

EYELA

**Low Temperature Circulator
Cool Ace**

CA-1320

Instruction Manual

This instruction manual is designed to use the product efficiently and safely with keeping its best performance.

**IMPORTANT**

**Be sure to read “Safety precautions”
before use.**



Please keep this manual in a place easily accessible to every user.

Safety precautions

1. Signal word for warning

Mishandling of inflammable or ignitable solution may cause some trouble. Also, due to its characteristics and functions, operating the product in high temperature will worsen the capability and cause malfunction. However, if you know the proper information before use, you can avoid almost all these troubles.

Therefore, this manual categorizes the level of Importance and danger as below with alert mark and signal word. Please follow the instructions and use the product safely.

Alert mark Signal word	Definition
 WARNING	Mishandling the product may cause serious personal injury or loss of life.
 CAUTION	Mishandling the product may injure users or cause property damage.

Though we are trying to look into conceivable risk of using the product, it is very difficult for us to expect of all of it. It means that all the instructions in this manual do not cover all the types of risk that may caused by the product.

However, if you follow the instructions, you surely can handle and operate the product safely.

Please use extreme care when handling the product and to prevent all the potential accidents and mechanical failures.

FORWARD

Thank you very much for your kind patronage of EYELA.
Get to know your EYELA products, but before using, to be sure to read this manual well.
EYELA cannot be held responsible for the malfunctions resulting from the use of EYELA Products other than as specified in this manual.

WARRANTY

EYELA products are warranted against defects in materials and workmanship for a period of year following the date of shipments.

EYELA will make repairs or replacements free of charge upon return to the factory, Transportation paid, of the defective item except following cases.

This warranty does not cover finishes nor dose it cover damage resulting from accident, misuse, abuse, tampering, servicing performed or attempted by unauthorized service agency.

The consumable parts are not warranted even if they are within the warranty period.

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LIABILITY DISCLAIMER

Liability to Tokyo Rikakikai Co., Ltd. For any defect in this instrument is limited to the Invoiced price of the defective instrument.

Tokyo Rikakikai Co., Ltd. Has no control over the set up, use, connection to other Equipment, or data generated by means of EYELA products.

Therefore in no event shall Tokyo Rikakikai Co., Ltd.be liable for any incidental or Consequential damages , losses, or liability which may result from improper use of its Products, either in connection with other equipment or in the generation, reporting, or Application of data and results.

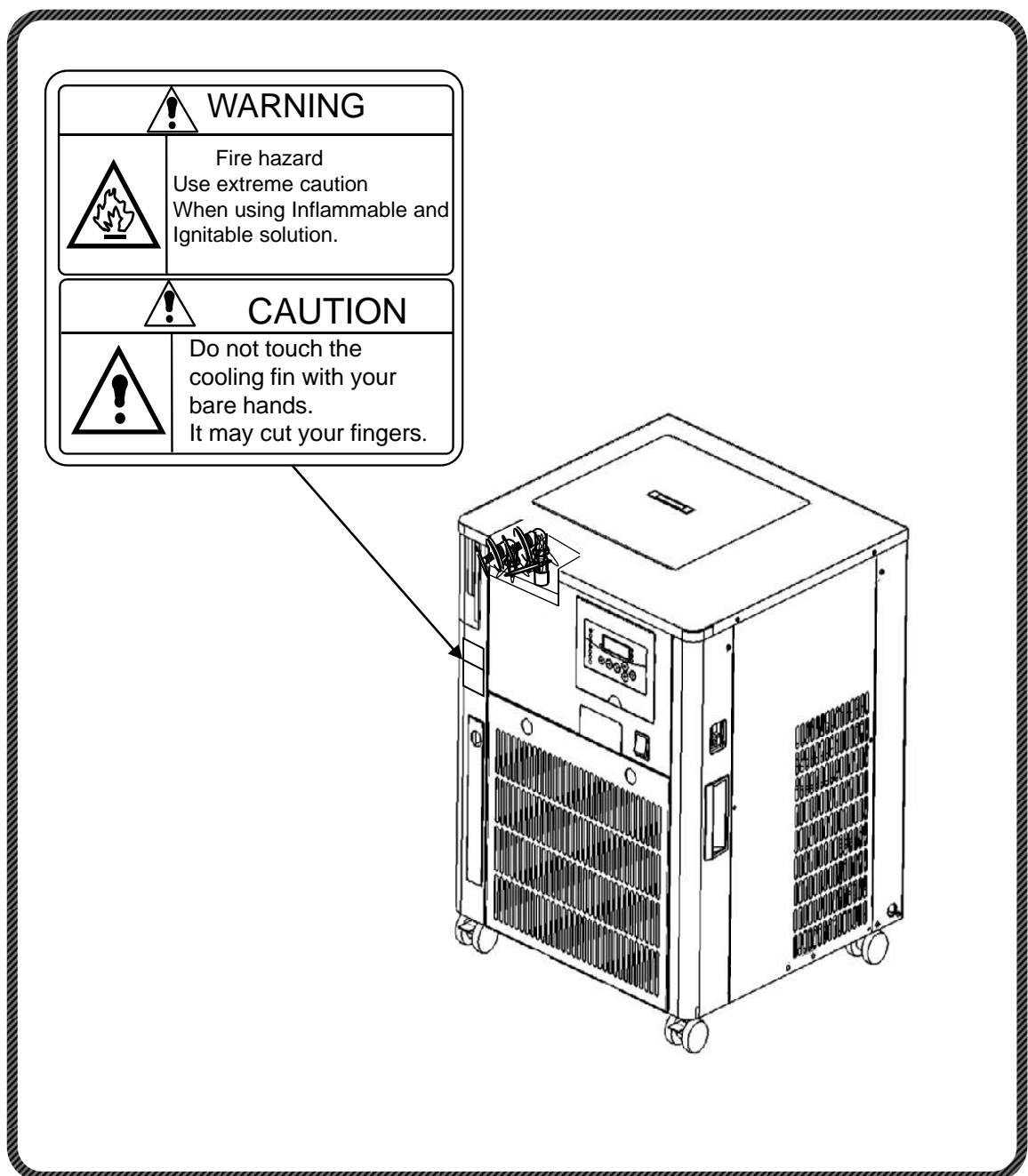
SERVICE

- 1. Before asking our service agency, check your instrument again with trouble shooting on this manual.**
- 2. We shall repair the instrument subject to WARRANTY CLAUSE**
- 3. Ask our authorized service agency for repairing.**

2. Warning display on the product

The warning label for serious danger is attached on the body of this unit.
The position of the label is shown as below.
Please read the instructions carefully whenever using this unit.

※ If you have any trouble reading the warning label because it is worn out and etc.,
please replace with new one. Do not hesitate in contacting us if you require new label.



Congratulations on your purchase of a

EYELA product.

Introduction

This manual describes the procedure of installation, operation, troubleshooting, maintenance, check-up and disposal of Low Temperature Circulator, [Cool Ace], CA-1320.

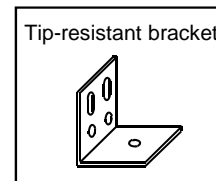
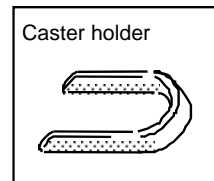
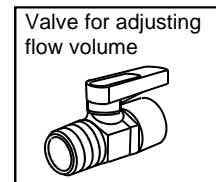
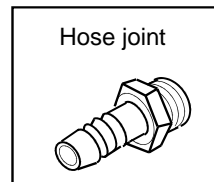
Table of contents

1. For safety use	1	5. Operation	
2. Outline of the product		5 - 1 Preparation	13
2 - 1 Application	2	5 - 2 How to operate	16
2 - 2 Specification	2	6. Optional accessories	
2 - 3 Cooling capability curve	3	6 - 1 External output terminal	21
2 - 4 Circulation capability	3	6 - 2 External sensor	21
2 - 5 Descriptions	4	6 - 3 Other options	21
3. Descriptions of operating portion		7. Troubleshooting	22
3 - 1 Control panel	5	8. Maintenance • checkup	
3 - 2 Safety • alarm features	6	8 - 1 Operation test for electric	24
4. Installation		leakage breaker	
4 - 1 Installation environment	8	8 - 2 Cleaning and caring the product.....	24
4 - 2 Installation condition	8	9. Disposal of the product	26
4 - 3 Installation	10	10. After-sales service	26
4 - 4 How to use tip-resistant bracket ..	11		
4 - 5 Utility connection	12		

Items contained in your carton

Check the type and quantity of items before setting up.

	Item	Quantity
1	Main unit	1
2	Hose joint (R3/8 x Ex.Dia.10.5)	2
3	Valve for adjusting Flow volume (R3/8 x Rc3/8)	1
4	Caster holder	4
5	Tip-resistant bracket	2
6	Instruction manual	1



1

For safety use

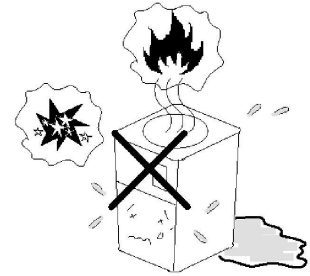
This product is not designed with explosion-proof construction. Use extreme care when handling it.



WARNING

Use extreme care when using inflammable and combustible solvent.

