

User Manual Vacuum Oven

Model : OV4-30, 65
Manual No. : 13315L002 Version : 0.0



 **WARNING**

Please read this user manual carefully before using the product. Users should operate the product according to the operating instructions contained in this user manual. Users should be aware of cautions and warnings for your safety. Failure to follow these guidelines may result in serious injury or damage to your property.

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1.0 Safety

1.1 How to Use this User Manual

1.1.1 Introduction

This user manual is written for vacuum oven (also referred to as 'product,' 'oven,' or 'instrument') users. Please use this manual as a guide for installation, operation and maintenance.

This user manual contains instructions on how to use the product properly and safely. Never perform maintenance without JEIOTECH's service and technical support.
Do not transfer the product without help of an engineer of laboratory equipment and electricity.

Make sure to keep the user manual close to the product so that you can always use when needed.

1.1.2 Summary of Each Chapter

Chapter 1(Safety) provides information of the instrument's safe use. You need to read this chapter before installation or operation.

Chapter 2(Functional Description) provides the functional description including introduction, features, and structure of the instrument.

Chapter 3(Installation) provides guidelines for pre-installation procedures, and installation requirements.

Chapter 4(Operation) offers basic operating guidelines for the instrument. It contains names and functions of control panels.

Chapter 5(Maintenance) offers maintenance information including the instrument's cleaning, transfer, and storage.

Chapter 6(Troubleshooting) offers troubleshooting for problems that can be occurred during the operation.

Chapter 7(Accessories) offers information on types and installation guide of accessories.

Chapter 8(S/W) offers information about a dedicated monitoring software for the oven. It contains information about installation and communication protocol of the software.

Chapter 9(Appendix) offers appendix including the instrument's specifications, disposals, warranty, and the contact points of service and technical supports.

1.1.3 Applicable Product Model

This manual is applicable to OV4-30 model, which is one of the vacuum oven series.

	Vacuum Oven Series	
Mode	OV4-30	OV4-65

1.2 Responsibility

The users can guarantee their safety only when they follow the instructions on operation and maintenance of the instrument described in this manual.

All the users should operate the instrument after reading and be fully aware of the safety warnings and precautions of the manual before operation.

1.2.1 General responsibility

In any case, your safety should be kept first. All the product owners, users, and maintenance engineers should be aware that the safety is the most important part of their work.

If you are concerned about loss of efficiency, consider the impact of human or physical damage from insensitivity of safety rules. The most obvious way to increase the efficiency and productivity is to establish effective safety programs and comply with the safety rules.

The users should maintain the product regularly, check the product's condition every day to ensure safety. Make sure to be familiar with this user manual that describes safety operation instructions.

1.2.2 User's responsibility

Even though efficient experimentation and production are important to the users, there is something more important to be kept with.

Mostly, users are aware of the performance and limitations of their products because they spend the most time with using them, but sometimes their safety is easily forgotten by the desire of efficiency or by the users' familiar manners formed over a long period of time.

Safety rules or user manual are not enough to protect you from injury while using the product. The most important thing is that you need to follow safety rules and the manual. Also, make sure to report a potential risk situation to your supervisor and colleagues immediately.

Things to Remember

- No one but trained qualified person should operate or inspect the instrument.
- Check the voltage, phase, and capacity of the power and connect them properly.
- Do not touch any dangerous part of the instrument with your body or hands.
- Employees shall confine long hair and secure loose clothing and jewelry before beginning work.
- Unplug your power cords, and turn off the instrument when it not being used.
- If the product is not operating normally or has been left unattended for a long time, check all the settings before operating the product.
- If you are moving the product or using it after stopping for a long time, make sure that the product is functioning normally.
- Please stop the instrument immediately when the it is in the following state, and report it to middle-level manager.
 - Incomplete operation and condition
 - Short circuit
 - Improper maintenance

1.2.3 Maintenance Personnel Duties & Responsibilities

Proper maintenance is an essential part of safety. Maintenance personnel should be aware of the importance of the safety in order to maintain the product effectively.

Disconnect all the electrical supplies until any part of the product is removed, adjusted, or replaced. Please also attach a warning label on the product that it is "working."

Please make sure to connect an outlet that is grounded to fit the plug of the instrument.





Do not operate the product until all workers clean the area around it. Also, please make sure that all the functions of the instrument are working properly

1.3 Symbols Used in this User Manual

This manual contains signal word panels, safety symbols, and non-safety symbols. This user manual describes the degree of danger with signal word panels, safety symbols, and non-safety symbols to minimize the operators' damage. Please make sure to be familiar with the followings before using the instrument.












1.3.1 Signal Word Panels

A signal word panel informs the users a severity of damage or danger from possible accidents. Three components of a word panel are safety warning signs, phrases and individual colored squares that follows a standard, ANSI Z535.4-2007, ISO 3864.

Safety Signs	Contents
	Indicates a hazardous situation which, if not avoided, will result in death, fatal injury, or property damage
	Indicates a hazardous situation which, if not avoided, could result in death, serious injury, or property damage
	Indicates a hazardous situation which, if not avoided, may result in minor or moderate injury
	Notifies you careful actions that are not relevant to your injury



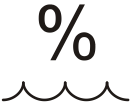


1.3.2 Safety Symbols

A safety symbol is a hazard prevention and control method that warn or identify the hazard situation, and the consequences of the hazard situation. Operate the product carefully by following the safety symbols.

Mandatory			
	Read manual.		Wear gloves.
	Wear a face mask.		Wear eye protection.
Prohibition			
	Avoid direct sunlight		Avoid high frequency noise
	Avoid corrosive fluids or cleaners		Avoid water
Warning			
	This is a safety alert symbol of general caution		Beware of electrical shocks.
	Beware flammable or fire.		Avoid contact with toxic chemical to the inside of the instrument.
	Do not take the device apart deliberately.		Crush and pinch point Keep hands away during operation.
	Lifting Hazard Single person lift could cause injury. Get help when moving or lifting.		Crush Hazard Keep feet clear.

1.3.3 Non-safety Symbols

The graphics below are used to convey important information about the use and characteristics of the instrument without further explanation.

Non-safety Symbols			
	Permissible ambient temperature		Altitude
	Relative humidity		Earth ground
	European Union electrical directive compliance		

1.4 Instructions for safe use (required reading)

This instrument has been manufactured reliably and stably only when the operators follow this user manual's instructions of installation, operation, and maintenance. Before you install or operate the instrument, please be aware of this user manual's instructions and safety precautions. If you have any questions or comments regarding to this user manual or the instrument, please contact our JEIOTECH sales department.

To prevent personal injury or damage to the instrument during the installation, operation, or maintenance, please be fully aware of the warnings and cautions shown below.

1.4.1 Warnings

 WARNING
Indicates a hazardous situation which, if not avoided, could result in death or serious injury.

1) Safety Labels

- Please be fully aware of all the safety labels.
- Do not remove or damage the attached safety labels.

2) Electricity and Power

- Before installing the instrument, you should check the power voltage, phase, and capacity displayed on the ID label and connect them correctly.
- This instrument need to use a power with high resistance grounding.
- : If the power is not grounded or poorly grounded, it may cause a hazard risk to an operator or the instrument. Also, never ground in a gas or water pipe.
- Do not connect other devices at the same time with one outlet.
- Never use branch sockets or double taps.
- : Over current can cause severe damage to cables, damage to instrument, and fire.
Do not operate the instrument when the power line is damaged.
- Improper power connections can cause damage to the instrument and serious personal injury

or death.

Do not handle or touch the electrical cords or electrical components with wet hands.

3) Installation

- Avoid contact with toxic chemical to the inside of the instrument.
- Do NOT install the instrument where flammable gas may leak.
- Do NOT use or store combustible gas around the instrument.
- Do NOT operate the instrument where an explosion may be occurred by organic evaporation gas.
- Do NOT operate the instrument in presence of industrial harmful gas, exhaust gas, or metal dust.
- Do NOT install instrument around gas pipes or water pipes.
- Do NOT install instrument in places with high humidity or risk of leakage.
- Water and organic solvents in the control panel may cause electrical short circuits.
- Do NOT expose the instrument to direct heat sources or direct sunlight.
- Keep the ambient temperature of the instrument between 5 and 30°C and the relative humidity below 80%.
- Ensure that the height of the installation site is less than 2,000 meters above the sea level.
- Install the instrument on a solid and flat floor in a laboratory facilitated with safety equipment.
- The door opens up to 140° to the left, so sufficient space should be considered when installing the instrument.

4) Operating and Transfer Instructions

- Do NOT let liquids enter the hole on the top of the vacuum oven. Do NOT place a liquid container on the instrument when in use. There is a risk of the machine failure or fire.
- Do NOT place explosive, flammable, combustible or oxidizable chemicals such as alcohol, benzene, gasoline, etc. on top of the instrument, store them or operate them inside the oven. There is a risk of fire, since the instrument is not a explosion proof structure.
- Do NOT place liquid containers on the instrument. Leakage of liquid may cause damage to the instrument.
- Do NOT allow moisture, organic solvents, dust, and corrosive gases into the operating parts and inside of the instrument.
- Do NOT use the instrument if it makes strange sounds, smells or smoke.
- Do NOT operate damaged or short-circuit equipment.
- Do NOT move the instrument when the power cord is connected or when the instrument is operating.

5) Repair and Modification

- Do NOT disassemble or modify the instrument at any time other than those described in this user manual.
- When handling electrical components inside the instrument, only qualified personnel should handle them.
- Make sure to turn off the power and check the power connection before replacing the fuse. If the power is turned on when replacing the fuse, a personnel might get serious injury or death.



Avoid direct sunlight.



Beware of corrosive materials.



Avoid water.



Beware of electrical shocks.



Beware of fire.



Avoid contact with toxic chemical to the inside of the instrument.



Do not disassemble deliberately.

1.4.2 Caution



Indicates a hazardous situation which, if not avoided, may result in minor or moderate injury.

1) Power

- This instrument should use a grounded power cord
- When installing and using the product, always use a grounded power outlet.
- Plug the power tightly and correctly to prevent loosening from the outlet.
- Avoid heavy objects or the instrument to be placed on the power cord.
- When the instrument is not in use, be sure to turn off the main power switch before unplugging the power cord.

2) Installation

- Do NOT install the instrument near devices with strong and high frequency noise (high frequency welders, high frequency sewing machines, high-capacity SCR controls).
- Be aware that artificial heart pulses or magnetic data devices may be affected by magnetic bars of the oven.
- Do NOT install instruments adjacent to other experimental devices, electrical devices and power terminals.
- Do NOT install the instrument in unventilated corners. If the place is not sufficiently ventilated, there is a risk of damage to the instrument due to overheating by difficult heat dissipation.
- The device should be installed close to the outlet and should be easy to use.
- Maintain an appropriate clearance distance (typically at least 30 cm) from other instruments.

3) Machine Operation

- When initiating the instrument, the operator should check the machine continuously until it reaches to normal status.
- When using the vacuum oven, the operator should be aware of a specimen's physical and chemical characteristics. The temperature lower than the boiling point of the specimen should be selected in a vacuum status. and if the sample is sublimatized before the boiling point, it may block the vacuum line and damage the pump. Also, biodegradation happens easily in a vacuum condition, so temperature should be carefully controlled.
- Dry samples should be kept as dry as possible when using a vacuum oven. Therefore, when canceling the vacuum, let moisture-free and dry air to enter the instrument. To make the entering air dry, the operator might use cold trap or chemical moisture trap.
- The vacuum pump is a highly sophisticated instrument that uses a very low vapor pressure (0.001 - 0.005MPa) lubricant at room temperature, which can be contaminated with a large vapor pressure solvent, resulting in a significant reduction in vacuum pump performance. Therefore, these solvents should be physically removed at the pre-vacuum pump stage. It is highly recommended to use the cold trap and the particle filter to ensure a durable and effective use of the vacuum pump.
- When shutting down the vacuum pump, the vacuum valve handle must be closed first before stopping the pump. Otherwise, if the pump is stopped immediately without being closed, oil might backflow into the chamber because of the vacuum inside the chamber. Moreover, when starting the vacuum pump operation, the valve should be locked first, and then open the valve after the pump is in operation.
- Cold trap and filter should be installed to prevent contamination of vacuum oil and damage to the wall of the rotary vane pump cylinder.
- Vacuum oil should be changed every 100 hours.
- Wear gloves when handling samples to prevent burns since there may be residual heat during the operation or even when the power is off.
- Keep the instrument clean and make sure that there is no any foreign substances inside the chamber.

- Take a special care not to damage any accessories or systems inside the instrument.
- Be careful not to contact the main body with high concentrations of nitric acid, sulfuric acid, sodium hydroxide, or corrosive solvents such as acetone, benzene, phenol, toluene, chloroform, crezol, acetic acid, chlorate.
- If the instrument is wet, shut down the machine immediately, remove the power cord, and request for the technical service.
- Do not insert conductive or flammable objects into the air ducts formed inside or outside the instrument. There is a risk of fire or electric shock.
- Do not give a shock or vibrate the instrument.
- Avoid contact with pesticides or combustible gases.

4) Storage and Transfer

- Be careful when transporting the instrument since it is heavy. Use required and appropriate tools when transporting the instrument, two or more people should carry it together.
- Do not move the instrument with the door holding.
- Do not cause mechanical shock or vibration during the transportation and storage of the instrument. Internal damage may cause problems with operation.
- Disconnect the power plug when the instrument is not in use.

5) Cleaning

- Before cleaning, turn off the power switch and remove the plug from the outlet. There is a risk of electric shock.
- Also, wear chemical resistant gloves.
- Never use chlorine detergent. It may cause the chamber to be oxidized. Also, do not use volatile substances such as cleaning agents, abrasives, benzene, acids or solvents.
- Do not use organic solvents such as sulfuric acid or hydrochloric acid to wipe the surface of the instrument.
- Use a soft cloth or sponge with a neutral detergent to clean the cleaning tool.
- Do not pour water directly into the instrument while cleaning the instrument or its surroundings.
- Do not disassemble when cleaning the instrument.
- If you are cleaning the instrument in a way other than the above, please check the cleaning manner with JEIOTECH or your company before cleaning.

6) Repair

- The electric parts and circuits embedded in this instrument are developed by JEIOTECH, therefore no one, who is not JEIOTECH employee or delegated person, should never fix this instrument.



Avoid high frequency.



Avoid water.



Beware of electric shock.



Beware of heavy weight.



Beware of fire.



Wear gloves.

In addition to the above-mentioned safety warnings, safety warnings are mentioned throughout this manual. These safety warnings are described with "warning marks" and "safety warnings". If users do not follow these important instructions, they may cause severe defects or fatal damage to the instrument, may result in personal injury, and death.

2.0 Functional Description

2.1 Introduction

This instrument is a multi-purpose vacuum oven that is used in various fields such as biotechnology, pharmacology medicine, chemistry, biology, etc.

The vacuum oven is designed primarily for the following purposes and provides an excellent experimental environment.

- (1) Dry compounds completely.
- (2) Separate the solvent completely from the substance without changing state of the substance.
- (3) Dry solvents effectively by lowering the boiling point.
- (4) Dry reagents safely that has a risk of explosion when in contact with oxygen.
- (5) Dry reagents while preventing the oxygen penetration into solid badges under anaerobic conditions.
- (6) Dry dense samples that cannot be dried well at atmospheric pressure.

2.2 Features

2.2.1 Excellent Performance

- (1) Wide range of temperature control
It has a wide range of temperatures that can be controlled up to 250°C and has an excellent insulation function that minimizes heat loss inside the chamber.
- (2) Uniform distribution of temperature
It is designed to distribute the temperature uniformly within the chamber. The temperatures of all areas on the three aluminium shelves are within $\pm 1.5^{\circ}\text{C}$.
- (3) Auto tuning

The system automatically sets the PID temperature control coefficient for your environment. [Please refer to 4.5.5 Auto Tuning]
- (4) Three point temp. calibration
Three-point calibration method is a function to control a wider range of temperature. It calibrates the temperature when there is a difference between the temperature inside the oven and the correction temperature[See 4.4.2 Calibration].
- (5) Suggesting frequently used temperature
This function automatically recommends and suggests three main temperatures that users frequently use without any saving action.
- (6) Event recording feature
It automatically stores up to 36 alarms that occur from the instrument while in use.
- (7) Rate-controlling function of rising temperature
If you set rate-controlling function of rising temperature in basic mode, the chamber rises the temperature slower than the default heating speed.

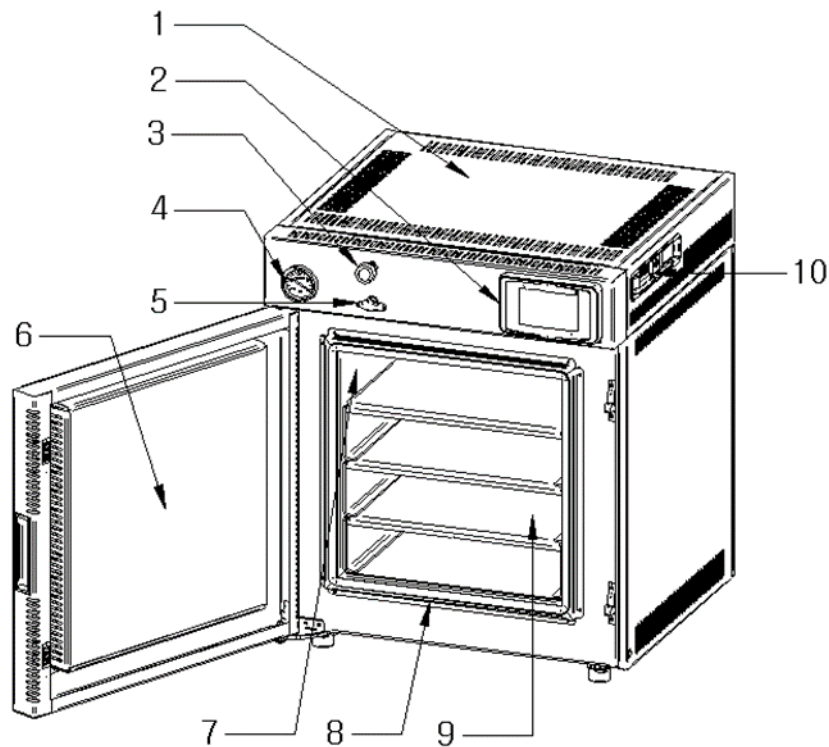
2.2.2 Safety

- (1) We invented a CLS-Control system that increases usability and stability
Custom Logical Safe (CLS) Control system is a "regulator embedded with a logical safety dedicated for specific devices." It enables the highest-level safety-grade control for the safe use of heating device that requires complete thermal safety from various combustible drugs. (patent registration number 10-0397583, 10-0328729)
- (2) Adopted a Safety Circuit
Safety circuits protect the instrument from over-current and over-passing heater.
- (3) Over Temperature Limiter
A mechanical temperature limiter is built in to prevent damage to the device due to overheating. [4.6. See Over Temperature Limiter]
- (4) A PC protection window
In case of malfunction during the operation, the error is displayed on the screen and the alarm will be activated.
- (5) Checking for abnormalities during the operation
In case of malfunction during the operation, the error is displayed on the screen and the alarm will be activated.
- (6) Instantaneous power outage recovery
If a short period of power outage (within 30 seconds) occurs, Instant Power Recovery feature will automatically operate the previous state and notifies you of the power outage recovery situation. (see 4.2.6 Instantaneous Power Recovery) If you use the Autorun function, you can operate the previous state even if the power is restored after 30 seconds.

