Neocool Circulator

Model

CHW700/CHS700

Instruction Manual

- Third Edition -

- Thank you for purchasing "Neocool Circulator, CHW/CHS Series" of Yamato Scientific Co., Ltd.
- To use this unit properly, read this "Instruction Manual" thoroughly before using this unit.
  Keep this instruction manual around this unit for referring at anytime.

⚠WARNING!:
Carefully read and thoroughly understand the important warning items described in this manual before using this unit.

Yamato Scientific Co. LTD.,

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Explanation

MEANING OF ILLUSTRATED SYMBOLS

Illustrated Symbols

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

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

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

Meaning of Symbols

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

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

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

Table of Illustrated Symbols

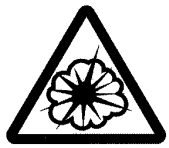
Warning


Warning, generally


Warning, high voltage


Warning, high temperature


Warning, drive train


Warning, explosive

Caution


Caution, generally


Caution, electrical shock


Caution, scald


Caution, no road heating


Caution, not to drench

Caution, water only


Caution, deadly poison

Prohibit


Prohibit, generally


Prohibit, inflammable


Prohibit, to disassemble


Prohibit, to touch

Compulsion


Compulsion, generally


Compulsion, connect to the grounding terminal

Compulsion, install on a flat surface


Compulsion, disconnect the power plug


Compulsion, periodical inspection

Fundamental Matters of "WARNING!" and "CAUTION!"

WARNING!

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

Never use this unit in an area where there is flammable or explosive gas. This unit is not explosion-proof. An arc may be generated when the POWER switch is turned on or off, and fire/explosion may result. (Refer to page 46 "List of Dangerous Substances".)

Always ground this unit

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

If a problem occurs

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

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

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

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

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

Substances that can not be used

Never use explosive substances, flammable substances and substances that include explosive or flammable ingredients in this unit. Explosion or fire may occur. (Refer to page 46 "List of Dangerous Substances".)

Do not disassemble or modify this unit

Do not disassemble or modify this unit. Fire or electrical shock or failure may be caused.

Do not touch high-temperature parts

Some of the parts may become hot during and just after operation. It may cause burns.

CAUTION!

During a thunder storm

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

Requirements for Installation

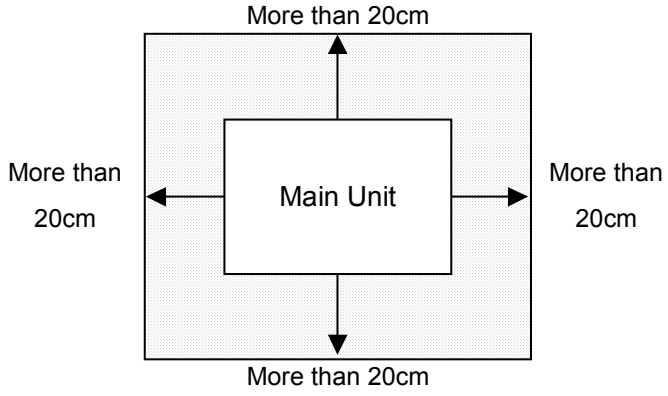
1. Always ground this unit

- Be sure to connect the earth wire (the green cable of power cord) to the grounding conductor or ground terminal to prevent accidents caused by electric leakage.
- Do not connect the earth wire to gas or water pipes. If not, fire disaster may be caused.
- Do not connect the earth wire to the ground for telephone wire or lightning conductor. If not, fire disaster or electric shock may be caused.
- Do not use a branching receptacle, which may cause the heat generation.

2. Choose a proper place for installation

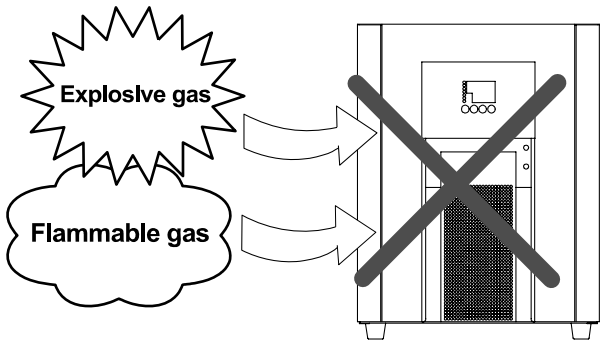
- Do not install this unit in a place where:
  - Rough or dirty surface.
  - Flammable gas or corrosive gas is generated.
  - Ambient temperature above 35°C.
  - Ambient temperature fluctuates violently.
  - There is direct sunlight.
  - There is excessive humidity and dust.
  - There is a constant vibration.

- Install this unit on a stable place with the space as shown below.



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

- Never use this unit in an area where there is flammable or explosive gas. This unit is not explosion-proof. An arc may be generated when the POWER switch is turned ON or OFF, and fire/explosion may result.
- To know about flammable or explosive gas, refer to page 46 “List of Dangerous Substances”.

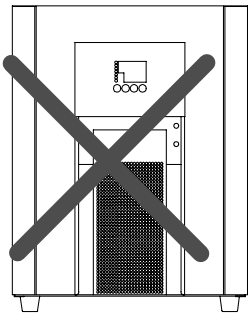


Requirements for Installation

4. Do not modify

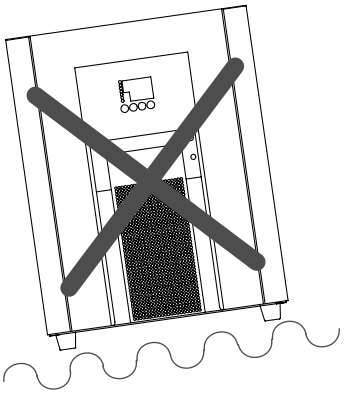
- Modification of this unit is strictly prohibited. This could cause a failure.

Modification



5. Installation on horizontal surface

- Place this unit as flat a place as possible. If the casters are not in uniform contact with the floor surface, noise or vibration may result. Additionally, the unit may cause a problem or malfunction.



6. Choose a correct power distribution board or receptacle

- Choose a correct power distribution board or receptacle that meets the unit's rated electric capacity.

Electric capacity: CHW700/CHS700: 100V AC, 12A

NOTE)
There could be the case that the unit does not run even after turning ON the power. Inspect whether the voltage of the main power is lowered than the specified value, or whether other device(s) uses the same power line of this unit. If the phenomena might be found, change the power line of this unit to the other power line.

- Starburst connection with a branching receptacle or extended wiring with a cord reel lowers electrical power voltage, which may cause the degradation of refrigeration capability.
- Connect the unit to only the power supply. If it is connected to a gas pipe, water pipe or telephone line, an accident or malfunction may result.

7. Before/after installing

- It may cause injure to a person if this unit falls down or moves by the earthquake and the impact. etc..To prevent, take measures that the unit cannot fall down, and not install to busy place.

Requirements for Installation

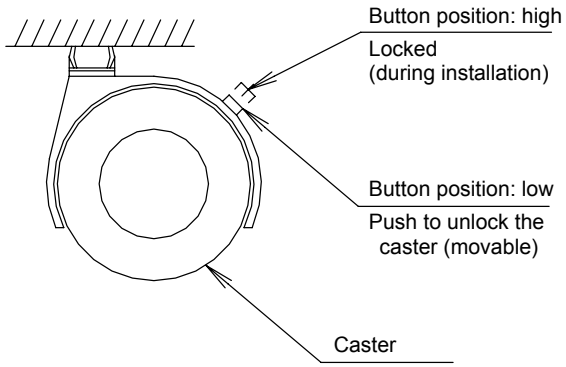
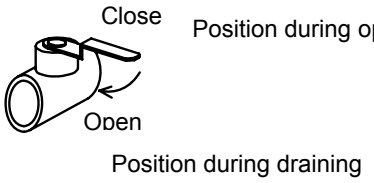
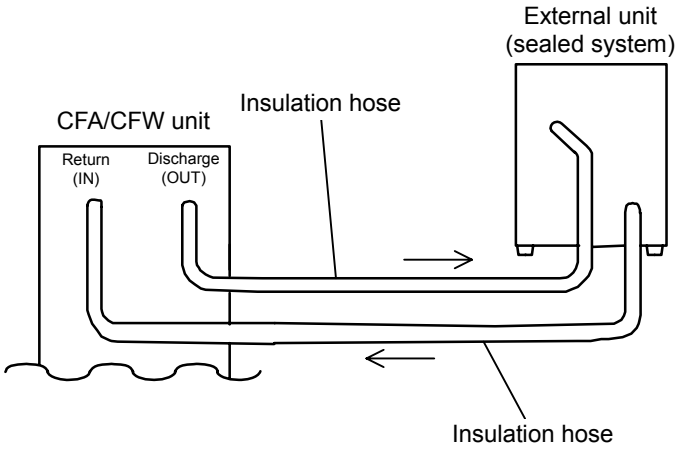
8. Handling of power code

- Do not entangle the power cord. This will cause overheating and possibly a fire.
- Do not bend or twist the power cord, or apply excessive tension to it. This may cause a fire and electrical shock.
- Do not lay the power cord under a desk or chair, and do not allow it to be pinched in order to prevent it from being damaged and to avoid a fire or electrical shock.
- Keep the power cord away from any heating equipment such as a room heater. The cord's insulation may melt and cause a fire or electrical shock.
- If the power cord becomes damaged (wiring exposed, breakage, etc.), immediately turn off the power at the rear of this unit and shut off the main supply power. Then contact your nearest dealer for replacement of the power cord. Leaving it may cause a fire or electrical shock.
- Connect the power plug to the receptacle which is supplied appropriate power and voltage.

9. Select a circulating fluid according to the model

- CHW700 type is a circulation device of external sealing system for general tap water, and CHS700 type is for pure water/general tap water. Do not use alcoholic circulating fluid or other solution for preventing any cause of failure.

Installation Procedure

1	Release the stopper lock of the casters. Push down the stopper button of the casters as shown in the right figure. It will be unlocked. (Only the two casters on the front side of the unit are equipped with a caster.) 
2	Move the unit to the place of installation. ❖ If there is a bump on the floor, the casters may receive excessive load and get damaged. In this case, lift and move the unit.
3	After the unit is placed in the desired position, lock the stopper button of the casters.
4	Check the drain cock. Confirm that the drain cock on the right side of the unit is in the "Close" position (perpendicular to the cock). 
5	Connect the hoses. (The package does not include any circulation hose. Please prepare it yourself.) Connect the connection port of the main part to the circulation route of the external sealing system so that there may be no leakage. Connect the hose to the return port (IN) and discharge port (OUT) of the main part. The diameter of a hose nipple is φ13.5 ㎜. Refer to the following figure. 

Installation Procedure

6 Precautions about the circulating path

- Carefully check the direction of circulation, and connect the hoses properly. Improper connection results in an accident or malfunction of the unit and the circulating path.
- Minimize the length of the circulating path. If resistance inside the piping increases, the quantity of circulating fluid decreases, resulting in lower cooling efficiency. For the capacity of the circulating pump, see "**エラー! 参照元が見つかりません。**" on page **エラー! ブックマークが定義されていません。**.
- Be sure to connect for making a circulating route. Do not connect with water service or gas pipe, etc. It may cause an accident or a failure.
- Check the circulation capacity and withstand pressure of the circulating path. Excessive circulation or pressure may result in an accident or malfunction.
- Do not connect any powered unit or a unit with a motor to the circulating path. It may cause an accident or failure.
- Do not close up the circulating route with a solenoid valve or a restrictor, etc. It may cause an accident, a failure, and a water leakage of this unit.
- Do not make it too narrow. The flux of the circulating water should be secured more than 1.5/min.
- When changing flux, execute the operation slowly. A rapid change of flux may damage the durability of the pump.
- If the unit is to be connected to a circulation unit installed in a higher place than it, beware of the backflow of the circulating fluid. If the fluid flows back, it may overflow the water bath of the unit. Add a valve to the circulating path or take other proper measures to prevent a backflow.

7 Connecting the power.

Confirm that the leakage breaker and the POWER switch are turned "OFF", and then plug into an outlet.