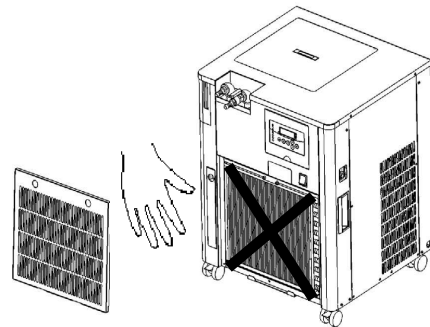
Leaving inflammable and combustible solvent (alcohol and etc.) out at room temperature or higher (or lower for some solvent), they may evaporate, catch fire and explode. Ventilate well before use and use care when handling these solvent.



CAUTION

Do not touch cooling fin with bare hands.

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

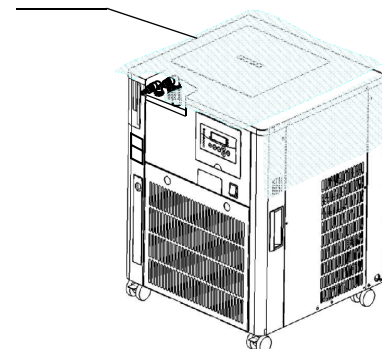


CAUTION

Top surface and exhaust port are subject to have high temperature. Do not touch these part.

Top surface and both sides are subject to have high temperature hotter than 30°C of room temperature because of exhaust heat and etc. Touching these part may burn yourself.

Shaded area (top surface and both sides) are subject to have high temperature.



2

Outline of the product

2-1 Application

**WARNING**

**Do not remodel the product.
Make sure it should not be used
out of intended use.**

Remodeling and improper use may cause electric shock or breakdown.

This is a low temperature circulator that cools down the liquid in the bath by refrigeration unit and circulate externally through circulation pump and cools it off the heating portion of evaporator, reaction bath and various devices.

It is the product which is low so that it is put under the bench.

In addition, it has capability of cooling down two Rotary Evaporator (Model:N-1000) at the same time.

2-2 Specification

Product name	Low temperature circulator (Cool Ace)	
Model	CA-1320	
Circulation system	Circulation toward closed system	
F E A T U R E S	Temperature control range ※1	-20~+20°C
	Accuracy of temperature control	±2°C
	Cooling capability ※2	1050W at10°C
	Circulation Capability ※3	Max. Lifting height 9.5 m (50Hz) Max. flow volume 16 l / min (50Hz)
C O N F I G U R A T I O N	Temperature control system	Refrigeration unit, ON – OFF control
	Temperature setting · display	Sheet key digital setting , LED digital setting (minimum digit:1°C) Selecting setting or measured temperature
	Safety features	Residual current device · excess current breaker , High pressure switch for refrigeration unit Over load relay holding circuit, Protection timer for refrigeration unit Self diagnosis function for temperature controller , Thermal protector for circulation pump
	Temperature controller	Electronic digital setting · digital display
	Temperature sensor	Pt100Ω sensor
	Refrigeration unit · refrigerant	Air-cooling system 650W (Rotary) · R407C
	Bath	Whole capacity Approx.12.8l Actual capacity:Approx.10l Material SUS304
	Cooling coil	Copper (Nickel coating)
	Diameter of circulation nozzle	External diameter:10.5×Bore diameter: 7 (R3/8)
	S P E C .	Range of ambient temperature
Dimensions (main unit) ※4		460(W)×430(D)×570(H) (excluding nozzle)
Dimension of the bath		280 (Diameter)×270 (Depth)
Rated supply		AC 220V±10% 50Hz
Supply power		5A 1.1 kVA
Weight		Approx. 48 kg
Operation presser max.		2.55Mpa
Pollution degree		2
Over voltage category		II
Operation at a terrestrial altitude	Max2000m above sea level	

※The value mentioned on the feature are measured under the following condition;

Room temperature: 20°C, Rated power supply voltage : 50Hz, NO load

※1. Temperature controller setting is to -10 °C at room temperature 35 °C

※2 Cooling capacity is ±10% of indicated capability.

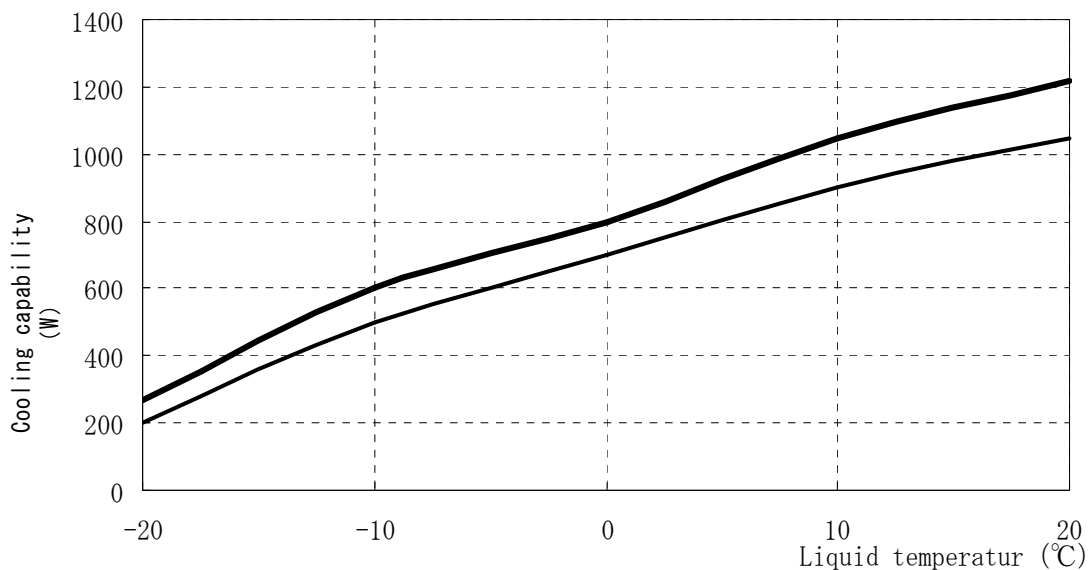
※3 Circulating capability is ±10% of indicated capability.

※4 No projection such as mains connector is included.

2-3 Cooling capability curve (Reference)

- Condition • 220V 50Hz Room temperature 20°C
- Stirring in the bath (Circulation amount: Max.)

Setting up outside of bench
 Setting up under bench

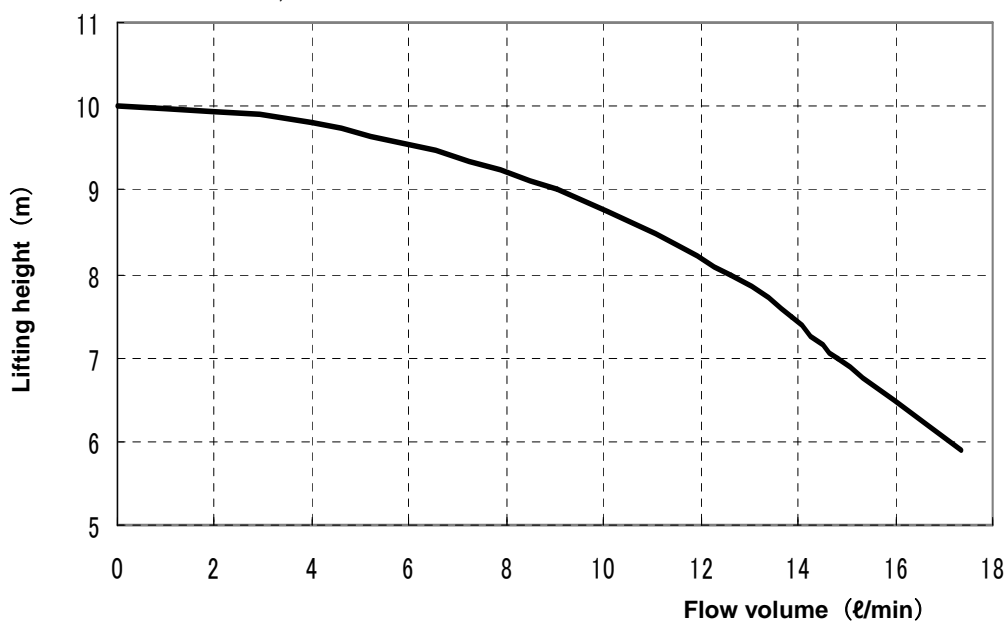


- Cooling capability is $\pm 10\%$ of indicated capability.
- Indicated capability is stand-alone capability of the device.
- When setting up the product under the bench, cooling capability of the product is about up to 14% lower than the condition that it is set up outside of the bench. Ability for 25% cooling decreases at the time of -20 °C.

※Conditions when setting up under the bench Measured under the condition that 5cm of back face, 3cm of top face, 40cm of right and left side are blocked off with bench surface.

