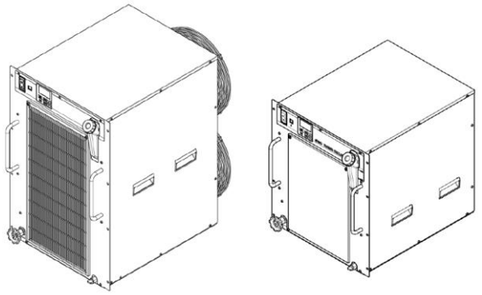
ORIGINAL INSTRUCTIONS

Instruction Manual
Thermo Chiller
HRR050



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 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 Specifications

Model			HRR050-A*-20-*	HRR050-A*-40-*	HRR050-W*-20-*	HRR050-W*-40-*
Cooling method			Air-cooled		Water -cooled	
Refrigerant			R410A (HFC)			
Quantity of refrigerant		kg	0.72	0.74	0.59	0.62
Control method			PID control			
Ambient temperature, humidity and altitude *1 *2			Temperature: 5 to 40°C, Humidity: 30 to 70%, Altitude: less than 3000m			
Circulating fluid system	Circulating fluid*3		Tap water, 15% ethylene glycol aqueous solution			
	Operating temperature range*1	℃	5 to 35			
	Cooling capacity*4 (50/60Hz)	W	4600 / 5100	4800 / 5800	5000 / 5900	5500 / 5900
	Heating Capacity*5 (50/60Hz)	W	1000 / 1200	1100 / 1200	1000 / 1200	1100 / 1200
	Temperature stability*6	℃	±0.1			
	Pump capacity*7 50 / 60Hz	MPa	0.34 (at 15 L/min) / 0.34 (at 23 L/min)	-	0.34 (at 15 L/min) / 0.34 (at 23 L/min)	-
	Pump capacity*7 Option T1	MPa	-	0.35 (at 16L/min)	-	0.35 (at 16L/min)
	Pump capacity*7 Option T2	MPa	-	0.40 (at 24L/min)	-	0.40 (at 24L/min)
	Rated flow*8 50/60Hz	L/min	15 / 23	-	15 / 23	-
	Rated flow*8 Option T1	L/min	-	16	-	16
	Rated flow*8 Option T2	L/min	-	24	-	24
	Flow display range *9	L/min	5 to 40			
	Electric conductivity display range	µS/cm	0.1 to 48(For option -DM)			

*1: No condensation should be present. During seasons or in locations where the ambient temperature is likely to fall below freezing point, please contact SMC.
*2: If the altitude is 1000 m or more, please refer to operation manual "P.3-3 When Thermo-chiller installation in high altitude of 1000 meters or more".
*3: If tap water is used, use water that is compliant with the Water Quality Standards of the Japan Refrigeration and Air Conditioning Industry Association (JRA GL-02-1994 cooling water system - circulating type - make-up water).
*4: (1)Ambient temp.: 25℃ [For water cooled type facility water temp: 25°C], (2) Circulating fluid temp: 20℃, (3) Circulating fluid at the rated flow,(4) Circulating fluid : Tap water, (5)Power supply : 200V type:AC200V, 400V type : AC400V, (6)Piping length : Shortest . For option T2(High pressure inverter pump), the cooling capacity is reduced by 400W.
*5: (1)Ambient temp: 25℃ [For water cooled type facility water temp: 25°C], (2) Circulating fluid temp: 20℃, (3) Circulating fluid at the rated flow,(4) Circulating fluid : Tap water, (5)Power supply : 200V type:AC200V, 400V type : AC400V, (6)Piping length : Shortest
*6: Temperature at the thermo-chiller outlet when the circulating fluid flow is at the rated flow and the circulating fluid outlet and return port are directly connected.The installation environment and power supply are within the specification range and stable.
*7: The capacity at the thermo-chiller outlet when the circulating fluid temp. is 20℃.
*8: The required flow rate for maintaining the cooling capacity or temperature stability. The specification of the cooling capacity and the temperature stability may not be satisfied if the flow rate is lower than the rated flow.
*9: Not included for options - Z and -Z1.
*10: Not included for options -Z.
*11: Options M (Applicable to DI water piping) and DM (Electric conductivity control + Applicable to deionized water piping) do not contain copper or bronze.
*12: For Option DM (With electric conductivity control function + Applicable to DI water piping).
*13: Max. voltage less than 500V (400V type) and no continuous voltage flucuation.
*14: Purchase an earth leakage breaker with a sensitivity current of 30 mA and a power supply of AC200 V separately.
*15: To be prepared by the customer.
*16: Front: 1 m, height: 1 m, stable with no load, Other conditions → See ⁎3.
*17: Dimension between panels. Projection is not included. When option Y[With feet, and no Rack Mounting bracket] is selected, refer to [6.4. Option Y (With feet and no Rack Mounting bracket)].
*18: For Option DM (With electric conductivity control function + Applicable to DI water piping), a DI filter is included. For pipe thread type F, a G thread conversion fitting set is included. For pipe thread type N, an NPT thread conversion fitting set is included.
*19: Weight in the dry state without circulating fluids The weight will increase by 1 kg when Option DM (With electric conductivity control function + Applicable to DI water piping) is selected. The product weight decreases by 1 kg for Option-Z.
*20: The required flow rate when the cooling capacity load is applied unders condition ⁎3.
*21: (1)Ambient temp: 25℃ [For water cooled type facility water temp: 25°C], (2) Circulating fluid temp: 20℃, (3) Circulating fluid at the rated flow,(4) Circulating fluid : Tap water, (5)Power supply : 200V type:AC200V, 400V type : AC400V, (6)Piping length : Shortest, (7)Rated cooling load is applied.

