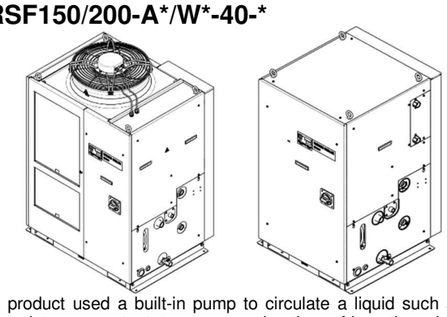
ORIGINAL INSTRUCTIONS

Instruction Manual
Thermo-Chiller
HRSF150/200-A*/W*-40-*



This product used a built-in pump to circulate a liquid such as water, adjusted to a constant temperature by the refrigeration circuit. This circulating liquid cools parts of customer's machine that generate heat.

1 Safety Instructions

These safety instructions are intended to prevent hazardous situations and/or equipment damage. These instructions indicate the level of potential hazard with the labels of "Caution," "Warning" or "Danger." They are all important notes for safety and must be followed in addition to International Standards (ISO/IEC) *1), and other safety regulations.

*1) ISO 4414: Pneumatic fluid power - General rules relating to systems.
ISO 4413: Hydraulic fluid power - General rules relating to systems.
IEC 60204-1: Safety of machinery - Electrical equipment of machines. (Part 1: General requirements)
ISO 10218-1: Robots and robotic devices - Safety requirements for industrial robots - Part 1: Robots.

- Refer to product catalogue, Operation Manual and Handling Precautions for SMC Products for additional information.
- Keep this manual in a safe place for future reference.

⚠ **Caution**	Caution indicates a hazard with a low level of risk which, if not avoided, could result in minor or moderate injury.
⚠ **Warning**	Warning indicates a hazard with a medium level of risk which, if not avoided, could result in death or serious injury.
⚠ **Danger**	Danger indicates a hazard with a high level of risk which, if not avoided, will result in death or serious injury.

⚠ Warning

- Always ensure compliance with relevant safety laws and standards.
- All work must be carried out in a safe manner by a qualified person in compliance with applicable national regulations.

2 Specifications

2.1 Product Specification

HRSF150/200-A*-40-*

Model				HRSF150-A-*40-*	HRSF200-A*-40-*
Cooling Method				Air-cooled refrigeration	
Refrigerant				R454C(HFO/HFC,GWP:146)	
Quantity			kg	1.5	
Control method				PID control	
Ambient temperature *1			℃	-20 to 45	
Ciculating Fluid system	Circulating Fluid *2			Clear water, 15 to 40% ethylene glycol aqueous solution, DI water (pure water)	
	Set temperature range *1		℃	5 to 35	
	Cooling capacity *3		kW	15.7	20.5
	Heating capacity *4		L	3	5.5
	Temperature stability *5		L	±0.1	
	Pump capacity	Rated flow rate (Outlet pressure)	L/min	45 (0.45MPa)	
		Maximum flow rate	L/min	130	
		Maximum lifting height	m	50	
	Settable pressure range *6		MPa	0.1 to 0.5	
	Minimum necessary flow rate *7		L/min	25	35
	Tank capacity		L	42	
	Port size			Rc1 (Symbol F: G1, Symbol N: NPT1)	
	Tank port size			Rc3/4 (Symbol F: G3/4, Symbol N: NPT3/4)	
	Automatic water fill function (standard)	Supply side pressure range	MPa	0.2 to 0.5	
		Supply side water temp. range	℃	5 to 35	
		Automatic water fill port size		Rc1/2 (Symbol F: G1/2, Symbol N: NPT1/2)	
		Overflow port size		Rc1 (Symbol F: G1, Symbol N: NPT1)	
	Fluid contact part material		Metal	Stainless steel, Copper (Brazing filler metal for the heat exchanger), Bronze, Brass	
			Resin	PTFE, PU, FKM, EPDM, PVC, NBR, POM, PE, NR	

2 Specification (continued)

Model				HRSF150-A-*40-*	HRSF200-A*-40-*
Electrical system	Power supply		50Hz	3 phase 380 to 415 VAC (50Hz) Allowable voltage fluctuation ±10% (No continuous voltage fluctuation)	
			60Hz	3-phase 380 to 480 VAC (60 Hz) Allowable voltage range +4%, −10% (Max. voltage less than 500 V and no continuous voltage fluctuation)	
	Applicable earth leakage breaker (standard)	Rated current	A	30	
		Sensitivity current	mA	30	
		Rated operating current *5	A	13.1	16.9
		Rated power consumption *5	kW (kVA)	8.0 (9.0)	10.8 (11.7)
Noise level (Front 1m, height 1m) *5			dB(A)	68	
Water-proof specification				IPX4	
Accessories				Alarm code list label 2 pcs. (English 1, Japanese 1), Operation manual (for installation/operation) (English 1, Japanese 1),Y-strainer (40 mesh) 25A, Barrel nipple 25A, Anchor bracket 2pcs. (including 6 pcs. of M8 bolts)□8	
Weight (in the dry state)			kg	Approx. 230	
Standards	CE Mark	EMC directive		2014/30/EU	
		Machinery directive		2006/42/EC	

HRSF150/200-W*-40-*

Model				HRSF150-W-*40-*	HRSF200-W*-40-*
Cooling Method				Water-cooled refrigeration	
Refrigerant				R454C(HFO/HFC,GWP:146)	
Quantity			kg	1.4	
Control method				PID control	
Ambient temperature *1			℃	2 to 45	
Ciculating Fluid system	Circulating Fluid *2			Clear water, 15% ethylene glycol aqueous solution, DI water (pure water)	
	Set temperature range *1		℃	5 to 35	
	Cooling capacity *3		kW	15.7	20.6
	Heating capacity *4		L	3.5	4
	Temperature stability *5		L	±0.1	
	Pump capacity	Rated flow rate (Outlet pressure)	L/min	45 (0.43MPa)	45 (0.45MPa)
		Maximum flow rate	L/min	130	
		Maximum lifting height	m	50	
	Settable pressure range *6		MPa	0.1 to 0.5	
	Minimum necessary flow rate *7		L/min	25	35
	Tank capacity		L	42	
	Port size			Rc1 (Symbol F: G1, Symbol N: NPT1)	
	Tank port size			Rc3/4 (Symbol F: G3/4, Symbol N: NPT3/4)	

