicator lamp goes off, the timer takes effect.

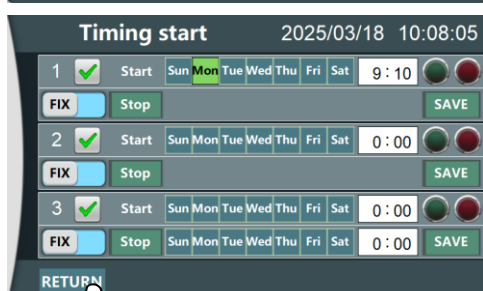
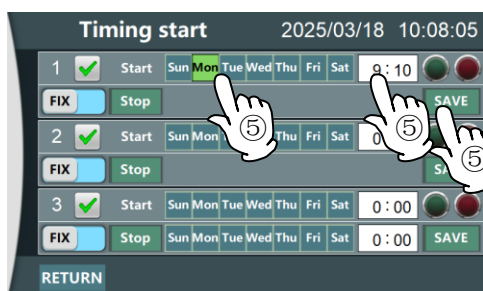
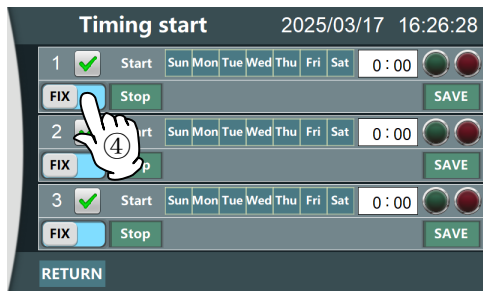
※ A timer can set multiple start dates, but set only one start time. For example, Monday and Tuesday can be set at 9:10 AM to start the equipment, but the two days must be at the same time.

※ At the same time, only one timer can activate. For example, after the timer 1 is started, if the set time of timer 2 is within the activating time of timer 1, timer 2 does not activate.

※ To modify the timer parameters, turn off the save button, restart the timer, after modifying the timer, save the parameters again.

※ When saving the timer, the red lamp lights up, indicating that the timer fails to be saved, and the timer cannot be executed. Check whether the timer is incorrectly set, for example, the time or date is not set.

- ⑥ Click "Return" to return to the main screen.



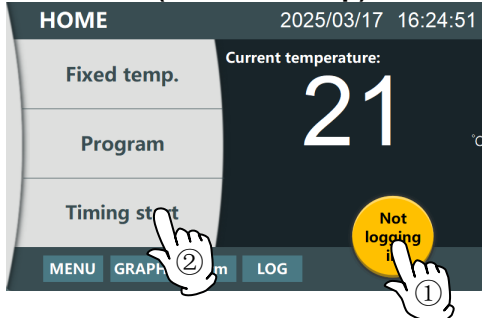
7. Operation procedures

Timer mode (auto start/stop)

Timer mode (auto start/stop) is used for "when the equipment needs to start and stop at a particular time".

Timer mode (auto start/stop) is used to set the time to start and stop the equipment in timer mode. Multiple times can be set on the same timer.

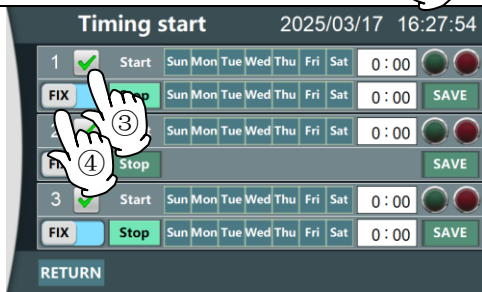
Setting of timer mode (auto start/stop)



1. Turn on the power (turn the breaker ON)

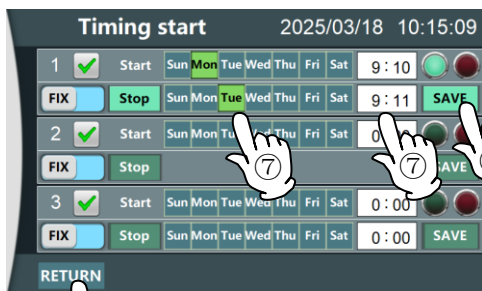
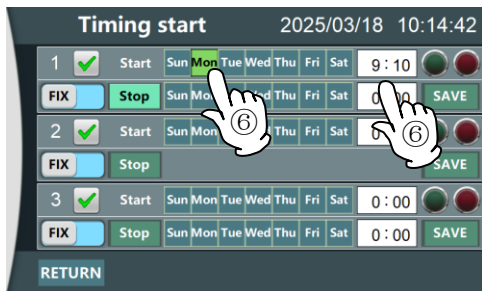
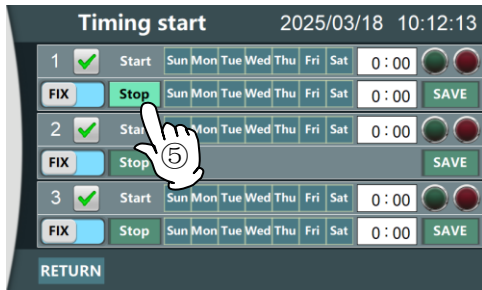
Turn on the power for about 4 seconds to display the main screen.

- ① Click the "Not login" button and enter the password to log in to the corresponding authority (administrator authority).
- ② Click the "Timer operation" button.



2. Set timer parameters

- ③ Enter the "Timer operation" screen, click button to start a timer.
 - ※ 3 timers are available.
- ④ Select the start mode, which can be selected from two modes: fixed temperature and program.
- ⑤ Click Stop button to turn on the timer stop time setting
- ⑥ Set the start time, the timer is the date selection and time setting mode, if want to set the equipment to start at 9:10 on Monday, set the date first, light the timer button and enter 9:10 in the time setting box.
- ⑦ Refer to setting the start time to set the stop time, click "Save". After saving successfully, click SAVE again, SAVE button goes off, indicator lamp goes off, the timer takes effect.



- ※ A timer can set multiple start dates, but set only one start time. For example, Monday and Tuesday can be set at 9:10 AM to start the equipment, but the two days must be at the same time.
- ※ At the same time, only one timer can activate. For example, after the timer 1 is started, if the set time of timer 2 is within the activating time of timer 1, timer 2 does not activate.
- ※ To modify the timer parameters, turn off the save button, after modifying the timer, save the parameters again.
- ※ When saving the timer, the red lamp lights up, indicating that the timer fails to be saved, and the timer cannot be executed. Check whether the timer is incorrectly set, for example, the time or date is not set.
- ⑧ Click "Return" to return to the main screen.

7. Operation procedures

Alarm record

Function screen

Return to previous screen

Alarm information display box

Historical alarm search bar

- ① Click the alarm button to enter the alarm record screen.
- ② When the equipment gives an alarm, this screen can display the detailed alarm content, and can display the historical alarm of the current day.
- ③ Click the date search at the bottom to query the previous alarm information of the equipment.