2 Specifications - continued

Model			HRR050-A□-20-□	HRR050-A□-40-□	HRR050-W□-20-□	HRR050-W□-40-□
Circulating fluid system	Electric conductivity setting range	µS/cm	0.5 to 45 (For option -DM)			
	Particle filter nominal filtration rating *10	µm	5			
	Bypass valve *10		Installed			
	Tank Capacity	L	Approx. 5			
	Port size		Rc 1/2			
	Drain port size		Rc 1/4, with cap			
	Leakage protection		Drain pan structure (with water leakage detector*10)			
	Fluid contact material		Stainless steel, Copper brazing (Heat exchanger)*11, Bronze*11, SiC, Aluminium oxide ceramic, Carbon, PP,PE,POM,PA,FKM,EPDM,PVC,PPS,AS, fluoropolymer*12 ,Ion exchange resin*12			
Facility water system	Temperature range	°C	-		5 to 40	5 to 35
	Pressure range	MPa	-		0.3 to 0.5	
	Required flow*20	L/min	-		16	
	Facility water supply pressure	MPa	-		0.3 or more	
	Port size		-		Rc3/8	
	Fluid contact material		-		Stainless steel, copper brazing, bronze, synthetic rubber	
Electric system	Power supply*13		Single-phase 200 to 230VAC (50/60 Hz)	3-phase 380 to 415VAC (50/60Hz) / 3-phase 460 to 480VAC (60Hz)	Single-phase 200 to 230VAC (50/60 Hz)	3-phase 380 to 415VAC (50/60Hz) / 3-phase 460 to 480VAC (60Hz)
	Allowable voltage fluctuation range		±10%	+4% , -10%	±10%	+4% , -10%
	Circuit Protector	A	20	10	20	10
	Applicable earth leakage breaker *14		Rated current: 20A	Rated current: 10A	Rated current: 20A	Rated current: 10A
			Sensitivity current: 30mA			
	Cable Qty x size (including ground)*15		3 cores x 12AWG (3 cores x 3.5mm²)	4 cores x 14AWG (4 cores x 2.0mm²)	3 cores x 12AWG (3 cores x 3.5mm²)	4 cores x 14AWG (4 cores x 2.0mm²)
	Rated operating current (50/60Hz)*21	A	9.3 / 11.8	4.4 / 4.1 (option T1) 4.9 / 4.5 (option T2)	8.5 / 11.0	4.1 / 3.5 (Option T1) 4.4 / 3.8 (option T2)
	Rated power consumption (50/60Hz)*21	kW (kVA)	1.9 / 2.4 (1.9 / 2.5)	2.2/2.5(3.1/2.9) (Option T1) 2.4/2.7(3.6/3.1) (Option T2)	1.7 / 2.2 (1.7 / 2.3)	1.9/2.1(2.9/2.5) (Option T1) 2.1/2.3(3.1/2.7) (Option T2)
Communication function			Contact input/output, Serial RS-485 / RS-232C			
Noise level*16 (50/60Hz)		dB(A)	63 / 67	70 / 70	63 / 67	70 / 70
Dimension s*17 (WxDxH)		mm	483x550x710		483x550x532	483x550x710
Accessory*18			Power supply connector, Maintenance handle for particle filter*10, Operation manual, Particle filter element*10			
Weight*19		kg	74	67	64	61

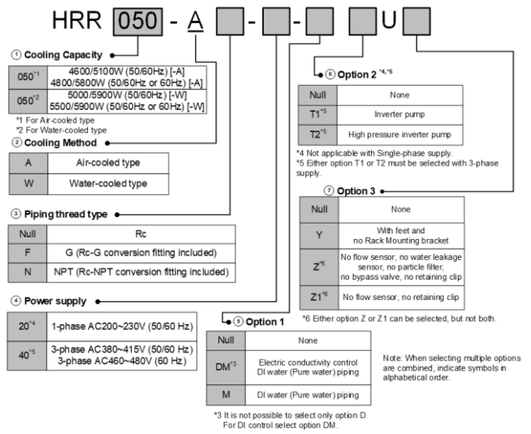
2 Specifications - continued

2.2 Production Serial Number Code

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

Month \ Year		2020	2021	2022	....	2025	2026	2027	....
Jan	o	yo	Zo	Ao	....	Do	Eo	Fo	....
Feb	P	yP	ZP	AP	....	DP	EP	FP	....
Mar	Q	yQ	ZQ	AQ	....	DQ	EQ	FQ	....
Apr	R	yR	ZR	AR	....	DR	ER	FR	....
May	S	yS	ZS	AS	....	DS	ES	FS	....
Jun	T	yT	ZT	AT	....	DT	ET	FT	....
Jul	U	yU	ZU	AU	....	DU	EU	FU	....
Aug	V	yV	ZV	AV	....	DV	EV	FV	....
Sep	W	yW	ZW	AW	....	DW	EW	FW	....
Oct	X	yX	ZX	AX	....	DX	EX	FX	....
Nov	y	yy	Zy	Ay	....	Dy	Ey	Fy	....
Dec	Z	yZ	ZZ	AZ	....	DZ	EZ	FZ	....

