



**Closed Cooling Water Circulator  
Neocool Circulator**

model **CF802-A**

Instruction Manual

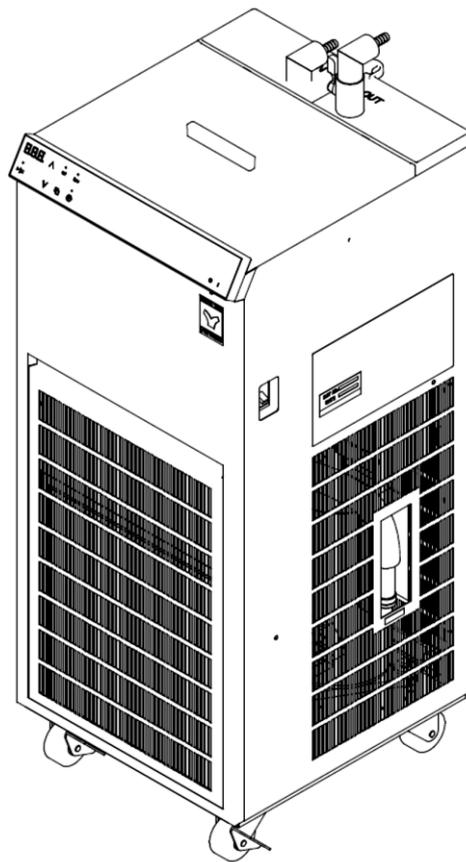
Second Edition

**Thank you for choosing CF802-A Neocool Circulator from Yamato Scientific Co., Ltd.  
For proper equipment operation, please read and become thoroughly familiar with this instruction manual before use. Please store this document close at your hands for future reference.**

**Yamato Scientific Co. Ltd.**

Printed on recycled paper

- CF units are for an external closed-loop circulation system such as evaporators.
- Circulation hoses are not included. Hoses and nozzles are available as options, prepare them according to the application.



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# 1. SAFETY PRECAUTIONS

## Explanation of Symbols

### A Word Regarding Symbols

Various symbols are provided throughout this text and on equipment to ensure safe operation. Failure to comprehend the operational hazards and risks associated with these symbols may lead to adverse results as explained below. Become thoroughly familiar with all symbols and their meanings by carefully reading the following text regarding symbols before proceeding

---

 **Warning** Signifies a situation which may result in serious injury or death (Note 1.)

 **Caution** Signifies a situation which may result in minor injury (Note 2) and/or property damage (Note 3.)

---

(Note 1) Serious injury is defined as bodily wounds, electrocution, bone breaks/fractures or poisoning, which may cause debilitation requiring extended hospitalization and/or outpatient treatment.

(Note 2) Minor injury is defined as bodily wounds or electrocution, which will not require extended hospitalization or outpatient treatment.

(Note 3) Property damage is defined as damage to facilities, equipment, buildings or other property.

### Symbol Meanings



Signifies warning or caution.  
Specific explanation will follow symbol.



Signifies restriction.  
Specific restrictions will follow symbol.



Signifies an action or actions which operator must undertake.  
Specific instructions will follow symbol.

# 1. SAFETY PRECAUTIONS

## Symbol Glossary

### WARNING / CAUTION



General



Danger!:  
Blast Hazard



Caution:  
Burn/Frostbite Hazard



Caution:  
May Leak Water!

### RESTRICTION



General  
Restriction



Do Not  
Disassemble



Do Not Touch

### ACTION



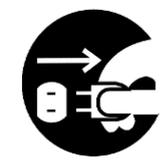
General Action  
Required



Connect  
Ground Wire



Level Installation



Disconnect Power



Inspect  
Regularly

# 1. SAFETY PRECAUTIONS

## Warnings and Cautions

### **WARNING**



#### **Install in a location free of flammables and explosives.**



Never install or operate the unit in a flammable or explosive gas atmosphere. This unit is NOT fire or blast resistant. Simply switching earth leakage breaker (ELCB) "ON (I)" or "OFF (O)" can produce a spark, which can then be relayed during operation, causing fire or explosion when near flammable or explosive fluids, chemicals or gases/fumes. See "15. LIST OF HAZARDOUS SUBSTANCES" (P.54) for information on flammable and explosive gases.



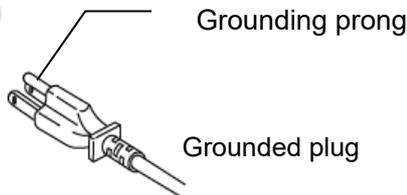
#### **Ground wire MUST be connected properly**



- Connect power cable to a grounded outlet in order to avoid electric shock.
- Never connect ground wire to gas lines or water pipes. Equipment malfunction, electric shock, fire, and/or explosion due to leaking gas may result.
- Never connect ground wire to telephone grounding lines or to lightning conductor rods. Fire or electric shock may result.
- Never insert multiple plugs into a single outlet. Doing so may result in power cable overheating, fire or drop in voltage.

#### Connect to grounded outlet

Grounded outlet



Grounding prong

Grounded plug

#### When no ground terminal is found

Contact original dealer of purchase for location-specific electrical requirements.



#### **DO NOT operate equipment when abnormalities are detected.**



If unit begins emitting smoke or abnormal odors for reasons unknown, turn OFF (O) ELCB immediately, disconnect power cable from power supply, and contact original dealer of purchase. Continuing to operate without addressing abnormalities may cause fire or electric shock, resulting in serious injury or death. Never attempt to disassemble or repair unit. Repairs should always be performed by a certified technician.

# 1. SAFETY PRECAUTIONS

## Warnings and Cautions



### Handle power cable with care.



- Do not operate unit with power cable bundled or tangled. Operating unit with the power cable bundled or otherwise tangled, may cause power cable to overheat and/or catch fire.
- Do not modify, bend, forcibly twist or pull on power cable. Fire or electric shock may result.
- Do not risk damage to power cable by positioning it under desks or chairs, or by allowing it to be pinched in between objects. Fire or electric shock may result.
- Do not place power cable near kerosene/electric heaters or other heat-generating devices. Doing so may cause power cable insulation to overheat, melt and/or catch fire, which may result in electric shock.
- Turn OFF(O) ELCB immediately and disconnect from facility terminal or outlet, if power cable becomes partially severed or damaged in any way. Contact original dealer of purchase for information about replacing power cable. Failure to do so may result in fire or electric shock.
- Always connect power cable to appropriate facility outlet.
- Periodically check and clean power cable connection. Buildup of dust on the connection may cause fire or electric shock.



### DO NOT disassemble or modify equipment.

Never attempt to disassemble or modify unit. Doing so may cause malfunction, fire, electric shock, or personal injury. Note that any malfunction resulting from unauthorized modifications or customizations to unit will void the warranty.



### DO NOT touch hot/cold surfaces



Do not touch low and high temperature portions during operation or immediately after operation. Severe burns or frostbite may result.



### DO NOT climb or place any objects on top of equipment.

Personal injury or equipment malfunction may result.  
Do not place any products other than those specified as options on top of unit.



### Keep upright.

Never tip or place unit on its side while moving or transporting. Damage to refrigeration system may result.  
If briefly tilting unit to one side or the other is unavoidable during transport, the amount of tilt must be 15 degrees or less. Refrain from turning on power for at least 24 hours after positioning unit upright.



### DO NOT operate equipment during thunderstorms.

In the event of a thunderstorm, turn OFF (O) ELCB and disconnect power cable immediately. A direct lightning strike may cause equipment damage, fire or electric shock, resulting in serious injury or death.

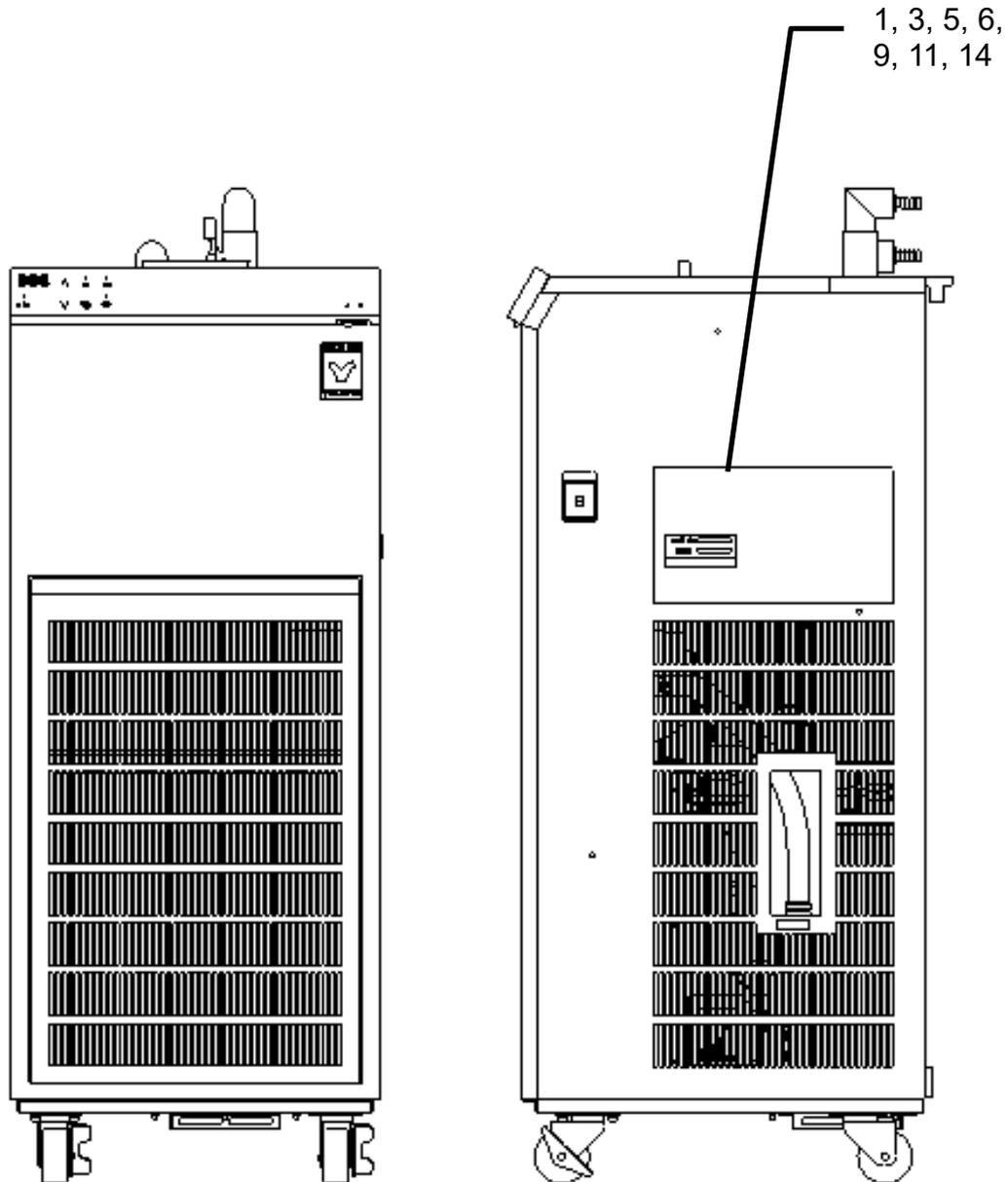
# 1. SAFETY PRECAUTIONS

## Residual Risk Map

These figures indicate positions of caution labels.

The numbers shown in the figure indicate the numbers listed in the "List of Residual Risks" in this manual.

For details of individual residual risks, see the List of Residual Risks.



**\*Contact original dealer of purchase if the nameplates and caution labels have come off, or become illegible. New nameplates are available at cost.**

# 1. SAFETY PRECAUTIONS

## List of Residual Risks

### List of residual risks (instructions for risk avoidance)

This list summarizes residual risks to avoid personal injuries during or related to the use of equipment.

**Be sure to fully understand or receive instructions on how to use, maintain and inspect equipment before starting operation.**

Loading/Installation				
No.	Degree of risks	Risk description	Protective measures taken by the user	Relevant page
1	WARNING	Fire/ Electric shock	Choose an appropriate installation site.	11
2	CAUTION	Injury	Use cargo-handling equipment for transportation and installation.	11
3	CAUTION	Injury	Install equipment on a level surface.	11
4	CAUTION	Injury	Take appropriate safety measures when installing.	12
5	WARNING	Fire/ Electric shock	Install in a dry location.	12
6	WARNING	Explosion/fire	Install in a location free of flammables and explosives.	3
7	WARNING	Fire/ Electric shock	Always connect a power cable to appropriate outlet.	12
8	WARNING	Fire/ Electric shock	Handle power cable with care.	4
9	WARNING	Fire/ Electric shock	Ground wire MUST be connected properly	3
10	WARNING	Fire/ Electric shock	DO NOT disassemble or modify equipment.	4

Use				
No.	Degree of risks	Risk description	Protective measures taken by the user	Relevant page
11	WARNING	Explosion/ Fire	DO NOT process explosive or flammable substances	24
12	WARNING	Fire/ Electric shock	DO NOT operate equipment when abnormalities are detected.	3
13	WARNING	Burn	DO NOT touch hot/cold surfaces	4
14	WARNING	Injury	DO NOT climb or place any objects on top of equipment.	4
15	WARNING	Fire	DO NOT operate equipment during thunderstorms.	4
16	CAUTION	Burn	ALWAYS operate equipment within a specified temperature range.	24

# 1. SAFETY PRECAUTIONS

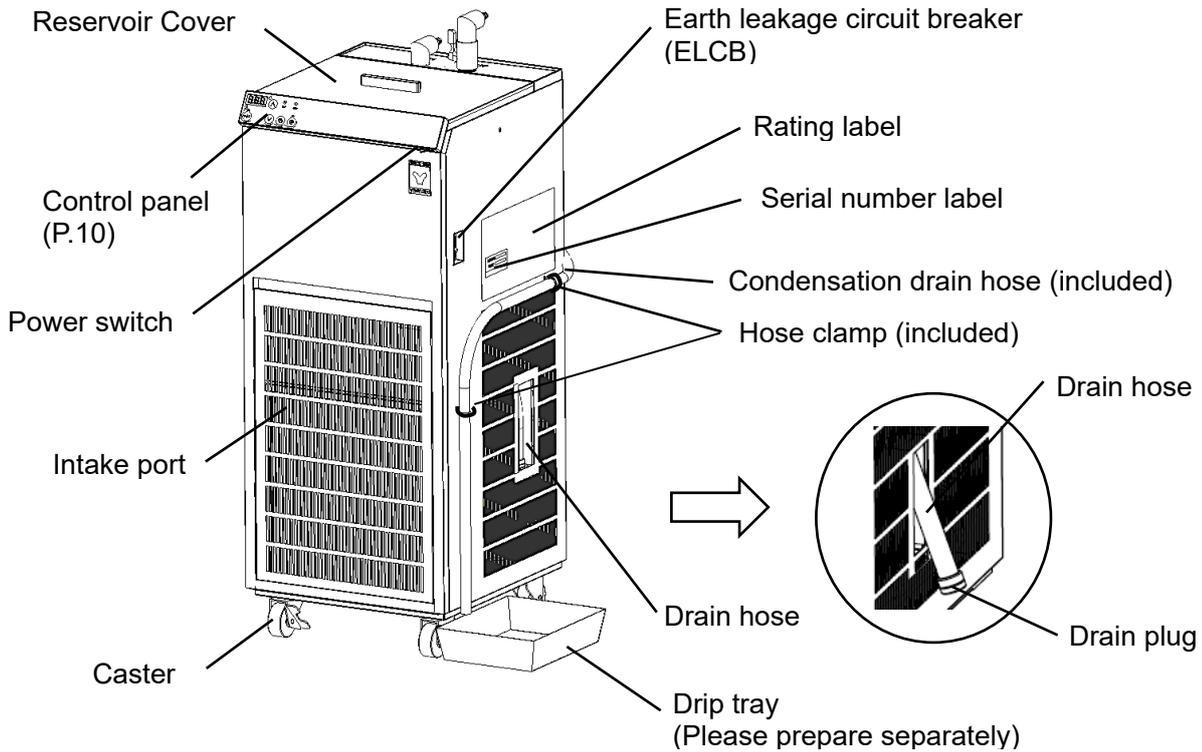
## List of Residual Risks

Daily inspection/maintenance				
No.	Degree of risks	Risk description	Protective measures taken by the user	Relevant page
17	WARNING	Fire/ Electric shock	Be sure to turn OFF (O) ELCB and disconnect the power cable before daily inspection and maintenance.	26
18	WARNING	Burn	Perform inspections and maintenance when the unit and circulating water are at room temperature.	26
19	WARNING	Fire/ Electric shock	NEVER disassemble or modify the unit.	26

Extended storage/disposal				
No.	Degree of risks	Risk description	Protective measures taken by the user	Relevant page
20	WARNING	Fire/ Electric shock	Turn OFF (O) ELCB and disconnect the power cable.	29
21	CAUTION	Injury	Do not leave the unit in a location where children may have access	29

# 2. COMPONENT NAMES AND FUNCTIONS

## External View



One-touch connector (L-type)

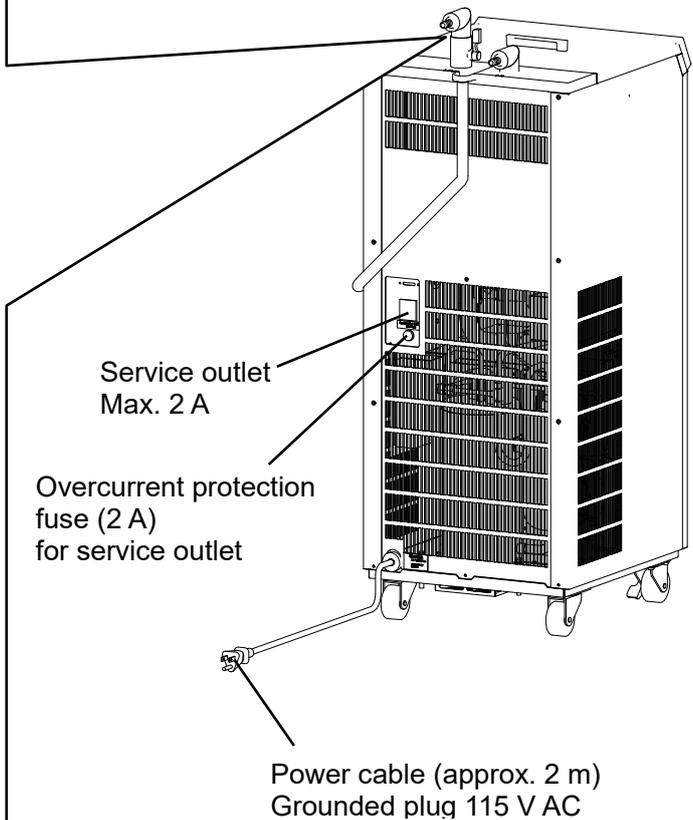
Discharge

Return

Flow rate valve

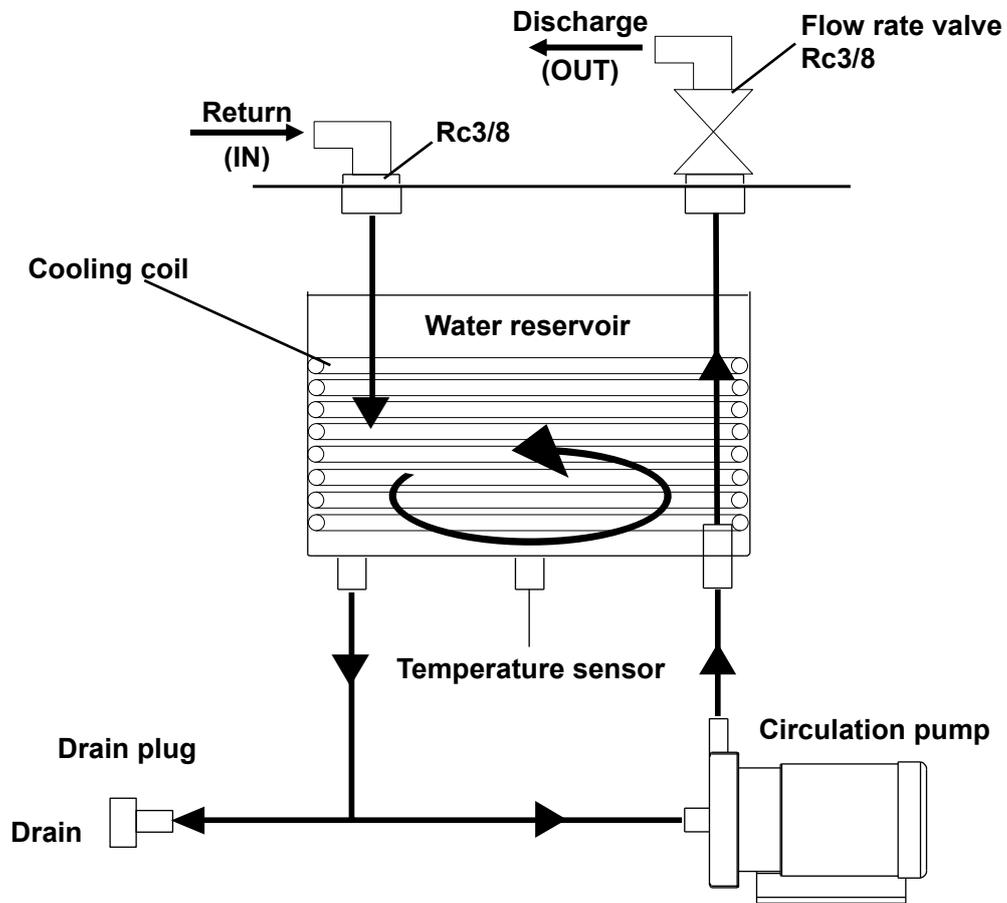
Hose nozzle (included)

Discharge port, Return port  
Rigid hose coupling with 10 mm O.D. or flexible hose coupling with 9 mm I.D. (with supplied hose nozzle attached)  
\* See "2. Circulation hose connection" (P.15) for details.  
\* One-touch connector (L-type) can rotate freely.  
\* When turning around the connection port, hold the one-touch connector (L-type) instead of the hose nozzle.