2.2.3 Convenience of Use

- (1) A 5-inch LCD Touch Controller
The 5-inch LCD touch controller allows you to check the convenient operation and control of the instrument.
- (2) Wait on, Wait off Timer Function
The "Wait on timer" function controls the temperature after you enter the time. The "Wait off timer" function controls the temperature after reaching the set temperature [Refer to 4.2.3 Timer Setup].
- (3) Autorun Function
When the power is shut off and restored (for 30 seconds or more) due to external influences, the device remembers and automatically operates the previous state information including the temperature controls. [See 4.3.4 Autorun & Safety Door Lock]
- (4) LC-Connected Service (optional)
LC-Greenbox (optional) enables equipment monitoring and control remotely via dedicated application connections. It can also store 30-day equipment monitoring data (optional).

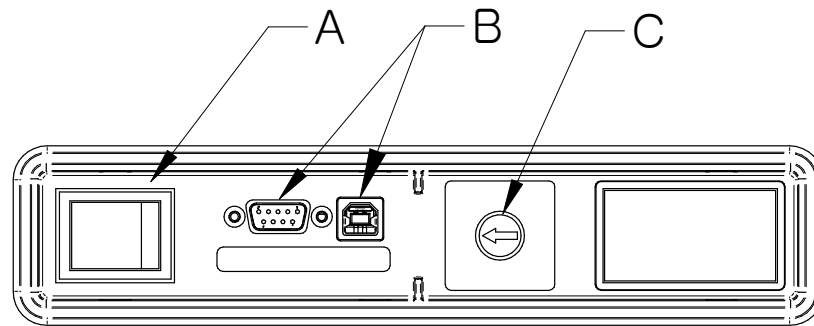
2.3 Structure



[OV4-65, Front part]

- (1) Main body
It is made with steel plates and then get painted.
- (2) Control Panel
The controllers and various electrical components are embedded in the oven.
- (3) Vacuum gauge
The vacuum gauge indicates the degree of vacuum of the chamber.
- (4) Vent valve
Close the vent valve when vacuuming, and open the valve handle when canceling the vacuum.
- (5) Vacuum valve
Open the valve when vacuuming. To shut down the vacuum pump, close the valve handle beforehand.
- (6) Safety cover
It can protect the users and the laboratory in case of the glass breaks.
- (7) Chamber
Stainless steel was used for the chamber.
- (8) Door gasket
The door gasket is molded with silicon for seamless joints.
- (9) Shelf
The shelf is where you place the samples. The aluminum shelf enables the uniform heat distribution through high thermal conductivity in a vacuum oven. Since it requires only conductive heat to increase the temperature without convection and we made the surface with aluminum.

(10) Side panel

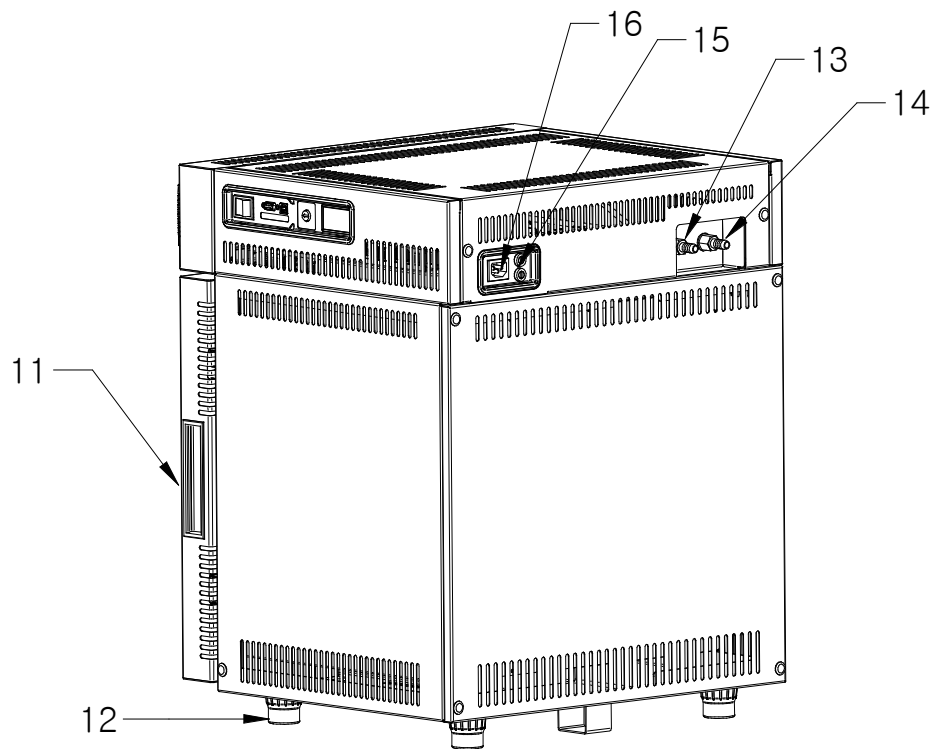


[OV4-65, Side panel]

- A) Switch
It On/Off the display power.

- B) Communication port
The USB port and RS232 port can be used to connect the oven to your computer for monitoring the behavior of the instrument or operate it. If you connect both ports at the same time, the USB port will be recognized first.

- C) Over temperature limiter
If the oven is heated abnormally above the set temperature, the temperature control will stop the instrument and a warning window will be displayed with an audible alarm. After checking the warning window and resolving the cause of the problem, rotate the "Over temperature limiter" to increase the temperature at least 15% above the set temperature, and press the 'Start' button once to restart the instrument. [See 4.6 Temperature Limiter]



[OV4-65, Rear part]

- (11) Door Handle
The door handle opens and closes the door.

- (12) Foot
The foot supports the body of the instrument and prevents it from slipping.

- (13) Vent nozzle
The nozzle is used when cancelling the vacuum or injecting the inert gas.

- (14) Vacuum nozzle
The nozzle connects the hose of the vacuum pump.

- (15) Fuse
It protects the device from momentary over-current. If replacing a fuse, check the rated power supply. [See 5.3 Fuse Replacement]

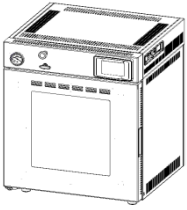

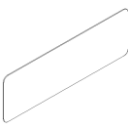

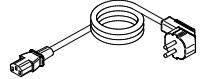
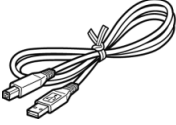



- (16) Power socket
The socket connects the main cord. Connect the main cord to the rated power source.

3.0 Installation

3.1 Equipment Components

After unpacking, please check all components listed in this manual. Also, check the ID label attached to the device and make sure it matches the model you ordered.

If the model name you ordered does not match, or if you do not receive any of the components below, please contact the branch office or device vendor of JEIOTECH. Please refer to 9.4 Service Contact Information for the status of JEIOTECH's branch offices

Item	Figure	Quantity	Description
Main body		1	-
Shelf		2	OV4-30 Top: 299 x 285 x 100 (1ea) Bottom: 292 x 285 x 100 (1ea)
		3	OV4-65 Top: 398 x 285 x 100 (2ea) Bottom: 392 x 285 x 100 (1ea)
Shelf spacer		2	-
Fuse		2	-
Main cord		1	-
Cable for communication (USB)		1	Visit the site below and go to the "Software Download Page" to download JEIOTECH software program. https://www.jeitech.com/
Silicone tubing		1	ID:8mm, OD:14mm, L: 2.5m
Tubing clamps		2	ID: 16mm
Operation manual		1	-

3.2 Preparation Before Installation

3.2.1 Environment Conditions for Equipment Installation

The device operates safely when the following environmental conditions are met.

WARNING



- Do not install the device around gas or water pipes.
- Do not install in a place with high humidity or risk of water leakage.
- If moisture or organic solvent enters the control panel, there is a risk of electric short circuit.



- Do not install the device in an environment where there is a possibility of flammable gas leakage.
- The use and storage of flammable and combustible gases around this device is prohibited.
- Do not operate the device in an environment where there is a possibility of explosion due to organic evaporation gas.
- Do not use the device in environments with industrial hazardous gases, fumes, or metal dust.

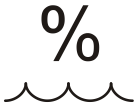
CAUTION



- Avoid direct heat sources or direct sunlight.



- Keep the ambient temperature of the instrument at 5°C to 30°C.



- Keep relative humidity below 80%.



- Install the instrument at a location below 2,000 meters above the sea level.

⚠ CAUTION

- Do not install the instrument near devices with strong and high frequency noise (high frequency welder, high frequency sewing machine, high capacity SCR control).
 - Be aware that artificial heartbeats or magnetic data devices may be affected by the device and magnetic bars.
-



- Do not install the device adjacent to other experimental devices, electrical devices, and power terminals
-



- Do not install the device in an unventilated place. If it is not sufficiently ventilated, there is a risk of damage to the instrument due to overheating from difficult heat dissipation.
 - After installing the instrument, use the wheel castor to fix it.
 - The instrument should be installed close to the outlet for an easy to use.
-

3.2.2 Installation Location

Install the device in a place considering the following precautions.

⚠ WARNING

- Install the product on a solid and flat floor in a laboratory that is equipped with safety equipment in case of an accident.
 - Please consider sufficient installation space as the door opens only up to 140° to the left.
-

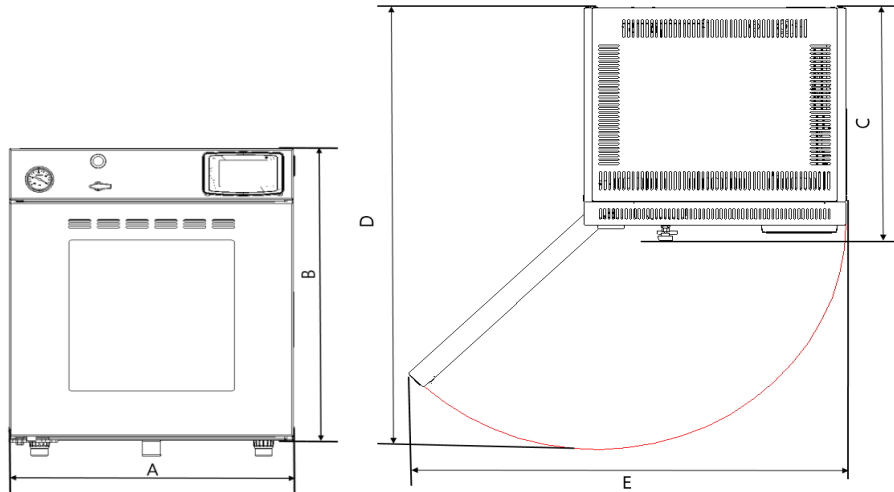
⚠ CAUTION

- Maintain adequate distance (typically over 30 cm) to avoid being too close to other devices or walls.
-

3.2.3 Minimum Space Required for Installation

In order to install JEIOTECH's products, the size and turning radius of the products must be accurately determined.

When installing this device, you should keep in mind the space of the instrument, and please secure the minimum space for the device to operate and maintain properly as shown in the figure below.



Description		Model	
		OV4-30	OV4-65
A	External Width	536	635
B	External Height	655	755
C	External Depth	522	622
D	Maximum depth when the door is opened	969	1169
E	Maximum width when the door is opened	916	1091

(Unit: mm)

3.3 Labels Attached to the Device

1) ID Label

An ID label is attached to the side panel on the right side of the instrument, showing the basic information of the instrument.
Before using the instrument, check the voltage, phase, and capacity of the power source indicated on the ID label.

2) Safety Labels

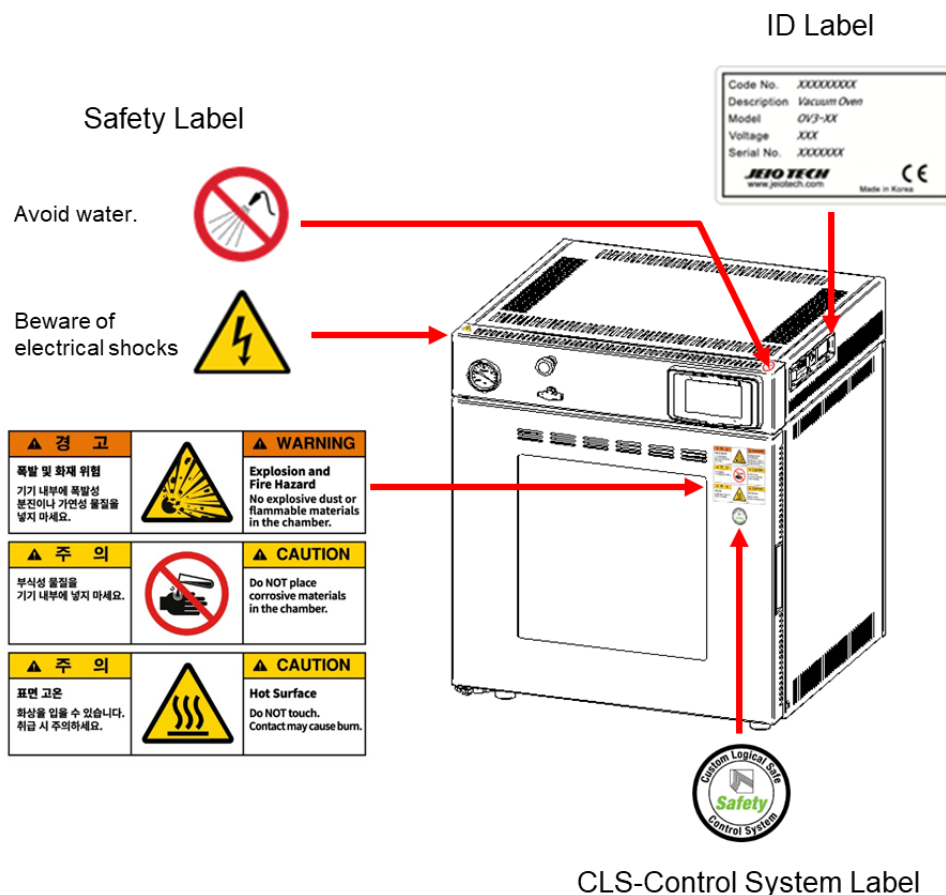
Safety labels are affixed to the instrument to provide important information about potential hazards or how to avoid them.

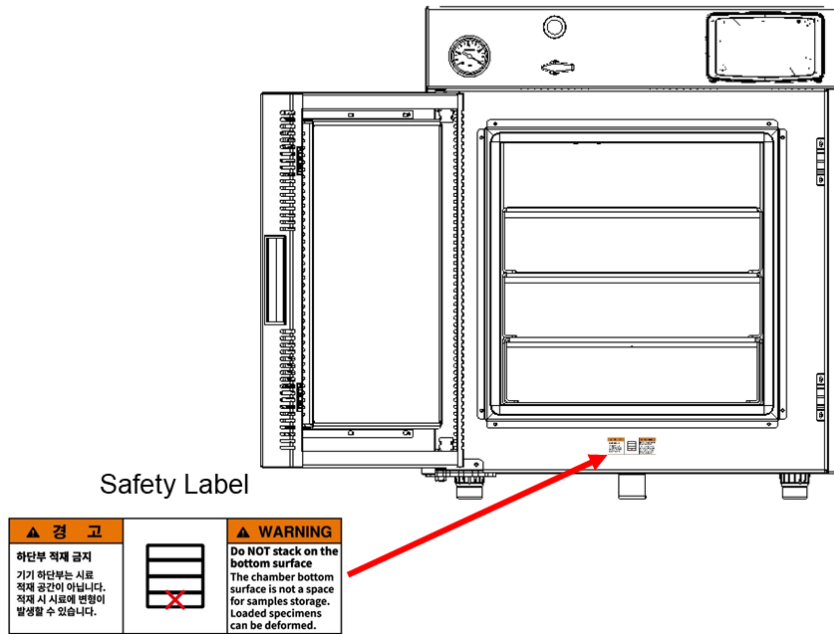
To ensure safe operation, all users should check the safety label before using the instrument, and carefully read the 1.4 Instructions for Safe Use (Required Reading).

If the Safety Label is damaged, request a new label from the JEIOTECH branch or the seller.

3) CLS(Custom Logical Safe)-Control system Label

This is a label that certifies that the instrument is applied with the CLS-Control system, the highest safety grade control device. [Refer to 2.2.2 Safety]





3.4 Power Connection

This device is designed to operate normally at rated voltage.
Before connecting the power supply, please read and observe the following warnings and cautions.

WARNING



- Check the voltage, phase, and capacity of the power source indicated on the ID label, and connect properly.
- Do not plug the device with other instruments simultaneously into one outlet.
- Never use branch sockets or double taps.
: If over current occurs, there is a risk of cable damage, damage to the device, and fire.
- If the power line is damaged, the operation of the device is prohibited.
- Improper power connections can cause damage to the unit and serious personal injury or death.
- Do not handle or touch the electrical cord or electrical parts with wet hands.
- Be sure to use a power source with a ground level of 2 or higher.
:If not grounded, it may cause serious damage to the device and human body. Also, never ground to a gas or water pipe.

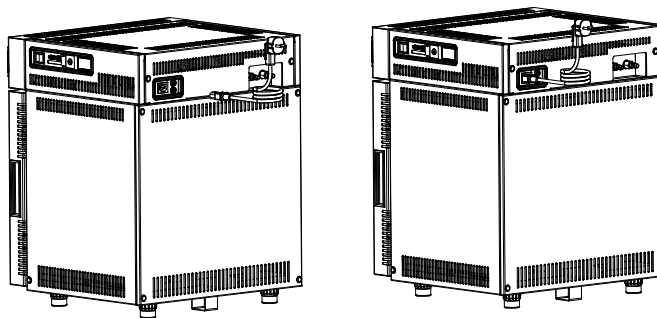
CAUTION



- When installing and operating the instrument, always use the outlet provided with the ground terminal.
- Connect the power plug tightly so that it does not shake.
- Do not place heavy object over the power cord that may press the cord under the instrument.
- After use, always turn off the main switch and unplug the power cord.

Follow the steps below to supply power to the device.

- (1) Set the power switch to Off before supplying power.
- (2) Connect one end of the power plug to the power input terminal on the back of the main unit.
- (3) Connect the other end of the power plug to a power outlet.



