INSTRUCTION MANUAL
FOR
CLEAN OVEN

Model **DE410/DE610/DT410/DT610**
DE410U/610U

Version 7

- Thank you very much for buying Yamato Scientific DE,DT,DEU series.
- For proper use of this unit, please read the instruction manual and warranty thoroughly before operation. Keep both for any future references.

Warning：Read and apprehend the important warning signs in this instruction prior to use.

Yamato Scientific

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Explanation of illustrated symbols

MEANING OF ILLUSTRATED SYMBOLS

Illustrated Symbols

Various symbols are used in this safety manual in order to use the unit without danger of injury and damage of the unit. A list of problems caused by ignoring the warnings and improper handling is divided as shown below.

Be sure that you understand the warnings and cautions in this manual before operating the unit.

Warning	**If the warning is ignored, there is the danger of a problem that may cause a serious accident or even fatality.**
Caution	**If the caution is ignored, there is the danger of a problem that may cause injury/damage to property or the unit itself.**

MEANING OF SYMBOLS

This symbol indicates items that urge the warning (including the caution).

A detailed warning message is shown adjacent to the symbol.

This symbol indicates items that are strictly prohibited.

A detailed message is shown adjacent to the symbol with specific actions not to perform.

This symbol indicates items that should be always preformed.

A detailed message with instructions is shown adjacent to the symbol.

Table of Symbol Mark

Warning

General Warning

Warning of High Potential voltage

Warning of High Temperature

Warning of drive section

Warning of explosion

Caution

General Caution

Caution of electric shock

Caution of scald

Caution of low-water boiling

Caution of water leak

Water only

Caution of deadly poison

Prohibition

General Prohibition

Prohibition of fire

Prohibition of disassembling

Prohibition of touch

Compulsion

General Compulsion

Ground the unit

Install on level area

Pull electric power plug

Fixed time check or maintenance

WARNING

Do not use the unit in an area where there is flammable or explosive gas.

■ Never use the unit in an area where there is flammable or explosive gas.
For the unit is not explosion-proof, fire/explosion may result.

Always ground the unit.

■ Always ground the unit on the power equipment side in order to avoid electrical shock or fire due to a power surge.

Do not use this unit if malfunction occurs.

■ If smoke or strange odor should come out of the unit for some reason, turn off the power key right away, then turn off the earth leakage breaker and the main power. If this procedure is not followed, fire or electrical shock may result.

Do not use the power cord if it is bundled or tangled.

■ Do not use the power cord if it is bundled or tangled. If it is used in this manner, it can overheat and fire may be caused.

Do not process, bend, wring, or stretch the power cord forcibly.

■ Do not process, bend, wring, or stretch the power cord forcibly. Fire or electrical shock may result.

Do not use the explosives or flammables.

■ Do not put the explosives, flammables or samples containing with such hazardous material.
Explosion or fire may be caused.

Do not disassemble or remodel this unit.

■ Disassembling this unit can cause a fire, electric shock or other crisis. Never disassemble or remodel this unit.

Do not touch hot area.

■ Some areas of the boiler are hot during or after operation. Pay attention not to get scalded.

CAUTION

If it begins to thunder.

■ If it begins to thunder, turn off the power immediately. Neglecting this can result in breakdown, fire or electricshock.

Installation and Preparation for Use

Warning

1. Ground the unit.

If you do not ground the unit, the earth leakage circuit breaker would not work in case of electric leakage. Be sure to connect the ground lead (green core line of the power cord) to the ground wire or terminal of the power source. Contact an electrician if you have no equipment for grounding.

DE410/DE610, DT410/DT610, DE410U/610U is AC200V three-phase specification.

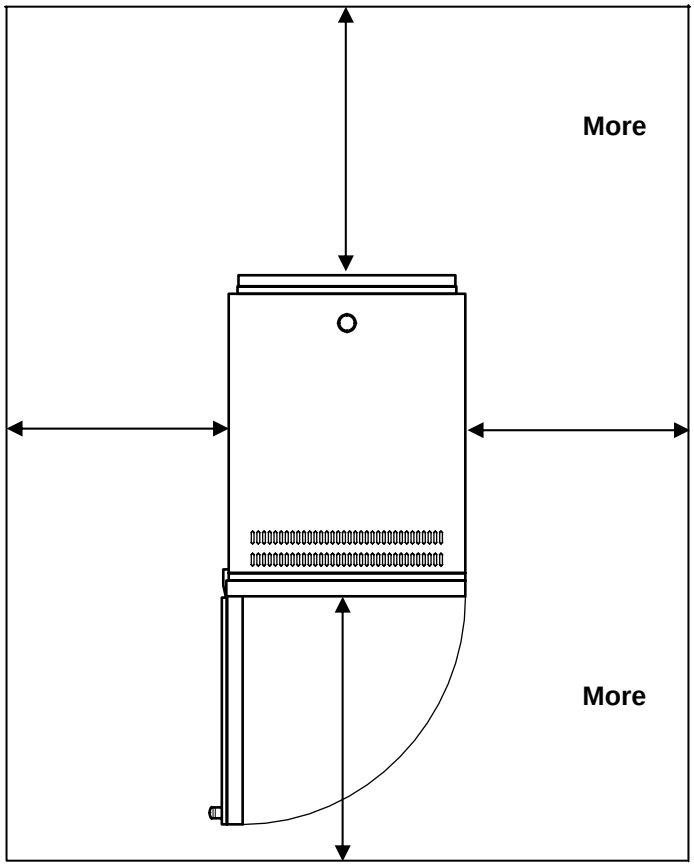
Connect the unit certainly with AC200V outlet or power distribution switchboard.

2. Choose a proper place for installation.

Do not install the oven in a place where:

- Flammable gas or corrosive gas is generated.
- Ambient temperature exceeds 35℃.
- Ambient temperature fluctuates violently.
- There is excessive humidity and bust.
- There is direct sunlight.
- There are constant vibrations.

Keep the following clearance around the oven.



Installation and Preparation for Use

⚠ Warning

3. Choose a correct power distribution board or receptacle.

Choose a correct power distribution switchboard or receptacle that meets the oven's rated electric capacity.

Electric capacity : DE410 AC200V three-phase 8.3A
DE610 AV200V three-phase 11.5A
DT410 AV200V three-phase 11.5A
DT610 AV200V three-phase 16.0A
DE410U AV200V three-phase 8.3A
DE610U AV200V three-phase 11.5A

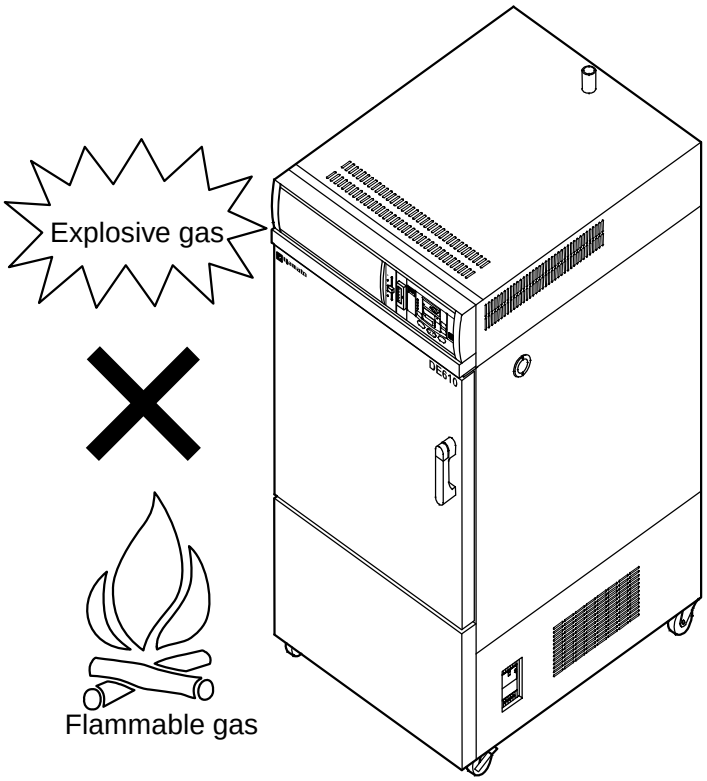
4.Supply connections for the oven

・Request the supply connection for the shingle-phase 220V specifications from a licensed electrician.

・The special knowledge and skill are required for connecting. Failure to have this operation complete by certified personnel will cause a fire or electrical shock during oven operation.

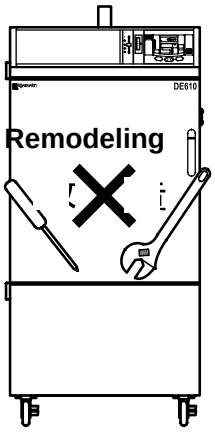
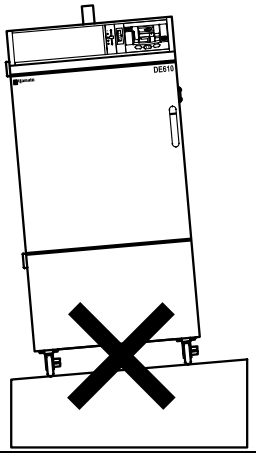
5.Do not use the unit in an area where there is flammable or explosive gas.

Never use the unit in an area where there is flammable or explosive gas. The unit is not explosion-proof. An arc may be generated when the power switch is turned ON or OFF, and fire/explosion may result.



Installation and Preparation for Use

⚠ Warning

6. Do not remodel the oven	7. Install the Oven on a level area.
Unauthorized modification will be hazardous and cause problems in the operation of the Oven.	Do not installation the oven on a non level surface. This will cause hazards to the operator and create problems during actual operation.
	

⚠ Caution

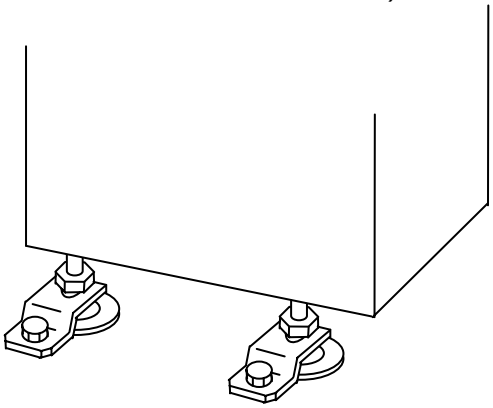
After installed, you should:

- It may cause injure to a person if this oven falls down or moves by the earthquake and the Impact, etc…
- To prevent, take measures that the unit cannot fall down.
- Ask the special trader how to fix the unit, because the way of fixing is different with the floor structure.

(Example)

The example of our preventing the Oven falling down is putting the level-adjuster to the unit (special modification needed) and fixing metal fitting adjuster to the floor.

(Ask the special trader how to fix the unit to the floor.)



Installation and Preparation for Use

⚠ Warning

Handling of power code.

- Do not use the power cord if it is bundled or tangled. If it is used in this manner, it can overheat and fire may be caused.
- Do not process, bend, wring, or stretch the power cord forcibly. Fire or electrical shock may result.
- Do not put the power cord under the desk, chair, etc., or through an object. Fire or electrical shock may be result.
- Do not run the power cord next to heating equipment such as a heater. The cover of the cord may melt and fire or electrical shock may result.
- When the power cord is damaged (exposure of the core wires, disconnection, etc.), turn off the power key right immediately, then turn off the earth leakage breaker and the main power. Contact customer service for a replacement immediately. If this procedure is not followed, fire or electrical shock may be caused.
- Connect power code certainly with proper power distribution switchboard or outlet.

Caution in setting shelves

- Do not use any shelves but the attached ones.
  If it is used in this manner, the oven cannot occasionally regulate temperatures properly.
- Put the attached shelves on the shelf brackets fitted to the chamber when you use the oven.

About the inhalation port

⚠ Warning

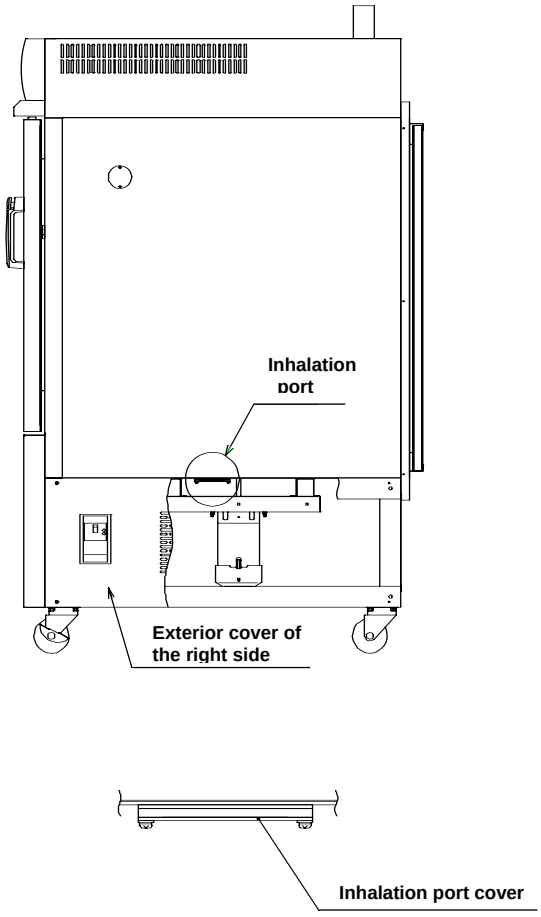
Ventilating

● When forwarding the unit, the intake port is closed. If you use the unit with the exhaust damper opened to ventilate more effectively, you should remove the cover of the intake port in advance as follows.

