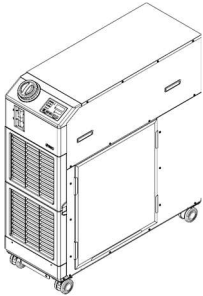




ORIGINAL INSTRUCTIONS

Instruction Manual
Thermo-chiller
HRSC090 Series



This product uses 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 generates 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 and safety requirements for systems and their components.
- ISO 4413: Hydraulic fluid power - General rules and safety requirements for systems and their components
- 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.

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

Warning



This symbol stands for a warning that this system contains refrigerant under high pressure. Do not tamper with the system. It must be serviced by suitably qualified personnel only.

2 Specifications

2.1 Product Specifications

Model			HRSC090-A-40	HRSC090-W-40	
Cooling method			Air-cooled refrigeration	Water-cooled refrigeration	
Refrigerant			R744 (CO ₂ , GWP: 1)		
Refrigerant charge		kg	0.83	1.07	
Control method			PID control		
Ambient Temperature/ Humidity/Altitude/ Installation environment ^{*1,10}			Temperature: 5 to 45°C, Humidity: 30 to 70%, Altitude: less than 3000 m, Environment: Indoor use		
Circulating fluid	Circulating Fluid ^{*2}		Water, 15% ethylene glycol aqueous solution, Deionized water		
	Set temperature ^{*1}		°C		
	Cooling capacity ^{*3,10}		kW	9.5	11
	Heating capacity ^{*4}		kW	2.5	2.5
	Temp. stability ^{*5}		°C		
	Pump capacity	Rated flow ^{*6}	L/min	45 (0.5MPa)	
		Max. flow	L/min	60	
	Pump capacity	Max. pump head	m	50	
	Settable pressure range ^{*7}		MPa		
	Minimum operating flow rate ^{*8}		L/min	20	
	Tank capacity		L	Approx. 18	
	Circulating fluid supply/return port			Rc1 (Symbol F: G1, Symbol N: NPT1)	

2 Specifications (continued)

Model				HRSC090-A-40	HRSC090-W-40	
Circ fluid	Tank drain port			Rc1/4 (Symbol F: G1/4, Symbol N: NPT1/4)		
	Fluid contact materials			Stainless, Copper (Heat exchanger brazing), Bronze, Brass, Carbon, Ceramic, PE, PVC, POM, PTFE, PP, PA, NBR, EPDM, FKM		
Facility Water	Temperature range	°C			10 to 40	
	Pressure range	MPa			0.3 to 0.5	
	Required flow rate	L/min			25	
	In-Out Press. Diff.	MPa			0.3 or more	
	Tank drain port				Rc1/2 (Symbol F: G1/2, Symbol N: NPT1/2)	
	Fluid contact material			Stainless, Copper (Heat exchanger brazing), Bronze, Brass, Carbon, Ceramic, PE, PVC, POM, PTFE, PP, PA, NBR, EPDM, FKM		
Electrical System	Power supply			3phase 380Y/220VAC to 415Y/240VAC (50Hz) Allowable voltage fluctuation +/-10% (No continuous voltage fluctuation) 3phase 380Y/220VAC to 480Y/277VAC (60Hz) Allowable voltage fluctuation +4%, -10% (Max. voltage less than 500Y/289V and no continuous voltage fluctuation)		
	Earth Leakage breaker (Standard)	Rated current	A	20		
		Sensitivity current	mA	30		
		Rated current ⁵	A		9.5	9.2
		Rated power consumption ⁵	kW (kVA)		6.4 (6.8)	6.2 (6.6)
Noise level (Front 1m/Height 1m) ⁵			dB(A)	67	65	
Accessories				Alarm code list label 2pc. (English 1pc. /Japanese 1pc.), Operation manual 2pc. (English 1pc. /Japanese 1pc.), Y strainer (40 meshes) 25A, Barrel nipple 25A Anchor brackets 2pcs. (Including M10 bolts 4pcs.) ¹¹		
Weight ⁹			kg	Approx. 137	Approx 135	

*1 Use 15% ethylene glycol aqueous solution if operating in a place where the circulating fluid temp. or ambient temperature is lower than 10 °C. Please discharge the facility water from the facility water circuit when there is a risk of freezing.

- *2 Use fluid in condition below as the circulating fluid.
Water: Standard of The Japan Refrigeration and Air Conditioning Industry Association (JRA GL-02-1994)
15% ethylene glycol aqueous solution: diluted by water in condition above without any additives such as antiseptics.
Deionized water: Electric conductivity 1μS/cm or higher (Electric resistivity 1 MΩ-cm or lower)
- *3 (1)Operating ambient/Facility water temp.: 32°C, (2)Circulating fluid: Water, (3)Circulating fluid temp.: 20°C, (4)Circulating fluid flow rate: Rated flow rate, (5)Power supply: 400VAC
- *4 (1)Operating ambient/Facility water temp.: 32°C, (2)Circulating fluid: Water, (3)Circulating fluid flow rate: Rated flow rate, (4)Power supply: 400VAC
- *5 (1)Operating ambient/Facility water temp.: 32°C, (2)Circulating fluid: Water, (3)Circulating fluid temp.: 20°C, (4)Heat load: Same as the cooling capacity, (5)Circulating fluid flow rate: Rated flow rate, (6)Power : 400VAC, (7)External piping length: Minimum.
- *6 The specification at the supply port of the thermo chiller when the circulating fluid temp is 20°C
- *7 With the pressure control mode of the pump operation mode. When the pressure control mode is not necessary, use the frequency set mode
- *8 Fluid flow rate to maintain the cooling capacity. If the actual flow rate is lower than this, please install a bypass piping.
- *9 Weight in the dry state without circulating fluids.
- *10 Cooling capacity is reduced at altitudes above 1000m. (Air-cooled model only)
- *11 The anchor brackets (including M10 bolts) are used for fixation with the skid when this product is packed. The anchor bolts are not attached.