3.5 Precautions When Using Vacuum Oven

When using the instrument, be aware of the following precautions and warnings and observe them.

- (1) Be sure not to allow liquid such as moisture to enter the perforation of the top of the vacuum oven. Do not use liquid containers on top of the device. There is a risk of malfunction or fire.
- (2) When using a vacuum oven, the physical and chemical properties of the sample should be well checked. In other words, be sure to select a temperature lower than the boiling point of the sample in a vacuum. Also, a sublimable sample should not be selected because this is sublimed before the boiling point to block the vacuum line and damage the pump. In addition, care must be taken at the temperature of use, as decomposition of organic substances easily occurs in a vacuum.
- (3) When using a vacuum oven, it is recommended to keep the dried sample as dry as possible. When the vacuum is released, air flows into the oven. So, it is recommended to use dry air with moisture removed. For this, cold traps and chemical moisture traps can be used.
- (4) The vacuum pump that creates a vacuum state is a very sophisticated device that uses a lubricant with a very low vapor pressure (0.001 to 0.005 MPa) at room temperature. If the lubricant is contaminated with a solvent having a large vapor pressure, the performance of the vacuum pump will rapidly decrease. Therefore, these solvents must be physically removed at all stages of the vacuum pump. This will ensure that the vacuum pump is durable and effective. For this, it is recommended to use Cold trap and Particle filter.
- (5) When you want to stop the operation of the vacuum pump, you must first put the Vacuum valve handle in the Close position and then stop the pump. If the pump is stopped first, the oil in the pump may back-flow and flow into the chamber due to the vacuum inside the chamber. Even when the vacuum pump starts to operate, after starting the pump with the Vacuum valve closed, the Vacuum valve must be opened.
- (6) Cold trap and filter must be installed to prevent contamination of vacuum oil and damage to the Rotary vane pump cylinder wall.
Vacuum oil must be replaced at regular intervals (approximately 100 hours).

WARNING



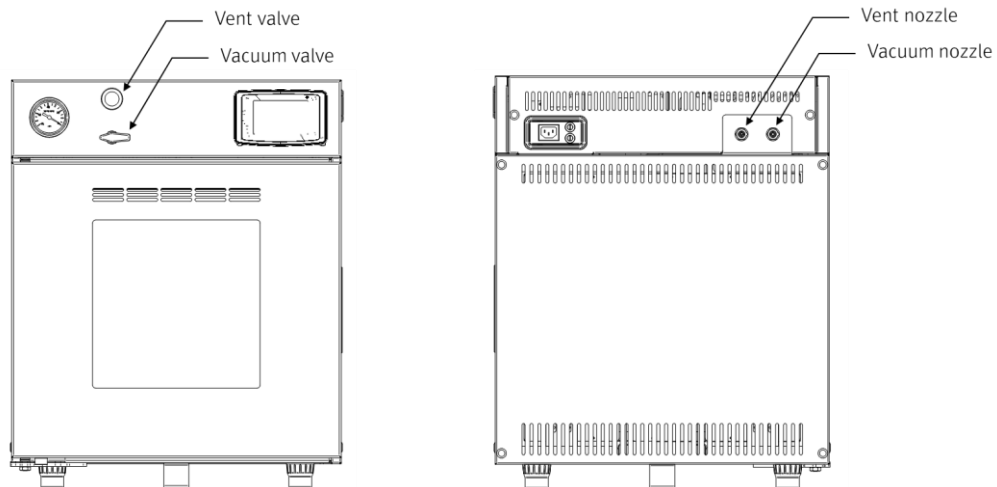
- Do not put substances that cause toxic gases inside the device.
- Do not place explosive, flammable, combustible, or oxidizing chemicals such as alcohol, benzene, or gasoline on top of the device, store it in the machine, or operate the device containing chemicals mentioned above. There is a risk of fire. This unit is not explosion-proof.
- Do not place a container with liquid on it. Liquid leakage can damage the unit.
- Do not allow moisture, organic solvents, dust, or corrosive gases to enter the control panel or inside of the device.
- Do not use the device if it generates strange sounds, smells or smoke.
- Do not use in places where there is a risk of electric leakage, water leakage or flooding
- Do not operate damaged or short-circuited equipment
- **DO NOT PLACE SAMPLES ON THE BOTTOM SURFACE** The chamber bottom surface is not an area for sample storage. Loaded specimens may deform.

CAUTION



- When the device is first started up, it must be checked continuously until normal conditions are reached.
- Be cautious of burns and wear gloves when handling samples, as residual heat may occur while the device is operating or even when the power is off.
- Before using the device, check if there are any foreign substances inside the chamber, and always keep it clean.
- Be careful not to damage the components inside the device or the system.
- Be careful not to allow high concentrations of nitric acid, sulfuric acid, sodium hydroxide or acetic acid, benzene, phenol, toluene, chloroform, cresol, acetic acid-based or chloric acid-based corrosive solvents to touch the body of the device.
- If moisture enters the unit, immediately stop operating the unit, disconnect the power cord, and request service.
- Do not insert current-flowing or combustible objects through vents formed inside or outside the device. There is a danger of fire or electric shock.
- Do not subject the device to strong shocks or vibrations.
- Avoid contact with pesticides or flammable gases.

3.6 Precautions before using Vacuum Oven



- (1) Put the sample in the chamber and close the door.
- (2) Turn the upper Vent valve handle clockwise (CLOSE) to lock it completely.
- (3) Turn the lower Vacuum valve handle to the 12 o'clock position (OPEN).
- (4) After connecting the vacuum pump hose to the Vacuum nozzle at the top of the back of the device, operate the vacuum pump to make the chamber vacuum.
- (5) When the vacuum setting is completed, first turn the lower Vacuum valve handle to the 3 o'clock position (CLOSE) and stop the vacuum pump operation.
- (6) When releasing the vacuum after using the device, turn the upper Vent valve handle counterclockwise (OPEN). At this time, the amount of air entered when the vacuum is released can be adjusted by adjusting the rotation amount of the Valve handle.

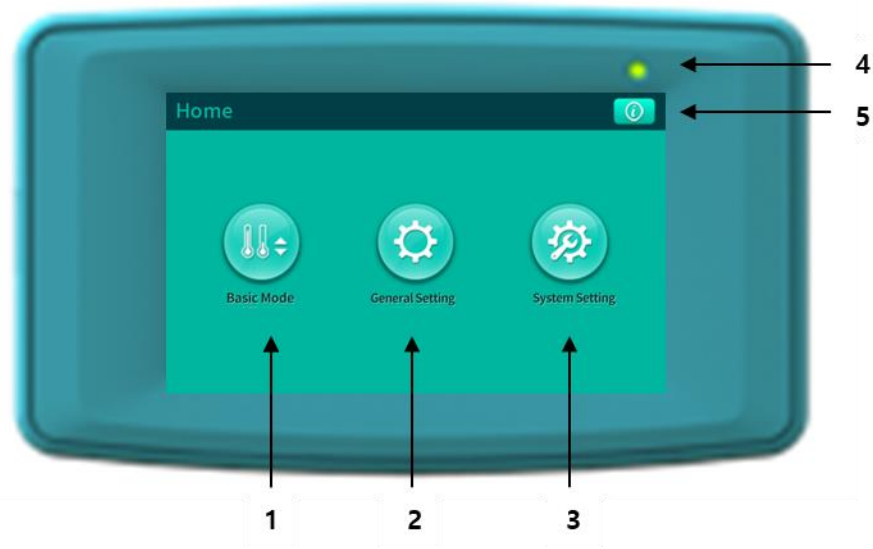
CAUTION



- When stopping the vacuum pump operation, first place the Vacuum valve in the close position. Otherwise, pump oil can flow into the chamber due to the vacuum inside the chamber.

4.0 Operation


4.1 Names and functions of the controller's home screen

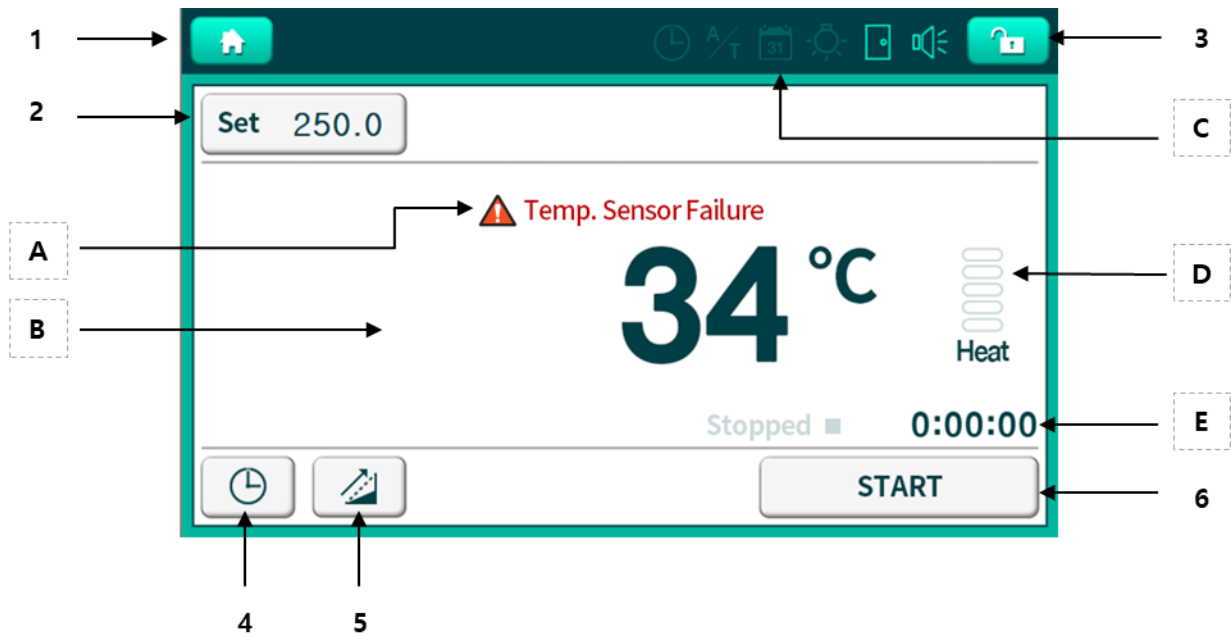


	Category	Functions	Related Chapters
1	Basic Mode	You can control the temperature with setting the temperature setting, timers[Start Schedule, End Schedule], temperature control/ shutdown, and temperature change rate functions.	4.2
2	General Setting	You can set the instrument with sound settings, date/time settings, and language selection.	4.3
3	System Setting	You can set and change the alarm settings, password settings, factory initialization, and so on.	4.4
4	Indicating LED	The green indicating LED enables to check the operation of the current instrument even when the screen is automatically turned off.	-
5	Information	You can find information about the firmware version, model name and options installed.	-

4.2 Basic Mode





The Basic mode is for controlling the internal chamber's temperature with the input value you entered.

You can move to the Basic Mode by pressing the  button to go to Home screen.









[Display window of the Basic Mode]

(1) Display

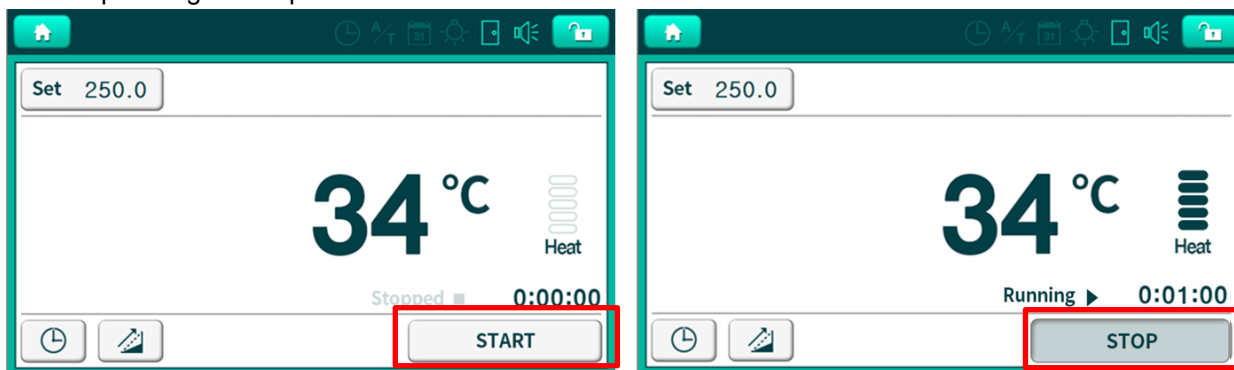
A	Warning	Caution or warning sign displays and show a pop-up notification.
B	Present Temperature	Shows the present temperature of inside the chamber.
C	Displaying the status	 Auto Tuning  Timer Setting  Door Open/ Close  Sound On/Off
D	Heating Volume	Shows the heating volume of the instrument.
E	Operation status and time	Displays the operating status and time, timer's remaining time and elapsed time, reserved status of start/ stop.

(2) Button

1		You can move to home screen. (Use the button to change the modes between Basic Mode / Program Mode, or to select menus of General Setting and Setting.) If you turn on the instrument power, the recent screen will be shown.
2		You can set the target temperature value.
3		Screen lock On/Off
4		Timer Setting: You can set the start/ stop timer.
5		Increasing rate of the temperature: You can control the rising rate of the temperature between 0 ~ 50°C per min. (Unit: °C/min)
6		The start button controls the temperature and the text will be changed to “STOP” once the instrument starts.

4.2.1 Start/ Stop of Basic mode


When controlling the instrument temperature with the target input value, please press the start button of the touch screen. Once the operation is done, please stop the temperature control by pressing the stop button of the touch screen.



NOTICE

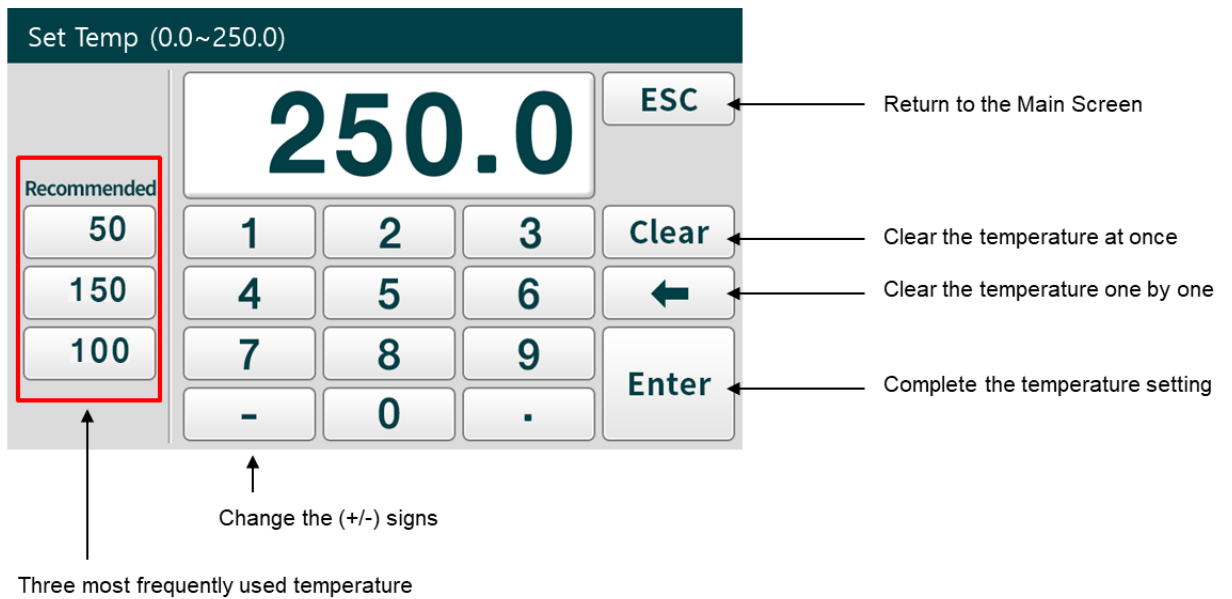
- If you operate the instrument when the door is opened, the alarm sound will be ringing and the instrument will not start. Please restart the machine with the door closed.
- If you open the door while the instrument is operating, the heater will stop, and “door open” error message will be shown without alarm sound. If you close the door within in a certain time, the instrument will continue the operation. If door is still opened even after the set time, an error message will be shown with an alarm sound. (You can set the waiting time of the door to be opened in System Seeting> Alarm) [Refer to 4.5.3 Alarm]. If you want to operate the instrument after the waiting time, please restart the instrument.

4.2.2 Temperature Setting

- (1) First, press the “Basic Mode” button in the home screen, and then press the  button placed on the upper left corner.
- (2) You can input the temperature value if you enter the ‘Temperature Setting’ screen. Once you press the “Enter” button, the set temperature is updated with the input value. The screen returns to the basic mode.

Press “Enter” to switch your screen to basic mode while updating the temperature with your input value.

(Press “ESC” if you would like to cancel the temperature update.)



※ Temperature Recommendation Function

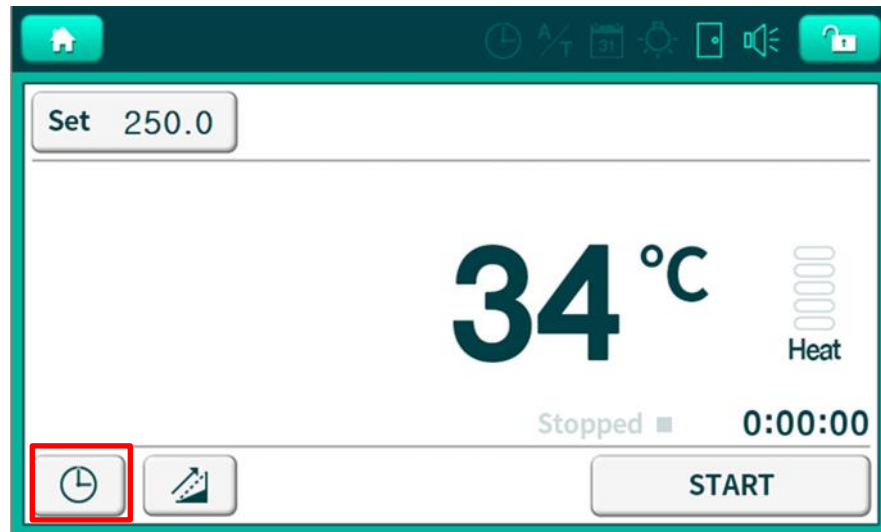
The system recommends and displays three frequently-using temperatures. Select one of the recommendations to update the temperature without pressing the “Enter” button.


