

**EYELA**

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Vacuum constant-temperature dryer  
Vacuum Dry Oven

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Model VOS-452SD  
Model VOS-602SD

**Instruction Manual**

This manual is designed to use this unit safely with the best performance.



IMPORTANT

**Read carefully the chapters for “safety operation” before operating this unit.**

Keep this instruction manual beside the unit.




**Tokyo Rikakikai Co., Ltd.**

# PRECAUTIONS FOR YOUR SAFETY

## 1. Warning signal words

On account of the functions and characteristics, some parts of this unit will become hot, and therefore careless touching to those parts during operating or working may cause unexpected injury. Most of such accidents, however, can be prevented if you are well informed of them beforehand.

To prevent the accidents, this manual defines the information on safety instructions according to their levels of importance or risks as flows, and alerting marks and signal words are attached. Please follow these instructions to use the product safely.

Alerting mark & Signal word	Definition
 DANGER	Indicate a strained hazardous situation which, if you use incorrectly, could result in death or serious injury.
 Warning	Indicate a potentially hazardous situation which, if you use incorrectly, could result in death or serious injury.
 Caution	Indicate a potentially hazardous situation which, if you use incorrectly, may result in injury or physical damage.

We have undertaken thorough verification concerning the possible occurrence of risks during using the product, but complete prediction of all and every kind of risks is extremely difficult. Namely, the cautions contained in this manual are not necessarily all of possible risks.

However, if the product is operated according to the procedures described in this manual, safety operating or working is ensured. Be sure to pay utmost care during handling the product to prevent accidents or failures of the product.

## 2. Warning labels on the Product

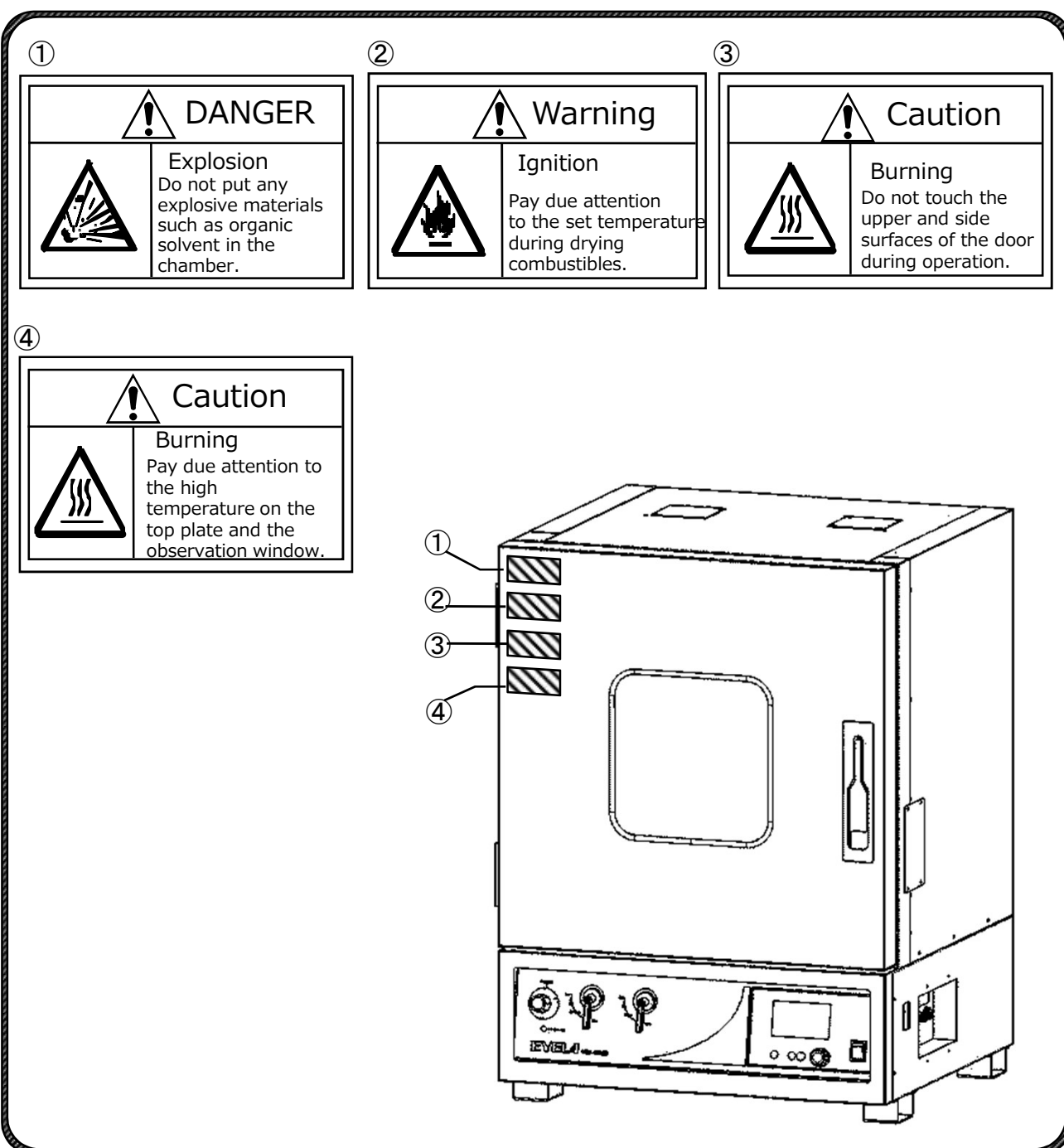
Warning labels are attached to the unit for the most important warnings.

The position to be attached is shown as below.

Be careful to use the unit referring to the warning messages.

\*When any of the warning labels are worn or the messages are unreadable, change it with a new one.

Please contact us to order a new label.



Thank you for choosing  
**EYELA**  
 Product.

## Introduction

This instruction manual describes the procedures for installation, operation, trouble shooting, maintenance/check-up and disposal for **Vacuum constant-temperature dryer [Vacuum Dry Oven]** VOS-452SD, 602SD

For using this unit, please refer to the following two manuals together with this manual: "Panel Key Operation Manual"

It instructs the procedures for creating the operation programs using the panel key.

"Key Operation Manual"

Quick reference for panel key operations.

Read this manual carefully before use.

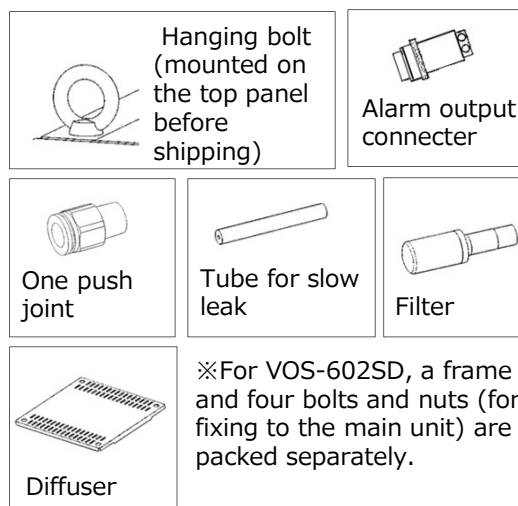
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## Items contained in your packing


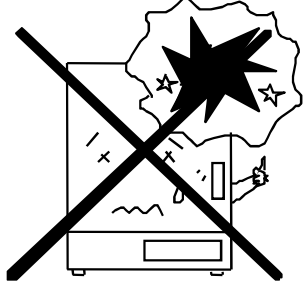

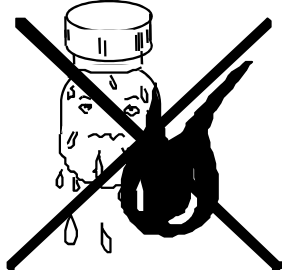

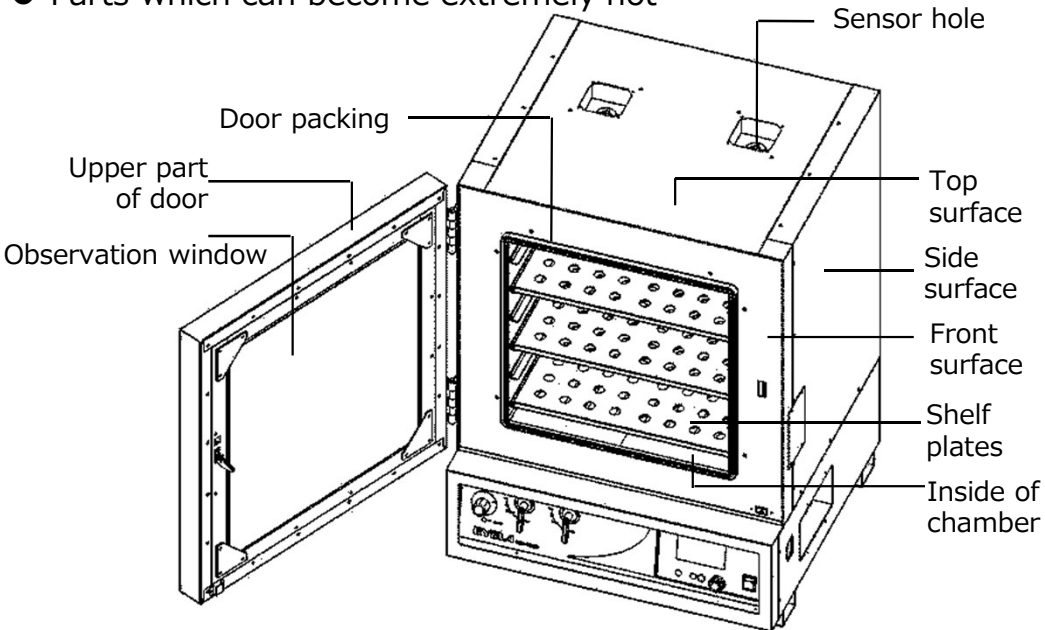
Check your model and the quantities of parts before setting.

	Name	VOS-452SD	VOS-602SD
1	Main unit	1	1
2	Shelf plate	3	4
3	Hanging bolt	-	4
4	Alarm output connecter	1	1
5	One push joint	1	1
6	Tube for slow leak	1	1
7	Filter	1	1
8	Diffuser	1	1
9	Instruction manual	1	1
10	Panel key operation manual	1	1
11	Key operation manual	1	1
12	Warranty card	1	1



# 1 For safety operation

This unit can become hot and doesn't have an explosion-proof structure, and therefore please be sure to handle safely.

 <p><b>DANGER</b></p>	<p><b>Do not use flammable materials such as an organic solvent.</b></p> <p>While operating, inside temperature of the unit is very high, and therefore sample materials may be vaporized, ignited or exploded. Do not use explosive materials such as nitrate and nitro compounds, and ignitable materials such as peroxide salts, inorganic peroxide, salt nitrate and organic solvents. This unit doesn't have an explosion-proof structure.</p> 
 <p><b>Warning</b></p>	<p><b>When drying flammable materials, set a proper temperature for safety.</b></p> <p>For example, if you set a high temperature by mistake for drying materials using resin-made vessels or parts, they may be melted and dropped on the heater or ignited. Do not put too much samples in vessels. In that case, only the bottom part is heated extremely, and then flammable material are melted or ignited.</p> 
 <p><b>Caution</b></p>	<p><b>During operation, do not touch the top surface of the unit and the upper part of the door because they become excessively hot.</b></p> <p>The observation window and the upper part of the door and the side surface of the unit becomes extremely hot during operation and for a while after operation. Do not touch them to prevent getting burned.</p> <ul style="list-style-type: none"> <li>● Parts which can become extremely hot</li> </ul> 

## 2 Outline

### 2-1 Application



#### Warning

**Do not remodel.**

**Do not use** out of the application range

Remodeling or using out of the application range may cause electrical shock accidents or mechanical troubles.

This is the Vacuum Constant-temperature Dryer for the purpose of removing water of various samples and materials under depressurized environment and drying or testing various materials and parts under oxygen-free condition created by filling the inside of the chamber with inactive gas.

