



Operation Manual

Installation · Operation

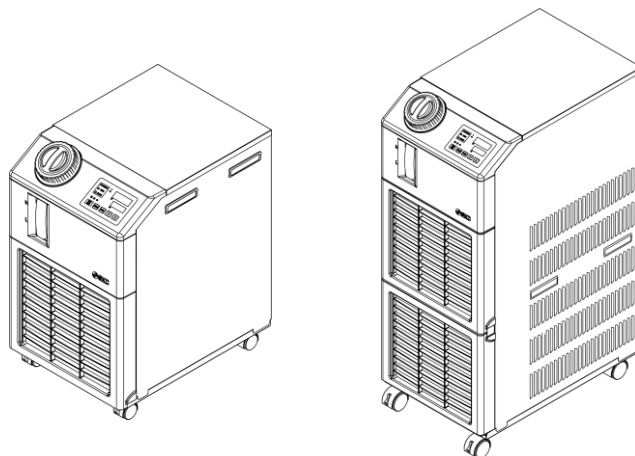
PRODUCT NAME

Thermo-chiller

MODEL / Series / Product Number

Air-Cooled
refrigerated type
HRSC012-A*-20-*
HRSC018-A*-20-*
HRSC024-A*-20-*
HRSC030-A*-20-*
HRSC040-A*-20-*
HRSC050-A*-20-*
HRSC060-A*-20-*

Water-Cooled
refrigerated type
HRSC012-W*-20-*
HRSC018-W*-20-*
HRSC024-W*-20-*
HRSC030-W*-20-*
HRSC040-W*-20-*
HRSC050-W*-20-*
HRSC060-W*-20-*



SMC Corporation **CE** **UK**
CA

To the Customers

Thank you for purchasing SMC's Thermo-chiller (hereinafter referred to as the "product").

For safety and long life of the product, be sure to read this operation manual (hereinafter referred to as the "manual") and clearly understand the contents.

- Be sure to read and follow all instructions noted with "Warning" or "Caution" in this manual.
- This manual is intended to explain the installation and operation of the product. Only people who understand the basic operation of the product through this manual or who perform installation and operation of or have basic knowledge about industrial machines are allowed to work on the product.
- This manual and other documents attached to the product do not constitute a contract, and will not affect any existing agreements or commitments.
- It is strictly prohibited to copy this manual entirely or partially for the use by a third party without prior permission from SMC.

Note: This manual is subject to possible change without prior notice.

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Chapter 1 Safety Instructions



Before using the product be sure to read and understand all the important actions highlighted in this manual.

1.1 Before using the product

- This "Safety" chapter describes the safety-related items that users should be aware of upon handling this product.
- The product is a circulating fluid temperature controller. SMC does not take any responsibility for any problems that may arise from using the product for other purposes.
- This product is not designed for a clean room. It generates dust from the internal components such as pump and fan motor.
- This product, which is operated under high voltage, is outfitted with the parts that cause a rise or drop in temperature and rotating parts when it is in action. All personnel who work with or around this product are required to thoroughly read and understand the safety-related items in this manual prior to working with or around this product. If a component needs to be replaced or repaired, contact a specialized vendor for parts and service.
- The relevant personnel must receive proper safety education prior to work training on this product. Otherwise, personnel may be exposed to hazards. Never conduct work training without giving proper consideration to safety.
- This manual is not intended to be used as a manual for comprehensive safety and hygiene education. Such a manual should be provided by a safety training manager.
- A safety manager is responsible for observing safety standards. Operators and maintainers, however, are to have individual responsibilities for complying with the safety standard in his/her daily work.
- Operators and maintainers must individually take account of safety and assure a proper working area and working environment.
- This appliance is not intended for use by persons (including children) with reduced physical, sensory or mental capabilities, or lack of experience and knowledge, unless they have been given supervision or instruction concerning use of the appliance by a person responsible for their safety.
- Children should be supervised to ensure that they do not play with the appliance.
- Save this manual at a designated place for reference when necessary.

1.2 Reading the Manual

This manual contains symbols to help identify important actions when installing, operating or maintaining the product.



This sign indicates actions that must be followed.



This sign indicates prohibited actions.

1.3 Hazards

1.3.1 Level of hazards

The instructions given in this manual aim to assure the safe and correct operation of the product, and to prevent injury of operators or damage to the product. These instructions are grouped into three categories, Danger, Warning and Caution, which indicate the level of hazard, damage and also the degree of emergency. All safety critical information should be carefully observed at all times.

“DANGER”, “WARNING” and “CAUTION” signs are in order according to severity (DANGER> WARNING> CAUTION).

DANGER

“DANGER”: Hazard that **WILL** cause serious personal injury or death during operation.

WARNING

“WARNING”: Hazard that **MAY** cause serious personal injury or death during operation.

CAUTION

“CAUTION”: Hazard that **MAY** cause minor personal injury.

CAUTION

“CAUTION without exclamation symbol”: Hazard that **MAY** cause damage or failure of the product, facility, devices, ect.

[Tips]

Tips are provided when there is information personnel are required to be aware of for system operation and maintenance. If the task carries useful information, the relevant tips are given as well.

1.3.2 Definition of “Serious injury” and “Minor injury”

■ “Serious injury”

This term describes injuries that result in after effects including loss of eyesight, burns, electrical shock, fracture, poisoning, etc. and requires long-term treatment or hospitalization.

■ “Minor injury”

This term describes injuries that do not need long-term treatment or hospitalization.
(Others excluded from serious injury.)

1.3.3 Types of hazard labels

The product has various potential hazards and they are marked with warning labels. Be sure to read this section before starting any work on the product.

■ Warning related to electricity

 WARNING	
	This symbol stands for a possible risk of electric shock. The product is operated at high voltage and contains uncovered live terminals inside. ● DO NOT operate the product without cover panels fitted. ● DO NOT work inside this product unless you have been trained to do so.

■ Warning related to high temperatures

 WARNING	
	This symbol stands for a possible risk of hot surface and burns. The product has surfaces that can reach high temperatures during operation. Even after the power is turned off, there can still be residual heat in the product. ● DO NOT operate the product without cover panels fitted. ● DO NOT start working inside the product until the temperature has decreased sufficiently.

■ Warning related to rotating objects

 WARNING	
	This symbol stands for a possible risk of cutting fingers or hand, or entanglement by rotating fan (For air-cooled type). The product contains a cooling fan that rotates during operation of the product. The fan can start and stop intermittently and without warning. ● DO NOT operate the product without cover panels fitted.

■ Warning related to high pressure refrigerant hazard

⚠ WARNING	
 ⚠ WARNING / AVERTISSEMENT The system contains refrigerant under high pressure. Do not tamper with the system. It must be serviced by suitably qualified persons only. For installation only in locations not accessible to the general public. Le système contient du réfrigérant sous haute pression. Ne pas intervenir sur le système. L'entretien doit être effectué uniquement par des personnes dûment qualifiées. À installer uniquement dans des endroits non accessibles au grand public. CO₂ R744   14MPa	This symbol stands for a possible risk of high pressure refrigerant. This system contains refrigerant under high pressure. Do not tamper with the system. It must be serviced by suitably qualified persons only.

■ Warning related to other general dangers

⚠ WARNING	
This symbol stands for general danger.	
	Hazards Inside Hot Surfaces Inside – See Hot Surface symbol Rotating Fan Inside – See Rotating Fan symbol (For air-cooled type) Pressurized Sytem Inside – The product contains pressurised fluid systems. ● DO NOT operate the product without cover panels fitted.

1.3.4 Locations of Hazard Labels

There are various warning labels on the product to show the potential hazards.

■ HRSC012/018/024/030/040-**-20

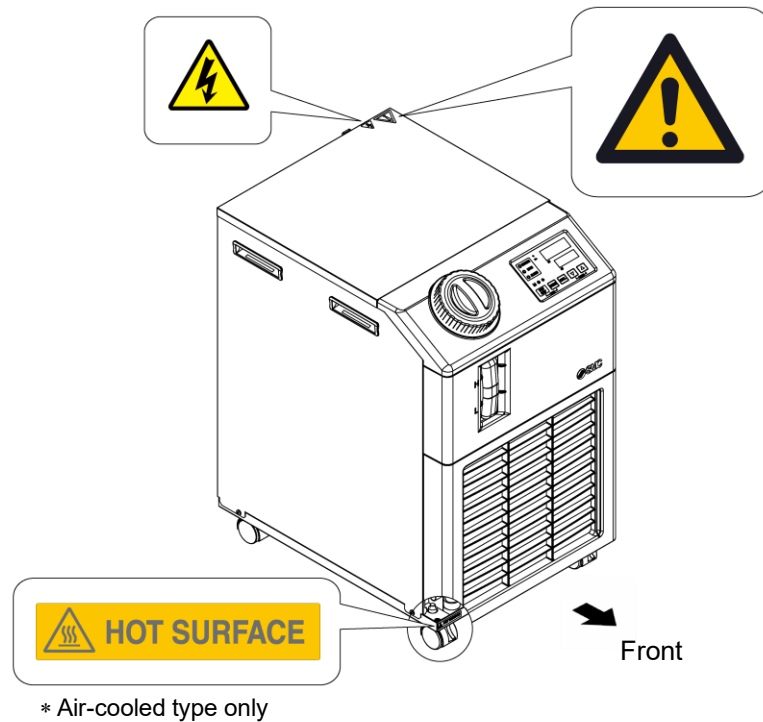


Fig. 1.3-1 Warning label position

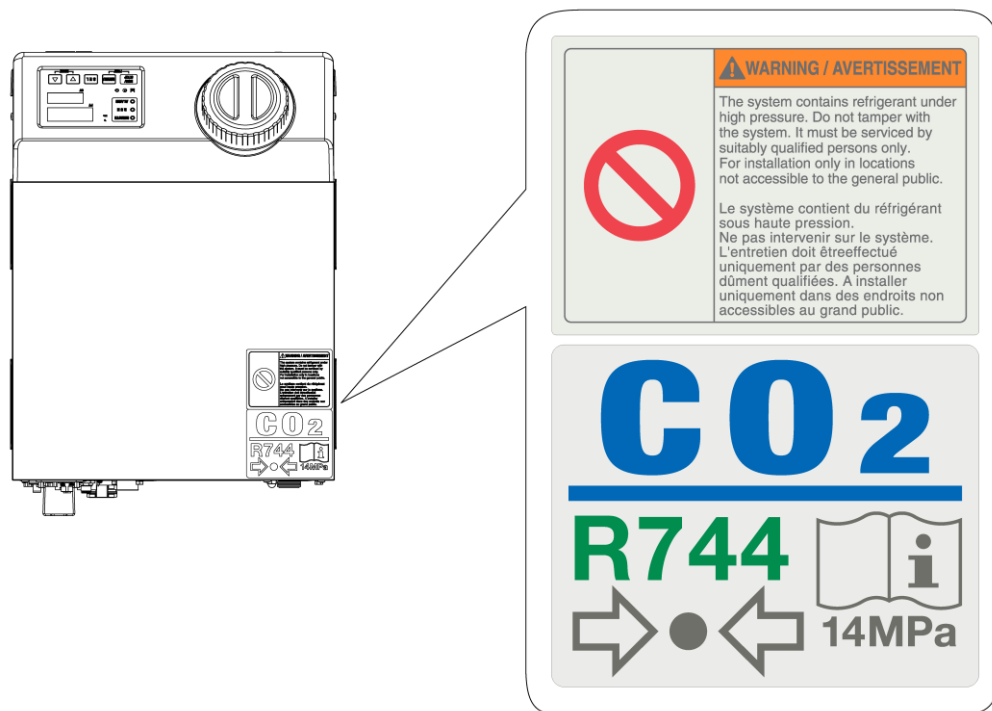


Fig. 1.3-2 Warning label position

■ HRSC012/018/024/030-**-20

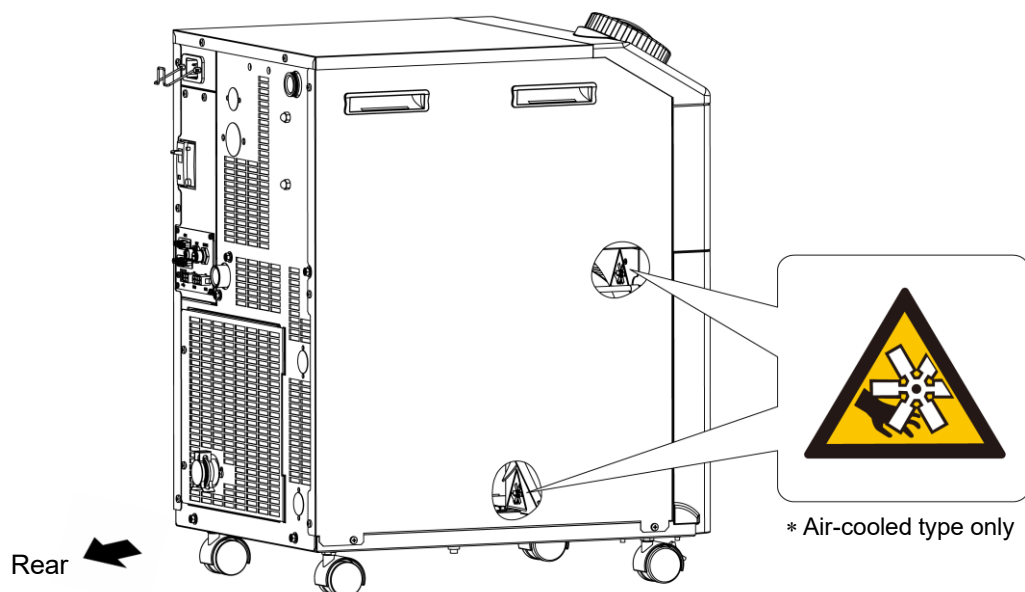


Fig. 1.3-3 Warning label position

■ HRSC040-**-20

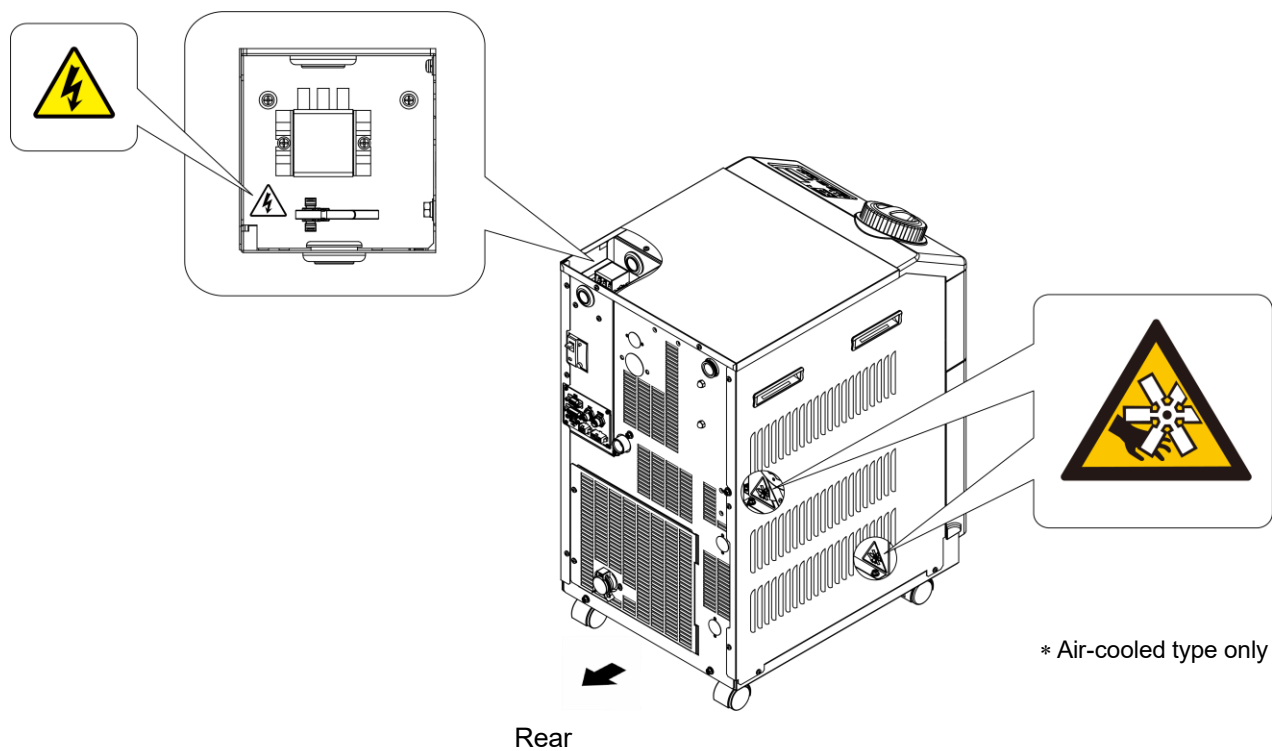


Fig. 1.3-4 Warning label position

■ HRSC050/060-**-20

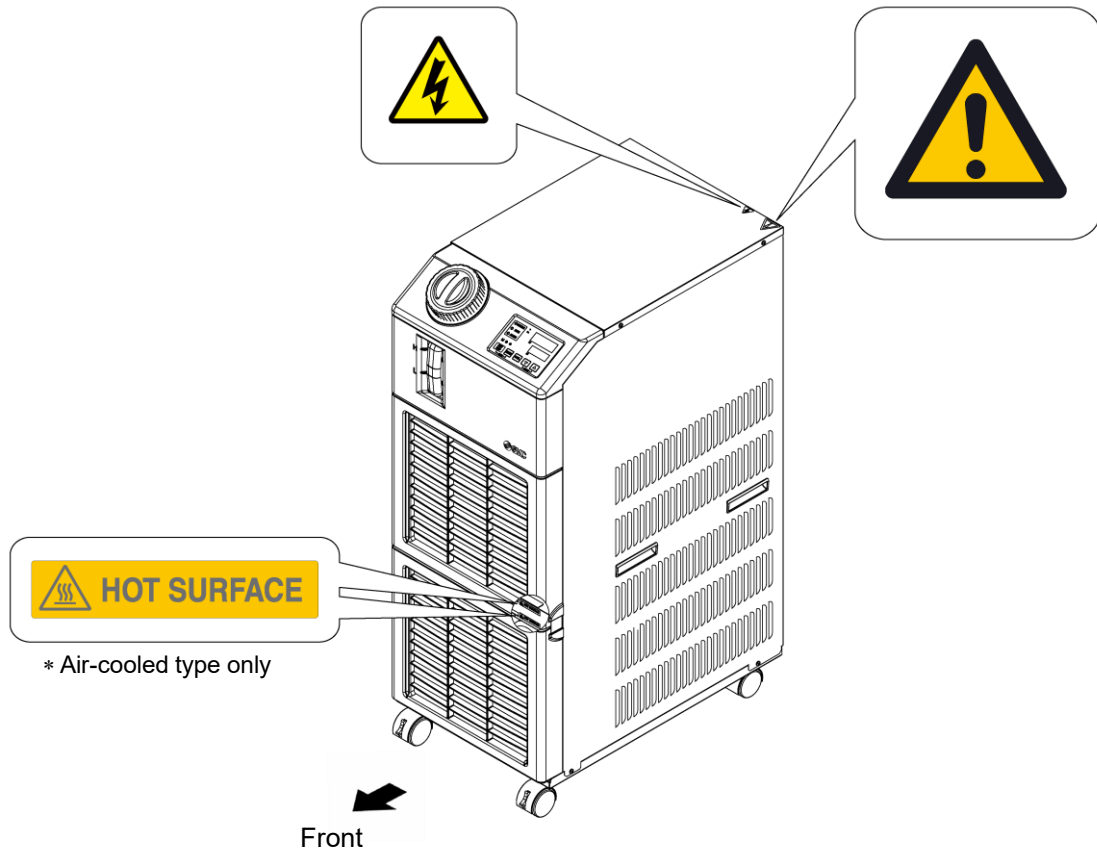


Fig. 1.3-5 Warning label position

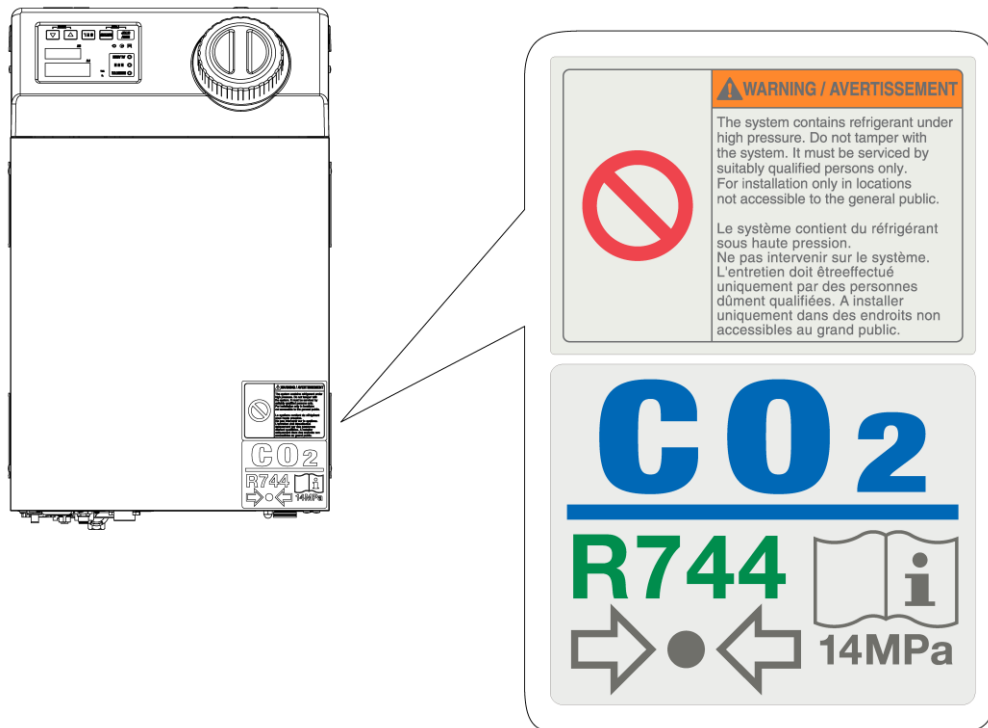


Fig. 1.3-6 Warning label position

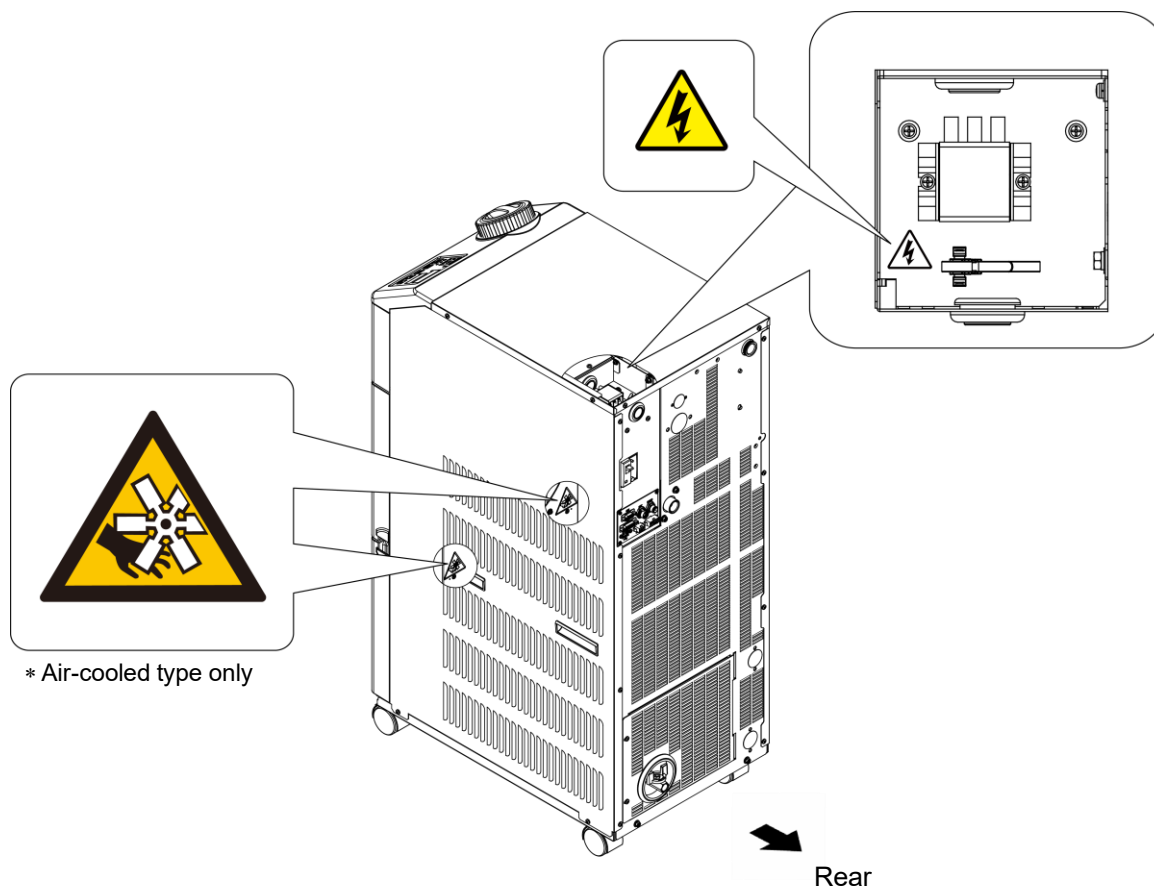
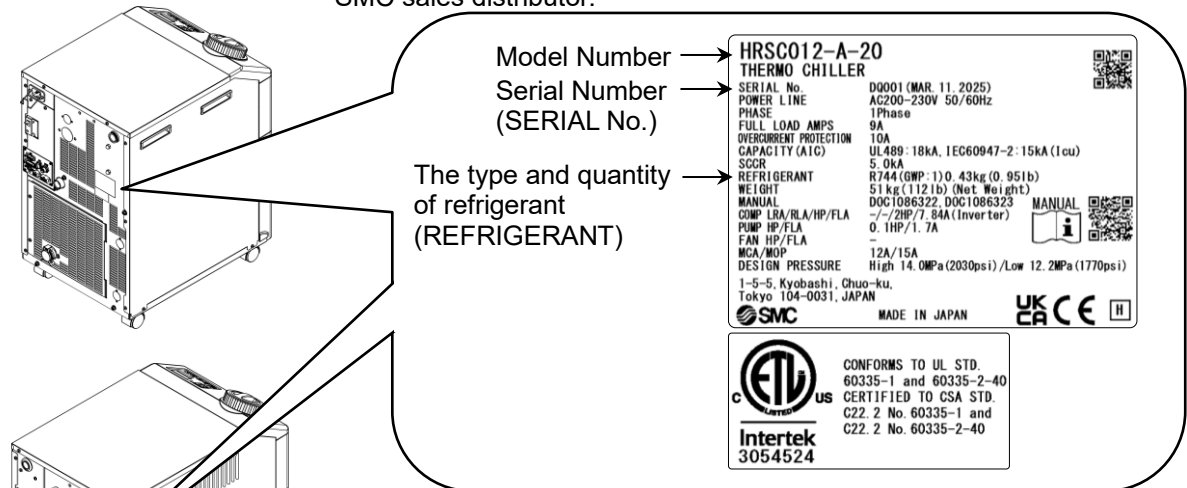


Fig. 1.3-7 Warning label position

1.4 Other Labels

1.4.1 Product Label

Information about the product, such as Serial No. and Model No. can be found on the product label. This information is needed when contacting an SMC sales distributor.



* (It is an example of model "HRSC012-A-20".)

How to see the manufacturing code **D Q 001** (March 2025)

D			Q			001
Year	Symbol	Remarks	Month	Symbol	Remarks	Serial no.
2025	D	Repeated from A to Z in Alphabetical order.	1	o	Repeated from "o" to "Z" in alphabetical order, with "o" for January and "Z" for December.	-
2026	E		2	P		
2027	F		3	Q		
↓	↓		↓	↓		

Fig. 1.4-1 Position of product label

1.4.2 Earth Label

■ HRSC040-**-20

■ HRSC050/060-**-20

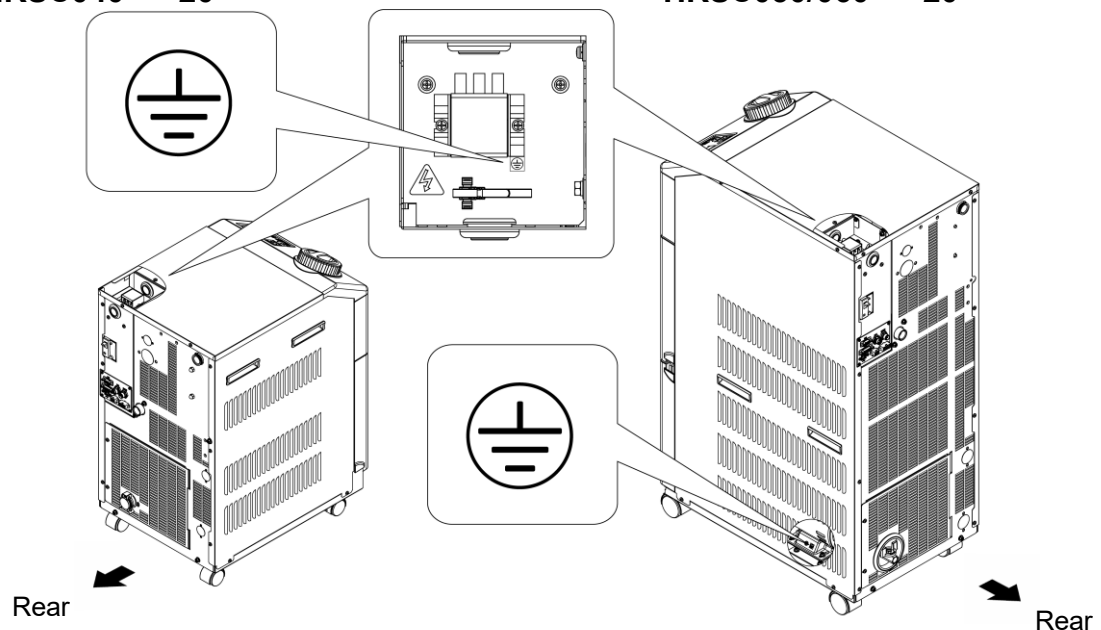


Fig. 1.4-2 Earth label

1.5 Safety Measures

1.5.1 Safety Instructions for Use

WARNING



Follow the instructions below when using the product. Failure to follow the instructions may cause an accident and injury.

- Read and understand this manual carefully before using the product.
- Before starting maintenance of the product, be sure to lock out and tag out the breaker of the user's power supply.
- If operating the product during maintenance, be sure to inform all workers nearby.
- Use only the correct tools and procedure when installing or maintaining the product.
- Use personal protective equipment where specified ("1.5.2 Personal Protective Equipment")
- Check all parts and screws are fitted correctly and securely after maintenance.
- Avoid working in a drunken or sick condition, which might cause an accident.
- Do not remove the panels except for the cases permitted in this manual.
- Do not remove the panels during operation.
- Use our service for parts replacement. Do not use parts other than the dedicated parts.
- Do not handle this product by any means other than specified in this Operation Manual; this can result in damage to the product or fire.
- The appliance shall be stored in a room without continuously operating ignition sources (for example: open flames, an operating gas appliance or an operating electric heater).
- Do not pierce or burn.

WARNING



1. The compatibility of the product is the responsibility of the person who designs the equipment or decides its specifications.

Since the product specified here is used under various operating conditions, its compatibility with specific equipment must be decided by the person who designs the equipment or decides its specifications based on necessary analysis and test results. The expected performance and safety assurance of the equipment will be the responsibility of the person who has determined its compatibility with the product. This person should also continuously review all specifications of the product referring to its latest catalog information, with a view to giving due consideration to any possibility of equipment failure when configuring the equipment.

2. Only personnel with appropriate training should operate machinery and equipment.

The product specified here may become unsafe if handled incorrectly. The assembly, operation and maintenance of machines or equipment including our products must be performed by an operator who is appropriately trained and experienced.

3. SMC products cannot be used beyond their specifications. They are not developed, designed, and manufactured to be used under the following conditions or environments. Use under such conditions or environments is not allowed.

- 1) Conditions and environments outside of the given specifications, or use outdoors or in a place exposed to direct sunlight.
- 2) Use for nuclear power, railways, aviation, space equipment, ships, vehicles, military application, equipment affecting human life, body, and property, combustion equipment, entertainment equipment, emergency shut-off circuits, press clutches, brake circuits, safety equipment, etc., and use for applications that do not conform to standard specifications such as catalogs and operation manuals.
- 3) Use for interlock circuits, except for use with double interlock such as installing a mechanical protection function in case of failure. Please periodically inspect the product to confirm that the product is operating properly.

CAUTION

SMC develops, designs, and manufactures products to be used for automatic control equipment, and provides them for peaceful use in manufacturing industries. Use in non-manufacturing industries is not allowed.

Products SMC manufacture and sell cannot be used for the purpose of transactions or certification specified in the Measurement Act of each country. The new Measurement Act prohibits use of any unit other than SI units in Japan.

1.5.2 Personal Protective Equipment

This manual specifies personal protective equipment for each work.

■ Transport, Installing and Uninstalling

CAUTION



Always use safety shoes, gloves and head protection when transporting, installing or uninstalling the product.

■ Handling of circulating fluid

CAUTION



Always use safety shoes, gloves, mask, apron and eye protection when handling the circulating fluid.

■ Operation

CAUTION



Always use safety shoes and gloves when operating the product.

1.6 Emergency Measures

When emergency conditions such as natural disaster, fire and earthquake, or injury occurs, turn off the power supply switch. The switch is located at the rear of the product.

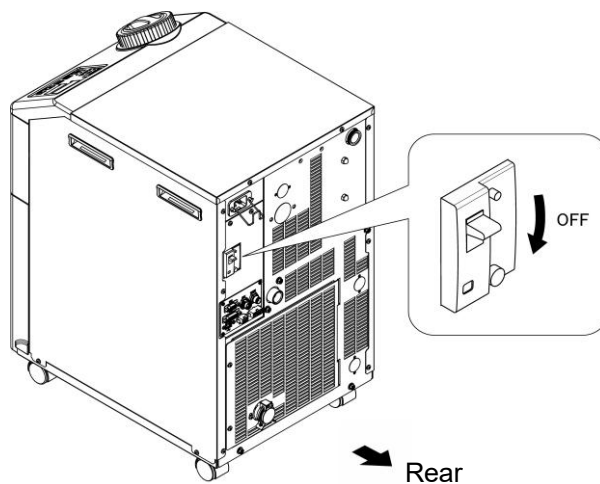
WARNING



Even when the power supply switch is turned off, some of the internal circuits are still energized, unless the user's power supply is shut off. Be sure to shut off the breaker of the user's power supply.

1. Turn off the power supply switch at the rear of the product to stop the operation of the thermo-chiller.

■ HRSC012/018/024/030/040-**-20



■ HRSC050/060-**-20

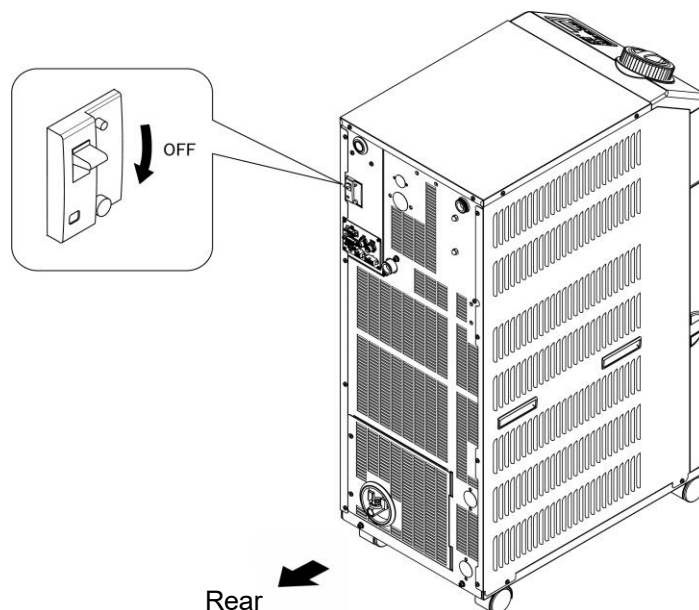


Fig. 1.6-1 Location of the switch for the power supply

- 2.** Be sure to shut off the breaker of the facility power supply (the power supply of the user's machine).

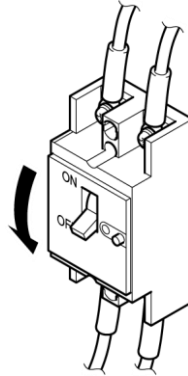


Fig. 1.6-2 Shut off of facility power supply

1.7 Waste disposal

1.7.1 Disposal of compressor oil

The product uses compressor oil. If they need to be recovered, read and understand the instructions below carefully. If there is any unclear point, contact an SMC's sales distributor.

WARNING



- Only maintenance personnel or qualified people are allowed to open the cover panels of the product.
- Do not mix the compressor oil with domestic waste for disposal. Also, the disposal of the waste must only be conducted by specific facilities that are permitted for that purpose.
- The refrigeration circuit of this product is in a high pressure state, so do not modify it. Contact knowledgeable service personnel before disposal.

WARNING



- Comply with the laws and regulations in each country for the disposal of compressor oil.
- Only people who have sufficient knowledge and experience about the product and its accessories are allowed to recover the compressor oil.
Avoid the vicinity of fire and flammable objects in a well-ventilated area.

(Tips)

For the type and quantity of the refrigerant, See "1.4.1 Product Label" on page 1-9.

1.7.2 Disposal of product

The disposal of the product must be handled by a specialized industrial waste disposal agency in accordance with local laws and regulations.

1.8 Safety Data Sheet (SDS)

If the safety data sheets of chemicals used in this product are needed, contact an SMC's sales distributor.

Any chemicals used by the user must be accompanied by an SDS.

Chapter 2 Name and Function of Parts

2.1 Model number of product

The product can be ordered with the model number configured as shown below.

The product needs to be handled in different ways depending on the model number. Refer to “1.4.1 Product Label” and check the model number of the product.

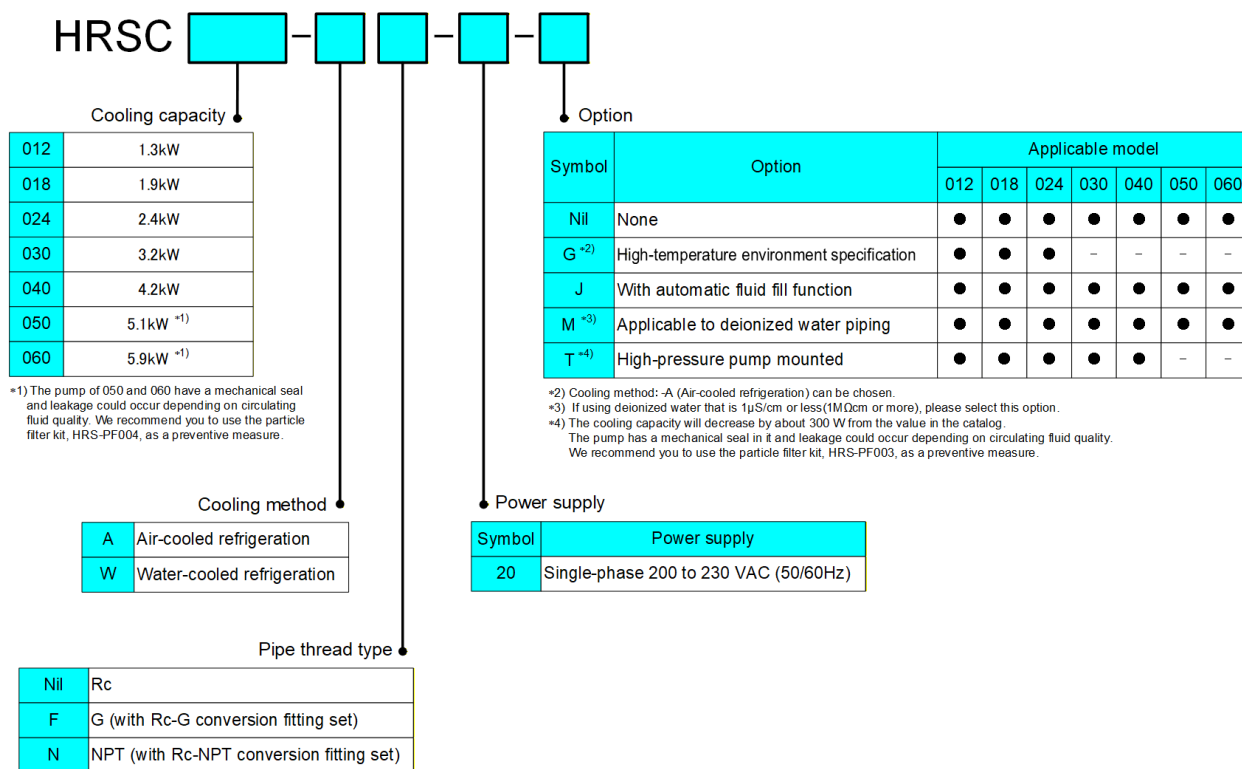


Fig. 2.1-1 Model number of product

2.2 Names of each part

2.2.1 HRSC012/018/024-**-20

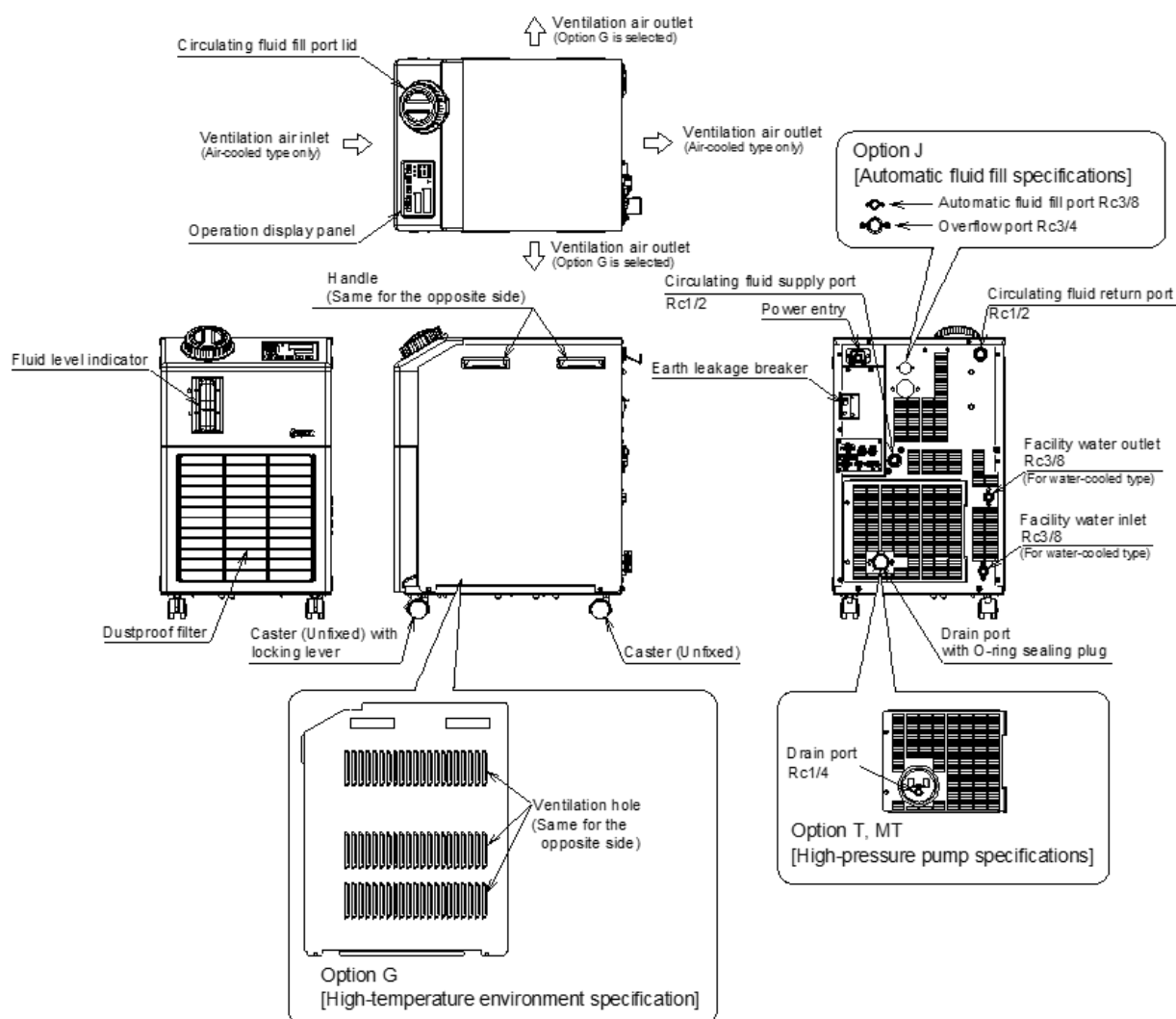


Fig. 2.2-1 Names of each part

Table 2.2-1 Accessories list

1	Quick manual		Japanese Text:1pc. English Text:1pc. (with a clear cover)
2	Alarm code list label		Japanese Text:1pc. English Text:1pc.
3	Power supply connector		1pc.
4	Fitting (for drain port)*		1pc.

* Not included when option [High-pressure pump specification] is selected.

2.2.2 HRSC030/040-**-20

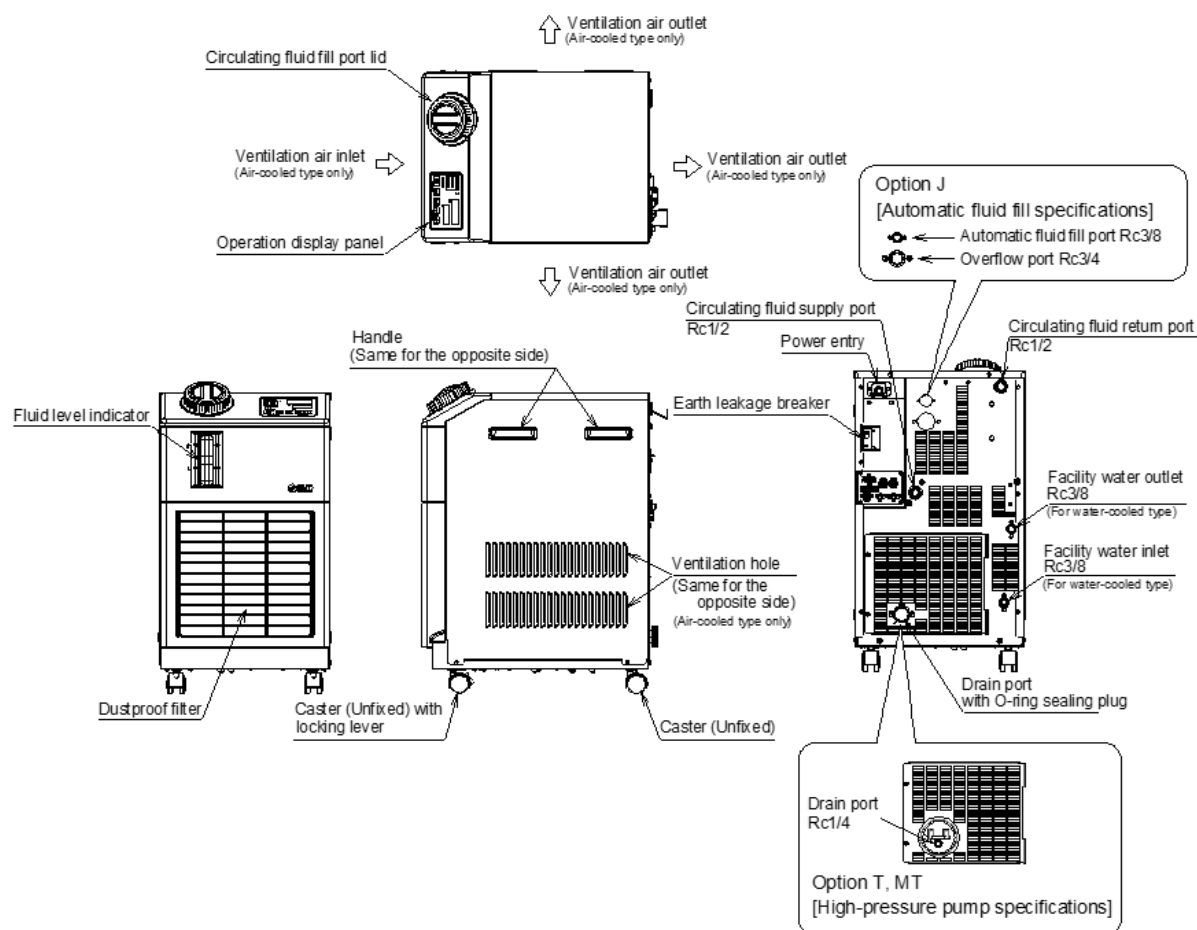


Fig. 2.2-2 Names of each part

Table 2.2-2 Accessories list

1	Quick manual		Japanese Text:1pc. English Text:1pc. (with a clear cover)
2	Alarm code list label		Japanese Text:1pc. English Text:1pc.
3	Power supply connector *1		1pc.
4	Fitting (for drain port) *2		1pc.

*1: Only included with HRSC030.

*2: Not included when option [High-pressure pump specification] is selected.

2.2.3 HRSC050/060-**-20

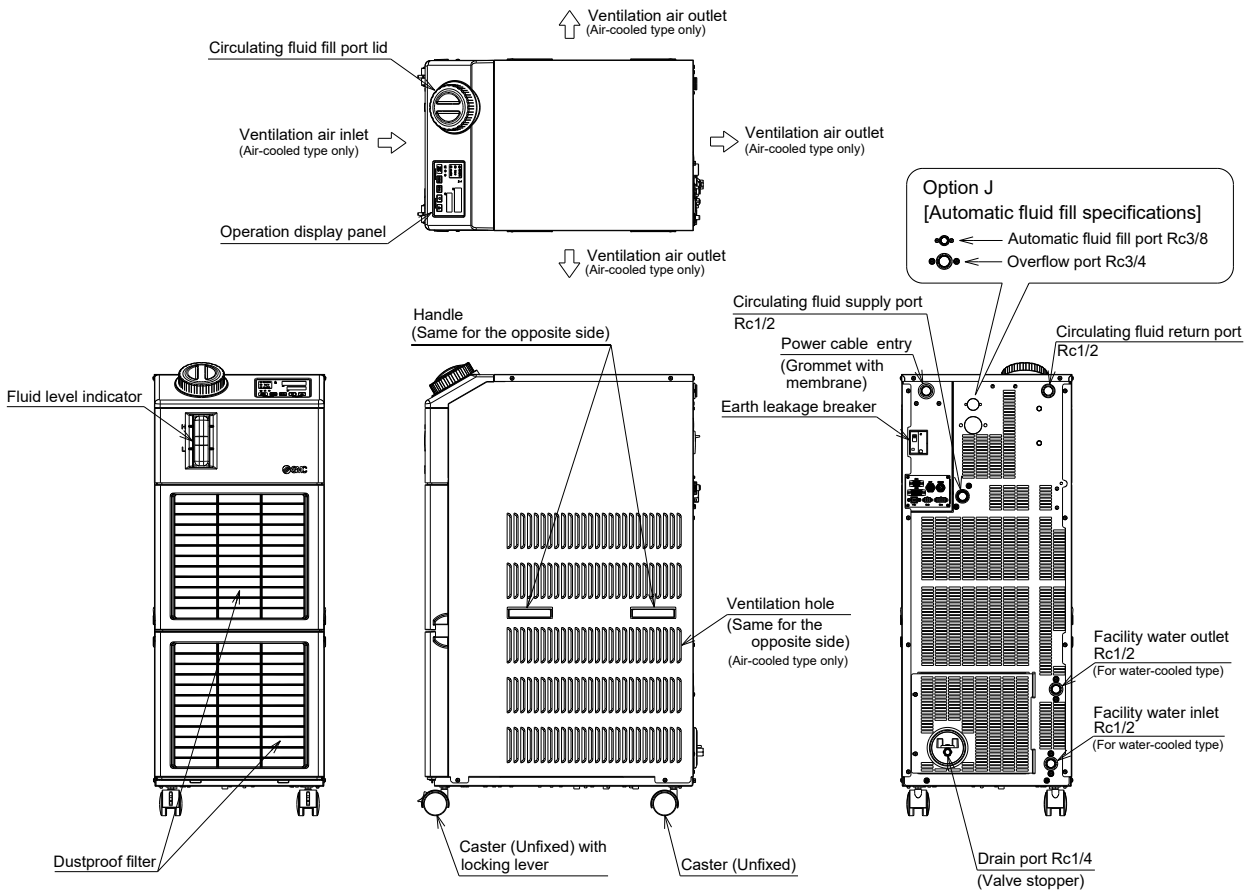


Fig. 2.2-3 Names of each part

Table 2.2-3 Accessories list

1	Quick manual		Japanese Text:1pc. English Text:1pc. (with a clear cover)
2	Alarm code list label		Japanese Text:1pc. English Text:1pc.