NOTICE

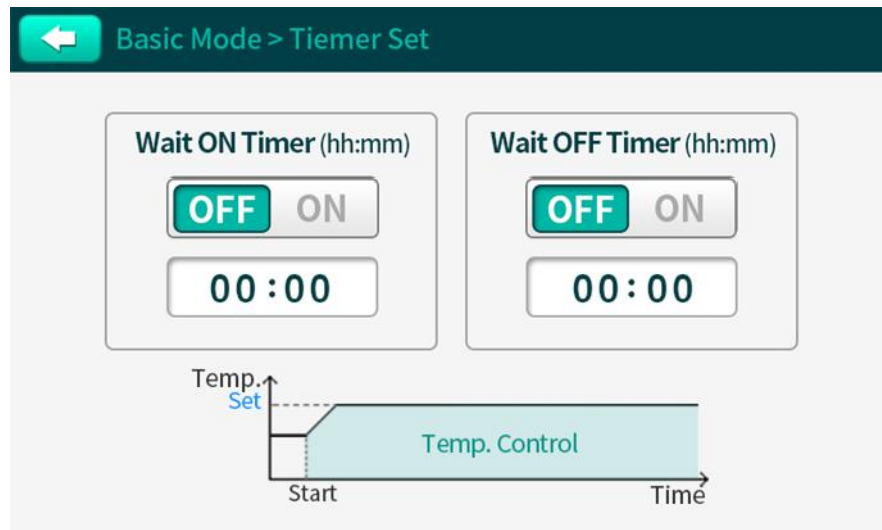
- The set temperature can be entered from 0 to 250°C, and the temperature control range of the device is Amb. It is +10 ~ 250°C.
- Set the temperature and start by pressing the START button.
- If the set temperature is changed through (1) to (3) during device temperature control, the changed set temperature applies immediately.
- Recommended temperature is automatically recommended for frequently used temperature.

4.2.3 Timer Setting and the Operation

The instrument has an embedded scheduling timer for initiating the instrument's temperature after a set time, and terminating the temperature for a set time after reaching the set temperature.

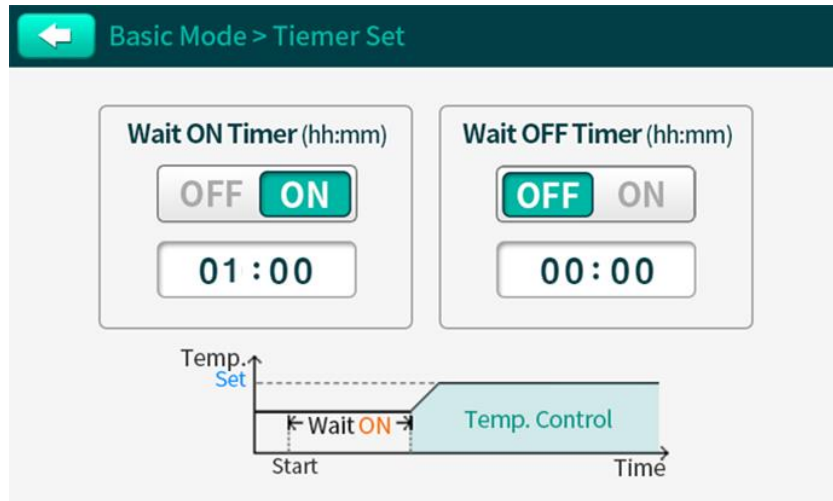




- (1) You can switch the screen to the “Timer Set” window by pressing  button from the Basic Mode.

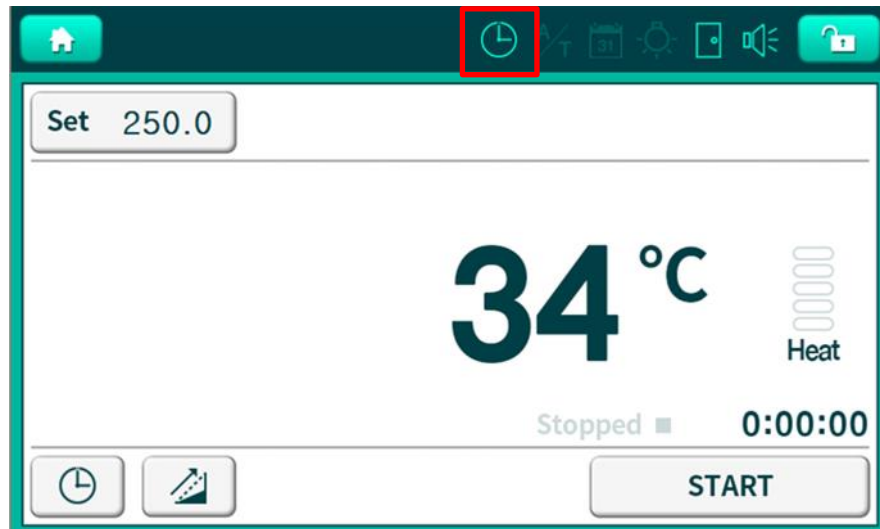


[Initial screen of Timer Set]

- (2) Activate the “Wait ON Timer” and “Wait OFF Timer” from “OFF” to “ON”.
- (3) Enter the “Timer Set” with the unit of “hh:mm”.

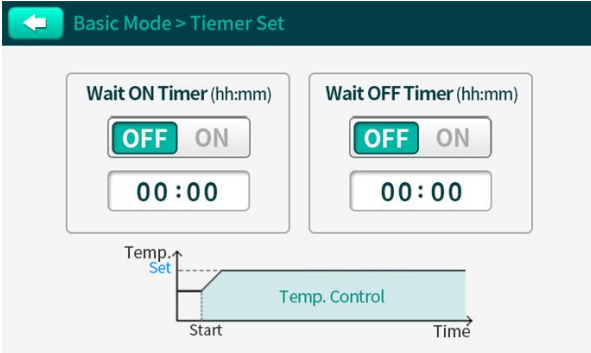
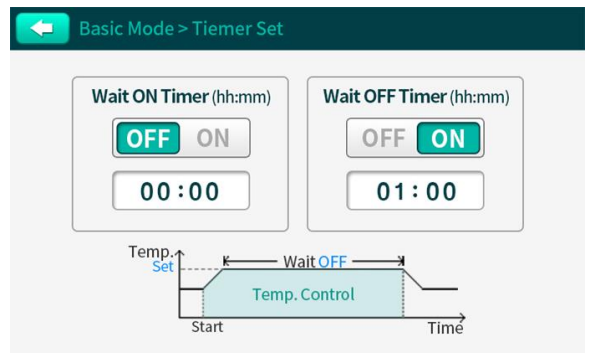
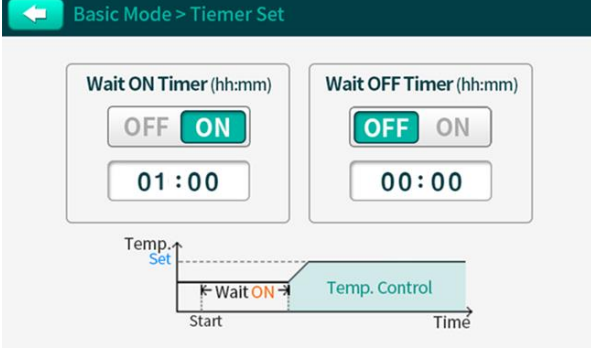
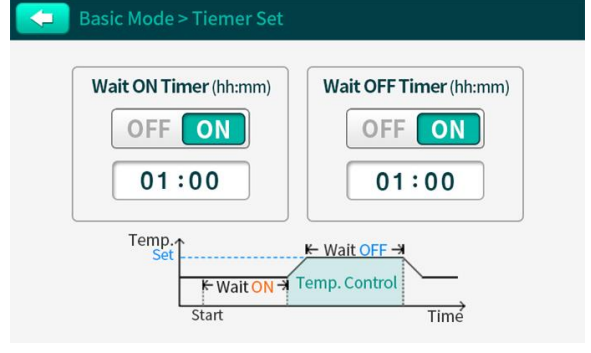


- (4) You can return to the “Basic Mode” screen by pressing  button with the start/ end reserved time applied. When the timer setting is completed, the icon,  will be shown on the screen.



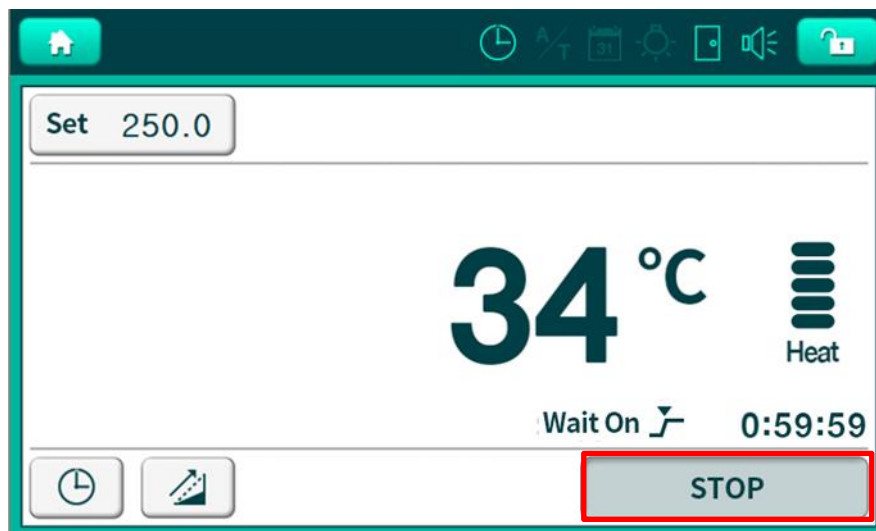
NOTICE

How to reserve the start/ end timer

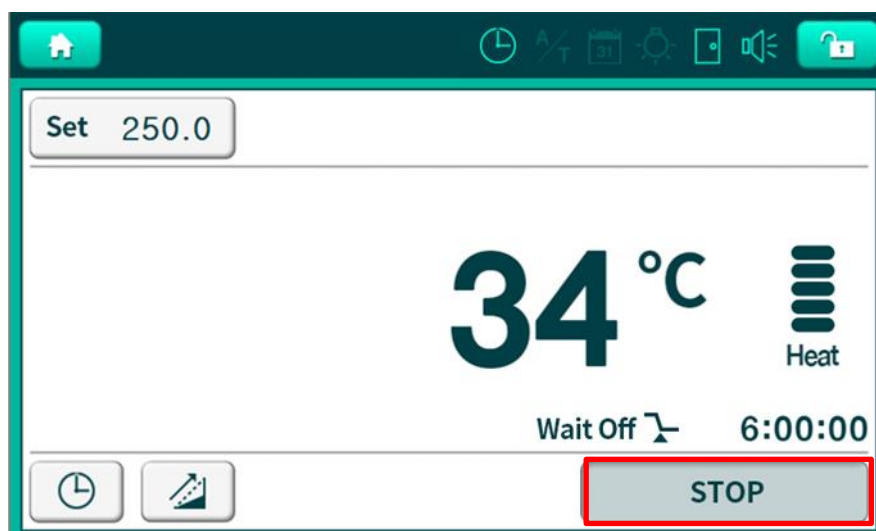
<p style="text-align: center;">In case of Wait ON Timer is OFF / Wait OFF Timer is OFF</p>  <ul style="list-style-type: none"> - The initial setting is shown as above. - These are the initial values of the “Timer Set” that will not be applied to the instrument. 	<p style="text-align: center;">In case of Wait ON Timer is OFF / Wait OFF Timer is ON</p>  <ul style="list-style-type: none"> - If you only set the Wait OFF timer, the temperature will maintain only for the entered time once it reaches the target temperature. - The temperature control will be terminated if all the reserved end time is passed.
<p style="text-align: center;">In case of Wait ON Timer is ON / Wait OFF Timer is OFF</p>  <ul style="list-style-type: none"> - If you only set the Wait ON Timer as ON, the instrument waits for the input value before raising the temperature as the set value. - In this case, the heater will be continuously working to maintain the set value until the user stops the heater. 	<p style="text-align: center;">In case of Wait ON Timer is ON / Wait OFF Timer is ON</p>  <ul style="list-style-type: none"> - If you turn on both Wait ON Timer and Wait OFF Timer, you can set the delay time before starting the heater and also set the maintaining time to last the set temperature. - In this case, the Wait OFF Timer will be start one the target temperature is reached, which means there will be extra heating timing between Wait ON time and Wait OFF time.

4.2.4 Checking the Operation after Timer Setting

- In case Wait ON Timer is set
 - (1) After setting the timer, press start button to start the Wait ON Timer.
 - (2) Once the Wait ON Time has passed, the heater operates to reach the target temperature.
(If you set up the Wait OFF Timer, it starts automatically once the temperature has reached.)



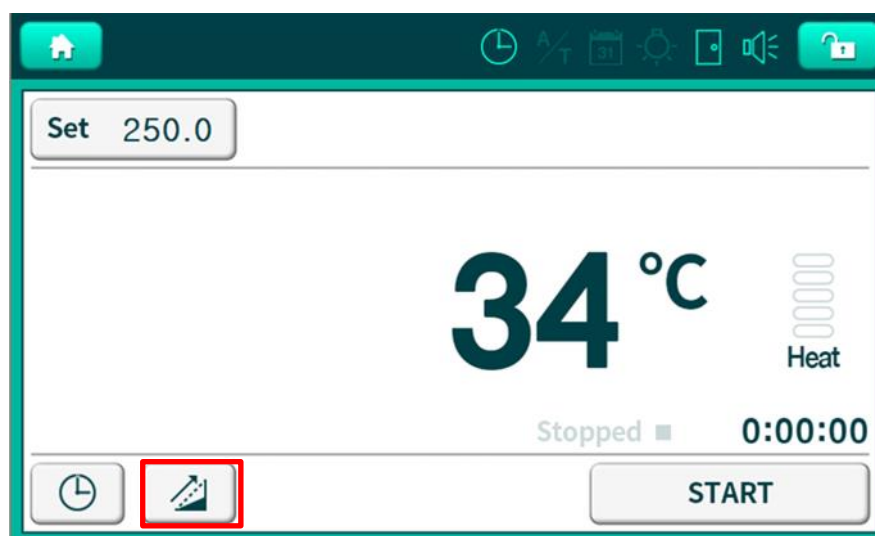
- In case Wait OFF Timer has set
 - (1) If you press the start button while the Wait OFF Timer has set, the instrument starts the heating operation with the termination time displayed.
 - (2) The Wait OFF Timer starts once the target temperature has reached.
 - (3) Once the Wait OFF Timer reaches its input time, the instrument stops operation.



NOTICE

- If the Wait ON Timer and Wait OFF Timer are both set, the activated timer and the remaining time will only be shown in the display.
- If you press the start button when the instrument is not operating, the timer starts the temperature control according to the Wait On Timer/ Wait OFF Timer.
- You can set the WAIT OFF Timer while the instrument is running.
- If you set the Wait OFF Timer while the instrument is in operation, the new timer will be applied immediately without having to press the Start button again.
- If you want to change the end schedule setting value during timer operation, you must turn off the Wait OFF Timer and reset the process.

4.2.5 Setting the Temperature Change Rate



The Temperature Change Rate is a function to protect the reagents or the instrument from the heat damage of the rapid temperature change.

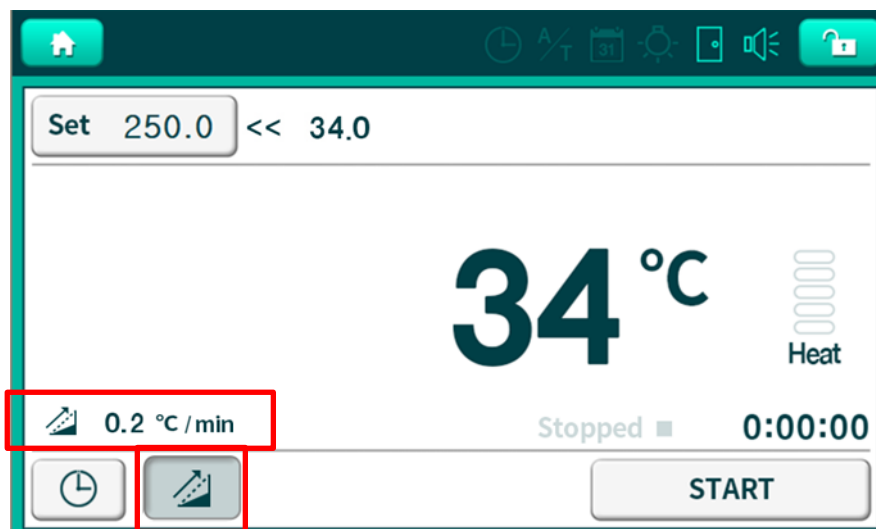
4.2.5.1 Changing the value of temperature change rate

Go to 'System Setup > Temperature', to set the temperature change rate value with the unit of Celsius per minute ($^{\circ}\text{C}/\text{min}$). The initial value of the temperature change rate is $6^{\circ}\text{C}/\text{min}$ and the setting value of the range is between 0 and $50^{\circ}\text{C}/\text{min}$. [See 4.4.1 Temperature & Temperature Change Rate]

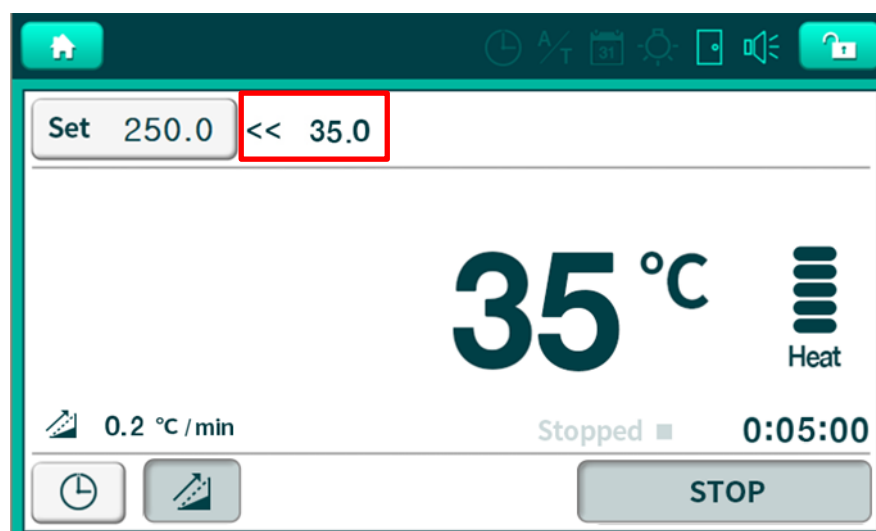
4.2.5.2 How to set the temperature change rate.

Once you select the temperature change rate function, press the start button.

- (1) Once you press the button, the screen shows you the value on the left bottom corner that you have set from the menu 'System Setup > Temperature.'



- (2) Once you press the start button, the heating operation will be started and you can check the temperature change rate in a real time.