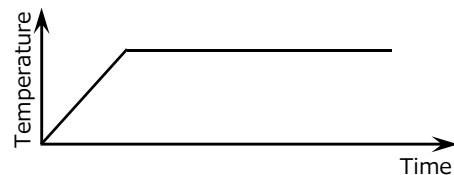
### 2-2 Program mode

Four basic patterns of temperature and time can be set according to your purpose. You can set it using the control panel.

For the details of each setting method, refer to the attached "Panel Key Operation Manual".

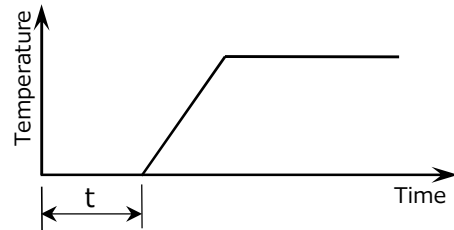
#### 1. Constant value operation

Once a temperature is set, the dryer starts the operation and enters continuous operation at the set temperature.



#### 2. Auto-start

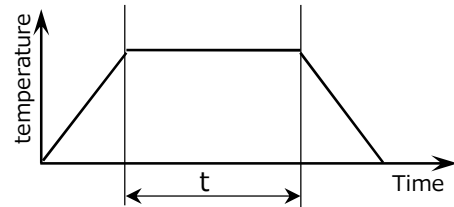
If you set a time until starting operation (t), the dryer starts the operation after the preset time elapses. Even after the time elapsed, in case of high pressure inside the dryer, it doesn't start the operation until the pressure becomes normal (not higher than atmosphere pressure). Combination with all temperature control modes is possible.



#### 3. Auto-stop

If you set a time until stopping operation (t), the dryer stops the operation after the time elapses.

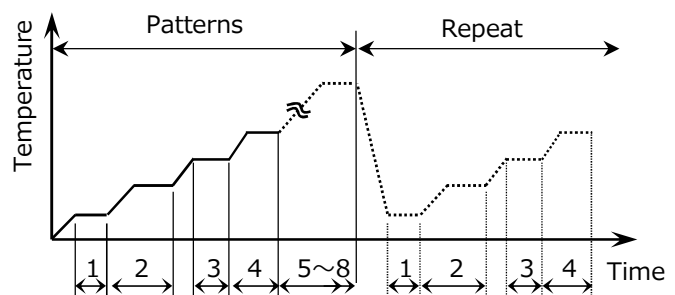
Auto-stop is enabled by setting the temperature and time only for seg 1 and also setting the number of repetition as "once" in the following "4. Program operation".



#### 4. Program operation

You can control the temperature with a combination of time and temperature by 8 steps at a maximum. You can also set the priority control (temperature/time) for each step.

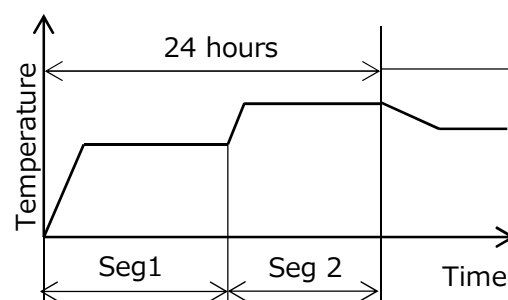
The preset program is repeatedly operated the set number of times (99 times at a maximum). You can also save 8 programs at a maximum.



(1)(3):Temp. priority, (2)(4):Time priority

#### 5. 24 hours cyclic operation

When temperature and time in seg 1 and temperature in seg 2 is set, the set programs in seg 1 and seg 2 are repeatedly operated in 24 hours cycle. (99 times at a maximum) The time until the temperature inside the chamber reaches the set time is included in the set time. (time priority)



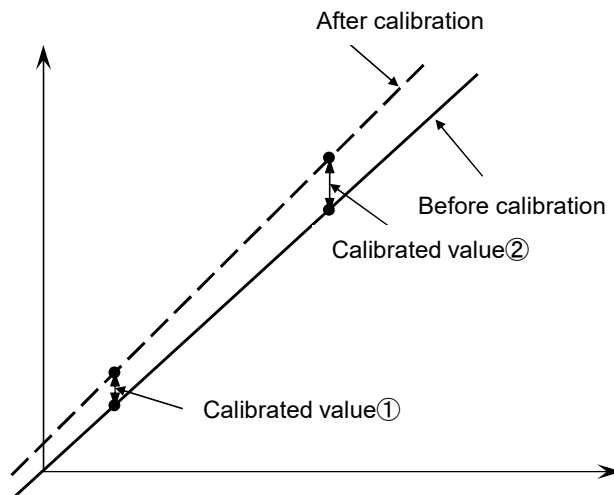
## 2-3 Adjustment mode

### 1. Temperature display calibration

The display of measured temperatures can be adjusted to the displayed temperature on standard thermometer, etc.

### 2. Pressure display calibration

The display of measured pressures can be adjusted to the displayed pressure on standard pressure tester, etc.

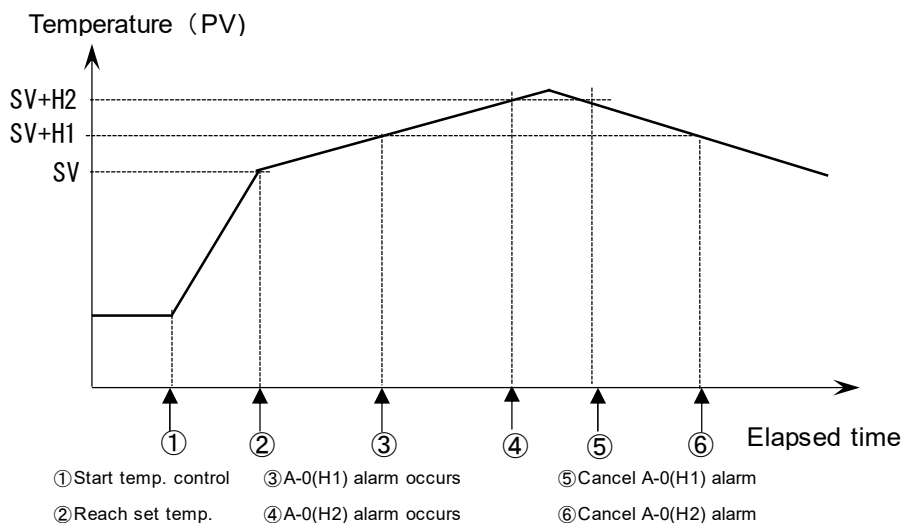


### 3. Temperature alarm

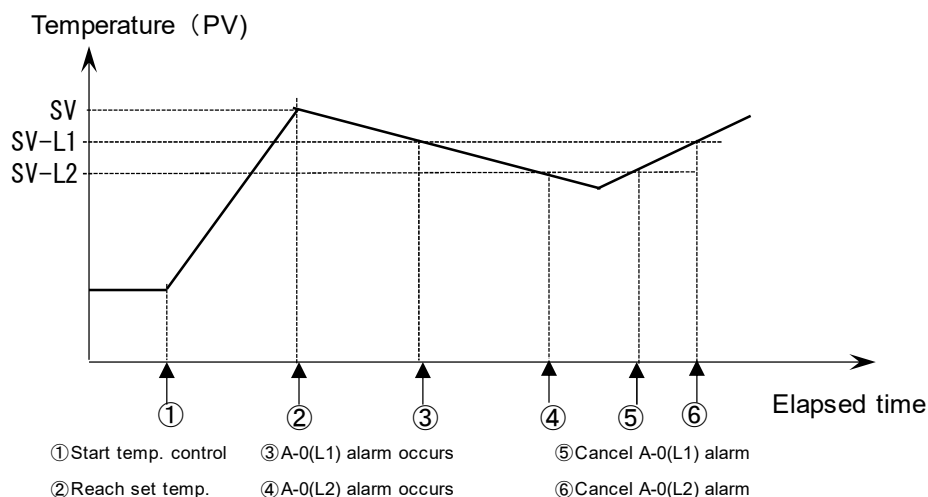
After reaching the preset temperature by temperature control, when the measured temperature (PV) exceeds the upper-limit temperature, upper limit temperature alarm (overshooting) occurs, and when the measured temperature (PV) exceeds the lower-limit temperature, lower limit temperature alarm (undershooting) occurs.

The upper limit temperature alarm and lower limit temperature alarm consists of 2 stages respectively.

Operating example of upper limit temperature alarm



Operating example of lower limit temperature alarm



## 2-4 Specifications

Product name		Vacuum constant-temperature Dryer (Vacuum Dry Oven)	
Model		VOS-452SD	VOS-602SD
Heating method		Chamber body heating	
Performance	Temp. control range	40~210°C	40~200°C
	Temp. control accuracy ※1	±1.0°C (at 210°C)	±1.0°C (at 200°C)
	Time-to-maximum temp. ※1	About 80 min.	About 110 min.
	Ultimate vacuum	1hPa	
Function	Temp. controller / sensor	Microcomputer P.I.D control / Pt100Ω	
	Timer function	Auto-start	
	Program function	Step operation (within 8 steps), 24 hours operation	
	External output	Output terminal for temperature/pressure recorder, Output: DC0-8000mV Output terminal for alarm, Output: Non-voltage a contact output (rating 250/2A)	
	Safety feature	Self-diagnostic function (temp sensor error, power restoration, door alarm, upper/lower limit alarm, heater short, heater breaking), Breaker for electrical leakage and overcurrent, Variable independent overheat protector (VOS-452SD: 50~270°C, VOS-602SD: 50~260°C)	
Composition	Temp. setting / display	Dial type encoder, Key input, Liquid crystal display	
	Heater	2.1kW	2.5kW
	Pressure sensor	Digital display: 0~1066hPa, Least input digit: 1hPa	
Specification	Inside dimension(mm)/capacity	450W×450 D×450 H/91L	600W×600 D×600 H/216L
	Shelf plate Load capacity/Material	UDL: 15kg/plate, Stainless steel sheet (NSSC180)	
	Number of shelf	3 pcs (6 pcs can be set.)	4 pcs (6 plates can be set.)
	Pitch/Steps of shelf	71 mm/6 stages (fixed)	95 mm/6 stages (fixed)
	Observation window(mm) ※2	250W×250 H	430W×430 H
	Inside surface of door	Tempered glass, Thickness: 15 mm	Tempered glass, Thickness: 19 mm
	Material of gas contact parts	Door packing: silicon, Inside the chamber: stainless steel sheet (SUS304), glass, Piping area: Stainless steel (SUS304,SUS316)	
	Suction port size	Vacuum nozzle: hose nozzle with ΦOUT 22 mm Purge nozzle: ΦOUT 16 mm (inner Rc1/4)	
Operating ambient temperature range	5~35°C		
Outside dimension (mm)/Weight	655(673)W×597(605)D×905 H /about 135kg	860(878)W×780(785)D×1720 (1780)H (incl. frame) /about 345kg	
Power input	10.75A, 2.15kVA	12.75A, 2.55kVA	
Power source	AC200V, Single phase, 50/60Hz		