1. Turn off the power of this unit and circuit breaker in advance.
2. Take off the four connecting screws at the right side to the body, and take off the exterior cover of the right side.
3. There is the closed intake port around the center of this side (See the figure below) of the motor that is at the bottom of the body chamber. Take off the four connecting screws, and take off the intake port cover.
4. Install the exterior cover of the right side as it was.

Be sure not to lose the intake port cover and connecting screws removed.

Be sure to turn off the power of this unit and circuit breaker in advance before doing this work.



For the hot wind or gases of the samples are discharged from the exhaust duct, you should modify the duct.

⚠ Warning

Substance that can be used

Never use explosive substances, flammable substances (shown on page 42 “hazardous Material”), and substances that include explosive or flammable ingredients in the unit. explosion or fire may occur.

Do not use this unit if malfunction occurs. You should:

If smoke or strange odor should come out of the unit some reason, turn off the power key right away, the turn off the earth leakage breaker and the main power.

Immediately contact a service technician for inspection. If this procedure is not followed, fire or electrical shock may result.

Never perform repair work yourself, since it is dangerous and not recommended.

Do not put the foreign substances in the oven.

Don not put a foreign substances such as metals or flammable substances in the port of the unit (ventilation hole and exhaust port, etc.). If this procedure is not followed, fire, electrical shock or burn may result.

If the foreign substances enter the unit, turn off the earth leakage breaker immediately and contact a service technician for inspection. If this procedure is not followed, fire, electrical shock or burn may result.

Caution in taking out samples

During and immediately after operation, the internal surfaces of the chamber and the door are extremely “HOT”. To prevent injury, wear thick gloves while taking out the sample.

When you open the door during working at the high temperature.

Do not touch the internal surfaces of the chamber and the door when you open the door at the high temperature, because they are extremely hot.

To open the door while the chamber is still hot may cause the malfunction of a fire detector if it is installed near the oven.

Do not touch heated parts.

Do not touch the door during or immediately after operation. Severe burning injury may be caused due to the high temperature.

⚠ Caution

1. When you use the oven for the first time

⚠ During the initial operation, the oven may occasionally generate an odor especially when high temperature are reached. This odor is normal and deose not signal a problem with the oven. The adhesive on the insulation melting causes the nature of the odor.

2. When you open the exhaust duct to its full width

⚠ When you open the exhaust duct to its full width, the time toward the maximum high temperature to use and air cleanliness may not be satisfied with class 100. When you open the inhalation port to its full width, it may not reach to the maximum high temperature to use.

3. Caution about a drenched sample

❗ When using a wet sample, try to drain it by heating it by heating with the ventilation damper opened. If water is adhered to the inside of the unit, it may cause electric shock, machine trouble, or weakness of HEPA filter.

🚫 Do not use a very wet sample as it is.

4. Caution about samples

❗ To be uniform the temperature distribution in the chamber, it is circulated whit the ventilation. When you use a powder sample or a small sample, be sure not to be scattered, if the flammable materials or metal to in the heater, it may cause fire ir electric shock.

⚠ It occasionally takes a long time before the chamber reaches the target temperature if the camber is congested with samples or a sample with the large specific heat is in it. In such cases, reduce samples. Moreover, note that the temperature display occasionally unsettle when you process the sample that generate heat (Only the case that the sample itself is not explosive, combustible, or ignitable substances).

5. Distribute sample

🚫 Each shelf can carry a uniform load of 30 kg. Do not put heavier sample than it.

When you place samples on a shelf, distribute them evenly over the shelf area.

🚫 If a shelf is congested with sample, the oven occasionally cannot regulate temperatures properly. To ensure the oven's temperature accuracy, there should be open space of at least 30% on each shelf.

6. Do not climb on the oven

🚫 Do not climb on top of the oven because it will fall down and break.

Failure to observe this caution may cause injury to a person.

⚠ Caution

7. Do not put anything on the oven.

Do not put anything on top pf the oven because they will fall and result in injury to a person.

8. During a thunderstorm.

During a thunderstorm, immediately turn off the earth leakage beraker and main power.

9. In case of power failure.

Once the power supply has been cut off due to power failure, and then the power supply is restored, the oven will resume running. (See page31 “Behavior after Power Restoration” about details.)

10. About the independent overheating prevention.

For safety use, be sure to set the independent overheating prevention. The temperature set of the independent overheating prevention must be 15℃ higher than the set of the temperature adjustment.

11. Caution about the temperature range.

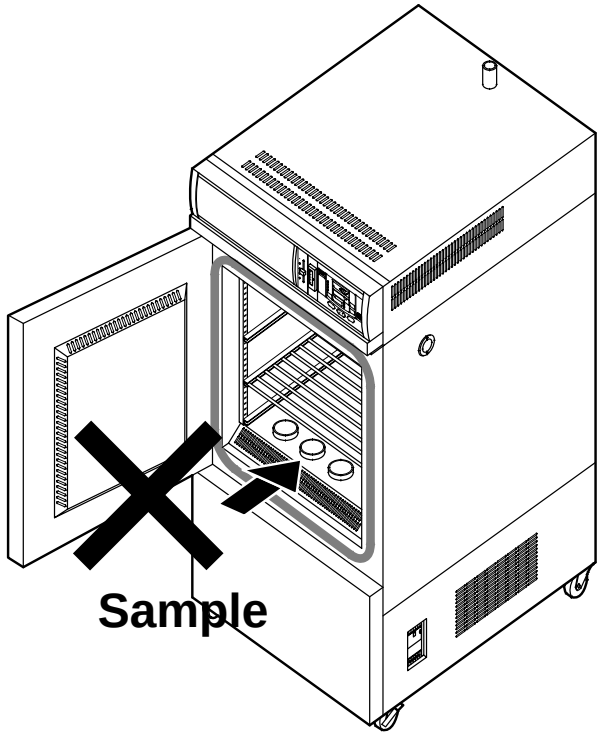
Use the oven in the range of room temperature +30℃ to 260℃ for DE610.

If you use the machine out of temperature range, it may cause machine trouble or accident.

⚠ Caution

12. Do not place any samples on the bottom of the chamber

Do not place any samples on the bottom of the chamber to heat, because it may cause that the unit does not work correctly, that the temperature become extraordinary high, and that machine trouble occurs. Put the samples on the attached shelves and set the shelves on the metal shelf brackets.



13. Never use corrosive samples

The main route of the circulation wind is made of stainless steel (SUS304). However, strong acid occasionally corrodes even stainless steel. Besides this, the silicone rubber packing is also vulnerable to acid, alkali, oil and halogens' solvents.

14. When you open and shut the door

Do not put your hand either face near the door when you open and shit the door. Failure to observe this caution may result in injury because the door hits your hand or face.

15. When you use the cable hole

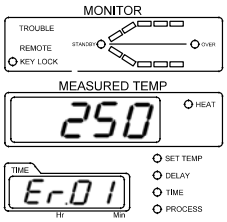
When you insert the sensor or probe for measurement into the cable hole, close the cover of the cable hole as much as you can, and seal up an opening with a cover, a heat-resistance gasket or a sealant. When the seal is not much enough, air cleanliness or temperature specification may decline.

Identification of “TROUBLE” and Error Code/Causes

Er.01 blinks

TROUBLE lamp flashes.

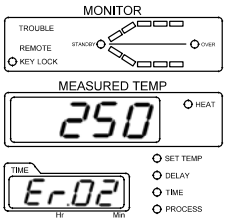
Trouble in temperature sensor.



Er.02 blinks

TROUBLE lamp flashes.

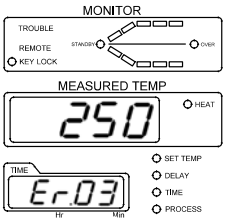
Trouble in heater control materials.



Er.03 blinks

TROUBLE lamp flashes.

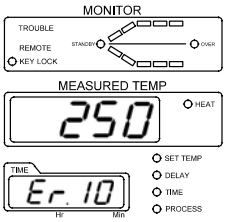
Heater circuit is disconnected.



Er. 10 blinks

TROUBLE lamp flashes.

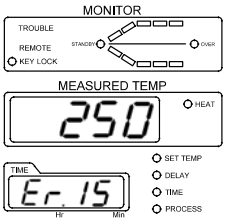
Bad quality in heater circuit.



Er. 15、**Er.08**、**Er. 14** etc. blinks

TROUBLE lamp flashes.

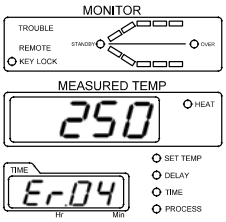
Bad quality in electronic circuit.



Er.04 blinks

TROUBLE lamp flashes.

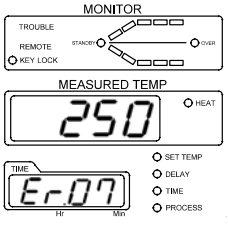
Trouble in fan.



Er.07 blinks

TROUBLE lamp flashes.

Running of independent overheating prevention

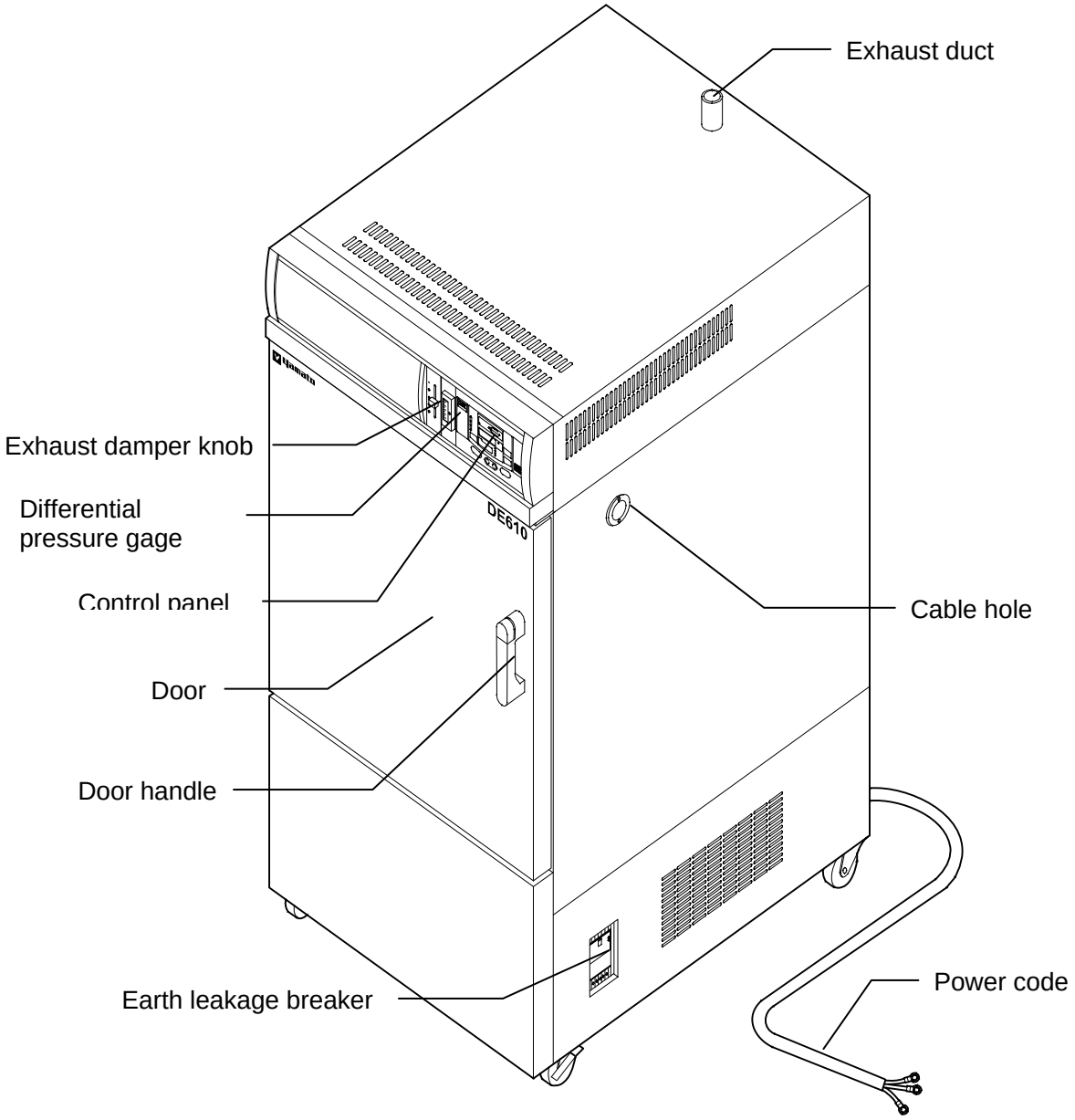


Troubleshooting

- When these error code comes up, record the error code, and turn off the power immediately.
- If a problem occurs with the Drying Oven, you need exchange some parts or inspect the unit. Contact our sales or service representative. When you contact, tell the error code blinked. (See to page 34 “After service and WARRANTY”.

