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- ✓ ISO 9001 Certified.
- ✓ ISO 13485 Certified for Medical Instruments
- ✓ UL/CUL Certified
- ✓ CE Certified
- ✓ PL Insurance.
- ✓ Patented(No. 10-0554098) Jog Dial Control System.
- ✓ Validation(IQ&OQ) Service.

◇ English Page : P. 1 ~ 26

◇ Korean Page : P. 27 ~ 52

User Manual

(Version 2.2.1)

written for
ThermoStable™ OV-20/-30/-70 models



"ThermoStable™ OV-30"
Precise Vacuum Oven, 30 Lit.

Sales & Basic A/S :
By the Nearest Official Distributors.

EUROPEAN DECLARATION OF CONFORMITY



We, DAIHAN Scientific Co., Ltd.,
326, Sinpyeongseokhwa-ro, jijeong-myeon, Wonju-si, Gangwon-do, Korea
Tel: 82-2-967-5235, Fax: 82-2-967-5258
declare under our sole responsibility that the product


Vacuum Oven **ThermoStable OV-20, OV-30, OV-70**

to which this declaration relates is in conformity
with the following standard or other normative document

EN 61326, EN 61000-3-2, EN 61000-3-3
EN 61010-1, EN 61010-2

following the provisions of the directives:

Low-Voltage Directive 2014/35/EU
EMC Directive 2014/30/EU

Signed:  (Chong ku Shu)

Date: 18, April 2016
Authority: President / CEO

For

DAIHAN Scientific Co., Ltd.
326, Sinpyeongseokhwa-ro, jijeong-myeon, Wonju-si, Gangwon-do, Korea
Tel: 82-2-967-5235, Fax: 82-2-967-5258

DH-DC140105-R02

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1. General

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1.1 Precautions Before Use

Thank you for purchasing the Precise Vacuum Oven.

This manual describes the performance and usage instructions of the product, and the precautions in the handling. Please carefully read this manual, before using the product. The following warnings should be strictly adhered to: (The following warning sign is marked in the part that is required user attention, so please safely use the product after being well-acquainted with the meaning.)

	<p>Warning Failure to follow the instructions may result in injury.</p>
	<p>Caution Failure to follow the instructions may result in product failure.</p>
	<p>Proximity Caution Keep clear of the product during use.</p>
	<p>Notification Do not disassemble or modify the product or use it for purpose other than its intended function.</p>
	<p>Caution: High Temperature High-temperature heating, pose a risk of burns.</p>
	<p>Danger of Explosion If volatile, explosive chemicals are used, there is a danger of explosion.</p>
	<p>This symbol indicates Protective earth (ground).</p>
	<p>This symbol indicates power "OFF" on the power on/off switch.</p>
	<p>This symbol indicates power "ON" on the power on/off switch.</p>
	<p>This symbol indicates the connection point of the neutral conductor on the installed unit.</p>
	<p>This symbol indicates alternating current Voltage.</p>

1. General


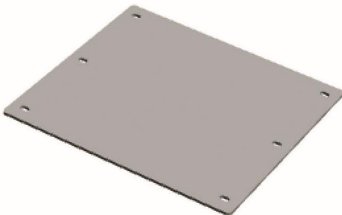
1.2 Product introduction

This product has the optimized structure for the experiment of the high vacuum level and gas exchange because the Vent (exhaust) pipe and Vacuum (suction air) pipe are separated, and also the High Heat Conduction Mechanism realizing the vacuum condition that keeps the high vacuum level and has not the thermal conductivity by air has been applied in this product. This product was developed and manufactured considering the best possible ease for use and safety, and has the following features.

1. Because the Vent (exhaust) pipe and Vacuum (suction air) pipe connected into the inside of the chamber are separated, respectively and are connected with outside, separately, the optimized structure for the experiment of gas exchange can be realized.
2. This product can realize high thermal conductivity by adopting the High Heat Conduction Mechanism which optimizes the thermal conductivity in the vacuum condition without the thermal conductivity by air.
3. Because the bracket and shelf attached to the inner wall of the chamber are directly fastened, high thermal conductivity can be reached to the samples on the shelf, and the fastened shelf can be separated and can support the experiments of the samples with various sizes.
4. The highest door sealing structure has been realized by adopting high quality Molded gasket.
5. The internal state of this product can be safely checked through the Highly Safety Viewing Window.
6. Because Jog Dial Knob and Push Button which are rigid and have excellent operability are mounted, this product has high operating sensitivity and excellent accuracy.
7. Because this product is equipped with a high-quality LCD Display with back-light function, it is easy to confirm its state.
8. The necessary matters during the experiment can be conveniently used by the support of SUB MENU.
9. The safety device for overheating prevention, and over current and short circuit prevention circuitry that preferentially consider the user's safety are mounted.
10. This product is remotely controlled by connecting to PC through RS232 communication port, and can be transmitted data.
11. CE Certified Products.
12. PL(Product Liability) Insurance

1. General

1.3 Product Configuration

Component Photo	Component Name	No. of Configuration
	ThermoStable™ OV-20 /-30 /-70	1 unit
	Standard Shelf, Aluminum	2 ea

- Including a copy of the Operation Manual

* Model

- ThermoStable™ OV-20: Precise Vacuum Ovens, 18.6Liter.
- ThermoStable™ OV-30 : Precise Vacuum Ovens, 30 Liter.
- ThermoStable™ OV-70 : Precise Vacuum Ovens, 70Liter.
- ThermoStable™ SOV-20: Smart Vacuum Ovens, 18.6Liter.
- ThermoStable™ SOV-30 : Smart Vacuum Ovens, 30 Liter.
- ThermoStable™ SOV-70 : Smart Vacuum Ovens, 70Liter.

2. Installation

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2.1 Product Installation

* Caution of Installation

1. Please be careful when transporting the product because it is heavy.
2. Please do not lay the product on the floor or subject it to shock. It can cause damage inside the product.
3. Please install the product in a hard, flat, and stable place.
4. Please do not install the product in a place where it is exposed to direct sunlight, or in the dangerous places.
5. To minimize the risk of short circuits, do not install the product (in the) places where it will be subjected to the inflow of moisture or organic solvents on the regulator part or inside of the body.
6. This product was manufactured for normal operation at a rated voltage, so please check the voltage status before installing the product.
7. When installing and using the product, please certainly use the power cord provided with the products.