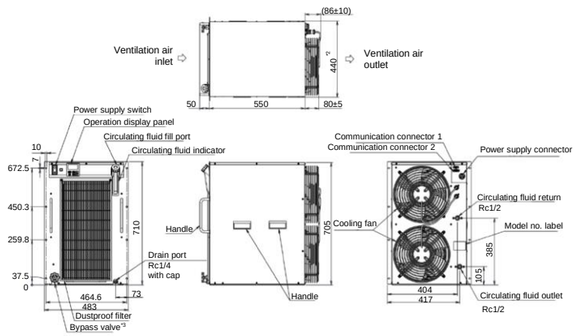
3 How to Order



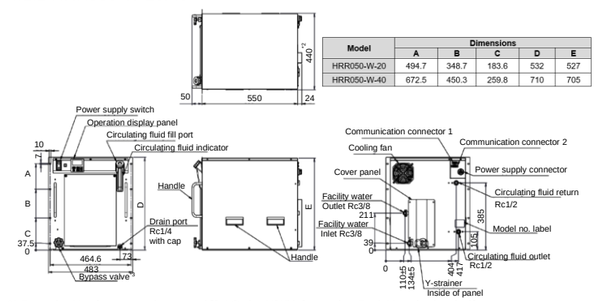
4 Names of Parts and Accessories

4.1 Outline Dimensions and Names of Parts

4.1.1 HRR050-A-20/40*1



4.1.2 HRR050-W-20/40*1



Model	Dimensions				
	A	B	C	D	E
HRR050-W-20	494.7	348.7	183.6	532	527
HRR050-W-40	672.5	450.3	259.8	710	705

*1 For option Y, refer to operation manual [6.4 Option Y(With feet and no Rack Mounting bracket)].
*2 Includes protruding parts.
*3 For option Z, without bypass valve.

4 Names of Parts and Accessories – continued

4.2 Accessory List

(1)	Operation manual	2 copies (English, Japanese)	
(2)	Power supply connector	1 pc.	
(3)	Maintenance handle for particle filter *1 *2	1 pc.	
(4)	Particle filter element *2	1 pc.	
(5)	[For option DM] DI filter	1 pc.	
(6)	For HRR050-AF-20/40-* (G thread adapter set)	1 set	
	For HRR050-AN-20/40-* (NPT thread adapter set)		
	For HRR050-WF-20/40-* (G thread adapter set)	1 set	
	For HRR050-WN-20/40-* (NPT thread adapter set)		

*1 Use handle for loosening only. Filter should be hand-tight.
*2 Not included with option Z.

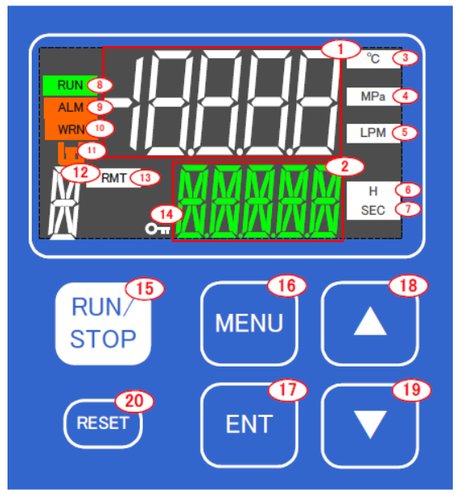
4.3 Function of parts

The names of parts used in this manual are as follows:

Name	Name
Operation display panel	Runs and stops the product and performs settings such as the circulating fluid temperature.
Fluid level gauge	Indicates the circulating fluid level of the tank.
Power supply switch	Shuts off the power supply to the internal equipment of product.
Model label	Shows the part number of the product.
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.
Drain port	Port to drain the circulating fluid out of the tank.
Power supply connector	Connect the power cable to the Power supply connector accessory, and then plug it in.
Communication connector CN1, CN2	Use for contact input / output, serial communication.
Facility water inlet (For water-cooled type)	A facility water inlet to which the facility water is fed through piping. The pressure of facility water should be in a range of 0.3 to 0.5MPa.
Facility water outlet (For water-cooled type)	A facility water outlet from which the facility water returns to the user's machine through piping.

4.3.1 Operation Display Panel

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



4 Names of Parts and Accessories – continued

Display panel functions.Reference pages are found in operation manual.

No	Name	Function	Reference page
(1)	Digital display (7 segments, 5 digits)	Displays the temperature, pressure and flow rate of the circulating fluid and the set values of other menus.	5.2
(2)	Digital display (11 segments, 5 digits)	Displays the discharge temperature of the circulating fluid and the set values of other menus.	
(3)	[℃] lamp	Lights up when temperature is displayed on the digital display.	
(4)	[MPa] lamp	Lights up when pressure is displayed on the digital display.	
(5)	[LPM] lamp	Lights up when flow rate is displayed on the digital display.	
(6)	[H] lamp	Lights up when time is displayed on the digital display.	
(7)	[SEC] lamp	Lights up when seconds are displayed on the digital display.	
(8)	[RUN] lamp	Lights up when the product is started and in operation.	4
(9)	[ALM] lamp	Lights up when a fault occurs. (This product will stop.)	7
(10)	[WRN] lamp	Lights up when a warning occurs. (This product will continue operation.)	
(11)	[⊟] lamp	Lights up when 「AL.01 Tank level drop failure」 or AL.02 Tank level drop」 alarm is generated.	-
(12)	Digital display (11 segment, 1 digit)	「X」 is displayed when notice for maintenance is generated.	5.4.4
(13)	[RMT] lamp	Lights up during remote operation by communication function.	5
(14)	[KEYLOCK] lamp	Lights up when key lock setting is active.	5.5.3
(15)	[RUN/STOP] key	Press and hold for 1 second to start or stop.	4.2
(16)	[MENU] key	Switching of each menu and cancellation of setting values.	5
(17)	[ENT] key	Switch to setting mode and set values.	
(18)	[▲] key	Move item upward or increase the set value.	-
(19)	[▼] key	Move item downward or decrease the set value.	-
(20)	[RESET] key	Reset the alarm.	7

5 Installation

5.1 Installation

Warning

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

5.2 Types of Hazard Labels

Warning

- The product has various potential hazards and they 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.