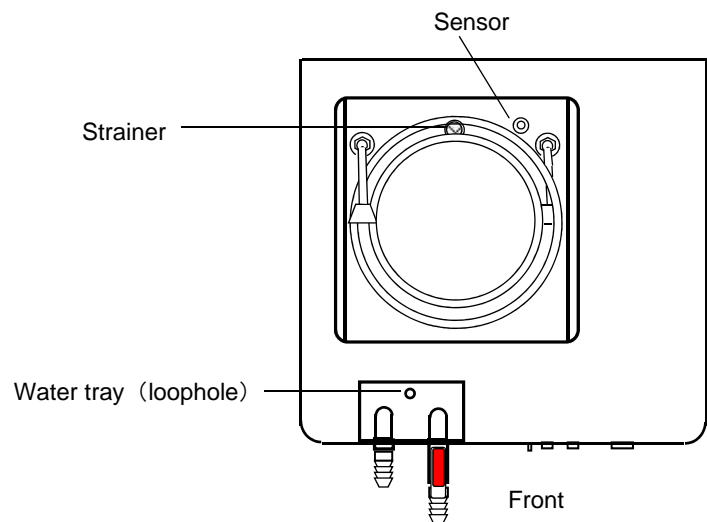
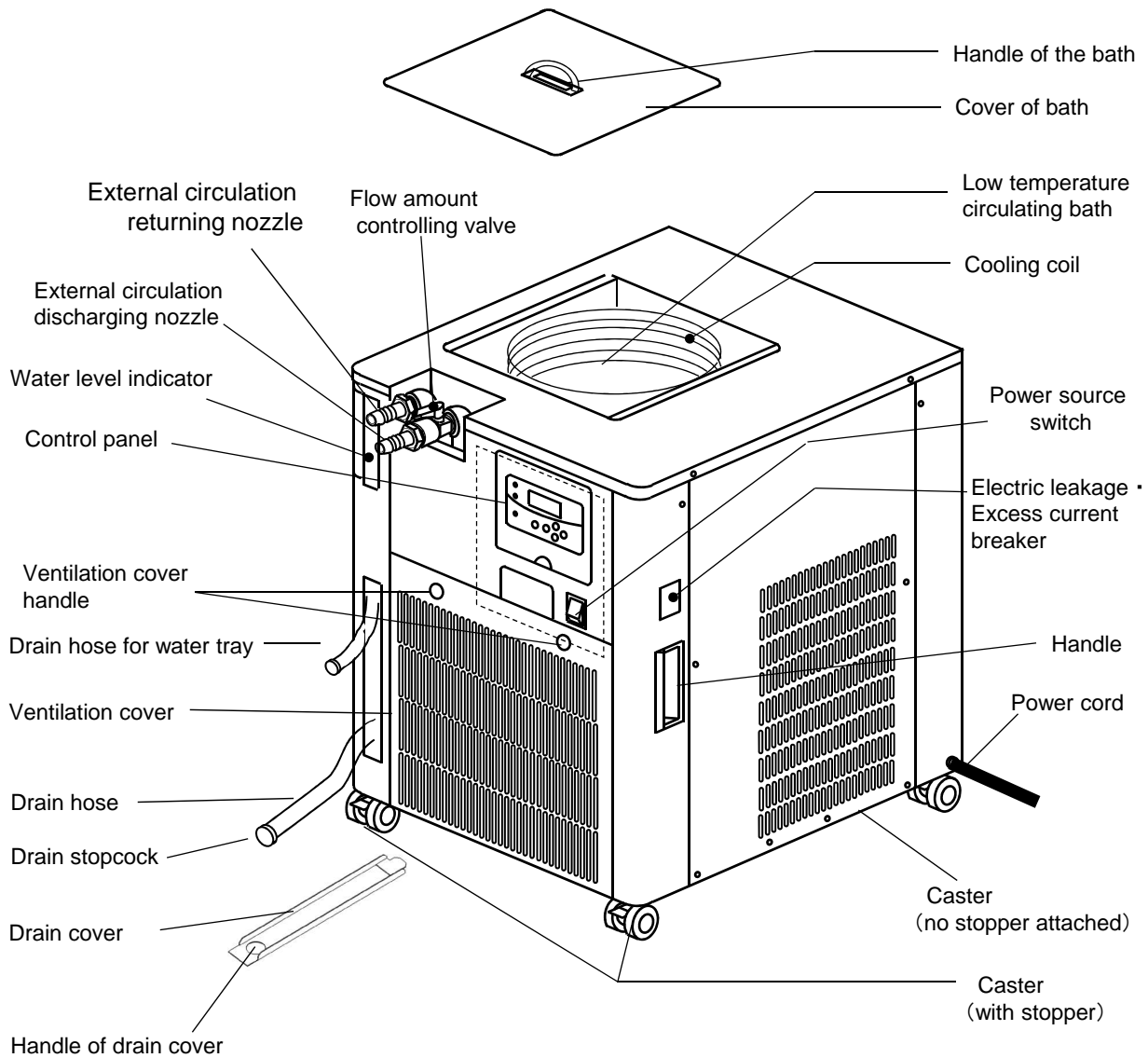
2-4 Circulation capability (Reference)

Condition • 220V , 50Hz • solvent : Water At 20°C



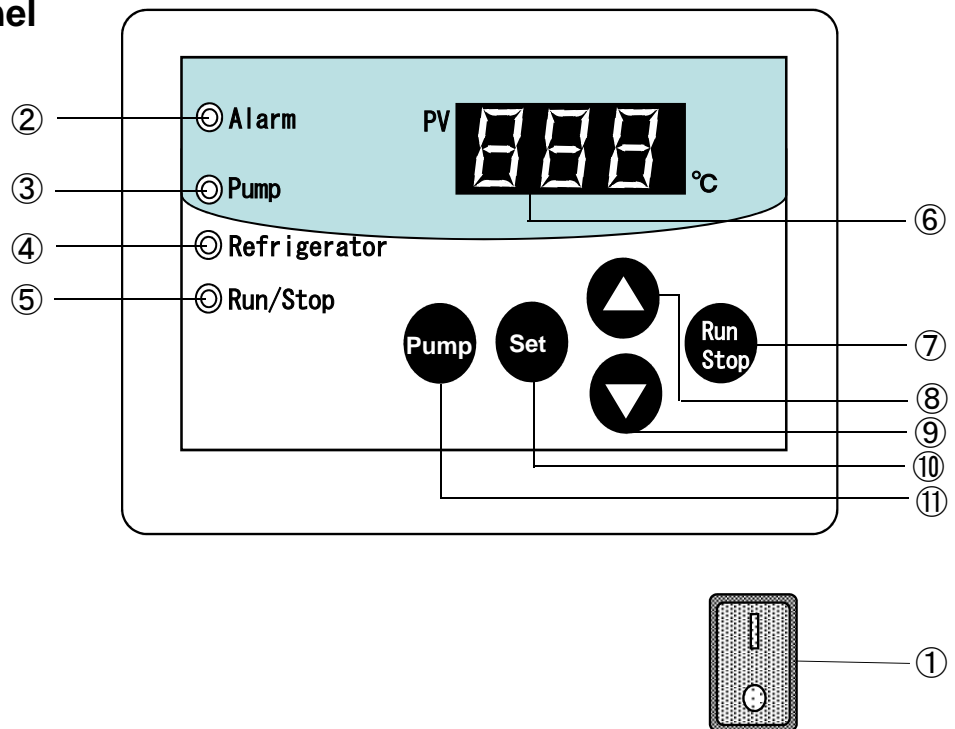
- * Circulation capability differs depending on diameter of nozzle, piping, type of solvent and other conditions.
- * If you conduct sealed operation for circulation pump, it may cause malfunction on the pump.

2-5 Descriptions



Top face

3-1 Control panel







No	Name	Function
①	Power switch	Turns on / off the power.
②	Alarm LED	Lights up when outputting alarm.
③	Circulation pump LED	Lights up when turning on circulating pump.
④	Refrigerator operation LED	Lights up when turning on refrigerator.
⑤	Run/Stop LED	Lights up when control.
⑥	Indicator	Displays temperature, setup character and the description of alarm.
⑦	Run/Stop key	Starts and stops control.
⑧	▲key	Available only at the time preset value (character) is displayed. When preset value is numeric, each time you press the key, the value increases by 1. If you hold down the key, the value increases continuously.
⑨	▼key	Available only at the time preset value (character) is displayed. When preset value is numeric, each time you press the key, the value decreases by 1. If you hold down the key, the value decreases continuously.
⑩	Set key	Selects measured value and preset value, and changes the preset value with pressing 「▲」 and 「▼」 key. While displaying alarm, the key cancels alarm and indicates normal display.
⑪	Circulation pump key	Turns on / off the external circulation pump.

3-2 Safety - alarm features

This product is equipped with the following safety features and alarm display features.
 In the event of any malfunction, please refer to “Troubleshooting” on page 22 and follow the proper instructions.

Safety features		
Safety device	Operation	Reasons why device operates
Electric leakage breaker	Turned off and cut off the power source.	Electric leakage occurs. Or excess current flows.
High pressure switch for refrigerator	Pressure increases abnormally when operating refrigerator. Alarm lamp lights up and refrigerator stops operation.	<ul style="list-style-type: none"> ▪ Ambient temperature exceeds 35°C. ▪ Heat load is stronger than cooling capacity and the temperature in the bath rises ▪ Dirt adheres on air filter. ▪ Fan for refrigerator does not work.
Over load relay maintaining circuit for refrigerator	Refrigerator performs over load (over heat) operation and alarm lamp is lighted up, which makes stop the operation of refrigerator.	<ul style="list-style-type: none"> ▪ Aside from the description on high pressure switch for refrigerator, refrigerator starts up with over load. ▪ Power supply voltage is low.
Thermal protector for circulation pump	Circulation pump performs over heat operation and stops operation. (Recovers when the pump is cooled down.)	Over heat operation of circulation pump <ul style="list-style-type: none"> ▪ Circulation liquid has high viscosity. ▪ Foreign substance is sucked in. ▪ Ambient temperature exceeds 35°C. ▪ Piping resistance is high. (Valve is closed and etc.)
Self testing function for temperature controller	The status of temperature controller becomes abnormal and alarm lamp is lighted up, which makes stop all the controls. The unit will recover automatically when the trouble is sorted out.	<ul style="list-style-type: none"> ▪ Temperature controller is in abnormal status because of noise and etc. ▪ Ambient temperature exceeds 35°C.