Note) The measurement temperature “250” in figure is example.

Main unit


Exhaust duct
Exhaust damper knob
Differential pressure gage
Control panel
Door
Door handle
Earth leakage breaker
Cable hole
Power code
DE610

Control Panel

The Control Panel is shown at Fig.3.3, and the identification of Parts is shown as below.

If you need detailed explanation about the specification, function, and operation about controller, refer to the attached instruction manual.

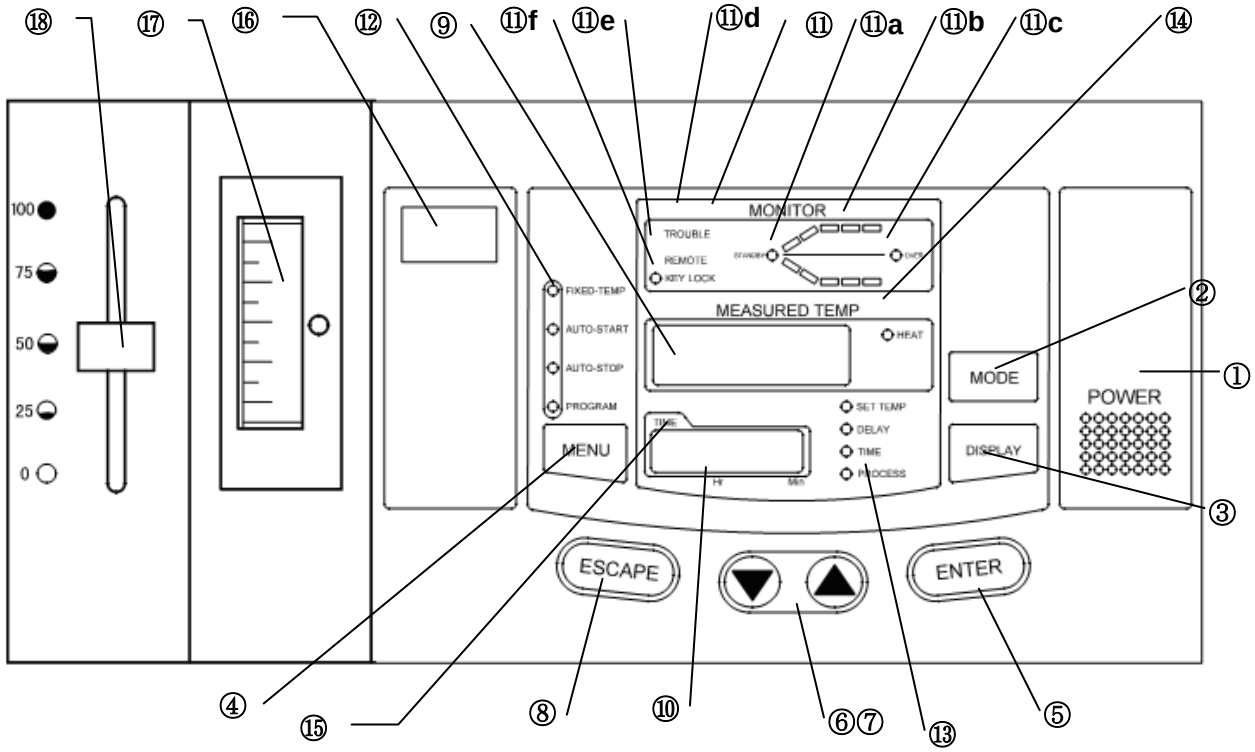


Fig.3.3 Control Panel

①	POWER key:	Key to make the controller ON/OFF.
②	MODE key:	Key to select a function from program input, edit, delete modes, hour/time setting, change-over mode, and other functions.
③	DISPLAY key:	Key to change-over the display content of the sub display(10). Display content is changed over to set temperature, remaining time, hour, execution segment No.
④	MENU key:	Key to select the operation mode. Each mode of fixed temperature, auto-start, auto-stop and program operation can be selected.
⑤	ENTER key:	Key to determine the input value of set value (temperature, time, hour, etc.), selection mode, execution segment No. etc.
⑥⑦▼▲（UP/DOWN）key		Key to change set value (temperature, time, hour, etc.) and to choose a selection from various parameters on the function menu.

⑧ ESCAPE key:	Key to cancel the latest entry and recover the status was valid prior to the making the selection.
⑨ Main display:	It displays temperature measurements, set values (temperature time, hour, etc.), program information, error information, etc.
⑩ Sub display:	It displays set temperature, remaining time, current hour and execution segment No. etc.
⑪ Operation monitor:	It indicates an operation mode.
⑪a STANDBY lamp:	It flashes to indicate that instrument is in the preoperational standby mode.
⑪b Temperature pattern lamp:	It illuminates to indicate the heat treatment process pattern executed by the controller with flashing light indicating the point currently in execution.
⑪c OVER lamp:	It flashes to indicate the end of auto-stop or program operation.
⑪d TROUBLE lamp:	It blinks when an error is detected and displays the corresponding code for that particular problem.
⑪e REMOTE operation indicator lamp:	It illuminates when the instrument is put into remote operation (optional) and displays the word “REMOTE”.
⑪f KEY LOCK indicator lamp:	It illuminates to indicate that the operation panel key lock function is in operation.
⑫ Operation menu indicator lamp:	It illuminates to indicate the active operation mode in the operation menu.
⑬ Sub display menu indicator lamp:	It illuminates to indicate the item (set temperature, remaining time, hour or execution segment) shown in the sub display.
⑭ HEAT ON indicator lamp:	It illuminates when the heater is on.
⑮ TIME indicator lamp:	It illuminates when the operation starting time if the auto-start and the operation completion time if the auto-stop is set in the hour setting mode.
⑯ Independent Temperature Overheating Prevention Device:	Setting the instrument to the operation temperature of the independent over rising prevention.
⑰ Differential pressure gage:	It illuminates to indicate the difference HEPA filter. It help you to decide the time for exchanging.
⑱ Exhaust damper knob:	It is the adjustment knob of width of exhaust damper. The indication value is a standard.

⚠ Warning

If you do not ground the unit, the earth leakage circuit breaker would not work in case of electric leakage. Be sure to connect the ground lead (green core line of the power cord) to the ground wire o terminal of the power source.

- Do not connect the grounding wire to a gas pipe or water pipe.
- Do not connect the divergence outlet because the generation of heat will occur.
- Do not use the unit in an area where there is flammable or corrosive gas.

⚠ Caution

Checking the outlet.

- Connect the power code with the correct power distribution switchboard or receptacle. When you use the three-phase electric power and connect the opposite phase, the fan may spin the opposite way and the oven may not run normally. When you connect the opposite phase, the indicator of the Differential pressure gage dose not increases. Connect again after checking the wiring diagram (page37～page38).

Checking the safety

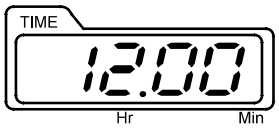
- Be sure to set the independent overheating prevention 15℃ higher than the temperature inside the unit running.

Operating Procedure

When prepared completely, proceed as follows:

1. Turning of power supply

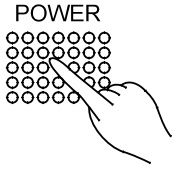
- Turn on the earth leakage breaker.



- The present time is shown on the sub display.

↓

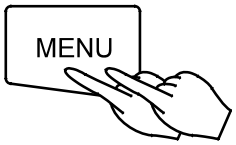
Push the POWER key in the operation panel.



- When once the power is on, this oven becomes a standby state. Under such a condition, every operation mode can be selected by pushing the MENU key.

2. Selection of operation menu

- Press the MENU key several times to select desired operating method.



Press MENU key several times

- It allows you to enter each parameter into a flashing menu.

○ Fixed Temperature
↓
○ Auto start
↓
○ Auto stop
↓
○ Program

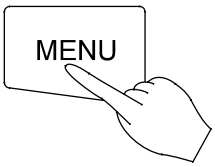
Explanation of operation menu

1. Fixed Temperature	: It is an operation method to bring the oven to the desired temperature and keep it steady.
2. Auto start	: It is an operation method to start the temperature operation when reached the set time or hours.
3. Auto stop	: It is an operation method to stop a fixed temperature operation when reached the set time or hours.
4. Program	: It is an operation method that can start or stop an operation either when reached the set time or hours. Moreover, it can change the temperature when reached the desired time and repeat to do that. ※Refer o the attached instruction manual “Programmable controller high-tech Ⅳ type” to know the way to input the program or edit.

Fixed temperature operation instructions

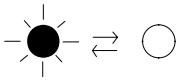
Selection of operation menu

- Push the MENU key and select the fixed temperature operation



Push the MENU key

↓



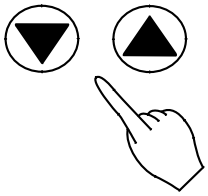
The lamp of the FIXD TEMP blinks.

↓

- The temperature set last time is blinking and enters the state that a set temperature can be input in a sub-display.

Input of set temperature

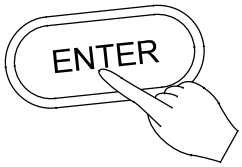
- Push the ENTER key after making a sub-display display an arbitrary set temperature pushing ▲▼ keys.



Press either the ▲key or the ▼key several times.

(Note) Then, the desired set temperature will appear on the main display.

↓

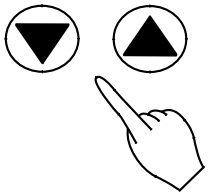


Press the ENTER key.

- The oven will start to run the fixed temperature operation to the renewed temperature.

Changing the set temperature when fixed temp operation is in progress

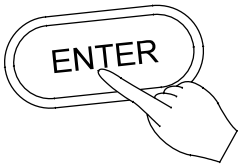
- Push either the ▲key or the ▼key to display the desired temperature on the main display and push the ENTER key



Press either the ▲key or the ▼key several times.

(Note) Then, the desired set temperature will appear on the main display.

↓



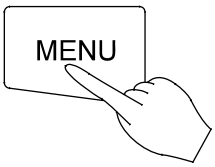
Press the ENTER key.

- The oven will start to run the fixed temperature operation to the renewed temperature.

Auto start operation instruction

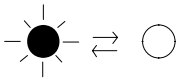
Selection of operation menu

- Select Auto START mode by pushing the MENU key.



Push the MENU key

↓

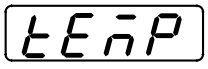


The operation menu lamp of an AUTO START blinks.

↓

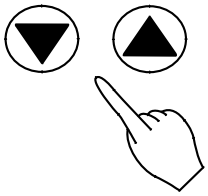
- tEmP will appear on the sub display (omission of temperature) and the desired temperature can be input.

Sub display



Input of set temperature

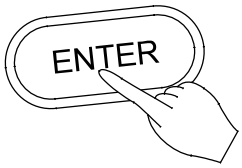
- Push either the ▲key or the ▼key to display the desired temperature on the main display and push the ENTER key



Press either the ▲key or the ▼key several times.

(Note) Then, the desired set temperature will appear on the main display.

↓



Press the ENTER key.

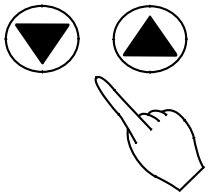
↓

- tiME will appear on the sub display (showing time) and the operation start time can be input. (running start time･hours)

Sub display

Inputting the desired set time

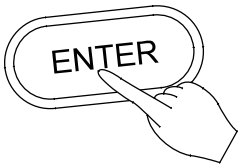
- Push either the ▲key or the ▼key to blink start time (or the hour) on the main display, and press the ENTER key



Press either the ▲key or the ▼key several times.

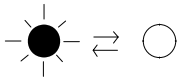
(Note) Then, the desired set temperature will appear on the main display.

↓



Press the ENTER key.

↓



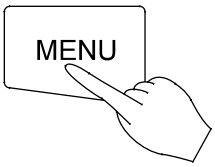
STANDBY lamp blinks.

- The STANDBY lamp of the operation monitor blinks.
- The operation will be in standby condition.
- After reaching the set time (or hour), the oven will start to run the auto start operation to the renewed temperature.

Auto stop operation method

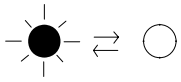
Selection of operation menu

- Press the MENU key and select the auto stop operation.



Push the MENU key

↓

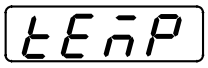


The menu lamp of an AUTO STOP blinks.

↓

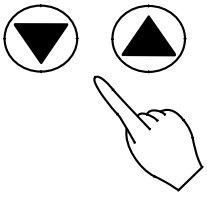
- tEMP will appear on the sub display (omission of temperature) and the desired temperature can be input.

Sub display



Input of set temperature

- Push either the ▲key or the ▼key to blink the desired temperature on the main display and push the ENTER key



Press either the ▲key or the ▼key several times.

(Note) Then, the desired set temperature will appear on the main display.

↓

Press the ENTER key.

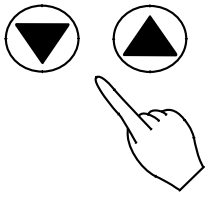
↓

- tIME will appear on the sub display and the operation stop time can be input. (running stop time or hours)

Sub display

Inputting the desired set time

- Push either the ▲key or the ▼key to blink your desired time (or the hour) for operation stop on the main display, and press the ENTER key



Press either the ▲key or the ▼key several times.