NOTICE

- The maximum temperature change rate may differ depends on the product models. Even though a user has set the temperature change rate, the instrument will operate with its maximum output value of the temperature change rate. If the input temperature change rate is greater than the maximum instrument's output value, the instrument's maximum output value will be applied.
- We recommend you to select the temperature change rate function firstly and then press the Start button for the instrument's stable temperature control. However, if you press the Start button while the temperature change rate function is running, a sudden temperature change may occur, but soon the temperature control will begin with the saved temperature change rate.

4.2.6 Instantaneous Outage Recovery Features


If power is restored within 30 seconds of a instantaneous power outage, please follow the below procedure.

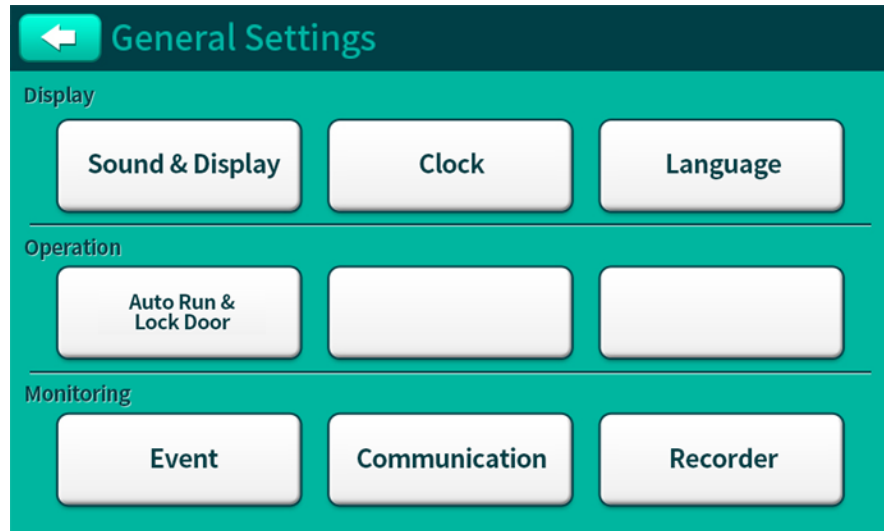
Before the Instantaneous Outage	Operation after Recovery from Instantaneous Outage in Basic Mode Control
Stationary	Stop
In operation	Operating the Instrument
Wait ON Timer is On	The elapsed time of the Wait ON Timer will not be saved, and will be started with the initial value.
Wait OFF Timer is On	The elapsed time of the Wait OFF Timer will not be saved, and will be started with the initial value.

Before the Instantaneous Outage	Operation after Recovery from Instantaneous Outage in Program Mode Control
Stationary	Stop
In operation	Restart the operation after recovering the process step, elapsed time and repeating cycle. If the process step is not yet started, it restarts from the beginning.
In case temperature/ timer limit is set	Proceed the current step after releasing the temperature/ time limit.
Maintaining by the maintain button	Release the maintaining function and proceed the step.
In case the temperature is maintained by the function in Closure Mode	Proceed the operation by keeping the maintaining the status.

4.3 General Settings

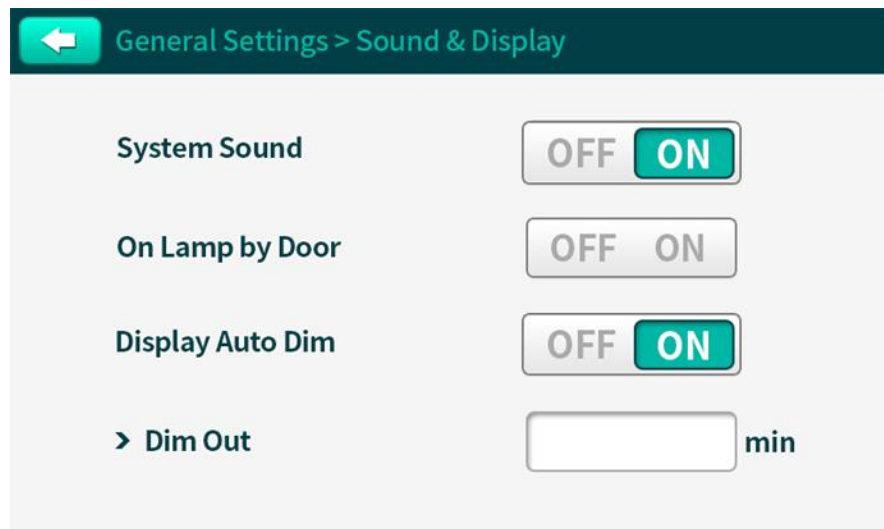
In General Settings, you can check and change the settings for Sound & Display, Clock, Language, Auto Run & Safety Lock Door, Event, Communication,

Pressing the General Settings  button in the home screen window takes you to the General Settings.



4.3.1 Sound & Display

In Sound & Display, you can set the sound generated when the screen is touched, the display light, and the Display Auto Dim function.



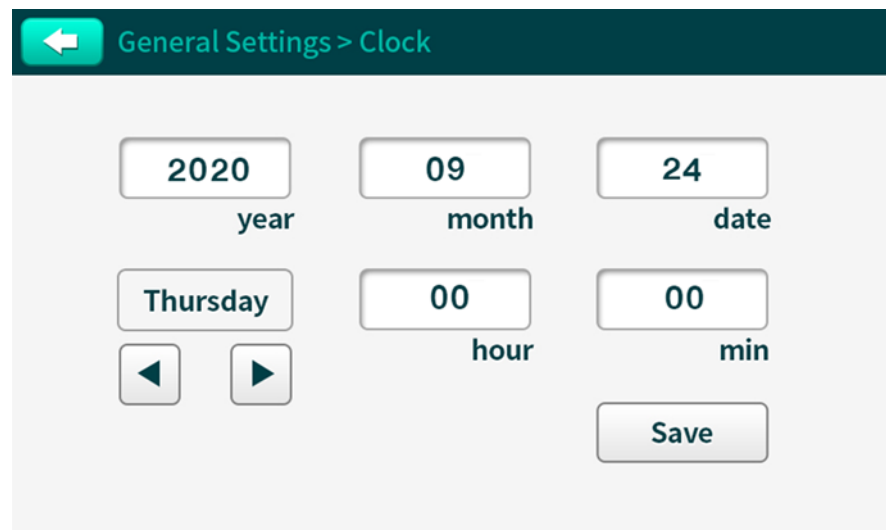
Item	Function	Input Value	Default
Sound Settings	Set the System Sound (touch screen sound). Even if it is set to OFF, an alarm sound occurs.	Off / On	ON
Display Auto Dim	Set the display Auto Dim function. If the touch screen is not touched for the entered time, the display turns off automatically.	Off / On	ON
Dim Out	Set the time for the display to turn off automatically.	0 ~ 30min	1


NOTICE

- OV4 Series does not support the automatic lighting function.


4.3.2 Clock

The Clock is a function that sets the time within the device. The time set in the Clock is the basis for the date and time of the event recording [see 4.4.6 Event]. (The default value is as shown in the following screen).



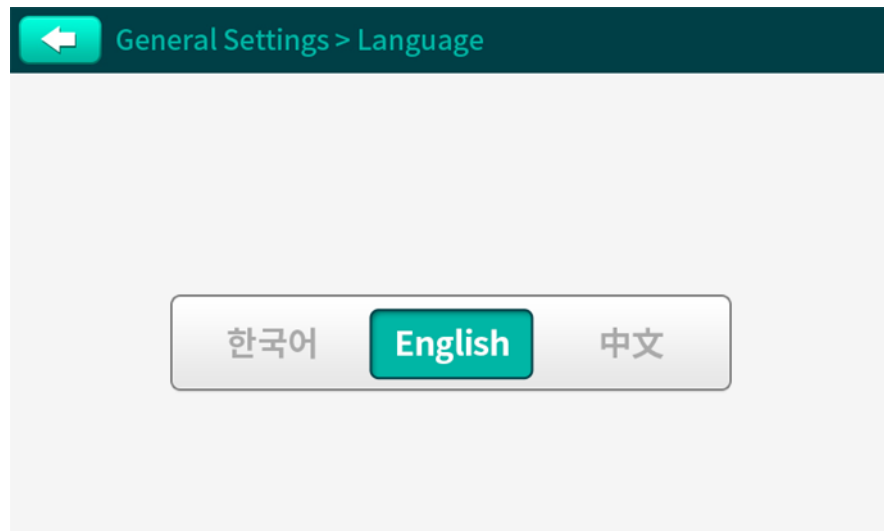
- (1) Choose a input field that you want to change among year, month, day, hour and minute.
- (2) You can enter the value when the keypad window pops up.
- (3) You can select the day of the week with the left and right arrow buttons.
- (4) Press the  button to save the changed value.

NOTICE

- If you press  button before saving, it cancels the changes and returns to the previous screen.

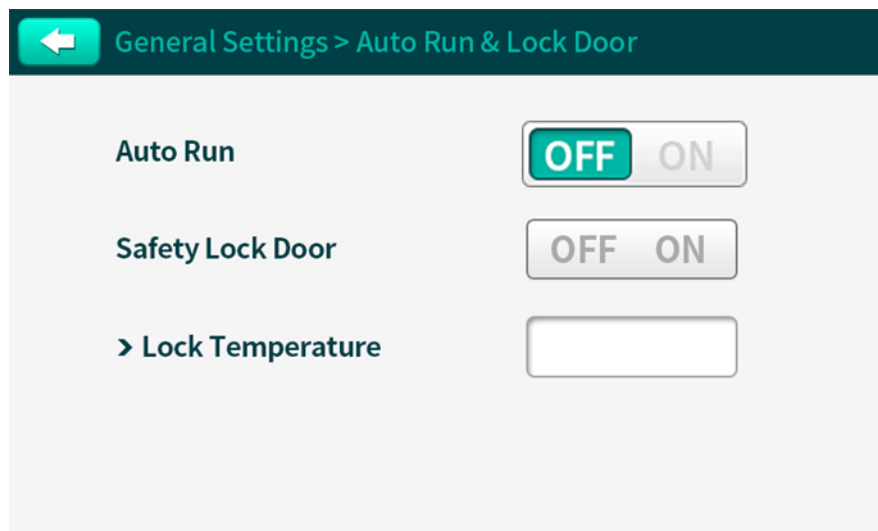
4.3.3 Language

You can set the default language that appears on the device. You can choose among Korean/English/Chinese (Chinese will be supported later).



4.3.4 Auto Run & Door Lock

When power is turned off and restored after more than 30 seconds, Auto Run function makes the user set the function to determine whether or not to operate by remembering the state before the power turns off.



Item	Function	Input Value	Default
Auto Run	When the power is turned off for more than 30 seconds during temperature control and restarts, set the function to automatically run at the previously set temperature.	Off / On	OFF

NOTICE

- OV4 Series does not support the safety lock door function.

NOTICE

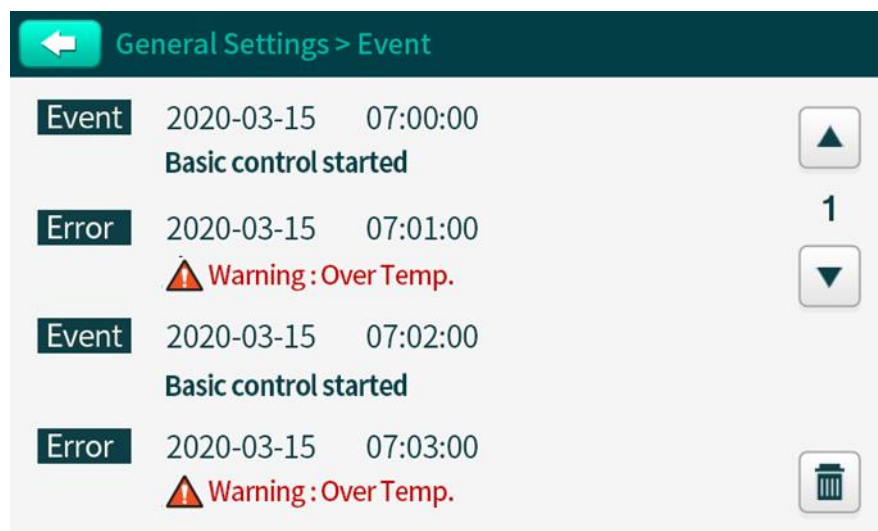
If the user sets the Auto Run and the power is restored after the device is turned off for 30 seconds or more during temperature control, follow the procedure below.

Previous States	Operation in Basic Control	
	Auto Run Off	Auto Run On
During Stop	Stop	Stop
During Operation	Stop	Operation
Wait ON Timer	Stop	The elapsed time of the Wait ON Timer is not be restored and returns to the initial setting.
Wait OFF Timer	Stop	The elapsed time of the Wait OFF Timer is not restored, and starts from the beginning.


※ Refer to [4.2.6 Instantaneous Power Failure Recovery Function] for operation by instantaneous power failure (recovery before 30 seconds).

4.3.5 Event

Event is the function to indicate the start of control and errors occurred in the device.



The latest event occurrence and time are displayed. Up to 4 events can be displayed on one screen, and you can move up to 9 pages by arrows. It can record up to 36 events.

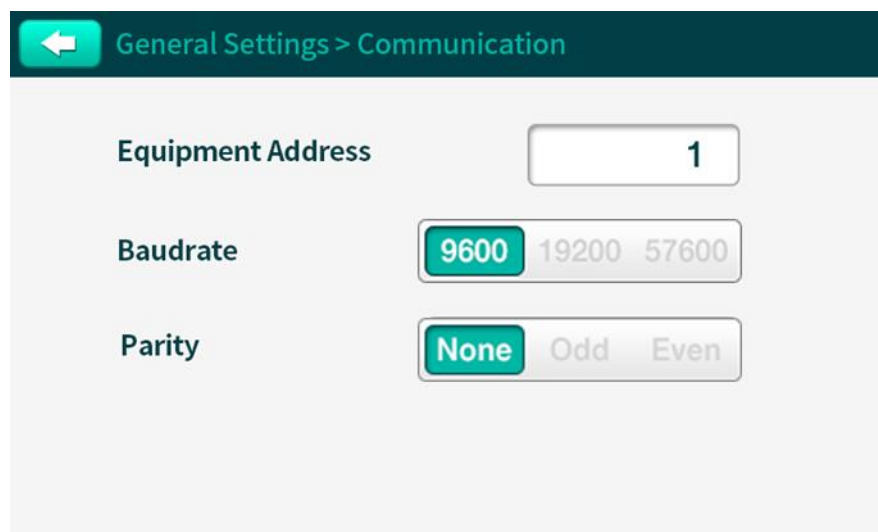
Either pressing the  button or turning off the power clears all the recorded events.

NOTICE

- If there are more than 36 event records, they are automatically deleted sequentially from the oldest.
- Click the "Delete" button to delete all existing records of the Event History.
- All event history will be deleted once the instrument power is turned off.

4.3.6 Communication

It is the function that allows communication settings with LC-GreenBox (Option).



The screenshot shows a mobile application interface for 'General Settings > Communication'. It features three rows of settings:

- Equipment Address:** A text input field containing the number '1'.
- Baudrate:** A selection menu with three options: '9600' (highlighted in green), '19200', and '57600'.
- Parity:** A selection menu with three options: 'None' (highlighted in green), 'Odd', and 'Even'.

Item	Function	Input Value	Default
Equipment Address	Set communication Address.	1~255	1
Baud Rate	Set Communication Rate.	9600,19200,57600	9600
Parity	Set Communication Parity.	None, Odd, Even	None

When using the LC-GreenBox, the Equipment Number must be set to the same number (1~4) you want to connect to the LC-GreenBox. Set the Baud Rate 9600 and Parity None.


Check the user manual of LC-GreenBox for more information.

NOTICE

- To connect the JEIOTECH Software to the MF2 instrument, enter the same port number (ex COM 3) that is found on the computer screen [see 8.2 Program and How to Connect Equipment]
- When using the LC-GreenBox, the Equipment Number must be set to the same number (1~4) you want to connect to the LC-GreenBox. Set the Baud Rate 9600 and Parity None. Check the user manual of LC-GreenBox for more information.

4.4 System Settings

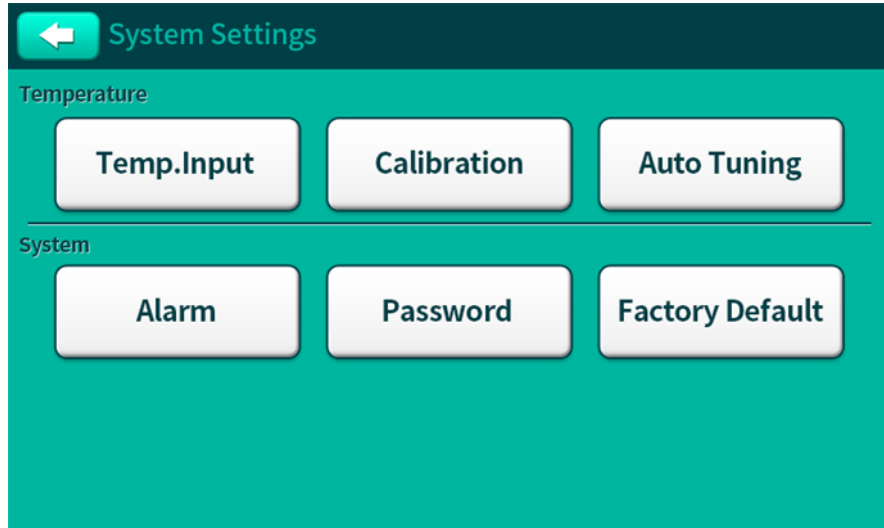
In the System Settings, you can check and change the settings for Temperature Input, Calibration, Auto Tuning, Alarm, Password, and Factory Default.

- (1) If you press the System Settings  button on home screen, the password window appears.



The image shows a password entry screen with a dark teal header containing the text "Enter Password(0 ~ 9999)". Below the header is a white input field. To the right of the input field is a button labeled "ESC". Below the input field is a numeric keypad with buttons for digits 1-9, 0, and a decimal point. To the right of the keypad are three buttons: "Clear", a left-pointing arrow, and "Enter".

