OPERATION MANUAL

[FORCED CONVECTION OVEN]

Model : OF-01E/11E/21E

Manual No : 00HAA0001164 (Version : 5.0)

This operation manual describes the important subjects to maintain the product¡s functions and to use it safely. Especially, be sure to read <Safety Precaution> carefully before you use this equipment. Please keep this manual close to the equipment to use it after reading through it once. Please place it where the new user can find it easily for the safety use when you hand over or lend the equipment to others.

JEIO TECH

Thank you for purchasing Jeio Tech¡s product. This operation manual forms a definition of warning marks according to the level of importance and danger in order to use the product safely and correctly and prevent the users from accidents or injuries. Hence, please use the product in accordance with the instructions.

Safety Notice

1) Caution

This product can cause a big accident in case of improper use of inflammable and combustible solvents in the chamber. Also, operation in the high temperature might cause a mechanical trouble and quality deterioration due to the function and the characteristic of the product.

Safety Precautions	
⚠DANGER	**¡Danger¡ means that the user may have serious damage and even die by improper handling on this unit.**
⚠WARNING	**¡Warning¡ means that the user may have serious damage by improper handling on this unit.**
⚠CAUTION	**¡Caution¡ means that the user may have minor damage and unit may have physical damage by improper handling on this unit.**

Although Jeio Tech thoroughly investigates the possibilities of dangerous situations from using the product, it is not possible to know every single danger. Hence, precautions described in this manual do not cover all the dangerous conditions.
However, you can operate this product safer when you follow the directions in this manual. Please, be sure to pay attention to the directions and be cautious so that a mechanical trouble or an accident would not be occurred.

2) Warning mark of product

The most important thing of the warning is a warning label attached to the product. It is located in front of the door. Be fully aware of the warning contents during operation.

※ Please change to the new warning label when it is unreadable from wearing out.
Please request the new label to us.

CONTENTS

1. For safe operation

This equipment is not explosion-proof construction. Be safe while operation.

⚠DANGER

Don¡t put inflammable substances like organic solvents.

In case of operation for the high temperature, the samples might ignite and explode from vaporization in the chamber. Explosive materials are acetic acid ester, nitro compound, and etc. Inflammable materials are inorganic peroxides, acetates, organic solvents, and etc.

This equipment does not have a hydrostat.

⚠DANGER

Naver put the sample on the bo Hom of chamber(heater blmd-patch) It can be danger of overheat or a fire.

2. Purpose and peculiar of this unit

1) Purpose

(1) Forced convection oven is used for rapid dry for glass ware test of thermal hardness and thermal variation.

(2) Forced convection oven is used for preheating before heating test and test of dry for architecture component and electric component and thermal durability.

(3) Forced convection oven is used for self life test of food in harshness condition, humidity remove, harden and soften test of food and chemical by heating, moisture removal in the sample and etc.

1 ⚠ WARNING

Do not rebuild the equipment.

Do not use it for other purposes.

An electric shock or a mechanical trouble might be occurred from rebuilding or using it for other purposes

2) Characteristics

(1) Forced convection oven is multi purpose instruments for Biotechnology, pharmacy, medical, chemical, and biology. This has firstly developed CLS (Custom Logical Safe)-Control system for convinces in use and safety to user.

(2) CLS-Control System means ¡Control system which has logical safety device specialized for individual model¡. Laboratory must have Thermal safety secure because there are a lot of inflammable reagent. This system is highest safety secure control device (patent no. 0397583 and 0328729) and makes the unit suitable for this kind of environment.

(3) This unit is designed to stop the Heater and Blower in order to protect the user from heat when its door opened while it works.

(4) This unit has insulation for high temperature in the outside of the inner chamber and inside of the door and also has Chamber Silicone door for high temperature therefore insulation is perfect and heat lose is very low.

(5) Triple observing window is good for insulation and observe. This is Optional.

(6) Uniform temperature in the chamber is made by special design.