2.2 Product Serial Number Code

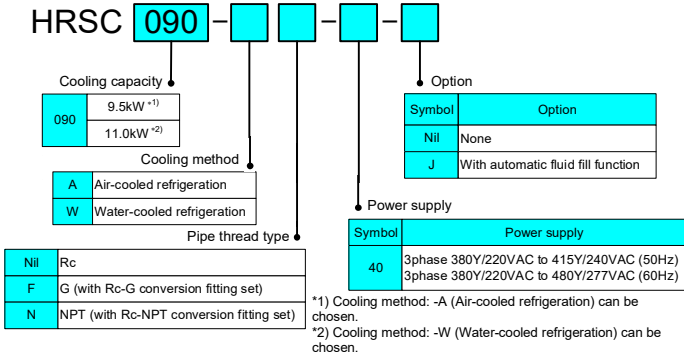
The production serial number code printed on the label indicates the month and year of production as per the following table:

Year	Month											
	2025	2026	2027	2028	2029	2030	2031	...				
Jan	o	Do	Eo	Fo	Go	Ho	io	Jo	...			
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	...			

Warning

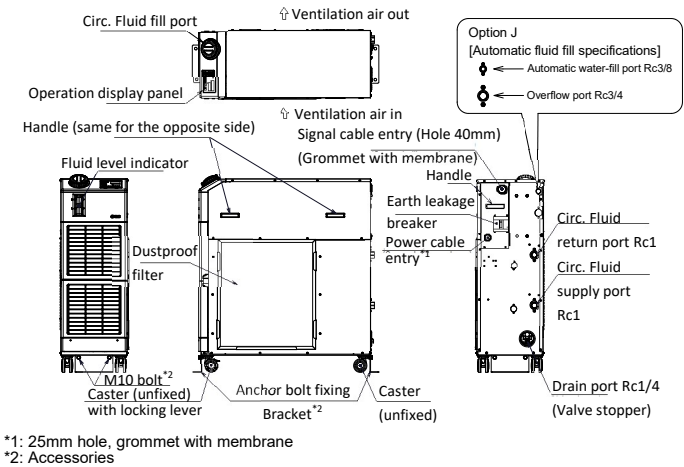
Special products (-X) might have specifications different from those shown in this section. Contact SMC for specific drawings.

3 How to Order



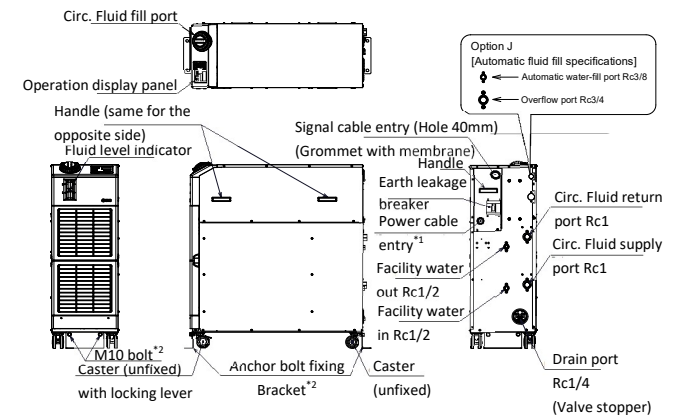
4 Name of Parts and Accessories

4.1 Name of Parts for Air-Cooled Model



*1: 25mm hole, grommet with membrane
*2: Accessories

4.2 Name of Parts for Water-Cooled Model



*1: Hole 25mm, grommet with membrane
*2: Accessories

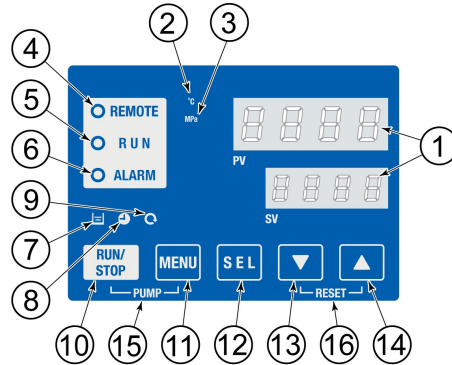
4.3 Accessories

	Name	Picture	Quantity	Air-cooled	Water-cooled
1	Alarm code list label		1 JA, 1 EN	•	•
2	Operation manual		1 JA, 1 EN	•	•
3	Y strainer (40meshes) 25A		1	•	•
4	Barrel nipple 25A		1	•	•
5	Anchor brackets (The anchor bolts are not attached)		2	•	•
6	G thread adapter set (HRS-EP019)		1 set	• (AF)	-
	NPT thread adapter set (HRS-EP018)		1 set	• (AN)	-

4 Name of Parts and Accessories (continued)

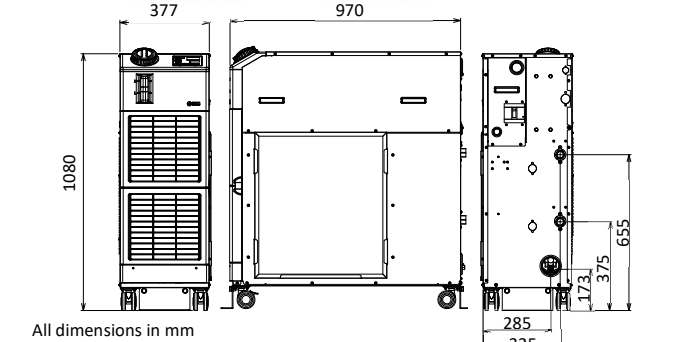
	Name	Picture	Quantity	Air-cooled	Water-cooled
6	G thread adapter set (HRS-EP021) For option J		1 set	• (AF)	-
	NPT thread adapter set (HRS-EP020) For option J		1 set	• (AN)	-
	G thread adapter set (HRS-EP023)		1 set	-	• (WF)
	NPT thread adapter set (HRS-EP022)		1 set	-	• (WN)
	G thread adapter set (HRS-EP025) For option J		1 set	-	• (WF)
	NPT thread adapter set (HRS-EP024) For option J		1 set	-	• (WN)