8 Pour circulating fluid into the bath.

- Confirming that the drain cock is closed, remove the lid. Pour the circulating fluid over the level of cooling coil (about 14L). At this step, connect the attached hose to the overflow (nipple) which is placed on the left side of the main part, and also prepare a proper receptacle.
- Turn on the earth leakage breaker and the power switch, then circulate to the device of external sealing system to be cooled. Confirm that the fluid circulates without any abnormal noise in the circulating pump.
- It may not circulate at first because of air accumulation. Extract the air by trying power switch ON/OFF. If it still does not circulate, turn off the power switch immediately, and inspect it referring to P40 "Trouble Shooting".

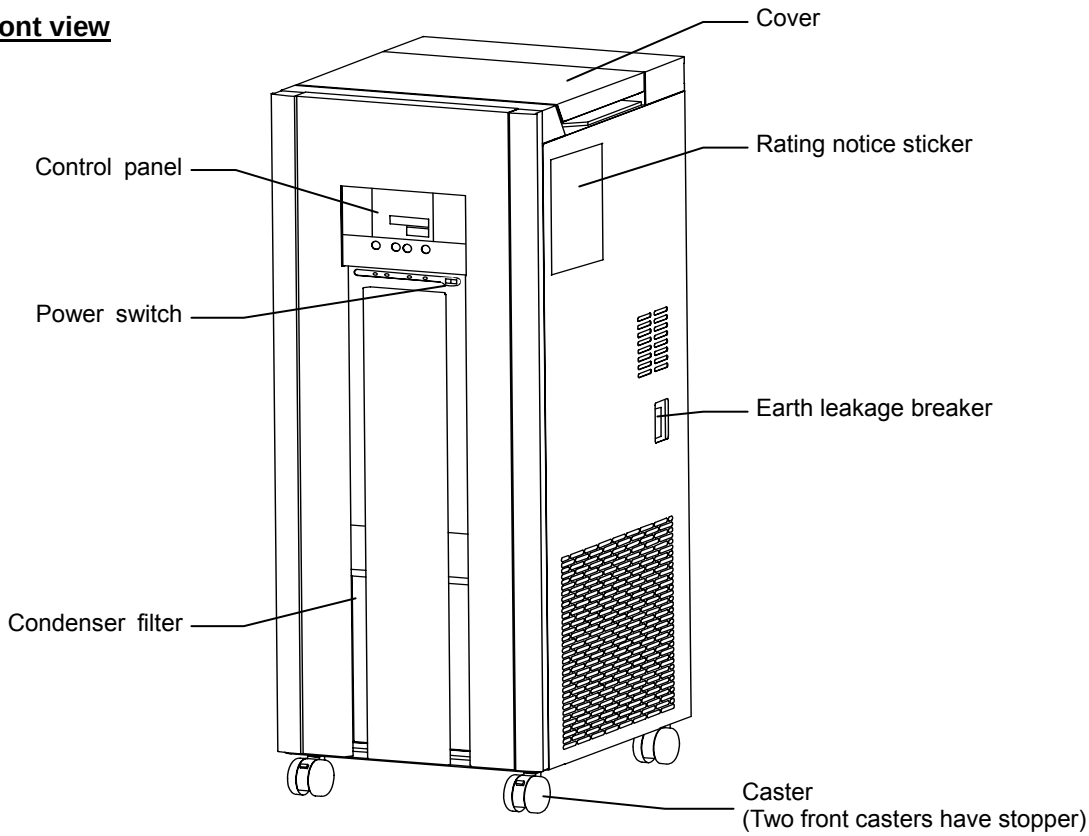
The circulating pump may malfunction if the unit is operated with the circulating fluid uncirculated.

- When circulation of the circulating fluid is stabilized, fill the circulating fluid over the level of the coolant coil.

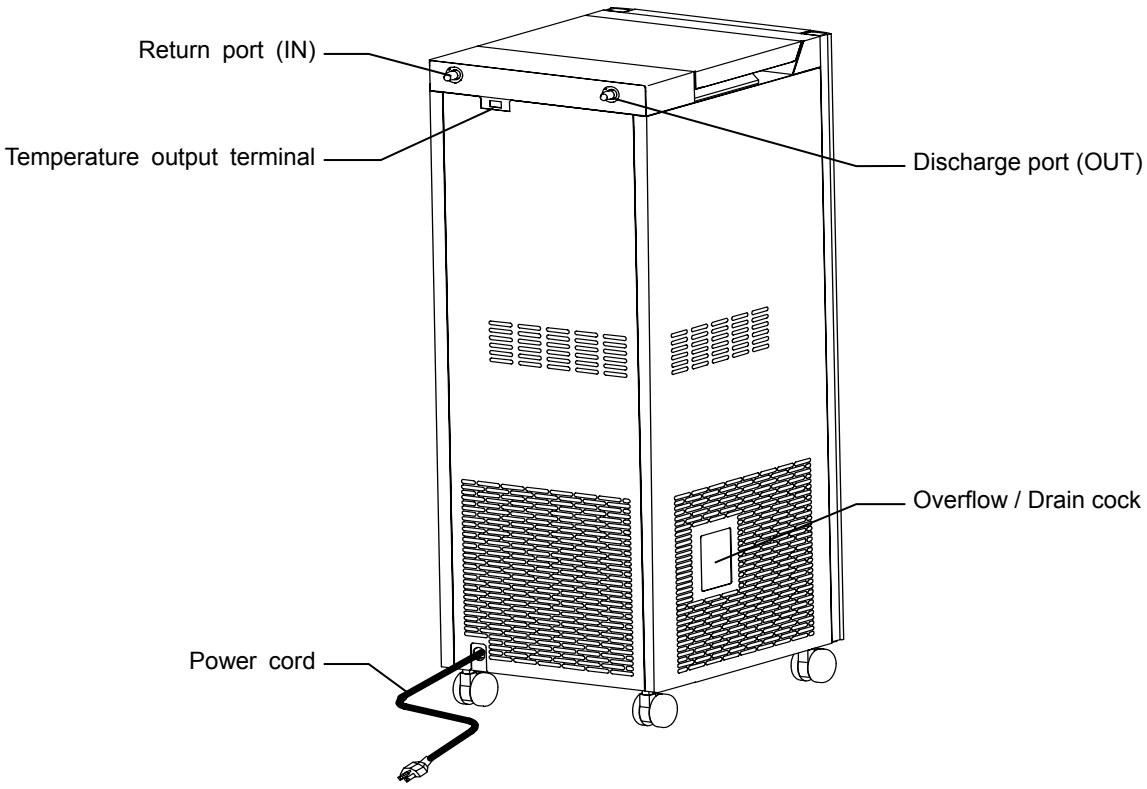
Note) Do not shot the coolant fluid in it. Pour it slowly.

Main Unit

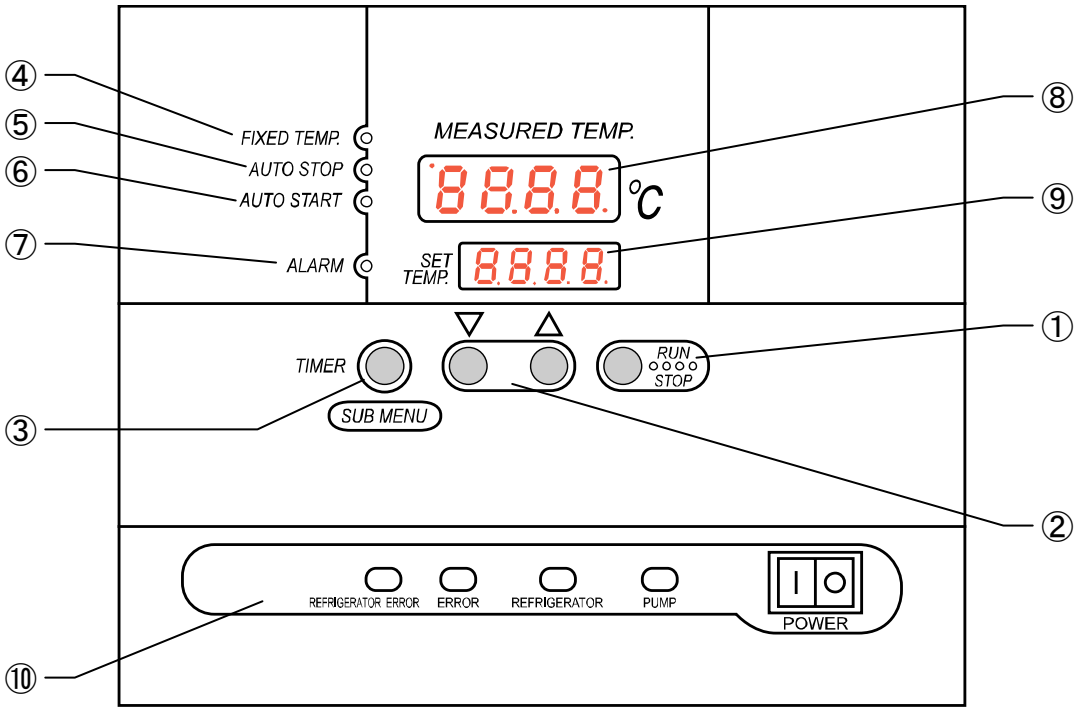
Front view



Rear view

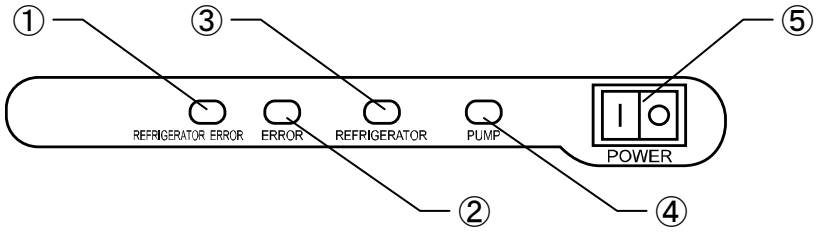


Control Panel



No.	Name	Function
①	RUN/STOP Key	Used for operation Start/Stop.
②	▲▼ Key	Selects setting value.
③	TIMER Key (SUB MENU Key)	Selection key for timer operation. Selects Quick Auto Stop operation, Auto Stop operation, and Auto Start operation. Carries out the settings for Calibration Offset Temperature, Key rock function, and power failure compensation function.
④	FIXED TEMP Lamp	Lights during Fixed Temp. operation.
⑤	AUTO STOP Lamp	Lights during Quick Auto Stop timer operation and Auto Stop timer operation.
⑥	AUTO START Lamp	Lights during Auto Start timer operation.
⑦	ALARM Lamp	Lights when an error occurs.
⑧	Measurement Temperature Screen	Displays Inner bath measurement temperature, Setting character, and Alarm information.
⑨	Setting Temperature Screen	Displays Setting temperature, Timer setting value, and Remaining time. (Temperature can be set up to the 1st decimal place.)
⑩	Operation Monitor	Refer to page 11.

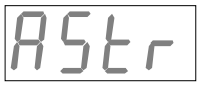
Operation Monitor



No.	Name	Function
①	REFRIGERATOR ERROR Lamp	Lights when the refrigerator is over-lorded.
②	ERROR Lamp	Lights when the water level of circulation fluid declines.
③	REFRIGERATOR Lamp	Lights when the refrigerator is running.
④	PUMP Lamp	Lights when the pump is running.
⑤	POWER Switch	Executes Power ON/OFF.

Characters of the Controller

The characters controller shows are as follows:

Character	Identifier	Name	Purpose
	**AStP**	Auto Stop Setting	Used for setting the auto stop operation.
	**AStr**	Auto Start Setting	Used for setting the auto start operation.
	**End**	Time-up	Displayed when timer operation is ended.
	**cAL**	Calibration Offset Setting	Used for inputting the calibration offset temperature. (Refer to Page 26 "Calibration Offset Function".)
	**LocK**	Key Lock	Locks the keys on control panel to protect from unnecessary operation. (Refer to Page 27 "Lock Function".)
	**Pon**	Power failure compensation setup	Used for Power failure compensation setup. (Refer to Page 28 "Power Failure Compensation Function".)
	**Accm**	Addition time	Displays the time that electricity is turned on with the controller. (Refer to Page 29 "Addition Time Function".)

❖ Refer to Page 15 "Operation Mode, Function Setting Key, and Characters" for operation mode and function character.

