Neo Cool Circulator

CF750/750S

Instruction Manual

Third edition

- **Thank you very much for purchasing this Yamato CF750/750S Neo Cool Circulator.**
- **Please read the “Operating Instructions” and “Warranty” before operating this unit to assure proper operation. After reading these documents, be sure to store them securely together with the “Warranty” at a handy place for future reference.**

Warning: Before operating the unit, be sure to read carefully and fully understand important warnings in the operating instructions.

Yamato Scientific Co., Ltd.

This paper has been printed on recycled paper.

Table of Contents

1. Safety precautions

Explanation of pictograms

About pictograms

A variety of pictograms are indicated in this operating instruction and on products for safe operation. Possible results from improper operation ignoring them are as follows.
Be sure to fully understand the descriptions below before proceeding to the text.

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

Caution Indicates a situation which may result in minor injury (Note 2) and property damages (Note 3.)

（Note 1）Serious injury means a wound, an electrical shock, a bone fracture or intoxication that may leave after effects or require hospitalization or outpatient visits for a long time.

（Note 2）Minor injury means a wound or an electrical shock that does not require hospitalization or outpatient visits for a long time.

（Note 3）Property damage means damage to facilities, devices and buildings or other properties.

Meanings of pictograms

This pictogram indicates a matter that encourages the user to adhere to warning (“caution” included).
Specific description of warning is indicated near this pictogram.

This pictogram indicates prohibitions
Specific prohibition is indicated near this pictogram.

This pictogram indicates matters that the user must perform
Specific instruction is indicated near this pictogram.

1. Safety precautions

List of symbols

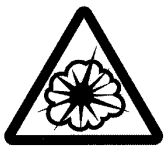
Warning

General warnings

Danger!: High voltage

Danger!: High temperature

Danger!: Moving part



Danger!: Hazard of explosion

Caution

General cautions

Electrical shock!

Burning!

Caution for no liquid heating!

Caution for water leak!

For water only

Poisonous material

Prohibitions

General bans

Fire ban

Do not disassemble

Do not touch

Compulsions

General compulsions

Connect ground wire

Install levelly

Pull out the power plug

Periodical inspection

1. Safety precautions

Warning・Cautions

⚠ Warning

Never operate the unit in an atmosphere containing flammable or explosive gas

Never operate the unit in an atmosphere containing flammable or explosive gas.
Otherwise, an explosion or a fire may result since the unit is not explosion-proof.
See section “14. List of dangerous materials” on page52.

Be sure to connect the ground wire.

Be sure to connect the ground wire correctly. Otherwise, electrical leak may result and cause an electrical shock or a fire.

Ban on operation when an abnormality occurs

When a smoke or an unusual odor is seen or sensed, immediately turn the ELB on the main unit off and pull out the power plug from the main power supply. A fire or an electrical shock may result.

Never use electrical power cords bundled.

When these are used bundled, they might overheat causing a fire.

Take care not to damage electrical power cords.

Avoid tightly bend, pull with a strong force or twist to prevent electrical power cords from damaging. A fire or an electrical shock may result.

Never try to disassemble or alter the unit.

Never try to disassemble or alter the unit. A malfunction, a fire or an electrical shock may result.

⚠ Caution

When a thunder is heard.

When a thunder is heard, turn the main power off immediately. A malfunction, fire or an electrical shock may result.

Never try to touch a hot part.

Some parts of the unit are hot during and immediately after operation. Take special care for possible burning.

Never use an explosive or a flammable material with this unit.

Never use an explosive material, a flammable material or a material containing them. An explosion or an electrical shock may result.
See section “14. List of dangerous materials” on page52.

2. Before operating the unit

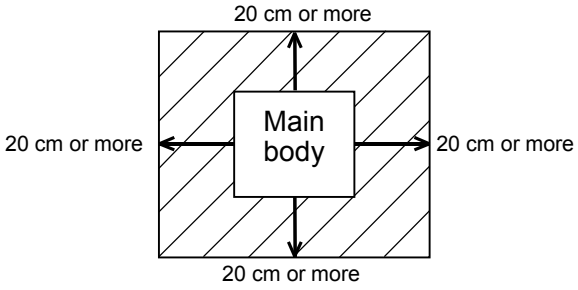
Precautions when installing the unit

1. Carefully select an installation site.

Take special care not to install the unit at a place described below:

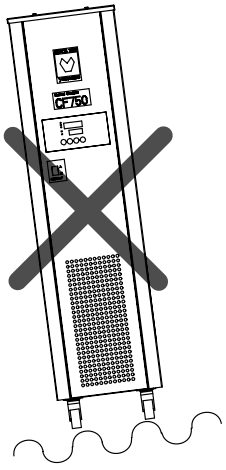
- Uneven surfaces or dirty surfaces
- Where flammable gas or corrosive gas exists
- Where the ambient temperature is 35℃ or more
- Where temperature changes severely
- Where humidity is high
- Where subject to direct sunlight
- Where vibration is severe

Install this unit at a place with spaces shown below.



2. Install the unit on a level surface.

Install the unit on a level surface. If the whole bottom surface of the unit does not contact the surface evenly, vibrations or noises may result. This might cause unexpected troubles or malfunctions.



Unit Weight CF750：Approx.60 kg, CF750S：Approx.65kg

When lifting the unit for transportation and installation, carefully handle it by at least two people.

3. Installation

The unit might fall down or move by an earthquake or an impact resulting a personal injury. We recommend making safety measures such as to avoid installing the unit at a place other than busy places.

4. Secure sufficient ventilation for the unit.

Do not operate the unit when its side panels and vent holes are blocked.
Internal temperature of the unit will rise degrading the performance and an accident, a malfunction or a fire may result.

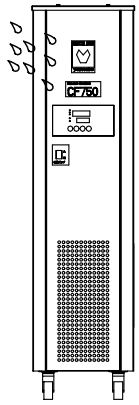
2. Before operating the unit

Precautions when installing the unit

⚠ Warning

5. Do not operate the unit at such a place that may subject to splash.

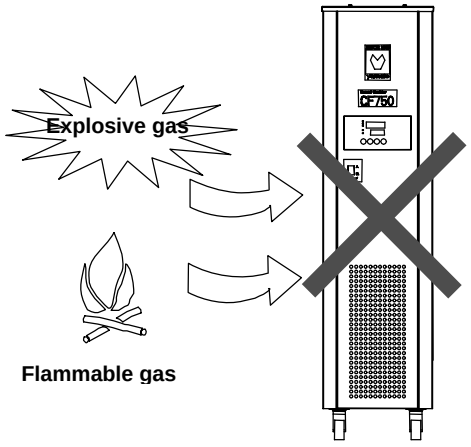
Do not operate the unit at such a place that may subject to splash. Liquid entering the inside may cause an accident, a malfunction, an electrical shock or a fire.



6. Never operate the unit in an atmosphere containing flammable or explosive gas.

Never operate the unit in an atmosphere containing flammable or explosive gas. Since the unit is not explosion-proof, an arc is discharged when switching the ELB “ON” and “OFF” and during operation and a fire or an explosion may result.

See the section “14. List of dangerous materials” on page 52 for flammable and explosive gases.



7. Be sure to connect the power plug to the dedicated power distribution panel or a wall outlet.

Use a power distribution panel or a wall outlet that meets the electrical capacity of the unit.

Electrical capacity:	CF750	AC100V	10A
	CF750S	AC100V	15A（service outlet 5A）

* When the unit will not start even when you turn the Electric Leakage Breaker to “ON”, check for low main voltage or if the unit is connected to the same power supply line as other devices and connect it to another line if necessary.
Avoid connecting too many devices using a branching outlet or extending a wire with a cord reel or refrigerating function and temperature controlling function may degrade due to voltage drop.

Do not connect the unit to any parts or lines other than a correct power supply line such as a gas pipe, a water pipe or a telephone line.
Otherwise, an accident or a malfunction may result.

2. Before operating the unit

Precautions when installing the unit

⚠ Caution

8. Handling of a power cord

Never use electrical power cords bundled. When these are used bundled, they might overheat causing a fire.

Do not convert, forcibly bend, twist or pull the power cord. Otherwise, a fire or an electrical shock may result.

Do not place the power cord under a desk or a chair, or sand between objects to avoid it from being damaged.
Otherwise, a fire or an electrical shock may result.

Do not place the power cord close to a stove or other heat generating device. Sheath of the cord may burn and result in a fire or an electrical shock.

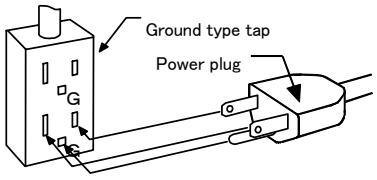
If the power cord should be damaged (exposure of core wire or disconnection), immediately turn the ELB off, turn the power supply off and ask your dealer to replace the cord. If the unit is operated with a damaged power cord, a fire or an electrical shock may result.

Connect the power cord to an appropriate wall outlet.

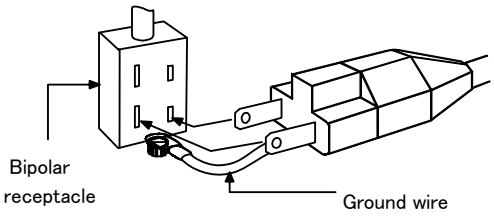
9. Be sure to connect the ground wire.

- Never fail to connect the earth wire (green core wire of the power cord) to the ground wire or to the ground terminal to prevent an electrical shock due to earth leakage.
- Never connect the earth wire to a gas pipe or a water pipe. Otherwise, a fire may result.
- Never connect the earth wire to the earth terminal of a telephone line or a lightening rod. Otherwise, a fire or an electrical shock may result.
- Never use a branching outlet, which might generate heat and cause a danger.

We recommend use of a ground type outlet tap.



When a bipolar type outlet tap is used



Insert the ground adaptor included as an option, into a power plug confirming the polarity of the outlet. Connect the grounding wire (green) of the ground adaptor to the ground terminal on the power supply equipment.

When there is no ground terminal.

In this case, class D grounding work is necessary and please consult your dealer or our nearest sales office.

Do not connect the grounding wire to any parts or lines other than a correct grounding terminal such as a gas pipe, a water pipe or a telephone line.
Otherwise, an accident or a malfunction may result.

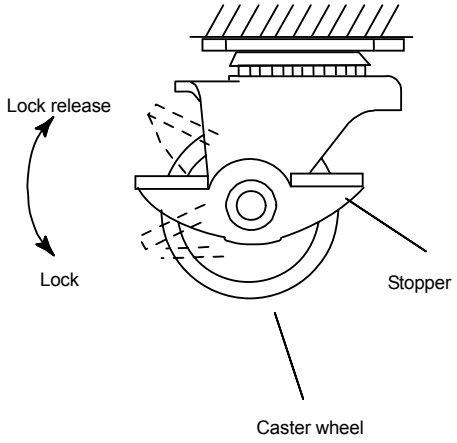
2. Before operating the unit

Installation method and cautions

(1) Release the caster wheel stoppers before transporting the unit.

Push up the caster wheel stopper levers to release lock.

（Only two caster wheels at the front have stoppers.）



(2) Select an installation site.

Make sure that the caster wheels at four points rest completely on a flat surface and there is not teetering or inclination, and then lock and fix the stopper locks of the caster wheels.

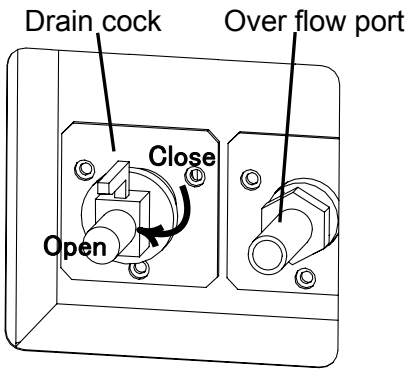
(3) ・Checking of the drain cock

Make sure that the drain cock is at the “Close” position (Up position) as shown in the drawing in the right.

・Checking of the overflow port

Connect the over flow hose and prepare an optional drain pan.

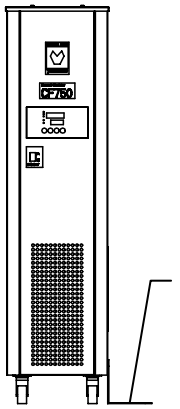
※The nozzle is located on the right side.



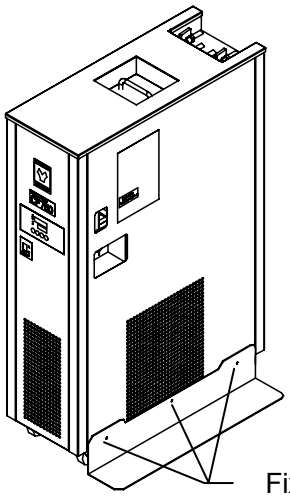
(4) When necessary, install a tip-resistant clamp.

Cautions:

- The drawing shows an example of installation on the right side but you can install a clamp on the left side as well.
- When a tip-resistant clamp is installed, the unit size will increase accordingly. Take care when passing by the unit or working on it.
- A tip-resistant clamp cannot assure a perfect safety or a prevention of topple-over. We recommend implementing additional safety measures such as a secure fixing.



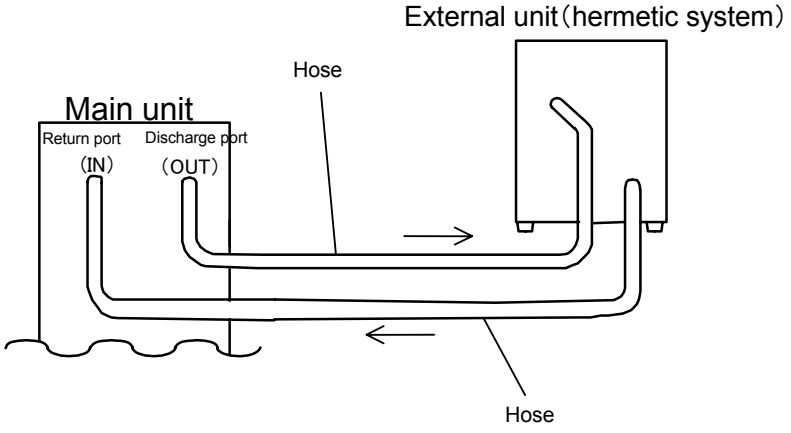
Tip-resistant clamp



Fix with screws

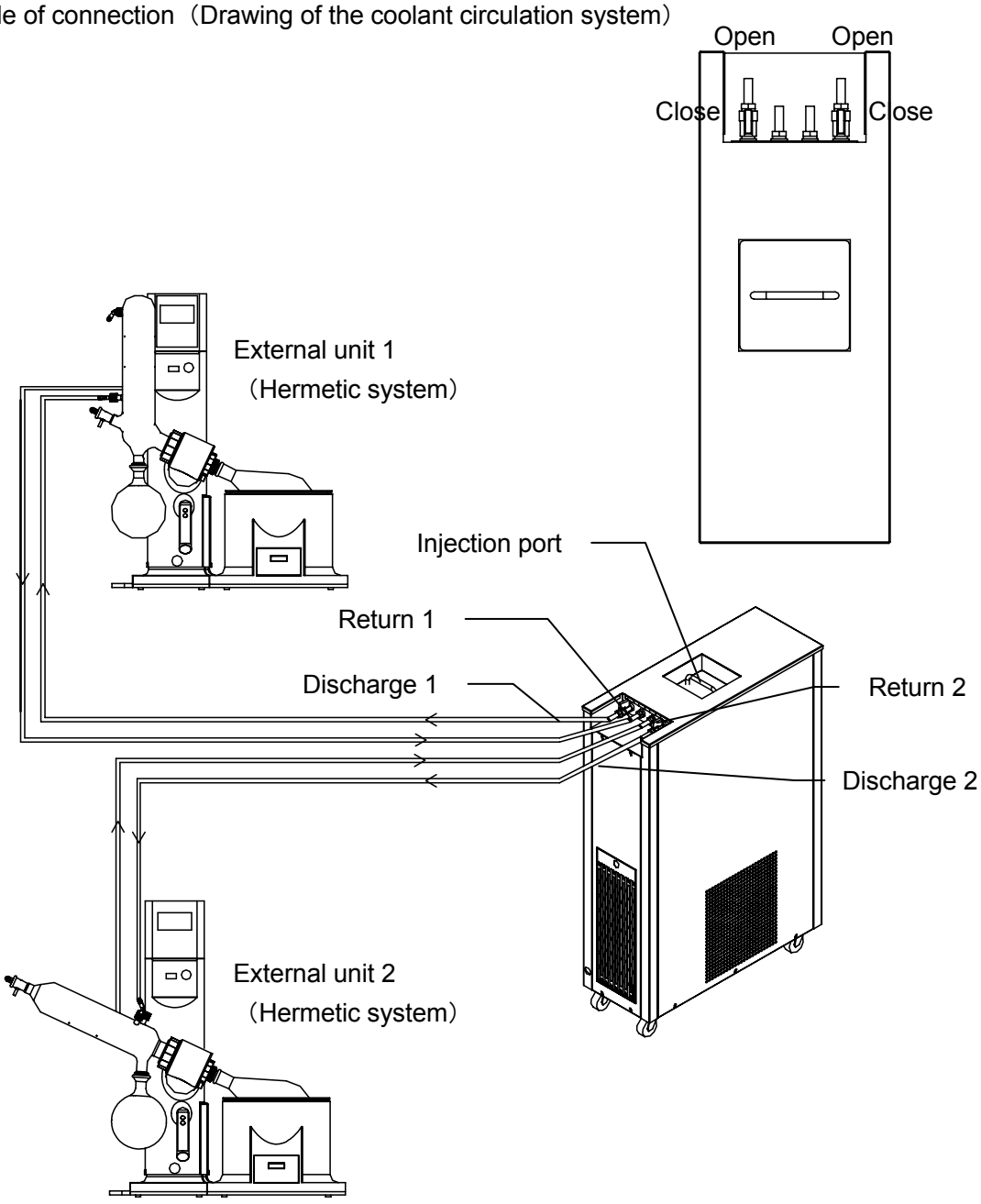
(5) Connect the hoses.