4.4 Operation Display Panel

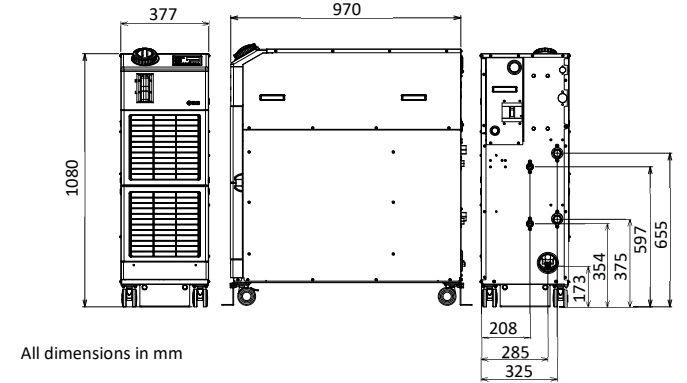


5 Outline Dimension

5.1 Outline Dimension for Air-Cooled Model



5.2 Outline Dimension for Water-Cooled Model



6 Transportation

6.1 Safety During Transportation

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

Warning

- When moving the product by using a forklift, insert the fork into the right positions referring to the operation manual.

- Moving by forklift should be done by people who have licensed persons.

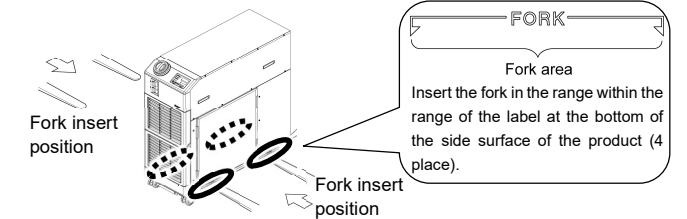
Caution

- 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.
- When the product is carried by using a forklift, make sure that the fork does not damage the cover panel, piping port, or caster. Do not manipulate the fork in the range outside the label at the bottom of the side surface of the product.

6.2 Transporting with a forklift

Warning

- This is a heavy product. (Weight: 137/135kg, A/W).
- Moving by forklift should be done by licensed persons.
- Forklift insertion positions are on either left or right side of this system. Do not insert from the front or the rear.



6.3 Transporting with Casters

Warning

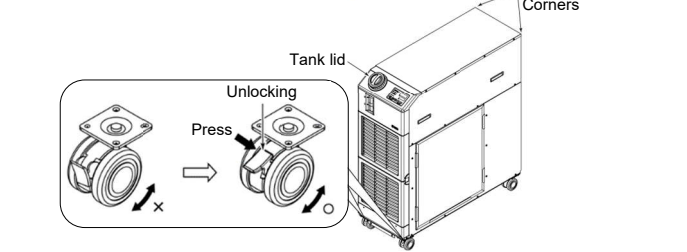
- This is a heavy product. (Weight: 137/135kg, A/W)
- Moving the product by casters should be performed by 2 persons or more.

Caution

- Release the lock lever of the front casters and push the corner of the product. Do not grip the piping or the handles of the panel. The piping or panel may be damaged.
- 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.

6 Transportation (continued)

- Remove the anchor bolt fixtures.



7 Installation

7.1 Safety During Product Installation

Do not install the product unless the safety instructions have been read and understood.

Warning

- Do not set up the product in places possibly exposed to leakage of flammable gas. Should any flammable gas remain around the product, the product may cause a fire.
- Do not use the product outdoors. If the product is subjected to rain or water splashes, it may cause electrical shock, fire, or failure.
- Keep all ventilation openings clear of obstruction 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 45°C. Operation below 5°C may cause compressor failure, and operation above 45°C may cause the product to overheat and shut down.
- 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.

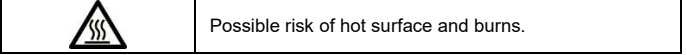
7.2 Types of Hazard Labels

The product has various potential hazards, and they are marked with the following labels.

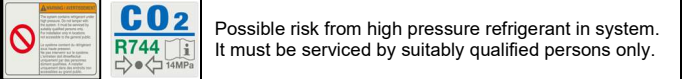
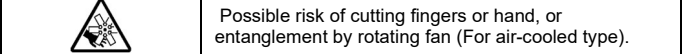
Warning Related to Electricity



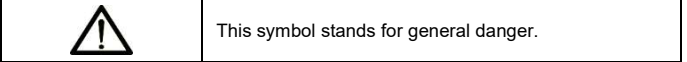
Warning Related to High Temperatures



Warning Related to Rotating Objects



Warning Related to other General Dangers



7.3 Environment

Warning

- Do not use in an environment where corrosive gases, chemicals, salt water or steam are present.
 - Do not use in an explosive atmosphere.
 - Do not expose to direct sunlight. Use a suitable protective cover.
 - Do not install in a location subject to vibration or impact in excess of the product's specifications.
 - Do not mount in a location exposed to radiant heat that would result in temperatures in excess of the product's specifications.
- 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.
- Location that is outside.
 - Location accessible to the general public.
 - 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 explosion-proof).
 - Location where the ambient is out of the following range:

7 Installation (continued)

- In transportation and in storage: 0 to 50°C (There should not be any water or circulating fluid in the product)
- In operation: 5 to 45°C (Use 15% ethylene glycol aqueous solution if operating in a place where the circulating fluid temperature or ambient temperature is lower than 10°C.)
- Location where the ambient humidity is out of the following range or where condensation occurs:
 - In transportation and in storage: 15 to 85%
 - In operation: 30 to 70%
- Location where condensation forms on the inside of electrical parts.
- 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 frequency radiation (microwaves).
- Location that is subjected to potential lightning strikes.
- 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 locations at altitudes of 1000m or higher. Therefore, the maximum ambient temperature and cooling capacity will lower according to the descriptions in the table below. Please select the thermo chiller considering the descriptions.