(Note) Then, the desired stop time (or hour) will appear on the main display.

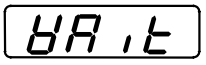
↓

Press the ENTER key.

↓

- WAIt will appear on the sub display and you can shoes the wait function to be activated or not.

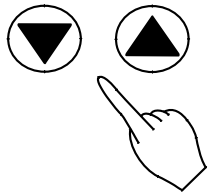
Sub display



Auto stop operation method

Selection of wait function

- Press either the ▲key or the ▼key to indicate the wait function (ON or OFF) on the main display. Then press ENTER key.



Press either the ▲key or the ▼key several times.

Either ON or OFF will appear on the main display.

(activate) (inactive)

↓

Press the ENTER key.

↓

- This operation activates the auto stop operation. The operation stops on the desired time or hour.

Working conditions of timer

- Auto stop timer activates when:

The wait function is on,

It starts when the set temperature has reached the target valve.

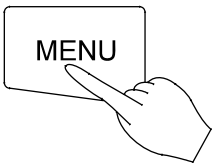
The waiting function is off or the time setting represents hours,

It starts right after the auto stop operation is started.

Programmed operation method

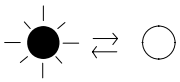
Selection of operation menu

- Press the MENU key and select the programmed operation.



Push the MENU key

↓



The operation menu lamp of the PROGRAM blinks.

↓

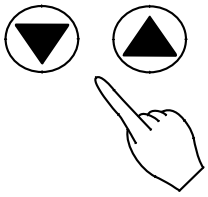
- PrOG will appear on the sub display and the execution program number can be input.

Sub display

PrOG

Input of set temperature

- Push either the ▲key or the ▼key to indicate an desired program number on the main display, and press the ENTER key



Press either the ▲key or the ▼key several times.

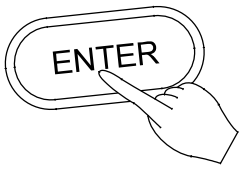
The program number will appear on the main display.

NOTE:

if no programs have been set, — is blinking.

See the Operating Instructions for Programmable Controller to set a new program.

↓



Press the ENTER key.

↓

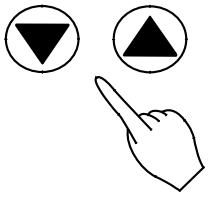
- tInE will appear on the sub display and the operation stop time can be input. (running stop time or hours)

Sub display

tInE

Input of time

- Push either the ▲key or the ▼key to blink your desired operation start time (or hour) on the main display, and press the ENTER key



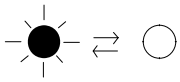
Press either the ▲key or the ▼key several times.

The desired set time will appear on the main display.

↓

Press the ENTER key.

↓



- The standby lamp on the operation monitor blinks.

  (Operation is in STANDBY MODE)
- The operation will start after the set time is up.

Switching from one operation to another

This instrument can switch to a different operation mode without stopping the current program no matter what mode it is in, fixed temperature operation, auto-start/stop operation, and program operation.

Selection of operation menu

- Press the MENU key several times unit the desired operation menu lamp flashes on the Operation Menu.
- Since the current operation has not stopped, the operation menu lamp is also lit.

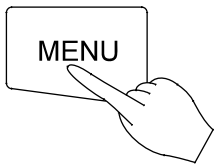
↓

- This status allows you to enter each parameter into blinking or lighting operation menu.

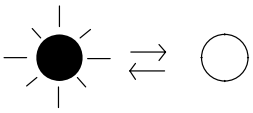
↓

- The next step is the same as each operation.

(See to page19～page23)



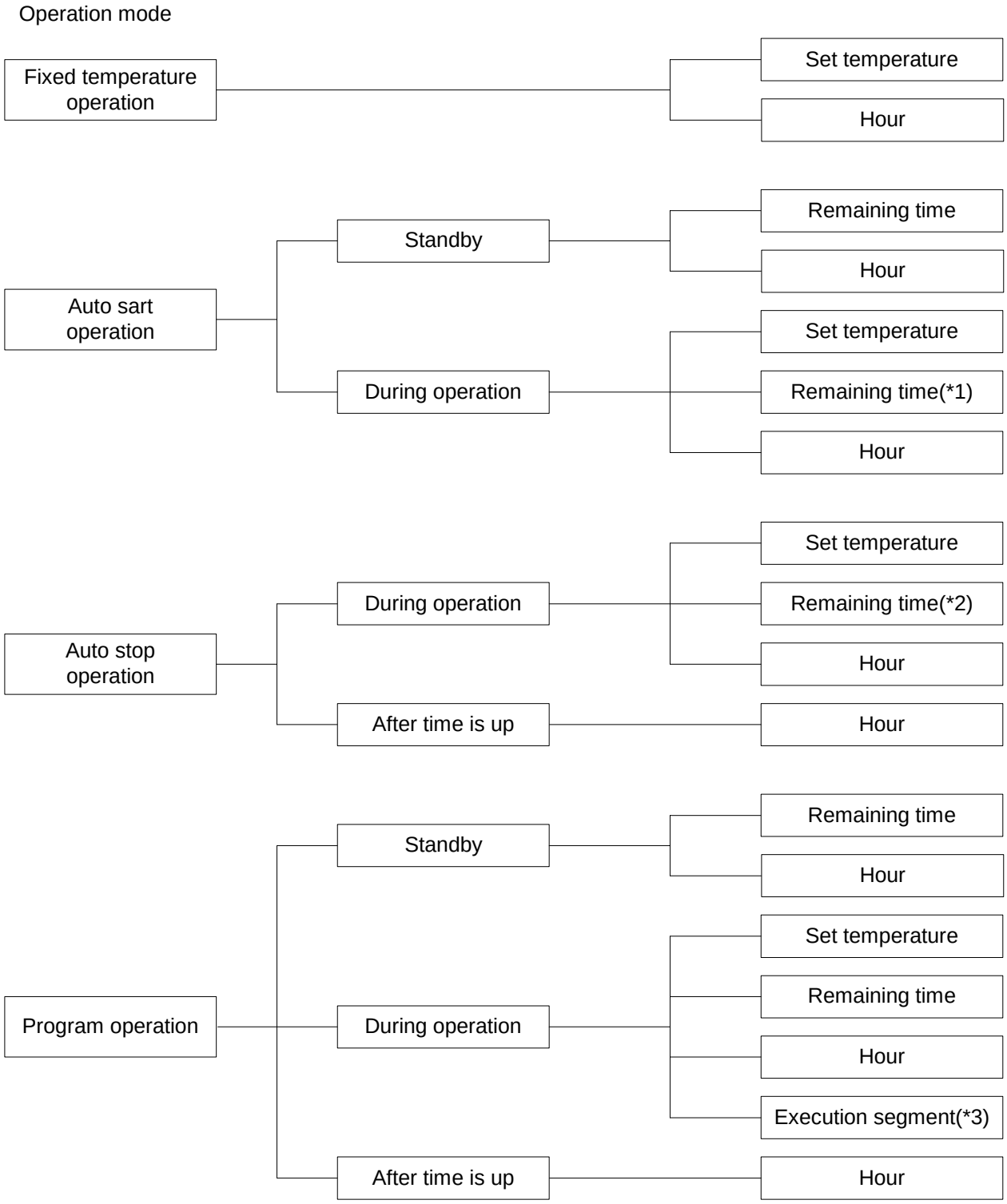
Press MENU key several times.



The lamp blinks or lights.

Method of using DISPLAY key

The display content of the sub display can be changed over by turns when pushed the DISPLAY key.



*1: HOLD is displayed.

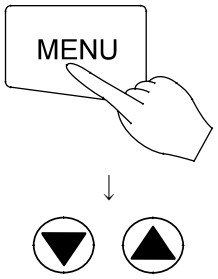
*2: When the wait function is set to on, WAIT is displayed in the waiting state.

*3: The DISPLAY key will enable to show the rest of the repeat cont while the repeat operation.

Content of function menu

This controller has the other functions bellow. you can choose the function by using the mode key and the ▲key or the ▼key.

- Press the MODE key and display your desired function on the main display by pushing either the ▼ key or the ▲key. Each function will appear by turns whenever pushing the ▼/▲keys.



Press the mode key.

Select with the ▼key or the ▲key.

Main display	Function	
PrOG	Inputting and editing program	To input and edit the program.
dELP	Deleting the program	To delete existing programs that are no longer necessary. (It is displayed only when he program is inputted)
tiME	Switching time setting mode	To input either an hour or a period of time during time setting process. ※It is set to the time (a period of time) setting mode when the product was shipped from the factory.
LOCK	Setting and releasing the key lock	This function is for protecting wrong key actions during the operation or while being in the standby state.
bEEP	Alarm buzzer ON/OFF function	To select whether you want to activate the alarm buzzer or not when an error occues.
ACCn	Accumulating time display function	To display the total duration that the POWER key is on, within the range of 0 to 49999 hours.
HOLd	Hold function	To hold the operation that is currently running. This function will get active to stop the count of desired time that is currently running. (This function is display only under operation)
CLOK	Date and current hour setting function	To set the date and hour.
CAL	Calibration offset function	To conform the display temperature to the measurement temperature of a voluntary point in the chamber at a voluntary temperature. Details are described on next page.

※The detail of the function menu is mentioned on the attached instruction manual “Programmable controller high-tech Ⅳ type”.

Outline of Function

In the controller, the relationship between the temperature T detected by the sensor and the display temperature of the operation panel D is expressed by the equation of the line which passes the two points (T_0, D_0) and (T_s, D_s) shown in Fig.1.

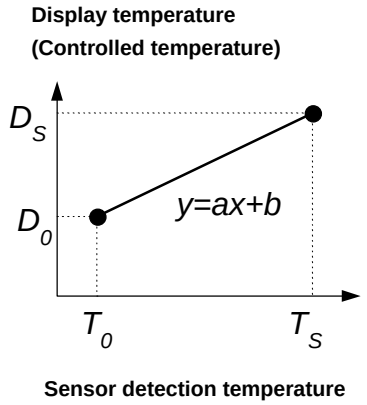


Fig. 1

Here, T_0 is the sensor detecting temperature when the chamber central temperature becomes the zero adjusting temperature (normally room temperature is adopted) D_0 at the time of no load, T_s is the sensor detecting temperature when the chamber central temperature becomes the span adjustment temperature (normally working maximum temperature is adopted) D_s at the time of no load in the same way.

As it is clear from the facts above, conforming of the chamber central temperature and the display temperature is guaranteed only when there is no load and at two points shown above.

In other words, it is possible for a temperature measured at a point in the chamber does not conform to the display temperature of the operation panel at a voluntary temperature without load. This is the function to move the line which passes above two points to the Y axis direction in parallel (increase or decrease y intercept of the line). The parallel movement amount including a sign is defined as the calibration offset. This function can conform the display temperature of the operation panel to the measurement temperature of a voluntary point in the chamber at a voluntary temperature.

Calibration Offset Function

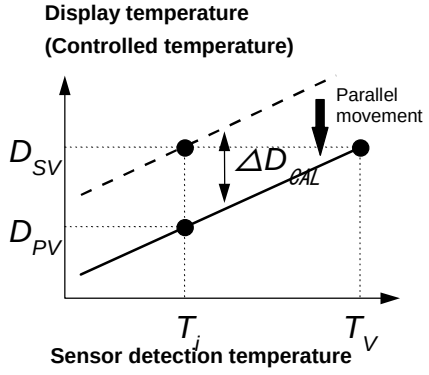


Fig. 2

In Fig. 2 D_{sv} is a display temperature of the operation panel nder the condition hat temperature in the chamber is constant for a set temperature. It is natural to say that this value is equal to the target set temperature. D_{PV} is a measurement temperature of a voluntary point in the chamber under this condition. The difference between D_{PV} and D_{sv} including the sign is defined as the calibration offset. Therefore offset is shown as

$$\Delta D_b = D_{PV} - D_{SV} \qquad \textbf{Equation 1}$$

In Fig. 2, $\triangle D_b$ becomes the negative value since the target set temperature D_{SV} is larger than the actually measured temperature D_{PV}.