5.3 Environment

Warning

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.

- Location that is outside.
- Location that is exposed to steam, saltwater or oil.

5 Installation - continued

- 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 temperature is out of the following range: During transportation and in storage: 0 to 50°C (with no water or circulating fluid in piping). During operation: 5 to 40°C
- Location where the ambient humidity is out of the following range or where condensation occurs: During transportation and storage: 15 to 85% During operation: 30 to 70%
- Location that is exposed to direct sunlight or heat radiation.
- Location that is near heat sources and poor in ventilation.
- Location that is subjected to abrupt changes in temperature.
- Location that is subjected to strong electromagnetic noise (intense electric field, intense magnetic field, or surges).
- Location that is subjected to static electricity, or conditions where static electricity can discharge to the product.
- Location that is subjected to strong high frequencies radiation (microwaves).
- Location that is subjected to potential lightning strike.
- Location at altitude of 3000m or higher (except during product storage and transport).
- 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

5.4 Installation and Maintenance Space

Warning

The Installer / End User is responsible for carrying out a noise risk assessment on the equipment after installation and taking appropriate measures as required.

Caution

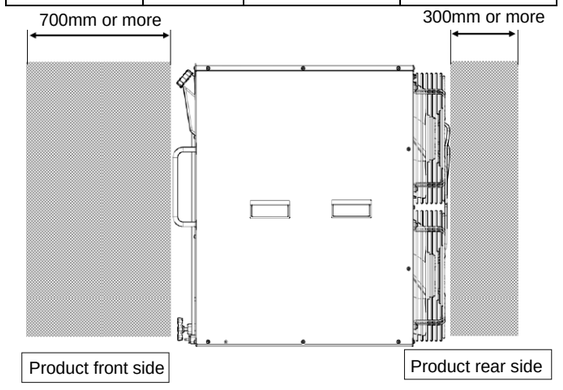
Leave enough space for the ventilation for the product. Otherwise it may cause a lack of cooling capacity or/ and stoppage of the product. Ensure there is enough space for maintenance.

Caution

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

Required ventilation for air cooled type

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
HRR050-A*-20/40-*	Approx. 10	140	70



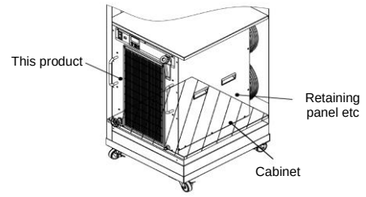
Required facility water system for water cooled type

Model	Heat Radiated (kW)	Facility water temp. Range (ºC)	Required facility water flow rate (l/min)			
			Facility water temperature			
			25 °C	32°C	35°C	40°C
HRR050-W*-20-*	Approx. 10	5 to 40 (Rating 25)	16	19	-	27
HRR050-W*-40-*	Approx. 10	5 to 35 (Rating 25)	16	19	22	-

5 Installation - continued

5.5 Mounting

1) When mounting the product to a cabinet, use a design which shall hold the weight at the bottom. Ensure safety with transportation test if the product is to be installed on a transportation device such as a trailer. Mount the product using the fixing holes in the front of the product. Use M5, M6 screws (bolts) or equivalent to fix the product. Do not drag this product after mounting, as the feet may be damaged (option -Y).
2) In the case of air cooling type, this product sucks air from the front and discharges it to the back. Please do not block the suction and the discharge air. Please do not install in a sealed place.



5.6 Electrical Wiring

Warning

- The electrical facilities should be installed and wired in accordance with local laws and regulations of each country and by the person who has knowledge and experience.
- Do not modify the internal electrical wiring of the product. Incorrect wiring may cause electrical shock or fire. Also, modifying the internal wiring will void the product's warranty.
- Do not connect the ground to water line, gas pipe or lightening conductor.

Caution

- Only qualified persons are allowed to wire the product.
- Be sure to shut off the user's power supply. Wiring with the product energized is strictly prohibited.
- The wiring must be conducted using cables complying with Table 1 firmly and secured to the product to prevent the external force of cables being applied to the terminals. Incomplete wiring or improper securing of wiring may cause electrical shock, excessive heat and fire.
- Ensure a stable power supply with no voltage surges.
- Ensure that an Earth Leakage Breaker is used in the power supply of the product. See Table 1.
- Use a power supply suitable for the specifications of the product.
- Use a power supply of over voltage category 3 (IEC60664-1)*1
- Be sure to connect the ground connection.
- Ensure that a lock out facility is available on the power supply.
- Each product must have its own separate Earth Leakage Breaker. Otherwise there can be a risk of electric shock or fire.

*1: For the product operation in the UL compliant conditions, please refer to "Installation/Operation in accordance with the UL standard"

Power supply specifications, cable and Earth Leakage Breaker

Prepare the power supply shown in Table 1. 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.

Table 1. Power supply cable and earth leakage breaker

Model	Power supply voltage	Cable qty. x size	Recommended earth leakage breaker	
			Rated current [A]	Sensitivity of leak current [mA]
HRR050-A/W*-20-*	1-phase 200-230V AC (50/60Hz)	3 cores x 12AWG (3 cores x 3.5mm²) (including ground)	20	30
HRR050-A/W*-40-*	3-phase 380-415V AC(50/60Hz) 3-phase 460-480V AC(60Hz)	4 cores x 14AWG (4 cores x 2mm²) (including ground)	10	

5 Installation – continued

Installation/operation in accordance with the UL standard

For the product operation in the UL compliant conditions, the conditions shown below must be satisfied:

- Use power supply of overvoltage category 2 (transient overvoltage 2500 V or less) *1

*1 When using a power supply in the overvoltage category 3, take measures such as mounting an isolation transformer between the product and the power supply or keep the transient overvoltage of the power supply to 2500 V or less by using a varistor, etc.