- The unit is specially designed to connect to an external hermetic circulating route.
- Connect the connection port on the main unit to the circulation route of an external hermetic system so that any leakage will not occur. Connect the hose to the return port (IN) and the discharge port (OUT) of the main unit. Its hose nipple diameter is 10.5㎜.



※Attach a hose band and tighten it at the connecting point between the unit and the hose.

(6) Example of connection（Drawing of the coolant circulation system）



・The internal piping of the unit has with two discharge ports and allows cooling in two systems(two external units).

・Carefully check the connecting piping before use.

※About the circulation pump switch

The circulation pump switch can be operated alone free of relations with the temperature controller.

Turn the breaker on, check that proper circulation is made in each pipe and that the unit is not operating with no-load, and then turn the switch “On”.

When circulation is not necessary, not only close the both cocks but also turn the switch “Off” to prolong the pump life.

※Operation and indicated data is for when only one side is used (one system is connected).

Note that the flow and the lift might decrease when both sides are used (two systems are connected) compared with when only one side is used.

(7) Cautions about the circulation paths

- Carefully check the circulation direction before connecting. Accidents or malfunctions to the unit and to the circulation paths may result.
- Make the circulation paths at a minimum length. Greater pipe resistance will lessen circulation amount decreasing the cooling efficiency. For capacity of the circulation pump, see “Flow and lift curves (reference data)” on P.37.
- Be sure to connect paths so that they will create a circulating path. Never connect it to a water pipe or a gas pipe. Otherwise, an accident or a malfunction may result.
- Take care for circulating amount and the withstand voltage of the unit connected via a circulating path. Otherwise, an accident or a malfunction may result.
- Never connect a drive or unit with a drive to the unit connected via a circulating path. Otherwise, an accident or a malfunction may result.
- Change flow only slowly. Sudden change in flow might shorten the service life of the stirrer pump.
- Take care for possible back flow of circulating fluid when connecting this unit to a circulation destination located at a higher position than this unit. A back flow may cause spill over the water bath of this unit. Install a separate valve to the circulating path to prevent a back flow.

(8) Connecting the power supply

Make sure that the electric leakage breaker is “Off” and then connect the power plug to the power distribution panel and an outlet.

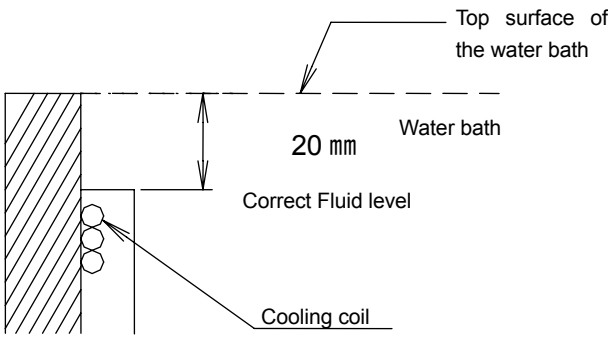
(9) Select a circulating fluid.

- Water: when the set temperature is 10℃ or above.
  Antifreeze fluid: when the set temperature is -10℃ or below.
  （ethyl alcohol, ethylene glycol, Nybrine）

- Coagulation point of an antifreeze fluid will change depending on its density or a type. Select an antifreeze fluid whose coagulation point is lower than the operating temperature by at least 10℃. When a fluid with a coagulation point above that temperature is used, the freezer assembly will freeze and might degrade heat exchange performance. An accident or a malfunction of the unit may result if the circulating path freezes.
- Antifreeze fluid density will change after a long time of use. If you continue to use the unit with such an antifreeze fluid, the fluid may freeze or its viscosity may increase and cause a malfunction of the pump.
- Use distilled water or tap water as the circulating fluid. Use of low quality water will cause scale or stones deposit on the heater or in the pump to decrease the performance and a malfunction may result. (such as well water)
- Use of a circulating fluid with a greater specific gravity or a viscosity will cause an overload to the pump and prevent it from exercising the maximum performance. (Fluorinert or Garden)
- Never use a corrosive substance or any substance that will produce a corrosive substance when heated. Otherwise, a malfunction may result. (For example, Fluorinate)
- Never use a substance whose vapor is harmful to human health when inhaled. Otherwise, an injury may result. (Methyl alcohol)

(10) Pour circulating fluid in the bath.

- Check for overflow. Connect the overflow hose to the overflow port and place its tip in the drain pan. Prepare a drain pan by yourself.
- Confirm that the discharge cock is securely closed and pour circulating fluid into the bath until the cooling coil is completely soaked. Observe the fluid level shown in the right diagram.



- Perform the following works with this status.
  Turn the ELB and the Circulation pump switch keys on to start circulating the fluid.
- When an external hermetic system is connected, open the circulating discharge valve to start circulation to the devices of the external hermetic system to be cooled, and the circulating fluid level will be lower when circulation becomes stable. Add circulating fluid up to the correct fluid level.
- When you have finished adding up circulating fluid, turn the ELB “Off”.

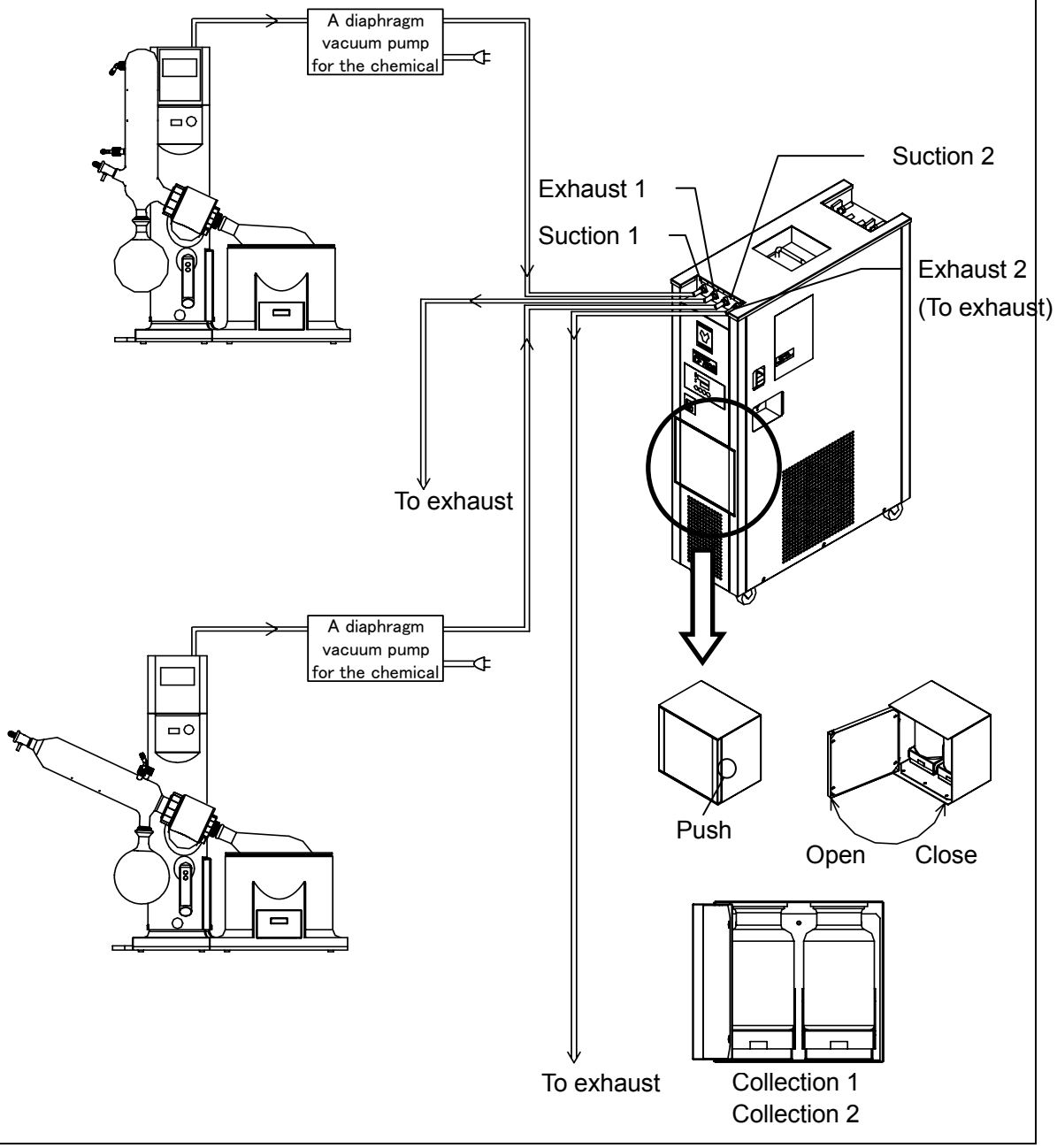
Note: When pouring circulating fluid, take care not to pour it violently but to pour gently.

⚠ **Take care so that circulating fluid will not splash over this unit. When electric components become wet with circulating fluid, an earth leakage or an electric shock may result. If the operation panel is wet, complete wipe moisture off.**

(11) Use of a model CF750S cooling trap

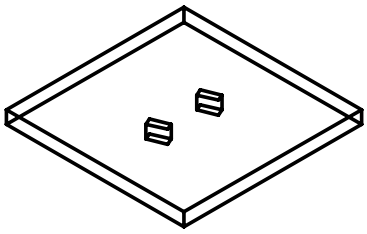
・The target substance is liquefied (condensed) by cooling exhaust gas that contains the vapor of the substance to be processed.

Example of connection



(12) How to attach or remove a model CF750S packing.

※A packing has been attached at the time of shipping from the plant.



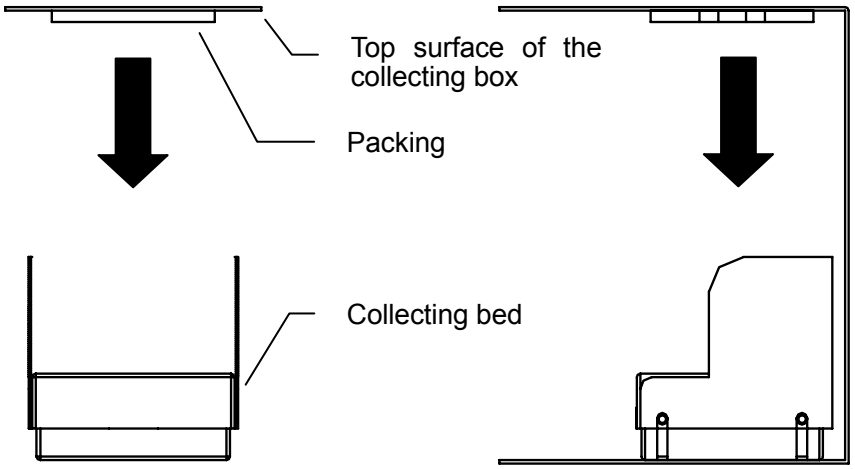
Size : 70 ㎜ square φ7 ㎜ x 2

Material : Fluororubber

※Packing is a consumable part.

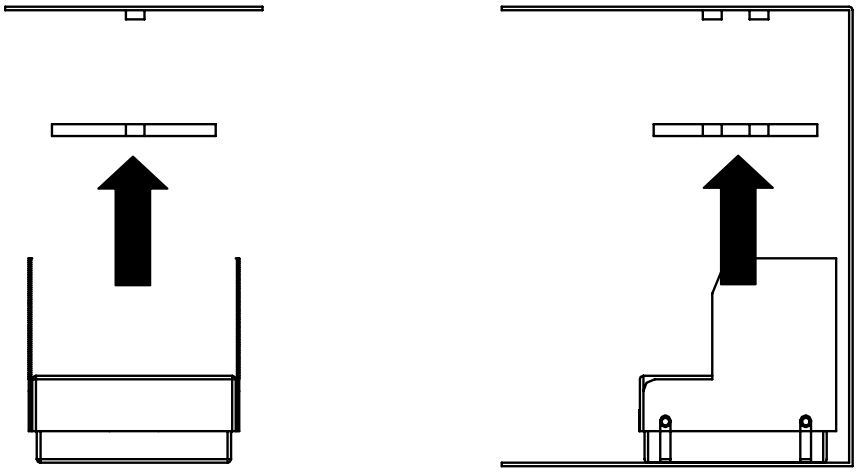
It may swell or degraded due to chemicals.

【How to remove the packing】



Slowly pull out of the top surface

【How to attach a packing】

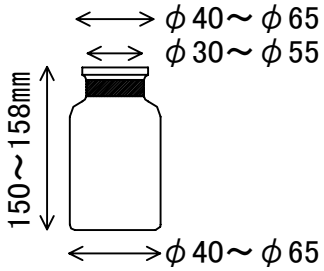


Put the packing so that its two holes fit over the pipes protruding on the top surface.

※Chemicals may be left on the bottle or the packing. Be sure to wipe any chemicals or put on gloves before handling them.

※Take care for the bottle fixing plate on the collecting bed when working.

(13) How to install and remove the model CF750S collecting bottle

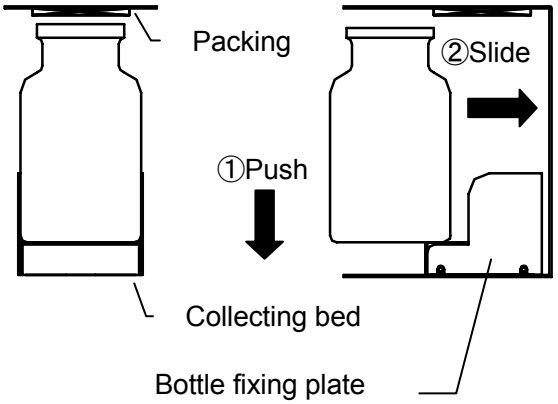


Confirm the size of the collecting bottle.

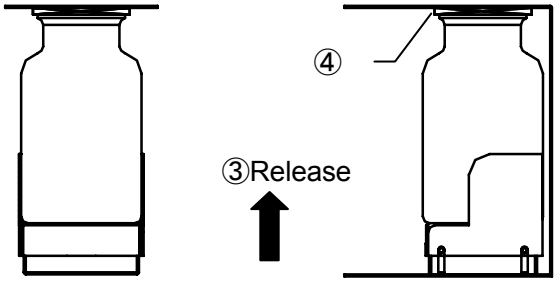
- Sizes must meet those shown in the left.
- The upper flange surface must be frosted.

When removing/attaching the collecting bottle, hold the neck (shown in black) of it.

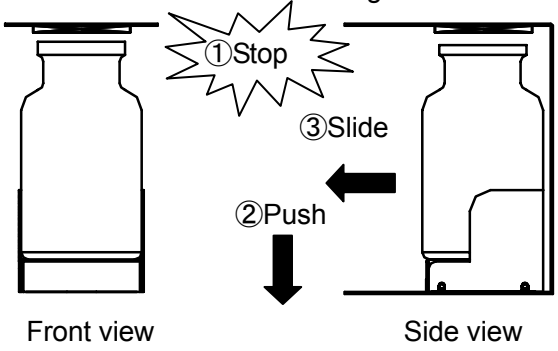
【How to attach the collecting bottle】



① Put the collecting bottle on the collecting bed and push the bed downward.
② With the collecting bed pushed in, slid the bottle to the deeper direction.
③ Slowly ease your grip holding the collecting bottle.
④ Attachment is all right if the top rim of the collecting bottle touches the packing evenly.



【How to remove the collecting bottle】



① Confirm that the vacuum pump in the piping system is stopped.
② Hold the collecting bottle and push the collecting bed downward.
③ Slide the collecting bottle toward you.