2 Specification (continued)

Model				HRSF150-W-*40-*	HRSF200-W*-40-*
Circulating fluid system	Automatic water fill function (standard)	Supply side	MPa	0.2 to 0.5	
		Supply side water temp. range	℃	5 to 35	
		Automatic water fill port size		Rc1/2 (Symbol F: G1/2, Symbol N: NPT1/2)	
		Overflow port size		Rc1 (Symbol F: G1, Symbol N: NPT1)	
	Fluid contact part material		Metal	Stainless steel, Copper (Brazing filler metal for the heat exchanger), Bronze, Brass	
			Resin	PTFE, PU, FKM, EPDM, PVC, NBR, POM, PE, NR	
Facility water system	Temperature range		℃	5 to 40	
	Pressure range		MPa	0.3 to 0.5	
	Required flow rate *9		L/min	30	50
	Inlet-outlet pressure differential of facility water		MPa	0.3 or more	
	Port size			Rc1	
	Fluid contact part material		Metal	Stainless steel, Copper (Brazing filler metal for the heat exchanger), Bronze, Brass	
			Resin	PTFE, NBR, EPDM	
Electrical system	Power supply		50Hz	3 phase 380 to 415 VAC (50Hz) Allowable voltage fluctuation ±10% (No continuous voltage fluctuation)	
			60Hz	3-phase 380 to 480 VAC (60 Hz) Allowable voltage range +4%, −10% (Max. voltage less than 500 V and no continuous voltage fluctuation)	
	Applicable earth leakage breaker (standard)	Rated current	A	30	
		Sensitivity current	mA	30	
		Rated operating current *5	A	12.7	15.6
		Rated power consumption *5	kW (kVA)	7.6 (8.8)	9.7 (10.8)
Noise level (Front 1m, height 1m) *5			dB(A)	60	
Water-proof specification				IPX4	
Accessories				Alarm code list label 2 pcs. (English 1, Japanese 1), Operation manual (for installation/operation) (English 1, Japanese 1),Y-strainer (40 mesh) 25A, Barrel nipple 25A, Anchor bracket 2pcs. (including 6 pcs. of M8 bolts)□8	
Weight (in the dry state)			kg	Approx. 195	
Standards	CE Mark	EMC directive		2014/30/EU	
		Machinery directive		2006/42/EC	

2 Specification (continued)

Notes:
*1: When the ambient temperature or circulating fluid temperature is 10°C or below, refer to "Operation at low ambient temperature or low circulating fluid temperature".
*2: Use fluid for circulating fluid that conforms to:
When there is a possibility of the facility water being frozen, make sure to discharge all the facility water from the facility water circuit.
Clean water: Water Quality Standards of the Japan Refrigeration and Air Conditioning Industrial Association (JRA GL-02-1994)
15 % ethylene glycol aqueous solution: Diluted with clean water, without any additives such as antiseptics.
DI water (pure water): Electrical conductivity 1 μS/cm or more (electrical resistivity 1MΩ・cm or less)
*3: (1) Ambient (A) / Facility water temperature (W): 32 °C, (2) Circulating fluid: Clean water, (3) Circulating fluid temperature: 20 °C, (4) Circulating fluid flow rate: Rated flow rate, (5) Power supply: 200 / 400 VAC
*4: (1) Ambient (A) / Facility water temperature (W): 32 °C, (2) Circulating fluid: Clean water, (3) Circulating fluid flow rate: Rated flow rate, (4) Power supply: 200 / 400 VAC
*5: (1) Ambient (A) / Facility water temperature (W): 32 °C, (2) Circulating fluid: Clean water, (3) Circulating fluid temperature: 20 °C, (4) Load: Refer to the specified cooling capacity
(5) Circulating fluid flow rate: Rated flow rate, (6) Power supply: 200 VAC, (7) Piping length: Minimum
*6: With pressure control function using an inverter. When the pressure control function is not being used, the pump power supply frequency setting function can be used.
*7: Required flow rate to maintain the cooling capacity. When the flow rate is lower than the rated flow, use a by-pass piping set.
*8: The anchor brackets (including M8 bolt x 6pcs.) are used for fixation with the skid when this product is packed. The anchor bolts are not attached.
*9: The actual flow rate of facility water will fluctuate according to your operating conditions.

2.2 Product Serial Number Code

The product serial number code printed on the label indicates the month and the year of production as per the following table:

Month \ Year		2025	2026	2027	2028	2029	2030	2031	…
Jan	o	D	E	F	G	H	i	J	…
Feb	P	DP	EP	FP	GP	HP	iP	JP	…
Mar	Q	DQ	EQ	FQ	GQ	HQ	iQ	JQ	…
Apr	R	DR	ER	FR	GR	HR	iR	JR	…
May	S	DS	ES	FS	GS	HS	iS	JS	…
Jun	T	DT	ET	FT	GT	HT	iT	JT	…
Jul	U	DU	EU	FU	GU	HU	iU	JU	…
Aug	V	DV	EV	FV	GV	HV	iV	JV	…
Sep	W	DW	EW	FW	GW	HW	iW	JW	…
Oct	X	DX	EX	FX	GX	HX	iX	JX	…
Nov	y	Dy	Ey	Fy	Gy	Hy	iy	Jy	…
Dec	Z	DZ	EZ	FZ	GZ	HZ	iZ	JZ	…

3 How to Order

HRSF□ - □ □ - 40 - □

① Cooling capacity

	Air	Water
150	15.7 kW	15.7 kW
200	20.5 kW	20.6 kW

② Cooling method

A	Air-cooled refrigeration
W	Water-cooled refrigeration

③ Piping thread type

Nil	Rc
F	G (Rc-G thread adapter set is included)
N	NPT (Rc-NPT thread adapter set is included)

④ Power supply

40	3 phase AC380-415V (50 / 60Hz) 3 phase AC460-480V (60Hz)

⑤ Options

Nil	None
A	Caster-adjuter foot installed
K	Fluid fill port
M	Applicable to DI water piping
T*1	High-pressure pump mounted

Note:
*1 Applicable only to Water-cooled refrigeration

4 Name of Parts and Accessories

4.1 Accessories Table

1	Alarm code list label	2pcs. (English 1pc. / Japanese 1pc.)	
2	Operation manual	2 copies. (English 1copy. / Japanese 1copy.)	
3	Y strainer (40 meshes) 25A	1pc.	
4	Barrel nipple 25A	1pc.	
5	For HRSF150/200-WF-** G thread adapter set (HRS-EP016)	1 set	
	For HRSF***-WN-** NPT thread adapter set (HRS-EP015)	1 set	
6	Anchor brackets (M8 Bolts)	2 pcs , 6 pcs	---

Note) The anchor brackets (including M8 bolts) are used for fixation with the skid when this product is packed. The anchor bolts are not attached.