(7) Easy to lock door opening system is used.

(8) Safety circuit is used to protect the instrument from over charge and over temperature of the heater.

3. Installation

(1) Please check the following contents after opening the package.

Main body, Operation manual(1EA), Fuse(2EA), Shelf(2EA), Shelf guide(4EA)

(2) This unit is quite heavy. Please carry it with a proper moving tool or 2 people together.

⚠CAUTION

Be aware of carrying since this unit is heavy.

OF-01E : 36kg, OF-11E : 47kg, OF-21E : 59kg

(3) This unit will work correctly on proper power supply. Please check power supply and ID Plate information are the same. User must use power supply connected earth and power cord must be connected to wall outlet supplying ground point.

⚠WARNING

Connect the power properly with correct voltage, phase, and capacity.

Improper connection causes a fire or an electric shock.

⚠WARNING

Use the grounded power supply.

Ungrounded power can give a serious damage to the equipment and the user. For the safety, do not connect a grounding conductor to the gas and water pipes.

(4) Outlet should be located near the unit and shall be easily accessible.

⚠WARNING

Do not use an ejected socket or a double tap.

Cable damages or a fire can occur by an excess current.

(5) Please install the unit in the flat place where prevents vibration and shock.

(6) Please avoid heat sources and direct sun light, and locate the unit where ambient temperature range is 5°C ~ 40°C and relative humidity is lower than 80%.

(7) Please do not let moisture, organic solvents, dust, and corrosive gas enter into the control box.

(8) Please don¡t install the unit in the dangerous place where there are flammable gases, explosive materials, and organic solvents such as acetone and methylene chloride.

(9) Please secure enough space for installation because the door opens 180¡ to the left.

(10) Please do not install the unit near by the machines generating a strong high frequency noise.

4. Notice

(1) Please don¡t touch Power cord and electric part with wet hand.

(2) Please don¡t put explosive and flammable chemicals (Alcohol, Benzene and etc) inside of the oven.

(3) The samples inside of the oven are very hot when the oven is works and for a while after it stops. Please take safety glove when you touch samples.

(4) Please don¡t set flammable materials near by oven.

(5) Please don¡t pour water on the unit directly when you clean the unit.

(6) Please don¡t put some conductive and flammable materials through ventilation or power supply port. It is dangerous and causing fire and electric shock.

(7) Circuit and electric component used in this unit are developed by Jeio tech. Please don¡t try to repair by yourself. Wrong combination of electric part may cause fire. You must ask to official Jeio tech dealer or distributor in your region.

⚠DANGER

Do not put inflammable substances like organic solvents.

In case of operation for the high temperature, the samples might ignite and explode from vaporization in the chamber. Explosive materials are acetic acid ester, nitro compound, and etc. Inflammable materials are inorganic peroxides, acetates, organic solvents, and etc.