* Installation Process

1. After receiving the unit and locating it in the specified location, remove the packaging.
2. Check the unit for any transport damages. If any such damages are found, please contact the deliverer of the product.
3. This Product is not equipped with casters. Units should be moved using a cart. Ensure that no damage is sustained by the units during transport. It is recommended that units are moved by at least 2 people and by lifting units up holding the indicated positions in the figure below.



4. The product should be positioned in a location where it has enough space for ventilation and prevention from fire. The recommended distance of each side is minimum 20cm from the back

wall, 100cm from the side walls and ceiling respectively.

5. Place the device on a level, horizontal surface to support the capacity of the device without vibration.
6. Once the unit is placed in its installation location, let the unit stand for 15-30 minutes so that all the internal parts of the unit stabilize.
7. Connect the power cord to the wall socket.
8. When installing the device, insure the wall socket is easily accessible.
9. Do not earth to gas pipe, plastic tap water pipe or phone line. It may cause an electrical shock, a fire, breakdown or explosion of the unit.

* Safety Symbols on a product

- Safety symbols stickers Attached to side of product. For meaning of each symbol, please refer to Precautions Before Use, Safety Instructions.



Safety symbols on units, for further description of each symbol, please refer to 3.1 Precautions for Use

□ Product Liability (PL) Insurance Admission

DAIHAN Scientific (Co., Ltd.) is a member of Product Liability Insurance (PL Insurance), so that its customers can trust our products, (believe and use its products,) by preparing against the accident which can be occurred during using the products by self-production.

[Contents]

Insurance Type: Product Liability Insurance

Publishing Office: Machinery Insurance Cooperative

Limit of Indemnity: 100 million won for Persons and Objects

Secured Area: Worldwide (excluding North America)

Emergency Contact: **DAIHAN Scientific (Co., Ltd.)** (TEL: 080-008-3000, FAX: 033-737-7575)
(TEL: 02-369-8516, FAX: 02-369-8521)

* Connection of Vacuum Pump, and Connecting Method of Cold Trap Bath

- The size of the Vacuum Nozzle and Vent Nozzle located on the right side of the Vacuum Oven are OD $\Phi 10\text{mm}$, so these nozzles should be connected to the Cold Trap Bath or the Vacuum Pump by using the hose with ID $\Phi 8\sim 9\text{mm}$ (Recommending to use a silicone-based hose).

* Connection of Cold Trap Bath

- The Cold Trap Bath can economically and effectively shut off that the harmful gas and the vapor of organic solvent which has a fetal influence on the vacuum device are flowed into the mechanism, so it can extend the life of the vacuum pump and enable the recovery of the organic solvent.
- If the gas removed from the inside of Oven has many heat when setting the vacuum, the Vacuum oil in the Vacuum Pump can be often scattered together the heat of the de-saturated gas. For this reason, because the life of Vacuum Pump can be shortened, user must protect the Vacuum Pump by cooling the de-saturated gas with the Cold trap.
- When air is injected into the Chamber of the vacuum condition at the time of vent setting, the samples of the vacuum condition should be protected from other components contained in the air.



* Connection of Vacuum Pump

- The Vacuum Pump makes the inside of chamber of the Vacuum oven to the vacuum state, and the vacuum pump model can be selected according to the desired exhaust speed (L/min).
- The vacuum pump should be installed in the place where is easy to install or remove it and to perform the work, such as checking and cleaning, and please install this device with attention to the ambient temperature if fixing it. In addition, please install using the vibration-proof and rubber, etc. so that the vibration is not transferred to the vacuum pump.
- The Cold Trap Bath, and Vacuum Pump connected to this product, including the Vacuum Oven can be identified at <http://mall.allforlab.com/>.

2. Installation

2.2 Product Specifications


Model		ThermoStable™ OV-20	ThermoStable™ OV-30	ThermoStable™ OV-70
Capacity		18.6 Lit	30 Lit	70 Lit
Vacuum Range		10 ~ 750 mmHg / PT100		
Temp.	Range / Sensor	Ambient +10 °C to 200 °C		
	Fluctuation	±0.5 °C at 100°C & 150°C		
	Variation	±2.0 °C at 100°C ±3.0 °C at 150°C		±2.5 °C at 100°C ±3.5 °C at 150°C
Heating Power		600W (170W X 2ea, 130W X 2ea)		1,600W (350WX2ea, 450WX2ea)
Heat-up Time		60 min to 100°C, 90 min to 150°C	70 min to 100°C, 100 min to 150°C	80 min to 100°C, 100 min to 150°C
Achievable vacuum level		0.63 mbar		
Leakage rate		0.39 mbar/hr		
Timer & Alarm		99 hr 59min (with delay / Continuous run.), Error status & Timer-end		
Display		Digital LCD with Back Light		
Controller		Digital Fuzzy Controller with Jog-Dial Switch (Turn + Push)		
Resolution		Control : ±1.0°C , Display : ±1.0°C		
Shelves		2ea of Aluminum Shelves Included(detachable)		
Shelves Size (W x D)		260 X 245mm	290 X 285mm	340 X 390mm
Height between shelves		87mm	98mm	133mm
Safety Circuit		Over Temp. and Over Current Protector, Sensor Error Detector, Leakage Breaker		
Material		Internal : Stainless steel (#304), External : Powder Coated steel, Window : Tempered Safety Glass 12T, Poly Carbonate 5T for Safety Insulation : Ceramic Wool		
Others		Storage Function (Temp and Timer) Locking Mode (jog - Dial Input Disabled)		
Dimension (w X d X h)	Internal(mm)	265 X 290 X 265	300 X 330 X 300	400 X 435 X 400
	Exterior(mm)	480 X 475 X 552	515 X 515 X 587	618 X 620 X 687
Vacuum Inlet Valve Size		od. 10mm		
Net Weight		48 kg	55 kg	85 kg
Packing Size (wXdXh)(mm) & Gross Weight		585 X 580 X 795 59 kg	620 X 620 X 830 67 kg	725 X 720 X 930 100 kg
Power Consumption		600 W	600 W	1.6 kW
Power Supply & Cord Plug*		1 Phase, AC 120V, 60Hz or AC 230V, 50/60 Hz		

* Other Specifications are available upon Customer's Request.