Operation log

Function screen

Return to previous screen

Operation log display box

Operation log search bar

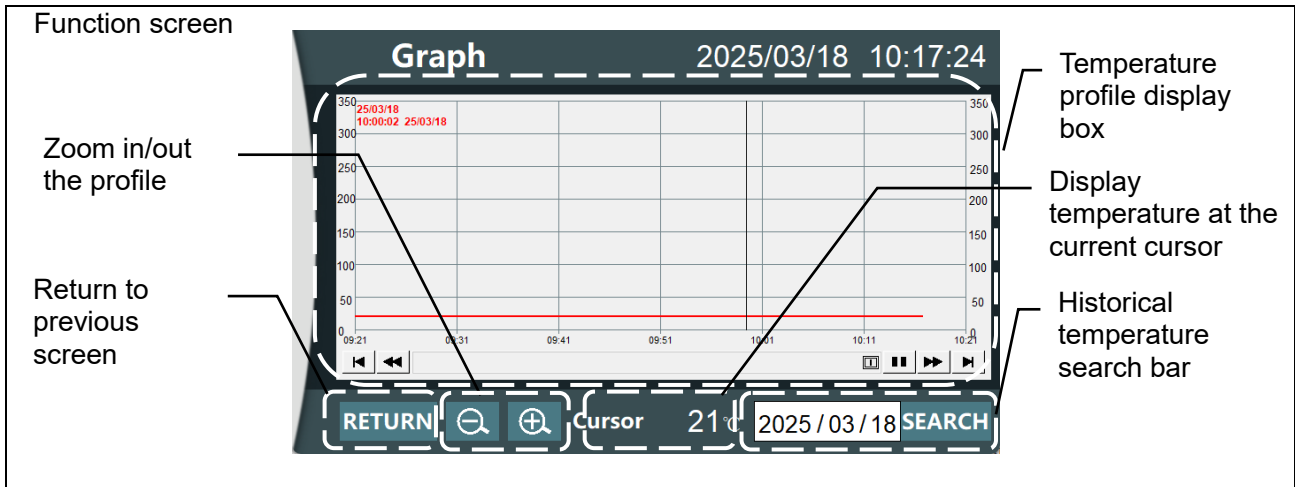
- ① Click the log button to enter the operation log screen.
- ② When need to view the operation logs, this screen can display the detailed operation content, and can display the operation logs of the current day.
Display the operation logs information.

(User) selects program (number), program name (operation program)	(User) starts the fixed temperature mode and set the temperature to (temperature)
(User) stops the fixed temperature operation	(User) runs program (number), program name (operation program)
(User) stops program (number), program name (operation program)	Complete the program (program name) operation
(User) resets the program (number), program name (operation program)	(User) sets the temperature of fixed temperature operation to (temperature)
(User) resets the time start/stop timer 1	(User) resets the time start/stop timer 2
(User) resets the time start/stop timer 3	(User) logs in
User logs out	The door closes during operation
The door opens during operation	

- ③ Click the date search at the bottom to query the previous log information of the equipment.

7. Operation procedures

Temperature profile



- ① Click the profile button to enter the temperature profile screen.
- ② When the equipment is turned on, the real-time chamber temperature profile is recorded, and the temperature of the current day can be displayed. Click on the profile to move the cursor to the click position. The display value at the cursor at the bottom of the screen shows the temperature data of the current cursor position.
- ③ Click the date search at the bottom to query the previous temperature profiles of the equipment.

The status of the automatic update function can be viewed by the screen control button:

■ indicates the profile data is automatically updated.

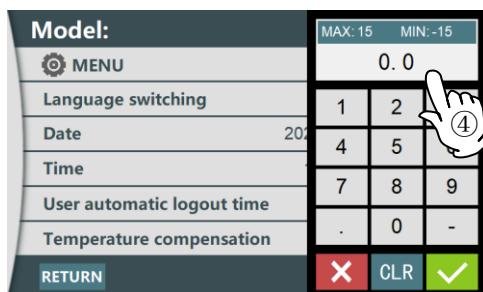
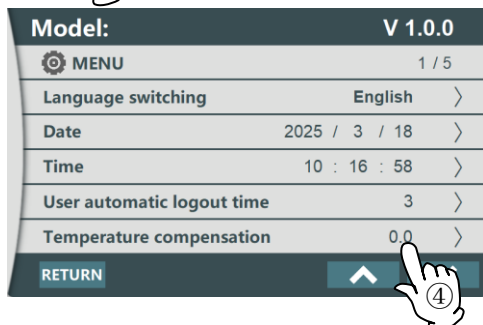
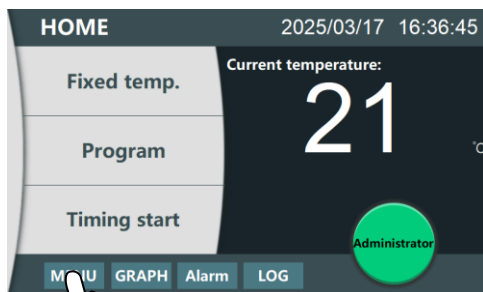
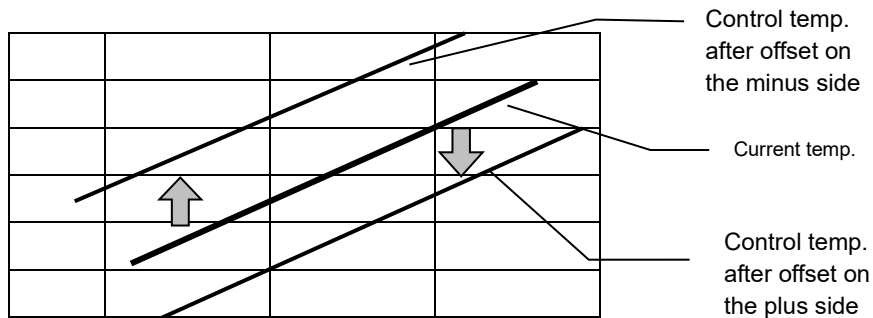
▶ indicates the profile data stops update.

When you scroll forward to view older data, the "Auto update data" function is deactivated. In this case, the control button icon is ▶.

7. Operation procedures

Calibration offset function

Calibration offset is a function which offsets the difference between the temperature in chamber and that of controller (sensor temperature) if arises. The function parallel offsets the difference either to the plus or minus side within the whole temperature range of unit.



- ① Start operation with the target setting temperature. Check the temperature in chamber (reference temperature) with a temperature recorder after it is stabilized.
- ② Check the difference between the measured temperature and chamber temperature (reference temperature).
- ③ On the main screen, log in as administrator authority and click the "Setting" button.
- ④ Find the "Temperature offset" and click to set it. The setting range of offset correction temperature is +15°C to plus side and -15°C to minus side respectively.
 When it is set to the minus side, the temperature on the measured temperature display screen falls by the setting temperature, while the chamber temperature rises.
 When it is set to the plus side, the temperature on the measured temperature display screen rises by the setting temperature, while the chamber temperature falls.