Alarm features

Alarm name	Alarm display and operation	Reasons why alarm works.
Sensor alarm	<ul style="list-style-type: none"> Alarm is displayed Alarm LED illuminates The control is stopped and the circulation pump stops.  <p style="text-align: right;">Illuminates</p>	<p>Operation conditions</p> <ul style="list-style-type: none"> Temperature sensor is disconnected or short-circuited.
Temperature upper limit alarm	<ul style="list-style-type: none"> Alarm is displayed Alarm LED illuminates The control is stopped and the circulation pump stops.  <p style="text-align: right;">Illuminates</p>	<p>Operation conditions</p> <ul style="list-style-type: none"> The temperature around the sensor exceeds the upper limit. <p>Alarm clear</p> <ul style="list-style-type: none"> Press Set key to clear alarm <ul style="list-style-type: none"> After clearing the alarm, if the alarm happens again, cool down the bath temperature to which can be measured and clear the alarm. <p>* Measurable temperature: -50°C ~ +80°C</p>
Temperature lower limit alarm	<ul style="list-style-type: none"> Alarm is displayed Alarm LED illuminates The control is stopped and the circulation pump stops.  <p style="text-align: right;">Illuminates</p> <ul style="list-style-type: none"> Alarm message blinks. Alarm LED illuminates The control is stopped and the circulation pump stops.  <p style="text-align: right;">Blinks</p>	<p>Operation conditions</p> <ul style="list-style-type: none"> The temperature around the sensor exceeds the lower limit. <p>Alarm clear</p> <ul style="list-style-type: none"> Press Set key to clear alarm <ul style="list-style-type: none"> After clearing the alarm, if the alarm happens again, raise the bath temperature to which can be measured and clear the alarm. <p>* Measurable temperature: -50°C ~ +80°C</p> <p>Operation conditions</p> <ul style="list-style-type: none"> Refrigeration unit high pressure switch works or the refrigeration unit overload relay works. <p>Alarm clear</p> <ul style="list-style-type: none"> When the refrigeration unit high pressure switch or the refrigeration unit overload relay recovers, press Set key to clear the alarm.

4

Installation

4-1 Installation environment



CAUTION

Be careful of Installation environment. Especially, care should be taken on set-up location, air conditioning and ventilation.

Due to utilization of air-cooling system refrigerator, heat is exhausted from the unit. Use the product at the location where is with good ventilation and conditioning for preventing ambient temperature from rising high. When the ambient temperature rises high, the operation efficiency will be worsened, which will lower the cooling capacity as well. Also, high temperature and high pressure operation of refrigerator may cause breakdown.

- No direct sunlight
- Range of ambient temperature should be from 5°C to 35°C.
- Good ventilation and air-conditioning or the location which can be ventilated well.
- No dew condensation
- No inflammable solid, liquid and gas around the unit.
- Fewer dust
- Fewer humidity and dripping
- Even and stable
(Check the weight of the product during operation.)
- Indoor use only.

4-2 Installation conditions



CAUTION

Making enough space around the unit.

To maintain the function of the product, leave the space between the product and wall surface and ceiling plane. Space should be larger than the ones shown on the right picture.

※The length between back surface and wall should be longer than 5cm, and the length between top surface and ceiling plane should be longer than 3cm.

※The unit can be used even though either right or left side is blocked off. However, the length between either side and wall surface should be longer than 40cm.(※When using the unit at 30°C or less (room temperature), it can be utilized if the length between either side and wall surface is longer than 10cm) .

※Set up the unit not to get the front surface (airflow orifice) into desk and etc. (Please see the figure on page 9)

※When setting up the unit under the desk with 40cm of length between the wall and machine, cooling capability is about 12% worse than setting it up outside the desk.



CAUTION

Do not put any object on the top.

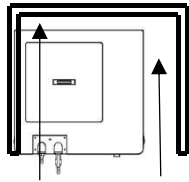


CAUTION

Exhaust gas temperature exceeds 60°C.

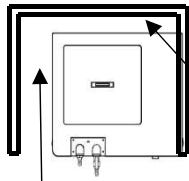
Example

Right examples



Longer than 5cm Longer than 40cm

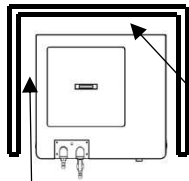
※Length between top surface and ceiling plane is longer than 3cm.



Longer than 5cm

Longer than 40cm

※Length between top surface and ceiling plane is longer than 3cm.

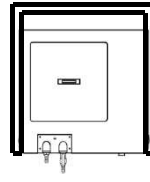


Longer than 5cm

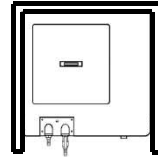
Longer than 40cm

※ Length between top surface and ceiling plane is longer than 3cm.

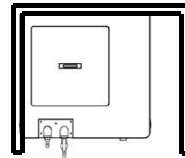
Wrong examples



※Left and right side are blocked off.

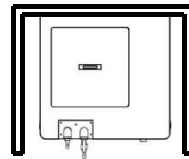


※Both sides and back surface are blocked off.

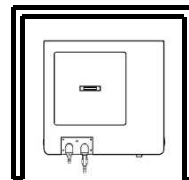


※Either side and back surface are blocked off.

※Neither right or left side should not be blocked off.



※Back surface is blocked off.

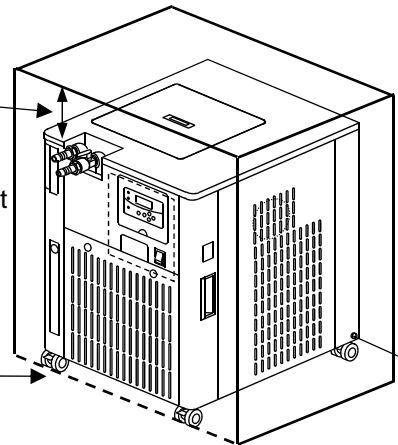


※Front surface gets into under the desk.


 CAUTION
Attention ! Heavy product Be ware when carrying. CA-1320 Approx. 48kg

Longer than 3cm

Install the unit with its Front matching the dot line as shown on right picture.



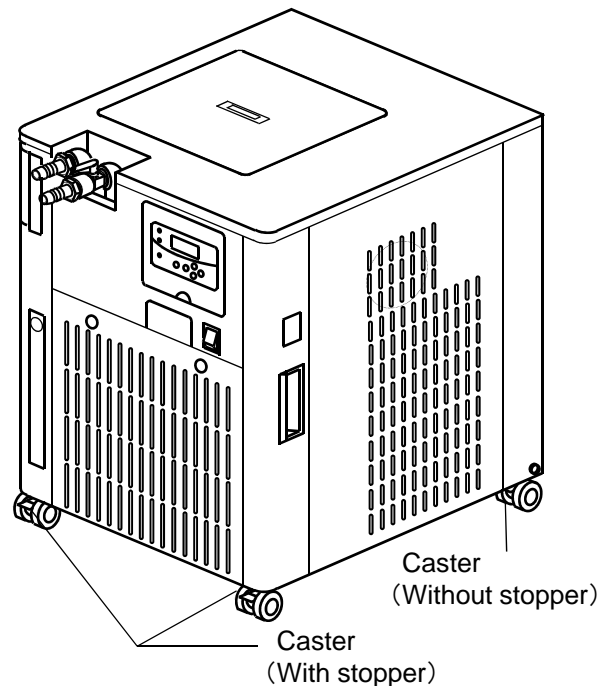
4-3 Installation

 CAUTION
Do not incline the product more than 15° This unit is equipped with refrigerator. Do not lay down the main unit or carry it with inclining more than 15° .

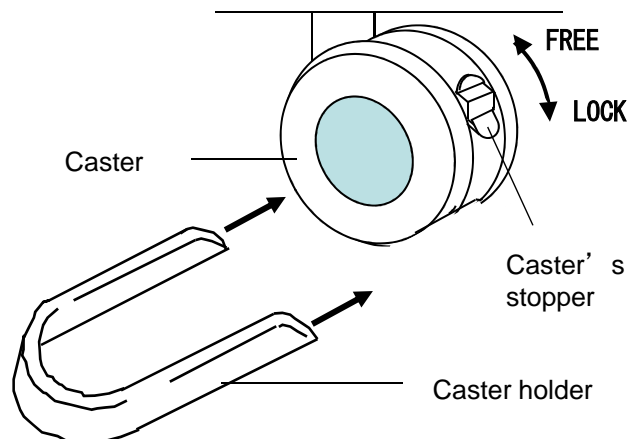
- (1) Unlock the lock of caster's stopper. Raise the lever of caster's stopper in order to release the lock. (Only two casters in the front face have stoppers.)

- (2) Move the product to setup site.

※Moving the product on uneven and bumpy location may damage the caster. Please carry it when passing over these places. Also, carrying the unit with refrigerant may overflow the water because the appropriate water level is closer to upper surface.



- (3) Lock the caster's stopper at the setup site. To unlock, put down the caster's lever.



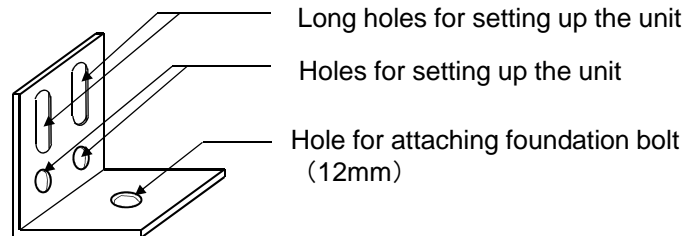
- (4) Slide attached caster holders (2 pcs.) into the right beside of the body. Stop the rolling and circling of caster and fix these holders.