2.3 Function of Parts

The function of parts is as follows.

Table 2.3-1 Function of parts

Name	Function
Operation display panel	Runs and stops the product and performs settings such as the circulating fluid temperature. For details, refer to "2.4 Operation display panel".
Fluid level indicator	Indicates the circulating fluid level of the tank. For details, refer to "3.5 Fill of circulating fluid".
Earth leakage breaker	Shuts off the power supply to the internal equipment of product.
Product label	Shows the part number of the product. For details, refer to "1.4.1 Product Label".
Circulating fluid supply port	The circulating fluid flows out from the supply port.
Circulating fluid return port	The circulating fluid returns to the return port.
Drain port	This drain port to drain the circulating fluid out of the tank. (The plug is connected to standard pump type at the time of shipment. The ball valve is installed in the high pump head type.)
Facility water inlet (For water-cooled type)	A facility water inlet to which the facility water is fed through piping. The pressure of facility water should be in a range of 0.3 to 0.5MPa.
Facility water outlet (For water-cooled type)	A facility water outlet from which the facility water returns to the user's machine through piping.
Automatic fluid fill port (When automatic fluid filling [Option J] is selected.)	Piping to the automatic fluid filling port enables easy supply of the circulating fluid through the built-in solenoid valve. The supply pressure should be in a range of 0.2 to 0.5MPa.
Overflow port (When automatic fluid filling [Option J] is selected.)	This is necessary when automatic fluid filling function. Discharge excess circulating fluid when the fluid level in the tank rises.

2.4 Operation display panel

The operation panel on the front of the product controls the basic operation of the product.

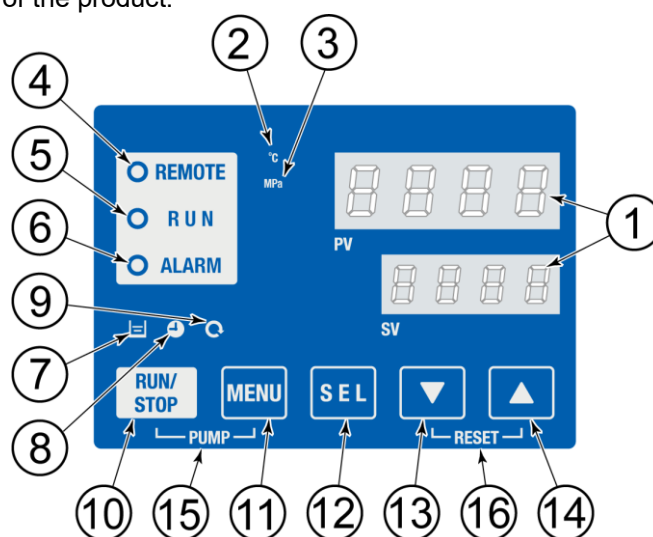


Fig. 2.4-1 Operation display panel

Table 2.4-1 Operation display panel

Table 2.4-1 Operation display panel				
No.	Description	Function		Reference page
①	Digital display (7 segment, 4 digits)	PV	Displays the temperature and pressure of the circulating fluid and alarm codes.	5.3
		SV	Displays the set temperature of the circulating fluid and the set values of other menus.	
②	[°C] lamp	Displays the unit of display temperature (°C).		-
③	[MPa] lamp	Displays the unit of display pressure (MPa).		-
④	[REMOTE] lamp	Lights up during remote operation by communication.		5.17
⑤	[RUN] lamp	- Lights up when the product is started and in operation. Goes off when the product is stopped. - Flashes during stand-by for stop (Interval 0.5 seconds). - Flashes during independent operation of the pump (Interval 0.3 seconds). - Flashes during anti-freezing function (At standby: Interval 2 seconds, At operation: Interval 0.3 seconds).		4.4
⑥	[ALARM] lamp	Flashes with buzzer when alarm occurs (Interval 0.3 seconds).		5.4
⑦	[] lamp	Lights up when the tank level indicator falls below the LOW level.		4.3
⑧	[] lamp	Lights up while the run timer or stop timer function is working.		5.7
⑨	[] lamp	Lights up when the product is in automatic operation.		5.10
⑩	[RUN/STOP] key	Makes the product start or stop.		4.4
⑪	[MENU] key	Shifts the main menu (display screen of temperature) the other menu (entry of set values and monitor screen).		5.2
⑫	[SEL] key	Changes the item in menu and enters the set value.		
⑬	[▼] key	Decreases the set value.		-
⑭	[▲] key	Increases the set value.		
⑮	[PUMP] key	When the [MENU] and [RUN/STOP] keys are held down simultaneously, the pump starts running independently.		4.3
⑯	[RESET] key	Keep the [▼] and [▲] keys pressed down simultaneously. This will stop the alarm buzzer and reset the [ALARM] lamp.		7.3

Chapter 3 Transport and Setting Up

WARNING



- Only persons who have sufficient knowledge and experience about the product and system are allowed to transport and set up the product.
- Especially pay attention to personal safety.

3.1 Transport

The product is heavy and has potential danger at transport. Also, to prevent damage and breakage of the product, be sure to follow these instructions for transport.

CAUTION



Never lay the product on its side.
The compressor oil will leak in to the refrigerant piping, which may cause early failure of the compressor.

CAUTION



Drain the residual fluid from the piping as much as possible to prevent any spillage.

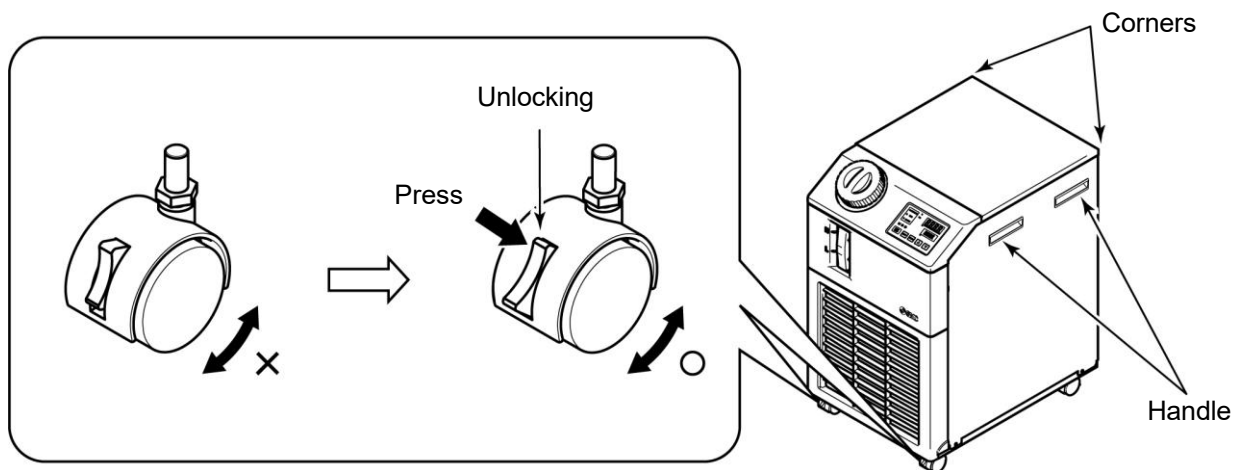
3.1.1 Transportation using casters

⚠ WARNING



**This product is heavy.
Care should be taken when the product is transported on a slope.**

- 1.** Release the lock levers of the front casters.
- 2.** Push the handles on the right/left panel or the corner of the product to move the product to the destination.
Do not hold the product by the cap to move it. This will apply excess force to the piping of internal parts which may lead to malfunctions such as fluid leakage.
- 3.** To push the front or rear panel, push it by the corner. Pushing by the center of the panel may deform the shape. Care should be taken.



* (It is an example of model "HRSC012-A-20".)

Fig. 3.1-1 Transportation using casters

3.2 Installation

WARNING



- Do not set up the product in places possibly exposed to leakage of flammable gas. Should any flammable gas stay around the product, the product may cause a fire.
- Do not use the product outdoors. If the product subjected to rain or water splash it may cause electrical shock, fire or failure.
- Keep clear of obstruction all ventilation openings in the appliance enclosure or in the structure for building-in.
- The product is not dust-proof. If used in an environment with dust, it may accumulate inside the product and cause not only a malfunction but also a fire hazard.

CAUTION



- Keep the product horizontal to a rigid and flat floor which can resist the weight of the product, and take measures to prevent the product from tipping over. Improper installation may cause water leakage, tipping, damage of the product or injure the operator.
- Keep the ambient temperature of the product between 5 to 40°C. Operation below 5°C may cause the compressor failure, and operation above 40°C may cause the product to overheat and shut down.
* The operating ambient temperature is 5 to 45°C for option G [High-temperature environment specification].

3.2.1 Environment

The product must not be operated, installed, stored or transported in the following conditions. Potential malfunction or damage to the product may occur if these instructions are disregarded.

The product does not conform to any clean room specifications. The pump and ventilating fan inside the product generate particles.

The installer/end user is responsible for carrying out an acoustic noise risk assessment on the equipment after installation and taking appropriate measures as required.

- Location accessible to the general public.
- Location that is outside.
- Location that is exposed to water, water vapour, steam, salt water or oil.
- Location that is exposed to dust or powder material.
- Location that is exposed to corrosive gas, organic solvent, chemical solution, or flammable gas (the product is not flame-proof)
- Location where the ambient temperature is out of the following range:
In transportation and In storage 0 to 50°C
(with no water or circulating fluid in piping)
In operation 5 to 40°C
(Option G [High-temperature environment specification]: 5 to 45°C)
- Location where the ambient humidity is out of the following range or where condensation occurs:
In transportation and storage 15 to 85%
In operation 30 to 70%
- Location that is exposed to direct sunlight or heat radiation.
- Location that is near heat sources and poor in ventilation.

- Location that is subjected to abrupt changes in temperature.
- Location that is subjected to strong electromagnetic noise (intense electric field, intense magnetic field, or surges).
- Location that is subjected to static electricity, or conditions where static electricity can discharge to the product.
- Location that is subjected to strong high frequencies radiation (microwaves).
- Location that is subjected to potential lightning strike.
- Location at altitude of 3000m or higher (except during product storage and transport).

*Because of lower air density, the heat radiation efficiencies of the devices in the product will be lower in the location at altitude of 1000m or higher. Therefore, the maximum ambient temperature to use and the cooling capacity will lower according to the descriptions in the table below. Please select the thermo-chiller considering the descriptions.

1. Max. ambient temp.: Use the product in lower ambient temperature than the described value at each altitude.
2. Cooling capacity coefficient: The product's cooling capacity will lower to one that multiplied by the described value at each altitude.

Altitude [m]	1. Max. ambient temp. [°C]		2. Cooling capacity coefficient
	Product of 40°C	Product of 45°C (High temperature type [Optional])	
Less than 1000m	40	45	1.00
Less than 1500m	38	42	0.85
Less than 2000m	36	38	0.80
Less than 2500m	34	35	0.75
Less than 3000m	32	32	0.70

- Bevelled place.
- Location where the product is affected by strong vibrations or impacts.
- Condition that applies external force or weight causing the product to be damaged.
- Location without adequate space for maintenance as required.
- Location where it is directly exposed to rain or snow.
- Place of Pollution Degree "1" or "2" (IEC60664-1).

3.2.2 Location (Required ventilation rate and facility water source)

CAUTION



Do not install in a location which can be subjected to any of the conditions in 3.2.1 Environment.

CAUTION



The product radiates heat from the air vent of the cooling fan. If the product is operated with insufficient air ventilation the internal temperature can exceed 40°C*, which can cause an overload or affect the performance and life of the product. To prevent this ensure that suitable ventilation is available (see below).

* (Option G [High-temperature environment specification]: 45°C)

■ Installation of multiple products

Keep sufficient space between products so that the air vented from one product will not be taken in by other products.

■ Installation Area Ventilation (For air-cooled type)

1. Facility having a large installation area (that can vent the air naturally)
Make an air vent on a wall at a high level and another air vent on a wall at a low level, to allow for adequate airflow.
2. Facility having a small installation area (that can not vent the air naturally)
Make a forced air exhaust vent on a wall at a high level and an air vent on a wall at a low level.

Table 3.2-1 Amount of radiation and required ventilation

Model	Heat Radiated kW	Required ventilation amount m ³ /min	
		Differential temp. of 3 °C between inside and outside of installation area	Differential temp. of 6 °C between inside and outside of installation area
HRSC012-A*-20	Approx. 3	50	30
HRSC018-A*-20	Approx. 4	70	40
HRSC024-A*-20	Approx. 5	90	50
HRSC030-A*-20	Approx. 6	100	60
HRSC040-A*-20	Approx. 8	140	70
HRSC050-A*-20	Approx. 10	180	80
HRSC060-A*-20	Approx. 12	200	100

CAUTION



The water-refrigerated thermo-chiller discharges heat by using facility water. Therefore, it is necessary to supply facility water from the source listed in the following table.

■ Facility water source to be prepared (For water-cooled type)

Table 3.2-2 Facility water source to be prepared

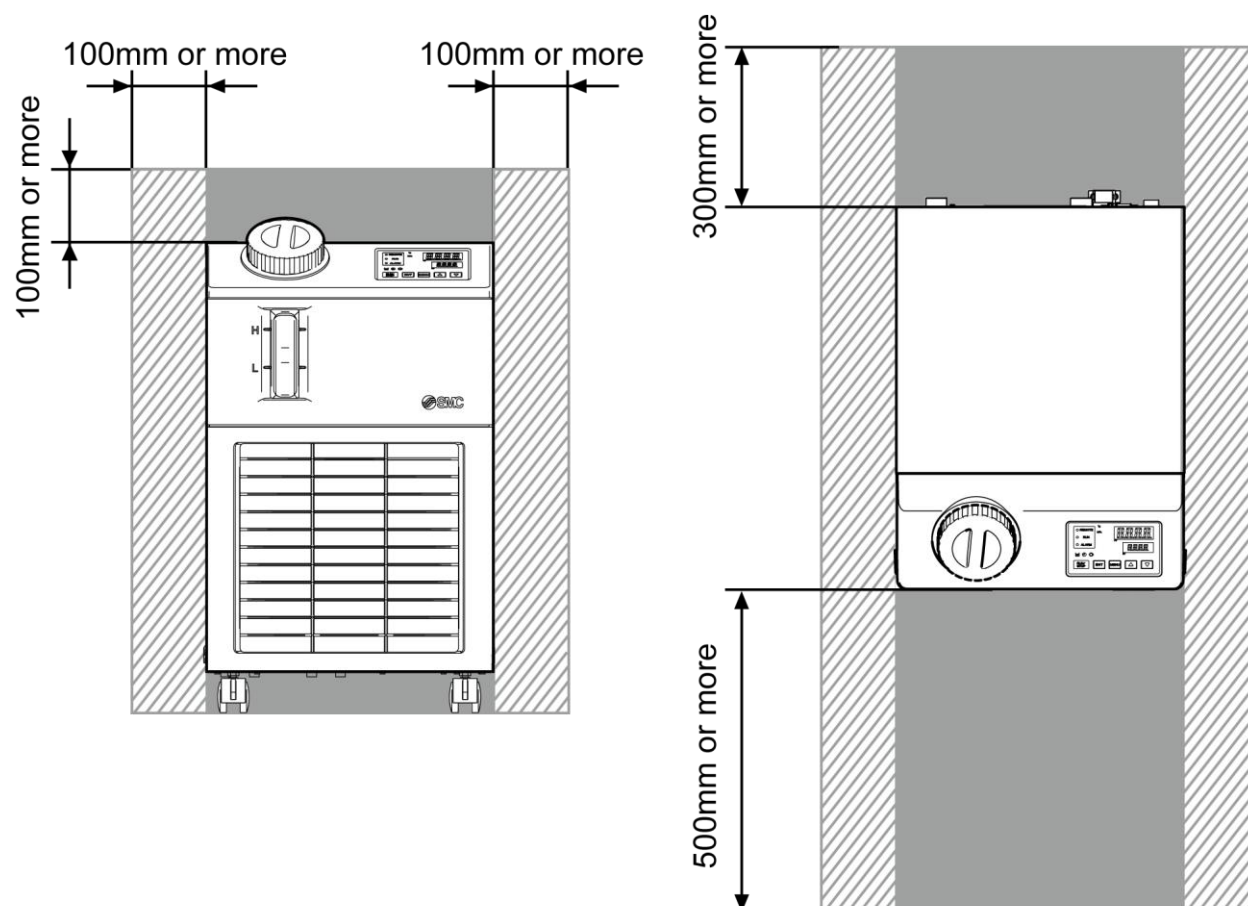
Model	Heat Radiated kW	Facility water temp. range °C	Required facility water rate L/min		
			Facility water temperature		
			25°C	32°C	40°C
HRSC012-W*-20	Approx. 3	5 to 40 (Rating 25)	8	12	20
HRSC018-W*-20	Approx. 4		12	15	23
HRSC024-W*-20	Approx. 5		14	17	25
HRSC030-W*-20	Approx. 6		15	18	26
HRSC040-W*-20	Approx. 8		15	18	26
HRSC050-W*-20	Approx. 10		16	19	27
HRSC060-W*-20	Approx. 12		17	20	28

3.2.3 Installation and Maintenance Space

It is recommended to keep the space around the product shown in Fig. 3.2-1.

For maintenance, move the thermo-chiller into a space where maintenance work is possible.

■ HRSC012/018/024/030/040-**-20



: Option G [High-temperature environment specification] is selected.

(HRSC012/018/024: Air-cooled type only)

(Option G has a vent hole on the product side. Ventilation space is necessary.)

Fig. 3.2-1 Installation space

CAUTION



The temperature of the outlet of for the ventilation of the thermo-chiller and the panel surface may become approx. 50°C or higher. When placing the thermos chiller, ensure the thermo-chiller does not affect surrounding environment.

■ HRSC050/060-**-20

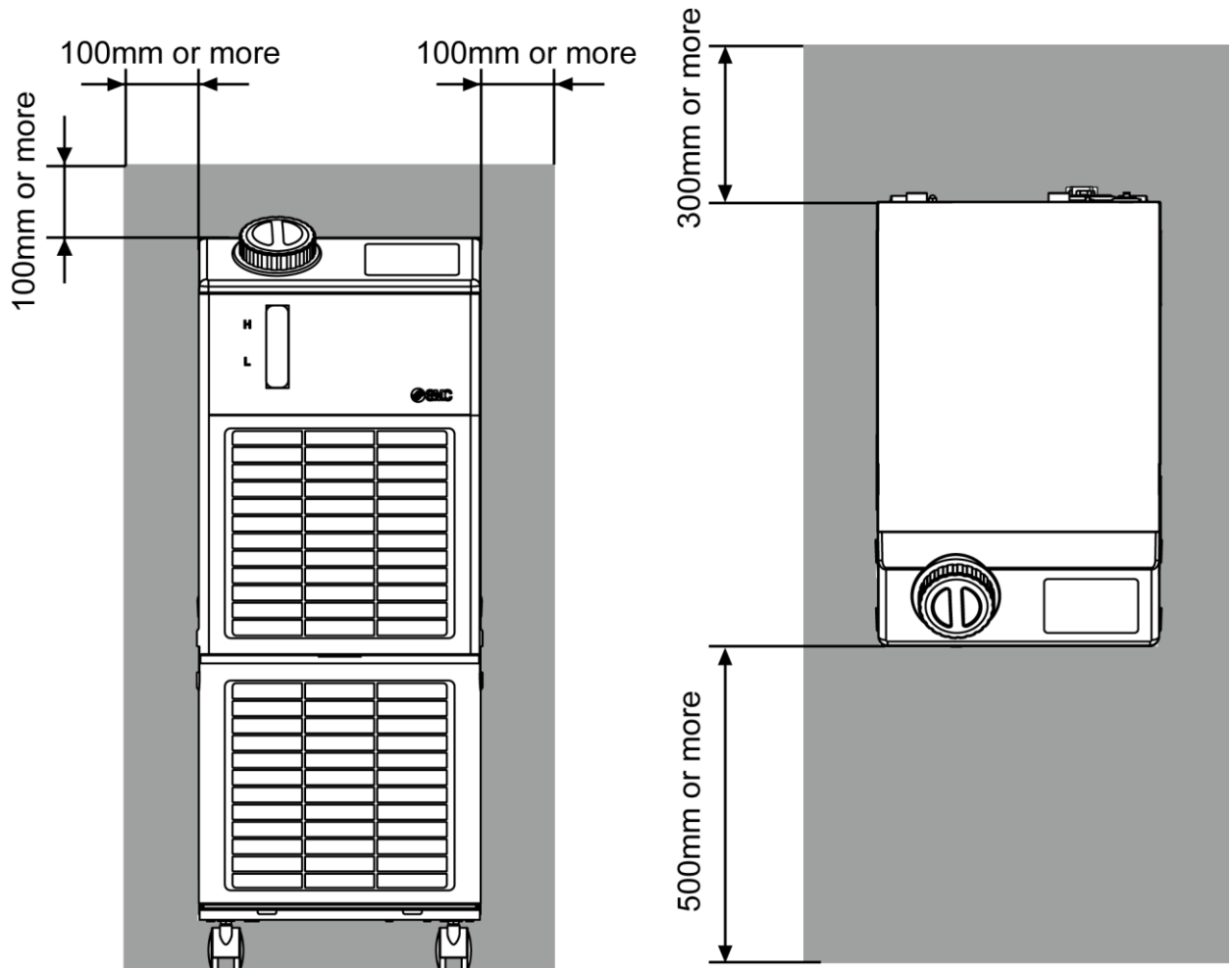


Fig. 3.2-2 Installation space

⚠ CAUTION



The temperature of the outlet of for the ventilation of the thermo-chiller and the panel surface may become approx. 50°C or higher. When placing the thermo-chiller, ensure the thermo-chiller does not affect surrounding environment.

3.3 Installation

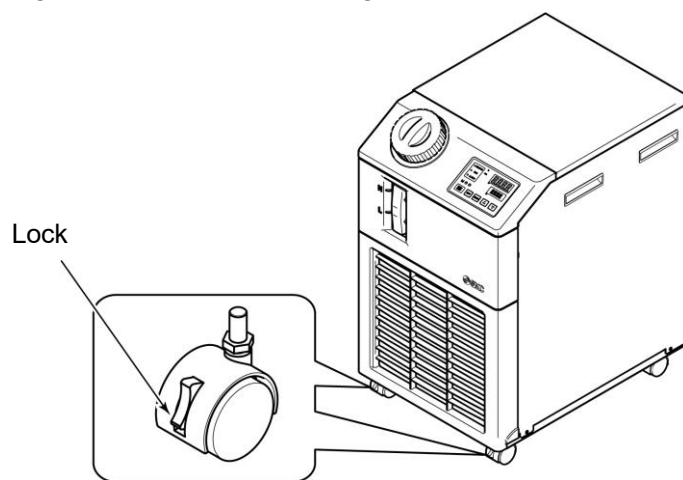
3.3.1 Mounting

- Mount the product on a flat and stable floor with no vibrations.
- Refer to "9.2 Outer dimensions" for dimensional information of the product.

■ How to mount the product

1. Move the product to the installation area.

2. After moving, lock the front casters again.



* (It is an example of model "HRSC012-A-20".)

Fig. 3.3-1 Installation procedures

■ 〈Fixture〉

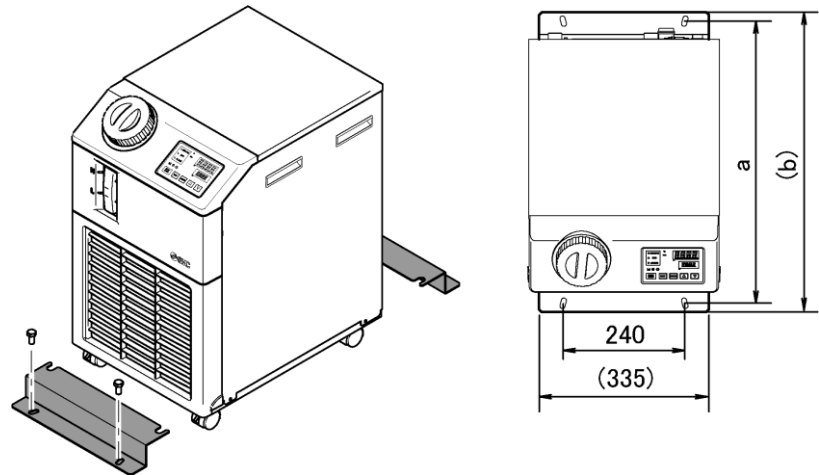
Follow the procedure below when fixing the thermo-chiller to the floor or the mounting frame.

1. Prepare the fixing bracket shown below (Not included in the package).

Item	Part number	Applicable model
Anti-Quake Bracket	HRS-TK001	HRSC012/018/024/030/040-**-20
	HRS-TK002	HRSC050/060-**-20

- 2.** Use M8 foundation bolts to fix the product within the dimensions below.
 *4 (four) M8 foundation bolts should be prepared by the customer.

■ **HRSC012/018/024/030/040-**-20**



Applicable number	a	b
HRSC012/018/024-**-20	555	590
HRSC030/040-**-20	546	581

Fig. 3.3-2 Anti-quake bracket installing

■ **HRSC050/60-**-20**

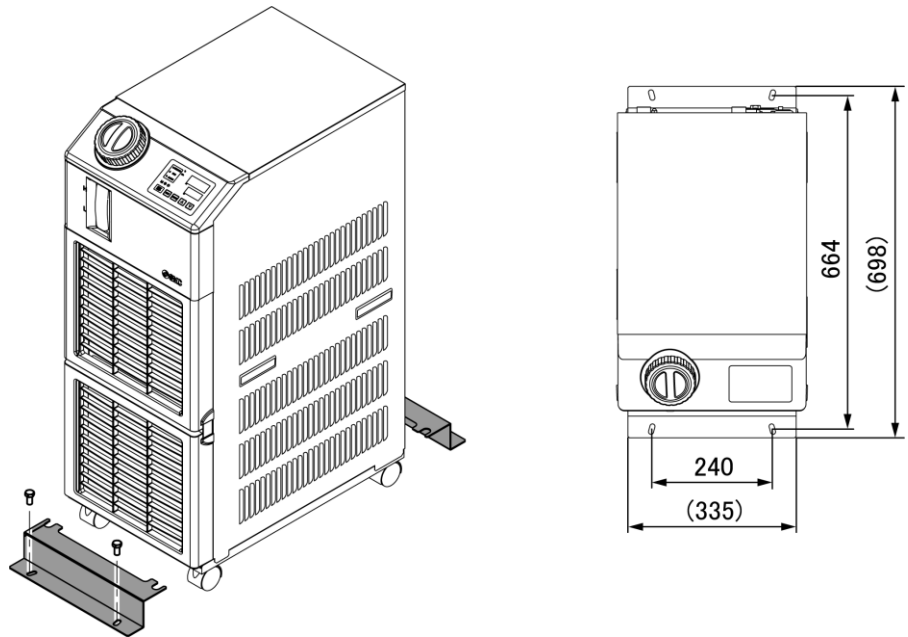


Fig. 3.3-3 Anti-quake bracket installing

3.3.2 Electrical wiring

WARNING



- Do not modify the internal electrical wiring of the product. Incorrect wiring may cause electrical shock or fire. Also, modifying the internal wiring will void the product's warranty.
- Do not connect the ground to water line, gas pipe or lightning conductor.

WARNING



- Only qualified persons are allowed to wire the product.
- Be sure to shut off the user's power supply. Wiring with the product energized is strictly prohibited.
- The wiring must be conducted using cables complying with "Table 3.3-1" firmly and secured to the product to prevent the external force of cables being applied to the terminals. Incomplete wiring or improper securing of wiring may cause electrical shock, excessive heat and fire.
- Ensure a stable power supply with no voltage surges.
- Ensure that an Earth Leakage Breaker is used in the power supply of the product. See "Table 3.3-1".
- Use a power supply suitable for the specifications of the product.
- Choose Overvoltage category from class II (IEC60664-1)
- Be sure to connect the ground connection.
- Ensure that a lock out facility is available on the power supply.
- Each product must have its own separate Earth Leakage Breaker. Otherwise there can be a risk of electric shock or fire.

■ Power supply cable and Earth Leakage Breaker

Prepare the power supply shown in the following table. For the connection between the product and power supply, use the power supply cable and earth leakage breaker shown below.

If communication with the user's machine is necessary, use the following signal cable.

Table 3.3-1 Power supply cable and Earth Leakage Breaker (Recommended)

Model	Power supply voltage	Terminal block			Cable qty. x size	Earth leakage breaker		
		Screw diameter	Recommended crimp terminal	Tightening torque		Rated voltage [V]	Rated current [A]	Sensitivity of leak current [mA]
HRSC012-**-20 HRSC018-**-20 HRSC024-W*-20	1-phase 200-230V AC (50/60Hz)	—	—	—	3 cores x 14AWG (3 cores x 2.0mm ²) (including ground)	200, 230	10	30
HRSC024-A*-20 HRSC030-**-20							15	30
HRSC012/018/024/ 030-**-20-**-T (High pump head [Optional])							15	30
HRSC040-**-20 HRSC050-W*-20 HRSC060-W*-20		M4	5.5-4	1.8N · m	3 cores x 12AWG (3 cores x 3.5mm ²) (including ground)		20	30
HRSC050-A*-20 HRSC060-A*-20					3 cores x 10AWG (3 cores x 5.5mm ²) (including ground)		30	30

* UL/CSA: For power supply cable, it is to be properly prepared by the customer in accordance with National Electrical Code and Canadian Electrical Code.

3.3.3 Preparation and wiring of power supply cable

WARNING



- The electrical facilities should be installed and wired in accordance with local laws and regulations of each country and by a person who has knowledge and experience.
- Check the power supply. Operation with voltages, capacities and frequencies other than the specified values can cause fire and electrical shock.
- Wire with an applicable cable size and terminal. Forcibly mounting with an unsuitable size cable may result in heat generation or fire
- After tightening the terminal screws, please visually check that the screws are not loosened, and pull the cables to ensure that the screws are tightened completely.
- Otherwise, there can be a risk of heat generation or fire.
- Check that cabling will not be subject to wear, corrosion, excessive pressure, vibration, sharp edges, or any other adverse environmental effects. The check shall also take into account the effects of aging or continual vibration from sources such as compressors or fans.

WARNING



Be sure to lock out and tag out the breaker of the facility power supply (customer power supply facility) before wiring.

WARNING



Be sure to connect the power supply cable from the product side first, and then connect the breaker of the facility power supply (the user's machine power supply).

CAUTION



When the panel is removed or mouted, be sure to wear protective shoes and gloves to prevent injury with the edge of the panel.

■ Preparation

■ HRSC012/018/024/030-**-20

1. Strip the sheath from both ends of the cable.
2. Disassemble the power supply connector. Crimp one end of the cable to L,N,PE (Earth) or L1,L2,GND (Earth) inside of the connector, then reassemble the power supply connector.
3. Connect the other end of the cable to a terminal (e.g. plug or crimped terminal) that is compatible with the facility power supply. Comply with all applicable electrical regulations.

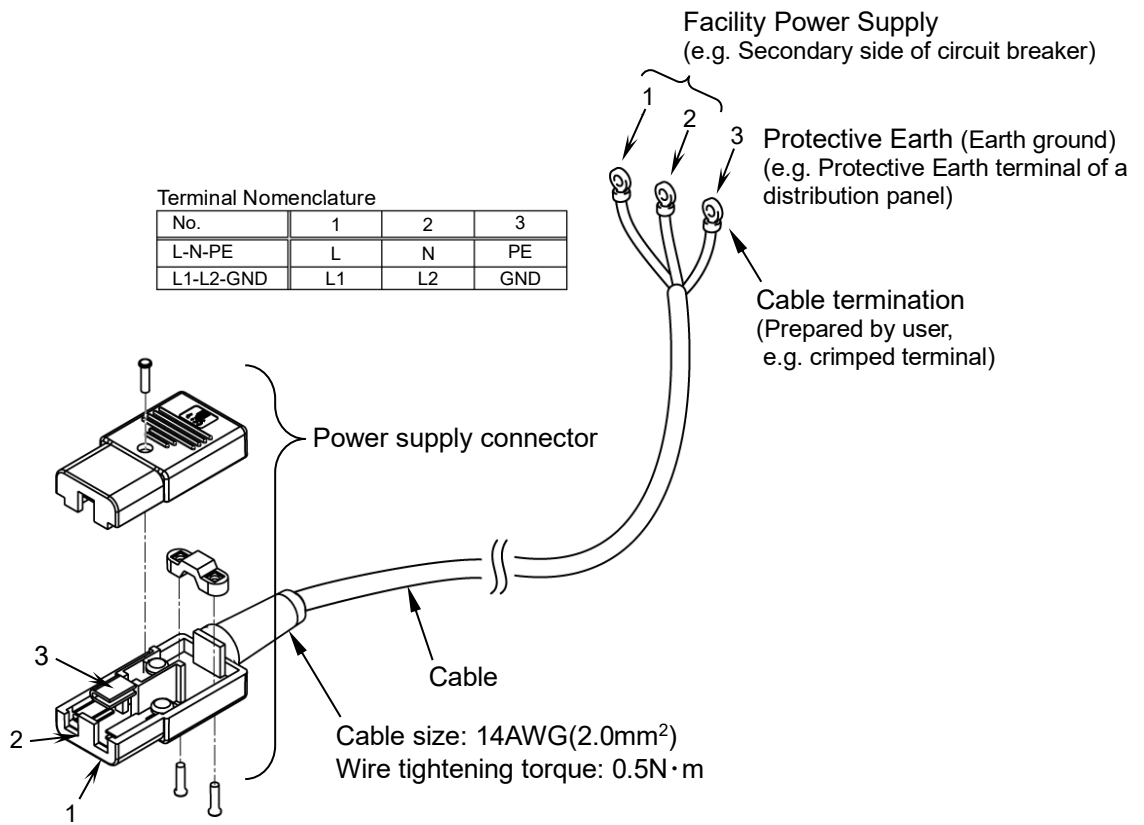


Fig. 3.3-4 Power supply cable

Note: the cable termination is prepared by the user. Use the appropriate components (terminals, plugs, sockets, breakers, etc.) to comply with all applicable electrical regulations.

■ HRSC040/050/060--20**

- 1.** Remove six screws to remove the upper panel.

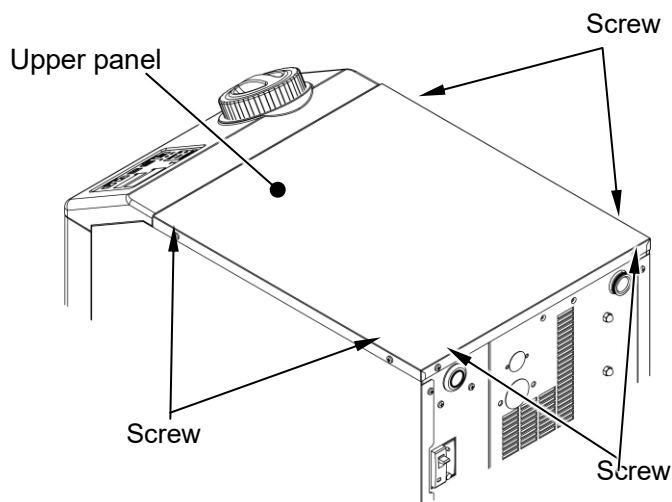


Fig. 3.3-5 Remove the upper panel

-
- 2.** Pull the upper panel towards the back of the product, and lift it to remove.

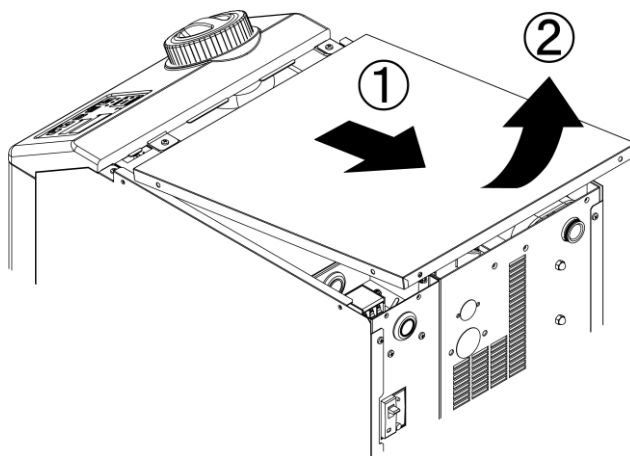


Fig. 3.3-6 Remove the upper panel

■ Wiring

■ HRSC012/018/024/030-**-20

1. Connect the power supply cable to the facility power supply including ground. Comply with all applicable electrical regulations.
-
2. Plug the power supply cable in to the power cable connector on the product.
-
3. Turn on the facility power supply to energize the product.

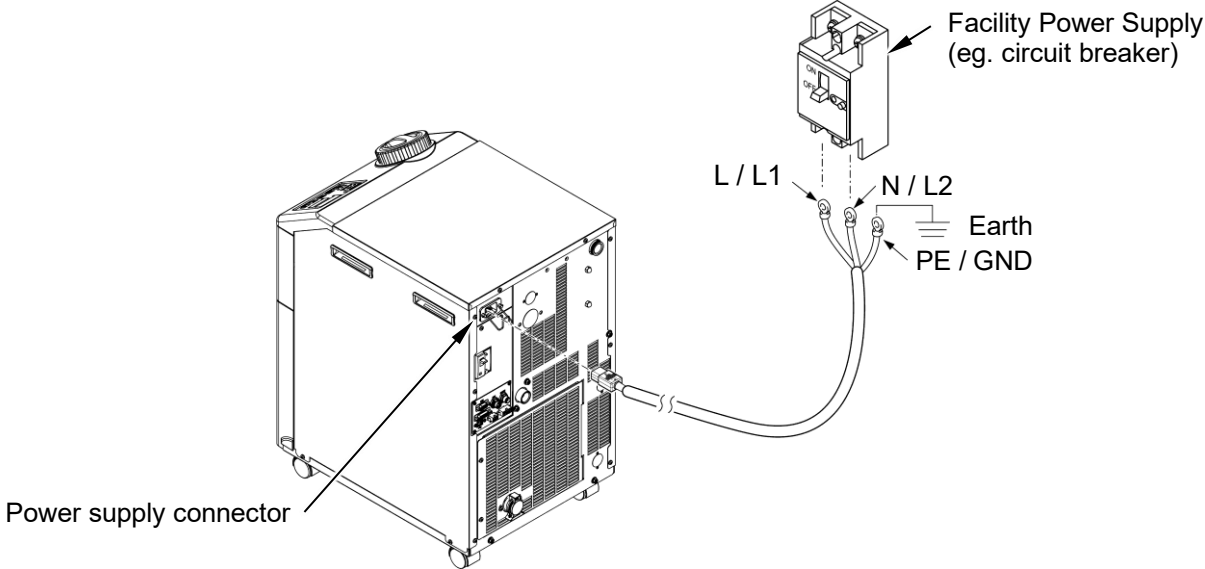
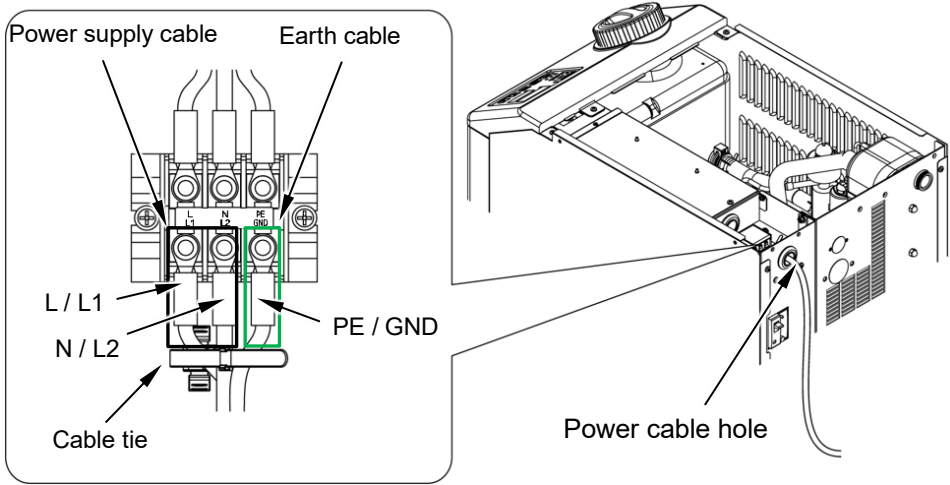


Fig. 3.3-7 Wiring of power supply

■ HRSC040/050/060-**-20

1. Connect the power supply cable and earth cable as shown in the figure below.



* (It is an example of model "HRSC060-A-20".)

Fig. 3.3-8 Wiring of power supply cable and earth cable

* Connect over current protection to the power cable connected to the equipment in order to avoid hazard.

3.3.4 Wiring of remote operation signal input

The remote signal input is to enable the product to be run and stopped remotely by applying a contact signal input. This chapter illustrates examples of wiring

Select DIO mode as the communication mode to activate the remote control signal input. After wiring, select DIO mode referring to the operation manual "Communication function".

[Tips]

This product has two input signals. These can be customized depending on the customer's application.

Refer to the Operation Manual for communication for details.

CAUTION

The capacity of the output contact of the product is limited. If the capacity is not large enough, install a relay, etc. (to allow for larger capacity). At the same time, ensure the input current of the relay is small enough in relation to the contact capacity of the product.

⚠ WARNING



Be sure to shut off the breaker of the facility power supply (the user's machine power supply) before wiring.

■ Contact Input/Output communication connector

The following connectors are used for this product as a contact input / output signal connector. Please prepare suitable mating connector cable.

Table 3.3-2 Contact input/output communication connector

Connector specification (this product side)
D-sub 15 pin female (socket) type

Table 3.3-3 Contact input/output communication specification

Item		Specification	
Contact input signal1,2	Insulation system	Photo coupler	- Run/Stop signal - External switch signal
	Rated input voltage	DC24V	
	Used input voltage	DC 24V+/-10%	
	Rated input current	5mA TYP	
	Input signal	4.7kΩ	
Contact output signal 1,2,3	Rated load voltage	AC48V or less /DC30V or less	- Signal of operating status - Signal for the alarm status - Signal for completion of preparation (TEMP READY) etc *2
	Maximum load current	AC/DC 500mA (Resistance load)	
	Minimum load current	DC5V 10mA	
DC24V output voltage		DC24V+/-10% 500mA MAX *1 (It can not be used for inductive load.)	

*1: When using the power supply of this product, make sure that the total load current is 500 mA or less.

*2: Refer to "3.3.5 Wiring of operation signal output and alarm signal output"

Table 3.3-4 Contact input/output pin number

PIN no	Application	Division	Initial value (Default setting)
1	DC 24V output	Output	
2	DC 24V output	Output	
3	DC 24V output	Output	
4	Contact input signal 1	Input	None
5	COM of contact output signal 1	Output	
6	COM of contact output signal 2	Output	
7	COM of contact output signal 3	Output	
8	None	-	
9	24 COM output	Output	
10	24 COM output	Output	
11	COM of contact input signal	Output	
12	Contact input signal 2	Input	None
13	Contact output signal 1	Output	Run status signal (N.O type)
14	Contact output signal 2	Output	Remote signal (N.O type)
15	Contact output signal 3	Output	Alarm signal (N.C type)

1. Prepare a suitable connector cable.
2. Wire the contact input / output signal connector as shown below and connect it to this product. (This wiring is an example, please refer to the instruction manual "Communication function" for details.)

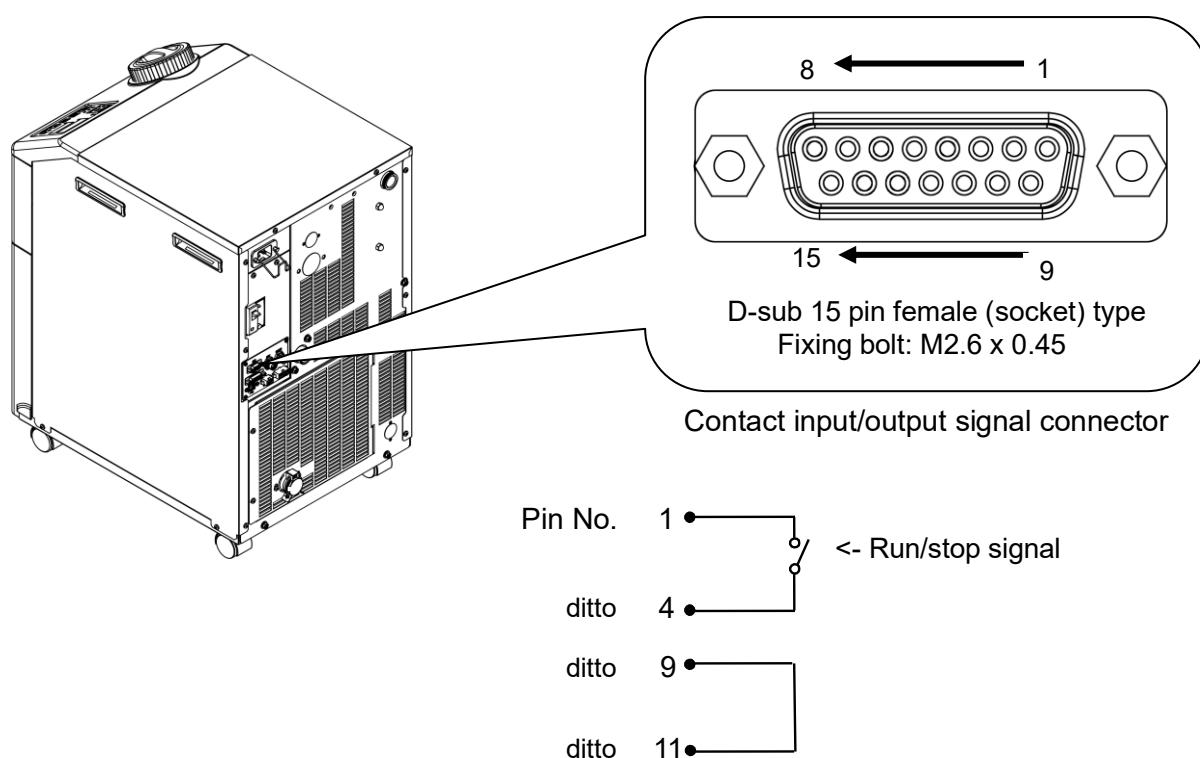


Fig 3.3-9 Wiring of run/stop signal input (Example)

3.3.5 Wiring of operation signal output and alarm signal output

The operation signal output and alarm signal output are the outputs generated by a contact signal to shown the status of the product.

WARNING



Be sure to shut off the breaker of the facility power supply (the user's machine power supply) before wiring.

The specifications of the contact for each signal output are as follows.

Table3.3-5 Signal output contact spec. at the time of shipment

Contact output	Signal explanation (Default setting)	Operation	
Output current 1 (Terminal no.5, 13)	Run status signal	A	At run : Contact closed At stop : Contact open With power supply shut off: Contact open
Output current 2 (Terminal no.6, 14)	Remote signal	A	At remote : Contact closed At non remote : Contact open With power supply shut off: Contact open
Output current 3 (Terminal no.7, 15)	Alarm signal	B	At generation : Contact open Not generated : Contact closed With power supply shut off: Contact open

[Tips]

This product has three output signals which can be customized depending on the customer's application

Signals below can be output. please refer to the operation manual "Communication function" for details

- Signal for completion of preparation (TEMP READY)
- Signal for operation stop alarm
- Signal for continuing operation alarm
- Signal for selection alarm
- Signal for operation start timer setting
- Signal for operation stop timer setting
- Signal for power recovery setting
- Signal for freezing prevention setting
- Contact input signal detection

3.3.6 RS-485 Communication wiring

Serial communication RS-485, operation start/stop, setting and reading of circulating fluid temperature, and reading of alarm condition can be done by remote control.

Please refer to the operation manual "Communication function" for details.

■ Wiring of interface communication cable

⚠ WARNING



Be sure to shut off the breaker of the facility power supply (the user's machine power supply) before wiring.

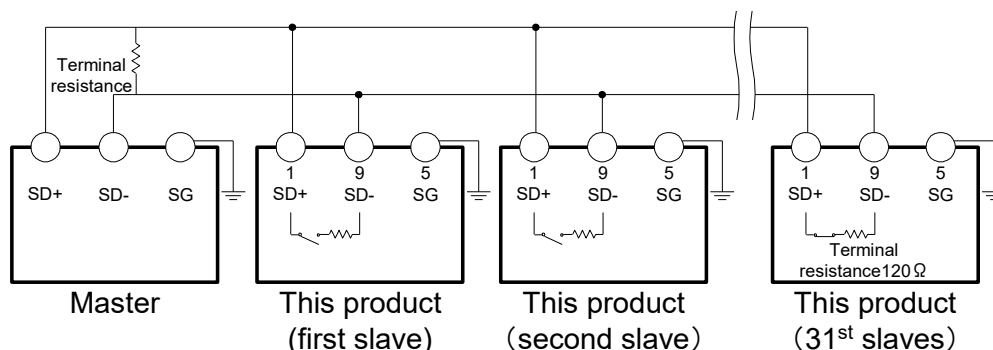
● Connecting to PC

RS-485 cannot be directly connected to a normal PC. Use a RS-232C/RS485 converter which is available on the market.

Be sure to follow the wiring procedure below for connecting multiple thermo-chillers.

● Configuration of connection

One host computer : One thermo-chiller, or one host computer : N thermo-chillers.
(Max. 31 thermo-chillers can be connected.)



Do not connect any wire to other PIN numbers.

Fig. 3.3-10 Connection of RS-485

(Tips)

Both ends of the communication connection (the end nodes) need to be connected to the host computer.

The terminal resistance of this product can be set by the operation display panel. Refer to "5.17 Communication function".

3.3.7 RS-232C Communication wiring

Serial communication RS-232C, operation start/stop, setting and reading of circulating fluid temperature, and reading of alarm condition can be done by remote control.

Please refer to the operation manual "Communication function" for details.

■ Wiring of communication cable

⚠ WARNING

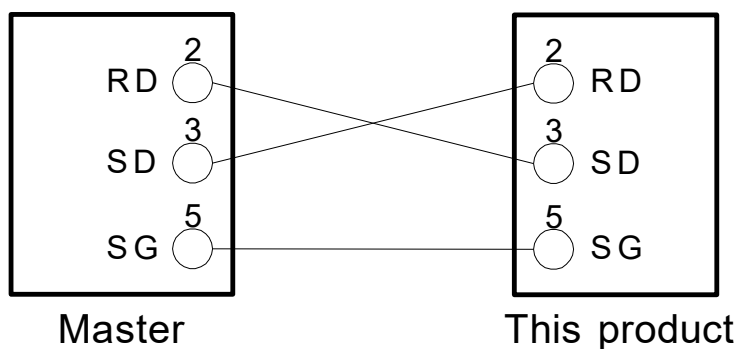


Be sure to shut off the breaker of the facility power supply (the user's machine power supply) before wiring.

Be sure to wire as shown in the figure below.

- Configuration

1 master : 1 thermo-chiller



Do not connect any wire to other PIN numbers.

Fig. 3.3-11 Connection of RS-232C

3.4 Piping

CAUTION



- Connect piping firmly. Incorrect piping might cause leakage of supplied or drained leakage and wet surrounding area and facility.
- Pay attention not to allow dust and foreign materials to enter into water circuit etc. during connection of piping.
- When the thermo-chiller is water-cooled refrigerated type, the temperature of the outlet of the facility water may become approx. 60°C depending on operating conditions
- Hold the piping port firmly with specific wrench when tightening.
- The piping should be selected with due consideration of pressure and temperature. Otherwise, the piping can burst in service.
- Use non-corrosive material for fluid contact parts of circulating fluid and/or facility water. Also, the use of corrosive materials such as aluminum or iron for fluid contact parts, such as piping, may not only lead to clogging or leakage in the circulating fluid and facility water circuits but also refrigerant leakage and other unexpected problems. Provide protection against corrosion when you use the product.
- Do not generate a rapid change of pressure by water hammer etc. The product and external piping might be damaged.
- The circuit to be connected to this product must be provided with a mechanism (e.g. relief valve) to safely release abnormal pressure.