- ※ If the offset input value is too large, there is a risk that the difference between the actual temperature and the display temperature is too large. So please consult with the nearest sales office for setting.
- ※ Besides the offset correction function, this unit has the multi-point offset function, and the adjustment temperature is set at the factory.
- ※ When changing the temperature regulator, please consult with our nearest sales office.

7. Operation procedures

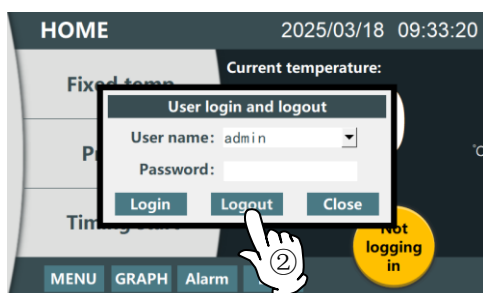
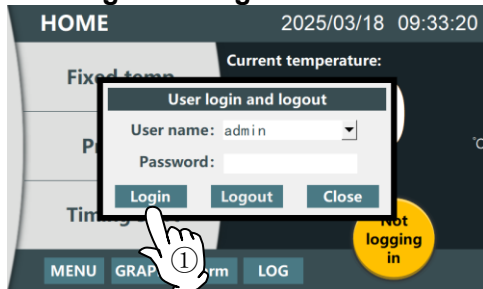
Three-level authority function

The main purpose of setting the three-level authority management system is to realize the standard and scientific information management and management system within the enterprise. The three-level authority system refers to the setting of different authority levels such as "system administrator", "operation and maintenance engineer", and "common operator" in the enterprise information system. Each level corresponds to different operation authority and responsibility range.

Table of responsibility range for each authority	
Operator authority	Program start/stop, select program.
Engineer authority	Log in to edit, modify the running program, modify the temperature time and edit the program time.
Administrator authority	After login, you can create new personnel and logout personnel, modify the system parameters and background parameters.

Table of initial password for each authority		
Authority type	Initial account name	Initial password
Operator authority	user1	11111111
Engineer authority	Engineer	12345678
Administrator authority	admin	18891889

User login and logout

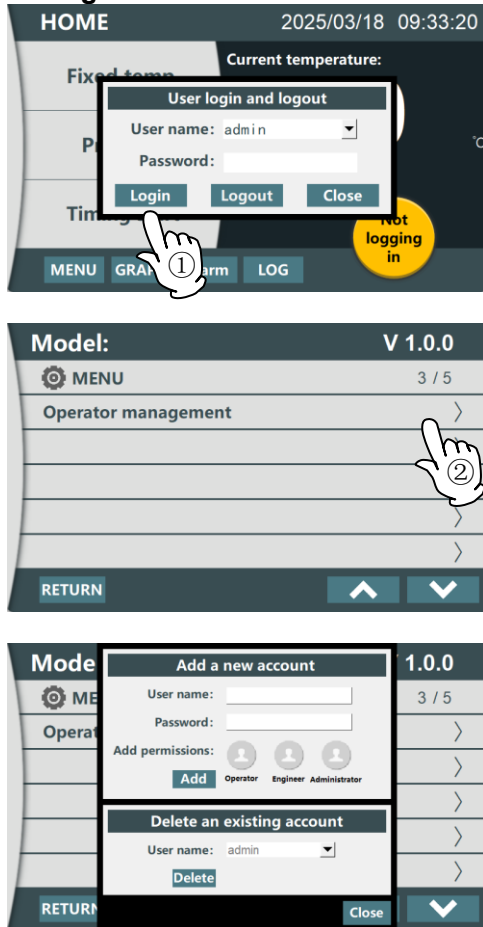


- ① Login operation: click the "Not login" button on the main screen, the user login and logout box will pop up, enter the user name and password, and click the "Log in" button to complete the login.
 - ✘ To ensure equipment safety, use the initial password of the administrator to log in to the new machine. You can also log in to the operator management screen to change the initial password. The changed password can be recorded in the "Table of initial password for each authority" to avoid forgetting.
 - ✘ The initial administrator account and password cannot be deleted on the "Operator management" screen.
 - ✘ If log in to an existing user, click the drop-down menu on the user name box to find the existing user name and enter the corresponding password to log in.
- ② Logout operation: when the user has logged in and needs to manually log out, click the "Login" button on the main screen, the user login and logout box will pop up, click the logout button to log out.
 - ✘ User logout can be divided into automatic logout and manual logout, automatic logout time can be set in the setting menu.
 - ✘ When the user needs to cancel automatic logout, set the automatic logout time to 0 in the setting menu, indicates that the user login is always valid. When need to restore, reset the automatic logout time to the required value.
 - ✘ The unit of automatic logout time in the setting menu is min.

7. Operation procedures

Three-level authority function

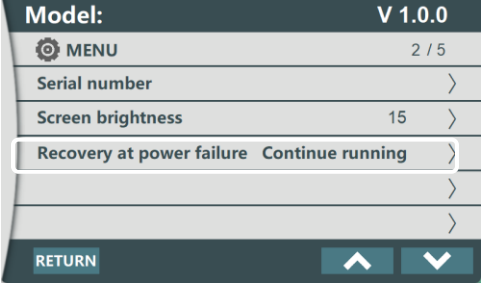
Three-level authority "Operator management" adds and delete users



- ① Login operation: click the "Not login" button on the main screen, the user login and logout box will pop up, enter the user name and password (administrator authority), and click the "Log in" button to complete the login.
- ※ To ensure equipment safety, use the initial password of the administrator to log in to the new machine. You can also log in to the operator management screen to change the initial password. The changed password can be recorded in the "Table of initial password for each authority" to avoid forgetting.
- ※ The initial administrator account and password cannot be deleted on the "Operator management" screen.
- ② Click the Setting button, click the up/down button at the bottom right, find the "Operator management", click and pop up the "Add and delete user" interface.
- ③ Add a user, enter the user name and password of new user, add authority according to the authority of the new user, click Add button, the new user is saved successfully.
- ※ Before adding authority, refer to P.36 "Table of responsibility range for each authority". Authorities are not downward compatible. If only click Administrator authority, engineer and operator authorities cannot be used.
- ④ Delete an existing user, enter the "Add new user" interface, click the drop-down menu on the "Delete existing user" to find the user name to be deleted, and click the Delete button to delete the user.
- ※ When the "Operation succeeded" button at the lower left lights on, the account is successfully deleted. When the button goes off, it fails to be deleted. Please check whether the account to be deleted is a login account.
- ⑤ Click the Close button to close the "Add new user" interface.