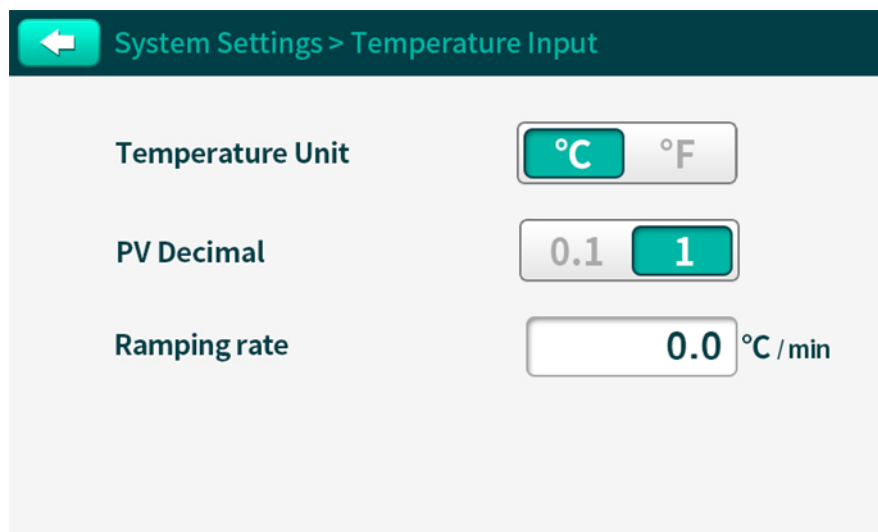
- (2) After entering the set password, press the Enter button to go to the System Settings window.
※ The initial password is set to '0000'.



The image shows the "System Settings" menu. At the top is a dark teal header with a left-pointing arrow and the text "System Settings". Below the header, the menu is divided into two sections: "Temperature" and "System". The "Temperature" section contains three buttons: "Temp.Input", "Calibration", and "Auto Tuning". The "System" section contains three buttons: "Alarm", "Password", and "Factory Default".

4.4.1 Temperature & Temperature Change Rate

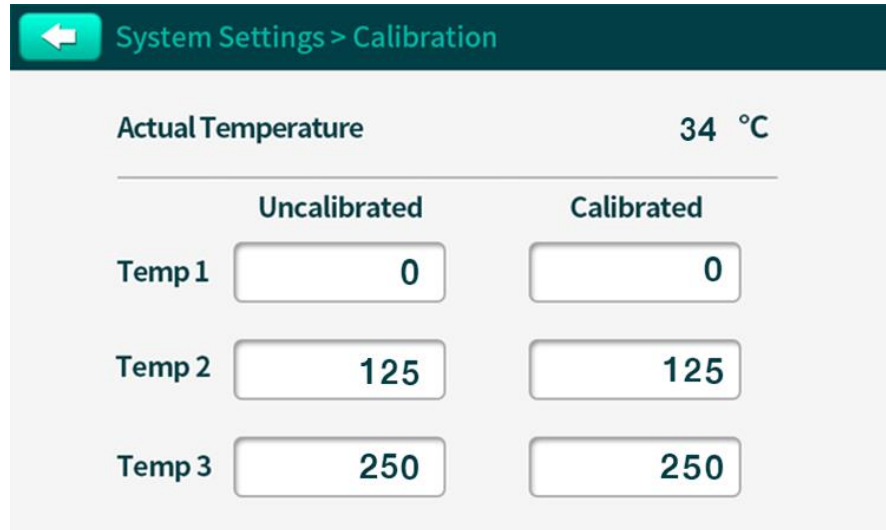
Temperature & Temperature Change Rate can be set for the temperature unit and decimal point unit displayed on the screen. You can also enter the value of the rate of temperature change used in the basic mode.



Item	Function	Input Value	Default
Temperature Unit	Set the unit of temperature.	°C / °F	°C
PV Decimal	Set the decimal place.	0.1 / 1	1
Ramping Rate	You can set the rate of temperature change that increases per minute. Click the temperature field to display a window where you can enter the temperature.	0~50°C	-

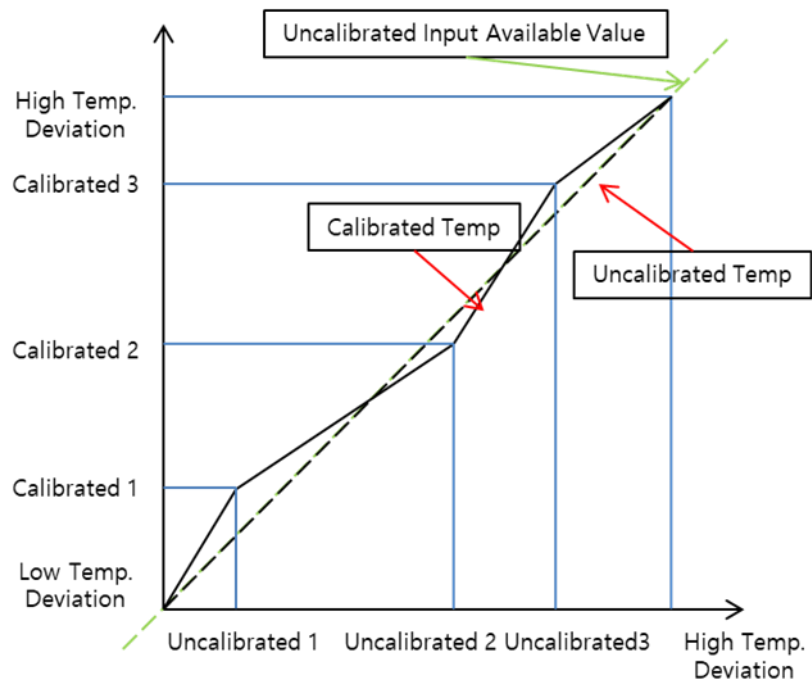
4.4.2 Calibration

When measuring the temperature inside the chamber by using the user's temperature sensor, if there is a temperature difference between the temperature sensor inside the device and the user's temperature sensor, you can calibrate the temperature sensor inside the device according to the user's temperature sensor. It is possible to calibrate temperatures accurately at up to three temperature points.



Actual Temperature		34 °C
	Uncalibrated	Calibrated
Temp 1	0	0
Temp 2	125	125
Temp 3	250	250

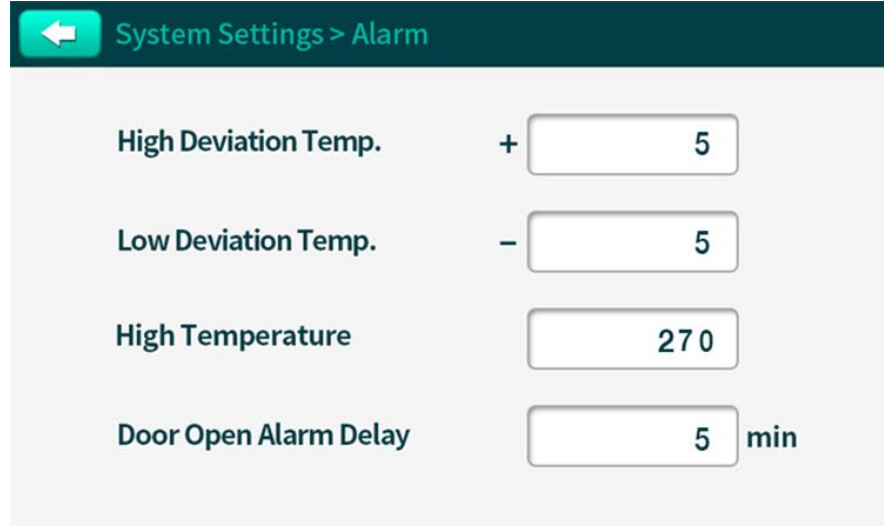
- (1) Specify Temperature 1, Temperature 2, and Temperature 3 to calibrate the temperature sensor inside the device and record them in the note (However, Temperature 1 < Temperature 2 < Temperature 3).
- (2) Go to the Basic Mode and set the set temperature as the Temperature 1 to be calibrated.
- (3) When the temperature converges to the set temperature and becomes stabilized, measure the internal temperature using the external temperature sensor and record it in the note.
- (4) Proceed with (2)~(3) by changing Temperature 1 to Temperature 2 and Temperature 3 and record the temperature measured by the external temperature sensor in the note.
- (5) You can go to System Setup> Calibration and enter Temperature 1, Temperature 2, and Temperature 3 in the Uncalibrated column. Also, enter the internal temperature measured by the external temperature sensor in the Calibrated column to complete the temperature calibration.



Item	Uncalibrated Input Value	Default
Temperature 1	-20 ~ (Value in Temperature 2 - 1)	0
Temperature 2	(Value in Temperature 1 + 1) ~ (Value in Temperature 3 - 1)	125
Temperature 3	(Value in Temperature 2 + 1) ~ 270	250

4.4.3 Alarm

It is a function to generate an alarm when the temperature is above or below the user-specified temperature or when the door is opened [see 4.5.3 Alarm Display and Pop-up Notification Function].



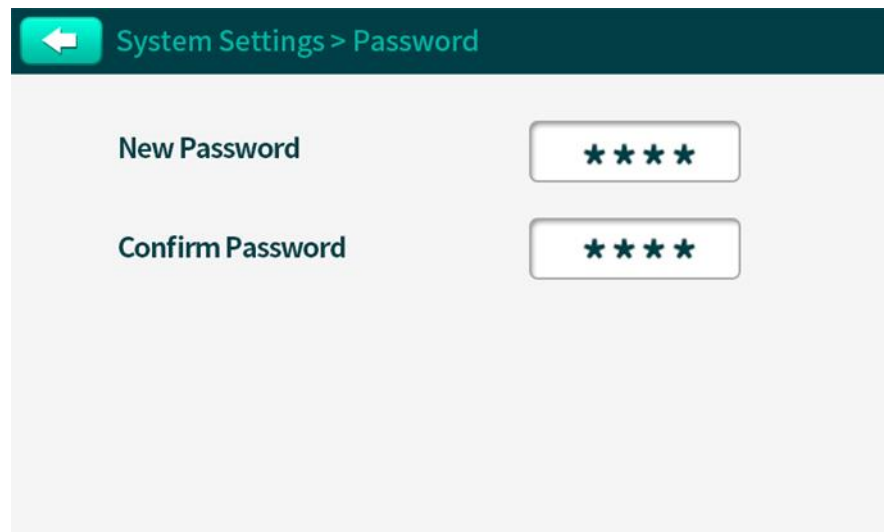
The screenshot shows the 'System Settings > Alarm' interface. It contains four adjustable settings:

- High Deviation Temp.:** Set to +5
- Low Deviation Temp.:** Set to -5
- High Temperature:** Set to 270
- Door Open Alarm Delay:** Set to 5 min


Item	Function	Input Value	Default
High Deviation Temperature	Set the upper limit of temperature deviation. If the actual temperature becomes higher than the target temperature + allowable upper limit temperature, an alarm is generated.	0 ~ 250°C	5
Low Deviation Temperature	Set the lower limit of temperature deviation. If the actual temperature becomes lower than the target temperature - allowable lower limit temperature, an alarm is generated.	0 ~ 250°C	5
High Temperature	Set the absolute upper limit temperature. An alarm occurs if the actual temperature exceeds the absolute upper limit temperature.	0 ~ 270°C	270
Door Open Alarm Delay	Set the alarm for the door open delay time. If the door opens exceeding Door Open Alarm Delay, an alarm occurs.	Off(0)~30min	5

4.4.4 Password

Click the Password button in the System Settings window.



The initial value is set to '0000'.

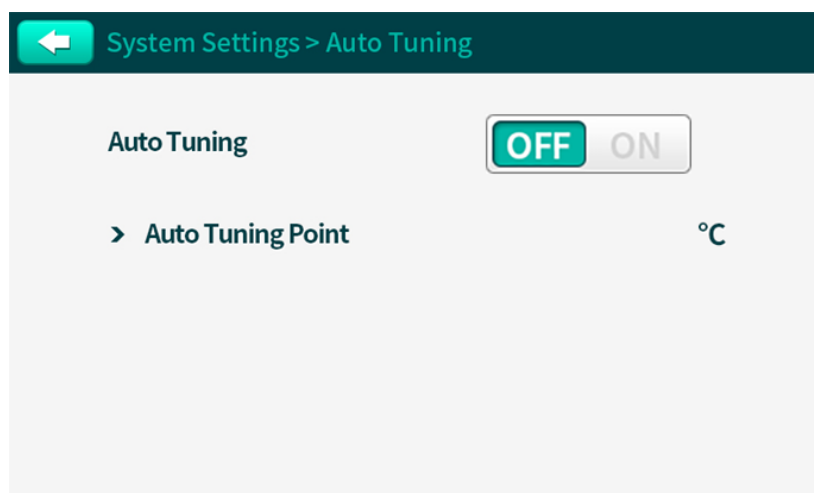
Enter the desired password and press the back button  to complete the saving.

4.4.5 Auto Tuning

It is a function to update the PID control parameters for temperature control. Optimum temperature control can be performed at the main operating temperature. The product is factory-set to perform temperature control in the temperature control area.

When using the device, if the device does not properly control the temperature due to a rapid change in the operating environment (such as right after the purchase of the device or the reinstallation due to relocation) with respect to the user's main operating temperature, Auto Tuning can be done for accurate temperature control.

Auto Tuning temperature is performed by setting the target temperature value in the Basic Setting Mode and starting the control, then activate the Auto Tuning button to ON in System Setup> Auto Tuning.




[How to set Auto Tuning]

(1) After setting the temperature in Basic Mode, press the start button.

(2) It is executed when the ON button is activated in the System Settings> Auto Tuning screen. The Auto Tuning function cannot be used when operation is stopped or in program control.

(3) It moves directly to the operation display window of Basic Mode, and the icon

 on the top status bar blinks indicating that Auto Tuning is running.

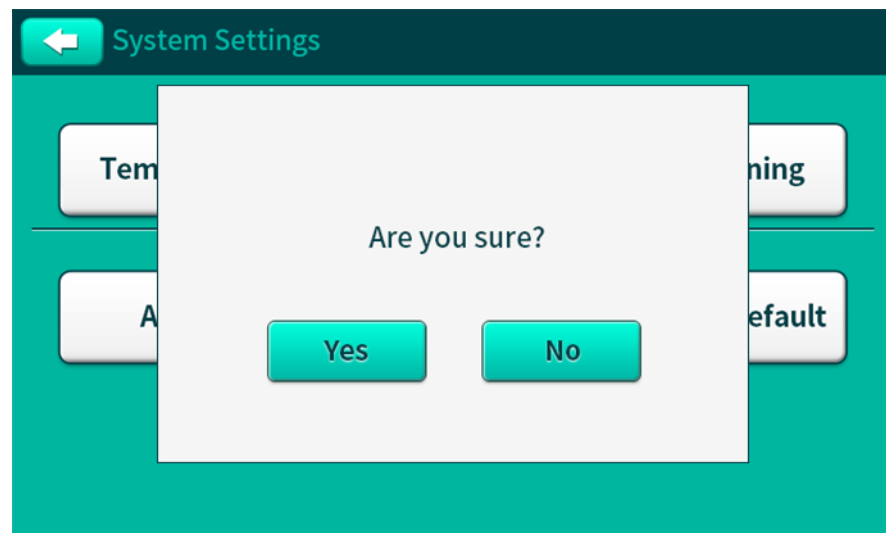
(4) When Auto Tuning is completed, the icon  on the top status bar disappears and the Auto Tuning value is automatically saved.

NOTICE

- Auto Tuning may take tens of minutes or hours depending on the set temperature.
- Do not turn off the power of the device while Auto Tuning is in progress.
- During Auto Tuning, it is recommended that the difference from the ambient temperature be at least 30 degrees. If the Auto Tuning temperature is similar to the ambient temperature, the reliability of the optimal parameter value may be reduced.
- Auto Tuning is not available when temperature control is stopped in Basic Mode or under temperature control in Program Mode.

4.4.6 Factory Default

It is a function that initializes all values in the device at once.



If you press the reset button, a pop-up notification appears and confirms whether or not to proceed with Factory Default.


This function initializes all settings changed in the Basic Settings, General Settings, and System Settings into the Factory Default values. When performing Factory Default, please be careful that all the values such as Auto Tuning and Temperature Calibration in the System Settings and General Settings are initialized.

4.5 Safety Function

(1) Over Temperature Limiter (Refer to 4.6 Temperature Limiter)

If the temperature of the sensor exceeds the Over temperature limit, operation stops with a beep. When the power is cut off, turn the Over Temperature Limiter on controller to set temperature at least 15% above the set temperature, and press the START button to restart the device.

(2) Lock









This  button turns the lock function on/off so that the touch screen cannot be used.

(3) Glass Tube Fuse

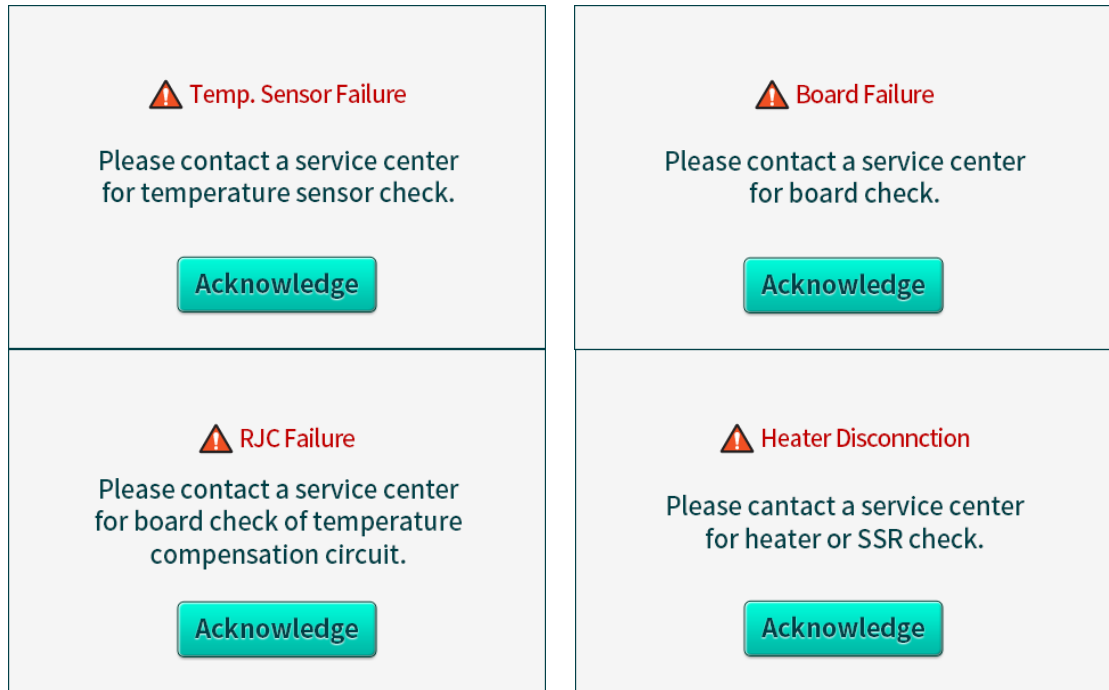
If an overcurrent occurs in the device, the built-in fuse is shorted and the device's power is cut off. Replace the fuse by referring to 5.3 Fuse Replacement.

(4) Alarm Display and Pop-up Notification Function

This device provides Alarm Display function as shown in the table below for various states of the device.