CAUTION



- Check the model number of this product in "1.4.1 Product Label" of this manual before connecting piping.
- Model number: HRSC0**-N-20
The transition connector from Rc to NPT is enclosed as an accessory. For NPT piping, be sure to use this connector.
- Model number: HRSC0**-F-20
The transition connector from Rc to G is enclosed as an accessory. For G piping, be sure to use this connector.

■ Piping port size

Table 3.4-1 Piping port size

Name	Port size*1	Recommended tightening torque	Recommended proof pressure for piping
Circulating fluid supply	Rc1/2	28 to 30N·m	0.4MPa more
Circulating fluid return	Rc1/2	28 to 30N·m	0.4MPa more
Facility water inlet *2	Rc3/8 *3 Rc1/2 *4	22 to 24N·m (Rc3/8) 28 to 30N·m (Rc1/2)	1.0MPa more (Facility water pressure 0.3 to 0.5 MPa)
Facility water outlet *2	Rc3/8 *3 Rc1/2 *4	22 to 24N·m (Rc3/8) 28 to 30N·m (Rc1/2)	
Automatic water-fill port *5	Rc3/8	22 to 24N·m	1.0MPa more (Automatic water-fill pressure 0.2 to 0.5MPa)
Overflow port *5	Rc3/4	28 to 30N·m	Inside diameter 19mm more of piping

*1 For NPT and G thread, use a conversion connector available as an accessory separately.

*2 For water-cooled type.

*3 Model : HRSC012/018/024/030/040-**-20

*4 Model : HRSC050/060-**-20

*5 For automatic fluid filling [Option J]

■ How to connect piping

Tighten the piping to circulating fluid outlet / return port and facility water outlet / inlet.

■ HRSC012/018/024/030/040-**-20

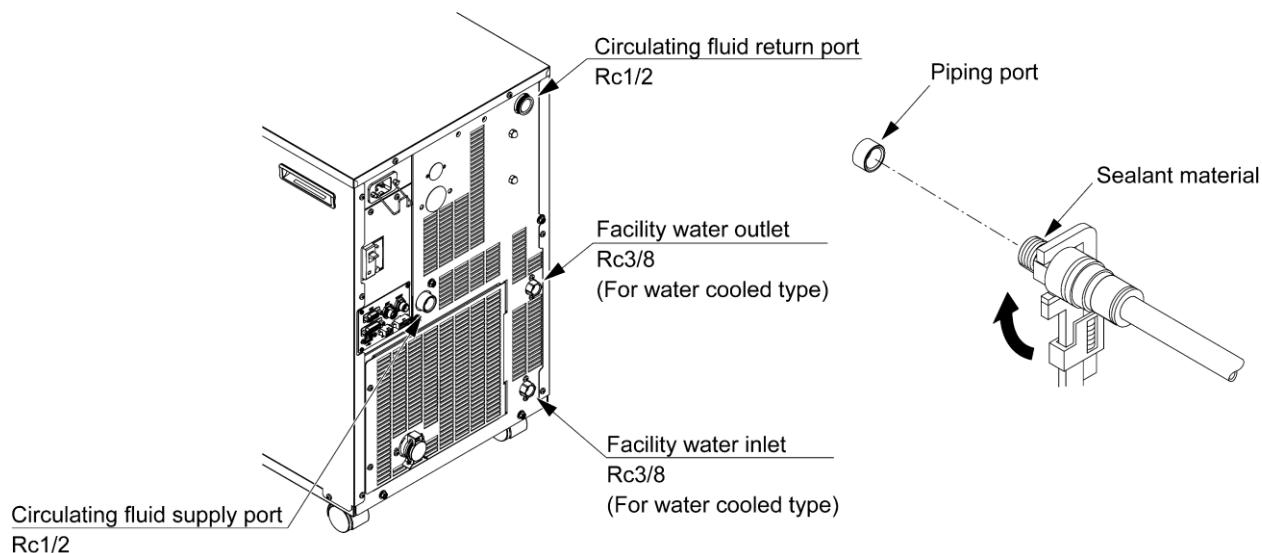


Fig. 3.4-1 Tightening of piping

■ HRSC050/060-**-20

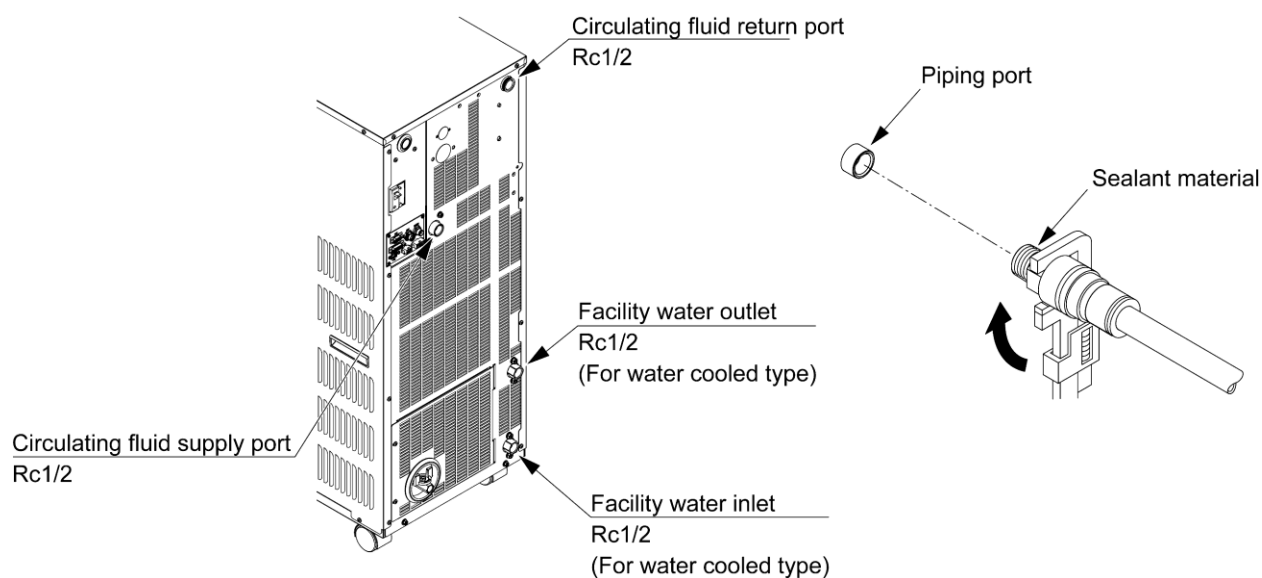


Fig. 3.4-2 Tightening of piping

■ Recommended piping circuit

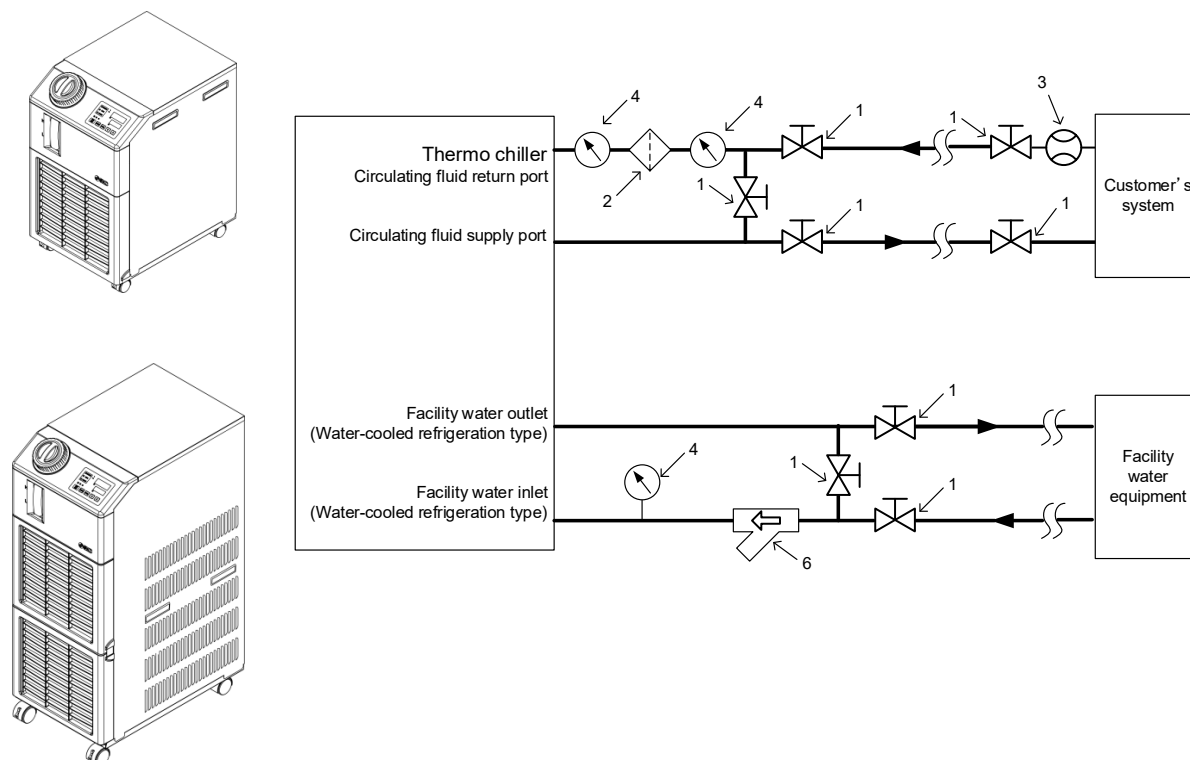


Fig. 3.4-3 Recommended piping circuit

No.	Description	Size	Recommended part no.	Note
1	Valve	Rc1/2	-	To prevent liquid spillage from the customer's piping or overflow from the tank during maintenance work.
2	Filter	Rc1/2 20μm	HRS-PF003	If foreign objects with a size of 20μm or more are likely to enter, install the particle filter.
3	Flow meter	0.5 to 50L/min	-	-
4	Pressure gauge	0 to 1.0MPa	-	-
5	Others (Pipe, hose, etc.)	φ15 or more	-	-
6	Y-strainer	Rc1/2 #40	-	Install either the strainer or filter. If foreign objects with a size of 20μm or more are likely to enter, install the particle filter.
	Filter	Rc1/2 20μm	Note) FQ1011N-04-T020-B-X61	

Note) The filter shown above cannot be directly connected to the thermos chiller. Install it in the user's piping system.

3.5 Fill of circulating fluid

Turn the tank lid anticlockwise to open. Supply the circulating fluid up to the “H” mark on the fluid level indicator. Use water which satisfies the water quality standard shown in Table 8-1, or a 15% ethylene glycol aqueous solution.

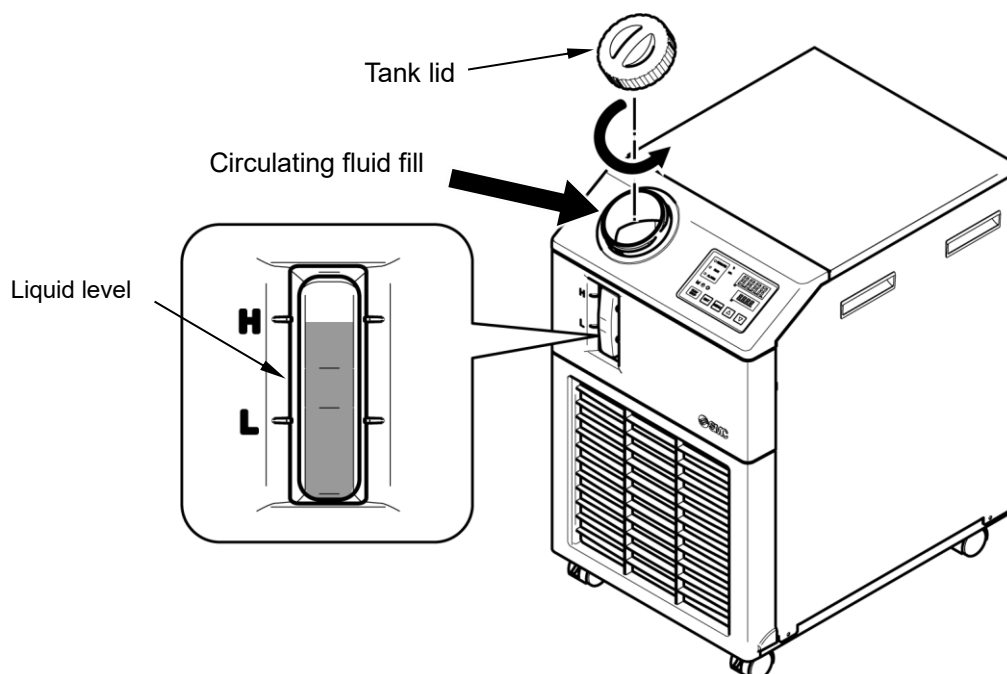


Fig. 3.5-1 Circulating fluid fill

CAUTION



- Check the drain port is plugged or closed by the valve to prevent the supplied circulating fluid from draining out.
- Supply the circulating fluid up to the “H” mark on the tank. Operation will stop when the fluid level falls lower than “L”.

CAUTION



- When the temperature of the circulating fluid is set to lower than 10°C, use a 15% ethylene glycol aqueous solution. Water may freeze in the thermo-chiller, leading to malfunction.

■ 15% ethylene glycol aqueous solution

When a 15% ethylene glycol aqueous solution is used, prepare the ethylene glycol aqueous solution separately.

To control the concentration of the ethylene glycol aqueous solution, a concentration meter is available separately from SMC.

Item	No.	Remarks
60% ethylene glycol aqueous solution	HRZ-BR001	Please dilute to 15% with water and use it.
Concentration meter	HRZ-BR002	-

3.6 Option J Piping of [Automatic fluid filling]

Automatic fluid filling port and over flow port need to be connected when optional [automatic fluid filling] is selected.

■ Piping to automatic fluid filling port

Connect the piping to supply the circulating fluid. Automatic fluid filling is performed by using the solenoid valve which is built in the thermo-chiller.

■ Piping to the overflow port

This is necessary when automatic fluid filling function is used. Discharge excess circulating fluid when the fluid level in the tank rises due to the failure of the solenoid valve etc.

Piping name	Port size	Piping specifications
Automatic fluid fill inlet	Rc3/8	Supply pressure: 0.2 to 0.5MPa
Overflow outlet	Rc3/4	Piping should be within 19mm of I.D. and 5m of length. Riser piping (trapping area) should be avoided.

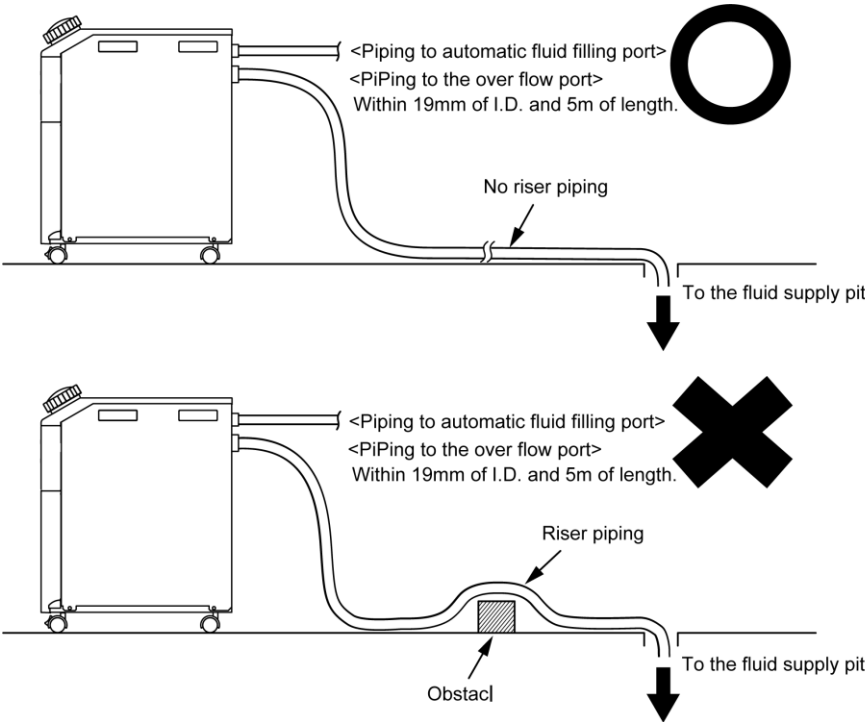


Fig. 3.6-1 Piping to automatic fluid filling port and overflow port

■ Supplying fluid from the automatic fluid filling port

Fluid filling starts if the power supply switch is turned ON when the fluid level of the circulating fluid is "L" of the level indicator or lower (4.2 Preparation for Start). Fluid supply stops when the fluid level reaches the proper level. If the fluid level does not reach the proper level within a fixed time after starting supplying fluid, it causes the alarm "AL01; Low level in tank". Fluid supply continues while the alarm is generated. Fluid supply stops after the fluid level reaching proper level. Alarm continues after fluid supply is completed. Release the alarm referring Chapter 6

3.7 Wiring of external switch

This product can be monitored by sampling the signal of the external switch prepared by the customer.

Table 3.7-1 Power supply, contact specifications

Name	Terminal NO.	Specification
Power supply output	1 (DC 24V)	DC 24V +/-10% 0.5A MAX*1
	9 (24V COM)	
Contact input signal 1	5 (Contact input signal 1)	NPN open collector output PNP open collector output
	13 (Common of contact output signal 1)	
Contact input signal 2	6 (Contact input signal 2)	
	14 (Common of contact output signal 2)	

*1: To use the power of the device, the total load current must be 500mA or less.

One external switch can be connected to contact input signal 1 and one to contact input signal 2. (Two in total) The external switch cannot be connected to the contact input signal 1 depending on the communication mode. Table 3.7-2 shows the setting.

Table 3.7-2 Sets external switch

Communication mode *1		Contact input signal 1	Contact input signal 2
Local mode		○	○
SERIAL mode	MODBUS	○	○
	Simple communication protocol 1	○	○
	Simple communication protocol 2	×	○
DIO mode		×	○

○ : Applicable

× : Not Applicable

*1: Refer to the Communications Operation Manual for more details of each mode.

Local mode: Mode allowing the product to be operated by the operation panel. (Default setting)

SERIAL mode: Mode allowing the product to be operated by serial communication.

DIO mode: Mode allowing the product to be operated by the contact input/output communication.

3.7.1 Reading of the External switch

This product can be monitored during operation by reading the signal of the external switch prepared by the customer.

The product stops monitoring when it stops operation.

This product generates an alarm and stops operating when a problem is detected from the external switch.

You can set the product to continue operation or not to detect the alarm.

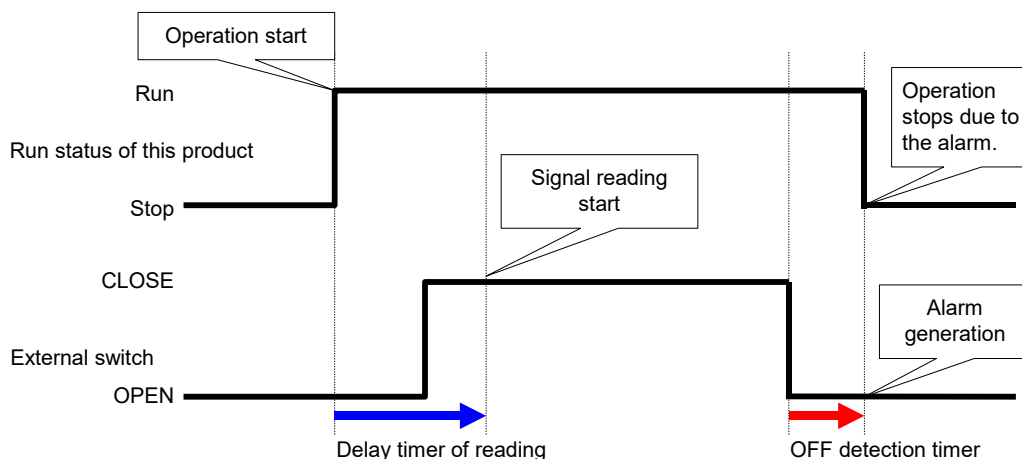


Fig. 3.7-1 Timing chart of external switch monitoring

■ Delay timer of reading

If the signal of the external switch prepared by the customer is not closed instantly when the product is operated, set the delay timer for reading. By setting this timer, the external switch monitoring starts after the time set by the delay time of reading since the operation start.

"0" is the default setting. Set a time which is suitable for your environment.

Example} When using a flow switch

When operation is started, it takes time for the fluid to reach the piping and the flow switch to detect the flow. Set the time for the flow switch to start.

■ OFF detection timer

If you do not want the alarm to be generated instantly when the external switch prepared by the customer is in open status, but instead want the alarm to be generated after the switch has been open for a specific time (continuous open status), set the OFF detection timer.

This timer enables the alarm to be generated when the time set for OFF detection time passes after the switch is in OPEN status.

The default setting is 0 sec. Set a time which is suitable for your application.

■ Contact input

N.O type or N.C. type can be selected for the external switch. Set the signal which is suitable for the external switch prepared by the customer.

3.7.2 Setting items

Table 3.7-3 Setting list of the external switch shows the setting items of the external switch. For details, refer to 5.17 Communication function.

Table 3.7-3 Setting list of the external switch

Display	Item	Initial value (Default setting)	Example*	Reference page	Category
[a.01]	Communication mode	LOC	LOC	5.17	Communication setting menu
[a.15]	Contact input signal 1	RUN	SW_A		
[a.16]	Contact input signal 1 type	ALT	ALT		
[a.17]	Contact input signal 1 delay timer (time delay) of reading	0	0		
[a.18]	Contact input signal 1 OFF detection timer	0	2		
[a.19]	Contact input signal 2	OFF	OFF		
[a.20]	Contact input signal 2 type	ALT	-		
[a.21]	Contact input signal 2 delay timer (time delay) of reading	0	-		
[a.22]	Contact input signal 2 OFF detection timer	0	-		

* Example: Connect flow switch A to contact input signal 1 in local mode.

Chapter 4 Starting the Product

CAUTION



Only people who have sufficient knowledge and experience about the product and its accessories are allowed to start and stop the product.

4.1 Before Starting

Check the following items before starting the product.

■ Installation conditions

- Check the product is installed horizontally.
- Check that there are no heavy objects on the product, and the external piping is not applying excessive force to the product.

■ Connection of cables

- Check the power, ground and communications (optional) cables are correctly connected.

■ Circulating fluid

- Check proper connection of piping at inlet and outlet.

■ Facility water piping (For water-cooled type)

- Check proper connection of piping at the facility water inlet and outlet.
- Check that the facility water source is in operation.
- Check that the facility water circuit is not shut off by valves

CAUTION



- The facility water should be checked for whether or not it satisfies the water quality standard described in “8.1 Control of Circulating Fluid Quality” and requirements specified in “9.1 Specifications List”.
- If the facility water supply pressure is too high (over 0.5 MPa), it will cause water leakage.
- Be sure to prepare your utilities so that the pressure of the thermo-chiller facility water outlet is at 0 MPa (atmospheric pressure) or more.
If the facility water outlet pressure becomes negative, the internal facility water piping may collapse, and proper flow control of facility water will be impossible.
- Using deionized water as facility water may cause problems such as clogging in the piping due to metal ion.

Tips

The product is equipped with a proportional valve, which does not allow the facility water to flow unless the product is started.

- **Automatic fluid filling piping (When option J [With automatic fluid filling] is selected)**
 - Confirm that the automatic fluid filling port piping is connected properly.
- **Overflow port piping (When option J [With automatic fluid filling] is selected).**
 - This is necessary when automatic fluid filling function is used.
 - Confirm that the overflow port piping is connected properly.
- **Fluid level indicator (for tank)**
 - Ensure that the fluid level is on “H”.

4.2 Preparation for Start

4.2.1 Power supply

Supply the power and turn on the power supply switch.

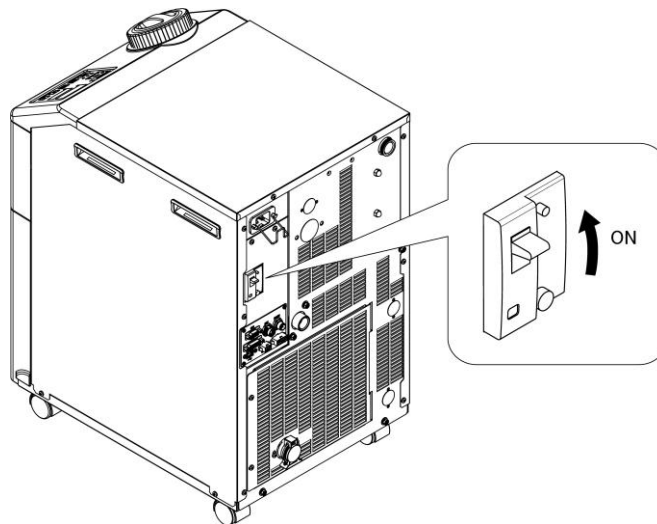
When the product is switched on, the operation panel displays the following conditions.

The initial screen (HELLO screen) is displayed for 8 seconds on the operation display panel. Then, the display changes to the main screen which displays the circulating fluid supply temperature.

The set value of circulating fluid temperature is displayed as SV on the panel.

The present value of circulating fluid temperature is displayed as PV on the panel.

■ HRSC012/018/024/030/040-**-20



■ HRSC050/060-**-20

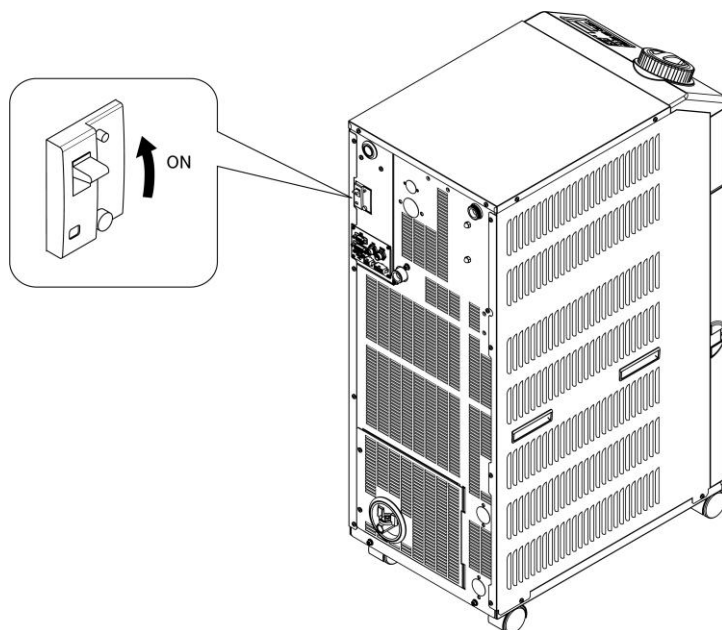


Fig. 4.2-1 Power supply

4.2.2 Setting of circulating fluid temperature

Press the [▼] and [▲] buttons on the operational panel to change the SV to required value.

When the temperature of the circulating fluid is set by the please refer to the operation manual "Communication function".

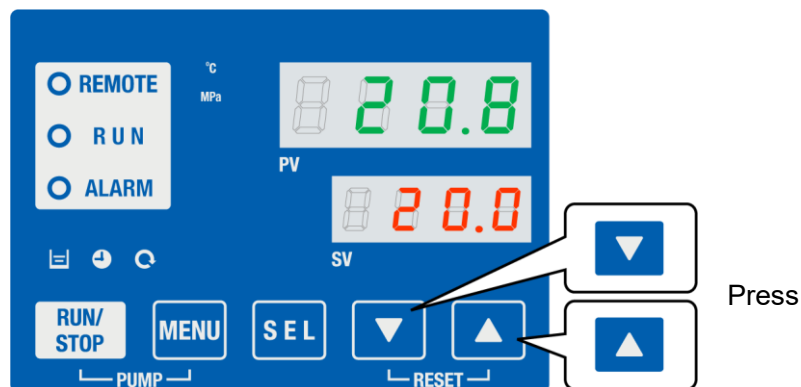


Fig. 4.2-2 Setting of circulating fluid temperature

4.3 Preparation of circulating fluid

When the circulating fluid tank is filled the user's machine and piping remains empty. In that condition, the circulating fluid flows out to the user's machine and piping and the tank level decreases and may require a refill. In that case, refill the circulating fluid in the following procedure.

1. Press the [PUMP] key on the operation display panel (press the [RUN/STOP] key and [MENU] key simultaneously).

The pump operates independently while the [PUMP] key is pressed. The [RUN] lamp (green) flashes while the pump is operating independently, and the circulating fluid in the tank is supplied to the customer's device and piping. This can be done to check for leakage, and to discharge air from the piping. If the fluid level in the tank reaches the lower limit, a buzzer will sound, and alarm no. "AL01 (tank fluid level is low)" is displayed on the digital display PV. The [ALARM] lamp (red) flashes, the [≡] lamp turns on, and the independent operation of the pump is stopped.

CAUTION

If leakage occurs due to faulty piping including an opened fitting of eternal piping, stop manual operation of the pump and fix the leak.

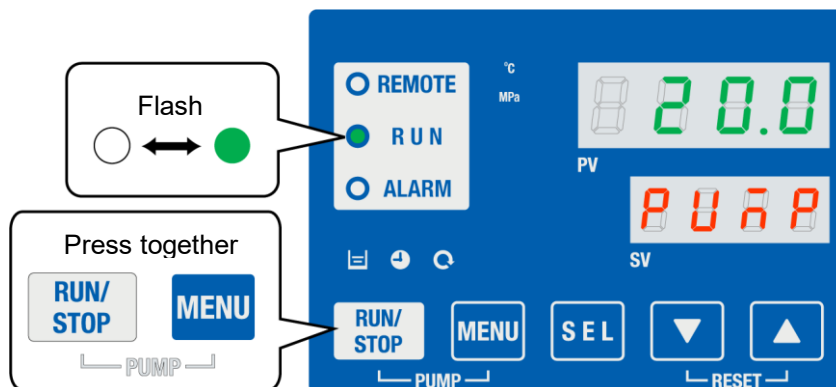


Fig. 4.3-1 Manual operation of the pump

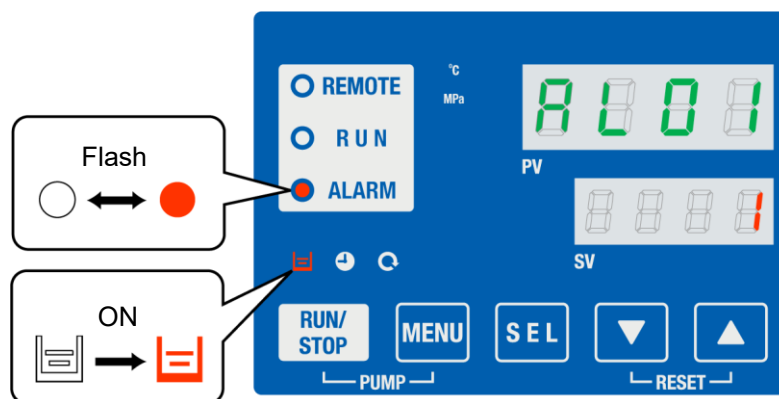


Fig. 4.3-2 Low tank level alarm

2. Press the [RESET] key ([▼] and [▲] keys simultaneously) to stop the alarm buzzer.

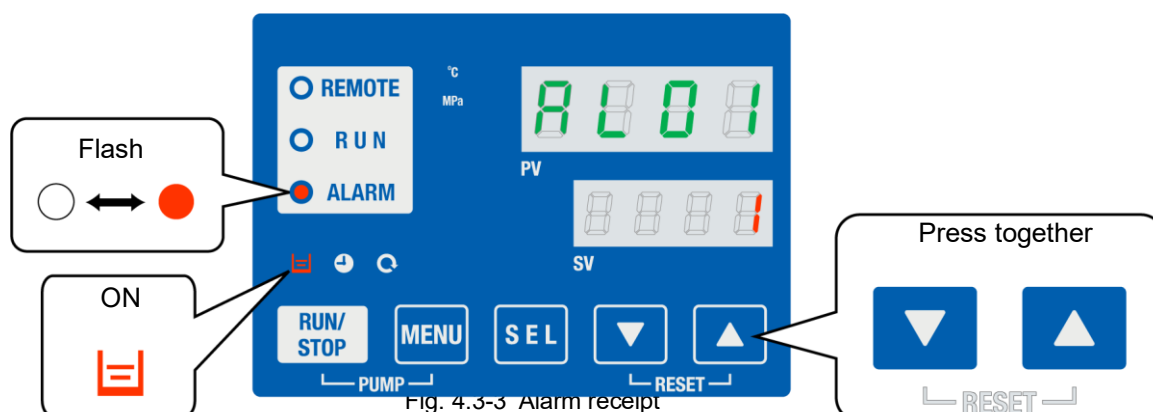


Fig. 4.3-3 Alarm receipt

CAUTION

Be sure to reset the alarm on the operation display panel of the alarm. Alarm reset is not accepted from any screen except the alarm display menu. Refer to 5.2.1 Key operations.

3. Open the tank lid and supply the circulating fluid up to the “H” mark on the tank.

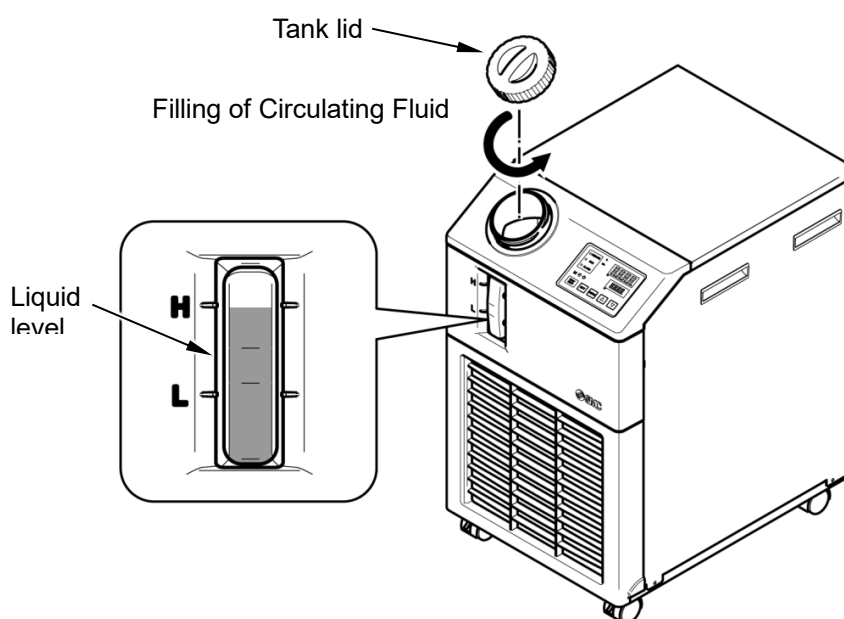


Fig. 4.3-4 Filling of Circulating Fluid

CAUTION



- Check the drain port is closed by the valve to prevent the supplied circulating fluid from draining out.
- Supply the circulating fluid up to the “H” mark on the tank. Operation will stop when the fluid level falls lower than “L”.

- 4.** Press the [RESET] key ([▼] and [▲] keys simultaneously) to reset the alarm.
- The alarm (tank fluid level is low) is reset, and the [ALARM] lamp and [≡] lamp are turned off. The display returns to the initial screen of the main menu: “Circulating fluid temp. / Circulating fluid set temp.” Press the [PUMP] key (press [RUN/STOP] key and [MENU] key simultaneously) to start independent operation of the pump.

CAUTION

Be sure to reset the alarm on the operation display panel of the alarm. Alarm reset is not accepted from any screen except the alarm display menu. Refer to 5.2.1 Key operations.

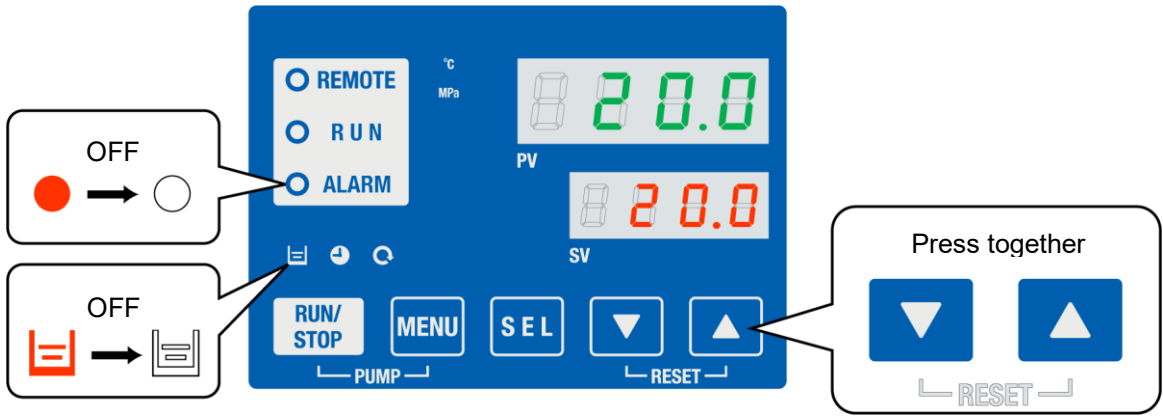


Fig. 4.3-5 Alarm release

- 5.** Repeat steps 1 to 4 to supply the circulating fluid to the customer’s device and piping. The tank level must be “H” on the tank liquid level indicator

4.4 Starting and Stopping

4.4.1 Starting the product

CAUTION



Allow at least five minutes before restarting the product.

Before starting, check the items specified in “4.1 Before Starting”

If any alarm lamp remains on, refer to Chapter 7 Alarm indication and trouble shooting”

1. Press the [RUN/STOP] key on the operation panel.

The [RUN] lamp lights up (in green) and the product starts running. The circulating fluid supply temperature (PV) is controlled to the set temperature (SV).

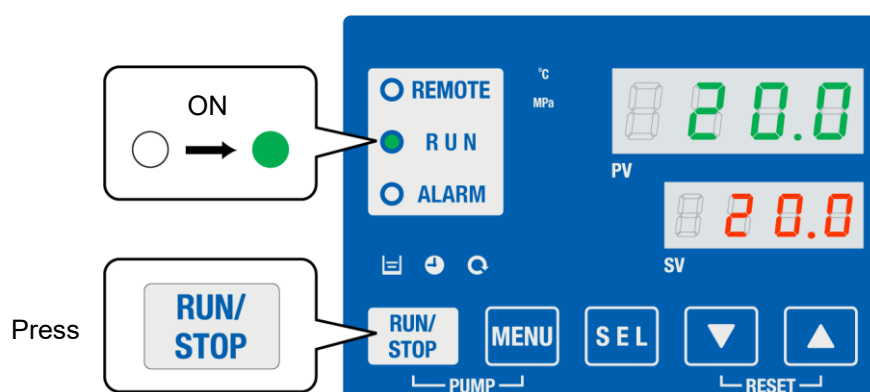


Fig. 4.4-1 Starting the product

CAUTION

When an alarm occurs Refer to “Chapter 7 Alarm indication and trouble shooting”

4.4.2 Stopping the product

1. Press the [RUN/STOP] button on the operation panel.

The [RUN] lamp on the operation panel flashes green at 1 second intervals, and continues operation to prepare to stop. After approx. 15 seconds, the [RUN] lamp goes off and the product stops.

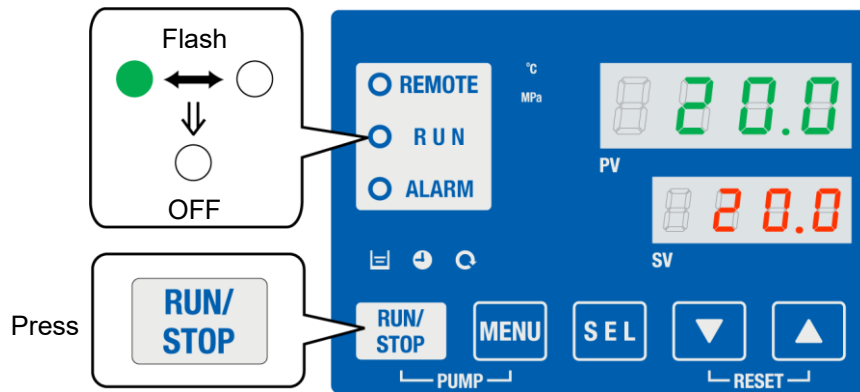


Fig. 4.4-2 Stopping the product

2. Turn off the power supply switch.
All LEDs go off.

WARNING



Be sure to shut off the breaker of the facility power supply (the user's machine power supply) before wiring.
Also, drain the circulating fluid, etc. from the product in accordance with and put into storage properly (Referring to "8.4.1 Discharge of the circulating fluid and facility water".)

CAUTION



- Except in case of emergency, do not turn off the power supply switch until the product has stopped completely. Doing so could cause failure.
- Wait 5 minutes or more before restating operation after it has been stopped. If the operation is restarted within 5 minutes, the protection circuit may activate and the operation may not start properly.
- Operation and suspension frequency should not exceed 10 times per day. Frequency switching between operation and suspension may result in the malfunction of the refrigeration circuit.

4.5 Check items after starting

Check the following items after starting the product.

WARNING



When an Alarm is seen, press the [STOP] button and then turn off the power supply switch to stop the product, and turn off the breaker of the user's power supply to isolate the product.

- There is no leakage from piping.
- There is no drain of circulating fluid from the tank drain port.
- The circulating fluid pressure is within the specified range.
- The tank level is within the specified range.

4.6 Adjustment of Circulating Fluid flow rate

■ Flow adjustment

If the flow rate is less than 7L/min (HRSC012/018/024/030/040), 20L/min (HRSC050/060) it will not be able to achieve the specified cooling capacity. The adjustment of flow rate should be performed using a manual bypass valve and monitoring the pressure or flow rate in the customer's device, referring to the recommended piping flow shown in Figure 3-12, until they reach the required value.

Description	Part no.	Applicable model
Bypass piping set	HRS-BP001	HRSC012/018/024/030-**-20
	HRS-BP004	HRSC040/050/060-**-20

CAUTION



If the valve locates in circulating piping, do not fully close the valve (0L/min). The pump may be damaged.

Chapter 5 Display and setting of various functions

WARNING



Read and understand this manual carefully before changing the settings.

5.1 List of function

The product can have the displays and settings shown in table 5-1.

Table 5-1 List of function

No.	Function	Outline	Reference page
1	Main display	Displays the current temperature and set temperature of the circulating fluid and the discharge pressure of the circulating fluid, and allows change of the set circulating fluid temperature.	5.3
2	Alarm display menu	Indicates alarm number when an alarm occurs.	5.4
3	Inspection monitor menu	Product temperature, pressure and accumulated operating time can be checked as daily inspection. Use these for daily inspection.	5.5
4	Key-lock	Keys can be locked so that set values cannot be changed by operator error.	5.6
5	Timer for operation start/stop	Timer is used to set the operation start/stop.	5.7
6	Signal for the completion of preparation	A signal is output when the circulating fluid temperature reaches the set temperature, when using contact input/output and serial communication.	5.8
7	Offset function	Use this function when there is a temperature offset between the discharge temperature of the thermo-chiller and the customer's device.	5.9
8	Reset after power failure	Start operation automatically after the power supply is turned on.	5.10
9	Anti-freezing function	Circulating fluid is protected from freezing during winter time or night time. Set beforehand if there is a risk of freezing.	5.11
10	Key click sound setting	Operation panel key sound can be set on/off.	5.12
11	Setting of alarm buzzer	Alarm sound can be set to on/off.	5.13
12	Alarm customizing	Operation during alarm condition and threshold values can be changed depending on the alarm type.	5.14
13	Data reset	Functions can be reset to the default settings (settings when shipped from the factory).	5.15
14	Accumulation time reset	Reset function when the pump, the fan, or the compressor is replaced. Accumulated time is reset.	5.16
15	Communication	This function is used for contact input/output or serial communication.	5.17
16	Option J [With automatic fluid fill]	This function is available for customer who selected option [Automatic fluid filling] (Refer to P2-1 Name and Function of Parts)	6.1
17	Option [Drain pan set]	This function is available for customer who purchased drain pan set.	6.3
18	Option [Electric resistivity / conductivity sensor set]	This function is available for customer who purchased the Electric resistivity / conductivity sensor set.	6.5

5.2 Function

5.2.1 Key operations

Fig. 5.2-1 Key operation (1/2) and
Fig. 5.2-2 Key operation (2/2) show the operation of keys of the thermo-chiller.

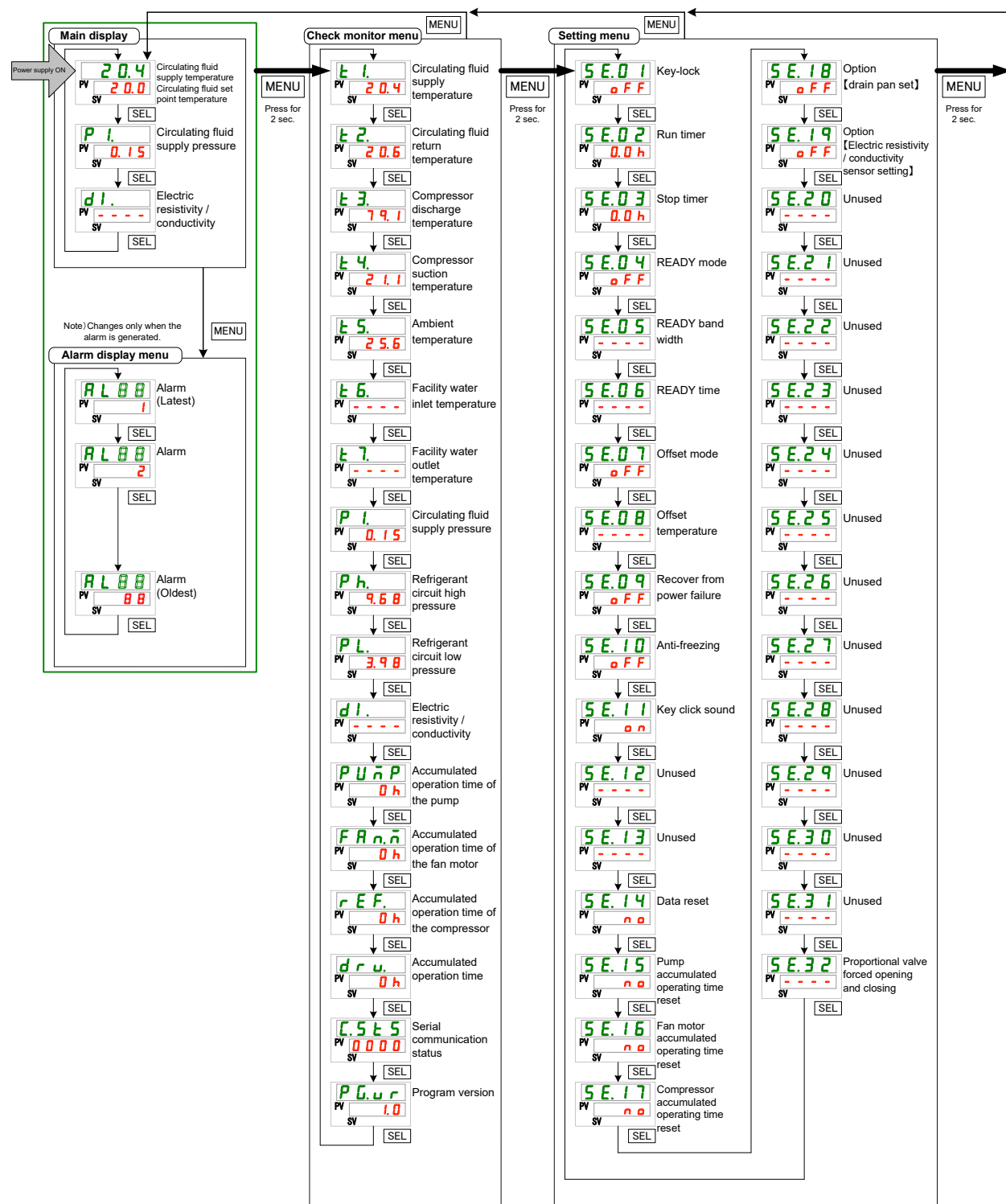


Fig. 5.2-1 Key operation (1/2)

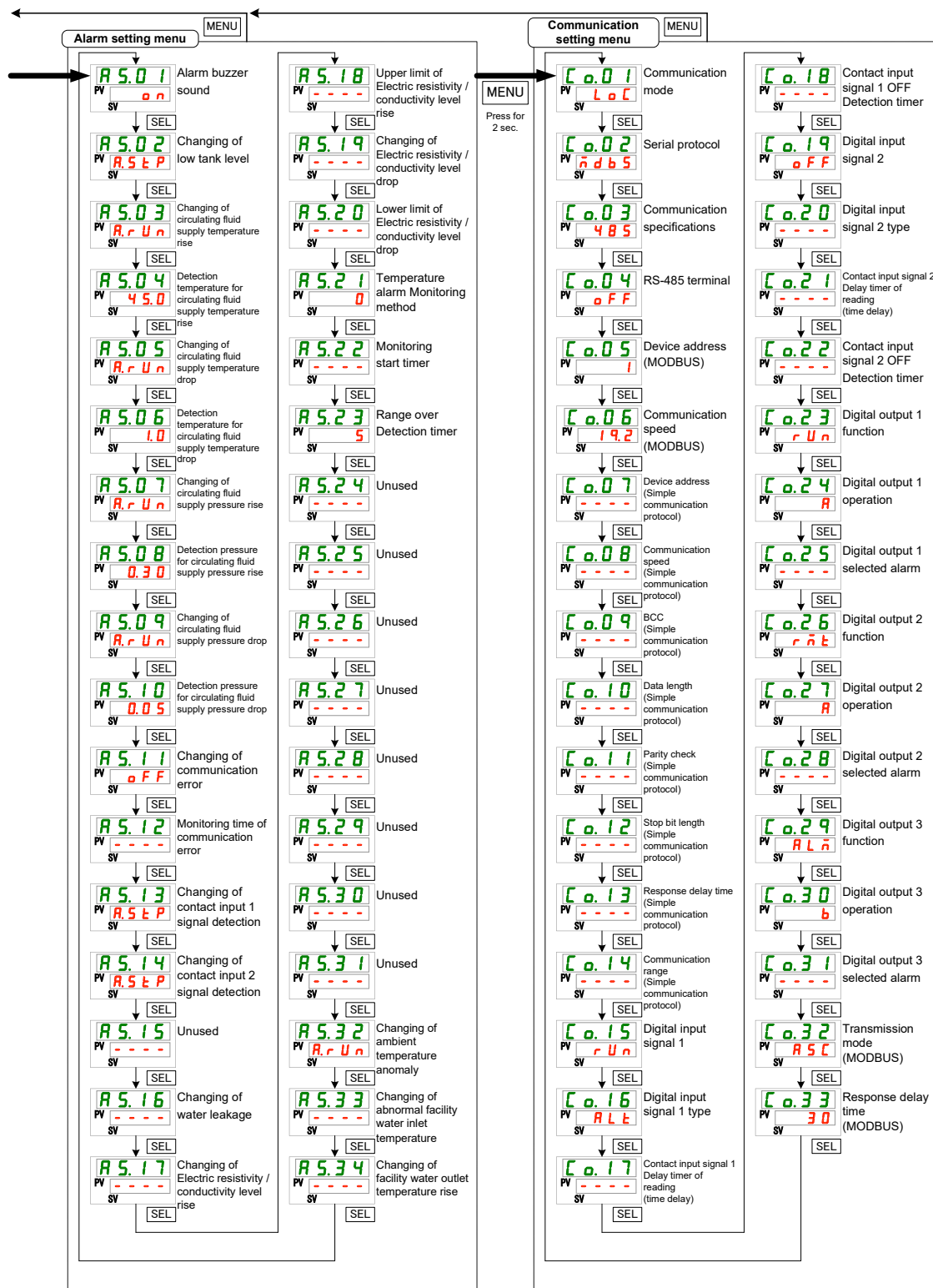


Fig. 5.2-2 Key operation (2/2)

5.2.2 List of parameters

Table 5.2-1“List of parameter (1/3)”, Table 5.2-2“List of parameter (3/3)” and Table 5.2-3“List of parameter (3/3)” show the parameters of the thermo-chiller.