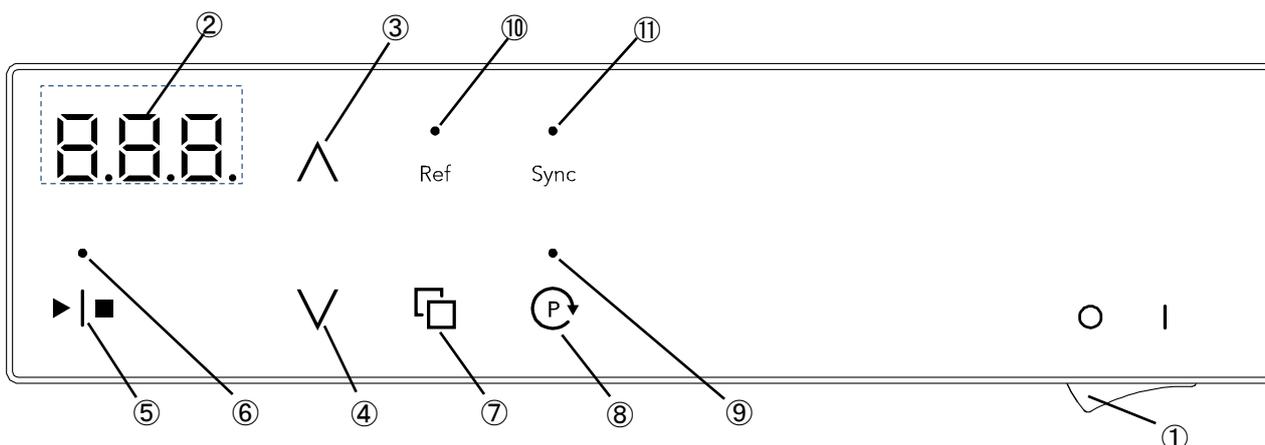
## 2. COMPONENT NAMES AND FUNCTIONS

### Circulation System



## 2. COMPONENT NAMES AND FUNCTIONS

### Control Panel



No.	Panel item	Description
①	Power switch	Turn ON/OFF power.
②	Temperature display	Shows current temperature, temperature setting, user setting items, etc.
③	Up key	Press to increase or decrease set value, scroll items in user setting, and switch settings.
④	Down key	
⑤	Run/Stop key	Press to start or stop cooling operation.
⑥	Run/ Stop lamp	Illuminates during cooling operation.
⑦	Set key	Press to switch screen between current temperature and temperature setting, and to finalize settings. Press and hold to switch screen to the user setting.
⑧	Pump key	Press to start or stop circulation pump.
⑨	Pump lamp	Illuminates while circulation pump is running.
⑩	Refrigerator lamp * Hereinafter Ref lamp	Illuminates while refrigerator is running. Flashes when the compressor delay timer operates. Goes out when the timer ends after about three minutes.
⑪	Synchro lamp	Not used for this unit.

### Display Characters

All characters displayed in the user setting are defined as follows

Character	Letters	Description
CAL	CAL	Appears when entering offset temperature values. See P.20 "Calibration Offset"
Pon	Pon	Appears when setting Auto-resume function. See P.21 "Auto-resume Function"
PUP	PUP	Appears when setting the circulation pump operation on temperature limit alert. See P.22 "Selection of circulation pump operation at temperature upper limit alert"
dSP	dSP	Appears when setting LED brightness. See P.23 "LED brightness setting"

# 3. PRE-OPERATION PROCEDURES

## Installation Precautions



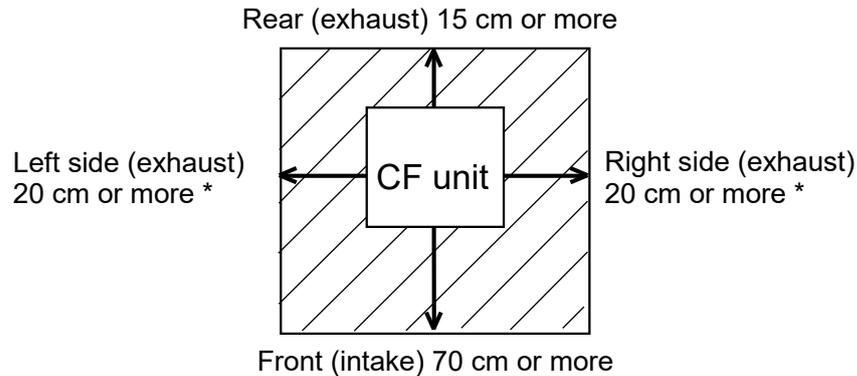
### Choose an appropriate installation site.

DO NOT install unit:

- where installation surface is not completely level, not even or not clean.
- where flammable or corrosive gases/fumes may be present.
- where ambient temperature will exceed 35 °C, will fall below 5 °C, or will fluctuate.
- where liquid is assumed to splash on unit
- in excessively humid or dusty locations.
- in direct sunlight or outdoors.
- where there is constant vibration.
- in direct contact with the outside air
- where power supply is erratic.
- where there is combustible material nearby.
- where there is a risk of freezing or condensation.



Install CF unit in a location with sufficient space, as specified below. Operating unit without enough space may trap the exhaust heat, and the cooling capacity may be greatly degraded.



- \* Leave 50 cm or more space above unit
- \* If unit is placed on either of the right or left walls, the other side shall be open at least 50 cm.
- \* Do not operate unit with ventilating openings on unit (front, side, rear) obstructed. Failure to do so may result in excessive temperatures inside unit, causing equipment malfunction.
- \* When using unit in a location with poor ventilation (under a laboratory table, etc.), be sure to install exhaust unit to dissipate the heat around unit. Estimated volume of heat and exhaust are as follows.

Approximate amount of waste heat (kW)	3.0
* Approximate exhausts (m <sup>3</sup> /min)	4.8



### Use cargo-handling equipment for transportation and installation.

Always use cargo-handling equipment to move or install unit. Transport unit with sufficient number of people and an appropriate work method when carrying out manually.



### Install equipment on a level surface.

Install unit on level and even surface. Failure to do so may cause abnormal vibrations or noise, possibly resulting in troubles and/or malfunction.

# 3. PRE-OPERATION PROCEDURES

## Installation Precautions



### Take appropriate safety measures when installing.

Implement appropriate safety measures for the installation environment. Unit may tip over or fall, causing injury or death during an earthquake or other unforeseen incident.



### Always connect a power cable to appropriate outlet.

Connect power cable to a suitable facility outlet or terminal, according to the electrical requirements.

Electrical requirements:	115 V AC 15 A
--------------------------	---------------

Operational voltage range is  $\pm 10\%$  of power rating, and performance guarantee voltage range is  $\pm 5\%$

Use the service outlet within 2 A.

\* If the unit is not activated by turning ON (I) ELCB, check the voltage and properly investigate whether a power line is not being shared by other equipment and connect the unit to another power source that is not being used by the other equipment.

\* When ELCB is turned ON (I), the service outlet is energized regardless of whether the power switch is turned ON (I) or OFF (O).

Connecting multiple cables using a branch outlet or extension cord will cause voltage to drop, leading to degraded temperature control or malfunction.

Ground wire **MUST** be connected properly

Power cable, terminal processing

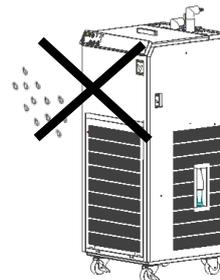
Standard	Cable end processing
3-core 2.0 mm <sup>2</sup> (*1)	Grounded plug

\* The length of power cable is about 2 m. \*1 Nominal cross-sectional area of conductor



### Install in a dry location.

Install unit where it will be free from liquid spray and other moisture. Failure to do so may result in control mechanisms becoming wet, causing malfunction, electric shock and/or fire.



### Ensure proper connection of the screwed portion.



Use a wrench or other tools to fasten the fittings securely. Improper connection may lead to water leakage.

# 3. PRE-OPERATION PROCEDURES

## Installation Precautions



### Preparation of circulating water

Select circulating water according to the operating temperature.

**If objective temperature is 10 °C or higher, use tap water or softened tap water \***  
**If objective temperature is lower than 10 °C, use an antifreeze solution, such as Nybrine (dilute with tap water)**

< Recommended Concentration > at -20 to 10 °C: Z1 60%

**\* Do not use pure water as circulating water.**

The ready-to-use Raku-raku line of Nybrine solutions from Yamato Scientific is recommended. Contact original dealer of purchase for Raku-raku Nybrine solutions.

Product name	Product code	Concentration	Standard operating temperature	Quantity
Raku-raku Solution Z16005	756071	60%	-20 °C	5L
Raku-raku Solution Z16010	756072			10L
Raku-raku Solution Z10005	756073	100%	-30 °C	5L
Raku-raku Solution Z10010	756074			10L
Raku-raku Solution NFP6005	756075	60%	-10 °C	5L
Raku-raku Solution NFP6010	756076			10L

Observe the following in order to prevent malfunction

- Replace circulating water entirely every month for tap water, or every six months for Nybrine solutions. Do not continue adding water without changing for a long period of time. Doing so may produce sludge, causing damage to the cooling coil and the circulation pump.
- Do not use liquids (caustic soda, sodium hydrate, etc.) that will powder when evaporated.
- Degraded unit performance and/or pump overload may be caused by using viscous fluid (300 cp or more), or heavy fluid such as Fluorinert, Galden, etc. for circulating water. When using a mixture of antiseptic agents, select it according to the material of wetted part.

Material of wetted part

Reservoir: 304 stainless steel

Cooling coil: 304 stainless steel

Fittings: 304 stainless steel, polypropylene, polyacetal

Hoses: silicone rubber

When ethanol is used as circulating water, note the following.

- Use silicone-based circulation hoses.
- When using circulation hoses made of ethylene-propylene rubber (EPM or EPDM), the plasticizers in the rubber may elute and cause discoloration. When diluted with water, it may become cloudy due to reaction with the eluted plasticizer.
- Use adequate ventilation and keep the product away from fire and ignition sources (static electricity, etc.) .

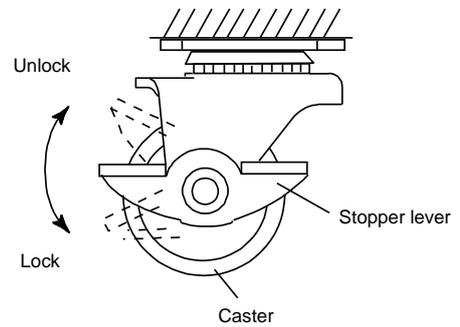
Do not use circulating water that will be harmful when vapor is breathed in (methanol, etc.). Do not use other flammable circulating liquids. (see "15. LIST OF HAZARDOUS SUBSTANCES" (P.54) )

# 4. INSTALLATION PROCEDURES

## Installation Procedure

### 1. Securing casters

1. Check that the four casters are uniformly placed on a flat location, and that unit does not wobble or tilt. Then lower the stopper levers to lock casters.
- ❖ Only two casters on the front of unit are equipped with stoppers.
2. Release the stopper levers of casters when moving. Flipping up the stopper lever releases the lock.
- ❖ Wheeling the unit over large bumps or crevices may cause excessive shock to unit or damage to casters. In such a case, obtain assistance and carefully lift unit over bumps.



# 4. INSTALLATION PROCEDURES

## Installation Procedure

### 2. Circulation hose connection

Connect hoses to the discharge port (OUT) and return port (IN) of the cooling water circulation system.

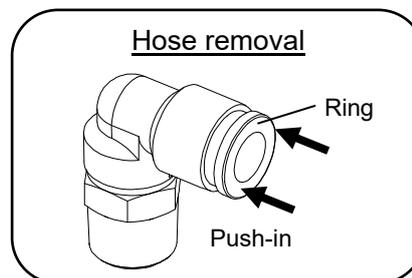
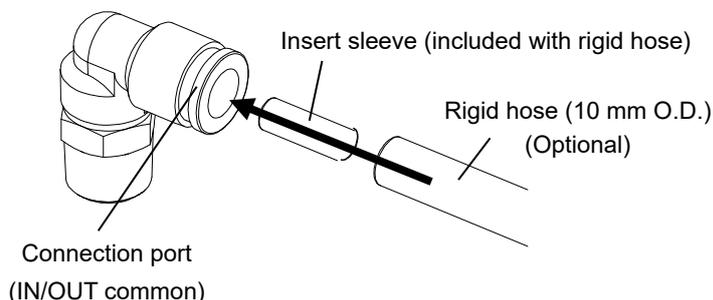
Connection can be made with 10 mm O.D. rigid hose, or with 9 mm I.D flexible hose.

See "List of Options" Circulation connection components (hoses) (P.37) for details on hoses. (Hoses are not included with unit)

Attach a 20-mesh filter to the return port if there is a risk of dust or foreign objects mixed into the circulating water returning from the external device. See "List of Options" strainer set (P.37)

#### ▪ When using rigid hose with 10 mm O.D.

Put the supplied insert sleeve into rigid hose, and push the hose straight to the end while holding the connection port with hand. Failure to use the insert sleeve may lead to water leakage.

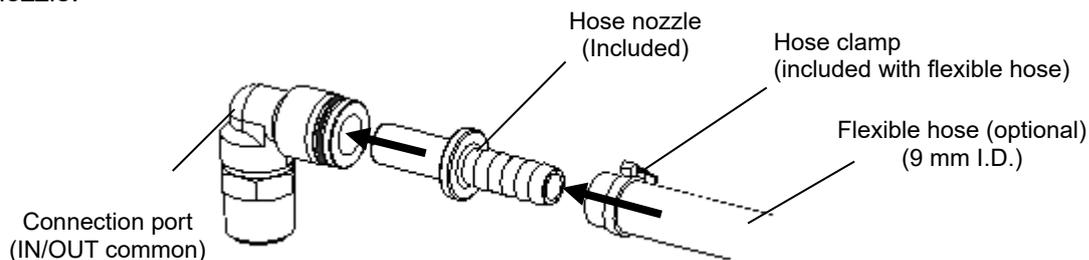


❖ To remove the hose, pull out the hose with the ring of the connection port pushed in.

#### ▪ When using a flexible hose with 9 mm I.D.

1. Connect the flexible hose securely to the barbed hose nozzle (included).
2. Push the hose nozzle straight to the end while holding the connection port with hand.
3. Secure the flexible hose with a hose clamp.

When turning around the connection port, hold the connection port body instead of the hose nozzle.



❖ To remove the hose, first pull out the hose nozzle with the ring of the connection port pushed in.

With optional nozzle attached, various hoses can be connected. If the optional hose does not fit, prepare a hose according to the purpose of use and the piping of the external device. See "List of Options" Circulation connection components (fittings) (P.36)

❖ Select a hose with sufficient pressure resistance (0.2Mpa or more). Use a hose clamp to secure the hose.

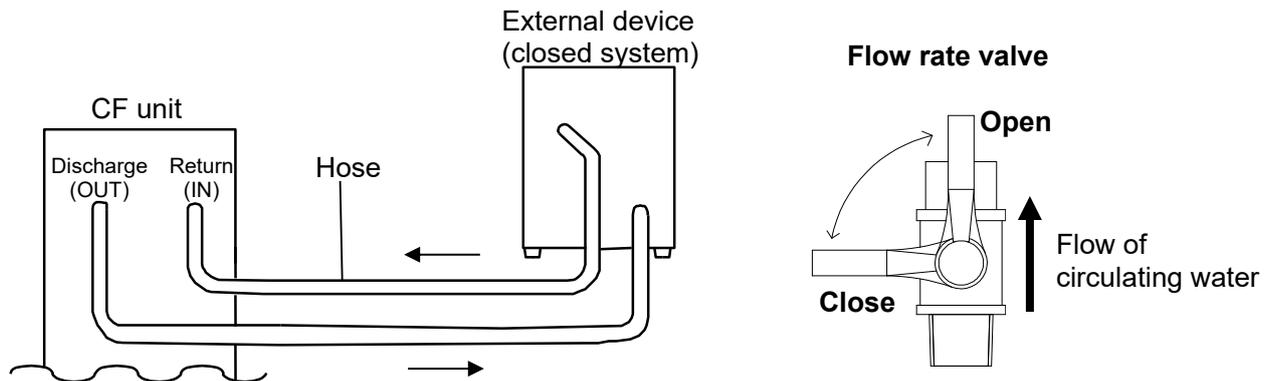
# 4. INSTALLATION PROCEDURES

## Installation Procedure

### 3. External circulation path

**Do not operate unit with the external circulation path shut.**

- When a connection between unit and hose is made, connect to an external device as shown in the figure. Rotatable connector on the connection port allows free change in the direction. Adjust the direction so that the hose does not bend when connected to an external device.



- ❖ Be sure that the cooling water line forms circulation path.
- Ensure the minimum flow rate of 1.5 L/min by opening the flow rate valve on the discharge port whenever running the circulation pump. Failure to do so may cause damage to the circulation pump.
- Do not shut the external circulation path completely.
- See “11. SPECIFICATIONS” (P.33) and “12. REFERENCE DATA” (P.35) for pump capacity.
- Be sure that circulation lines are the minimum required lengths. Cooling efficiency is decreased while flow resistance increases in relation to longer circulation line length.
- Do not connect circulation lines to gas or water plumbing lines.
- Check the specifications of the external devices (required flow rate, allowable pressure of piping) in order to avoid accident or equipment malfunction. Degraded performance, leakage, or equipment malfunction may result.
- Do not connect CF unit to external devices with supplemental powering mechanisms.
- Always change the flow rate slowly. A sudden change in the flow rate may cause malfunction, or may shorten the life of the circulation pump.
- Where CF unit is connected to an external device located higher than CF unit itself, circulating water may flow backward at the time of stopping the pump.

# 4. INSTALLATION PROCEDURES

## Installation Procedure

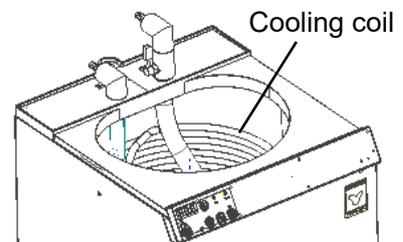
### 4. Filling water reservoir

Select circulating water according to "Preparation of circulating water" (P.13)

1. Open the lid and let circulating water flow into the reservoir until the cooling coil is immersed.
2. In this state, turn ON (I) ELCB and press the Power switch to run circulation pump and begin liquid circulation. See "5. OPERATION PROCEDURES" (P.18) for circulation pump operation.
3. The water level in the reservoir will decrease by the time circulating path is filled up. Add circulating water until the cooling coil is once again immersed.