- Max ambient temp: Use the product in lower ambient temperature than the described value at each altitude.
- Cooling capacity coefficient: The product's cooling capacity will lower by multiplying by the described value at each altitude.

Altitude	1. Max. ambient temp [°C]	2. Cooling capacity coefficient
Less than 1000m	45	1.00
Less than 1500m	42	0.85
Less than 2000m	38	0.80
Less than 2500m	35	0.75
Less than 3000m	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).

7.4 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 "6.3 Environment" of the operation manual.

Warning

- 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).

Installation of multiple products

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

For Installation at Indoor Site:

- In case of facility having a large installation area (that can vent the air naturally) Make an air outlet on a wall at a high level and air inlet on a wall at a low level, to allow for adequate airflow.
 - In case of facility having a small installation area (that cannot vent the 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.
 - Using a duct to exhaust the air. In case the indoor site cannot accept the exhausted 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. Have the space at least the duct's diameter apart. Use a fan for the duct that considered the ventilation resistance of the duct.

Model	Heat radiation kW	Required ventilation amount m³/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
HRSC090-A*-40	Approx. 18	305	155

Caution

The water-cooled product radiates heat to the facility water. It is necessary to supply the facility water. Please prepare the facility water system that satisfies the heat radiation and the facility water specifications in the next column.

Required facility water system:

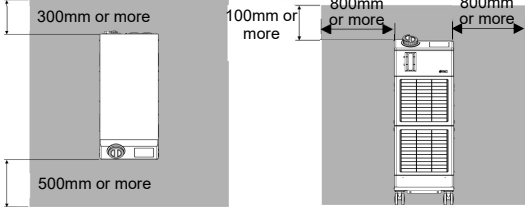
Model	Heat radiation kW	Facility water specifications
HRSC090-W*-40	Approx. 20	Refer to "2.1 specifications"

7 Installation (continued)

7.5 Installation and Maintenance Space

Caution

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



7.6 Mounting

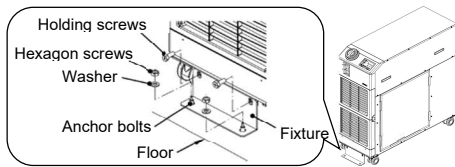
Caution

- Install the product on the horizontal floor.
- Prepare the M10 anchor bolts that are appropriate to the material of the floor that the product will be installed. Drive the anchor bolts at least at two places of the left and right side of the product each (totally four places). Refer to the image below for the dimensions of the positions of the anchor bolts.



- Install the anchor bolts on the levelled floor with dimensions above.
- Set the fixture from the top of the anchor bolts.
- Set hexagon screws to the anchor bolts and screw the holding screws into the product to settle the product to the floor. Fixture is mounted to the front and the rear surface of the product (2 places)

For fixture to the ground, SMC Foundations bolt set [IDF-AB500] (SUS M10x50mm) is applicable.



7.7 Electrical Wiring

Warning

- Do not modify the internal electrical wiring of the product. Incorrect wiring may cause electric 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.
- Only qualified persons are allowed to wire the product.
- Be sure to shut off the user's power supply. Wiring with the product energised is strictly prohibited.
- The wiring must be conducted using cables complying with the table below and must be firmly 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 the table below.
- Use a power supply suitable for the specifications 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 of electric shock or fire.
- Ensure that no harmonics are superimposed at power supply. (Do not use inverter etc.)
- Supply a steady power supply which is not affected by surges or distortion. In particular, if the voltage rate of increase (dv/dt) at zero crossing exceeds 40V/200µsec, it may cause malfunction.

7.8 Power Supply Specifications, 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.

Model	Power supply voltage	Terminal block screw diameter	Recommended crimp terminal	Cable specifications*	Earth leakage breaker	
					Rated Current [A]	Sensitivity of leak current [mA]
HRSC090-A*-40 HRSC090-W*-40	3phase 380Y/220VAC to 415Y/240VAC (50Hz) 3phase 380Y/220VAC to 480Y/277VAC (60Hz)	M5	R5.5-5	4 cores x AWG10 (4 cores x 5.5mm²) (Including ground)	20	30

7 Installation (continued)

7.9 Preparation and Wiring of Power Supply Cable

Warning

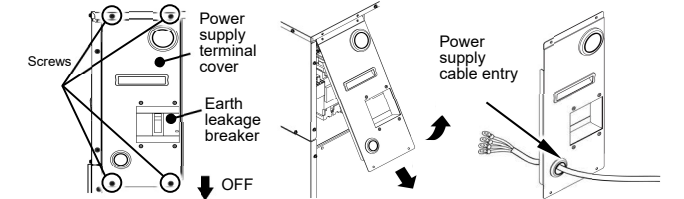
- The electrical facilities should be installed and wired in accordance with local laws and regulations of each country and by a person who has knowledge and experience.
- Check the power supply. Operation with voltages, capacities and frequencies other than the specified values can cause fire and electrical shock.
- Wire with an applicable cable size and terminal. Forcible 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.
- Be sure to lock out and tag out the breaker of the facility power supply (customer power supply facility) before wiring.
- 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

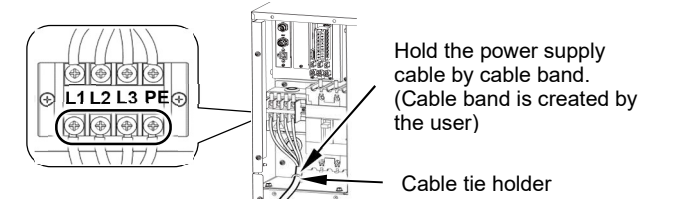
- When the panel is removed or mounted, be sure to wear protective shoes and gloves to prevent injury with the edge of the panel.