⚠CAUTION

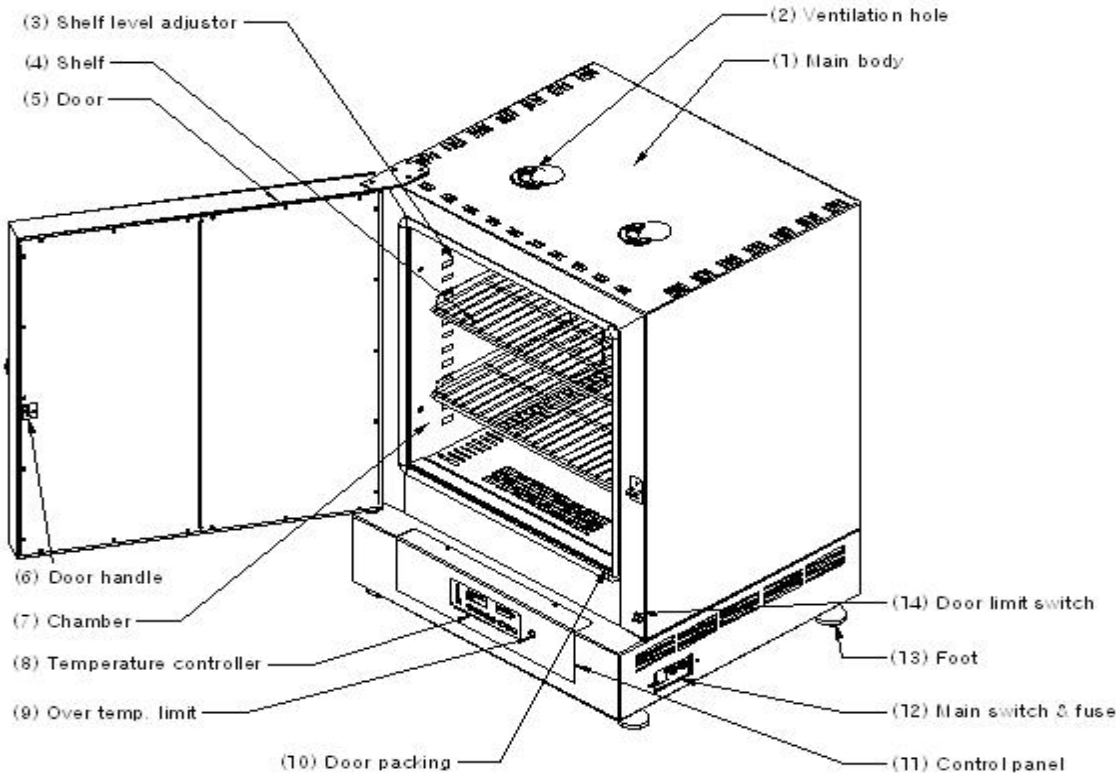
Do not put liquid sample on the equipment.

This equipment is not explosion-proof construction. Spilling liquid on the equipment can cause to stop operation or electric shock. If liquid is spilt on the equipment, put off the power and mop up the spilt liquid

⚠CAUTION

Be careful from high temp.

5. Name of each parts



(1) Main body

Made by iron plate and painted.

(2) Ventilation hole

It changes air volume of ventilation. It¡s very hot, please wear safety glove when you need to adjust it. The safety gloves must be dry. Wearing wet gloves causes burning and electric shock.

(3) Shelf level adjustor

Shelf level is easily adjustable by the size of sample.

(OF-01E→10 levels, OF-11E→14 levels, OF-21E→15 levels)

(4) Shelf

It¡s made by Stainless steel wire. It¡s easy to clean and ventilation is good. The surface of

it is electrically polished therefore it has beautiful face good anti-corrosion.

(5) Door

There are air barrier between door surface and insulation of the door. Therefore the surface of the door is cool.

(6) Door Handle

It is Door handle for door opening.

(7) Chamber

It¡s made of stainless steel and there are Blower, Heater, Temp. sensor and Temp. regulator inside of the chamber.

(8) Temperature Controller

This has a Micro processor (CPU) which has Digital PID Auto tuning function. It also has temperature compensation function for temperature sensor and the highest class safety level control system such as heating volume controller.

(9) Over temp. Limit.

If the heater temperature rises higher than set temperature it cut the power of the temperature controller, makes the over temperature LED blinking and alarming beep sounds. If you resume the operation, please set knob of it about 15% higher than set temperature and press Start/Stop switch ones then check run led of temperature controller is on.

(10) Door packing

A silicone rubber for high temperature keeps high air sealing.

(11) Control panel

Controller and electric component are there.

(12) Main switch & Fuse

This is the switch for main power. Fuse protects the instrument from electric shock. Please

check out correct power supply when you replace Fuse.

(13) Foot

This adjusts level of the instrument.