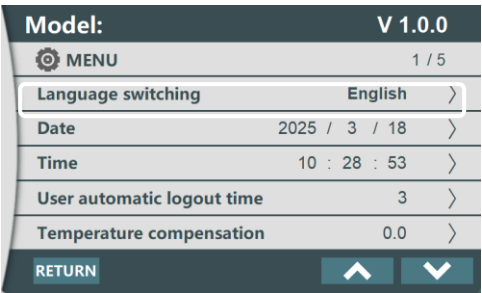

7. Operation procedures

Power outage compensation function

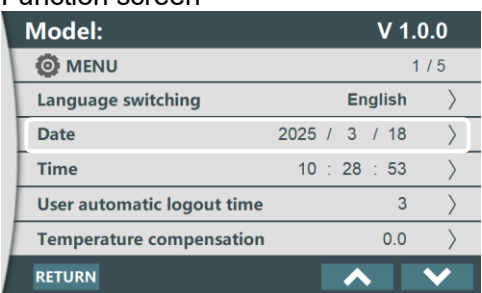

Use power outage compensation function	Set the action in the Setting menu when the power is restored after an unexpected power failure during the operation.
 <p>The screenshot shows a menu with the following items: Model: V 1.0.0, MENU (2 / 5), Serial number, Screen brightness (15), and Recovery at power failure (Continue running). At the bottom, there is a RETURN button and two arrow buttons (up and down).</p>	<ol style="list-style-type: none">① Login operation: click the "Not login" button on the main screen, the user login and logout box will pop up, enter the user name and password (administrator authority), and click the "Log in" button to complete the login.② Click the Setting button, click the up/down button at the bottom right, find "Action when power is restored". Click it and the selection box will switch between Stop operation and Continue operation. If set to Continue operation, when the power is restored after an unexpected power failure during the operation, the equipment will automatically restore the mode before the power failure. If set to Stop operation, no matter it is in any operation state before power failure, the unit will remain in standby state after power recovery. <p>※ The factory setting is "Continue operation".</p>

7. Operation procedures

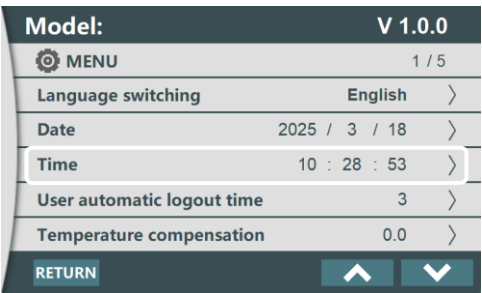

Language switch setting

	<ol style="list-style-type: none">① Login operation: click the "Not login" button on the main screen, the user login and logout box will pop up, enter the user name and password (administrator authority), and click the "Log in" button to complete the login.② Click the "Setting" button on the main screen, and click the up/down button to display "Language switch setting".③ Click the "Language switch setting".④ Please select the desired language. <p>※ The following languages are available. English, Chinese, Japanese</p> <p>Please click the  to confirm.</p>
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Date setting

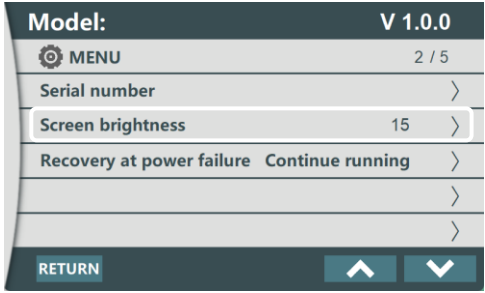

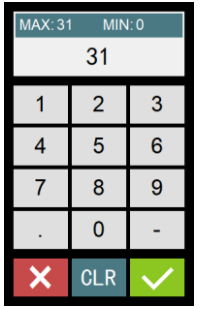
	<ol style="list-style-type: none">① Login operation: click the "Not login" button on the main screen, the user login and logout box will pop up, enter the user name and password (administrator authority), and click the "Log in" button to complete the login.② Click the "Setting" button on the main screen, and click the up/down button to display "Date".③ Click the "Date" setting box.④ Please enter the value through the numeric keys.⑤ Please click the  to confirm. <p>※ An incorrect date setting will result in timer start/stop and history query errors.</p>
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Time setting

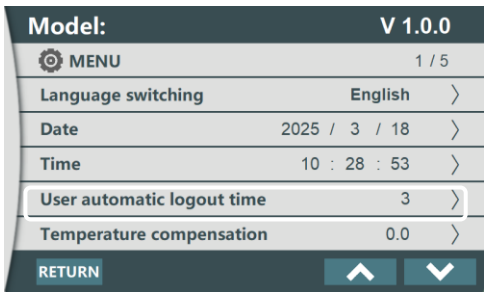

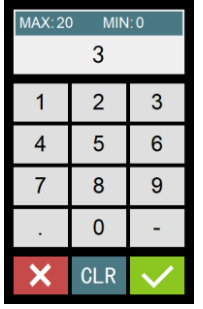
	<ol style="list-style-type: none">① Login operation: click the "Not login" button on the main screen, the user login and logout box will pop up, enter the user name and password (administrator authority), and click the "Log in" button to complete the login.② Click the "Setting" button on the main screen, and click the up/down button to display "Time".③ Click the "Time" setting box.④ Please enter the value through the numeric keys. <p>※ Time is counted and input as 24 hours.</p> <ol style="list-style-type: none">⑤ Please click the  to confirm.
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7. Operation procedures

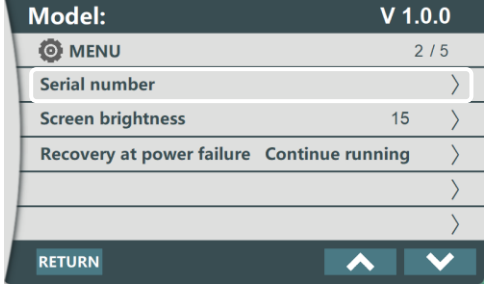

LCD brightness setting

<p>Function screen</p> 	<ol style="list-style-type: none"> ① Login operation: click the "Not login" button on the main screen, the user login and logout box will pop up, enter the user name and password (administrator authority), and click the "Log in" button to complete the login. ② Click the "Setting" button on the main screen, and click the up/down button to display "LCD brightness". ③ Click the "Brightness" setting box. ④ Please enter the value through the numeric keys. ⑤ Please click the  to confirm. 	
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Automatic logout time of user