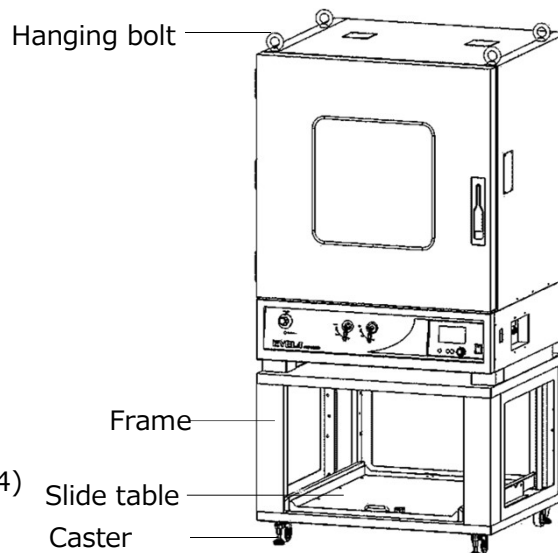
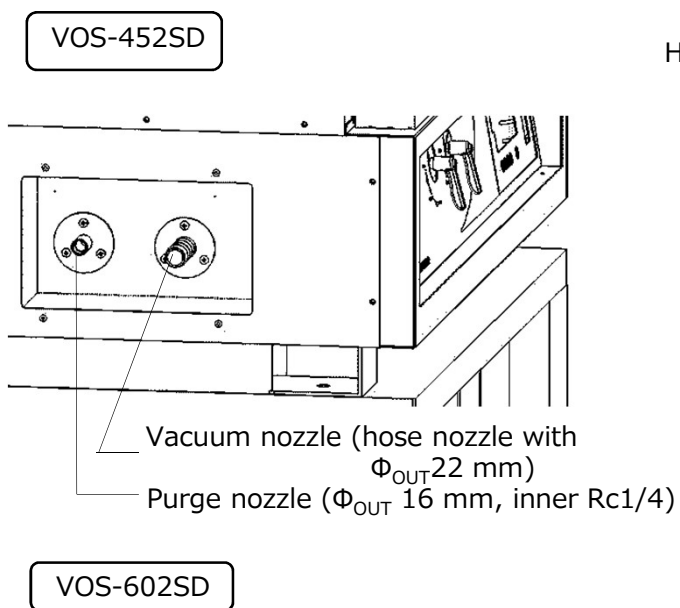
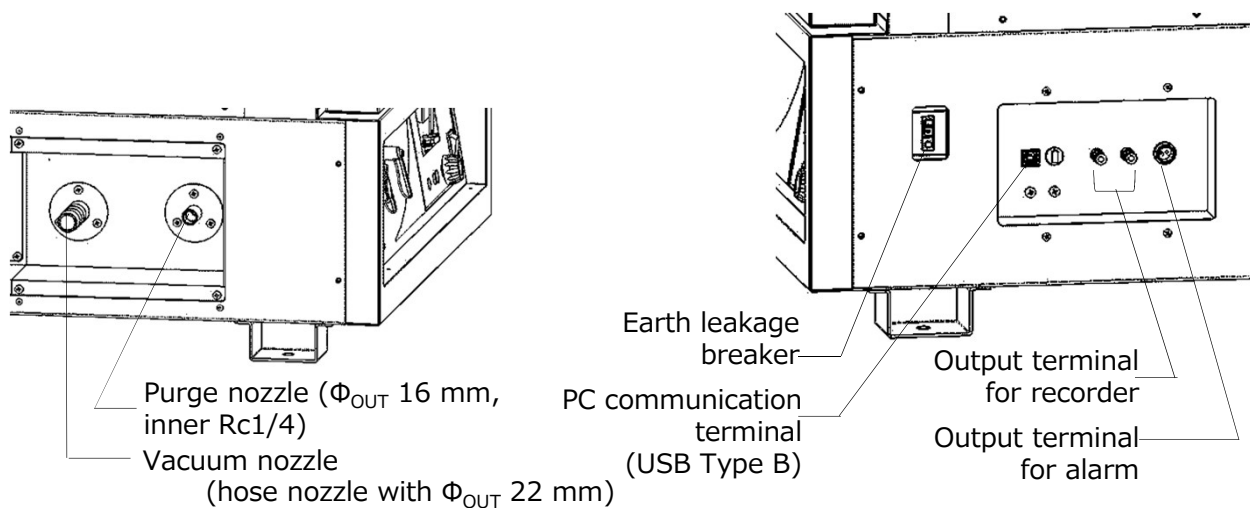
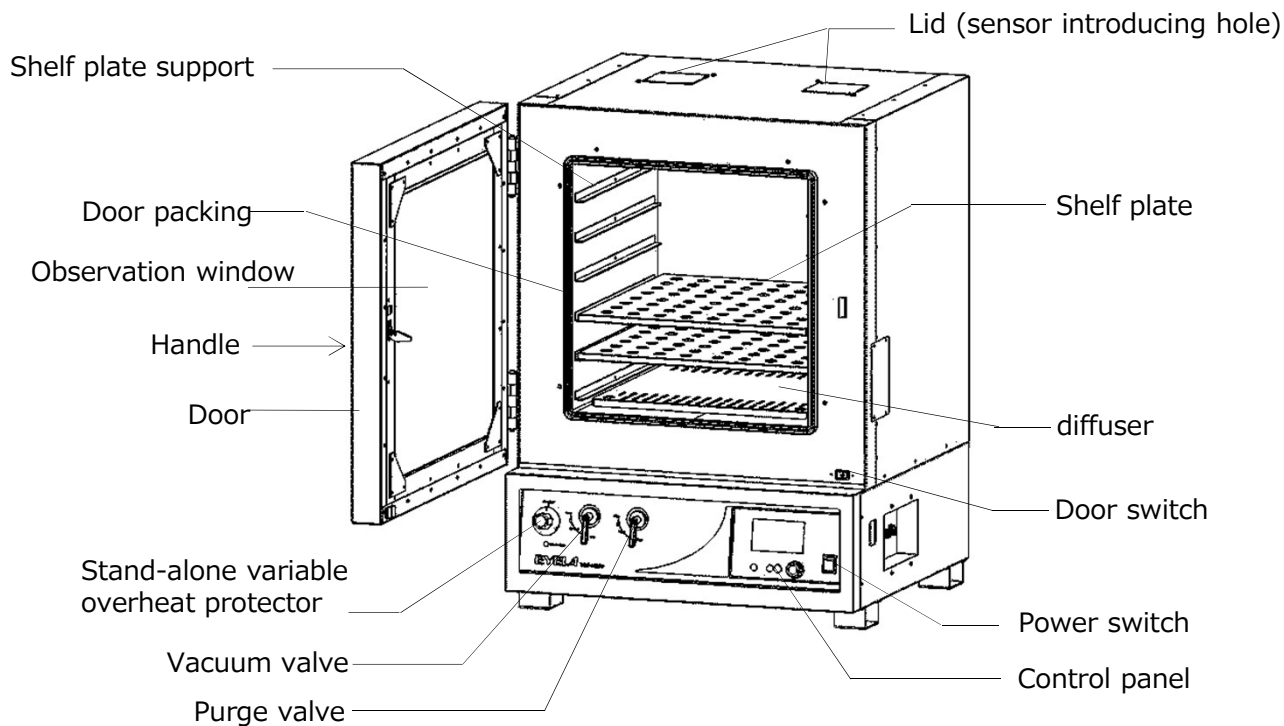
※1 The values were obtained at RT 20°C, without a load, under depressurized pressure.  
Time-to-maximum temp. means the surface temperature of chamber body in a depressurized state.

※2 Observation window: Tempered glass (VOS-452SD: thickness 15 mm, VOS-602SD: thickness 19 mm)  
+ polycarbonate protection cover

※Dimensions shown in ( ) include projections.



## 2-5 Name of parts



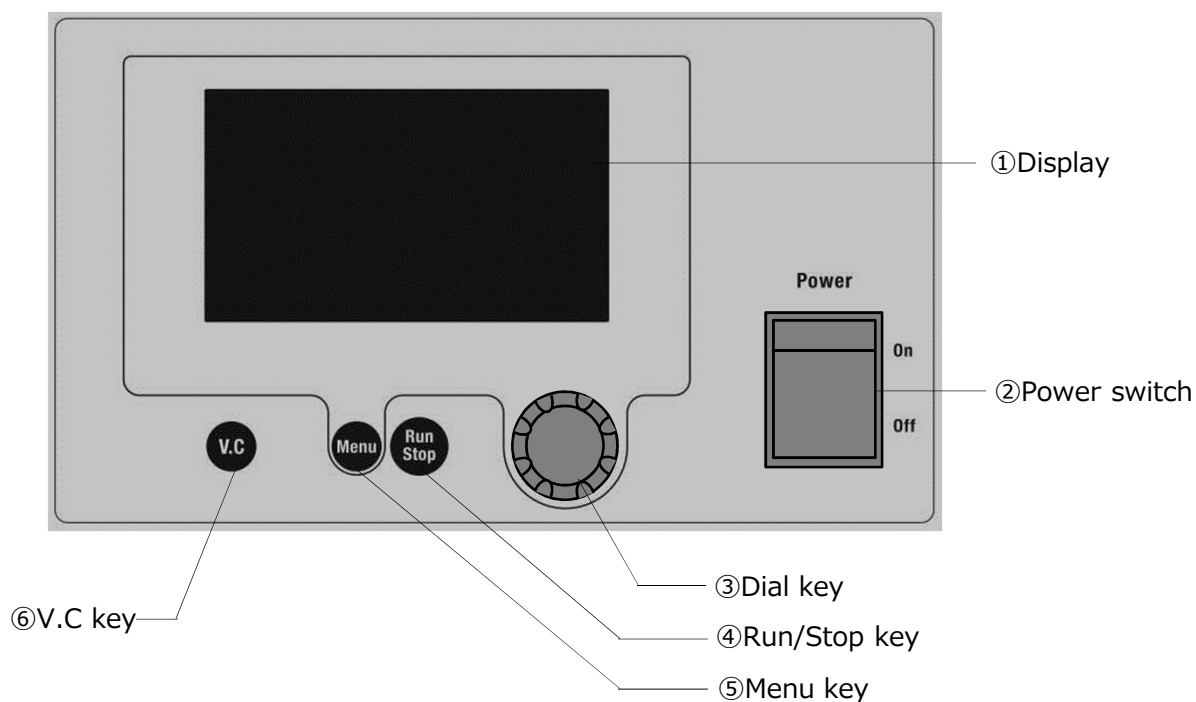
VOS-452SD

VOS-602SD

VOS-602SD

## 3 Name and Functions of Controller

### 3-1 Control panel



No.	名 称	機 能
①	Display	Indicates temperature, pressure, time, set character and alarm information.
②	Power switch	Switch ON/OFF the power.
③	Dial key	1.Main screen is switched to the screen for selecting operation modes by pressing this key. 2.The following operations can be performed while the cursor is displayed. By turning : Increase/Decrease the numerical values, Move the cursor. By pressing : Select items, Fix the set values. 3.In case of constant value operation mode, numeric values are increased or decreased by turning the dial, and the set values are fixed by pressing the key when the main screen is displayed.
④	Run/Stop key	Start/stop the control.
⑤	Menu key	Main screen is displayed. This key is used for returning from each screen and returning to the set value before changing.
⑥	V.C key	Options can be controlled. Effective only when connecting to options.

## 3-2 Safety and alarm functions

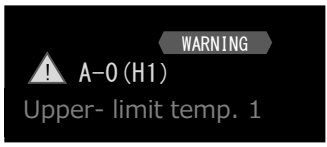
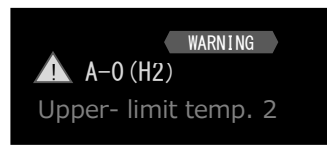

This product is provided with safety and alarm indication functions as described below. In case of any abnormality, take appropriate measures referring to "Causes and measures for


Troubles" on page 20 and "Alarm function" in the additional manual, "Panel key operation manual".


### Safety functions


Safety device	Description	Cause	Remedy
Earth leakage/Overcurrent breaker	It shuts down the power supply when detecting earth leakage or overcurrent.	<ul style="list-style-type: none"> <li>Electrical leakage by wiring laceration</li> <li>Overcurrent by wiring deterioration</li> </ul>	Immediately stop the operation and contact your dealer or local service center.
Variable independent overheat protector	It shuts down the power supply when the measured temp is rising over the preset temp. in the device. Alarm lamp is lighted.	<ul style="list-style-type: none"> <li>The preset temperature in the device is lower than the temperature set in Control panel.</li> <li>The measured temp. rose over the preset temp. in the device due to a failure of temp. controller.</li> </ul>	Check the preset temp. in the device and the preset temp in temp. controller and then set appropriate temp. If the problem persists, immediately stop the operation and contact your dealer or local service center.


