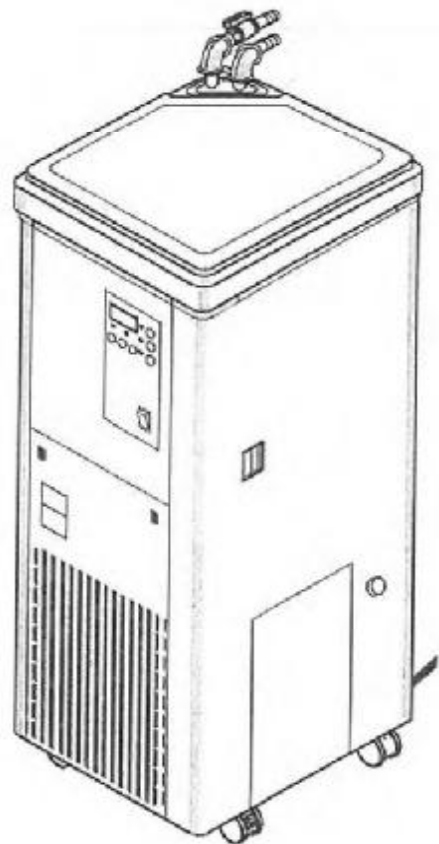
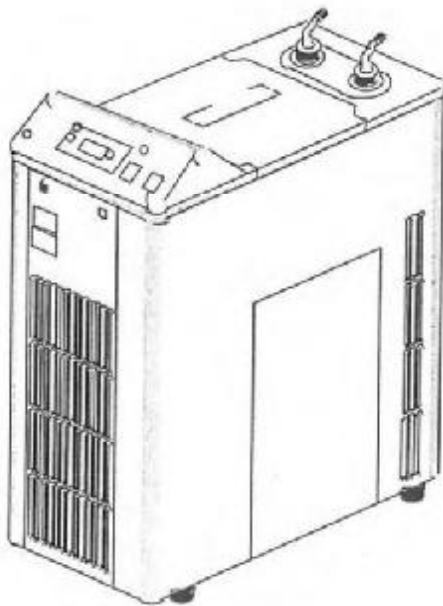




# Recirculating Coolers

SRC4 SRC14  
Instructions for use



## Congratulations on your purchase

### Introduction

This manual describes the procedure of installation, operation, troubleshooting, maintenance, check-up and disposal of Low Temperature Circulator,

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### Items contained in your carton

Check the type and quantity of items before setting up.

No.	Name	QTY
1	Main unit	1
2	Instruction Manual	1
3	Slow blow fuse 6.3A (Spare part)	2
4	Power cord (applicable in European countries)	1

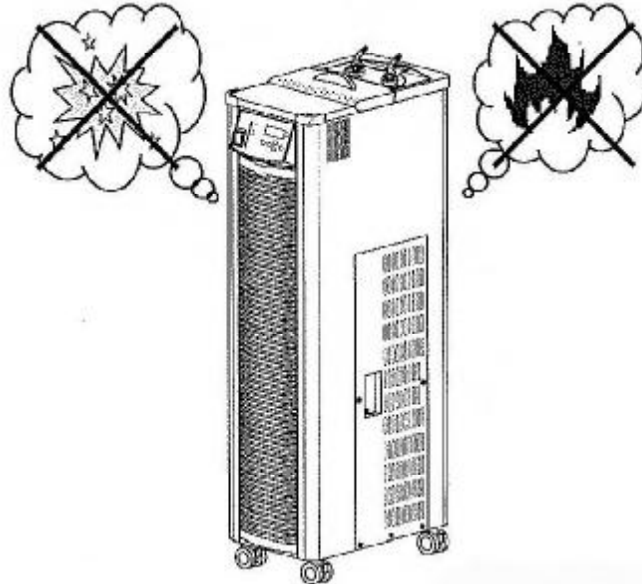
# 1 For safety use


This product is not designed with explosion-proof structure.  
Use extreme caution when handling it.

 Warning

## Use extreme caution when handling inflammable or combustible solution.

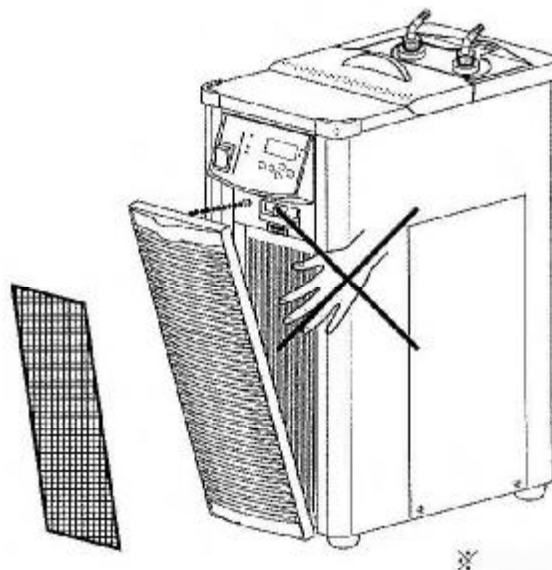
If you leave inflammable or combustible solution (ethanol and etc.) at room temperature or higher (lower for some solutions), it may evaporate and catch fire with some fire sources, and cause a fire and explode. Ventilate the space well before use.



 Caution


## Do not use touch cooling fin with bare hands.

Do not touch cooling fin with bare hands while performing maintenance work. Edgy fin may cut your fingers.



## 2 Outline of the product

### 2-1 Application

	<b>Warning</b>
<p><b>Do not remodel the product. Do not use it out of specified application.</b></p> <p>Remodeling or inappropriate use of the Product may cause electric shock or malfunction.</p>	

This is a low temperature circulator that cools down the solvent in the bath by refrigeration unit and circulates externally through circulation pump and cools it off the heating portion of evaporator(1L), reaction bath and various devices.

### 2-2 Specification

Product name		Low temperature circulator		
Model				
Circulation system		Circulation toward sealed system		
F E A T U R E S	Range of temperature control ※1		-20~30°C	
	Accuracy of temperature control ※2		±1°C (Setting 20~10°C) ±1.5°C (Setting -11~-20°C)	
	Cooling capability ※3	Liquid temp.	at 10°C	450W
			at 0°C	400W
			at -10°C	310W
	Circulation capability ※4	Max. Lifting height	4.2±0.5m(50Hz)	
Max. Flow volume		9L/min(50Hz)		
F U N C T I O N S	Temperature control system		Refrigeration unit ON-OFF control	
	Temperature setting·display		Sheet key digital setting Digital display for measured and setting temperature (Resolution:1°C)	
	Ancillary functions		·User adjustment mode (calibrating displayed temperature, power recovery setting)	
	Safety features		·Residual current device, excess current breaker ·Over load relay for refrigeration unit ·Protection timer for refrigeration unit ·Self-diagnosis functions (abnormal status of refrigeration unit, power failure alarm, sensor alarm, watch dog) ·Impedance protection for circulation pump	
	Optional functions		·Stop valve for flow volume, ·insulation hose set, ·stainless lid, ·Pt screw port, ·Carriage, ·Clamp for fixing the product	
C O M P O N E N T S	Temperature controller		Electrical digital display·digital display	
	Temperature sensor		Thermister	
	Refrigeration unit·refrigerant		Air-cooled type, 450W, HFC R-404A	
	Bath		·Whole capacity: Approx.4L ·Actual capacity:Apprx.3L ·Material: SUS304	
	Cooling coil		Copper (Nickel plate)	
	Diameter of circulation nozzle		11mm (External diameter) × 7mm(bore diameter)	

## 2-2 Specification

Product name		Low temperature circulator
Model		
S P E C.	Dimension of bath	156W × 225D × 115H (mm)
	Range of ambient temperature	5~40°C (Indoor use only) ※5
	External dimension (W × D × H) ※6	232W × 497D × 490H (mm)
	Weight	Approx. 30kg
	Supply power, voltage	4A, 0.8KVA
	Rated supply ※7	AC220V ± 10% 50Hz
	Operation presser max.	2.33Mpa
	Pollution degree	2
	Over voltage category	II
	Operation at a terrestrial altitude	Max2000m above sea level

※1 Heater is not equipped.

- Temperature control not available when the ambient temperature is low, unloaded and high temperature setting.

※2 Condition

- Room temperature : 20°C • Circulation volume : Max. • No Load • Supply power and voltage : AC220V 50Hz

※Ambient temperature is 20°C and unloaded, temperature setting at 30°C is not available.

- Accuracy of temperature control differs depending on circulation volume of liquid, type of refrigerant, heat load and room temperature and other use conditions.
- Displayed temperature may be higher than actual temperature depending on display accuracy of temperature controller.
- Accuracy of temperature control is not the value that is displayed on temperature controller.

※3 Condition

- Room temperature : 20°C • Circulation volume : Max. • Supply power and voltage : AC220V 50Hz
- Cooling capability is ± 10% of displayed capability.
- Cooling capability differs depending on room temperature, supply power, voltage, type of refrigerant and stirring condition in the bath.

※4 Condition

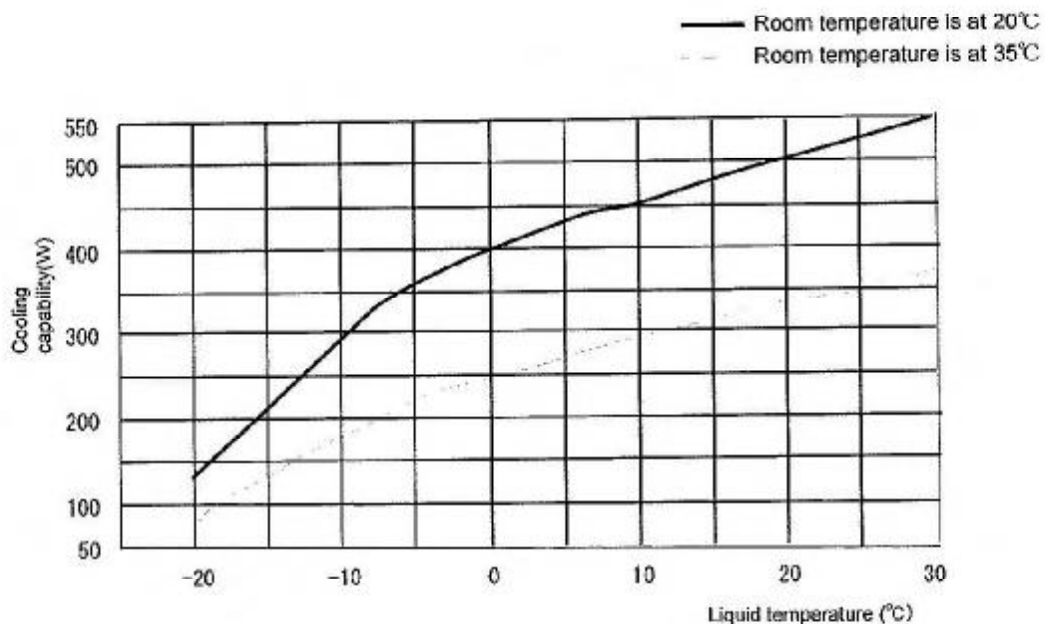
- Room temperature : 20°C • Supply power, voltage : AC220V 50Hz
- Cooling capability is ± 10% of displayed capability.
- Circulation capability differs depending on use conditions (type of the liquid, room temperature and etc.).

※5 In order to guarantee the performance of the instrument described in this manual ambient temperature must be within the range from 5 to 35°C.