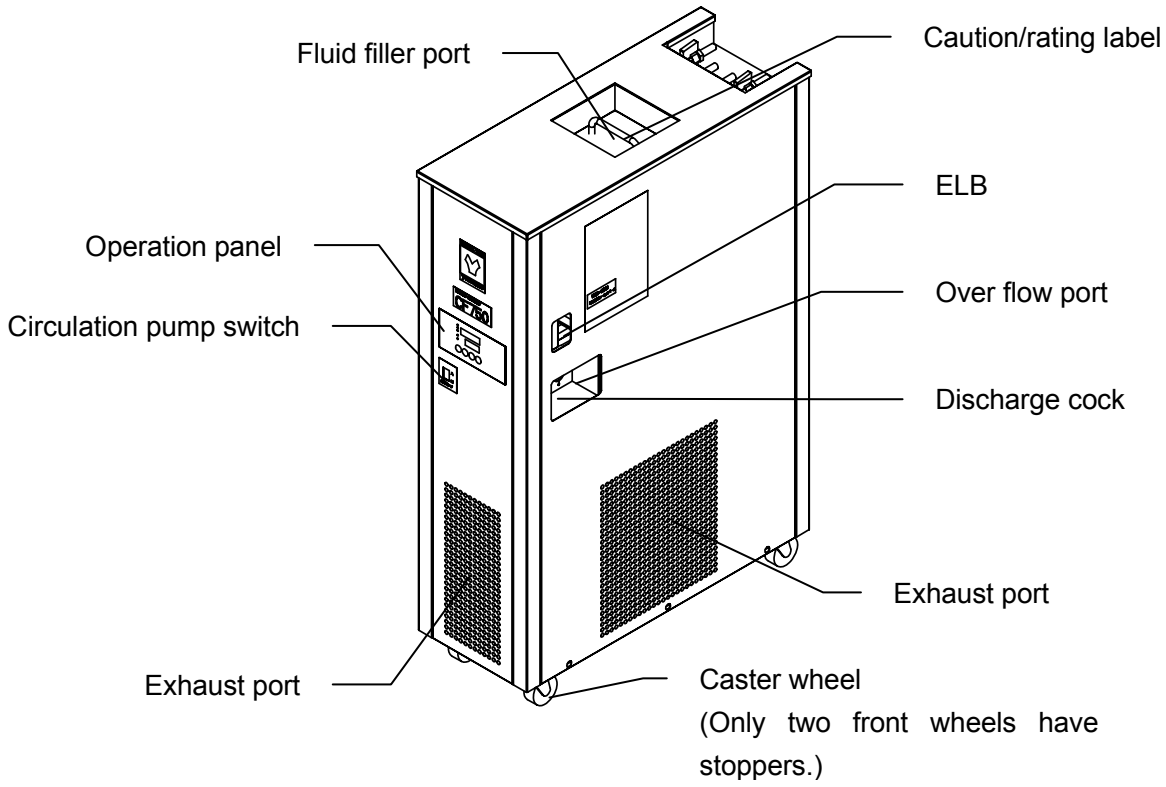
※Chemicals may be left on a bottle or a packing. Be sure to wipe any chemicals or put on gloves before handling them.

※Take care for the bottle fixing plate on the collecting bed when working.

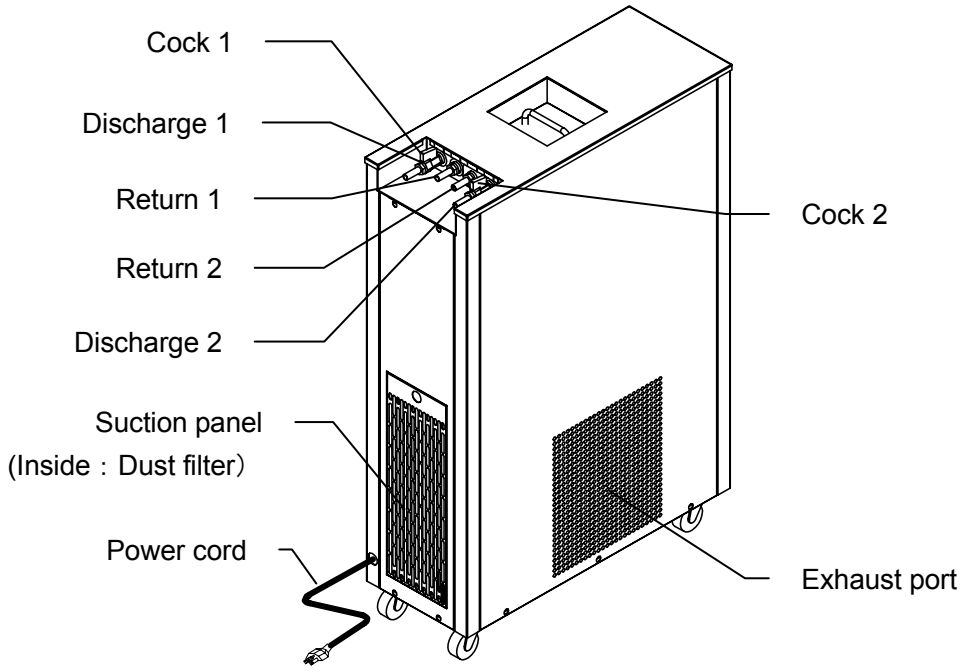
3. Names and functions of parts

Main unit

Front view of CF750



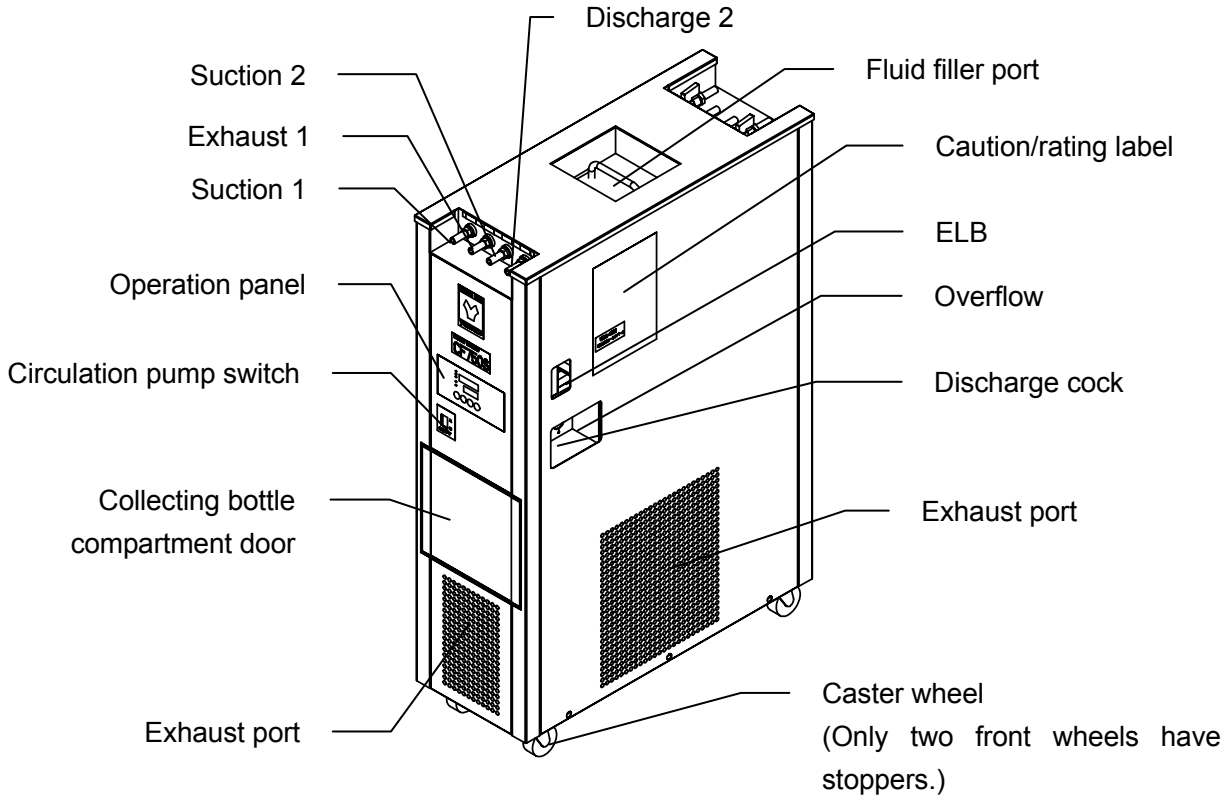
Rear view of CF750



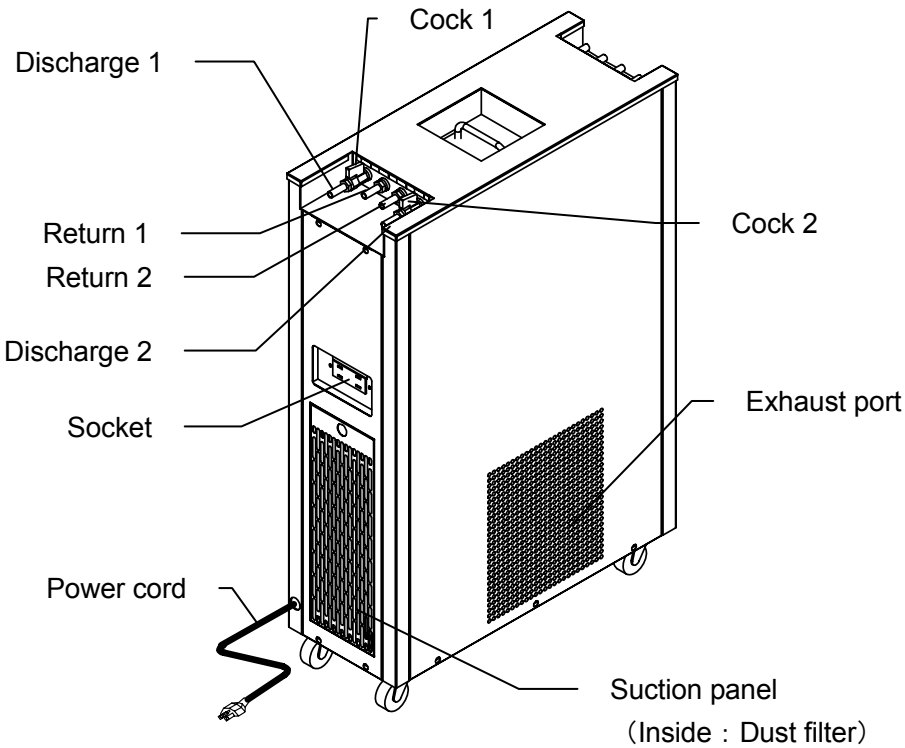
3. Names and functions of parts

Main unit

Front view of CF750S

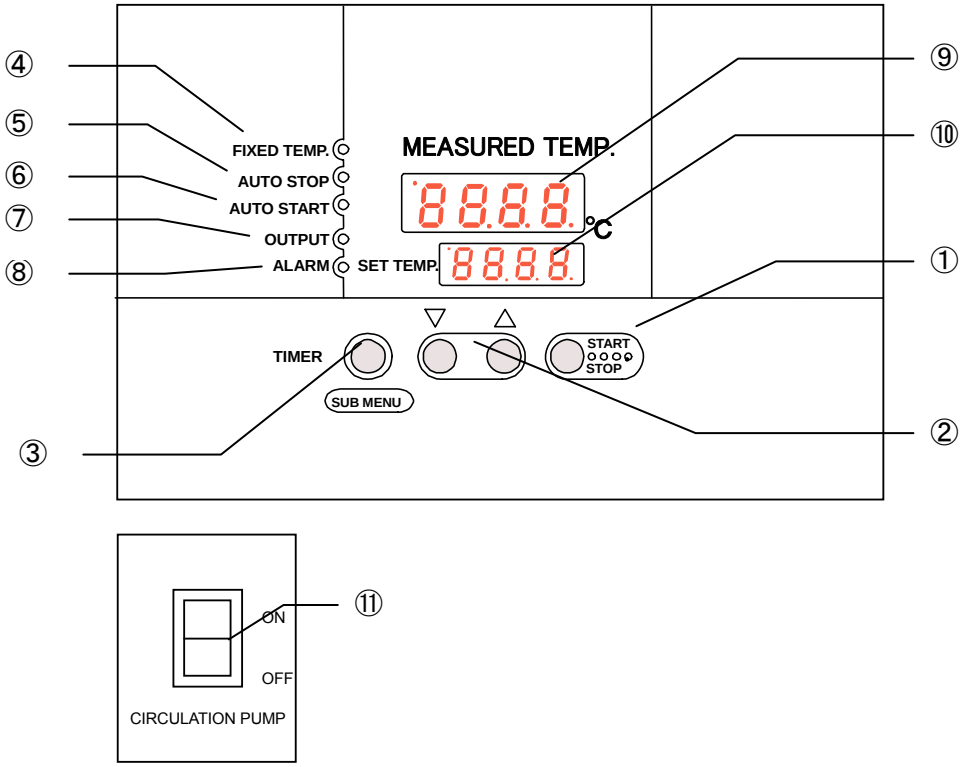


Rear view of CF750S



3. Names and functions of parts

Operation panel

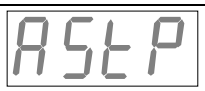
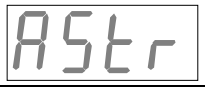


No.	Name	Operation/action
①	Start/Stop key	This key is used to start/stop operation.
②	▼▲ keys	The keys are used to select a setting.
③	Timer key (Sub menu key)	The key is used to select a timer operation mode. You can select from Quick auto stop operation, auto stop operation, and auto start operation. Pressing this key for four seconds or more will switch the sub menu screen. You can select temperature setting for calibration offset, the key lock function, the power failure compensation function, and the accumulated time function.
④	Fixed value operation lamp	The lamp comes on during the fixed value operation and normal operation.
⑤	Auto stop lamp	The lamp comes on during the quick auto stop timer operation. The lamp comes on during the auto stop timer operation.
⑥	Auto start lamp	The lamp comes on during the auto start timer operation.
⑦	Output lamp	The lamp comes on while the freezer is outputting.
⑧	Alarm lamp	The lamp comes on when an error occurs.
⑨	Meas. Temp. indicator	This indicator indicates the measured temperature in the bath, the set characters, and alarm information.
⑩	Set Temp. indicator	This indicator indicates the set temperature, the timer setting, and the timer remaining time. Temperature can be set to one decimal place.
⑪	Circulation pump switch	This switch is used to turn ON and OFF of the circulation pump. The lamp comes on when this switch is ON. This operates free of any relations with other operations.

3. Names and functions of parts

Description of characters

Meanings of characters that will appear on the controller are as follows.

Characters	Descriptor	Name	Application
	AStP	Auto stop setting	This is used to set the auto stop operation.
	AStr	Auto start setting	This is used to set the auto start operation.
	End	Time up	This indication appears when the timer operation is finished. See P.25 and 28.
	cAL	Calibration offset setting	This is used to input a calibration offset temperature. See “Using the calibration offset function” on P.32.
	LocK	Setting key lock	Keys are locked to disable changing the current settings. See “Using the lock function“ on P.33.
	Pon	Power failure compensation	This is used to set power failure compensation. See “Useful functions (Power failure compensation function)” on P.34.
	Accm	Accumulated time	This is used to display the activated time of the controller. See “Useful functions (Accumulated time function” on P.35.

※For operation modes and characters of functions, see “Operation modes, function setting keys, and characters” on P.21.

4. How to operate the unit

Operation modes and list of functions

Operation modes of this unit are as follows.

No.	Name	Description	Page
1	Fixed value operation	You can set a temperature with the ▼▲ keys. Press the Start/Stop key for about one second to start operation and press the Start/Stop key for about one second again to stop operation.	P.22
2	Quick auto stop operation	This is used when you “want to stop operation automatically after several hours after the set temperature has been attained”. When the set temperature is attained, you can set time before stopping operation by pressing the Timer key. You can set time with the ▼▲ keys. Press the Start/Stop key to start the quick auto stop operation.	P.24
3	Auto stop operation	This is used when you "want to stop operation automatically beforehand when setting a fixed value operation". You can set a temperature with the ▼▲ keys. Press the Timer key to display “AStP”. You can set time with the ▼▲ keys. Press the Start/Stop key for about one second to start the auto stop operation.	P.26
4	Auto start operation	This is used when you "want to start operation automatically after some hours" after turning power on. You can set a temperature with the ▼▲ keys. Press the Timer key to display “AStr”. You can set time with the ▼▲ keys. Press the Start/Stop key for about one second to start the auto start operation.	P.29
※You cannot change the operation mode while the unit is in operation. First stop operation before trying to change the mode.			