Preparation for Operation

- 1.Remove 4 screws to remove the power supply cover on the back of the product.
- 2.Hold the pull of the power supply cover. Pull the bottom of the cover forward and remove it moving the cover downwards.
- 3.Insert the power supply cable and ground cable to the power supply cable entry of the power supply terminal cover (grommet with film)



- 4.Connect the power supply and the ground cable as show in the figure below.



- 5.Mount the power supply terminal cover using 4 screws.

7.10 Piping

Caution

- Connect piping firmly. Incorrect piping may 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.
- 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.
- 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 materials prone to corrosion such as aluminium 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.

Piping Port Size

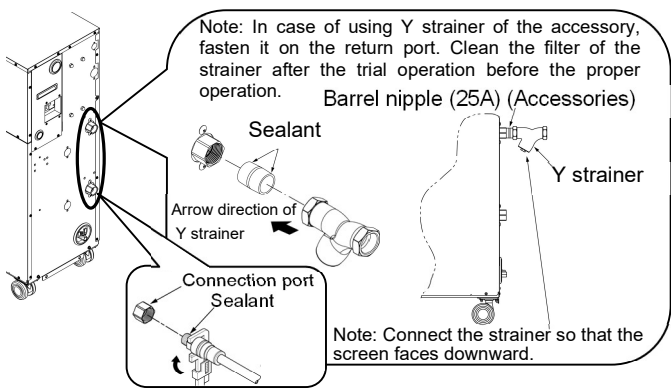
Name	Port size	Recommended tightening torque	Recommended piping specification
Circulating fluid supply port	Rc1	36 to 38N·m	1.0MPa and more
Circulating fluid return port	Rc1	36 to 38N·m	1.0MPa and more
Drain port	Rc1/4	8 to 12N·m	-
Facility water inlet port *1	Rc1/2	28 to 30N·m	1.0MPa and more.
Facility water outlet port *1	Rc1/2	28 to 30N·m	(Facility water pressure 0.3 to 0.5MPa)
Automatic fluid fill port *2	Rc3/8	22 to 24N·m	1.0MPa more (Automatic water-fill pressure 0.2 to 0.5MPa)
Overflow port *2	Rc3/4	28 to 30N·m	Inside diameter 19mm more of piping

*1 Water-cooled type only.

*2 For Option J [Automatic fluid filling]

7 Installation (continued)

How to Connect Piping

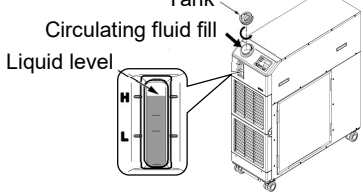


Caution

Without holding the ball valve of the drain port with a wrench, the ball vale may rotate, and it may cause a fluid leakage and malfunction of the product. Be sure to hold the ball valve of the drain port.

7.11 Filling with 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 or a 15% ethylene glycol aqueous solution.



8 Starting and Stopping the Product

8.1 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.

Before starting, check the following items:

- 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.
- Check the power, ground and communications (optional) cable are correctly connected.
- Check proper connection of piping at inlet and outlet.
- Ensure that the fluid level is "H".
- Check proper connection of piping at the facility water inlet and outlet. (W only)
- Check that the facility water source is in operation (W only)
- Check that the facility water circuit is not shut off by valves (W only)

8.2 Preparation for start Power supply

Turn on the breaker switch on the back of the product. 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.

Setting of Circulating Fluid Temperature

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



Setting of pump operation mode

The initial setting of the pump operation mode is pressure-controlled mode and the pressure setting is 0.5MPa.

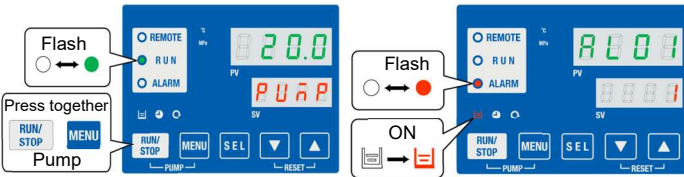
Preparation of circulating fluid

When the circulating fluid tank has filled the user's machine and the piping remain empty, 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 in the following procedure.

8 Starting and Stopping the Product (continued)

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

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. If the fluid level in the tank reaches the lower limit "AL01 (tank fluid level is low)" will trigger. The [ALARM] lamp (red) flashes, the [AL01] lamp turns on.



Caution

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

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

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.

2. Open the tank lid and supply the circulating fluid up to the "H" mark on the tank.

Caution

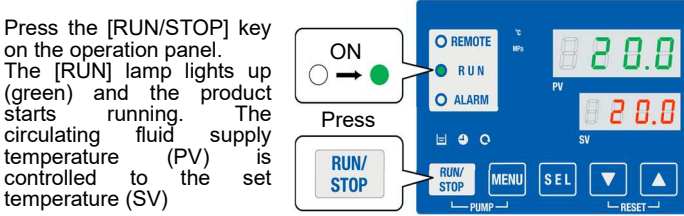
- Check the drain port is plugged or closed by the valve to prevent the supplied circulating fluid from draining out.
 - When the fluid level falls lower than "L", the alarm will be generated.
- 3.Press the [RESET] key ([▼] and [▲] keys simultaneously) to reset the alarm.
 - 4.Repeat steps 1 to 4 to supply the circulating fluid to the customer's equipment and piping. The tank level must be "H" on the tank liquid level indicator.



8.3 Starting and Stopping Starting the Product

Caution

Allow at least five minutes before restarting the product.



