

INSTRUCTION MANUAL
FOR
Vacuum Controller **VR100**

The 2nd Edition

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Congratulations on your selection of Yamato Scientific's VR100!
Please read these operating instructions, user notes and the warranty card thoroughly before the initial operation of your VR100. This will ensure proper operating procedures and extended life for the unit. Please keep the operating instructions together with the warranty card for easy access whenever you need them.

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MEANING OF ILLUSTRATED SYMBOLS

Illustrated Symbols

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



Warning

If the warning is ignored, there is the danger of a problem that may cause a serious accident or even fatality.



Caution

If the caution is ignored, there is the danger of a problem that may cause injury/damage to property or the unit itself.

Meaning of Symbols



This symbol indicates items that urge the warning (including the caution).
A detailed warning message is shown adjacent to the symbol.



This symbol indicates items that are strictly prohibited.
A detailed message is shown adjacent to the symbol with specific actions not to perform.



This symbol indicates items that should be always performed.
A detailed message with instructions is shown adjacent to the symbol.

Cautions in Using with Safety

WARNING

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

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

Always ground the unit.

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

If a problem occurs, you should:

- If smoke or strange odor should come out of the unit for some reason, **turn off** the power key right away, then **turn off** the circuit breaker and the main power. Immediately contact a service technician for inspection. If this procedure is not followed, fire or electrical shock may result. Never perform repair work yourself, since it is dangerous and not recommended.

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

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

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

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

Substances that can not be used.

- Never use explosive substances, flammable substances and substances that include explosive or flammable ingredients in the unit. Explosion or fire may occur.

Do not disassemble or modify the unit.

- Do not reconfigure the unit. Fire or electrical shock may be caused.

CAUTION

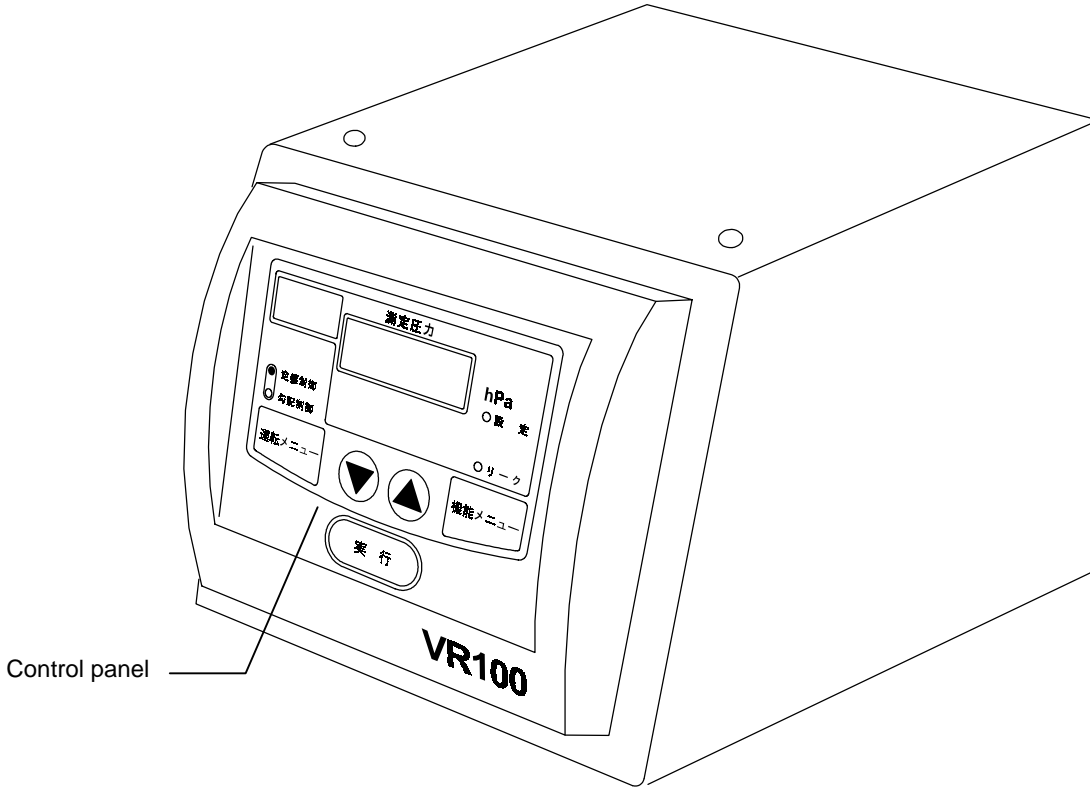
During a thunder storm

- During a thunder storm, **turn off** the power key immediately, then **turn off** the circuit breaker and the main power. If this procedure is not followed, fire or electrical shock may be caused.