(14) Door limit switch

It¡s installed inside of the unit. The Logic IC of this switch put off the main switch. This cut off all 2 phase currency in the instrument therefore heater and blower stops for safety of user. Door LED blinking to indicate the door is opened. If the door is opened more than 1 minute then the alarming buzzer sound in order to inform the user that the door is opened for a while. (Restart the equipment by pressing START/STOP button after closing the door)

6. Controller

1) Specificity

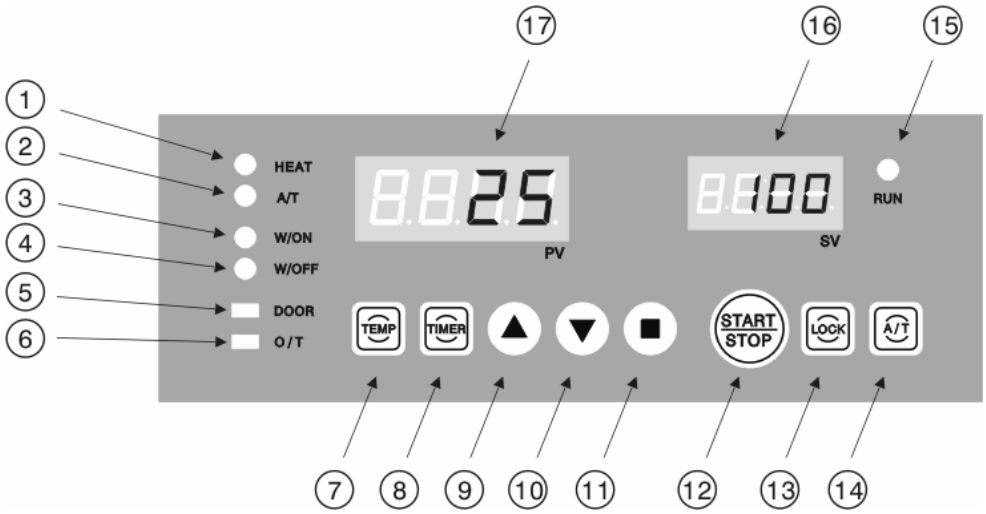
(1) CLS-Control System temperature and heater output are controlled in Main CPU which can do precise PID calculation. All control for safety is conducted by selective functional Logic IC which is installed separately. This is designed to conduct safety performance against any electric and electronic shock on the unit.

(2) CLS-Control System shuts down all 2 phase power supply to each part immediately and informs user instability by audio and visual device then keeps in safe mode until all instability conditions removed.

(3) CLS-Control System gives user two choice, one is resume operation of the unit and another is keeps the unit in standstill when the unit operation were terminated by power failure and then recovered.

(4) CLS-Control System, the safety device designed to keep very small amount of currency (only 5V, 10mA) in contact point. This makes durability of contact point very long.

2) Name and operation



(1) HEATER LED

It shows Heating function is ¡ON¡

(2) Auto Tune LED

Flickering begins on Auto-tuning.

(3) Wait On Timer LED

This is the LED indicating operation start time. The LED is blinking when the timer works and the LED off when the timer is in waiting condition.

(4) Wait Off Timer LED

This is the LED indicating operation stop time. The LED is blinking when the timer works and the LED off when the timer is in waiting condition.

(5) Door open LED

The LED is on when the door is open.

(6) Over heating alarm LED

If the heater temperature rises higher than set temperature it cut the power of the temperature controller, makes the over temperature LED blinking and alarming beep sounds. If you resume the operation, please set knob of it about 15% higher than set

temperature and press Start/Stop switch ones then check run led of temperature

(7) Temp. button.

This button is for temperature setting.

(8) Timer button.

This button is for timer setting.

(9) Up button.

This button is for increasing set value.

(10) Down button.

This button is for decreasing set value.

(11) Enter button.

This button is for saving value after varying set value.

(12) Start/Stop button.

This button is for start/stop of unit and for resuming operation after removing some unstable factors when operation is terminated because of it.