4. How to operate the unit

Operation modes and list of functions

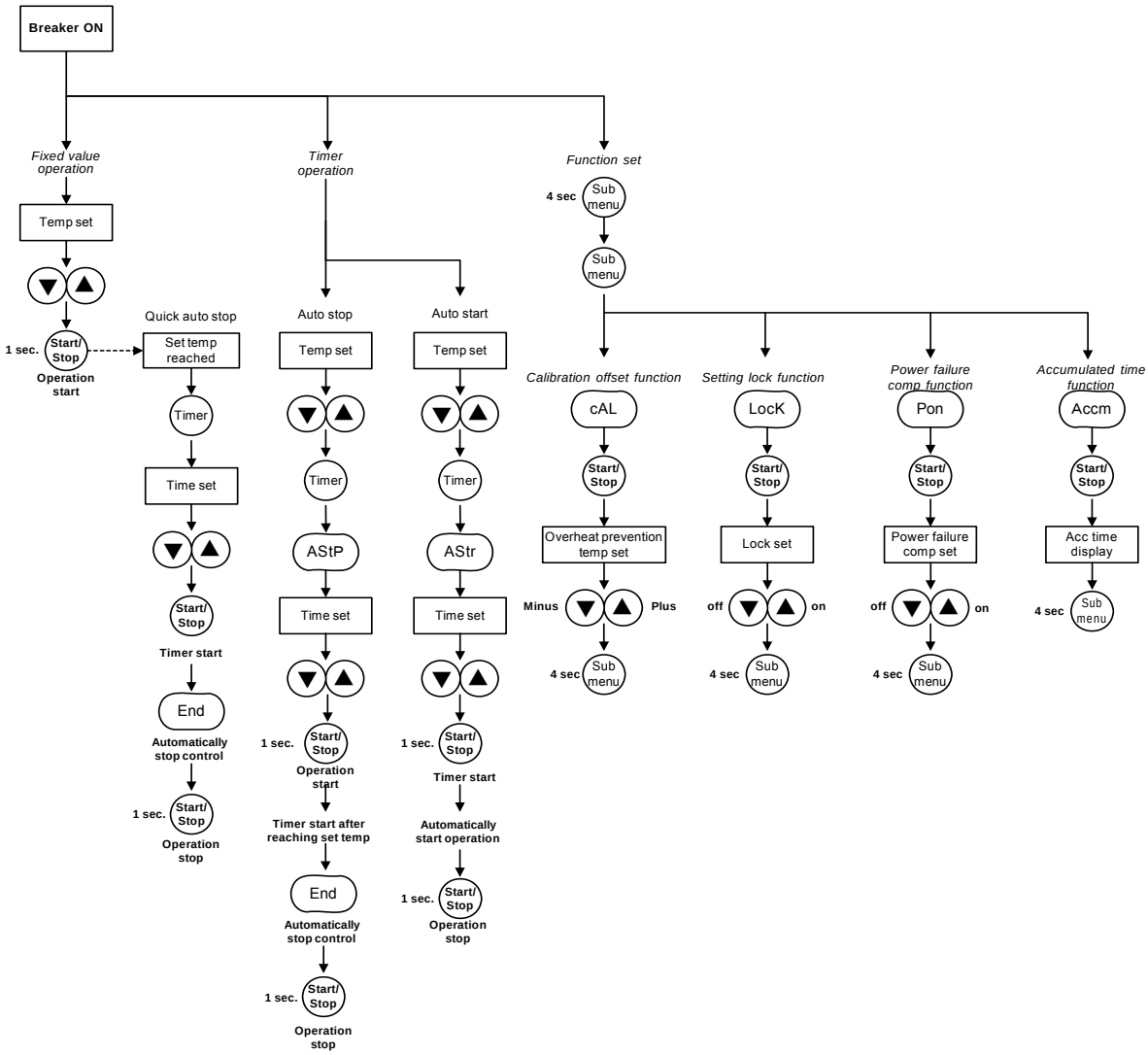
Functions of this product are as follows.

No.	Name	Description	Page
1	Calibration offset function	The calibration offset function compensates any difference between the target temperature in the bath and the controller controlled temperature (sensor temperature). You can apply compensation to the plus or minus side over the entire temperature range of the unit. You can set this parameter with the Sub menu Key.	P.32
2	Setting lock function	This function is used to lock a set operation mode. You can set or cancel this function with the Sub menu key.	P.33
3	Power failure compensation function	When a power failure occurs in the middle of operation, this function is used to start operation at the status immediately before power failure. You can set or cancel this function with the Sub menu key.	P.34
4	Accumulated time function	This function accumulates time while power is supplied to the unit in the unit of one hour. You can display the value with the Sub menu key.	P.35

4. How to operate the unit

Operation modes, function setting keys, and characters

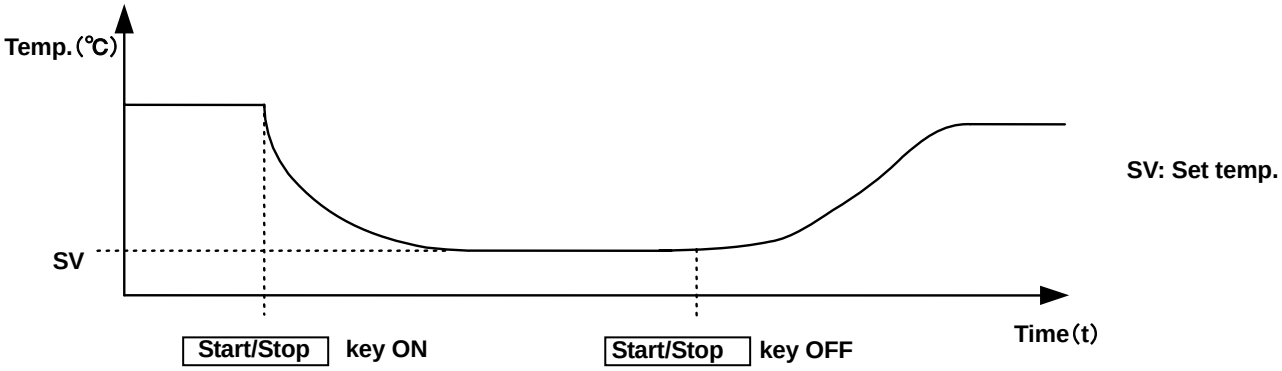
Key operations and characters shown below are used for setting an operation mode and a function.



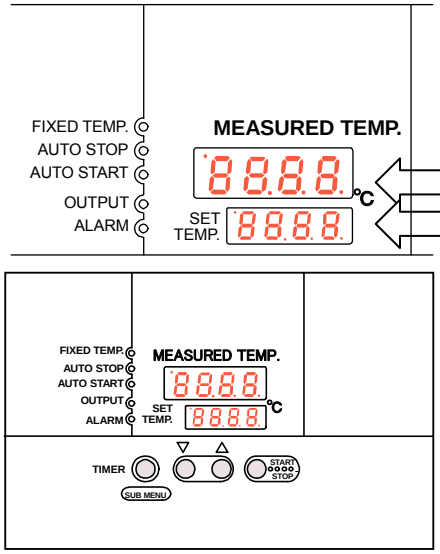
4. How to operate the unit

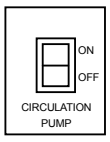
Operating procedures （fixed value operation）

In this mode, press the Start/Stop key to start and continues operation at the set temperature until you press the Start/Stop key again as shown below.



How to perform fixed value operation



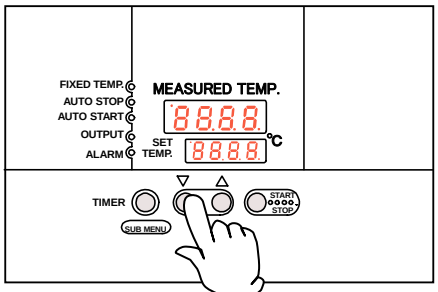


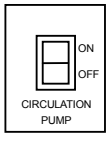
1. Turning the ELB on

Turning the ELB on will display the starting screen for four seconds. Then the screen switches to the initial setting screen and each indicator shows the present in-bath temperature and the set temperature.

Measured temp screen : Displays the present in-bath temperature

Set temp screen : Displays the set temperature



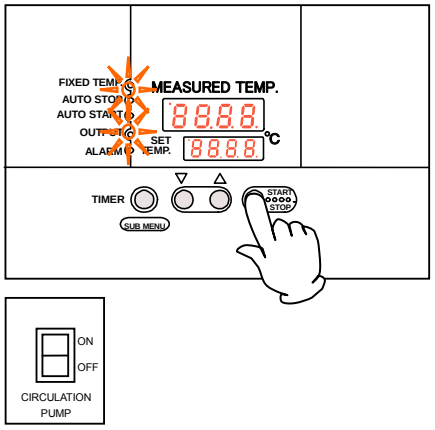


2. Setting a temperature

You can set a temperature you want with the ▼▲ keys.
The set value will flash in the set temp screen.
Use the ▼ key to decrease the setting and use the ▲ key to increase it.

4. How to operate the unit

Operating procedures （fixed value operation）



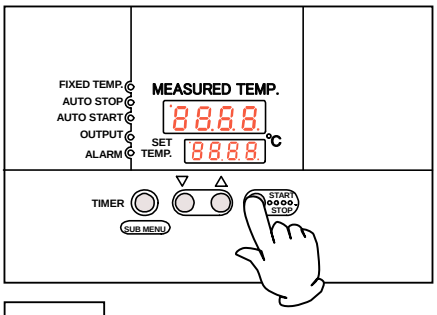
3. Starting operation

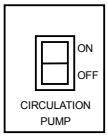
Press the Start/Stop key for about one second.

The fixed value operation lamp will come on and operation starts.

Once operation of the freezer is started, the output lamp will come on.

※The circulation pump will not operate under this setting.





4. Stopping operation

Press the Start/Stop key for about one second.

The fixed value operation lamp and the output lamp will go off and operation will stop.

The screen will return to the initial setting screen.

※The circulation pump will not stop under this setting.

When you want to correct wrong settings or change settings

Use the ▼▲ keys to reset when you want to change the settings.

Flashing will stop after three seconds after change and the new settings will be fixed.

※The circulation pump has nothing to do with other operations.

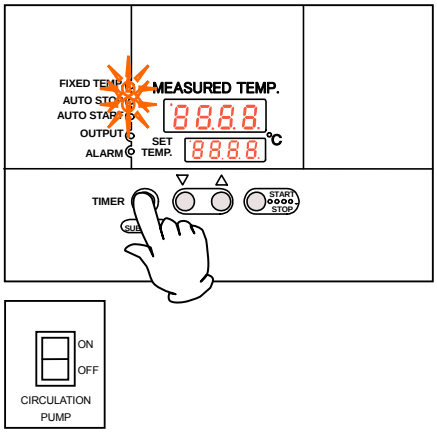
Thus, you cannot control operation or stoppage of the circulation pump with this setting.

4. How to operate the unit

Operating procedures（Quick auto stop operation）

This mode is used when you "want to stop automatically several hours after the set temperature is attained."

How to perform quick auto stop operation

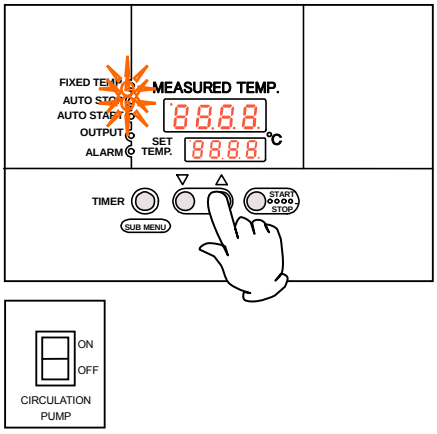


1. Setting a time after attainment of the set temperature before stop.

Make sure that the fixed value operation lamp is on and the unit is operating.

Press the Timer key.

The auto stop lamp will flash.



2. Setting a timer duration

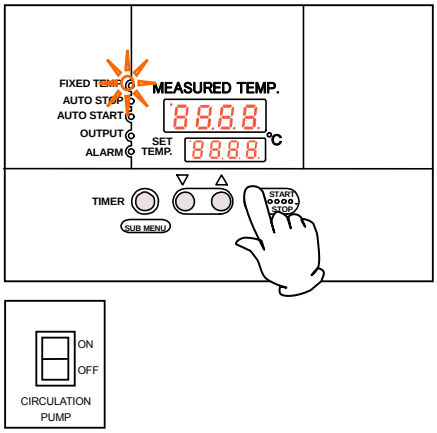
The setting flashes in the set temp screen.

Set a time you want with the ▼▲ keys.

Use the ▼ key to decrease the setting and use the ▲ key to increase it.

About the timer function

The maximum timer setting possible is 999 hours 50 minutes.
You can set a time in the unit of minutes up to 99 hours 59 minutes.
The setting unit will be 10 minutes for a time of 100 hours or longer.
You can change a set time quickly to the time you want by keeping the ▼▲ keys pressed. To fine adjust a time, repeat pressing the ▼▲ key for each digit.



3. Starting the quick auto stop operation

Press the Start/Stop key.

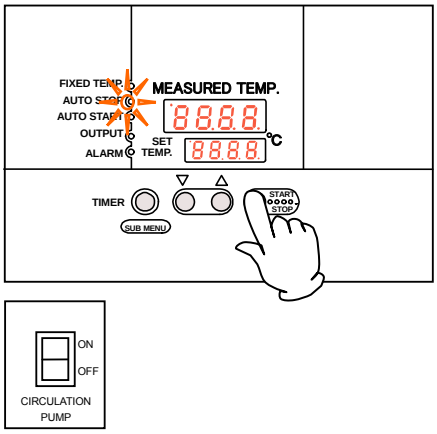
Start the timer operation when the fixed value operation lamp and the auto stop lamp are on.

Timer operation starts when the Start/Stop key is pressed.

The remaining time is displayed on the set temp screen during timer operation.

4. How to operate the unit

Operating procedures（quick auto stop operation）



4. Stopping and finishing timer operation

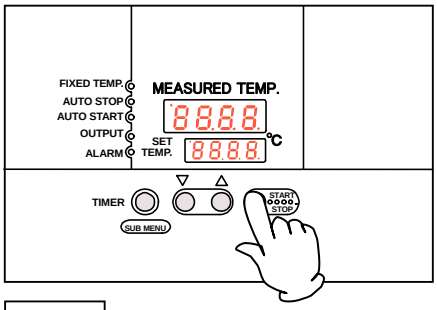
Control will automatically stop at the set time.

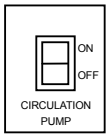
At this time the characters End flash in the set temp screen to indicate operation has finished with the fixed value operation lamp and the auto stop lamp are on.

Press the Start/Stop key for about one second to finish the timer operation mode.

The screen will return to the initial setting screen.

※The circulation pump will not stop under this setting.





5. When you want to stop quick auto stop operation in the middle of it

Press the Start/Stop key for about one second to finish the timer operation mode.

The screen will return to the initial setting screen.

When you want to adjust the set time

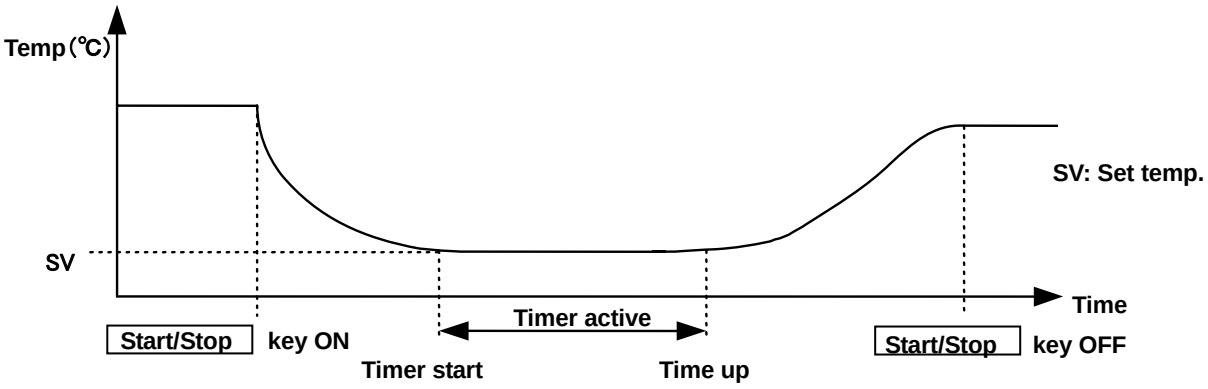
When you want to change the set time during operation, press the Timer key and set a time you want with the ▼▲ keys. In this case, however, you need to set a time calculated by adding the passed time to the duration you want to add. The set temp screen will stop flashing and be fixed after some time after change.

※The circulation pump has nothing to do with other operations.
Thus, you cannot control operation or stoppage of the circulation pump with this setting.