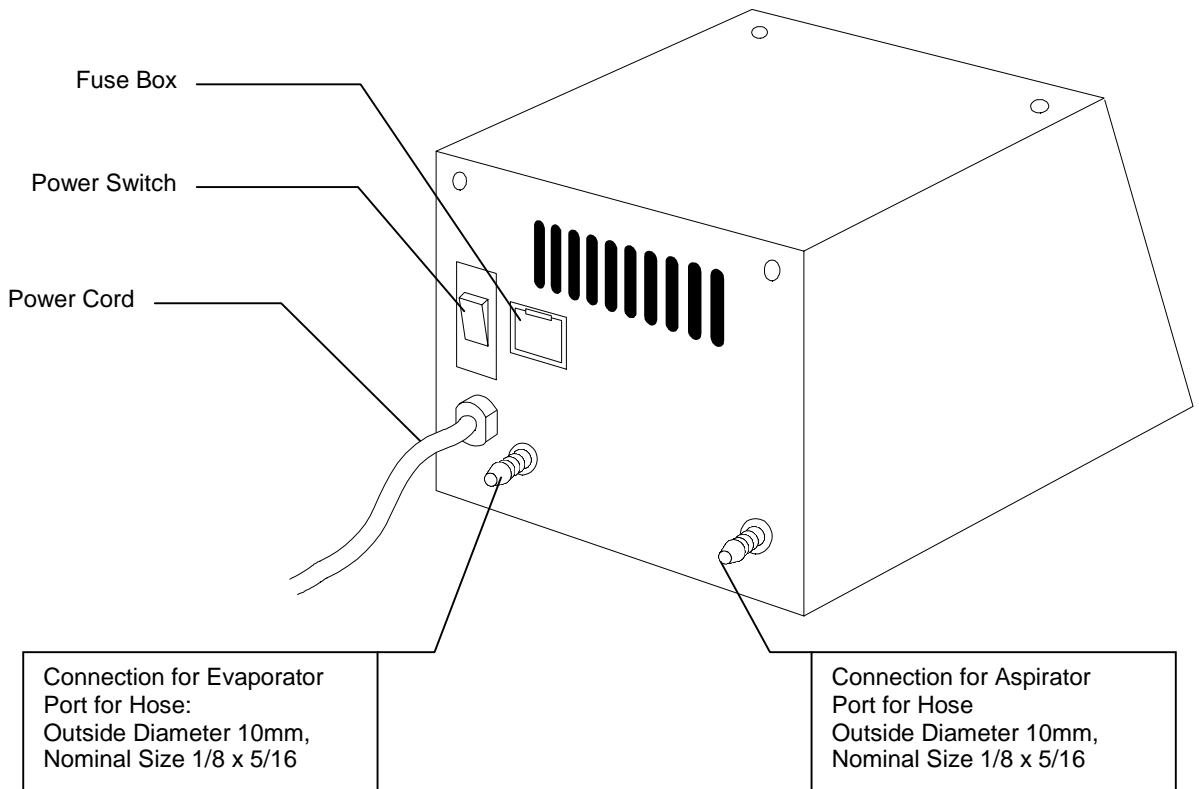
Description and Function of Each Part

Main unit

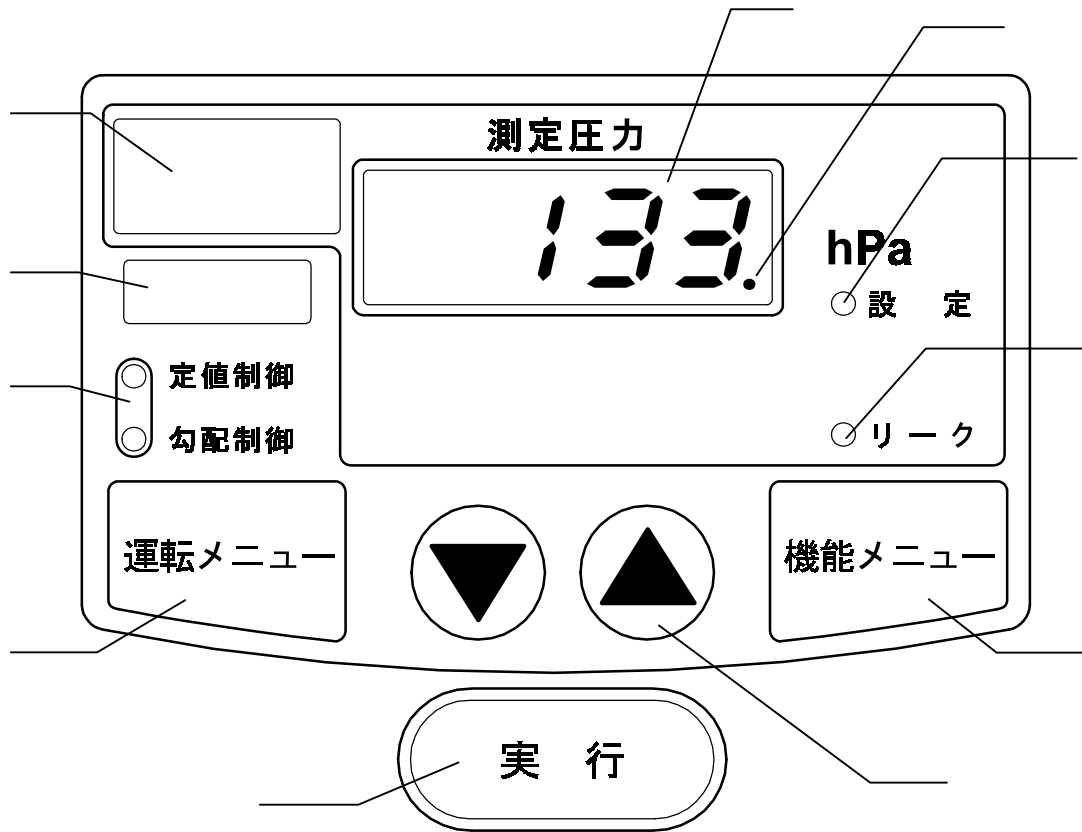
Front view



Rear view



Control Panel

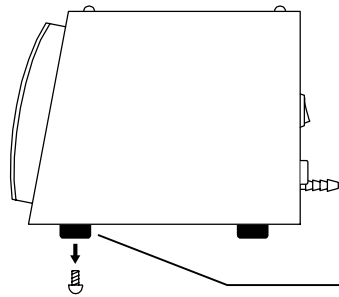


Main Display:	Displays measurements, set points (indicated as ~hPa), literal informations in the ramp control editing, etc.
Solenoid Valve Lamp (LED):	Lit while the solenoid valve for control opens.
Blind Window:	Indicates a blinking 「異常」(Means TROUBLE) when an abnormality occurred.
Edit Mode Display Lamp (LED)	Lights up 「編集」(Means EDIT) when the edit mode is selected.
Operation Mode Display Lamp	indicates a selected operation mode. It is lit while operation, and blinked in the set mode and the edit mode. Nothing is indicated in the free mode.
Set Mode Display Lamp	lit when settings and edits are done.
Leak Lamp	lit while the leak valve opens.
Operation Menu Key	used to select one of the following operations.「the fixed value control」,「the ramp control」,「the free mode」
Function Menu Key	used to select the function;「the measurement calibrating mode」in the fixed value control and 「the edit mode」 in the ramp control.
Up/Down Key	used to change the set point.
Enter Key	used to decide or input set points and modes, such as operation, calibration, edit.

Requirements for Installation

Installation to Rotary Evaporator RE400/500/440/540

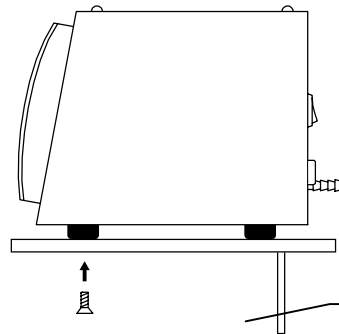
1.



Unscrew the screw which fix the rubber-leg of the body.

Rubber leg

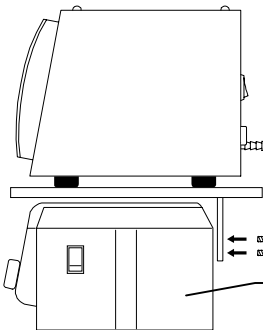
2.



Fix the metal fixture provided as standard accessories with flat-head screws.

Metal Fixture

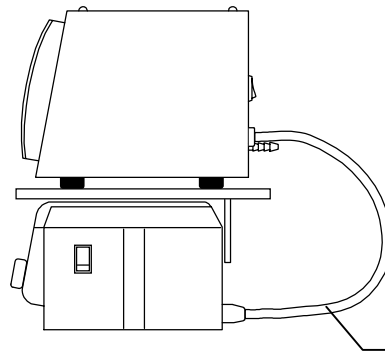
3.



Fix the metal fixture to the rear of the control unit with four screws.

Control Unit of RE400/500

4.

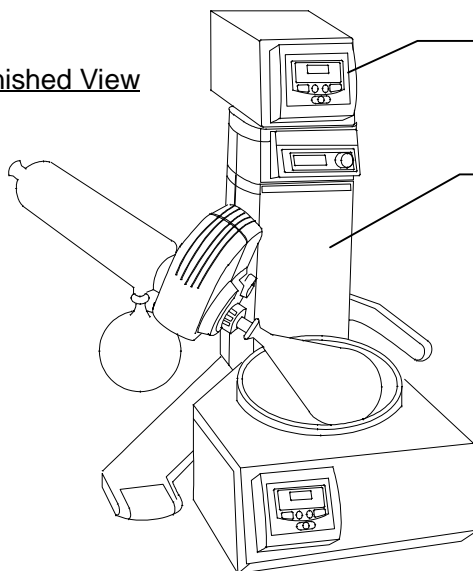


Put the power plug of the vacuum regulator in the outlet at the rear of the control unit.

Power Cord Plug

5.

Finished View



VR100

RE400/500/440/540

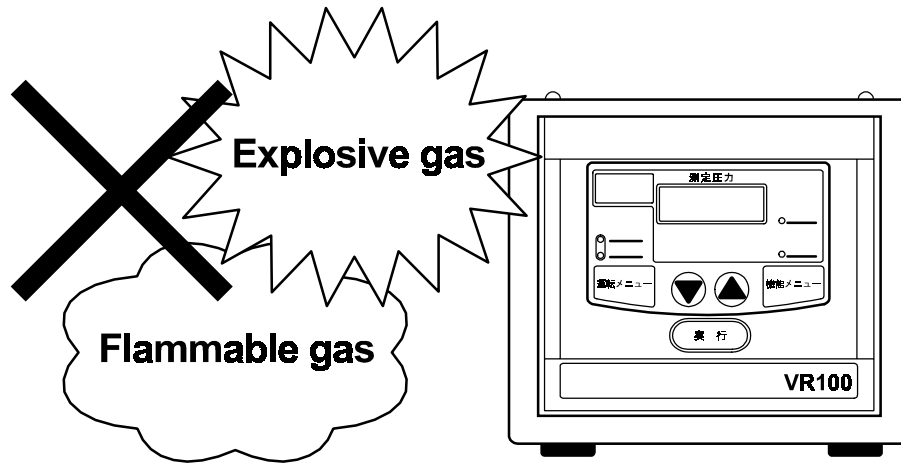
Being the auto lift style, the body-outlook of RE440/540 is not the same as the drawing on the left.

⚠ Warning

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



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



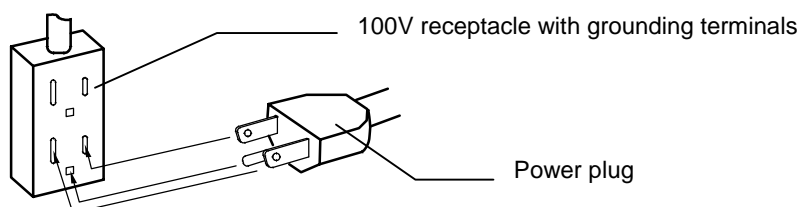
Always ground the unit.