5.7 Preparation and wiring of power supply cable

Warning

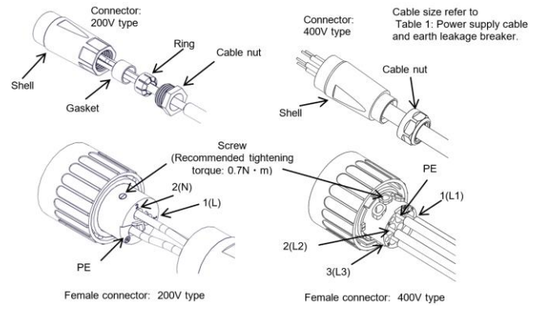
- The electrical facilities should be installed and wired in accordance with local laws and regulations of each country and by a person who has knowledge and experience.

Warning

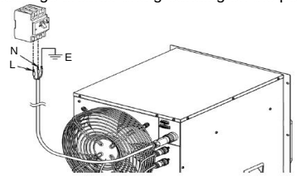
- Check the power supply. Operation with voltages, capacities and frequencies other than the specified values can cause fire and electrical shock.
- Wire with an applicable cable size and terminal. Forcibly mounting with an unsuitable size cable may result in heat generation or fire
- Be sure to lock 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).

5.8 Preparation for operation

1. Prepare the cable and individual socket or earth leakage breaker shown in the table below.
2. Strip the sheath from both ends of the cable.
3. Disassemble the female power supply connector (supplied with the product) to mount one end of the cable. Route the cable through the cable nut, ring, gasket, and shell.
4. Connect the stripped cable to the L, N, PE terminals of the female connector. Recommended tighthening torque: 0.7 N.m



5. Assemble the power connector shell, gasket, ring and cable nut.
6. Insert the power supply connector to the power supply connector socket. Turn the connector clockwise to fix it.
7. Connect the crimped terminals to the secondary side of the earth leakage breaker and grounding on the power supply facility.



5.9 Piping

Caution

- Before connecting piping make sure to clean up chips, cutting oil, dust etc.
- When installing piping or fittings, ensure sealant material does not enter inside the port. When using seal tape, leave 1 thread exposed on the end of the pipe/fitting.
- Tighten fittings to the specified tightening torque.
- Check the model number of this product in "3. How to Order" before connecting piping.

5 Installation – continued

5.9.1 Piping port size

Port Name	Port size*1	Recommended tightening torque	Recommended proof pressure for piping
Circulating fluid outlet	Rc1/2	28 to 30N・m	1.0MPa more
Circulating fluid return			
Facility water inlet *2	Rc3/8	22 to 24N・m	1.0MPa or more (Supply pressure: 0.3 to 0.5MPa)
Facility water outlet *2			

*1 For NPT and G thread, use the conversion set available as an accessory (included when option F or N is selected).

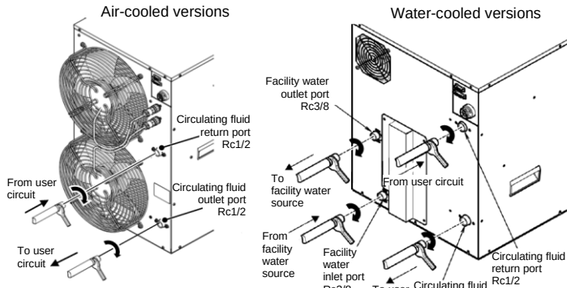
*2 For water-cooled type only.

5.9.2 How to connect piping

Caution

Make the piping to ensure that the circulating fluid always flows. The product will break down if it is operated with no circulating fluid flowing.

1. Ensure that the power source and the power supply of the product is turned off (or the power plug is disconnected).
2. This product generates an alarm and stops running when the circulating fluid flow rate becomes 5L/min or less. Please make piping that allows more than 5L/min. (For 200V type option Z, Z1, the alarm doesn't generate. For 400V type option Z, Z1, the alarm generates at less than 7 L/min.) In addition, this product generates an alarm and stops when the circulating fluid discharge pressure becomes 0.5 MPa or more.
3. Connect the circulating fluid return port with the user's machine outlet.
4. Connect the circulating fluid discharge port with the user's machine inlet.
5. In the case of the water-cooled type, please also connect the facility water piping inlet and outlet of the customer's water source.

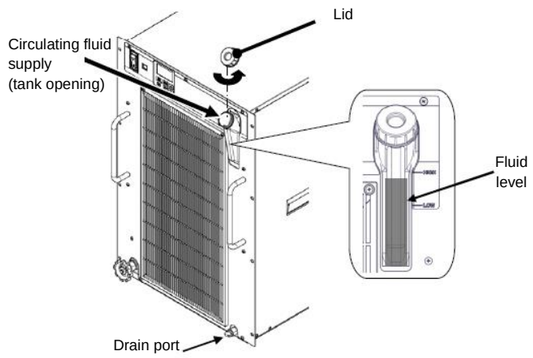


Tightening torque	Rc1/2: 28 to 30 N.m
	Rc3/8: 22 to 24 N.m

5.10 Fill of circulating fluid

1. Ensure that the power source and the power supply of the product is turned off.
2. Check the drain port is plugged to prevent the supplied circulating fluid from draining out.
3. Open the circulating fluid inlet cap by turning it counterclockwise and fill the circulating fluid within the range from LOW to HIGH shown on the level gauge.
4. Use tap water which satisfies the water quality standard shown in Table 8-1 of operation manual, or a 15% aqueous solution of ethylene glycol.