Stopping the product

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. 20 to 60 seconds, the [RUN] lamp goes off and the product stops.

Shut off the breaker to the customer's power supply.

All LEDs go off.

Warning

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

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 restarting operation after it has been stopped. If restarted within 5 minutes, the protection circuit may activate and the operation may not start properly.

8 Starting and Stopping the Product (continued)

- Operation and suspension frequency should not exceed 10 times per day. Frequently switching between operation and suspension may result in the malfunction of the refrigeration circuit.

8.4 Items to Check After Starting

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.

Check the following items after starting the product:

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

8.5 Adjustment of circulating fluid flow rate

If the flow rate is lower than the minimum operating flow rate, the product may not manage to achieve specified performance and the compressor may not start running.

Adjust the hand valve installed by the customer side to make the desired pressure and/or flow rate.

Caution

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

9 Maintenance

9.1 General Maintenance

Warning

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

Caution

- Not following proper maintenance procedures could cause the product to malfunction and lead to equipment damage.
- If handled improperly, compressed air can be dangerous.

- Maintenance of pneumatic systems should be performed only by qualified personnel.
- Before performing maintenance, turn off the power supply and be sure to cut off the supply pressure. Confirm that the air is released to atmosphere.
- After installation and maintenance, apply operating pressure and power to the equipment and perform appropriate functional and leakage tests to make sure the equipment is installed correctly.
- If any electrical connections are disturbed during maintenance, ensure they are reconnected correctly and safety checks are carried out as required to ensure continued compliance with applicable national regulations.
- Do not make any modification to the product.
- Do not disassemble the product, unless required by installation or maintenance instructions.

9.2 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. In most areas, water can be used. However, if the water in the area is hard, there is a possibility of failure or performance decline due to limescale build up. To soften the water, and avoid problems, consider using water hardness filters.

Caution

- 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 because evaporation of the fluid causes concentrations of impurities.
- 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 thermo chiller to break down.
- A 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.

9 Maintenance (continued)

9.3 Daily Check

Check each item of the table 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.

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 is 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. Check the function.	The numbers on the display are clear. The [RUN/STOP] and [MENU], [SEL], [▼], [▲] buttons operate properly.
Circulating fluid temperature	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.
Ventilating condition *1	Check the condition of the ventilation grill.	Make sure the ventilation grille is not obstructed.
Facility water *2	Facility water condition	Temperature, pressure and flow rate are within the specified range of the product.

*1: Air-cooled only. *2: Water-cooled only

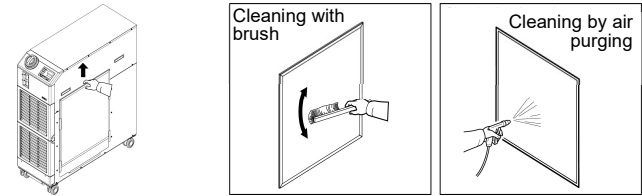
9.4 Monthly Check

Caution

If the air ventilation of the product has clogged with dust or debris, heat radiation performance reduces. This results in the reduction of cooling performance and may stop the operation.

Clean the dust-proof filter with a long-bristled brush or by air purging to prevent the finds from being deformed or damaged.

- 1.Dust-proof filter is installed on the right side of the chiller.
- 2.Pull the dust-proof filter upward with care as to not deform or scratch the air-cooled condenser.
- 3.Clean the dust-proof filter with a long-bristled brush or by air purging.



9.5 Inspection Every 3 Months

Replacement of Circulating Fluid

- Exchange the circulating fluid to a new one otherwise alga may form or it will decompose.
- In case of using the Y strainer of accessory, clean the screen mesh in the strainer when exchanging the circulating fluid.
 - Confirm if there is no circulating fluid remained in the product, the customer's machine and the piping.
 - Remove the cap cover of the strainer and take out the screen mesh.
 - Clean the screen mesh with detergent or/and purge by air. Take care not to make scratches at this time.
 - Do not use any chlorinated detergents and cleansers.
 - Put the screen mesh in the groove of the cap and assemble it to the strainer.

Replacement of facility water

Clean the customer's facility water system and replace facility water.

Caution

If there are foreign matters or clogs in the screen mesh, the pressure loss will become large, and it may break the screen mesh.

9.6 Inspection Every 6 Months

Check for Water Leakage from Pump

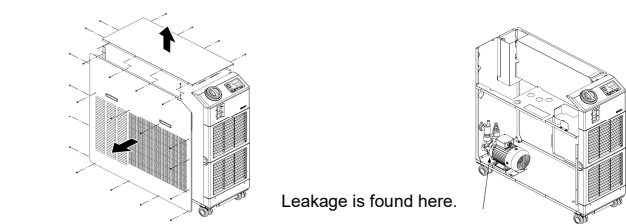
Remove the panel and check the pump for excessive leakage. If the leakage is found, replace the mechanical seal. Order the mechanical seal described in "9.8 consumables" as a service part.

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 recommended lifetime of the mechanical seal before needing replacement is 6000 to 8000 hours.



Leakage is found here.

9 Maintenance (continued)

9.7 Inspection for Winter Season

Caution

The power supply should be ON for these functions. Otherwise, these functions cannot start.

Anti-Freezing Function

To prevent the circulating fluid freezing during winter, this function operates the pump automatically to heat the circulating fluid from the pump's heat radiation. If there is a possibility of the circulating fluid freezing due to changes in the installation and operating environment (season and weather), set this function in advance.

Warming Up Function

During the winter or night, this function operates pump automatically to heat the circulating fluid by the pump's heat radiation to keep the circulating fluid temperature around the warming up function set temperature. If it is necessary to shorten the circulating fluid temperature rising time, set this function in advance.

For Freezing of the Facility Water

Please discharge the facility from facility water circuit when there is fear of a freeze.

9.8 Consumables

Replace the following parts depending on their condition.