4. How to operate the unit

Operating procedures（auto stop operation）

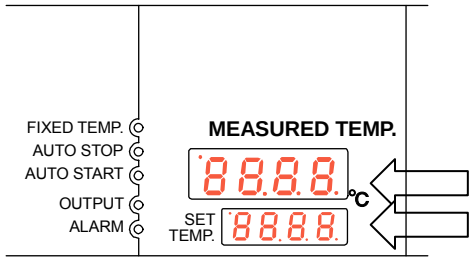
As shown in the drawing, this mode stops operation automatically after set time since the beginning of the fixed value operation by setting a timer.



How to perform auto stop operation

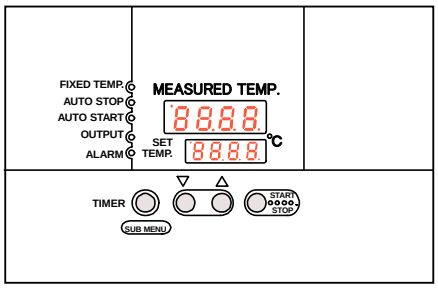
1. Turning the ELB on

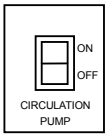
Turning the ELB on will display the starting screen for four seconds. Then the screen switches to the initial setting screen and each indicator shows the present in-bath temperature and the set temperature.



Measured temp screen : Displays the present in-bath temperature

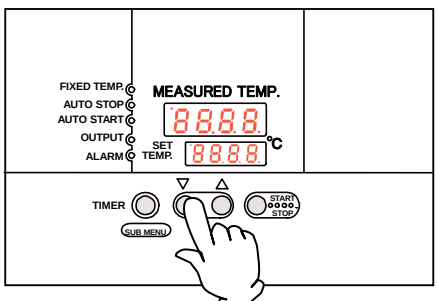
Set temp screen : Displays the set temperature

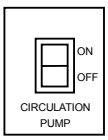




2. Setting a temperature

You can set a temperature you want with the ▼▲ keys.
The set value will flash in the set temp screen.
Use the ▼ key to decrease the setting and use the ▲ key to increase it.

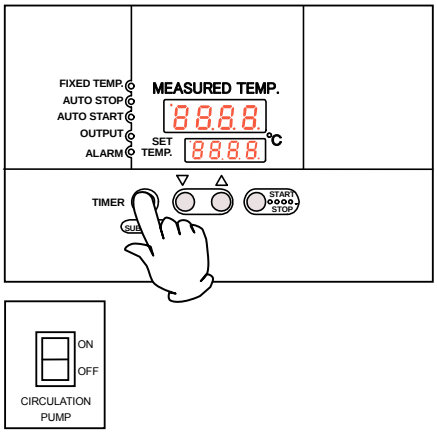




You can change the set temperature even in the middle of operation unless the timer has activated.
If you want to change the setting, press the ▼▲ keys to set a temperature again.
Flashing will stop after three seconds after change and the new settings will be fixed.

4. How to operate the unit

Operating procedures（auto stop operation）

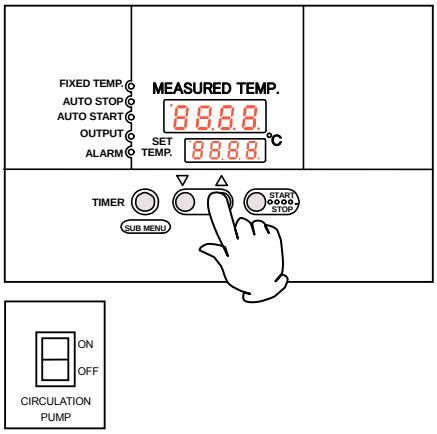


3. Selecting auto stop operation

Press the Timer key lightly to display the characters AStP  that mean auto stop operation.

Measured temp screen：Displays AStP  that mean auto stop operation.

Set temp screen：Displays the time you have just set.



2. Setting a timer duration

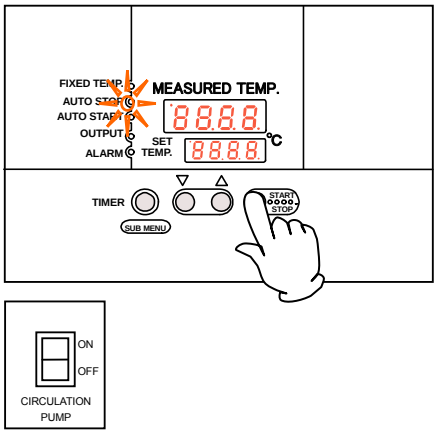
The setting flashes in the set temp screen.

Set a time you want with the ▼▲ keys.

Use the ▼ key to decrease the setting and use the ▲ key to increase it.

About the timer function

The maximum timer setting possible is 999 hours 50 minutes.
You can set a time in the unit of minutes up to 99 hours 59 minutes.
The setting unit will be 10 minutes for a time of 100 hours or longer.
You can change a set time quickly to the time you want by keeping the ▼▲ keys pressed. To fine adjust a time, repeat pressing the ▼▲ key for each digit.



5. Starting the auto stop operation

Press the Start/Stop key about one second.

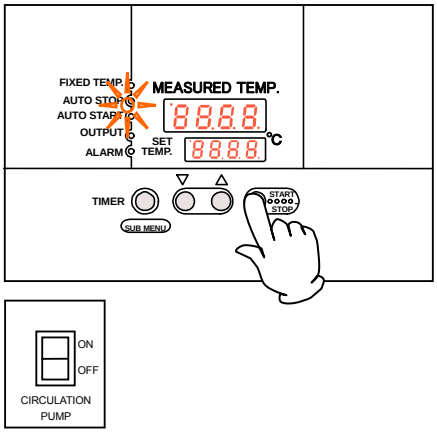
The auto stop lamp comes on and operation will start.

The time starts when the in-bath temperature in the measured temp screen reaches the set temperature.

The remaining time is displayed on the set temp screen during timer operation.

4. How to operate the unit

Operating procedures（auto stop operation）



6. Stopping and finishing timer operation

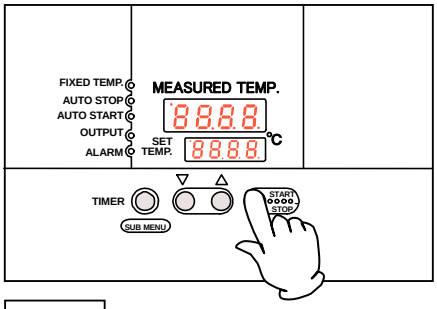
Control will automatically stop at the set time.

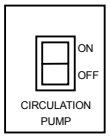
At this time the characters End flash in the set temp screen to indicate operation has finished with the auto stop lamp are on.

Press the Start/Stop key for about one second to finish the timer operation mode.

The screen will return to the initial setting screen.

※The circulation pump will not stop under this setting.





7. When you want to stop auto stop operation in the middle of it

Press the Start/Stop key for about one second to finish the timer operation mode.

The screen will return to the initial setting screen.

When you want to change the set time

When you want to change the set time before the timer starts, press the Timer key to switch to the setting mode where you can change the time. Enter a time before stopping operation after the set temperature is attained.

When you want to change the set time after the timer has started, press the Timer key in this state to switch to the setting mode and change. Note however, that you need to set a time calculated by adding the passed time to the duration you want to add.

After change, press the Start/Stop key to finish.

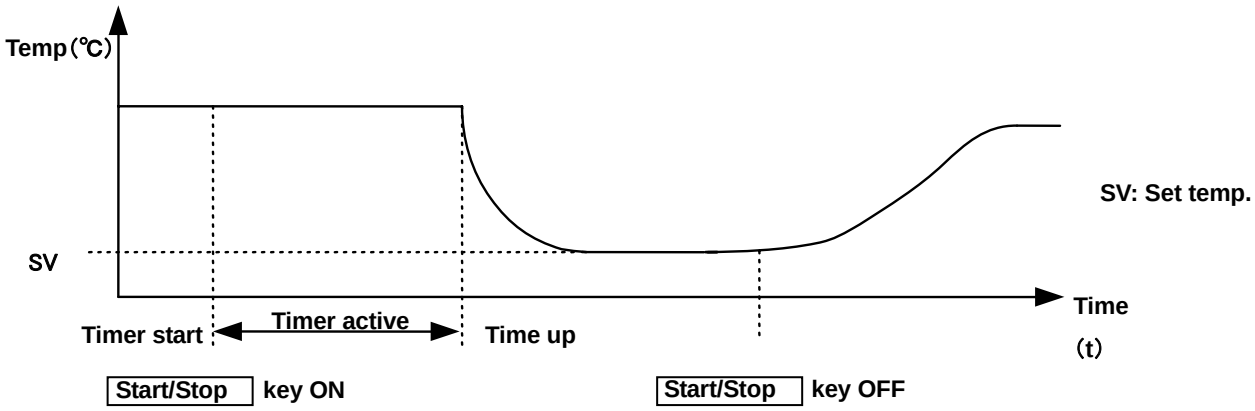
※The circulation pump has nothing to do with other operations.

Thus, you cannot control operation or stoppage of the circulation pump with this setting.

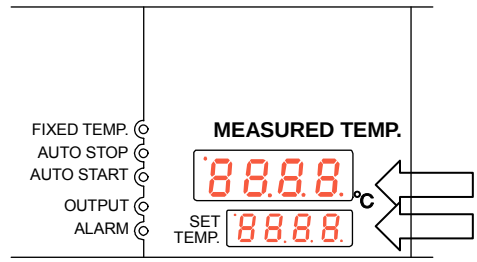
4. How to operate the unit

Operating procedures（auto start operation）

As shown in the drawing, this mode starts operation automatically after set time since the beginning of the fixed value operation by setting a timer. But this mode does not stop automatically and you need to stop manually.



How to perform auto start operation

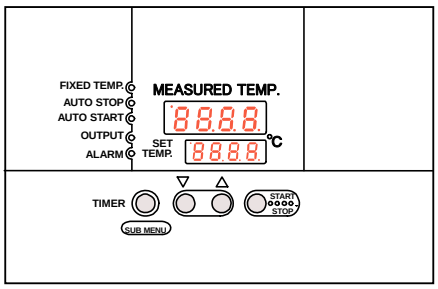


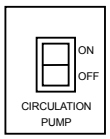
1. Turning the ELB on

Turning the ELB on will display the starting screen for four seconds. Then the screen switches to the initial setting screen and each indicator shows the present in-bath temperature and the set temperature.

Measured temp screen : Displays the present in-bath temperature

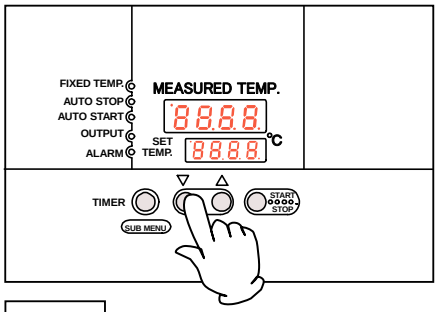
Set temp screen : Displays the set temperature

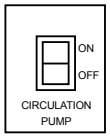




2. Setting a temperature

You can set a temperature you want with the ▼▲ keys.
The set value will flash in the set temp screen.
Use the ▼ key to decrease the setting and use the ▲ key to increase it.

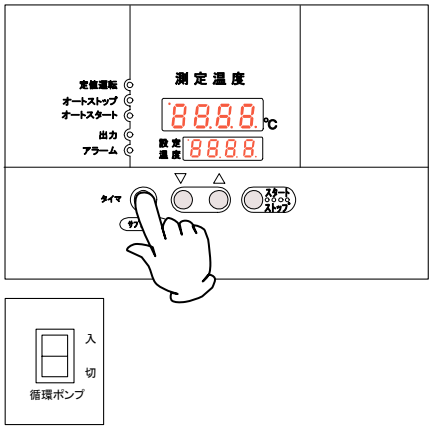




You can change the temperature in the middle of operation.

4. How to operate the unit

Operating procedures（auto start operation）

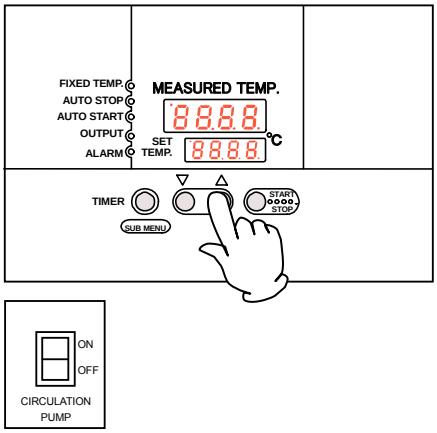


3. Selecting the auto start operation

Press the Timer key lightly to display the characters AStr that mean auto start operation.

Measured temp screen：Displays AStr that mean auto start operation.

Set temp screen ： Displays the time you have just set.



2. Setting a timer duration

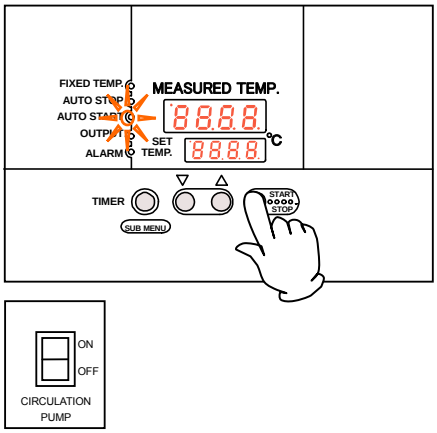
The setting flashes in the set temp screen.

Set a time you want with the ▼▲ keys.

Use the ▼ key to decrease the setting and use the ▲ key to increase it.

About the timer function

The maximum timer setting possible is 999 hours 50 minutes.
You can set a time in the unit of minutes up to 99 hours 59 minutes.
The setting unit will be 10 minutes for a time of 100 hours or longer.
You can change a set time quickly to the time you want by keeping the ▼▲ keys pressed. To fine adjust a time, repeat pressing the ▼▲ key for each digit.



5. Starting auto start operation

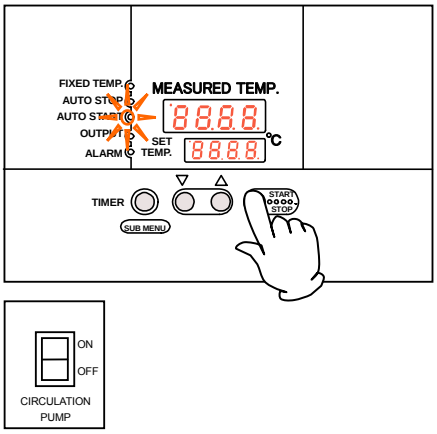
Press the Start/Stop key about one second.

The auto start lamp comes on and operation will start.

The remaining time is displayed on the set temp screen during timer operation.

4. How to operate the unit

Operating procedures（auto start operation）



6. Stopping and finishing timer operation

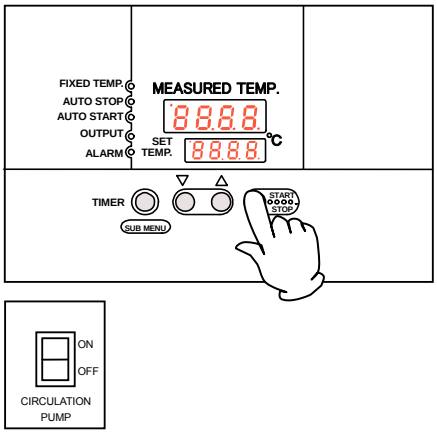
Timer operation finishes and operation will start at the set time automatically.

At this time, the auto start lamp will remain on.

Press the Start/Stop key for about one second to finish the timer operation mode to stop or finish timer operation.

The screen will return to the initial screen.

※The circulation pump will not operate under this setting.



7. When you want to stop auto start operation in the middle of it

Press the Start/Stop key for about one second to finish the timer operation mode.

The screen will return to the initial screen.

When you want to change the set temperature or the set time

When you want to change the set temperature while in operation, press the ▼▲ keys in that state to make the setting in the set temp screen flash to enable to change it with the ▼▲ keys.

When you want to change the set time while in operation, press the Timer keys in that state to make the setting in the set time screen flash to enable to change it with the ▼▲ keys.

Flashing in the set temp screen will stop after a while after change and the new settings will be fixed.
When changing the set time, however, you need to set a time calculated by adding the passed time to the duration you want to add.
Note that you cannot change the setting once the auto start time has passed and operation has started. In this case, first stop operation with the Start/Stop key and repeat setting procedures again.