Table 5.2-1 List of parameter (1/3)

Display	Item	Initial value (Default setting)	Reference page	Category	
Temperature	Circulating fluid temperature (TEMP PV)		5.3	Main display	
	Circulating fluid set temperature (TEMP SV)	20 °C			
	P I.	Circulating fluid outlet pressure			
	d I.	Electric resistivity / conductivity			
AL x x	Alarm no.		5.4	Alarm display menu	
t 1.	Circulating fluid supply port temperature		5.5	Check monitor menu	
t 2.	Circulating fluid return port temperature				
t 3.	Temperature of the compressor outlet				
t 4.	Temperature of the compressor inlet				
t 5.	Ambient temperature				
t 6.	Facility water inlet temperature				
t 7.	Facility water outlet temperature				
P I.	Circulating fluid outlet pressure				
P h.	Pressure of higher pressure refrigerant circuit				
P L.	Pressure of lower pressure refrigerant circuit				
d I.	Electric resistivity / conductivity				
P U n P	Accumulated operation time of the pump				
F A n. n	Accumulated operation time of the fun motor				
r E F.	Accumulated operation time of the compressor				
d r u.	Accumulated operation time				
C S t S	Serial communication status				
P G. v r	Program Version				
SE.01	Key-lock	OFF	5.6	Setting menu	
SE.02	Run timer	0.0H	5.7		
SE.03	Stop timer	0.0H			
SE.04	READY mode	OFF	5.8		
SE.05	READY band width	0.0 °C			
SE.06	READY time	10 sec	5.9		
SE.07	Offset mode	OFF			
SE.08	Offset temperature	0.0 °C	5.10		
SE.09	Recover from power failure	OFF			
SE.10	Anti-freezing	OFF	5.11		
SE.11	Key click sound	ON	5.12		
SE.14	Data reset	NO	5.15		
SE.15	Pump accumulated operating time reset	NO	5.16		
SE.16	Fun motor accumulated operating time reset	NO			
SE.17	Compressor accumulated operating time reset	NO			
SE.18	Option [Drain pan set]	OFF	6.4		
SE.19	Option [Electric resistivity / conductivity sensor set]	OFF	6.5		
SE.32	Proportional valve forced open/close	OFF	8.4		

Table 5.2-2 List of parameter (2/3)

Table 3.2-2 List of parameter (2/3)						
Display	Item		Initial value (Default setting)	Reference page	Category	
R 5.01	Alarm buzzer sound		ON	5.13	Alarm setting menu	
R 5.02	Changing of low tank level		A.STP	5.14		
R 5.03	Changing of circulating fluid supply temperature rise		A.RUN			
R 5.04	Detection temperature for circulating fluid supply temperature rise		45.0℃			
R 5.05	Changing of circulating fluid supply temperature drop		A.RUN			
R 5.06	Detection temperature for circulating fluid supply temperature drop		1.0℃			
R 5.07	Changing of circulating fluid supply pressure rise		A.RUN			
R 5.08	Detection pressure for circulating fluid supply pressure rise		0.30MPa *			
R 5.09	Changing of circulating fluid supply pressure drop		A.RUN			
R 5.10	Detection pressure for circulating fluid supply pressure drop		0.05MPa			
R 5.11	Changing of communication error		OFF			
R 5.12	The monitoring time of communication error		30 sec			
R 5.13	Changing of Contact input signal 1 detection		A.STP			
R 5.14	Changing of Contact input signal 2 detection		A.STP			
R 5.16	Changing of water leakage		A.STP			
R 5.17	Changing of upper limit of Electric resistivity / conductivity		OFF			
R 5.18	Upper limit of Electric resistivity / conductivity		□			
R 5.19	Changing of lower limit of Electric resistivity / conductivity		OFF			
R 5.20	Lower limit of Electric resistivity / conductivity		□			
R 5.21	Temperature alarm Monitoring method		0			
R 5.22	Monitoring start timer		- - - -			
R 5.23	Range over Detection timer		5			
R 5.32	Changing of ambient temperature anomaly		A.RUN			
R 5.33	Changing of facility water inlet temperature anomaly		A.RUN			
R 5.34	Changing of facility water outlet temperature rise		A.RUN			
C 0.01	Communication mode		LOC	5.17	Communic ation setting menu	
C 0.02	Serial communication	Serial protocol	MDBS			
C 0.03		Communication specifications	485			
C 0.04		RS-485 terminal	OFF			
C 0.05		MODBUS	Device address			1
C 0.06			Communication speed			19.2
C 0.07		Simple communication protocol	Device address			1
C 0.08			Communication speed			9.6
C 0.09			BCC			ON
C 0.10			Data length			8BIT
C 0.11			Parity check			NON
C 0.12			Stop bit length			2BIT
C 0.13			Response delay time			0
C 0.14			Communication range			RW

Table 5.2-3 List of parameter (3/3)

Display	Item		Initial value (Default setting)	Reference page	Category
[o. 1 5]	Contact input/output communication	Contact input signal 1	RUN	5.17	Communication setting menu
[o. 1 6]		Contact input signal 1 type	ALT		
[o. 1 7]		Unused	-		
[o. 1 8]		Unused	-		
[o. 1 9]		Contact input signal 2	OFF		
[o. 2 0]		Contact input signal 2 type	ALT		
[o. 2 1]		Contact input signal 2 delay timer (time delay) of reading	0		
[o. 2 2]		Contact input signal 2 OFF detection timer	0		
[o. 2 3]		Contact output 1 function	RUN		
[o. 2 4]		Contact output 1 operation	A		
[o. 2 5]		Selected for contact output 1	AL.01		
[o. 2 6]		Contact output 2 function	RMT		
[o. 2 7]		Contact output 2 operation	A		
[o. 2 8]		Selected for contact output 2.	AL.01		
[o. 2 9]		Contact output 3 function	ALM		
[o. 3 0]		Contact output 3 operation	B		
[o. 3 1]		Selected for contact output 3	AL.01		
[o. 3 2]	Serial	MODBUS	Transmission mode		
[o. 3 3]			Response delay time		

* HRSC012/018/024/030-**-20-T (Option [High-pressure pump specification]): 0.70MPa

HRSC012/018/024/030-**-20-MT(Option [Pure water piping] + [High-pressure pump specification]):0.60MPa

HRSC040-**-20-T,MT (Option [High-pressure pump specification]): 0.50MPa

HRSC050/060-**-20: 0.50MPa

5.3 Main screen

5.3.1 Main screen

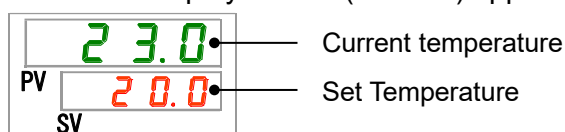
Displays the current temperature and the set temperature of the circulating fluid. The set temperature can be changed on this screen.

5.3.2 Display on the main screen

The display on the main screen is as follows.

Current temperature of circulating fluid supply Display

1. Turn ON the power supply switch.
Current temperature and set temperature are displayed on the digital display.
Alarm display screen (See 5.4) appears when an alarm is generated.

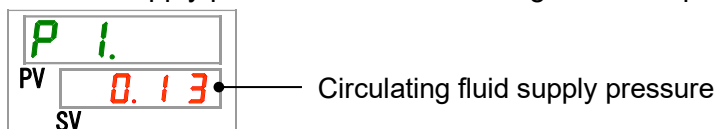


Circulating fluid temperature Set

2. Change the set temperature by pressing the [▼][▲] key.
After changing the set temperature, set it by pressing the [SEL] key.
*The set value flashes while it is being changed.
*If [SEL] key is not pressed, the value is reset after 3 sec.

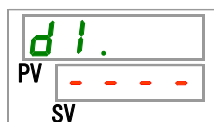
Circulating fluid supply pressure Display

3. Press the [SEL] key.
The supply pressure of the circulating fluid is displayed on the digital display.



Electric resistivity / conductivity Display

4. Press the [SEL] key.
The Electric resistivity / conductivity is displayed on the digital display.



*This function is available for customers who have purchased the Electric resistivity / conductivity sensor set which is a separately sold accessory. Refer to the Operation Manual attached to these optional accessories for details.

5.4 Alarm display menu

5.4.1 Alarm display menu

The alarm display screen appears when an alarm is generated.

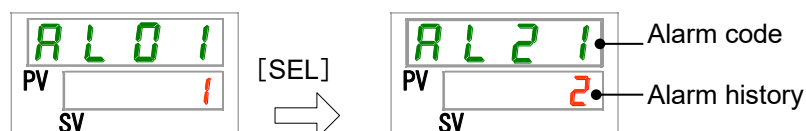
- * The alarm display menu cannot be accessed when no alarm has been generated.
- * Refer to “Chapter 7 Alarm indication and trouble shooting” for the content of alarms.

5.4.2 Content of display of alarm display menu

The alarm display screen appears when an alarm is generated.

When multiple alarms are generated, the latest alarm is displayed on the screen.

Each time the [SEL] key is pressed, the alarms are displayed in order, starting from the latest one.



The main screen is displayed when the alarm is reset.



The main screen is displayed when [MENU] key is pressed while an alarm is output.



The alarm display screen is displayed if [MENU] key is pressed again.

5.5 Inspection monitor menu

5.5.1 Inspection monitor menu

As a part of the daily inspection, the temperature, pressure and accumulated operating time can be checked.

Please use this for confirmation of your daily inspection.

5.5.2 Checking of the Inspection monitor menu

The table below explains the check items of the inspection monitor menu.

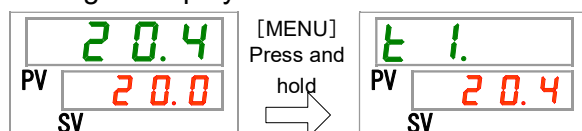
Table 5.5-1 List of check items of Inspection monitor menu

Display	Item	Contents
	Circulating fluid supply temperature	Displays the temperature of the circulating fluid supply port. This temperature does not take offset into consideration.
	Circulating fluid return temperature	Displays the temperature of the circulating fluid return port.
	Compressor discharge temperature	Displays the temperature of the outlet of the compressor.
	Compressor suction temperature	Displays the temperature of the inlet of the compressor.
	Ambient temperature	Displays the temperature of ambient.
	Facility water inlet temperature	Displays the temperature of facility water inlet.
	Facility water outlet temperature	Displays the temperature of facility water outlet.
	Circulating fluid supply pressure	Displays the circulating fluid supply pressure port.
	Refrigerant circuit high pressure	Displays the pressure of high pressure side of the refrigerant circuit.
	Refrigerant circuit low pressure	Displays the pressure of lower pressure side of the refrigerant circuit.
	Electric resistivity / conductivity	Displays the Electric resistivity / conductivity.
	Accumulated operation time of the pump	Displays the accumulated operation time of the pump.
	Accumulated operation time of the fan motor	Displays the accumulated operation time of the fan motor. (For air-cooled type)
	Accumulated operation time of the compressor	Displays the accumulated operation time of the compressor.
	Accumulated operation time	Displays the accumulated operation time.

Check of the circulating fluid supply port temperature

1. Press and hold the [MENU] key for approx. 2 sec.

The temperature of the circulating fluid supply port 「」 is displayed on the digital display.

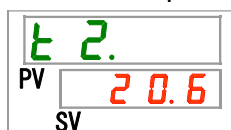


Displays the temperature of the circulating fluid at the supply port from which the fluid is fed to the customer's device. This temperature does not take temperature offset into consideration.

Check of the circulating fluid return temperature

2. Press the [SEL] key once.

The temperature of the circulating fluid return is displayed on the digital display.

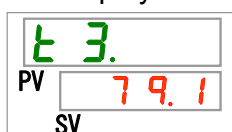


Displays the temperature of the circulating fluid returning from the customer's device.

Check of the temperature of the outlet of the compressor.

3. Press the [SEL] key once.

The temperature of the refrigerant circuit compressor outlet is displayed on the digital display.

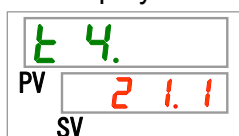


Displays the temperature of the compressor outlet.

Check of the temperature of the inlet of the compressor.

4. Press the [SEL] key once.

The temperature of the refrigerant circuit compressor inlet is displayed on the digital display.

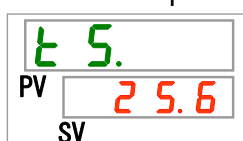


Displays the temperature of the compressor inlet.

Check of the ambient temperature

5. Press the [SEL] key once.

The temperature of the ambient is displayed on the digital display.

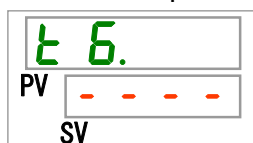


Displays the temperature of the ambient.

Check of the facility water inlet temperature

6. Press the [SEL] key once.

The temperature of the facility water inlet is displayed on the digital display.

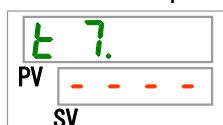


Displays the temperature of the facility water inlet.

Check of the facility water outlet temperature

7. Press the [SEL] key once.

The temperature of the facility water outlet is displayed on the digital display.

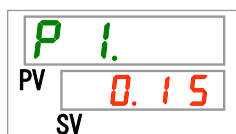


Displays the temperature of the facility water outlet.

Check of the circulating fluid supply pressure

8. Press the [SEL] key once.

The circulating fluid supply port pressure is displayed on the digital display.

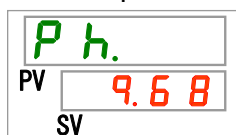


The pressure of the circulating fluid supply port from which the fluid is sent to the customer's device is displayed.

Check of the pressure of the higher pressure side of the refrigerant circuit

9. Press the [SEL] key once.

The pressure of higher pressure refrigerant circuit is displayed on the digital display.

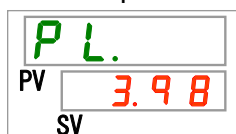


Displays the pressure of the higher pressure side of the refrigerant circuit.

Check of the pressure of the lower pressure side of the refrigerant circuit

10. Press the [SEL] key once.

The pressure of lower pressure refrigerant circuit is displayed on the digital display.



Displays the pressure of the lower pressure side of the refrigerant circuit.

Check of the Electric resistivity / conductivity

11. Press the [SEL] key once.

The Electric resistivity / conductivity is displayed on the digital display.



*This function is available for customers who have purchased the Electric resistivity / conductivity sensor set which is a separately sold accessory. Refer to the Operation Manual attached to these optional accessories for details.

Check of the accumulated operation time of the pump

12. Press the [SEL] key once.

The accumulated operation time of the pump is displayed on the digital display.



Displays the accumulated operation time of the pump. Refer to the table below for the display.

Table 5.5-2 List of time display

Cumulative time	Indicated value
0h to 999h	0 h to 999 h
1,000h to 999,999h	- - - 1 ⇔ 000 h (Alternately lights up) to - 999 ⇔ 999 h (Alternately lights up)
1,000,000h	- 999 ⇔ 999 h (Alternately lights up)

AL28 Pump maintenance alarm is generated when the accumulated operation time of the pump reaches 20,000 hours (- - 20 ⇔ 000 h) or more. [In the case Option T, 8,000 hours (- - - 8 ⇔ 000 h) or more.]

For details, refer to Chapter 7 Alarm indication and trouble shooting.

Check of the accumulated operation time of the fan motor

13. Press the [SEL] key once.

The accumulated operation time of the fan motor is displayed on the digital display.



Displays the accumulated operation time of the fan motor. Refer to Table 5.5-2 for the display.

AL29 Fan motor maintenance alarm is generated when the accumulated operation time of the fan motor reaches 20,000 hours (- - 20 ⇔ 000 h) or more. For details, refer to Chapter 7 Alarm indication and trouble shooting.

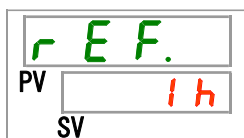
Water-cooled refrigerated type does not have the fan motor. The accumulated time of the digital display shows "- - - -".

Also, AL29 fan motor maintenance alarm is not generated.

Check of the accumulated operation time of the compressor

14. Press the [SEL] key once.

The accumulated operation time of the compressor is displayed on the digital display.



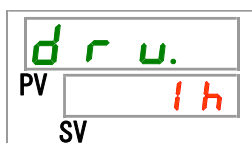
Displays the accumulated operation time of the compressor. Refer to Table 5.5-2 for the display.

AL30 Compressor maintenance alarm is generated when the accumulated operation time of the compressor reaches 50,000 hours ($\text{-- 50} \leftrightarrow \text{000 h}$) or more. For details, refer to Chapter 7 Alarm indication and trouble shooting.

Check of the accumulated operation time

15. Press the [SEL] key once.

The accumulated operation time is displayed on the digital display.

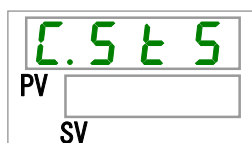


Displays the accumulated operation time. Refer to Table 5.5-2 for the display.

Check of the serial communication status

16. Press the [SEL] key once.

The serial communication status is displayed on the digital display.



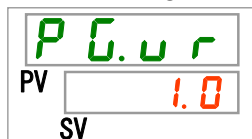
Displays the serial communication status. When using serial communication (MODBUS), the communication status can be checked.

Refer to the "Communication Functions Operation manual".

Check of the program version

17. Press the [SEL] key once.

The program version is displayed on the digital display.



Displays the program version.

5.6 Key-lock

5.6.1 Key-lock

The keys can be locked to prevent the set values being changed by operator error. Operation can be started/stopped by the “RUN/STOP” key even while key-lock is set.

If you try to change the set value with “▲” and “▼” key while key-lock is set, “**L o C K**” is displayed for 1 sec. on the screen. The set value cannot be changed. (Refer to the figure below.)



CAUTION



During key-lock setting, no other setting is available.
Release the key-lock setting for other setting.

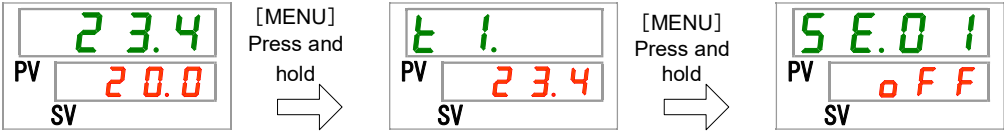
5.6.2 Key-lock setting / checking

The table below explains the setting items of the key-lock function and the initial values.

Table 5.6-1 List of key-lock

Display	Item	Contents	Initial value (Default setting)
	Key-lock	Sets key-lock. While key-lock setting is ON, no other setting is available.	OFF

1. Press and hold the [MENU] key for approx. 2 sec.
Repeat pressing until the setting display [] for key-lock setting appears on the digital display

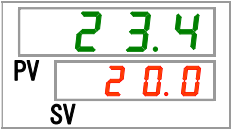


2. Select "ON" from the table below with [▲] key or [▼] key, and confirm with "SEL".

Table 5.6-2 List of set value

Set value	Explanation	Initial value (Default setting)
	Key-lock function OFF	○
	Key-lock function ON	

3. Press the [MENU] key once.
Return to the main screen (screen displaying the circulating fluid temperature).



5.7 Run timer, stop timer function

5.7.1 Run timer and stop timer function

This function starts or stops operation automatically when a set time has passed. The time can be set according to the customer's working hours. Set the circulating fluid temperature in advance.

[Run timer] is a function to start operation after a set time. Stop timer] is a function to stop operation after a set time. It is possible to set both [Run timer] and [Stop timer]. The set time of both the [Run timer] and [Stop timer] can be up to 99.5 hours, in 0.5 hour units.

[When communication is used]

If the communication mode is DIO REMOTE, SERIAL mode (MODBUS, Simple communication 2) this function does not operate. DIO REMOTE, SERIAL (MODBUS, Simple communication 2) mode operation/stop signal has priority.

●Run timer

- Run timer] starts operation after the set time.

If the thermo-chiller is already operating or the pump is operating independently, this function does not operate even if the set time has passed.

Operation can start when the condition is normal and there is no alarm generated.

- The [⌚] lamp lights up when the run timer is set. The [⌚] lamp is turned off when the operation is started by the run timer.

The [⌚] lamp is not turned off if the Stop timer is set.

- The Run timer setting is reset when the main power supply is cut or a power failure occurs. Please reset.

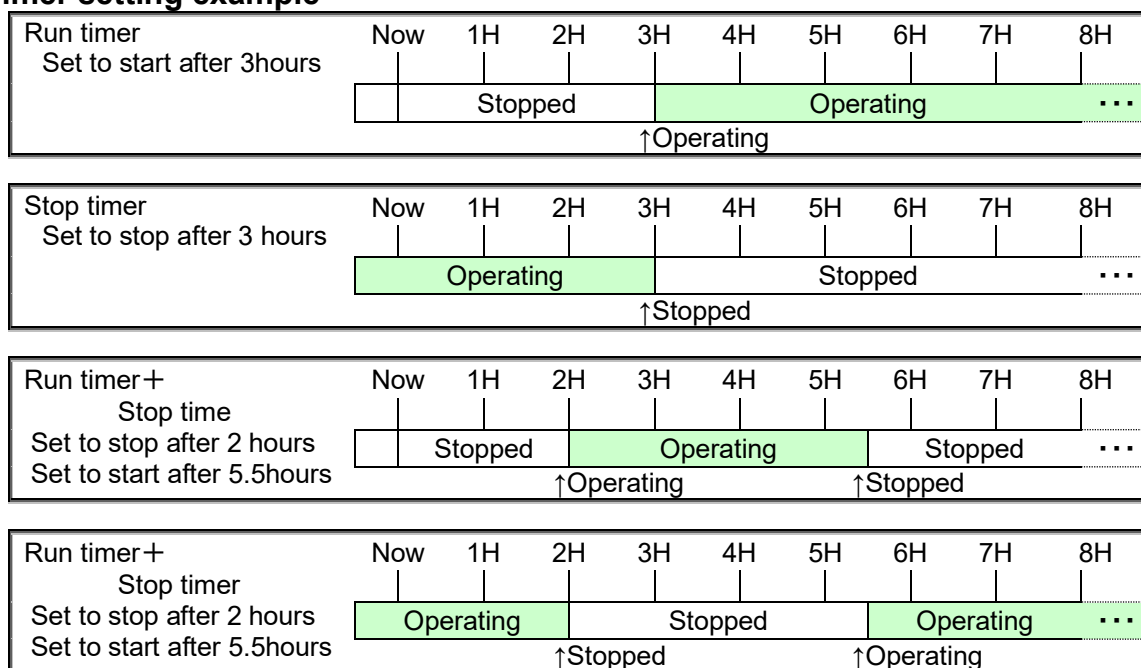
●Stop timer

- The [⌚] lamp lights when the Stop timer is set. The [⌚] lamp is turned off if the operation is stopped by the Stop timer.

The [⌚] lamp is not turned off if the Run timer is set.

- The Stop timer setting is reset when the main power supply is cut or a power failure occurs. Please reset.

Timer setting example



⚠ CAUTION



- Set while the power supply switch is ON (while the power is supplied).
- The setting is released when operation is started or stopped by the timer. Resetting is necessary to use the timer next time.
- Run timer setting is released when the power supply switch or the customer's power supply facility is cut, or a power failure occurs. Please reset.

5.7.2 Setting and checking of Run timer and stop timer function

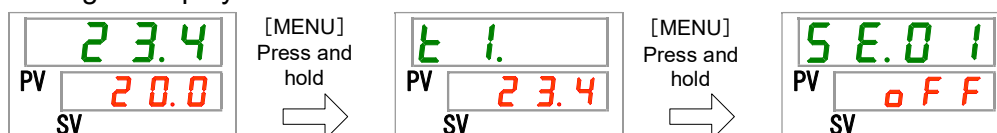
The table below explains the setting items of the run/stop timer and the initial values.

Table 5.7-1 List of set run timer and stop timer

Display	Item	Contents	Initial value (Default setting)
SE.02	Run timer	Sets run timer.	0.0H
SE.03	Stop timer	Sets stop timer.	0.0H

This part explains the setting and checking items of both the run and stop timers. Please refer to the applicable items for the timer you wish to use.

1. Press and hold the [MENU] key for approx. 2 sec.
Repeat pressing the key until the setting screen for key-lock [SE.01] appears on the digital display.



Run timer Setting and checking

2. Press the [SEL] key once.
The set screen of run timer is displayed on the digital display.

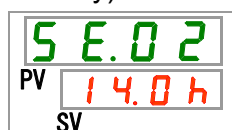


3. Select run timer from the table below with [▲] key or [▼] key, and confirm by pressing "SEL".

Table 5.7-2 List of set value

Set value	Explanation	Initial value (Default setting)
0.0 h	Timer OFF	○
0.5 h to 99.5 h	Operation starts after set time. Setting unit is 0.5 hour	

E.g. Set at 5:30pm the previous day. Operation starts 14 hours later (7:30am the next day).



Stop timer Setting and checking

4. Press the [SEL] key once.

The set screen of stop timer is displayed on the digital display.

**5.** Select stop timer from the table below with [▲] key or [▼] key, and confirm by pressing "SEL".

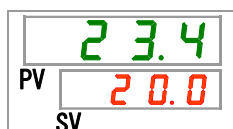
Table 5.7-3 List of set value

Set value	Explanation	Initial value (Default setting)
0.0 h	Timer OFF	○
0.5 h to 99.5 h	Operation stops after set time. Setting unit is 0.5 hour	

E.g. Set at 4:30pm. Operation stops 1 hour and 30 minutes later (at 6:00pm).

**6.** Press the [MENU] key once.

Return to the screen displaying the circulating fluid temperature.

**7.** Once the run timer is set leave the power supply to the product on. The product will start automatically in the set time.

When the stop timer is set, leave the product running. The product will stop automatically in the set time.

5.8 Signal for completion of preparation (TEMP READY)

5.8.1 Signal for completion of preparation (TEMP READY)

This function sets the band width for the circulating fluid set temperature (upper/lower temperature range) in order to notify the customer by communication that the circulating fluid temperature has reached the band range (upper/lower temperature range). The default setting of this function is "OFF".

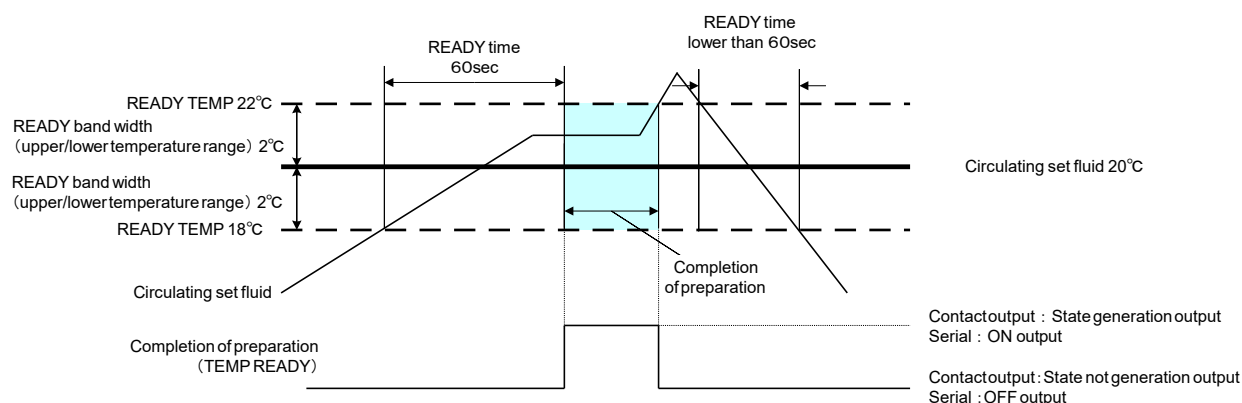
[Tips]

This function is available when contact input/output and serial communication is used. Please refer to the operation manual "Communication function" for details.

An example is shown below.

Circulating fluid set temperature	: 20 °C
READY band width (upper/lower temperature range)	: +/-2 °C
READY time	: 60 sec.

Preparation is completed 60 seconds after the circulating fluid temperature reaches 18°C to 22°C.



5.8.2 Signal for completion of preparation (TEMP READY) setting / checking

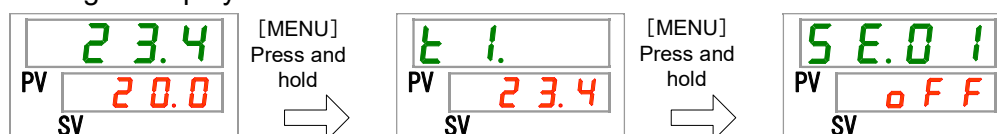
The table below shows the explanation of and initial value of set items of signal for completion of preparation (TEMP. READY)

Table 5.8-1 List of set Signal for completion of preparation (TEMP READY)

Display	Item	Contents	Initial value (Default setting)
	READY mode	Sets signal for completion of preparation (TEMP READY)	OFF
	READY band width (upper/lower temperature range)	Sets temperature of signal for completion of preparation.	0.0 °C
	READY time	Sets time of signal for completion of preparation.	10 sec

- 1.** Press and hold the [MENU] key for approx. 2 sec.

Repeat pressing the key until the setting screen for key-lock [] appears on the digital display.



READY mode Setting and checking

- 2.** Press the [SEL] key 3 times.

The set screen of ready mode is displayed on the digital display.



- 3.** Select 「ON」 from the table below with [▲] key or [▼] key, and confirm by pressing "SEL".

Table 5.8-2 List of set value

Set value	Explanation	Initial (Default setting)
	Signal for completion of preparation (TEMP READY) function OFF	○
	Signal for completion of preparation (TEMP READY) function ON	

READY band width setting and checking

4. Press the [SEL] key once.

The set screen of READY band width (upper/lower temperature range) is displayed on the digital display.

**5.** Select READY band width (upper/lower temperature range) from the table below with [▲] key or [▼] key, and confirm by pressing "SEL".

Table 5.8-3 List of set value

Set value	Explanation	Initial (Default setting)
----	Setting and checking are not available when READY mode setting is OFF.	
Centigrade 0.0 to 5.0	Set READY band width (upper/lower temperature range) for the circulating fluid temperature Temperature unit is Centigrade : Setting unit is 0.1°C	0.0

READY time Set and checking

6. Press the [SEL] key once.

The set screen of READY time is displayed on the digital display.

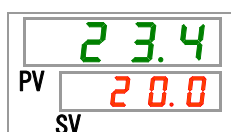
**7.** Select READY time from the table below with [▲] key or [▼] key, and confirm by pressing "SEL".

Table 5.8-4 List of set value

Set value	Explanation	Initial value (Default setting)
----	Setting and checking are not available when READY mode setting is OFF.	
10 to 9999	Sets ultimate time. Set unit is 1 sec.	10

8. Press the [MENU] key once.

Return to the main screen (screen displaying the circulating fluid temperature).



5.9 Offset function

5.9.1 Offset function

This function controls the circulating fluid supply temperature with offset.

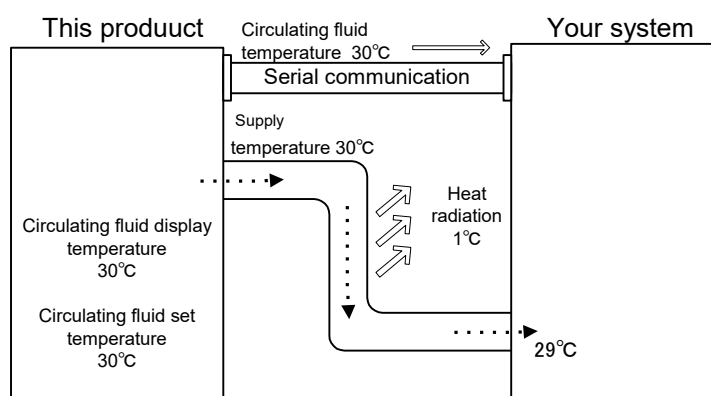
Temperature offset may occur between the thermo-chiller and the customer's device depending on the installation environment. To correct the temperature offset, three types of offset functions are available (MODE1 to 3). The default setting of this function is "OFF".

[When communication is used]

The circulating fluid temperature sent by serial communication is the circulating fluid temperature which is displayed on the thermo-chiller (the circulating fluid temperature after offset).

●Example of temperature offset

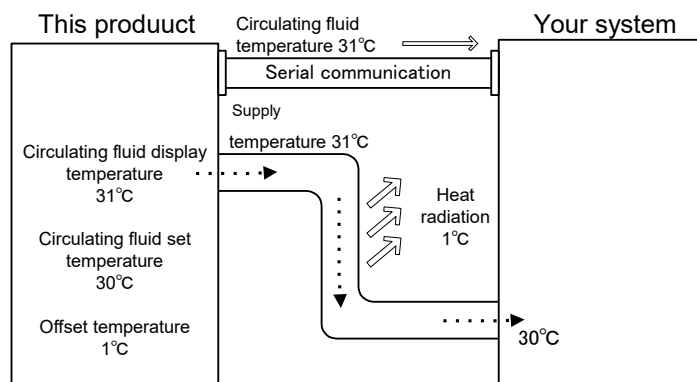
The supply temperature of the circulating fluid is 30°C, but the fluid temperature in the customer's device is 29°C because of heat radiation during sending of the fluid.



MODE	Explanation
MODE1	Control the temperature so that the supply temperature of the circulating fluid is circulating fluid set temperature + offset temperature. Circulating fluid temperature indicates the circulating fluid supply temperature.
MODE2	Control the temperature so that the supply temperature of the circulating fluid is circulating fluid set temperature. Circulating fluid temperature indicates the circulating fluid supply temperature + offset temperature.
MODE3	Control the temperature so that the supply temperature of the circulating fluid is circulating fluid set temperature + offset temperature. Circulating fluid temperature indicates the circulating fluid supply temperature - offset temperature.
OFF	Control the temperature so that the supply temperature of the circulating fluid is circulating fluid temperature set value.

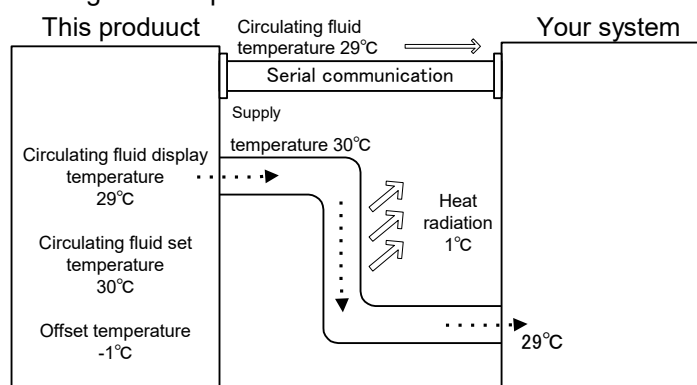
■ Example of MODE 1

When the offset temperature is 1°C, the thermo-chiller controls the temperature aiming at 31°C (circulating fluid set temperature + offset temperature.) Even if the supply temperature is 31°C, the circulating fluid temperature is 30°C at the customer's device because of 1°C of heat radiation during sending of the fluid. Recirculating fluid display temperature and communication data is 31°C.



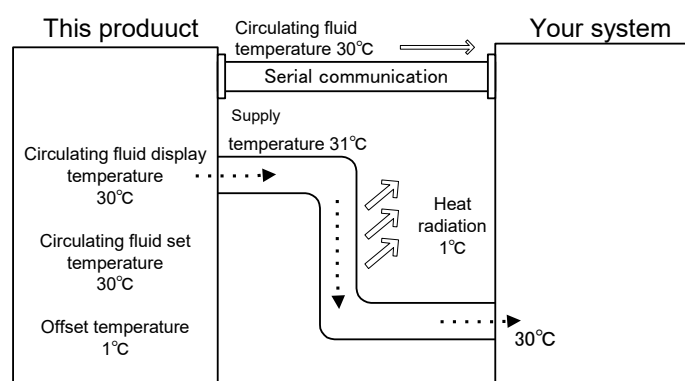
■ Example of MODE 2

When the offset temperature is -1°C, circulating fluid display temperature and the communication data is 29°C (circulating fluid supply temperature + offset temperature), and matches the circulating fluid temperature of the customer's device.



■ Example of MODE 3

When the offset temperature is 1°C, the thermo-chiller controls the temperature aiming at 31°C (circulating fluid set temperature + offset temperature) Even if the supply temperature is 31°C, the circulating fluid temperature is 30°C at the customer's device because of 1°C of heat radiation during sending of the fluid. The circulating fluid display temperature and the communication data is 30°C (circulating fluid supply temp. - offset temp.), and matches the circulating fluid temperature of the customer's device.



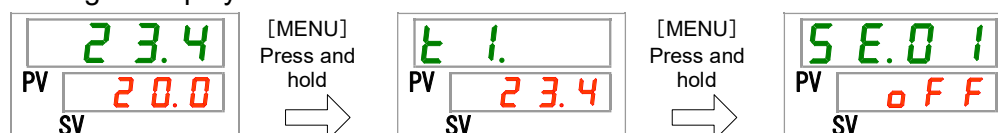
5.9.2 Offset function setting and checking

The table below explains the setting items of the offset function and the initial values.

Table 5.9-1 List of set offset function

Display	Item	Contents	Initial (Default setting)
5 E.0 7	Offset mode	Sets offset mode.	OFF
5 E.0 8	Offset temperature	Sets offset temperature.	0.0 °C

1. Press and hold the [MENU] key for approx. 2 sec.
Repeat pressing the key until the setting screen for key-lock [**5 E.0 1**] appears on the digital display.



Offset mode Setting and checking

2. Press the [SEL] key 6 times.
The set screen of offset mode is displayed on the digital display.



3. Select offset mode from the table below with [▲] key or [▼] key, and confirm by pressing "SEL".

Table 5.9-2 List of set value

Set value	Explanation	Initial value (Default setting)
0 F F	Offset function OFF	○
1 d 1	Offset mode 1	
1 d 2	Offset mode 2	
1 d 3	Offset mode 3	

Offset temperature Setting and checking

4. Press the [SEL] key once.
The set screen of offset temperature is displayed on the digital display.



5. Select offset temperature from the table below with [▲] key or [▼] key, and confirm by pressing "SEL".

Table 5.9-3 List of set value

Set value	Explanation	Initial (Default setting)
- - - -	Setting and checking are not available when offset mode setting is OFF.	
- 2 0.0 to 2 0.0	Sets offset temperature. Temperature unit is Centigrade: Setting unit is 0.1°C	0.0

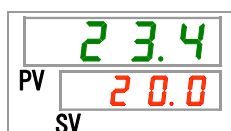
⚠ CAUTION



- This function controls the offset temperature to the circulating fluid supply temperature
- Control range of the circulating fluid temperature is 5.0°C to 40.0°C.
- When the circulating fluid temperature is set to 5.0°C and the offset temperature to -20.0°C, the offset temperature is automatically adjusted to 0.0°C depending on the offset mode.

6. Press the [MENU] key once.

Return to the main screen (screen displaying the circulating fluid temperature).



5.10 Function to recover from power failure

5.10.1 Function to recover from power failure

When the power supply is cut due to power failure etc., this function restarts the operation when the power supply recovers, retaining the conditions before the power cut.

【When communication is used】

If the communication mode is DIO REMOTE, SERIAL mode (MODBUS, Simple communication 2), this function does not start. The signal of start/stop of DIO REMOTE SERIAL mode (MODBUS, Simple communication 2) has priority.

The [Ⓢ] lamp lights when the power failure recovery is set. The default setting of this function is "OFF".

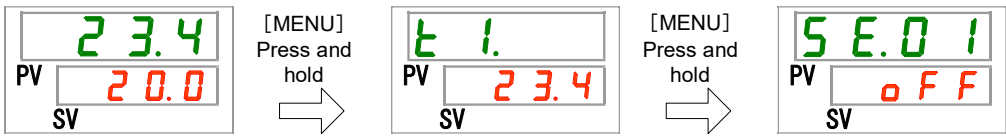
5.10.2 Function to recover from power failure setting and checking

The table below explains the setting items of the power recovery function and the initial values.

Table 5.10-1 List of set function to recover from power failure

Display	Item	Contents	Initial value (Default setting)
	Recover from power failure	Sets recover from power failure.	OFF

1. Press and hold the [MENU] key for approx. 2 sec.
Repeat pressing the key until the setting screen for key-lock [] appears on the digital display.



Recover from power failure Setting and checking

2. Press the [SEL] key 8 times.
The set screen of recover from power failure is displayed on the digital display.

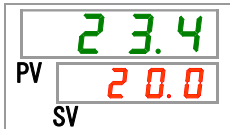


3. Select recover from power failure from the table below with [▲] key or [▼] key, and confirm by pressing "SEL".

Table 5.10-2 List of set value

Set value	Explanation	Initial value (Default setting)
	Function to recover from power failure OFF	○
	Function to recover from power failure ON	

4. Press the [MENU] key once.
Return to the main screen (screen displaying the circulating fluid temperature).



5.11 Anti-freezing function

5.11.1 Anti-freezing function

The product can prevent the circulating fluid from freezing during winter time. If there is a possibility of the circulating fluid freezing due to changes in the installation and operating environment (operating period and weather), set the protection in advance.

- If the circulating fluid temperature falls below 3 °C, the pump will start operating automatically.
- The heat generated by the pump operation will warm up the circulating fluid.
When the circulating fluid temperature reaches 5 °C or higher, the pump will stop operating automatically.
- As a result, the circulating fluid maintains a temperature of between 3 °C and 5 °C, preventing freezing.

If the anti-freezing function is set, [RUN] lamp flashes for 2 sec. during waiting (pump does not operate). The [RUN] lamp flashes at 0.3 sec. intervals during the automatic operation of the pump. The default setting of this function is "OFF".

CAUTION



- This function starts in stand-by condition (power supply switch is ON).
- Fully open the valve or manual bypass valve arranged by the customer so that the circulating fluid can circulate when the pump starts automatic operation.
- In extremely cold weather conditions, the heat generated by the pump as described above may not be enough to prevent freezing.

CAUTION



- During the automatic operation, the pump does not stop even if you press "RUN/STOP" key.
- In an emergency, stop operation by shutting off the power supply.

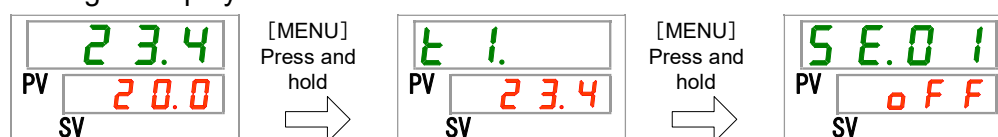
5.11.2 Anti-freezing function setting and checking

The table below explains the setting items of the anti-freezing function and the initial values.

Table 5.11-1 List of set anti-freezing function

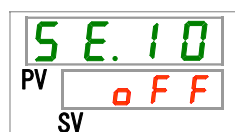
Display	Item	Contents	Initial value (Default setting)
SE.10	Anti-freezing	Sets anti-freezing	OFF

1. Press and hold the [MENU] key for approx. 2 sec.
Repeat pressing the key until the setting screen for key-lock [SE.01] appears on the digital display.



Anti-freezing Setting and checking

2. Press the [SEL] key 9 times.
The set screen of anti-freezing is displayed on the digital display.

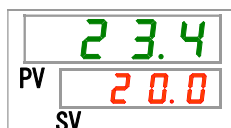


3. Select anti-freezing from the table below with [▲] key or [▼] key, and confirm by pressing "SEL".

Table 5.11-2 List of set value

Set value	Explanation	Initial value (Default setting)
OFF	Anti-freezing function OFF	○
ON	Anti-freezing function ON	

4. Press the [MENU] key once.
Return to the main screen (screen displaying the circulating fluid temperature).



5.12 Key click sound setting

5.12.1 Key click sound setting

Set whether or not a click sound is made when keys on the operation panel are pressed.

The default setting is key sound “on”.

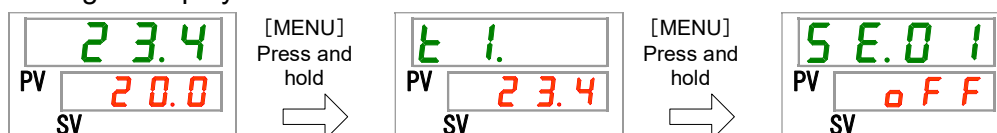
5.12.2 Key click sound setting and checking

The table below explains the setting items of the key click sound and the initial values.

Table 5.12-1 List of set key click sound

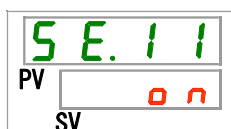
Display	Item	Contents	Initial value (Default setting)
	Key click sound	Sets key click sound.	ON

1. Press and hold the [MENU] key for approx. 2 sec.
Repeat pressing the key until the setting screen for key-lock [] appears on the digital display.



Key click sound Setting and checking

2. Press the [SEL] key 10 times.
The set screen of key click sound is displayed on the digital display.

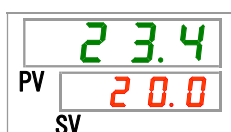


3. Select key click sound from the table below with [▲] key or [▼] key, and confirm by pressing “SEL”.

Table 5.12-2 List of set value

Set value	Explanation	Initial value (Default setting)
	No key click sound	
	Key click sounds	○

4. Press the [MENU] key once.
Return to the main screen (screen displaying the circulating fluid temperature).



5.13 Alarm buzzer sound setting

5.13.1 Alarm buzzer sound setting

This sets whether a warning sound is made or not when alarm signal is output.

The default setting is buzzer sound ON.

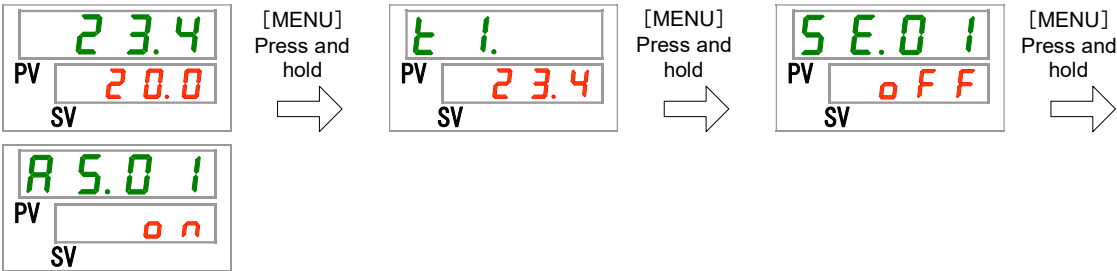
5.13.2 Alarm buzzer sound setting and checking

The table below explains the setting items of the alarm buzzer sound and the initial values.

Table 5.13-1 List of set alarm buzzer sound

Display	Item	Contents	Initial value (Default setting)
	Alarm buzzer sound	Sets alarm buzzer sound.	ON

1. Press and hold the [MENU] key for approx. 2 sec.
Repeat pressing the key until the setting screen for alarm buzzer sound [] appears on the digital display.



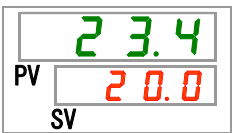
Alarm buzzer sound Setting and checking

2. Select alarm buzzer sound from the table below with [] key or [] key, and confirm by pressing “SEL”.

Table 5.13-2 List of set value

Set value	Explanation	Initial value (Default setting)
	No alarm buzzer sound	
	Alarm buzzer sound	

3. Press the [MENU] key once.
Return to the main screen (screen displaying the circulating fluid temperature).



5.14 Alarm customize function

5.14.1 Alarm customize function

The operation and the threshold when alarm signal is output can be customized. Customers should set them depending on their applications.
The alarms below can be customized.

- AL01 Low level in tank (Refer to Table 5.14-3)

Operation: When this alarm signal is output, user can choose to stop/continue the operation.

"Operation stop" is default setting.

- AL03 Circulating fluid supply temp. rise (Refer to Table 5.14-4 and Table 5.14-5)

Operation: When this alarm signal is output, user can choose to stop/continue operation, or not to detect this alarm.

"Operation continue" is default setting.

Threshold change: Temp. setting at which the alarm is generated can be changed, and also, the alarm generating conditions can be set.

"45.0°C" is default setting.

- AL04 Circulating fluid supply temp. (Refer to Table 5.14-6 and Table 5.14-7)

Operation: When this alarm signal is output, user can choose to stop/continue operation, or not to detect this alarm.

"Operation continue" is default setting.

Threshold change: Temp. setting at which the alarm is generated can be changed, and also, the alarm generating conditions can be set.

"1.0°C" is default setting.

- AL08 Circulating fluid supply pressure rise (Refer to Table 5.14-8 and Table 5.14-9)

Operation: When this alarm signal is output, user can choose to stop/continue operation, or not to detect this alarm.

"Operation continue" is default setting.

Threshold change: Pressure at which this alarm is generated can be changed.

"0.30MPa" is default setting.

Initial value:

HRSC012/018/024/030-**-20-T (High-pressure pump [Optional]):
0.70MPa
HRSC012/018/024/030-**-20-MT (Option [Pure water piping] +
[High-pressure pump specification]): 0.60MPa
HRSC040-**-20-T, MT (High-pressure pump [Optional]): 0.50MPa
HRSC050/060-**-20: 0.50MPa

- AL09 Circulating fluid supply pressure drop (Refer to Table 5.14-10 and Table 5.14-11)
Operation: When this alarm signal is output, user can choose to stop/continue operation, or not to detect this alarm.
"Operation continue" is default setting.
Threshold change: Pressure at which this alarm is generated can be changed.
"0.05MPa" is default setting.

- AL19 Communication error (Refer to Table 5.14-12 and Table 5.14-13)
Operation: When this alarm signal is output, user can choose to stop/continue operation, or not to detect this alarm.
"Not to detect" is default setting.
Threshold change: Time at which this alarm is generated can be changed.
"30sec" is default setting.

- AL31 Contact input signal 1 detection (Refer to Table 5.14-14)
Operation: When this alarm signal is output, user can choose to stop/continue operation, or not to detect this alarm.
"Operation continue" is default setting.

- AL32 Contact input signal 2 detection (Refer to Table 5.14-15)
Operation: When this alarm signal is output, user can choose to stop/continue operation, or not to detect this alarm.
"Operation continue" is default setting.

- AL33 Water leakage (Refer to Table 5.14-16)
Operation: When this alarm signal is output, user can choose to stop/continue the operation.
"Operation stop" is default setting.

- AL34 Electric resistivity / conductivity rise (Refer to Table 5.14-17)
Operation: When this alarm signal is output, user can choose to continue operation, or not to detect this alarm.
"Operation continue" is default setting.
Threshold change: Electric resistivity / conductivity at which this alarm is generated can be changed.

- AL35 Electric resistivity / conductivity drop (Refer to Table 5.14-18)
Operation: When this alarm signal is output, user can choose to continue operation, or not to detect this alarm.
"Not to detect" is default setting.
Threshold change: Electric resistivity / conductivity at which this alarm is generated can be changed.

- AL52 Ambient temperature abnormality (Refer to Table 5.14-18)
Operation: When this alarm signal is output, user can choose to stop/continue operation, or not to detect this alarm.
"Operation continue" is default setting.
- AL53 Facility water inlet temperature abnormality (Refer to Table 5.14-18)
Operation: When this alarm signal is output, user can choose to stop/continue operation, or not to detect this alarm.
"Operation continue" is default setting.
- AL55 Facility water outlet temperature abnormality (Refer to Table 5.14-18)
Operation: When this alarm signal is output, user can choose to stop/continue operation, or not to detect this alarm.
"Operation continue" is default setting.

⚠ CAUTION

"Operation stop" is the default setting for alarm "AL01 Low tank level". If the customer changes this setting to continue operation, fill the circulating fluid immediately after the alarm is generated. Operation without filling the circulating fluid leads to cause malfunction.

5.14.2 Alarm customize function setting and checking

The table below explains the setting items of the alarm customize function and the initial values.