5 Installation – continued



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

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

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

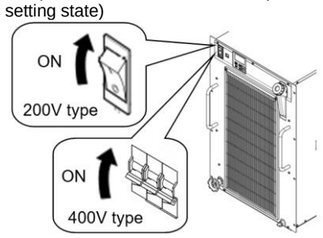
6 Start, Stop and Temperature Settings

6.1 Before Starting - Check the following items:

- *Installation conditions*
  - Check the product is installed horizontally.
  - Check that there are no heavy objects on the product, and the external piping is not applying excessive force to the product.
- *Connection of cables*
  - Check the power, ground and communications (optional) cables are correctly connected.
- *Circulating fluid piping*
  - Check proper connection of piping at inlet and outlet.
- *Fluid level indicator (for tank)*
  - Confirm that the fluid level is between 'HIGH and 'LOW' levels of the fluid gauge.
- *Facility water piping (for water cooled type)*
  - Check that the piping is correctly connected to the facility water inlet and outlet ports and the facility water source is in operation.

6.2 Starting the product

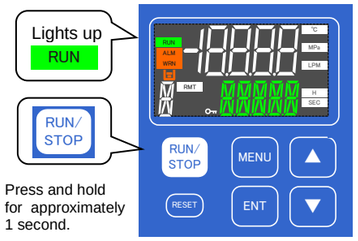
1. Supply power to the product.
   Turn on the power switch. The operation display panel lights up. At this point, the product is in the "Stopped" state (Please note that operation is started after the power is turned on when the operation signal is sent in the remote setting state)



2. Set the circulating fluid temperature. When you press the "ENT" key, the set temperature (lower part of the numerical value display: green) flashes. Press the [▲] [▼] key to set the target temperature, then press the "ENT" key to set.
   (Flashing ends when set.) Please refer to various setting / display in operation manual.
3. Press and hold [RUN / STOP] key for 1 second. The [RUN] lamp lights up and operation starts.

6 Start, Stop and Temperature Settings - continued

* When operating for the first time after piping, the circulating fluid in the tank decreases until the the piping is filled with circulating fluid. (An alarm occurs when the liquid level falls below "LOW".) When the circulating fluid in the tank decreases, repeat "Circulating liquid supply" procedure so that the liquid level is within the range from LOW to HIGH.
* 30 seconds after start of operation, if the circulating fluid flow rate is less than 5 L / min, an alarm occurs and the product stops. Ensure that the circulating fluid flow rate will be 5 L / min or more (7 L / min or more for 400V type option Z and Z1).
* For 200V type option Z, Z1, the alarm for the does not generate. Make piping so that the circulating fluid always flows. The product will break down if it is operated with no circulating fluid flowing.
* If the circulating fluid discharge pressure becomes 0.5 MPa or more, an alarm occurs and the product stops. Refer to operation manual [4.3 Adjustment of bypass valve] to make pressure 0.5 MPa or less.



6.2.1 Restart When an Alarm is Generated

This product has two types of operation depending on the alarm being generated. The restart is different depending on the operation mode.

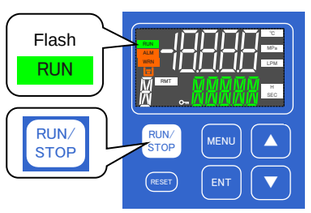
[1] When the following alarm occurs, this product stops.

- AL01：Low level in tank
- AL03：Incorrect phase error (400V type only)
- AL09：Circulating fluid discharge pressure rise (Select from WRN/ FLT)
- AL17：Flow rate failure (Not generated for options Z and Z1.)
- AL18：High circulating fluid discharge temp
- AL19：High circulating fluid return temp.
- AL21：High circulating fluid discharge pressure
- AL22：Low circulating fluid discharge pressure
- AL24：Memory abnormal
- AL25：Contact input 1 signal detection(Select from OFF/ WRN/ FLT)
- AL26：Contact input 2 signal detection(Select from OFF/ WRN/ FLT)
- AL27：Forced a stop
- AL30：Refrigerant circuit abnormal
- AL31：Sensor abnormal
- AL32：Controller abnormal

After resetting the alarm, when resuming operations press and hold the [RUN／STOP] key for approximately 1 second. (Refer to "Chapter 7 Alarm Notification and Troubleshooting" of the operation manual)

[2] When alarms except those shown above are generated the compressor stops, and the circulating fluid pump continues running for a fixed time (The time to run the pump can be set within the range of "0 to 9999 seconds". The factory setting is "0 seconds").

At this time, the "RUN" lamp flashes.
In case of resetting the alarm (Refer to 7.3 "What to do when an alarm occurs" in the operation manual) while the pump is operating, pressing the "RUN / STOP" key once (for 1 second) causes the compressor to operate and the operation of the product will resume.
(This operation only occurs when this function is set. For details, refer to 5.3.6 Alarm Setting menu in the operation manual)

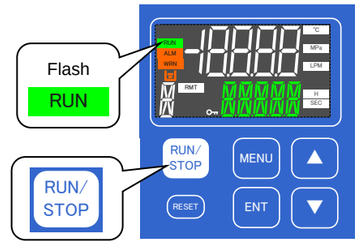


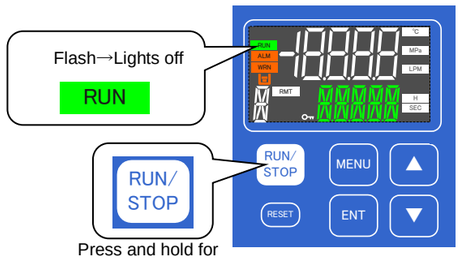
6 Start, Stop and Temperature Settings - continued

To stop the product when only the pump is running, press and hold the [RUN／STOP] key for approximately 5 seconds. (When this operation is performed, an alarm "AL27: forced a stop " occurs.)