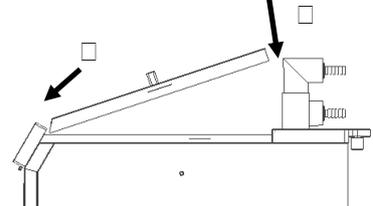
❖ **Complete this work before operating the refrigerator.**

4. Turn OFF (O) ELCB when circulating water is sufficiently supplied.
- ❖ When pouring circulating water, put it in gently without giving a momentum. Note that when the circulation pump stops, the water level in the reservoir will vary.
5. Replace reservoir cover.
- ❖ When placing the cover, slide in the front side first, then put the rear side down.
- ❖ Do not open the cover unless otherwise necessary to prevent dust, foreign object, etc. from entering the reservoir.



\* Unit does not have overflow system. Be careful not to overfill the reservoir.

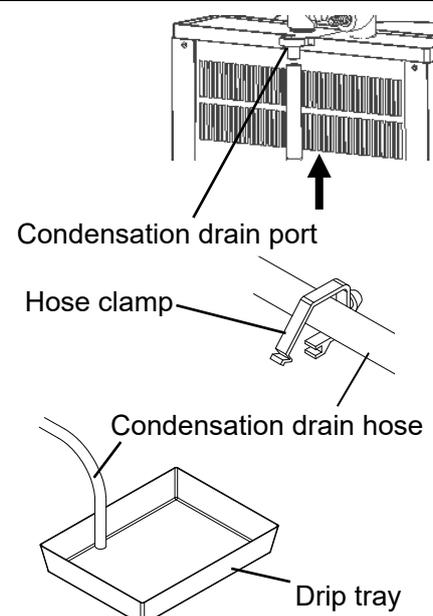
Insert the front first



**Use caution not to let circulating water spill over unit. Electric leakage or electric shock may result if the circulating water comes into contact with the electrical components. When cooling water spills on the control panel, wipe it with dried clean cloth.**

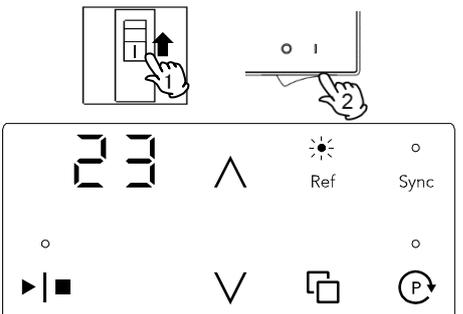
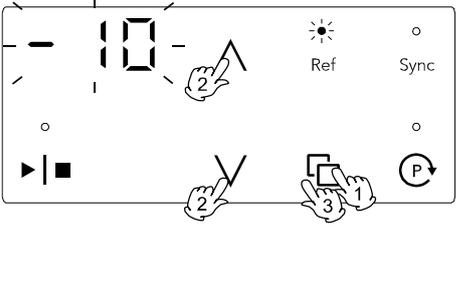
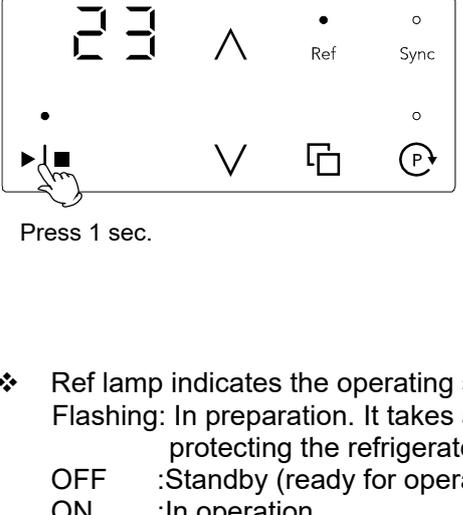
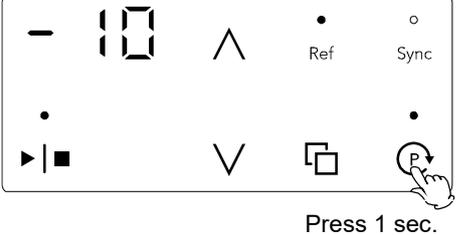
### 5. Installation of condensation drain hose

1. Connect the condensation drain hose to the condensation drain port on the back of unit.
2. Insert two supplied hose clamps into the holes on the right side of unit. See "External View" (P.8) for locations.
3. Draw the condensation drain hose through hose clamp and secure it.
4. Prepare a drip tray.  
(Drip tray is not included and should be prepared separately)
5. Draw the condensation drain hose into the drip tray.
  - ❖ Drain and clean the drip tray on a regular basis.



# 5. OPERATION PROCEDURES

## Operation Procedure

<p>1. Turn on power.</p>		<p>1. Turn ON (I) ELCB. 2. Turn ON (I) the Power switch.</p> <p>Temperature : Shows temperature reading following the software version "V.○.○" Ref lamp : Flashing (goes off after about three minutes)</p> <p>☼ indicates flashing.</p>
<p>2. Set temperature</p>		<p>1. Press □.</p> <p>Temperature : Current set temperature flashes. display</p> <p>2. Set temperature using the ^ V keys.</p> <p>3. Press □ to finalize.</p> <p>Temperature : Shows temperature reading display</p> <p>❖ If not operated for about one minute while the temperature setting is on screen, the display reverts to the previous screen.</p>
<p>3. Run refrigerator</p>	 <p>Press 1 sec.</p>	<p>Press ▶ ■ for one second.</p> <p>Run/ Stop lamp : ON Ref lamp : ON Refrigerator : Run</p> <p>❖ Refrigerator will operate when Ref lamp stops flashing</p> <p>&lt;To stop the refrigerator&gt;</p> <p>Press ▶ ■ again.</p> <p>Run/ Stop lamp : OFF Ref lamp : Flashing (goes off after about three minutes) Refrigerator : Stop</p> <p>❖ Ref lamp indicates the operating state of the refrigerator. Flashing: In preparation. It takes about three minutes the refrigeration to start operation to protecting the refrigerator. OFF :Standby (ready for operation) ON :In operation</p>
<p>4. Start circulation</p>	 <p>Press 1 sec.</p>	<p>Press Ⓟ for one second.</p> <p>Pump lamp : ON Circulation pump : Run</p> <p>&lt;To stop the refrigerator&gt;</p> <p>Press Ⓟ again.</p> <p>Pump lamp : OFF Circulation pump : Stop</p>
<p>❖ The cooling operation can be started or stopped while setting the temperature (setting value flashes). The change will be finalized with the value displayed at the time the Run/Stop key is pressed.</p> <p>❖ It is also possible to start or stop circulation operation while changing the temperature setting (setting value flashing). In this case however, temperature setting is not finalized.</p> <p>Note) Be sure to open the flow rate valve at the discharge port when operating the circulation pump. See "External circulation path" (P.16)</p>		

# 5. OPERATION PROCEDURES

## User Setting

### List of user setting items

- Press and hold  for three seconds. User setting items will be shown. Select an item using the  $\wedge \vee$  keys. Press  again to edit the displayed item.
- While the user setting item is displayed, leaving unit without key operation for about two minutes will discard the unconfirmed changes, and the display reverts to the previous screen.
- As with the case above, holding down  for two seconds will finalize the setting and the display reverts to the previous screen.
- The user settings can be set while both cooling and circulation operations are stopped (Run/Stop lamp and Pump lamp OFF). Only calibration offset function "CAL" can be set or altered during cooling operation (with Run/Stop lamp ON).
  - \* None of the functions can be set during circulation operation (with Pump lamp ON).

Panel item	Description	Page
Calibration offset	Calibration offset is a function which can correct for any differences discovered between actual liquid temperature and the temperature displayed on the control panel. Offset function can correct to either the positive or negative side of the entire unit temperature range. Setting range: -5.0 to +5.0 °C Default setting is "0.0"	P.20
Auto-resume function	Select recovery mode for the event of a power failure. OFF: Unit goes into idle at power recovery. ON: Unit automatically reverts to status just before power loss and begin operation once again from that point. Default setting is "OFF"	P.21
Selection of circulation pump operation at temperature upper limit alert	Select operation of the circulation pump when temperature upper limit alert is triggered. OFF: Circulation pump will remain in idle. ON: Circulation pump begins running with the Pump key ON. Default setting is "ON"	P.22
LED brightness setting	Change the LED brightness of the control panel. The brightness can be set in 8 levels. Setting range: 0-7 Default setting is "3"	P.23

- ◆ By purchasing optional "External interlock input terminal" (model OCF98, product code 281485, see P.51), the external interlock function setting can be made through the user setting.

# 5. OPERATION PROCEDURES

## Calibration Offset

Calibration offset is a function which can correct for any differences discovered between actual liquid temperature and the temperature displayed on the control panel. Offset function can correct to either the positive or negative side of the entire unit temperature range.

- Run unit at desired temperature. Once temperature has risen and stabilized, gauge temperature of circulating water with a thermograph.
- Check the difference between the set temperature and the actual liquid temperature.

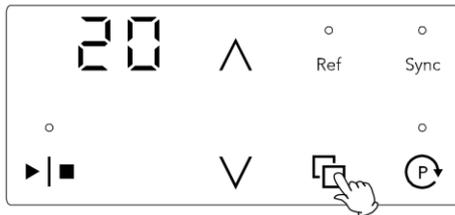
### Example

Actual temperature is lower than temperature reading by 2 °C:

Temperature reading can be calibrated by entering a calibration offset value of -2.0 to compensate against the actual temperature deficiency of 2 °C.

If the initial temperature reading was 20 °C, it will read 18 °C after offset calibration, and be brought into agreement with actual liquid temperature.

### 1. Enter user setting

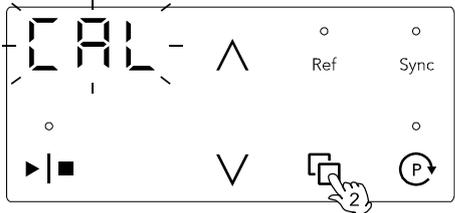


Press 3 sec.

Turn ON (I) power and press for three seconds while temperature reading is on the screen.

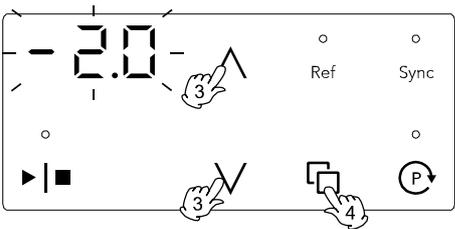
Unit enters user setting.

### 2. Change offset value



1. Select "CAL" using the  $\wedge$   $\vee$  keys.

Temperature display: "CAL" flashes.



2. Press .

Temperature display: Current set value flashes.

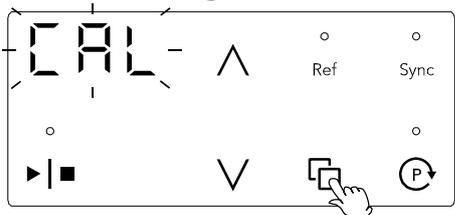
3. Enter a value that brings set temperature and circulating water temperature into agreement, using the  $\wedge$   $\vee$  keys.

4. Press to finalize.

Temperature display: Set value is shown for about one second.

After completion, the screen returns to step 1.

### 3. Exit user setting



Press 2 sec.

After completing the setting, press and hold for two seconds. Display reverts to initial screen and shows temperature reading.

# 5. OPERATION PROCEDURES

## Auto-resume Function

### Select recovery mode for the event of a power failure.

OFF: Unit goes into idle at power recovery. (Default setting)

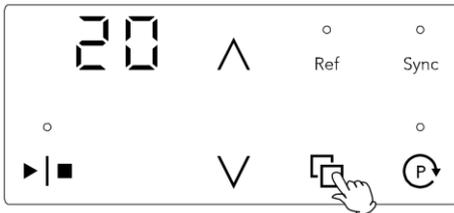
ON: Unit automatically reverts to status just before power loss and begin operation once again from that point.

(To protect refrigerator, refrigeration begins after about three minutes)

**\* Check the recovery status after a power failure on the external device before making this setting.**

**When setting it to ON, be sure to confirm the state of the unit at the time of power recovery.**

### 1. Enter user setting

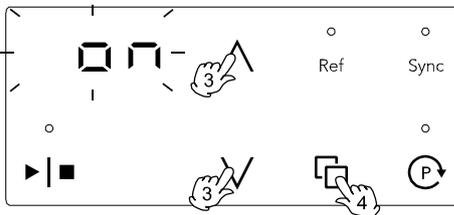
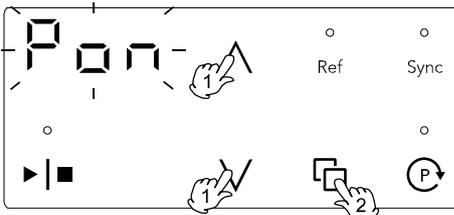


Press 3 sec.

Turn ON (I) power and press  for three seconds while temperature reading is on the screen.

Unit enters user setting.

### 2. Change the Auto-resume setting



1. Select "Pon" using the  $\wedge$   $\vee$  keys.

Temperature display: "Pon" flashes

2. Press .

Temperature display: Current set value flashes.

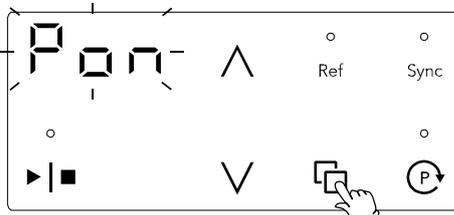
3. Use the  $\wedge$   $\vee$  keys to alter the setting.

4. Press  to finalize.

Temperature display: Set value is shown for about one second.

After completion, the screen returns to step 1.

### 3. Exit user setting



Press 2 sec.

After completing the setting, press and hold  for two seconds. Display reverts to initial screen and shows temperature reading.

# 5. OPERATION PROCEDURES

## Selection of circulation pump operation at temperature upper limit alert

Select the circulation pump operation for the time temperature upper limit alert (Hi) is issued and temperature reading exceeds 40 °C.

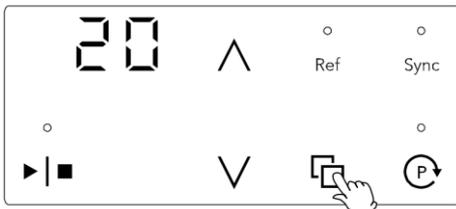
OFF: Circulation pump will remain in idle.

ON: Circulation pump begins running with the Pump key ON. (Default setting)

See "Reading Error Codes" (P.30) for temperature upper limit alert.

Unit detects abnormality (temperature upper limit error, E06) and terminates operation when the liquid temperature exceeds 60 °C.

### 1. Enter user setting

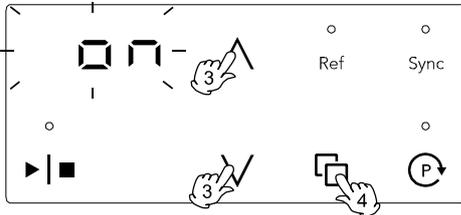
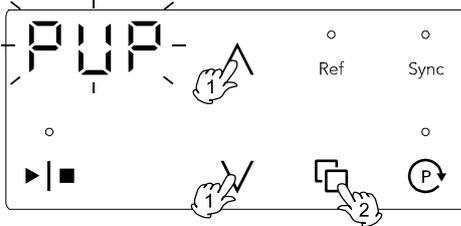


Press 3 sec.

Turn ON (I) power and press  for three seconds while temperature reading is on the screen.

Unit enters user setting.

### 2. Change the pump operation setting.



1. Select "PUP" using the  $\wedge$   $\vee$  keys.

Temperature display: "PUP" flashes

2. Press .

Temperature display: Current set value flashes.

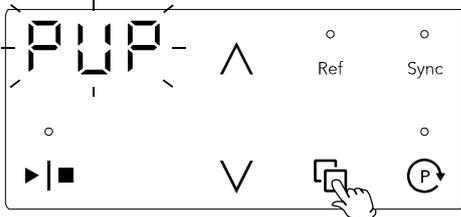
3. Use the  $\wedge$   $\vee$  keys to alter the setting.

4. Press  to finalize.

Temperature display: Set value is shown for about one second.

After completion, the screen returns to step 1.

### 3. Exit user setting



Press 2 sec.

After completing the setting, press and hold  for two seconds. Display reverts to initial screen and shows temperature reading.

# 5. OPERATION PROCEDURES

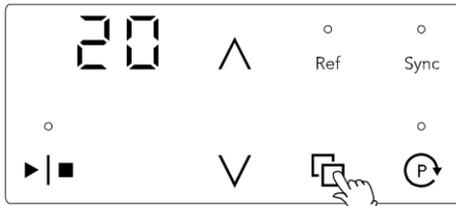
## LED brightness setting

### Change the LED brightness of the control panel.

The brightness can be set in 8 levels from 0 to 7.

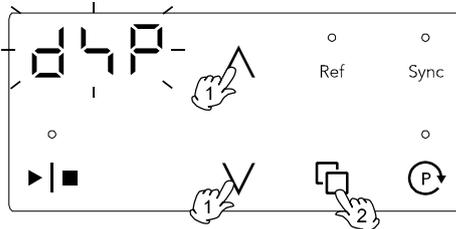
(Default setting: "3").

#### 1. Enter user setting



Turn ON (I) power and press  for three seconds while temperature reading is on the screen.  
Unit enters user setting.

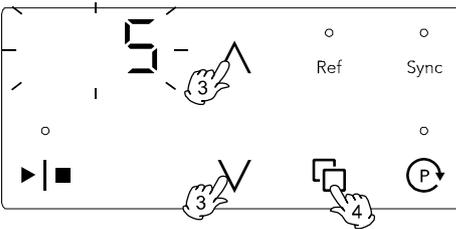
#### 2. Select the LED brightness level



1. Select "dSP" using the  $\wedge$   $\vee$  keys.  
Temperature display: "dSP" flashes

2. Press .  
Temperature display: Current set value flashes.

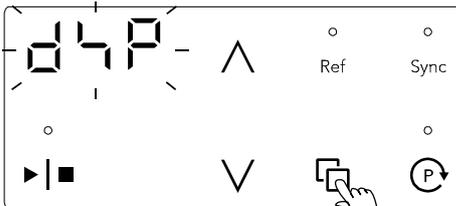
3. Use the  $\wedge$   $\vee$  keys to alter the setting.



4. Press  to finalize.  
Temperature display: Set value is shown for about one second.

After completion, the screen returns to step 1.

#### 3. Exit user setting



After completing the setting, press and hold  for two seconds. Display reverts to initial screen and shows temperature reading.

## 6. HANDLING PRECAUTIONS

### Warnings and Cautions

#### CAUTION



##### **DO NOT process explosive or flammable substances**

Never attempt to process explosives, flammables or any items which contain explosives or flammables. Fire or explosion causing serious injury or death may result. See "15. LIST OF HAZARDOUS SUBSTANCES" (P.54)



##### **DO NOT use harmful substances**

Never use test samples that are toxic or that generate noxious fumes, which may cause serious accident.



##### **DO NOT operate equipment when abnormalities are detected.**

If unit begins emitting smoke or abnormal odors for reasons unknown, turn OFF (O) ELCB immediately, disconnect power cable from power supply, and contact original dealer of purchase for assistance. Failure to do so may result in fire or electric shock. Never attempt to disassemble or repair unit. Repairs should be always be performed by a certified technician.



##### **Wash water reservoir before use.**

Unit has been cleaned at the time of shipment. However, when unit is used for the first time or has been in storage for a long period of time, Fill the reservoir with tap water and drain to clean the reservoir and water lines.



##### **Overnight and extended storage.**

- Whenever unit is not in operation, stored overnight or put in storage, always turn OFF (O) ELCB and disconnect power cable.
- Drain circulating water from the reservoir and circulation lines by removing the drain plug if unit will be in storage for a long period of time. See P.26 "Changing circulating water" Failure to do so may cause corrosion or clogging, resulting in equipment malfunction.



##### **ALWAYS operate equipment within a specified temperature range**

Operate unit within the temperature setting range specified in "11. SPECIFICATIONS" (P.33). Operating unit outside of specification range may result in equipment damage or malfunction.