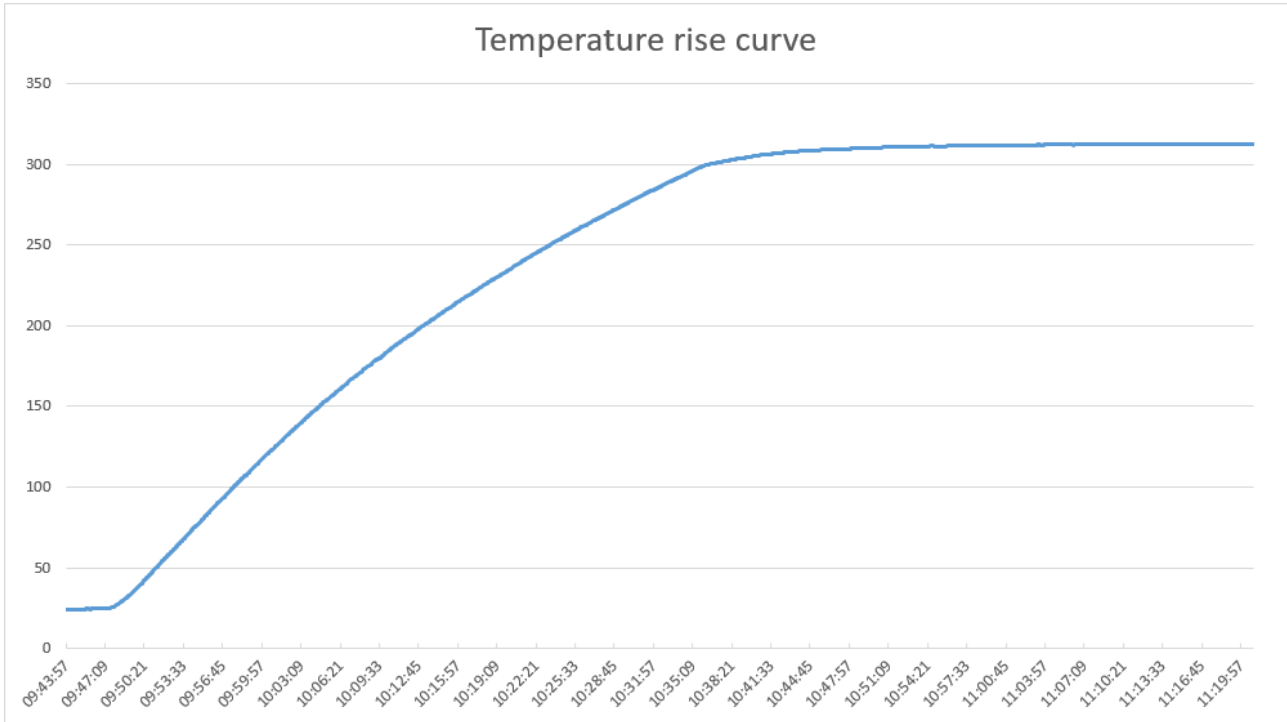
<p>Function screen</p> 	<ol style="list-style-type: none"> ① Login operation: click the "Not login" button on the main screen, the user login and logout box will pop up, enter the user name and password (administrator authority), and click the "Log in" button to complete the login. ② Click the "Setting" button on the main screen, and click the up/down button to display "Automatic logout time of user". ③ Click the "Automatic logout time of user" line to set the value. ④ Please enter the value through the numeric keys. ⑤ Please click the  to confirm. <p>※ If the value is set to 0, indicates that the user login is always valid.</p>	
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Equipment serial number

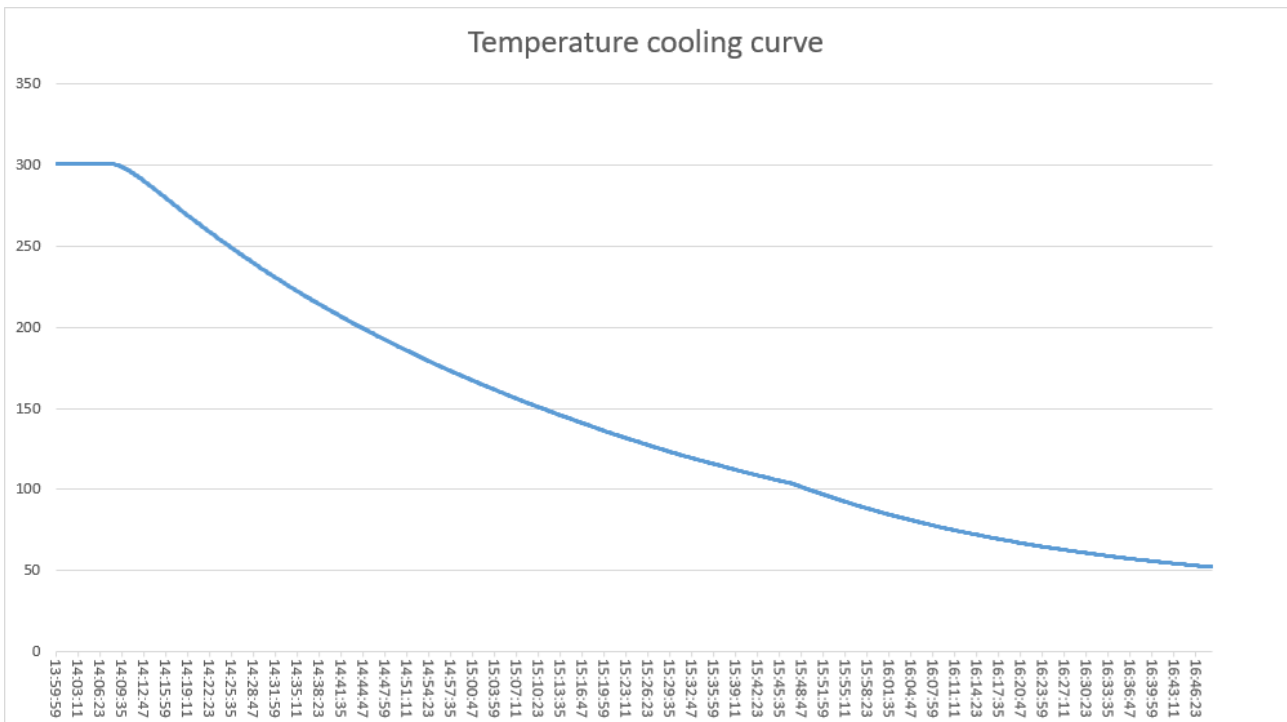
<p>Equipment serial number</p>	<p>When selecting a printer, need to display the device name, which needs to be set here.</p>	
<p>Function screen</p> 	<ol style="list-style-type: none"> ① Login operation: click the "Not login" button on the main screen, the user login and logout box will pop up, enter the user name and password (administrator authority), and click the "Log in" button to complete the login. ② Click the "Setting" button on the main screen, and click the up/down button to display "Equipment serial number". ③ Click the "Equipment serial number" line to set the value. ④ Please enter the value through the numeric keys. ⑤ Please click the  to confirm. 	

7. Operation procedures

Temperature rise characteristics (reference data)



Temperature fall characteristics during power failure (reference data)



< Conditions >

- Setting temperature: 310°C
- Power source AC220V 50Hz
- Ambient temperature: RT 23°C±5°C
- Ambient humidity: 65%RH±20%
- No samples

8. Maintenance method

Daily inspection/maintenance

Warning

- During inspection and maintenance, be sure to unplug the power cord from the main power supply unless necessary.
- Perform this operation after the equipment returns to normal temperature.
- Do not disassemble the equipment.

Caution

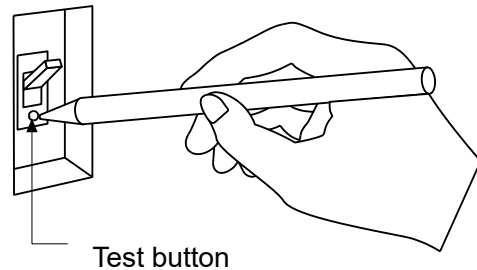
- Please wipe the dirt with a soft cloth. Do not use gasoline, banana oil, cleaning powder and so on, do not brush. It will cause deformation, metamorphism, discolor, etc.