4 - 4 How to use tip-resistant bracket

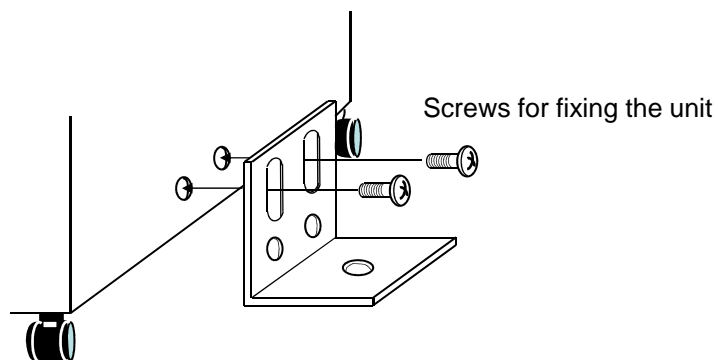
This tip-resistant bracket is utilized for the unit as anti-earthquake measures.
When fixing the product, follow the same procedure to fix it on the floor with using foundation bolt.

【 Note 】

You need to purchase the foundation bolt (for M10) .
Tip-resistant bracket is not attached when shipping the product.





When fixing the unit with using foundation bolt





※Fix the tip-resistant bracket as shown on the above picture.

4-5 Utility connection

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

 WARNING
<p>The unit must be earthed.</p> <p>Without grounding the unit, the product may cause electric shock hazard.</p>

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

 CAUTION
<p>Remove the dirt on the grounding adapter, outlet and mains connector.</p> <p>Dirt on these parts may cause tracking or fire.</p>

- (1) Check the voltage, phase and capacity of the power source. Required power source is as shown in right table.

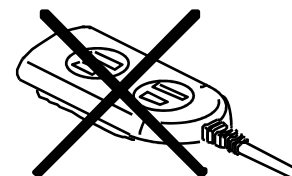
Model	Required power source	
	Voltage	Capacity
CA-1320	AC 220V Single phase	15A

- (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.

Length	Thickness (O.D.)	Mains plug	Cable cross-sectional area
2.8m	About 9mm	3-pronged with earth terminal	1.5mm ²

* The grounding adaptor is not supplied with this unit.

Do not use branching socket when connecting to power source.



5-1 Preparation

**WARNING**

Use extreme care when using inflammable or combustible solvent.

If inflammable or combustible solvents (ethanol and etc.) is left higher than room temperature (or lower than room temperature for some solvents), it may evaporate, catch fire and explode. Ventilate well when using these solvents.

**CAUTION**

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

Materials used for the circulation route are stainless, brass, Teflon, silicon rubber, PPO chloroprene - rubber, ethylene propylene rubber, POM and polypropylene.

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 solution, which may corrode the metal of circulation route.

**CAUTION**

Do not shorten the piping diameter or extend the length of hose.

Do not use the hose joint of which its inner diameter is less than 6mm. Also, use the hose with its required minimum length. When the piping resistant is too much, circulating water amount gets lesser, which worsens cooling capability because of insufficient stirring in the bath and temperature distribution in the circulating bath gets worse. Also, refrigerator and circulating pump are loaded excessively, which may cause malfunction.

**CAUTION**

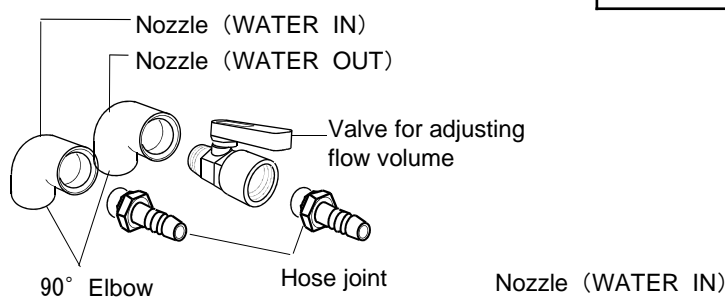
Don't use purified water.

Since higher purity water has the characteristic that liquates out the material of contacting unit, using this water may break up thin coating, cause malfunction on pump. Use tap water or softened tap water.

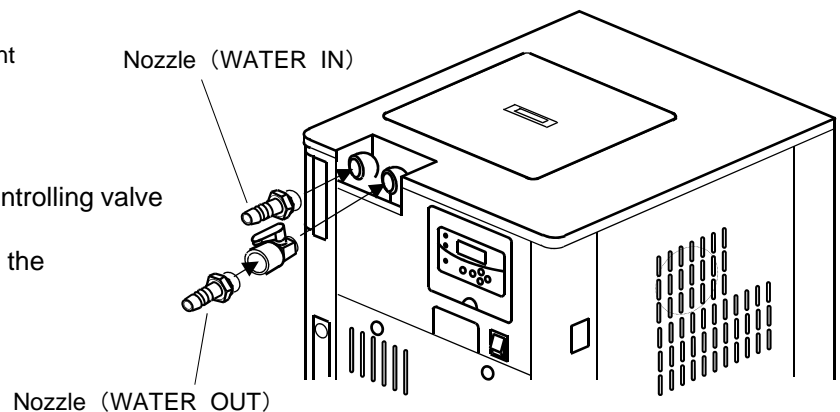
**CAUTION**

Don't perform close up operation or idling of the circulating pump.

Performing close up operation or idling may cause malfunction on the circulating pump.

**Connecting pipe and hose**

- (1) Screw hose joint, flow amount controlling valve hose joint into the unit.
(The seal tape is wrapped around the hose joint and the valve.)



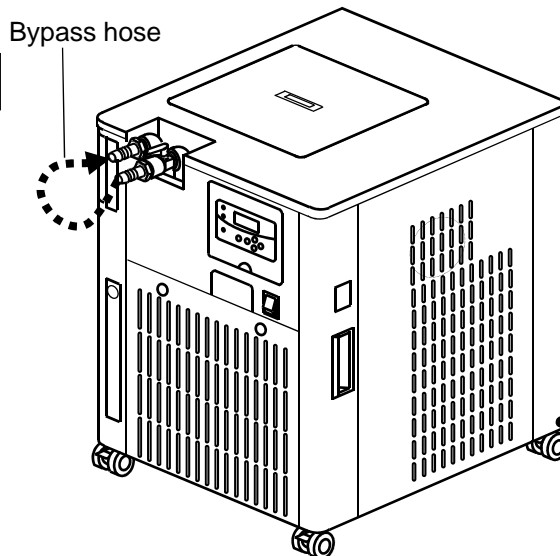
- (2) Connect hose (bore diameter: 9mm) to external circulation discharging nozzle, water-in nozzle, device for cooling (closing-up style) and etc. Fix the hose tightly with hose band so that it won't be slipped.
(Hose and hose band are not included.)

※Use the hose that has appropriate withstanding pressure, heat-resistant and appropriate material, which can not be soaked in solvent.
Also, the material of hose should not be bended or squashed when pulling it around the unit.

Using the unit as an stand-alone low temp. bath

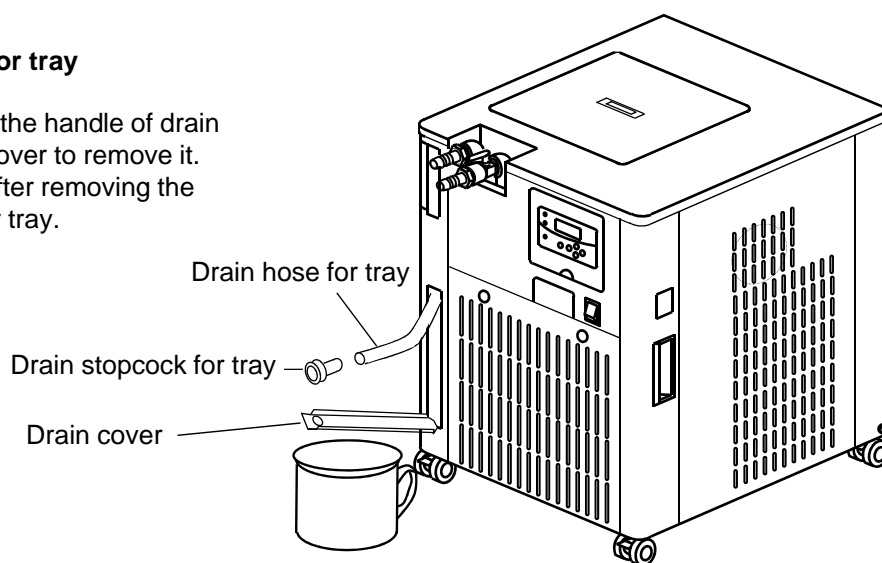
When using the unit as a stand-alone low temp. bath, Connect bypass hose to discharge and water-in nozzle. If you turn on circulating pump switch in this status, stirring will be performed in the bath and cooling capacity will be worsened.

Fix the hose tightly with hose band so that it won't be Slipped (hose and hose band are not included).



Drainage from drain hose for tray

Check the tray regularly. Pull the handle of drain cover softly and pick up the cover to remove it. Then, drain away the water after removing the stopcock of the drain hose for tray.



※Container to catch discharged water is not included.