3. Product Usage


3.1 Precautions for Use








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	Please be familiar with the user manual before using this product, and operation should be performed only by qualified personnel
	This product should be connected to a appropriate power source that it is generally used. Please use a lower power source than the regulation load permitted (AC 120, 60Hz or AC 230V, 50/60Hz, Single-phase).
	Place the product on a level, horizontal surface to support the weight of the product without vibration. Install the product in a place where the floor is hard and flat. Failure to do so can cause accidents. by negligence.

● Warnings

- Please observe the following precautions.

	This product should be operated in a room with temperature maintain between 5℃ and 40℃. Long-term use in an environment that exceeds the allowable range may cause a malfunction.
	Please do not damage or distress the power cord. (Please do not hurt on the power cord, or process it, or force bend it, or pull it, and tie it.) Also, if heavy objects are placed over the power cord, or the power cord is inserted in between objects, the power cord can be damaged and may cause fire or electric shock.
	Please do not directly spray water on the product or wash it with water, to avoid short circuits or electric shock.
	Please do not touch or manipulate the electrical parts such as the power plug with wet hands electric shock.
	Please do not operate the product by manipulation of the plug to avoid electric shock or short circuits
	Do not install the product where it can get damp or in a dusty environment. It may cause overheating or short circuit. – Pollution Degree 2
	Do not install the product in a location at an altitude of over 2,000 meters (6,562 feet).
	Please do not use any kind of plastic container or the goods for dry purpose. The temperature around the heater mounted on the floor of the chamber is higher than the operating temperature, and if the internal temperature is rapidly risen due to the malfunction of user, there may present a fire risk.

	The internal temperature rises up to 200°C, so please be careful when opening or closing Air Duct or Door.
	The inner chamber is hot during an operation, do not touch the inner chamber without proper hand protection during operation as burns may occur.
	Do not operate this product near a heater or an air-conditioner.
	Clean the bottom of inner chamber and install the shelves properly before use.
	Do not close your face, hands or body into a chamber. It may cause an injury or burn by high temperature.
	Only operate unit after checking the safety of the unit.
	The temperature of the regulator SAFETY should be set up 30 ~ 40°C higher than the operating temperature. If the regulator SAFETY is set to 0, the heater does not operate.
	If unexpected sound, smell or smog is generated, pull the main plug out from the wall socket and contact the technical assets of DAIHAN Scientific
	If irradiated or contaminated samples are placed in the chamber, the warranty is voided. Do not use this product to sterilize or disinfect objects or samples.
	Do not use outdoors avoid overheating or electrical faults. The use in the place where the sun continuously shines and can get rained on it is prohibited. It may cause overheating or electrical fault of the product.
	Please do not use flammable or volatile products in the vicinity of the product to minimize the risk of fire. Please do not use the flammable spray such as lacquers and paint, or volatile, flammable chemicals and its similar product, in the proximity of the product. They may cause the ignition due to the spark of switch.
	Please avoid the disassembly or modification of this product by a non-authorized person to avoid serious electrical problems and to retain the warranty service of DAIHAN Scientific Co., Ltd.
	This product must be connected to a properly grounded power supply.
	Please regularly check whether dust or dirt are on the power plug and completely connect the plug. If the plug is covered with dust, or the connection is not complete, it will cause an electrical shock or fire.
	Please separate the power plug from the outlet for safety when the product is unused for long periods of time to avoid overheating or ignition due to dust.
	When disconnecting the power plug, it must be grasped by the hands and then pulled. Grasping only the cord and then disconnecting it may cause overheating or ignition because of internal lines being disconnected.

	<p>Insert the plug securely into an appropriate wall socket. Loose connections result in excessive heat generation to the device and may cause arcing to occur at the connection.</p>
	<p>If unusual noise or signs of abnormal behavior are found during use of this product, please immediately contact the supplier or DAIHAN Scientific (Co., Ltd.) after turning off the power supply and disconnecting the power line.</p>
	<p>When moving the product, please move it so that the power cord and the product are not damaged after disconnecting the power plug from the electrical outlet, in order to avoid the electrical shock or the ignition due to the damage to the cord.</p>
	<p>Please maintain the clean condition of this product by removing the foreign matter while gently wiping with the neutral detergent and a dry cloth after checking whether the foreign matter present or not, before and after using this product.</p>
	<p>The fluctuation of main power voltage should be lower than +/-10% of the nominal voltage..</p>
	<p>The maximum relative humidity is 80% at 31°C and 50% at 40°C .</p>
	<p>If a product was transported or stored in high humidity condition, please check packaging condition before use. If the carton or wooden box is waterlogged, please contact the deliverer or our technical service engineer. Do not operate the unit before checking with an engineer, otherwise it may cause an electrical shock or a fire.</p>
	<p>The Sound Level of the buzzer is maximum 60dB in 1 meter distance when an error is detected.</p>
	<p>The device should be set at a well ventilated place. Be sure the holes on the side or rear surface of the body are blocked by a wall or an object. And do not operate the device at a poor ventilated place or use closed. It may cause a fire or damage of the device as not to release heat or insufficient ventilation may result.</p>
	<p>Please, do not use the samples with sublimation property. Because the sublimable sample can block the Vacuum line by sublimating before the boiling point and it can damage the pump, the use of such samples is forbidden.</p>
	<p>If user wants to maintain the vacuum state, the Pump should be stopped after closing the Vacuum Valve, first. First, If the pump is stopped, the oil of pump can be flown in the inside of oven due to the vacuum in the oven.</p>
	<p>The experimental temperature in the vacuum state should be set up lower than the experimental temperature at the atmospheric pressure.</p>
	<p>This Symbol indicates that this product is to be collected separately. The following apply only to users in European countries:</p> <ul style="list-style-type: none"> ● This product is designated for separate collection at an appropriate collection point. Do not dispose of as household waste. <p>This product is required to comply with the European Union's Waste Electrical & Electronic Equipment(WEEE) Directive 2002/96/EC</p>

※ All of the circuits, electrical or mechanical parts and configurations used in this product are the

technical assets of DAIHAN Scientific (Co., Ltd.). Only technicians of the technical support team at DAIHAN Scientific (Co., Ltd.) or technicians approved through the education from DAIHAN Scientific should be allowed to repair this product.