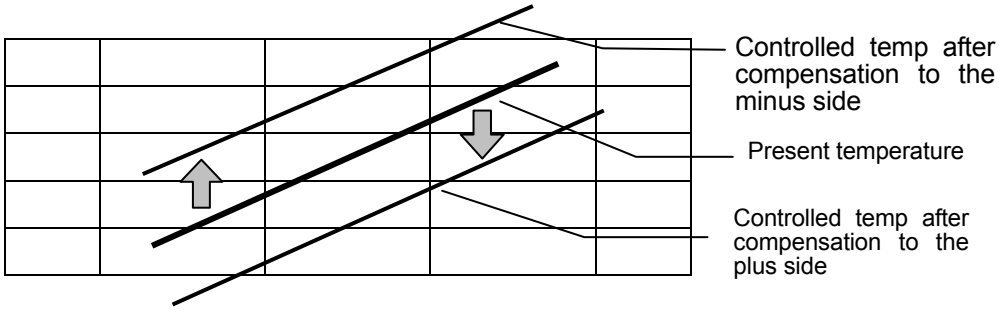
※The circulation pump has nothing to do with other operations.
Thus, you cannot control operation or stoppage of the circulation pump with this setting.

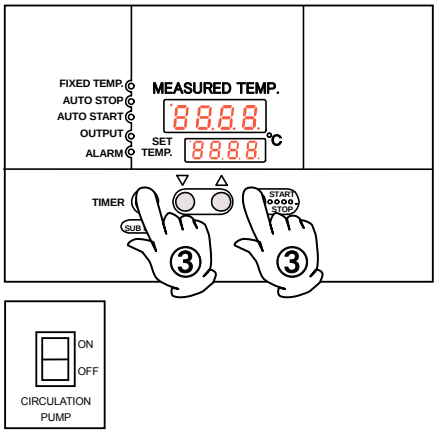
4. How to operate the unit

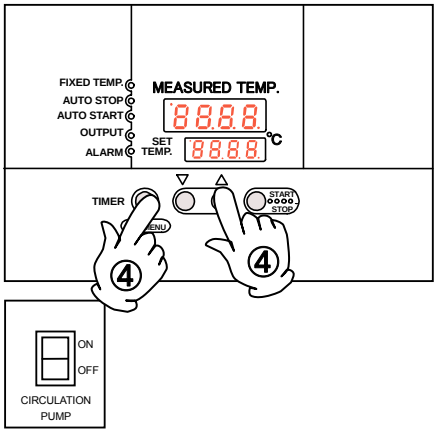
Useful functions（calibration offset function）

Using the calibration offset function

The calibration offset function compensates any difference between the target in-bath temperature and the control temperature of the controller (sensor temperature). You can apply parallel compensation to the plus or minus side over the entire temperature range of the unit.
You can set/cancel this function with the Sub menu key.
The offset is set at “0” at the time of factory shipping.







① Start operation at the target set temperature and check the in-bath temperature on a temperature recorder when the temperature is stable.
② Check the difference between the set temperature and the in-bath temperature.
③ Press the Sub menu key for four seconds.
④ Press the Sub menu key again to select the character cAL  that mean calibration offset and then press the Start/Stop key.
⑤ Enter the difference between the set temperature and the in-bath temperature with the ▼▲ keys and press the Sub menu key longer to finish setting.

※You can set an offset compensation temperature to either + or – side.
Setting to the － side will decrease the temperature on the measured temp indicator by the compensated temperature and the in-bath temperature will increase by that amount accordingly.
Setting to the ＋ side will increase the temperature on the measured temp indicator by the compensated temperature and the in-bath temperature will decrease by that amount accordingly.

※The unit has a two-point compensation function that adjusts offset for the lower temperature region and the high temperature region in addition to the calibration offset function and adjusting temperatures have been set at the time of factory shipping.

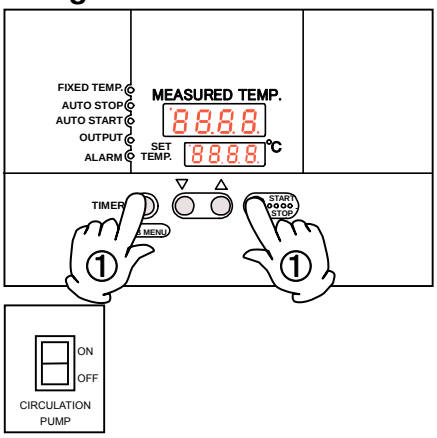
※When validating the temperature indicator, first consult with your nearest sales office or the customer support center.

4. How to operate the unit

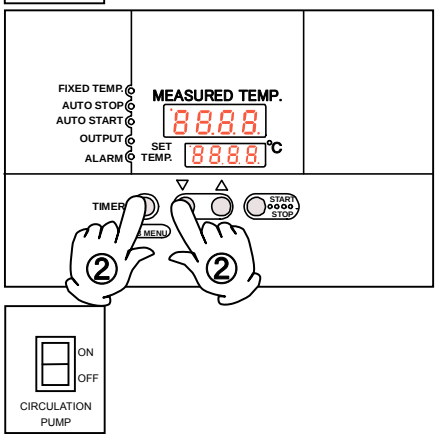
Useful functions（setting lock function）

Using the lock function

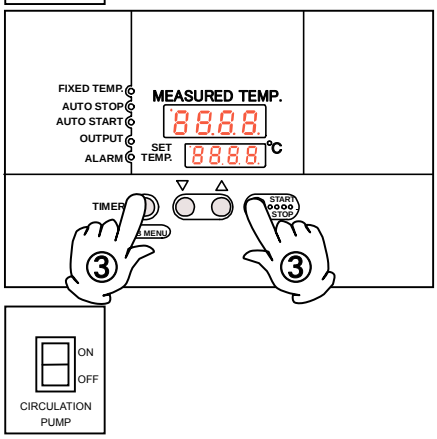
This function locks set operating parameters to disable change of them. Press the



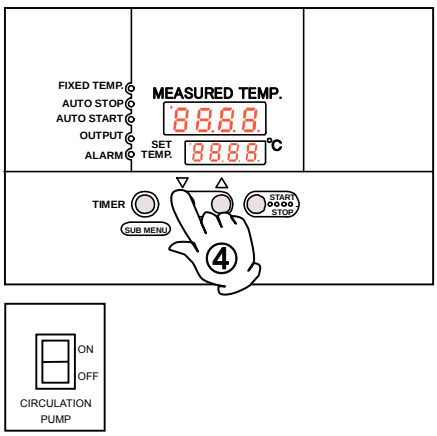
①Press the Sub menu key for four seconds.
Then press the Sub menu key to select the characters LocK that mean setting lock and then press the Start/Stop key.



②The indication “off” appears in the set temp screen. Change it to “on” with the ▼▲ key to lock the settings.
Press the Sub menu key longer to finish setting.



③To release lock, press the Sub menu key for four seconds.
Then press the Sub menu key to select the characters LocK that mean setting lock and then press the Start/Stop key.



④Select “off” with the ▼▲ keys and then press the Start/Stop key to release lock.

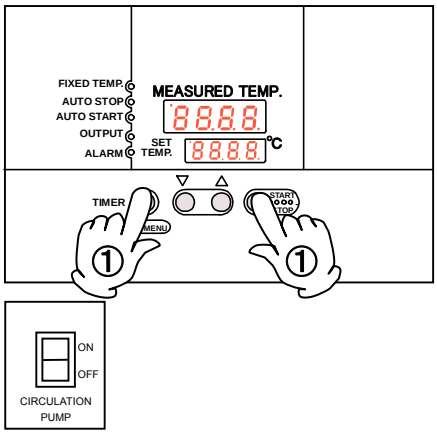
※While the lock function is “on”, any keys other than the Start/Stop key and the Sub menu key are locked.

4. How to operate the unit

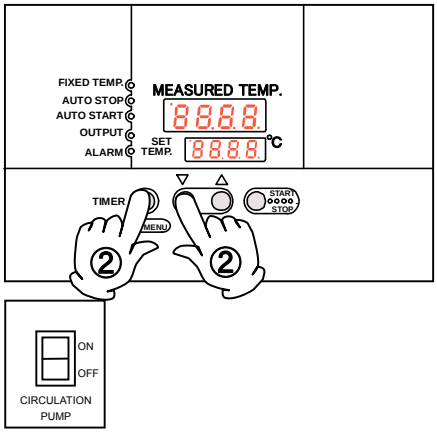
Useful function（power failure compensation function）

Using the power failure compensation function

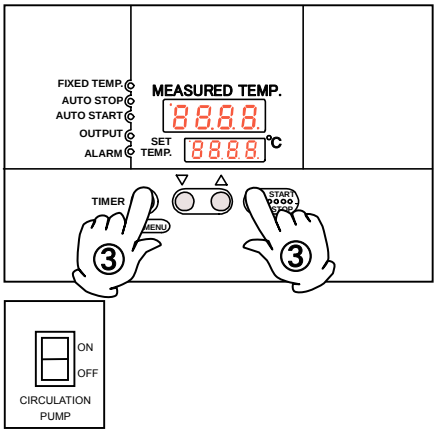
This function can be used when a power failure occurs to allow resuming operation at a state immediately before that power failure.



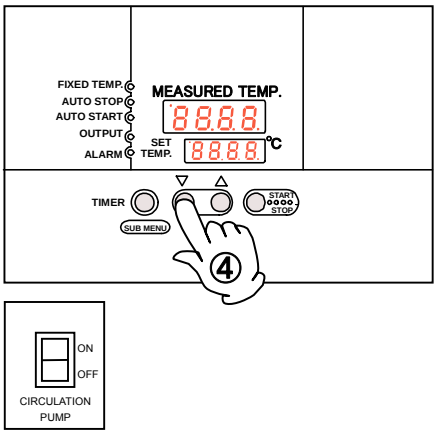
①Press the Sub menu key for four seconds.
Then press the Sub menu key to select the characters Pon that mean power failure compensation and press the Start/Stop key.



②The indication “off” comes on in the set temp screen. Turn this indication to “on” with the ▼▲ key to set the power failure compensation operation.
Press the Sub menu key longer to finish setting.



③To release power failure compensation, press the Sub menu key for four seconds.
Then press the Sub menu key to select the characters Pon that mean power failure compensation and press the Start/Stop key.



④Select “off” with the ▼▲ keys and then press the Start/Stop key to release.

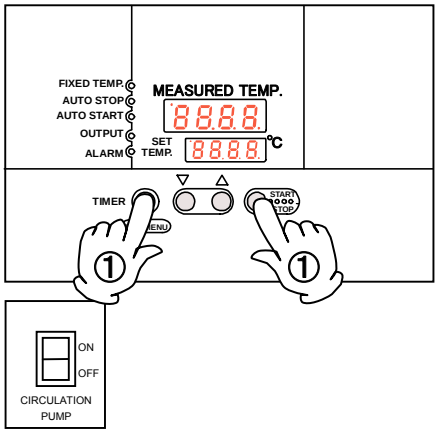
※The power failure compensation is set at “off”(disabled) at the time of factory shipping.

4. How to operate the unit

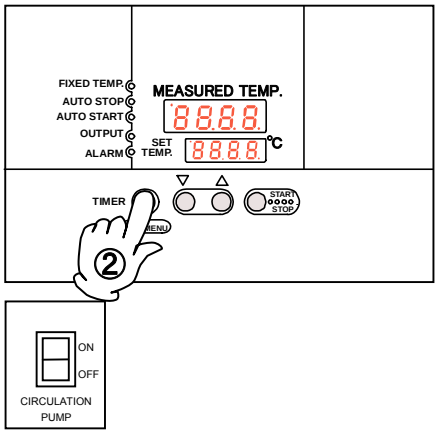
Useful function（accumulated time function）

Using the accumulated time function

This function indicates the activation time of the controller.



①Press the Sub menu key for four seconds.
Then press the Sub menu key to select the characters Accm  that mean the accumulated time and press the Start/Stop key.



②The activated time of the controller is displayed in the set temp screen.
Press the Sub menu key longer.
The screen will return to the initial screen.

Cooling curve and freezing retaining capacity curve（reference data）

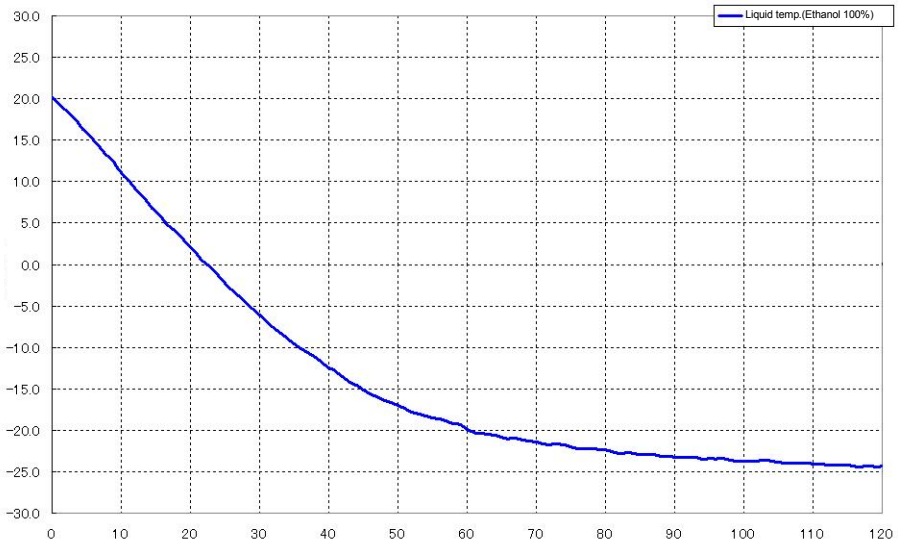
⚠ Regard the data below as reference only because actual result will differ depending on the amount of samples and the environmental temperature.

Measurement conditions（cooling characteristics, freezing retaining capacity）

- Room temp：20℃ ・External load：no load ・Power supply：AC100V
- Frequency:50Hz(cooling characteristics, freezing retaining capacity), 50Hz/60Hz(flow and lift)
- Circulating fluid：Ethyl alcohol (cooling characteristics, freezing retaining capacity), tap water (flow and lift)
- Circulating fluid amount: Model CF750: 10ℓ
- Unit setting：(cooling characteristics, freezing retaining capacity)：External circulation OFF, fixed position CF is center in the bath
- Unit setting (flow and lift)：Fixed value operation at 20℃, measuring point: discharge port, discharge port open

※Lift Calculated as 1.0MPa ＝ 10.0kg/cm^2 ≒ 100.0m

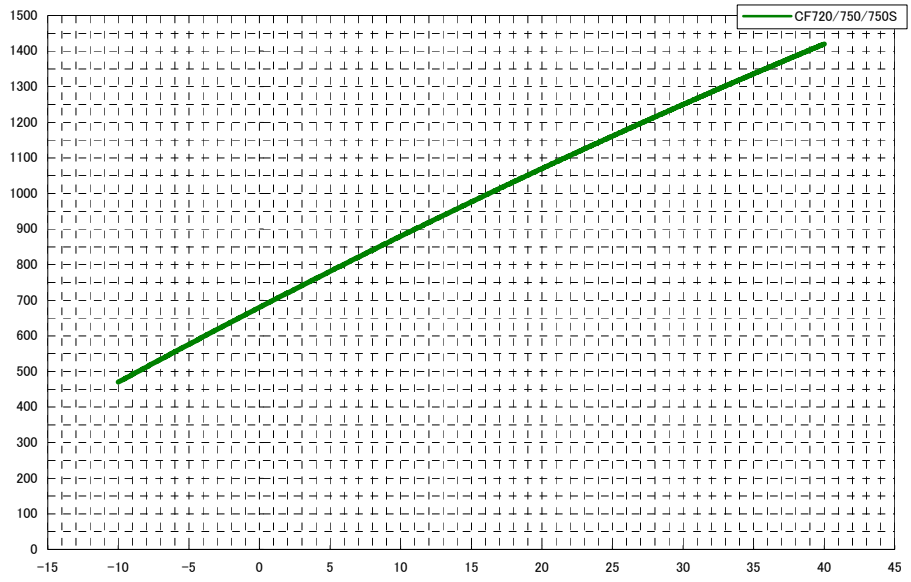
Cooling characteristics



Temp.（℃）

Time (min)

Freezing retaining capacity

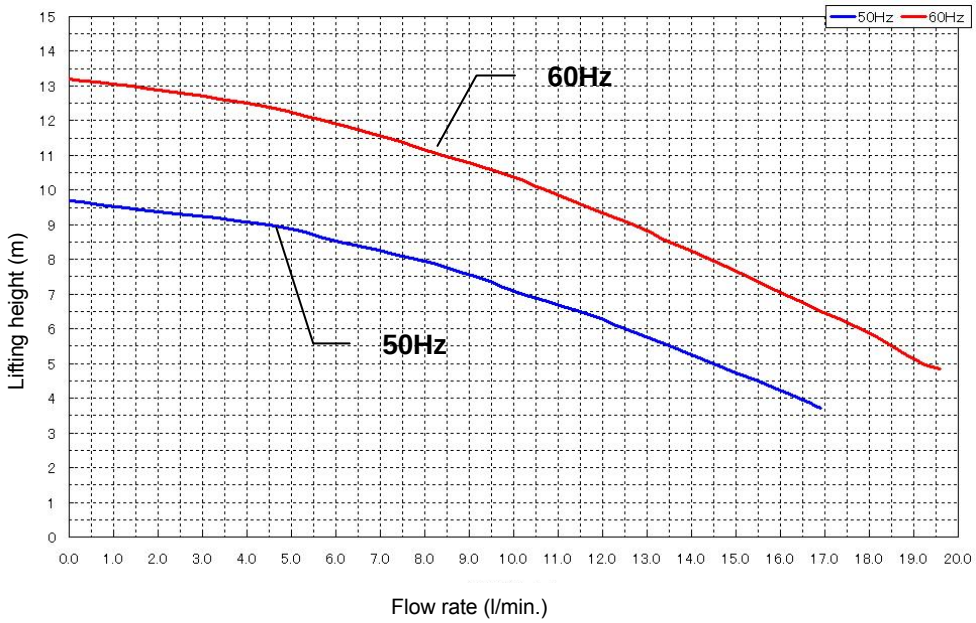


Freezing retaining capacity（W）

Temperature（℃）

Flow and lift curves（reference data）

Flow and lift



Selecting heat medium for lower temperature（reference data）

You need to use a heat medium for lower temperature when the cooling temperature is set to 10℃ or below.