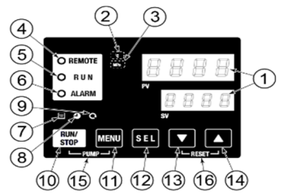
4 Name of Parts and Accessories (continued)

4.2 Function of Parts

Name	Function
Operation display panel	Runs and stops the product and preforms settings such as the circulating fluid temperature. For details, refer to Operation Manual section "2.4 Operation Display Panel".
Fluid level gauge	Indicates the circulating fluid level of the tank. Confirm the level is between HIGH and LOW. For details, refer to Operation Manual section "3.5 Circulating Fluid".
Product label	Shows the product information such as model number and serial number. For details, refer to Operation Manual section "1.4 Product Label".
Circulating fluid outlet port	The circulating fluid flows out from the outlet port.
Circulating fluid return port	The circulating fluid returns to the return port.
Tank drain port	The drain port to drain the circulating fluid out of the tank.
Automatic fluid fill port	Piping to the automatic fluid filling port enables easy supply of the circulating fluid through the ball tap in the reservoir. The supply pressure should be within the range of 0.2 to 0.5 MPa.
Overflow port	Be sure to connect piping from this port to sump pit to discharge the excess circulating fluid that is caused by the fluid level rising.
Dust-proof filter	Inserted to prevent that the dust and contamination are clung on the air-cooled condensers directly. Clean the filter periodically. For details, refer to Operation Manual section "7.2.2 Monthly check".
Power cable entry	Insert the power cable to the power cable entry and connect it to the power terminal. For details, refer to Operation Manual section "3.3.2 Electrical Wiring" and "3.3.3 Preparation and wiring of power supply cable".
Power terminal	
Signal cable entry	Insert the signal cable to the signal cable entry and connect it to the signal connectors. For details, refer to Operation Manual sections "3.3.4 Contact input/output communicatin wiring", "3.3.6 Wiring of run/stop signal input and remote signal input", "3.3.8 Wiring of external switch signal input", "3.3.9 Wiring of contact output signal", "3.3.8 RS-485 communication wiring", "3.3.9 RS-232C communication wiring" or the Operation Manual Communication Function.
Signal connectors	
Earth leakage breaker with breaker handle	Shuts off the power supply to the internal equipment of the product. (Parts energised remained in the product). For details, refer to Operation Manual section "3.3.2 Electrical Wiring" for the earth leakage breaker.
Water fill port (When option K "Water fill port" is selected.)	Users who will not use the automatic water fill function can fill the circulating fluid without removing the panel.
Facility water inlet port	Supply facility water to the inlet port
Facility water outlet port	Facility water is discharged from the outlet port and returns to the user's facility water system.

4.3 Operation Panel

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

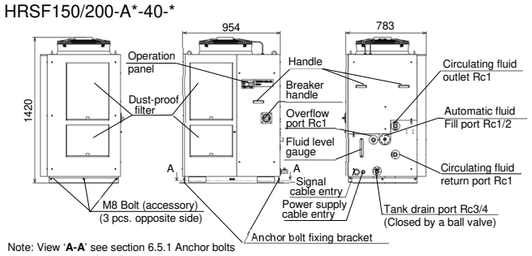


No	Description	Function	
1	Digital display (7 segment, 4 digits)	PV	Displays the temperature and pressure of the circulating fluid and alarm codes.
		SV	Displays the set temperature of the circulating fluid and the set values of other menus.
2	[°C] light	Displays the unit of the display temperature	
3	[MPa] light	Displays the unit of the display pressure	
4	[REMOTE] light	Turns on during remote operation by communication.	
5	[RUN] light	• Turns ON when the product is started an in operation. Turns OFF when the product stops. • Blinks during standby for stop (Interval 0.5 seconds). • Blinks during independent operation of the pump (Interval 0.3 seconds). • Blinks while the anti-freeze function is being set (During standby: Interval 2 seconds, During operation: Interval 0.3 seconds). • Blinks during warming up function (During standby: Turns ON for 0.5 seconds and OFF for 3 seconds, During operation: Interval 0.3 seconds).	
6	[ALARM] light	Blinks with buzzer when alarm occurs (Interval 0.3 seconds).	
		Blinks while AL25 is OFF (Turns ON for 0.5 seconds and OFF for 3 seconds).	
7	[ ] light	Turns ON when the fluid level lowers below "L" (low) level.	
8	[ ] light	Turns ON while the run timer or stop timer function is working.	
9	[ ] light	Turns ON when the product is in automatic operation.	
10	[RUN/STOP] key	Makes the product start or stop.	
11	[MENU] key	Moves from the main menu (display which shows circulating fluid temperature, pressure, etc.) to the other menus (entry of set values and monitor screen).	
12	[SEL] key	Changes the item in the menu and enters the set value.	
13	[▼] key	Decrease the set value.	
14	[▲] key	Increases the set value.	
15	[PUMP] key	When the [MENU] and [RUN/STOP] buttons are held down simultaneously, the pump starts running independently.	
16	[RESET] key	Press the [▼] and [▲] keys simultaneously. This will stop the alarm buzzer and turn off the [ALARM] light.	
		Keep the [▼] and [▲] keys pressed down simultaneously for 3 seconds to reset AL46 and AL48. (After resetting AL48, WAIT(WAIT) will be displayed and the product cannot start running for 40 seconds. Restart 40 seconds later after resetting.	

4 Name of Parts and Accessories (continued)

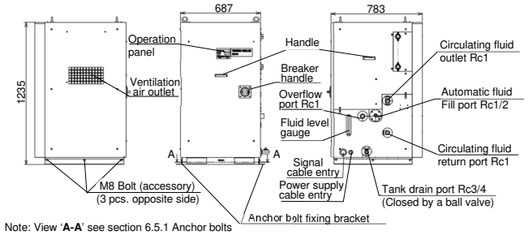
4.4 Name of Parts and Outline Dimensions

HRSF150/200-A*-40-*



Note: View '**A-A**' see section 6.5.1 Anchor bolts

HRSF150/200-W*-40-*



Note: View '**A-A**' see section 6.5.1 Anchor bolts

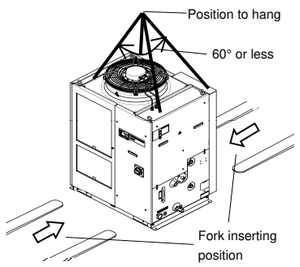
5 Transportation, Transfer and Moving

Caution

- Never lay the product on its side. The compressor oil will leak into the refrigerant piping, which may cause early failure of the compressor.
- Drain the residual fluid from the piping as much as possible to prevent any spillage.
- Moving the product by casters (only applicable to option "-A", refer to 3 How to Order) should be done by 2 persons or more.
- Raise the adjuster feet and push the corners of the product when moving the product using the casters.
- Do not hold the product by the piping connections or panel handles when moving by casters.

Warning

- The product is a heavy object (Refer to 2.1 Product specifications for weights).
- Moving by forklift and slinging should be done by trained personnel who have the required licenses.
- Be sure to use all four eye bolts when slinging the product.
- The slant angle of each rope should be 60 degrees or less.
- make sure that the fork does not damage the cover panel or piping port.