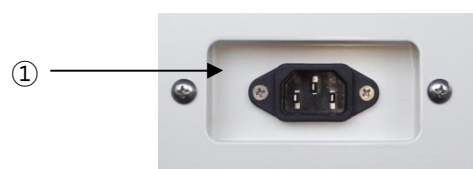
3. Product Usage

3.2 Names of Each Part

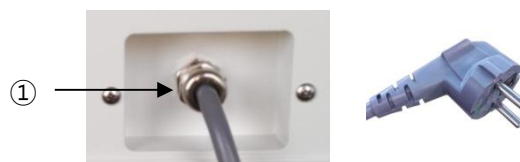
● Outside



<Fig.3.2.1> Precise Vacuum Oven
" ThermoStable™ OV-30 "



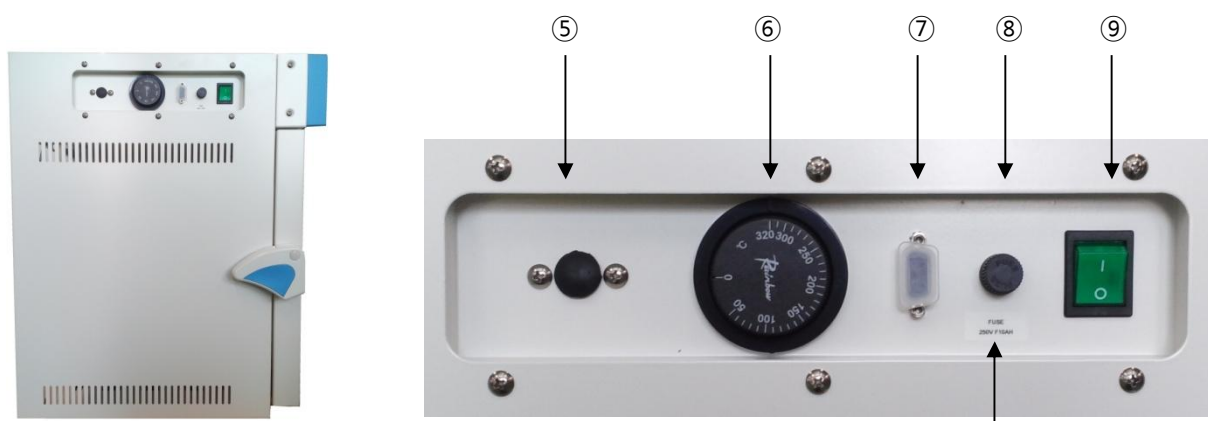
<Fig.3.2.2> Back of
" ThermoStable™ OV-20/30"



<Fig.3.2.3> Back of
" ThermoStable™ OV-70"

NO	Names	Description
①	Power Connection	Power Cord Apply
②	Vacuum Gauge	If user set up the vacuum, indicate the vacuum level of the inside while the needle of gauge moves from the right to the left.
③	Controller	Set and Check operation
④	Door Handle	Door Open and Locking

<Table 3.2.1> Names of each part and description

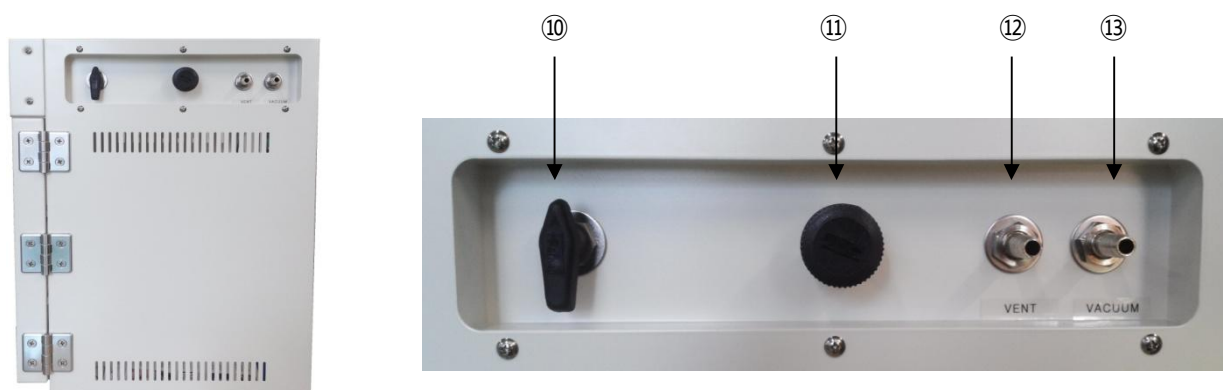


ThermoStable OV-20 (120V,230V) : 250V F 10AH

ThermoStable OV-30 (120V,230V) : 250V F 10AH

ThermoStable OV-70 (120V,230V) : 250V F 20AH

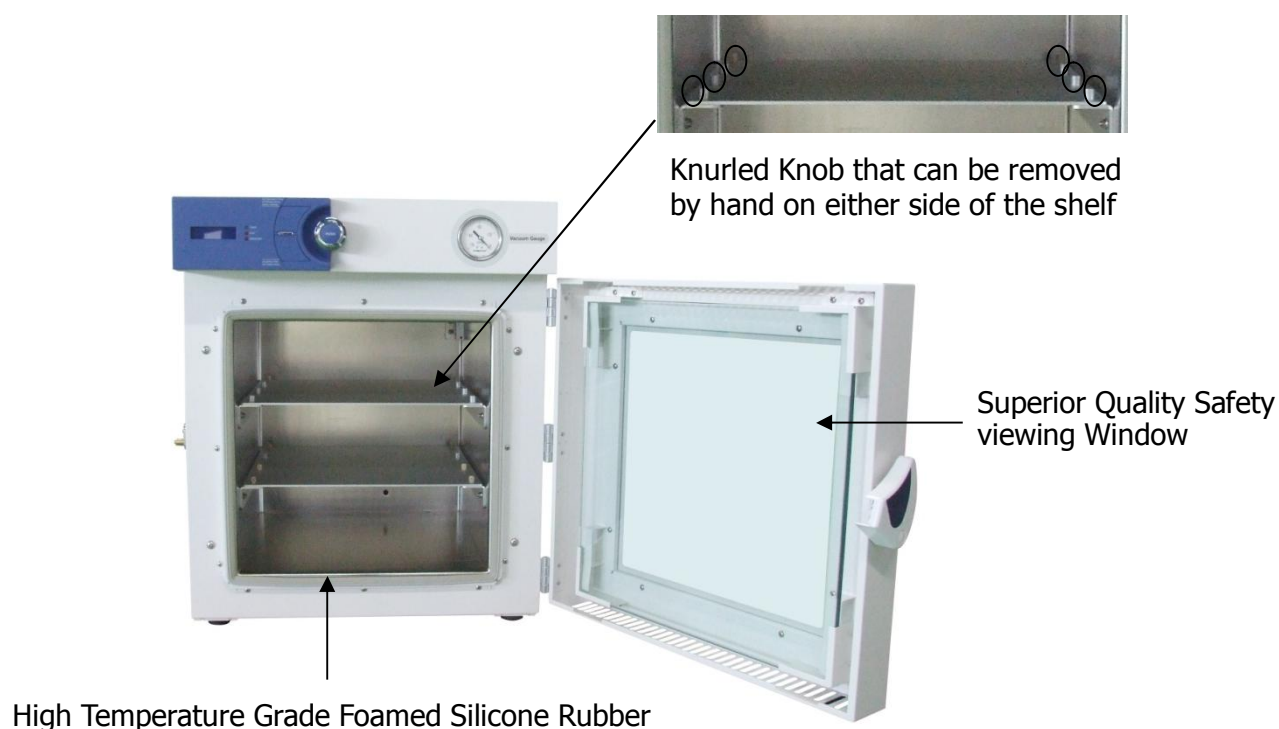
<Fig.3.2.4> Right Side of Precise Vacuum Oven " ThermoStable™ OV "