Monthly inspection

Inspect the ON and OFF functions of Earth Leakage Breaker (ELB).

Connect the power cord and test it when it is powered on.

- First switch the power supply to [OFF] state.
- Then switch to [ON] state, use the tip of the ballpoint pen, etc. to press the test button of the ELB, if the ELB is cut off, it is normal.



- Check the activation of independent overheat protector
 - After the chamber has stabilized at the appropriate set temperature, set the activating temperature of the independent overheat protector to a value several degrees (5°C) lower than this temperature.
 - Under normal circumstances, after a few seconds the heater loop is disconnected, at the same time, the operation panel displays [Independent overheat protector error], and the alarm buzzer sounds.
- ※ In addition, before long-term continuous operation and unmanned operation during night time, please be sure to implement the activation confirmation of the above ELB and independent overheat protector.

Maintenance of the inner chamber

Please stop operation and turn off the ELB. Remove the power cord from the switchboard or socket.

Check the temperature in the chamber, remove the shelf plates and shelf supports.

The inner chamber, shelf plates and shelf supports are made of stainless steel SUS304 material, wet a rag with cleaning alcohol and wipe it clean, and then gently wipe again with dry rag.

Please be careful not to use acid lotion, alkaline lotion, oil, organic solvent, etc., because it will lead to corrosion, damage and other problems.



Please be careful not to be injured because of sharp protrusions on the inner chamber, shelf plates and shelf supports. Especially when new hands working, please wear gloves.

9. Long storage and scrap

When not using the equipment for a long time / when scrapping

Caution

Warning

<p>When not using the equipment for a long time</p> <ul style="list-style-type: none"> ● Please cut off the power supply and unplug the power cord from the power supply. 	<p>Scrap this equipment.</p> <ul style="list-style-type: none"> ● Do not leave the unit where children may play around. ● Please remove the handle and hinges so that the door cannot be locked. ● Please disinfect the inner chamber before scrapping. ● In general, please dispose as large garbage.
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Matters to consider when scrapping the equipment

Always pay attention to the protection of the global environment.

- We highly recommend taking the unit apart as far as possible for separation or recycling to contribute to the protection of the global environment. Major components and materials for the unit are as follows:

Names of major components	Major materials
Major components of the main unit	
Exterior	Cold rolled steel plate with chemical resistant coating
Interior	Stainless steel SUS304
Heat insulation material	Glass wool + rock wool
Door sealing strip	Foamed silicone rubber
Handle	Cast aluminum, epoxy resin spraying
Label	Polyethylene (PET) resin film
Major components of the electric system	
Heater	Stainless steel pipe heater SUS321
Motor	Steel plate, copper wire, resin series, with insulation protective layer wires
Board	Board, capacitor, resistor, transformer etc. composite products
Power cords, wiring materials and other materials	Synthetic rubber insulation protective layer and resin series insulation protective layer wiring materials

10. Troubleshooting

Error indications and solutions

When an error occurs, the buzzer sounds and the operation panel will display “Error No.” and “Error name”.

Operating conditions are as follows depending on the error name.

- Error name is “Error”: Operation other than error items continues.
- Error name is “Warning”: Operation continues as in the normal status.

Safety device	Error code	Reason and solution
Abnormal sensor	Er.01 Abnormal sensor	<ul style="list-style-type: none"> ● The temperature sensor is disconnected and abnormal Please contact our service department.
SSR short circuit	Er.02 SSR short circuit	<ul style="list-style-type: none"> ● SSR short circuit Please contact our service department.
Heater disconnection	Er.03 Heater disconnection	<ul style="list-style-type: none"> ● Heater disconnection Please contact our service department.
Main relay The contact welding is abnormal	Er.10 Main relay contact short circuit	<ul style="list-style-type: none"> ● Main relay contact short circuit Contact the customer service center.
Abnormal display	Er.15 Abnormal memory	<ul style="list-style-type: none"> ● The memory settings are abnormal Please contact our service department.
Abnormal internal communication	Er.17 Abnormal internal communication	<ul style="list-style-type: none"> ● Abnormal internal communication, temperature input loop Please contact our service department.
Temperature overheat	Er.19 Temperature overheat	<ul style="list-style-type: none"> ● Overheat protector activates Confirm the set temperature. If cannot reset, please contact our service department.
Abnormal measured temperature	Er.00 Abnormal measured temperature	<ul style="list-style-type: none"> ● When the measured temperature outside the display range Please contact our service department.
The USB flash drive memory is faulty	The internal memory of the touch screen is damaged and data cannot be saved	<ul style="list-style-type: none"> ● Check whether the internal USB flash drive is falling or loose, or replace the internal USB flash drive If cannot reset, please contact our service department.
The storage space of the USB flash drive is full	The internal storage space of the touch screen is insufficient, please clear up	<ul style="list-style-type: none"> ● Check whether the internal USB flash drive is falling or loose If cannot reset, please contact our service department.

※ When more than one errors occur, they will be displayed in turn.

10. Troubleshooting

Trouble Shooting

Phenomenon	Check point
Unit does not start even if the power is on	<ul style="list-style-type: none">● Check if the power cord is properly connected to the power supply and socket.● Is there a power outage?
Temperature does not rise	<ul style="list-style-type: none">● Is the setting value lower than the chamber temperature?● Is the supply voltage low or unstable?● Is the ambient temperature getting lower?● Is the cooling load in the chamber too large?
Temperature fluctuates during operation	<ul style="list-style-type: none">● Is the set temperature appropriate?● Is the supply voltage low or unstable?● Check if there are large fluctuations in ambient temperature● Whether the load in the chamber becomes larger
The display temperature does not match the measured temperature	<ul style="list-style-type: none">● Check if the set value of calibration offset is a value other than [0], set it to [0]. Confirm the set value of "Calibration offset function" on P.35

- ◆ In short, when the above abnormal situation occurs, please immediately turn off the earth leakage breaker of unit body, remove the power cord, and contact the dealer or Yamato Chongqing as soon as possible.

11. After sales service and warranty

When requesting a repair

When requesting a repair

If any trouble occurs, immediately stop operation, turn the power switch off, pull out the power plug and contact your dealer or our sales office.

Information necessary for requesting a repair

- Model name of the product
- Serial number
- Date (y/m/d) of purchase
- Description of trouble
(as in detail as possible)
- Samples in use (whether it's toxic, pathogenic)

See the warranty card or the nameplate installed on the unit.

Be sure to indicate the warranty card to our service representative.

Warranty card (attached separately)

- The warranty card is given to you by the dealer or the sales department of Yamato Scientific Chongqing Co., Ltd. Please confirm that it is recorded in the [dealer name, purchase date] and so on, and hold it for safekeeping.
- Warranty period is one full year from the date of purchase. Repair service for free is available according to the conditions written on the warranty card.
- For repairs after the warranty period, please consult your dealer or our sales office. Paid repair service is available on your request when the product's functionality can be maintained by repair.