Operation Mode and Function List

The operation modes of this unit are as follows;

Name	Description	Page
Fixed Temperature Operation	Set the Temperature by ▼▲ key. Start/Stop operation by pressing RUN/STOP key for about 1 second.	16
Quick Auto Stop Operation	Used in case that the operation needs to be stopped a few hours after setting. The time to the operation stop can be set up by pressing TIMER key during the Fixed Temp. operation. The time can be set by ▼▲ key. Quick Auto Stop operation will start by pressing RUN/STOP key.	18
Auto Stop Operation	Used for Auto Stop operation setting at the time of Fixed Temp. operation setting. The temperature can be set by ▼▲ key. Display "AStP" by pressing TIMER key. The time can be set by ▼▲ key. Auto Stop operation will start by pressing RUN/STOP key.	20
Auto Start Operation	Used for the operation that starts automatically a few hours after turning on the POWER key. The temperature can be set by ▼▲ key. Display "AStP" by pressing TIMER key. The time can be set by ▼▲ key. Auto Start operation will start by pressing RUN/STOP key.	23

NOTE) This unit is impossible to be changed the mode during the operation. If the mode requires to be changed, stop the operation.

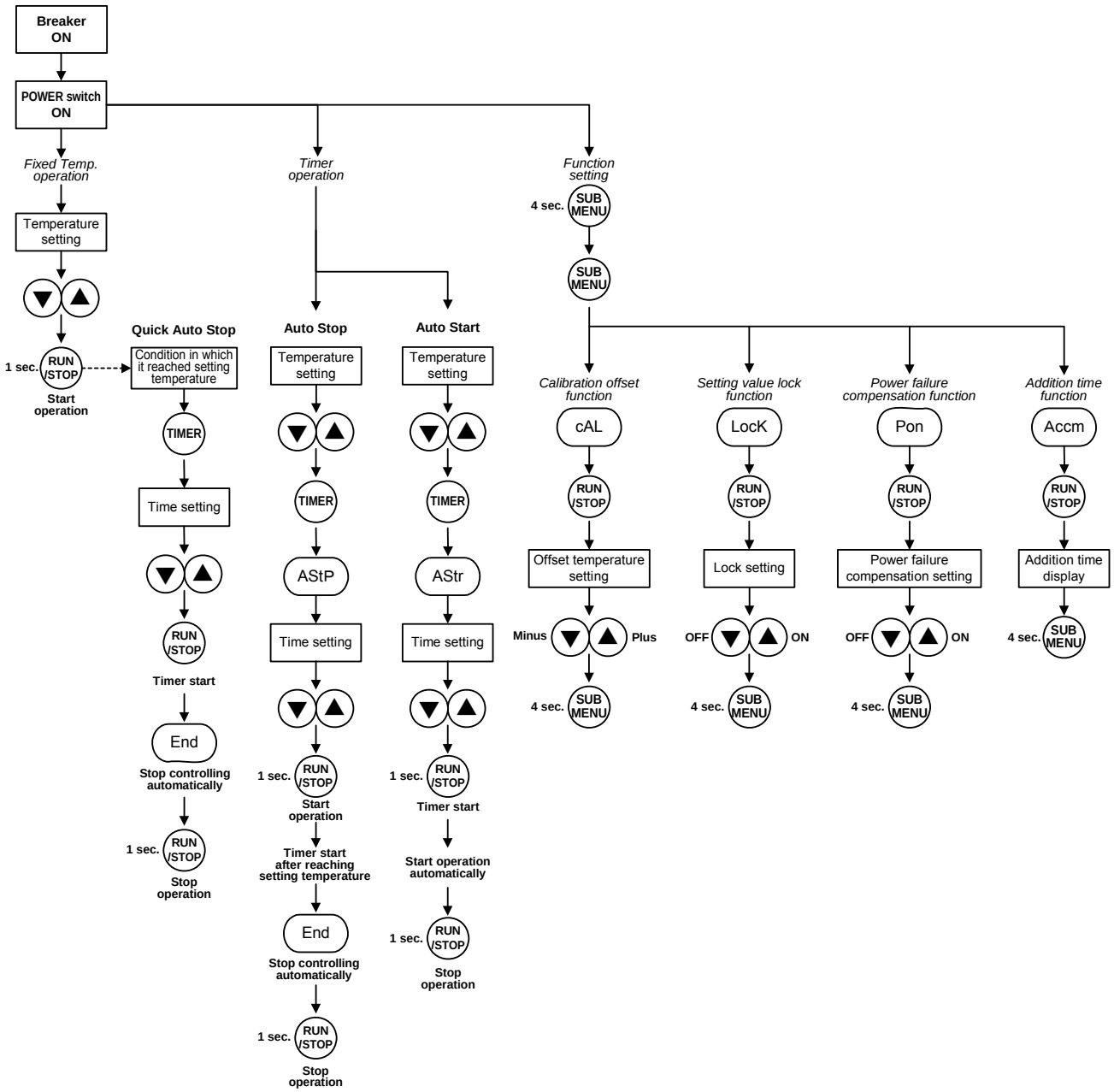
Operation Mode and Function List

The operation functions of this unit are as follows;

Name	Description	Page
Calibration offset function	This calibration offset function is for calibrating the difference occurred between the required in- bath temperature and control temperature (sensor temperature) of the controller. This unit can be calibrated toward either plus side or minus side of the whole temperature range.	26
Setting value locking	This function locks the established operation status. It can be set and cancelled with the SUB MENU key.	27
Power failure compensation function	In case of electric outage during operation, the operation will be started in the state just before the electric outage. It can be set or cancelled by SUB MENU key.	28
Addition time function	Time length while the Power supply is turned on is to be added by 1 hour cycle. It can be displayed by SUB MENU key.	29
Temperature Output Terminal	Transmits and outputs the measured temperature of the controller at 4 to 20 mA.	30

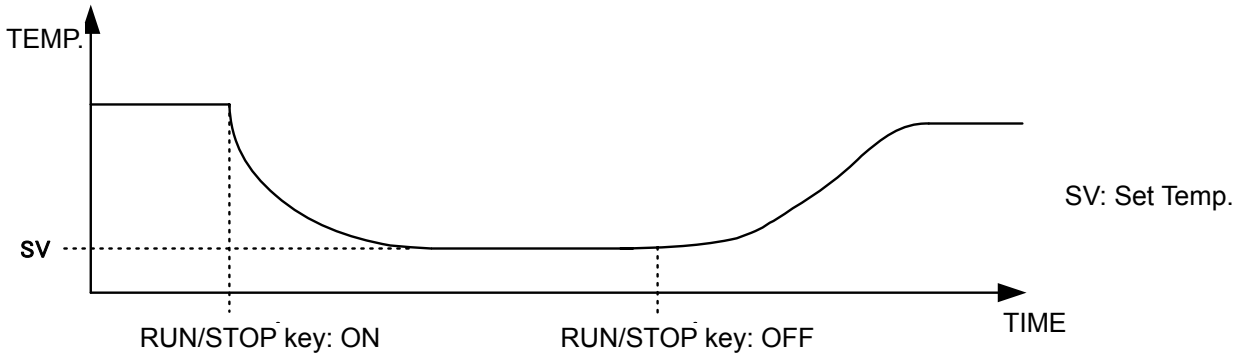
Operation Mode, Function Setting Key, and Characters

The operation mode setting and function setting use the key operation and characters show in the following figure.



Fixed Temperature Operation

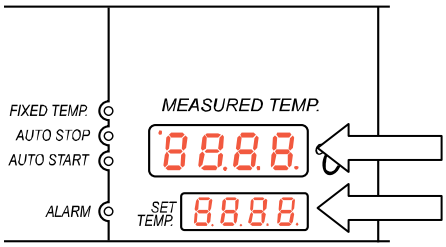
In this mode, the unit starts to operate by pressing RUN/STOP key and continues operating at the set temperature until RUN/STOP key is re-pressed, as shown in the figure below.



Fixed temperature operation procedure

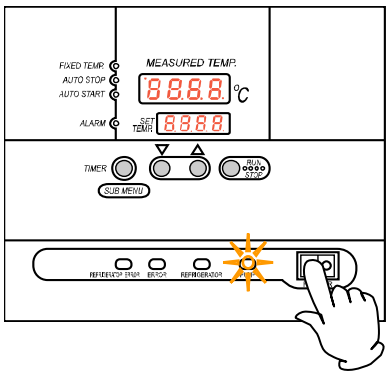
1. Turn on the earth leakage breaker/ POWER switch

- When the earth leakage breaker and POWER switch are turned on, a starting screen will be displayed for about 4 seconds. PUMP lamp is to be lit, the pump starts operating, and the circulation starts. After starting operation, the initial setting screen will be displayed. Each screen shows the current inner bath temperature and setting temperature.



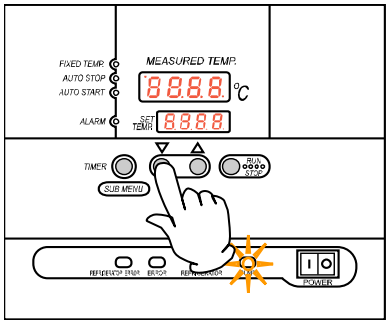
Measurement temperature screen:
Displays the current temperature in bath.

Setting temperature screen:
Displays the setting temperature.

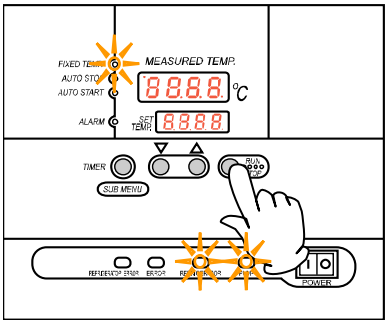


2. Set the temperature

- Set the proper temperature by ▼▲ key.
  The setting value will be smaller by ▼ key, and larger by ▲ key.
- Setting value will blink at the setting temperature screen.

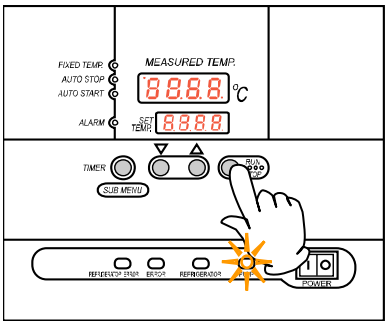


Fixed Temperature Operation



3. Start operation

- Press RUN/STOP key for a second.
- FIXED TEMP. lamp will be lit and operation will start.
- When the refrigerator starts operating, REFRIGERATOR lamp will be lit.



4. Stop operation

- Press RUN/STOP key for a second.
- FIXED TEMP. lamp will be put out and operation will stop.
- The screen will return to the initial setting screen.

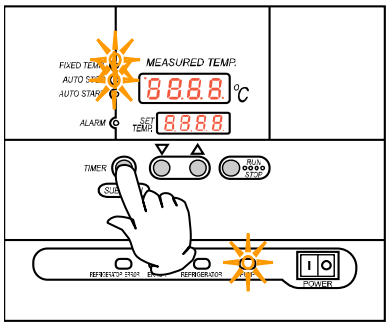
To correct or check setting…

To change the setting value, press ▼▲ key. The blink will stop after 3 seconds, and the change will be confirmed.

Quick Auto Stop Operation

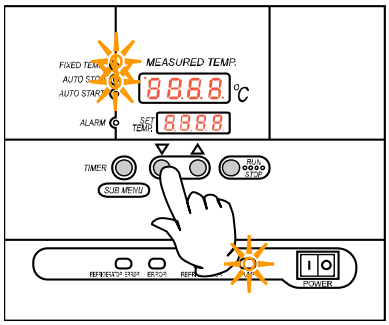
Quick auto stop operation procedure

This operation is used to specify the period up to automatic stop, i.e., sets the auto stop timer during operation.



1. Enter the quick auto stop mode during fixed temperature operation

- Confirm that the FIXED TEMP. lamp is lit, and it is under operation.
- Press TIMER key.
- AUTO STOP lamp will blink.

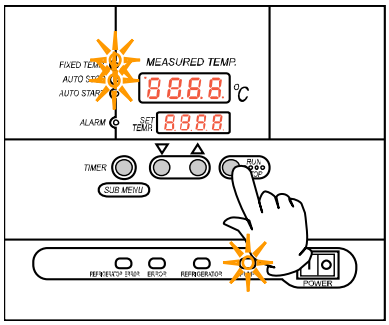


2. Set the timer

- Setting value will blink at setting temperature screen.
- Set the proper time by ▼▲ key.
  The setting value will be smaller by ▼ key, and larger by ▲ key.