1	 High Temp. Deviation	Alarm displays when the actual temperature is higher than the target temperature + allowable upper limit temperature
2	 Low Temp. Deviation	Alarm displays when the actual temperature is lower than the target temperature – allowable lower limit temperature
3	 Warning : Over Temp.	Alarm displays when the temperature is over the absolute upper limit temperature that the device set
4	 Heater Disconnction	Alarm displays when there is a problem with the heater or SSR
5	 High Temp.	Alarm displays when the temperature of the device is higher than the temperature set in Over Temp Limit.
6	 Temp. Sensor Failure	Alarm displays when there is a problem with the temperature sensor.
7	 Board Failure	Alarm displays when there is a problem in the temperature detection circuit.
8	 RJC Failure	Alarm displays when there is a problem with the temperature compensation circuit.

In addition, if a problem occurs with the device during the system use, the following pop-up windows are provided to give information on problem solving. Check the notification message and please contact a service center referring to 9.4 Service Contact.



4.6 Temperature Limiter

The Temperature Limiter is a device to prevent fire due to overheating of the machine. If the temperature of the heater rises abnormally above the temperature set in the Temperature Limiter, the temperature control is stopped, and a warning window is displayed with a beep.



[Temperature Limiter]

※ If you want to use the Temperature Limiter as a temperature limiter for sample protection, set it in the following order.

- (1) After setting the temperature inside the device, press the Start/Stop button to start the device.
- (2) When the set temperature is reached, stabilize the equipment for a certain period of time.
- (3) Turn the red knob counterclockwise using a screwdriver. Stop the knob when a warning window appears on the display with a beep.



(4) Turn the red knob clockwise to set it at least 15% above the set temperature. (If you turn the knob clockwise, you can see that the contact works on the Temperature Limiter.)

(5) Press the Start/Stop button twice.

NOTICE

- If a beep sound and an 'Over temp' warning window is displayed due to overheating during temperature control, check the warning window and fix the problem. When the temperature goes down, it operates again. If you need to continue the same temperature control, turn the red knob on the Temperature Limiter to set it at least 15% above the set temperature, and press the Start button once to restart the device.

5.0 Maintenance

5.1 Inspection Cycle

Category	Inspection Cycle				
	Daily	Weekly	Monthly	Quarterly	Yearly
General Checklist					
Power Cord					
Check the instrument and the power connection	•				
Check the damage of the power cord	•				
Cleanness of external part			•		
Cleanness of internal part		•			
Cleanness of accessories		•			
System (Control) Related Checklist					
Automatic tuning				•	
Temperature calibration					
Check the temperature offset value					•
Calibrating actual temperature/ displaying temperature					•
Check temperature setting value	•				
Check dedicated S/W Synchronization	•				
Check function of controller				•	
Electric wire related checklist					
Defects if electric wire			•		
Check contamination of electric wire			•		
Check fixation of wiring fasteners			•		

CAUTION

- Before using the instrument, make sure that there is no foreign substances inside the chamber and keep it clean.
- Be careful not to damage accessories or systems inside the instrument.
- Be careful not to contact the main body with high concentrations of nitric acid, sulfuric acid, sodium hydroxide or corrosive solvents such as acetone, benzene, phenol, toluene, chloroform, crezol, acetic acid, chloroform.

To maintain the instrument in the best condition and to use it effectively and efficiently, you need to clean it periodically.

Inspect the instrument daily for cleanliness, clean the internal part once a week, and clean the external body once a month. Please clean the instrument immediately if it is contaminated.

Before cleaning, turn off the power switch and remove the plug from the outlet. There is a risk of electric shock. Also, wear chemical-resistant gloves.

Please clean according to the method indicated below.

Step 1: Wipe the external surface of the instrument with a wet and soft damp cloth. If it is severely contaminated, wipe it with a sponge or a soft cloth with a neutral detergent.

Step 2: Wipe the instrument with a dry towel

5.2 Cleaning the instrument

5.2.1 Cleaning the internal part of the instrument

(1) Normal State

Step1: Remove the shelf inside the instrument and wipe it with a dry cloth using a neutral detergent.

Step2: Clean the inner surface of the instrument with a dry cloth with a neutral detergent.

(2) Contaminated State

If the instrument is contaminated with toxic chemicals or toxic gases, clean the instrument using the following procedure.

Step 1: Always wear chemical resistant gloves and masks.

Step 2: Clean contaminated parts of the instrument with a dry cloth.

Step 3: Wipe with a sponge or soft cloth using a neutral detergent, then wipe again with a dry cloth.

5.2.2 Cleaning the external part of the instrument

Step 1: Wipe the external surface of the instrument with a wet and soft damp cloth. If it is severely contaminated, wipe it with a sponge or a soft cloth with a neutral detergent.

Step 2: Wipe the instrument with a dry towel

5.2.3 Cleaning Accessory

Wipe the accessories with a sponge or a soft cloth using a neutral detergent, then wipe it with a dry cloth.

CAUTION

- Before cleaning, turn off the power switch and remove the plug from the outlet. There is a risk of electric shock.
 - If the device is contaminated with toxic chemicals or toxic gases, make sure to wear chemical resistant gloves and masks when cleaning the inside.
 - Never use chlorine detergent, because it may cause the chamber to be oxidized. In addition, do not use volatile substances such as cleaning agents, abrasives, benzene, acids or solvents.
 - Do not use organic solvents such as sulfuric acid or hydrochloric acid to wipe the surface of the instrument.
 - To clean the cleaning tool, use a soft cloth or sponge with a neutral detergent.
 - Do not pour water directly into the instrument while cleaning it or its surroundings.
 - Do not randomly disassemble when cleaning the instrument.
 - If you are cleaning the instrument in a way other than the above, please check with JEIOTECH or your company before cleaning.
-

5.3 Fuse Replacement

If an over current occurs to the instrument, the built-in fuse will short out and the power will be cut off. If an extra fuse is stored near the instrument and the fuse has blown, please refer to the methods below to replace it. [See 5.3.1 How to Replace Fuses]

Two fuses are enclosed with this manual when the instrument is purchased. If additional fuses are required, please request them to our company, our branch office, or seller with a proper model. [See 5.3.2 Fuse Specifications]

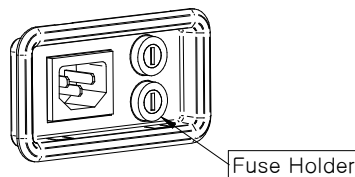
WARNING



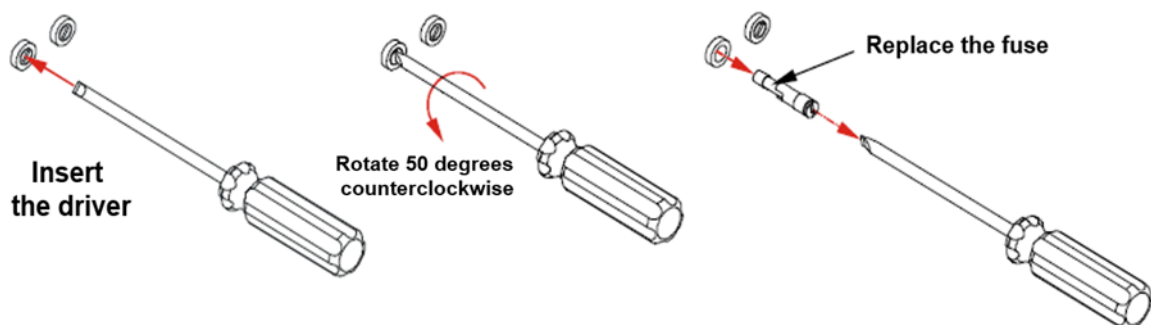
- Before replacing a fuse, turn off the power and check the power connection again. Replacing the fuse with power supplied may cause serious injury or death to the human body.
- Do not handle or touch electrical cords or electrical parts with wet hands.

5.3.1 How to Replace Fuses

- (1) Press the power switch to turn off the instrument.
- (2) Insert the “-“driver into the fuse holder groove. Rotate the fuse holder by 50 degrees counterclockwise to separate the fuse holder from the fuse holder socket.



- (3) Replace the shorted fuse with an extra fuse.



- (4) Complete the fuse replacement by execute the reverse step of (2).

5.3.2 Fuse Specification

Model	Voltage	Current (A)	Fuse(A)	Fuse Model
OV4-30	220	5.6	10	00CDE0005543
OV4-65	220	6.4	10	00CDE0005543

5.4 Maintenance Checklist

Please check the checklists below to ensure proper operation of the instrument.

- (1) Check the connection between the instrument and the power supply.
- (2) Check if the instrument and the system are correctly fixed in the castor section.
- (3) Check the instrument's horizontal level.
- (4) Make sure there is no flammable or explosive substances remain in the instrument.

 WARNING

- Do not disassemble or modify the device without permission except as noted in this User Manual.
 - When handling electrical components inside the instrument, only qualified personnel must handle them.
-

5.5 Moving and Storage

- (1) When moving the instrument, unplug the power from the outlet.
- (2) Take everything out from the instrument.
- (3) Close the door of the instrument completely and then start to move it.
- (4) Do not move the instrument while holding the instrument's door.
- (5) Pack the equipment, accessories in their original package properly to protect the instrument while on the move.
- (6) When not in use for a long period of time, unplug the power plug, clean it, pack it, and store it in a dry place.

WARNING



- Do not move the instrument with the power cord connected.
- Do not move the instrument while it is in operation.

CAUTION



- Be careful when transporting the instrument since it is heavy. Use the appropriate required tools for transport and carry it two or more people together.
 - Do not move the instrument while holding the door.
 - Do not cause mechanical shock or vibration during movement or storage of the instrument. Internal damage may cause problems with operation.
 - Disconnect the power plug when the instrument is not in use.
-

6.0 Trouble Shooting

6.1 Power-related trouble shooting

Problems	Possible Causes	Solutions
Oven is not turned on	<ul style="list-style-type: none"> Power supply does not match the equipment's power type. 	<ul style="list-style-type: none"> Check the voltage, phase and capacity of the power supply and connect the power correctly.
	Either circuit breaker is tripped or there is a power outage.	<ul style="list-style-type: none"> If the electrical circuit breaker in the building is tripped, find the cause of the short circuit and fix it.
	The power cord is not connected to the outlet correctly.	<ul style="list-style-type: none"> Plug the power cord into the outlet correctly.
	Outlet/ plug/ power cord is damaged.	<ul style="list-style-type: none"> Replace the damaged outlet/ plug/ power cord.
	<ul style="list-style-type: none"> Internal circuit failure of the equipment 	<ul style="list-style-type: none"> Request service.
Circuit breaker in the building keeps tripped.	<ul style="list-style-type: none"> Too many plugs are connected. 	<ul style="list-style-type: none"> Remove all the devices connected to the circuit breaker and use within the capacity of the circuit breaker current.
	<ul style="list-style-type: none"> Internal circuit failure of the instrument 	<ul style="list-style-type: none"> Request service.
The power is working but the instrument does not work.	<ul style="list-style-type: none"> Due to overheating, the protection device cuts off the power. 	<ul style="list-style-type: none"> Unplug the power cord and allow the equipment cool, then restart.
	<ul style="list-style-type: none"> Internal circuit failure of the equipment 	<ul style="list-style-type: none"> Request service.

6.2 Errors during the Operation

Problems	Possible Causes	Solutions
Alarm is keep ringing	<ul style="list-style-type: none"> Abnormal set temperature of the 'Over temperature limiter' 	<ul style="list-style-type: none"> Increase the current temperature up to 15% of the 'Over temp. limiter.'
In case the temperature does not increase	<ul style="list-style-type: none"> Check if the 'run' mark on the top of the controller's status display is blinking. 	<ul style="list-style-type: none"> Press Start/ Stop button if the status is marked as 'Run'
In case the vibration of the instrument does not stop.	<ul style="list-style-type: none"> The vacuum valve's knob is closed. 	<ul style="list-style-type: none"> Change the vacuum valve's knob is heading toward 12 o' clock direction.
	<ul style="list-style-type: none"> Vent valve is closed. 	Close the vent valve completely by rotating the knob to the clockwise.
	<ul style="list-style-type: none"> The vacuum hose is not connected properly. 	<ul style="list-style-type: none"> Make sure there is no leak between vacuum pump and vacuum hose, vacuum hose and vacuum nozzle.
	<ul style="list-style-type: none"> Door is opened. 	<ul style="list-style-type: none"> Close the door completely.
	<ul style="list-style-type: none"> There is a gap between door gaskets and glass. 	Replace the door gaskets if they are worn out.
The vacuum state is not maintained.	<ul style="list-style-type: none"> Vacuum valve is not placed properly. 	<ul style="list-style-type: none"> Locate the vacuum valve's knob toward 3 o'clock direction.
	<ul style="list-style-type: none"> Vent not locked completely. 	<ul style="list-style-type: none"> Lock the vent valve by rotating the knob to the clockwise.
Temperature is not controlled.	<ul style="list-style-type: none"> There are devices installed with high frequency noise. 	<ul style="list-style-type: none"> Make sure there is no device installed with high frequency noise.
	<ul style="list-style-type: none"> Did not perform auto tuning 	<ul style="list-style-type: none"> Perform auto tuning.
	<ul style="list-style-type: none"> Did not hold the vacuum. 	<ul style="list-style-type: none"> Hold the vacuum.
	Foreign substances or oil flowed into the controller.	<ul style="list-style-type: none"> Request for service.
Dial knob is not working.	<ul style="list-style-type: none"> Defect of Knob 	<ul style="list-style-type: none"> Pull the knob and place to the original position. Request for service.

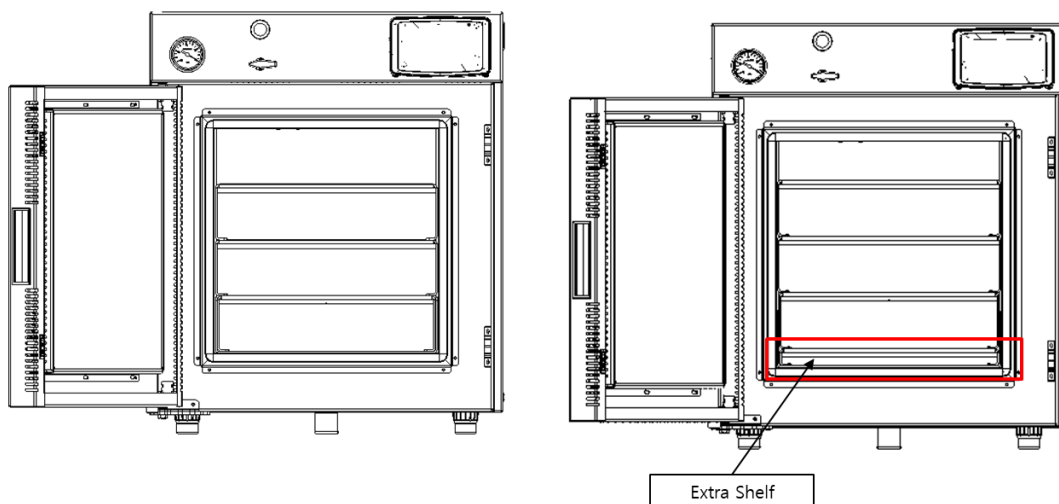
7.0 Accessories

7.1 Types of Accessories

7.1.1 Shelf

- Extra shelves

If the extra shelf is used at the bottom, the chamber interior space can be used more efficiently.



[OV4-65 Interior space (Left: Basic Shelf / Right: Add Extra Shelf)]

Designation		Cat. No.	Dimension (W x D x H, mm)
Upper Shelf	OV4-30	AAA13512	299 x 385 x 100
	OV4-65	AAA13514	398 x 385 x 100
Lower Shelf	OV4-30	AAA13517	292 x 385 x 100
	OV4-65	AAA13518	391 x 385 x 100
Extra Shelf	OV4-30	AAA13511	292 x 285 x 30
	OV4-65	AAA13513	391 x 385 x 30

※ If an additional shelf is fitted, the variation may be different from that of 9.1 Specification.

7.1.2 Spacer

It complements the loss of thermal conductivity due to thermal deformation of the aluminum shelf.

Designation		Cat. No.	Dimension (W x D x H, mm)
Shelf Spacer	OV4-30	AAA13515	285x83x2
	OV4-65	AAA13516	385x76x2


7.1.3 Gaskets

When using organic solvents, You may use a gasket made of highly chemical-resistant Viton to minimize the damage of gasket due to reagents.

Designation		Cat. No.	Dimension (W x D x H, mm)
Viton gasket	OV4-30	FAA5187	-
	OV4-65	FAA5188	-
Silicone gasket	OV4-30	FAA5146	-
	OV4-65	FAA5147	-

7.2 Cold Trap Bath(Optional)

It is recommended to use a cold trap when connecting vacuum pump to vacuum line to protect vacuum pumps. Low Temperature Freeze Traps (CTB-10/CTB-20, JEIOTECH) protect samples within the vacuum oven and vacuum line by freezing and condensing hazardous gases and moisture.

Designation	Cat. No.	Description	Figure
Cold trap bath(-40°C)	AAA62011	CTB-10	 CTB-10 CTB-20
Cold trap bath(-70°C)	AAA62021	CTB-20	

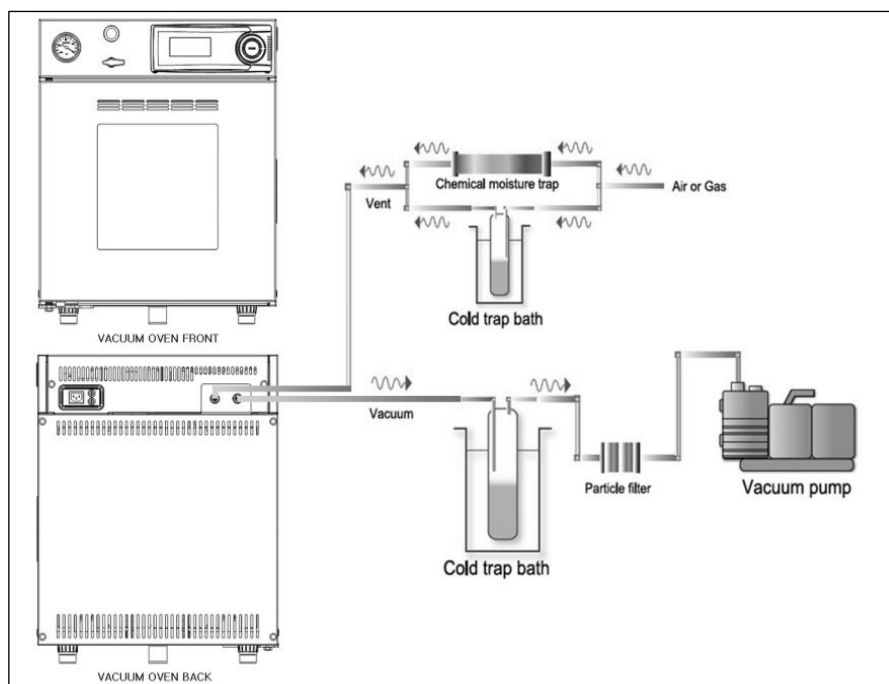


Figure) Overall Diagram of Vacuum oven/ Cold trap bath/ Vacuum pump

※ Please contact JEIOTECH sales department or the seller to exchange accessory, more information about Cold trap bath/ Vacuum pump. You may also visit JEIOTECH homepage (<http://www.jeitech.com>, <http://www.labcompanion.com>)

7.3 LC GreenBox(Optional)

This device connects JeioTech laboratory research into one network, enabling an experimenter to the equipment more efficiently.