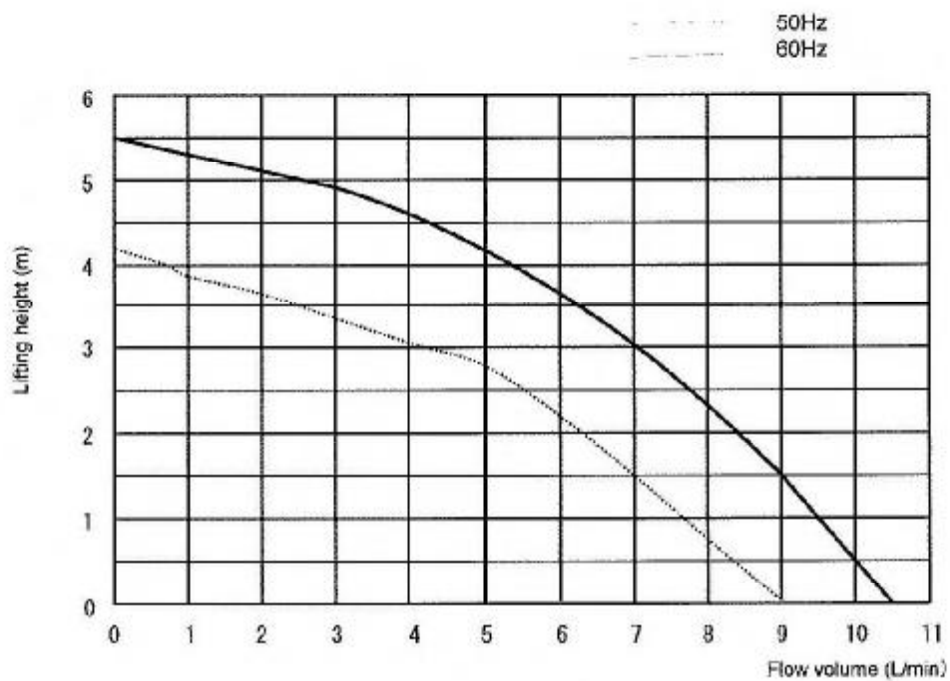
※6 External dimension does not include protrusion.

※7 When voltage is dipped during operation, the unit may indicate "OVL" or "Poff" may be on the control panel and then quit operation. However, this is not a fault of the unit.

### 2-3 Cooling capability curve (Reference)



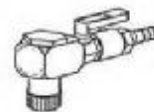
### 2-4 Circulation capability (Reference)



## 2-5 Options

### 1. Stop valve

No.	Product name	QTY	Catalog No
1	Stop valve	1	182460



※This stop valve has no nozzle and it can be connected to stainless pipe with RC3/8 screws.

### 2. Pt Screw port

No.	Product name	QTY	Catalog No
1	Pt Screw port	1	216450

### 3. Insulation hose set

No.	Product name	Bore diameter	QTY	Catalog No
1	Insulation hose set 1m	9.0mm	1	112690
2	Insulation hose set 2m	9.0mm	1	112700
3	Insulation hose set 5m	9.0mm	1	174420



※Material of connecting part is chloroprene rubber. Use the solution that does not immerse into the material.

Insulation hose is consumable product. As the progress of deterioration differs depending on the use condition, please check the hose regularly and replace it if it's required.

### 4. Stainless lid

No.	Product name	Spec.	QTY	Catalog No
1	Stainless lid	SUS304	1	222910



The lid is required when using highly-volatile solution such as methanol. Supplied bath cover is made of plastic and not supportable when using such as highly-volatile solution as a circulation liquid.  
※Material is SUS304.

If you leave inflammable or combustible solution (methanol and etc.) out in a place where the temperature is higher (or lower) than room temperature, it may evaporate and cause explosion. Use extreme care when using these solutions and ventilate the site well.

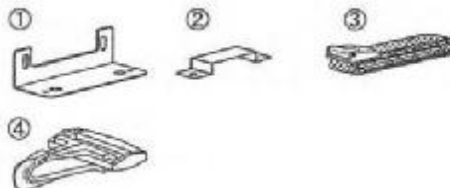
### 5. Carriage

No.	Product name	QTY	Catalog No
1	Carriage (with stopper for 4 wheels)	1	222920
2	Caster holder	4	



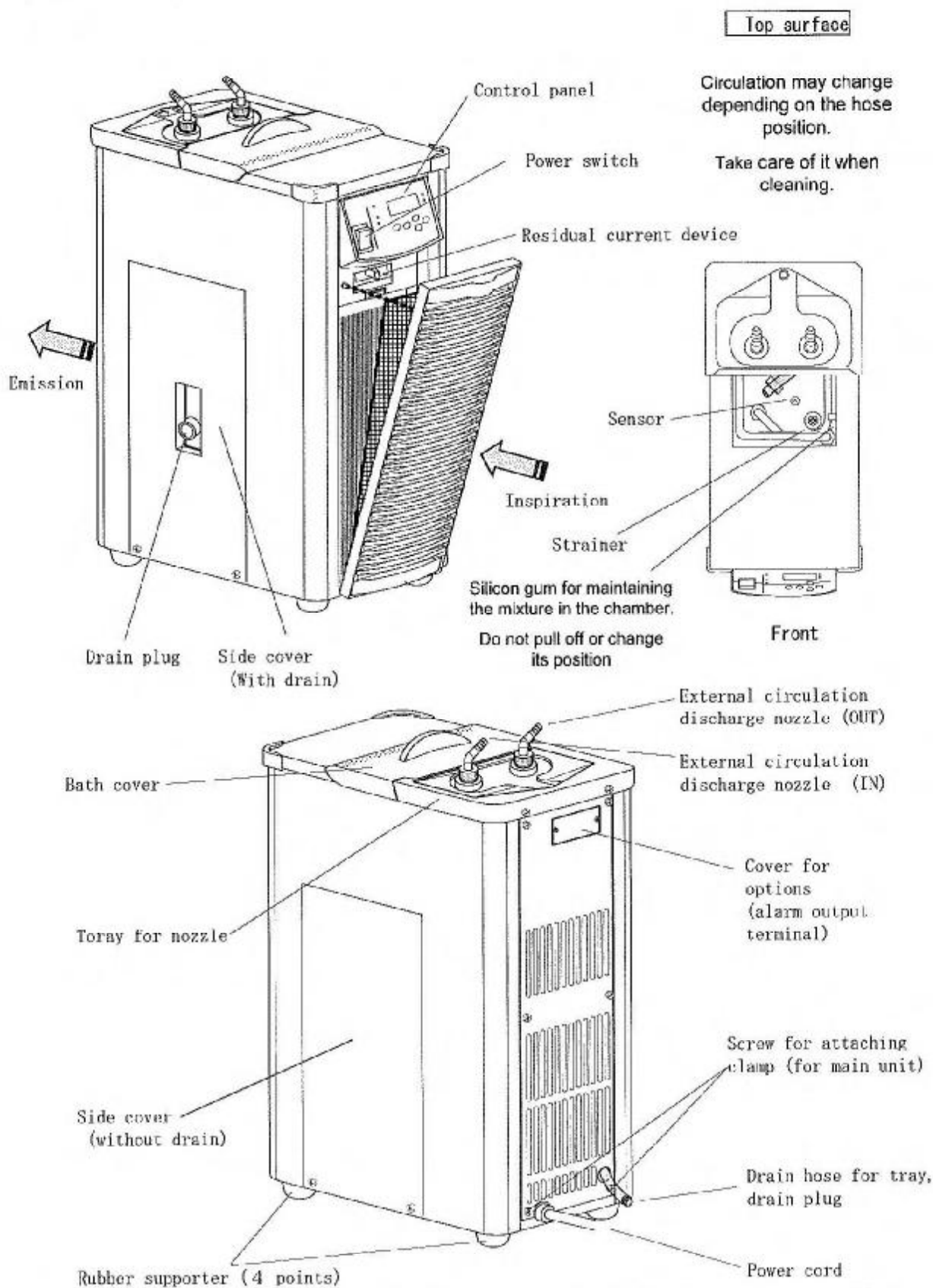
### 6. Clamp for fixing the product

No.	Product name	QTY	Catalog No
1	Clamp for fixing the main unit	1	222930
2	Clamp for belt	1	
3	Belt for fixing the product	1	
4	PC ring	1	



※Two-sided tape is attached to both clamps. Screw and anchor bolt is not supplied with these parts.

## 2-6 Description

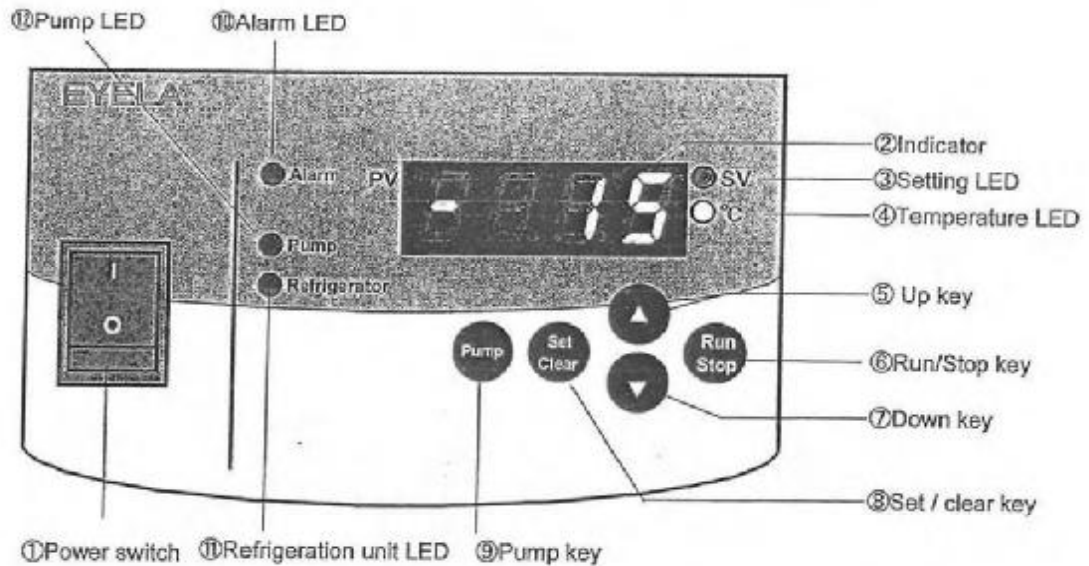


※The unit is coated with ABS (control panel), polyphenylene ether (bath cover), polyacetal (nozzle and drain plug) and nitrile rubber (tray). (These are nonferrous materials). Compared to metals, these plastics and rubbers can be easily discolored, deformed and damaged by heat, light (example: direct sun), solution (example: circulation liquid, cleanser) and forces (impact). So use caution when handling the unit.



### 3 Functions and names of operating portion

#### 3-1 Control panel



No.	Name	Functions
①	Power switch	Turns on and off the power.
②	Indicator	Displays measured, setting temperature, alarm and characters.
③	Setting LED	Lights up while displaying setting value (temperature and character) on indicator.
④	Temperature LED	Lights up while displaying temperature. Unit gets controlled while this LED blinks.
⑤	Up key	Value : Each time you press the key, the value increases by 1. Pressing and holding the key can increase the value continuously. Character : Each time you press the key, the character changes.
⑥	Run/Stop key	Starts and stops control.
⑦	Down key	Value : Each time you press the key, the value decreases by 1. Pressing and holding the key can decrease the value continuously. Character : Each time you press the key, the character changes.
⑧	Set/Clear key	Switches measured and setting temperature and determines the setting temperature. Clears alarm display when the alarm is activated. Holding down the key for longer than 5 sec. can switch from temperature display to user adjustment mode. In user adjustment mode, each time you press the key (less than 5 sec.), the key switches from setting items to setting value.
⑨	Pump key	Runs and stops pump.
⑩	Alarm LED	Lights up when refrigeration unit or sensor is in abnormal condition, or upper or lower temperature limit alarm is activated.
⑪	Refrigeration unit LED	Lights up when refrigeration unit is turned on.
⑫	Pump LED	Lights up when pump is controlled.

### 3-2 Adjustment mode

5 adjustment modes are available in this unit,

For mode details for setting each mode, please refer to "5-4 How to set adjustment mode"

1. Calibrating displayed temperature  
Measured temperature can be matched to the value displayed on your temperature gauge.  
※ Temperature range : -10°C~10°C  
(Setting range : -20°C~20°C)
2. Upper temperature limit alarm  
Changes the detecting temperature for upper temperature limit alarm.  
※When the setting temperature is lower than 10°C, upper temperature limit alarm tends to be activated. So do not set the value lower than 10°C. (Setting range : 0°C~20°C)
3. Lower temperature limit alarm  
Changes the detecting temperature for lower temperature limit alarm.  
※When the setting temperature is lower than 10°C, upper temperature limit alarm tends to be activated. So do not set the value lower than 10°C. (Setting range : 0°C~20°C)
4. Power recovery setting  
In case of power failure or for the case of turning off the power switch during operation, you can set power recovery setting.  
※Setting items  
「cont」 : Continues to control  
「stop」 : Stops operation
5. Power failure alarm setting  
In case of power failure or for the case of turning off the power switch during operation you can set the alarm setting

※Setting items

- 「sense」 : Sense power failure
- 「stop」 : Stop power failure sensor

**⚠ Caution**

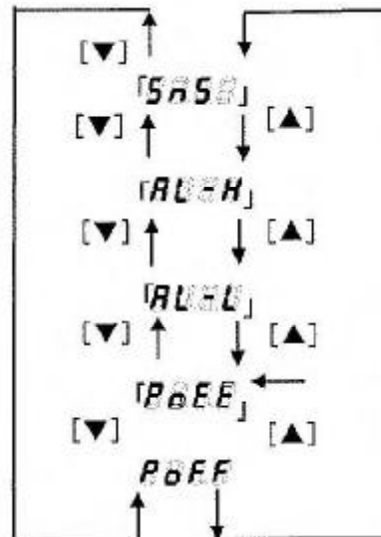
**Calibrate displayed temperature within the range of -10°C~10°C**

Although the setting range is from -20°C to 20°C, set the temperature within the range of -10°C~10°C. If the temperature exceeds this range, refrigeration unit may get stopped or refrigeration alarm ( oBL ) may be activated or cause other trouble.