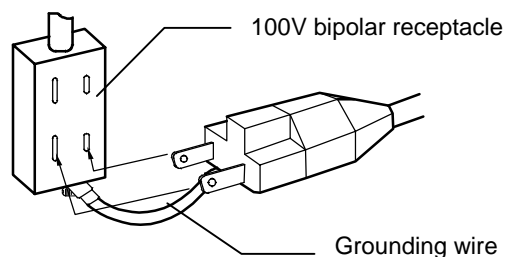
- Connect VR100's power plug to a receptacle with grounding connectors.
- Do not forget to ground VR100, to protect you and the unit from electrical shock in case of power surge. Choose a receptacle with grounding connectors as often as possible.



- Do not connect the grounding wire to a gas pipe, or by means of a lightning rod or telephone line. A fire or electrical shock will occur.



- If only bipolar receptacles are available for VR100, connect an optional grounding adapter to VR100's power plug. Check the polarity of the receptacle before connecting the adapter to the receptacle. Connect the adapter's grounding wire (green) to a grounding terminal to the power supply. Contact our sales representative in your vicinity or our service center for additional information or assistance.



Choose a correct power distribution board or receptacle.

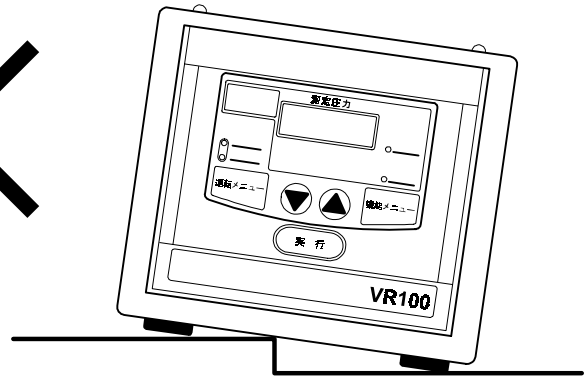


- Choose a correct power distribution board or receptacle that meets VR100's rated electric capacity.
Electric capacity : AC100 V, 1A
- Do not connect VR100 to an outlet that differs from the above specifications because a fire or electrical shock will occur.

Install on a level area.



- Do not install VR100 on a non level surface. This will cause hazards to the operator and create problems during actual operation.



Choose a proper place for installation.



- Do not install VR100 in a place where:
 - ◆ Flammable gas or corrosive gas is generated.
 - ◆ Ambient temperature exceeds 35°C, also below 5°C.
 - ◆ Ambient temperature fluctuates violently.
 - ◆ There is direct sunlight.
 - ◆ There is excessive humidity and dust.
 - ◆ There is constant vibrations.



- Keep the clearance over 15cm around VR100.

⚠ Caution

Handling of power code.

- ⊘ Do not entangle the power cord. This will cause overheating and possibly a fire.
- Do not bend or twist the power cord, or apply excessive tension to it. This may cause a fire and electrical shock.
- Do not lay the power cord under a desk or chair, and do not allow it to be pinched in order to prevent it from being damaged and to avoid a fire or electrical shock.
- Keep the power cord away from any heating equipment such as a room heater. The cord's insulation may melt and cause a fire or electrical shock.
- ⚠ If the power cord becomes damaged (wiring exposed, breakage, etc.), immediately turn off the power at the rear of the product and shut off the main supply power. Then contact your nearest dealer for replacement of the power cord. Leaving it may cause a fire or electrical shock.
- Connect the power plug to the outlet which is supplied appropriate power and voltage. If the power cord is connected the supply which is also connected to a aspirator or a vacuum pump etc., with no sufficient power and voltage, the product may not operate properly because the power would fall.

Piping

- ⚠ Vacuum hoses (outside diameter 12 x inside diameter 6mm) are required. These are not included in accessories.
- Refer to figure below in order to pipe. Stickers that indicate where to connect are attached at the rear. Connect the pipes correctly in accordance with each indication of them.

The diagram illustrates the rear panel of the device. On the left, a power cord is connected to a power switch labeled '電源 ON OFF AC100V'. To the right of the switch is a vent. Two vacuum hoses are connected to the rear panel. The left hose is labeled 'to condenser's decompression port of ROTARY EVAPORATOR' and the right hose is labeled 'to suction port of ASPIRATOR'. A label 'Vacuum Hose' points to the hoses. The rear panel is labeled 'The rear of the body'.

Warning

Approaching Thunderstorm



- If a thunderstorm approaches in the distance, immediately turn off the power at the rear panel and shut off the supply power. Leaving the power turned on may cause a fire or electrical shock.

During Power Failure



- In case of power failure, the leak valve opens, the atmosphere in the system of the rotary evaporator is released, and the solenoid valve for control is shut. It prevents spout of organic solvent in distillation, and back-flow of water from the aspirator.
- After power failure was repaired, the set mode is automatically switched to the fixed value control. The indicator displays the set pressure blinking. The leak valve opens and the solenoid valve for control shuts.
- The product is not interlocked with neither the rotary evaporator nor bath. Care should be taken that each movement of them is not the same after the power failure. If power fails while the evaporator is revolving, it starts revolving after power failure was repaired.



- Make sure that the aspirator and the cold circulating device etc. is working properly when you start the vacuum control again.

Aspirator Shutdown



- The device must be stopped before you stop the aspirator. If not, back-flow, from the aspirator's bath to the pressure sensor, may occur. In case of back-flow, the indicator may not display accurate values, or the sensor may be damaged.

Using the Product



- The product is not a pressure measurement apparatus. Do not use it for calibration.



- There are not functions for vacuum and pressure raising in the product itself. The product is used to control the pressure in the system. The operation runs in order to reach to the pressure which is set depending on the rise of pressure, by connecting to a decompression device of aspirator etc. The rise of pressure (depending on the steam pressure of sample) is that occurs when the rotary evaporator operates distillations.

Corrosive Samples



- The product's connections to gas are made of materials given in Table 1. Especially metal piping parts and gas-joint for pressure sensor are corroded by strong acids and strong alkalines. Do not use the product for distillation of strong acids and strong alkalines.



- As the product's gas-joints are exposed to low-concentrated steam that can not be trapped by the condenser (cooler), the joints are not corroded soon. However a sort of rubber might swell depending on the kind of solvent or frequency of use. If pressure in the system is not held, or, an abnormality is shown the indicator, please contact us.



- Make sure that vacuum hoses are connected correctly, to 「pressure」 and to 「load」.

Caution

Do not lay down the product.



- Do not lay down the product. It may cause troubles.

Do not put anything on the product.



- Do not put anything on the product. It may fall and cause an injury.

Corrosive Resistance

TABLE: Corrosive resistance of the parts connected to gas

FPM: Fluoro Rubber, PTFE: Teflon

\	Part						
	Pressure sensor	Solenoid valve		Solenoid valve armature		Piping tube	Joint
	Material						
	Silicon ceramic nickel	Brass (body)	FPM (O-Ring)	FPM (sheet)	SUS (body)	PTFE	Brass
Methyl alcohol			×	×			
Ethyl alcohol							
Isopropanol							
Methyl chloride	×						
Chloroform	×						
Aceton			×	×			
Methyl ethyl ketone			×	×			
Benzene	×						
Toluene	×						
Ethyl acetate			×	×			
Hydrochloric acid (20 under5%)	×	×					×
Hydrochloric acid (20 over5%)	×	×			×		×
Sulphuric acid (20 under5%)	×	×					×
Sulphuric acid (20 over5%)	×	×			×		×
Sodium hydroxide (20 under10%)	×	×					×

:suitable for use, :not recommended, × :unsuited

NOTE 1

The corrosion resistance above shows the case when samples are immersed in solvent or the like. Since the product's gas-joints are exposed to low-concentrated steam that can not be trapped by the condenser (cooler) , the joints are not corroded soon. However some sort of rubber might swell depending on the kind of solvent, or, frequency of use. If pressure in the system is not held or an abnormality is shown, please contact us.