6 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.
- This product use flammable refrigerant. Do not install in public hallways or lobbies. Install it in a place with a floor space area of 10m^2 or more.
- 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 upright on a rigid and flat floor which can resist the weight of the product. Take precautions 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 45°C. Operation out of this ambient temperature range may cause a malfunction of the product and the safety device may activate. This will result in the product stopping operation.
- 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.
- The product is not designed for clean room. The pump and ventilating fan inside the product generate particles.

6 Installation (continued)

6.1 Types of Hazard Labels

The product has various potential hazards which are marked with warning labels.

Warning related to Electricity

	This symbol stands for a possible risk of electric shock.

Warning related to High Temperatures

	This symbol stands for a possible risk of hot surface and burns.

Warning related to Rotating Objects

	This symbol stands for a possible risk of cutting fingers or hand, or entanglement by rotating fan (For air-cooled type).

Warning related to other General Dangers

	This symbol stands for general danger.

Warning related to Fire Hazards

	Any of these symbols represent a Fire Hazard. This product use a flammable refrigerant (R454C).

6.2 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.

- Do not use in an environment where corrosive gases, chemicals, salt water or steam are present.
- Do not use the product in an area of high temperature and humidity which cannot be exhausted, or where it is exposed to corrosive substances. Cooling failure can result.
- Do not use in environment exposed to dust or powder material.
- Do not use the product outdoors. If the product is exposed to rain or water splash it may cause electrical shock, fire or failure.
- Do not use in an explosive atmosphere.
- Do not install in a location exposed to direct sunlight and radiant heat.
- Do not install in a location subjected to vibration or impact.
- Do not install subjected to strong electromagnetic noise (intense electric field, intense magnetic field, or surges).
- Do not install subjected to static electricity, or conditions where static electricity can discharge to the product.
- Do not install subjected to strong high frequencies radiation.
- Do not use in locations at altitudes of 3000m or higher (except for product storage and transport), refer to the Operation Manual section '3.2.1 Environment'.
- Do not install in a location without adequate space for maintenance.

6.2.1 Installation at altitudes of 1000m or more

Due to the lower air density, the heat radiation efficiencies of the devices in the product will be lower in the location at altitude of 100m or higher. So, the maximum ambient temperature for the thermo-chiller operation and the cooling capacity will be reduced. See table below for details.

Altitude	Max. ambient temp. (°C)	Cooling capacity correction coefficient	Cooling capacity (kW)	
			HRSF150-A*-40-*	HRSF200-A*-40-*
Less than 1000m	45	1.00	15.70	20.50
1000m – less than 1500m	42	0.85	13.34	17.42
1500m – less than 2000m	38	0.80	12.50	16.40
2000m – less than 2500m	35	0.75	11.77	15.37
2500m – less than 3000m	32	0.70	10.99	14.35

6.3 Location

Caution

If the air-cooled 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 45°C, which can affect the performance and life of the product. To prevent this, ensure that suitable ventilation is available (see below).

6.3.1 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.

6.3.2 Installation at indoor site

1. In case of facility having a large installation area (that can vent air naturally) – Make an air outlet on a wall at a high level and an air inlet at a low level, to allow for adequate air flow.
2. In case of facility having a small installation area (that cannot vent air naturally) – Make a forced air exhaust vent on a wall at a high level and an air inlet on a wall at a low level.

6 Installation (continued)

3. Using ducts to exhaust the air – In case the indoor site cannot accept the exhaust air from the product or/and is air conditioned, ventilate by installing a duct on the outlet ventilation of the product. Do not fasten the duct on the outlet ventilation of the product directly. Leave a space which is equal or greater than the duct's diameter. Use a fan for the duct that considered the ventilation resistance of the duct.

6.3.3 Radiation and Ventilation for Air-cooled Products

Model	Heat radiation (kW)	Required ventilation amount m^3/min	
		Differential temp. of 3°C between inside and outside if installation area	Differential temp. of 6°C between inside and outside if installation area
HRSF150-A*-40-*	Approx. 29	490	245
HRSF200-A*-40-*	Approx. 35	590	295

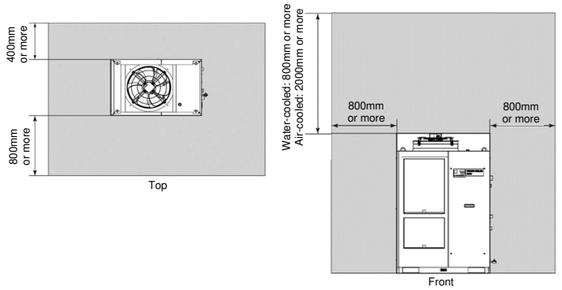
6.3.4 Radiation and Facility Water for Water-cooled Products

Model	Heat radiation (kW)	Facility water specifications
HRSF150-W*-40-*	Approx. 27	Refer to Operation Manual section "8.1. Specifications".
HRSF200-W*-40-*	Approx. 34	

6.4 Installation and Maintenance Space

Cation

Have enough space for the ventilation for the product. Otherwise, it may cause a lack of cooling capacity or/and stoppage of the product. Have enough space for maintenance.



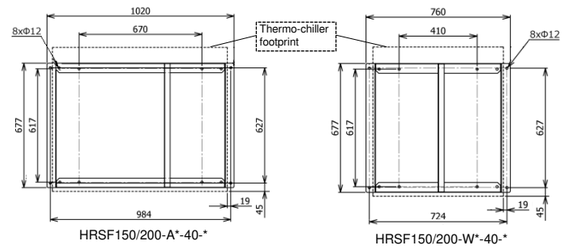
6.5 Installation Procedure

Caution

Install the product on a horizonal and level floor.

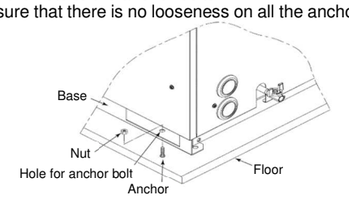
6.5.1 Anchor Bolts

Prepare M10 anchor bolts that are appropriate to the material of the floor that the product will be installed. Drive the anchor bolts at least two places of the left and right side of the product (four places in total). Refer to the dimensions below.



6.5.2 How to mount the product

1. Insert the product to the anchor bolts that were previously driven on the level floor.
2. Fasten the nuts to the anchor bolts.
3. Make sure that there is no looseness on all the anchor bolts and nuts.



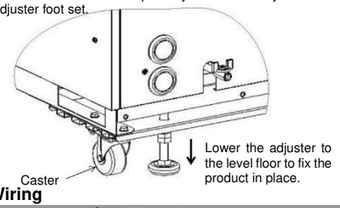
6 Installation (continued)

6.5.3 For Option A or Caster Adjuster-foot kit (HRS-KS002/KS003)

Caution

In case of using Caster Adjuster-foot kit, be sure to use the adjuster foot to install on the floor. The adjuster foot is not earthquake-proof. Make an earthquake resistant measure by the customer side.