Switching to adjustment mode

1) Press [ Set ] key for longer than 5 sec.  
Indicator displays 「5n5d」 and mode enters into adjustment mode.

2) Each time you press [▲] or [▼] key, setting mode changes as below.



List of setting value

No	Name	Character	Default
1	Calibrating displayed temperature	5n5d	0°C
2	Upper temperature limit alarm	RU=H	10°C
3	Lower temperature limit alarm	RU=L	10°C
4	Power recovery setting for	P=EE	cont
5	Power failure alarm setting for	P=FF	stop

Setting value for adjustment mode and selecting items can be changed regardless of the status of the unit.

### 3-3 Safety · alarm features


This product is equipped with the following safety features and alarm features.






If you face any trouble, please refer to "Troubleshooting" on page 10 and follow the instruction.

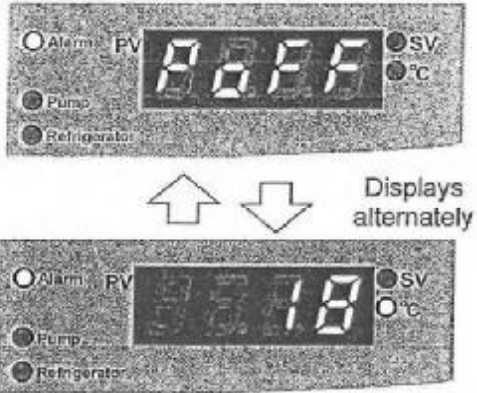

#### Safety features

Safety device	Operations	Reasons why the device works.
Fuse	Due to abnormal current flow, fuse blows and cuts off the power source.	<ul style="list-style-type: none"> <li>Power supply circuit is short-circuited or excess current flows.</li> </ul>
Over load relay for refrigeration unit	Refrigeration unit runs over load (over heat) operation, which makes alarm lamp light up and 「oVL」 will be displayed on indicator to stop refrigeration unit and pump.	Refrigeration unit runs over load (over heat) operation (start-up). <ul style="list-style-type: none"> <li>Power and voltage variation exceeds the rated value (<math>\pm 10\%</math>).</li> </ul>
Impedance protector for circulation pump (Available only for	Controls electric flow of pump while circulation pump runs over heat operation, and also controls temperature rise to prevent the burning of pump.	Constraint operation because of over load of circulation pump <ul style="list-style-type: none"> <li>Viscosity of circulation liquid is high.</li> <li>Foreign substances are sucked in.</li> <li>Ambient temperature exceeds 40°C.</li> <li>Pipe resistance is too strong (Valve is too tightened and etc.)</li> </ul>
Self-diagnosis function for control basal plate (Watch dog)	Control basal plate is in abnormal condition, which stops control.	<ul style="list-style-type: none"> <li>Ambient temperature exceeds 40°C.</li> <li>Influence of noise and etc.</li> </ul>

#### Alarm functions

Alarm name	Alarm display and operations	Reasons why alarm is activated.
Temperature sensor alarm	<ul style="list-style-type: none"> <li>Buzzer beeps for 15 sec.</li> <li>All the controls (for refrigeration unit and circulation pump output) gets stopped.</li> <li>[Alarm] LED lights up.</li> <li>Alarm description will be displayed on indicator.</li> </ul> 	<b>Operations</b> <ul style="list-style-type: none"> <li>Temperature sensor is disconnected.</li> </ul> <b>Releasing alarm</b> <ul style="list-style-type: none"> <li>Alarm can be released when turning the power switch on again.</li> </ul>

Alarm name	Alarm display and operations	Reasons why alarm is activated.
Refrigeration unit alarm	<ul style="list-style-type: none"> <li>• Buzzer beeps for 15 sec.</li> <li>• All the controls (refrigeration unit + circulation pump output) get stopped.</li> <li>• [Alarm] LED lights up.</li> <li>• Indicator displays the alarm description.</li> </ul> 	<p>Operation conditions</p> <ul style="list-style-type: none"> <li>• Refrigeration unit protector (over load relay + high-pressure switch) works.</li> </ul> <p>Releasing alarm</p> <ul style="list-style-type: none"> <li>• Alarm can be released by [Set] key.</li> <li>※After the alarm is released, control gets started automatically.</li> <li>• Alarm can be released by [Run/Stop] key.</li> <li>※Control gets stopped after releasing alarm.</li> </ul>
Upper temperature limit alarm	<ul style="list-style-type: none"> <li>• Buzzer beeps for 15 sec. and control will be continued.</li> <li>• [Alarm] LED lights up.</li> <li>• Indicator displays "Measured temperature" and "Setting temperature" alternately.</li> </ul>  <p style="text-align: center;">↑ ↓ Displays alternately</p> 	<p>Operation conditions</p> <ul style="list-style-type: none"> <li>• Alarm is activated when the bath temperature is higher than [Setting temperature + setting temperature for upper temperature limit alarm]. (Default setting for this alarm is 10°C.)</li> </ul> <p>Releasing alarm</p> <ul style="list-style-type: none"> <li>• Alarm will be released automatically when measured temperature is within the range of [Setting temperature + setting value for upper temperature limit alarm].</li> <li>• Alarm can be released by [Set] key.</li> <li>※Setting value for upper temperature limit alarm can be changed (Refer to "How to set upper temperature alarm")</li> </ul>
Lower temperature limit alarm	<ul style="list-style-type: none"> <li>• Buzzer beeps for 15 sec. and control will be continued.</li> <li>• [Alarm] LED lights up.</li> <li>• Indicator displays "Measured temperature" and "Setting temperature" alternately.</li> </ul>  <p style="text-align: center;">↑ ↓ Displays alternately</p> 	<p>Operation conditions</p> <ul style="list-style-type: none"> <li>• Alarm is activated when the bath temperature is lower than [Setting temperature - setting temperature for lower temperature limit alarm]. (Default setting for this alarm is 10°C.)</li> </ul> <p>Releasing alarm</p> <ul style="list-style-type: none"> <li>• Alarm will be released automatically when measured temperature is within the range of [Setting temperature - setting value for lower temperature limit alarm].</li> <li>• Alarm can be released by [Set] key.</li> <li>※Setting value for lower temperature limit alarm can be changed (Refer to "How to set lower temperature alarm")</li> </ul>

Alarm name	Alarm display and operations	Reasons why alarm is activated.
<p>Power failure alarm</p>	<ul style="list-style-type: none"> <li>Control gets stopped or will be continued by power recovery setting.</li> <li>[Alarm] LED lights up.</li> <li>Alarm description will be displayed on indicator.</li> </ul> 	<p>Operation conditions</p> <ul style="list-style-type: none"> <li>Power failure occurred during control (while outputting refrigeration unit) Or voltage is dipped.</li> <li>Power switch was turned off without stopping refrigeration unit.</li> <li>※Power failure alarm is not activated while only circulation pump is turned on. However, circulation pump stops or continues to work by following the power recovery setting.</li> </ul> <ul style="list-style-type: none"> <li>In case of power failure alarm setting is 「ERRR」, power failure alarm does not work.</li> <li>Power failure alarm setting is changeable. 「How to set power failure alarm」</li> </ul> <p>Releasing alarm</p> <ul style="list-style-type: none"> <li>Alarm can be released by 「Set」 key.</li> </ul>
<p>Watch dog</p>	<ul style="list-style-type: none"> <li>All the controls (refrigeration unit + circulation pump output) get stopped.</li> <li>Indicator turns off a light.</li> </ul> 	<p>Operation conditions</p> <ul style="list-style-type: none"> <li>Due to noise and ambient temperature etc., control basal plate is in abnormal status and can not recover.</li> </ul> <p>Releasing alarm</p> <ul style="list-style-type: none"> <li>Alarm can be released when turning the power switch on again.</li> <li>Or set the ambient temperature lower than 40°C.</li> </ul>

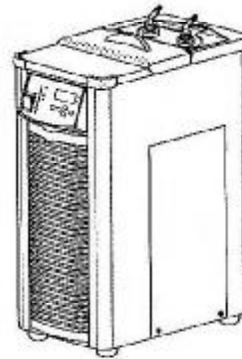
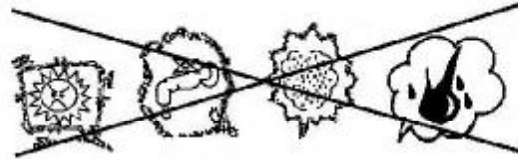
## 4 Installation

### 4-1 Installation condition

#### CAUTION

#### Select appropriate installation site that can be ventilated well.

Since air-cooled type refrigeration unit is equipped with this product, heat is exhausted from the unit. Select the installation site that can be ventilated well so that the ambient temperature won't rise because of exhausted heat. Using the product in high ambient temperature may worsen the operation efficiency or cooling capability. Also, refrigeration unit will be hot and operate under high pressure, which may cause malfunction.



Select the installation site that meets the following conditions.

- Ⓞ No inflammable solid or liquid or gas around the unit.
- Ⓞ Ambient temperature must be from 5 to 35°C.
- Ⓞ No dew condensation
- Ⓞ Lesser humidity and no dripping on the unit.
- Ⓞ Lesser dust
- Ⓞ No direct sun light
- Ⓞ Well-ventilated.
- Ⓞ Level and stable  
(Check the weight of the product during operation.)

### 4-2 Installation conditions

#### Caution

#### Keep enough space around the unit.

To keep the best performance of the product, leave the space between product and wall, ceiling plane. The distance between the product and wall, ceiling plane must be longer than the one mentioned in the right picture.

#### Caution

**This product is a heavyweight product.  
Use caution when carrying the product**

Approx. 30kg

### 4-3 Installation

#### Caution

#### Do not incline the main unit more than 15°

As refrigeration unit is equipped with the main unit, do not lay down the product or incline it more than 15° when carrying. If you do, it may be deformed or damaged.

## Changing the direction of sticking out drain hose

### Caution

Move and install the unit before filling cool water.

In case that cool water has been already filled into the bath, drain the water before installing the unit.

### Caution

#### Disconnect power plug

Before changing the direction of sticking out the drain hose, turn off the power switch, residual current device and disconnect power plug to avoid electric shock or damage for the product.

Direction of drain hose can be changed depending on the condition of your installation site.

※Default setting of the direction is left side.

#### 1. Removing side cover

- Take the hose out and make sure that no cool water is filled before removing drain plug.
- Remove the screws from side covers (both sides) and lower and slide the cover to remove.
- Take the hose out from side cover (with drain).

#### 2. Changing the position of the hose

Take the hose out from other direction.

※Use extreme caution when getting the hose through the other side, so that the pipes and parts won't be damaged.

#### 3. Setting the hose and side cover

- Get the hose through side cover (with drain) and put the drain plug on.
  - Attach the side cover (for both sides) as shown in right illustration.
  - Insert two screws (for both sides) to fix the side cover.
- ※Make sure that no wire or pipe or part is sucked in.
- ※Make sure that drain hose does not touch the fan.