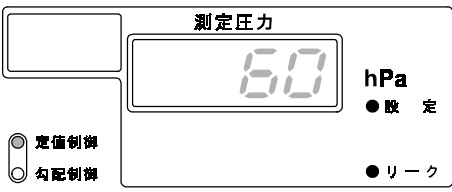

NOTE 2

Since the pressure detection circuit which is constructed in the pressure sensor is exposed, care should be taken to see that no liquid touch it. If the aspirator is shutdown without leaking the vacuum, it may cause a back-flow and sensor parts may be damaged by water from the aspirator's bath.



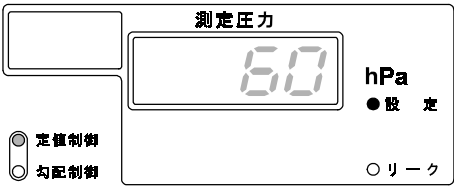

There are three modes, the fixed value control, the ramp control, free mode (control-free), as a series in the operation menu.

- ◆ In the fixed value control mode, step-control runs, aiming at the pressure set point which is selected freely.
- ◆ In the ramp control mode, the ramp control runs, aiming at the preset ramp level in the fixed ramp time.
- ◆ In the free mode, the pressure control is cancelled and the solenoid valve is kept opening.
- ◆ In any control mode, the operation stops after pressing ENTER again. In this case, the solenoid valve for control is closed and the leak valve is opened.
- ◆ Shifting to other control mode during operation is accepted in four cases;「the fixed value control the free mode」 「the ramp control the fixed value control」 「the ramp control the free mode」. To shift the mode, press OPERATION MENU. The selecting mode appears on the indicator, showing a feasible control(depending on what operation is running). Pressing OPERATION MENU makes control modes scroll. Select the control mode you desired and press ENTER. The present operation continues unless ENTER, which is used to decide the control mode, is pressed.
- ◆ After turning the power on, the fixed control mode is automatically selected. Everytime OPERATION MENU is pressed, the modes, the ramp control mode, the free mode, the fixed value control mode, shift and scroll in order.
- ◆ The operation menu is accepted either before or during operation. If the control menu key was pressed during operation, the control mode which is placed next to the present mode is selected. Press ENTER, which is used to decide the control mode, and the operation is shift.
- ◆ It is possible to stop shifting the operation mode, if it is done on the verge of pressing ENTER. Press OPERATUON MENU and select the present operation mode again, or leave it. All function selecting and set point editing, which have been done during selecting the operation mode in the function menu,are cancelled.
- ◆ If there is no key operation for ten seconds after pressing OPERATION MENU, the display returns to the original state.

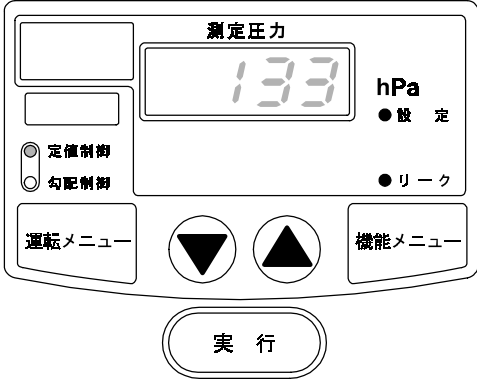
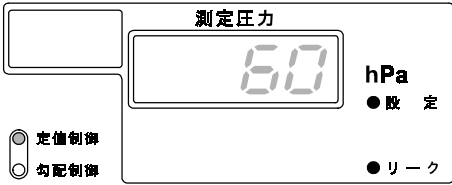
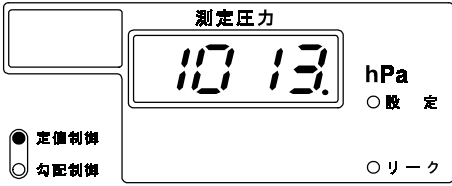
The Fixed Value Control

	Display After Operation	Key	Explanation
1			<ul style="list-style-type: none"> • Turn the power on.
2			<ul style="list-style-type: none"> • After turning the power on, the fixed value control set mode is automatically selected. The previous pressure set point appears blinking on the indicator. • Set at 133hPa in the example on the left. • The fixed value control lamp appears blinking. • The set lamp is on, indicating that the set mode is ready for operation. • The leak lamp is on since the leak valve opens. • The solenoid valve for control closes.
3			<ul style="list-style-type: none"> • Press「<input type="button" value="↑"/>」or「<input type="button" value="↓"/>」 and change to the pressure set point you desired. Changed to 60hPa in the example.
4		ENTER	<ul style="list-style-type: none"> • Press ENTER and the pressure set point is decided then the fixed value control starts. The present pressure measurement is displayed, then the fixed value control lamp is on but stop blinking. • The set mode ends so that the set lamp turns off. The solenoid valve for control lamp is on. After the pressure was reached to the aimed set point, the solenoid valve opens or close according to the fluctuations of the pressure, the fixed value control continues.

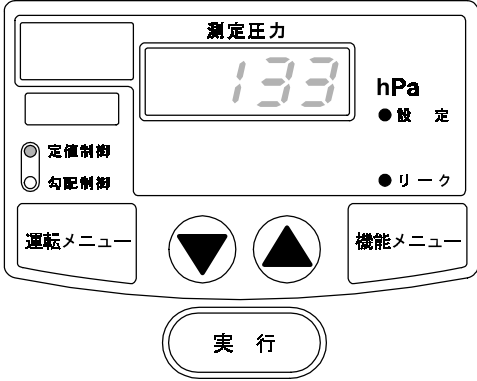
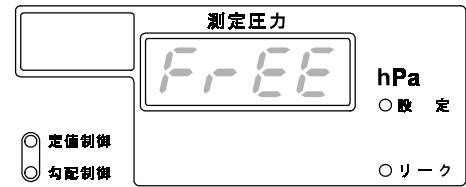

Changing the Set point While the Fixed Value Control Operates

	Display After Operation	Key	Explanation
1			<ul style="list-style-type: none"> The fixed value control is running.
2			<ul style="list-style-type: none"> Press 「<input type="button" value="Left"/>」 or 「<input type="button" value="Right"/>」. The previous set pressure values appears blinking on the indicator. Changed to 200hPa in the example on the left. The fixed value control lamp is on. The set mode lamp is on, indicating that the set mode is ready for operation.
3			<ul style="list-style-type: none"> Press 「<input type="button" value="Left"/>」 or 「<input type="button" value="Right"/>」 and change to the pressure value you desired. Changed to 60hPa in the example. At this stage, the present control is still running.
4		ENTER	<ul style="list-style-type: none"> Press ENTER and the fixed value control (step-control) starts, aiming at the new-set point you have set. The present pressure measurement appears on the indicator. The fixed value control lamp is on, but stop blinking. The set mode ends so that the set lamp is off. In the example, the solenoid valve lamp is on, since the pressure set point was lowered and the solenoid valve for control opened. After the pressure was reached to the aimed set point, the solenoid valve for control opens or closes according to the fluctuations of the pressure. The fixed value control continues.

The Ramp Control

	Display After Operation	Key	Explanation
1			<ul style="list-style-type: none"> • Turn the power on.
2			<ul style="list-style-type: none"> • After turning the power on, the fixed value control set mode is automatically selected. The previous pressure set point appears blinking on the indicator. • Set at 133hPa in the example on the left. • The fixed value control lamp appears blinking on the indicator. • The set mode lamp is on, indicating that the set mode is ready for operation.
3		<p>OPERATION MENU</p>	<ul style="list-style-type: none"> • Press OPERATION MENU to select the ramp control mode. Then the previous 「Ramp Level」 and 「Ramp Time」 appears alternately blinking on the indicator. • The ramp control lamp blinks on the operation mode indicator. • The set mode lamp is on, indicating that the set mode is ready for operation. • Refer to 「Editing the Set point of the Ramp Control」 (p.20), when you change 「Ramp Level」 and 「Ramp Time」.
4		<p>ENTER</p>	<ul style="list-style-type: none"> • Press ENTER and 「Ramp Level」 and 「Ramp Time」 are decided. Then the ramp control starts. The present pressure measurement appears on the indicator. • The ramp control lamp is on, but stop blinking. • The set mode ends and the set lamp is off, The solenoid valve opens and the solenoid valve lamp is on. • Until the pressure is reached to the aimed set point, the solenoid valve for control opens or closes according to the ramp time. The ramp control continues.