6.2.2 Stopping the product

Press and hold the [RUN / STOP] key for 1 second.
[RUN] lamp goes out and operation stops.
*It takes about 10 seconds of operation to prepare to stop before it stops. During the stopping preparation the [RUN] lamp flashes.





Caution

Except in case of an emergency, do not turn OFF the breaker before the thermo-chiller stops operation completely.

7 Maintenance

7.1 General Maintenance

Caution

- Not following proper maintenance procedures could cause the product to malfunction and lead to equipment damage.
- Before performing maintenance, turn off the power supply. After installation and maintenance, turn on power to the equipment and perform appropriate functional and leakage tests to make sure the equipment is installed correctly.
- Do not make any modification to the product.
- Do not disassemble the product, unless required by installation or maintenance instructions.

7.2 Inspection and Cleaning

Warning

- Do not operate with wet hands and do not touch the electrical parts such as the connecter. 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.

7.2.1 Control of Circulating Fluid Quality

Warning

Use specified fluids only. If other fluids are used, they may damage the product, causing fluid leakage, or result in hazards such as electric shock or leakage of electricity.

7 Maintenance – continued

When using clear water (tap water), ensure that it satisfies the water quality criteria shown in the operation manual.

⚠ 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 evaporates and impurity concentration in the circulating fluid increases. Replace the circulating fluid on the tank once in every 3 months. (Please refer to operation manual table 8-1 for quality criteria of clean water)

7.2.2 Daily check

Check the items listed in the table on the next page. If any abnormality is found, stop the operation of the product and turn the power supply OFF, and ask for service.

Daily Check Items

Item	Contents of check	
Installation condition	Check the installation conditions of the product.	・Check that there is no heavy object on the product or excessive force applied to the piping. ・Temperature should be within the specification range of the product. ・Make sure the ventilation grille is not obstructed. (For air-cooled type)
Fluid leakage	Check the installation conditions of the product.	Check that there is no fluid leakage from the connected parts of the piping.
Amount of circulating fluid	Check the liquid level 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 keys, [RUN/STOP], [MENU], [ENT], [▼], and [▲], operate correctly.
Circulating fluid temperature	Check on the operation panel.	There should be no problem for operation.
Circulating fluid discharge pressure	Check on the operation panel.	There should be no problem for operation.
Circulating fluid flow rate	Check the operating condition of the product (except option Z, Z1)	There should be no problem for operation. If the flow rate is decreasing, check the particle filter for contamination, and if it is dirty, replace the element.
Operating condition	Check the operation condition.	・There should be no abnormality with noise, vibration, smell, or generation of smoke. ・There should be no active alarm signal.
Facility water (for water-cooled type)	Check the facility water condition.	Temperature, flow rate and pressure are within the specified range. If the flow rate is decreasing, check the Y type strainer for clogging and clean the strainer.
Ventilating condition (for Air-cooled type)	Check the condition of the ventilation grille.	・Make sure the ventilation grille is not obstructed.

7.2.3 Monthly check

Item	Contents of check	
Ventilating condition (air cooled type)	Clean the ventilation grilles.	Make sure the ventilation 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.

7.3 Cleaning of air vent

⚠ Caution

If the dustproof filter at the ventilation inlet is clogged with dust or debris, heat radiation performance declines. This will result in a reduction of cooling performance and may stop the operation because the safety device is triggered.

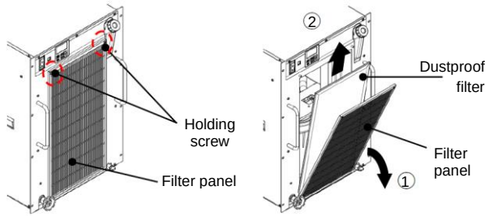
7.3.1 Cleaning of filter.

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

7 Maintenance - continued

7.3.2 Removal of the dustproof filter

1. The dustproof filter is installed in the inside of the filter panel at the front of the product.
2. Loosen the filter panel holding screws by using a cross slot screwdriver.
3. There is a dustproof filter inside the filter panel. Remove the dustproof filter



7.3.3 Mounting of the dustproof filter

Reassemble the filters in the reverse order to the removing procedure. (Recommended tighten torque of filter panel holding screws: 1.5 N · m)

7.4 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 periodically. Clean the tank.	- Ensure that the water has not been contaminated and that there is no algae growth. - Circulating water inside the tank must be clean and there must not be foreign matter inside. - Use clean water or pure water. The water quality must be within the range shown in Table 8-1 of operation manual.
	Density control (When using 15% concentration ethylene glycol aqueous solution)	- Density must be within the range of 15 % +5/-0.
Facility water (For water-cooled type)	Check the water quality.	- Ensure that the water is clean and contains no foreign matter. Also check that the water has not been contaminated and there is no algae growth. - The water quality must be within the range shown in Table 8-1 of operation manual.

* It is recommended to replace the circulating fluid every 3 months when periodic maintenance is performed.

7.5 Inspection every 6 months

- Check for water leakage from pump(200V type only): Remove the filter panel and check the pump for excessive leakage. If the leakage is found, replace the mechanical seal. (See 8.2.4 inspection every 6 months in the operation manual for details.)