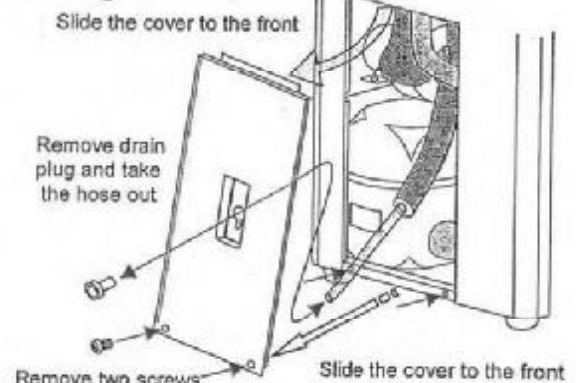
### Caution

Handle the hose when the unit is cooled down.

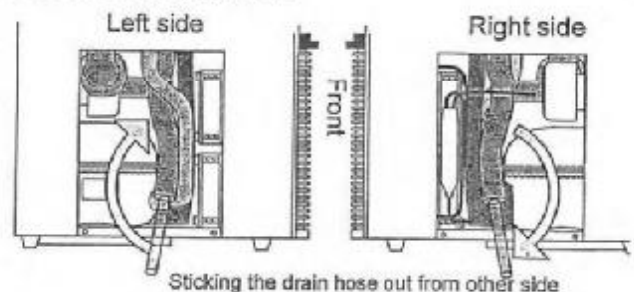
Since refrigeration unit and pipes are in hot temperature, do not handle the hose right after the unit stops running.

※When changing the direction from left side to right side, do not push the hose into the unit, which may cause leak or other trouble.

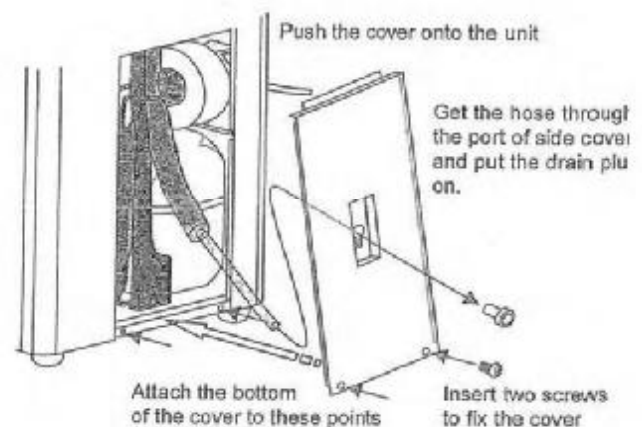
#### Removing side cover




#### Direction of drain hose




#### Setting drain hose and side cover

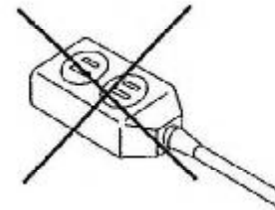


#### 4-4 Utility connection

 <b>Warning</b>
<p><b>Check the voltage, phase and capacity of power source before connecting.</b></p> <p>Inappropriate connection may cause a fire or electric shock hazard.</p>

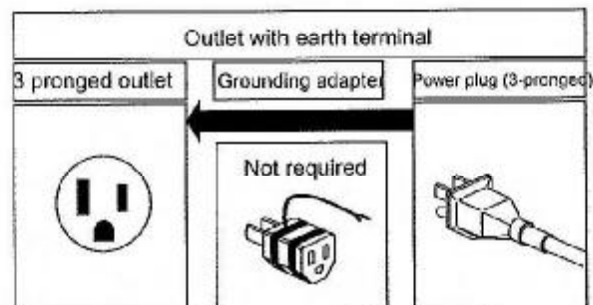
 <b>Warning</b>
<p><b>Do not use branching socket.</b></p> <p>Excess current may burn cable or cause a fire.</p>

 <b>Warning</b>
<p><b>Ground the unit properly.</b></p> <p>Without grounding the unit, the product may cause electric shock hazard.</p>



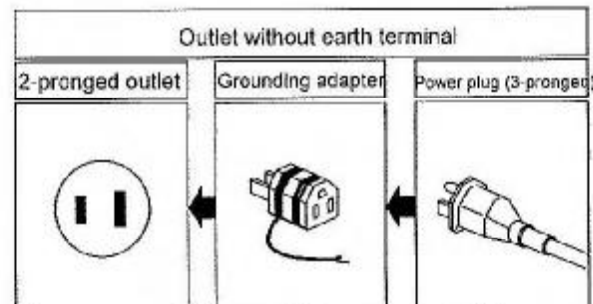
1. Check the voltage, phase and capacity of the power source.

2. Check the type of outlet at the installation site.  
 (Do not connect the mains connector yet.)  
 If the outlet has earth terminal, mains connector can be connected.



If the earth terminal is not available, connect grounding adapter to power plug.  
 Connect earth wire of grounding adapter to earth terminal.

※Grounding adapter is not supplied with the product.





## 5 Operation

### 5-1 Preparation

#### Warning

**Use extreme caution when using combustible or inflammable solvent.**

If you leave combustible or inflammable solvent (methanol and etc.) out at room temperature or higher (lower for some solvent), it may evaporate and catch fire with some ignition source, and cause explosion. Ventilate the space well while using these solvent.

#### Caution

**Use circulation liquid that does not affect the material of circulation route inside the unit.**

Materials used for the circulation route are copper, stainless, brass, fluorine resin, polyacetal, silicon rubber, polyphenylene ether, ethylene propylene rubber. Use circulation liquid that does not affect these materials. Or some parts in the circulation route may be damaged. Also, do not use extra-pure water or ion exchange water. These water may solve carbon dioxide in the air and generate acid solvent, which may corrode the metal of circulation route.

#### Caution

**Use the hose at appropriate length.**

Use the hose at appropriate length. When the piping resistance is strong, cooling capability or temperature distribution in the circulation bath will be worsen because of small quantity of circulation water.

#### Caution

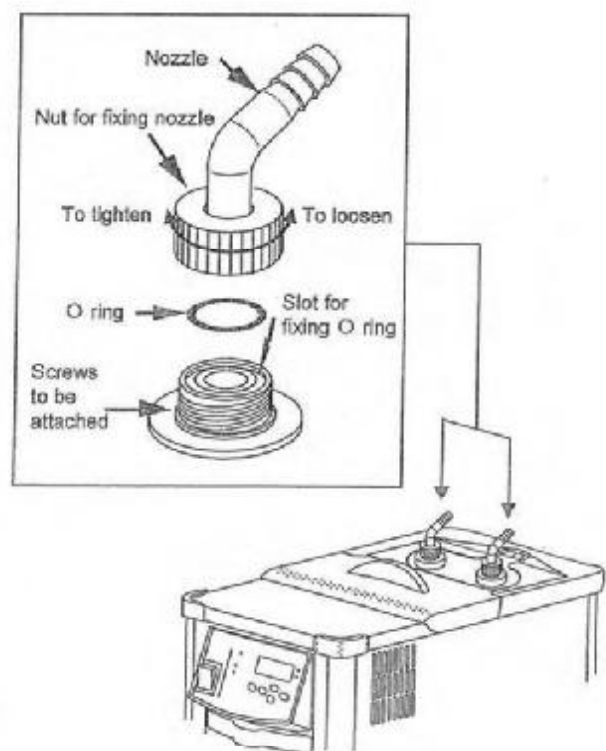
**Do not conduct closed operation or idling of circulation pump.**

These operation may cause malfunction.

#### 1 Connecting pipes and hose

- 1) Loosen nut for fixing nozzle and make sure that o ring is fixed at the slot for fixing o ring.
- 2) With holding nozzle with your hands, tighten the nut so that the water won't be leaked.
- 3) Connect hose (Diameter: 9mm) to external circulation nozzle (IN & OUT) and the device to be cooled down. Attach hose band to fix the hose (hose and hose band are not supplied with the product).

- ※ Do not jack up the nozzle too much.
- ※ Do not change the direction of nozzle during operation to prevent damage or leak.
- ※ Material of the hose must have appropriate pressure and fever-resistance and it must not be affected by any solvent. Also, make sure that hose is not banded or crashed when using the unit.



## 2. Connecting drainage hose for tray

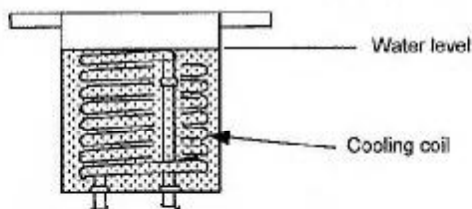
Remove plug for drainage hose and set the vessel to receive drained water. The unit will have more dew condensation water if it is used in a place where dew condensation is often formed or humidity is quite high. Check the unit regularly and drain the water.

## 3. Filling cool water

1) Make sure that drain plug is connected to drain hose.

2) Fill the water in the bath up to the position where cooling coil is fully filled  
Approx. 3L.

Water level of low temperature circulation bath



### Do not use pure water

Use tap water or softened tap water.  
Do not use pure water or ion exchange water.  
These types of water solve carbon dioxide in the air into acid solution, which could corrode the metal of circulation route.  
Also, pin hole of cooling coil or circulation pump may be impaired because of the use of these water.

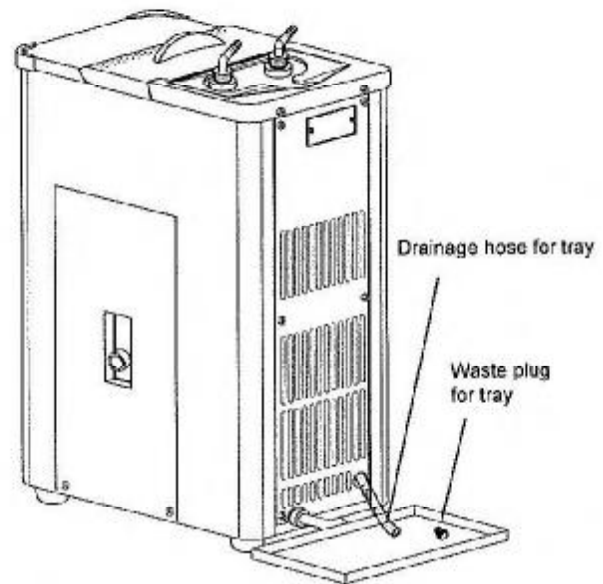
- ※ Use antifreeze if you use the unit at +7°C or lower. However, if you use ethylene glycol or nibrine, the viscosity will be higher in low temperature, which makes temperature distribution in the bath worse.  
In such a case, mix the moderate amount of water ( Make sure the freezing temperature when the liquid is concentrated.)
- ※ Make sure that there's no foreign substance in circulation liquid, which will cause malfunction.

3) Set the bath cover on the main unit.

## 4. Connecting power plug

Make sure that residual current device and power switch are turned off before connecting power plug to outlet.

## Setting drainage hose for tray



※ Vessel for drained water is not supplied with the product.




### Caution

#### Do not get control panel wet.

When filling water into the bath, do not get control panel wet. It will cause malfunction in controlling portion or electric shock hazard because of electric leakage.

※ The unit is coated with ABS (control panel), polyphenylene ether (bath cover), polyacetal (nozzle and drain plug) and nitrile rubber (tray). (These are nonferrous materials). Compared to metals, these plastics and rubbers can be easily discolored, deformed and damaged by heat, light (example: direct sun), solution (example: circulation liquid, cleanser) and forces (impact). So use caution when handling the unit.

## 5-2 How to operate the unit

Turn on residual power switch.  
In about 5 seconds after displaying initial display, measured temperature of cool water circulating bath will be displayed (measuring mode)  
※On 「」, the specific value or alphabet will be displayed.

### 1. Setting temperature

Setting temperature can be changed regardless of the status of the unit.

#### 1) Setting temperature (setting mode)

Press [Set/Clear] key. Indicator changes to display setting temperature (blinking) and you can set the temperature.

- 「Setting LED (SV)」 lights up.

※Setting temperature is the value you used previous time. Factory default is 「20℃」.

#### 2) Changing setting temperature

Press [▲] or [▼] key to input setting temperature

※ Each time you press [▲] or [▼] key, the temperature changes by 1℃ and holding down the key for longer than 3 sec. can change the value by 10℃.

#### 3) Determining setting temperature

Press [Set/Clear] key. Displayed setting temperature (blinking) is determined and indicator changes to display measured temperature (measuring mode).

- 「Setting LED (SV)」 turns off a light.

※If no key operation is done for longer than a minute, changed preset temperature can not be determined and indicator changes to display measured temperature (measuring mode). In such a case, please reset from 1).