Part number	Name	Qty.	Remarks
HRS-S0306	Dust-proof filter	1	1 pc. Is used per unit
HRS-S0307	Mechanical seal set	1	1 set is used per unit

9.9 Stop for a Long Time

- 1.Shut off the breaker of the customer's power supply.
- 2.Drain the circulating fluid completely.
- 3.After draining, cover the product with a sheet and store.

9.10 Draining of the Circulating Fluid

Warning

Stop the customer device and release the residual pressure before draining the circulating fluid.

Caution

For relocation or long-term storage, drain the residual liquid in the piping as much as possible. Residual liquid may drip during movement or installation.

- 1.Shut off the breaker of the customer's power supply.
- 2.Place a container underneath the drain outlet.
- 3.Remove the tank lid.
- 4.Open the ball valve of the drain port and drain the fluid.

- 5.Confirm that all the circulating fluid has been drained from the product and the user's machine and piping and apply air purge from the circulating fluid return port.
- 6.After discharging the circulating fluid from the drain port, remove residual liquid in the tank using a syringe or waist cloth.
- 7.Close the ball valve and mount the tank lid.

9.11 Draining of the Facility Water (For Water-Cooled Type)

Warning

Stop the customer device and release the residual pressure before draining the facility water.

Caution

For relocation or long-term storage, drain the residual liquid in the piping as much as possible. Residual liquid may drip during movement or installation.

- 1.Shut off the breaker of the customer's power supply.
- 2.Stop supplying the facility water and make sure there is no pressure in the facility water piping.
- 3.Remove the facility water piping from the product.
- 4.Press the [SEL] key 31 times.

The digital display will show the setting screen for forced opening/closing if the proportional valve, so turn it to on.



Caution

Just removing the facility water piping does not discharge the facility water completely. Remove the plug to discharge the facility water.

- 5.The facility water in the product will be drained from the facility water inlet port and outlet port.

10 Troubleshooting

10.1 Troubleshooting

The troubleshooting method depends on which alarm has been generated.

Warning

In the event of an unexpected problem or malfunction, switch off the product and investigate the cause. If the cause of the problem cannot be determined, do not use the product, but contact SMC for assistance.

10 Troubleshooting (continued)

10.2 Alarm Code List and Troubleshooting

Code	Alarm name	Operation (default)	Cause / Remedy (Press the reset key after eliminating the cause.)	
AL01	Low level in tank	A.RUN *1	The fluid level has fallen below the level indicator. Refill the circulating fluid.	
AL02	Circulating fluid supply temperature high	A.STP	- Check that the minimum circulating fluid flow rate is maintained. - Check that the ambient temperature, facility water temperature, and/or heat load are within specification.	
AL03	Circulating fluid supply temperature rise	A.RUN *1	- Wait until the circulating fluid temperature decreases.	
AL04	Circulating fluid supply temperature drop	A.RUN *1	Check that the ambient temperature and supplied circulating fluid temperature are within specification.	
AL05	Circulating fluid return temperature high	A.STP	- Check that the minimum circulating fluid flow rate is maintained. - Check that the ambient temperature, facility water temperature, and/or heat load are within specification.	
AL06	Circulating fluid supply pressure high	A.STP *2	Check the customer's piping for closed valves, obstructive bends, or foreign object blockage.	
AL07	Pump operation abnormality	A.STP *2	Pump is not operating. Check the pump thermal protection switch. Check the customer's piping for closed valves, obstructive bends, or foreign object blockage.	
AL08	Circulating fluid supply pressure rise	A.RUN *1 *2	If 'EEEE' is displayed on the PI screen in the inspection monitor menu, it indicates a short-circuit or open-circuit in the circulating fluid circuit pressure sensor. Request service for the pressure sensor.	
AL09	Circulating fluid supply pressure drop	A.RUN *1 *2	Restart and confirm that the pump is operating. If 'EEEE' is displayed on the PI screen in the inspection monitor menu, it indicates a short-circuit or open-circuit in the circulating fluid circuit pressure sensor. Request service for the pressure sensor.	
AL10	Compressor suction temperature high	P.RUN	- Check the circulating fluid return temperature. - Check that the heat load is within the appropriate range.	
AL11	Compressor suction temperature low	P.RUN	- Check that the circulating fluid is flowing.	
AL12	Superheat temperature low	P.RUN	- Use 15% ethylene glycol aqueous solution if the set temperature is below 10°C.	
AL13	Compressor discharge pressure high (sensor)	P.RUN	Check that the ambient temperature, facility water temperature, and/or heat load are within specification.	
AL14	Compressor discharge pressure high (switch)	P.RUN	Check that the ambient temperature, facility water temperature, and/or heat load are within specification.	
AL15	Refrigeration circuit pressure (high pressure side) drop	P.RUN	- Check that the ambient temperature is within the specified range. - Possible refrigerant leak detected. Request for service.	
AL16	Refrigeration circuit pressure (low pressure side) rise	P.RUN	Check that the ambient temperature, facility water temperature, and/or heat load are within specification.	
AL17	Refrigeration circuit pressure (low pressure side) drop	P.RUN	- Check that the circulating fluid is flowing. - Possible refrigerant leak detected. Request for service.	
AL18	Compressor overload	P.RUN	Wait 10 minutes, then restart and confirm that the compressor is operating.	
AL19	Communication error	OFF *1	Request message from host computer not received. Please resend the request message.	