Pouring cool water

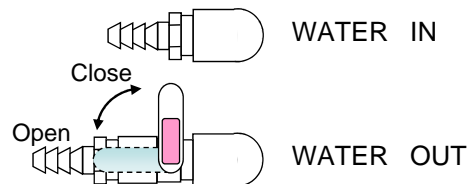
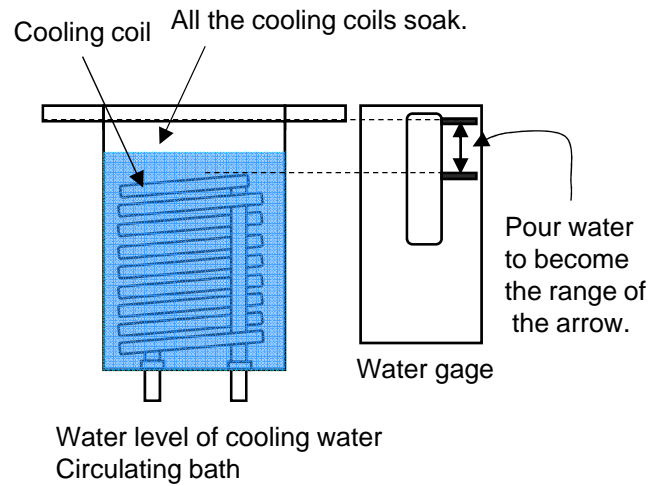
- (1) Make sure the drain stopcock is closed and remove the cover for the bath to pour the water.

Banning the use of purified water

Use tap water softened tap water.
 Since higher purity water has the characteristic that liquates out the material of contacting unit, using this water may break up thin coating, cause malfunction on pump.

- ※Use antifreeze when using the unit at 5°C or less. However, when using ethylene glycol or Nybrine, viscosity gets stronger in low temperature zone, which lowers the circulation amount or makes safety device of circulating pump (see page 6)works. For this reason, do not use these liquids with 100% of density (Since freezing temperature differs depending on concentration, check up the temperature range of antifreeze).
- ※When using water around +5°C, it freezes over cooling coil and cooling capacity may be worsened.
- ※Do not use circulating liquid including foreign substances, which may cause malfunction on the unit.

- (2) Make sure that discharging flow amount controlling valve is " closed ".
- (3) Set up the cover for bath on main unit depending on use condition.



Valve for adjusting flow volume

Connecting mains connector

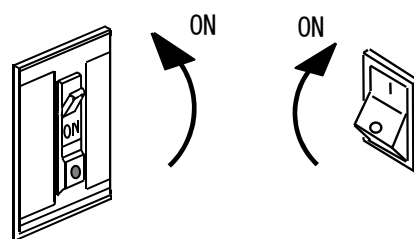
Make sure power switch is off and plug the mains connector into outlet.

5-2 How to operate

Turn on electric leakage, excess current breaker and power source switch.

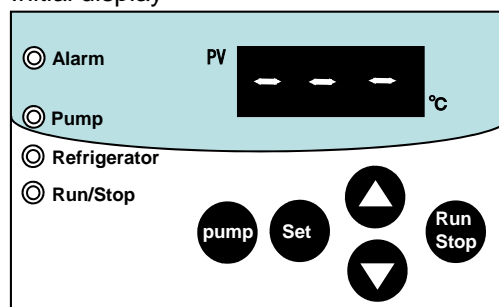
Electric leakage ·
excess current breaker

Power source
switch

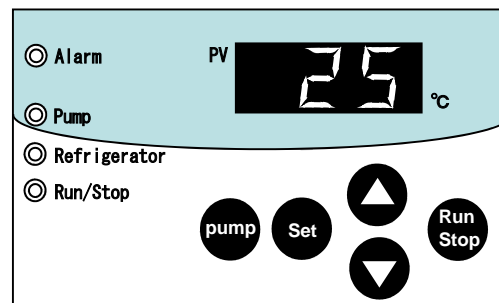


“Measured temperature” will be displayed after showing initial display [— — —] for 1 seconds.

Initial display



After showing initial display for 1 seconds, measured temperature will be displayed.



1. Setting up temperature

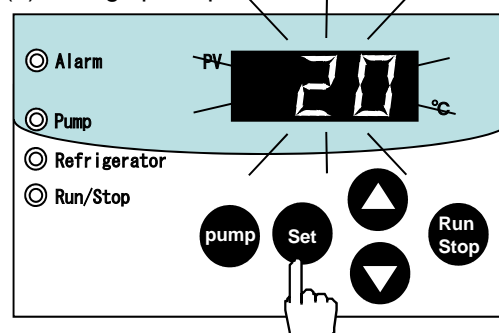
Preset temperature can be changed even during control or under suspension.

(1) Press [Set] key.

Indicator change to show the display of preset temperature (blinking) and temperature can be set up.

※ Displayed preset temperature was the value that was set up previously. Factory default value is 20°C.

(1) Setting up temperature



(2) Press [▲] and [▼] key to input the temperature.

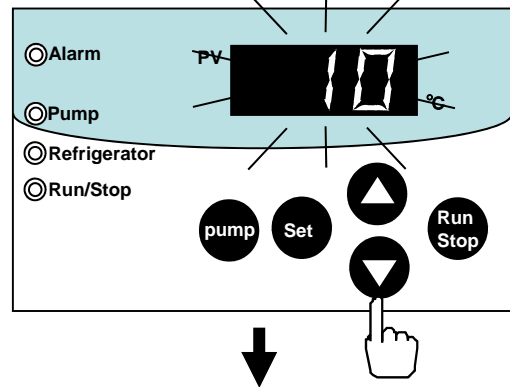
※Each time you press [▲] and [▼] the value increases / decreases by 1°C.

(3) Press [Set] key.

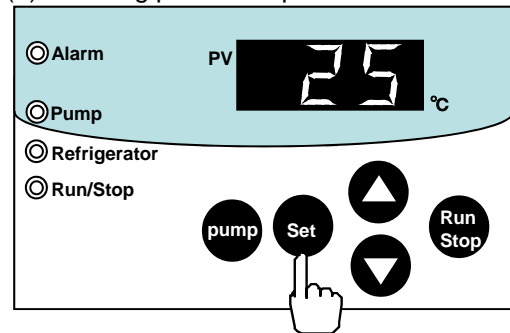
Displayed preset temperature (blinking) is fixed and indicator changes to display measured temperature.

※If no key operation is done for longer than 5 second during setting up, indicator starts to display measured temperature again. In this case,

(2) Changing preset temperature



(3) Deciding preset temperature



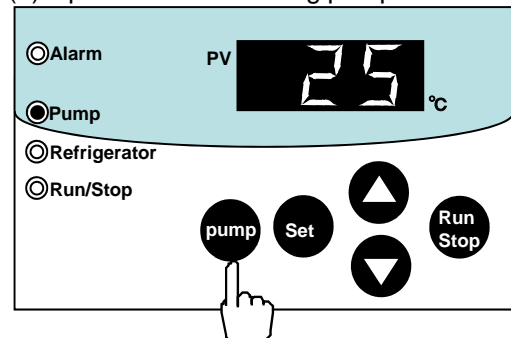
2. Starting up operation

(1) Press [pump] key. Circulating pump starts working.

- 「Pump LED (Pump) 」 lights up.
- Please gradually open a flow amount controlling valve if you [pump] key it on. start circulation to the outside. Please confirm the leak from a hose joint by all means at the same time.

※ Circulating pump does not link [Run/Stop] key.
 ※ Operating circulating pump with closing flow control valve closed (closing-up operation of circulating pump) may cause malfunction.

(1) Operation of circulating pump



CAUTION

Do not use the Closing-up operation

If the Closing-up operation is used, it creates the pressure (0.1MPa (about 1 kg/cm²) in the internal pipes, which may cause the trouble such as the water leak from the connecting points and slipping out the hoses.

※ Do not open the flow control valve much immediately.

Immediate opening much creates the pressure on circulating route and it may causes water leakage, the damage on hoses and glass wares on the circulating route.

※ The flow rate can be controlled to a certain degree by the flow control valve.

Use some antifreeze liquid if the circulating flow quantity is few and gets frozen.

※ When reducing the quantity of circulating water, the stirring in the water tank is not enough, that results in the temperature distribution worsen.

※ Since the water level of the cooling water bath becomes down when the circulating water is supplied into circulation system, refill cooling water. Refill the water up to the same level as when you poured the cooling water (refer to page 15).

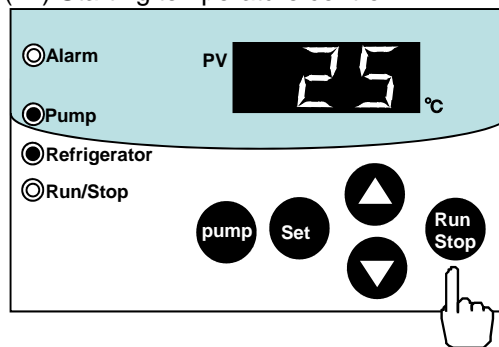
If the cooling liquid does not circulate, take some of the air out of pump.

Taking air out of circulating pump

Remove the drain stopcock and make sure the cooling liquid flows out of the drain nozzle.
Then, put the stopcock again.
Turn on and off [pump] key a few times and take the air out.

- (2) Press [Run/stop] key. Temperature control started.
- 「Refrigerator LED(Refrigerator) 」 lights up.
 - The refrigerator starts at the preset value +0.5°C. 「Refrigerator LED (Refrigerator) 」 lights up during the refrigerator is tern on. The refrigerator stops when the measured temperature is about -1.4°C lower than the preset temperature and [Refrigerator LED (Refrigerator)] turns off a light.