##### **Power loss recovery.**

The behavior of unit at the time of recovery from power failure can be set in the user setting. See "Auto-resume Function" (P.21) for details. (Default setting is "OFF")

## 6. HANDLING PRECAUTIONS

### Warnings and Cautions



#### Circulation pump



- **Do not operate with the circulating path completely closed.**
- Make sure that the flow rate of circulating water keeps at least 1.5 L/min.
- Never operate circulation pump dry. Damage or malfunction may result.  
Operating unit without circulating water in the reservoir and circulation pump may cause seizure of the pump and/or other problems.
- Keep water reservoir covered and do not allow any debris to enter and remain in the reservoir. Damage to the pump may result.



#### Refrigerator abnormal stop (Refrigerator overload relay)

If room temperature and liquid temperature are high, or the intake dust filter is clogged, increasing the load of the refrigerator. The refrigerator overload relay protective circuit may operate and stop the refrigeration. See "Refrigerator error (E13)" (P.30)



#### Temperature compensation (calibration offset)

If there is a discrepancy between temperature reading and actual liquid temperature, see "Calibration Offset" (P.20) to make a correction.



#### Inspect equipment regularly.

See "Inspection and Maintenance" (P.26) for detailed instructions.

# 7. MAINTENANCE PROCEDURES

## Inspection and Maintenance



### WARNING

- Be sure to disconnect power cable before conducting inspection and maintenance, unless otherwise necessary.
- Inspect and perform maintenance when circulating water is at room temperature.
- Never attempt to disassemble unit.



### CAUTION

- Clean unit using soft damp cloth. Never use benzene, paint thinner, scouring powder, scrubbing brush or other abrasives and solvents to clean unit. Superficial damage and/or discoloration, as well as deformity to some components may result.

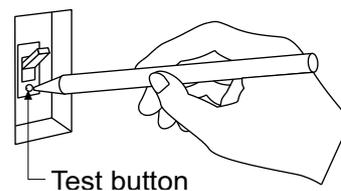
### Check at each operation

Make sure that there is no leaks, abnormal noise and vibration while unit is running.

### Inspect monthly

Inspect earth leakage breaker ON and OFF function.  
Prepare unit for inspection by connecting power cable to a facility outlet or terminal.

- Turn "OFF (O)" ELCB.
- Turn "ON (I)" ELCB, and depress the test button on ELCB using a ball-point pen or other fine-tipped object. If ELCB shuts off, it is functioning normally.



### Hose replacement

Silicone hose is used for the piping inside unit. Hoses may become discolored with time. Replacing hoses once every two years is recommended for safe use. Contact original dealer of purchase for requesting replacement.

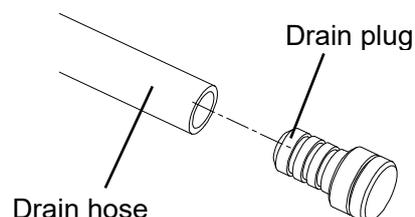
### Pump replacement

Replace circulation pump by 8000-hour run or once every three years. Water may leak due to deterioration of seal components inside circulation pump. Contact original dealer of purchase for requesting replacement.

### Changing circulating water

Change circulating water entirely every month for tap water/ethanol solutions or every six months for Nybrine solutions. Observe local laws and regulations when disposing of Nybrine and handle it in an appropriate manner. Scale, algae and other substances may accumulate in circulation pump, if the above guidelines are not observed, resulting in decreased pump performance or equipment malfunction.

When changing circulating water, pull out drain hose on the right side of unit, remove the drain plug to discharge the water.



# 7. MAINTENANCE PROCEDURES

## Inspection and Maintenance

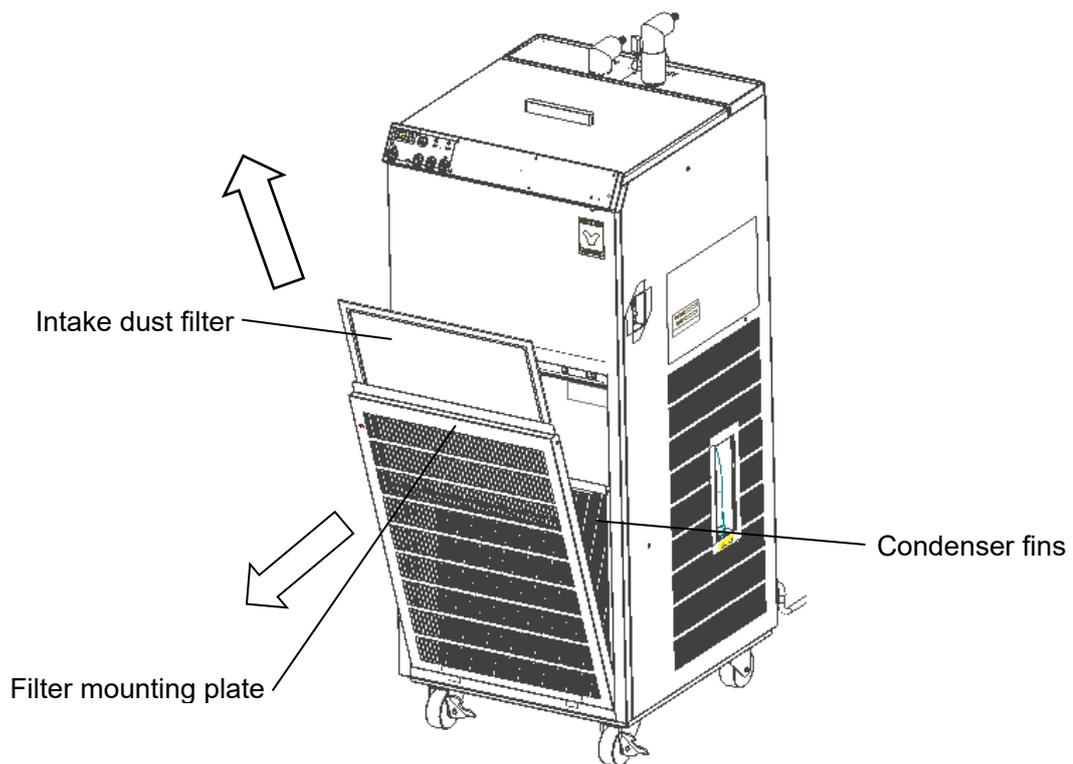
### Water reservoir maintenance

Remove any foreign substances and debris from water reservoir as frequently as possible. Failure to do so may cause damage to circulation pump. Wear proper gloves when performing reservoir maintenance.

### Cleaning intake dust filter

A clogged intake dust filter will degrade cooling performance and may result in refrigeration system malfunction. Clogging degree of the intake dust filter varies depending on operating time and environment. Be sure to periodically clean or replace filter.

The filter mounting plate is fixed with a magnet, pull it to the near side to detach.  
Remove dust from the intake dust filter and condenser fins with a vacuum cleaner, etc.



Note: Condenser fins are soft and likely to be bend. Handle them carefully.  
Edges of condenser fins are very sharp. Do not contact with bare hands or skin. Cuts and injuries may result.

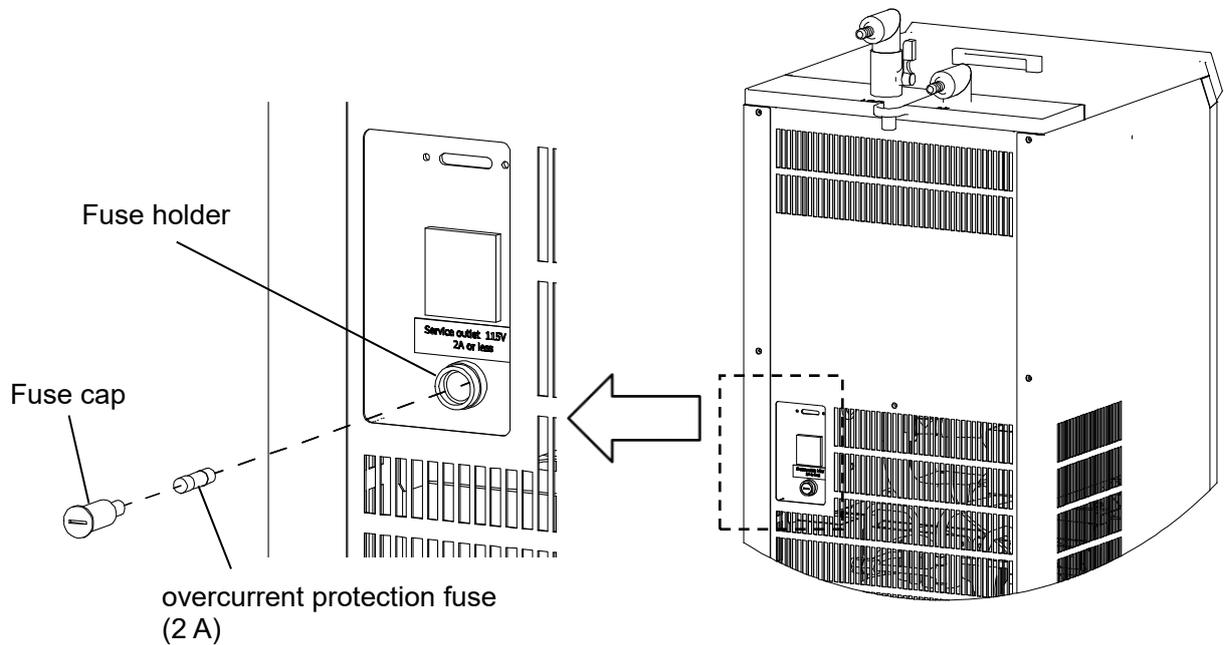
# 7. MAINTENANCE PROCEDURES

## Inspection and Maintenance

### Fuse replacement

Service outlet is equipped with overcurrent protection fuse.

If overcurrent protection fuse has blown, eliminate the cause and replace with a spare.



1. Turn OFF (O) ELCB and disconnect power cable.
2. Remove fuse cap with a slotted screwdriver. Turn 90 degrees counterclockwise to remove the cap.
3. Replace the blown fuse with a spare, and put the cap back on the fuse holder. Insert it into the fuse holder, and fix the cap by turning it 90 degrees clockwise pushing lightly.

◆ Contact original dealer of purchase, if further questions arise concerning maintenance procedures.

## 8. EXTENDED STORAGE AND DISPOSAL

### Extended Storage/Unit Disposal

 <b>WARNING</b>	 <b>CAUTION</b>
<p><b>Extended storage</b></p> <ul style="list-style-type: none"> <li>● Turn OFF (O) ELCB and disconnect power cable from facility outlet or terminal.</li> <li>● Drain circulating water. When tap water is used, algae may develop inside the piping, or water may freeze and break wetted parts if the room temperature falls below freezing point.</li> </ul>	<p><b>Disposal</b></p> <ul style="list-style-type: none"> <li>● Do not leave unit in a location where children may have access</li> </ul>

### Disposal Considerations

Dispose of this unit in accordance with local laws and regulations. Dispose of or recycle this unit in a responsible and environmentally friendly manner.

- Yamato Scientific Co., Ltd. strongly recommends disassembling unit, as far as is possible, in order to separate parts and recycle them in contribution to preserving the global environment. Major components and materials, comprising CF unit are listed in the table below:

Component Name	Material
<b>Main Unit Components</b>	
Exterior	Chromium-free electrogalvanized steel sheet, baked-on finish
Water reservoir	Stainless steel
Insulation material	Chloroprene, polyethylene
Refrigerator, refrigeration piping system	Composite of iron, copper, stainless steel, and other materials
Refrigerant	R410A
Water piping system	Reservoir: stainless steel, Cooling coil: stainless steel Fittings: stainless steel, polypropylene, polyacetal Hoses: silicone rubber
Circulation pump	Composite of iron, aluminum, stainless steel, PPO, copper, and other materials
Fan motor	Composite of aluminum, iron, stainless steel, copper, and other materials
<b>Electrical Parts</b>	
Switches and relays	Composite of resin, copper and other materials
Control panel	Polycarbonate resin, polyethylene (PET) resin film
Circuit boards	Composite of fiber glass and other materials
Power cable	Composite of synthesized rubber coating, copper, nickel and other compounds
Wiring material	Composites of fiber glass, fire-retardant vinyl, copper, nickel and other compounds
Seals	Resin material
Sensor (Pt100Ω)	Stainless steel and other materials

# 9. TROUBLESHOOTING

## Reading Error Codes

Unit has a self-diagnostic function built into the CPU board and a separate safety device, independent of the CPU board.

The table below shows possible causes and measures to take when safety device is triggered.

[Error Codes]

When an operational error or malfunction occurs, error code and temperature reading are alternately displayed on the control panel, and operation stops. Confirm the error code, terminate operation and turn OFF (O) ELCB immediately.

Display code	Error description	Possible causes & measures
E 0 1	Temperature sensor error (E01)	<ul style="list-style-type: none"> <li>● Controller failure</li> <li>● Temperature sensor failure (disconnection or short circuit)</li> <li>● Temperature out of specification range.</li> </ul> Contact original dealer of purchase.
E 0 6	Temperature upper limit error Temperature lower limit error (E06)	<ul style="list-style-type: none"> <li>● Circulating water temperature error</li> </ul> Unit detects abnormality and terminates operation when the temperature reading rises over 60 °C or falls below -25 °C, Turn OFF (O) ELCB and wait until the liquid temperature comes within the appropriate ranges: -20 to 30 °C, and restart operation. If unit does not reset, contact original dealer of purchase.
E 1 3	Refrigerator error (E13)	<ul style="list-style-type: none"> <li>● Refrigerator overload</li> <li>● Refrigerator failure</li> </ul> Turn OFF (O) ELCB. Wait until refrigerator sufficiently cools down, and then restart operation. Make sure that the ambient temperature is lower than 35 °C. Check intake dust filter and condenser fins for clogging, and clean dust off if accumulated. See "Cleaning intake dust filter" (P.27) for cleaning method and precautions. If unit does not reset, contact original dealer of purchase.
E 1 5	EEPROM error (E15)	<ul style="list-style-type: none"> <li>● Error in a storage element EEPROM on the controller board</li> </ul> Turn OFF (O) ELCB and restart unit. If unit does not reset, contact original dealer of purchase.

• Other warnings (displayed alternately with temperature reading)

Display alert	Alert description	Possible causes & measures
L 0	Temperature lower limit alert (Lo)	<ul style="list-style-type: none"> <li>● Alert is displayed when temperature reading falls below -22 °C. (operation continued) Contact original dealer of purchase if temperature continues to significantly decrease after alert occurs.</li> </ul>
H 1	Temperature upper limit alert (Hi)	<ul style="list-style-type: none"> <li>● Alert is displayed when temperature reading exceeds 32 °C (operation continued).</li> <li>● Unit terminates cooling operation when temperature becomes 40 °C or higher, and operates circulation operation according to the setting of "PUP" in the user setting.</li> </ul> Refrigerator may be overloaded and unit may perform abnormal stop to protect refrigerator. Always operate unit in the proper liquid temperature range of -20 to 30 °C. When abnormal stop occurs, turn OFF (O) ELCB and wait until liquid temperature falls sufficiently, then start it up again. If unit does not reset, contact original dealer of purchase.

# 9. TROUBLESHOOTING

## Troubleshooting Guide

Symptom	Possible causes	Possible measures
Display is blank when ELCB and the Power switch are turned ON (I).	<ul style="list-style-type: none"> <li>● Power supply failure</li> <li>● ELCB failure</li> <li>● Power switch failure</li> <li>● Controller failure</li> </ul>	<ul style="list-style-type: none"> <li>● Check power supply voltage (must be 115 V AC <math>\pm</math>10%)</li> <li>● Replace relevant parts (call for service)</li> <li>● Replace relevant parts (call for service)</li> <li>● Replace relevant parts (call for service)</li> </ul>
Temperature does not rise.	<ul style="list-style-type: none"> <li>● No-load operation</li> </ul>	<ul style="list-style-type: none"> <li>● Unit does not have heating function. Operate unit with an external load.</li> </ul>
Temperature does not fall when the Run/Stop key is ON	<ul style="list-style-type: none"> <li>● Compressor delay timer is in operation</li> <li>● Excessive external load</li> <li>● External temperature is exceeding 35 °C</li> <li>● Condenser is clogged with dust, etc.</li> </ul>	<ul style="list-style-type: none"> <li>● Wait until the Ref lamp stops flashing (about three minutes from the start of flashing)</li> <li>● Reduce the external load</li> <li>● Ambient temperature must be within the range of 5 to 35 °C</li> <li>● "Cleaning intake dust filter" (P.27)</li> </ul>
	<ul style="list-style-type: none"> <li>● Power supply failure</li> <li>● Temperature sensor failure</li> <li>● Controller failure</li> <li>● Relay failure</li> <li>● Refrigerator error</li> </ul>	<ul style="list-style-type: none"> <li>● Check power supply voltage (must be 115 V AC <math>\pm</math>10%)</li> <li>● Replace relevant parts (call for service)</li> <li>● Replace relevant parts (call for service)</li> <li>● Replace relevant parts (call for service)</li> <li>● Repair or replace relevant parts (call for service)</li> </ul>
Circulation will not begin when the Pump key is ON	<ul style="list-style-type: none"> <li>● Malfunction due to idle operation or overload operation of circulation pump</li> <li>● Circulation pump protective device activates (temporarily) due to excessive pressure loss at the external device, or valve shut-off operation</li> </ul>	<ul style="list-style-type: none"> <li>● Replace relevant parts (call for service)</li> <li>● Open discharge valve</li> </ul>
Power is not supplied when ELCB is turned ON(I)	<ul style="list-style-type: none"> <li>● Power supply failure</li> <li>● Overcurrent protection fuse blown.</li> <li>● Service outlet failure</li> </ul>	<ul style="list-style-type: none"> <li>● Check power supply voltage (must be 115 V AC <math>\pm</math>10%)</li> <li>● Fuse replacement (P.28)</li> <li>● Repair or replace relevant parts (call for service)</li> </ul>

# 10. SERVICE & REPAIR

## Requests for Repair

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### Requests for Repair

If abnormalities remain after confirming "Troubleshooting Guide", terminate operation, turn OFF (O) controller and ELCB, and disconnect power cable. Contact original dealer of purchase for assistance.

The following information is required for all repairs.

- Product Name
  - Model
  - Serial Number
  - Date (year/month/day) of Delivery
  - Description of problem in as much detail as possible
- } Refer to warranty card.
- Repair this equipment for free of charge according to the contents on warranty card. Warranty period is 1 (one) year from date of purchase.
  - Consult with original dealer of purchase for any repair after warranty ended. Charged repair service of this equipment will be available on customer's request when it can be maintained functional by its repair.

\* Be sure to present warranty card to the service representative.

### Guaranteed Supply Period for Repair Parts

Guaranteed maximum supply period for repair parts is 7 (seven) years from date of discontinuation for this equipment.

"Repair parts" is defined as components which, when installed, allow for continued equipment operation.

# 11. SPECIFICATIONS

Product Name		Closed Cooling Water Circulator Neocool circulator
Model		CF802-A
System/circulating water		Closed circulation/Nybrine, tap water, (over 10 °C)
Operating ambient temperature range		5 to 35 °C
Performance	Temperature setting range *1	-20 to 30 °C
	Temperature control accuracy (JTM K05) *2	±1.0 °C
	Temperature fluctuation (JIS) *2	3.0 °C
	Cooling capacity (liquid temp) *2	Approx. 1320 W (at 10 °C) Approx. 700 W (at -10 °C)
	Max. flow rate *3	Approx. 14 L/min
	Max. head *3	Approx. 14.3 m
Configuration	Temperature control system	Refrigerator ON-OFF
	Temperature sensor	Pt100Ω
	Controller	White LED digital display, key entry, minimum digit of 1 °C
	Refrigeration system/Rated performance/Refrigerant	Air-cooling/700 W/R410A
	Cooling coil	304 stainless steel
	External circulation connection port	
		One-touch connector (swivel type, L-type)
		Flow rate valve
Safety functions		Overcurrent ELCB, Temperature sensor failure, Temperature upper/lower limit alert, Temperature upper/lower limit error, Refrigerator overload relay, Refrigerator high-pressure cut-off switch, Fan motor protection, Circulation pump protection, Delay timer for refrigerator protection, Overcurrent protection fuse(for service outlet)
Other functions		Drain hose, Condensation drain hose, Intake dust filter, Cooling operation key, Circulating pump key, Calibration offset, Auto-resume function, Service outlet (2 A)
Standard	Reservoir material	Stainless steel
	Capacity (liquid volume)	Approx. 15.5 L (liquid volume 14 L)
	External dimensions (including protrusions)	W340 × D370 × H838 mm (W340 × D408 × H920 mm)
	Power supply	Single phase 115 V AC ±10%
	Current (ELCB capacity)	15 A (including service outlet 2 A) (15 A)
	Power cable	2 m with a plug
Weight		Approx. 44 kg
Accessories		Instruction manual (1), Warranty card (1), Condensation drain hose (1 m)(1), Hose clamp (2), Hose nozzle (for flexible hose connection)(2), Spare fuse for service outlet 2 A (1)

\*1 Unit does not feature heating function. When the ambient temperature is over 25 °C, liquid temperature may not reach -20 °C.