<Fig.3.2.5> Left Side of Precise Vacuum Oven " ThermoStable™ OV "

NO	Names	Description
⑤	OPT	Anti-overheating device of 300℃ or more.
⑥	Safety Knob	User Setting Desuperheater
⑦	RS232C	Serial Interface for Remote control by PC
⑧	Fuse	Protect unit from High Current
⑨	Main Power Switch	Power ON/OFF
⑩	Vacuum Control Valve	Open/Close for Vacuum State using Vacuum Pump Connection
⑪	Vent Control Valve	Air Inflow Controller within Chamber when releasing Vacuum
⑫	Vent Nozzle	Air Inflow Nozzle when releasing Vacuum (OD Φ10mm)
⑬	Vacuum Nozzle	Connection Nozzle with the Vacuum Pump when set up Vacuum (OD Φ10mm)

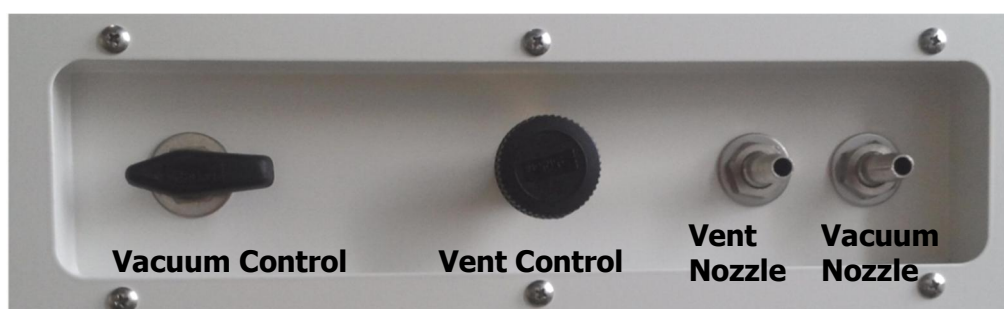
<Table 3.2.2> Names of each part and description



<Fig.3.2.6> Precise Vacuum Oven " ThermoStable™ OV " Door Open

* Method for Vacuum Setting and Releasing

- Please proceed as described below in order to safely re-set the vacuum again after setting the inside of Oven in the vacuum state.



<Fig.3.2.7> Left Side of Precise Vacuum Oven " ThermoStable™ OV "

1. Check Vacuum Set/Vent device located at the right of this product.
2. Put Samples into the Chamber before performing the operation of the product.
3. Check the Vent Control Valve in the vacuum control unit of the oven, and close it by completely turning clockwise.
4. Open the Vacuum Control Valve by turning horizontally.

5. Make the inside of Oven in a vacuum state by operating the vacuum pump after connecting a vacuum hose to the Vacuum Nozzle.
6. Check the vacuum state while confirming the pressure gauge after operating the vacuum pump. At this time, the rate making progress to the vacuum state may be varied according to the capacity of the vacuum pump.
7. Once the vacuum setup is complete, close the valve by turning lengthways the Vacuum Valve. And stop the operation of the pump. At this time, first, user must close the Valve and stop the operation of the pump.
8. If user releases the vacuum state after that the experiment is completed, open the Vent Valve by turning it counterclockwise. The quantity of inflow air at the time of the vacuum release can be adjusted according to the rotating amount of the handle.

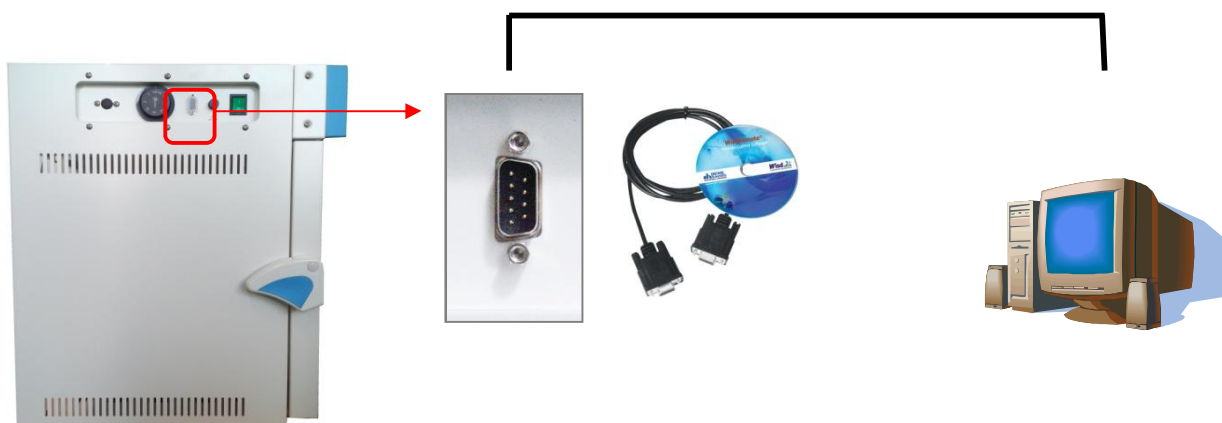


Precautions

- If the samples are solid, because any substances can come out along with air when the inside of the chamber is progressed in the vacuum state, user must operate the vacuum pump while slowly adjusting the vacuum level using the needle of the vacuum gauge after once blocking the vacuum line by the Septa.
- If the samples are the liquid with high viscosity, because it can become a solid while the solvent is evaporated, such samples should be used in the vacuum pump after removing the solvent.
- The flask used in the vacuum state should be safely used after being fixed using a joint clip and hanging in the Clamp.