Ethylene glycol

Property	
Boiling point	197.8℃
Coagulation point	-13.0℃
Ignition point	121.0℃
Firing point	410.0℃
SG（at 20℃）	1.1188
SH（at 20℃）	0.561cal/g℃
Evaporative latent heat	191cal/g℃
Viscosity	0.021Pa・s(20.93CP)
Steam pressure(25℃)	16.0Pa（0.12mHg）

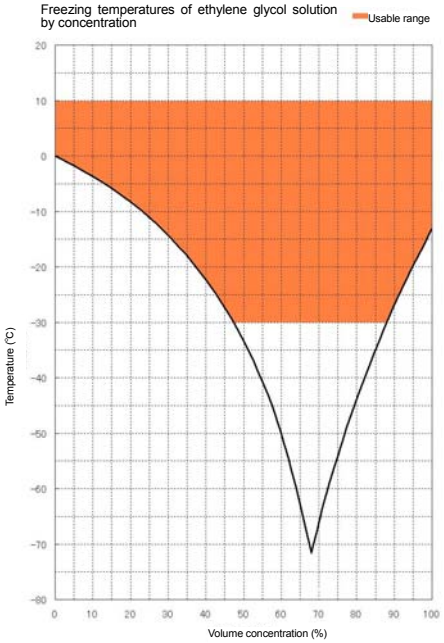
Ethyl alcohol

Property	
Molecular weight	46.068
Boiling point	78.32℃
Coagulation point	-114.5℃
Ignition point	13℃(closed), 18℃(open) 24.7℃(60% solution,at25℃)
Firing point	439℃
SG（at20℃）	0.7893
SH（at20℃）	0.579cal/g・℃
Viscosity	1.0826cp(at25℃)

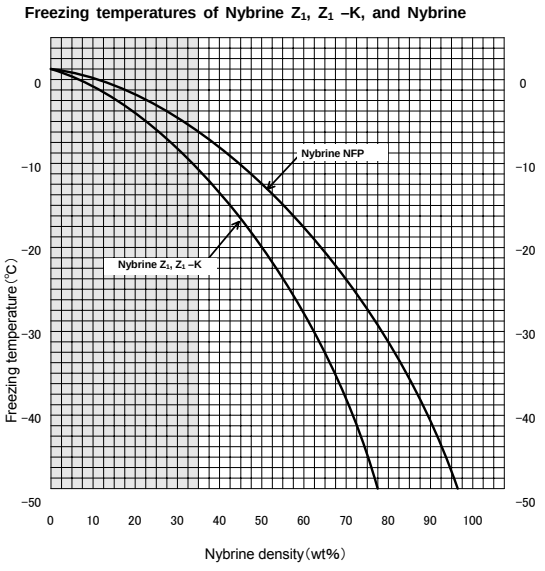
Nybrine

Property	Z1,Z1-K		RH		NFP	
	50Wt%	100 Wt%	50Wt%	100 Wt%	50Wt%	100 Wt%
Boiling point （℃）	104	117	105	118	102	107
Specific resistance（Ω・cm at 25℃）	625	1250	270	440	530	970
Conductivity(S・m^{-1} at 25℃)	0.160	0.080	0.370	0.227	0.189	0.103
Steam pressure (Kpa at 20℃)	1.7	0.5	1.7	0.5	2.3	1.3
Freezing point (℃)	-21	-50 or less	-21	-50 or less	-13.5	-50 or less
SG (at20℃)	1.05	1.10	1.07	1.134	1.026	1.048
Viscosity (mPa・s at 20℃)	2.5	9.5	2.5	9.5	2.6	9.4
SH (cal/g at 20℃)	0.850	0.670	0.850	0.670	0.773	0.642

Freezing temp of ethylene glycol



Freezing temp of Nybrine



5. Handling precautions

⚠ Warning

1. Ban of use/measures in an abnormality

If this unit should generate a smoke or a strange odor for unknown reason, immediately turn the ELB of the main unit and the power off and ask your dealer or one of our sales offices for inspection. Leaving the unit in such a state may cause a fire or an electrical shock. Never attempt to repair the unit by yourself, which poses a danger.

⚠ Caution

1. About unsupported substances.

Take extreme care when using an explosive, combustible substances or those contain such substances. Otherwise, an explosion or a fire may result.
See “14. List of dangerous substances” on P.52.

2. Never climb on the unit.

Never climb on the unit. The unit may topple over or be damaged and a personal injury or a malfunction may result.

3. Do not put any object on the unit.

Do not put any object on the unit. It may fall off and cause a personal injury.

4. When a thunder is heard.

When a thunder is heard, immediately turn the ELB of the main unit and the power supply off. Leaving it as it is may cause a fire from lightening.

5. Thoroughly wash the unit.

Although the unit has been washed, wash it thoroughly when you are going to use it for the first time or you have not used it for a long time.

6. During nighttime and when you are not going to use the unit for a long time.

- Turn the ELB “off” during nighttime and when you are not going to use the unit for a long time.
- When you are not going to use the unit for a long time, drain fluid at the discharge cock from the circulation system.

7. About protection of the circulation pump.

- Never operate the circulation pump without any medium. It will cause a malfunction of the pump.
- Contamination of the cooler with a foreign object may cause a damage of it.
- Take care for possible no-load operation of the circulation pump.
  No-load operation means operating the circulation pump when its pump chamber does not contain any circulating fluid.
  No-load operation cannot cool down the mechanical seal and sliding parts such as the bearing of the circulation pump and may cause seizing or damage.

5. Handling precautions

⚠ Caution

7. About recovery from a power failure.

⚠ When a power failure occurs during operation and power supply recovers, the unit will automatically return to the state immediately before that power failure and resume operation. For how to make settings, see “Using the power failure compensation function” on P.34.
Turn the ELB off if you do not want to recover and resume operation automatically.

8. About the abnormal freezer pressure. （Freezer overload relay）

⚠ When an abnormal overheat is detected on the freezer, the freezer overload relay may be activated and stop the freezer.

9. About malfunction and stop of the circulation pump. （pump thermal protector）

⚠ When an abnormal overheat of the circulation pump motor is detected, the circulation pump may be stopped to protect it. The pump will recover automatically and resume circulation when the motor is cooled down.

10. Freezer delay timer

⚠ The unit has a three-minute delay timer with a controller to prevent insufficient lubricant from excessive lift of oil at the freezer compressor caused by short cycle operation, burnout of the coil due to overheat of the internal electric motor from repeated surge current at starting operations.

11. About circulating fluid

⚠ Set a circulating fluid according to the scheduled operation temperature.
Set temperature ＋10℃ or more ：Water
Set temperature ＋10℃ or less：Antifreeze fluid (ethyl alcohol, ethylene glycol, Nybrine）

- Coagulation point of an antifreeze fluid will change depending on its density or a type. Select an antifreeze fluid whose coagulation point is lower than the operating temperature by at least 10℃. When a fluid with a coagulation point above that temperature is used, the freezer assembly will freeze and might degrade heat exchange performance. An accident or a malfunction of the unit may result if the circulating path freezes.
- Antifreeze fluid density will change after a long time of use. If you continue to use the unit with such an antifreeze fluid, the fluid may freeze or its viscosity may increase and cause a malfunction of the pump.
- Use distilled water or tap water as the circulating fluid. Use of low quality water will cause scale or stones deposit on the heater or in the pump to decrease the performance and a malfunction may result. (such as well water)
- Use of a circulating fluid with a greater specific gravity or a viscosity will cause an overload to the pump and prevent it from exercising the maximum performance. (Fluorinert or Garden)
- Never use a corrosive substance or any substance that will produce a corrosive substance when heated. Otherwise, a malfunction may result. (For example, Fluorinate)
- Never use a substance whose vapor is harmful to human health when inhaled. Otherwise, an injury may result. (Methyl alcohol)

6. Maintenance

Daily inspection/maintenance

We strongly recommend daily inspection and maintenance to assure stable operation of the unit.
The major objective of inspection and maintenance is checking for stones which will increase when municipality water is used for the unit.

⚠ Warning

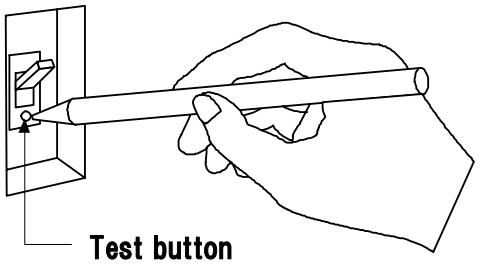
- Be sure to remove the power cord before inspection or maintenance unless necessary.
- Start working after the unit temperature has returned to the normal temperature.
- Never attempt to disassemble devices.

⚠ Caution

- Wipe off any dirt with a well wrung out soft cloth. Never use benzene, thinner, or scorching powder or rub with a hard brush. Otherwise, deformation, deterioration, or discoloration may result.

Monthly

- Inspect the function of the ELB.
  Connect the power cord and conduct a test while it is activated.
  - First turn the ELB “off”.
  - Then turn it “on” and push the test button of the ELB with a pointed object such as a ball point pen and it is normal if it is turned off.



Maintenance of the water bath

Remove any foreign objects in the water bath at shorter intervals. Leaving such objects may cause a malfunction of the circulation pump.

Replacement of hoses

To assure stable performance of the product, replace the hose once every two years as a guide.
Ask one of our sales offices or the general customer service center for replacement.

Collecting bottle fixing packing

Packing is a consumable part.
Tendency of swelling from a chemical or shortening of service life from deterioration will differ depending on specific products.
Check the packing frequently.
※Chemicals may be left on a bottle or a packing. Be sure to wipe any chemicals or put on gloves before handling them.
※Take care for the bottle fixing plate on the collecting base when conducting work.

Maintenance of the filters

Clogged filter will degraded cooling efficiency. It also may cause a malfunction of the freezer. Extent of clogging will differ depending on the environment or operating time and clean the filters at a regular interval appropriate for the specific operating conditions.

Simply pull the filter holding plate toward you which is held with magnets.

Remove dusts in the condenser fins with an electric cleaner.

Caution: Handle fins gently because they are soft and easily bend.
The edges of the fins are keen. Never attempt to touch them with bare hands to avoid personal injury.

Filter is held with the filter fixing plate. Remove the filter and wash or remove dust with an electric cleaner with the filter attached.
After cleaning, follow the procedures above to attach it.

◆If you have any questions, immediately contact your dealer, one of our sales offices, or the general customer service center.

7. When the unit is not to be used for a long time or when disposing

When the unit is not to be used for a long time or when disposing

⚠ Caution

When the unit is not going to be used for a long time

●Turn the ELB to off and pull out the power cord.

⚠ Warning

When disposing the unit

●The Unit employs substitutive CFC.
Ask disposal to a professional company.

Notes about disposition

Always pay attention to the preservation of the global environment.

・We highly recommend taking the unit apart as far as possible for separation or recycling to contribute to the preservation of the global environment. Major components and materials for the unit are as follows:

Names of major parts	Major materials
Major components of the outer finish	
Outer finish	Bonderized steel sheet, melamine resin baking finish
Internal bath	SUS304 stainless steel
Nameplate	Polyethylene（PET）resin film
Major electric parts	
Switches and relays	Resin, copper
Board	Fiber glass
Power cord	Synthetic rubber coating, copper, nickel
Pump	Iron, copper, resin, ceramic
Refrigerator	Iron, copper
Major piping parts	
Hoses	Silicon
Drain hose	Silicon
Hose clamp	66 nylon
Piping heat insulation hose	Polyurethane sponge
Piping parts	Copper
Condenser	Iron, copper, aluminum
Refrigerator encapsulated refrigerant	
Refrigerant	HFC-R404A

8. When a trouble occurs

Safety units and error codes

The unit has a self diagnostic function integrated in the controller and safety units independent of it.
The table below shows the possible causes for a trouble an activation of a safety device and solutions.

[Error code]

When an operational abnormality or a unit malfunction occurs, the alarm lamp on the operation panel comes on, an error code appears, and control of the unit will stop. When a malfunction occurs, note the error code and immediately stop operation.

Safety units	Symptom	Possible causes and solutions
Temp input error	Alarm lamp on  indication	● Malfunction of temp input circuit ● Temp sensor disconnection or a malfunction ● When measured temp is outside the indication range: Contact our general customer service center.
Error of measured temp lower limit	Alarm lamp on  indication	● When the lower limit alarm of the temp alarm function is triggered. Contact our general customer service center.
Malfunction of memory	Alarm lamp on  indication	● Wrong settings in memory Contact our general customer service center.
Abnormal measured temperature	Alarm lamp on －－－－ －－－－indication	● When the upper limit alarm of the temp alarm function is triggered. Contact our general customer service center.

※The circulation pump has nothing to do with other operations.
The circulation pump will not stop even if a control error is detected.

8. When a trouble occurs

If a malfunction is suspected

In the following cases

Symptom	Check
The ELB will not become active even if power is turned on.	●If power plug is connected to the receptacle correctly. ●For a power failure. ●If the power switch is turned OFF.
The alarm lamp comes on.	●If there is circulating fluid in the external water bath. ●Check error codes. Check the meaning of the error code in “Safety units and error codes” on P.44.
Temperature will not decrease.	●If the setting is high than the in-bath temperature. ●If the condenser filter at the lower front of the main body is dirty. ●If the condenser fins are clogged. ●If heat load of circulating fluid is too large. ●If the environmental temperature is high. ●If the vent hole is blocked.
A strange noise is heard at the circulation pump.	●If the circulation pump is contaminated with air.
Circulation fluid does not circulate.	●If the circulation path is clogged or extremely chocked. ●If the circulation pump switch is turned on. ●If the cock is open.
Indicated temperature is different from the actual temperature.	●If the calibration offset setting is other than “0”. Set this parameter to “0”. Check the setting in “Using the calibration offset function” on P.32.

If a power failure occurs

When a power failure occurs in the middle of operation, this function is used to start operation at the status immediately before power failure. See “Using the power failure compensation function” on P.34 for how to set.

◆When the symptom does not correspond to any of the above, immediately turn the ELB on the main unit off, remove the power plug out of the power supply and contact your dealer, one of our sales offices, or our general customer service center.

9. After sales service and warranty

When requesting a repair

If any trouble occurs, immediately stop operation, turn the ELB off, pull out the power plug and contact your dealer or our sales office.

Information necessary for requesting a repair

- Model name of the product
- Serial number
- Date (y/m/d) of purchase

} See the warranty card or the nameplate on the unit. See the section “Names and Functins of Parts” on page15.

- Description of trouble (as in detail as possible)

Be sure to indicate the warranty card to our service representative.

Warranty card (attached separately)

●Your dealer or one of our sales offices will hand you a warranty card. Please fill necessary data such as “dealer name, date of purchase, etc” and fax to our general customer service center (03-3231-6523). Store the warranty card at a safe place.

●Warranty period is one full year from the date of purchase. Repair service for free is available according to the conditions written on the warranty card.

●For repairs after the warranty period consult your dealer or one of our sales offices. Paid repair service is available on your request when the product’s functionality can be maintained by repair.