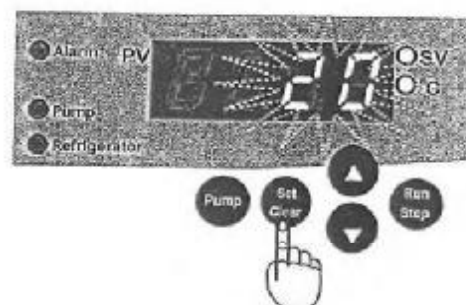
#### ※Status of LED

- 「●」, 「」 Turns off a light
- 「○」, 「」 Lights up
- , 「」 Blinks

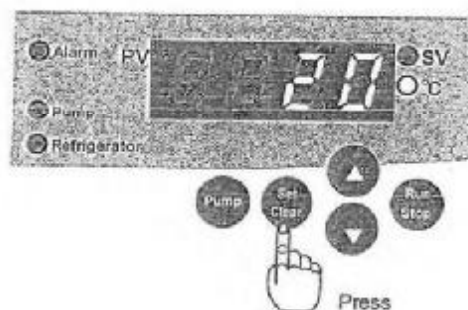
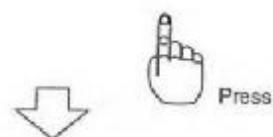
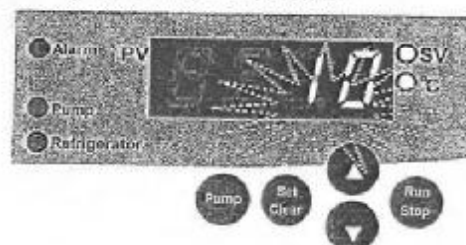
### Initial screen



After approx. 5 sec.



### 2) Changing setting temperature



## 2. Starting operation

### 1) Starting temperature control

Press [Run/Stop] key to start temperature control.

- 「Temperature LED (°C)」 blinks.
- 「Refrigerator LED (Refrigerator)」 lights up when the refrigeration unit is turned on.

※As protective timer for refrigeration unit is equipped, refrigeration unit won't start up until the timer stops after turning the power switch on or the refrigeration units stops working temporarily.

: Approx. 70 seconds

### 2) Running circulation pump

Press [Pump] key. Circulation pump starts working and circulating externally.

- 「Pump LED (Pump)」 lights up.

※Make sure that connecting part of hose and nozzle have no leak.

※If the liquid does not circulate, the air may be sucked in the pump. So release the air.

※Pressing [Run/Stop] key does not work on circulation pump

### 3) Filling cool water

Since filling the water in circulation system makes the water level lower, refill the cool water.

- ※Refill the cool water up to the level mentioned in the section 「3. Filling cool water」 on page 20.
- ※Cooling capability will be worsened when cooling coil is exposed.

## 3. Stopping operation

### 1) Stopping temperature control

Press [Run/Stop] key to stop temperature control.

- 「Temperature LED (°C)」 starts lighting up.
- 「Refrigerator LED (Refrigerator)」 turns off a light.

### 2) Stopping circulation pump

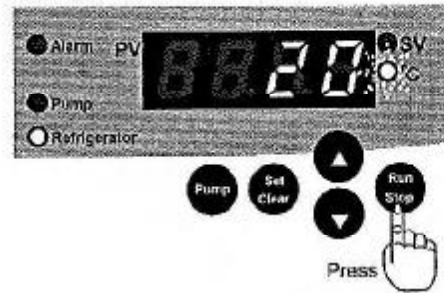
Press [Pump] key to stop circulation pump.

- 「Pump LED (Pump)」 turns off a light.

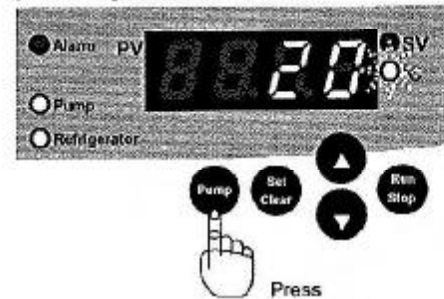
※To stop operation, stop the operation before turning the power switch off. Turning the switch off without stopping operation will activate power failure alarm next time.

※If you do not use the unit for a long time, turn off the power switch, residual current device, excess current breaker and disconnect power plug from outlet. Also, drain the water from bath and pipe (check the bath and pipe regularly in winter time so that water won't be frozen).

### 1) Starting temperature control

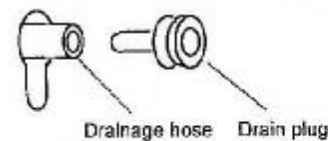


### 2) Running circulation pump

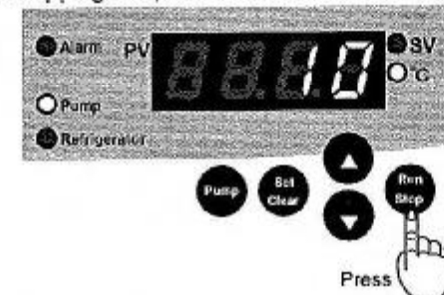


### ※Releasing air

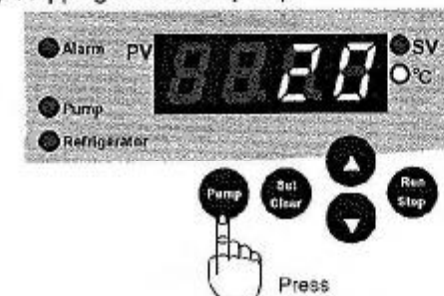
Remove drain plug and make sure that coolant is drained from drainage plug and put the plug on. Then, turn circulation pump on and off repeatedly for twice or 3 times to release air from the pump



### 1) Stopping temperature control



### 2) Stopping circulation pump



## 5-3 How to use optional accessories

### 5-3-1. How to use stop valve

#### 1. Attaching stop valve

- 1) Loosen the nut for fixing external circulation nozzle and remove it from the main unit. Make sure that o ring is fixed at the slot for fixing o-ring
- (1) Prepare stop valve, which is optional accessory, and with holding rotating valve part, tighten the nut to prevent leak.
- (2) After tightening the nut, valve can be rolled 360°.
- (3) Connect hose (diameter: 9mm) to the nozzle of stop valve and to the device that is to be cooled down.
- (4) Fix the hose with hose band (hose and hose band are not supplied with the product).

- ※Do not jack up the nozzle too much.
- ※Material of the hose must have appropriate pressure and fever-resistance and it must not be affected by any solutions. Also, make sure that hose is not bended or crashed when using the unit.

- 2) Make sure that drainage pug is attached and fill the water into the bath (Approx.3L) .

- ※Use antifreeze if you use the unit at +7°C or lower. However, if you use ethylene glycol or nibrine, the viscosity will be higher in low temperature, which makes temperature distribution in the bath worse.

In such a case, mix the moderate amount of water ( Make sure the freezing temperature when the liquid is concentrated.)

- 3) Make sure that stop valve is closed.

- ※Cooling capability will be worsened when the cooling coil is exposed during operation.

#### 2. How to operate

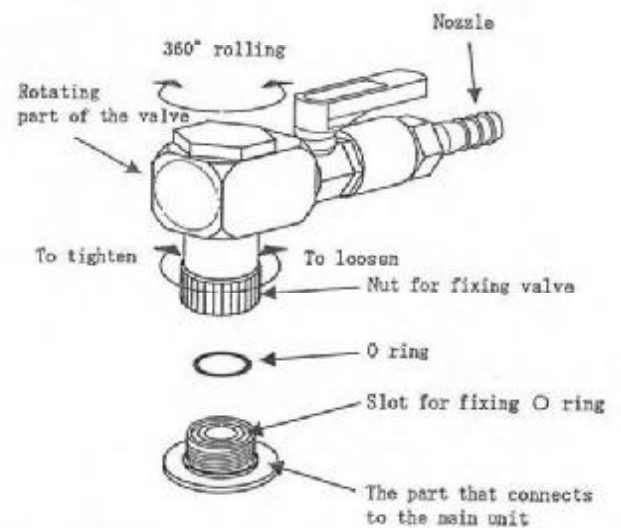
- 1) Turn residual current device, power switch and pump key.
- 2) Pump LED lights up and pump starts working. Open the stop valve gradually to start external circulation. Make sure that connecting part of hose and nozzle have no leak.

### ⚠ Caution

Use the hose at appropriate length.

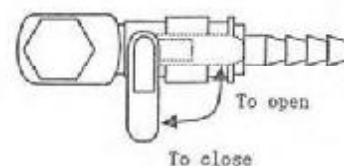
Use the hose at appropriate length. When the piping resistance is strong, cooling capability or temperature distribution in the circulation bath will be worsen because of small quantity of circulation water.

#### Attaching stop valve



※You can remove nozzle and connect stainless pipe to RC3/8 screw.

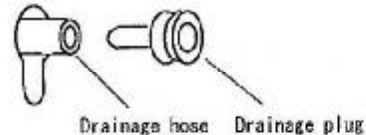
#### Status of stop valve



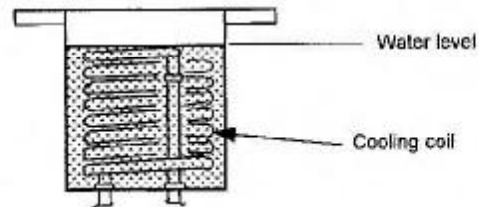
- 3) Check the circulation volume of back flow liquid and water level of the bath, and adjust stop valve.
  - ※Tightening circulation valve while the circulation pump runs may cause malfunction (closed operation of circulation pump).
  - ※By using stop valve, flow volume can be roughly adjusted. Use antifreeze when the circulation volume is low or the liquid is frozen. However, when the circulation volume is low, bath can not be stirred sufficiently, which makes the temperature distribution worse. When the liquid does not circulate, release the air from the pump.
- 4) When flowing water into circulation system, water level will lower. So refill the water in the bath up to the level shown in the right picture.
- 5) To stop operation, close the stop valve and turn off the circulation pump before turning off power switch and residual current device.

※Closed operation for circulation pump  
Since the piping in the unit will be heavily pressured when performing closed operation, the unit may have malfunction, leak or disconnect pipes.

※Releasing air  
Remove drain plug and make sure that cool liquid drains from drainage port and put the plug again. Then, turn on and off the circulation pump twice or three times repeatedly to release the air from the pump.



Water level of cool water circulation bath



#### Procedure after operation

If you do not use the unit for a long time, turn off the power switch, residual current device, excess current breaker and disconnect power plug from outlet. Also, drain the water from bath and pipe (check the bath and pipe regularly in winter time so that water won't be frozen).

#### 5-3-2. Terminal for outputting alarm

Terminal for outputting alarm, which is optional accessory, enables to take out alarm output when the alarm (sensor, refrigeration unit, power failure, lower and upper temperature limit) is activated.

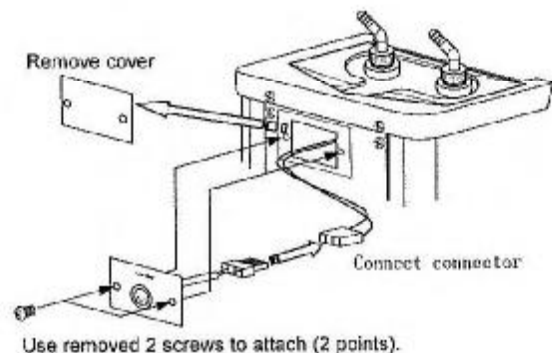
Please refer to 「2-5. Options (2. Terminal for outputting alarm)」 on page 6.

※Alarm output is no electric pressure grounding point output (a grounding point).  
capacity of grounding point: AC250V/DC30V 3A Max

##### 1. Attaching terminal for outputting alarm

- 1) By using cross-slot screwdriver, remove screws from the cover (for optional accessories). You can remove the cover with wires.
  - ※Keep the removed screws. Cover won't be required after this procedure.
- 2) Remove the wires from the back surface of cover and connect connector for wires to the connector for terminal for outputting alarm.
  - ※Make sure the direction for connecting connector.
- 3) Fix the terminal to the main unit with removed screws.
  - ※When fixing terminal, do not jam the wires.

##### Attaching terminal for outputting alarm



## 2. Wiring connector for outputting alarm

- 1) Disassemble connector for outputting alarm and solder lead wire of external device on the terminal of connector.

※ Insulate soldered terminal with heat shrinkable tube.

※ Keep the screws for the clamp for fixing lead wires.