Table 5.14-1 List of set alarm customize function (1/2)

Display	Item	Contents	Initial value (Default setting)
R 5.02	Changing of low tank level	Set the operation when alarm No. AL01 "Low tank level" is generated.	A.STP
R 5.03	Changing of circulating fluid supply temperature rise	Set the operation when alarm No. AL03 "circulating fluid supply temperature rise" is generated.	A.RUN
R 5.04	Detection temperature for circulating fluid supply temperature rise	Sets the detection temperature for the alarm of alarm NO. AL03 "circulating fluid supply temperature rise". Alarm signal is generated when the temperature becomes higher than this temperature.	45.0°C
R 5.05	Changing of circulating fluid supply temperature drop	Set the operation when alarm No. AL04 "circulating fluid supply temperature drop" is generated.	A.RUN
R 5.06	Detection temperature for circulating fluid supply temperature drop	Sets the detection temperature for the alarm of alarm NO. AL04 "circulating fluid supply temperature drop". Alarm signal is generated when the temperature becomes lower than this temperature.	1.0 °C
R 5.07	Changing of circulating fluid supply pressure rise	Set the operation when alarm No. AL08 "circulating fluid supply pressure rise" is generated.	A.RUN
R 5.08	Detection pressure for circulating fluid supply pressure rise	Sets the detection pressure for the alarm of alarm NO. AL08 "circulating fluid supply pressure rise". Alarm signal is generated when the pressure becomes higher than this pressure.	0.30MPa *1
R 5.09	Changing of circulating fluid supply pressure drop	Set the operation when alarm No. AL09 "circulating fluid supply pressure drop" is generated.	A.RUN
R 5.10	Detection pressure for circulating fluid supply pressure drop	Sets the detection pressure for the alarm of alarm NO. AL09 "circulating fluid supply pressure drop". Alarm signal is generated when the pressure becomes lower than this pressure.	0.05MPa
R 5.11	Changing of operation when communication error	Set the operation when the alarm No. AL19 "Communication error" is generated.	OFF
R 5.12	The monitoring time of communication error	Set the alarm monitoring time when the alarm No. AL19 "Communication error" is generated. Alarm signal is generated when the monitoring time is exceeded.	30 sec
R 5.13	Changing of contact input signal 1 detection	Set the operation when the alarm No. AL31 "contact input signal 1 detection" is generated.	A.STP
R 5.14	Changing of contact input signal 2 detection	Set the operation when the alarm No. AL32 "contact input signal 2 detection" is generated.	A.STP
R 5.15	Changing of DC line fuse cut	Set the operation when the alarm No. AL21 "DC line fuse cut" is generated.	A.STP
R 5.16	Changing of water leakage	Set the operation when the alarm No. AL33 "water leakage" is generated.	A.STP *2
R 5.17	Changing of electric resistivity/conductivity rise	Set the operation when the alarm No. AL34 "Electric resistivity / conductivity rise" is generated.	OFF *3
R 5.18	Upper limit of Electric resistivity / conductivity rise	Sets the detection level for the alarm of alarm NO. AL34 "Electric resistivity / conductivity rise". Alarm signal is generated when the level becomes higher than this level.	--- *3

Table 5.14-2 List of set alarm customize function(2/2)

Display	Item	Contents	Initial value (Default setting)
A 5.1 9	Changing of electric resistivity/conductivity drop	Set the operation when the alarm No. AL35 "Electric resistivity / conductivity drop" is generated.	OFF*3
A 5.2 0	Lower limit of electric resistivity/conductivity drop	Sets the detection level for the alarm of alarm NO. AL35 "Electric resistivity / conductivity drop". Alarm signal is generated when the level becomes lower than this level.	---*3
A 5.2 1	Temperature alarm Monitoring method	One alarm monitoring method can be selected from four methods for AS04 "Detection temp for the circulating fluid supply temp. increase" and AS06 "Detection temp. for circulating fluid supply temp. drop".	0
A 5.2 2	Monitoring start timer	Alarm will not be generated during the set period of time after starting operation. Alarm monitoring starts when it reaches the set time.	---
A 5.2 3	Range over Detection timer	After starting the alarm monitoring, the alarm will not be generated right away and will be kept not generated for the set period of time for AS04 "Detection temp for the circulating fluid supply temp. increase" and AS06 "Detection temp. for circulating fluid supply temp. drop", when the temperatures goes out of the set range.	5
A 5.3 2	Changing of Ambient temperature abnormality	Set the operation when the alarm No. AL52 "Ambient temperature abnormality" is generated.	A.RUN
A 5.3 3	Facility water inlet temperature abnormality	Set the operation when the alarm No. AL53 "Facility water inlet temperature abnormality" is generated.	A.RUN
A 5.3 4	Facility water outlet temperature rise	Set the operation when the alarm No. AL55 "Facility water outlet temperature rise" is generated.	A.RUN

*1: HRSC012/018/024/030-**-20-T (Option [High-pressure pump specification]): 0.70MPa

HRSC012/018/024/030-**-20-MT (Option [Pure water piping] + [High-pressure pump specification]):0.60MPa

HRSC040-**-20-T, MT (Option [High-pressure pump specification]): 0.50MPa

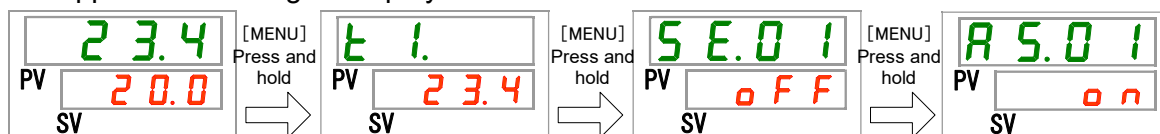
HRSC050/060-**-20: 0.50MPa

*2: This function is available for customers who have purchased the drain pan set.

*3: This function is available for customers who have purchased the Electric resistivity / conductivity sensor set.

1. Press and hold the [MENU] key for approx. 2 sec.

Repeat pressing the key until the setting screen for alarm buzzer sound [**A 5.0 1**] appears on the digital display.



Low tank level Setting and checking

2. Press the [SEL] key once.

The set screen of changing of low tank level is displayed on the digital display.



3. Select changing of low tank level from the table below with [▲] key or [▼] key, and confirm by pressing "SEL".

Table 5.14-3 List of set value

Set value	Explanation	Initial value (Default setting)
A.rUn	Operation continues when this alarm signal is generated.	
A.StP	Operation is stopped when this alarm signal is generated.	○

Note) On option J (automatic fluid fill function) model, Abnormal Pump Operation (AL07) could be happened when you select "A.rUn" mode.

Changing of circulating fluid supply temperature rise Setting and checking

4. Press the [SEL] key once.
The set screen of changing of circulating fluid supply temperature rise is displayed on the digital display.



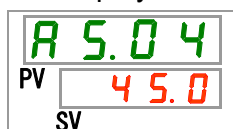
5. Select changing of circulating fluid supply temperature rise from the table below with [▲] key or [▼] key, and confirm by pressing "SEL".

Table 5.14-4 List of set value

Set value	Explanation	Initial value (Default setting)
oFF	This alarm signal is not detected.	
A.rUn	Operation continues when this alarm signal is generated.	○
A.StP	Operation is stopped when this alarm signal is generated.	

Detection temperature for circulating fluid supply temperature rise Setting and checking

6. Press the [SEL] key once.
The set screen of detection temperature for circulating fluid supply temperature rise is displayed on the digital display.



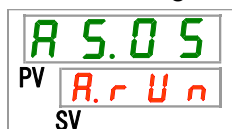
- 7.** Select detection temperature for circulating fluid supply temperature rise from the table below with [▲] key or [▼] key, and confirm by pressing “SEL”.

Table 5.14-5 List of set value

Set value	Explanation	Initial value (Default setting)
---	Setting/checking are not available if the setting of the circulating fluid supply temperature rise is OFF.	
5.0 to 48.0	Sets detection temp for the circulating fluid supply temperature rise. Temperature unit is Centigrade: Setting unit is 0.1°C	45.0

Changing of circulating fluid supply temperature drop setting and checking

- 8.** Press the [SEL] key once.
The set screen of changing of circulating fluid supply temperature drop is displayed on the digital display.



- 9.** Select changing of circulating fluid supply temperature drop from the table below with [▲] key or [▼] key, and confirm by pressing “SEL”.

Table 5.14-6 List of set value

Set value	Explanation	Initial value (Default setting)
o F F	This alarm signal is not detected.	
R. r U n	Operation continues when this alarm signal is generated.	○
R. S t P	Operation is stopped when this alarm signal is generated.	

Detection temperature for circulating fluid supply temperature drop Setting and checking

- 10.** Press the [SEL] key once.
The set screen of detection temperature for circulating fluid supply temperature drop is displayed on the digital display.



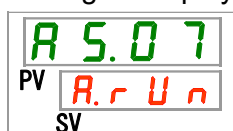
- 11.** Select detection temperature for circulating fluid supply temperature drop from the table below with [▲] key or [▼] key, and confirm by pressing “SEL”.

Table 5.14-7 List of set value

Set value	Explanation	Initial value (Default setting)
----	Setting/checking are not available if the setting of the circulating fluid supply temperature drop is OFF.	
1.0 to 39.0	Sets detection temp for the circulating fluid supply temperature drop. Temperature unit is Centigrade: Setting unit is 0.1°C	1.0

Changing of circulating fluid supply pressure rise Setting and checking

- 12.** Press the [SEL] key once.
The set screen of changing of circulating fluid supply pressure rise is displayed on the digital display.



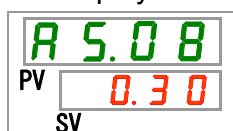
- 13.** Select changing of circulating fluid supply pressure rise from the table below with [▲] key or [▼] key, and confirm by pressing “SEL”.

Table 5.14-8 List of set value

Set value	Explanation	Initial value (Default setting)
o F F	This alarm signal is not detected.	
R.r U n	Operation continues when this alarm signal is generated.	○
R.S t P	Operation is stopped when this alarm signal is generated.	

Detection temperature for circulating fluid supply pressure rise Setting and checking

- 14.** Press the [SEL] key once.
The set screen of detection temperature for circulating fluid supply pressure rise is displayed on the digital display.



- 15.** Select detection temperature for circulating fluid supply pressure rise from the table below with [▲] key or [▼] key, and confirm by pressing “SEL”.

Table 5.14-9 List of set value

Set value	Explanation	Initial value (Default setting)
----	Setting/checking are not available if the setting of the circulating fluid supply pressure rise is OFF.	
0.05 to 0.70	Sets detection temp for the circulating fluid supply pressure rise. - Option -T Set range: HRSC012/018/024/030: 0.05 to 0.70MPa HRSC040: 0.05 to 0.50MPa Default setting: HRSC012/018/024/030: 0.70MPa HRSC040: 0.50MPa - Option -M Set range: HRSC012/018/024/030: 0.05 to 0.60MPa HRSC040: 0.05 to 0.50MPa Default setting: HRSC012/018/024/030: 0.60MPa HRSC040: 0.50MPa Pressure unit is MPa: Setting unit is 0.01MPa	0.30 *

* HRSC050/060: 0.50MPa

Changing of circulating fluid supply pressure drop Setting and checking

- 16.** Press the [SEL] key once.

The set screen of changing of circulating fluid supply pressure drop is displayed on the digital display.



- 17.** Select changing of circulating fluid supply pressure dro from the table below with [▲] key or [▼] key, and confirm by pressing “SEL”.

Table 5.14-10 List of set value

Set value	Explanation	Initial value (Default setting)
o F F	This alarm signal is not detected.	
R.r U n	Operation continues when this alarm signal is generated.	○
R.5 t P	Operation is stopped when this alarm signal is generated.	

Detection temperature for circulating fluid supply pressure drop Setting and checking

18. Press the [SEL] key once.

The set screen of detection temperature for circulating fluid supply pressure drop is displayed on the digital display.

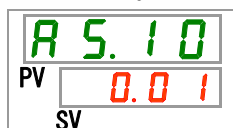
**19.** Select detection temperature for circulating fluid supply pressure drop from the table below with [▲] key or [▼] key, and confirm by pressing "SEL".

Table 5.14-11 List of set value

Set value	Explanation	Initial value (Default setting)
----	Setting/checking are not available if the setting of the circulating fluid supply temperature drop is OFF.	
0.05 to 0.18	Sets detection temperature for circulating fluid supply pressure drop. - Option -T Set range: HRSC012/018/024/030: 0.05 to 0.70Mpa HRSC040: 0.05 to 0.50Mpa - Option -M Set range: HRSC012/018/024/030:0.05 to 0.60MPa HRSC040:0.05 to 0.50MPa Default setting: HRSC012/018/024/030:0.60MPa HRSC040:0.50MPa Pressure unit is MPa: Setting unit is 0.01MPa	0.05

Changing of operation when communication error Setting and checking

20. Press the [SEL] key once.

The set screen of changing of operation when communication error is displayed on the digital display.

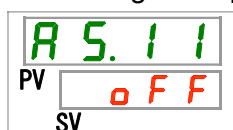
**21.** Select changing of operation when communication error from the table below with [▲] key or [▼] key, and confirm by pressing "SEL".

Table 5.14-12 List of set value

Set value	Explanation	Initial value (Default setting)
0FF	This alarm signal is not detected.	○
R.r U n	Operation continues when this alarm signal is generated.	
R.S t P	Operation is stopped when this alarm signal is generated.	

The monitoring time of communication error Setting and checking

22. Press the [SEL] key once.

The set screen of the monitoring time of communication error is displayed on the digital display.

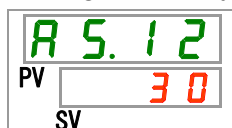
**23.** Select the monitoring time of communication error from the table below with [▲] key or [▼] key, and confirm by pressing "SEL".

Table 5.14-13 List of set value

Set value	Explanation	Initial value (Default setting)
---	Setting/checking are not available if the setting of the communication error is OFF.	
30 to 600	Sets communication error. Set unit is 1 sec. unit.	30

Changing of Contact input signal 1 detection Setting and checking

24. Press the [SEL] key once.

The set screen of the changing of contact input signal 1 detection is displayed on the digital display.

**25.** Select the changing of contact input signal 1 detection from the table below with [▲] key or [▼] key, and confirm by pressing "SEL".

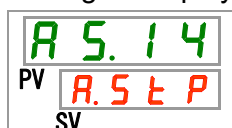
Table 5.14-14 List of set value

Set value	Explanation	Initial value (Default setting)
o F F	This alarm signal is not detected.	
R. r U n	Operation continues when this alarm signal is generated.	
R. S t P	Operation is stopped when this alarm signal is generated.	○

Changing of Contact input signal 2 detection Setting and checking

26. Press the [SEL] key once.

The set screen of the changing of contact input signal 2 detection is displayed on the digital display.



- 27.** Select the changing of contact input signal 2 detection from the table below with [▲] key or [▼] key, and confirm by pressing “SEL”.

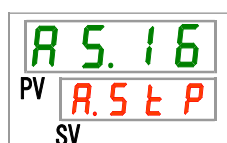
Table 5.14-15 List of set value

Set value	Explanation	Initial value (Default setting)
OFF	This alarm signal is not detected.	
Run	Operation continues when this alarm signal is generated.	
Stop	Operation is stopped when this alarm signal is generated.	○

Changing of water leakage Setting and checking

- 28.** Press the [SEL] key once.

The set screen of the changing of water leakage is displayed on the digital display.



- 29.** Select the changing of water leakage from the table below with [▲] key or [▼] key, and confirm by pressing “SEL”.

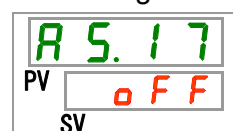
Table 5.14-16 List of set value

Set value	Explanation	Initial value (Default setting)
---	Setting/checking are not available if the setting of the water leakage option is OFF.	
Run	Operation continues when this alarm signal is generated.	
Stop	Operation is stopped when this alarm signal is generated.	○

Changing of Electric resistivity / conductivity rise Setting and checking

- 30.** Press the [SEL] key once.

The set screen of the changing of Electric resistivity / conductivity rise is displayed on the digital display.



- 31.** Select the changing of Electric resistivity / conductivity rise from the table below with [▲] key or [▼] key, and confirm by pressing “SEL”.

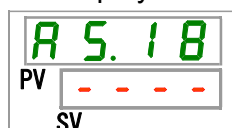
Table 5.14-17 List of set value

Set value	Explanation	Initial value (Default setting)
	Setting/checking are not available if the setting of the Electric resistivity / conductivity option is OFF.	
	This alarm signal is not detected.	
	Operation continues when this alarm signal is generated.	○

Changing of upper limit of Electric resistivity / conductivity rise Setting and checking

- 32.** Press the [SEL] key once.

The set screen of the changing of upper limit of Electric resistivity / conductivity rise is displayed on the digital display.

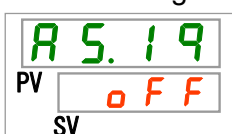


- 33.** Select the changing of upper limit of Electric resistivity / conductivity rise from the table below with [▲] key or [▼] key, and confirm by pressing “SEL”. Refer to the Operation Manual attached to these optional accessories for details.

Changing of Electric resistivity / conductivity drop Setting and checking

- 34.** Press the [SEL] key once.

The set screen of the changing of Electric resistivity / conductivity drop is displayed on the digital display.



- 35.** Select the changing of Electric resistivity / conductivity drop from the table below with [▲] key or [▼] key, and confirm by pressing “SEL”. Refer to the Operation Manual attached to these optional accessories for details.

Table 5.14-18 List of set value

Set value	Explanation	Initial value (Default setting)
	Setting/checking are not available if the setting of the Electric resistivity / conductivity option is OFF.	
	This alarm signal is not detected.	○
	Operation continues when this alarm signal is generated.	

Changing of lower limit of Electric resistivity / conductivity drop Setting and checking

36. Press the [SEL] key once.

The set screen of the changing of lower limit of Electric resistivity / conductivity drop is displayed on the digital display.

**37.** Select the changing of lower limit of Electric resistivity / conductivity drop from the table below with [▲] key or [▼] key, and confirm by pressing "SEL". Refer to the Operation Manual attached to these optional accessories for details.

How to monitor the temperature alarm Setting and Checking

38. Press the [SEL] key once.

Setting screen of the temperature alarm monitoring method is displayed on the digital display.

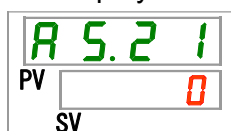
**39.** Select temperature alarm monitoring method from the table below with [▲] key or [▼] key, and confirm by pressing "SEL".

Table 5.14-19 List of set value

Set value	Item	Explanation	Initial value (Default setting)
	Continuous monitoring	Alarm monitoring starts at the same time as it is turned on.	○
	Automatic monitoring	When the circulating fluid temperature is outside of the alarm threshold range at the time of operation start, the alarm will not be generated until the temperature comes inside the alarm threshold range.	
	Monitoring start timer	Alarm will not be generated until it reaches the time set for the AS.22 "Monitoring start timer" after the operation starts. Alarm monitoring starts when it reaches the set time.	
	Automatic monitoring + Monitoring start timer	Alarm will not be generated until it reaches the time set for the AS.22 "Monitoring start timer" after the operation starts. Alarm monitoring starts when it reaches the set time. When the circulating fluid temperature enters the alarm threshold range before it reaches the set time, the alarm monitoring will be started at that time.	

* Settings of this function and example of alarm generating timing for 5.14.3 "Setting of temperature alarm monitoring method and generation timing".

Monitoring start timer Setting and Checking

40. Press the [SEL] key once.

Setting screen of the monitoring start timer is displayed on the digital display.

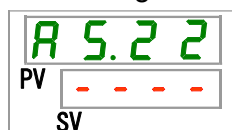
**41.** Select monitoring start timer from the table below with [▲] key or [▼] key, and confirm by pressing "SEL".

Table 5.14-20 List of set value

Set value	Explanation	Initial value (Default setting)
----	Setting and checking are impossible when "0: Continuous monitoring" or "1: Automatic monitoring" is selected for the setting of AS21 "Temperature alarm monitoring method".	○
0 to 600	Sets the time when alarm monitoring starts Setting unit is 1 minute.	

* Settings of this function and example of alarm generating timing for 5.14.3 "Setting of temperature alarm monitoring method and alarm generation timing".

Range over detection timer; Setting and Checking

42. Press the [SEL] key once.

Setting screen of the range over detection timer is displayed on the digital display.

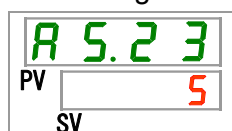
**43.** Select range over detection timer from the table below with [▲] key or [▼] key, and confirm by pressing "SEL".

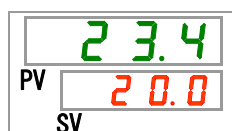
Table 5.14-21 List of set value

Set value	Explanation	Initial value (Default setting)
5 to 999	Sets time from detecting the alarm to generation of the alarm. Setting unit is 1 second.	5

* Settings of this function and example of alarm generating timing for 5.15.3 "Setting of temperature alarm monitoring method and alarm generation timing".

44. Press the [MENU] key once.

Return to the main screen (screen displaying the circulating fluid temperature).



Changing of ambient temperature abnormality Setting and Checking

45. Press the [SEL] key once.

Setting screen of the ambient temperature abnormality is displayed on the digital display.

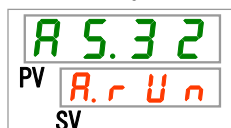
**46.** Select Ambient temperature abnormality from the table below with [▲] key or [▼] key, and confirm by pressing "SEL".

Table 5.14-23 List of set value

Set value	Explanation	Initial value (Default setting)
☐ o F F	This alarm signal is not detected.	
☐ A.r U n	Operation continues when this alarm signal is generated.	○
☐ A.S t P	Operation is stopped when this alarm signal is generated.	

Changing of facility water inlet temperature abnormality Setting and Checking

47. Press the [SEL] key once.

Setting screen of the facility water inlet temperature abnormality is displayed on the digital display.

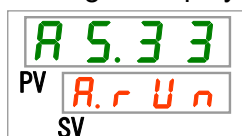
**48.** Select Facility water inlet temperature abnormality from the table below with [▲] key or [▼] key, and confirm by pressing "SEL".

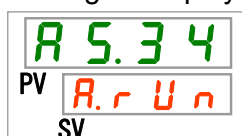
Table 5.14-24 List of set value

Set value	Explanation	Initial value (Default setting)
☐ - - - -	Only water-cooled refrigeration model can be set.	
☐ o F F	This alarm signal is not detected.	
☐ A.r U n	Operation continues when this alarm signal is generated.	○
☐ A.S t P	Operation is stopped when this alarm signal is generated.	

Changing of facility water outlet temperature abnormality Setting and Checking

49. Press the [SEL] key once.

Setting screen of the facility water outlet temperature abnormality is displayed on the digital display.



- 50.** Select Facility water inlet temperature abnormality from the table below with [▲] key or [▼] key, and confirm by pressing “SEL”.

Table 5.14-25 List of set value

Set value	Explanation	Initial value (Default setting)
- - - -	Only water-cooled refrigeration model can be set.	
o F F	This alarm signal is not detected.	
R. r U n	Operation continues when this alarm signal is generated.	○
R. S t P	Operation is stopped when this alarm signal is generated.	

5.14.3 Setting of temperature alarm monitoring method and alarm generation timing

Examples of temperature alarm monitoring method setting and alarm generation timing are shown below.

■ When "Automatic monitoring" is selected

- [1] Circulating fluid temperature when starting operation: Approximately 20 °C
- [2] Circulating fluid set temperature: 15 °C
- [3] "AS.21: Temperature alarm monitoring method": Select "Automatic monitoring".
(" - - - " (invalid setting) will be shown for "AS.22: Monitoring start timer".)
- [4] "AS.04: Detection temp. for the circulating fluid supply temp. increase": Set to "16 °C".
- [5] "AS.06: Detection temp. for the circulating fluid supply temp. drop": Set to "14 °C".
- [6] "AS.23: Range over detection timer" Set to "600 sec".

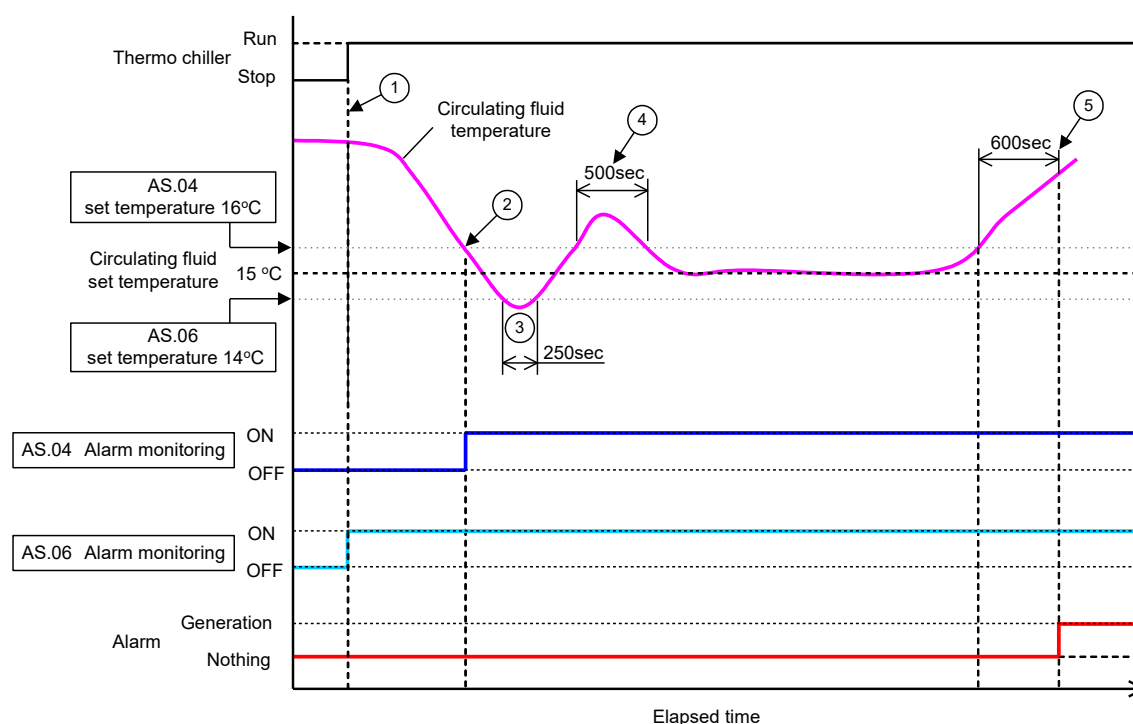


Fig 5.14-1 Alarm generation timing

■ -Alarm generation timing

- Status (1): Temperature alarm monitoring starts by starting the chiller operation. As the circulating fluid temperature at this time is 20 °C, "AS.06" starts alarm monitoring at the same time as the operation start.
- Status (2): The circulating fluid temperature becomes within the set range of "AS.04", and starts "AS.04" alarm monitoring.
- Status (3): The circulating fluid temperature exceeds the threshold of "AS.06", but the alarm will not be generated as it has returned within the 600 sec range of the "AS.23: Range over detecting timer".
- Status (4): The circulating fluid temperature exceeds the threshold of "AS.04", but the alarm will not be generated as it has returned within the 600 sec range of the "AS.23: Range over detecting timer".
- Status (5): Alarm "AL03: Circulating fluid supply temp. increase" will be generated after 600 seconds that is set for the "AS.23: Range over detection timer" after the circulating fluid temperature exceeds the threshold of "AS.04".

■ When "Automatic monitoring + Monitoring start timer" is selected

- [1] Circulating fluid temperature when starting operation: Approximately 20 °C
- [2] Circulating fluid set temperature: 15 °C
- [3] "AS.21: Temperature alarm monitoring method": Select "Automatic monitoring + Monitoring start timer".
- [4] "AS.22: Monitoring start timer": Set it to "50 min".
- [5] "AS.04: Detection temp. for the circulating fluid supply temp. increase": Set to "16 °C".
- [6] "AS.06: Detection temp. for the circulating fluid supply temp. drop": Set to "14 °C".
- [7] "AS.23: Range over detection timer": Set to "600 sec".

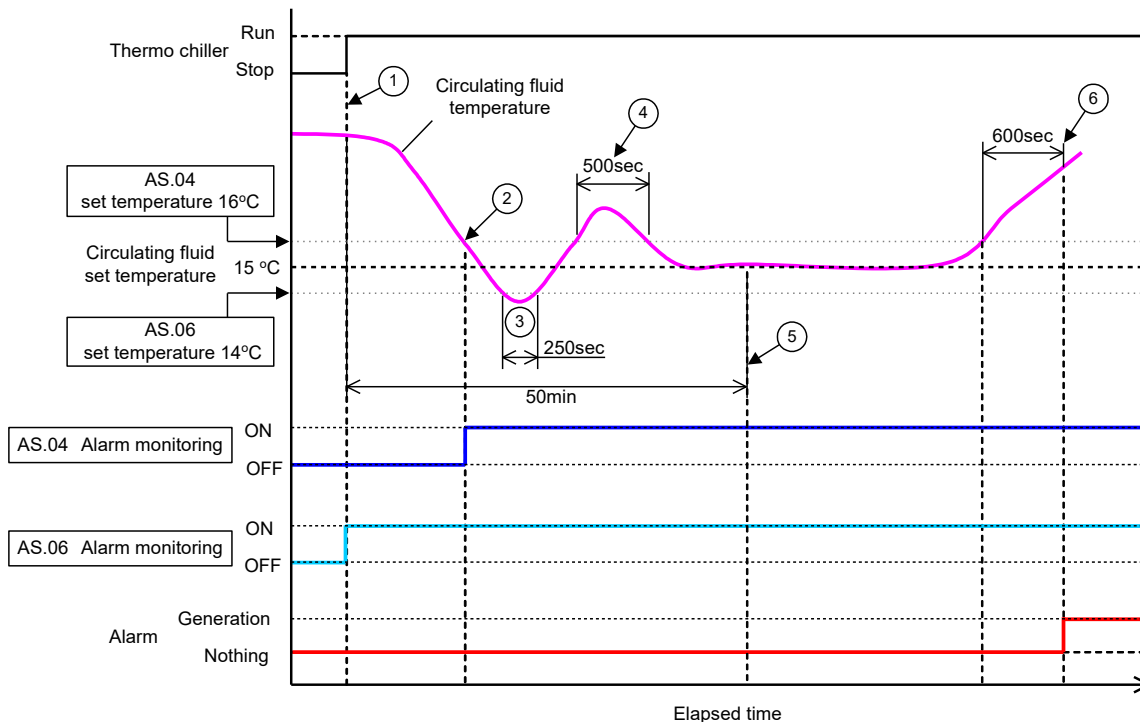


Fig 5.14-2 Alarm generation timing

■ -Alarm generation timing

- Status (1): Start operation of the chiller. As the circulating fluid temperature is within the set range of "AS.06", "AS.06" alarm monitoring starts.
- Status (2): The circulating fluid temperature becomes within the set range of "AS.04". "AS.04" alarm monitoring starts.
- Status (3): The circulating fluid temperature exceeds the threshold of "AS.06", but the alarm will not be generated as it has returned within the 600 sec range of the "AS.23: Range over detecting timer".
- Status (4): The circulating fluid temperature exceeds the threshold of "AS.04", but the alarm will not be generated as it has returned within the 600 sec range of the "AS.23: Range over detecting timer".
- Status (5): 50 minutes passes after starting operation. Alarm monitoring has started. It shows that the "50 min" setting does not influence the alarm monitoring under these conditions.
- Status (6): Alarm will be generated after 600 seconds that is set for "AS.23: Range over detection timer" after the circulating fluid temperature exceeds the threshold of "AS.04".

5.15 Data reset function

5.15.1 Data reset function

Values set by customer are reset to default values. Accumulated operating time is not reset.

CAUTION



All setting values are reset.
It is recommended to record set data before reset.

5.15.2 Method of resetting data reset function

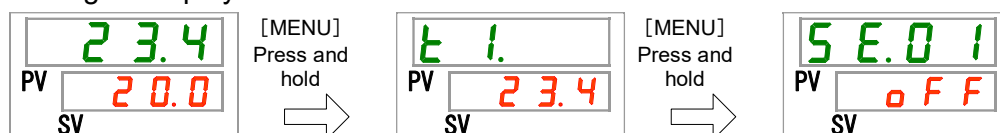
The table below explains the setting items of the data reset and the initial values.

Table 5.15-1 List of data reset

Display	Item	Contents	Initial value (Default setting)
SE.14	Data reset	All data is reset. (Accumulated operation time is not reset.)	NO

1. Press and hold the [MENU] key for approx. 2 sec.

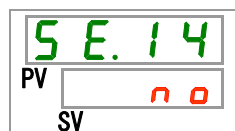
Repeat pressing the key until the setting screen for key-lock [SE.01] appears on the digital display.



Data reset

2. Press the [SEL] key 13 times.

The set screen of data reset is displayed on the digital display.



3. Select YES from the table below with [▲] key or [▼] key, and confirm by pressing "SEL". Select YES, then all data returns to default setting. The display returns to the main screen.

Table 5.15-2 List of set value

Set value	Explanation	Initial value (Default setting)
no	Not reset	○
YES	All data is reset	

5.16 Accumulated time reset function

5.16.1 Accumulated time reset function

The alarms below are generated to notify the maintenance time.
The product is not stopped for alarm.

- Pump maintenance (AL28): Generated after 20,000h of accumulated operating time
[Option T] Generated after 8,000h of accumulated operating time
- Fan motor maintenance (AL29) : Generated after 20,000h of accumulated operating time. * For air-cooled type
- Compressor maintenance (AL30): Generated after 50,000h of accumulated operating time

To reset the alarm, reset the accumulated operating time.
Reset the accumulated time after the replacement of parts (call for inspection service).

5.16.2 Method of resetting accumulated time reset function

The table below explains the setting items of the accumulated time reset and the initial values.

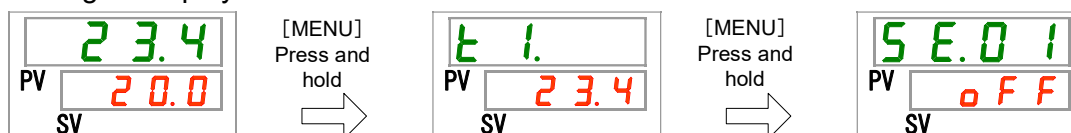
Table 5.16-1 List of set accumulated time reset function

Display	Item	Contents	Initial value (Default setting)
SE.15	Pump accumulated operating time reset	Reset the accumulated operating time of the pump.	NO
SE.16	Fan motor accumulated operating time reset	Reset the accumulated operating time of the fan motor. (For air-cooled type)	NO
SE.17	Compressor accumulated operating time reset	Reset the accumulated operating time of the compressor.	NO

Refer to each paragraph for the detail of resetting the accumulated operating time.

1. Press and hold the [MENU] key for approx. 2 sec.

Repeat pressing the key until the setting screen for key-lock [**SE.01**] appears on the digital display.



Pump accumulated operating time reset

2. Press the [SEL] key 14 times.

The set screen of pump accumulated operating time reset is displayed on the digital display.

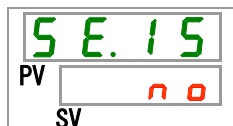
**3.** Select from the table below with [▲] key or [▼] key, and confirm by pressing "SEL". Select , then the accumulated operating time of the pump is reset. The display returns to the main menu.

Table 5.16-2 List of set value

Set value	Explanation	Initial value (Default setting)
no	Not reset	○
YES	Pump accumulated operating time is reset	

Fan motor accumulated operating time reset

4. Press the [SEL] key once.

The set screen of fan motor accumulated operating time reset is displayed on the digital display.

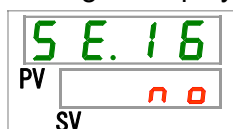
**5.** Select from the table below with [▲] key or [▼] key, and confirm by pressing "SEL". Select , then the accumulated operating time of the fan motor is reset. The display returns to the main menu.

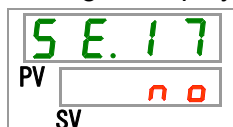
Table 5.16-3 List of set value

Set value	Explanation	Initial value (Default setting)
----	Not possible to reset	
no	Not reset	○
YES	Fan motor accumulated operating time is reset	

Compressor accumulated operating time reset

6. Press the [SEL] key once.

The set screen of compressor accumulated operating time reset is displayed on the digital display.



7. Select y E S from the table below with [▲] key or [▼] key, and confirm by pressing "SEL". Select y E S, then the accumulated operating time of the compressor is reset. The display returns to the main menu.

Table 5.16-4 List of set value

Set value	Explanation	Initial value (Default setting)
n o	Not reset	○
y E S	Compressor accumulated operating time is reset	

5.17 Communication function

5.17.1 Communication function

The product can have contact input/output and serial communication.
Refer to the Operation Manual for communication for details.

5.17.2 Communication function setting and checking

The table below explains the setting items of the communication function and the initial values.

Table 5.17-1 List of set communication function

Display	Item		Contents	Initial value (Default setting)
[0.01]	Communication mode		Sets communication mode.	LOC
[0.02]	Serial communication	Serial protocol	Sets serial communication protocol.	MDBS
[0.03]		Communication specification	Sets standard of the serial communication.	485
[0.04]		RS-485 terminal	Sets of the terminal of RS-485.	OFF
[0.05]		MODBUS	Device address	1
[0.06]			Communication speed	19.2
[0.07]		Simple communication protocol	Device address	1
[0.08]			Communication speed	9.6
[0.09]			BCC	ON
[0.10]			Data length	8BIT
[0.11]			Parity check	NON
[0.12]			Stop bit length	2BIT
[0.13]			Response delay time	0
[0.14]			Communication range	RW
[0.15]	Contact input/output communication	Contact input signal 1	Sets contact input signal 1.	RUN
[0.16]		Contact input signal 1 type	Sets input type of contact input signal 1.	ALT
[0.17]		Contact input signal 1 Delay timer of reading (time delay)	Sets the delay timer of reading of contact input signal 1.	0
[0.18]		Contact input signal 1 OFF detection timer	Sets the contact input signal 1 OFF detection timer	0
[0.19]		Contact input signal 2	Sets contact input signal 2.	OFF
[0.20]		Contact input signal 2 type	Sets input type of contact input signal 2.	ALT
[0.21]		Contact input signal 2 Delay timer of reading (time delay)	Sets the delay timer of reading of contact input signal 2.	0
[0.22]		Contact input signal 2 OFF detection timer	Sets the contact input signal 2 OFF detection timer	0
[0.23]		Contact output 1 function	Sets contact output signal 1.	RUN
[0.24]		Contact output 1 operation	Sets input type of contact output signal 1.	A
[0.25]		Contact output 1 selected alarm	Sets alarm which is selected for contact output 1.	AL.01
[0.26]		Contact output 2 function	Sets output signal function of contact output 2.	RMT
[0.27]		Contact output 2 operation	Sets output signal operation of contact output 2.	A
[0.28]		Contact output 2 selected alarm	Sets alarm which is selected for contact output 2.	AL.01
[0.29]		Contact output 3 function	Sets output signal function of contact output 3.	ALM
[0.30]		Contact output 3 operation	Sets output signal operation of contact output 3.	B
[0.31]		Contact output 3 selected alarm	Sets alarm which is selected for contact output 3.	AL.01
[0.32]	Serial	MODBUS	transmission mode	Sets the transmission mode of the MODBUS protocol.
[0.33]			response delay time	Sets the time to delay sending a response message.

Communication mode setting and checking

1. Press and hold the [MENU] key for approx. 2 sec.

Repeat pressing the key until the setting screen for communication mode [**C o.0 1**] appears on the digital display.

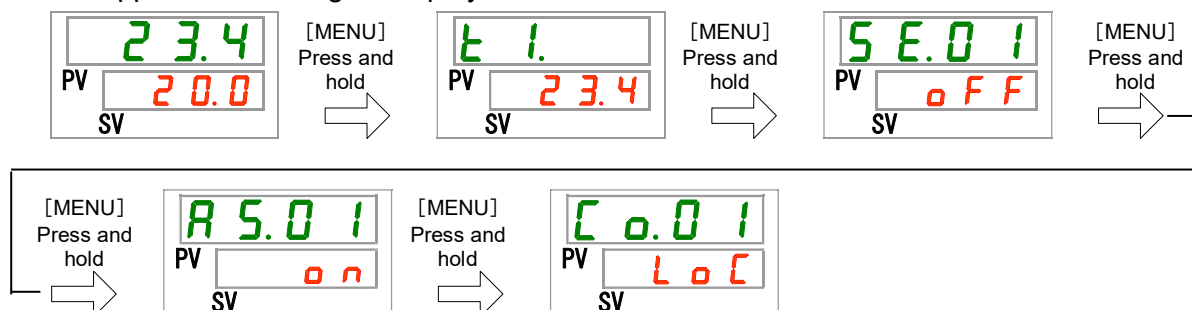
2. Select communication mode from the table below with [**▲**] key or [**▼**] key, and confirm by pressing “SEL”.

Table 5.17-2 List of set value

Set value	Explanation	Initial value (Default setting)
L o C	Sets LOCAL mode. (The operation panel operates and sets the thermo-chiller.)	○
d i o	Sets DIO mode.*1 (The operation starts with contact input/output.)	
5 E r	Sets SERIAL mode.*2 (Serial communication performs operation/setting.)	

*1: When the setting of the contact input 1 is “External switch signal”, “DIO mode” cannot be set.

*2: If the serial protocol is “Simple communication protocol 2” and the contact input 1 is “external switch signal” or contact input 2 is “remote signal”, “SERIAL mode” cannot be set.

Serial protocol Setting and checking

3. Press the [SEL] key once.

The set screen of serial protocol is displayed on the digital display.

4. Select serial protocol from the table below with [**▲**] key or [**▼**] key, and confirm by pressing “SEL”.

Table 5.17-3 List of set value

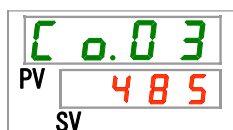
Set value	Explanation	Initial value (Default setting)
n d b 5	MODBUS protocol	○
P r o 1	Simple communication protocol 1	
P r o 2	Simple communication protocol 2*3	

*3: When the setting of the contact input 2 is “Remote signal”, “Simplified communication protocol 2” cannot be set.

Communication specification Setting and checking

5. Press the [SEL] key once.

The set screen of communication specification is displayed on the digital display.



6. Select communication specification from the table below with [▲] key or [▼] key, and confirm by pressing "SEL".

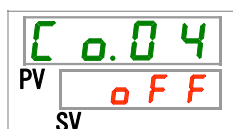
Table 5.17-4 List of set value

Set value	Explanation	Initial value (Default setting)
232C	RS-232C	
485	RS-485	○

RS-485 terminal Setting and checking

7. Press the [SEL] key once.

The set screen of RS-485 terminal is displayed on the digital display.



8. Select RS-485 terminal from the table below with [▲] key or [▼] key, and confirm by pressing "SEL".

Table 5.17-5 List of set value

Set value	Explanation	Initial value (Default setting)
0FF	No terminal	○
0n	With terminal	

Device addresses (MODBUS) Setting and checking

9. Press the [SEL] key once.

The set screen of device addresses (MODBUS) is displayed on the digital display.



- 10.** Select device addresses (MODBUS) from the table below with [▲] key or [▼] key, and confirm by pressing “SEL”.

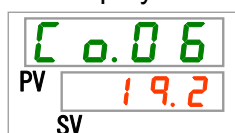
Table 5.17-6 List of set value

Set value	Explanation	Initial value (Default setting)
----	Setting/checking are not available unless the serial protocol setting is MODBUS.	
1 to 99	Sets of device addresses for MODBUS. Set range is 1 to 99.	1

Communication speed (MODBUS) Setting and checking

- 11.** Press the [SEL] key once.

The set screen of communication speed (MODBUS) is displayed on the digital display.



- 12.** Select communication speed (MODBUS) from the table below with [▲] key or [▼] key, and confirm by pressing “SEL”.

Table 5.17-7 List of set value

Set value	Explanation	Initial value (Default setting)
----	Setting/checking are not available unless the serial protocol setting is MODBUS.	
9.6	9600bps	
19.2	19200bps	○

Device addresses (simple communication protocol) Setting and checking

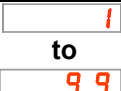
- 13.** Press the [SEL] key once.

The set screen of device addresses (simple communication protocol) is displayed on the digital display.



- 14.** Select device addresses (simple communication protocol) from the table below with [▲] key or [▼] key, and confirm by pressing “SEL”.

Table 5.17-8 List of set value

Set value	Explanation	Initial value (Default setting)
	Setting/checking are not available unless the serial protocol setting is simple communication protocol.	
	Sets of device addresses for simple communication protocol. Set range is 1 to 99.	

Communication speed (simple communication protocol) Setting/checking

- 15.** Press the [SEL] key once.

The set screen of communication speed (simple communication protocol) is displayed on the digital display.



- 16.** Select communication speed (simple communication protocol) from the table below with [▲] key or [▼] key, and confirm by pressing “SEL”.

Table 5.17-9 List of set value

Set value	Explanation	Initial value (Default setting)
	Setting/checking are not available unless the serial protocol setting is simple communication protocol.	
	1200bps	
	2400bps	
	4800bps	
	9600bps	○
	19200bps	

BCC (simple communication protocol) Setting/checking

- 17.** Press the [SEL] key once.

The set screen of BCC (simple communication protocol) is displayed on the digital display.



- 18.** Select BCC (simple communication protocol) from the table below with [▲] key or [▼] key, and confirm by pressing “SEL”.

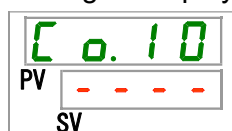
Table 5.17-10 List of set value

Set value	Explanation	Initial value (Default setting)
----	Setting/checking are not available unless the serial protocol setting is simple communication protocol.	
o F F	No BCC	
o n	With BCC	○

Data length (simple communication protocol) Setting and checking

- 19.** Press the [SEL] key once.

The set screen of data length (simple communication protocol) is displayed on the digital display.



- 20.** Select data length (simple communication protocol) from the table below with [▲] key or [▼] key, and confirm by pressing “SEL”.

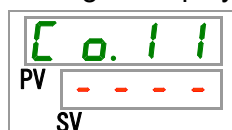
Table 5.17-11 List of set value

Set value	Explanation	Initial value (Default setting)
----	Setting/checking are not available unless the serial protocol setting is simple communication protocol.	
7 b i t	7 7 bit	
8 b i t	8 bit	○

Parity check (simple communication protocol) Setting and checking

- 21.** Press the [SEL] key once.

The set screen of parity check (simple communication protocol) is displayed on the digital display.



- 22.** Select parity check (simple communication protocol) from the table below with [▲] key or [▼] key, and confirm by pressing “SEL”.

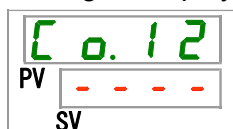
Table 5.17-12 List of set value

Set value	Explanation	Initial value (Default setting)
----	Setting/checking are not available unless the serial protocol setting is simple communication protocol.	
non	None	○
odd	Odd number	
Even	Even number	

Stop bit (simple communication protocol) Setting and checking

- 23.** Press the [SEL] key once.

The set screen of stop bit (simple communication protocol) is displayed on the digital display.



- 24.** Select stop bit (simple communication protocol) from the table below with [▲] key or [▼] key, and confirm by pressing “SEL”.

Table 5.17-13 List of set value

Set value	Explanation	Initial value (Default setting)
----	Setting/checking are not available unless the serial protocol setting is simple communication protocol.	
1bit	1 bit	
2bit	2 bit	○

Response delay time (simple communication protocol) Setting and checking

- 25.** Press the [SEL] key once.

The set screen of response delay time (simple communication protocol) is displayed on the digital display.



- 26.** Select response delay time (simple communication protocol) from the table below with [▲] key or [▼] key, and confirm by pressing “SEL”.

Table 5.17-14 List of set value

Set value	Explanation	Initial value (Default setting)
----	Setting/checking are not available unless the serial protocol setting is simple communication protocol.	
0 to 250	Setting of response delay time. Set range is 0 to 250msec.	0

Communication range (simple communication protocol) Setting and checking

- 27.** Press the [SEL] key once.

The set screen of communication range (simple communication protocol) is displayed on the digital display.



- 28.** Select communication range (simple communication protocol) from the table below with [▲] key or [▼] key, and confirm by pressing “SEL”.

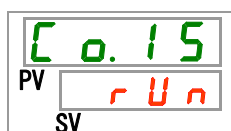
Table 5.17-15 List of set value

Set value	Explanation	Initial value (Default setting)
----	Setting/checking are not available unless the serial protocol setting is simple communication protocol.	
r 0	Only reading is available	
r 1	Reading and writing are available	0

Contact input signal 1 Setting and checking

- 29.** Press the [SEL] key once.

The set screen of contact input signal 1 is displayed on the digital display.



- 30.** Select contact input signal 1 from the table below with [▲] key or [▼] key, and confirm by pressing “SEL”.

Table 5.17-16 List of set value

Set value	Explanation	Initial value (Default setting)
OFF	No input signal	
run	Start and stop signal input	○
SH-A	External switch signal input(N.O. type)*4,*5	
SH-b	External switch signal input (N.C. type) *4,*5	

*4: When the setting of the communication mode is “DIO mode”, “External switch signal” cannot be set.

*5: When the setting of the communication mode is “SEIRAL mode” and the protocol setting is “Simplified communication protocol 2”, “External switch signal” cannot be set.

Contact input signal 1 type Setting and checking

- 31.** Press the [SEL] key once.

The set screen of contact input signal 1 type is displayed on the digital display.



- 32.** Select contact input signal 1 type from the table below with [▲] key or [▼] key, and confirm by pressing “SEL”.

Table 5.17-17 List of set value

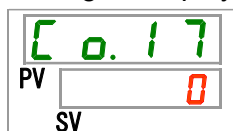
Set value	Explanation	Initial value (Default setting)
---	Setting/checking are not available if the setting of contact input signal 1 is OFF.	
ALt	Alternate signal	○
nt	Momentary signal*6	

*6: Used when the setting of the contact input 1 is “Operation stop signal input”.

Contact input signal 1 delay timer of reading Setting and checking

- 33.** Press the [SEL] key once.

The set screen of the contact input signal 1 delay timer of reading is displayed on the digital display.



- 34.** Select contact input signal 1 delay timer of reading from the table below with [▲] key or [▼] key, and confirm by pressing “SEL”.

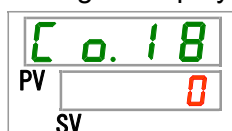
Table 5.17-18 List of set value

Set value	Explanation	Initial value (Default setting)
----	Setting and checking are not available unless contact input signal 1 is external switch signal input (N.O. type or N.C. type).	
0 to 300	Setting of contact input signal 1 delay timer of reading. Set range is 0 to 300 sec.	0

Contact input signal 1 OFF detection timer Setting and checking

- 35.** Press the [SEL] key once.

The set screen of the contact input signal 1 OFF detection timer is displayed on the digital display.



- 36.** Select contact input signal 1 OFF detection timer from the table below with [▲] key or [▼] key, and confirm by pressing “SEL”.

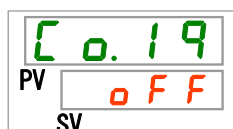
Table 5.17-19 List of set value

Set value	Explanation	Initial value (Default setting)
----	Setting and checking are not available unless contact input signal 1 is external switch signal input (N.O. type or N.C. type).	
0 to 10	Setting of contact input signal 1 OFF detection timer Set range is 0 to 10sec.	0

Contact input signal 2 Setting and checking

- 37.** Press the [SEL] key once.

The set screen of contact input signal 2 is displayed on the digital display.



- 38.** Select contact input signal 2 from the table below with [▲] key or [▼] key, and confirm by pressing "SEL".

Table 5.17-20 List of set value

Set value	Explanation	Initial value (Default setting)
o F F	Without input signal	○
r U n	Input of run/stop signal	
S H - A	External switch signal input (N.O. type)	
S H - b	External switch signal input (N.C. type)	
r n t	Remote signal*7	

*7: When the setting of the serial protocol is "Simplified communication protocol 2", "Remote signal" cannot be set.

Contact input signal 2 type Setting and checking

- 39.** Press the [SEL] key once.

The set screen of contact input signal 2 type is displayed on the digital display.



- 40.** Select contact input signal 2 type from the table below with [▲] key or [▼] key, and confirm by pressing "SEL".

Table 5.17-21 List of set value

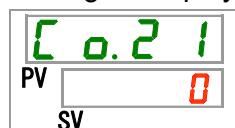
Set value	Explanation	Initial value (Default setting)
- - - -	Setting/checking are not available if the setting of contact input signal 1 is OFF.	
A L t	Alternate signal	○
n t	Momentary signal*8	

*8: Can be set when the setting of contact input signal 2 is "Run/Stop signal input" or "Remote signal"

Contact input signal 2 delay timer of reading Setting and checking

- 41.** Press the [SEL] key once.

The set screen of contact input signal 2 delay timer of reading is displayed on the digital display.



- 42.** Select contact input signal 2 delay timer of reading from the table below with [▲] key or [▼] key, and confirm by pressing “SEL”.

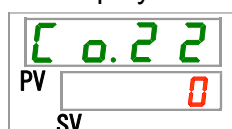
Table 5.17-22 List of set value

Set value	Explanation	Initial value (Default setting)
---	Setting and checking are not available unless contact input signal 2 is external switch signal input (N.O. type or N.C. type).	
0 to 300	Setting of contact input signal 2 delay timer of reading. Set range is 0 to 300 sec.	0

Contact input signal 2 OFF detection timer Setting and checking

- 43.** Press the [SEL] key once.

The set screen of contact input signal 2 OFF detection timer is displayed on the digital display.



- 44.** Select contact input signal 2 OFF detection timer from the table below with [▲] key or [▼] key, and confirm by pressing “SEL”.

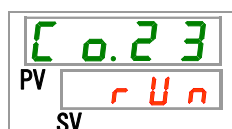
Table 5.17-23 List of set value

Set value	Explanation	Initial value (Default setting)
---	Setting and checking are not available unless contact input signal 2 is external switch signal input (N.O. type or N.C. type).	
0 to 10	Setting of contact input signal 2 OFF detection timer Set range is 0 to 10sec.	0

Contact output signal 1 function Setting and checking

- 45.** Press the [SEL] key once.