Minimum holding period of repair parts

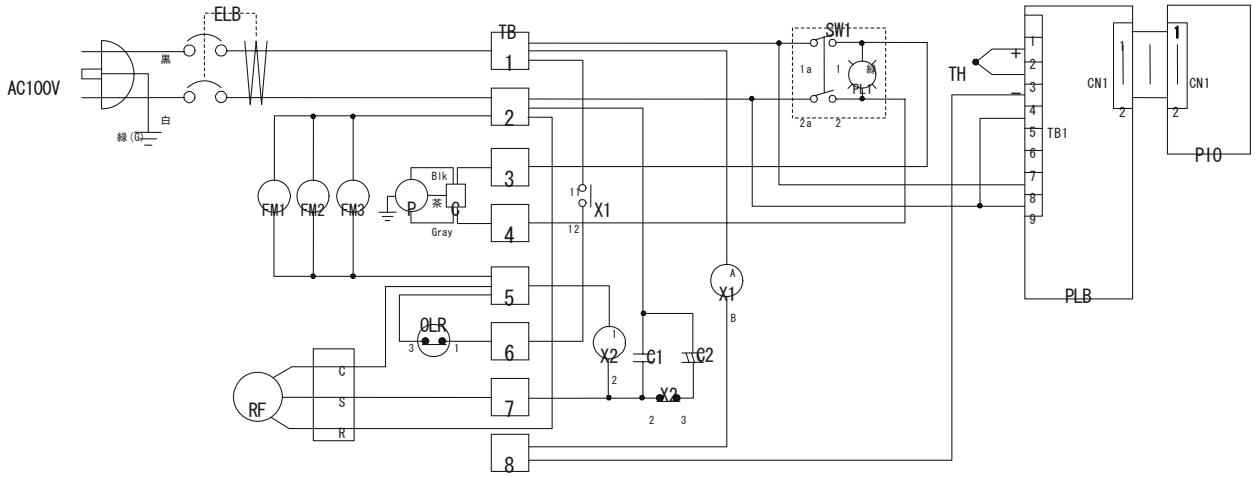
The minimum holding period of repair parts for this product is seven years after end of production.
Repair parts here refer to parts necessary for maintaining performance of the product.

10. Specifications

Product name		Neo Cool Circulator	
Model		CF750	CF750S
System		External hermetical circulation	
Operating environmental temp range		5℃～35℃	
Performance	Operating temp range	-20℃～Room temperature	
	Set temp range	-25℃～35℃	
	Tem adjusting precision	±2.0℃	
	Freezer capacity	Approx. 880W（750kcal/h） at fluid temp: 10℃ Approx. 680W（580kcal/h） at fluid temp: 0℃ Approx. 470W（400kcal/h） at fluid temp: -10℃	
	Max flow of unit	16.9/19.6ℓ /min（50/60Hz）	
	Max lift of unit	9.7/13.2m（50/60Hz）	
Configuration	Internal bath	SUS304 stainless steel bath	
	Temp control	Freezer ON-OFF control	
	Sensor	T thermocouple	
	Temp setting system	Digital	
	Temp display system	Digital	
	Freezer	Air-cooled hermetic rotary system : 600W	
	Cooling medium/its amount	R404A 680g	
	Cooling coil	Cupper nickel plated	
	External circulation nozzle	Hose nipple of O.D.:10.5 ㎜ （2 for each of I/O, with a stop valve）	
	Circulation pump	Magnet pump:127W	
	Collecting condenser	—	ϕ8 SUS316 x 2 systems
	Collecting connection port(suction port)	—	Hose nipple of O.D.:ϕ8 ㎜ x 2 systems
	Discharge connection port	—	Hose nipple of O.D.:ϕ8 ㎜ x 2 systems
	Collecting trap	—	500mℓ bottle x 2
Safety functions		Over current ELB, freezer overload relay protective circuit, pump thermal protector, freezer protective delay timer, pump protective H bypass	
Other functions		Drain cock, dust filter, freezer pressure indicator, overflow, key lock function, calibration offset function, power failure compensation function, temperature output terminal, accumulation time function, 2-branch circulation port, circulation fluid stop cock, collecting trap (model CF750S only)	
Standard	Water bath size (W x D x H ㎜)	145×405×180	
	External size (W x D x H ㎜)	230×600×900	
	Volume of bath	11.5ℓ （fluid amount: 10.5ℓ ）	
	Power supply （50/60Hz）	AC100V 10A	AC100V 15A （service outlet 5A）
	Weight	Approx. 60 ㎏	Approx. 65 ㎏
Accessories		Tip-resistance clamp x 1, truss screw x 3, top cover, drain hose x 1 Circulation hose (neoprene) 1.5m x 4, overflow hose x 1, Wire clamp x 4, glass gas collecting bottle x 2（model CF750S only） Operating instructions x 1, warranty card x 1	

11. Wiring diagram

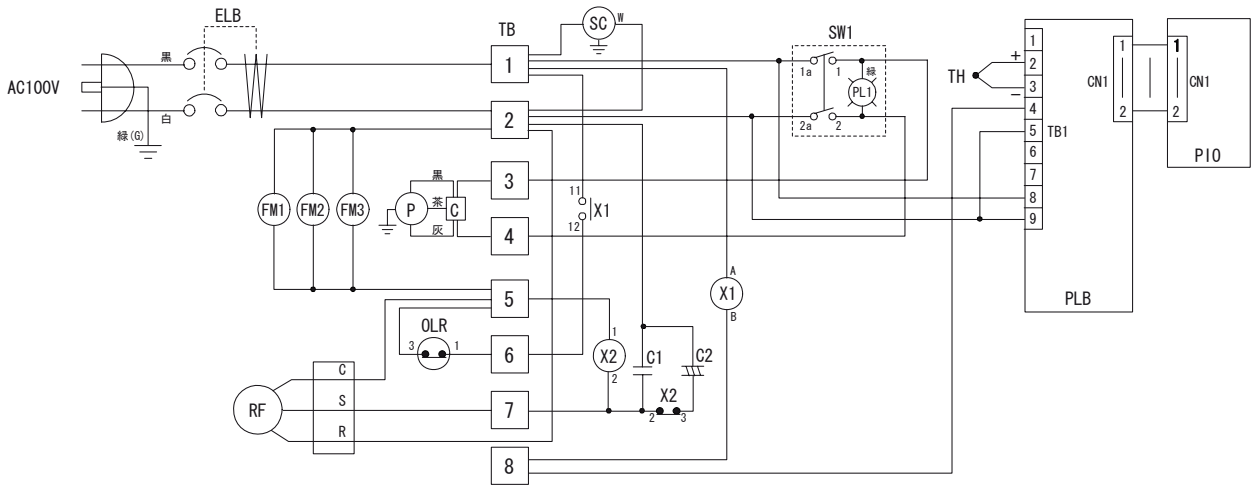
CF750



Symbol	Part name	Symbol	Part name
ELB	Electric Leakage Breaker	C1	Operation condenser
TB	Terminal block	C2	Starting condenser
SW1	Circulation pump switch	X1	Electromagnetic Contact（freezer）
P	Circulation pump	X2	Relay（start）
FM	Fan motor	PLB	Planer board
RF	Freezer	PIO	Display board
OLR	Overload relay		

11. Wiring diagram

CF750S



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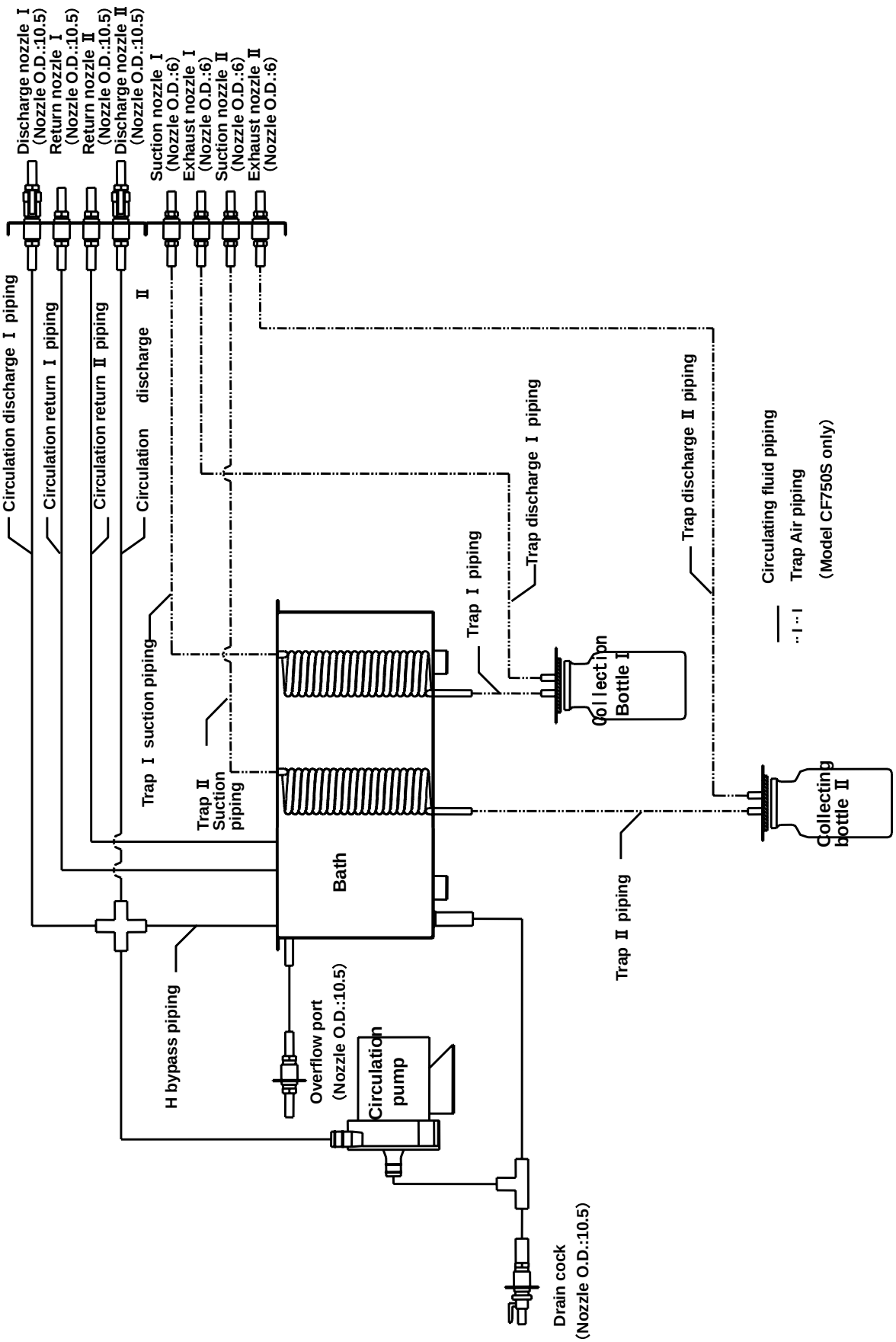
RF	Freezer	PIO	Display board
OLR	Overload relay	SC	Service outlet

12. Piping system diagram



13. Replacement part table

Common parts

Symbol	Part name	Code №.	Specification	Maker
-	Caster wheel	LT00020363	LG-50NS（with stopper）	Yamato
-	Caster wheel	LT00020363	LG-50N	Yamato
RF	Compressor	3010060012	C-RHN60LOA（600W）	Yamato
P	Pump	LT00017764	Ps90-200A3	Hagiwara ss
-	Control pump	LT00006065	G3/8	Yamato
-	Stainless steel hose nipple	LT00019484	R3/8 X φ10.5	Yamato
-	Drain cock	LT00005465	R3/8 X φ10.5	Yamato
FM	Fan motor	2150000010		Yamato
-	Filter	LT00019832		Yamato
-	Circulation hose	3040000001	EPM φ9×φ13×1.5m	Yamato
	Wire clamp	4320016005	Nominal diameter:14	Yamato
PLB/P10	Planar board	LT00018172	TTM00B-YC-CF（display board, with a tough card）	Yamato
ELB	ELB	LT00029774	NV-L22GR 15A	Mitsubishi
SW1	Switch (pump)	2550000011	CW-SB21NMKZMEF（Green）	Nikkai
X1	Electromagnetic Contact	LT00032906	FC-0ST 1a 100V	Fuji
-	Power cord	LT00008924	T2-3c	Yamato
TB	Terminal block	LT00031664	TFD250ABC-8P	Terminal
	Cord bushing	7050010002	SR-7W-2	Heyco
TH	Temperature sensor	LT00019488	T thermocouple	Yamato

CF750S

Symbol	Part name	Cord №.	Specification	Maker
-	Stainless steel hose nipple	LT00019696	R3/8 × ϕ 8	Yamato
-	Solvent packing	LT00021603	Fluororubber	Yamato
-	Spring	LT00019106		Yamato
-	Glass gas collecting bottle	LT00019107	500 ㎜ℓ	Yamato
SC	Service outlet	2080016004	WN1512K	Matsushita

14. List of dangerous materials

Never use an explosive substance a flammable substance or a substance containing them for this device.

Explosive substance	Explosive substance	①Nitroglycol, glycerine trinitrate, cellulose nitrate and other explosive nitrate esters
		②Trinitrobenzen, trinitrotoluene, picric acid and other explosive nitro compounds
		③Acetyl hydroperoxide, methyl ethyl ketone peroxide, benzoyl peroxide and other organic peroxides
Flammable substances	Explosive substances	Metal “lithium”, metal “potassium”, metal “natrium”, yellow phosphorus, phosphorus sulfide, red phosphorus, celluloids, calcium carbide (a.k.a, carbide), lime phosphide, magnesium powder, aluminum powder, metal powder other than magnesium and aluminum powder, sodium dithionous acid (a.k.a., hydrosulphite)
	Oxidizing substances	①Potassium 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
		④Potassium nitrate, sodium nitrate, ammonium nitrate, and other nitrates
		⑤Sodium chlorite and other chlorites
		⑥Calcium hypochlorite and other hypochlorites
	Flammable substances	①Ethyl ether, gasoline, acetaldehyde, propylene chloride, carbon disulfide, and other substances with ignition point at a degree 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.
		③Methanol, ethanol, xylene, pentyl acetate, (a.k.a.amyl acetate) and other substances with ignition point between zero and less than 30 degrees.
		④Kerosene, light oil, terebinth oil, isopenthyl alcohol(a.k.a. isoamyl alcohol), acetic acid and other substances with ignition point between 30 degrees and less than 65 degrees.
	Combustible gas	Hydrogen, acetylene, ethylene, methane, ethane, propane, butane and other gases combustible at 15℃ at one air pressure.

(Quoted from the separate table 1 in Article 6, the enforcement order of the Industrial Safety and Health Law)

15. Standard installation manual

※Install the unit according to the items below. （Confirm optional or special specifications.）

Model	Serial number	Date	Inst. Manager(company name)	Inst. manager	Judge

No.	Item	Implementation method	TOC No. Ref. column of manual	Judge
Specifications				
1	Accessories	Check items based on the accessories column	10.Specification column P.47	
2	Installation	・Visual check of the environmental conditions Caution：Surrounding environment	2.Before operating the unit ・Precautions on installation・・・ P.4	
		・Securing a space		
		・Add water in the water bath.	2.Before operating the unit ・Precautions on installation ・・・ P.7～8	
Operation related matters				
1	Source voltage	・Measure customer side voltage (at an outlet) with a tester. ・Measurement of an operating voltage （must meet the standard） Caution：Use a product that comply with the standard for installing to a plug or a breaker.	2.Before operating the unit ・Be sure to connect the earth・・・ P.6 ・Connect the power supply・・・ P.5 10. Specifications P.47 ・Standard－power supply	
2	Starting operation	・Start operation Circulating fluid must be circulating. Set to 20℃ and check the stability. Check：There is no water leak.	2.Before use P.7～8 ・Installation method・・・ 4.How to operate P.19～37 ・Operating procedures	
Description				
1	Description of operation	Explain operation of each part to the customer as per the instructions.	4.Operating procedures P.19～37 ・Operating method 1.Safety precautions P.1 ～14. List of dangerous substances ～P.52	
2	Error codes	Explain error codes and how to release to the customer as per the instructions.	8.When a trouble occurs ～ 9.After sales service and warranty P.44～46	
3	Maintenance and inspection	Explain operation of each part to the customer as per the instructions.	6.Maintenance procedures ・Daily inspection/ maintenance P.41	
4	Matters to note on completion of installation	・Note the installation date and the manager on the nameplate. ・Note necessary matters in the warranty card and hand it to the customer. ・Explain the after sales service route.	9.After sales service and warranty P.46	

Limited liability

Be sure to use the unit strictly following the handling and operating instructions in this operating instruction.
Yamato Scientific Co., Ltd. assumes no responsibility for an accident or a malfunction caused by use of this product in any way not specified in this operating instruction.
Never attempt to perform matters prohibited in this operation instruction.
Otherwise, an unexpected accident may result.

Notice

- **Descriptions in this operating instruction are subject to change without notice.**
- **We will replace a manual with a missing page or paging disorder.**

Instruction Manual
Neo Cool Circulator
CF750/750S
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