\*2 Performance based on 115 V AC supplied power, and 20 °C ambient temperature. Temperature control accuracy and Temperature fluctuation are standards calculated according to JTM K05 and JIS respectively.

\*3 Pump performance based on tap water at 20 °C

# 12. REFERENCE DATA

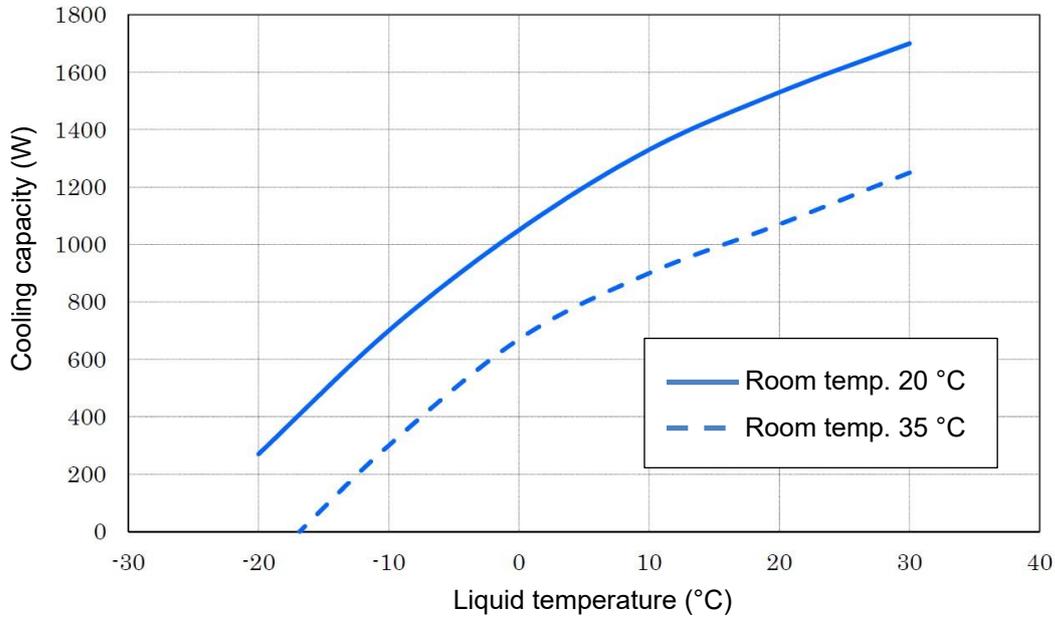
## Cooling Capacity Curve



The following graphs show cooling capacities and characteristics. Findings may vary with sample quantity, ambient temperature, individual differences and other factors. Use graph values as reference only.

### Analysis provisions

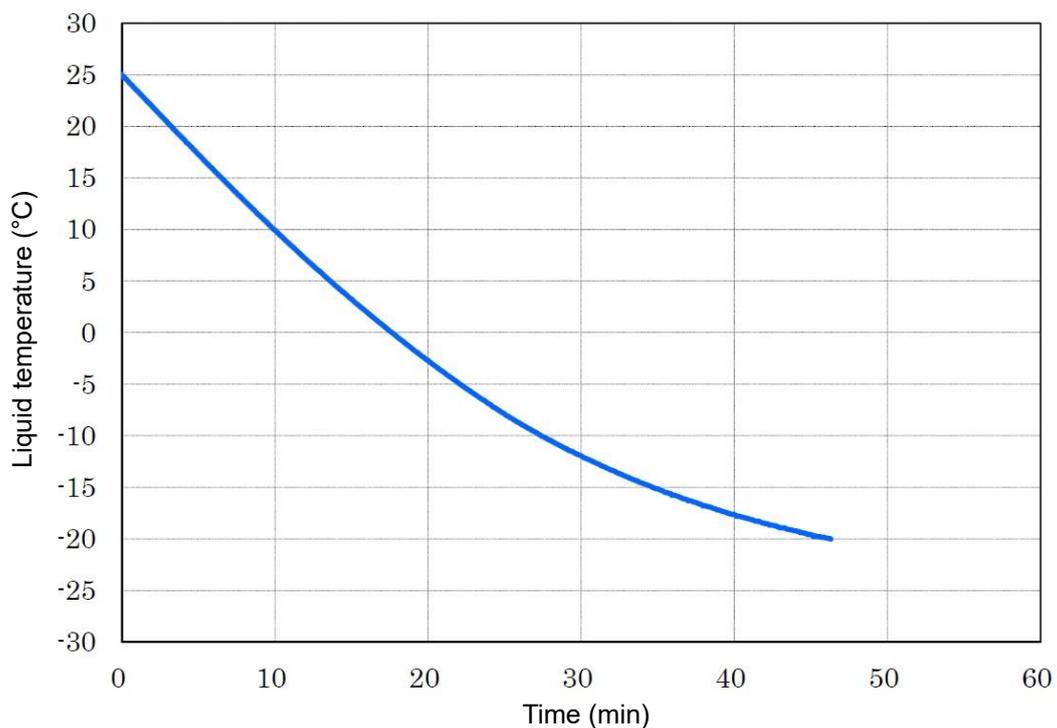
- Room temperature measurement: at the center of condenser inlet
- Power supply: 115 V AC



## Cooling Characteristics

### Analysis provisions

- Room temperature: 20 °C
- Power supply: 115 V AC
- Circulating water: 60% dilution of Nybrine Z1
- Liquid volume: 14 L



# 12. REFERENCE DATA

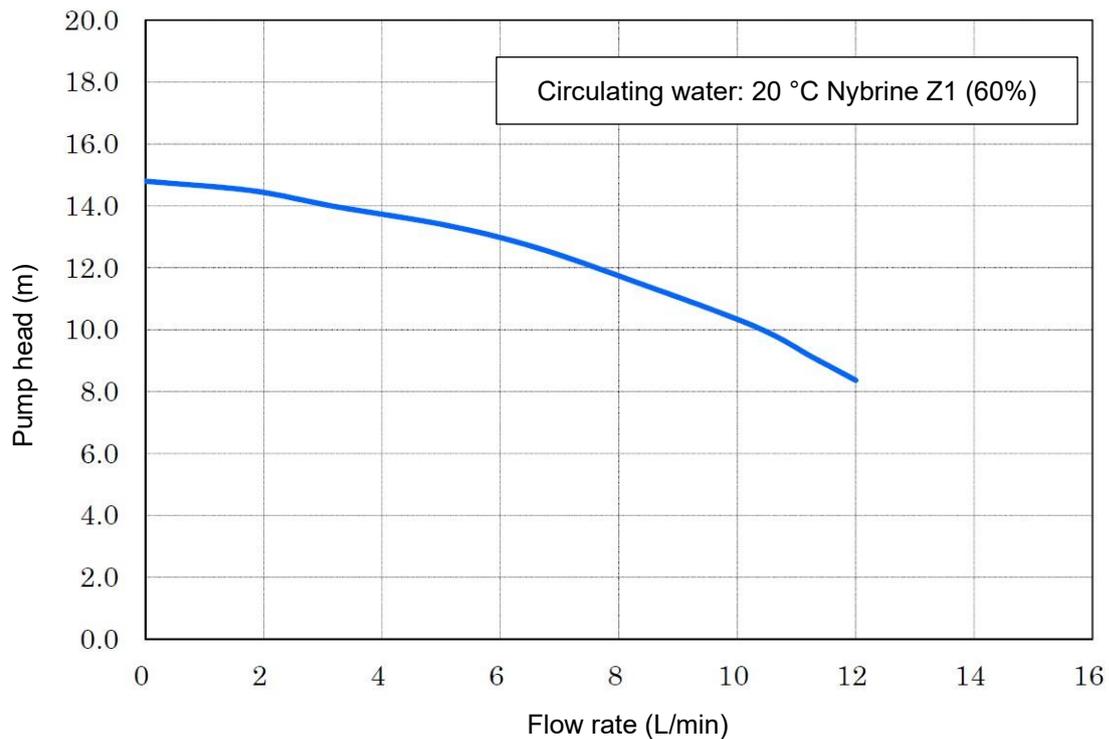
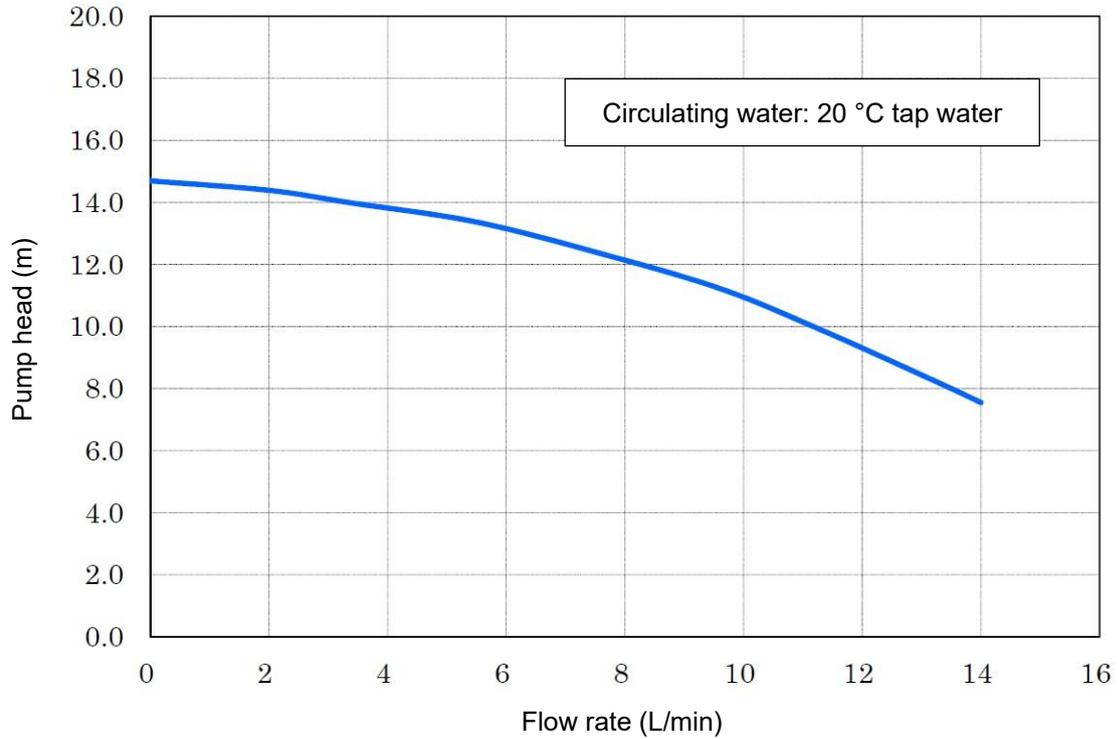
## Pump Performance Curve



The following graph shows the pump performance curve. Findings may vary with sample quantity, ambient temperature, individual differences and other factors. Use graph values as reference only.

### Analysis provisions

- Room temperature: 20 °C
- Power supply: 115 V AC



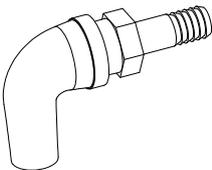
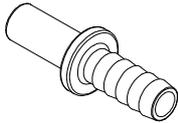
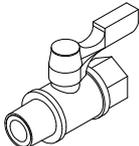
## 13. OPTIONAL ACCESSORIES

### List of Options

A variety of optional accessories are available to suit the piping system of external device and for a wide range of uses.

Contact original dealer of purchase for requests for options.

### Circulation connection components (fittings)

Product Name	Model Product code	Description	Contents
	OCF80 281476	Used to connect the circulation ports IN/OUT and flexible hoses. Select a fitting according to the inner diameter of the circulation hose to be used. * When connecting with hoses, be sure to secure the hose with a hose clamp.	Standard: $\phi$ 8 mm R3/8 Material: Stainless steel 1 pc
	OCL30 221396		Standard: $\phi$ 10.5 mm R3/8 Material: Stainless steel 1 pc
	OCL40 221397		Standard: $\phi$ 13 mm R3/8 Material: Stainless steel 1 pc
	OCL50 221398		Standard: $\phi$ 16 mm R3/8 Material: Stainless steel 1 pc
One-touch connector (straight) 	OCF88 281480	Usable liquid temperature range: -20 to 60 °C * No freezing of circulating water Usable pressure: 1.0 MPa or less	Standard: R3/8 10 mm O.D. For rigid hoses 1 pc
One-touch connector (L-type) 	OCF90 281481	Usable liquid temperature range: -20 to 60 °C * No freezing of circulating water Usable pressure: 1.0 MPa or less	Standard: R3/8 10 mm O.D. For rigid hoses Swivel type 1 pc
Hose nozzle 	OCF94 281483	Usable liquid temperature range: -20 to 65 °C * No freezing of circulating water Usable pressure: 1.0 MPa or less (below 20 °C) 0.7 MPa or less (20 to 65 °C)	Standard: 1 pc For flexible hoses 9 mm I.D. Connector receptacle 10 mm O.D. Material: polyacetal
Flow rate valve 	OCF82 281477	Usable liquid temperature range: -20 to 80 °C * No freezing of circulating water Usable pressure: 0.98 MPa or less	Standard: R3/8 × Rc3/8 1 pc

## 13. OPTIONAL ACCESSORIES

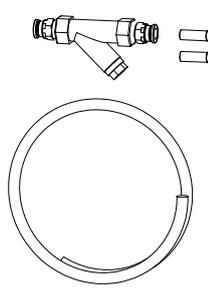
### List of Options

#### Circulation connection components (hoses)

Product Name	Model Product code	Description	Contents
Thermal insulation hose (flexible)	OCF12 221581	Usable temperature range: -20 to 80 °C * No freezing of circulating water Usable pressure: 0.2 MPa or less (below 40 °C) 0.1 MPa or less (40 to 80 °C)	Standard: φ9 mm × φ13 mm × 2 m 2 pcs (insulation: 28 mm O.D.) Hose clamp 4 pcs Thermal insulation tape 1m Material (wetted part): Ethylene propylene
Thermal insulation hose (flexible, highly insulated)	OCF62 221599	Usable temperature range: -20 to 80 °C * No freezing of circulating water Usable pressure: 0.2 MPa or less (below 40 °C) 0.1 MPa or less (40 to 80 °C)	Standard: φ9 mm × φ14 mm × 2 m 2 pcs (insulation: 30mm O.D.) Hose clamp 4 pcs Thermal insulation tape 1m Material (wetted part): Silicon
Thermal insulation hose (rigid)	OCF78 281475	Usable temperature range: -20 to 60 °C * No freezing of circulating water Usable pressure: 0.6 MPa or less (below 20 °C) 0.5 MPa or less (20 to 40 °C) 0.4 MPa or less (40 to 60 °C)	Standard: Rigid hose with 2 pcs 10 mm O.D. × 2m (insulation: 31mm O.D.) Insert sleeve 2 pcs Thermal insulation tape 1 m Insulation hose piece 0.5 m Material (wetted part): polyurethane.

- ◆ Cut the thermal insulation tape and the insulation hose piece to the required length, and apply them to the connection.

#### Circulation connection components (strainers)

Product Name	Model Product code	Description	Contents
Strainer set 	OCF92 281482	Removes dust in circulating water Install right behind the outlet of unit. Usable liquid temperature range: 10 to 60 °C * No freezing of circulating water Usable pressure: 0.6 MPa or less (below 20 °C) 0.5 MPa or less (20 to 40 °C) 0.4 MPa or less (40 to 60 °C)	Standard: 20 mesh Y-strainer Rc3/8 1 pc Connection port: Straight one-touch connector 10 mm O.D. 2 pcs Insert sleeve 2 pcs Polyurethane tube 1 pc

# 13. OPTIONAL ACCESSORIES

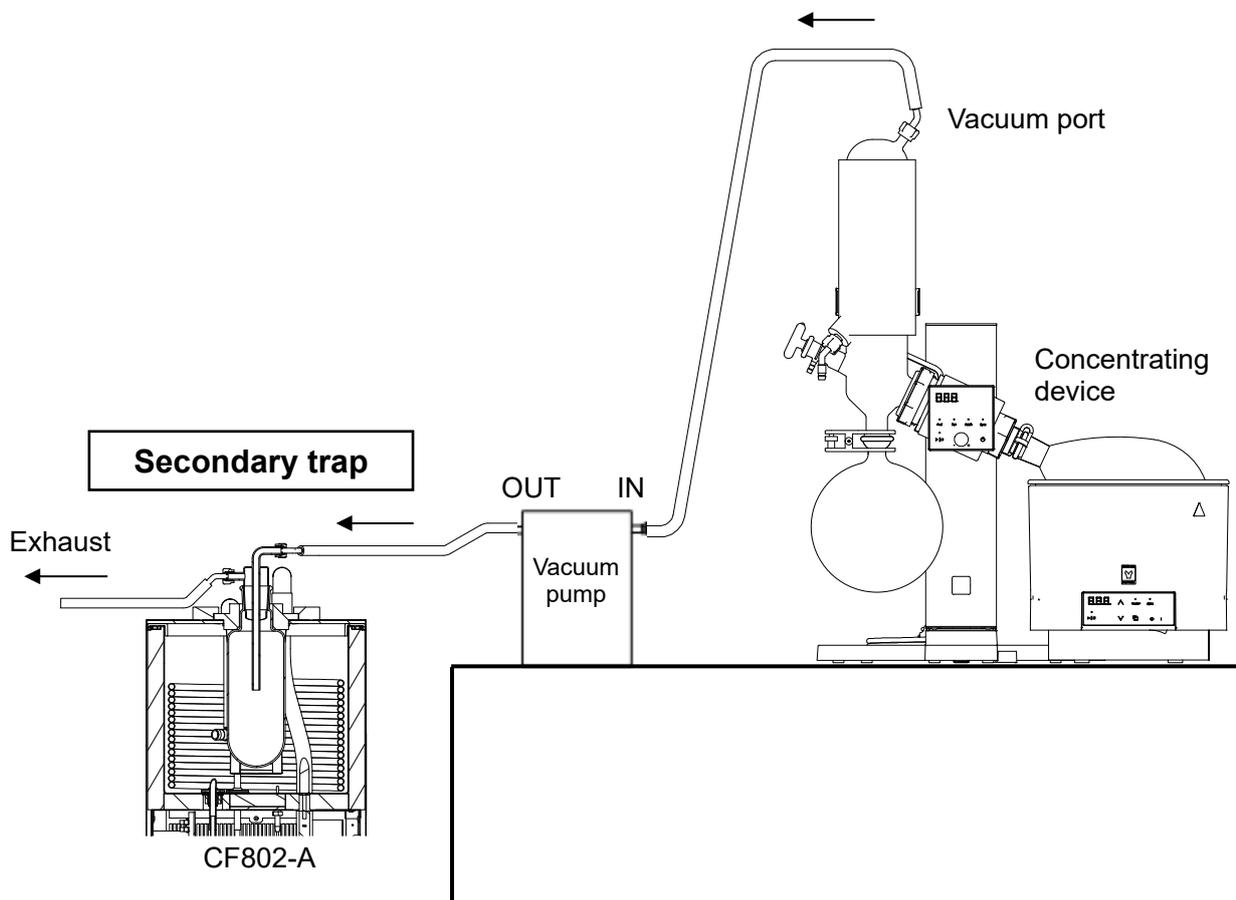
## List of Options

### Secondary trap

Model OCF84

Product code 281478

This option is to liquefy and recover solvent gases remaining in a concentration recovery process. Connect hose to OUT (atmosphere) side of a vacuum pump.