(2) Starting temperature control



※ Just after starting up the unit in the condition that refrigerator is cold, cooling capability is poor therefore the liquid temperature in the bath may rise because of the condition of the circulating pump. After the refrigerator is warmed up, the cooling capability will be back to the normal status.

In such a case, wait and see for a bout 30 minutes whether the cooling capability function normally.

protection timer

Since the maximum limit of protection timer of the refrigerator is 120 seconds, the refrigerator cannot start for 120 seconds after the refrigerator gets stopped temporarily.

3. Stopping operation

- (1) Press [Run/Stop] key. It stops the operation.
 - 「Run/Stop LED 」 off a light.
- (2) Close a flow control valve.
- (3) Press [pump] key. Circulating pump stops the operation.
 - 「pump LED 」 off a light.

※When terminating the operation and pump, turn off power switch after stopping the operation and pump. If you turn off the switch without stopping the operation and pump, operation start will work next time you use the unit.

※If you don't use the product for a long time, turn off power switch, electric leakage · excess current breaker and unplug the mains connector from outlet.

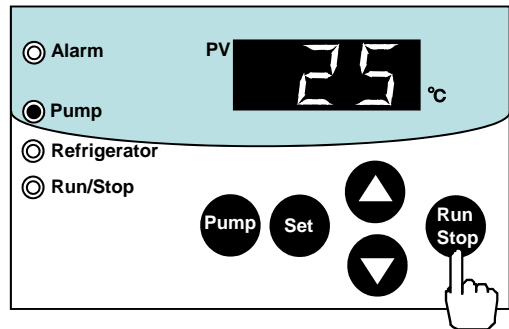
※Drain the water from bath, pipe and circulating pump.

4. After terminating operation

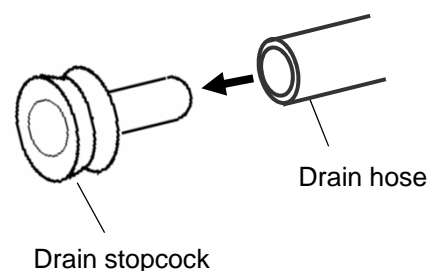
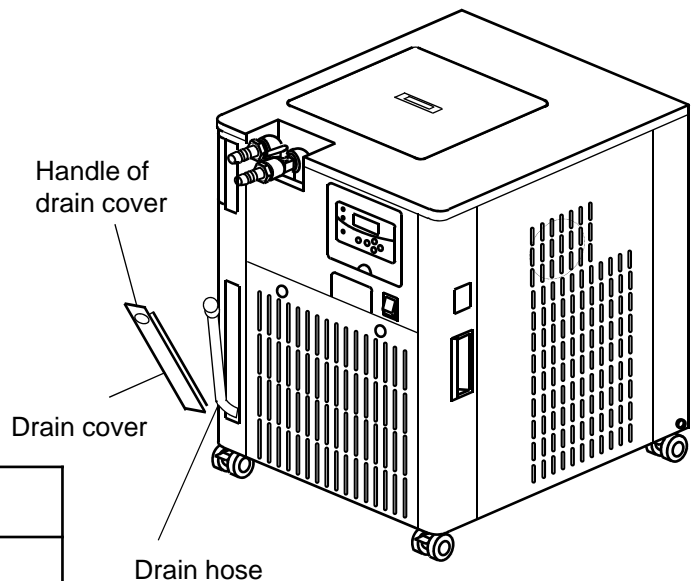
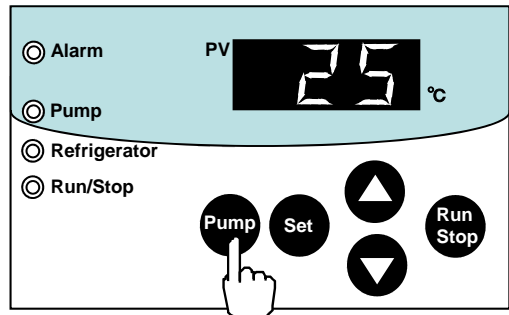
Drain the water from low temp. circulator.


- (1) Pull the handle of drain cover softly and pick up the cover to remove it.
- (2) Take out drain hose and remove drain stopcock to drain the water.

(1) Stopping operation



(2) Stopping operation of circulating pump



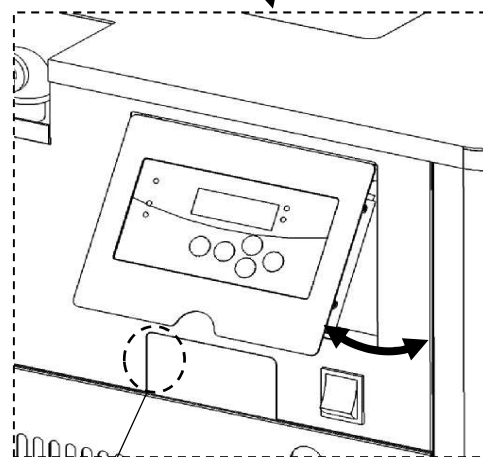
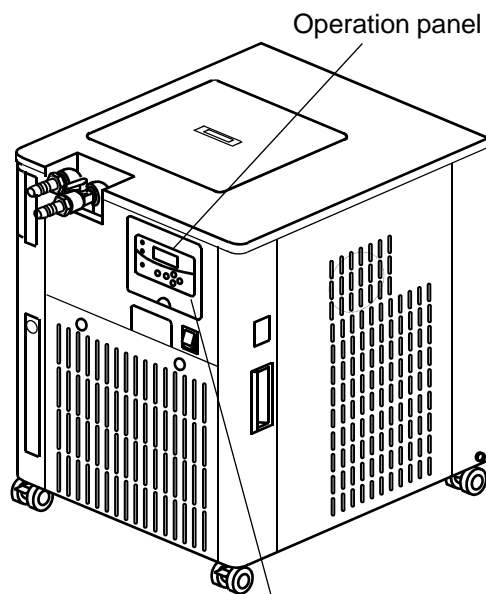
	CAUTION
Procedure after the operation	
<p>After using the product, drain the water from the bath and remove impurities to prevent the outbreak of scale and rust.</p> <p>Also, if you don't use the product for a long time, drain the water from circulating container and piping system. Circulating route may be clogged with dirty water if you use the product without changing water. Change the water in the bath and piping system regularly.</p>	

5. Controlling operation panel

The angle of panel surface of the unit can be changed.
Adjust the panel surface depending on use conditions.

- (1) Insert your finger into the cutout part of operation panel and pull it toward.
- (2) As operation panel moves as shown on right picture, adjust the position so that it can be seen easily.

※When using operation panel with a certain angle, hold the panel part and carry out key operation with holding down the panel part. Without holding it, operation panel will be moved and key operation can not be carried out smoothly.

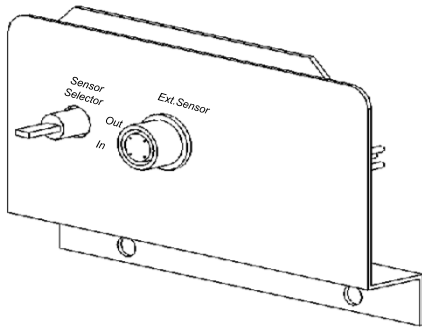


Cutout part of operation panel

6

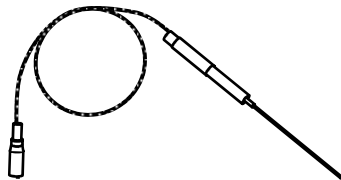
Optional accessories

6-1 External out put sensor terminal



model	Cat.No.	Q'ty
HRC-3	249280	1

6-2 External out put sensor



model	Cat.No.	Q'ty
STP-100	114220	1

Cable part approximately 1500mm
Sensor part approximately 150mm

6-3 Other options

※When discharge rate is fewer, lower the piping resistance by using circulating nozzle (one of the options) of which its diameter is small.

■ Circulation nozzle A

Model	Nozzle O.D. (material)	Cat.No.	Q'ty
A-2	φ13.5 R3/8 (brass)	113120	1
A-3	Φ16 R3/8 (brass)	113130	1

※Using cold insulation hose set (one of the options) allows to prevent the condensation of the water on the hose surface.

The material of the hose is CR (chloroprene rubber).

■ Cold insulation hose set

Length	1m		
Bore dia.	9.0mm	12.0mm	15.0mm
Catalog No.	112690	113280	113290

Length	2m		
Bore dia.	9.0mm	12.0mm	15.0mm
Catalog No.	112700	143330	143340

Length	5m		
Bore dia.	9.0mm	12.0mm	15.0mm
Catalog No.	174420	174440	174460

※ Quantity of all hose set : 1

Cold insulation hose is a consumable product. Life of the hose differs depending on the use condition, so please check it regularly and replace it with new one if needed.

7

Troubleshooting

For a trouble that is not mentioned below, please contact your local dealer or closest customer service center.