Note: Refer to the Operation Manual for the separately sold accessory for further details of the swivel caster and the adjuster foot set.



6.6 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.
- NEVER connect the ground to a water line, a gas pipe or a lightning conductor.

Warning

- The installation of electrical equipment and wiring work should only be preformed by personnel with sufficient knowledge and experience.
- 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 information in section "6.6.1 Power Supply Specifications, Power Supply Cable and Earth Leakage Breaker". The wiring must be firmly secured into the product to prevent the external force of cables being applied to the terminals. Incomplete wiring or improper securing of wiring may cause electric shocks, excessive heat and fire.
- Ensure a stable power supply with no voltage surges.
- Ensure than an Earth Leakage Breaker is used in the power supply of the product. See section "6.6.1 Power Supply Specifications, Power Supply Cable and Earth Leakage Breaker" for details.
- Use a power supply suitable for the specification of the product. 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 if electric shock or fire.
- Ensure that no harmonics are superimposed at the power supply. (Do not use inverters, etc.)
- Supply a steady power supply which is not affected by surges or distortion. If the voltage rate of increase (dv/dt) at zero crossing exceeds 40V/200µsec, it may cause malfunction.

6.6.1 Power Supply Specifications, 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. An earth leakage breaker must be mounted to a position where the breaker is easily accessible and close to the thermo-chiller.

Model	Power supply voltage	Terminal block screw diameter	Recommended crimp terminal	Cable qty. x size*2	Earth leakage breaker*1	
					Rated current (A)	Sensitivity of leak current (mA)
HRSF150-A/W*-40-* HRSF200-A/W*-40-*	3 phase 380 to 415 VAC (50/60Hz)	M5	R5.5-5 For power line (Terminal width 12mm or less)	3 x 5.5 mm^2 (3 x AWG10)	30	30

Notes:
*1: A specified earth leakage breaker and handle are installed for HRS100/150-**-40/46-*
*2: Cable specification are the example when using the product at a continuous allowable operating temperature of 70°C, with an operating voltage of 600V and two kinds of plastic insulated wires at an ambient temperature of 30°C. Please select the proper size of cable according to the actual condition.

6.7 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 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. Forcefully mounting with an unsuitable size may result in heat generation or fire.

6 Installation (continued)

Warning

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

Warning

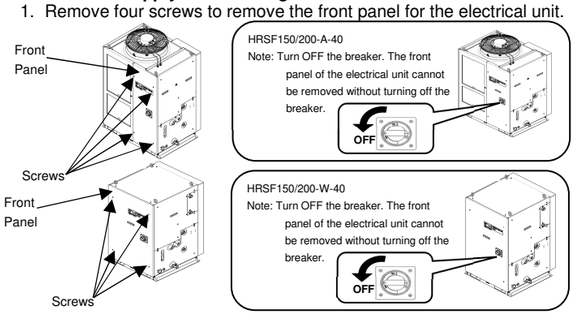
Be sure to connect the power supply cable from the product side first, and then connect the breaker of the facility power supply (the user's machine power supply).

Caution

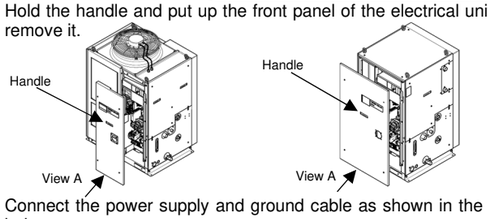
When the panel is removed or mounted, be sure to wear protective shoes and gloves to prevent injury with the edge of the panel.

6.7.1 Power Supply Cable Wiring

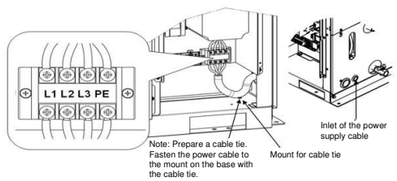
1. Remove four screws to remove the front panel for the electrical unit.



2. Hold the handle and put up the front panel of the electrical unit, and remove it.



3. Connect the power supply and ground cable as shown in the figure below.



Note: Connect overcurrent protection to the user's side (primary side) to avoid hazard.

6.8 Piping

Caution

- Connect piping firmly. Incorrect piping might cause leakage of supplied or drained fluid and wet surrounding area and facility.
- Use caution not to allow dust, chips, cutting oil and other foreign matter to enter the water circuit, etc. during connection of piping.
- During piping work, residual liquid may drip from the circulating fluid circuit or facility water circuit. Prepare a drain pan near the pipe connection so that the residual liquid can be received.
- Securely connect the piping at the piping port with specific wrench when tightening.
- Incorrect piping can burst in service.
- Use non-corrosive material for fluid contact parts of circulating fluid and/or facility water.
- Do not use corrosive material such as aluminium or iron for fluid contact parts, such as piping. Using such materials may lead to clogging or leakage in the circulating fluid and facility water circuits. Also, it may cause refrigerant leak and other unexpected problems.
- Do not generate a rapid change of pressure by water hammer, etc. Internal parts of the product and/or the piping may be damaged.
- It is recommended to use heat insulation to reduce the heat radiation and absorption to/from customer's piping.
- The circuit to be connected to this product must be provided with a mechanism (such as relief valve) to safely release abnormal pressure.

6 Installation (continued)

6.8.1 Piping Port Size

Name	Port size	Recommend tightening torque	Recommended piping specification
Circulating fluid outlet port	Rc1	36 to 38N·m	1.0MPa and more
Circulating fluid return port	Rc1	36 to 38N·m	1.0MPa and more
Facility water inlet port*	Rc1	36 to 38N·m	1.0MPa and more (Supply pressure: 0.3 to 0.5 MPa)
Facility water outlet port*	Rc1	36 to 38N·m	
Automatic fluid fill port	Rc3/8	28 to 30N·m	1.0MPa and more (Automatic fluid fill pressure: 0.2 to 0.5 MPa)
Overflow port	Rc1	36 to 38N·m	ID25mm or more Length 5 m or less
Pump drain port	Rc3/4	28 to 30N·m	ID 19mm or more

Notes: *Water cooled type only.

For HRSF***-AN/WN-*: A set of thread adapters that converts the connectors from Rc to NPT is enclosed as an accessory. For NPT thread, be sure to use this adapter.

For HRSF***-AF/WF-*: A set of thread adapters that converts the connections from Rc to G is enclosed as an accessory. For G thread, be sure to use this adapter.