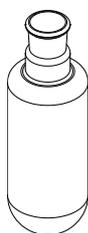
# 13. OPTIONAL ACCESSORIES

## Secondary trap

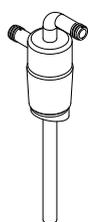
### • Packing List

No.	Part	Qty
①	Glass container, capacity 1L (recovery volume 0.5L)	1
②	Glass-stopper	1
③	Glass container holder	1
④	Mounting hardware	1
⑤	Observation window cover	1
⑥	Fixing plate	2
⑦	Vacuum nozzle (10 mm O.D.)	2
⑧	Fixing screw	2
⑨	Instruction manual (this manual)	1

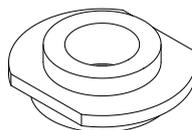
① Glass container



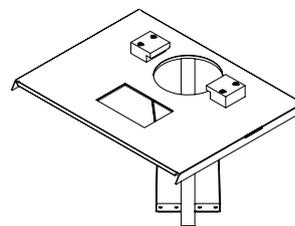
② Glass-stopper



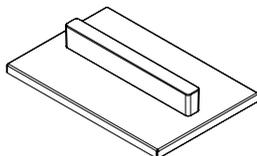
③ Glass container holder



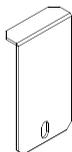
④ Mounting hardware



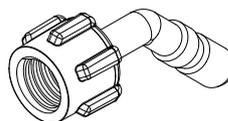
⑤ Observation window cover



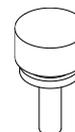
⑥ Fixing plate



⑦ Vacuum nozzle (10 mm O.D.)



⑧ Fixing screw

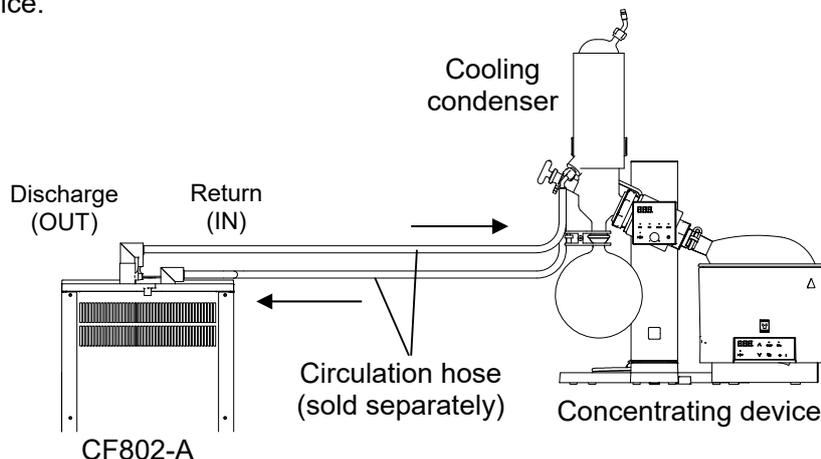


# 13. OPTIONAL ACCESSORIES

## Secondary trap

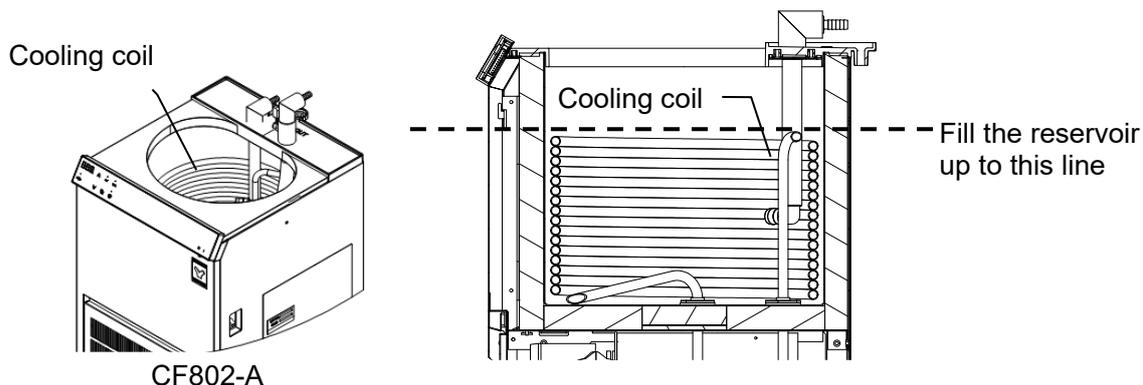
### • Instructions

- (1) Connect CF802-A and a cooling condenser with an optional circulation hose. See “List of Options” Circulation connection components (hoses) (P.37). \* See “2. Circulation hose connection”(P.15) in CF802-A instruction manual for details. Rotatable connector on the connection port allows free change in the direction. Adjust the direction so that the hose does not bend when connected to an external device.

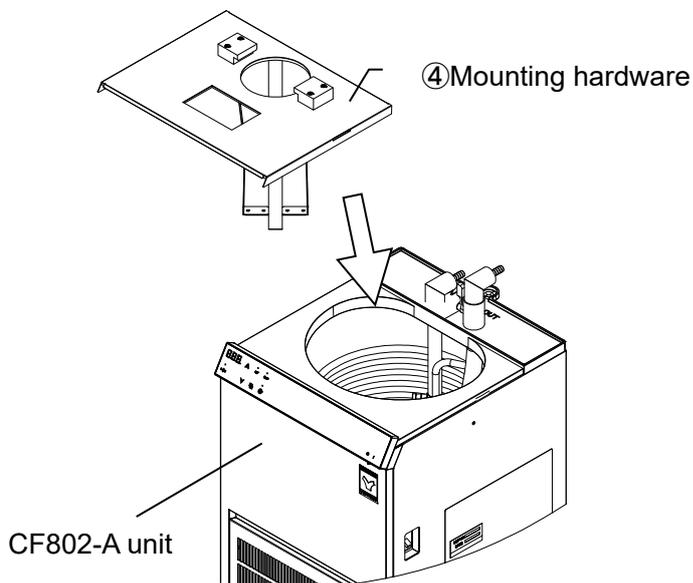


- (2) Pour circulating water into the reservoir of CF802-A until the cooling coil is immersed.

\* Liquid level will rise when setting the glass container in the reservoir. Do not overfill the reservoir in order to avoid overflow.



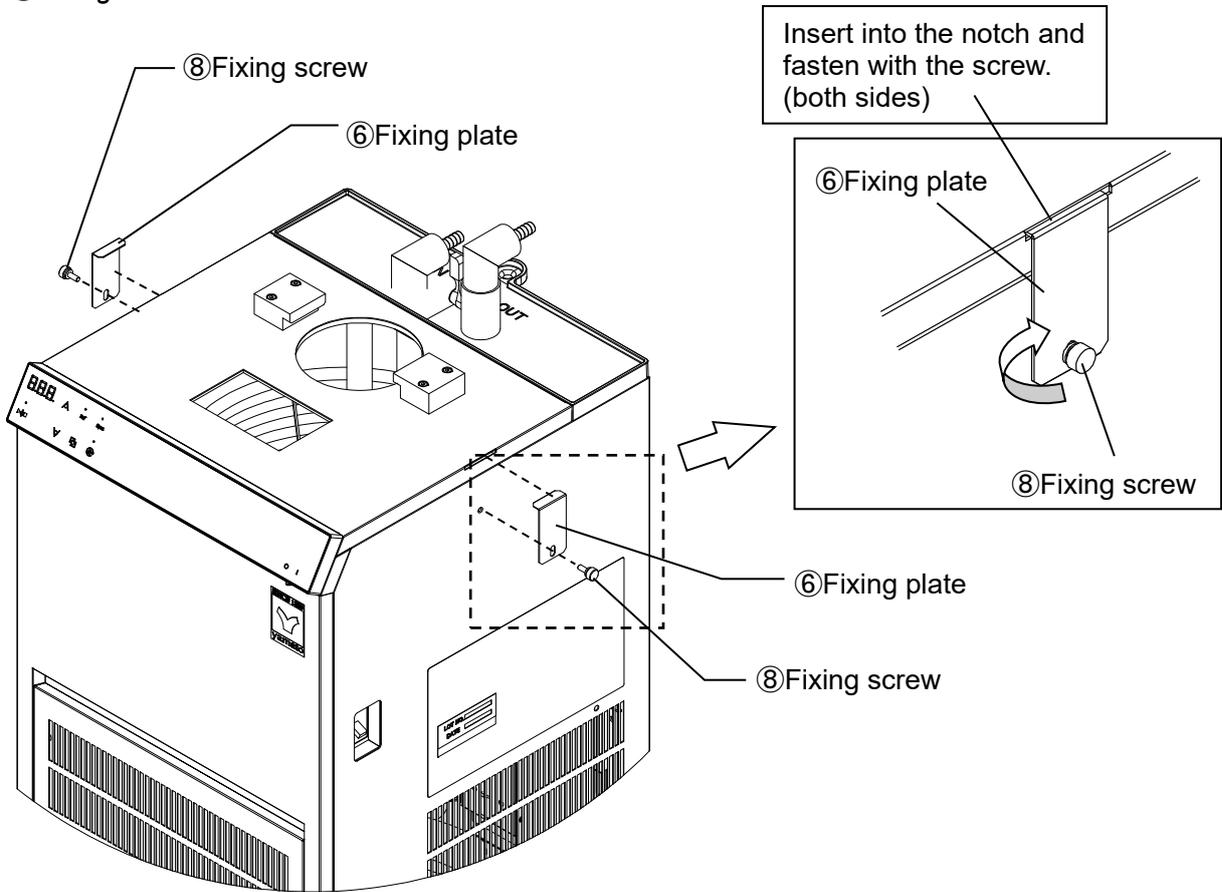
- (3) Place ④ Mounting hardware on CF802-A unit. Standard reservoir cover is not used.



# 13. OPTIONAL ACCESSORIES

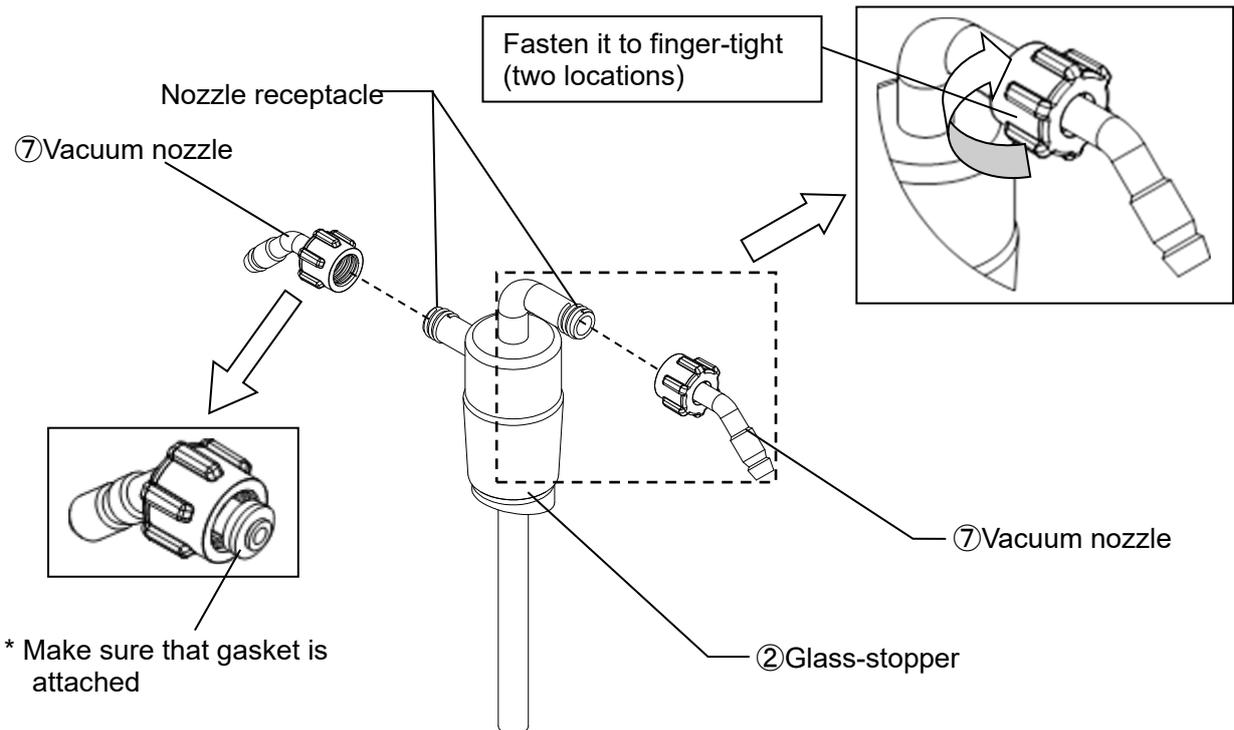
## Secondary trap

- (4) Fit ⑥ *Fixing plate* into the notches on both sides of ④ *Mounting hardware*, and fix them with ⑧ *Fixing screw*.



- (5) Screw down ⑦ *Vacuum nozzle* against nozzle receptacle on ② *Glass-stopper*.

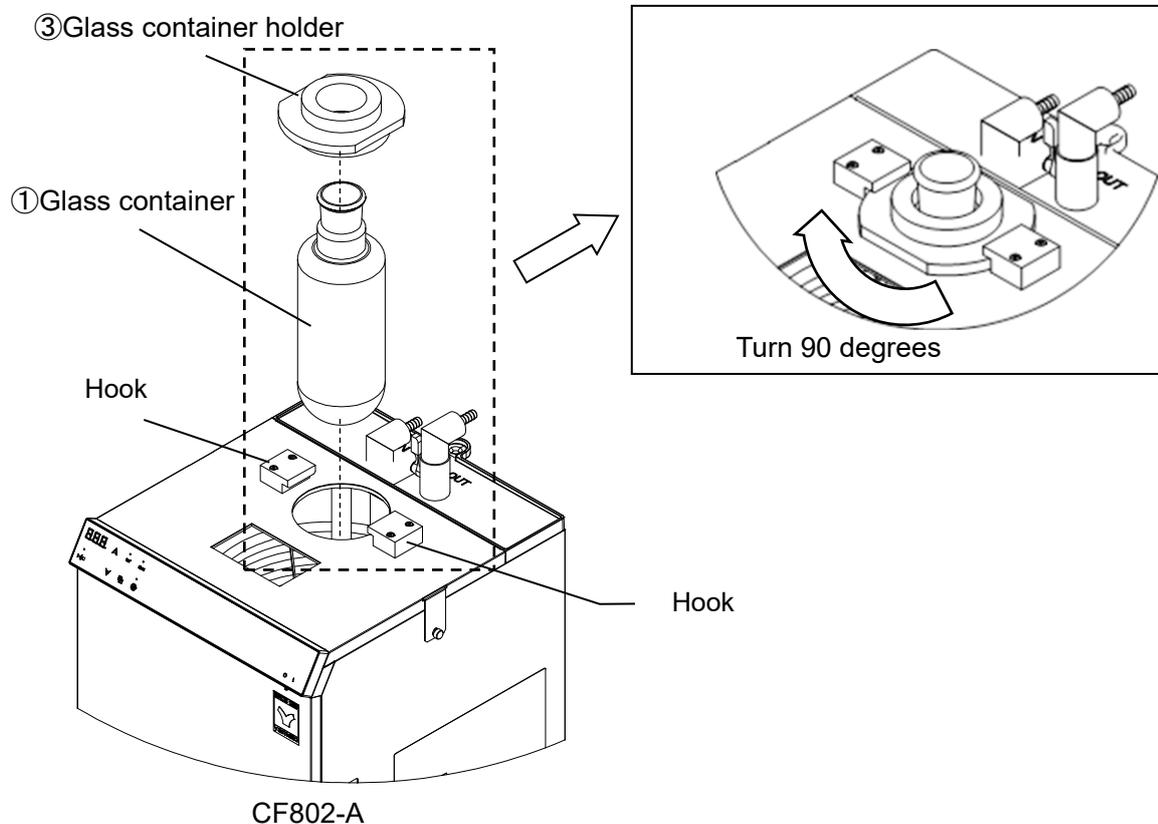
\* Ensure proper connection of the screwed portion.



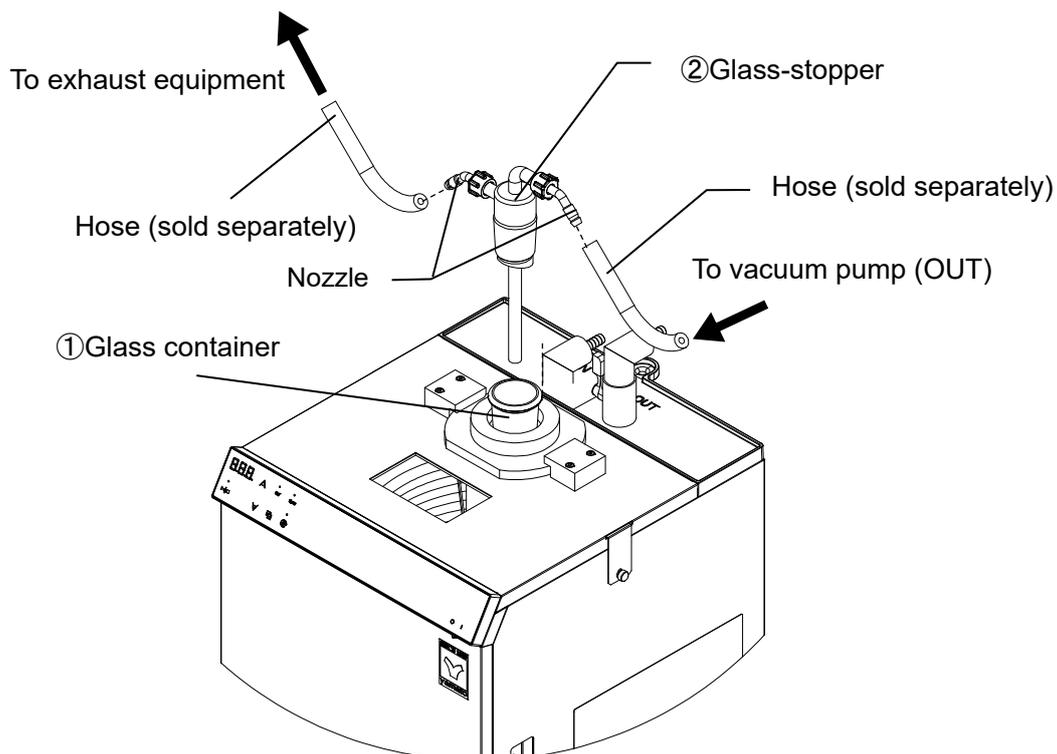
# 13. OPTIONAL ACCESSORIES

## Secondary trap

- (6) Install ① Glass container in the reservoir of CF802-A. **Glass container will come floating with buoyancy. Always hold the container by hand,** and push it in with ③ Glass container holder. Turn ③ Glass container holder 90 degrees and secure it with the hooks.



- (7) Connect optional hose to the nozzle of ② Glass-stopper and set it on ① Glass container. See "Optional parts for Secondary trap" (P.46).