The Free Mode

	Display After Operation	Key	Explanation
1			<ul style="list-style-type: none"> • Turn the power on.
2	 <p>The display shows '測定圧力' (Measurement Pressure) and '133 hPa'. The '設定' (Set) lamp is lit. The '固定制御' (Fixed Control) lamp is lit and blinking. The '機能メニュー' (Function Menu) button is visible.</p>		<ul style="list-style-type: none"> • After turning the power on, the fixed value control set mode is automatically selected. The previous pressure set point appears blinking on the indicator. • Set at 133hPa in the example on the left. • The fixed value control lamp appears blinking. • The set mode lamp is on, indicating that the set mode is ready for operation.
3	 <p>The display shows '測定圧力' (Measurement Pressure) and 'FrEE hPa'. The '設定' (Set) lamp is off. The 'フリー制御' (Free Control) lamp is lit. The '機能メニュー' (Function Menu) button is visible.</p>	OPERATION MENU	<ul style="list-style-type: none"> • Press OPERATION MENU twice to select the free mode. 「FrEE」 appears blinking on the indicator. • All operation mode lamp is off, indicating that the control is cancelled. • The set mode lamp is also off.
4	 <p>The display shows '測定圧力' (Measurement Pressure) and '10.13 hPa'. The '設定' (Set) lamp is off. The 'フリー制御' (Free Control) lamp is lit. The '機能メニュー' (Function Menu) button is visible.</p>	ENTER	<ul style="list-style-type: none"> • Press ENTER and the present pressure measurement appears. • The solenoid valve for control opens so that the solenoid valve lamp is on. • The solenoid valve for control is kept opening unless ENTER is pressed again or the power is turned off.


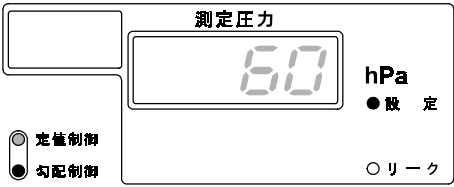

Shutdown

	Display After Operation	Key	Explanation
1			<ul style="list-style-type: none"> The fixed value control is running.
2		ENTER	<ul style="list-style-type: none"> Press ENTER while operation runs, and an operation stops at that point. Present pressure measurement and 「StoP」 appear alternately blinking on the indicator. All operation mode lamp is off and the leak lamp is on, indicating that it is opening. The solenoid valve for control closes and the leak valve opens.

Restart

	Display After Operation	Key	Explanation
1			<ul style="list-style-type: none"> Stop
2		ENTER	<ul style="list-style-type: none"> When operation stopped, press ENTER again. Returned to the previous mode, which was set just before shutdown, the operation restarts in order to achieve the previous set point. The present pressure measurement appears. The operation mode lamp is on, indicating that the operation which was stopped is now running as before. The leak valve closes and the solenoid valve for control opens at this stage.

Shifting to Other Operation

	Display After Operation	Key	Explanation
1	 <p>The display shows a pressure of 200 hPa. The mode indicator shows 'Ramp Control' (勾配制御) is selected with a solid black circle. Other modes like 'Fixed Value Control' (定値制御) and 'Leak' (リーク) are unselected with open circles.</p>		<ul style="list-style-type: none"> The ramp control is running.
2	 <p>The display shows a pressure of 60 hPa. The mode indicator shows 'Operation Menu' (OPERATION MENU) is selected with a solid black circle. Other modes are unselected.</p>	OPERATION MENU	<ul style="list-style-type: none"> Press OPERATION MENU while the operation runs, and the selecting mode appears on the indicator, showing a feasible controls (depending on what operation is running). The control modes are scrolled by OPERATION MENU. The ramp control is shifted to the fixed value control or the free mode. It is shifted to the fixed value control mode in the example on the left. Select the control mode you desired and press ENTER to shift. The present operations continues unless ENTER, which is used to decide the control mode, is pressed. Thus, the lamp of the present operation mode is on, at the same time, the next-mode lamp blinks at this stage.
3	 <p>The display shows a pressure of 198 hPa. The mode indicator shows 'Fixed Value Control' (定値制御) is selected with a solid black circle. Other modes are unselected.</p>	ENTER	<ul style="list-style-type: none"> Select the control mode you desired and press ENTER. Then the control is shifted. The lamp of the mode which was selected newly turned on, and the previous-mode lamp is off.


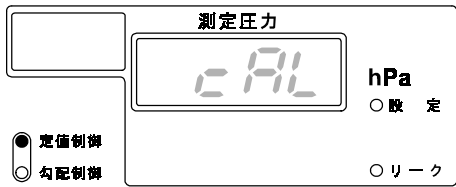
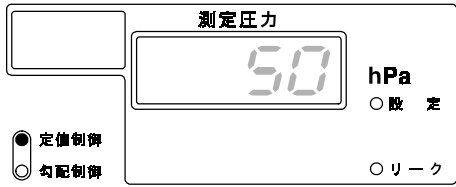
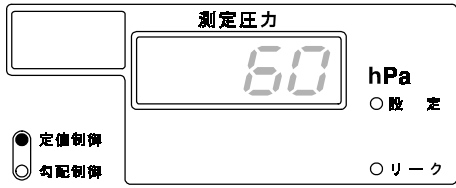

Using the Function Menu

- ◆ The function menu is accepted either before or during operations.
- ◆ The measurement calibrating system is programmed in the function menus of the fixed value control mode and of the free mode. The calibration mode is accepted before a control starts, or, while a control operates.
- ◆ There are 「 Ramp time edit 」 and 「 Pressure ramp level edit 」 system in the ramp control as a series.
- ◆ When FUNCTION MENU is pressed again, just before ENTER is pressed to decide values; Function selectings and set point editings, which has been done in the function menu, are stopped.
Operations, which has been running until FUNCTION MENU was pressed, are returned. The set point which was decided during editing is restored.
- ◆ If there is no key operations for ten seconds after FUNCTION MENU was pressed, the indication is returned to the original state.

Calibrating Measurements

- ◆ This function is used to calibrate the deviation which is occurred between the displayed-measurement of the product and the reading of calibrated vacuum gage you have (e.g. manometer). The calibrated informations relate to the ramp control mode.
- ◆ It is programmed in the function menu of the fixed value control mode and of the free mode. The calibration mode is accepted either before or during operations.

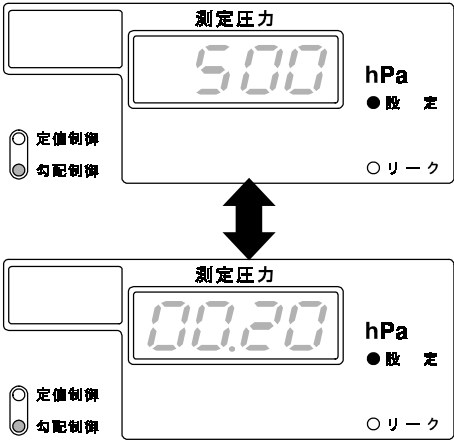
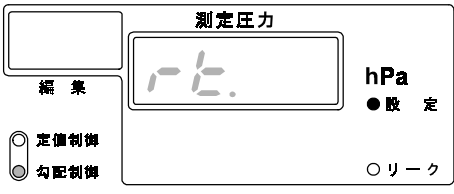
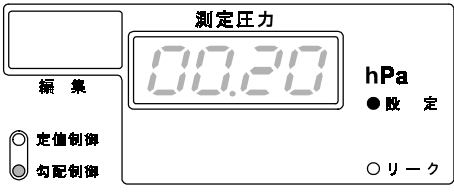
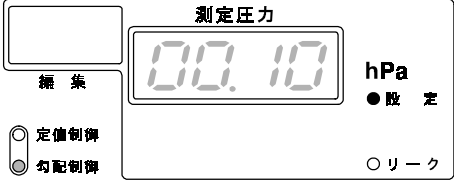
The following shows the procedure for calibrating while the fixed value control operates.