(13) Lock button.

This is lock the controller buttons.

(14) Auto Tune button.

The auto tune begins if you press this button for 1 second.

(15) RUN LED

This LED indicates Work/Stop state of unit. It turns on when the unit runs and turns down when the unit stops

(16) SV display

This display is for showing set temperature and showing remaining time when the timer function is activated.

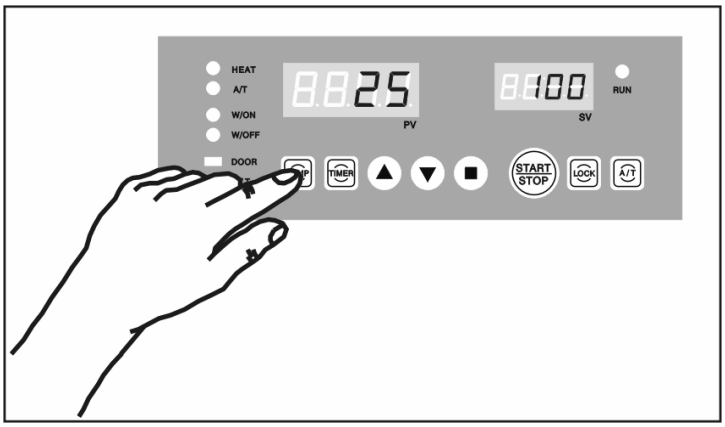
(17) PV display

This display is for showing present temperature.

3) Temperature setting way

(1) Press TEMP button.

Set temperature value (SV) is blinking. This means you can vary set value.

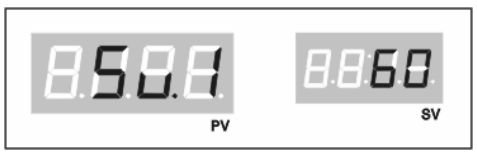


(2) Press ▲ ▼ button to vary digit number and press ■ button when you save the value.

(3) It goes back to previous state without saving if you don¡t touch any button for 10 seconds.

(4) Press TEMP button again when it is in SV set state then following additional functions are activated.

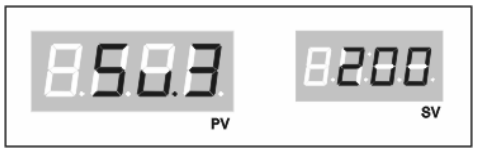
4) Additional function of TEMP button



(1) Favorite values can be stored at Sv.1, Sv2, Sv3 for each operation.

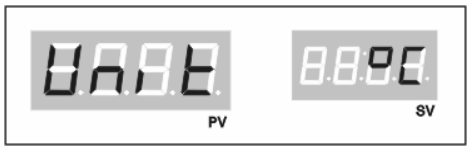
Press TEMP 2 times and set temp. values by pressing ▲ and ▼, and conclude the setting by pressing ■

Set temperature is saved on memory and set



temperature varies Sv1, Sv 2, Sv 3 are applied the same.

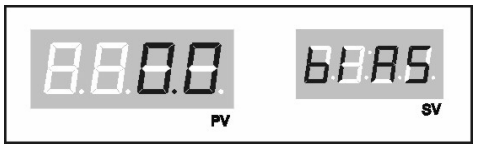
Press TEMP button repeatedly then Sv1, Sv2, Sv3 are shown and temperature unit set mode shown by pressing 5 times repeatedly.



(2) This is a function vary the unit of temperature value.

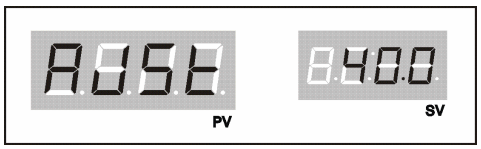
Initial display is ℃ and it can be varied ℃ and ℉ by pressing ▲ and ▼ buttons.

(3) Next mode is shown by pressing TEMP 6 times.