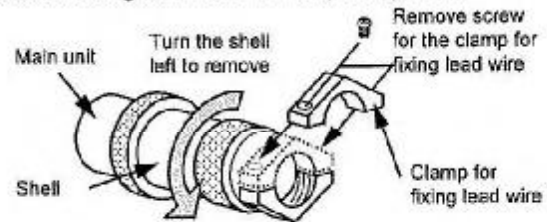
- 2) Set up disassembled connector.

※ When attaching it to the main unit, turn the shell.

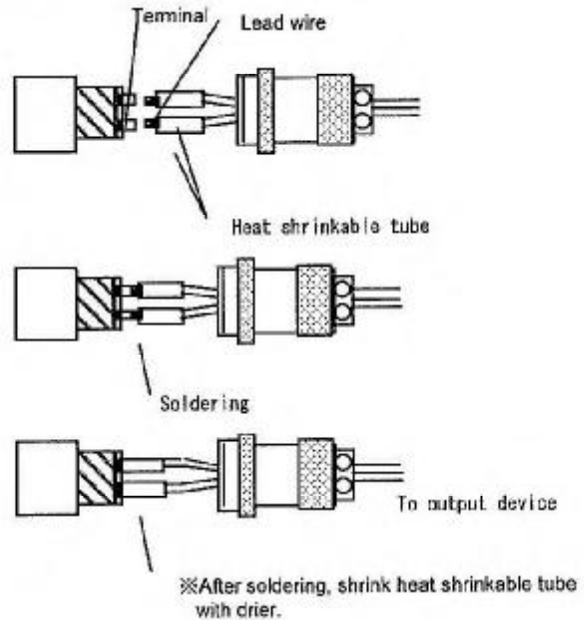
※ Attach the clamp for fixing lead wire after attaching shell to the main unit.

- 3) Connect the connector to 「Alm Out」 of the terminal for outputting alarm that is attached to the main unit.

### Disassembling connector for outputting alarm



### Wiring connector for outputting alarm



### 5-3-3. Insulation hose set

Insulation hose, which is optional accessory, prevents the concentration of water on the hose surface. For more details about the type of insulation hose, please refer to 「2-5. Options (3. Insulation hose)」.

※ Use the hose that has appropriate length and diameter.

※ Material of the hose is chloroprene rubber.

Insulation hose is consumable. Since the deterioration of the hose differs depending on the use condition, check the hose regularly and replace it if it's required.

### 5-3-4. Stainless bath cover

It is required when using high-volatile solution such as methanol. Supplied bath cover is plastic and has lesser resistance for solution and metal.

※ Material is SUS304.

If you leave combustible or inflammable solution (methanol and etc.) out at room temperature or higher (lower for some solutions), it may evaporate and catch fire with some ignition source, and cause explosion. Ventilate the space well while using these solutions.

### 5-3-4. Carriage

By setting carriage, can be moved and installed smoothly on the floor.

#### 1. Position of the carriage

1) Lower the stop lever (for 4 wheels) to lock the caster so that carriage won't move.

2) Set the 4 rubber supporters on the carriage.

※Since the weight of the main unit is about 30kg, handle it with two persons.

※Since there's no space between carriage and main unit, use caution not to jam your fingers.

#### 2. Carrying and installing the unit

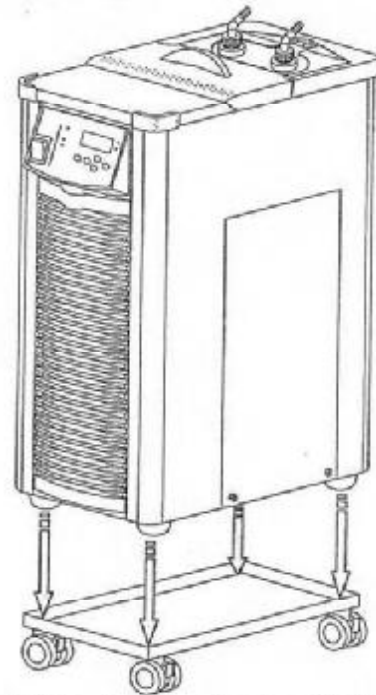
1) Raise the 4 stop levers to unlock and move it to the installation site.

※Moving the unit on bumpy place will damage the casters. In such a case, carry the unit.

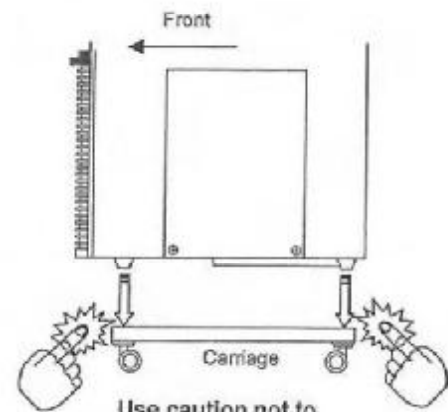
2) At installation site, lower the stop levers of casters to lock.

3) Insert supplied 4 caster holders into the caster to fix.

### Setting carriage

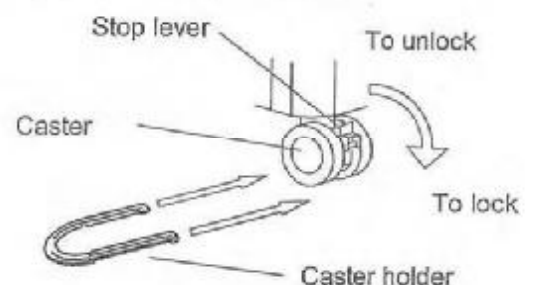


Set the rubber supporters (4 points) of the main unit on the carriage as shown above.



Use caution not to jam your finger.

### Locking and unlocking the caster





### 5-3-6. Clamp for fixing the product

Retainer for the product prevents the fall of the product.

※Select appropriate method depending on the installation site.

※Two-sided tape is attached to the clamp for fixing main unit and the clamp for fixing belt.  
If the two-sided tape is hard to be attached or for the purpose of antiearthquake measures, use anchor belt, tapping or screw to fix the clamp tightly.

※Anchor bolt, tapping screws are not supplied with the product.

※Before attaching two-sided tape, make sure that no dust or dirt adheres to the point.

#### 1. How to use the clamp for fixing main unit

There are two different size ports (Diameter:  $\phi 7\text{mm}$  ·  $\phi 12\text{mm}$ ) for anchor bolt on the clamp for fixing main unit

※Carriage is not available for this case.

1) Move the product to the installation site and remove screws for attaching clamp for fixing main unit from the back of the unit.

※Since the weight of the main unit is about 30kg, handle the unit with two persons.

※Keep removed screws.

2) Fit the screw of the main unit to longer port of the clamp for fixing main unit and attach the clamp to the floor.

3) By using removed screws, fix the clamp with the main unit.

#### 2. How to use fixing belt

By using fixing belt and the clamp for fixing belt, the unit can be fixed firmly on the floor or wall or side of laboratory table.

※Clamp for fixing belt has port ( $\phi 5\text{mm}$ ) for tapping screw.

※Carriage is available for this case. If the carriage is required, tighten it with fixing belt.

1) Attach the belt to the floor or wall where the clamp for fixing belt is fixed.

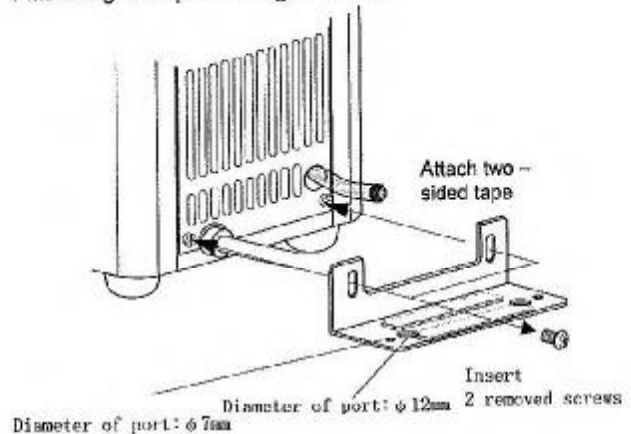
※When fixing the unit on the floor, attach the belt so that the clamp is placed on the back of the rubber supporter (front). When using carriage, set the belt on the back of the caster (front wheels).

2) Get the belt through the clamp and wind it around the main unit tightly to fix.

※Pull the belt tightly to be locked.

※Get the belt through the back of the rubber supporters. When using carriage, get it through the back of the caster (front wheel).

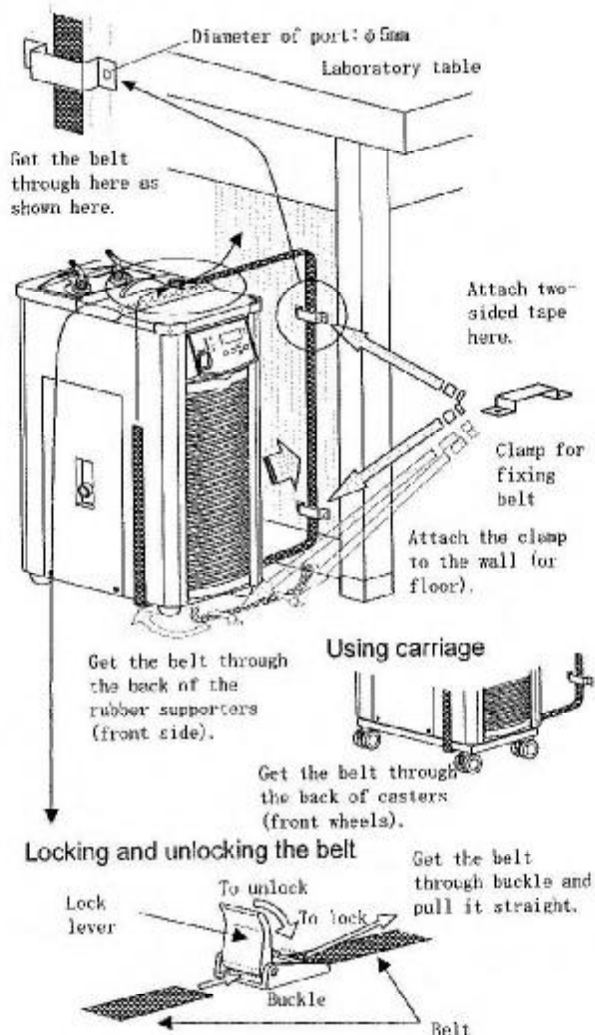
#### Attaching clamp for fixing main unit



#### Precautions when fixing clamp for fixing main unit and for fixing belt with two-sided tape

- Wipe the dirt, rust and oil on the surface and dry well.
- Attach the tape and connect them tightly.
- Leave the unit for longer than 30 min. after attaching tape.
- The tape has strong adhesion force for metal, solid plastic and wood.
- Use anchor bolt or screws to attach more tightly.

#### Attaching clamp for fixing belt



3. How to use PC ring for fixing belt  
 If the wall or laboratory table has hook or handle, supplied PC ring enables to lock or unlock the main unit easily.

※Even when using carriage, main unit can be locked or unlocked.

※Hook and handle are not supplied with the product. Please purchase them at the store closer to you.

1) Get the belt through PC ring and wind the belt around the main unit.

※Check the direction of PC ring.

※Wind the belt tightly.

※When using carriage, wind the belt around the carriage as well. In this case, get the belt through the back of the casters (front wheels).

※When not using carriage, get the belt through the back of rubber supporters (front).

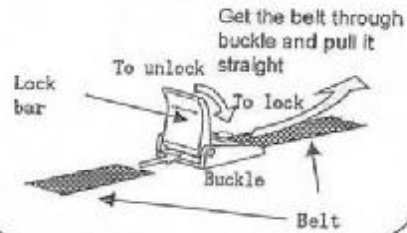
2) Hook the PC ring to the hook or handle on the wall.