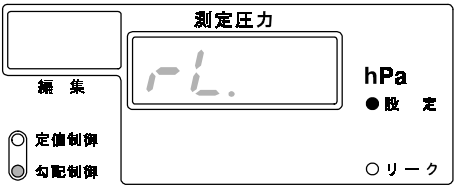
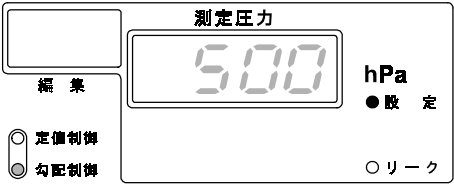
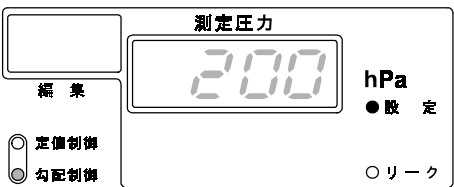
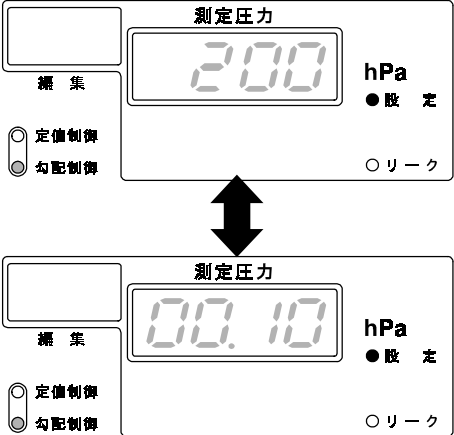
	Display After Operation	Key	Explanation
1			<ul style="list-style-type: none"> • The fixed value control is running. • The present pressure measurement appears on the indicator. The fixed value control lamp is on.
2		FUNCTION MENU	<ul style="list-style-type: none"> • Press 「FUNCTION MENU」 and 「CAL」 appears blinking on the indicator, showing that the pressure measurement calibration mode was shifted. • The operation continues and the operation lamp is still on.
3		ENTER	<ul style="list-style-type: none"> • Press ENTER and the present pressure measurement appears blinking on the indicator. • The operation is still running.
4			<ul style="list-style-type: none"> • Change to the calibration value you desired by pressing 「↑」 or 「↓」. Changed to 60hPa in the example. • The operation is still running.
5		ENTER	<ul style="list-style-type: none"> • Press ENTER and the calibration value is decided. The pressure measurement appears on the indicator again. • At this stage, the suitable operation is continued by the controller. Because deviations occur between the pressure set point and the pressure measurement during calibrations.

Editing the Set point of the Ramp control


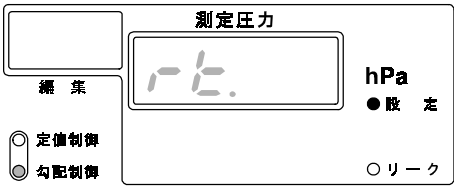
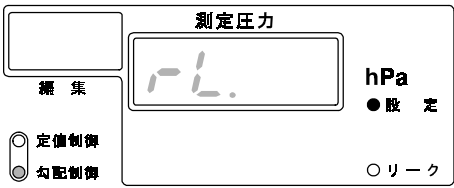
The set point of the ramp control can be edited either before operations (the power is on) or during operations.

Editing the Set point Before Operation

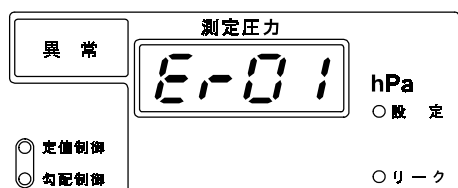
	Display After Operation	Key	Explanation
1		OPERATION MENU	<ul style="list-style-type: none"> • Press OPERATION MENU and select the ramp control. • The ramp control was selected, the previous 「Ramp Level」 and 「Ramp Time」 alternately appear blinking on the indicator. • The ramp control lamp is turned on. • The set point lamp is turned on, indicating that the setting mode is ready for operation.
2		FUNCTION MENU	<ul style="list-style-type: none"> • The 「Ramp Time」-edit mode starts by pressing FUNCTION before or during the operation. 「rt.」 appears blinking on the indicator. • 「Edit」 LED turns on, indicating that the edit mode starts.
3			<ul style="list-style-type: none"> • Three seconds later, the previous ramp time appears blinking on the indicator, showing that you can change values. The ramp time is set at 20min. in the example.
4			<ul style="list-style-type: none"> • Press 「<input type="rightarrow"/>」 or 「<input type="leftarrow"/>」 and change to the ramp time you desired. To increase values, keep on pressing 「<input type="rightarrow"/>」. Once values reached 「99.59」 (the maximum:99hours 59 minutes),it returns to 「00.00」 and starts increasing again. To decrease values, keep on pressing 「<input type="leftarrow"/>」. Once values reached 「00.00」, it returns to the maximum point and starts decreasing again. • The ramp time is set at 10min.in the example.

	Display After Operation	Key	Explanation
5		ENTER	<ul style="list-style-type: none"> Press the Enter and the 「Ramp Level」-edit mode starts. 「rL」 appears blinking on the indicator.
6			<ul style="list-style-type: none"> Three seconds later, the previous ramp level appears blinking on the indicator, showing that you can change values. The ramp level is set at 500hPa in the example.
7			<ul style="list-style-type: none"> Press 「↑」 or 「↓」 and change to the ramp level you desired. To increase values, keep on pressing 「↑」. Once values reached 「660hPa」, the maximum, it stops increasing. To decrease values, keep on pressing 「↓」. Once values reached 「66hPa」, the minimum, it stops decreasing. The ramp level is set at 200hPa using 「↓」 in the example.
8		ENTER	<ul style="list-style-type: none"> Press ENTER and the changed set point is restored. The edit mode ends. These new level and time alternately appear blinking on the indicator. 「EDIT」 LED is off.

Editing the Setting Point During the Ramp Control

	Display After Operation	Key	Explanation
1			<ul style="list-style-type: none"> The ramp control is running.
2		FUNCTION MENU	<ul style="list-style-type: none"> Press FUNCTION MENU while the ramp control is running, and the RAMP TIME edit mode starts. 「rt.」 appears blinking on the indicator. 「EDIT」LED is on, indicating that the edit mode starts.
3			<ul style="list-style-type: none"> Three seconds later, The previous ramp time appears blinking, indicating that you can change values.
4			<ul style="list-style-type: none"> Press 「<input type="text"/>」 or 「<input type="text"/>」, and change the ramp time you desired. Refer to the previous chapter 「EDITING THE SET POINT BEFORE OPERATION」 in order to input the time.
5		ENTER	<ul style="list-style-type: none"> Press ENTER, and the 「Ramp Level」 edit mode starts. 「rL.」 appears blinking on the indicator.
6			<ul style="list-style-type: none"> Three seconds later, the previous ramp level appears blinking, indicating that you can change the values.
7			<ul style="list-style-type: none"> Press 「<input type="text"/>」 or 「<input type="text"/>」, and change the ramp level you desired. Refer to the previous chapter in order to input ramp level.
8		ENTER	<ul style="list-style-type: none"> Press ENTER, and the changed set point is restored. The ramp control continues, aiming at the pressure and the time you have set. 「EDIT」LED is off.

The product features the detection function for breakages of the pressure sensor.



「Er01」 appears blinking on the indicator (and two Japanese letters appear on the blind window) when breakages of the pressure sensor occurred. The solenoid valve for control shuts, the leak valve opens.

During Power Failure

In case of power failure, the leak valve opens, the atmosphere in the system of the rotary evaporator is released, and the solenoid valve for control is shut. It prevents spout of organic solvent in distillation, and back-flow of water from the aspirator.

After Power Failure

After power failure was repaired, the set mode is automatically switched to the fixed value control. The indicator displays the set pressure blinking. The leak valve opens and the leak lamp is on. The solenoid valve for control shuts. The fixed value control lamp blinks and the set lamp is on.



- Make sure that the cooling circulating device or others are working properly when the vacuum control is started again.

⚠ Caution

The product is not interlocked with neither the rotary evaporator nor bath. Care should be taken that each movement of them are not the same after the power failure. If power fails while the evaporator is revolving, it starts to revolve after power failure was repaired.