NOTE: Setting Tolerance of Calibration Offset

- **The setting tolerance of the calibration offset is ±14℃ for DE610. Initial off set value has been set to 0℃ when shipping.**

Setting the calibration offset function

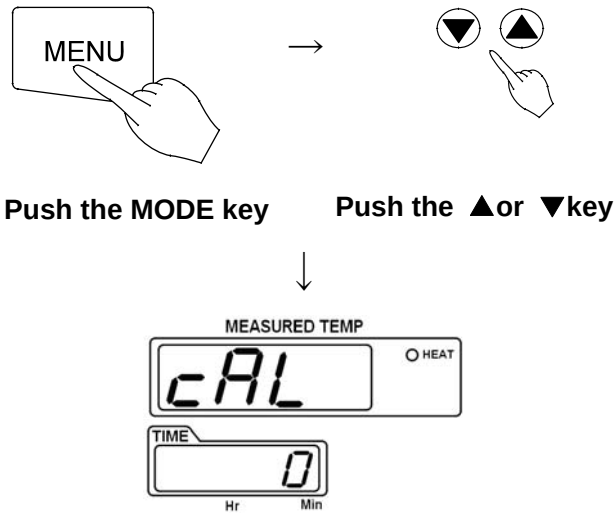
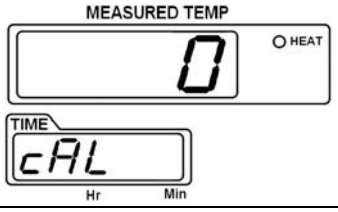
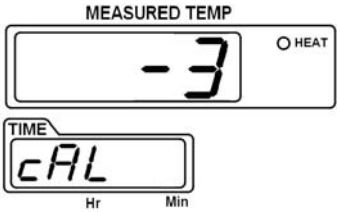
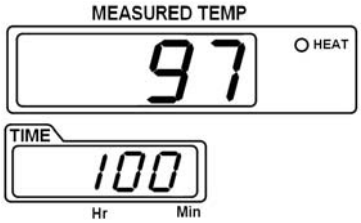
This function can be activated when the controller is in the condition of accepting the MODE key.

EX. Bring the oven to the target set temperature 100℃ and allow it to reach the steady state. After then, measure the temperature at a point in the chamber. If it shows 97℃ when the main display shows 100℃, you can conform your measuring value to the one on the display by using calibration offset function.

Calibration offset $\triangle D_b$ is obtained from the Equation 1 (page27) as shown below.

$\triangle D_b$: 97℃－100℃=−3℃

procedures to set the calibration offset $\triangle D_b$ to the controller are shown as below.

Procedure and Display	Explanation
 **Push the MODE key** **Push the ▲or ▼key**	● Push the Mode key, and then push the ▲key or the ▼key several times to display “cAL” on the main display. The sub display shows the calibration offset value that has been set the last time. In this examples, the calibration offset is shown for 0. ※When the unit is shipped from the factory, the sub-display shows 0 as the calibration offset value.
Push the ENTER key 	● If you change the calibration offset, push the ENTER key when the main display shows “cAL”. Then the sub display shows “cAL”, and the main display flashes the present calibration offset value.
Push the ▲key or ▼key 	● push either the ▲key or the ▼key to change the value on the main display to your desired value (calibration offset value to be set newly). In this example, the main display shoes-3.
Push the ENTER key 	● When the changing is completed, push the ENTER key. ● The changed value is entered and both the main and the sub displays return to the display mode just before pushing MODE key. The controller starts the temperature controlling operation in order to make the difference zero, since the difference is generated between the target set temperature and the temperature in the chamber by the changing of the calibration offset value.

Safety Devices and Error Codes

This instrument incorporates an automatic diagnosis function built in the controller and safety devices independent of the controller. The purposes and operations of the safety devices and countermeasures are shown in the Table below. When an abnormal condition occurs, an error code is displayed in the main display. Immediate action should be taken according to the specific counter-measures.

Safety Device	Display	Cause & Counter-measures
1. Earth leakage breaker	No Display	⇒ Report to our service office and check the cause of the problem
2. Motor thermal Protector	No Display	● Heater Overheating ⇒ Report to our service office
3. Sensor malfunction detector	TROUBLE lamp flashes Er.01 flashes	● Break in temperature sensor circuit ⇒ Report to our service office
4. Triac circuit detector	TROUBLE lamp flashes Er.02 flashes	● Short circuit in triac ⇒ Report to our service office
5. Disconnected heater circuit detector	TROUBLE lamp flashes Er.03 flashes	● Heater circuit is disconnected ⇒ Report to our service office
6. Fan malfunction detector	TROUBLE lamp flashes Er.04 flashes	● Trouble in fan ⇒ Report to our service office
7. Independent overheating prevention	TROUBLE lamp flashes Er.07 flashes	● Incorrect setting of the independent overheating prevention ⇒ Set correctly ● Heating of sample ⇒ Reduce the amount of the sample ● Malfunction of the independent overheating prevention circuit ⇒ Report to our service office
8. Main relay malfunction detector	TROUBLE lamp flashes Er. 10 flashes	● A malfunction of the main relay ⇒ Report to our service office
9. POST function*	TROUBLE lamp flashes Er.08, Er. 14 Er. 15 flashes	● POST function is running (See the attached instruction manual “Programmable controller high-tech Ⅳ type”) ● Contact Yamato Scientifics’ Technical Service Department.
10. Door switch	door flashes	● The door is opened. It is not the fault. When opened the door, door will flash on the sub display and the heater circuit will be cut off and the fan will stop for safety. Once closed the door, door will go out and the heater circuit and the fan will resume working.
11. Automatic overheating preventive function	No Display	● The function of overheating prevention in controller. When the temperature detected by sensor is 12℃ higher than the target set temperature, this function in the controller runs automatically and the heating stops. When the differences become less than 12℃, the function is removed.

Independent overheat prevention

There are two safety devices in this unit: the auto-overheating preventive function of the controller (automatic recovery) and the independent overheating prevention (manual recovery). Circuits and sensors that are independent from the controller configure them. These safety devices for the temperature overheating prevention protect the instrument in a fail-safe method.

Setting the Temperature Range and Function

Setting Temperature:	0～399℃
Input Method:	Three integer digital switch. Turn the drum of each column and set the desired value. The first integer can only be from 0 to 3 for the hundred columns.
Function:	Heater output is cut off when the measured temperature gets higher than the set temperature of the independent overheating prevention. The function is active when the earth leakage breaker is ON. When the independent overheating prevention is activated, is flashing on the main display with the Er.07 and TROUBLE lamp flashes. When the independent overheat prevention is active while the heater is in the temperature rising process, etc., and flash alternately Er.07 and Er.03 on the display.

Activation/Setting Method

1. Set the independent overheating prevention 15℃ higher than the set temperature of the main unit.
2. The purpose of overheating prevention device is to protect the unit from overheating. It does not intend to protect the sample, or to protect them from the accident caused by the use of explose or inflammability.The temperature is set to 280℃ DE410/610,to 220℃ DE410U/610U,to 375℃ DT410/610 at factory shipment.
3. When the independent overheating prevention is activated improperly by changing the setting of the independent overheating prevention lower than the internal temperature or by continuing operation with setting the unit at too low temperature, turn off the earth leakage breaker to reset the unit and perform the setting again. If it is activated by another reason, see chapter of Safety Devices and Error Codes on page29.

Precautions

1. Only 0 to 3 can be see for the column of hundreds of the digital switch by the stop mechanism; however, if forced to change it to a value higher than 3, It will damage the unit.
2. Set temperature can change by touching the setter when cleaning. Always confirm that the set temperature is correct after cleaning or before operation.

Behavior after Power Restoration

In case of power failure during operation, the controller resumes the following operations after the power restoration.

In case of power failure during the program operation

1. The controller automatically resumes the program operation when it left at the power shutdown.
2. When the controller does not resumes the program operation automatically,

※In case that the temperature inside the chamber is outside the specified temperature range based on the setpoint temperature, the controller foes to the FORECED WAIT STATE until the temperature inside the chamber comes back to the specified temperature range. When you select the display of the remaining time by pushing the Display key in this condition, the sub display shows F. WT.

The timer built-in the controller dose not count as running time for a period of power failure. Therefore the rest time just before the power failed is the same time as the rest time just after the power recovered.

In case of power failure during the Auto-Stop operation

The controller automatically resumes to the standby when the Auto-Stop operation left at the power shutdown.

※In case that the temperature inside the chamber is outside the specified temperature range based on the setpoint temperature after the power restoration, the controller goes to the FORECED WAIT STATE until the temperature inside the chamber comes back to the specified temperature range. When you select the display of the remaining time by pushing the Display key in this condition, the sub display shows F. WT.

In case that the operation stop time is set in a period of time, the timer built in the controller does not count as running time for a period of power failure. On the contrary, in case

The timer built-in the controller dose not count as running time for a period of power failure. Therefore the rest time just before the power failed is the same time as the rest time just after the power recovered.

In case of power failure while the controller is in standby condition

The controller automatically returns to the standby condition when the standby condition of auto-start and programmed auto-start left at the power shutdown.

※In case that the operation start time is set in a period time, the timer built in the controller dose not count as standby time for a period of power failure. On the contrary, in case that the operation start time is set in hours, the timer built in the controller counts as standby time for a period of power failure.

When the operation start time reaches during power failure, the controller starts running just after the power restoration.

In case of power failure during the fixed temperature operation and a soak period of the Auto-Start operation

When power restoration occurs for the operation that is independent upon time such as the fixed temperature or a soak period of the Auto-Start operation, the controller resumes running toward to the preset temperature.

Periodic inspection/Maintenance

⚠ Warning

- ●Before starting inspection or maintenance, disconnect the power plug from the receptacle.
- ●Conduct inspection and maintenance only after the oven has cooled down.
- ●Do not disassemble the oven.

⚠ Caution

- ●When you remove dirt or stains from the unit's resin parts and the control panel, use a soft wet cloth. Do not use benzene, thinner, cleanser or a hard brush; it will cause deformation, qualitative deterioration and/or discoloring of the components.

Every month

- ●Check the function of the earth leakage breaker.
  - ・Connect the power code and check the function in the condition of electricity running.
  - ・At first, turn the earth leakage breaker "ON".
  - ・At next, when you push the red test button of the earth leakage breaker with the point of ballpoint pen, it is normal that the earth leakage breaker becomes "OFF".
- ●Check the operation of independent temperature overheating prevention device.
  - ・After executing the fixed temperature operation at the appropriate set temperature, set the operation temperature of the independent temperature overheating prevention device to the temperature little lower (about 5℃) than the fixed temperature.
  - ・Under normal circumstances, the heater circuit is cut off in a few seonds and the TROUBLE lamp and Er.07 flashes at the same time, and the alarm buzzer sounds if the alarm buzzer function is ON.

※Always perform inspection of the earth leakage breaker and the operation of independent temperature overheating prevention device before a long continuous operation or an unattended operation.

Replacement of the HEPA filter

Replace the HEPA filter with a new one if the differential pressure comes up to the values shown as below while running in the standby state. Contact our sales or service representative.

	50Hz Area	60Hz Area
DE410/DT410/DE410U	**250 Pa**	**290 Pa**
DE610/DT610/DE610U	**200 Pa**	**230 Pa**

Long storage and disposal

⚠ Caution	⚠ Warning
When you do not use the oven for a long period of time. ● Disconnect the power cable from the power switchboard.	When you dispose of the oven. ● Do not leave it where children can access. ● Remove the knob and hinges of the door to disable the door locking system. ● Dispose it as a large-sized discarded articles.

After service and WARRANTY

If a Service Call is required

- If a problem occurs with the Drying Oven, record the error code on the display and stop the operation immediately, turn off the power switch, and disconnect the power plug from the receptacle. Contact our sales or service representative.

(Give us the information below)

Warranty Card (attached to your Oven)

- The warranty card is given from the sales or service representative. Keep the warranty card carefully after you check the entry of “sales and date of purchase” and you read the warranty card carefully.
- Warranty period is one (1) year after the date of your purchase. During this warranty period, we will offer free repair service on the basis of the conditions provided on the warranty card.
- If you need repair service after expiration of the warranty period, contact our sales or service representative in your vicinity or service office for advice.

Minimum Inventory Period of Repair Parts

Repair parts will be available for at least 7 years after termination of our production of Drying Oven Series. Repair parts mean the parts that are necessary to maintain the performance of the ovens.

TROUBLE Shooting

Problem	Check
No display of current hour in the sub-display at the activation of the earth leakage breaker.	● Check if the power cable is firmly connected to a receptacle or the earth leakage breaker. ● Check for power failure.
Temperature fluctuates during the operation	● Are there too many samples in the chamber? ● Does ambient temperature fluctuate violently?
It takes too much time for temperature to rise.	● Are there too many samples in the chamber?