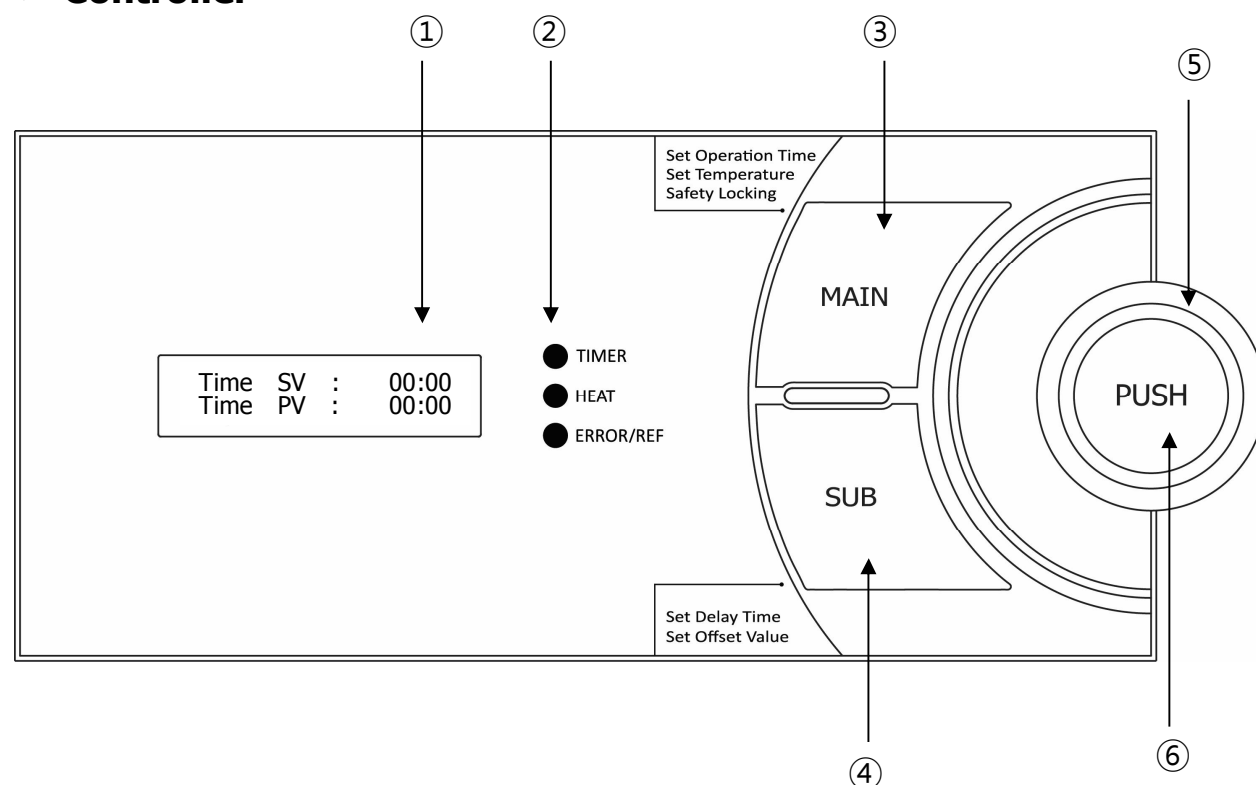
* RS232C Connector

- Port for cable connection to PC. Monitoring and Controlling with PC by connecting RS232C cable.



<Fig.3.2.8> Precise Vacuum Oven " ThermoStable™ OV " RS232C Connect

● Controller



<Figure 3.2.9> Precise Vacuum Oven " ThermoStable™ OV "

NO	Names	Function and Features
①	LCD	Display Set-up Value and Current Status.
②	LED Lamp	Indicate operation of TIMER, HEAT, ERROR/REF.
③	MAIN Button	Convert into mode of Timer, Heating, Locking.
④	SUB Button	Convert into mode of delay timer and offset function.
⑤	Jog Dial knob	Control that Reduces or Adds Values, and Does Start/Stop Operation.
⑥	PUSH Button	Operate Start/Stop.

<Table 3.2.3> Controller for " ThermoStable™ OV "

3. Product Usage

3.3 Usage Instructions

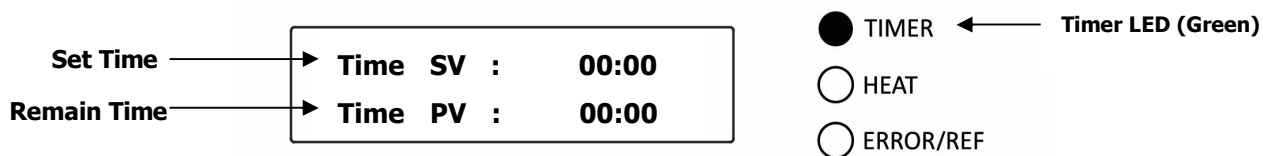
- Before operation, Set the SAFETY knob to 30~40°C higher than operation temperature.
- Connect the power cord to the proper power socket and Turn on the Main Switch.

* Operation method for Jog-Dial

- Jog-Dial can be manipulated for the setting in each mode by Turning and Push motion.
- If turning the Jog-Dial knob to clockwise or counter-clockwise, the setting values can be adjusted, and if briefly pressing once the PUSH button, the Start or the Stop operation is performed.
- The Turning of the Jog-Dial knob does not manipulated during operating, and if resetting the set value, it can be adjusted by the Jog-Dial knob after stopping the product by pressing briefly once the PUSH button.
- If pressing for 2 or 3 seconds the PUSH button, the set value is saved, and even if the power is turned on again, that value is maintained. (If "0" value is saved, the setting value is initialized.)

① MAIN - Set Operation Time

- When the power is turned ON, the initial screen is the setting mode of the Timer set mode.