Timer function:

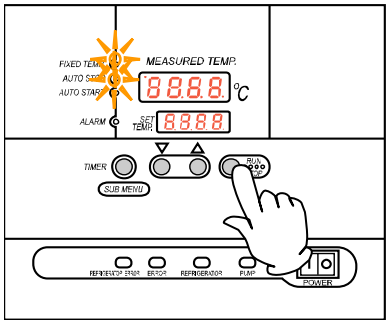
- The maximum setting time is "999 hours and 50 minutes".
- The time can be set in increments of a minute under 99 hours and 59 minutes.
- It can be set in increment of ten minutes over 100 hours.
- The "▼▲" can change the setting time quickly when it is pressed continuously. Press them discontinuously when fine adjustment is needed.



3. Start timer operation

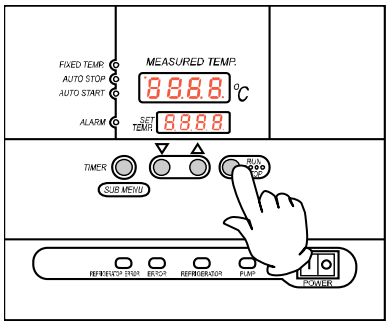
- Press RUN/STOP key.
- Start timer operation with the FIXED TEMP. lamp and AUTO STOP lamp on.
- Timer operation starts when RUN/STOP key is pressed.
- Remaining time is displayed at the setting temperature screen during the operation.

Quick Auto Stop Operation



4. Stop/terminate timer operation

- The operation will be stopped automatically at the setting time.
- The character "End" which tells that the operation is ended will blink at the setting temperature screen, while FIXED TEMP. lamp and AUTO STOP lamp are on.
- End the timer operation mode by pressing RUN/STOP key for a second.
- The screen will return to initial setting screen.



5. To suspend quick auto stop operation

- End timer operation mode by pressing RUN/STOP key for a second.
- The screen will return to initial setting screen.

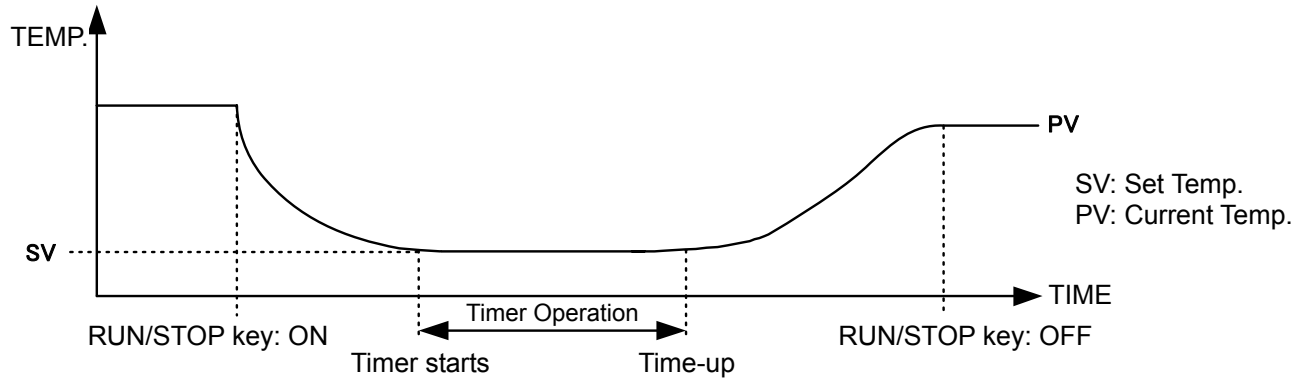
To change the setting time…

To change the setting time during the operation, press TIMER key and set the proper time by ▼▲ key.

In this case, it is necessary to add the value of elapsed time to newly adding time. After a while, the blink at the setting temperature screen will stop, and the change will be confirmed.

Auto Stop Operation

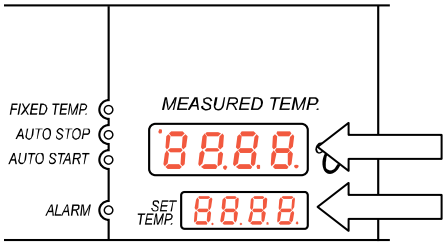
In this mode, the unit automatically comes to a stop after the set period passes away from the start of fixed-value operation according to timer setting, as shown in the figure below.



Auto stop operation procedure

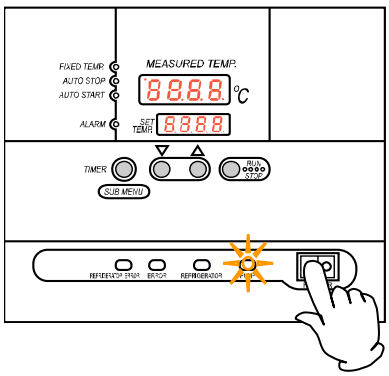
1. Turn on the earth leakage breaker/ POWER switch

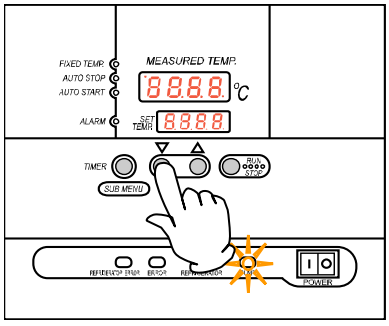
- When the earth leakage breaker and POWER switch are turned on, a starting screen will be displayed for about 4 seconds. PUMP lamp is to be lit, the pump starts operating, and the circulation starts. After starting operation, the initial setting screen will be displayed. Each screen shows the current inner bath temperature and setting temperature.



Measurement temperature screen:
Displays the current temperature in bath.

Setting temperature screen:
Displays the setting temperature.



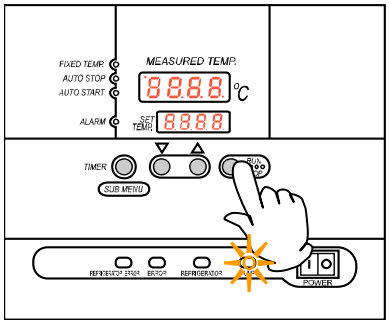


2. Set the temperature

- Set the proper temperature by ▼▲ key.
  The setting value will be smaller by ▼ key, and larger by ▲ key.
- Setting value will blink at the setting temperature screen.

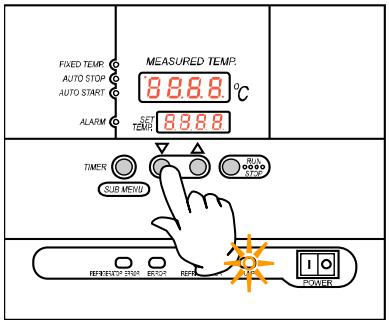
❖ Before the timer starts, the setting temperature can be changed during the operation. Press ▼▲ key to change the setting value. After 3 seconds from changing, the blink stops and the change will be confirmed.

Auto Stop Operation



3. Select auto stop operation

- Press TIMER key, and display the character "AStP" which means auto stop operation.
- Measured temperature screen:
  "AStP" which means auto stop operation is displayed.
- Setting temperature screen:
  The time which is set just before is displayed.

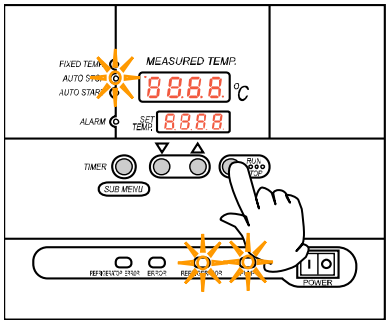


4. Set the timer

- Setting value will blink at setting temperature screen.
- Set the proper time by ▼▲ key.
  The setting value will be smaller by ▼ key, and larger by ▲ key.

Timer function:

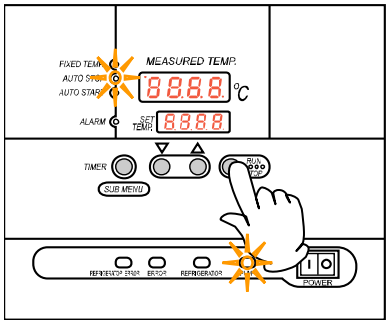
- The maximum setting time is "999 hours and 50 minutes".
- The time can be set in increments of a minute under 99 hours and 59 minutes.
- It can be set in increment of ten minutes over 100 hours.
- The "▼▲" can change the setting time quickly when it is pressed continuously. Press them discontinuously when fine adjustment is needed.



5. Start timer operation

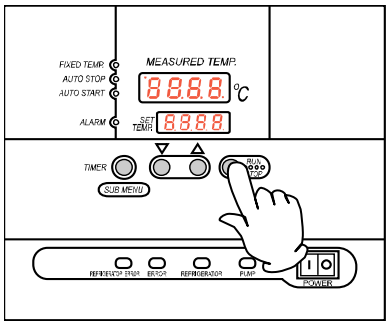
- Press RUN/STOP key for a second.
- AUTO STOP lamp blinks and the operation will start.
- Timer operation starts when the inner bath temperature at the measured temperature screen reaches the setting temperature.
- During timer operation, the remaining time is displayed at the setting temperature screen.

Auto Stop Operation



6. Stop/terminate timer operation

- The operation will be stopped automatically at the setting time.
- The character "End" which tells that the operation is ended will blink at the setting temperature screen, while AUTO STOP lamp is on.
- End the timer operation mode by pressing RUN/STOP key for a second.
- The screen will return to initial setting screen.



7. To suspend auto stop operation

- End timer operation mode by pressing RUN/STOP key for a second.
- The screen will return to initial setting screen.

To change the setting time…

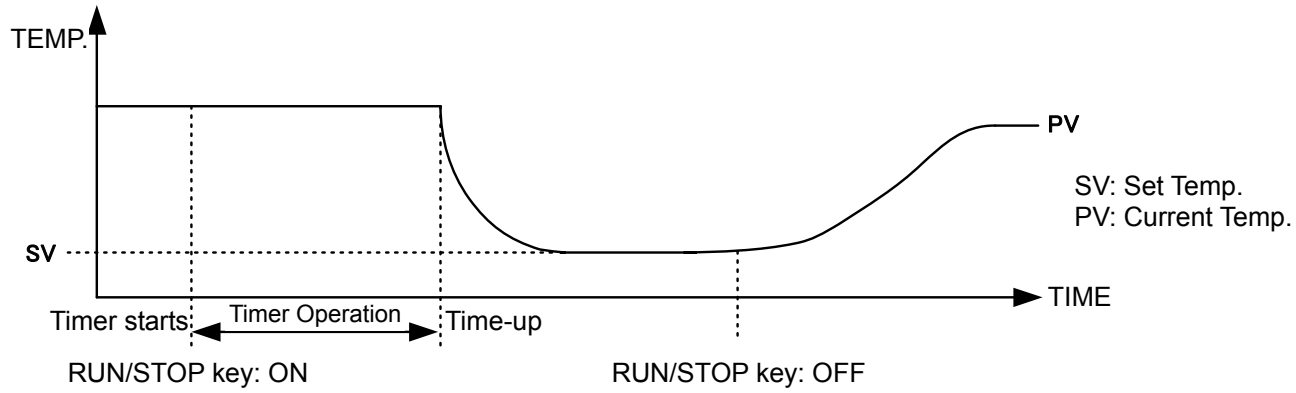
To change setting time before the timer operation, press TIMER key. It will be in setting mode, and setting time can be changed. Input time length from the time that it reaches the setting time to the time that it stops the operation.

To change setting time before the timer operation, press TIMER key. In this case, it is necessary to add the value of elapsed time to newly adding time.

After that, press RUN/STOP key to confirm the change.

Auto Start Operation

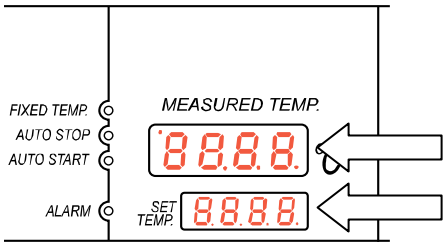
In this mode, the unit automatically starts to operate after the set period passes away from the start of fixed temperature operation according to timer setting, as shown in the figure below. However, it does not automatically come to a stop and must be manually deactivated.