### Alarm functions


 <p>WARNING</p> <p>A-0 (H1) Upper-limit temp. 1</p> <p>Status display</p> <p>A-0(H1)</p>	[A-0(H1)] Upper-limit temp. alarm 1	
	Main cause	Continuous state of Measured temp.(PV) > Set temp.(SV) + Upper-limit temp. alarm 1(H1)
	Operation	Initial setting is "OFF". Controlled according to the setting.
	How to cancel the alarm	<ul style="list-style-type: none"> <li>Press Dial key while stopping temp. control.</li> <li>Stop and then restart temp. control.</li> <li>Change the set temp.</li> <li>Continuous state of Measured temp.(PV) ≤ Set temp.(SV) + Upper-limit temp. alarm 1(H1)</li> </ul>
 <p>WARNING</p> <p>A-0 (H2) Upper-limit temp. 2</p> <p>Status display</p> <p>A-0(H2)</p>	[A-0(H2)] Upper-limit temp. alarm 2	
	Main cause	Continuous state of Measured temp.(PV) > Set temp.(SV) + Upper-limit temp. alarm 2(H2)
	Operation	<ul style="list-style-type: none"> <li>Stop temp. control.</li> <li>Inform by displaying an alarm and sounding buzzer.</li> </ul>
	How to cancel the alarm	<ul style="list-style-type: none"> <li>Press Dial key while stopping temp. control.</li> <li>Stop and then restart temp. control.</li> <li>Change the set temp.</li> <li>Continuous state of Measured temp.(PV) ≤ Set temp.(SV) + Upper-limit temp alarm 2(H2)</li> </ul>
 <p>WARNING</p> <p>A-0 (L1) Lower-limit temp. 1</p> <p>Status display</p> <p>A-0(L1)</p>	[A-0(L1)] Lower-limit temp. alarm 1	
	Main cause	Continuous state of Measured temp.(PV) < Set temp.(SV) – Lower-limit temp. alarm 1(L1)
	Operation	Initial setting is "OFF". Controlled according to the setting.
	How to cancel the alarm	<ul style="list-style-type: none"> <li>Press Dial key while stopping temp. control.</li> <li>Stop and then restart temp. control.</li> <li>Change the set temp.</li> <li>Continuous state of Measured temp. (PV) ≥ Set temp.(SV) – Lower-limit temp. alarm 1(L1)</li> </ul>


 <b>A-0(L2)</b> Lower-limit temp. 2  Status display <b>A-0(L2)</b>	<b>[A-0(L2)] Lower-limit temp. alarm 2</b>	
	Main cause	Continuous state of Measured temp. (PV) < Set temp.(SV) – Lower-limit temp. alarm 2(L2)
	Operation	<ul style="list-style-type: none"> <li>• Stop temp. control.</li> <li>• Inform by displaying an alarm and sounding buzzer.</li> </ul>
	How to cancel the alarm	<ul style="list-style-type: none"> <li>• Press Dial key while stopping temp. control.</li> <li>• Stop and then restart temp. control.</li> <li>• Change the set temp.</li> <li>• Continuous state of Measured temp. (PV) ≥ Set temp.(SV) – Lower-limit temp. alarm 2(L2)</li> </ul>





 <b>A-1</b> Out of control  Status display <b>A-1</b>	<b>[A-1] Out of temperature control</b>	
	Main cause	Measured temp. (PV) cannot reach the Set temp (SV) after a certain period of time elapses after starting temp. control.
	Operation	<ul style="list-style-type: none"> <li>• Initial setting is “Continue control”.</li> <li>• Inform by displaying an alarm and sounding buzzer.</li> </ul>
	How to cancel the alarm	<ul style="list-style-type: none"> <li>• Press Dial key while stopping temp. control.</li> <li>• Stop and then restart temp. control.</li> <li>• Change the set temp.</li> <li>• Measured temp. (PV) reaches the Set temp.(SV).</li> </ul>

 <b>A-2</b> Door alarm  Status display <b>A-2</b>	<b>[A-2] Door alarm</b>	
	Main cause	<ul style="list-style-type: none"> <li>• Door was open continuously exceeding the preset time while controlling temp.</li> <li>• Temp. control was started with the door open.</li> </ul>
	Operation	<ul style="list-style-type: none"> <li>• Initial setting is “Continue temp. control”.</li> <li>• Inform by displaying an alarm and sounding buzzer.</li> </ul>
	How to cancel the alarm	<ul style="list-style-type: none"> <li>• Automatically cancel the alarm when detecting that the door is closed.</li> <li>• Cancel by pressing Dial key when temp. control stops.</li> </ul>

 <b>A-4</b> Power restoration  Status display <b>A-4</b>	<b>[A-4] Power restoration</b>	
	Main cause	The power was broken down or shut down during controlling temp.
	Operation	<ul style="list-style-type: none"> <li>• Initial setting is “Stop temp. control”.</li> <li>• Inform by displaying an alarm and sounding buzzer.</li> </ul>
	How to cancel the alarm	Cancel by pressing Dial key.

 <b>A-16</b> Abnormal pressure (high)  Status display <b>A-16</b>	<b>[A-16] Abnormal pressure (high)</b>	
	Main cause	The pressure sensor detected abnormally high pressure.
	Operation	<ul style="list-style-type: none"> <li>• Stop control.</li> <li>• Inform by displaying an alarm and sounding buzzer.</li> </ul>
	How to cancel the alarm	Automatically canceled when the pressure decreases.

 <b>F-0</b> Heater disconnection  Status display <b>F-0</b>	<b>[F-0] heater disconnection</b>	
	Main cause	<ul style="list-style-type: none"> <li>• Heater was disconnected.</li> <li>• Off-failure occurred in SSR.</li> </ul>
	Operation	<ul style="list-style-type: none"> <li>• Stop control.</li> <li>• Inform by displaying an alarm and sounding buzzer.</li> </ul>
	How to cancel the alarm	Immediately stop the operation and contact your dealer or local service center.

 <b>F-1</b> Temp. sensor error Status display <b>F-1</b>	[F-1] Temp. sensor error	
 <b>F-6</b> Short circuit of heater Status display <b>F-6</b>	Main cause	<ul style="list-style-type: none"> <li>Temp. sensor detected a temp. out of the range appropriate for displaying.</li> <li>Temp. sensor was disconnected.</li> </ul>
	Operation	<ul style="list-style-type: none"> <li>Stop control.</li> <li>Inform by displaying an alarm and sounding buzzer.</li> </ul>
	How to cancel the alarm	Immediately stop the operation and contact your dealer or local service center.
 <b>F-85</b> Memory error Status display <b>F-85</b>	[F-85] Memory error	
 <b>F-98</b> Substrate error Status display <b>F-98</b>	Main cause	Failure in readout from internal memory and storing
	Operation	<ul style="list-style-type: none"> <li>Stop control.</li> <li>Inform by displaying an alarm and sounding buzzer.</li> </ul>
	How to cancel the alarm	Immediately stop the operation and contact your dealer or local service center.
	Main cause	<ul style="list-style-type: none"> <li>Failure in the display</li> <li>Failure in control substrate</li> </ul>
	Operation	<ul style="list-style-type: none"> <li>Stop control.</li> <li>Inform by displaying an alarm and sounding buzzer.</li> </ul>
	How to cancel the alarm	Immediately stop the operation and contact your dealer and local service center.

## 4 Installation

### 4-1 Installation environment



#### Warning

##### Do not install at a dangerous place.

This unit incorporates a heater, and it may cause a fire when using it under a dangerous environment.



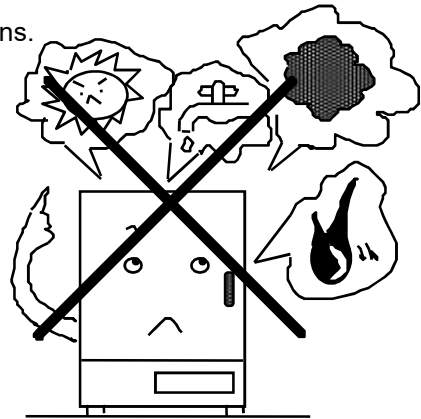
#### Caution

##### Maintain a suitable environment.

Under poor installation environment, deterioration of the unit may be accelerated, or its functions and performance cannot be exerted sufficiently.

Please select an installation location that meets the following conditions.

- No flammable gas, liquid or solid materials near the unit
- Ambient temperature of 5-35°C
- No condensation
- Less moisture, and no water droplets fall on the unit.
- Minimum dust
- Place away from direct sunlight
- Well-ventilated
- Air doesn't hit on the unit directly.
- Horizontal, stable and firm place  
(Check the product weight during operation.)



### 4-2 Installation conditions



#### Caution

##### Secure enough space around the unit.

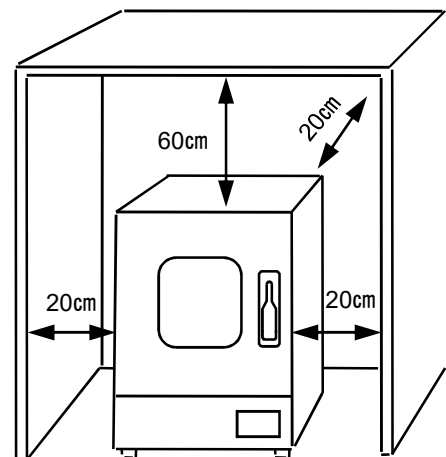
Be sure to secure at least the minimal space shown in the picture on the right between the unit and walls/ceilings to maintain its performance.




#### Caution

Take care when carrying the unit because it's heavy.


VOS-452SD (approx. 135 kg), 602SD (approx. 345 kg)




### 4-3 Connecting utilities

 **Warning**


**Confirm whether voltage, phase and capacity is suitable.**  
Wrong power supply connection may cause a fire or electric shock hazard.

 **Warning**

**Connect the earth wire correctly.**  
Do not connect the earth wire to gas or water pipes to prevent electrical shock hazards.

 **Warning**

**Do not use the branching socket or table tap.**  
A burnout of cables or a fire may occur due to an overcurrent.

 **Caution**

**Remove the dust accumulated in outlet and power plug.**  
It may generate tracking phenomenon, and it may also cause a fire.

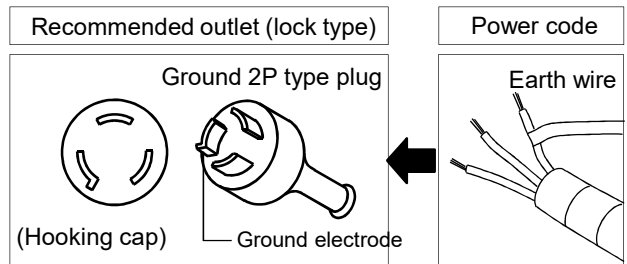
(1) Check your product model as well as voltage, phase and capacity of power source to be connected.

Power source to be connected to the unit is as shown in the right table.

Product model	Required power supply	
	Voltage	Capacity
VOS-452SD	AC200V Single phase	15A
VOS-602SD		

(2) No power plug is supplied with this unit.  
Recommend directly wiring of switchboard etc. or difficult-to-disconnect outlet, for example, lock-type one shown in the picture on the right.

If there is no earth terminal in your installation location, please ask an electrician to install it through Type D earth installation work.



#### Specifications of power code

Cable		Tip	Wire cross-sectional area	Connection (color)		
Length	Thickness ( $\Phi_{OUT}$ )			L	N	E
2.9 m	About 8.5 mm	No plug (bare tip only)	2 mm <sup>2</sup>	Black	White	Green

## 5-1 Preparation

### 5-1-1 Slide table (VOS-602SD)

#### Caution

Do not place heavy objects exceeding 60 kg on the slide table.

If the objects exceeding the withstand load are placed, slide rails or the surrounding components may be deformed, and the slide table may not move smoothly.

Please note that the slide table may be also deformed even when a heavy vacuum pump is placed roughly with the table drawn out.

(1) Loosen the knob bolt.  
There is no need to remove it.

(2) Draw out the table gripping the handle and place a vacuum pump quietly.  
See "5-1-2. Connecting vacuum pumps" for recommended vacuum pumps.