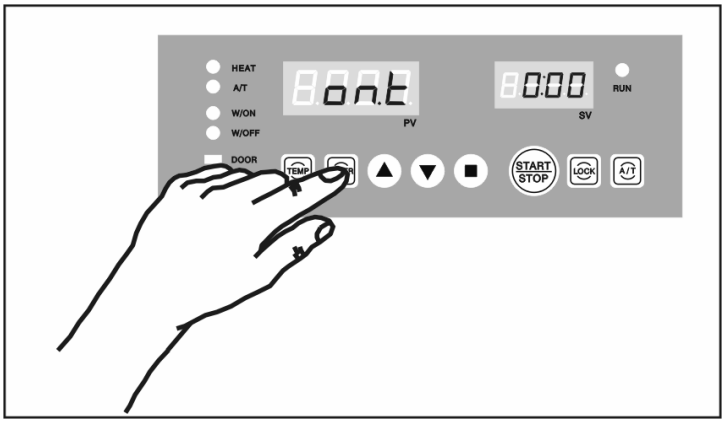
This compensates the temp. value errors.

Requested values are put on PV display. Move to the next mode by pressing ▲ and ▼ buttons.



PV is put on the SV display and can be set as exactly as shown on thermometer. Set the value by pressing ▲ and ▼ , and conclude the setting by pressing ■

5) Timer set way



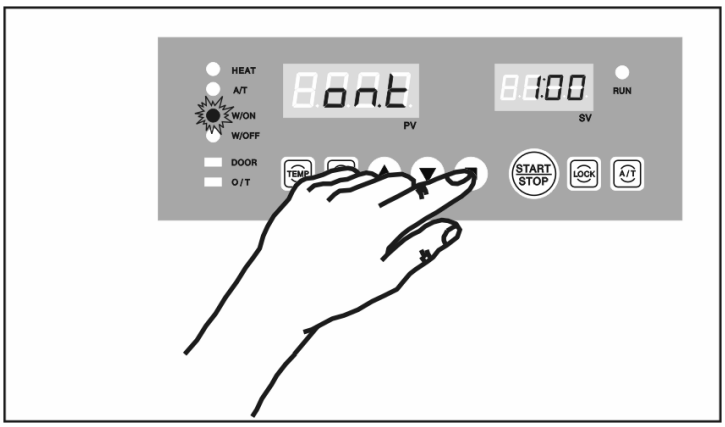
(1) Press TIMER button.

Timer (On Timer / Off Timer) is shown on PV and time is shown on SV. Set time by pressing ▲ ▼ button and save and finish by pressing ■ button.

(2) W/ON LED turns on with Beep sound after finishing wait on timer set.

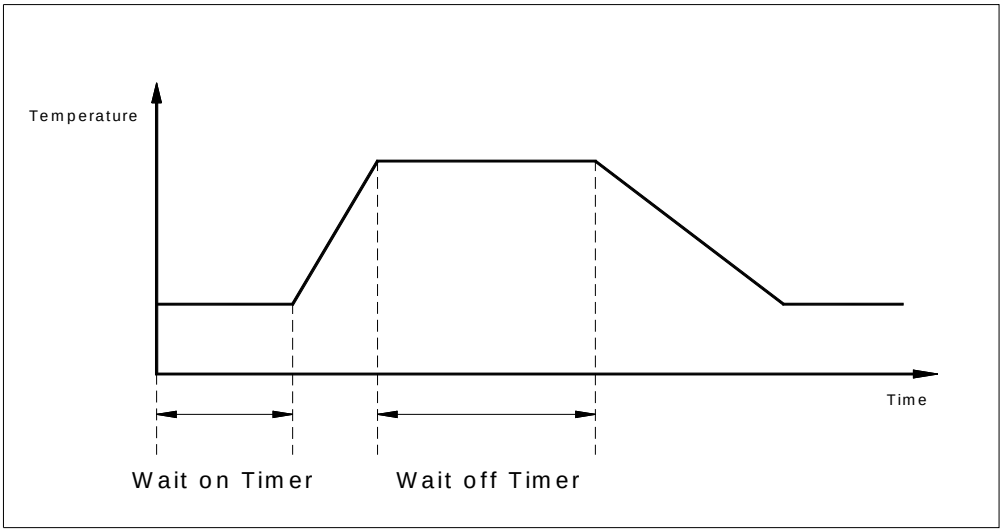
(3) Press TIMER button one more time. You can set wait off timer.