Auto start operation procedure

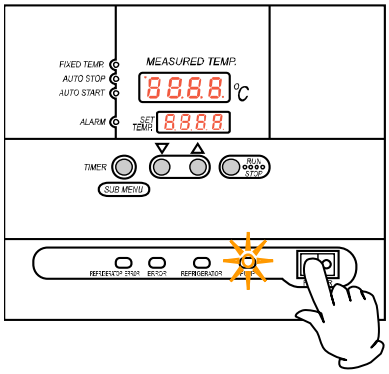
1. Turn on the earth leakage breaker/ POWER switch

- When the earth leakage breaker and POWER switch are turned on, a starting screen will be displayed for about 4 seconds. PUMP lamp is to be lit, the pump starts operating, and the circulation starts. After starting operation, the initial setting screen will be displayed. Each screen shows the current inner bath temperature and setting temperature.



Measurement temperature screen:
Displays the current temperature in bath.

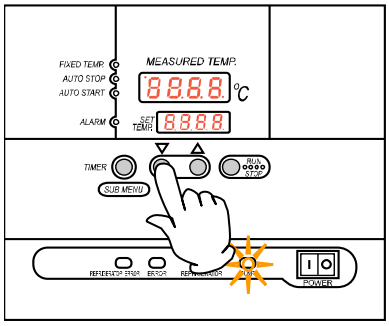
Setting temperature screen:
Displays the setting temperature.



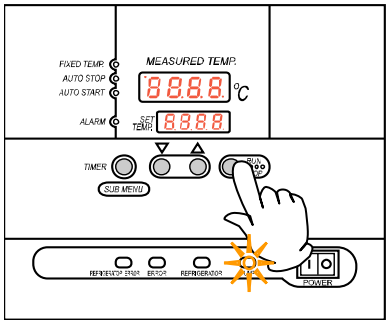
2. Set the temperature

- Set the proper temperature by ▼▲ key.
  The setting value will be smaller by ▼ key, and larger by ▲ key.
- Setting value will blink at the setting temperature screen.

❖ Temperature can be changed during operation.

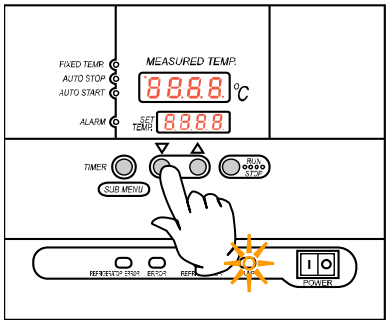


Auto Start Operation



3. Select auto start operation

- Press TIMER key, and display the character "AStr" which means auto start operation.
- Measured temperature screen:
  "AStr" which means auto start operation is displayed.
- Setting temperature screen:
  The time which is set just before is displayed.

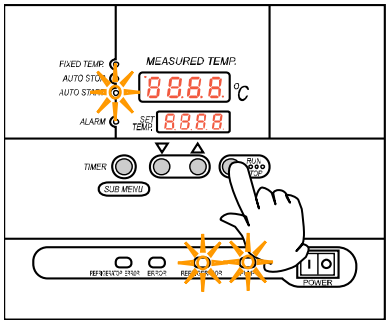


4. Set the timer

- Setting value will blink at setting temperature screen.
- Set the proper time by ▼▲ key.
  The setting value will be smaller by ▼ key, and larger by ▲ key.

Timer function:

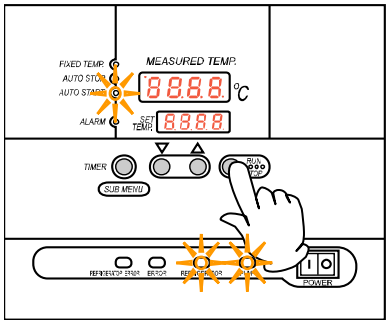
- The maximum setting time is "999 hours and 50 minutes".
- The time can be set in increments of a minute under 99 hours and 59 minutes.
- It can be set in increment of ten minutes over 100 hours.
- The "▼▲" can change the setting time quickly when it is pressed continuously. Press them discontinuously when fine adjustment is needed.



5. Start timer operation

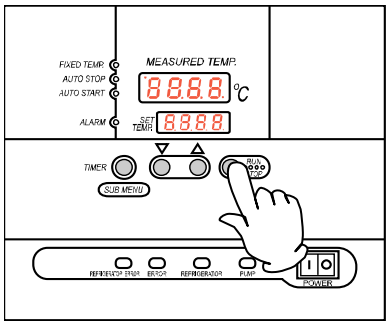
- Press RUN/STOP key for a second.
- AUTO START lamp blinks and the operation will start.
- During timer operation, the remaining time is displayed at the setting temperature screen.

Auto Start Operation



6. Stop/terminate timer operation

- After timer operation, it will start operation at the setting time. At this time, AUTO START lamp is still on.
- To stop/terminate timer operation, press RUN/STOP key for a second, then timer operation mode will end.
- The screen will return to the initial screen.



7. To suspend auto start operation

- End timer operation mode by pressing RUN/STOP key for a second.
- The screen will return to initial setting screen.

To change the setting temperature / setting time…

To change setting temperature during operation, press ▼▲ key. The initial value blinks at setting temperature screen, and setting temperature can be changed by ▼▲ key.

To change setting time during operation, press TIMER key. The initial value blinks at setting temperature screen, and setting time can be changed by ▼▲ key.

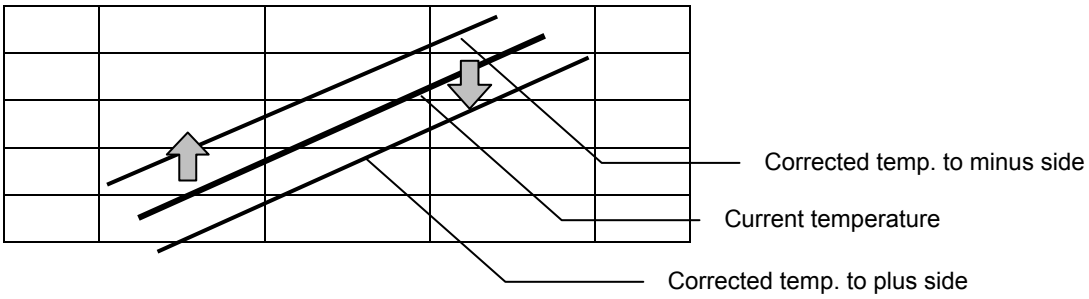
After either change, the blink at setting temperature screen stops, and the setting is confirmed.

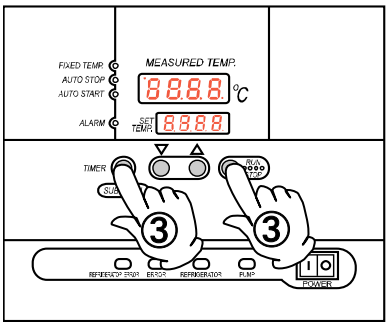
In this case, it is necessary to add the value of elapsed time to newly adding time.

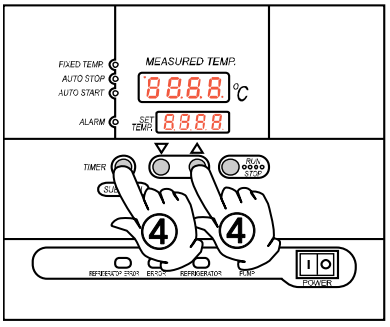
Any setting changes after auto start time cannot be done. In this case, press RUN/STOP key to stop the operation once, then reset from the beginning.

Calibration Offset Function

Calibration offset is a function which corrects the difference between the temperature in bath and that of controller (sensor temperature) if arises. The function parallel corrects the difference either to the plus or minus side within the whole temperature range of unit. The function can be set or cancelled by the SUB MENU key. "0" is set at factory shipment.







① Start operation with the target setting temperature. Check the temperature in bath with a thermograph after it is stabilized.

② Check the difference between the setting temperature and that in bath.

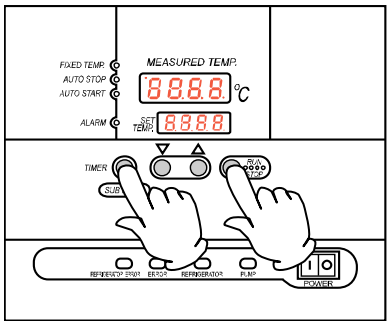
③ Press SUB MENU key for 4 seconds. Press SUB MENU key again. Select "cAL" which means calibration offset, and press RUN/STOP key.

④ Input the difference between setting temperature and inner bath temperature by ▼▲ key, and press SUB MENU key for a few seconds to complete the setting.

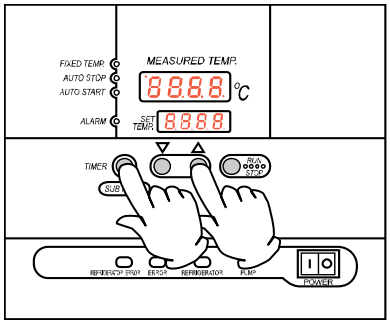
- ❖ When the offset correction temperature is set to the minus side, the temperature on the measurement temperature display screen falls by the setting temperature, while the temperature on bath rises.
  When it is set to the minus side, the temperature on the measurement temperature display screen rises by the setting temperature, while the temperature on bath falls.
- ❖ The unit has two-point correction function, which performs offset between low-temperature zone and high-temperature zone.
- ❖ Please consult our local branch office when carrying out validation of temperature controller.

Lock Function

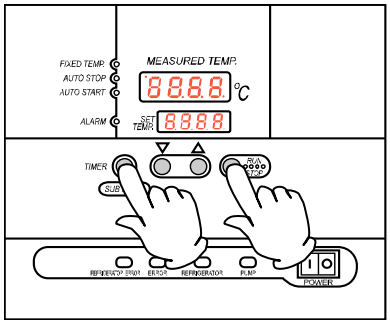
Lock function that makes operation setting unchangeable.



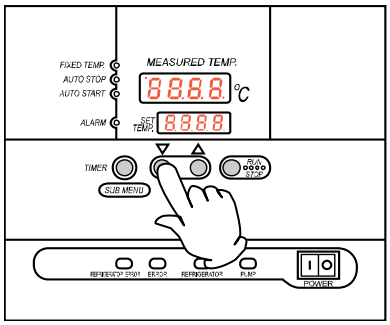
① Press SUB MENU key for 4 seconds.
Then by pressing SUB MENU key, select the character "LocK" which means setting value lock, and press RUN/STOP key.



② The display "oFF" will light at the setting temperature screen. By changing the display to "on" with ▼▲ key, the setting value will be locked.
Press SUB MENU key for a few seconds to complete the setting.



③ To cancel the lock function, press SUB MENU key for 4 seconds.
Then by pressing SUB MENU key, select the character "LocK" which means setting value lock, and press RUN/STOP key.

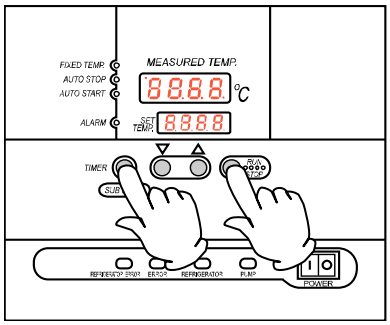


④ Select "oFF" by ▼▲ key, and press RUN/STOP key to cancel the lock function.

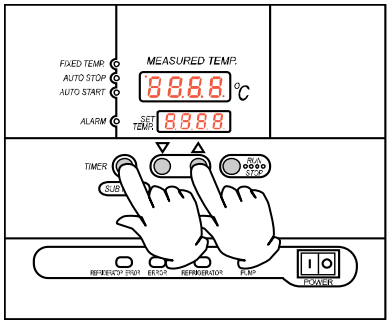
❖ All keys other than the RUN/STOP and SUB MENU keys are lock when the lock function is on.

Power Failure Compensation Function

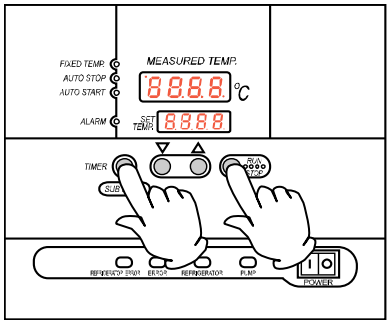
This is the setting that can start the operation with the former setting in case of electric outage.