6.9 Circulating Fluid Supply

Caution

- When tap water is used, refer to Operation Manual section "7.1 Quality Control of Circulating Fluid and Facility Water".
- When 15% ethylene glycol aqueous solution is used, dilute pure ethylene glycol with water. Additives cannot be used.
- When deionised water is used, the conductivity should be 1μS/cm or higher (Electrical resistivity: 1MΩ·cm or lower).
- Confirm that the fluid level is between "HIGH" and "LOW" level of the fluid level gauge.
- Confirm that the valve of the drain port is closed to prevent the supplied circulating fluid from draining out.
- When the set circulating fluid temperature and/or the ambient temperature is lower than 10°C, use a 15% aqueous solution of ethylene glycol. Tap water may be frozen in the thermo-chiller which may damage the product.

6.9.1 15% Aqueous Solution of Ethylene Glycol

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

To control the density of the ethylene glycol aqueous solution, a densitometer is available (sold separately) from SMC.

Item	Part No	Remarks
Ethylene glycol aqueous solution 60%	HRZ-BR001	Please dilute to 15% with tap water and use it.
Densitometer	HRZ-BR002	---

Caution

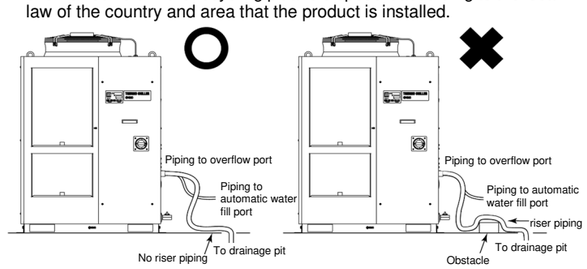
When a 15% aqueous solution of ethylene glycol is used, check the density periodically because the density will be lower due to the automatic fluid-fill function.

6.9.2 Automatic Fluid-Fill Function

Open the fluid supply that is connected to the automatic water fill port. Fluid supply starts and stops automatically with the ball tap in the tank.

Caution

- Be sure to connect the piping from the overflow port to the sump pit to drain the excessive amount of the fluid from the tank.
- When using a 15% aqueous solution of ethylene glycol, collect the overflowed fluid in the recycling pit and dispose it according to the local law of the country and area that the product is installed.



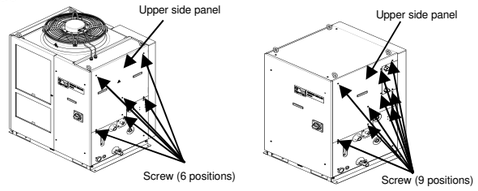
Piping name	Port size	Piping specification
Automatic fill fluid port	Rc1/2	Supply pressure: 0.2 to 0.5MPa
Overflow port	Rc1	The piping length should be Ø25mm or more and the length of 5 meters or less, Avoid riser piping (trapping part)

6.9.3 Fill of Fluid without using Automatic Fluid-Fill Function

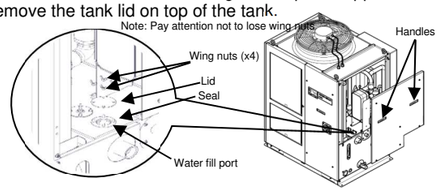
To supply the circulating fluid without using the automatic fluid-fill port, remove the upper panel on the right side, and supply the fluid to the fluid-fill port on top of the tank.

6 Installation (continued)

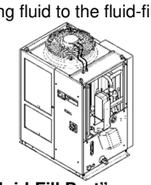
1. Remove the screws (7 pcs.) to remove the upper panel on the right side



2. Hold the handles and lift the right side panel upper and remove it. Remove the tank lid on top of the tank.



3. Supply the circulating fluid to the fluid-fill port.



6.9.4 For Option K "Fluid-Fill Port"

Open the cap of the fluid-fill port and supply the circulating fluid to the fluid level between "HIGH" and "LOW" levels of the fluid level gauge. Close the cap after supplying

7 Starting the Product

7.1 Before Starting

Caution

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

Check the following points before starting.

- Installation state
  - 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 that the power, ground and I/O signal cables (to be supplied by user) are correctly connected.
- Circulating fluid piping
  - Check that the circulating fluid piping is correctly connected to the inlet and outlet.
- Piping to automatic fluid-fill port
  - Confirm that the piping to the automatic fluid-fill port is correctly connected
- Piping to overflow port
  - Piping must be connected to the overflow port regardless of using or not using the automatic fluid-fill function.
  - Confirm that the piping to the overflow port is correctly connected.
- Fluid level gauge
  - Confirm that the fluid level is between "HIGH" and "LOW" levels of the fluid level gauge.
- Facility water piping (For water cooled type)
  - Check that the piping is correctly connected to the facility water inlet and outlet ports.
  - Confirm that the facility water source is in operation.
  - Confirm that the facility water circuit is not closed with a valve, etc.

Note: A water control valve is mounted inside the water-cooled thermo-chiller. For the water-cooled type, facility water may not run without operating the product.

Caution

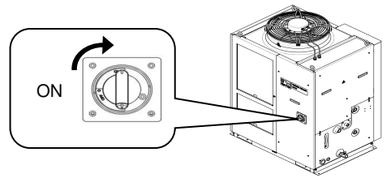
Facility water quality must satisfy the quality standard shown in Operation Manual section "7.1 Quality Control of Circulating Fluid and Facility Water" and the conditions shown in section "2. Specifications".

7.2 Preparing for Start

7.2.1 Power Supply

Turn ON the breaker of the user's power supply.

7 Starting the Product (continued)



When the product is switched ON, the operation panel display operates as shown below:

- The initial screen (HELLO screen) is displayed for 8 seconds on the operation display panel. Then, the display moves to the main display which shows the circulating fluid outlet temperature.
- The set circulating fluid temperature is displayed as SV on the digital display.
- The present circulating fluid temperature is displayed as PV on the digital display.

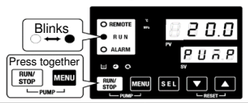
7.2.2 Setting the Circulating Fluid Temperature

Press the [▼] and [▲] button on the operation panel to change the SV to the required value. When setting the circulating fluid temperature by communication, refer to Operation Manual Communication Function.

7.3 Preparation of Circulating Fluid

Circulation fluid is supplied only inside of the product at the time of installation of the thermo-chiller. When the product starts operation in this condition, circulating fluid level will be reduced as the fluid in the level gauge goes down. This is due to the fluid supply to the user's equipment from the thermo-chiller, so additional fluid needs to be supplied to the thermo-chiller.

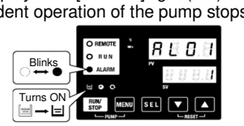
1. Fill the thermo-chiller with fluid, while it is turned OFF. Then turn ON the thermo-chiller.
2. Press the [PUMP] button on the operation panel (press the [RUN/STOP] button and the [MENU] button simultaneously).
   The pump operates independently while the [PUMP] button is being pressed. The [RUN] light (green) blinks while the pump is operating independently and the circulating fluid in the tank is being supplied to the user's equipment and piping. This finds out leakage from the piping as well as discharges air from the piping.