※ Allowable dimensions for placing on the table (mm): 610Wx700D

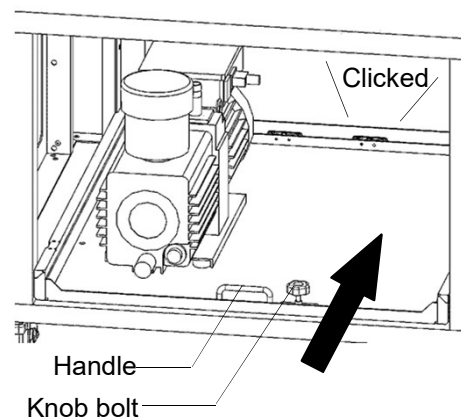
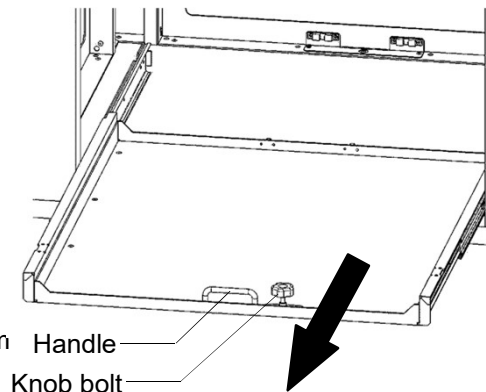
(3) Push the table until the latch is clicked.

※ Take care that the power cable of vacuum pump and other objects are not caught in.

(4) Tighten the knob bolt.

※ The table may be drawn back due to an earthquake, vibration of vacuum pumps or handling of the vacuum hose connected to a vacuum pump.

Be sure to tighten the knob bolt.

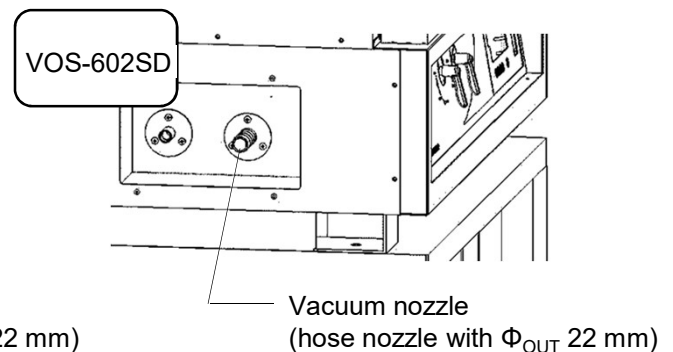
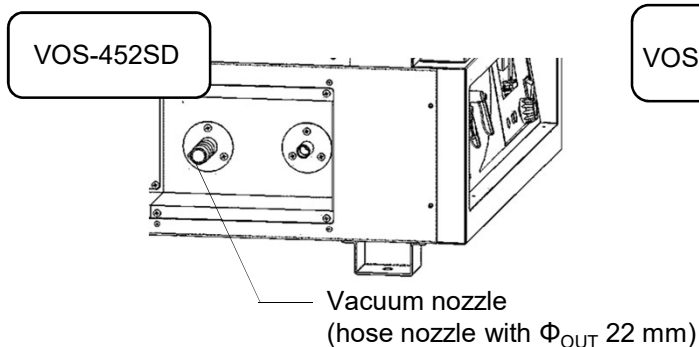


### 5-1-2 Connecting vacuum pump

(1) Connect the vacuum nozzle of the unit to a vacuum pump or suction line of a cold trap using vacuum hose.

Be sure to be connected without air leak.

※ Please note that a failure of pressure sensor may occur due to the pressurized chamber when connecting the vacuum nozzle to exhaustion line of vacuum pump.





■ Recommended Connection Products

Code No.	Name	Model	Remarks
270580	Oil rotation	GLD-137 CN	Recommended: VOS-452SD
189160	Vacuum pump	GCD-136 XN	Recommended: VOS-602SD
118650	Oil mist	OMT-200A	Target Vacuum-pump: GLD-137CN
118690	Trap	OMC-200 (with clamping)	Target Vacuum-pump: GCD-136XN
268560	Dry Vacuum pump	NeoDry7E-C (100V)	Recommended: VOS-452SD
268580		NeoDry7E-C (200V)	Recommended: VOS-452SD
266160		NeoDry15E-C (100V)	Recommended: VOS-452SD/602SD
264600		NeoDry15E-C (200V)	Recommended: VOS-452SD/602SD

※No vacuum hose is supplied with this unit, and please order it separately. Use a vacuum hose with id18mm if the vacuum pump inlet port is for connecting to a vacuum hose and its outside diameter is 22 mm.

If it does not match the vacuum hose with id.18 mm, please connect it according to the instruction manual of the pump manufacturer.

※Joints with different diameter (vacuum hose adapters) are available as an option.

※Remove water vapor as much as possible by using refrigerated cold trap and dehydrating agents (e.g., Molecular sieves) which can absorb water vapor in order to maintain the service life of the vacuum pump and oil.

Code No.	Specification [mm]	Length
119230	$\Phi_{IN}$ 18 x $\Phi_{OUT}$ 42	5 m

Code No.	Name	Port size [mm]
119240	Adapter A	$\Phi_{OUT}$ 22 x 17
119250	Adaptor B	$\Phi_{OUT}$ 17 x 13
119270	Adaptor D	$\Phi_{OUT}$ 22 x 13

Code No.	Name	Model
279990	Refrigerated cold trap	UT-3010L
216180		UT-4000L
216220	Transparent lid with nozzle	For UT-3010L/ UT-4000L

### 5-1-3 Setting purge port

Preparation for gas replacement

#### Caution

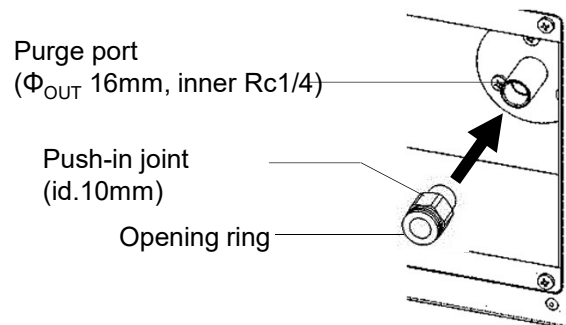
**For gas replacement, gas supply pressure shall be 19.6 kPa (0.2kg/cm<sup>2</sup>) or less.**

If the gas supply pressure is high when replacing the gas in the chamber, the chamber body may be deformed, or the observation window or the pressure sensor may be damaged.

- (1) Connect the gas cylinder so as to fit the purge port.  
When connecting the supplied push-in joint, a plastic tube with  $\Phi_{OUT}$  10 mm can be connected. (Tube is not included)

When removing the tube, pull the tube while pressing the opening ring.

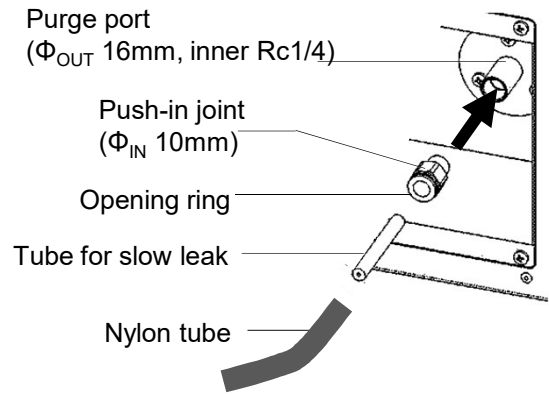
- (2) Adjust the gas supply pressure with a regulator so as to keep 19.6 kPa (0.2 kg/cm<sup>2</sup>) or less.



### Preparation for slow gas replacement

- (1) Install a push-in joint to the purge port.
  - (2) Prepare and insert a nylon tube ( $\phi 10 \times \phi 8$ ) (option) into the gas cylinder.
  - (3) Insert a tube for slow leak (accessory) completely into the tip of the nylon tube.
- If it protrudes from the nylon tube, please cut it to the length of about 10 mm so as to completely insert it into the nylon tube.
- (4) Insert the nylon tube all the way seated in the push-in joint.

When removing the tube, pull the tube while pressing the opening ring.

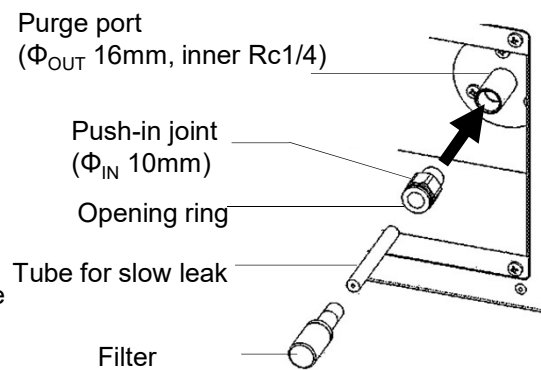


### Preparation for slow-leak of the atmosphere

Attaching a tube for slow leak to the purge port allows leaking more slowly than usual.

- (1) Install a push-in joint to the purge port.
- (2) Insert a tube for slow leak into the filter and insert it all the way seated in the push-in joint.

When removing the filter or the tube, pull the filter while pressing the opening ring.

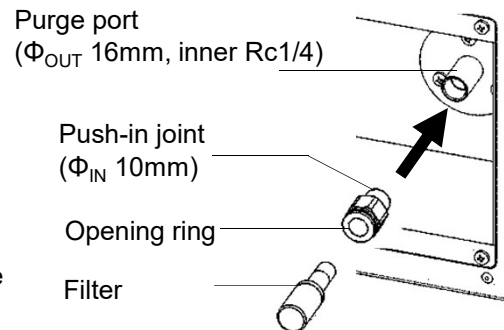


### Preparation for the filter

Attaching a filter to the purge port can prevent dust from entering inside the chamber.

- (1) Install a push-in joint to the purge port.
- (2) Insert the filter all the way seated in the push-in joint.

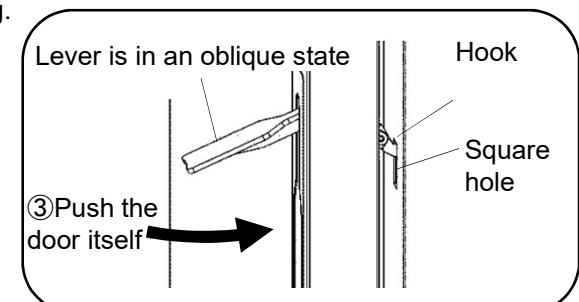
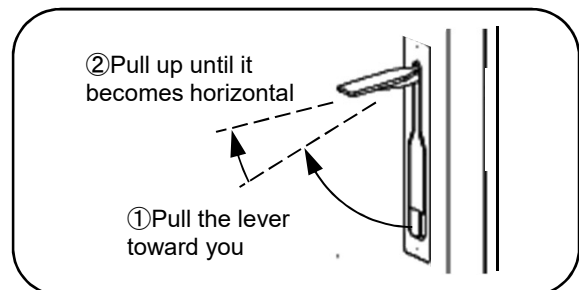
When removing the filter, pull the filter while pressing the opening ring.



## 5-1-4 Opening/Closing Door

- (1) Pull up the lever of the handle toward you.
- (2) Pull it up until it becomes horizontal for unlocking the door and opening it.
- (3) When the door is closed by pushing the door itself with the lever of the handle in an oblique state, the hook is automatically hooked in the square hole of the housing.
- (4) When the lever of the handle is stored by pushing it down, the glass of the door adheres to the packing, and the door completely closes.

※The operation do not start unless the door is securely closed.  
(Door alarm is displayed.)



### 5-1-5 Setting shelf plates/diffusers

**⚠ Caution**

**Be sure to set a diffuser.**  
Be sure to always set it except when cleaning.

If used without a diffuser, it may be impossible to weaken the purge force, and the sample may be scattered.

**⚠ Caution**

**Handle shelf plates carefully.**  
The shelf plates are heavy and there is a risk of injury if dropped on foot, etc.

Be especially careful when setting the shelf plates on the shelf support of the upper stage.

(1) Place the diffuser directly on the bottom of the chamber. Place it in the center of the chamber in the state of being closed to the back of the chamber.