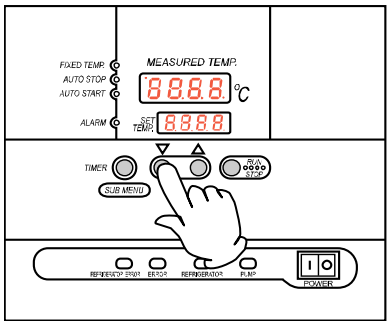
① Press SUB MENU key for 4 seconds.
Then by pressing SUB MENU key, select the character "Pon" which means power failure compensation, and press RUN/STOP key.



② The display "oFF" will light at the setting temperature screen. By changing the display to "on", power failure compensation operation is set.
Press SUB MENU key for a few seconds to complete the setting.



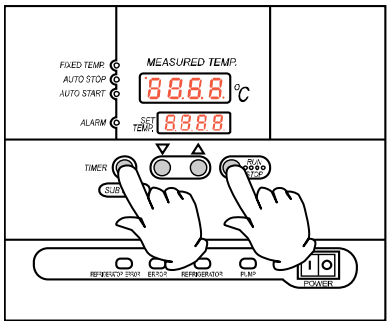
③ To cancel power failure compensation, press SUB MENU key for 4 seconds.
Then select the character "Pon" by pressing SUB MENU key, and press RUN/STOP key.



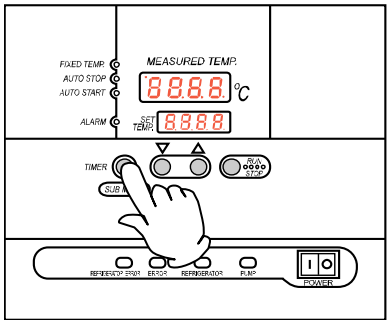
④ Select "oFF" by ▼▲ key, and press RUN/STOP key to cancel the lock function.

Addition Time Function

Displays the time length that the controller is plugged.



① Press SUB MENU key for 4 seconds.
Then by pressing SUB MENU key, select the character "Accm" which means addition time, and press RUN/STOP key.



② The time length that the controller is plugged is displayed at the setting temperature screen.
Press SUB MENU key for a few seconds. The screen will returns to the initial screen.

Temperature Output Terminal

Precautions

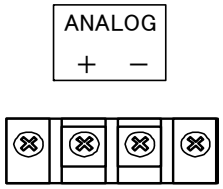
- Operate this product according to the procedure described in this instruction manual. Failure to follow the operation procedure described herein may result in a problem. The guarantee will not apply if you operate the product in the wrong manner.

⚠ CAUTION!

- Turn off the breaker before connecting the cables.
- Connect a recorder or another appliance of 600 W or less in input impedance to the temperature output terminal.
- Securely fasten all connections with the screws attached to the terminal block.

Connection procedure

- Connect the cables to the appropriate terminals.
- When using temperature output, use a shielded wire for the cable to be connected to prevent noise.



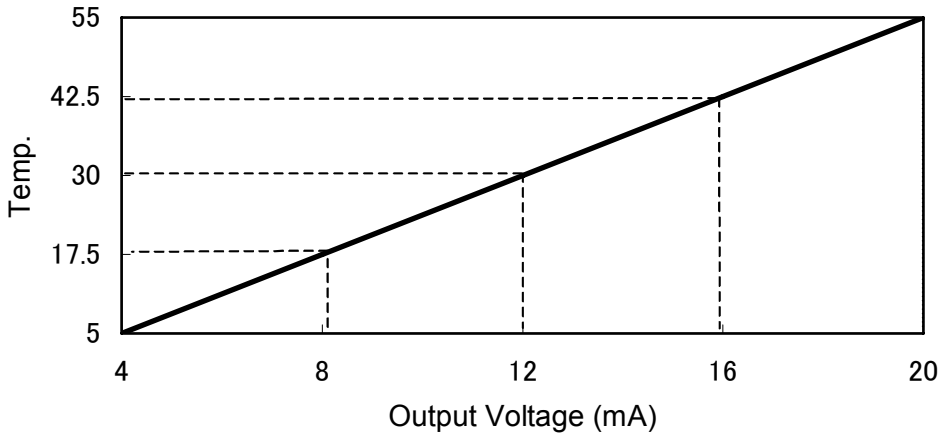
Connection terminal

Temperature Output Terminal

Specification

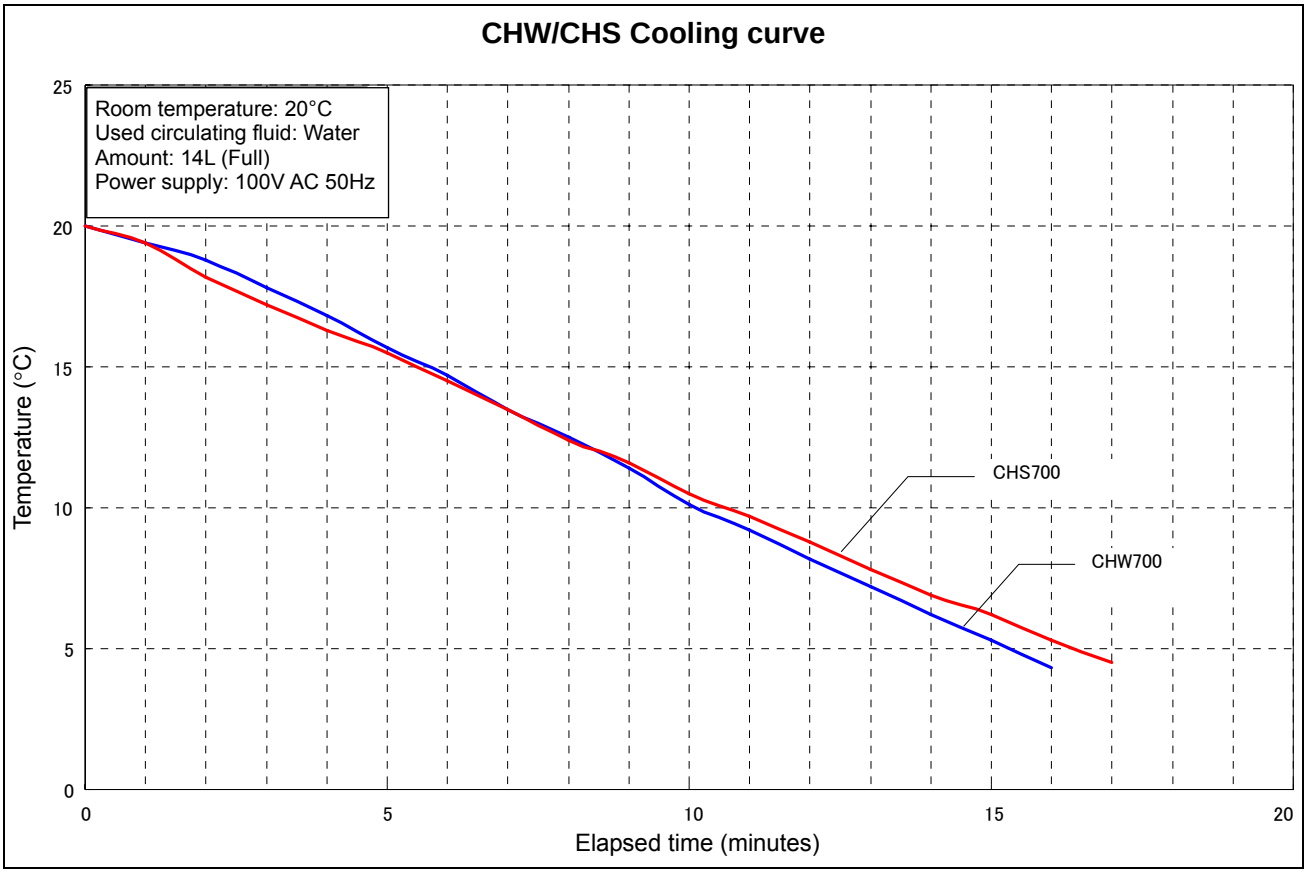
Temperature Output (ANALOG)	• The voltage (DC) corresponding to the measured temperature is output. • Output temperature range: 5 to 55 • Output voltage: 4 to 20㎃ DC • Load: 600Ω or bellow • Resolution: ±1℃ • Connection: M4 screw terminal block

Temperature Output

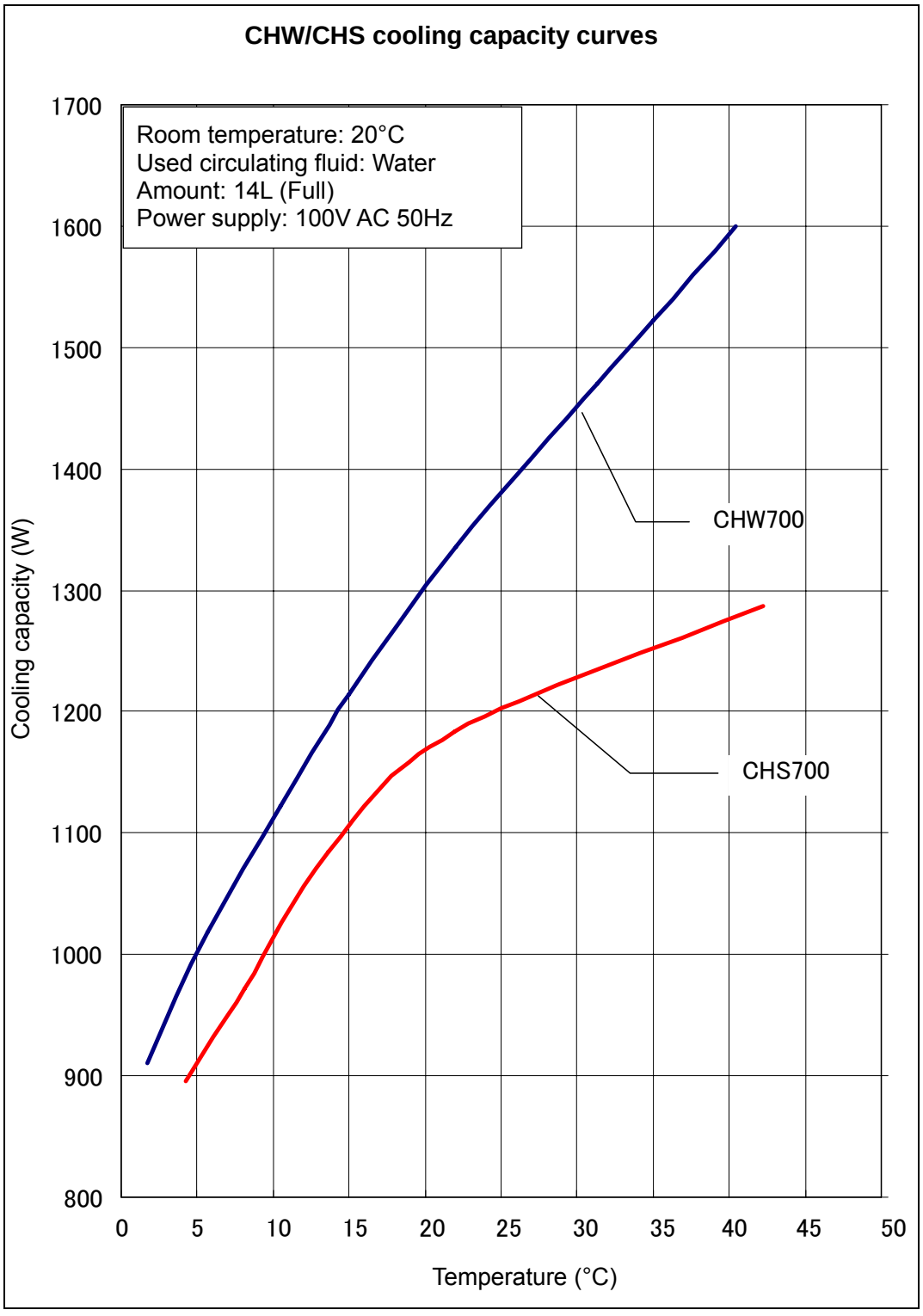


Cooling curve, cooling capacity curve (reference data)

⚠ The graphs show the cooling and cooling capacity curves of each model below. Use the values just for reference because they depend on the sample volume, the ambient temperature, etc.