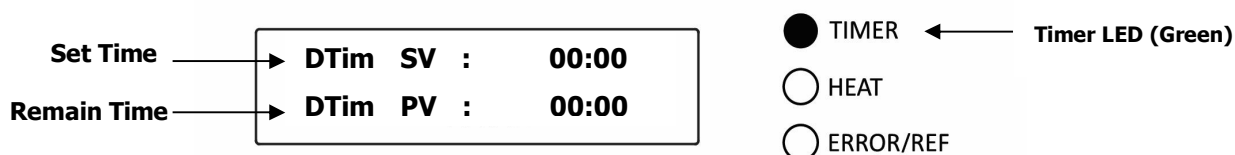


< Fig 3.3.1. Set Operation Time Mode >

- TIMER LED is lighted during the operation of timer, and indicates that it is operating.
- The range of setting time is from 00:00 to 99hr and 59min(it is possible to adjust at 1min.) and 00:00 indicates continuous operation.
- If the timer operation is completed, the alarm will sound and heating will be stopped.
- The timer setting mode can be operated by referring to the jog-shuttle operation method.

* Set Delay Time (Delay Timer)

- If pressing the SUB button in the Set Operation Timer Mode, it is switched to the Set Delay Time mode.
- The Delay Timer sets the reservation time and has the function that sets so that the operation of Heating and Timer are performed after that time is elapsed.

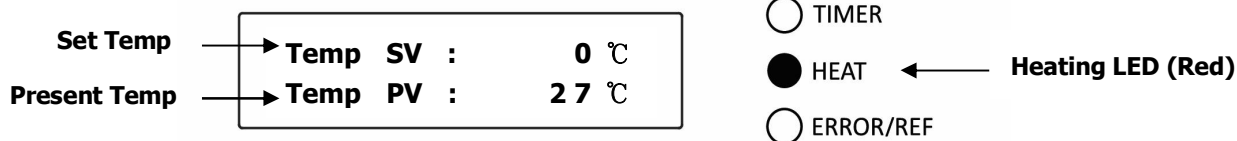


< Fig 3.3.2. Set Delay Time Mode >

- The proper use of the delay timer is to manipulate so that the reservation time is set for the first time, and then the temperature and the operation timer is set and the set operation is automatically operated after the reservation time is elapsed.
- The reservation time value is displayed over blinking on the display, and if pressing the PUSH button by setting the reservation time value with the Jog-Dial knob, the value is fixed on the Display, and the reservation timer is activated.
- After setting the reservation timer value, you can set-up the operation timer value by pressing the MAIN button and then press Start button. And, you can set-up the temperature by pressing the MAIN button again, and then press Start button. The Start button in the condition that the reservation timer has been set-up, is the button for the operation of the setting value after the reservation timer, not to immediately operate.
- As described above, if continuously setting the operation, Heating and Timer are operated after the set reservation time as user intend.
- Since the delay timer is not set during the operation of Heating/Timer, the delay timer should be set after stopping the operation of Heating/Timer.
- You can change or save the setting by using the operation method of the Jog-Dial, and Start/Stop of operation can be performed.
- If pressing MAIN button, it is switched to the Set Operation Time Mode.

② MAIN - Set Temperature

- If pressing once the MAIN button in the Set Operation Time Mode, it is switched to the temperature setting mode.

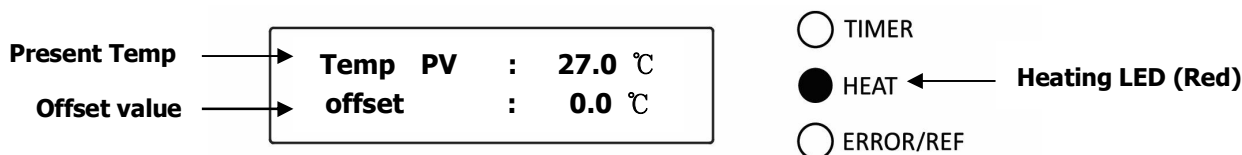


< Fig 3.3.3. Set Temperature Mode >

- The setting temperature is entered by turning the Jog-Dial Knob to clockwise or counter-clockwise. If the setting value is entered to above 0°C, the operation standby state is displayed while blinking the HEATING indication of LCD Display.
- The HEATING indication of LCD Display is always displayed during the operation of HEATING, and if the setting value is entered to above 0°C in the condition that the heating is stopped, the HEATING indication indicates the standby status while blinking in long interval.
- The range of the setting temperature is adjustable in the unit of 1°C, and can be set up to 200°C.
- You can change or save the setting by using the operation method of the Jog-Dial, and Start/Stop of operation can be performed.

* SUB - Set offset value

- Temperature compensation is the function that can add or reduce the constant value by setting the compensation value in the case that user must experiment by matching the thermometer which he/she is using as the experimental standard and the thermometer indicated in this regulator.



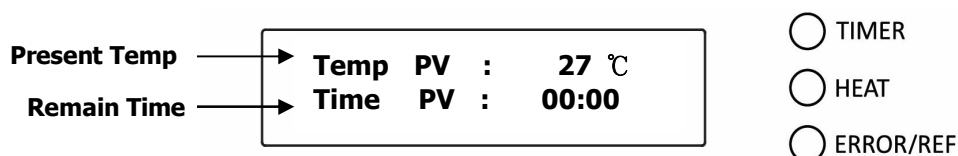
< Fig 3.3.4. Set offset value Mode >

- If pressing the SUB button in the Set Temperature mode, it is switched to the Set Temperature Offset mode.
- The scope of the compensative value is -20.0°C ~ +20.0°C, and it is possible to adjust at 0.1°C unit.
- After setting the compensation value, the indication of the current temperature is displayed as the temperature including the compensation value.

- When entering into the compensation value setting mode during the Heating operation, the Heating operation that is operating is stopped. After setting the compensation value, the Heating operation is re-conducted in the Set Temperature Mode.
- After setting offset value of one temperature range, Setting back the Offset value for correct temperature control in case of the use another temperature range. Is users choice case for accurate temperature control of test.
- If the PUSH button of Jog Dial Knob is pressed and held for 2-3 seconds, the setting value is saved and this saved value is maintained even when the power is turned on again.
- If pressing MAIN button, it is switched to the Set Temperature Mode.

③ MAIN - Safety Locking

- If pressing MAIN button in the Set Temperature Mode, it is switched to the Locking mode.