After connecting the equipment to LC GreenBox, you the LC Connected service, which enables mobile and control of the equipment's current operating faults.

(You can connect up to four devices to one LC GreenBox.)



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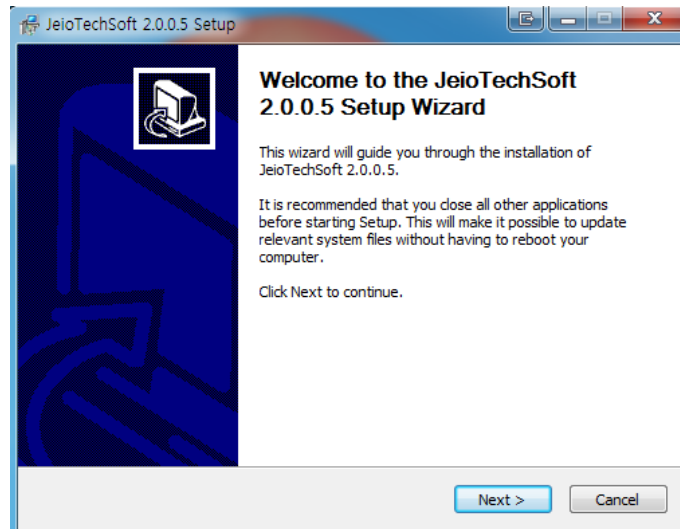
Item	Cat. No.	Dimension (W x D x H, mm)	Figure
LC GreenBox	AAAQ1011	156 x 94 x 100 (with antenna)	

8.0 Dedicated Software

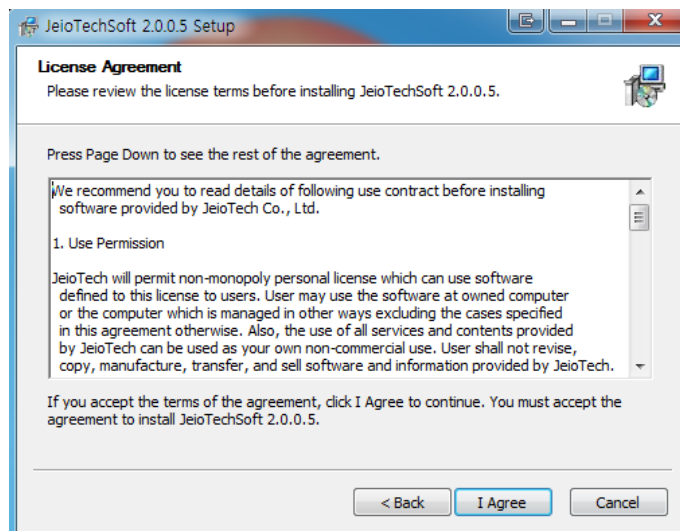
8.1 Installing Monitoring Program

Please visit JEIOTECH homepage (<https://www.jeiotech.com/>) to download the dedicated software implemented by JEIOTECH.

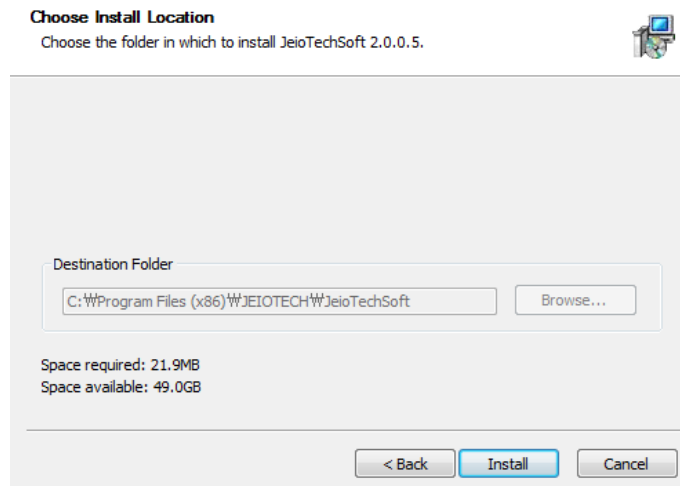
- (1) After downloading the installer, press the "Next" button to switch to the License agreement screen.



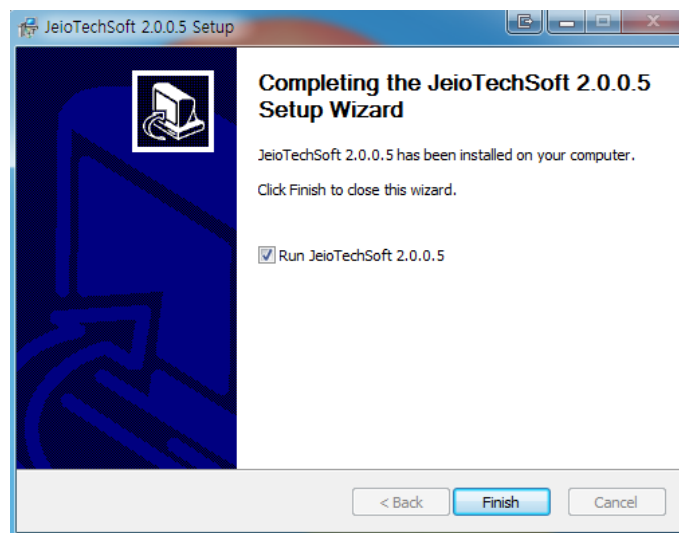
- (2) Before installing JeioTechSoft, review the license details and press the "I agree" button.



(3) After specifying a storage path, press the "Install" button to start installing the program.



(4) When the program installation is completed, the JeioTechSoft icon will be created on the desktop. Please launch the program by checking the JeioTechSoft 2.0.0.5 list box or double-clicking the icon on your desktop.

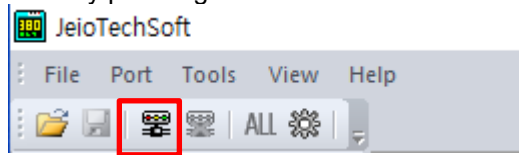


NOTICE

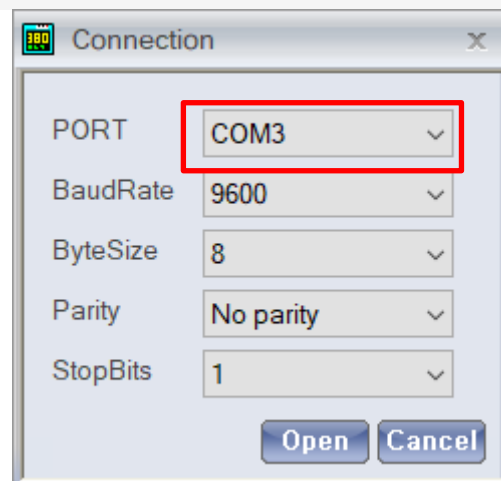
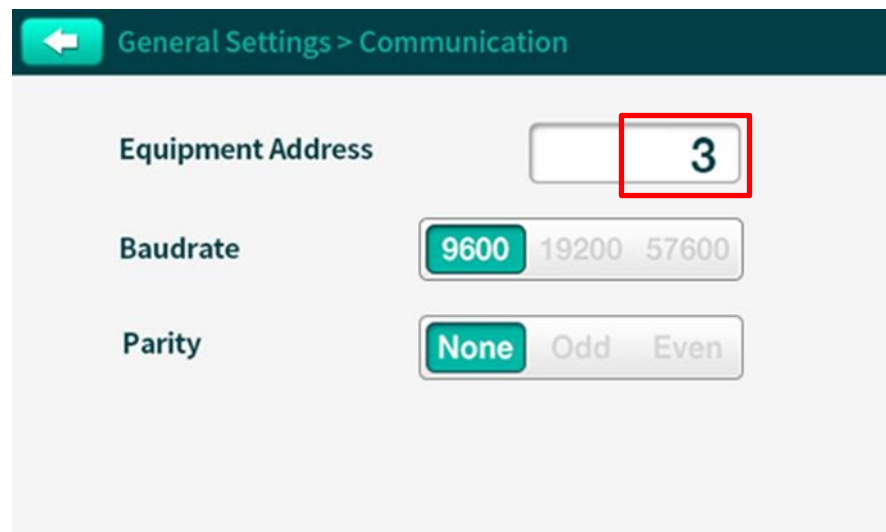
- When running the JeioTechSoft program via the communication port, the input values of the temperature, timer, and pump circulation can be entered directly by the numeric keypad on the computer keyboard or by the ↑ or ↓ of the direction keys. At this point, the number of digits of the input value can be moved by using the ← or → directional keys, or by entering "." at the decimal place.
- Press the Delete key on your computer keyboard to set the input value to "0".
- If you enter a value that is greater than the inputable value, the maximum inputable value will be entered.

8.2 Connecting the Instrument and Computer Software

- (1) Execute the JeioTechSoft from your computer.
- (2) Start the connection process by pressing the button as shown below



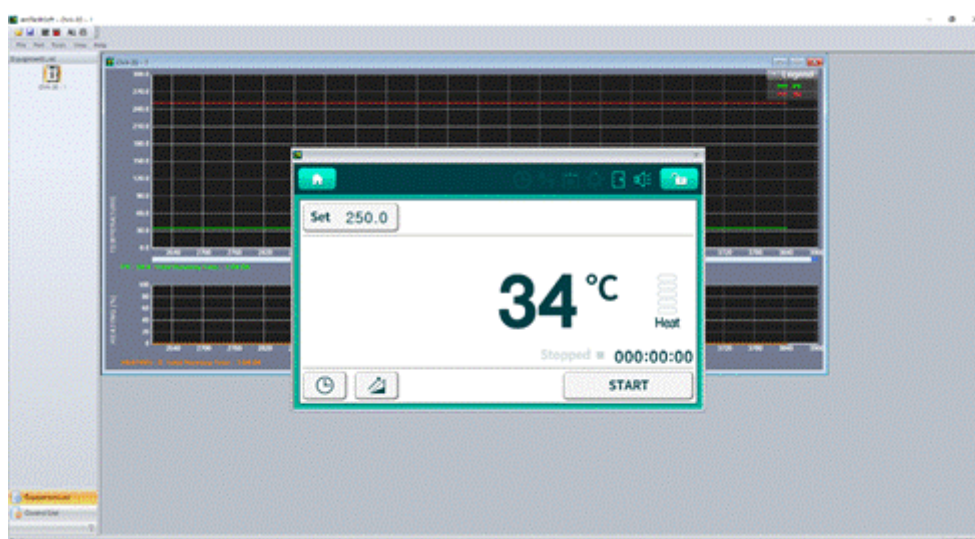
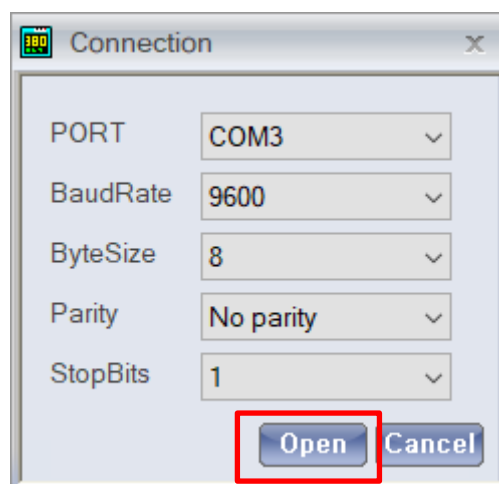
- (3) Once the Connection window appears, select the number of the PORT same as the “instrument number” that can be checked from the MF2 menu, “General Settings> Communication.” To check the communication port number from your computer, go to Control Panel> Devices and Printers> Management Console> Port (COM & LPT).



* Initial Values for the Connection

PORT	BandRate	ByteSize	Parity	StopBits
COM1	9600	8	No parity	1

- (4) The connection process will be started, once the PORT value and the instrument number are identically entered and click the Open button.



[Computer screen with completed connection]

NOTICE

- You can find the communication port number of the equipment on your computer at Control Panel > Devices and Printers > Management Console > Ports (COM & LPT).
- While the JeioTechSoft program is running via the communication port connection, you can enter the input values of the temperature, timer, and pump circulation directly by the numeric keypad of the computer keyboard or by the \uparrow or \downarrow of the direction key. In this case, the number of digits of the input value can be moved by using the directional keys (\leftarrow or \rightarrow), or by entering "." at the decimal place.
- Press the Delete key on your computer keyboard to set the input value as "0".
- If you enter a value that is greater than the inputable value, the maximum inputable value of the instrument will be set.

8.3 Communication Specification

8.3.1 Communication Overview

Communication Speed: 9600, 19200, 57600 bps

Parity: none, Odd, Even

Protocol : MODBUS-RTU

Address: 0 (Broad Casting), 1~255

8.3.1.1 Data Type

Contents	RTU
Start Setting Point	None
End Setting Point	None
Data Length	8-bit (fixed)
Data Type	Binary
Error detection	CRC-16 (Polynomial = 0xA001)
Data Time Interval	Less than 24-bit hour

8.3.1.2 Composition of Frame

Start Setting Point	Communication Address	Function Code	Data	CRC Check	End Setting Point
None	8-bit	8-bit	n * 8-bit	16-bit	None

8.3.1.3 Communication Function Code

MODBUS communication function code is composed of a function code that can read/write D-Register contents and a loop-back detection function code.

Function Code	Contents
03	Continuously Reading D-Register
06	Single Write of D-Register
08	Diagnostics (Loop-Back Test)
16	Continuously Writing D-Register

*The recognizing time in the communication in MODBUS RTU is "3.5 Character" + "maximum 2ms"

Please visit www.jeiotech.com to download further information of communication specifications.

9.0 Appendix

9.1 Technical Specification

Model		OV4-30	OV4-65
Temp.	Range (°C)	Amb. +15 ~ 250	
	Fluctuation at 100°C (°C)	±0.1	±0.3
	Variation at 100°C (°C)	±1.5	±1.5
	Heat up time to 100°C (min.)	60	85
	Controller	Microprocessor PID	
	Sensor	PT100	
	Heater (W)	1220	1400
Vacuum	Range	0.0~0.1MPa, Analogue	
	Nozzle size (mm)	Vacuum Ø 10, Vent Ø 10	
Controller functions		Auto tuning, 3-point temp. calibration, Wait on / off timer(999hr 59min), Auto-run	
Safety		CLS(Custom Logical Safe)-control system, Over temp. limit	
Control panel		TFT LCD 5 inch	
Communication interface		USB, RS-232	
Material	Internal	Stainless steel, 3.0t	
	External	Steel powder coating, 1.0t	
	Shelves	Aluminum, 3.0t	
	Insulation	Ceramic wool (50mm)	
	Door gasket	Molded heat resistance silicone rubber	
	Window	Tempered safety glass, 12t	Tempered safety glass, 15t
	Viewing window	Polycarbonate, 3.0t	
Dimensions	Chamber volume (L)	28	65
	Interior (W x D x H, mm)	302 x 305 x 302	402 x 405 x 402
	Exterior (W x D x H, mm)	537 x 522 x 655	636 x 622 x 755
	Shelves (W x D x H, mm)	Top: 299 x 285 x 100 (1ea) Bottom: 292 x 285 x 100 (1ea)	Top: 398 x 385 x 100 (2ea) Bottom: 391 x 385 x 100 (1ea)
Weight (net, kg)		68	107
Load per shelf (kg)		20	
Electric requirements (VAC, Hz)		220, 60	
Current consumption (220V, A)		5.6	6.4
Permissible ambient temperature (°C)		5 – 30	
Permissible relative humidity (%)		10 - 80	

※ Data that are not specifically marked are standard values at 25°C, 60% R.H.

※ The specifications above may be changed without notice due to the improvement of quality and performance of the instrument.

※ All temperature specifications follow DIN 12880 methodology.

9.2 Disposal of Instrument

Before disposing a instrument or its component, please be aware of the followings.



- (1) This product is potentially hazard when exposed to biological, chemical, or radioactive materials, so it must be cleaned up to protect disposal personnel, waste collectors, and environment.
- (2) Please contact a person who is in charge of disposing of the products to check the electrical, electronic and material disposal standards. When you request externally, it is recommended that you contact to your company's vendor or a testing equipment manufacturer that can properly dispose the laboratory equipment and its components.

9.3 Warranty

- (1) If the product fails during normal and proper use, the warranty period for manufacturing liability shall be two years from the date of purchase.
- (2) If you request a repair, please check the items below and let us know so that you can get a quicker and more accurate repair.

- Date of purchase:
- Customer name / address / phone number / E-mail:
- Fault status:

9.3.1 Warranty Exceptions

Paid repairs are carried out even within the warranty period in the following cases

- Failure due to improper use by the user
- Failure due to improper handling and storage by the user
- Improper use, modification, or repair of the instrument
- Failure caused by natural disasters such as fire, flood, or abnormal voltage, etc.
- Fault caused by not following the instructions of user manuals

9.3.2 How to Request for the Customer Service

Customers have always been at the center of what we do, and we have always looked at things from the customer's perspective. If you find out any problems with your instrument, please fill out the service application form listed below and submit it to the head office or your dealer for quick and accurate repair.

1. Product Name/ Date of Purchase
2. Customer/ Address/ Telephone Number / E-mail address
3. Product Serial Number (it is on the ID plate, on the side of the product)
4. Problem Details of the Product

If you would like to purchase any instrument accessories, please contact the following branch office or head office.

9.3.3 Returning Process of the Product

If you need to return the product due to damages during the transportation or any other reasons, please receive the return authorization number from the distributor you purchased. When returning the product, please fill out the return form with the following details and send it to the head office or to the distributor you purchased.

1. Product name / purchase date
2. Customer name / address / telephone number / E-mail
3. Product serial number (it is on the ID plate, on the side of the product)
4. Transport company's information
5. Return authorization number
6. Reason for Returning

9.4 Service Contact Point

Contact of Customer Support Representative

TEL: 1522-4298

FAX: 042-933-4233

E-mail: help@jeiotech.com

Head Office and Factory

Techno 2-ro 153, Yuseong-gu, Daejeon, Republic of South Korea (34025)

TEL: 1588-4298

FAX: 042-933-4293

<http://www.jeiotech.com>

E-mail: sales@jeiotech.com

- The contents of this manual are subject to change without notice to improve the performance of the product and to ensure accurate information delivery.
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