Cooling curve, cooling capacity curve (reference data)



⚠WARNING!

If a problem occurs

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

Substances that cannot be used

Never use explosive substances, flammable substances and substances that include explosive or flammable ingredients in this unit. Explosion or fire may occur. (Refer to page 46 "List of Dangerous Substances".)

⚠CAUTION!

Do not step on this unit

Do not step on this unit. It will cause injury if this unit fall down or break.

Do not put anything on this unit

Do not put anything on this unit. It will cause injury if fall.

During a thunder storm

During a thunderstorm, turn off the POWER switch immediately, then turn off the circuit breaker and the main power. If this procedure is not followed, fire or electrical shock may be caused.

Thoroughly wash the unit.

The unit was washed already. However, when you first use it or operate it after a long period of deactivation, thoroughly wash it.

Countermeasure for stop operation during night or long-term stop

In case of stopping operation during night or long-term, toggle the breaker and POWER switch to "OFF".

The circulating pump protection

- Do not let the citculating pump run at idle. This may result in the circulating pump malfunction.
- Entering foreign materials into the cooler may result in damage of the circulating pump.
- When installing a solenoid valve or a throttle valve in the circulating route, do not close or extremely squeeze it for protection of the circulating pump.
- Secure the flow amount of 1.5L/min or more for the circulating fluid.

Recovery from a power failure

If the unit was deactivated in the middle of operation due to a power failure and is re-energized, the unit automatically returns to the state just before the power failure and resumes operation. (To know the setting method of this function, refer to page 28 "Power Failure Compensation Function".)
If the resumption of operation by automatic recovery is inconvenient, turn off the leakage breaker.

Abnormal refrigerator pressure

⚠ If the refrigerator operates in a high-temperature range, the refrigerator overload relay protecting circuit may work to illuminate REFRIGERATOR ERROR lamp deactivate the refrigerator.
In this case, reduce thermal load by changing the fluid, or taking other appropriate measures.

Abnormal water level

⚠ When circulating fluid is supplied after "Er20" occurred, operation is not to be resumed although error release is carried out. Press RUN/STOP key to resume the operation.

Daily Inspection and Maintenance

For the safety use of this unit, please perform the daily inspection and maintenance without fail.
Using the city water to this unit might attach dirt. Do inspect and maintain this point while performing daily inspection and maintenance.

⚠WARNING!

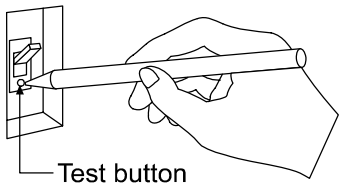
- Disconnect the power cable from the power source when doing an inspection or maintenance unless needed.
- Perform the daily inspection and maintenance after returning the temperature of this unit to the normal one.
- Do not disassemble this unit.

⚠CAUTION!

- Use a well-drained soft cloth to wipe dirt on this unit. Do not use benzene, thinner or cleanser for wiping. Do not scrub this unit. Deformation, deterioration or color change may result in.

Monthly maintenance

- Check the earth leakage breaker function.
  1. Connect the power cord.
  2. Turn the breaker on.
  3. Push the red test switch by a ballpoint pen etc.
  4. If there is no problem, the earth leakage breaker will be turned off.



Maintaining the water tank

- Remove foreign substances inside the water tank as frequently as possible. They may result in circulating pump malfunction if they are left there.

Replacing the hoses

- Replace the hoses at regular intervals, ideally every two years, to use the product in good condition. Ask Yamato Scientific Co., Ltd. for replacement.

Daily Inspection and Maintenance

Cleaning the filter

A clogged filter deteriorates cooling performance or causes the refrigerator to malfunction. The clogged state depends on the ambient environment or working period. Clean the filter at regular intervals according to the working conditions.

The mesh plate is fixed with a magnet. Pull it toward you.

The bottom of the mesh plate is slipped over pins. Lift it up and remove it.

The filter cover is fixed with a magnet. Remove it, and clean the filter or remove dust with a vacuum cleaner.
Deep inside the filter is a condenser fin. Do not touch it with bare hands because you may get injured.
After cleaning, reversely follow the procedure to replace the filter cover.

For any questions, contact the dealer who you purchased this unit from, or the nearest sales division in our company.

When not using this unit for long term / When disposing

⚠CAUTION!

When not using this unit for long term…

- Turn off the breaker and disconnect the power cord.

⚠WARNING!

When disposing…

- Keep out of reach of children.
- The unit uses a CFCs substitute. Ask a qualified disposal service company for the disposal of it.

Environmental protection should be considered

We request you to disassemble this unit as possible and recycle the reusable parts considering to the environmental protection. The feature components of this unit and materials used are listed below.

Component Name	Material
Exterior Parts	
Outer covering	Bonderizing steel plate baked with melamine resin coating
Inner bath	Stainless steel SUS304
Brace	Aluminum
Plates	PET resin film
Electrical Parts	
Switches, Relay	Resin, copper and other
Circuit boards	Composite of glass fiber and other
Power cord	Synthetic rubber coated wiring materials, copper and nickel
Pump	Iron, copper, resin and ceramic
Refrigerator	Iron and copper
Piping Parts	
Hoses	Silicon
Drain hose	Silicon
Hose clamp	66 nylon
Insulation hose	Polyurethane sponge
Pipes	Copper
Condenser	Iron, copper and aluminum
Cooling medium	
Cooling medium	HFC-R407C

Safety Device and Error Code

This unit has an automatic diagnosis function built in the controller and safety devices independent of the controller. The table below shows the cause and the solution method when the safety device operates.

Error Code:

When an abnormal condition occurs, an error code appears and the ALARM lamp lights in the controller, the buzzer sounds simultaneously. Record the error code and turn off the power of device immediately.

Safety Device	Notify	Cause/Solution
Temperature input error	"**ALARM**" lamp lights on, "**Er.01**" appears	• Failure in temperature input circuit. • Temperature sensor is broken or disconnected. • Measured temperature is out of display range. ❖ Make a call for service.
Measured temperature lower limit error	"**ALARM**" lamp lights on, "**Er.13**" appears	• When the temperature warning function issues a lower limit warning ❖ Make a call for service.
Memory error	"**ALARM**" lamp lights on, "**Er.15**" appears	• Failure in internal memory. ❖ Make a call for service.
Abnormal water level	"**ALARM**" lamp lights on, "**Er.20**" appears	• Water level is low. ❖ Supply circulating fluid. Inspect referring to P35 "Abnormal water level". If it is not recovered, contact our service department.
Measurement temperature error	"**ALARM**" lamp lights on, "**----**" appears	• Upper limit alarm of the temperature alarm function is activated. ❖ Make a call for service.
Refrigerator pressure error	"**REFRIGERATO ERROR**" lamp lights on	• The condenser filter is dirty. • The room temperature is high. ❖ Make a call for service.

Trouble Shooting

Phenomenon	Check point
The unit does not start to operate although the earth leakage breaker and POWER switch are turned on.	• Check if the power cable is securely connected to the power supply. • Check if the POWER switch is turned OFF. • Check if the power fails.
The ALARM lamp lights on.	• Check if the external water tank is filled with a circulating fluid. • Check the error code. (Refer to P39 "Safety Device and Error Code".)
The temperature does not drop.	• Check if the set temperature is higher than the inside temperature of the bath. • Check if the condenser filter is contaminated. • Check if the condenser fin is clogged. • Check if the heat load of the circulating fluid has increased. • Check if the ambient temperature has risen. • Check if the area around the vent is blocked.
The circulating pump produces unusual noise.	• Check if air remains in the circulating pump.
The circulating fluid does not circulate.	• Check if the circulating path is blocked or extremely constricted. (Refer to P8.)
"REFRIGERATO ERROR" lamp lights on.	• Check if the condenser filter is dirty. • Check if the room temperature is high. • Check if the fluid temperature is 40°C or higher.

When a power failure occur

If the unit was deactivated in the middle of operation due to a power failure and is re-energized, the unit automatically returns to the state just before the power failure and resumes operation. (To know the setting method of this function, refer to page 28 "Power Failure Compensation Function".)
If the resumption of operation by automatic recovery is inconvenient, turn off the leakage breaker.

In the case if the error other than listed above occurred, turn off the POWER switch and primary power source immediately. Contact the shop of your purchase or nearest Yamato Scientific Service Office.

In Case of Request for Repair

If the failure occurs, stop the operation, turn OFF the POWER switch, and unplug the power plug. Please contact the sales agency that this unit was purchased, or the Yamato Scientific's sales office.

< Check following items before contact >

- ◆ Model Name of Product
- ◆ Production Number
- ◆ Purchase Date

} See the production plate attached to this unit.

- ◆ About Trouble (in detail as possible)

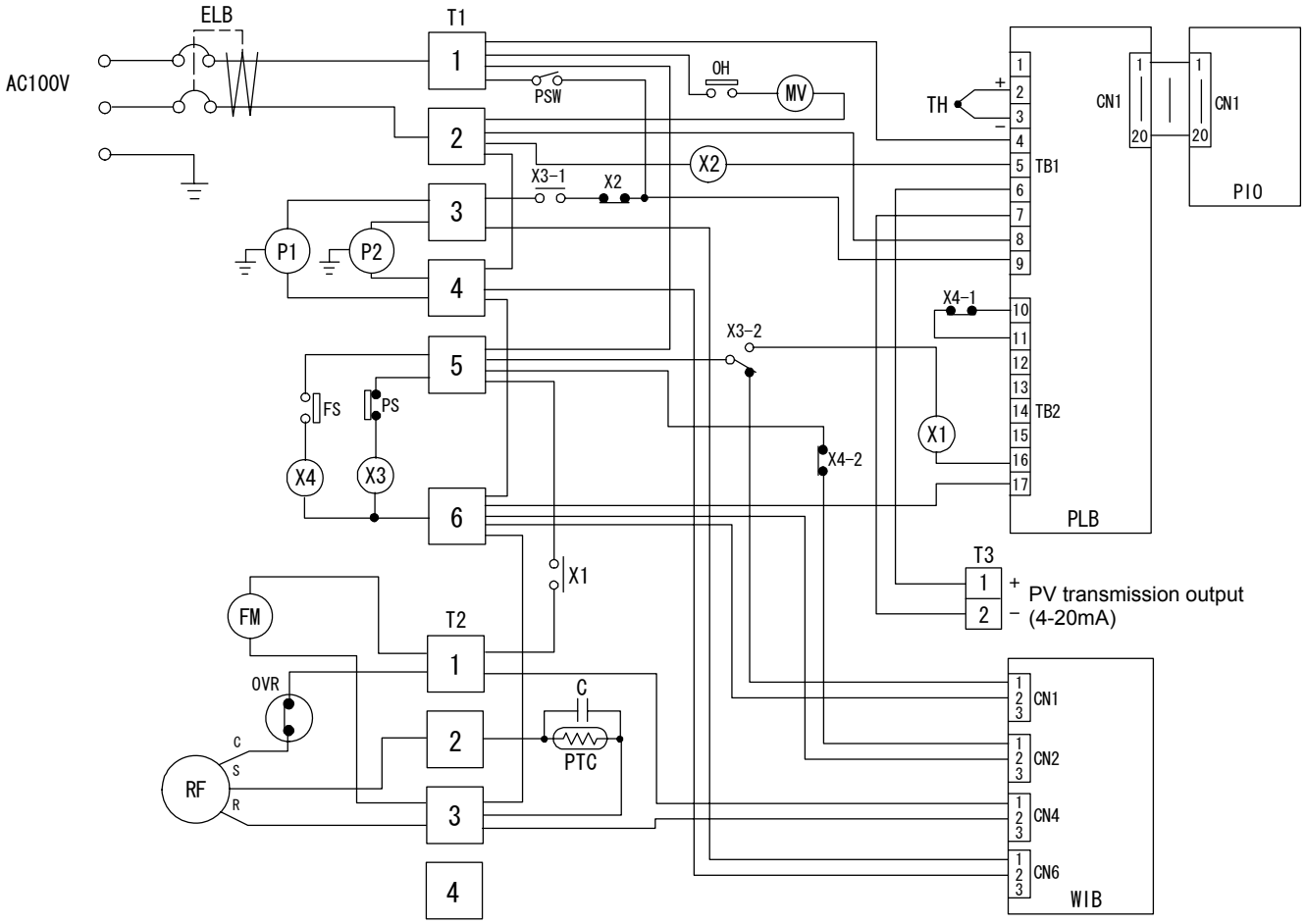
Minimum Retention Period of Performance Parts for Repair

The minimum retention period of performance parts for repair of this unit is 7 years after discontinuance of this unit.
The "performance part for repair" is the part that is required to maintain this unit.