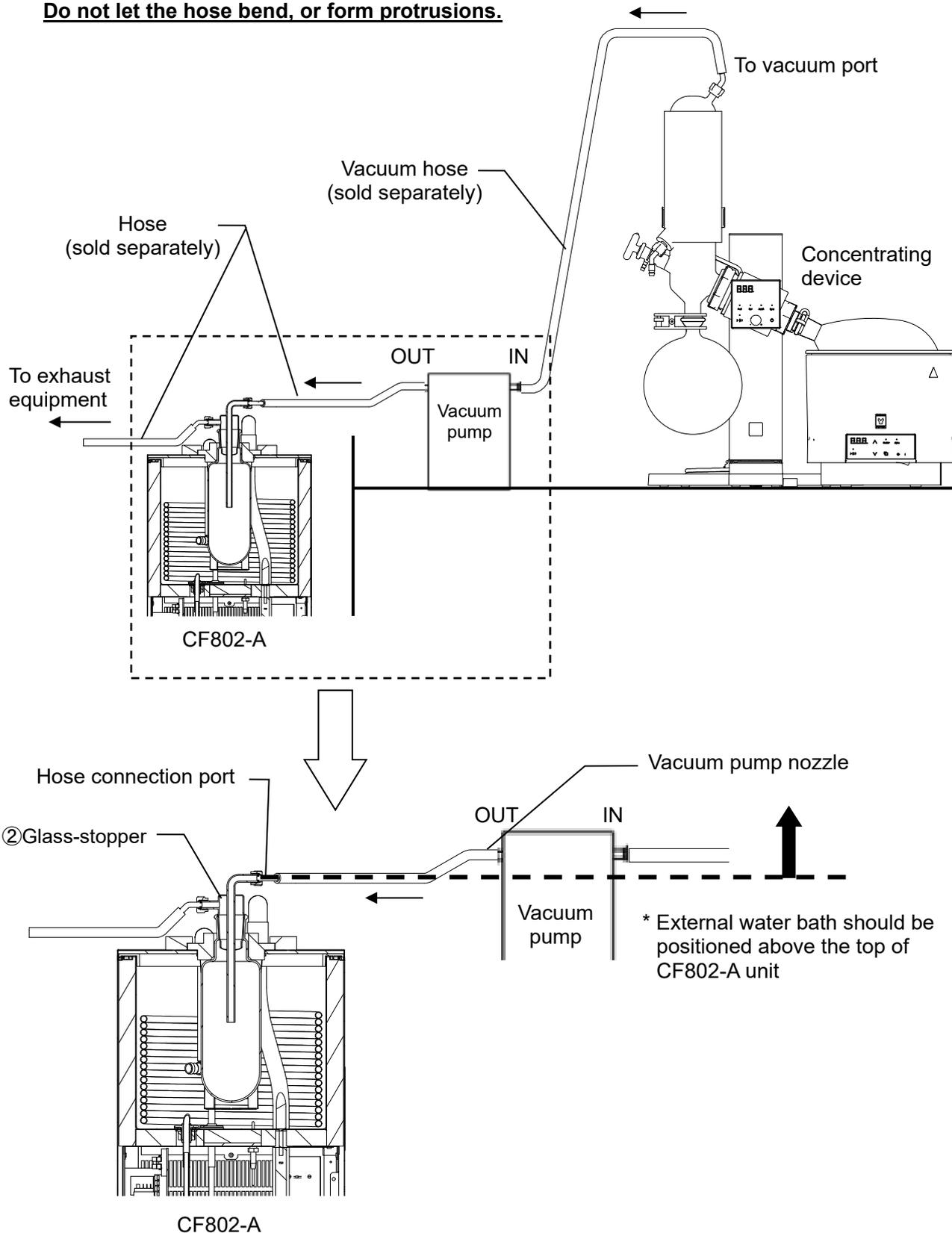
# 13. OPTIONAL ACCESSORIES

## Secondary trap

(8) Make connections as shown in the figure below.

**Ensure that the nozzle of the vacuum pump comes above the hose connection port of ②Glass-stopper.**

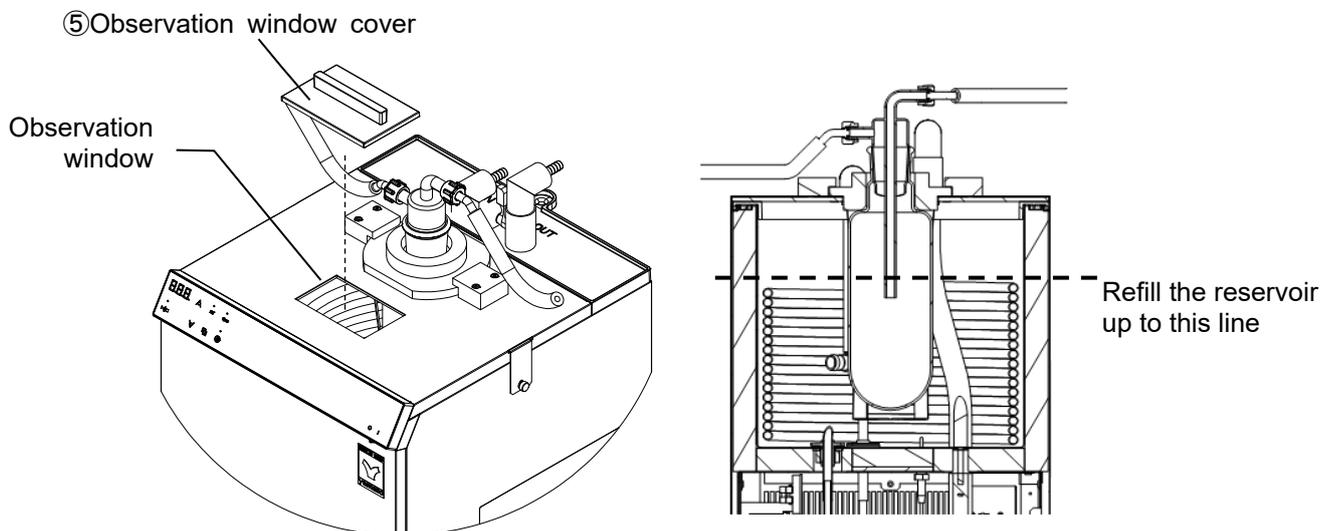
**Do not let the hose bend, or form protrusions.**



# 13. OPTIONAL ACCESSORIES

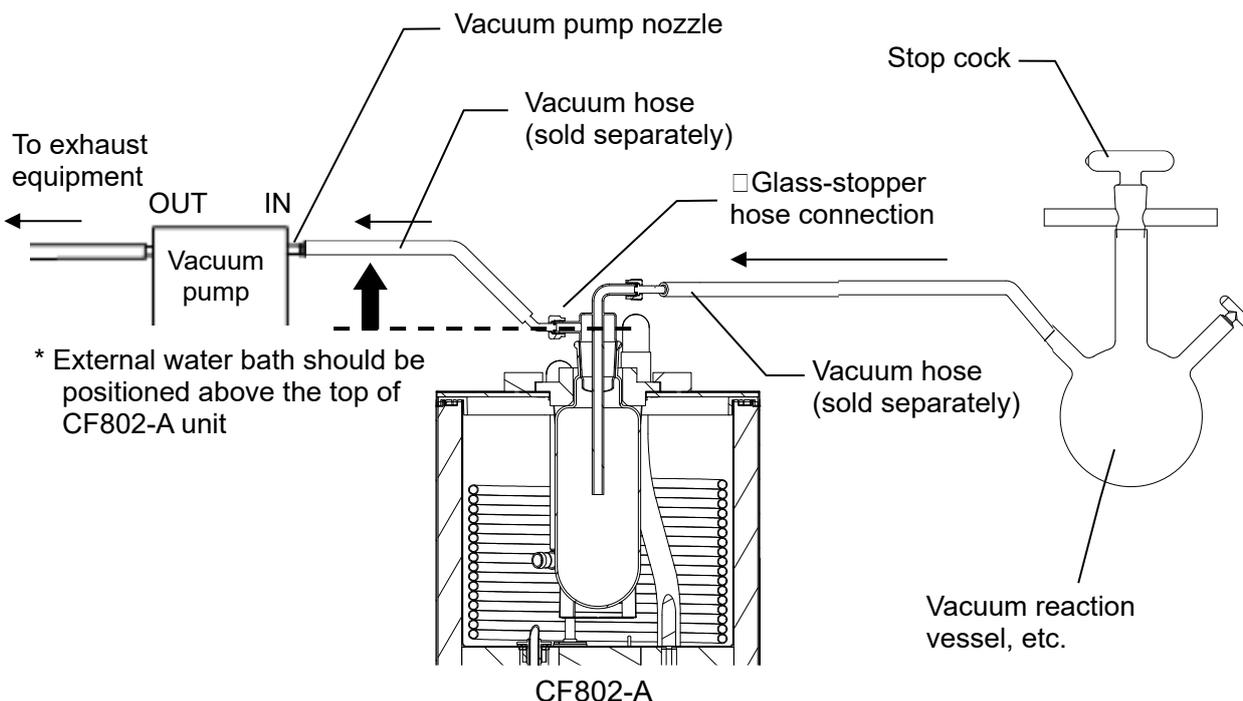
## Secondary trap

- (9) The water level in the reservoir will decrease by the time circulating path is filled up. Add circulating water through the observation window until the cooling coil is once again immersed. Place the ⑤ *Observation window cover* on the observation window after the reservoir is replenished.



- (10) Once the recovered solvent reaches a certain level, remove the ② *Glass-stopper*. **Glass container will come floating with buoyancy. Hold the ① *Glass container* by hand, turn ③ *Glass container holder* to release from the hooks, then take out the container.**

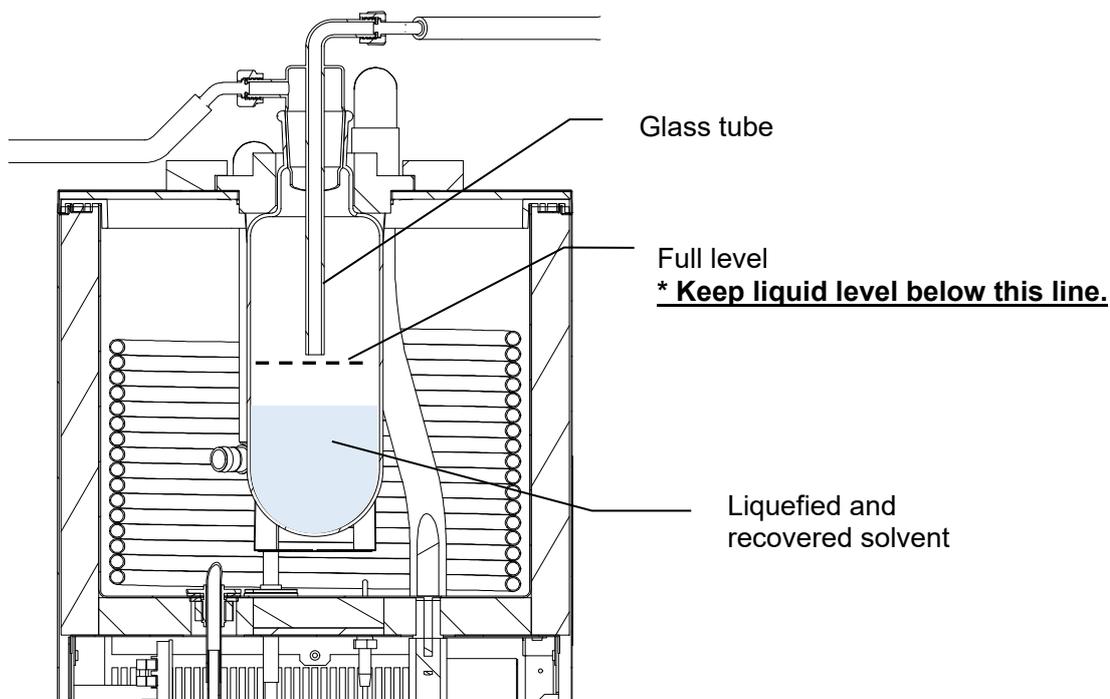
- It can also be used on the IN (vacuum) side of the vacuum pump. In that case, attach a stop cock etc. to release the pressure. Use optional vacuum hose and install the system as shown in the figure below. See "Optional parts for Secondary trap"(P.46). When the solvent recovery is completed, open it to atmospheric pressure.



## 13. OPTIONAL ACCESSORIES

### Secondary trap

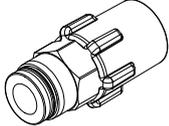
- Handling Precautions
  - Stop the vacuum pump immediately when the concentrating operation is finished. The recovered solvent may evaporate again.
  - If the liquid recovered by Secondary trap is stored more than adequate level, the internal pressure is applied to the exhaust path of the vacuum pump, resulting in equipment malfunction. Check the amount of recovered solvent from time to time, and collect it from the container before the liquid level reaches the tip of the glass tube.



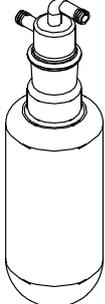
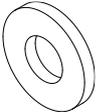
## 13. OPTIONAL ACCESSORIES

### Secondary trap

#### Optional parts for Secondary trap

Product Name	Model Product code	Description	Contents
One-touch connector 	ORE33 255743	Necessary when using thermal insulation hose (rigid)(281475)	GL14, 10 mm O.D. 2 pcs Material (wetted part): Polypropylene
Tygon tubing	LT00040100	Used for OUT (atmosphere) side of vacuum pump	$\phi 5/16 \times \phi 9/16 \times 1.5$ m 1 pc Material: PVC
Vacuum hose	255297	Used for IN (vacuum) side of vacuum pump (Can also be used on the atmosphere side)	$\phi 6 \times \phi 15 \times 5$ m 1 pc Material: Natural rubber

#### List of Consumables/Replacement Parts for Secondary trap

Product Name	Model Product code	Description	Contents
Glass container 	OCF26 281487	Set of Glass container and Glass stopper	Glass container Standard: Capacity 1 L (Liquid volume 0.5 L) 1 pc Glass-stopper 1 pc
Vacuum nozzle set 	ORG80 255512	Set of 2 pieces with gasket	Standard: GL14, 10 mm O.D. Nozzle 2 pcs Nozzle cap 2 pcs Gasket 2 pcs Material: Polypropylene Silicon (gasket)
Gasket set 	OCF40 281494	Set of 12 pieces.	Standard: Gasket 12 pcs Material: Silicon

# 13. OPTIONAL ACCESSORIES

## List of Options

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### Seal lid for External Open Connection

Model OCF86

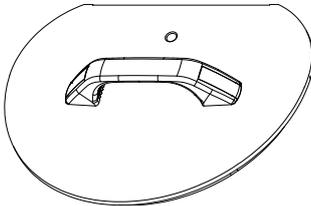
Product code 281479

This option allows to make a circulation connection to an open circulation path such as a water bath.

#### • Packing List

No.	Part	Qty
①	Seal lid (with O-ring)	1
②	Silicon plug	1
③	Return piping unit (with seal tape)	1
④	Instruction manual (this manual)	1

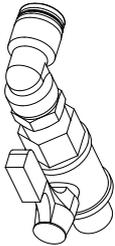
① Seal lid



② Silicon plug



③ Return piping unit

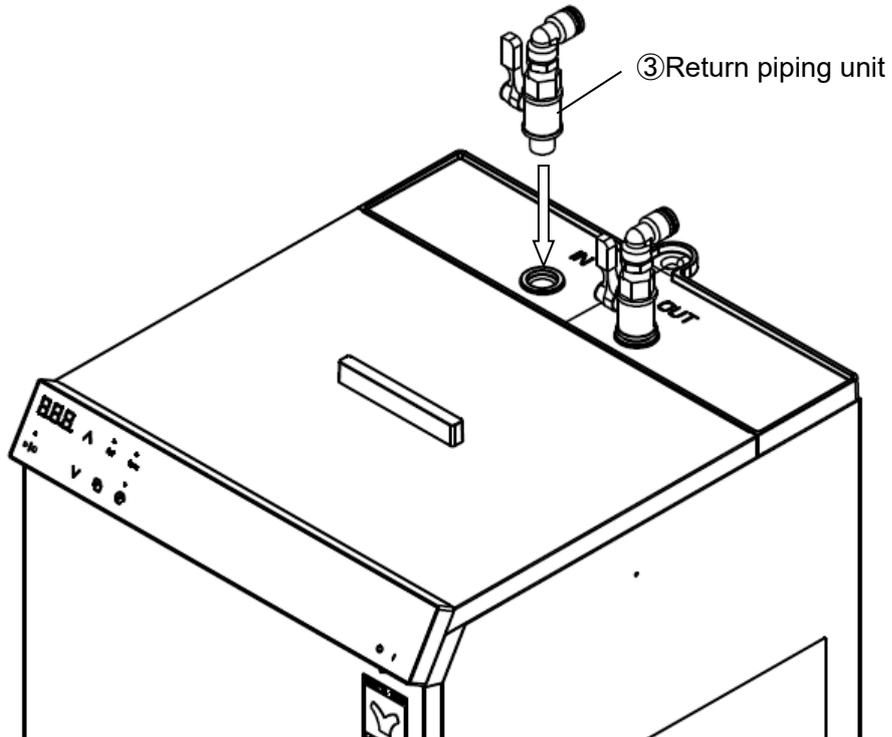


# 13. OPTIONAL ACCESSORIES

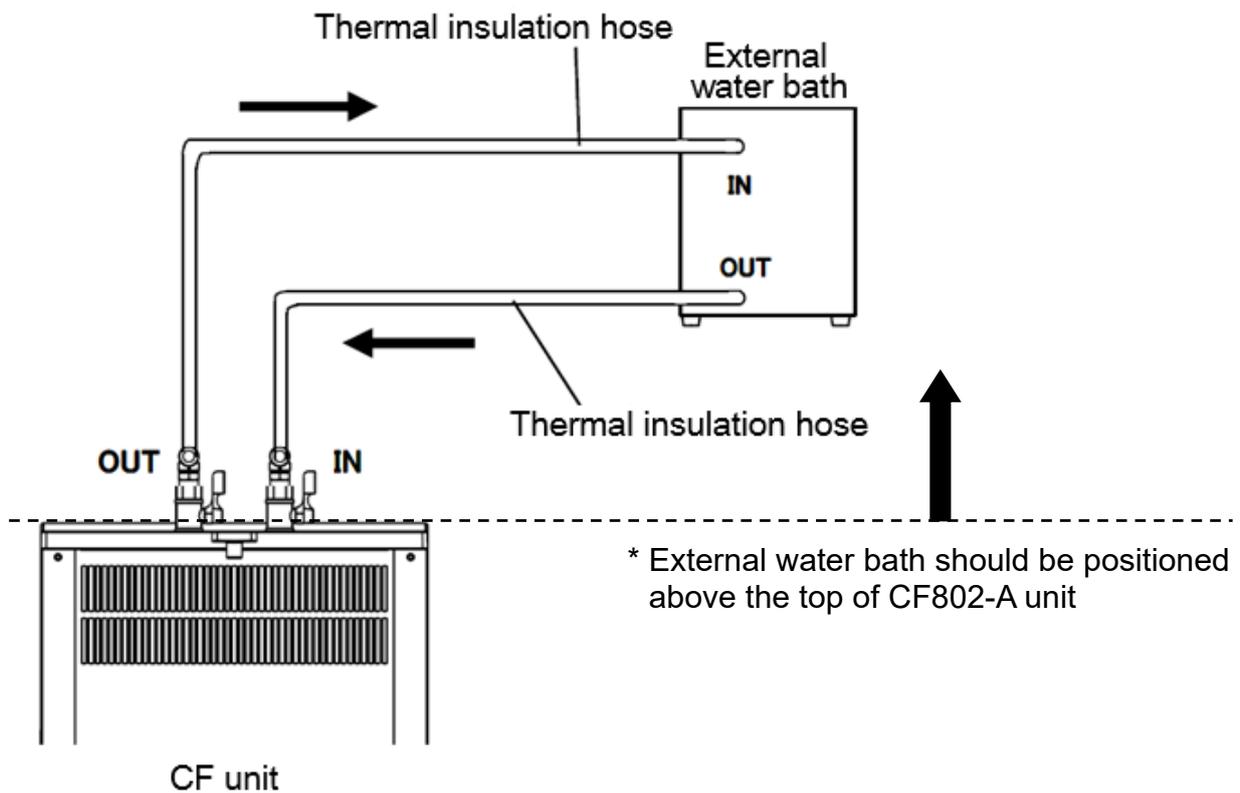
## Seal lid for External Open Connection

### • Instructions

- (1) Change the fitting for the return connection with the return piping unit.