### Attaching PC ring

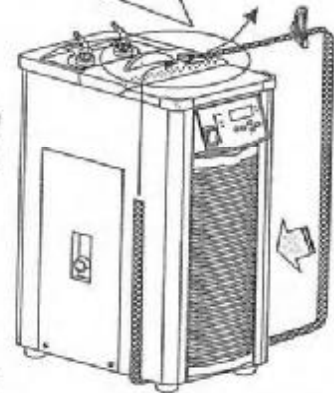
Get fixing belt through PC ring



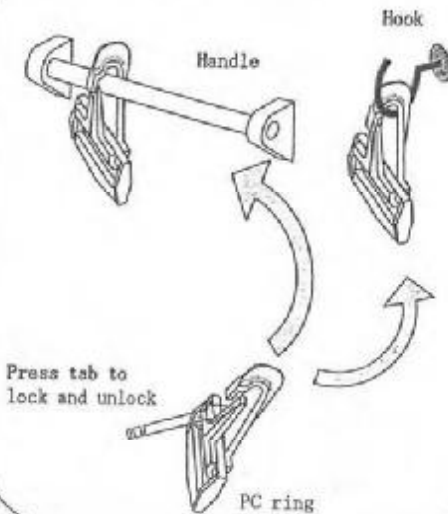
### Locking and unlocking fixing belt



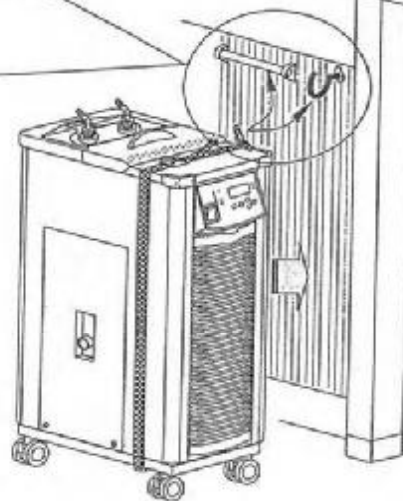
Get the belt through PC ring and wind it round the main unit tightly and fix it.



### Locking and unlocking PC ring




Laboratory table



Hook PC ring to the wall or to the hook on the side of laboratory board to fix the main unit.

## 5-4 How to operate adjustment mode

 **Caution**

Calibrate displayed temperature within the range from -10°C to 10°C.

Though setting range is from -20°C to 20°C, do not exceed the range from -10°C to 10°C. Exceeding this range may stop refrigeration unit or activate refrigeration unit (oHL) or cause other trouble.

### 1. How to operate calibrating displayed temperature mode

If the value measured by standard temperature gauge differs from the displayed value on the indicator, this mode calibrates the displayed temperature.

※ Do not use this mode out of the specified range.

#### Setting calibrating displayed temperature

##### 1) Moving to adjustment mode

Press [Set] key for longer than 5 sec.

The mode enters into adjustment mode and [5n5] will be shown on indicator. Then, the mode changes to calibrating displayed temperature mode.

• 「Setting LED (SV)」 turns off a light.

##### 2) Moving to calibrating displayed temperature

Press [Set] key.

Indicator changes to display calibrated temperature (blinking).

※ Preset calibrated temperature (blinking) is the value that is input previous time. Factory default is 0.0°C.

##### 3) Changing calibrated temperature

Press [▲] or [▼] key to input setting temperature.

Each time you press [▲] or [▼] key, the temperature changes by 1°C. If you press and hold the key, the value changes continuously.

##### 4) Determining calibrated temperature (moving to upper temperature limit alarm)

Press [Set] key. Displayed calibrating temperature (blinking) is determined and indicator shows [ALSH].

Then, the mode changes to upper temperature limit alarm mode.

※ Calibrated temperature will not be available until you press [Set] key.

※ To change another adjustment mode, press [▲] or [▼] key to change the mode.

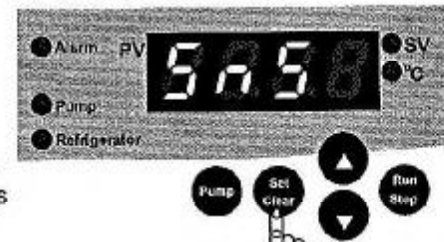
※ If you do not change other adjustment mode, press [Set] key for longer than 5 seconds. Indicator changes to display measured temperature again.

※ If no key operation is done for longer than a minute while setting, the display changes to measured temperature display again. In such a case, please reset all the settings from 1).

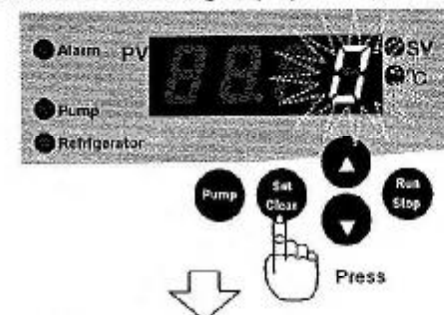
### Measured temperature display (Measuring mode)



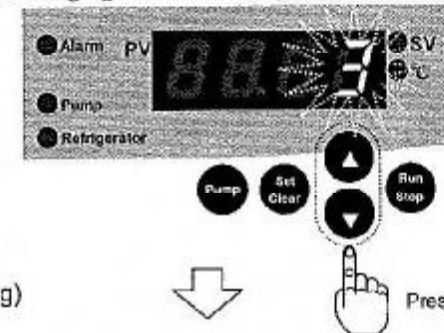
#### 1) Moves to adjustment mode



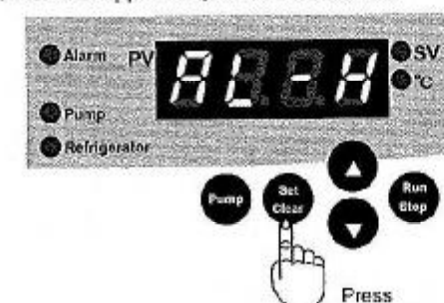
#### 2) Moves to calibrating displayed temperature



#### 3) Changing calibrated temperature



#### 4) Determining calibrated temperature (Moves to upper temperature limit alarm)



## 2. How to operate upper temperature limit alarm

Detecting temperature for upper temperature limit alarm can be changed.

- \* If you set the temperature lower than 10°C, upper temperature limit alarm tends to be activated.  
So do not set the value lower than 10°C.

### Setting upper temperature limit alarm

- 1) Press [Set] key for longer than 5 seconds.  
The mode changes to adjustment mode and indicator shows [55.5]. Then, the mode changes to calibrating displayed temperature mode.  
- 「Setting LED (SV)」 turns off a light.

- 2) Setting upper temperature limit alarm  
Press [▲] key to enter into upper temperature limit alarm [88.88].

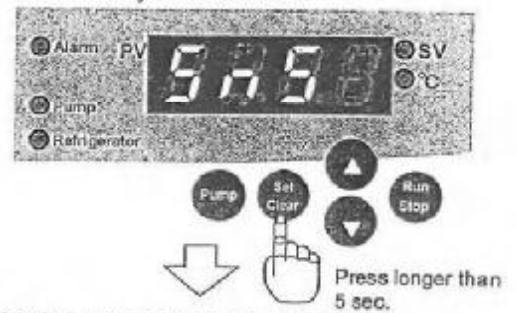
- 3) Moving to upper temperature limit alarm  
Press [set] key. Indicator changes to display preset temperature (blinking) for upper temperature limit alarm.  
※Preset temperature (blinking) is the value that was input previous time. Factory default value is 10°C.

- 4) Changing setting value for the alarm  
Press [▲] and [▼] key to input setting temperature.  
Each time you press [▲] or [▼] key, the temperature changes by 1°C. Pressing and holding down the key can change the value continuously.

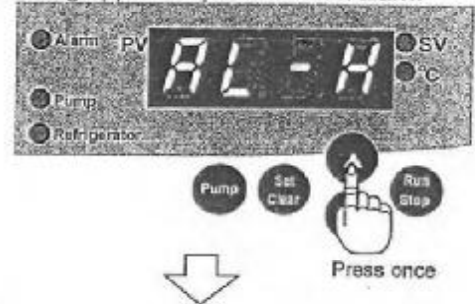
- 5) Determining the setting value for the alarm (moves to lower temperature limit alarm)  
Press [Set] key. Displayed temperature (blinking) is determined and indicator shows [88.88].  
Then, the mode changes to lower temperature limit alarm mode.

- ※ Calibrated temperature will not be available until you press [Set] key.
- ※ To change another adjustment mode, press [▲] or [▼] key to change the mode.
- ※ If you do not change other adjustment mode, press [Set] key for longer than 5 seconds. Indicator changes to display measured temperature again.
- ※ If no key operation is done for longer than a minute while setting, the display changes to measured temperature display (measuring mode) again.  
In such a case, please reset all the settings from 1).

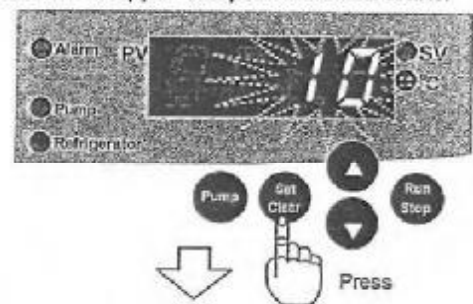
### 1) Moves to adjustment mode



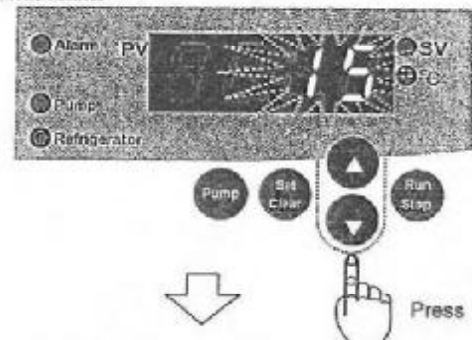
### 2) Setting upper temperature limit alarm



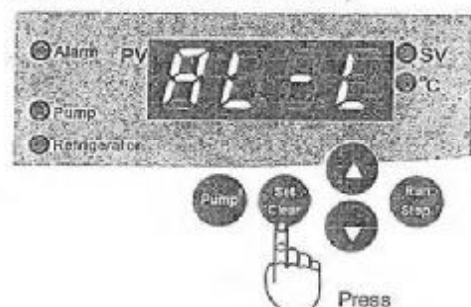
### 3) Moves to upper temperature limit alarm



### 4) Changing the setting value for upper temperature limit alarm



### 5) Determining upper temperature limit alarm (Moves to lower tem. Limit alarm)



### 3. How to operate lower temperature limit alarm

Detecting temperature for lower temperature limit alarm can be changed.

\* If you set the temperature lower than 10°C, lower temperature limit alarm tends to be activated. So do not set the value lower than 10°C.

#### Setting lower temperature limit alarm

##### 1) Moving to adjustment mode

Press [Set] key for longer than 5 seconds.

The mode changes to adjustment mode and indicator shows [5.5.5]. Then, the mode changes to calibrating displayed temperature mode.

- 「Temperature LED (°C)」 turns off a light.

##### 2) Setting lower temperature limit alarm

Press [▲] key twice to enter into lower temperature limit alarm [AL-L].

##### 3) Moves to lower temperature limit alarm

Press [Set] key.

Indicator changes to display preset temperature (blinking) for lower temperature limit alarm.

※Preset temperature (blinking) is the value that was input previous time. Factory default value is 10°C.

##### 4) Changing setting value for the alarm

Press [▲] and [▼] key to input setting temperature.

Each time you press [▲] or [▼] key, the temperature changes by 1°C. Pressing and holding the key can change the value continuously.

##### 5) Determining the setting value for the alarm (Moves to power failure alarm setting)

Press [Set] key.

Displayed temperature (blinking) is determined and indicator shows [8.8.8].

Then the mode changes to power failure recovery setting. And the indicator shows [8.8.8].

(Page35). Then the mode changes to power failure recovery

- ※ Changed temperature will not be available until you press [Set] key.
- ※ To change another adjustment mode, press [▲] or [▼] key to change the mode.
- ※ If you do not change other adjustment mode, press [Set] key for longer than 5 seconds. Indicator changes to display measured temperature again.
- ※ If no key operation is done for longer than a minute while setting, the display changes to measured temperature (measuring mode) display again. In such a case, please reset all the settings from 1).

##### 1) Moves to adjustment mode



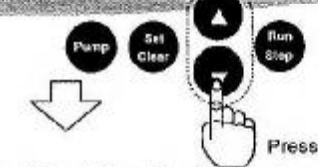
##### 2) Setting lower temperature limit alarm



##### 3) Moves to lower temperature limit alarm



##### 4) Changing the setting value for lower temperature limit alarm



##### 5) Determining the setting value for the alarm



Moves to power failure recovery setting | -----



#### 4. How to operate power failure recovery setting

You can set the setting after the recovery of power failure.  
(Power failure includes the case that power switch is turned off without stopping control.)