Set time by pressing ▲ ▼ button and save and finish by pressing ■ button.



(4) W/OFF LED turns on with Beep sound after finishing wait on timer set.

(5) The function of Timer is as follows.



① Wait On Timer

- The unit begins to work after time passed programmed on Wait On Timer.
- Maximum is 99hr 59mim. and minimum is 1min.

② Wait Off Timer

- The unit stops after time passed programmed on Wait Off Timer since SV and PV meet.

③ Combination of Wait On Timer & Wait Off Timer.

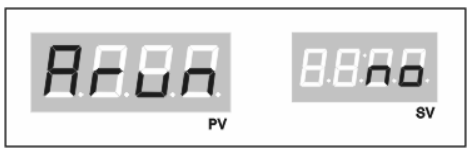
- The unit works as picture above

(6) Timer set deactivation

Press START STOP button in order to deactivate timer function then LED turns off and set timer deactivated (Both On/Off timer deactivated). If you want only one timer set time of timer for 0 then the timer is deactivated.

6) Additional function of TIMER button.

Press TIMER button once again on wait On/Off Timer function then following additional f unction displayed.



(1) This is selection of unit state after power failure. If you set yes the unit will run or else the unit will not run after power failure situation finished.

7) Auto Tuning

Perform Auto Tuning in order to get precise and rapid temperature control. PID value saved automatically after Auto Tuning.

(1) Set temperature you want.

(2) Press A/T button for a while(3seconds) then Auto Tune shown display like right hand side picture and A/T LED blinking.

(3) Auto Tune time is various according to installed environment. LED turns off after finishing Auto Tune and Present temperature & Set temperature meet.

8) Lock Function.

This is to lock controller buttons.

(1) Press LOCK button for a while (3seconds), then Lock function is set with Beep sound and the unit wouldn¡t corresponding any more key pressing.

(2) In order to deactivate this function please Press LOCK button for 3 seconds again.

(3) This protects improper pressing of the controller buttons while operation.

7. Maintenance of this unit

⚠CAUTION

Pull out the power plug before checking and cleaning the instrument.

Turn off the power switch and off the plug before checking and cleaning the instrument to avoid from electric shock or damage.

(1) Turn off the main power switch and pull out a power plug from wall outlet.

(2) Remove all liquid in the bath.

(3) Wash with soft cloth containing neutral detergent.

(4) Wash with soft cloth containing distilled water.

(5) Dry with dry cloth.

⚠CAUTION

Use proper way to clean and maintain the equipment.

Do not pour water into the equipment and do not use polishing powder, thinner, kerosene, acid etc.

Those materials can cause electric shock or item damage.

(6) Don¡t use organic solvent.

(7) If user try to clean this unit with other method not mentioned on this manual please contact us in order not to damage to the unit.

(8) Put on Safety glove for harmful chemicals and Safety Mask for harmful gas and then wash out pollutant with dried cloth when harmful chemicals and gases are spread out on the unit.

⚠WARNING

Do not disassemble the equipment.

Disassembling the equipment can cause electric shock due to voltage inside the equipment.

(9) Serious damage can not be repaired.

(10) If you do not operate the equipment, pull out the plug and store it in dried place after packing.

8. Action for malfunction

1) Check points when the unit doesn¡t work.

(1) Check out power supply.

(2) Check out fuse if off.

(4) Check out Run LED on display is off. Please press Start / Stop button if it is off.