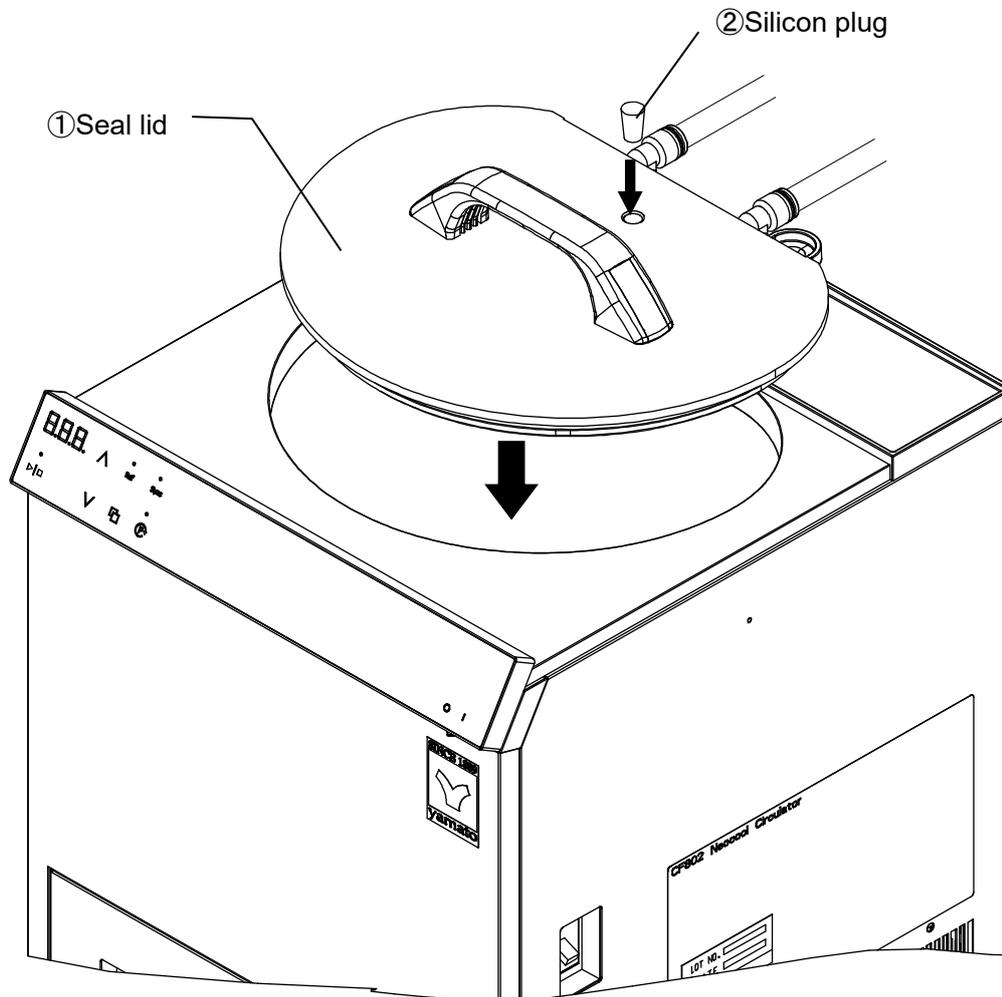
- (2) Connect circulation hoses to an open water bath. Be sure that circulation lines are the minimum required lengths.



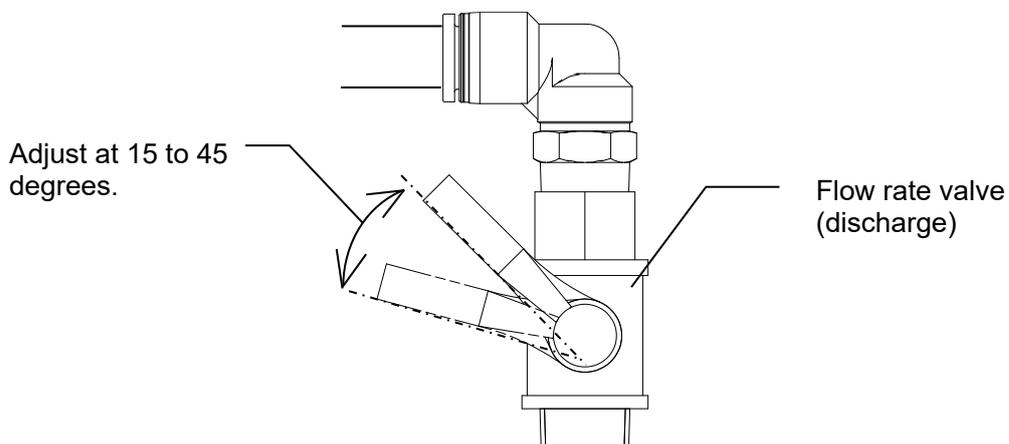
# 13. OPTIONAL ACCESSORIES

## Seal lid for External Open Connection

- (3) Close the flow rate valves of both discharge and return ports, and pour circulating water in the open water bath and the reservoir of CF802-A.
- (4) Push the lid in the opening on top of unit.
- (5) Plug the hole on the seal lid with silicon plug.



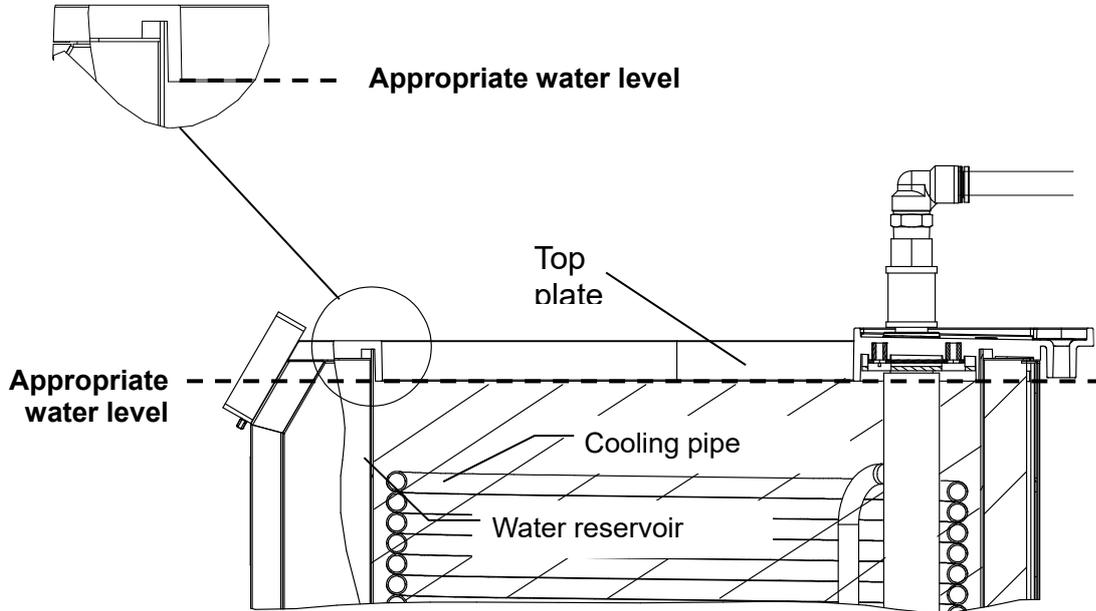
- (6) Open the flow rate valves of both discharge and return ports. Adjust the aperture of each valve at 15 to 45 degrees. Be sure to keep the opening within that range. After opening the valves, press the Pump key to start up the pump and bleed air from the hoses.



# 13. OPTIONAL ACCESSORIES

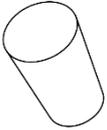
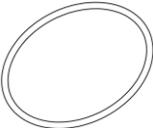
## Seal lid for External Open Connection

- (7) Press the Pump key to stop the pump and add circulation water to the appropriate level. With the flow rate valve open, remove silicon plug and the water level of the reservoir will gradually increase. When it reaches the appropriate level as shown in the figure below, close the flow rate valve and plug the hole with silicon plug.



- (8) Once the reservoir has been filled to the appropriate level, ensure that the flow rate valves of both discharge and return ports are properly closed.
- (9) **Flow rate valves must be open while the circulation pump is running, and must be closed when the pump is stopped.** Stopping the pump without closing the valve may result in overflow of either CF unit reservoir or external water bath.
- (10) **Adjust aperture of flow rate valve at the discharge port so that the water level of external bath keeps constant during the circulating operation. For the valve at the return port, on the other hand, leave it fully open.**

### • List of Consumables/Replacement Parts for Seal lid for External Open Connection

Part name	Part code	Standard
 Silicon plug	LT00039382	Upper diameter $\phi$ 12 mm, lower diameter $\phi$ 9 mm
 O-ring	LT00039456	G210 silicon (white)

# 13. OPTIONAL ACCESSORIES

## List of Options

### External interlock input terminal

Model OCF98

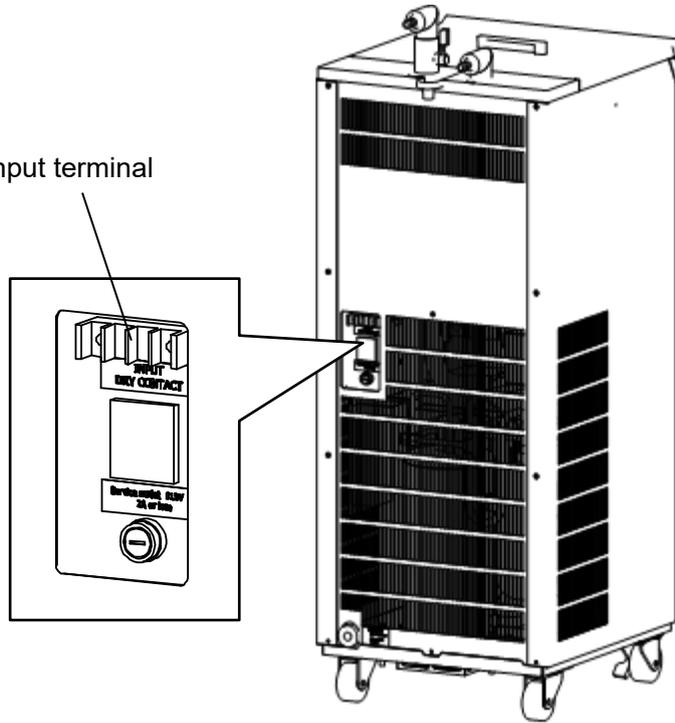
Product code 281485

This function is to start and stop cooling operation + circulation operation, or only circulation operation of unit by external control input (no-voltage a contact input).

#### Terminal block placement

On the back of unit

External interlock input terminal



#### Connection instructions

##### Connect external device to terminal contacts (Terminal screw size: M4)

Connect external device to terminals on the rear panel of main unit.

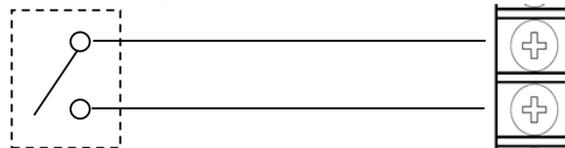
No-voltage a contact (relay/switch contact, etc.) can be connected as a control input.

Approx. 12V DC/80 mA will be applied to the contact (relay/switch contact, etc.).

Select relay or switch based on the above voltage/current

Control contact: no-voltage a contact

Unit side: external interlock input terminal



##### Control system

Control contact open: operation stops

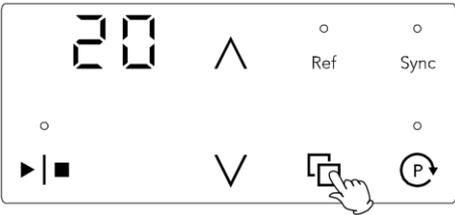
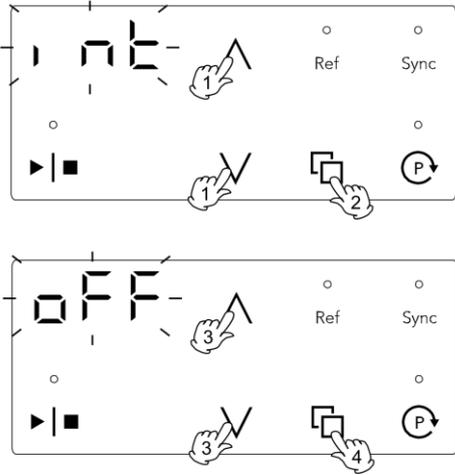
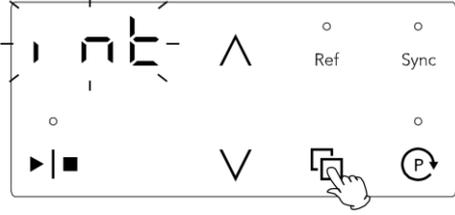
Control contact short circuited: operation starts

Do not apply voltage to the external interlock input terminal. Equipment malfunction may result.

# 13. OPTIONAL ACCESSORIES

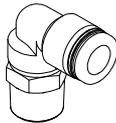
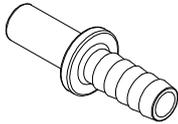
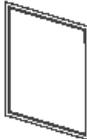
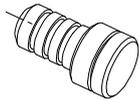
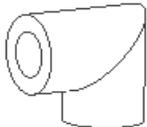
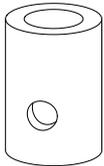
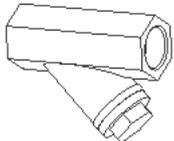
## External interlock input terminal

### • Setting instructions

<p><b>Make settings for external interlock function (int) in the user setting.</b></p> <p>OFF: Enables the Run/Stop key (cooling operation) and the Pump key (circulation operation) (Default setting)</p> <p>Cir: Enables the Run/Stop key (cooling operation), and disables the Pump key (circulation operation). Circulation operation is performed while the control contact is short circuited. Temperature display shows "Cir" (1 sec) and temperature reading (4 sec) alternately after returning from the user setting.</p> <p>ALL: Disables the Run/Stop key (cooling operation) and the Pump key (circulation operation). Cooling and circulation operations are performed while the control contact is short circuited. Temperature display shows "ALL" (1 sec) and temperature reading (4 sec) alternately after returning from the user setting.</p>	
<p><b>1 Enter user setting</b></p>	 <p>Turn power ON (I) and press  for three seconds while temperature reading is on the screen. Unit enters user setting.</p> <p>Press 3 sec.</p>
<p><b>2 Change the external interlock function setting</b></p>	 <ol style="list-style-type: none"> <li>① Select "int" using the <math>\wedge \vee</math> keys. Temperature display: "int" flashes</li> <li>② Press . Temperature display: Current set value flashes.</li> <li>③ Use the <math>\wedge \vee</math> keys to change the setting (OFF, Cir, ALL).</li> <li>④ Press  to finalize. Temperature display: Set value is shown for about one second. After completion, the screen returns to ①.</li> </ol>
<p><b>3 Exit user setting</b></p>	 <p>After completing the setting, press and hold for two seconds. Display reverts to initial screen and shows temperature reading.</p> <p>Press 2 sec.</p>

\* When "Cir" is selected in the step 2 above, temperature display shows "Cir" (1 sec) and temperature reading (4 sec) by turns, and when selected "ALL", it shows "ALL" (1 sec) and temperature reading (4 sec).  
 If abnormalities such as Temperature lower limit alert (Lo) and Temperature sensor failure (E01) occur in above state, error codes will show in priority to above indications.

# 14. REPLACEMENT PARTS LIST

Part name	Part code	Standard
One-touch connector (L-type)	 LT00039314	R3/8
Hose nozzle	 LT00039316	10 mm O.D. connectors for flexible hose with 9 mm I.D.
Intake dust filter	290 × 315mm 	CF80243100 Front air intake
Drain plug	 CF80241060	For 16 mm I.D. hose
Circulation port cover	 CF30240211	Insulation material (discharge port, return port)
Valve cover	 CF80240841	Insulation material (discharge port)
Silicon hose	LT00007489	φ12×φ16mm 1.0m condensation drain hose (Included)
Strainer	 LT00036771	20-mesh Rc3/8
Insert sleeve	 LT00039454	Applicable hose: φ6.5 × φ10 mm

# 15. LIST OF HAZARDOUS SUBSTANCES



Never attempt to process explosives, flammables or any items which contain explosives or flammables.

Explosive substances	① Nitroglycol, Glycerine trinitrate, Cellulose Nitrate and other explosive nitrate esters
	② Trinitrobenzen, Trinitrotoluene, Picric Acid and other explosive nitro compounds
	③ Acetyl Hydroperoxide, Methyl Ethyl Ketone Peroxide, Benzoyl Peroxide and other organic peroxides
	④ Metallic Azide, including Sodium Azide, etc.
Combustible substances	① Metal "Lithium" ② Metal "Potassium" ③ Metal "Natrium" ④ Yellow Phosphorus
	⑤ Phosphorus Sulfide ⑥ Red Phosphorus ⑦ Phosphorus Sulfide
	⑧ Celluloids, Calcium Carbide (a.k.a, Carbide) ⑨ Lime Phosphide ⑩ Magnesium Powder
	⑪ Aluminum Powder ⑫ Metal Powder other than Magnesium and Aluminum Powder
	⑬ Sodium Dithionous Acid (a.k.a., Hydrosulphite)
Oxidizing substances	① Potassium Chlorate, Sodium Chlorate, Ammonium Chlorate, and other chlorates
	② Potassium Perchlorate, Sodium Perchlorate, Ammonium Perchlorate, and other perchlorates
	③ Potassium Peroxide, Sodium Peroxide, Barium Peroxide, and other inorganic peroxides
	④ Potassium Nitrate, Sodium Nitrate, Ammonium Nitrate, and other nitrates
	⑤ Sodium Chlorite and other chlorites
	⑥ Calcium Hypochlorite and other hypochlorites
Flammable substances	① Ethyl Ether, Gasoline, Acetaldehyde, Propylene Chloride, Carbon Disulfide, and other substances having ignition point of 30 or more degrees below zero.
	② n-hexane, Ethylene Oxide, Acetone, Benzene, Methyl Ethyl Ketone and other substances with ignition point between 30 degrees below zero and less than zero.
	③ Methanol, Ethanol, Xylene, Pentyl n-acetate, (a.k.a. amyl n-acetate) and other substances having ignition point of between zero and less than 30 degrees.
	④ Kerosene, Light Oil, Terebinth Oil, Isopenthyll Alcohol (a.k.a. Isoamyl Alcohol), Acetic Acid and other substances having ignition point of between 30 degrees and less than 65 degrees.
Combustible gas	Hydrogen, Acetylene, Ethylene, Methane, Ethane, Propane, Butane and other gases combustible at 15°C, ambient air pressure.

\* When using highly flammable liquids such as ethanol as antifreeze liquids, be sure to provide adequate ventilation and not to allow anything that may be a source of fire or ignition (static electricity, etc.) approached.

# 16. STANDARD INSTALLATION MANUAL

Install this equipment according to following format (check options and special specifications separately).

Model	Serial Number	Installation Date	Charged Personnel or Company Name for Installation	Installation proved by	Judgment

No	Item	Implementation method	Chapter No. & Reference page of instruction manual	Judgment
<b>Specifications</b>				
1	Accessories	- Quantity check according to the accessories column	11. SPECIFICATIONS P.33	
2	Installation	-Visual check of surrounding conditions Caution: Take care for environment -Securing a space	3. PRE-OPERATION PROCEDURES -Choose an appropriate ... P.11	
		-Fill the reservoir with circulating water	4. INSTALLATION PROCEDURES ▪ Installation Procedure P.14-17	
<b>Operation-related matters</b>				
1	Power supply voltage	- Measure line voltage (power distribution board of facilities, outlet etc.) with a tester. - Measure line voltage during operation (must meet required voltage). Caution: Use a compliant device to install	1. SAFETY PRECAUTIONS -Ground wire MUST ... P.3 3. PRE-OPERATION PROCEDURES -Always connect power cable to ... P.12 11. SPECIFICATIONS -Standard-Power Supply P.33	
2	Starting operation	-Start operation. Check that circulating water is flowing properly. Set at 10 °C and check the stabilization state. Make sure there are no water leaks	4. INSTALLATION PROCEDURES ▪ Installation Procedure P.15-17 5. OPERATION PROCEDURES P.18-23	
<b>Description</b>				
1	Operational descriptions	- Explain operations of each component and handling precautions according to instruction manual.	1. SAFETY PRECAUTIONS P.3-7 5. OPERATION PROCEDURES P.18-25 -6. HANDLING PRECAUTIONS 15. LIST OF HAZARDOUS SUBSTANCES P.54	
2	Display code	- Explain about error codes and procedures for reset according to instruction manual.	9. TROUBLESHOOTING P.30-32 -10. SERVICE & REPAIR	
3	Maintenance and Inspection	- Explain about maintenance of equipment and each component according to instruction manual.	6. HANDLING PRECAUTIONS P.24-27 -7. MAINTENANCE PROCEDURES	
4	Completion of installation Matters to be Stated	- Enter the date of installation and name of the charged personnel in the main unit nameplate. - Write necessary information on warranty card and hand over it to customer - Explain how to contact with service personnel	10. SERVICE & REPAIR P.32	

## Limited Liability

**Always operate equipment in strict compliance to the handling and operation procedures set forth by this instruction manual.**

**Yamato Scientific Co., Ltd. assumes no responsibility for malfunction, damage, injury or death, resulting from negligent equipment use.**

**Never attempt to disassemble, repair or perform any procedure on CF802-A Neocool Circulator which are not expressly mandated by this manual. Doing so may result in equipment malfunction, serious personal injury or death.**

## Notice

- **Instruction manual descriptions and specifications are subject to change without notice.**
- **Yamato Scientific Co., Ltd. will replace flawed instruction manuals (pages missing, pages out of order, etc.) upon request.**

Instruction Manual

Neocool circulator

model CF802-A

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Revised:

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