Specifications

Model	DE410	DE610	DT410	DT610
Performance:				
Operating temperature	Room temperature +30～260℃		Room temperature +30～360℃	
Temperature stability *1	±0.3℃ (at 260℃)		±0.3℃ (at 360℃)	
Temperature uniformity	±2.5℃ (at 260℃)		±4.0℃ (at 360℃)	
Time to reach max. Temp. *1	About 70 min (to 260℃)	About 60 min (to 260℃)	About 80 min (to 360℃)	
Degree of clean. *1	Class 100 during temperature stability			
Function / Structure:				
Temperature control method	PID control by microprocessor			
Temperature setting method	Digital setting method by ▲▼ keys			
Temperature indicating method	Digital display by green LED			
Other indication	Temperature pattern LED indication that shows operation indicate			
Timer set / Display range	1min.to 99hrs.59min.or 100hrs.to 999hrs,digital set / display			
Operation function	Fixed temperature operation, Auto-start/Auto-stop operation Program operation (Maximum 16 segments, repeat, slope, etc)			
Additional function	Calendar timer function (actual hr. timer within 24hrs.), integrating time function (Integrated hr. up to 49999hrs. can be measured.), Calibration offset function, Time indication (The present time is indicated.)			
Safety device	Self-diagnostic function (sensor abnormality, heater disconnection and triac short circuit detection; automatic temperature over-rise prevention), Key lock function, Door switch, Independent Temperature Overheat Prevention device, Earth leakage breaker with the over current protector			
Sensor	K thermocouple (double sensor)			
Heater	Stainless pipe heater			
Heater nominal capacity (kW)	2.5	3.6		5.2
Fan motor	Sirocco fan (condenser type motor 400W)			
Differential pressure gage	Analog type 0～500Pa (same as 0～51mmH2O)			
Filter	Heat-resistance HEPA filter (dust efficiency: more than 99.97% for 0.3μm articles)			
Cable port	Inner diameter 32.9mm (one place near the windows of upper right side)			
Insulating material	Glass wool		Ceramic fiber	
Other accessory	Exhaust damper (manual)			
Specification:				
Internal dimensions (WxDxHmm) *2	450×450×450	600×600×600	450×450×450	600×600×600
External dimensions (WxDxHmm) *2	700×1000×1765	850×1150×1765	700×1000×1765	850×1150×1765
Capacity (liters)	91	216	91	216
Load endurance of board (kg/piece)	Approx. 30			
Number of shelf holder	12 steps	17 steps	12 steps	17 steps
Shelf holder pitch	30mm			
Power Requirements 50/60Hz	AC200V, three-phase, 8.3A	AC200V, three-phase,11.5A	AC200V, three-phase,11.5A	AC200V, three-phase,16.0A
Weight (kg)	Approx. 220	Approx. 270	Approx. 220	Approx. 270
Accessories:	Shelf board (stainless wire)			
	2	3	2	3
Option	(1)Temperature output terminal (2)Time-up output terminal (3)Outside alarm terminal (4)Auto-damper (5)Digital printer (6)Analog recorder (6 punch type) (7)Outside communication adapter (8)Additional sensor (triple sensor) (9) Additional sensor (K thermocouple) (10)N2 induction device (11) Lamp display of abnormal alarm (12) Emergency stop switch (13)Shelf board (for each type) (14)Restart mode select function			

NOTES: *1. The values written on the chart have been measured with no sample and both exhaust and In take ports closed in ambient temperature of 20℃.

*2. Both of internal and external dimensions do not include the one of protruding parts.

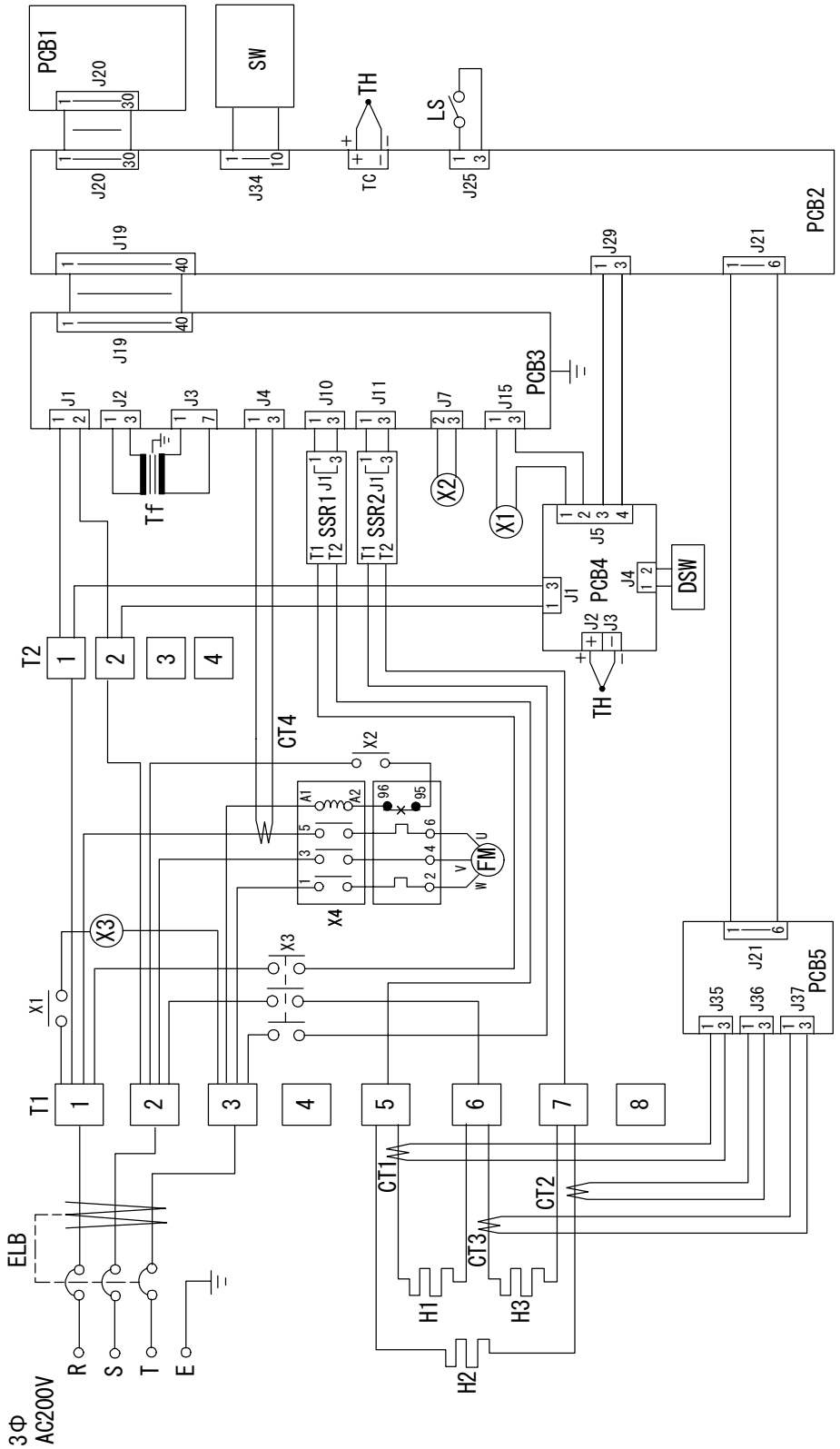
Specifications

Model	DE410U	DE610U
Performance:		
Operating temperature	Room temperature +50～200℃	
Temperature stability *1	±0.3℃ (at 200℃)	
Temperature uniformity	±4℃ (at 200℃)	
Time to reach max. Temp. *1	About 60 min (to 200℃)	
Degree of clean. *1	Class 100 during temperature stability	
Function / Structure:		
Temperature control method	PID control by microprocessor	
Temperature setting method	Digital setting method by ▲▼ keys	
Temperature indicating method	Digital display by green LED	
Other indication	Temperature pattern LED indication that shows operation indicate	
Timer set / Display range	1min.to 99hrs.59min.or 100hrs.to 999hrs,digital set / display	
Operation function	Fixed temperature operation, Auto-start/Auto-stop operation Program operation (Maximum 16 segments, repeat, slope, etc)	
Additional function	Calendar timer function (actual hr. timer within 24hrs.), integrating time function (Integrated hr. up to 49999hrs. can be measured.), Calibration offset function, Time indication (The present time is indicated.)	
Safety device	Self-diagnostic function (sensor abnormality, heater disconnection and triac short circuit detection; automatic temperature over-rise prevention), Key lock function, Door switch, Independent Temperature Overheat Prevention device, Earth leakage breaker with the over current protector	
Sensor	K thermocouple (double sensor)	
Heater	Stainless pipe heater	
Heater nominal capacity (kW)	2.5	3.6
Fan motor	Sirocco fan (condenser type motor 400W)	
Differential pressure gage	Analog type 0～500Pa (same as 0～51mmH2O)	
Filter	Heat-resistance HEPA filter (dust efficiency: more than 99.97% for 0.3μm articles)	
Cable port	Inner diameter 32.9mm (one place near the windows of upper right side)	
Insulating material	Glass wool	
Other accessory	Exhaust damper (manual)	
Specification:		
Internal dimensions (WxDxHmm) *2	450×450×450	600×600×600
External dimensions (WxDxHmm) *2	700×1000×1765	850×1150×1765
Capacity (liters)	91	216
Load endurance of board (kg/piece)	Approx. 30	
Number of shelf holder	12 steps	17 steps
Shelf holder pitch	30mm	
Power Requirements 50/60Hz	AC200V, three-phase, 8.3A	AC200V, three-phase,11.5A
Weight (kg)	Approx. 220	Approx. 270
Accessories:	Shelf board (stainless wire)	
	2	3
Option	(1)Temperature output terminal (2)Time-up output terminal (3)Outside alarm terminal (4)Auto-damper (5)Digital printer (6)Analog recorder (6 punch type) (7)Outside communication adapter (8)Additional sensor (triple sensor) (9) Additional sensor (K thermocouple) (10)N2 induction device (11) Lamp display of abnormal alarm (12) Emergency stop switch (13)Shelf board (for each type) (14)Restart mode select function	

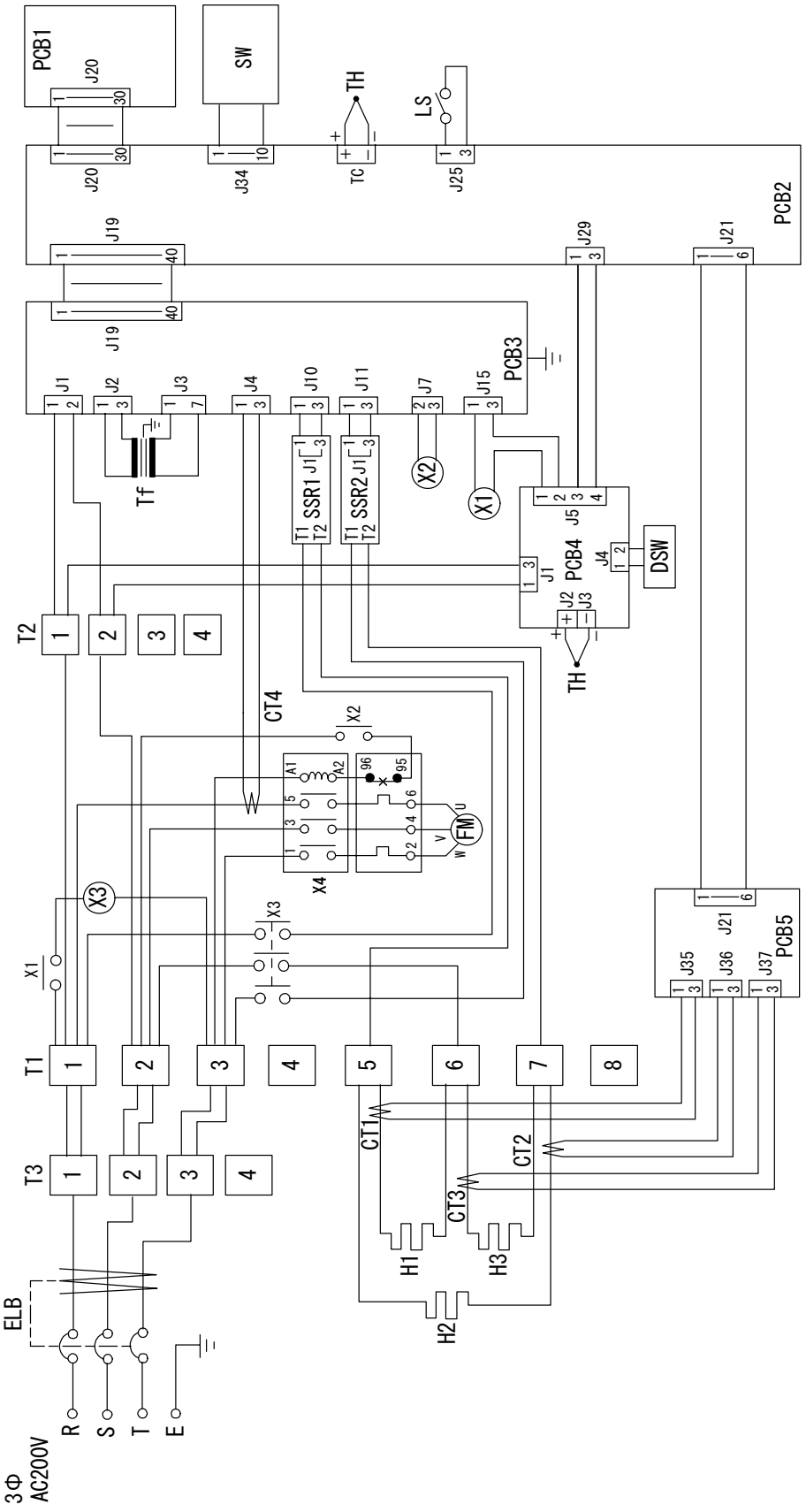
NOTES: *1. The values written on the chart have been measured with no sample and both exhaust and In take ports closed in ambient temperature of 20℃.

*2. Both of internal and external dimensions do not include the one of protruding parts.