The set screen of contact output signal 1 function is displayed on the digital display.



- 46.** Select contact input signal 1 function from the table below with [▲] key or [▼] key, and confirm by pressing “SEL”.

Table 5.17-24 List of set value

Set value	Explanation	Initial value (Default setting)
	Without output signal	
	Signal of operating status is output	○
	Signal of remote status is output	
	Signal for completion of preparation (TEMP READY)	
	Signal for the status of the operation stop alarm is output	
	Signal for the status of the operation continue alarm is output	
	Signal for the alarm status is output	
	Signal for selected alarm status is output	
	Signal for Run timer set status is output	
	Signal for Stop timer set status is output	
	Signal for the recovery from power failure is output	
	Signal for anti-freezing setting is output	
	Pass through signal of contact input signal 1	
	Pass through signal of contact input signal 2	
	Signal output during automatic fluid filling	

Contact output signal 1 operation Setting and checking

- 47.** Press the [SEL] key once.

The set screen of contact output signal 1 operation is displayed on the digital display.



- 48.** Select contact output signal 1 operation from the table below with [▲] key or [▼] key, and confirm by pressing “SEL”.

Table 5.17-25 List of set value

Set value	Explanation	Initial value (Default setting)
	N.O type	○
	N.C type	

Contact output signal 1 selected alarm Setting and checking

- 49.** Press the [SEL] key once.

The set screen of contact output signal 1 selected alarm is displayed on the digital display.



- 50.** Select contact output signal 1 selected alarm from the table below with [▲] key or [▼] key, and confirm by pressing “SEL”.

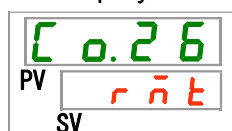
Table 5.17-26 List of set value

Set value	Explanation	Initial value (Default setting)
----	Setting/checking are not available unless the function setting of digital output 1 is selected alarm status signal.	
AL.01 to AL.63	Sets selection alarm. Set range is AL.01 to AL.63.	AL.01

Contact output signal 2 function Setting and checking

- 51.** Press the [SEL] key once.

The set screen of contact output signal 2 functions are displayed on the digital display.



- 52.** Select contact output signal 2 function from the table below with [▲] key or [▼] key, and confirm by pressing “SEL”.

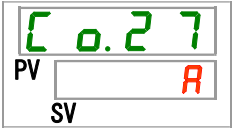
Table 5.17-27 List of set value

Set value	Explanation	Initial value (Default setting)
o F F	Without output signal	
r U n	Signal of operating status is output	
r n t	Signal of remote status is output	○
r d y	Signal for completion of preparation (TEMP READY)	
A. S t P	Signal for the status of the operation stop alarm is output	
A. r U n	Signal for the status of the operation continue alarm is output	
A L n	Signal for the alarm status is output	
A. S E L	Signal for selected alarm status is output	
o n. t n	Signal for Run timer set status is output	
o F. t n	Signal for Stop timer set status is output	
P. r S t	Signal for the recovery from power failure is output	
F. P.	Signal for anti-freezing setting is output	
I n P 1	Pass through signal of contact input signal 1	
I n P 2	Pass through signal of contact input signal 2	
A. F I L	Signal output during automatic fluid filling	

Contact output signal 2 operation Setting and checking

53. Press the [SEL] key once.

The set screen of contact output signal 2 operation is displayed on the digital display.



54. Select contact output signal 2 operation from the table below with [▲] key or [▼] key, and confirm by pressing "SEL".

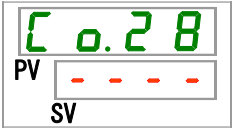
Table 5.17-28 List of set value

Set value	Explanation	Initial value (Default setting)
A	N.O type	○
b	N.C type	

Digital output signal 2 selected alarm Setting and checking

55. Press the [SEL] key once.

The set screen of contact output signal 2 selected alarm is displayed on the digital display.



56. Select contact output signal 2 selected alarm from the table below with [▲] key or [▼] key, and confirm by pressing "SEL".

Table 5.17-29 List of set value

Set value	Explanation	Initial value (Default setting)
- - - -	Setting/checking are not available unless the function setting of digital output 2 is selected alarm status signal.	
AL.01 to AL.63	Sets selected alarm Set range is AL.01 to AL.63.	AL.01

Contact output signal 3 function Setting and checking

57. Press the [SEL] key once.

The set screen of contact output signal 3 function is displayed on the digital display.



- 58.** Select contact output signal 3 function from the table below with [▲] key or [▼] key, and confirm by pressing “SEL”.

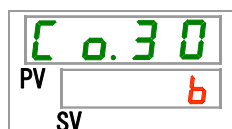
Table 5.17-30 List of set value

Set value	Explanation	Initial value (Default setting)
o F F	Without output signal	
r U n	Signal of operating status is output	
r n t	Signal of remote status is output	
r d y	Signal for completion of preparation (TEMP READY)	
A. S t P	Signal for the status of the operation stop alarm is output	
A. r U n	Signal for the status of the operation continue alarm is output	
A L n	Signal for the alarm status is output	○
A. S E L	Signal for selected alarm status is output	
o n. t n	Signal for Run timer set status is output	
o F. t n	Signal for Stop timer set status is output	
P. r S t	Signal for the recovery from power failure is output	
F. P.	Signal for anti-freezing setting is output	
I n P 1	Pass through signal of contact input signal 1	
I n P 2	Pass through signal of contact input signal 2	
A. F I L	Signal output during automatic fluid filling	

Contact output signal 3 operation Setting and checking

- 59.** Press the [SEL] key once.

The set screen of contact output signal 3 operation is displayed on the digital display.



- 60.** Select contact output signal 3 operation from the table below with [▲] key or [▼] key, and confirm by pressing “SEL”.

Table 5.17-31 List of set value

Set value	Explanation	Initial value (Default setting)
A	N.O type	
b	N.C type	○

Contact output signal 3 selected alarm Setting and checking

61. Press the [SEL] key once.

The set screen of contact output signal 3 selected alarm is displayed on the digital display.

**62.** Select contact output signal 3 selected alarm from the table below with [▲] key or [▼] key, and confirm by pressing "SEL".

Table 5.17-32 List of set value

Set value	Explanation	Initial value (Default setting)
----	Setting/checking are not available unless the function setting of digital output 3 is selected alarm status signal.	
AL.01 to AL.63	Sets selected alarm Set range is AL.01 to AL.63.	AL.01

Transmission mode (MODBUS) Setting and Checking

63. Press the [SEL] key once.

The set screen of transmission mode (MODBUS) is displayed on the digital display

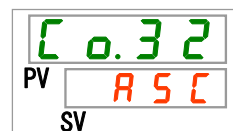
**64.** Select contact transmission mode (MODBUS) from the table below with [▲] key or [▼] key, and confirm by pressing "SEL".

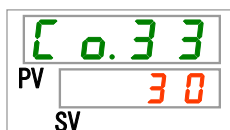
Table 5.17-33 List of set value

Set value	Explanation	Initial value (Default setting)
----	Setting/checking are not available unless the setting of serial protocol is selected MODBUS.	
A S C	ASCII mode	○
r t u	RTU mode	

Response delay time Setting and Checking

65. Press the [SEL] key once.

The set screen of response delay time is displayed on the digital display



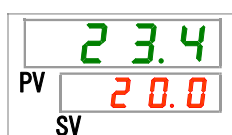
- 66.** Select response delay time (MODBUS) from the table below with [▲] key or [▼] key, and confirm by pressing "SEL".

Table 5.17-34 List of set value

Set value	Explanation	Initial value (Default setting)
- - - -	Setting/checking are not available unless the serial protocol setting is MODBUS.	
0 to 250	Setting of response delay time. Set range is 0 to 250msec.	30

- 67.** Press the [MENU] key once.

Return to the main screen (screen displaying the circulating fluid temperature).



Chapter 6 Option·Optional Accessories

6.1 Option J [Automatic fluid filling]

6.1.1 Option J [Automatic fluid filling]

This function is available for customers who selected automatic fluid filling.

Refer "3.6 Option J Piping of [Automatic fluid filling]" for the installation of the automatic fluid filling.

Piping to the automatic fluid filling port enables easy supply of the circulating fluid through the level switch in the tank.

- Starts supplying the circulating fluid automatically when the circulating fluid amount in the tank is small.
- Stops supplying the circulating fluid automatically when the circulating fluid is filled in the tank.
- Automatic fluid filling does not start when alarm of table 6.1-1 is generated. Fluid filling stops if the filling is automatic.

Table 6.1-1 Table of alarms automatic fluid filling stops / does not start

Code	Description	Code	Description
AL02	Circulating fluid supply temperature high	AL25	Circulating fluid supply pressure sensor abnormality
AL05	Circulating fluid return temperature high	AL26	Compressor discharge pressure sensor abnormality
AL06	Circulating fluid supply pressure high	AL27	Compressor suction pressure sensor abnormality
AL07	Pump operation abnormality	AL33	Fluid leakage
AL10	Compressor suction temperature high	AL37	Compressor discharge temperature sensor abnormality
AL11	Compressor suction temperature low	AL38	Compressor discharge temperature rise
AL12	Superheat temperature low	AL46	Compressor inverter error
AL13	Compressor supply pressure high (sensor)	AL54	Facility water inlet temperature high
AL14	Compressor supply pressure high (switch)	AL56	Facility water outlet temperature high
AL15	Refrigeration circuit pressure (high pressure side) drop	AL57	Ambient temperature sensor abnormality
AL16	Refrigeration circuit pressure (low pressure side) rise	AL58	Facility water inlet temperature sensor abnormality
AL17	Refrigeration circuit pressure (low pressure side) drop	AL59	Facility water outlet temperature sensor abnormality
AL18	Compressor overload	AL60	Internal communication error
AL20	Communication error	AL61	Power supply abnormality
AL22	Circulating fluid supply temperature sensor abnormality	AL62	Compressor inverter parameter error
AL23	Circulating fluid return temperature sensor abnormality	AL63	Compressor inverter communication error
AL24	Compressor suction temperature sensor abnormality	-	-

CAUTION



- This function starts both in stand-by condition (power supply switch is ON) and in operation.
- The freezing of the automatic fluid filling circuit can not be prevented if an anti-freezing function is used. To be arranged by the user.

6.2 Option M [DI water (Pure water) piping]

6.2.1 Option M [DI water (Pure water) piping]

This option is for customers who use DI water (pure water) as circulating fluid.

Circulating fluid wetted materials	Stainless (I include heat exchanger brazing), Aluminum oxide ceramic, SiC, Carbon, PP, PE, POM, FKM, EPDM, PVC (No. copper used)
------------------------------------	--

- Serviceable conductivity: 0.22μS/cm or more. (Resistivity: 4.5MΩ·cm or less.)
- This option doesn't include a function to maintain high resistivity/conductivity.
You need ion exchange resin filter (DI filter) for the purpose.
(Optional accessory: DI filter set: HRS-DP001)

6.3 Option T [High-pressure pump mounted]

6.3.1 Option T [High-pressure pump mounted]

With option T (high-pressure pump mounted), the discharge pressure is raised.

- The high-pressure pump uses a mechanical seal.
- Thermo-chiller makes AL28 alarm when driving time is passed a recommended preventive maintenance hours. Please contact to service center to ask for maintenance of the pump and mechanical seal.

Applicable model			HRSC012/018/024-※**-20-T	HRSC030-※**-20-T	HRSC040-※**-20-T	HRSC012/018/024-※**-20-MT ^{Note5)}	HRSC030-※**-20-MT ^{Note5)}	HRSC040-※**-20-MT ^{Note5)}
P u m p	Rated flow (50/60Hz) Note ¹⁾ Note ²⁾	L/min	10 (0.44MPa) / 14 (0.40MPa)		23 (0.18MPa) / 28 (0.23MPa)	10 (0.32MPa) / 14 (0.32 MPa)		23 (0.18MPa) / 28 (0.23MPa)
	Maximum flow rate (50/60Hz)	L/min	18/22		30/35	18/22		30/35
	Maximum pump head (50/60 Hz)	m	70		50	60		50
	Output	W	550					
	Earth leakage breaker	Rated current	A	15		20	15	
Sensitivity current		mA	30					
Cooling capacity ^{Note 3)}		W	The cooling capacity reduces about 300 W from the value in the catalog. (due to an increase in the heat generation of the pump)					

Note 1) The capacity at the thermo-chiller outlet when the circulating fluid temperature is 20°C.

Note 2) Required minimum flow rate for cooling capacity or maintaining the temperature stability.

Note 3) Cooling capacity will decrease as pump power increases.

Note 4) When the option "high pressure pump mounted" is selected, the weight increases by 6 kg.

Note 5) -MT: Applicable to deionized water piping + High pressure pump.

6.4 Optional Accessories [Drain pan set]

6.4.1 Optional Accessories [Drain pan set]

This function is available for customer who purchased drain pan set. For the installation of the drain pan, refer to the Operation Manual of the "Drain pan set".

Water leakage can be detected by this function. "AL33 Leakage" is generated when water leakage is detected.

It is possible to set the operation when the alarm is generated. Refer to the "5.14 Alarm customize function" for details.

CAUTION



Alarm "AL33 Fluid leakage" be generated if this setting is valid with the water leakage detector not being connected. Make this setting valid after installing the drain pan set properly.

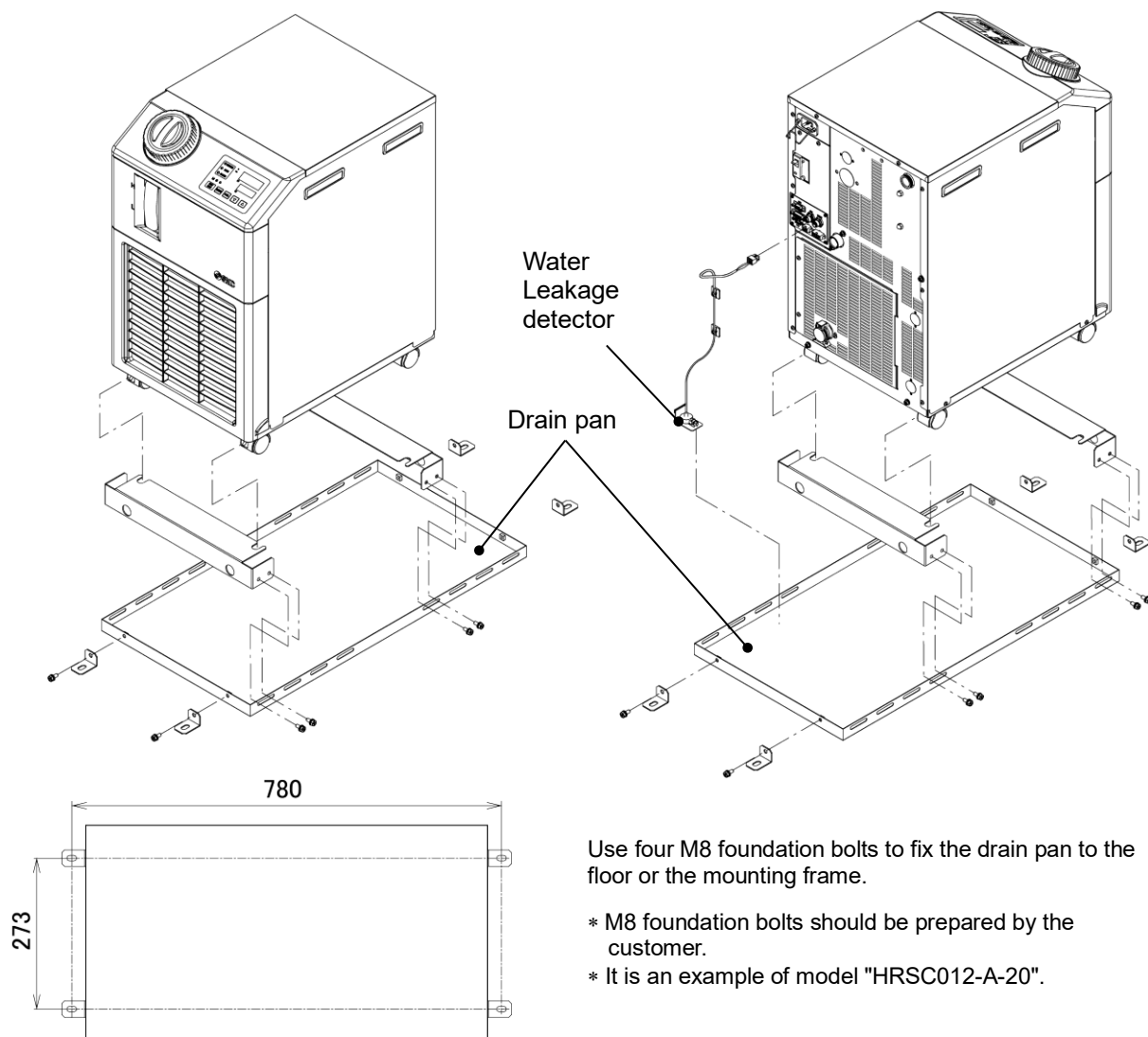


Fig. 6.4-1 Optional Accessories [Drain pan set]

6.4.2 Optional Accessories [Drain pan set] setting and checking

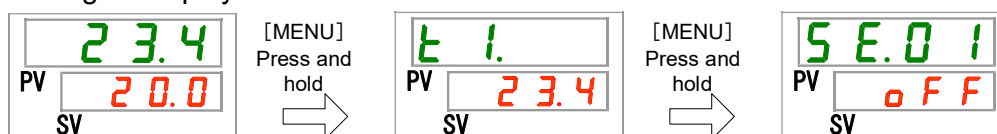
The table below explains the setting items of the optional accessories [Drain pan set] and the initial values.

Table 6.4-1 List of set optional accessories [Drain pan set]

Display	Item	Contents	Initial value (Default setting)
	Optional accessories [Drain pan set]	Set the optional accessories [Drain pan set] mode to valid / invalid.	OFF

1. Press and hold the [MENU] key for approx. 2 sec.

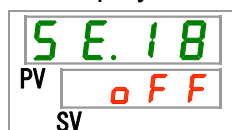
Repeat pressing the key until the setting screen for key-lock [] appears on the digital display.



Drain pan set [Option] Setting and checking

2. Press the [SEL] key 17 times.

The set screen of drain pan set [Optional Accessories] is displayed on the digital display.



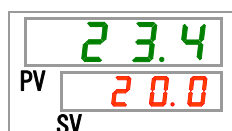
3. Select drain pan set [Optional Accessories] from the table below with [▲] key or [▼] key, and confirm by pressing "SEL".

Table 6.4-2 List of set value

Set value	Explanation	Initial value (Default setting)
	Drain pan set [optional accessories] mode to invalid	○
	Drain pan set [optional accessories] mode to valid	

4. Press the [MENU] key once.

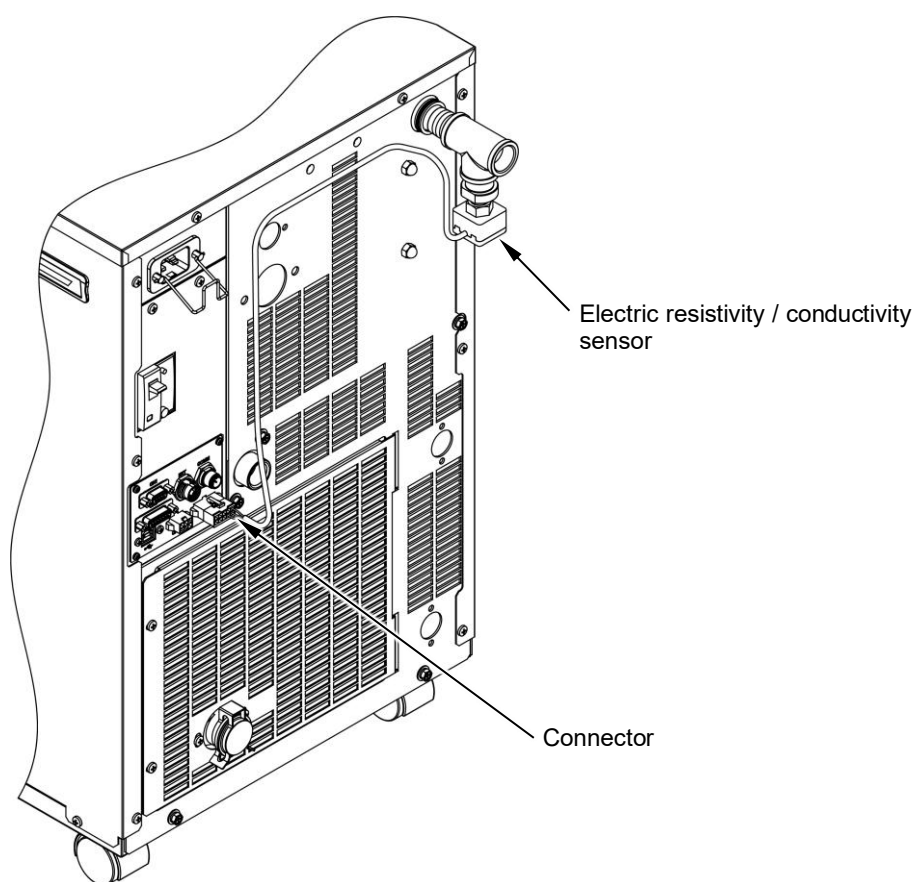
Return to the main screen (screen displaying the circulating fluid temperature).



6.5 Optional Accessories [Electric resistivity / conductivity sensor set]

6.5.1 Optional Accessories [Electric resistivity / conductivity sensor set]

This function is available for customers who have purchased the Electric resistivity / conductivity sensor set which is a separately sold accessory. Refer to the Operation Manual attached to these optional accessories for details.



* It is an example of model "HRSC012-A-20".

Fig. 6.5-1 Optional Accessories [Electric resistivity / conductivity sensor set]

Chapter 7 Alarm indication and trouble shooting

7.1 Alarm Display

When any alarm occurs, the product responds with the following conditions.

- The [ALARM] lamp will flash.
- The alarm buzzer sounds.
- The alarm no. is displayed on PV.
- Contact signal of contact input/output communication is output.

Refer to the Operation Manual for communication for details.

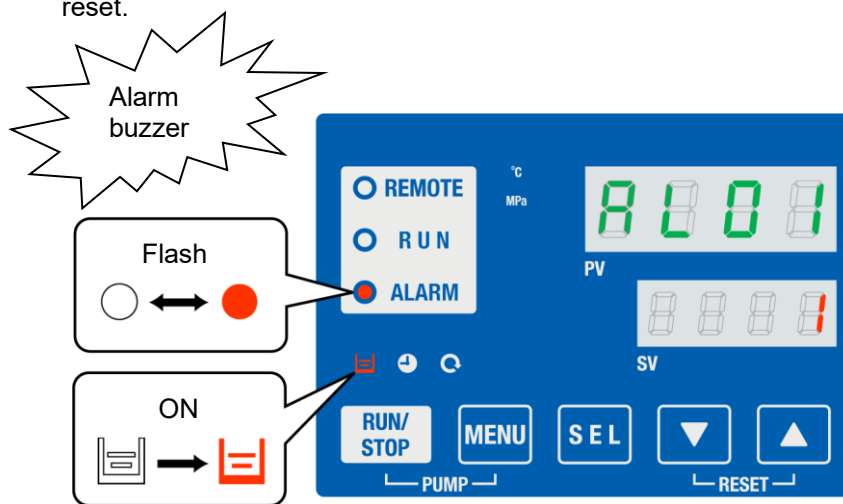
- Read alarm status with serial communication.

Refer to the Operation Manual for communication for details.

- The thermo-chiller has two types of operation depending on the alarm status.

One alarm type will stop operation when an alarm is generated during operation. The other type will not stop operation even when an alarm is generated.

Refer to the “Table 7.3-1 Alarm code list and Troubleshooting”. When the operation is forced to stop, the product cannot restart until the alarm is reset.

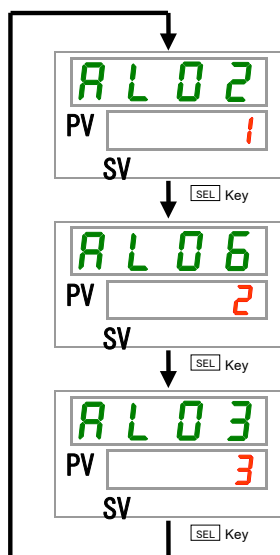


* [AL01] lamp lights only when AL01 Low tank level is generated.

When multiple alarms are generated, the alarms are displayed one by one by pressing the [SEL] key

Alarm with no.1 on the digital display SV is the latest alarm. The alarm with the highest number is the alarm that was generated first.

[Example of display]



The temperature rises gradually, and alarms are generated in the order AL03, AL06, AL02.

The alarm code displayed on the operation panel is AL02. AL06, AL03 are displayed by pressing the [SEL] key.

Digital display SV displays "3" when AL03 is displayed. In this example, AL03 is the highest number. This means AL03 is the alarm generated first.

7.2 Alarm buzzer stop

The alarm buzzer sounds to notify when the alarm signal is output. How to stop the alarm buzzer.

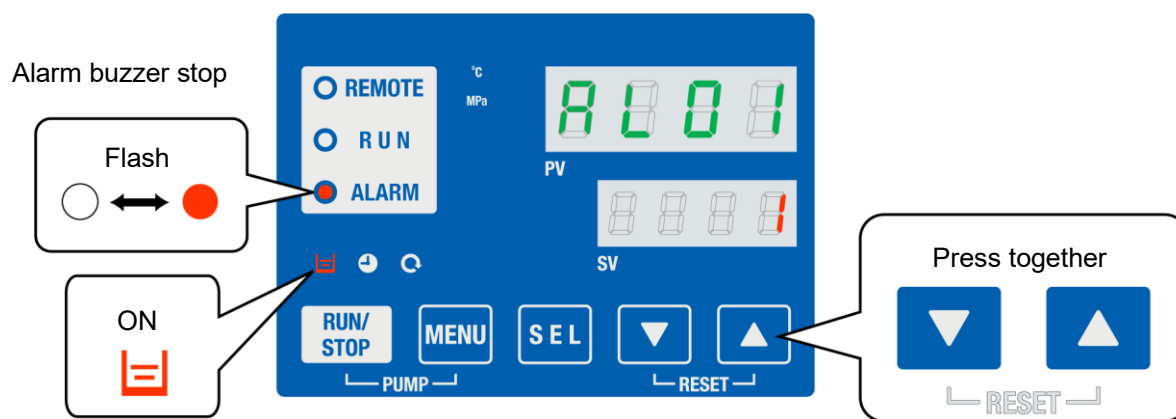
- Ensure that the alarm display screen is displayed. The alarm buzzer can only be stopped on this screen.
- Press [▼] and [▲] keys down simultaneously..
- The alarm buzzer is stopped.

[Tips]

-
- The alarm buzzer can be set not to make sound. Refer to 5.13

Alarm buzzer sound setting". The procedure to stop the alarm buzzer is not necessary when the buzzer is set not to make a sound.

- If this procedure is performed when the cause of the alarm has been eliminated before stopping the alarm buzzer, the alarm will be reset at the same time.



* [] lamp lights only when AL01 Low tank level is generated.

7.3 Troubleshooting

The troubleshooting method depends which alarm has been generated. Refer to "Table 7.3-1 Alarm code list and Troubleshooting".

This page explains how to reset the alarm signal condition after eliminating the cause of the alarm.

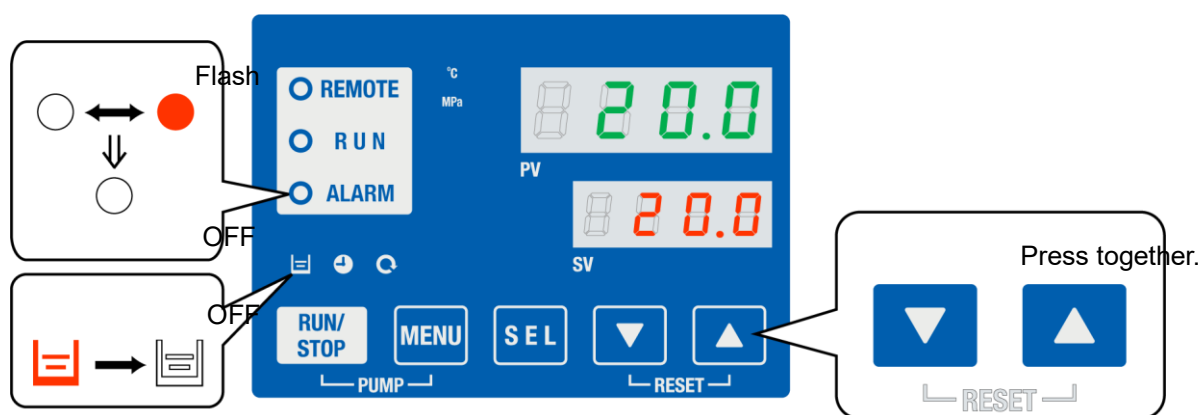
- Ensure that the alarm display screen is displayed. Alarm can only be reset on this screen.
- Press [▼] and [▲] keys down simultaneously.
- The alarm is reset.

The [ALARM] lamp goes off.

The operation panel displays the circulating fluid temperature and the circulating fluid set temperature.

The contact signal of the contact input/output communication stops.

(Please refer to the operation manual "Communication function" for details.)



* [] lamp lights only when AL01 Low tank level is generated.

- Use our service for parts replacement. Do not use parts other than the dedicated parts.

Table 7.3-1 Alarm code list and Troubleshooting (1/2)

Code	Alarm name	Operation	Cause / Countermeasure (Press the reset key after eliminating the cause.)	
AL01	Low level in tank	Stop * ¹	The fluid level has fallen below the level indicator. Refill the circulating fluid.	
AL02	Circulating fluid supply temperature high	Stop	- Check that the circulating fluid flow rate is at least 7l/min. or more.	
AL03	Circulating fluid supply temperature rise	Continued * ¹	- Check that the ambient temperature, facility water temperature, and/or heat load are within specification.	
AL04	Circulating fluid supply temperature drop	Continued * ¹	- Wait until the circulating fluid temperature decreases.	
AL05	Circulating fluid return temperature high	Stop	Check that the ambient temperature and supplied circulating fluid temperature are within specification.	
AL06	Circulating fluid supply pressure high	Stop	- Check that the circulating fluid flow rate is at least 7l/min. or more.	
AL07	Pump operation abnormality	Stop	- Check that the ambient temperature, facility water temperature, and/or heat load are within specification.	
AL08	Circulating fluid supply pressure rise	Continued * ¹	Check the customer's piping for closed valves, obstructive bends, or foreign object blockage.	
AL09	Circulating fluid supply pressure drop	Continued * ¹	Restart and check that the pump is operating.	
AL10	Compressor suction temperature high	Stop	- Check that the tank level is within the appropriate range.	
AL11	Compressor suction temperature low	Stop	- Check the circulating fluid return temperature.	
AL12	Superheat temperature low	Stop	- Check that the heat load is within the appropriate range.	
AL13	Compressor discharge pressure high (sensor)	Stop	- Check the circulating fluid flows.	
AL14	Compressor discharge pressure high (switch)	Stop	- Check the circulating fluid in the evaporator is not frozen.	
AL15	Refrigeration circuit pressure (high pressure side) drop	Stop	- Use a 15% ethylene glycol aqueous solution if operating with a set temperature lower than 10°C.	
AL16	Refrigeration circuit pressure (low pressure side) rise	Stop	Check that the ambient temperature, facility water temperature, and/or heat load are within specification.	
AL17	Refrigeration circuit pressure (low pressure side) drop	Stop	- Check that the ambient temperature is within the specified range.	
AL18	Compressor overload	Stop	- Possible refrigerant leak detected. Request for service.	
AL19	Communication error	OFF * ¹	Check that the circulating fluid is flowing.	
AL20	Memory error	Stop	- Possible refrigerant leak detected. Request for service.	
AL22	Circulating fluid supply temperature sensor abnormality	Stop	Wait 10 minutes, then restart and confirm that the compressor is operating.	
AL23	Circulating fluid return temperature sensor abnormality	Stop	Request message from host computer not received. Please resend the request message.	
AL24	Compressor suction temperature sensor abnormality	Stop	Controller error detected. Power off the device and restart. If the issue continues, request service.	
AL25	Circulating fluid supply pressure sensor abnormality	Stop	Temperature sensor short-circuit or open-circuit detected. Request sensor service.	
AL26	Compressor discharge pressure sensor abnormality	Stop		
AL27	Compressor suction pressure sensor abnormality	Stop		
AL28	Pump maintenance	Continued	Regular maintenance is due. Recommended to request inspection / service of the component. *Refer to "5.16 Accumulated time reset function".	Every 20,000 hours (Option T: Every 8,000 hours) * ²
AL29 * ³	Fan motor maintenance* ³	Continued		Every 20,000 hours
AL30	Compressor maintenance	Continued		Every 50,000 hours

Table 7.3-2 Alarm code list and Troubleshooting (2/2)

Code	Description	Operation	Cause / Remedy (Press the reset key after eliminating the cause.)
AL31	Contact input 1 signal detected	Stop * ¹	Contact input is detected.
AL32	Contact input 2 signal detected	Stop * ¹	
AL33	Fluid leakage	Stop * ¹	- Check that the leak sensor is connected. - Liquid leakage detected. Find and repair the leak location.
AL34	Electric resistivity / conductivity rise	OFF* ¹	Electrical resistivity / conductivity is larger than the set value. If an electrical conductivity sensor is used, replace the DI filter.
AL35	Electric resistivity / conductivity drop	OFF* ¹	Electrical resistivity / conductivity is smaller than the set value. If an electrical conductivity sensor is used, replace the DI filter.
AL36	Electrical resistivity / conductivity sensor abnormality	Continued	- Check that the electrical resistivity / conductivity sensor is connected. - The electrical resistivity / conductivity sensor may have a short-circuit or open-circuit. Replace the sensor.
AL37	Compressor discharge temperature sensor abnormality	Stop	Temperature sensor short-circuit or open-circuit detected. Request sensor service.
AL38	Compressor discharge temperature rise	Stop	Check that the ambient temperature, facility water temperature, and heat load are within specification.
AL46	Compressor inverter error	Stop	Check for power supply system abnormalities (e.g. ground fault, short-circuit, voltage fluctuation, abnormal phase-to-phase voltage, open phase, surge). Power off the device and restart. If the issue continues, ask for service.
AL52	Ambient temperature abnormality* ³	Continued* ¹	Check that the ambient temperature is within the specified range.
AL53	Facility water inlet temperature abnormality* ⁴	Continued* ¹	Check that the facility water temperature is within the specified range.
AL54	Facility water inlet temperature high* ⁴	Stop	Check the customer's piping for closed valves, obstructive bends, or foreign object blockage.
AL55	Facility water outlet temperature rise* ⁴	Continued* ¹	- Check the temperature and flow rate of the customer's facility water system. - Check that the heat load is with the appropriate range.
AL56	Facility water outlet temperature high* ⁴	Stop	
AL57	Ambient temperature sensor abnormality* ³	Stop	Temperature sensor short-circuit or open-circuit detected. Request sensor service.
AL58	Facility water inlet temperature sensor abnormality* ⁴	Stop	
AL59	Facility water outlet temperature sensor abnormality* ⁴	Stop	
AL60	Internal communication error	Stop	Check for power supply system abnormalities (e.g. ground fault, short-circuit, voltage fluctuation, abnormal phase-to-phase voltage, open phase, surge). Power off the device and restart. If the issue continues, ask for service.
AL61	Power supply abnormality	Stop	
AL62	Compressor inverter parameter error	Stop	
AL63	Compressor inverter communication error	Stop	

*1: This is the factory default setting. The setting can be changed by the customer. For details, refer to 5.14 Alarm customize function".

*2: Notice on mechanical seal replacement. Mechanical seal replacement is limited to 2 times. If the cumulative operation time of the pump exceeds 20,000 hours, please consider asking pump inspection service.

*3: This alarm does not occur on water-cooled refrigeration model.

*4: This alarm does not occur on air-cooled refrigeration model.

7.4 Other Errors

■ How to check other errors

The causes and remedies for failures that are not indicated by alarm numbers are shown in "Table 7.4-1".

Table 7.4-1 Causes and remedies for failures without alarm number

Content of failure	Cause	Remedy
The operation panel displays nothing	The power supply switch is not turned on.	Turn on the power supply switch.
	Failure of power supply switch	Replace the power supply switch.
	No power supply (The breaker for the power supply is not turned on.)	Supply the power.
	Trip of breaker due to short-circuit and current leakage	Repair the short-circuit or current leaking part.
The [RUN] LED does not light up even when the [RUN/STOP] switch is pressed.	Communication is set.	Check the presence of communication setting.
	Failure of the [RUN] LED	Replace the controller.
	Failure of the [RUN/STOP] switch	Replace the controller.

Chapter 8 Control, Inspection and Cleaning

8.1 Control of Circulating Fluid Quality

WARNING



Use specified circulating fluids only. If other fluids are used, they may damage the product or result in dangerous hazards.

When using water ensure that it satisfies the water standard shown in the table below.

If the water quality standards are not met, clogging or leakage in the facility water piping, or other problems such as refrigerant leakage, etc., may result.

Table 8-1 Quality standard for water

	Item	Product	Standard value		Influence	
			Circulating fluid	Facility water	Corrosion	Scale generation
Standard item	pH (at 25°C)	—	6.0 to 8.0	6.5 to 8.2	○	○
	Electric conductance (at 25°C)	[μS/cm]	100 to 300	100 to 800	○	○
	Chloride ion	[mg/L]	50 or less	200 or less	○	
	Sulfuric acid ion	[mg/L]	50 or less	200 or less	○	
	Acid consumption (at pH 4.8)	[mg/L]	50 or less	100 or less		○
	Total hardness	[mg/L]	70 or less	200 or less		○
	Calcium hardness	[mg/L]	50 or less	150 or less		○
	Ion silica	[mg/L]	30 or less	50 or less		○
Referential item	Iron	[mg/L]	0.3 or less	1.0 or less	○	○
	Copper	[mg/L]	0.1 or less	0.3 or less	○	
	Sulfide ion	[mg/L]	Not detected	Not detected	○	
	Ammonium ion	[mg/L]	0.1 or less	1.0 or less	○	
	Residual chlorine	[mg/L]	0.3 or less	0.3 or less	○	
	Separation carbonic acid	[mg/L]	4.0 or less	4.0 or less	○	

* Quoted from JRA-GL-02-1994, The Japan Refrigeration and Air Conditioning Industry Association.

* ○: Factors that have an effect on corrosion scale generation.

* Even if the water quality standards are met, complete prevention of corrosion is not guaranteed.

CAUTION

- Clean the tank, circulating fluid circuit, and change the circulating fluid in the tank if any problems are found during the regular check. Additionally, even if no problems are found, it is necessary to change the fluid once every 3 months in case evaporation of the fluid causes concentration of impurities. Refer to the page containing "8.2 Inspection and Cleaning" for the regular check.
- Use an ethylene glycol aqueous solution that does not contain additives such as preservatives.
- When using ethylene glycol aqueous solution, maintain a maximum concentration of 15 %.
- Overly high concentrations can cause a pump overload. Low concentrations, however, can lead to freezing when circulating fluid temperature is 10 °C or lower and cause the thermo-chiller to break down.
- A magnet pump or mechanical seal pump is used as the circulating pump for the circulating fluid. It is particularly impossible to use liquid including metallic powder such as iron powder.

8.2 Inspection and Cleaning

⚠ WARNING

- Do not operate switches, etc. with wet hands and do not touch the electrical parts such as the power supply plug. It might cause electric shock.
- Do not splash water directly on the product and do not wash with water. It might cause electric shock and fire, etc.
- Do not touch the fins directly when cleaning the dustproof filter. It might cause injury.

⚠ WARNING

- Shut off the power supply of the product when performing cleaning, maintenance or inspection. It might cause electric shock, injury or burn, etc.
- Replace all panels removed for inspection or cleaning. It might cause injury or electric shock if it is operated with the panel removed or open. Do not operate switches, etc. with wet hands and do not touch the electrical parts such as the power supply plug. It might cause electric shock.

8.2.1 Daily check

Check each item of Table 8-2 below, and if any error is seen, stop the operation of the product and turn off the user's power supply, and service the product.

Table 8-2 Contents of daily check

Item	Content of check	
Installation condition	Check the installation conditions of the product.	There is no heavy object on the product or excessive force on the piping.
		Temperature and humidity are within the specified range of the product.
Fluid leakage	Check the connected part of piping	There is no circulating fluid leakage from the connected part of piping.
Fluid amount	Check the liquid level indicator.	The circulating fluid must enter the scale of "H".
Operation panel	Check the display.	The numbers on the display are clear.
	Check the function.	The [RUN/STOP] and [MENU], [SEL], [▼], [▲] buttons operate properly.
Circulating fluid supply pressure	Check on the operation panel.	There is no problem for use.
Operating conditions	Check the operation condition.	There is no abnormal noise, vibration, smell and smoke. There should be no active alarm signal.
Ventilating condition (For air-cooled type)	Check the condition of the ventilation grille.	Make sure the ventilation grille is not obstructed.
Facility water supply (For water-cooled type)	Check the supply condition to the thermo-chiller.	Temperature, flow rate and pressure are within the specified range.

8.2.2 Monthly check

Table 8-3 Contents of Monthly check

Item	Content of check	
Ventilating condition (For air-cooled type)	Clean the ventilation grille.	Make sure the ventilation grille is not clogged with dust, etc.
Facility water supply (For water-cooled type)	Check the facility water.	Make sure the facility water is clean and contains no foreign matter.
Automatic water supply (Option J: Automatic water supply)	Check the supply water.	Make sure the supply water is clean and contains no foreign matter.

■ Cleaning of air vent (For air-cooled type)

CAUTION

- If the fins of the air-condenser become clogged with dust or debris, heat radiation performance reduces. This results in the reduction of cooling performance, and may stop the operation because the safety device is trigger. Shut off the power supply of the product when performing cleaning, maintenance or inspection. It might cause electric shock, injury or burn, etc.

Use a long bristled brush or air gun to clean the condenser to prevent the fins from being deformed or damaged.

■ Removal of the dustproof filter

- 1.** The dustproof filter is installed at the lower part of the front face of the thermo-chiller. It is mounted with a magnet. Pull out the lower part of the side surface of the dustproof filter.
-
- 2.** When the magnet comes off, pull the dustproof filter downwards to remove. Care should be taken not to deform or scratch the air-cooled condenser.

■ HRSC012/018/024/030/040-A*-20

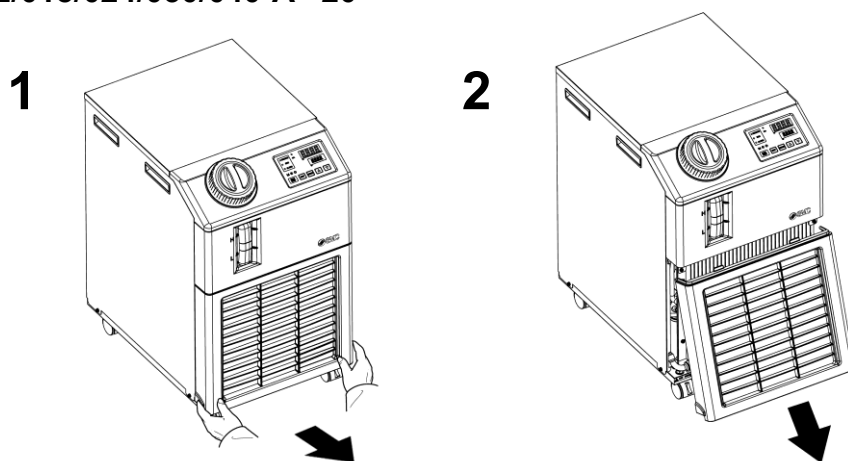


Fig. 8.2-1 Removal of the dustproof filter

■ HRSC050/060-A*-20

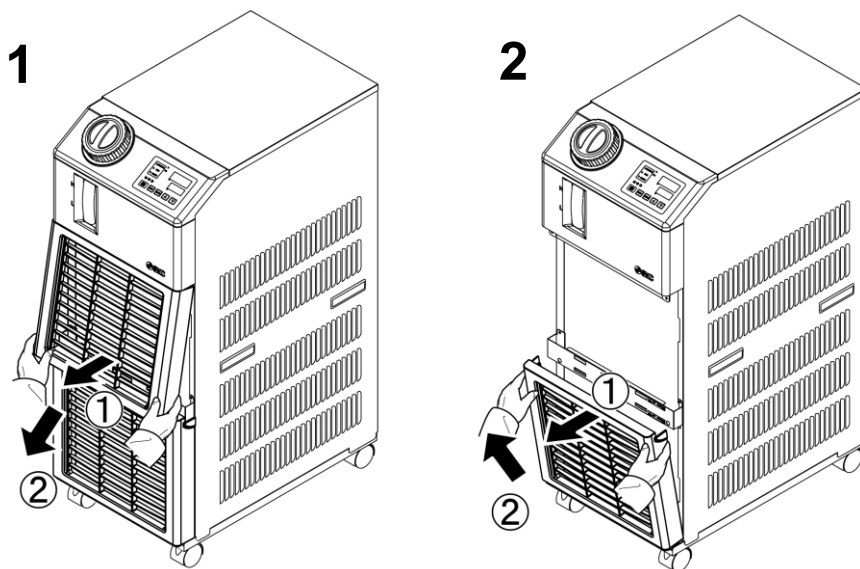


Fig. 8.2-2 Removal of the dustproof filter

■ Cleaning of filter

Use a long bristled brush or air gun to clean the condenser.

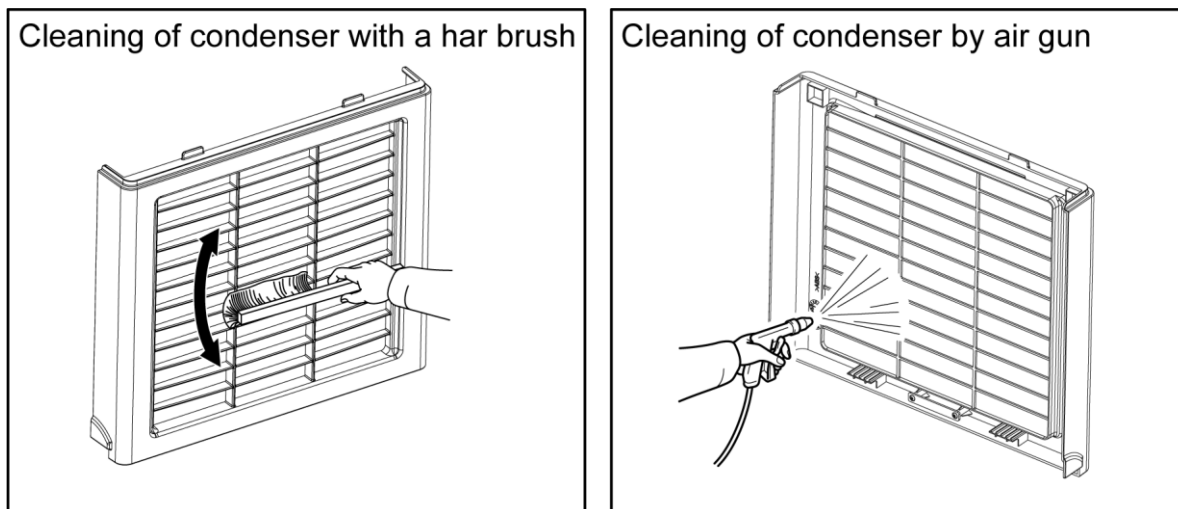


Fig. 8.2-3 Cleaning of filter

■ Mounting of dustproof filter

Insert the collar in reverse order of removal, then mount the dustproof filter. The magnet clicks when mounted.)

8.2.3 Inspection every 3 months

Table 8-4 Contents of every 3 months check

Item	Content of check	
Power supply	Check the power supply voltage.	- Make sure the supply voltage is within the specification range.
Circulating fluid	Replace the circulating water periodically. Clean the tank.	- Ensure that the water has not been contaminated and that there is no algae growth. - Circulating water inside the tank must be clean and there must not be foreign matter inside. - Use water or pure water. The water quality must be within the range shown in Table 8-1. * It is recommended to replace the circulating fluid every 3 months when periodic maintenance is performed.
	Density control (When using 15% concentration ethylene glycol aqueous solution)	- Density must be within the range of 15 % +5/-0.
Facility water (For water-cooled type)	Check the water quality.	- Ensure that the water is clean and contains no foreign matter. Also check that the water has not been contaminated and there is no algae growth. - The water quality must be within the range shown in Table 8-1.

■ Replacement of circulating fluid

- Replace the circulating fluid with new clean fluid periodically, or it may get algae or decompose.

Circulating fluid to be supplied in the tank should satisfy the water quality specified in "Table 8-1 Quality standard for water".

- For the circulating fluid, select from the specification range shown in "Table 8-1 Quality standard for water".
- When using 15% ethylene glycol solution, check that the concentration is within the range of 15% +5/-0.

■ Replacement of circulating fluid (For water-cooled type)

- Clean the facility water source and replace the facility water.
- For the facility water, select from the specification range shown in "Table 8-1 Quality standard for water".

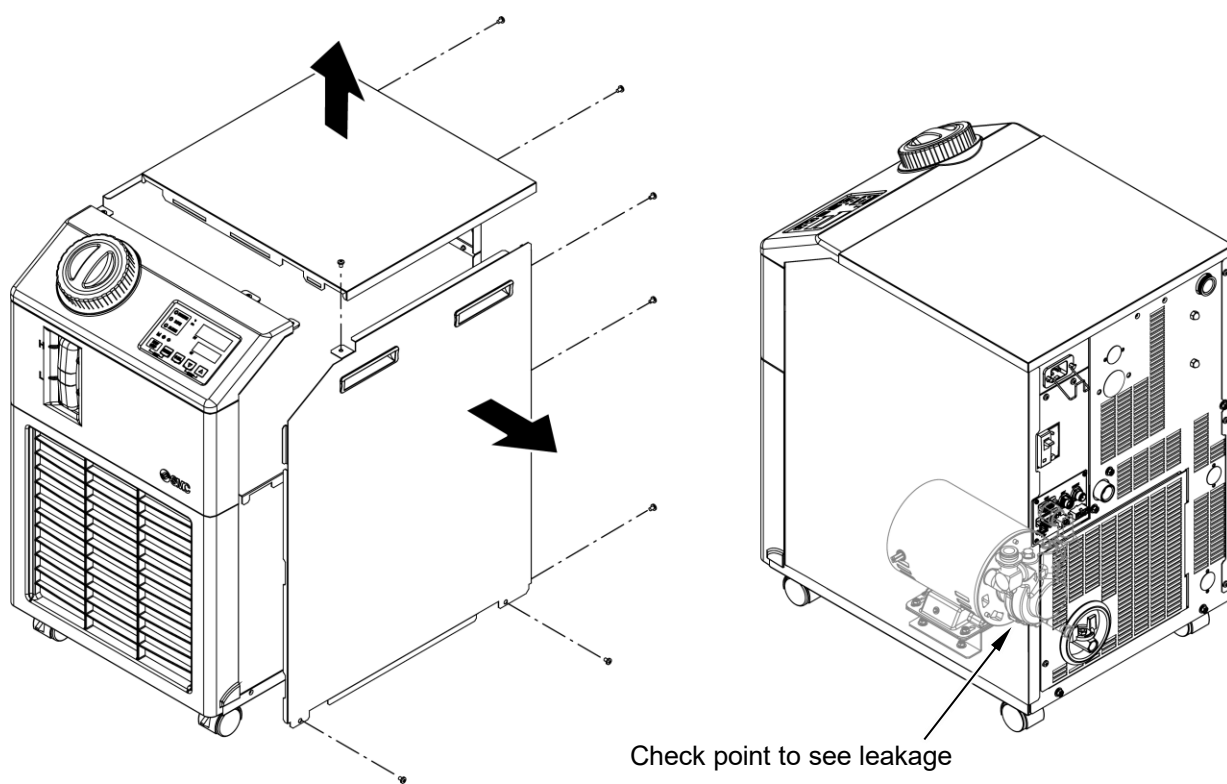
8.2.4 Inspection every 6 months

■ Check for water leakage from pump (For High-pressure pump)

Remove the panel and check the pump for excessive leakage. If the leakage is found, replace the mechanical seal. Order the mechanical seal described in "8.3 Consumables" as a service part.

CAUTION

- **Leakage from the mechanical seal**
It is impossible to prevent the leakage from the mechanical seal completely because of its structure. Although the leakage is described as 3cc/hr or less.
- **The recommend life time of the mechanical seal before needing replacement is 6000 to 8000 hours (usually 1 year)**



* It is an example of model "HRSC012-A-20-T".