Caution

When any external fluid leakage is found with the piping during this operation, stop the individual operation of the pump and fix the leaking part.

If the fluid in the tank reaches the lower limit, a buzzer will be generated, and the alarm number "AL01 (low level in tank)" is displayed as PV on the digital display. The [ALARM] light (red) blinks, the [⏛] light turns ON, and independent operation of the pump stops.



3. Press the [RESET] button (press the [▼] and [▲] buttons simultaneously to stop the alarm buzzer.

Caution

Reset alarms on the "Alarm menu" screen. Alarm reset is not accepted from any screen except the "Alarm menu" screen. Refer to Operation Manual section "5.2.1 Key Operations".

4. Fluid supply using automatic water fill function has been stared. Operation shown in step 3 can be performed after some minutes.

7 Starting the Product (continued)

5. Press the [RESET] button (press the [▼] and [▲] buttons simultaneously) to reset the alarm. Pressing these buttons at the same time resets the alarm (Low level tank) and turns OFF the [ALARM] LED (red) and the [▭] LED. The display returns to the initial main menu screen. Press the [PUMP] button (press the [RUN/STOP] button and the [MENU] button simultaneously) again to operate the pump individually.

6. Repeat steps 1 to 4 to supply the circulating fluid to the user's equipment and piping. Keep the fluid level in the tank between "HIGH" and "LOW" levels of the fluid level gauge of this product.

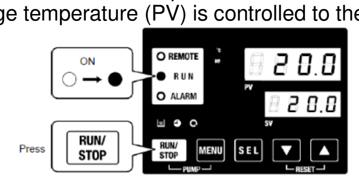
7.4 Operation Start and Stop

7.4.1 Starting the Product

⚠ Caution

Allow at least 5 minutes before restarting the product.

1. Press the [RUN/STOP] key on the operation panel. The [RUN] LED (green) turns ON and the product starts running. The circulating fluid discharge temperature (PV) is controlled to the set temperature (SV).



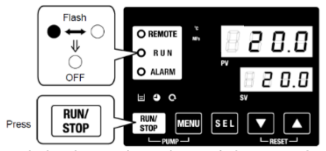
⚠ Caution

When any alarm is generated, refer to Operation Manual section "6 Alarm Notification and Troubleshooting".

2. Be sure to confirm that the circulating fluid level satisfies the minimum required flow rate specified for each model with the check monitor menu.

7.4.2 Stopping the Product

Press the [RUN/STOP] key on the operation panel. The [RUN] light on the operation panel blinks green at 1 second intervals, and continues operation prepare to stop. After approximately 20 seconds, the [RUN] light turns OFF and the operation stops completely.



1. Turn off the earth leakage breaker of the user's power supply.

⚠ Caution

Except in case of emergency, do not turn off the breaker until the product has stopped completely. Otherwise, it may cause a failure.

8 Alarms and Troubleshooting

8.1 Alarm Notification

The product makes a notification in the following order when any alarm is generated:

- The [ALARM] light blink
- The alarm buzzer sounds
- The alarm number is displayed in the PV window on the digital display.
- Contact signal of the contact input/output communication is output.

Refer to the Operation Manual Communication Function for more detail.

- It is possible to read the alarm status using serial communication.

Refer to the Operation Manual Communication Function for more detail.

This product has two types of operation depending on the alarm being generated. Some of the alarms stop the product operation and some of them do not stop the operation with the alarm being generated.

Refer to Operation Manual "Table 6-1 to Table 6-3". When the operation shops due to the alarm, it is not possible to restart the operation until the alarm is reset.

- When multiple alarms are generated, the alarm codes are displayed one by one by pressing the [SEL] button

8.2 Alarm Buzzer Stop

An alarm buzzer sounds to notify when any alarms are generated. How to stop the alarm buzzer is explained below.

- Confirm that the alarm display is shown. The alarm buzzer can be stopped only on this screen.
- Press the [▼] and [▲] buttons simultaneously, and the alarm buzzer stops.

8 Alarms and Troubleshooting (continued)

Alarm buzzers can be set not to make a sound. Refer to Operation Manual section "5.19 Alarm Buzzer Sound Setting". It is not necessary to follow the buzzer stop instruction when the alarm buzzer sound is set to OFF. If this procedure is preformed when the cause of the alarm has been eliminated before stopping the alarm buzzer, the alarm will be reset at the same time.

8.3 Alarm contents, Causes, and Troubleshooting

Troubleshooting method varies depending on which alarm has been generated. Refer to Operation Manual "Table 6-1 to Table 6-3 Alarm codes and troubleshooting". Instruction to reset the alarms after eliminated the cause of the alarms explained below.

- Confirm that the alarm display is shown. Alarms can only be reset on this screen.
- Press the [▼] and [▲] buttons simultaneously.
- The alarm is reset, and the [ALARM] light turns OFF. The operation panel displays the circulating fluid temperature and the set circulating fluid temperature. Contact signal output for the contact input/output communication stops. (Refer to the Operation Manual Communication Function for more details.)
- Operation status of the thermo-chiller during the alarm is being generated can be customised by the user. Refer to Operation Manual section "5.21 Alarm Customizing Function" for more details.

9 Maintenance

9.1 General Maintenance

⚠ Warning

Use specified fluids only. If other fluids are used are used, they may damage the product, caused fluid leakage, or result in hazards such as electric shock or leakage of electricity. When using clear water (tap water), ensure that it satisfied the water quality criteria shown in the Operation Manual table "7-1 Quality criteria for clean water (tap water)". 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.

⚠ Caution

Replace the circulating fluid and/or the facility water if any problems are found in the regular check. Even if no problems are found, some of the water in the tank evaporated and impurity concentration in the circulating fluid increases. Replace the circulating fluid on the tank once in every 3 months. Refer to the section "9.2 Inspection and cleaning" for regular inspection.

9.2 Inspection and Cleaning

⚠ Warning

- Do not preform button operation or setting of this equipment with wet hands. Do not touch the electrical parts such as the power supply plug. It may cause an electric shock.
- Do not splash water directly on the product or do not wash with water. It might cause electric shock, fire, etc.
- Do not touch the fins directly when cleaning the dust-proof filter. It may cause injury.
- Shut off the power supply to this product before preforming cleaning, maintenance or inspection, or it may cause electric shock, injury, burn, or etc. When the panel has been removed for the purpose of inspection or cleaning, mount the panel after the work is completed. If the product is operated with the panel removed or open, it may cause injury or electric shock.