Code	Alarm name	Operation (default)	Cause / Remedy (Press the reset key after eliminating the cause.)	
AL20	Memory error	A.STP	Controller error detected. Power off the device and restart. If the issue continues, request service.	
AL22	Circulating fluid supply temperature sensor abnormality	A.STP	Temperature sensor short-circuit or open-circuit detected. Request sensor service.	
AL23	Circulating fluid return temperature sensor abnormality	A.STP		
AL24	Compressor suction temperature sensor abnormality	P.RUN	Pressure sensor short-circuit or open-circuit detected. Request sensor service.	
AL25	Circulating fluid supply pressure sensor abnormality	A.STP *1		
AL26	Compressor discharge pressure sensor failure	P.RUN	Regular maintenance is due. Recommended to request inspection / service of the component.	
AL27	Compressor suction pressure sensor failure	P.RUN		
AL28	Pump maintenance	OFF *1	Every 20,000h *3	Every 30,000h Every 30,000h
AL29	Fan motor maintenance *4	OFF *1	Every 30,000h	
AL30	Compressor maintenance	OFF *1	Every 30,000h	
AL31	Contact input 1 signal detected	A.STP *1	Contact input is detected.	
AL32	Contact input 2 signal detected	A.STP *1		
AL34	Electrical conductivity rise	OFF *1	Electrical conductivity is larger than the set value. If an electrical conductivity sensor is used, replace the DI filter.	
AL35	Electrical conductivity drop	OFF *1	Electrical conductivity is smaller than the set value. If an electrical conductivity sensor is used, replace the DI filter.	
AL36	Electrical conductivity sensor abnormality	A.RUN	- Check that the electrical conductivity sensor is connected. - The electrical conductivity sensor may have a short-circuit or open-circuit. Replace the sensor.	
AL37	Compressor discharge temperature sensor abnormality	P.RUN	Temperature sensor short-circuit or open-circuit detected. Request sensor service.	
AL38	Compressor discharge temperature rise	P.RUN	Check that the ambient temperature, facility water temperature, and heat load are within specification.	
AL40	Dust-proof filter maintenance *4	OFF *1	Regular maintenance notice. Please clean the dust filter.	Every 500h *5
AL41	Power outage recovery	A.STP *1	Power supply was interrupted during operation. Check the power supply and restart the system.	
AL42	Compressor operation standby	A.RUN	Waiting until the compressor is ready for operation. Please wait. This will clear automatically after operation starts.	

10 Troubleshooting (continued)

Code	Alarm name	Operation (default)	Cause / Remedy (Press the reset key after eliminating the cause.)	
AL43	Fan breaker trip ^{*4}	P.RUN	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.	Reset the fan breaker.
AL44	Fan inverter error ^{*4}	P.RUN		
AL45	Compressor breaker trip	P.RUN		
AL46	Compressor inverter error	P.RUN		
AL47	Pump breaker trip	A.STP		
AL48	Pump inverter error	A.STP		
AL52	Ambient temperature abnormality ^{*4}	A.RUN ^{*1}	Check that the ambient temperature is within the specified range.	
AL53	Facility water inlet temperature abnormality ^{*6}	A.RUN ^{*1}	Check that the facility water temperature is within the specified range.	
AL54	Facility water inlet temperature high ^{*6}	A.STP	Check the customer's piping for closed valves, obstructive bends, or foreign object blockage.	
AL55	Facility water outlet temperature rise ^{*6}	A.RUN ^{*1}	- Check the temperature and flow rate of the customer's facility water system.	
AL56	Facility water outlet temperature high ^{*6}	A.STP	- Check that the heat load is with the appropriate range.	
AL57	Ambient temperature sensor abnormality ^{*4}	A.STP	Temperature sensor short-circuit or open-circuit detected. Request sensor service.	
AL58	Facility water inlet temperature sensor abnormality ^{*6}	A.STP		
AL59	Facility water outlet temperature sensor abnormality ^{*6}	A.STP		
AL60	Internal communication error	A.STP	Check for power supply system abnormalities (e.g. ground fault, short-circuit, voltage fluctuation, abnormal phase-to-phase voltage, open phase, surge).	
AL61	Power supply abnormality	A.STP	Power off the device and restart. If the issue continues, ask for service.	
AL62	Compressor Inverter parameter error	P.RUN	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.	
AL63	Compressor Inverter communication error	P.RUN		
AL64	Pump Inverter parameter error	A.STP		
AL65	Pump Inverter communication error	A.STP		

A.STP: Stops the pump, compressor and fan with the alarm.

A.RUN: Continues running the pump, compressor and fan with the alarm.

P.RUN: Stops the compressor and fan and continues running the pump with the alarm.

OFF: Does not generate the alarm.

*1: This is the factory default setting. The setting can be changed by the customer.

*2: AL25 is forcibly turned OFF when WRN is set.

*3: 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.

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

*5: The setting can be adjusted in the range of 1 to 9999 hours.

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

10.3 Other errors

Content of failure	Cause	Remedy
The operation panel displays nothing	The breaker of the customer's power supply or/and the optional breaker is/are not turned on.	Turn on the breaker.
	Failure of the breaker of the customer's power supply or/and optional power supply.	Replace the breaker.
	No power supply (The breaker for the power supply is not turned on.)	Supply the power.
	Breaker trip of the customer's power supply or/and the optional 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.

11 Limitations of Use

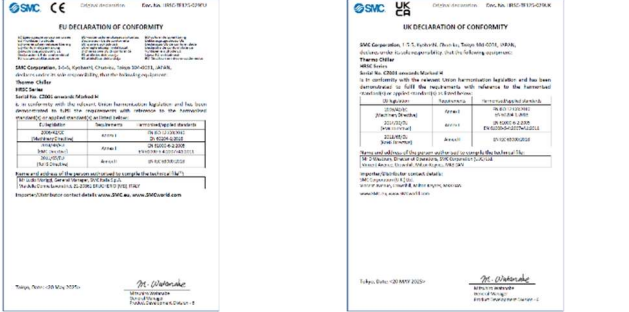
11.1 Limited warranty and disclaimer/compliance requirements

Refer to Handling Precautions for SMC Products.

12 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.

13 Declaration of Conformity



14 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.
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