< Fig 3.3.5. Safety Locking Mode >

- In the Locking Mode, the Turning by the Jog-Dial Knob or Push button do not applied, and LCD Display and LED lamp indicate the status that is currently operating.
- If pressing once the MAIN button, it is entered into the Set Operation Time Mode.

* Automatic Operation Function

- In the use of the product, if the power supply has been interrupted and then is reapplied, it has the function that protects the experimental results and samples by automatically reactivating as the setting of final operation.
- In Jog-Dial operation method, support this function by activating the setting temperature stored through the saving method of the set points.
- When reapplying the power supply according to the problem on safety or user's intention, if you want to disable the automatic operation function, set up the temperature to zero (0) according to the instruction of Jog-Dial.

* ERROR Message

ERROR Message	Cause	Remedy
Error 1	Informs the time to be displayed the temperature of abnormal value due to the abnormality of Temperature Sensor.	Please check the temperature of the heated top plate.

<Table 3.3.1 > ERROR Message Table

* Check Safety Knob by Regulation.



1. On the product Side, check the Safety Knob.
2. If the power of the product is OFF, check the 'Tak' sound in the vicinity of room temperature when slowly turning clockwise up to 320°C after adjusting the Safety Knob to 0°C.
3. If the power of the product is ON, check the 'Tak' sound in the vicinity of current temperature of product when slowly turning clockwise up to 320°C after adjusting the Safety Knob to 0°C.
4. 'Tak' sound is Normal, If 'Tak' sound is not occurred A/S is required.
5. Please check the progress on a regular basis. Proceed at least once to 6 months.

4. Products Management

4.1 Accessories

4

* Ordering Information

Image	Ordering Number	Information
	DH.WOV11020	Standard Shelf, Aluminum, "OVS020", w295xd285xh98mm, for 18.6 Lit.
	DH.WOV11030	Standard Shelf, Aluminum, "OVS030", w295xd285xh98mm, for 30 Lit.
	DH.WOV11070	Standard Shelf, Aluminum, "OVS070", w395xd395xh130mm, for 70 Lit.
Validation(IQ, OQ) Service	DH.WOV31020	Validation Service(IQ, OQ), "OVV020", for "ThermoStable OV-20"
	DH.WOV31030	Validation Service(IQ, OQ), "OVV030", for "ThermoStable OV-30"
	DH.WOV31070	Validation Service(IQ, OQ), "OVV070", for "ThermoStable OV-70"

4. Products Management Method

4.2 Maintenance and Management

Precise Vacuum Oven was manufactured with the consideration of various situations that may occur during the operation. However, for long-term use with stable performance, please observe the following precautions.

1. If the unit is not to be used for an extended period of time, disconnect the power cord from the wall socket.
2. **DAIHAN** is not responsible for damage to the unit caused by abnormal use or by not heeding warnings and cautions in the manual or unauthorized modifications of the unit.

CLEANING

1. Before cleaning the unit, disconnect the power cord from the wall socket. Otherwise, it may cause an electric shock or fire.
2. To clean the unit, a neutral detergent and soft cloth is recommended. Do not use coarse cloth, strong chemicals or organic solutions.
3. Do not use water, Benzene, Thinner or any alcohol for cleaning the product. It may cause discoloration, damage, an electric shock or fire.
4. If you expect damage by a chemical during cleaning, call technical support team.
5. Do not pour water directly into the unit. It may cause an electric shock or fire.
6. During cleaning of the chamber, be careful cleaning the corners to avoid injury.

- Cleaning Method of the Inner Chamber

- Remove the shelves equipped in the chamber. Clean the contaminated part using a neutral detergent and soft cloth.
- After cleaning, reassemble the shelves properly.
- Do not clean the unit aggressively. Otherwise, the coating or painting of the product could be damaged.

- Cleaning Method of the Exterior

- Clean the exterior using a neutral detergent and soft cloth.
- Do not clean the display or Jog-Dial Knob aggressively as they may be damaged.
- Do not clean the unit aggressively. Otherwise, the coating or painting could be damaged.

- Cleaning Method of the Parts

- Clean the parts using a neutral detergent and soft cloth.
- Do not clean the unit aggressively. Otherwise, the coating or painting could be damaged.

4. Products Management

4.3 If product Defect Occur

Situation	Confirmations and Solutions
If power does not turn ON.	<p>Make sure that Power Cord is plugged well.</p> <p>Check that there are no problems in the power supplied.</p> <p>Make sure that the circuit breaker is in the ON position.</p> <p>Check the short circuit status of the fuse.</p>
Power Failure	<p>Check the power cord is plugged into wall socket.</p> <p>Check the supplied voltage is proper and regulated.</p>
Heating, but temperature is fluctuated	<p>Check the temperature that is currently set.</p> <p>Make sure that the power switch is in the ON position.</p> <p>Check that SAFETY Knob is not placed in the "0" position, and if SAFETY Knob is in the "0" position, sets up 30℃~40℃ higher than the service temperature.</p>
Heating, but unit not reaching temperature	<p>Check the Set Temperature is higher than ambient temperature (recommended min set temp: 10C higher than ambient temp).</p> <p>Problem in the sensor or main controller.</p>
Fuse is blown OR circuit breaker is flickered.	<p>Check power source of wall socket and see what other loads are on wall circuit.</p>
If the vacuum is not taken,	<p>Check the Open condition of the Vacuum Valve.</p> <p>Check the Close condition of the Vent Valve.</p> <p>Check the connection state with the Vacuum pump.</p> <p>Make sure whether there is the leakage between the vacuum hose and the Vacuum Nozzle, or not.</p> <p>Check the closed state of the Door.</p> <p>Check the degree of adhesion between the Door gasket and the glass.</p>
<p>※ If you have any problem other than the above, please call technical service of manufacturer or an official agent.</p>	

5. Product Assurance

5.1 Quality Assurance

5

CERTIFICATE

of
**Quality Tested by Manufacturer
and Free Warranty up to 2 years
for Laboratory Instrument**

Limited Warranty

1. This instrument has gone through our testing process about all functions before shipment.
2. This instrument is warranted for 2 years from purchasing date.
3. A breakdown caused by customer's improper use or natural disaster is excepted from this warranty.
4. This certification is only for international customers.

Item	Precise Vacuum Ovens
Model No.	ThermoStable™ OV-
Serial No.	
Date	
Customer	

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