9.2.1 Daily Check

Item	Contents of check	
Installation condition	Check the installation condition if the product	Check that there is no heavy object on the product or excessive force applying to the piping.
		Temperature should be within the specification range of the product.
Fluid leakage	Check the connected parts of the piping.	Check that there is no fluid leakage from the connected parts of the piping.
Amount if circulating fluid	Check the liquid kevel indicator.	Fluid level should be between "HIGH" and "LOW" levels of the fluid level meter.
Operation panel	Check the indications on the display.	The numbers shown on the display should be clear and legible.
	Check the functionality.	Check that the buttons, [RUN/STOP], [MENU], [SEL], [▼] and [▲] operate correctly.
Circulating fluid temperature	Check the operation panel.	There should be no problem for operation.
Circulating fluid flow rate	Check the operation panel.	There should be no problem for operation. If flow rate has become smaller, check for any clogging of the Y-strainer and clean it.
Operating condition	Check the operating condition of the product.	There should be no abnormality with noise, vibration, smell, or generation of smoke.
Facility water (for water-cooled type)	Check the facility water condition.	Check that the temperature, pressure and flow rate are with the specification ranges.

9.2.2 Monthly Check

Item	Contents of check	
Ventilating condition (air-cooled type)	Clean the ventilating grills.	Make sure the ventilating grilles are not clogged with dust, etc.
Facility water (water-cooled type)	Check the facility water.	Make sure the facility water is clean and contains no foreign matter.

9 Maintenance (continued)

Cleaning of Air Ventilation

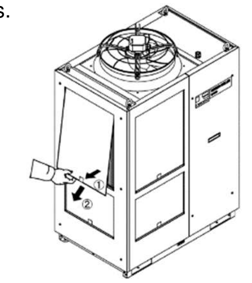
⚠ Caution

If the fins of the air-cooled condenser become clogged with dust or debris, heat radiation performance declines. This will result in the reduction of cooling performance and may stop the operation because the safety device is triggered.

Clean the dust-proof filters with a long bristled brush or by air blow to prevent the fins from being damaged or deformed.

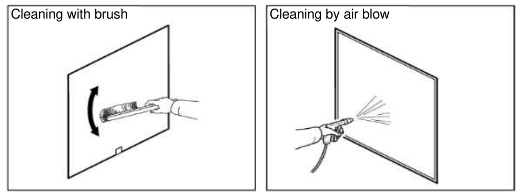
Removal of the Dust-proof Filter

1. The dust-proof filters are installed on the front and left sides of the product. The dust-proof filters are mounted at four sections. They are all identical in shape.
2. They cab removed as shown in the drawing below. Care should be taken not to deform or scratch the air-cooled condenser (fins) while removing the filters.



Cleaning of Dust-proof Filter

Clean the dust-proof filter with a long bristled brush or by air blow.



Mounting of Dust-proof Filters

Assemble the filters in the reverse order to the removing procedure.

9.2.3 Inspection Every 3 Months

Item	Contents 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 (clean water) periodically	• 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 clean water or pure water. The water quality must be within the range shown in the Operation Manual "Table 7-1" * 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 the Operation Manual "Table 7-1"

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 the Operation Manual "Table 7-1"
- When using 15% ethylene glycol solution, check that the concentration is within the range of 15% +5/-0.
- Do NOT use chlorine-based or such types or detergents or cleansers.
- When using the Y strainer provided as an accessory for piping, clean the screen mesh inside the strainer at the same time as when replacing the circulating fluid.
  Ensure that there is no circulating fluid in the thermo-chiller, user's equipment, and piping. Remove the cap and take out the screen mech inside and clean the screen mesh with compressed air or detergent. Use cation not to cause damage to the screen mesh.

Clean the Customer's Facility Water System (Water-cooled Type)

- Clean the customer's facility water system and replace facility water.
- Facility water quality must satisfy the criteria specified in the Operation Manual "Table 7-1".

9 Maintenance (continued)

⚠ Caution

If there is foreign matter accumulated or clogging in the facility water system, pressure loss increases with less flow rate, and it may damage the screen mesh.

9.2.4 Inspection during winter season

⚠ Caution

Keep the power supply ON for these functions. These functions do not start when the power is OFF.

Item	Description
Anti-freezing function	This function prevents freezing of the circulating fluid while the product stops operation in the winter season with heat generated by automatically operating the pump. When there is a possibility of the circulating fluid freezing due to changes in the installation or operating environment (e.g. season, weather), set this function ON in advance. For more details, refer to Operation Manual "5.11 Anti-freezing Function".
Warming up function	This function maintains the circulating fluid temperature to the set warming-up temperature with heat generated by automatically operating the pump in the winter season or at night. When the time required for increasing the temperature of the circulating fluid needs to be shortened at startup, set this function ON in advance. *For more details, refer to Operation Manual "5.16 Warming Up Function".
Anti-snow coverage function	This function prevents snow coverage on the exhaust port on top of the product during the wintertime by automatically operating the fan periodically. When there is a possibility of snow coverage due to changes in the installation or operating environment (e.g. season, weather), set this function ON in advance. For more details, refer to Operation Manual "5.17 Anti-Snow Coverage Function".
Freezing of the facility water	When there is a possibility of the facility water being frozen, make sure to discharge all the facility water from the facility water circuit. *Refer to Operation Manual "7.4.2 Discharge of the facility water (Water-cooled type)" for how to discharge the facility water.

9.3 Consumables

Part number	Name	Qty.	Remarks
HRS-S0213	Dust-proof filter (Lower)	1 pc	For air-cooled: 2 pcs are used per unit
HRS-S0214	Dust-proof filter (Upper)	1 pc	For air-cooled: 2 pcs are used per unit

10 Limitation of Use

10.1 Limited warranty and disclaimer/compliance requirements

Refer to Handling Precautions for SMC Products.

⚠ Caution

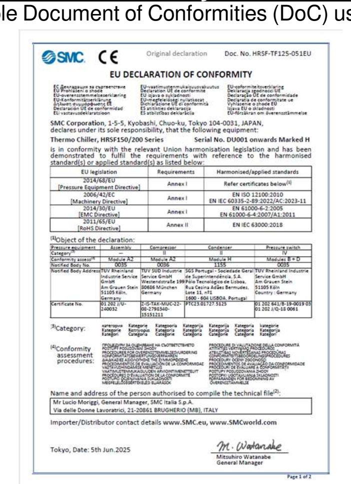
Refer to section "2. Specifications" for the product limitations of use.

11 Product Disposal

This product shall not be disposed of as municipal waste. Check your local regulations and guidelines to dispose this product correctly, in order to reduce the impact on human health and the environment.

12 Declaration of Conformity

Below are sample Document of Conformities (DoC) used for this product.



13 Contacts

Refer to www.smcworld.com or www.smc.eu for your local distributor/importer.

SMC Corporation

URL : https:// www.smcworld.com (Global) https:// www.smc.eu (Europe)
SMC Corporation, 1-5-5, Kyobashi, Chuo-ku, Tokyo 104-0031, JAPAN
Specifications are subject to change without prior notice from the manufacturer.

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