DE410/610/410U/610U・DT410



DT610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J20
SW
TH
LS
J34
TC
J25
PCB2
J19
J29
J21
PCB3
J1
J2
J3
J4
J10
J11
J7
J15
Tf
SSR1
SSR2
X2
X1
PCB4
J5
J4
DSW
J2
J3
TH
T2
CT4
X4
FM
U
V
W
X3
X1
PCB5
J35
J36
J37
T1
T3
CT1
CT2
CT3
H1
H2
H3
ELB
R
S
T
E
3Φ
AC200V

DE410

Symbol	Part Name	Code No.	Specifications
CT1,2,3,4	Current Transformer	2-17-001-0002	CTL-6-S-400
ELB	Earth leakage breaker	2-06-008-0004	BJC3-15-3N AC200V
FM	Fan motor	2-14-001-0018	MLH2075Z AC200V
H1,2,3	Heater	DE42S-30010	AC200V 830W
DoorSW	Door switch	LT00035254	OMRON LAB1(recreation)
PCB1	PIO board	1-24-000-0024	
PCB2	PLANAR board	1-24-000-0065	
PCB3	Power board	1-24-000-0025	Type 1
PCB4	Independent overheat prevention	1-27-001-0008	ⅣLE
PCB5	Lack phase board	1-19-001-0001	
SSR1,2	Solid-state relay	LT00028423	SSR-01
SW	Membrane keypad	1-01-320-0001	Type 4
Tf	Transformer	2-18-000-0023	AC200V
TH	Thermocouple	1-16-001-0049	K thermocouple (double sensor)
X1,2	Relay	2-05-000-0028	JR1aF-TM-DC12V
X3	Electromagnetic Contact	LT00034446	FC-0ST 1a 200V
X4	Electromagnetic Switch	LT00034445	SW-03 1a 0.4KW
	HEPA filter	9-03-001-0002	NS-90-H(Y)
	Filter	9-01-001-0001	ϕ 78×t5
	Differential pressure gage	5-04-001-0004	0～500Pa

DE610

Symbol	Part Name	Code No.	Specifications
CT1,2,3,4	Current Transformer	2-17-001-0002	CTL-6-S-400
ELB	Earth leakage breaker	2-06-008-0004	BJC3-15-3N AC200V
FM	Fan motor	2-14-001-0018	MLH2075Z, AC200V
H1,2,3	Heater	DE62S-30010	AC200V 1200W
DoorSW	Door switch	LT00035254	OMRON LAB1(recreation)
PCB1	PIO board	1-24-000-0024	
PCB2	PLANAR board	1-24-000-0065	
PCB3	Power board	1-24-000-0025	Type1
PCB4	Independent overheat prevention	1-27-001-0008	ⅣLE
PCB5	Lack phase board	1-19-001-0001	
SSR1,2	Solid-state relay	LT00028423	SSR-01
SW	Membrane keypad	1-01-320-0001	Type 4
Tf	Transformer	2-18-000-0023	AC200V
TH	Thermocouple	1-16-001-0042	K thermocouple (double sensor)
X1,2	Relay	2-05-000-0028	JR1aF-TM-DC12V
X3	Electromagnetic Contact	LT00034446	FC-0ST 1a 200V
X4	Electromagnetic Switch	LT00034445	SW-03 1a 0.4KW
	HEPA filter	9-03-001-0001	NS-170-H(Y)
	Filter	9-01-001-0001	ϕ 78×t5
	Differential pressure gage	5-04-001-0004	0～500Pa

DT410

Symbol	Part Name	Code No.	Specifications
CT1,2,3,4	Current Transformer	2-17-001-0002	CTL-6-S-400
ELB	Earth leakage breaker	2-06-008-0004	BJC3-15-3N AC200V
FM	Fan motor	2-14-001-0018	MLH2075Z AC200V
H1,2,3	Heater	DT42S-30430	AC200V 830W
DoorSW	Door switch	LT00035254	OMRON LAB1(recreation)
PCB1	PIO board	1-24-000-0024	
PCB2	PLANAR board	1-24-000-0065	
PCB3	Power board	1-24-000-0025	Type 1
PCB4	Independent overheat prevention	1-27-001-0008	ⅣLE
PCB5	Lack phase board	1-19-001-0001	
SSR1,2	Solid-state relay	LT00028423	SSR-01
SW	Membrane keypad	1-01-320-0001	Type 4
Tf	Transformer	2-18-000-0023	AC200V
TH	Thermocouple	1-16-001-0042	K thermocouple (double sensor)
X1,2	Relay	2-05-000-0028	JR1aF-TM-DC12V
X3	Electromagnetic Contact	LT00034446	FC-0ST 1a 200V
X4	Electromagnetic Switch	LT00034445	SW-03 1a 0.4KW
	HEPA filter	9-03-001-0001	NS-170-H(Y)
	Filter	9-01-001-0001	ϕ 78×t5
	Differential pressure gage	5-04-001-0004	0～500Pa

DT610

Symbol	Part Name	Code No.	Specifications
CT1,2,3,4	Current Transformer	2-17-001-0002	CTL-6-S-400
ELB	Earth leakage breaker	2-06-008-0005	BJC3-20-3N AC200V
FM	Fan motor	2-14-001-0018	MLH2075Z, AC200V
H1,2,3	Heater	DE62S-30010	AC200V 1200W
DoorSW	Door switch	LT00035254	OMRON LAB1(recreation)
PCB1	PIO board	1-24-000-0024	
PCB2	PLANAR board	1-24-000-0065	
PCB3	Power board	1-24-000-0025	Type1
PCB4	Independent overheat prevention	1-27-001-0008	ⅣLE
PCB5	Lack phase board	1-19-001-0001	
SSR1,2	Solid-state relay	LT00028423	SSR-01
SW	Membrane keypad	1-01-320-0001	Type 4
Tf	Transformer	2-18-000-0023	AC200V
TH	Thermocouple	1-16-001-0042	K thermocouple (double sensor)
X1,2	Relay	2-05-000-0028	JR1aF-TM-DC12V
X3	Electromagnetic Contact	LT00034446	FC-0ST 1a 200V
X4	Electromagnetic Switch	LT00034445	SW-03 1a 0.4KW
	HEPA filter	9-03-001-0001	NS-170-H(Y)
	Filter	9-01-001-0001	ϕ 78×t5
	Differential pressure gage	5-04-001-0004	0～500Pa

DE410U

Symbol	Part Name	Code No.	Specifications
CT1,2,3,4	Current Transformer	2-17-001-0002	CTL-6-S-400
ELB	Earth leakage breaker	2-06-008-0004	BJC3-15-3N AC200V
FM	Fan motor	2-14-001-0018	MLH2075Z AC200V
H1,2,3	Heater	DE42S-30430	AC200V 830W
DoorSW	Door switch	LT00035254	OMRON LAB1(recreation)
PCB1	PIO board	1-24-000-0024	
PCB2	PLANAR board	1-24-000-0065	
PCB3	Power board	1-24-000-0025	Type 1
PCB4	Independent overheat prevention	1-27-001-0008	ⅣLE
PCB5	Lack phase board	1-19-001-0001	
SSR1,2	Solid-state relay	LT00028423	SSR-01
SW	Membrane keypad	1-01-320-0001	Type 4
Tf	Transformer	2-18-000-0023	AC200V
TH	Thermocouple	1-16-001-0049	K thermocouple (double sensor)
X1,2	Relay	2-05-000-0028	JR1aF-TM-DC12V
X3	Electromagnetic Contact	LT00034446	FC-0ST 1a 200V
X4	Electromagnetic Switch	LT00034445	SW-03 1a 0.4KW
	HEPA filter	9-03-001-0016	NMP-93S2K2-STX-T
	Filter	9-01-001-0001	ϕ 78×t5
	Differential pressure gage	5-04-001-0004	0～500Pa

DTE10U

Symbol	Part Name	Code No.	Specifications
CT1,2,3,4	Current Transformer	2-17-001-0002	CTL-6-S-400
ELB	Earth leakage breaker	2-06-008-0004	BJC3-15-3N AC200V
FM	Fan motor	2-14-001-0018	MLH2075Z, AC200V
H1,2,3	Heater	DE62S-30010	AC200V 1200W
DoorSW	Door switch	LT00035254	OMRON LAB1(recreation)
PCB1	PIO board	1-24-000-0024	
PCB2	PLANAR board	1-24-000-0065	
PCB3	Power board	1-24-000-0025	Type1
PCB4	Independent overheat prevention	1-27-001-0008	ⅣLE
PCB5	Lack phase board	1-19-001-0001	
SSR1,2	Solid-state relay	LT00028423	SSR-01
SW	Membrane keypad	1-01-320-0001	Type 4
Tf	Transformer	2-18-000-0023	AC200V
TH	Thermocouple	1-16-001-0042	K thermocouple (double sensor)
X1,2	Relay	2-05-000-0028	JR1aF-TM-DC12V
X3	Electromagnetic Contact	LT00034446	FC-0ST 1a 200V
X4	Electromagnetic Switch	LT00034445	SW-03 1a 0.4KW
	HEPA filter	9-03-001-0017	NMP-160K2-STX-T
	Filter	9-01-001-0001	ϕ 78×t5
	Differential pressure gage	5-04-001-0004	0～500Pa

Explosives	Explosives Substances	1.Nitroglycol, Nitroglycerin, Nitrocellulose, and other explosive nitric esters.
		2.Trintrobenzens, Trinitrotoluene, Picric acid, and other explosive nitro compounds.
		3.Peracetic acid, Methyl ethyl ketone peroxide, Benzoyl peroxide, and other organic peroxides.
Flammables	Combustible Substances	Metallic lithium, Metallic potassium, Metallic sodium, Yellow phosphorus, Phosphorus sulfide, Red phosphorus, Celluloid, Calcium carbide, Lime phosphate, Magnesium powder, Aluminum powder, and other ignitable metal powders and sodium dithionite (hydrosulfite).
	Oxidants	1.Potassium chlorate, Sodium chlorate, Ammonium chlorate, and other chlorates.
		2.Potassium perchlorate, Sodium perchlorate, Ammonia perchlorate, and other perchlorates.
		3.Potassium peroxide, Sodium Peroxide, Barium peroxide, and other inorganic peroxides.
		4.Potassium nitrate, Sodium nitrate, Ammonia nitrate, and other nitrates.
		5.Sodium chlorite and other chlorites.
		6.Calcium hypochlorite and other hypochlorites.
	Ignitable Substances	Ethyl ether, Gasoline, Acetaldehyde, Propylene chloride, Carbon disulfide, and flammable substances with a flash point below minus 30℃.
		Normal hexane, Ethylene oxide, Acetone, Benzene, Methyl ethyl ketone, and flammable substances with a flash point between minus 30℃ and 0℃.
		Methanol, Ethanol, Xylene, Pentyl acetate (amyl acetate), and inflammable substance with a flash point between 0℃ and 30℃.
		Kerosene, Light oil, Turpentine oil, Isoamyl alcohol, Acetic acid, and flammable substances with a flash point between 30℃ and 65℃.
	Combustible Gases	Hydrogen, Acetylene, Ethylene, Methane, Propane, butane, and other gases that are flammable under 1 atmospheric pressure at 15℃.

(Quoted from “Addendum Table 1 of Code of Work Safety and Hygiene Standard”)

List of Symbols in the display

The oven has the controller with the 7-digit LED display. The meaning of symbols in the display is as follows:

Besides some symbols are not displayed in type of ovens.

Capital	Symbol	Meaning of Abbreviation	Meaning of Symbol in the display
A	Abnd	abnd abnormal end	Abnormal end
	Abrt	abrt abort	Abort: The function of stopping operation compulsorily
	Accm	accm accumulation	Integrated time
	A.StP	a.stp auto stop	Quick auto stop
B	bEEP	Beep	Beep: Alarm sound setting mode
	buSy	Busy	During transfer: during date transfer to the printer
C	ch.**	ch.** character**	Character printing mode ** is 3 kind of 01(1min.), 10(10min.), and 60(60min.)
	CLoC	clok clock	Clock: Setting of date and time
	com.L	com.l communication lockout	Setting/Removing of communication lockout function
	cont	cont continue	Continuous running mode of the freezing machine
	cycL	cycl cycle	Cycle running mode of the freezing machine
D	dAmP	damp damper	Auto damper function
	d.cyc	d.cyc defrost cycle	Running mode of defrost cycle
	dEF	def defrost	Defrost running function
	dEF.W	def.w defrost wait	Wait period a program
	dEL.P	del.p delete program	Deleting a program
	diSP	disp display	Sub display switching mode
	door	door	Door open
	dP.**	dp.** damper**	Damper opening degree of segment**

List of Symbols in the display

Capital	Symbol	Meaning of Abbreviation	Meaning of Symbol in the display
E	End	end	End: Setting mode for program end
	Er.**	er.** error	Error (abnormal) code number**
	ESc	esc escape	Escape function (The function at the time when you stop selecting mode on the way or you redo to input/edit the program)
F	FAn	fan	fan
	Fn.**	fn.** fan**	Fan function of the segment**
	FULL	full	The registration number of pre-set temperature is full
	F. WC	f.wt forced wait	Forced wait (Forced wait state after the power restoration)
G	GrAP	grap graphic	Graphic printing mode
H	HoLd	hold	Hold function mode (The timer is stopped, and then the status of the controller is help)
	hr.mn	hr.mn hour. minute	Setting of time (hour, minute)
I	imnd	immd immediately	Immediately printing mode
	intr	intr interval	Interval time: ○○hours○○minutes or○○○hours
L	LiSt	list	Program list printing mode
	Loch	lock	Panel key lock
M	mn.dy	mn.dy month. day	Setting of the date (month and day)
O	oFF	off	Off: Make a function inactive
	on	on	On: Make a function active
P	Pr.**	pr.** program**	Program number
	Prnt	prnt print	Printing function
	ProG	prog program	Program mode
	Pr.SG	pr.sg program. segment	Ongoing program and ongoing segment