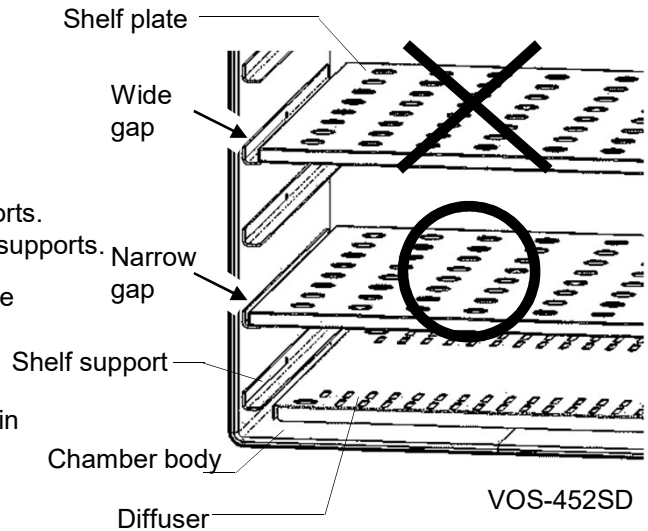
※It cannot be placed on the shelf supports.

(2) Place the shelf plates on the shelf supports.  
VOS-452SD: Place them on L-shaped shelf supports.  
VOS-602SD: Insert them into the U-shaped shelf supports.

(3) Push them until they contact with the back of the chamber.

※The shelf plates have a rectangular shape.

In order to prevent them from falling, place them in the direction where the gap between the shelf plates and the chamber body becomes narrow.



### 5-1-6 Placing samples/vessels inside

**⚠ Warning**

**Pay close attention to the set temp. when drying combustibles.**  
For example, when drying samples using resin vessels or parts, if the temp. is set too high by mistake, they may be dissolved and ignite. In addition, if the sample is too packed, the temp. may become locally high, and the combustibles may be dissolved and ignite.

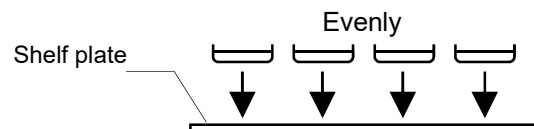
**⚠ DANGER**

**Do not put inflammable substances such as organic solvents.**  
The inside of the chamber becomes hot during drying, and therefore they may be vaporized in the chamber, and ignition or explosion may occur.  
Explosive substances include nitrate and nitro compounds, and flammable substances include peroxide salts, inorganic peroxides, salt nitrate and organic solvents.  
This unit doesn't have an explosion-proof structure.

**⚠ Caution**

**Do not place the sample on the diffuser.**  
Do not place the sample (vessel) on the diffuser. The diffuser may be deformed due to the temp. difference caused by the evaporation heat of the sample, and the sample may be scattered.

- (1) Make sure to remove water from the sample, vessels and other parts.
- (2) Place them equally on a shelf plate.  
(The load capacity of a single shelf plate is 15 kg.)



### 5-1-7 Connecting Power plug

Check that both the earth leakage breaker and power switch are turned OFF, and then insert the power plug into the outlet.

### 5-1-8 How to introduce sensor

A temperature sensor can be inserted into the chamber by using the sensor introducing hole.

- (1) Remove the lid on the topface and the four fixed screws, and then slide the lid as shown in the picture on the right and then fix them again.
- (2) Remove the four screws fixed to the flange and remove the flange and rubber plug.
- (3) Form a hole in the rubber plug through which the sensor can be introduced.

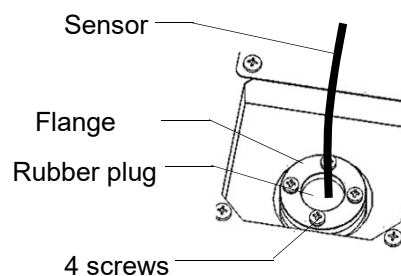
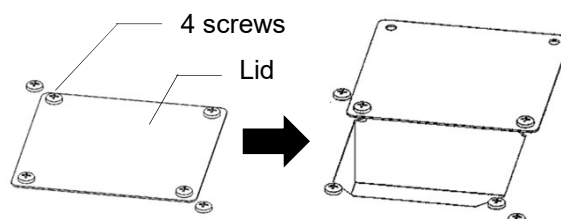
The hole should be smaller than the sensor so that the sensor can be close to the hole as much as possible.

- (4) Pass the sensor through the flange and rubber plug in order and insert the sensor into the chamber.

※If the pressure does not fall, apply vacuum grease to it.

- (5) Fix the rubber plug and the flange with four screws.

※Do not use it for continuous operation. If the operation continues for a long time with the sensor inserted, vacuum leakage will occur.



### 5-1-9 Connecting recorder output terminal

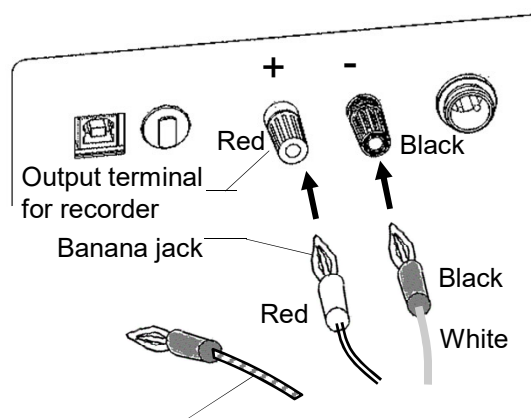
The measured temperature or pressure can be output by using the recorder output cable.

Both temperature and pressure cannot be output at the same time.

Code No.	Name of part
147570	Recorder output cable

- (1) Insert each banana jack which has the same color as each recorder output terminal of the unit.

- (2) For detailed output settings, refer to "Panel Key Operation Manual" attached with this operation manual.



Gray twisted wire with semi-transparent cable is for grounding. Not used with this unit.

### 5-1-10 Connecting alarm output terminal

When the safety function, etc., is activated, contact output of errors in the unit is possible.

- (1) Disassemble the supplied alarm output connector and solder the lead wires of the external device, etc. to the terminals as shown in the figure.

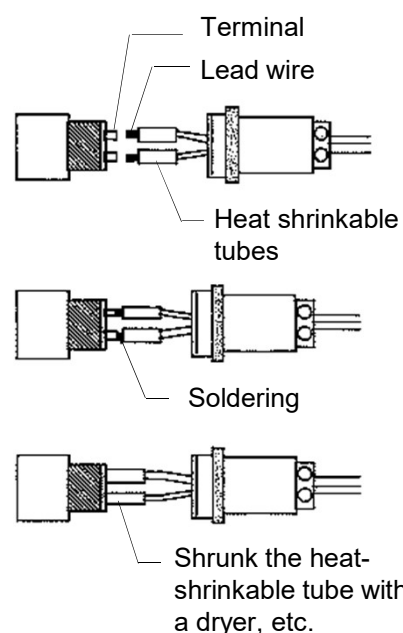
※Insulate the soldered terminals with heat-shrinkable tubes, etc. to prevent short-circuiting.

※The thickness of the two terminals is different, but there is no polarity.

※Do not use the unit in the state that the lead wires are wound onto the terminals (and not soldered).

- (2) Assemble the disassembled connectors.
- (3) Connect to the alarm output terminal of the unit.

- (4) For detailed output settings, refer to "Panel Key Operation Manual" attached with this operation manual".



## 5-2 Operating Methods

### Caution

#### Do not touch hot parts during use or for a while after use.

The observation window as well as the upper part and the side of the door becomes hot during use and for a while after use. Touching those parts may cause burns.

### Caution

#### Stop the operation if any abnormality is found

If any abnormality is found, immediately turn off the power switch and earth leakage breaker (power switch) and refer to the section of "Causes and measures for troubles" on page 20.

### 5-2-1 How to control temperature

(1) Turn ON the earth leakage breaker.

(2) Set the overheat protector.

Turn the knob to adjust the set temperature to the position of the base point, and then firmly press the reset switch to the back.

Normally, set the temperature about 40°C higher than the upper limit H1 or the upper limit H2 of the temperature alarm on the control panel.

Setting range of the overheat protector  
 VOS-452SD: 50-270°C  
 VOS-602SD: 50-260°C

※When the operation check point is set to the base point, the overheat protector will start working.

(3) Turn ON the power switch.

After the opening screen is displayed, the display switches to the main screen.

※Depending on the setting conditions, it may take some time to switch to the main screen.

※If the display does not display anything and the overheat protector alarm lamp is lighted even when the power switch is turned ON, the overheat protector is working.

(4) For the control panel settings, refer to "Panel Key Operation Manual" attached with this operation manual.

(5) For finishing the control, turn OFF the power switch, and then turn OFF the earth leakage breaker.

### 5-2-2 How to reset overheat protector

Check that the unit itself is cold and press the reset switch located in the center of the knob until it clicks.

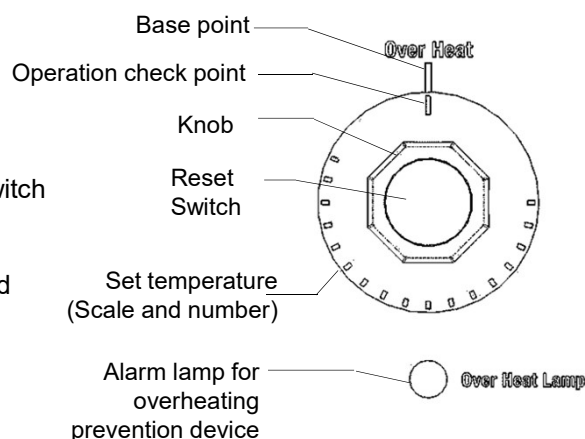
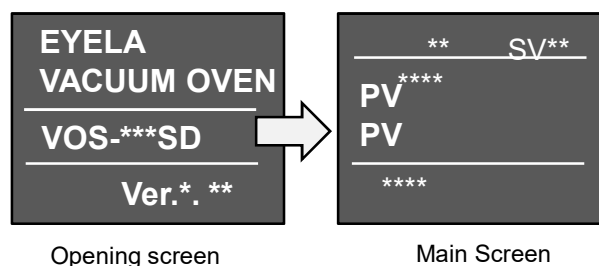
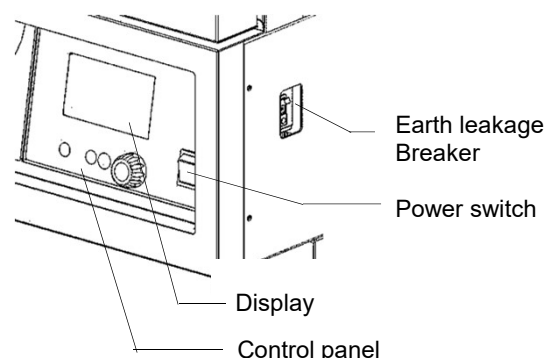
The alarm lamp of the overheat protector goes off and then restoring starts.

※The alarm lamp will not go off even if the reset switch is pressed when the unit is not cooled down enough.

### CAUTION

#### Ventilate soon if there is any unusual odor.

Operation at a high temperature for the first time may generate unusual odor for a short time because odor components may be volatilized from materials such as thermal insulation. Ventilate well if there is any unusual odor.



## 5-2-3 How to operate the vacuum

### Warning

#### Do not use if the glass has any flows.

If the glass has any scratches, cracks, or other flows, the glass may be broken and scattered when operation in vacuum starts. In some cases, it may be scattered outside the unit and there is a risk of injury. Never operate the unit.

### Caution

#### The oil in the vacuum pump should be replaced regularly.

If the vacuum pump is used for a long time, the oil in the vacuum pump will deteriorate, and it will lead to poor ultimate vacuum or damage to the vacuum pump. Replace the oil regularly.

(1) Turn the vacuum valve and purge valve to "Close" ..

※ When opening or closing the valves, turn them firmly until the handles does not turn any further.

Using in a halfway position may cause deterioration in valve performance or vacuum leakage.