Fig. 8.2-4 Check for water leakage from pump

8.2.5 Inspection for winter season

■ Prevention of freezing of circulating fluid

The product can prevent freezing of the circulating fluid during winter or at night. If there is a risk of freezing due to a change of installation conditions and operating environment (operating time, weather etc.), conduct the following operations in advance.

■ Anti-freezing function (automatic pump operating function)

- When the circulating fluid temperature reaches 30C, the pump will start automatically.
- The operation of pump will heat the circulating fluid with its power. Then, when the circulating fluid temperature reaches 5 oC, the pump will stop automatically.
- As a result, the circulating fluid temperature is kept between 3 and 5 oC, and can be prevented from freezing.
- The operation cannot prevent freezing of the facility water circuit (For water cooled type). The user should take measures against freezing.
- This function does not prevent the freezing of the automatic fluid filling circuit (when the option is selected). The measure for the automatic fluid filling circuit is taken by customer.

* For details refer to "5.11 Anti-freezing function".

1. Keep the power supply on. (RUN lamp flashes at 2sec. intervals.)

2. Fully open the valve and manual relief valve installed by the user, to ensure the circulating fluid will be able to circulate when the pump starts automatically.

CAUTION



- Also, the facility water circuit does not have a similar function.
- Also, the automatic water-fill does not have a similar function.

8.3 Consumables

Replace the following parts depending on their condition.

Table 8-5 Consumables

Part number	Name	Qty.	Remarks
HRS-S0001	Dustproof filter	1	For spare
HRG-S0211	Mechanical seal set	1	- HRSC012/018/024/030/040-**-20-** For option T (High head pump) - For HRSC050/060-**-20

8.4 Stop for a Long Time

If there is a concern that the product will not be operated for a long period of time or there is a risk of freezing, conduct the following operations.

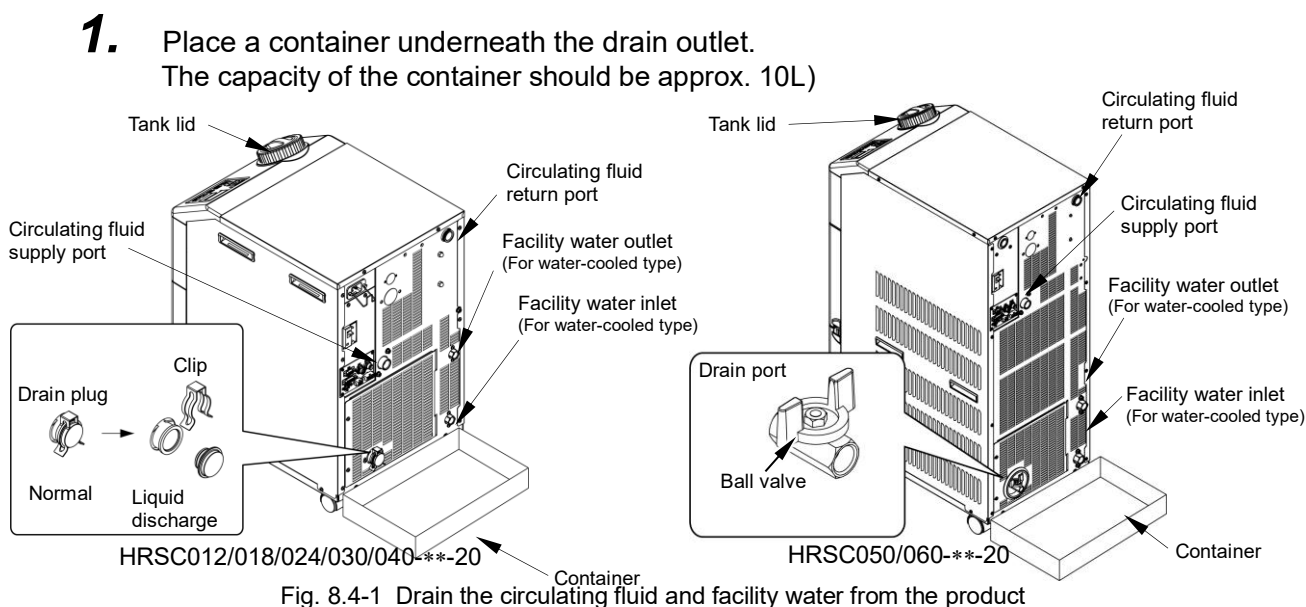
1. Turn off the user's power supply (breaker).
2. Drain the circulating fluid and facility water (for water-cooled type) of the product completely.
Please refer to "8.4.1 Discharge of the circulating fluid" for the method of drain the circulating fluid from the product.
3. After draining, cover the product with vinyl, etc. and store.

8.4.1 Discharge of the circulating fluid and facility water

⚠ WARNING



- Stop the customer device and release the residual pressure before discharging the circulating fluid.
- Before discharging the facility water, in case of water-cooled refrigerated type, stop the equipment for the facility water, or stop the facility water circuit to release the residual pressure.



2. Remove the tank lid.
3. <HRSC012/018/024/030/040-**-20>
Remove the drain plug on the drain port on the piping to discharge the fluid.
An O ring is used for the drain plug. Take care not to damage the O ring.
<HRSC050/060-**-20>
Open the ball valve at the drain opening to drain the liquid.
4. Confirm that a sufficient amount of the circulating fluid has been drained from the user's machine and piping, and apply air purge from the circulating fluid return port.

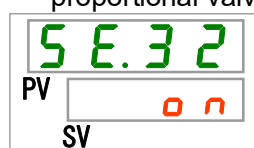
5. <HRSC012/018/024/030/040-□□-20>

After discharging the circulating fluid in the tank, refit the drain plug, clip and close the tank lid.

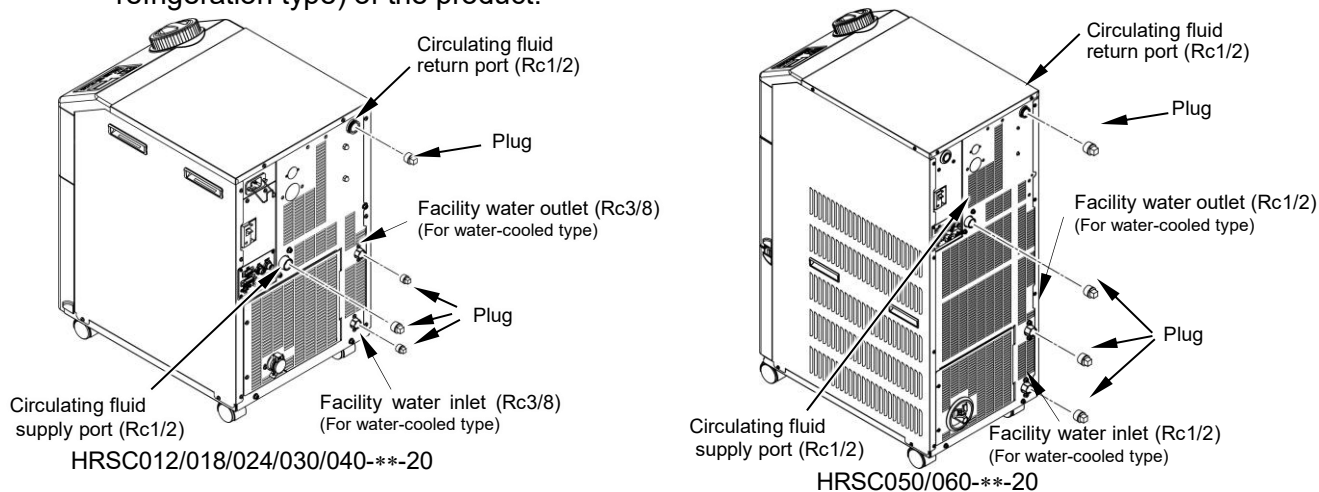
<HRSC050/060-**-20>

After discharging the circulating fluid in the tank, close the ball valve and attach the tank lid.

<For the water-cooled refrigeration chiller, drain the facility water according to the procedures from 6 to 8.>

6. Remove the piping of the outlet of the facility water.**7.** Press the [SEL] key 31 times.
The digital display will show the setting screen for forced opening/closing of the proportional valve, so turn it to " ".**CAUTION**

Just removing the facility water piping does not discharge the facility water completely. Remove the plug to discharge the facility water.

8. After confirming that the discharged water has been fully discharged, turn off the forced opening/closing of the proportional valve that was set in step 7.**9.** Referring to Fig. 8.4-2 Removal of the plug, install plugs at the circulating liquid supply/return ports and heat radiation water inlet/outlet (in the case of water-cooled refrigeration type) of the product.

Facility water inlet/ outlet plug	Size
HRSC012/018/024/030/040-**-20	Rc3/8
HRSC050/060-**-20	Rc1/2

Fig. 8.4-2 Removal of the plug

■ Fitting for the drain port (Accessory)

■ HRSC012/018/024/030/040-**-20

The thermo-chiller includes the fitting for the drain port shown in Fig. 8.4-3 .Discharging of the drain will be easier if customer prepares a valve.The valve has to be connected to the drain port fitting.If the valve is connected far away from the drain port fitting, it cause an air trap.

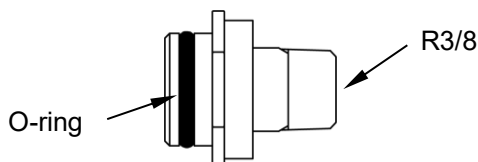


Fig. 8.4-3 Fitting for the drain port (Accessories)

Example)

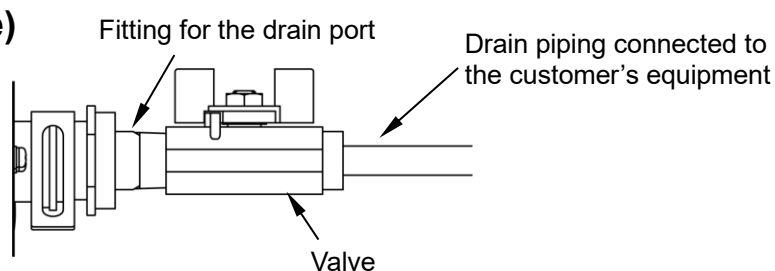


Fig. 8.4-4 Example of using fitting for the drain port

■ Connection to the drain (ball valve)

■ HRSC050/060-**-20

When connecting piping to the drain (ball valve), fix the ball valve with a spanner.

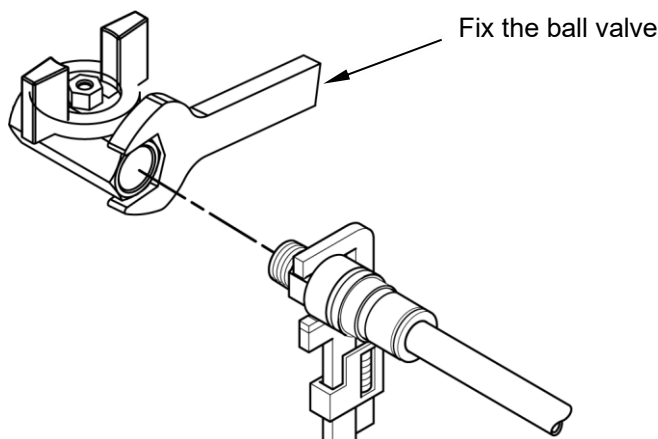


Fig. 8.4-5 Connection to the drain

CAUTION



If you do not fix the ball valve during piping, the ball valve will rotate, causing fluid leakage or malfunction.
Fix the ball valve during piping.

■ HRSC012/018/024/030/040--20-* For Option T, MT [High-pressure pump]**

The ball valve is the drain port. Open the ball valve to discharge the circulating fluid in the same way as procedure 1 to 9. Close the ball valve after discharging the circulating fluid.

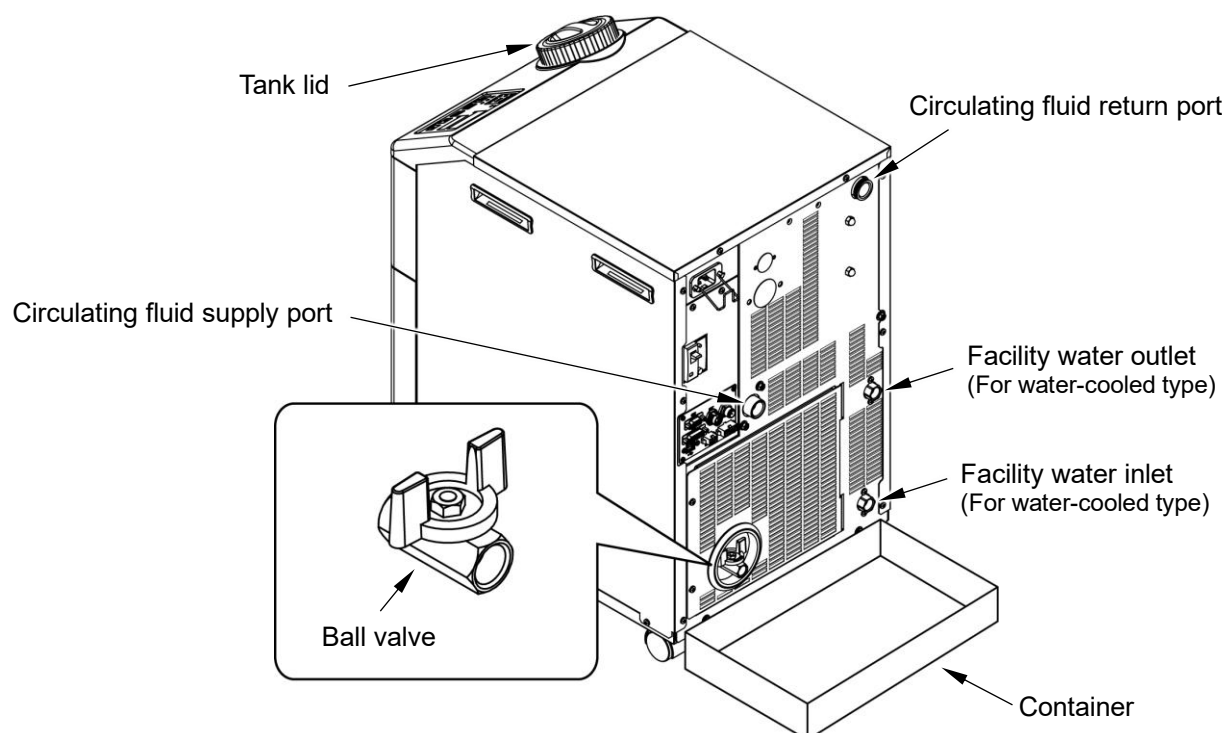


Fig. 8.4-6 Drain the circulating fluid and facility water from the product for option T, MT [High-pressure pump]

Chapter 9 Documents

9.1 Specifications List

9.1.1 Product specification

Table 9.1-1 Specifications List [HRSC***-A*-20]

Model			HRSC012-A-20	HRSC018-A-20	HRSC024-A-20	HRSC030-A-20	HRSC040-A-20	HRSC050-A-20	HRSC060-A-20		
Cooling method			Air-cooled refrigeration								
Refrigerant			R744 (CO ₂ , GWP: 1)								
Refrigerant charge		[kg]	0.43	0.43	0.43	0.48	0.48	0.54	0.54		
Control method			PID control								
Ambient temperature/Humidity/Altitude ^{*1, 10} /Installation environment			Temperature: 5 to 40°C, High-temperature environment specification (option): 5 to 45°C, Humidity: 30 to 70%, Altitude: less than 3000 m, Environment: Indoor								
Circulating fluid system	Circulating fluid ^{*2}		Water, 15% ethylene glycol aqueous solution ^{*4}								
	Set temperature range ^{*1}		[°C]		5 to 40						
	Cooling capacity ^{*3}		[W]	1300	1900	2400	3200	4200	5100	5900	
	Heating capacity ^{*3}		[W]	650	650	650	640	1100	1400	1300	
	Temperature stability ^{*5}		[°C]	±/ - 0.1							
	Pump	Rated flow (50/60 Hz) ^{*6, 7}	[L/min]	7 (0.13MPa) / 7 (0.18MPa)						23 (0.24MPa) / 28 (0.32MPa)	
		Maximum flow rate (50/60 Hz)	[L/min]	27 / 29				34 / 40		31 / 42	
		Maximum pump head (50/60 Hz)	[m]	14 / 19						50	
		Output	[W]	200						550	
	Tank capacity		[L]	Approx. 5							
	Port size			Rc1/2							
	Fluid contact material ^{*15}			Stainless steel, Copper (Heat exchanger brazing), Brass, Alumina ceramic ^{*13} , Carbon, PP, PE, POM, FKM, EPDM, PVC, SiC ^{*14}							
Electrical system	Power supply		Single-phase 200 to 230 VAC (50/60 Hz) Allowable voltage range ±/ - 10% (No continuous voltage fluctuation)								
	Earth leakage breaker(Standard)	Rated current	[A]	10	10	15	15	20	30	30	
		Sensitivity current	[mA]	30	30	30	30	30	30	30	
	Rated operating current ^{*3}		[A]	5.0/5.1	6.4/6.5	7.7/7.8	8.6/8.7	11.4/11.5	12.7/14	14.6/15.9	
	Rated power consumption ^{*3}		[kW(kVA)]	0.8/0.8(1.0/1.0)	1.0/1.0(1.3/1.3)	1.3/1.3(1.6/1.6)	1.3/1.4(1.8/1.8)	1.8/1.8(2.3/2.3)	2.1/2.4(2.5/2.8)	2.3/2.6(2.9/3.2)	
Noise level (50/60 Hz) ^{*8}			[dB(A)]	60/61	60/61	60/61	62/65	64/66	65/68	66/68	
Accessories			Fitting (for drain outlet) 1pc ^{*11} , Power supply connector 1pc. ^{*12} , Quick Manual (with a clear case) Japanese text: 1pc. English text: 1pc., Alarm code list sticker Japanese text: 1pc. English text: 1pc., Power supply cable: Option (sold separately) to be ordered or prepared by the user.								
Weight ^{*9}		[kg]	51		53		73				

*1 No condensation should be present.

*2 Use fluid in condition below as the circulating fluid.

Water: Please refer to "8.1 Control of Circulating Fluid Quality".

15% ethylene glycol aqueous solution: diluted by water in condition above without any additives such as antiseptics.

Deionized water: Electric conductivity 1 µS/cm or higher (Electric resistivity 1 MΩ·cm or lower)

*3 ① Ambient temperature: 25°C, ② Circulating fluid temperature: 20°C, ③ Circulating fluid at the rated flow, ④ Circulating fluid: Water

Refer to the cooling capacity and heating capacity graphs.

*4 Use a 15% ethylene glycol aqueous solution if operating in a place where the circulating fluid temperature is 10°C or less.

*5 Temperature at the thermo-chiller outlet when the circulating fluid flow is at the rated flow and the circulating fluid outlet and return port are directly connected.

The installation environment and power supply are within the specification range and stable.

*6 The capacity at the thermo-chiller outlet when the circulating fluid temperature is 20°C

*7 The required minimum flow rate for maintaining the cooling capacity or temperature stability. The specification of the cooling capacity and the temperature stability may not be satisfied if the flow rate is lower than the rated flow. (In such a case, use a bypass piping set (sold separately).)

*8 Front: 1 m, height: 1 m, stable with no load, Other conditions -> See *3.

*9 Weight in the dry state without circulating fluids.

*10 If the product is used at an altitude of 1000 meters or higher, the maximum allowable ambient temperature and the cooling capacity decrease.

*11 It is not provided for the HRSC050/060.

*12 It is not provided for the HRSC040/050/060.

*13 Not included for the HRSC050/060.

*14 When Option T, MT is selected for HRSC012/018/024/030/040, when HRSC050/060 is selected.

*15 Copper and brass is not included when option M [DI water (pure water) piping] is selected.

Table 9.1-2 Specifications List [HRSC***-W*-20]

Model			HRSC012-W-20	HRSC018-W-20	HRSC024-W-20	HRSC030-W-20	HRSC040-W-20	HRSC050-W-20	HRSC060-W-20	
Cooling method			Water-cooled refrigeration							
Refrigerant			R744 (CO ₂ , GWP: 1)							
Refrigerant charge		[kg]	0.4	0.4	0.4	0.41	0.41	0.44	0.44	
Control method			PID control							
Ambient temperature/Humidity/Altitude ^{*1} /Installation environment			Temperature: 5 to 40°C, Humidity: 30 to 70%, Altitude: less than 3000 m, Environment: Indoor							
Circulating fluid system	Circulating fluid ^{*2}		Water, 15% ethylene glycol aqueous solution ^{*4}							
	Set temperature range ^{*1}		[°C]		5 to 40					
	Cooling capacity ^{*3}		[W]	1300	1900	2400	3200	4200	5100	5900
	Heating capacity ^{*3}		[W]	650	650	650	600	1000	1300	1300
	Temperature stability ^{*5}		[°C]	±0.1						
	Pump	Rated flow (50/60 Hz) ^{*6,7}	[L/min]	7 (0.13MPa) / 7 (0.18MPa)					23 (0.24MPa) / 28 (0.32MPa)	
		Maximum flow rate (50/60 Hz)	[L/min]	27 / 29			34 / 40		31 / 42	
		Maximum pump head (50/60 Hz)	[m]	14 / 19					50	
		Output	[W]	200					550	
	Tank capacity		[L]	Approx. 5						
Port size			Rc1/2							
Fluid contact material ^{*15}			Stainless steel, Copper (Heat exchanger brazing), Brass, Alumina ceramic ^{*13} , Carbon, PP, PE, POM, FKM, EPDM, PVC, SiC ^{*14}							
Facility water system	Temperature range		[°C]		10 to 40					
	Pressure range		[MPa]		0.3 to 0.5					
	Required flow rate (50/60 Hz) ^{*10}		[L/min]	8	12	14	15	15	16	17
	Inlet-outlet pressure differential of facility water		[MPa]		0.3 or more					
	Port size		Rc3/8					Rc1/2		
Fluid contact material			Stainless steel, Copper (Heat exchanger brazing), EPDM							
Electrical system	Power supply		Single-phase 200 to 230 VAC (50/60 Hz) Allowable voltage range ±10% (No continuous voltage fluctuation)							
	Earth leakage breaker(Standard)	Rated current	[A]	10	10	10	15	20	20	20
		Sensitivity current	[mA]	30	30	30	30	30	30	30
	Rated operating current ^{*3}		[A]	3.1/3.2	4.0/4.1	4.4/4.5	6.1/6.2	7.6/7.7	9.4/10.7	10.3/11.6
	Rated power consumption ^{*3}		[kW(kVA)]	0.5/0.6(0.6/0.7)	0.6/0.7(0.7/0.8)	0.8/0.9(0.9/1.0)	0.9/1.0(1.3/1.3)	1.1/1.2(1.6/1.6)	1.6/1.9(1.9/2.2)	1.7/2.0(2.0/2.3)
Noise level (50/60 Hz) ^{*8}			[dB(A)]	60/61	60/61	60/61	62/65	64/66	65/68	66/68
Accessories			Fitting (for drain outlet) 1 pc ^{*11} , Power supply connector 1 pc. ^{*12} , Quick Manual (with a clear case) Japanese text: 1pc, English text: 1pc., Alarm code list sticker Japanese text: 1pc, English text: 1pc., Power supply cable: Option (sold separately) to be ordered or prepared by the user.							
Weight ^{*9}		[kg]	50			53		70		

*1 No condensation should be present.

*2 Use fluid in condition below as the circulating fluid.

Water: Please refer to "8.1 Control of Circulating Fluid Quality".

15% ethylene glycol aqueous solution: diluted by water in condition above without any additives such as antiseptics.

Deionized water: Electric conductivity 1 μS/cm or higher (Electric resistivity 1 MΩ·cm or lower)

*3 ① Ambient temperature: 25°C, ② Circulating fluid temperature: 20°C, ③ Circulating fluid at the rated flow, ④ Circulating fluid: Water

Refer to the cooling capacity and heating capacity graphs.

*4 Use a 15% ethylene glycol aqueous solution if operating in a place where the circulating fluid temperature is 10°C or less.

*5 Temperature at the thermo-chiller outlet when the circulating fluid flow is at the rated flow and the circulating fluid outlet and return port are directly connected.

The installation environment and power supply are within the specification range and stable.

*6 The capacity at the thermo-chiller outlet when the circulating fluid temperature is 20°C

*7 The required minimum flow rate for maintaining the cooling capacity or temperature stability. The specification of the cooling capacity and the temperature stability may not be satisfied if the flow rate is lower than the rated flow. (In such a case, use a bypass piping set (sold separately).)

*8 Front: 1 m, height: 1 m, stable with no load, Other conditions -> See *3.

*9 Weight in the dry state without circulating fluids.

*10 The required flow rate when the cooling capacity load is applied at a circulating fluid temperature of 20°C, and circulating fluid rated flow and facility water temperature of 25°C. The actual facility water flow rate will vary depending on the operating conditions.

*11 It is not provided for the HRSC050/060.

*12 It is not provided for the HRSC040/050/060.

*13 Not included for the HRSC050/060.

*14 When Option T, MT is selected for HRSC012/018/024/030/040, when HRSC050/060 is selected.

*15 Copper and brass is not included when option M [DI water (pure water) piping] is selected.

9.1.2 Communication specifications

■ Contact input/output

Table 9.1-3 Specifications List

Item		Specification
Connector type (for this product)		D-sub15 pin Female connector
Input signal	Insulation system	Photo coupler
	Rated input Voltage	DC24V
	Operating voltage range	DC24V +/-10%
	Rated input current	5mA TYP
	Input signal	4.7kΩ
Contact output signal	Rated load voltage	AC48V or less /DC30V or less
	Maximum load current	AC/DC500mA (Resistance load)
	Minimum load current	DC5V 10mA
Output voltage		DC24V +/-10% 0.5A MAX (Cannot be used for inductive loads)
Circuit structure diagram	This product ↔ Your system DC24V output 24VCOM output DC24V output 24VCOM output DC24V output MAX 0.5A COM of contact input signal Contact input signal 1: Run/Stop signal (Default unsetting) Contact input signal 2: OFF (Default unsetting) COM of contact output signal 1 Contact output signal 1: Run status (Default unsetting) COM of contact output signal 2 Contact output signal 2: Remote (Default unsetting) COM of contact output signal 3 Contact output signal: Alarm (Default unsetting) None Do not connect.	

*1 The pin numbers and output signals can be set by user. For details, refer to the [5.17 Communication function].

*2 When using with optional accessories, depending on the accessory, the allowable current of 24 VDC devices will be reduced. Refer to the operation manual of the optional accessories for details.

■ Serial communication

Table 9.1-4 Specifications List

Item		Specification
Connector type (for this product)		D-sub9 pin Female connector (Mounting screw: M2.6×0.45)
Protocol		Modicon MODBUS standard / Simple communication protocol
Standard		EIA RS-485 EIA RS-232C
Circuit structure diagram	This product ↔ Your system SD+ SG SD- RD SD SG	

■ Connector location

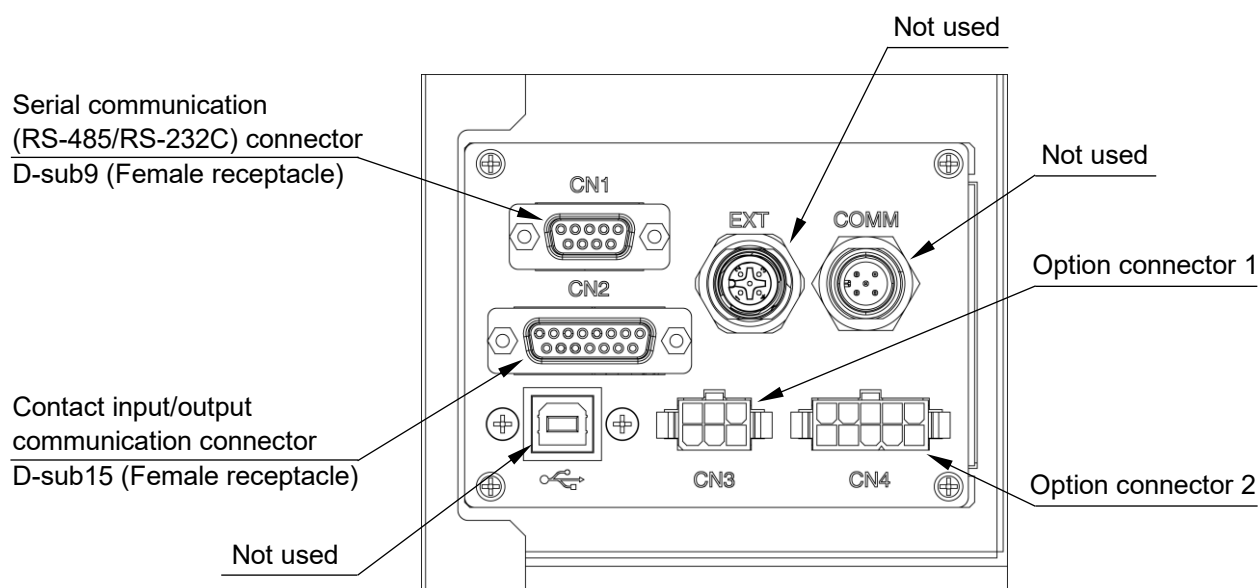


Fig 9.1-1 Rear side

9.2 Outer dimensions

■ HRSC012/018/024-**-20

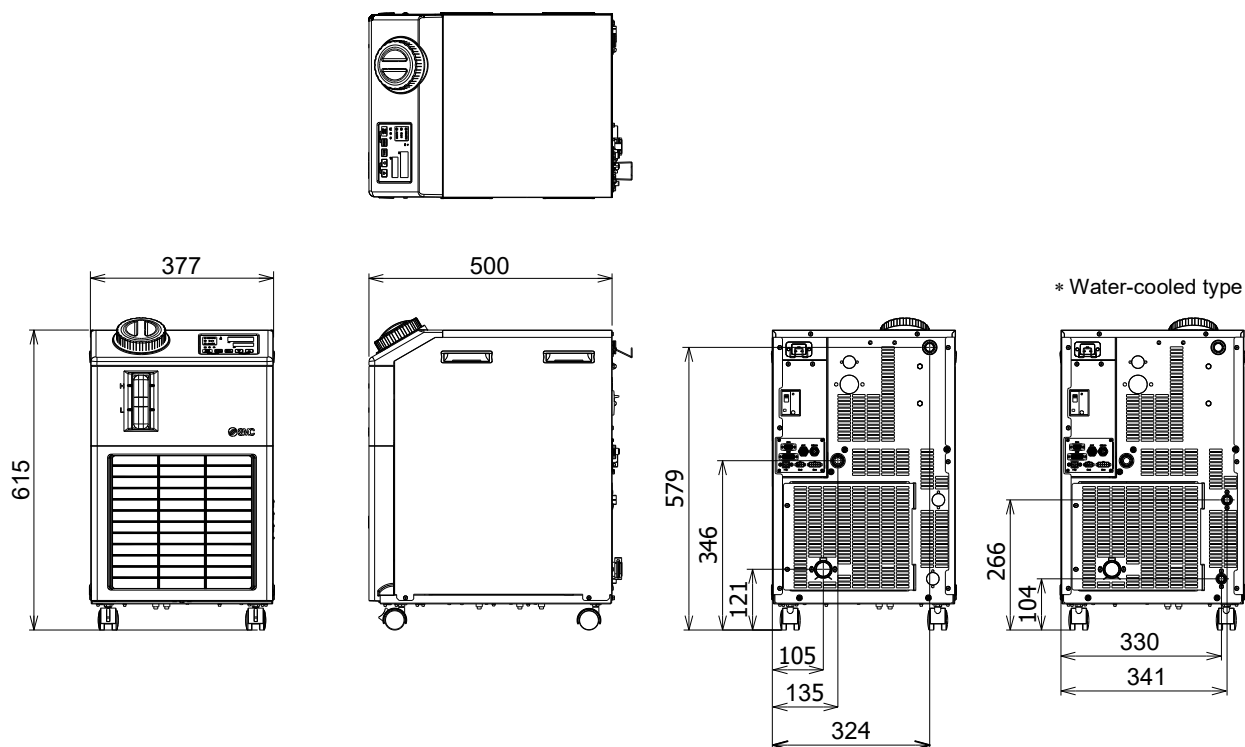


Fig 9.2-1 Outer dimensions

■ HRSC030/040-A*-20

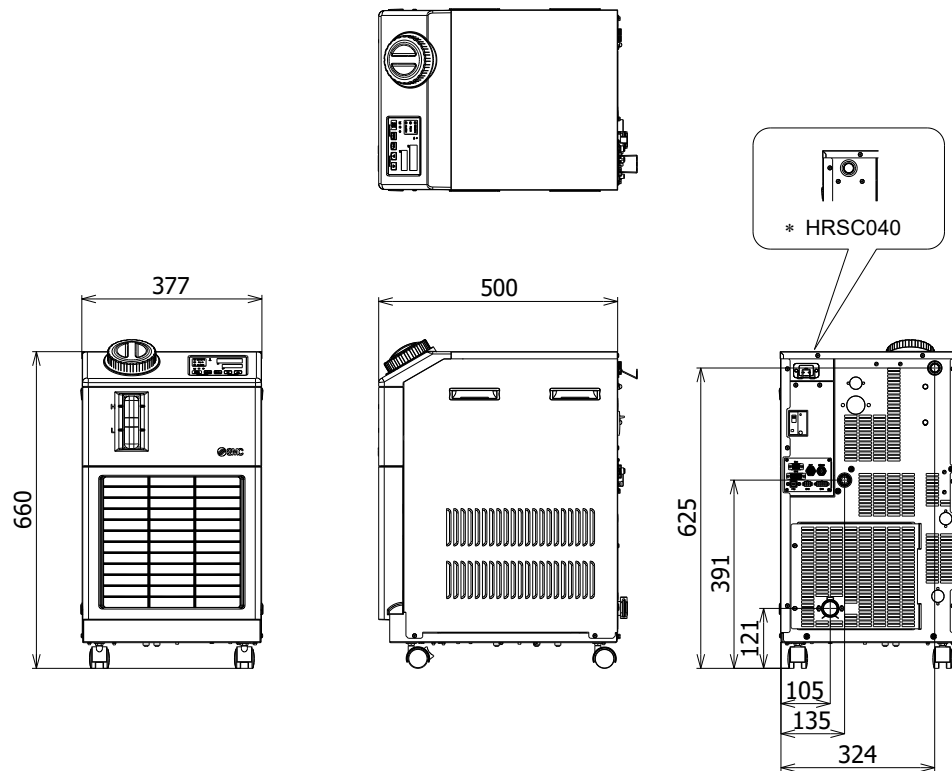


Fig 9.2-2 Outer dimensions

■ HRSC030/040-W*-20

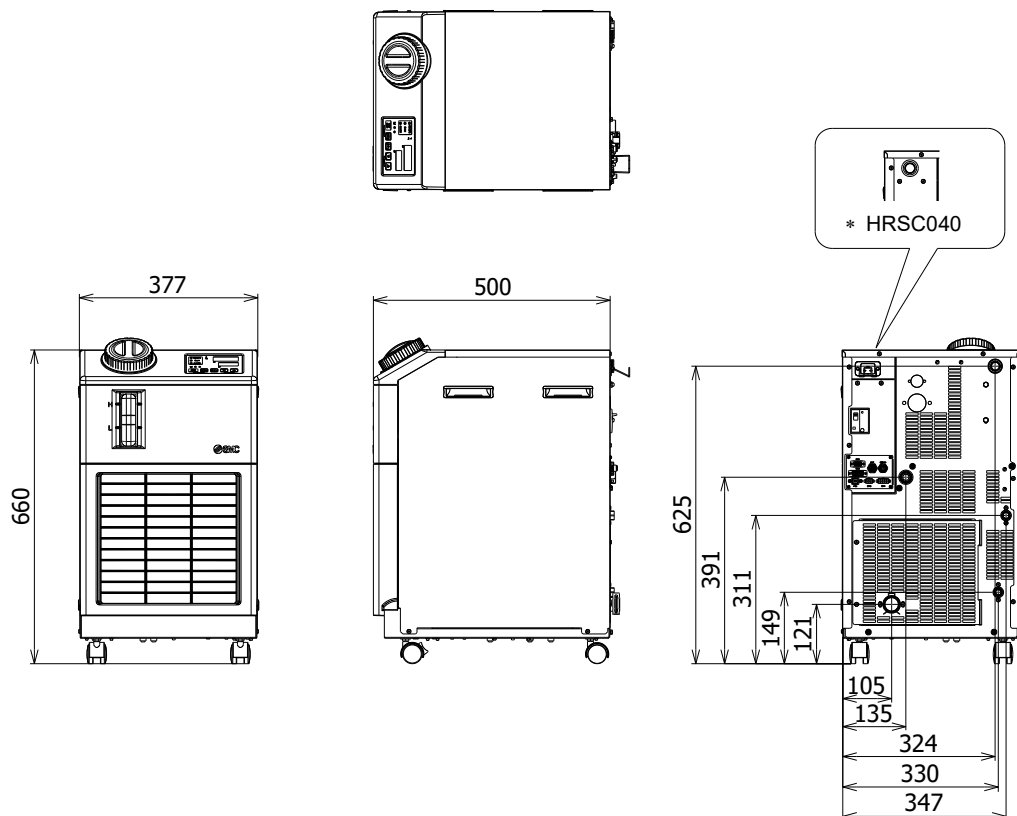


Fig 9.2-3 Outer dimensions

■ HRSC050/060-A*-20

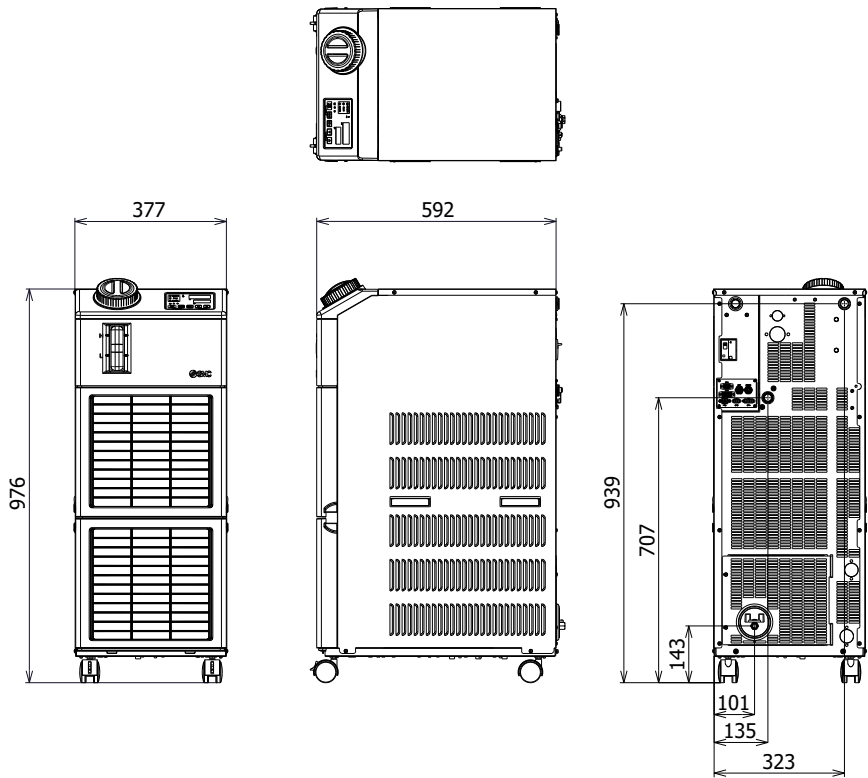


Fig 9.2-4 Outer dimensions

■ HRSC050/060-W*-20

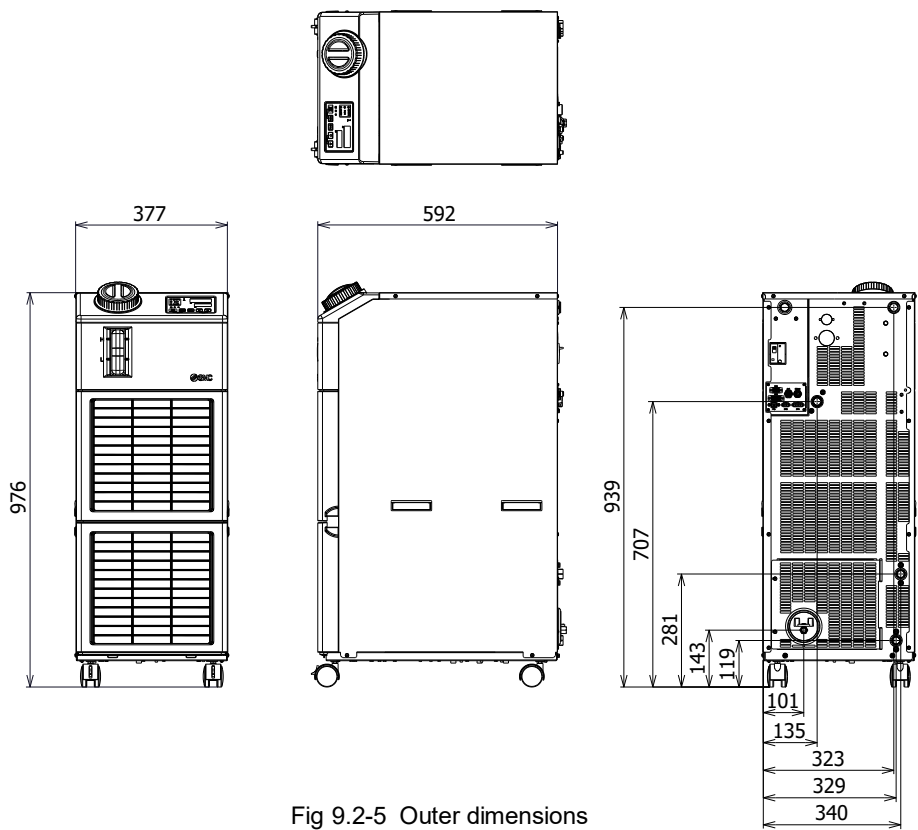


Fig 9.2-5 Outer dimensions

9.3 Flow Chart

9.3.1 HRSC012-A*-20, HRSC018-A*-20, HRSC024-A*-20, HRSC030-A*-20, HRSC040-A*-20

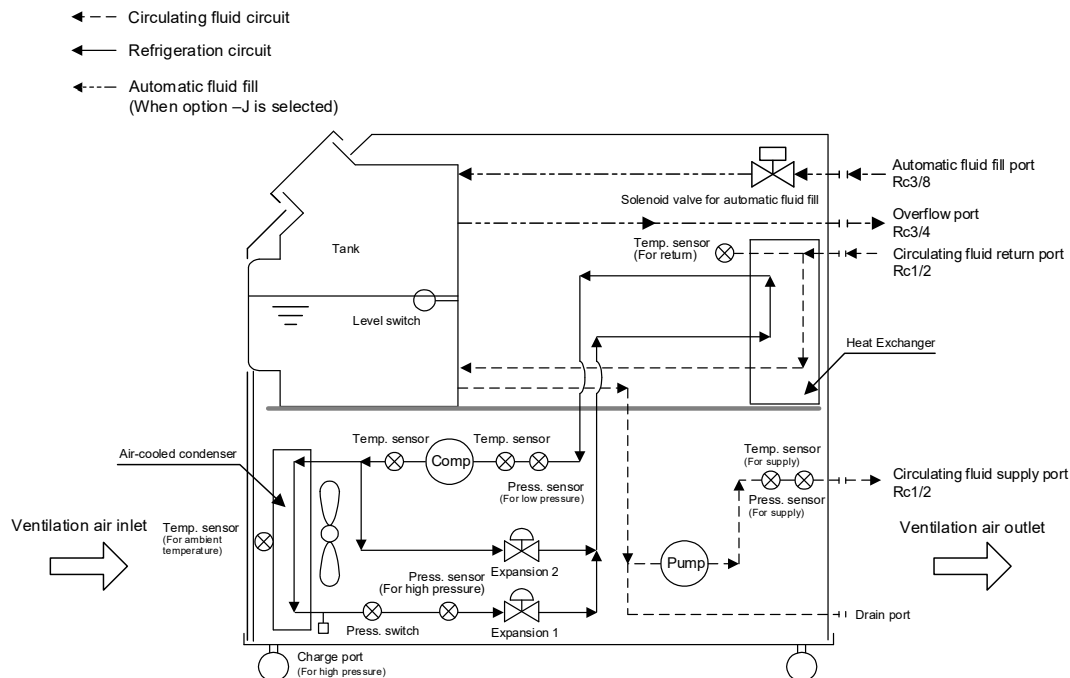


Fig9.3-1 Flow Chart

9.3.2 HRSC012-W*-20, HRSC018-W*-20, HRSC024-W*-20, HRSC030-W*-20, HRSC040-W*-20

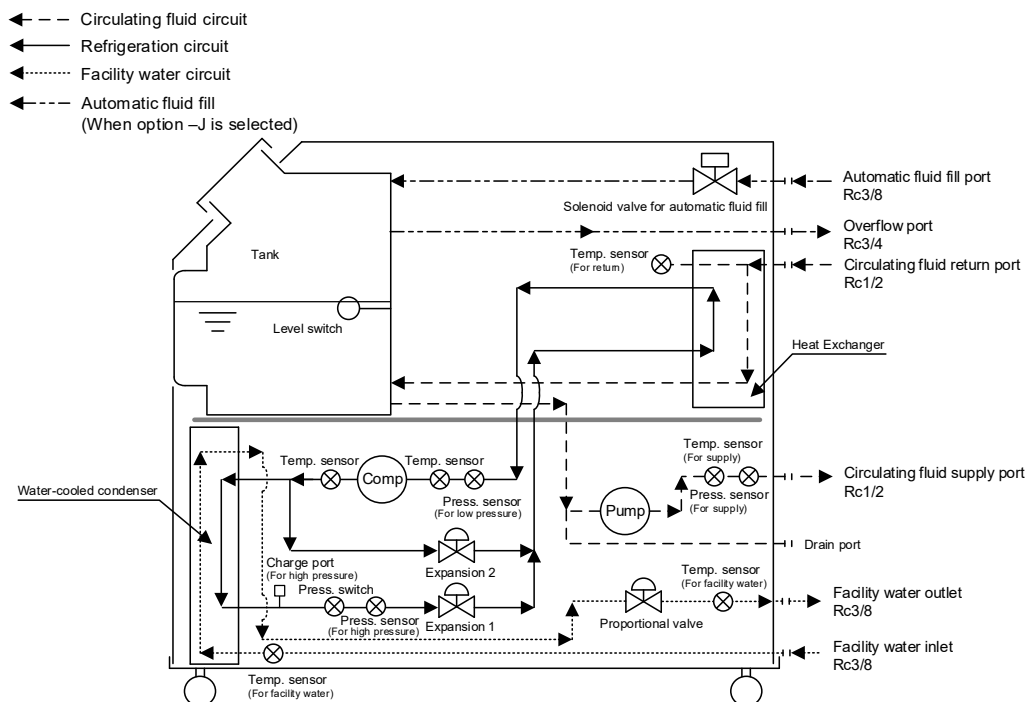


Fig9.3-2 Flow Chart

9.3.3 HRSC050-A*-20, HRSC060-A*-20

- ←-- Circulating fluid circuit
- ← Refrigeration circuit
- ←--- Automatic fluid fill
(When option -J is selected)

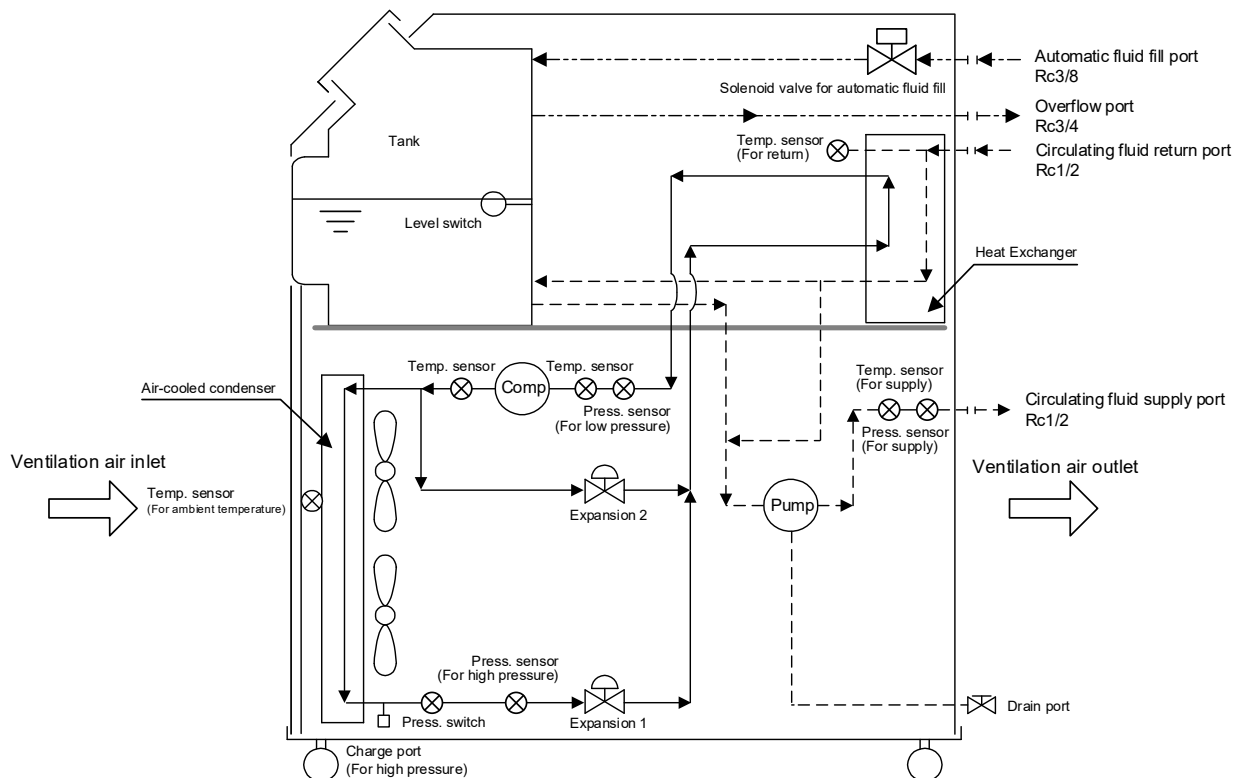


Fig9.3-3 Flow Chart

9.3.4 HRSC050-W*-20, HRSC060-W*-20

- ← — Circulating fluid circuit
- ← — Refrigeration circuit
- ← Facility water circuit
- ← --- Automatic fluid fill
(When option -J is selected)