Specification

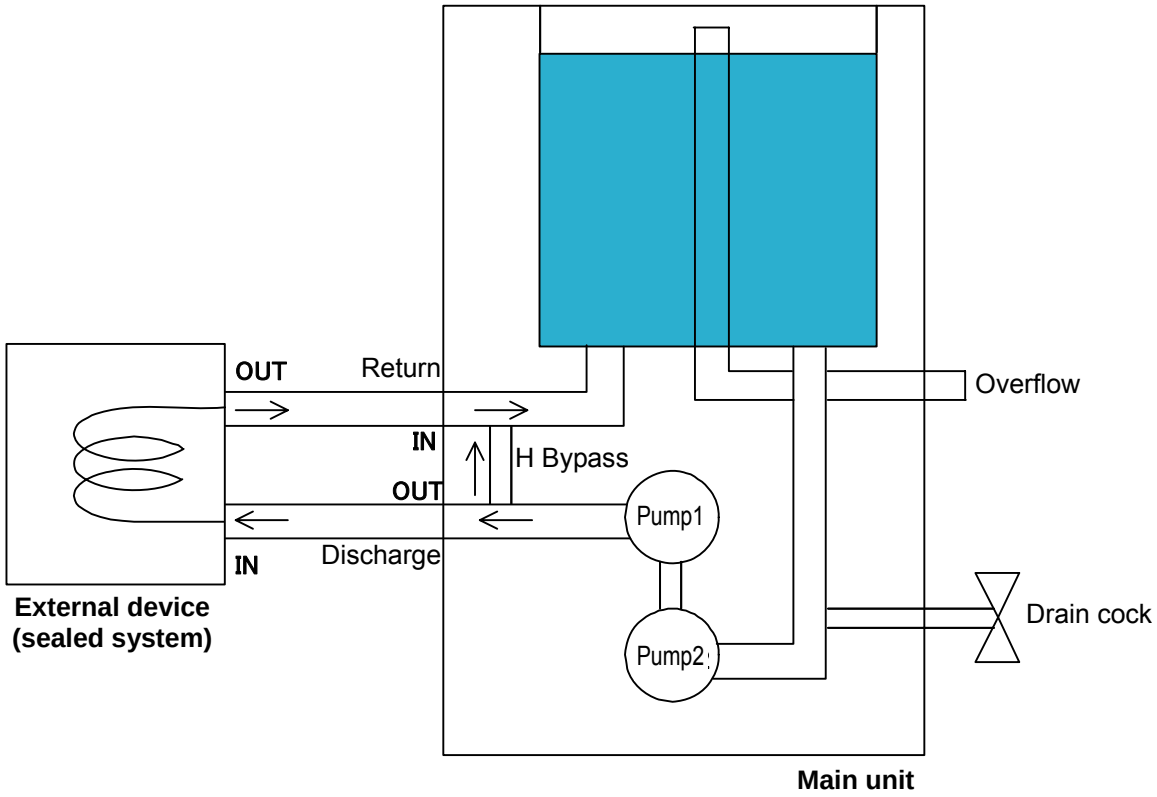
Product Name		Neocool Circulator	
Model		CHW700	CHS700
Circulation unit		For tap water circulation	For pure water circulation
Usable ambient temp.		5 to 35℃	
Performance	Temperature control range	10℃ to room temperature	
	Temperature setting range	5 to 35℃	
	Temperature adjustment accuracy	±1.5 to 2.5℃	
	Cooling capacity	Approx. 1050W (830kcal) at fluid temp.: 20℃, room temp.: 20℃	
	Maximum flow rate of pump	15/17 L/min (50/60 Hz)	
	Maximum head of pump	18m (50/60 Hz)	
Configurations	Bath	SUS304	
	Temperature control method	Refrigerator ON-OFF control	
	Sensor	T-thermocouple	
	Temperature setting method	Digital setting by up/down keys	
	Display method	Digital display	
	Refrigerator	Air-cooled sealed rotary type 675W	
	Cooling medium	R407C 360g	
	Cooling coil	Copper and nickel plate	SUS304
	Outside diameter of external circulating nozzle	ϕ13.5 mm hose nipple	
	Circulation pump	Magnet pump 65W × 2	
Safety devices		Over current earth leakage breaker, Refrigerator overload relay protecting circuit, Float switch, Refrigerator pressure detection, Delay timer for refrigerator protection, Bypass for circulating pump protection	
Other functions		Drain cock, Condenser filter, Refrigerator pressure indicator, Key lock function, Calibration offset function, Power failure compensation function, Temperature output terminal, Addition time function	
Standard	Bath dimensions (Inner dia. × height)	ϕ300 × 235 mm	
	External dimensions (W × D × H)	380 × 460 × 1050 mm	
	Bath capacity	16L (fluid measure: 14L)	
	Power supply (50/60Hz)	100V AC, 12A	
	Weight	Approx. 73kg	
Accessories		0.5-meter-long drain hose, 0.5-meter-long overflow hose, Instruction manual	

CHW700/CHS700



Symbol	Part name	Symbol	Part name
ELB	Earth leakage breaker	WIB	Operation display board
T1	Terminal block	PSW	Power switch
T2	Terminal block	P1,P2	Magnet pump
T3	Terminal block	X1	Electromagnetic Contact (refrigerator)
PLB	Temperature controller	X2	Relay (error)
PIO	Display board	X3	Relay (pressure)
TH	Temperature sensor (T)	X4	Relay (flow)
FM	Fan motor	PS	Pressure switch
RF	Compressor	FS	Float switch
OVR	Overload relay	OH	Thermostat
C	Operation condenser	MV	Solenoid valve
PTC	PTC starter		

Piping Diagram



Common Parts

Symbol	Part Name	Code No.	Specification	Manufacturer
WIB	Operation display board	LT00006042		Toho Denshi
PLB	Temperature controller	LT00005449	TTM-00B-YC (with tough card)	Toho Denshi
FS	Float switch	LT00006503	HL-3A	Keihin Sokki
TH	Temperature sensor	LT00006504	T-thermocouple H=110mm	Yamato Scientific
-	Hidden hinge	4-25-000-0026	RS-114	Sugatsune
-	Drain cock	LT00005465	TA295BH-31	Tasco
PSW	Power switch	2-01-001-0011	DS-850S-F2-10	Miyama
FM	Fan motor	3-01-006-0014	SE4-D11LP	Sanyo
P1, P2	Magnet pump	LT00006502	MD-40RZ-MN Screw connection	Iwaki
RF	Compressor	LT00006453	C-1RN67HOA	Sanyo
X1	Electromagnetic Contact	LT00032906	FC-0ST 1a 100V	Fuji
X2, X3, X4	Relay	LT00004416	BW55501K	Matsushita
T1	Terminal block	LT00031663	TFD250ABC-6P	Terminal
T2	Terminal block	LT00031661	TFD250ABC-4P	Terminal
T3	Terminal block	LT00005450	MF10-4AX 2P	Toyo Giken
ELB	Earth leakage breaker	LT00029774	NV-L22GR 15A	Mitsubishi
-	Power cord	2-13-001-0005	T2-3b	Yamato Scientific

List of Dangerous Substances

Never use explosive substances, flammable substances and substances that include explosive or flammable ingredients in this unit.

EXPLOSIVE

EXPLOSIVE:	Ethylene glycol dinitrate (nitro glycol), Glycerin trinitrate (nitroglycerine), Cellulose nitrate (nitrocellulose), and other explosive nitrate esters
	Trinitrobenzene, Trinitrotoluene, Trinitrophenol (picric acid), and other explosive nitro compounds
	Acetyl hidroperoxide (peracetic acid), Methyl ethyl ketone peroxide, Benzyl peroxide, and other organic peroxides

FLAMMABLE

IGNITING:	Lithium (metal), Potassium (metal), Sodium (metal), Yellow phosphorus, Phosphorus sulfide, Red phosphorus, Celluloid compounds, Calcium carbide, Lime phosphate, Magnesium (powder), Aluminum (powder), Powder of metals other than magnesium and aluminum, Sodium hydrosulfite
OXIDIZING:	Potassium chlorate, Sodium chlorate, Ammonium chlorate, and other chlorate
	Potassium perchlorate, Sodium perchlorate, Ammonium perchlorate, and other perchlorate
	Potassium peroxide, Sodium peroxide, Barium peroxide, and other inorganic peroxide
	Potassium nitrate, Sodium nitrate, Ammonium nitrate, and other nitrate
	Sodium chlorite and other chlorites
	Calcium hypochlorite and other hypochlorites
INFLAMMABLE LIQUID:	Ethyl ether, Gasoline, Acetaldehyde, Propylene chloride, Carbon disulfide, and other flammable substances having a flash point of lower than -30℃
	Normal hexane, ethylene oxide, acetone, benzene, methyl ethyl ketone, and other flammable substances having a flash point of -30℃ or higher but lower than 0℃
	Methanol, Ethanol, Xylene, Pentyl acetate (amyl acetate), and other flammable substances having a flash point of 0℃ or higher but lower than 30℃
	Kerosene, Light oil (gas oil), Oil of turpentine, Isopentyl alcohol (isoamyl alcohol), Acetic acid, and other flammable substances having a flash point of 30℃ or higher but lower than 65℃
FLAMMABLE GAS:	Hydrogen, Acetylene, Ethylene, Methane, Propane, Butane, and other flammable substances which assume a gaseous state at 15℃ and 1 atm

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

Install the unit according the procedure described below (check options and special specifications separately).

Model	Serial number	Date	Person in charge of installation (company name)	Person in charge of installation	Judgment

No.	Item	Method	Reference operation manual		Judgment
Specifications					
1	Accessories	Check the quantities of accessories with the quantities shown in the Accessory column.	**Specification**	P.42	
2	Installation	・Visually check the surrounding area. Caution: Pay attention to the ambient environment.	**Before Using This Unit** "2. Choose a proper place for installation"	P.4	
		・Keep space.			
		・Pour water into the water bath. Caution: Air release.	**Before Using This Unit** "Installation Procedure"	P.7	
Operation					
1	Power voltage	・Using a tester, measure the voltage of the voltage used by the customer (distribution board, outlet, etc.). ・Measure the voltage during operation (the voltage must be within the standard). Caution: When a unit is to be connected to the plug or breaker, use one that conforms to the standard.	**Before Using This Unit** "1. Always ground this unit"	P.4	
			Before Using This Unit "6. Choose a correct power distribution board or receptacle"	P.5	
			Specification	P.42	
2	Start of operation	・Start operation. The circulating water must circulate. Set the temperature at 20°C to confirm the state. Check: Water leakage is not permissible.	**Before Using This Unit** "Installation Procedure"	P.7	
			Operation Method	P.13	
Description					
1	Description of operation	Explain the operation of each unit to the customer according to this Operation Manual.	**All**		
2	Error code	Explain error codes and the procedure for resetting them to the customer according to this Operation Manual.	**In the Event of Failure…**	P.39	
3	Maintenance inspection	Explain the operation of each unit to the customer according to this Operation Manual.	**Maintenance Method**	P.36	
4	Completion of installation Information to be entered	・Enter the date of installation and the name of the person in charge of installation on the face plate on the unit. ・Enter necessary information on the guarantee, and pass it to the customer. ・Explain the after-sale service route to the customer.	**After Service and Warranty**	P. 41	

Responsibility

Please follow the instructions in this document when using this unit. Yamato Scientific has no responsibility for the accidents or breakdown of device if it is used with a failure to comply.
Never conduct what this document forbids. Unexpected accidents or breakdown may result in.

Note

- The contents of this document may be changed in future without notice.
- Any books with missing pages or disorderly binding may be replaced.

Instruction Manual for
Neocool Circulator
Model CHW700/CHS700
Third Edition Sep. 24, 2009
Revised Feb. 21, 2012

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