##### Power recovery setting

###### 1) Moves to adjustment mode

Press [Set] key for longer than 5 sec.

The mode enters into adjustment mode and indicator displays 「58.58」.

Then, the mode changes to calibrating displayed temperature.

- 「Setting LED (SV)」 turns off a light.

###### 2) Power recovery setting

Press [▲] key three times (or press [▼] key once) to display power recovery setting 「8888」.

###### 3) Moves to power recovery setting

Press [Set] key.

Indicator changes to display the preset character (blinking) for power recovery setting.

※Preset character (blinking) is the one that was set previous time. Factory default setting is 「0000」.

###### 4) Changing preset character for power recovery setting

Press [▲] or [▼] key to select setting character.

※Setting character changes in order as below;

「0000」 : Continues to control

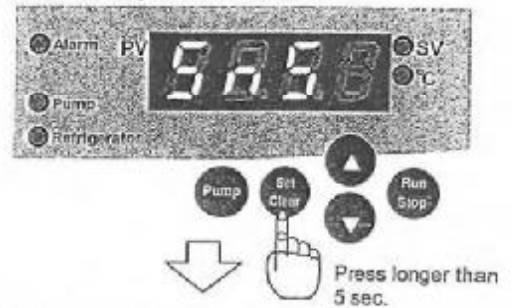
「5888」 : Stopping control

###### 5) Determining power recovery setting (moves to power failure alarm setting)

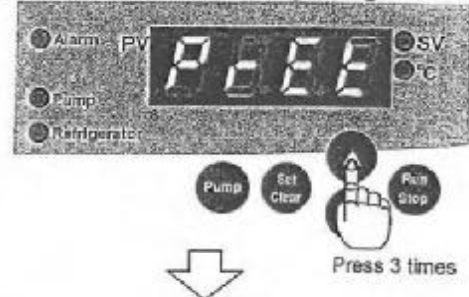
Press [Set] key. Displayed setting character (blinking) is determined and indicator displays 「8888」 to change to power failure alarm setting.

- ※ Changed character will not be available until you press [Set] key.
- ※ To change another adjustment mode, press [▲] or [▼] key to change the mode.
- ※ If you do not change other adjustment mode, press [Set] key for longer than 5 seconds. Indicator changes to display measured temperature again.
- ※ If no key operation is done for longer than a minute while setting, the display changes to measured temperature (measuring mode) display again. In such a case, please reset all the settings from 1).

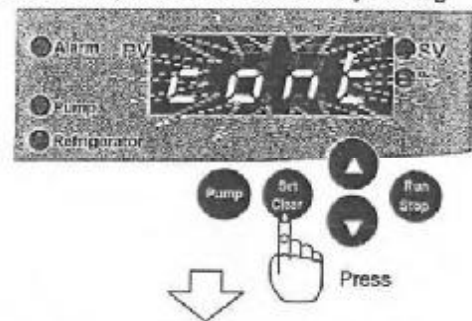
###### 1) Moves to adjustment mode



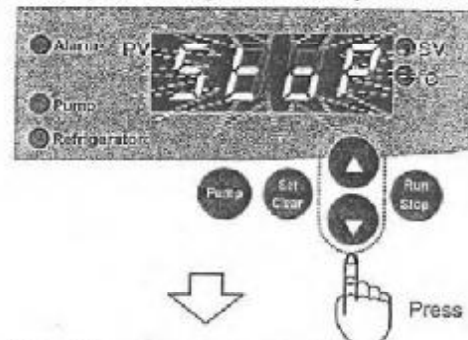
###### 2) Setting power failure recovery setting



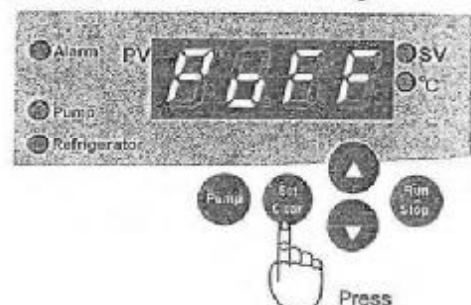
###### 3) Moves to power failure recovery setting



###### 4) Changing the setting character for power recovery



###### 5) Determining power recovery setting (Moves to power failure alarm setting)



## 5. How to operate power failure alarm setting

You can select power failure alarm sensor after the recovery of power failure. (Power failure includes the case that power switch is turned off without stopping control.)

### Power failure alarm setting

#### 1) Moves to adjustment mode

Press [Set] key for longer than 5 sec.

The mode enters into adjustment mode and indicator displays 「5.7.5」.

Then, the mode changes to calibrating displayed temperature.

• 「Setting LED (SV)」 turns off a light.

#### 2) Power failure alarm setting

Press [▲] key four times (or press [▼] key once) to display power failure alarm setting 「Poff」.

#### 3) Moves to power failure alarm setting

Press [Set] key.

Indicator changes to display the preset character (blinking) for power recovery setting.

※Preset character (blinking) is the one that was set previous time. Factory default setting is 「0000」.

#### 4) Changing preset character for power failure alarm setting

Press [▲] or [▼] key to select setting character.

※Setting character changes in order as below;

「0000」 : alarm setting on

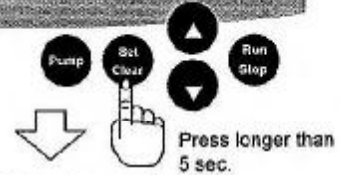
「0EFF」 : alarm setting off

#### 5) Determining power failure alarm setting (moves to power failure recover setting)

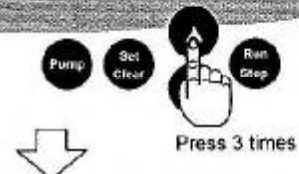
Press [Set] key. Displayed setting character (blinking) is determined and indicator displays 「5.7.5」 to change to calibrating displayed temperature setting.

- ※ Changed character will not be available until you press [Set] key.
- ※ To change another adjustment mode, press [▲] or [▼] key to change the mode.
- ※ If you do not change other adjustment mode, press [Set] key for longer than 5 seconds. Indicator changes to display measured temperature again.
- ※ If no key operation is done for longer than a minute while setting, the display changes to measured temperature (measuring mode) display again. In such a case, please reset all the settings from 1).

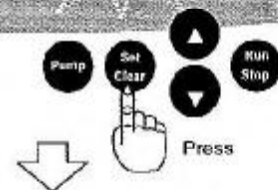
#### 1) Moves to adjustment mode



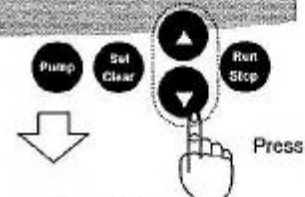
#### 2) Setting power failure alarm setting



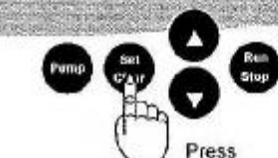
#### 3) Moves to power failure alarm setting



#### 4) Changing the setting character for power failure alarm setting



#### 5) Determining power failure alarm setting (Moves to displayed temperature setting)



## 6 Troubleshooting

Trouble	Cause of trouble	Countermeasures
No display is shown when turning on power switch.	Power plug is disconnected to outlet, or not connected to outlet completely.	Turn off residual current device and power switch, and connect power plug to outlet.
	Power source is not supplied.	Turn on the breaker on distribution board.
	Fuse has blown. (Excess current flows.)	Replace with new fuse. If that failure mode still remains after replacing the fuse, stop running the product immediately and contact your local dealer or closest customer service center.
	Power switch is impaired.	
Refrigeration unit does not work.	Temperature controller is impaired.	Stop running the product immediately and contact your local dealer or closest customer service center.
	Refrigeration unit is impaired.	
	SSR is impaired.	
	Water level lowers and cooling coil is exposed, which causes over load operation.	Refill the cool water. (Refer to 「3. Filling cool water」 on page 16.)
The unit is not cooled down.	Protective timer for refrigeration unit works.	After passing the time, make sure that refrigeration unit works.
	Refrigeration unit does not work.	Stop running the product immediately and contact your local dealer or closest customer service center.
	Fan of refrigeration unit does not work.	
	Gas leaks.	
The unit is cooled down poorly.	Gas leaks.	Set the temperature lower than 35°C.
	Fan for refrigeration unit does not work.	
	Ambient temperature is higher than 35°C.	Reduce the load to the value that is within specified range.
	Heat load is too heavy.	Set enough space around the unit. (Refer to 「4-2. Condition」 on page 12.
	Obstacle closer to the main units prevents emission and exhaust heat.	
Cool water does not circulate.	Strainer in the cool water circulation bath has some dust.	Remove the dust.
	Air is sucked in.	Remove drainage plug and make sure that cool water flows from drainage port, and put drainage plug again. Turn on and off the circulation pump for 2-3- times repeatedly to release the air. (Refer to 「2. Starting operation」 on page 18.
	Stop valve is closed. (In case that any option is attached.)	Open the valve. (In case that any option is attached.)
Circulation volume is small.	Hose is crushed.	Fix the hose.
	Pressure loss of circulation system is too big.	Reduce pressure loss.
	External circulating point is too high.	Adjust the position.
Bath is frozen at 7°C or higher (setting temperature).	Due to pressure loss of pipe, circulation volume is small and bath can not be stirred sufficiently.	Open stop valve. Use antifreeze.
	Temperature controller is impaired or refrigeration unit does not stop.	Stop running the product immediately and contact your local dealer or closest customer service center.



## 7 Maintenance • checkup

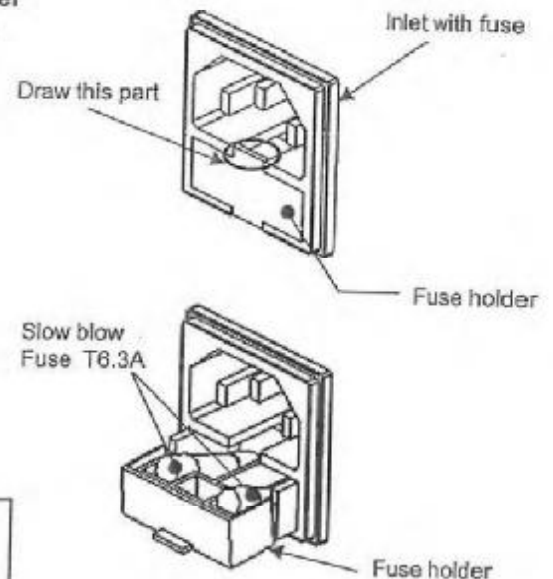
### 7-1 Replacing fuse



- When replacing fuse the product, turn off the power switch and residual disconnect mains connector.
- Use only the fuse of a regulated value.

- 1) Turn off the power switch and disconnect power cord from inlet with fuse.
- 2) Take the fuse holder out by flat-blade screwdriver.
- 3) Replace 2 fuses with new ones.
- 4) After replacing fuses, insert fuse holder.

※If the fuse blows after replacing with new one, stop using the product and call the local dealer.



#### Fuse can be used

##### Cartridge fuses

5 × 20mm Slo-Blo T6.3A 250V (Surge withstand)  
Ex. Manufacturer : Little fuse 021306.3XP

### 7-2 Cleaning and caring the product



#### Warning

**Do not disassemble the unit.**

Some parts in the unit are under electric pressure and high pressure. So disassembling the unit may cause electric shock or cause users physical injury.



#### Caution

**Do not touch cooling fin with bare hands.**

Do not touch cooling fin with bare hands when conducting maintenance work. Edgy fin may cut your hands.



#### Caution

**Use appropriate product for cleaning and caring the product in proper way.**

When cleaning and caring the product, do not pour water directly on the external and internal part of the unit, and also do not use cleanser, thinner, petrol, lamp oil, acid and related products. These products may cause Electric shock or damage the unit.



#### Caution

**Disconnect mains connector when cleaning and caring the product.**

When cleaning and caring the product, turn off the power switch and residual disconnect mains connector from outlet for preventing electric shock hazard or damage on the product.

※The unit is coated with ABS (control panel), polyphenylene ether (bath cover), polyacetal (nozzle and drain plug) and nitrile rubber (tray). (These are nonferrous materials). Compared to metals, these plastics and rubbers can be easily discolored, deformed and damaged by heat, light (example: direct sun), solution (example: circulation liquid, cleanser) and forces (impact). So use caution when handling the unit.