(2) When using a trap, cool the inside of the trap sufficiently.

(3) Turn on the vacuum pump.

(4) Turn the vacuum valve to "Open" and start evacuation inside the chamber.

(5) When drying is completed, turn the vacuum valve to "Close", and then turn the purge valve to "Open" to return the pressure inside the chamber to atmospheric pressure.

(6) Leave the purge valve "Open" and turn the vacuum valve to "Open" again so that the vacuum pump can draw the atmospheric pressure for about 1 minute.

※ If the vacuum pump is turned off without performing the procedures of (5) and (6) after completion of drying, the oil in the vacuum pump may flow back to the trap or the chamber.

※ In an experiment in which a sample is placed under reduced pressure, turn the vacuum valve to "Close" after the chamber reaches the vacuum state or the gas purge is completed, disconnect the piping of the main body and the vacuum pump (after returning the suction port of the vacuum pump to the atmospheric pressure), and then turn off the power of the vacuum pump.

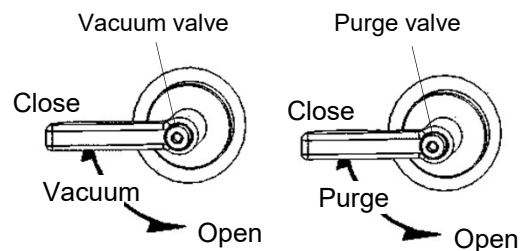
If the vacuum pump is turned off without removing the vacuum hose, the oil in the vacuum pump may flow back to the trap or the chamber.

※ If the chamber is left under reduced pressure after high temperature operation and then the chamber is naturally cooled, the door packing may be stuck to the glass and the door may not open.

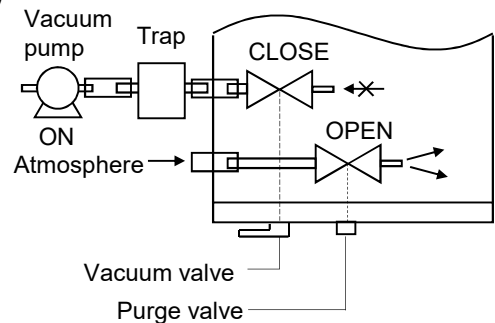
In this case, it will come unstuck if the lever of the handle is pulled up and left it as it is for a few minutes.

Alternatively, the door packing will be difficult to be stuck to the glass if it is replaced with an optional door packing made by Viton.

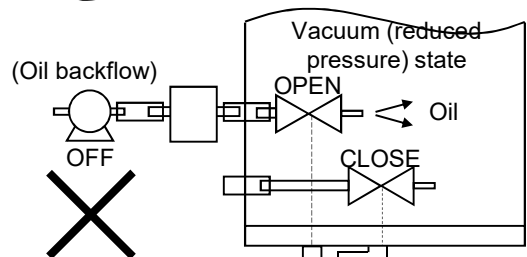
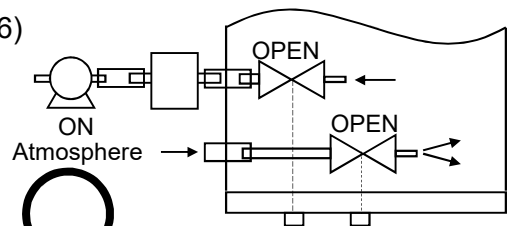
※ Remove water vapor as much as possible by using refrigerated cold trap and dehydrating agents (e.g., Molecular sieves) which can absorb water vapor in order to maintain the service life of the vacuum pump and oil.



(5)



(6)



This figure shows the operation in VOS-452SD model.

(7) Turn off the vacuum pump.

## 5-2-4 How to replace gas

### Caution

**Gas replacement shall be performed at gas supply pressure of 19.6 kPa (0.2kg/cm<sup>2</sup>) or less.**

If the gas supply pressure is high, the chamber body may be deformed, or the observation window may be damaged by replacing the gas inside the chamber.

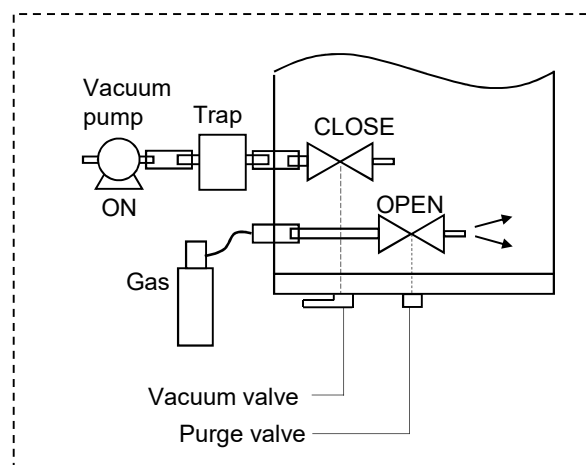
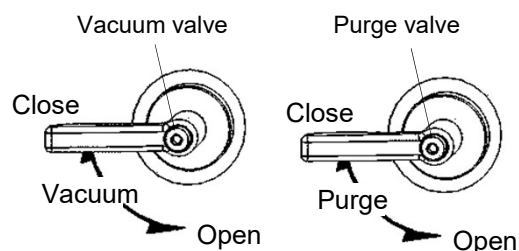
(1) Adjust the gas supply pressure with the regulator so as to keep 19.6kPa (0.2kg/cm<sup>2</sup>) or less.

(2) Vacuum the chamber with a vacuum pump before turning the vacuum valve to "Close".

※ Do not turn off the vacuum pump.

Oil in the vacuum pump may flow backward because the inside of the trap or vacuum hoses is in a vacuum state.

(3) Turn the purge valve to "Open" to replace the gas.

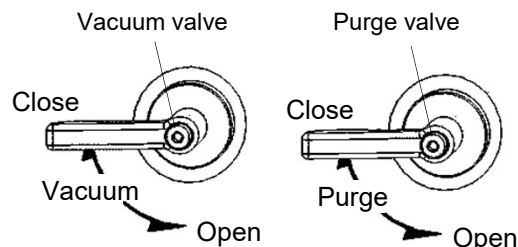


This figure shows the operation in VOS-452SD model.

(4) After replacing the gas, turn the purge valve to "Close" to seal the inside of the chamber.

※ In an experiment in which a sample is placed under a gas atmosphere, turn the vacuum valve to "Close" after the vacuum oven reaches the vacuum state or the gas purge is completed, disconnect the piping of the vacuum oven and the vacuum pump (after returning the suction port of the vacuum pump to the atmospheric pressure), and then turn off the power of the vacuum pump.

If the vacuum pump is turned off without removing the vacuum hose, the oil in the vacuum pump may flow back to the trap or the chamber.



## 6 Trouble shooting

For troubles other than those described in the table below, contact your dealer or local service center.

Situation	Cause	Countermeasures
The earth leakage breaker is turned OFF soon even when it is turned ON.	Earth leakage occurred.	Immediately stop the operation and contact your dealer or local service center.
	Overcurrent is flowing.	
The display indicates nothing even though the power switch is turned ON.	The power plug is disconnected from the outlet or not inserted securely. In other cases, the direct connection wiring is disconnected.	Turn off the earth leakage breaker and the power switch, and then insert the power plug into the outlet. In other cases, re-connect the direct connection wiring.
	No power supply	Turn ON the breaker of the switchboard.
	Earth leakage breaker is not turned ON.	Turn ON the earth leakage breaker.
	Earth leakage breaker is defective.	Immediately stop operation and contact your dealer or local service center.
	The power switch is defective.	
	The temp. controller is defective.	
The overheat protector is not reset. The lamp of the overheat protector alarm is lighted.	Reset the overheat protector.	
The lamp of the overheat protector alarm is lighted.	The set temperature of the overheat protector is lower than the measured temperature (PV) or the set temperature (SV).	Press the reset switch of the overheat protector and then change the set temperature of the overheat protector. Normally, set the temperature about 40°C higher than the upper limit 1 (H1) or 2 (H2) of the temperature alarm.
	Due to failures in the temperature controller or SSR, the measured temperature exceeded the set temp. of the overheat protector.	Immediately stop operation and contact your dealer or local service center.
The operation stops during operation.	The set temperature of the overheat protector is lower than the set temperature (SV).	Press the reset switch of the overheat protector and then change the set temperature of the overheat protector. Normally, set the temperature about 40°C higher than the upper limit 1 (H1) or 2 (H2) of the temperature alarm.
	Due to failure in the temperature controller (SSR is ON fault), the measured temperature exceeded the set temperature of the control panel or overheat protector.	Immediately stop operation and contact your dealer or local service center.
The displayed temperature does not reach the set temperature, or the reaching speed is slow.	The set temperature is high.	Set a lower temperature.
	The volume of the sample or the amount of evaporation are large, and it is difficult to raise the temperature.	Set a lower temperature or reduce the volume of the sample.
	Several heaters are disconnected and the temperature rises slowly.	Contact your dealer or local service center.
The slide table cannot be pulled out.	The fixture is not removed.	Remove it.
The exterior was discolored near the entrance to the chamber body or on the top surface.	In case of high temperature operation, the heat of chamber body may be transmitted to the exterior, and it causes discoloration.	There is no problem for use.



Situation	Cause	Countermeasures	
Pressure display remains unchanged even if the pressure is reduced by vacuum pump. The speed of falling the pressure is slow.	Purge valve is open.	Completely turn the purge valve to "Close".	
	Vacuum valve is closed.	Turn the vacuum valve to "Open".	
	The lid of the refrigerated cold trap is detached or not closely attached.	Reduce the pressure with a vacuum pump while pressing the lid strongly.	
	The inside of the chamber or pipes are dirty.	Clean them.	
	The rubber plug of the sensor hole is detached.	Securely install it with a flange.	
	Vacuum is leaked from the gap between the rubber plug and the temperature sensor.	Apply vacuum grease.	
	The door packing is deteriorated.	Replace the packing.	
	The vacuum hose size is incorrect.	Replace the hose.	
	The vacuum hose has cracks or is almost disconnected.		
	Failure in the vacuum pump	Replace the pump.	
	The capacity of the vacuum pump is Insufficient.		
	Oil in the vacuum pump is deteriorated or mixed with impurities.	Replace the oil.	
	Failure in the pressure sensor, or it is dirty.	Contact your dealer or local service center.	
The displayed pressure is incorrect.	The pressure sensor becomes dirty.	Perform pressure display calibration. If the problem persists, contact your dealer or local service center.	
Pressure display always indicates 0 hPa while the operation stops.	Failure in the pressure sensor	Contact your dealer or local service center.	
Alarm information is displayed.	"Temperature alarm [A-0]" comes out.	Continuous state of Measured temperature (PV) > Set temperature (SV) + Upper limit 1 (H1) or 2 (H2) of the temperature alarm	Increase the setting value of the upper limit 1 (H1) or 2 (H2) of the temperature alarm.
		Continuous state of Measured temperature (PV) < Set temperature (SV) – Lower limit 1 (L1) or 2 (L2) of the temperature alarm	Increase the setting value of the lower limit 1 (L1) or 2 (L2) of the temperature alarm.
	"Temperature uncontrollable [A-1]" comes out.	Several heaters are broken, and the temperature cannot be controlled normally.	Immediately stop the operation and contact your dealer or local service center.
		The volume of the sample or the amount of evaporation are large, and it is difficult to raise the temperature.	Set a lower temperature or reduce the volume of the sample.
		Temperature is controlled without using a vacuum pump.	Use a vacuum pump.
	"Door alarm [A-2]" comes out.	The door is not fully closed.	Fully close the door.
		The door was opened for a longer time than the set time during operation, or the operation was started with the door open.	
Failure in the door switch		Immediately stop the operation and contact your dealer or local service center.	