Trouble	Cause of trouble	Countermeasure
Electric leakage breaker works when turning on power switch.	Electric leakage occurs.	Stop the operation immediately and contact your local dealer or closest customer service center.
	Excess current flows.	
The unit does not circulate even though power switch is turned on (Temperature controller does not display either).	Power source is not supplied.	Turn on the breaker of distribution board.
	Mains connector is not plugged into outlet or not plugged completely.	Turn off power switch and plug the mains connector into the outlet.
	Electric leakage breaker is OFF.	Turn on electric leakage breaker.
	Electric leakage breaker has been broken down.	Stop the operation immediately and contact your local dealer or closest customer service center.
	Temperature controller has been broken down.	
Power switch has been broken down.		
Refrigerator does not work.	Protection timer for refrigerator works.	For the sake of protecting the cooling function, refrigerator can not be turned On for 120 seconds if it is turned off once.
	High pressure switch or over load relay holding circuit of refrigerator works.	Since heat load is too heavy for refrigerator, reduce the load.
		Set the temperature at 35°C or less when room temperature is high.
	Refrigerator has been broken down.	Please refer to "Setup conditions" on page 8.
Refrigerator has been broken down.	Stop the operation immediately and contact your local dealer or closest customer service center.	
Water level lowers and cooling coil is exposed, which cause over load operation	Fill the circulating liquid into circulating bath.	
The temperature does not reach at preset temperature	External temperature sensor is left out of the bath.	Install external temperature sensor in the bath.
	Preset temperature is not correct.	Check the preset temp. and compensated displayed temp.
	Refrigerator does not work.	Stop the operation immediately and contact your local dealer or closest customer service center.
	Fan for refrigerator does not work.	
	Gas is leaking.	
	Refrigerator has been broken down.	
	temperature controller has been broken down.	
	Heat load is too heavy.	Since the heat load is too heavy for refrigerator, reduce the load.
Room temperature is too high.	Set the room temperature at 35°C or less when ambient temp. is too high.	
Dirt adheres on the filter of refrigerator.	Clean the filter (Refer to the section of maintenance and check-up).	

Trouble	Cause of trouble	Countermeasure
Cooling water does not circulate.	Thermal protector of circulating pump works.	When using antifreeze that has high viscosity for freezing liquid, water it down or use the antifreeze that has lower viscosity.
	Air is included.	Remove drain stopcock and make Sure the cooling water flows out of Drain nozzle. Then, set the drain stopcock and turn on / off pump switch twice or three times in order to release the air.
	Flow control valve is closed.	Open control valve.
	Dirt adheres on the strainer of low temp. circulator.	Remove the dirt.
Circulating amount is few.	Hose gets crushed.	Fix the hose.
Sensor alarm occurs. <ul style="list-style-type: none"> • [Alarm LED] Lights up • [F01] Lights up <p>=====</p> <p>Optional accessories At the time external temperature sensor is used</p>	Temperature sensor has been come down or short circuit.	Stop the operation immediately and contact your local dealer or closest customer service center.
	Sensor selecting switch is on "OUT" side when the unit is controlled by internal sensor .(Sensor selecting switch is on "IN" side when the unit is controlled by external sensor.)	Turn selecting switch to select the appropriate side.
	Sensor connecting connector is not connected or connector has been come down.	Connect sensor connecting connector.
Alarm for refrigerator occurs. <ul style="list-style-type: none"> • [Alarm LED] Lights up • 「A14」 Lights up 	High pressure switch or over load relay holding circuit of refrigerator works.	<ul style="list-style-type: none"> • Set the room temperature at 35°C or less when ambient temp. is too high • Since the heat load is too heavy for refrigerator, reduce the load. • Checking FAN. • Checking power source volt.
Upper temperature limit alarm occurs. <ul style="list-style-type: none"> • [Alarm LED] Lights up • 「HHH」 Lights up 	Alarm detects when the temperature in the bath rises higher	The temperature inside the tank temperature can be measured Make sure that you have become [Set] To cancel the alarm by pressing the key Please. ※Temperature can be measured : -50~+80°C
Lower temperature limit alarm occurs. <ul style="list-style-type: none"> • [Alarm LED] Lights up • 「LLL」 Lights up 	Alarm detects when the temperature in the bath rises lower	The temperature inside the tank temperature can be measured Make sure that you have become [Set] To cancel the alarm by pressing the key Please. ※Temperature can be measured : -50~+80°C
Inside bath is frozen at +5°C Or higher.	Circulation is less because of pressure loss of piping and internal part of the bath is not stirred efficiently.	Use antifreeze.
Control gets stopped	Temperature controller is in abnormal status because of noise and etc.	Change the power source. If it does not work, stop the operation immediately and contact your local dealer or closest customer service center.

8

Maintenance · check-up

8-1 Operation test for electric leakage breaker



WARNING

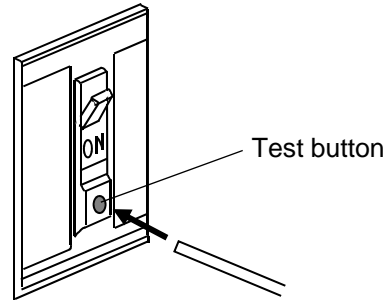
Conduct a operation test for electric leakage breaker.

Using electric leakage breaker in bad status may cause electric shock. Conduct a operation test per month.

Plug mains connector and turn on the power of the breaker, and push test button with thin stick.

The status is normal if the breaker operates and turned OFF.

※If it does not work out, stop using the product and call your local dealer or closest customer center for preventing the occurrence of electric leakage and etc.



8-2 Cleaning and caring the product



WARNING

Do not take down the product.

A part of the internal portion of the unit is under electric pressure and subject to have high temperature. Therefore, breaking down the unit may cause electric shock or injure yourself.



CAUTION

Use appropriate product for cleaning and caring the unit 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.



WARNING

Do not touch cooling fin with bare hands.

Do not touch cooling fin with bare hands during maintenance operation. Edgy fin may cut your hands.



WARNING

Unplug mains connector when Cleaning and caring the product.

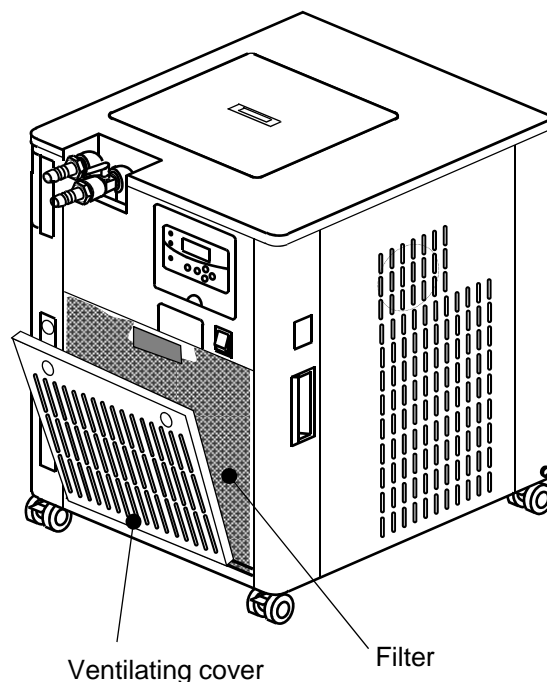
Turn off power switch, electric leakage breaker and unplug mains connector from outlet when cleaning and caring the product.

Without doing these, it may cause electric shock or damage the product.

1. Cleaning air filter

Clogged filter worsens the cooling capacity. Also, it may cause glitch on refrigerator. The condition of the filter differs depending on sue environment and operating time, however, please check and clean the filter regularly.

- (1) Turn off electric leakage breaker and power switch. Unplug the mains connector from outlet.
- (2) Hold the handle of ventilating cover and pull it toward softly to remove. Then, take the filte out.
- (3) Tap the filter softly and remove dirt and wash it wel. (Use mild detergent if the dirt is greasy.)
- (4) Dry well after finishing washing the filter. (Do not use dryer for preventing the filter from being melted).
- (5) After cleaning, set up the filter to follow the opposite procedure of removing it.



2. Cleaning the strainer

Remove the cover on the upper surface of the unit and check up and clean the strainer placed at the bottom of the bath regularly. In this case, drain the water from the bath.

3. Cleaning the product

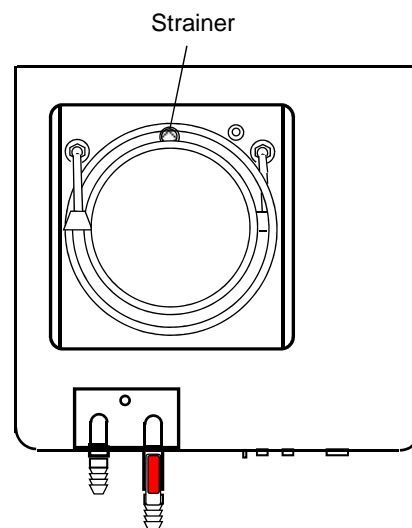
For cleaning the main body, use soft cloth after screwing water tightly. Use mild detergent to remove greasy dirt and wipe it off after using the detergent.

4. Checking up pipe

Check up the piping system whether it has any leak or slacken or deteriorated part before and after use. Deterioration and obsolescence of the hose and etc. differs depending on use conditions. Please check regularly and replace the parts if needed.

5. Changing circulating water

Change circulating water regularly (once / month). When you do not use the unit, please drain the water from bath. Corruption of standing water generates scale and mold and cause clogged drain, eroded pipe and rust.



9

Disposal of the product

When disposing of the product or parts, please follow the instructions as below.

Main components and disposal instructions

Model	Component	Mass	External measurement	How to dispose
CA-1320	Main unit	Approx. 48kg	460(W) × 430(D) × 570 (H) mm	Please contact waste disposer.
	Refrigerant included in refrigerator Fluorocarbon R407C	330g		For disposing Fluorocarbon R407C, please ask waste disposer.

* Please dispose packing materials by separating each type of material.

10

After-sale service

1. When the machine does not work properly, please check and see whether it breaks down or not by referring to pages of Troubleshooting” .
2. If you are sure that it breaks down, please contact your local dealer or customer service center mentioned on the manual.

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