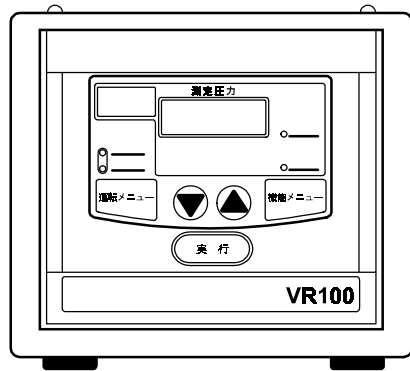
Daily Inspection and Maintenance

Warning

Do not make modifications to this product.



- Disassembly of the product is strictly prohibited. This may cause an electrical shock since there are high-voltage circuits inside the product. Inspection, maintenance, or repair of the internal circuits and mechanism should be inquired of the dealer or your nearest sales representative office.
- Modification is strictly prohibited. This may cause a fire or electrical shock.



Caution

Maintenance



- Make sure that you turn off the power at the rear and shut off the supply power, before maintenance.
- Use a soft, damp cloth to wipe off dirt from the resin moldings and operation panel. Do not clean the product with volatile solvent such as thinner or benzen or cleanser, and do not rub it with a pot cleaner or brush. This may cause a deformity, alteration, or discoloration.

Warning

Long Storage and Disposal

Not Using For a Long Period



- If you will not use the product for a long period, turn off the power switch and shut off the power supply surely for safety.

Disposing

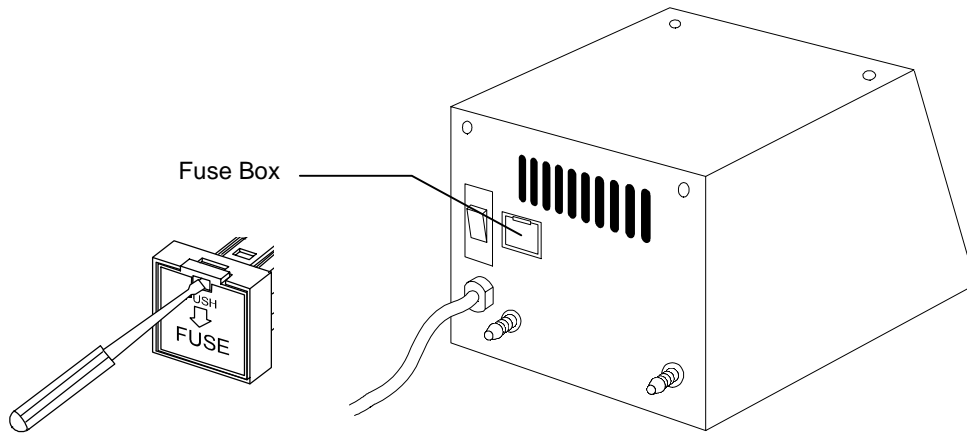


- When you dispose the product, do not put the product where children are around.

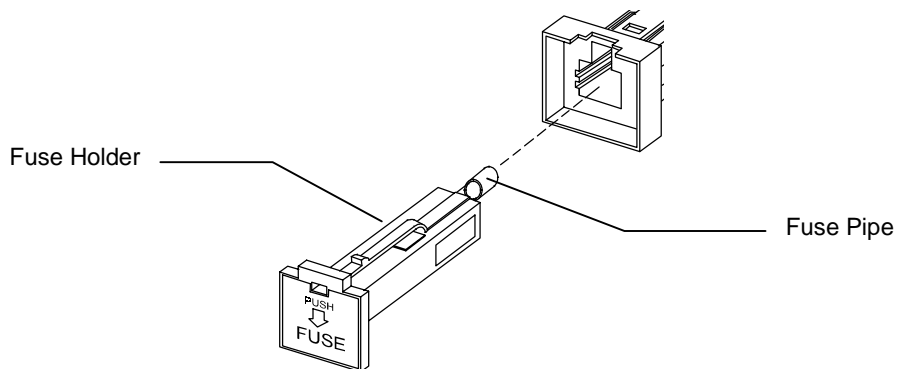
- ◆ For any questions, contact the dealer who you purchased the product from, or the nearest sales division in our company.

Replacing Fuse

1. Put an appropriate tool(e.g. a flathead screw driver) into a hole at the top of the fuse box on the rear. Hold a lever inside with the tool and pull it.



2. The fuse is removed with a fuse holder. Pull out the disconnected fuse from the fuse holder and replace to new one.
3. Insert the fuse holder and push it lightly and the lever is locked.



After Service and Warranty

If a Service Call is Required:

If a Service Call is required

- If a problem occurs with VR100, record the error code on the display and stop the operation immediately, turn off the power switch, and disconnect the power plug from the receptacle. Contact our sales or service representative.
- Check the warranty card or the name plate of your VR100 and give us the information below.

Name of the product;

Serial product number of the product;

Date of purchase;

Problem with the product
(as detailed as possible).

Warranty Card (attached to your VR100)

- Please fill out completely and return the bottom portion of the warranty card when the unit is received. The completed top portion is your Registration Card that should be retained for your records.
- Warranty period is one (1) year after the date of your purchase. During this warranty period, we will offer free repair service on the basis of the conditions provided on the warranty card.
- If you need repair service after expiration of the warranty period, contact our sales or service representative in your vicinity or service office for advice.

Minimum Inventory Period of Repair Parts

- Repair parts will be available for at least 7 years after termination of our production of VR100. Repair parts mean the parts that are necessary to maintain the performance of VR100.