Minimum holding period of repair parts

The minimum holding period of repair parts for this equipment is 7 years after end of production. Repair parts here refer to parts necessary for maintaining performance of the equipment.

12. Specification

Model		DKT410C	DKT610C	DKT810C
System		Forced convection circulation		
Performance ※1	Operating temperature range	RT+ 15°C~300°C		
	Temperature control precision	±0.5°C (at 300°C, exhaust port closed)		
	Temperature distribution precision	± 1.5% (at 300°C, exhaust port closed)		
	Temperature rise time	Approx. 60min (RT~300°C)		
Structure	Exterior	Cold-rolled steel plate with surface coating		
	Insulating material	Glass wool + rock wool		
	Heater	SUS heater		
		2KW	1.3KW×2	1.85KW×2
	Motor	Centrifugal fan 1pc Capacitor start motor 30W		
	Cable hole	I.D. 30mm (right side)		
Exhaust port	I.D. 30mm×2 (back side)			
Control part	Controller	7 inch touch screen +VS6 control board		
	Control system	The heater output is controlled by microcomputer PID		
	Setting system	7 inch touch screen		
	Display system			
	Time	1min-99hr59min		
	Time resolution	1min		
	Operation mode	Fixed temp., program, timer stop, timer start operation		
	Program mode	100 programs, each program has 30 segments		
	Sensor	K thermocouple		
Auxiliary functions	Lock function, calibration offset function, power outage compensation function			
Safety device	Self-diagnosis function	Abnormal temperature sensor, heater, display, SSR short circuit, auto overheat prevention, measured temperature		
	Safety device	Earth leakage breaker, hydraulic overheat protector, heating stop when door opens		
Spec.	Outer dimensions (mm) ※2 (W×D×H)	610×690×960	760×740×1010	760×740×1780
	Inner dimensions (mm) ※2 (W×D×H)	450×450×450	600×500×500	600×500×1000
	Internal volume	90L	150L	300L
	Load capacity of shelf plate	30kg/pc		
	Steps of shelf bracket support	11 steps	13 steps	29 steps
	Spacing of shelf bracket support	30mm		

12. Specification

Model		DKT410C	DKT610C	DKT810C
Spec	Power supply	AC220V 9.5A	AC220V 12.5A	AC220V 17.5A
	Weight	Approx.80kg	Approx.100kg	Approx.140kg
Accessories	Shelf plate	Stainless steel wire plate		
		2pcs		4pcs
	Shelf bracket support	4pcs		8pcs
	Instruction manual, warranty card	1pc for each		
Stand	ONK60C	ONK60C	—	
	Other options	Shelf plate, cable hole (I.D. 30/50mm), micro printer, recorder, combined alarm light (standby/running/failure), remote monitoring function (network port), temperature output terminal (4-20mA), external alarm output terminal, time arrival output terminal		

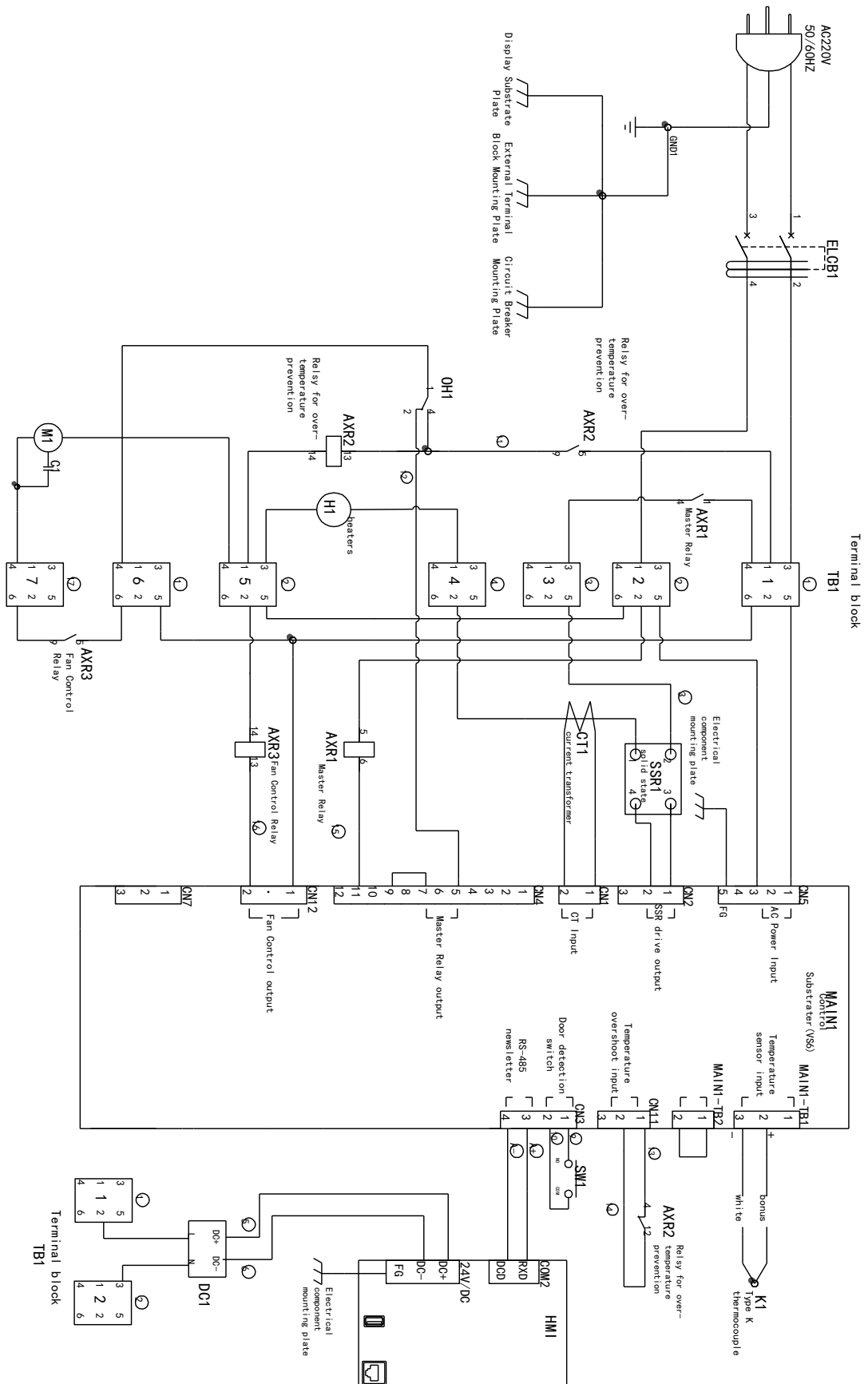
※1 Performances have been measured at power AC220V, RT 23°C±5°C, humidity 65%RH±20% and no-load.

The operating environmental temperature range of the unit is 5°C~30°C.