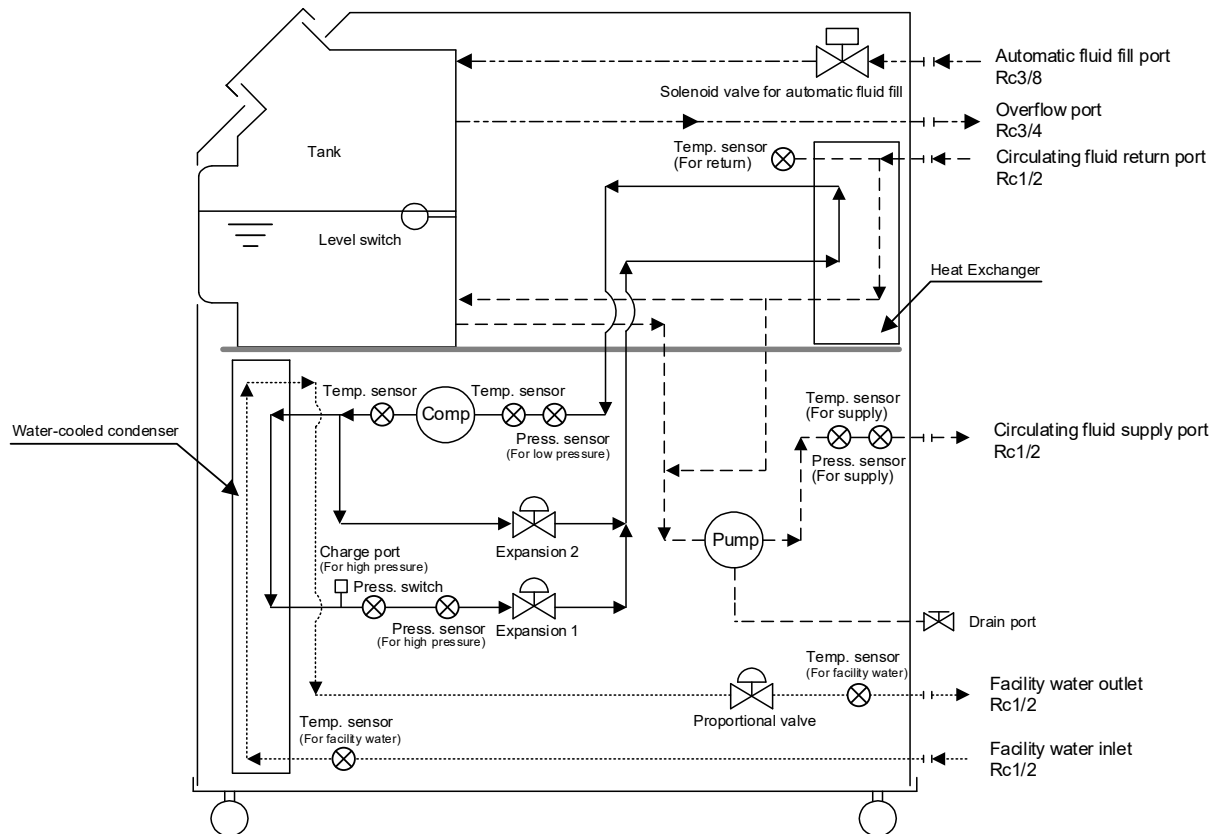
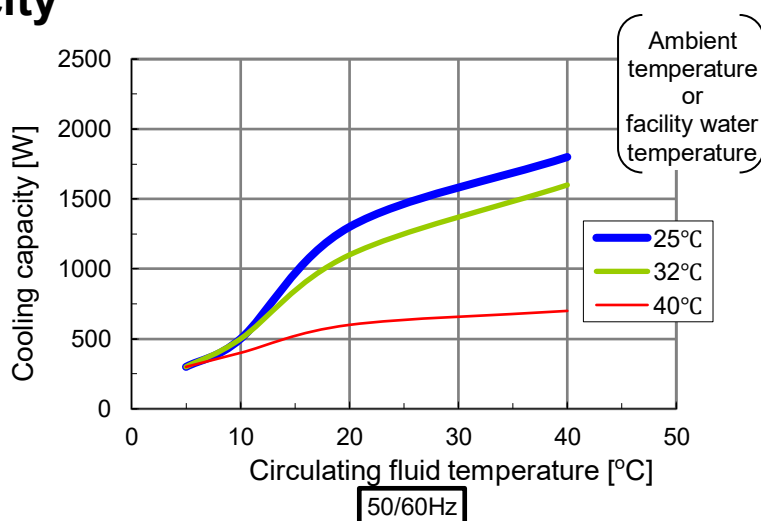


Fig.9.3-4 Flow Chart

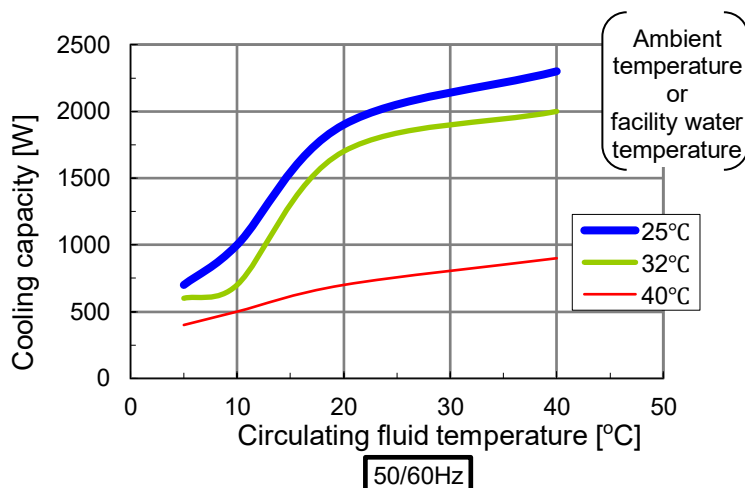
9.4 Cooling capacity

9.4.1 HRSC012-**-20



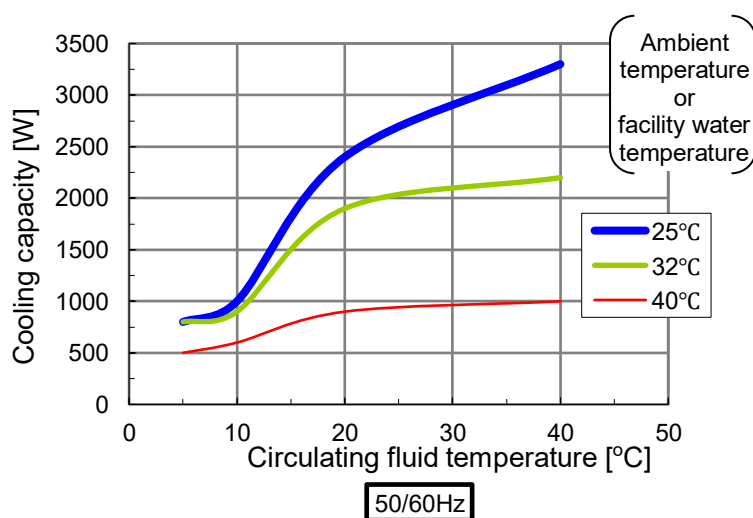
* The cooling capacity will be reduced by 300W when option: -T and -MT are selected.
Fig 9.4-1 Cooling capacity (HRSC012-**-20)

9.4.2 HRSC018-**-20



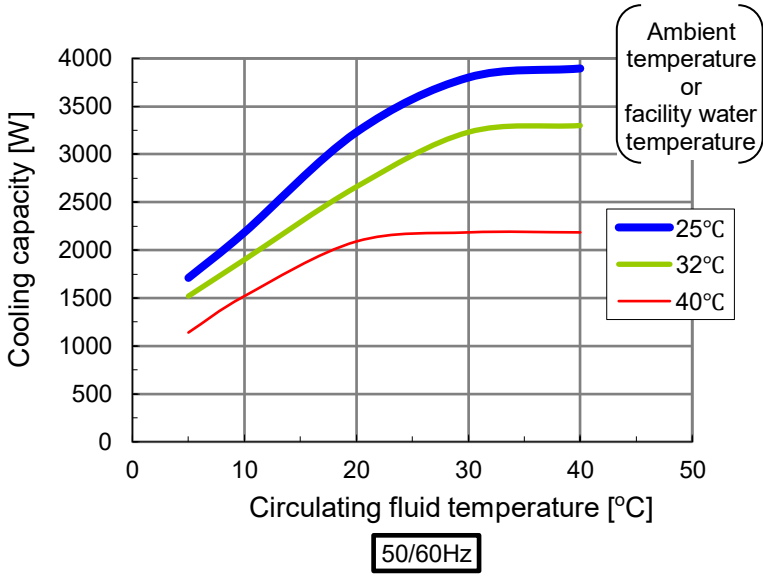
* The cooling capacity will be reduced by 300W when option: -T and -MT are selected.
Fig 9.4-2 Cooling capacity (HRSC018-**-20)

9.4.3 HRSC024-**-20



*The cooling capacity will be reduced by 300W when option: -T and -MT are selected.
Fig 9.4-3 Cooling capacity (HRSC024-**-20)

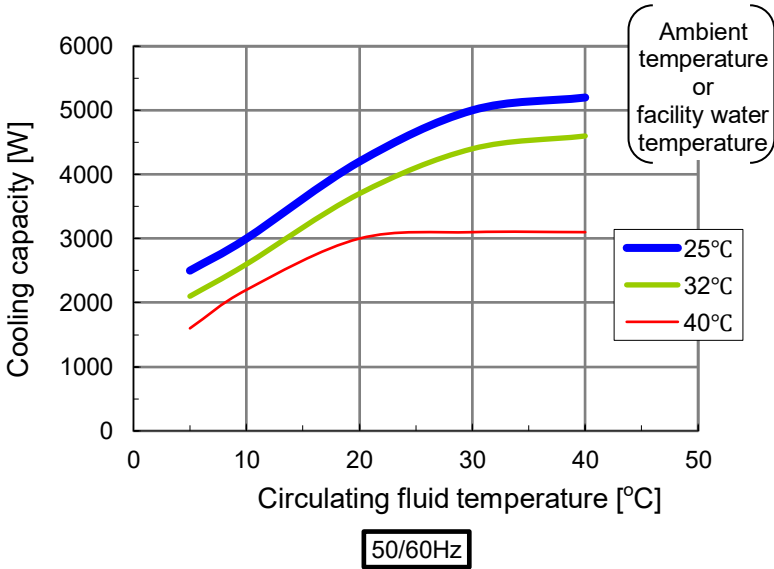
9.4.4 HRSC030-**-20



* The cooling capacity will be reduced by 300W when option: -T and -MT are selected.

Fig. 9.4-4 Cooling capacity (HRSC030-**-20)

9.4.5 HRSC040-**-20



* The cooling capacity will be reduced by 300W when option: -T and -MT are selected.

Fig. 9.4-5 Cooling capacity (HRSC040-**-20)

9.4.6 HRSC050-**-20

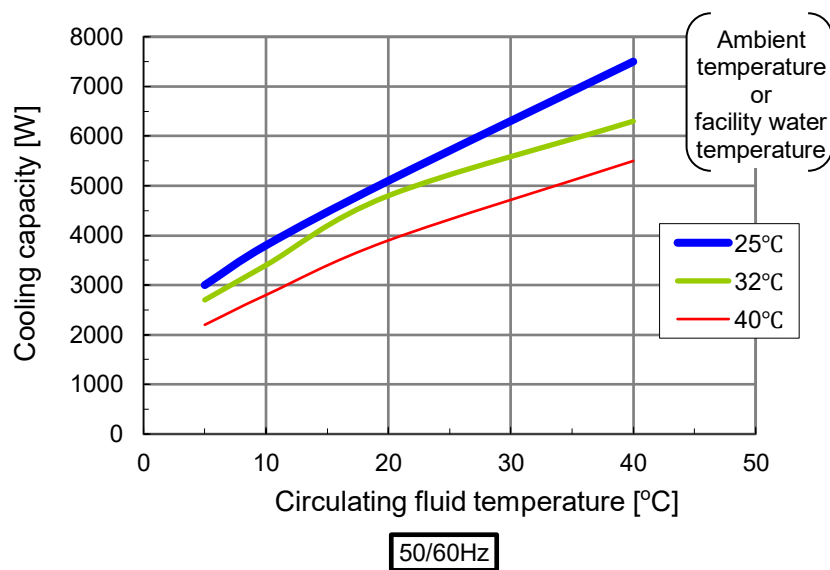


Fig. 9.4-6 Cooling capacity (HRSC050-**-20)

9.4.7 HRSC060-**-20

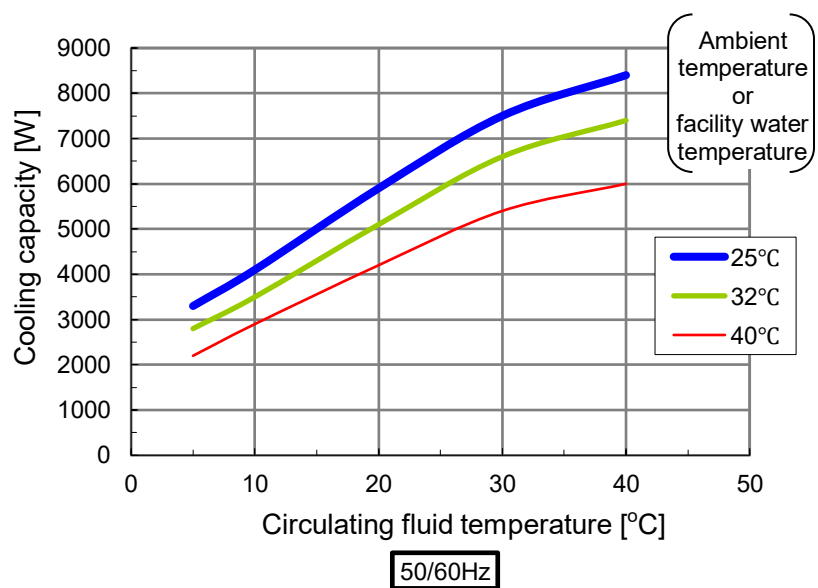
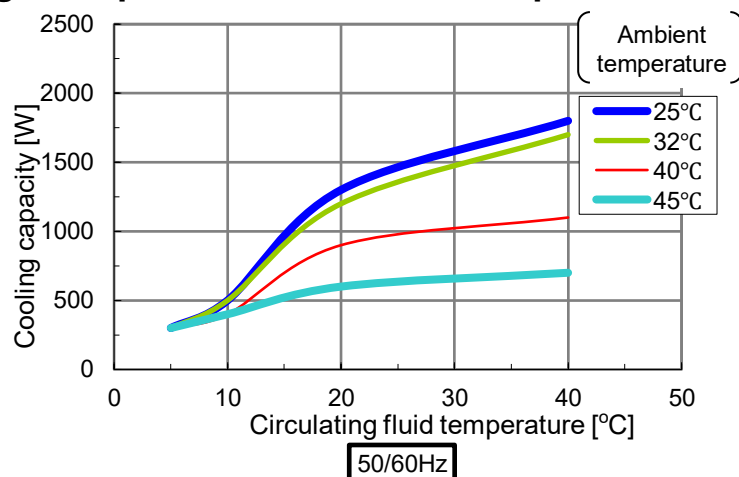


Fig. 9.4-7 Cooling capacity (HRSC060-**-20)

9.4.8 Option G [High-temperature environment specification]

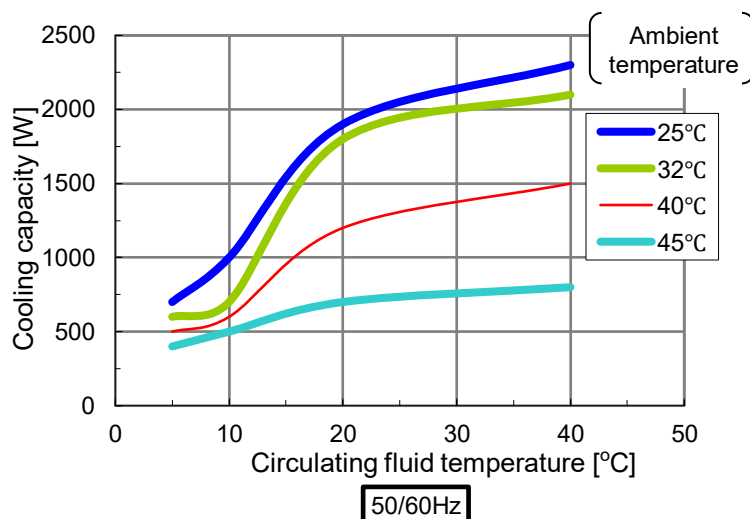
1) HRSC012-A*-20-G



* Cooling capacity is reduced by 300W if option -T and -MT are used together.

Fig 9.4-8 Cooling capacity (HRSC012-A*-20-G)

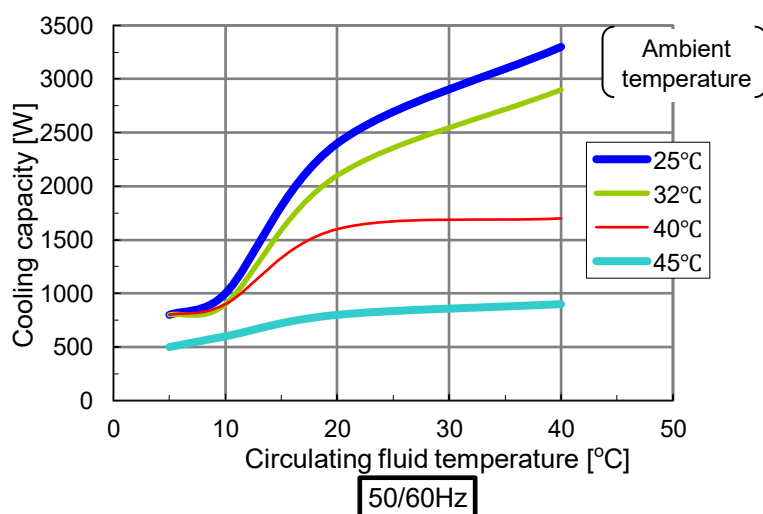
2) HRSC018-A*-20-G



* Cooling capacity is reduced by 300W if option -T and -MT are used together.

Fig 9.4-9 Cooling capacity (HRSC018-A*-20-G)

3) HRSC024-A*-20-G



* Cooling capacity is reduced by 300W if option -T and -MT are used together.

Fig 9.4-10 Cooling capacity (HRSC024-A*-20-G)

9.5 Heating capacity

9.5.1 HRSC012-**-20, HRSC018-**-20, HRSC024-**-20

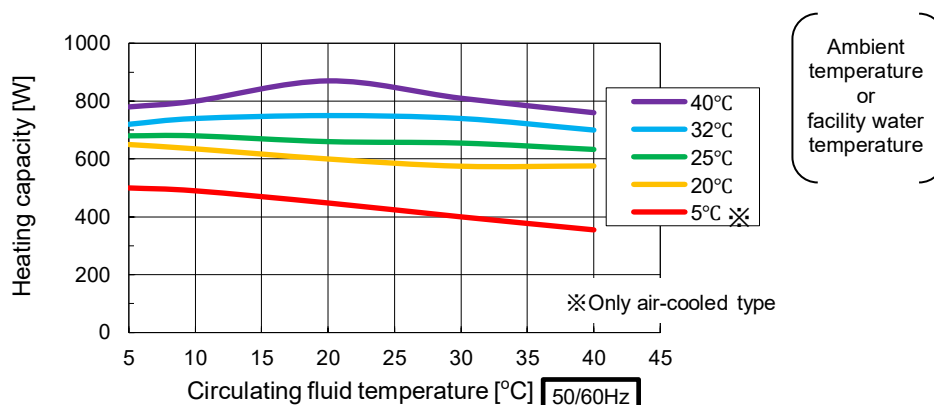


Fig 9.5-1 Heating capacity (HRSC012-**-20, HRSC018-**-20, HRSC024-**-20)

9.5.2 HRSC030-A*-20

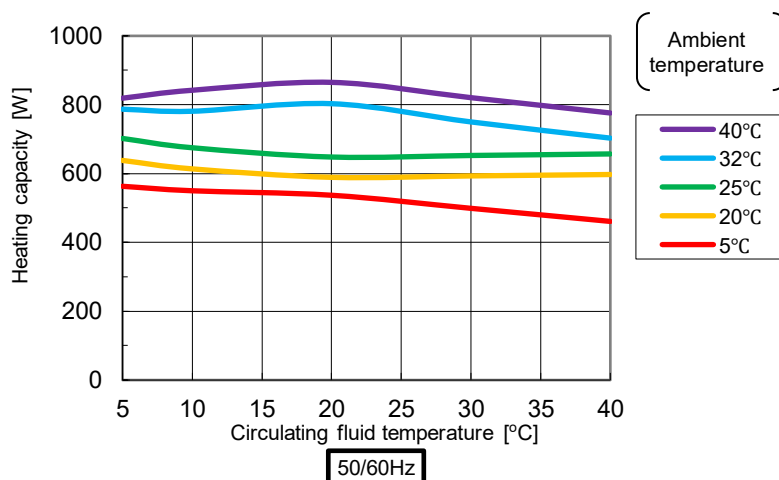


Fig. 9.5-2 Heating capacity (HRSC030-A*-20)

9.5.3 HRSC030-W*-20

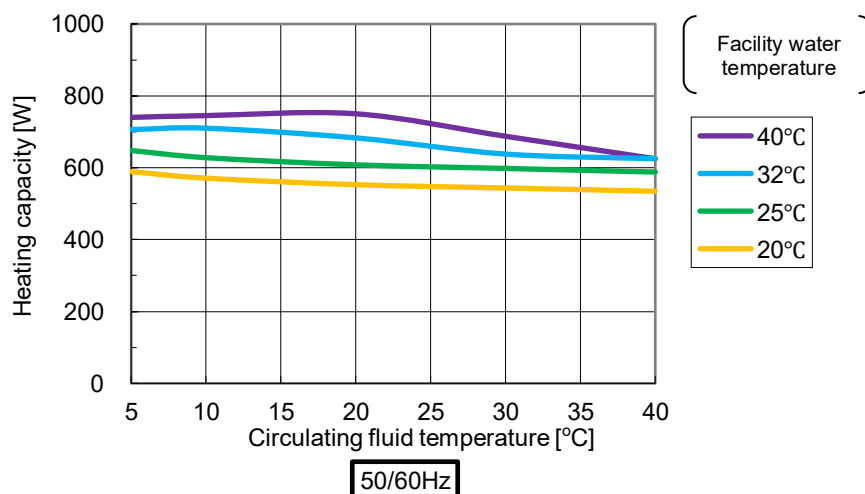


Fig. 9.5-3 Heating capacity (HRSC030-W*-20)

9.5.4 HRSC040-A*-20

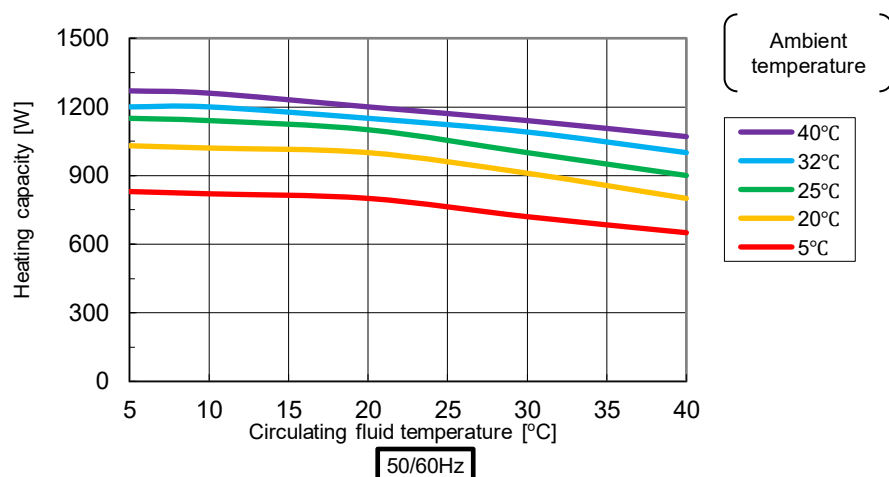


Fig. 9.5-4 Heating capacity (HRSC040-A-20)

9.5.5 HRSC040-W*-20

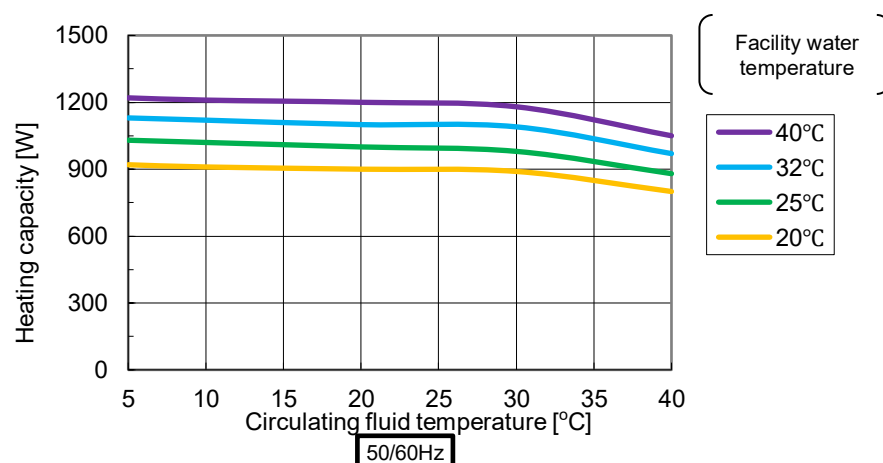


Fig. 9.5-5 Heating capacity (HRSC040-W-20)

9.5.6 HRSC050-A*-20

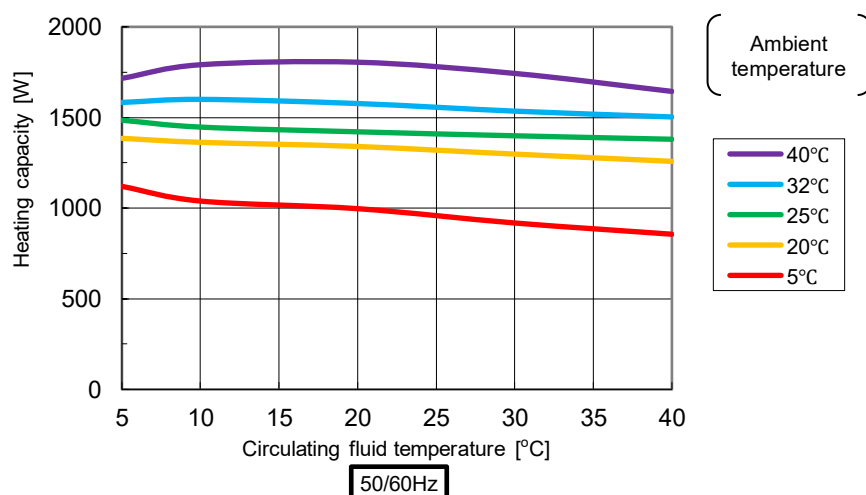


Fig. 9.5-6 Heating capacity (HRSC050-A-20)

9.5.7 HRSC050-W*-20

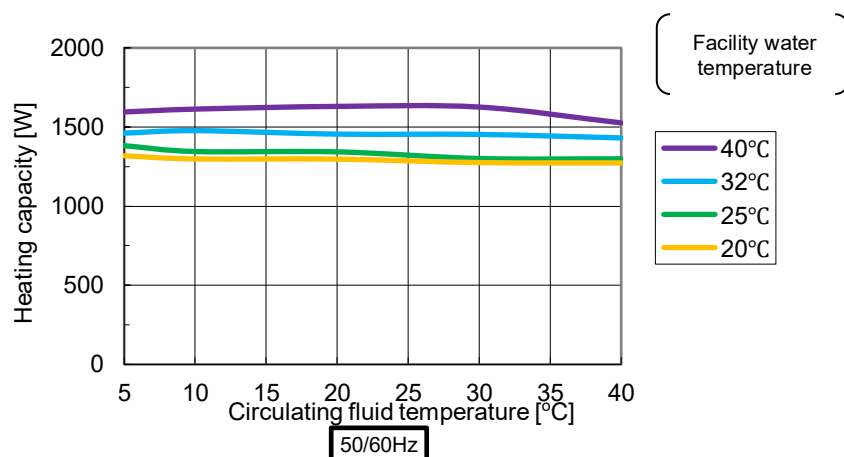


Fig. 9.5-7 Heating capacity (HRSC050-W-20)

9.5.8 HRSC060-A*-20

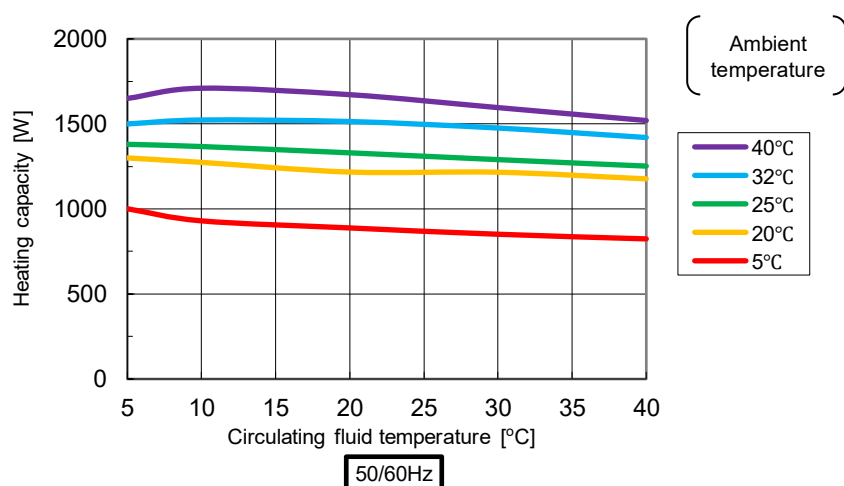


Fig. 9.5-8 Heating capacity (HRSC060-A*-20)

9.5.9 HRSC060-W*-20

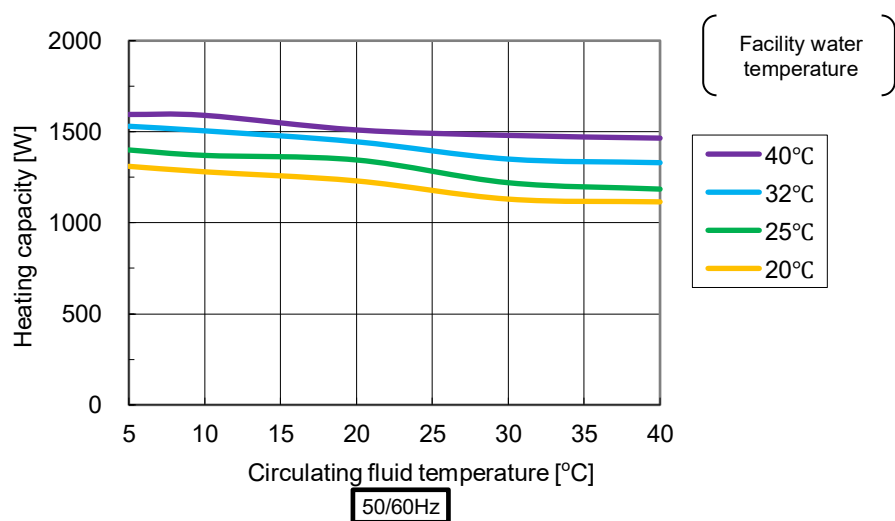


Fig. 9.5-9 Heating capacity (HRSC060-W*-20)

9.6 Pump capacity

9.6.1 HRSC012-**-20, HRSC018-**-20, HRSC024-**-20

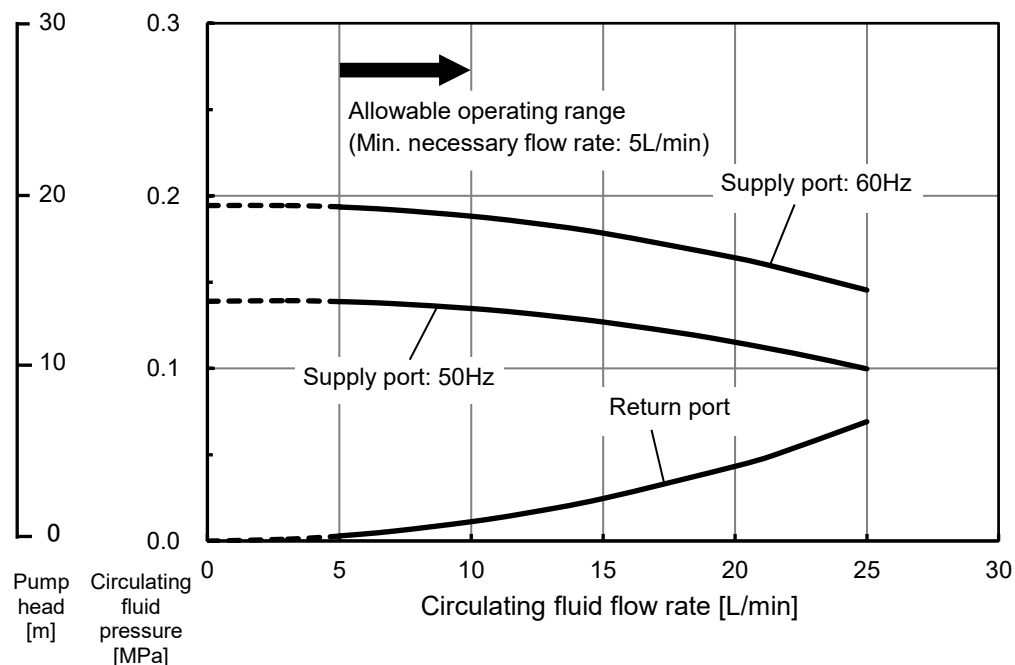


Fig 9.6-1 Pump capacity (HRSC012-**-20, HRSC018-**-20, HRSC024-**-20)

9.6.2 HRSC012-**-20-T, HRSC018-**-20-T, HRSC024-**-20-T

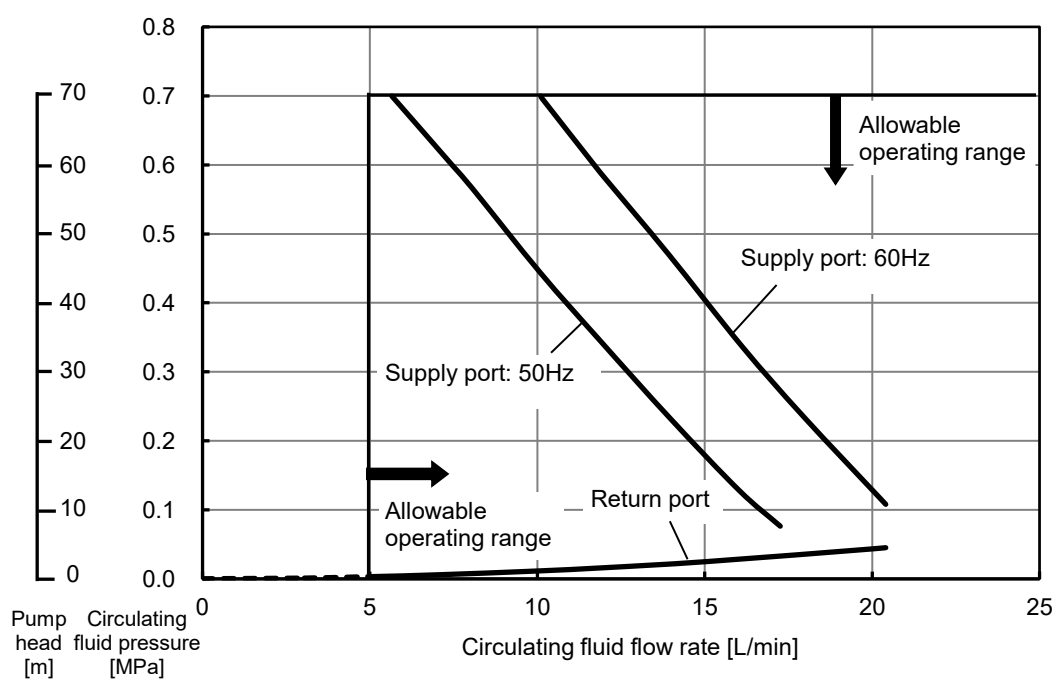


Fig 9.6-2 Pump capacity (HRSC012-**-20-T, HRSC018-**-20-T, HRSC024-**-20-T)

9.6.3 HRSC012-**-20-MT, HRSC018-**-20-MT, HRSC024-**-20-MT

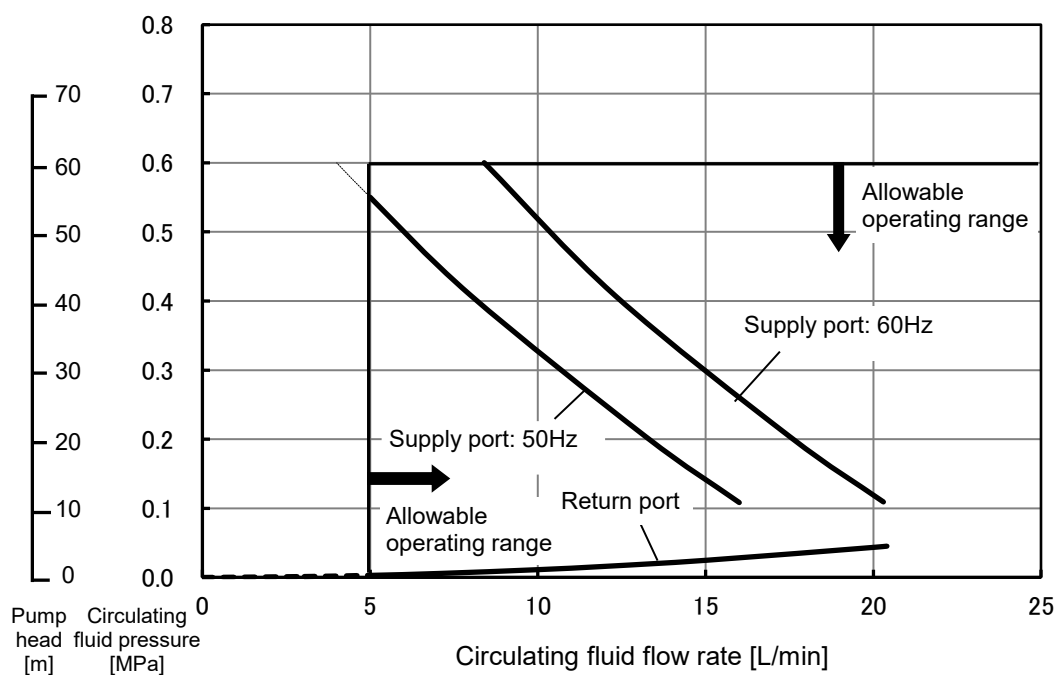


Fig 9.6-3 Pump capacity(HRSC012-**-20-MT, HRSC018-**-20-MT, HRSC024-**-20-MT)

9.6.4 HRSC030-**-20, HRSC040-**-20

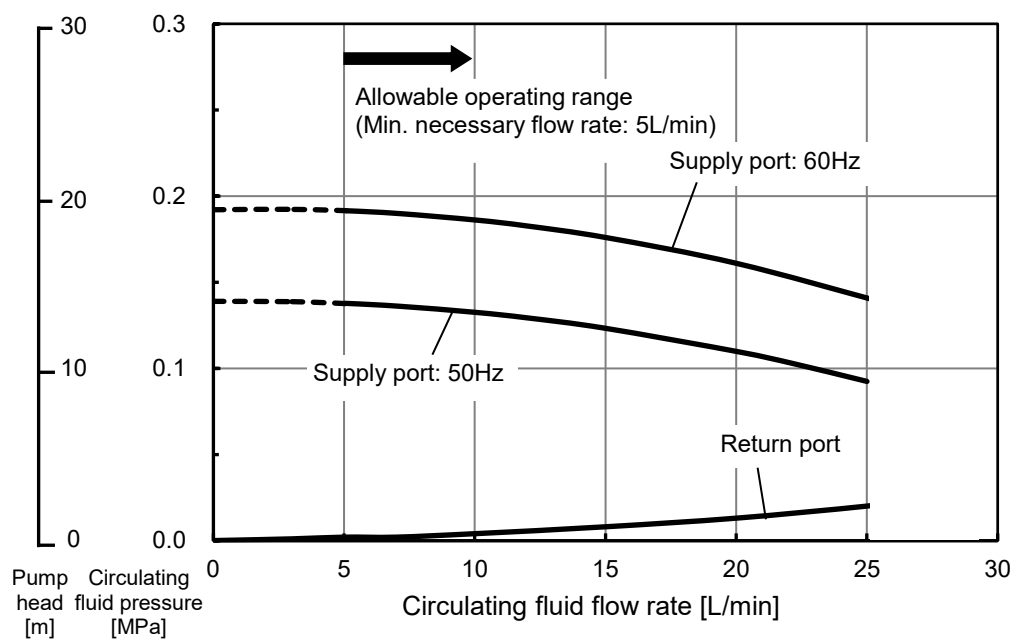


Fig. 9.6-4 Pump capacity (HRSC030-**-20, HRSC040-**-20)

9.6.5 HRSC030-**-20-T

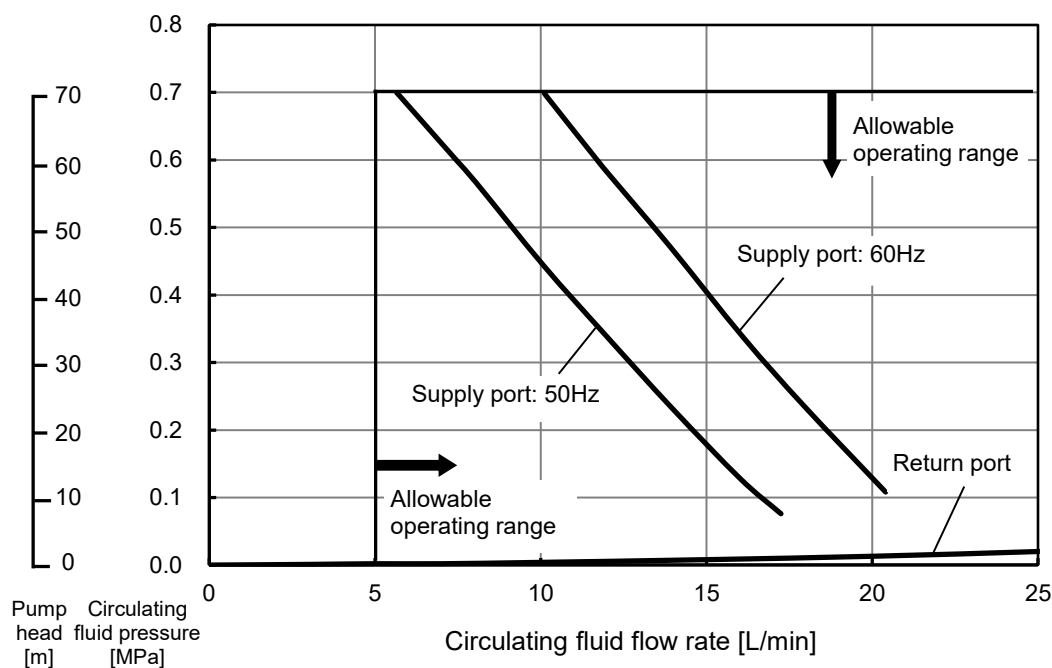


Fig. 9.6-5 Pump capacity (HRSC030-**-20-T)

9.6.6 HRSC030-**-20-MT

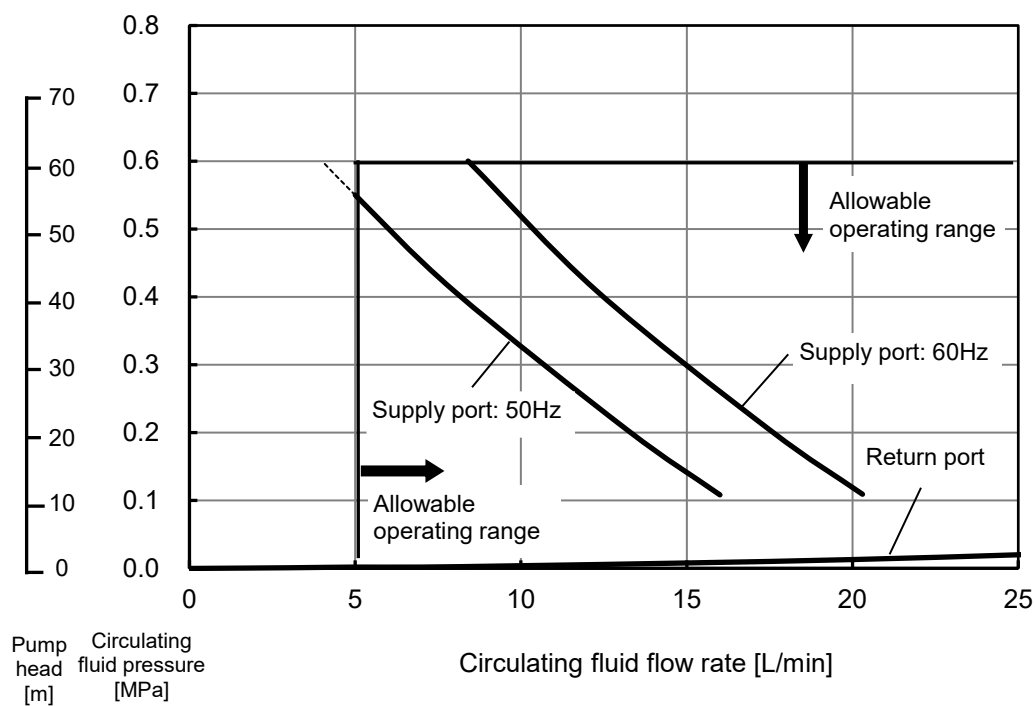


Fig. 9.6-6 Pump capacity (HRSC030-**-20-MT)

9.6.7 HRSC040-**-20-T,-MT

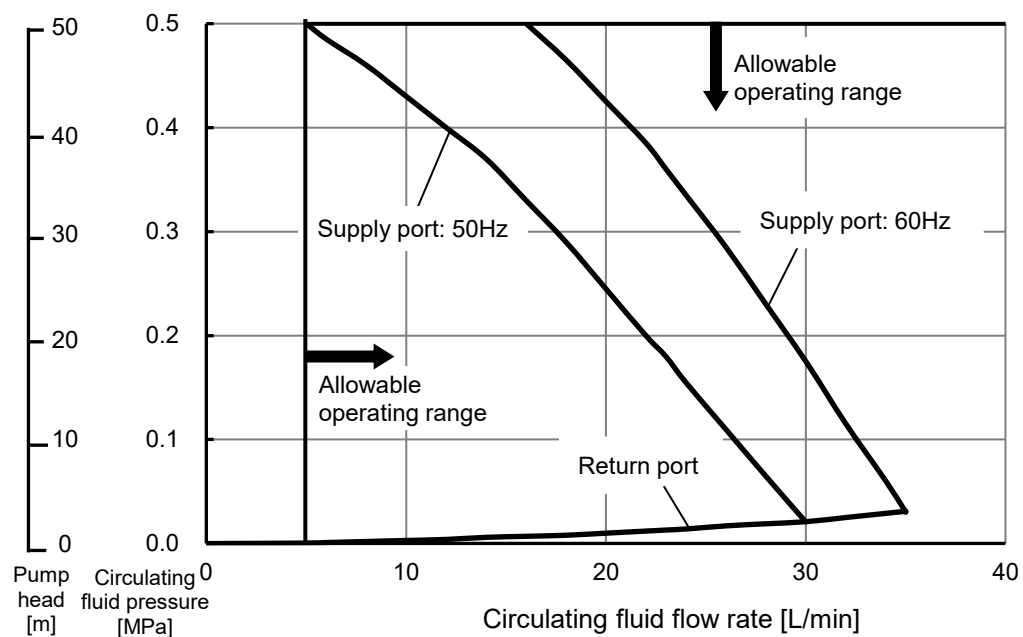


Fig. 9.6-7 Pump capacity (HRSC040-**-20-T, -MT)

9.6.8 HRSC050-**-20, HRSC060-**-20

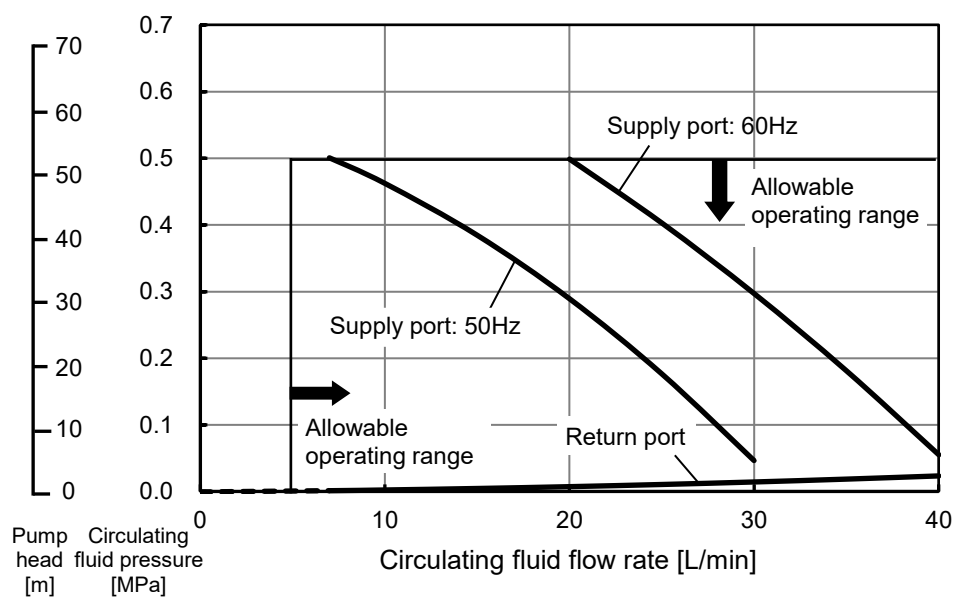
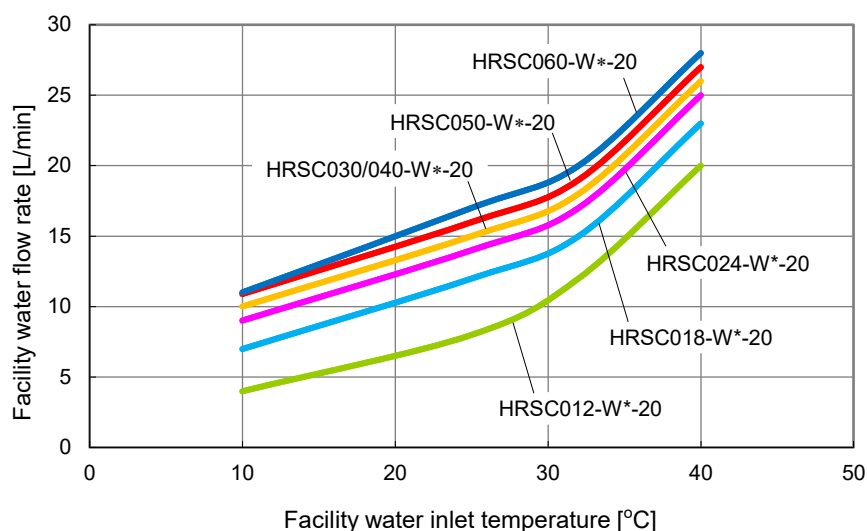


Fig. 9.6-8 Pump capacity (HRSC050-**-20, HRSC060-**-20)

9.7 Required facility water flow (for water-cooled type)



* The amount of the facility water for the operation with rated circulating fluid, cooling capacity which is described in fig. 9.4-1 to 9.4-8.

Fig 9.7-1 Required facility water flow (for water-cooled type)

9.8 Compliance

This product conforms to the following standards.

Table 9-8 Compliance

CE Marking	EMC Directive	2014/30/EU
	Machinery Directive	2006/42/EC
	RoHS Directive	2011/65/EU
UL/CSA standard (NRTL certified)	UL60335-2-40 CSA C22.2 No.60335-2-40	

9.9 Daily Check Sheet



Thermo-chiller Daily Check Sheet

Model no.
Mfg. code

For information about how to perform daily checks of the thermo-chiller, refer to section "8.2.1 Daily Check" of the operation manual. Check and record the condition at start right after setting up.

[illegible]

Chapter 10 Limited warranty and Disclaimer/ Compliance Requirements

The product used is subject to the following “Limited warranty and Disclaimer” and “Compliance Requirements”. Read and accept them before using the product.

Limited warranty and Disclaimer

1. Period

The warranty period of the product is 1 year in service or 1.5 years after the product is delivered, whichever is first.

2. Scope

For any failure reported within the warranty period which is clearly our responsibility, replacement parts will be provided. In that case, removed parts shall become the property of SMC.

This guarantee applies only to our product independently, and not to any other damage incurred due to the failure of the product.

3. Content

The following situations are out of scope of this warranty.

1. The product was incorrectly installed or connected with other equipment.
2. The product was modified or altered in construction.
3. The failure was a secondary failure of the product caused by the failure of equipment connected to the product.
4. The failure was caused by a natural disaster such as an earthquake, typhoon, or flood, or by an accident or fire.
5. The failure was caused by operation different from that shown in the Operation Manual or outside of the specifications.
6. The checks and maintenance specified (daily checks and regular checks) were not performed.
7. The failure was caused by the use of circulating fluid or facility water other than those specified.
8. The failure occurred naturally over time (such as discoloration of a painted or plated face).
9. The failure does not affect the functioning of the product (such as new sounds, noises and vibrations).
10. The failure was due to the “Installation Environment” specified in the Operation Manual.

4. Disclaimer

1. Expenses for daily and regular checks
2. Expenses for repairs performed by other companies
3. Expenses for transfer, installation and removal of the product
4. Expenses for replacement of parts other than those in this product, or for the supply of liquids
5. Inconvenience and loss due to product failure (such as telephone bills, compensation for workplace closure, and commercial losses)

For warranted repair, please contact the supplier you purchased this product from.

Compliance Requirements

1. The use of SMC products with production equipment for the manufacture of weapons of mass destruction (WMD) or any other weapon is strictly prohibited.
2. The exports of SMC products or technology from one country to another are governed by the relevant security laws and regulations of the countries involved in the transaction. Prior to the shipment of a SMC product to another country, assure that all local rules governing that export are known and followed.

Note: Specifications are subject to change without prior notice and any obligation on the part of the manufacturer.
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