	Situation	Cause	Countermeasures
Alarm information is displayed.	"Power restoration [A-4]" comes out.	A power failure occurred during operation.	Cancel it by pressing the dial. After the power is restored, the temperature is controlled according to the setting of power restoration mode.
		The power was turned off during operation.	
	"Abnormal pressure (high pressure) [A-16]" comes out.	The gas supply pressure for gas replacement is abnormally high.	Reduce the gas supply pressure. The alarm display is automatically cleared when the supply pressure decreases. Clear the alarm output manually. If neither of them can be cleared, contact your dealer or local service center.
		Abnormally pressurized because the exhaust line of the vacuum pump was connected to the vacuum nozzle.	Connect the suction line of the vacuum pump. The alarm display is automatically cleared when the abnormal pressurization stops. Clear the alarm output manually. If neither of them can be cleared, contact your dealer or local service center.
	"Heater disconnected [F-0]" comes out.	The heater is burnt out, or SSR is OFF failure.	Immediately stop the operation and contact your dealer or local service center.
	"Temperature sensor failure [F-1]" comes out.	A temperature exceeding the display range was detected, or the temperature sensor is disconnected.	
	"Heater short [F-6]" comes out.	The heater is short-circuited, or SSR is ON failure.	
"Memory failure [F-85]" comes out.	Failed to read or save the internal memory.		
"Substrate error [F-98]" comes out.	Failures in the display or the control substrate		
An unusual odor is generated.	Odor components from heat insulation materials, etc. are volatilized because of high-temperature operation for the first time. <b>※Some unusual odors or smoke may be generated.</b>	Check whether there is no burn on the sample inside the chamber. If the problem persists after a few hours, stop the operation and contact your local service center.	
The door packing is stuck to the glass and the door cannot be opened.	If the chamber is left under reduced pressure after high temperature operation and then the chamber is naturally cooled, the door packing may be stuck to the glass.	① If the standard door packing is stuck to the glass, raise the handle lever to cool the inside of the chamber naturally, and wait about 10 minutes before opening the door. ② If the sticking time is long or the door packing is completely stuck to the glass, an optional door packing made by Viton is more difficult to be stuck to the glass than the standard one. ③ If the door packing made by Viton is also stuck to the glass, raise the handle lever to cool the chamber naturally, and wait about 10 minutes before opening the door.	
Oil in the vacuum pump flowed backward.	The vacuum pump was turned OFF while the suction port of the vacuum pump remained in the depressurized state.	• Turn off the vacuum pump after returning the suction port to the atmospheric pressure. • Use the dry vacuum pump.	

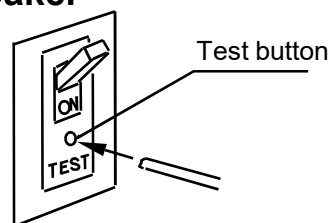
## 7 Maintenance and check-up

### 7-1 Operation test for electrical leakage breaker

#### Caution

#### Conduct an operation test for the electrical leakage breaker.

If operated with a malfunctioning electrical leakage breaker, there is a risk of electric shock hazards when an electric leak occurs. Conduct an operation test at least once a month.



Insert the power plug and press the test button of the breaker with a thin rod while the breaker is ON. It is normal if the breaker operates and turns OFF.

### 7-2 Cleaning and care of the product

#### Warning

#### Do not disassemble the equipment.

There are some places where voltage is applied and those that become hot, and therefore disassembling of the unit may cause an electric shock hazard or injury.

#### Caution

#### Do not clean the unit while it is hot.

There is a risk of burn injury when cleaning the unit while it is hot.

#### Caution

#### Clean and maintain the unit in appropriate ways

Never pour water directly onto the exterior or electric parts of the unit, or never use cleansers (polish agents), thinners, petroleum, kerosene, acid, or the like when cleaning the unit. It may cause an electric shock hazard or damage to the unit.

#### Caution

#### Frequently remove the dust around the outlet.

If the power plug is left inserted into the outlet for a long time, dust will gradually accumulate in the gap between the outlet and the plug, and then it may lead to the failures of the unit or ignition. (tracking phenomenon)

(1) Before cleaning, turn off the power switch (earth leakage breaker) and unplug the power plug from the outlet.

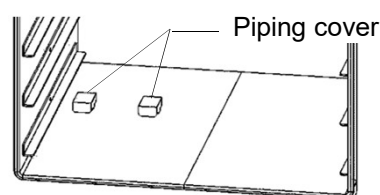
(2) For cleaning, wipe the unit with a soft cloth wrung hard with water. Use a neutral detergent for hard-to-clean stains. Wipe it with a cloth after use of the detergent. You can wipe the inside of the chamber with a cloth that is wet enough to allow water to drip.

(3) The diffuser can be removed to clean.

Replace it after cleaning.

The direction to be placed is not specified.

※ Do not remove the piping cover located on the bottom of the chamber.



### 7-3 Consumables

The door packing is a consumable part. Replace it before use if the required degree of vacuum cannot be obtained due to swelling by solvents or cracks.

(1) Fit the four corners of the door packing so that it can cover the projections in the chamber.

(2) Cover the rest of the projecting area and fit the door packing on all the projecting area.

※ Make sure that the temperature of the chamber body is low enough before replacing.

There is a risk of burn injury

Code No.	Name	Target model
100900	Door packing	VOS-452SD
278860	Door packing made by Viton	VOS-452SD
100910	Door packing	VOS-602SD

※ The Viton one can be used at 240°C at a maximum.

## 8 Disposal of product

Please dispose the product or parts according to the following instructions

### Main Components and Disposal Methods

Components	Standard & specifications	Total weight	External dimensions	Disposal method
Main unit	VOS-452 SD	Approx. 135 kg	655 W x 597 D x 905 H (mm)	Request a waste collection company to dispose the main unit.
	VOS-602 SD	Approx. 345 kg	860 W x 780 D x 1720 H (mm)	

※Please dispose packaging materials separately by sorting them by materials.

### Materials for main parts

Components	Main parts	Main components	Main materials
Main unit	Controlling part	Circuit board	glass epoxy resin, LED, glass, copper, stainless steel, Juracon
		Switch, Breaker	resin, copper
		Relay, Terminal block, SSR	resin, copper, PBT
		Lamp	acrylic, copper
		Switching power supplies	resin, phosphor bronze, aluminum, nylon, PET
		Communication connector	resin, copper, aluminum, nylon, PC
		Pressure sensor	stainless steel (SUS316L), ceramics, copper
		Power cord	vinyl, copper
	Housing part	Exterior, Shelf plates, Handle	stainless steel sheet (NSSC180, SUS304), electrogalvanized steel sheet
		Chamber body	stainless steel plate (NSSC180, SUS304)
		Piping	stainless steel (SUS304)
		Valve, Handle	stainless steel (SUS316, SUS304, SCS13A), Zinc die-casting, POM, Hypatite PTFE, PTFE containing glass fiber
		Hinge	stainless steel (SUS316)
		Packing	silicon, perfluoro
		Observation window	PC, tempered glass
		Heat insulation	rock wool
		Eyebolt	Iron
	Heating part	Heater	mica, insulator, nichrome wire
		Temperature sensor	stainless steel (SUS304), silicone rubber, copper wire, magnesia
		Overheat protector	polyamide (glass fiber), silver, steel sheets, phenol molded articles
	Frame	Frame	Exterior, Shelf plates, Handle
Slide		Table, Rail	electrogalvanized steel sheet, steel
Lock		Knobs, Transport fixtures	nylon-66, stainless steel (SUS304), electrogalvanized steel sheet
Caster			cold roller steel sheet (SPCC), PA

※Please sort all the components by materials referring to the above table and dispose them separately when you dispose the product.

1. If the device is not functioning properly, please check whether the device is malfunctioning or not referring to the page of “Causes and measures for troubles”.

2. If the problem persists, contact your dealer or local service center listed on “Network for your service” to repair it.

3. Repairs during the warranty period will be provided in accordance with the warranty policy.

4. Repairs after the warranty period expires will be provided for a fee upon your request.

### Warranty policy

1. The warranty period for the purchased product is twelve months from the date of purchase.
2. For any defects resulted from your normal use within the warranty period, your product will be repaired or replaced with a new one for free.
3. This warranty covers the product itself, but does not cover all losses (operating loss, cost and expenses) caused by failures or malfunctions of the product.
4. This warranty is valid only in Japan.

When your purchased products are indirectly exported to a foreign country, all liability for them shall belong to the exporter, and this warranty policy shall not be applied to them based on the issue of parameter sheet for export restriction goods.

5. For the following cases, repairing services will be undertaken for a fee even within your warranty period.

- 1) The warranty card is not returned, or the user registration is not completed on our HP within one month after purchase.
- 2) There is no showing of this warranty or no user registration upon your request for repair.
- 3) There is no name-writing and seal-compression of your dealer and no description of the date of purchase on your warranty.
- 4) Failures or damage caused by handling against the precautions stated in the instruction manual and labels on the main body of the product or relocating the product, dropping the product or giving any shocks on the product during use after purchase.
- 5) Failures or damage caused by improper use, modification or repair.
- 6) Failures or damage caused by a fire, an earthquake, wind and flood damage, salt damage, lightning strike, other natural disasters, or abnormality of external factors such as power supply to be used.
- 7) Performance degradation or failures due to wear of consumable parts, and replacement of consumable parts.

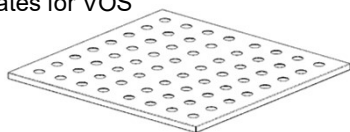
6. For repairing after the warranty period expires, contact your dealer or local sales office. (The retention period of functional parts for repair is, in principle, 7 years after the discontinuance of product production.)

7. The product warranty for products sold overseas by our overseas sales divisions is based on the separate provisions.

# 10 List of consumables / replacement & optional parts

## 10-1 List of Optional Parts

① Shelf plates for VOS



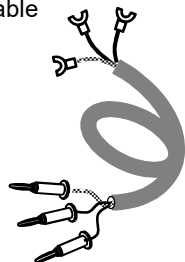
Code No.	Name	Quantity	Model
100820	Shelf board	1	VOS-452SD
100830	Shelf board	1	VOS-602SD

③ Vacuum hose



Code No.	Specification [mm]	Length
119230	$\Phi_{IN}$ 18 x $\Phi_{OUT}$ 42	5 m

④ Recorder output cable



※One of those cables is for grounding.

Code No.	Specification	Length
147570	Shield wire (AWG22 x 2)	3 m

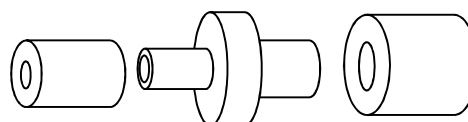
② Door packing



Code No.	Name	Quantity	Model
100900	Door packing	1	VOS-452SD
278860	Door packing made by Viton	1	VOS-452SD
100910	Door packing	1	VOS-602SD

※The Viton one can be used at 240°C at a maximum.

⑤ Vacuum hose adapter



※Vacuum hose (200mm) for connecting to both ends is included.

Code No.	Name	Port size [mm]	Quantity
119240	Adapter A	$\Phi_{OUT}$ 22 x 17	1
119250	Adaptor B	$\Phi_{OUT}$ 17 x 13	1
119270	Adaptor D	$\Phi_{OUT}$ 22 x 13	1

Code No.	Name	Model	Remarks
100300	Frame for Dryer	HSS-21C	Recommended: VOS-452SD
279990	Refrigerated cold trap	UT-3010L	Recommended: VOS-452SD, 602SD
216180		UT-4000L	Recommended: VOS-452SD, 602SD
216220	Transparent lid with nozzle	For UT-3010L/UT-4000L	-
270580	Oil rotation	GLD-137 CN	Recommended: VOS-452SD
189160	Vacuum pump	GCD-136 XN	Recommended: VOS-602SD
118650	Oil mist Trap	OMT-200A	Target Vacuum-pump: GLD-137CN
118690		OMC-200 (with clamp)	Target Vacuum-pump: GCD-136XN
268560	Dry Vacuum pump	NeoDry7E-C (100V)	Recommended: VOS-452SD
268580		NeoDry7E-C (200V)	Recommended: VOS-452SD
266160		NeoDry15E-C (100V)	Recommended: VOS-452SD, 602SD
264600		NeoDry15E-C (200V)	Recommended: VOS-452SD, 602SD