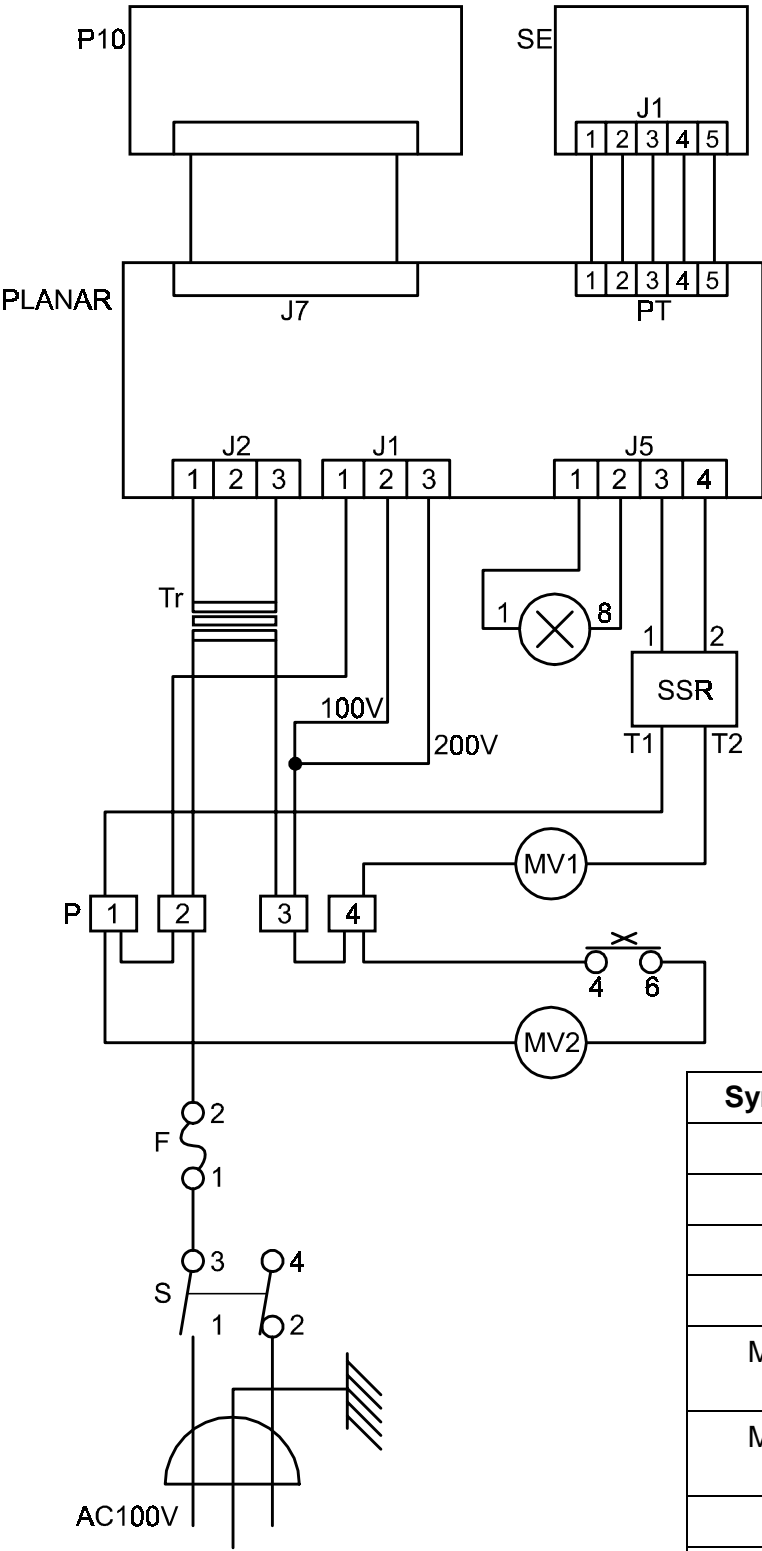
Troubleshooting

Problem	Confirm if...
The power turning on, the indicator of the operation panel is not lit.	<ul style="list-style-type: none"> ● The power cord is surely connected to an outlet. (If a rotary evaporator RE400/500/440/540 is installed, check its power as well.) ● The fuse is not disconnected. ● There is not a power failure.
The pressure does not fall.	<ul style="list-style-type: none"> ● The decompression device is working. ● The atmosphere is not escaping from the condenser of the rotary evaporator(for load). ● The vacuum hose is surely connected.
The pressure does not rise.	<ul style="list-style-type: none"> ● Condensation and vaporization in the condenser of the rotary evaporator have not ended.
The decompression speed is slow.	<ul style="list-style-type: none"> ● The hose for vacuum is connected.(The hose is not crushed.) ● Cooling operation is done in the condenser of rotary evaporator
The decompression starts after turning the power on.	<ul style="list-style-type: none"> ● The vacuum hose is properly connected to the evaporator, or, to the aspirator.

Specifications

Model	VR100
Pressure Control Range(hPa):	Reached pressure in the vacuum system ~ 800 ± 5% Full scale
Pressure Measurement/Display Range(hPa):	1~1013 ± 5% Full scale
Pressure Setting Range(hPa)	1~1013
Grading Pressure Setting Range(hPa):	66~600
Grading Time Setting Range	1~99hrs.59min.
Measurement Calibration Setting Range(hPa):	Measurement ± 5% Full scale
Pressure Control Method:	Feedback ON/OFF Control by Semiconductor Pressure Sensor and Control Valve
Pressure Setting Method:	Digital Setting by (up/down) Key
Pressure (etc.) Indication Method:	Measured Pressure, Set point (pressure, ramp time) are digitally displayed on the indicator
Setting/Displayed Pressure Resolving Power (hPa):	1
Functions For Operation:	Fixed Control Operation(Step-Control ranged1~800hPa), Ramp Control Operation (ramp control ranged66~600hPa), Free Mode Operation (cancels operations. Depends on reached pressure in the vacuum system)
Control Mode:	Fixed Value Control, Ramp Control
Auxiliary Functions:	Measured Pressure Calibrating Function(fixed value control; accepted before or during the free mode), Ramp Control Set point Edit Function
Controller:	IV LE type Controller +PIO 4 Indicator
Pressure Sensor:	Measurement Range;0~1030hPa ± 5% Full scale
Solenoid Valve for Control:	AC100V normally close
Leak Valve:	AC100V normally open
Safety System:	Fuse (rating;AC250V 2A), Leak Function, Self-Diagnostics Sensor (for disconnected sensor)
Dimensions (WxDxH mm):	155x190x145(approximately)
Power Supply:	AC100V 1A
Weight:	3.5kg (approximately)
Accessories:	Metal Fixture, Screws, Fuse(1), Guarantee, Instruction Manual
Optional Accessories:	None

Wiring Diagram



Symbol	Part Name
C	Condenser
F	Fuse
S	Power switch
P	Terminal table
MV1	Solenoid valve for control (normally close)
MV2	solenoid valve for leak (normally open)
Tr	Power transformer
X	Relay
PLANAR	Control circuit board
PIO	Display circuit board
SE	Pressure sensor board
SSR	Solid-state relay

Replacement Parts Table

Part Name	Code No.	Specifications	manufacturer
Control Circuit Board		IV LE	Yamato Scientific
Display Circuit Board		IV FR	Yamato Scientific
Transformer	1-01-320-0005	IV FR AC100V	Yamato Scientific
TRIAC 1 Board	2-16-000-0010	YLT-SSR-01	Yamato Scientific
Sensor Placing Board			Yamato Scientific
Relay	2-05-000-0013	JR1aF-TM-DC6V	Matsushita
Power Switch		DS-850S-F-00	Miyama
Solenoid Valve for Control		VX2122V-01-1G NO type(SMC)	SMC
Leak Valve		VX2122V-01-1G NO type(SMC)	SMC
Fuse		6.2x30 AC250V 2A	Nagasawa

Dangerous Substances

EXPLOSIVE

EXPLOSIVE:	<ul style="list-style-type: none"> Ethylene glycol dinitrate (nitroglycol), glycerine trinitrate (nitroglycerine), cellulose nitrate (nitrocellulose), and other explosive nitrate esters
	<ul style="list-style-type: none"> Trinitrobenzene, trinitrotoluene, trinitrophenol (picric acid), and other explosive nitro compounds
	<ul style="list-style-type: none"> Acetyl hydroperoxide (peracetic acid), methyl ethyl ketone peroxide, benzoyl peroxide, and other organic peroxides

FLAMMABLE

IGNITING:	<ul style="list-style-type: none"> Lithium (metal), potassium (metal), sodium (metal), yellow phosphorus, phosphorus sulfide, red phosphorus, celluloid compounds, calcium carbide, lime phosphide, magnesium (powder), aluminum (powder), powder of metals other than magnesium and aluminum, sodium hydrosulfite
OXIDIZING:	<ul style="list-style-type: none"> Potassium chlorate sodium chlorate, ammonium chlorate, and other chlorate
	<ul style="list-style-type: none"> Potassium perchlorate, sodium perchlorate ammonium perchlorate, and other perchlorate
	<ul style="list-style-type: none"> Potassium peroxide, sodium peroxide, barium peroxide, and other inorganic peroxide
	<ul style="list-style-type: none"> Potassium nitrate, sodium nitrate, ammonium nitrate, and other nitrate
	<ul style="list-style-type: none"> Sodium chlorite and other chlorites
	<ul style="list-style-type: none"> Calcium hypochlorite and other hypochlorites
INFLAMMABLE LIQUID:	<ul style="list-style-type: none"> Ethyl ether, gasoline, acetaldehyde, propylene chloride, carbon disulfide, and other flammable substances having a flash point of -30 or higher but lower than 0
	<ul style="list-style-type: none"> Normal hexane, ethylene oxide, acetone, benzene, methyl ethyl ketone, and other flammable substances having a flash point of -30 or higher but lower than 65
	<ul style="list-style-type: none"> Methanol, ethanol, xylene, pentyl acetate (amyl acetate), and other flammable substances having a flash point of 0 or higher but lower than 30
	<ul style="list-style-type: none"> Kerosene, light oil (gas oil), oil of turpentine, isopentyl alcohol (isoamyl alcohol), acetic acid, and other flammable substances having a flash point of 30 or higher but lower than 65
FLAMMABLE GAS:	<ul style="list-style-type: none"> Hydrogen, acetylene, ethylene, methane, propane, butane, and other flammable substances which assume a gaseous state at 15 and 1 atm

(Source: Appendix Table 1 of Article 6 of the Industrial Safety and Health Order in Japan)

Pressure Conversion

Refer to the Pressure Conversion Table below.

hPa	Torr
1013	760
800	600
600	450
400	300
200	150
60	45
1	1

(1Torr=1.33hPa)

Explanation of Character on the Display

7 segment LED is applied in the indicator of the product. The meanings of displays are shown below.

Display	Displayed Word	Meanings
<i>eAL</i>	calibration	Calibration mode of measurement
<i>Er.</i>	error ##	Error No. (in the case of a abnormality)
<i>FrEE</i>	free	Free mode
<i>rL.</i>	ramp level	Ramp level in ramp control
<i>rt.</i>	ramp time	Ramp time in ramp control
<i>StoP</i>	stop	Shutdown