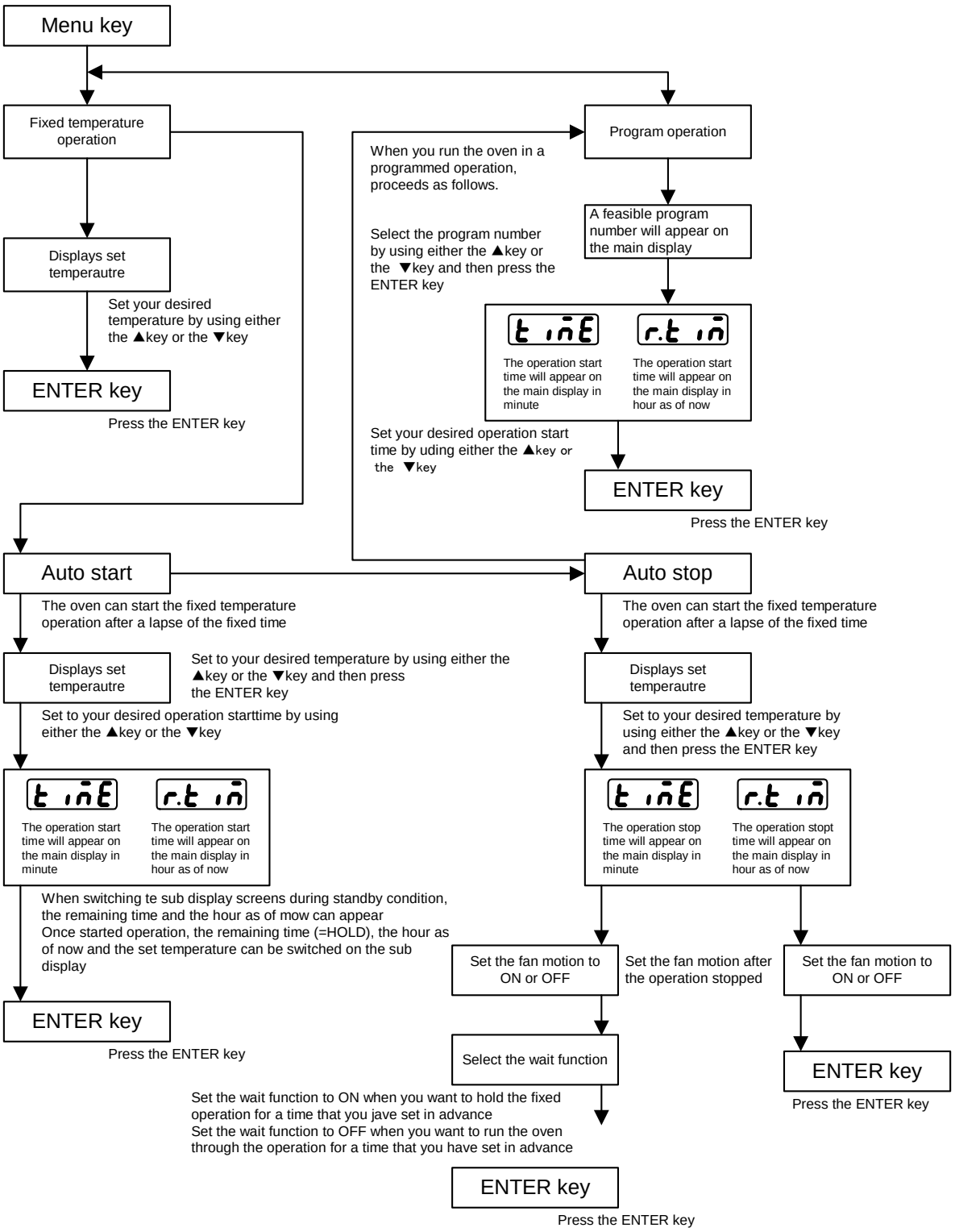
	P.tmP	p.tmp preset temperature	Preset temperature

List of Symbols in the display

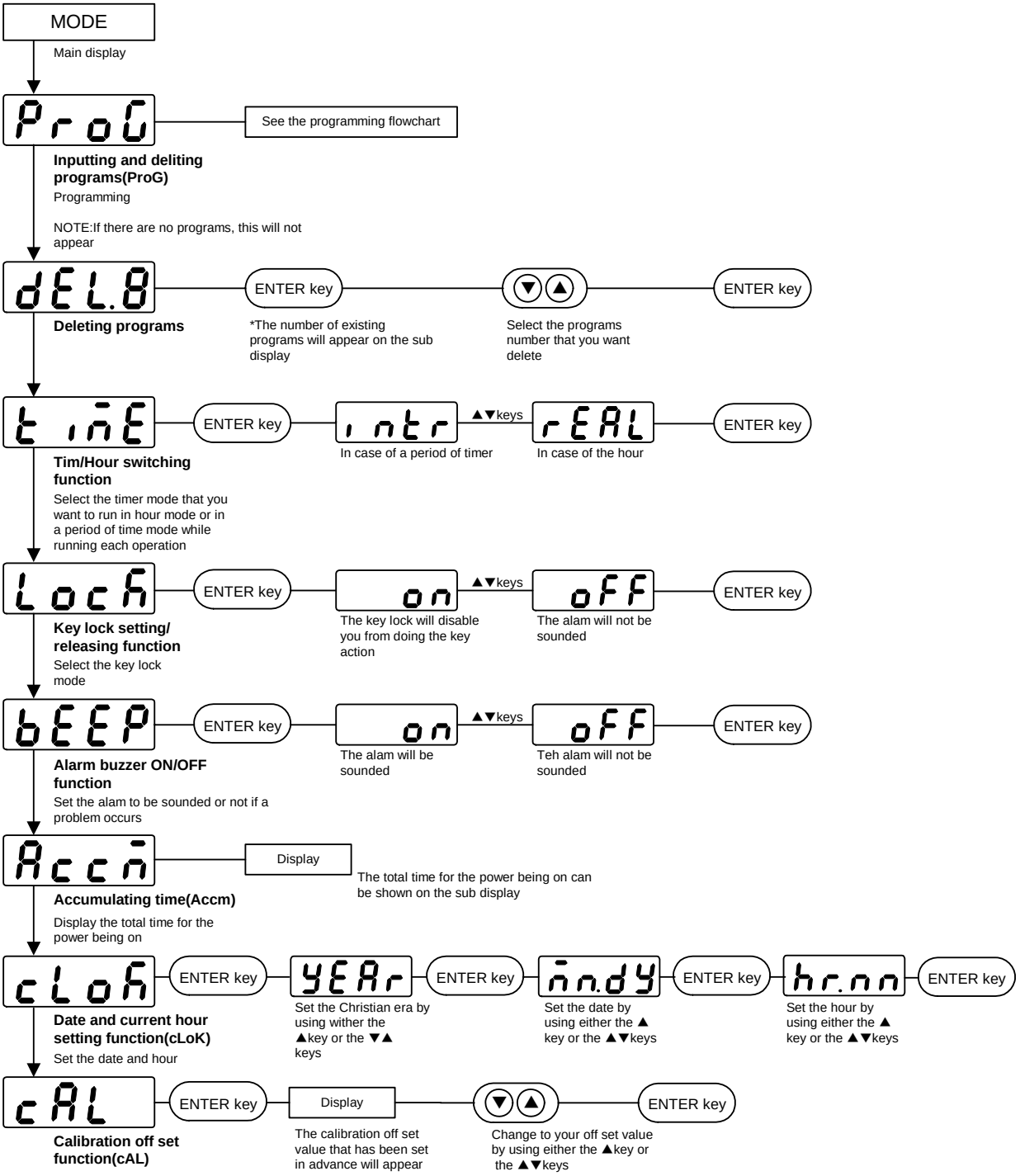
Capital	Symbol	Meaning of Abbreviation	Meaning of Symbol in the display
P	PUmP	pump	Pump
R	r.cnt	r.cnt repeat count	Repeat frequency setting mode
	rdy	rdy ready	Ready: The condition that is able to transfer to the printer
	rEAL	real real time	The real time (hour) ○○hour○○minutes
	rEFr	refr refrigerator	Refrigerator running mode
	rEP	rep repeat	Repeat command mode
	rESt	rest rest time	Rest for remaining time
	rL.**	rl.** ramp level**	Ramp level of segment** (Desired set temperature)
	r.Str	r.str repeat start	Repeat start segment setting mode
	rSUm	rsum resume	Resume running function
	rt.**	rt.** ramp time**	Ramp time of Segment** (Time required to reach the ramp level)
	r.t im	r.tim real time	The real time (hour)
S	SG.**	sg.** segment**	Segment number**
	St.**	st.** soak time**	Sock time if Segment** (Holding time if the ramp level)
	StEP	step	Increasing and decreasing with full power
	SUrE	sure	Check: Check the execution of forced stopping operation
T	tEmP	temp temperature	Temperature mode
	t imE	time	Time mode
	t imr	timr timer	Timer defrost running mode
W	WA it	wait	Wait function (The function that guarantee the temperature within some range of Ramp level as a standard for set soak time)

	wt.* *	wt.** wait.**	Wait function of Segment**
Y	YEAr	year	The Christian era

Run “MENU”

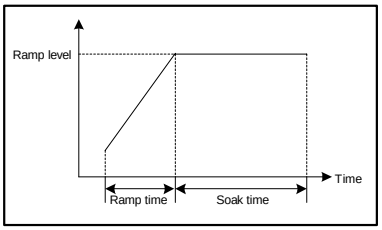

Menu key
Fixed temperature operation
Displays set temperautre
Set your desired temperature by using either the ▲key or the ▼key
ENTER key
Press the ENTER key
Program operation
When you run the oven in a programmed operation, proceeds as follows.
A feasible program number will appear on the main display
Select the program number by using either the ▲key or the ▼key and then press the ENTER key
t inE
The operation start time will appear on the main display in minute
r.t in
The operation start time will appear on the main display in hour as of now
Set your desired operation start time by uding either the ▲key or the ▼key
ENTER key
Press the ENTER key
Auto start
The oven can start the fixed temperature operation after a lapse of the fixed time
Displays set temperautre
Set to your desired temperature by using either the ▲key or the ▼key and then press the ENTER key
Set to your desired operation starttime by using either the ▲key or the ▼key
t inE
The operation start time will appear on the main display in minute
r.t in
The operation start time will appear on the main display in hour as of now
When switching te sub display screens during standby condition, the remaining time and the hour as of mow can appear
Once started operation, the remaining time (=HOLD), the hour as of now and the set temperature can be switched on the sub display
ENTER key
Press the ENTER key
Auto stop
The oven can start the fixed temperature operation after a lapse of the fixed time
Displays set temperautre
Set to your desired temperature by using either the ▲key or the ▼key and then press the ENTER key
t inE
The operation stop time will appear on the main display in minute
r.t in
The operation stopt time will appear on the main display in hour as of now
Set the fan motion to ON or OFF
Set the fan motion after the operation stopped
Set the fan motion to ON or OFF
Select the wait function
ENTER key
Press the ENTER key
Set the wait function to ON when you want to hold the fixed operation for a time that you jave set in advance
Set the wait function to OFF when you want to run the oven through the operation for a time that you have set in advance
ENTER key
Press the ENTER key

Program “MODE”



Flowchart for programming

Segment condiguration
: Segments are made up of the following items, and must be input in this order



1.Ramp time
rt. Rising time

2.Ramp level
rL. Target temperature

3.Soak time
St. Time held at ramp level

4.Wait function
Wt. Selects whether to give prority to soak time(OFF), or to hold process time at ramp level (ON)

MODE key

Press

key

ProG

Call up the program mode

ENTER key

key

Pr. 1

Call up the program number that you want to input or edit

ENTER key

key

SG. 1

When you want to rewrite programs, call up you desired segment number on the main display
Note that this will appear in case of editing

ENTER key

key

rt. 8

Input Ramp time
Note: When you run this unit with full power, input StEP

ENTER key

key

rL. 1

Input Ramp level

ENTER key

key

St. 1

Input Soak time
Note: If there is no soak time (changing immediately to next temperature), input 0. to hold, select Hold

ENTER key

key

Wt. 1

Select wait function

ENTER key

key

SG. 2

The next segment will appear
Note: To repeat, press sither the ▲key or the ▼key to display rEP and select it with the ENTER key
Input the segement number that you want to repeat, and then do the repeat count

ENTER key

key

*Input all the settings in the same way

8888

When finished in inputting all items, select End for the ramp time, and press the ENTER key

ENTER key

key

Settings finished

Limited liability

Be sure to use the unit strictly following the handling and operating instructions in this operating instruction.

Yamato Scientific Co., Ltd. assumes no responsibility for an accident or a malfunction caused by use of this product in any way not specified in this operating instruction.

Never attempt to perform matters prohibited in this operation instruction.

Otherwise, an unexpected accident may result.

Notice

- Descriptions in this operating instruction are subject to change without notice.
- We will replace a manual with a missing page or paging disorder.

INSTRUCTION MANUAL
CLEAN OVEN
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