(5) Please check the power is out.

2) Malfunction check list.

Malfunction symptom	What to check and what to do.
Buzzer sound continuously(1)	If Door is opened, Press START/STOP Switch once and check out Run LED turns on.
No temperature control.	Check if there are machines generating strong high frequency noise near by the unit. Check if Some contaminants are in the control panel. Do Auto tune again.
Air circulation is not made in the chamber	Check the door switch (open and close the door 2~3times) Check the blower works correctly
Abnormal sound	Check the Impeller of blower is OK inside of the chamber. Open the back plate of the instrument and Check the Impeller of Blower touches any part.
No power	Check the Main power Switch is on. Check the power supply is on in the room. Check the power failure. Check the fuse is OK
Temperature wouldn¡t rise	Check the RUN LED is on. Press the START/STOP Switch once if the RUN LED is off. Check the door is opened.
Buzzer sound continuously(2)	Check the Over temp. limit is set lower than current set value of the temperature. If it is, please set the value of the Over temp. limit at least 15% higher than PV. Press the START/STOP Switch once and the check the RUN LED.

☞ If you can't recover the instrument please call a repair service.

9. Warranty criterion

1) Warranty service duration

It covers for 1 year since you purchase the unit and then after the duration you need to pay for service parts.

Please contact your authorized Jeio tech dealer when you need warranty service.

You have a right to repair, replacement and payback within the warranty service duration.

2) The case user can¡t get warranty service

Damages on unit caused by fire and natural disaster like flood, earth quakes aren¡t covered by warranty service. Damaged by over voltage and abnormal conditional usage aren¡t covered by warranty service.

10. Warranty criterion

1) Please dispose the equipment or the parts following to the disposal way.

(1) How to dispose

Part	Model	Gross Weight(kg)	External Dimension (mm)	How to dispose
Main body	OF-01E	36	530¡ 535¡ 737	Contact to disposer
Main body	OF-11E	47	610¡ 595¡ 877	
Main body	OF-21E	59	740¡ 625¡ 922	

11. Specifications

Model		OF-01E	OF-11E	OF-21E
Chamber volume		52L	100L	150L
Permissible environmental condition		Temperature 5℃ to 40℃ Maximum relative humidity 80% Altitude up to 2,000m		
Temperature	Range	Amb.+10℃ ~ 220℃		
	Uniformity	±2℃ at 100℃		
	Accuracy	±1℃ at 100℃		
	Heat up time	100℃ Within 15 min		
	Controller	Digital PID auto tuning		
	Timer	Wait on time, Wait off time(Max. 99hr 59min, Min. 1min)		
	Sensor type	K-CA		
Material	Internal	Stainless steel, 0.6t		
	External	Steel,1.2t, powder coating		
	Shelves	Stainless steel wire, electro polished		
	Heater	Incoloy sheath 230VAC/1000W 120VAC/800W	Incoloy sheath 230VAC/1400W 120VAC/1000W	Incoloy sheath 230VAC/1700W 120VAC/1200W
	Insulation	Mineral wool (50t)		
	Door gasket	High temperature grade foamed silicone rubber		
	Over temp. limit	Hydraulic over temp. limit		
	Ventilation slide	Stainless steel, dia 38mm¡ 2EA		
Safety device		CLS(Custom Logical Safe)-control system		
Size (W¡ D¡ H)	Internal(㎜)	375¡ 370¡ 370	455¡ 430¡ 510	585¡ 460¡ 555
	External(㎜)	530¡ 535¡ 737	610¡ 595¡ 877	740¡ 625¡ 922
Electric requirement	AC230V, 50/60Hz	4.4A	6.1A	7.4A
	AC120V, 60Hz	6.8A	8.4A	10.1A
Weight(net)		36kg	47kg	59kg

* Uniformity, Accuracy, Heat up time can be changed by room temp. heat load, power voltage etc.