※2 Protrusions are excluded.

13. Wiring diagram

DKT410C/DKT610C/DKT810C



13. Wiring diagram

DKT410C/DKT610C/DKT810C

Part symbols in the wiring diagram

Symbol	Name	Symbol	Name
ELB	Earth leakage breaker	CONT	Control board
TM1	Terminal block	HMI	Touch screen
H	Heater	TH1	Control sensor
AXR1	Main relay	AXR2	Relay for temperature overheat prevention
AXR3	Fan control relay	CT1	Current transformer
M1	Fan	OH	Liquid-expansion temperature controller
SSR	Solid state relay	SW1	Door detection switch
DC1	DC switching power supply		

14. List of replacement parts

Common Use Parts for DKT410C/DKT610C/DKT810C

Symbol	Part name	Specifications	Code No.
TH	K-type thermocouple	T0304_01-78 Φ 3.2*85*2000 DKT single	H011501006
CONT	Control board	VS6	B011401053
HMI	Touch screen	MT8071IP	A020400020
OH	Liquid-expansion temperature controller	WTB 50~350°C	A020103003
X1	AC relay	H116F-2/220AL1HSTFW	A011002002
X2	AC relay	MY2N-GS AC220/240 BY OMZ/C	A011002011
X3	AC relay	MY2N-GS AC220/240 BY OMZ/C	A011002011
SSR	Solid state relay	KS15/D-38Z25-L	A011006023
CT	Current transformer	URD CTL-6-S-4	B010509001
M	High temperature long shaft motor	IC-8434YAMA(30W C.C.W)	B011603017
DC	Switching power supply	RS-25-24	A010801060

DKT410C replacement parts

Symbol	Part name	Specifications	Code No.
H	Heater	DKT410C_01_02-04 (220V 2000W)	H011501013
ELB	Earth leakage breaker	BV-DN IP+N 16A 30mA	A010410004

DKT610C replacement parts

Symbol	Part name	Specifications	Code No.
H	Heater	DKT610C_01_02-04 (220V 1300W)	H011501012
ELB	Earth leakage breaker	BV-DN IP+N 16A 30mA	A010410004

DKT810C replacement parts

Symbol	Part name	Specifications	Code No.
H	Heater	DKT810C_01_02-04 (220V 1850W)	H011501011
ELB	Earth leakage breaker	BV-DN 1P+N 20A 30mA	A010410001

15. List of dangerous substances



Never use an explosive substance a flammable substance or a substance containing them for this device.

Explosive substance	Explosive substance	① Nitroglycol, glycerine trinitrate, cellulose nitrate and other explosive nitrate esters
		② Trinitrobenzen, trinitrotoluene, picric acid and other explosive nitro compounds
		③ Acetyl hydroperoxide, methyl ethyl ketone peroxide, benzoyl peroxide and other organic peroxides
Flammable substances	Explosive substances	Metal "lithium", metal "potassium", metal "natrium", yellow phosphorus, phosphorus sulfide, red phosphorus, celluloids, calcium carbide (a.k.a, carbide), lime phosphide, magnesium powder, aluminum powder, metal powder other than magnesium and aluminum powder, sodium dithionous acid (a.k.a., hydrosulphite)
	Oxidizing substances	① Potassium chlorate, sodium chlorate, ammonium chlorate, and other chlorates
		② Potassium perchlorate, sodium perchlorate, ammonium perchlorate, and other perchlorates
		③ Potassium peroxide, sodium peroxide, barium peroxide, and other inorganic peroxides
		④ Potassium nitrate, sodium nitrate, ammonium nitrate, and other nitrates
		⑤ Sodium chlorite and other chlorites
		⑥ Calcium hypochlorite and other hypochlorites
	Flammable substances	① Ethyl ether, gasoline, acetaldehyde, propylene chloride, carbon disulfide, and other substances with ignition point at a degree 30 or more degrees below zero.
		② n-hexane, ethylene oxide, acetone, benzene, methyl ethyl ketone and other substances with ignition point between 30 degrees below zero and less than zero.
		③ Methanol, ethanol, xylene, pentyl acetate, (a.k.a.amyl acetate) and other substances with ignition point between zero and less than 30 degrees.
		④ Kerosene, light oil, terebinth oil, isopentyl alcohol(a.k.a. isoamyl alcohol), acetic acid and other substances with ignition point between 30 degrees and less than 65 degrees.
Combustible gas	Hydrogen, acetylene, ethylene, methane, ethane, propane, butane and other gases combustible at 15 degrees at one air pressure.	

16. Standard installation manual

※Install the product according to the following (confirm separately for optional items or special specifications)

Model	Serial number	Date	Installation mgr. (company name)	Installation mgr.	Judgment

No.	Item	Implementation method	TOC No. Reference page of the operating instruction manual	Judgment
Specifications				
1	Accessories	Confirm quantity according to accessories column	10. Specifications P.48	
2	Installation	·Visual check of environmental conditions Caution: Take care for environment	2. Before operation · Installation site P.6	
		·Securing a space		
Operation-related matters				
1	Power source voltage	·Use multimeter to detect the voltage at the user side (socket, etc.) ·Measurement of voltage during operation (within standard) Note: When installing plugs and protective switches, please use items that meet specifications	2. Before operation · Must connect grounding wire properly P.8 · Dedicated power supply P.7	
			12. Specifications ·Specification-power supply P.47	
2	Start operation	·Start operation Perform the fixed temp., timer stop, timer start, program operation	Precautions before use P.9~22	
			4. Operating procedures P.20~41	
Description				
1	Operational descriptions	Explain operations of each part according to the instruction manual	5. Use cautions P.16	
			1. Safety precautions P.1	
			15. List of dangerous substances P.52	
2	Error codes	Explain the customer about error codes and procedures for release according to the instruction manual	10. Error indications and solutions P.44~45 ~Troubleshooting	
3	Maintenance and inspection	Explain operations of each part according to the instruction manual	8. Maintenance method ·Daily inspection/maintenance P.42	

16. Standard installation manual

※Install the product according to the following (confirm separately for optional items or special specifications)

Description					
4	Completion of installation Record items	<ul style="list-style-type: none">• Fill in the installation date and the installation mgr. on the nameplate of the main unit• Fill in necessary information items to the warranty card and hand it over to the customer• Explanation of the route for after-sales service	11. After sales service and warranty	P. 46	

Limited liability

Be sure to use this Equipment strictly following the handling and operating instructions in this Instruction Manual.

Yamato Scientific assumes no responsibility for accident or malfunction caused by inappropriate operation of this Equipment in any way not specified in this Instruction Manual.

Never attempt to perform matters prohibited in this Instruction Manual.

Otherwise, unexpected accident may result.

Notice

- Descriptions in this Instruction Manual are subject to change without notice.
- Our company will replace this Instruction Manual with missing page or paging disorder.

Instruction Manual

Forced Convection

Constant Temperature Oven

Model DKT410C/DKT610C/DKT810C

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Revised on

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