7.5.1 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 8-1: Quality criteria for clean water (tap water)”)
- Make sure that the concentration of ethylene glycol aqueous solution is 15%$^{+5/-0}$ when 15% ethylene glycol solution is used.
- If the particle filter element is dirty, replace the element. (See 8.4.1 Replacing Particle Filter in the operation manual.)

7.5.2 Cleaning of the 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 operation manual (“Table 8-1 Quality criteria for clean water (tap water)”).
- Check the strainer and clean it if it is dirty. Refer to "Cleaning of Y - strainer".

⚠ 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.

7.5.3 Cleaning of Y- strainer

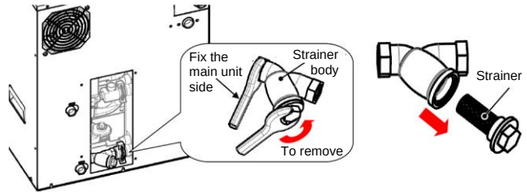
When cleaning Y-strainer, facility water must be discharged. Refer to operation manual “8.3.2 Discharge of the facility water “for further instructions.

⚠ Warning

Before discharging the facility water, stop operation of the user’s equipment and release the residual pressure. Wear protective equipment like gloves to avoid getting injured like cutting hand by sharp edge of panel.

1. Discharge the facility water. Refer to operation manual "8.3.2 Discharge of the facility Water".
2. The strainer is installed on the back of the product. Remove the strainer using a tool such as a spanner. When removing the strainer, product should be fixed to not move.

7 Maintenance - continued



3. Clean the strainer.
4. After cleaning, please install the strainer by the reverse procedure.
5. Install the cover panel.

8 Troubleshooting

Refer to section ‘7.3 Troubleshooting’ in operation manual for alarm code list and troubleshooting procedures.

Alarm No.	Description	Initial value	Display Unit		Cause/Remedy (Press the reset key after eliminating the cause.)
			Upper stage (White)	Lower Stage (Green)	
AL01	Low level in tank	FLT	AL01	LOW⇒LEVEL⇒FLT	Fluid level has fallen, add circulating fluid.
AL02	Low level in tank	WRN	AL02	LOW⇒LEVEL⇒WRN	
AL03	Phase loss/ phase reverse error*1	FLT	AL03	PHASE ⇒ ERROR	The phase of the power line is connected by incorrect phase.
AL04	Water leakage*2	WRN*3	AL04	WATER ⇒ LEAK	Circulating fluid leakage inside unit is suspected.
AL05	Pump Inverter error*1	WRN	AL05	PUMP ⇒ INV	
AL06	Internal fan stop*4	WRN	AL06	FAN ⇒ ERROR	Check for fan rotation.
AL07	Fan Invertor error*1*5	WRN	AL07	FAN ⇒ INV	Check that there is no abnormality with the power supply system (e.g. ground fault, short-circuit, voltage fluctuation, abnormal interphase voltage, open phase, surge).
AL09	Circulating fluid discharge pressure rise	FLT*6	AL09	HIGH⇒PRESS	Piping resistance increased. Check valve opening, blockage of piping, clogging of filter.
AL10	Flow rate decreased*7	WRN*3	AL10	LOW⇒FLOW⇒WRN	
AL11	Ambient temperature is out of range *5	OFF*3	AL11	AMB⇒TEMP⇒OUT	Check the installation environment. Clean the dust filter.
AL12	Electric conductivity rise*8	WRN*9	AL12	DI⇒ERROR	Replace the DI filter.
AL13	NOT TEMP READY	OFF*3	AL13	TEMP⇒READY ⇒ERROR	Overloaded, cooling failure, insufficient circulating fluid flow rare, large fluctuation of the heat load, etc. Increase the flow rate through the chiller. (Adjust the by-pass valve)
AL14	Circulating fluid temperature range rise	OFF*3	AL14	TEMP⇒OUT.HI	
AL15	Circulating temperature range drop	OFF*3	AL15	TEMP⇒OUT.LO	
AL17	Low flow rate*7	FLT*3	AL17	LOW⇒FLOW⇒FLT	Display flow rate: 5 LPM or (For 400V type options Z and Z1:Less than 7L/min),piping is thin, external valve closed, pinching or blockage of piping or clogging of filter.
AL18	High circulating fluid discharge temp.	FLT	AL18	TEMP⇒FLT	Discharge temperature 45°C or higher. Overload, cooling failure, insufficient flow rate, etc. Increase the chiller flow rate. (Adjust the bypass valve)
AL19	High circulating fluid return temp.	FLT	AL19	RET⇒TEMP⇒FLT	Return temperature: 45°C or higher. Insufficient flow rate, overload etc. Increase the chiller flow rate. (Adjust the bypass valve)
AL21	High circulating fluid discharge pressure	FLT	AL21	HIGH⇒PRESS⇒FLT	Display pressure: 0.5 MPa or more. Connect piping so that the pressure is 0.5 MPa or less. Adjust the bypass valve.
AL22	Low circulating fluid discharge pressure	FLT	AL22	LOW⇒PRESS⇒FLT	Displayed pressure:0.03MPa or less. Check that the pump has not stopped.
AL24	Memory error	FLT	AL24	MEM⇒ERROR	Turn off the power supply switch and restart. If the error occurs again, ask for service.
AL25	Contact input 1 signal detection	FLT*3	AL25	INP1⇒ERROR	Contact input has been detected.
AL26	Contact input 2 signal detection	FLT*3	AL26	INP2⇒ERROR	
AL27	Forced stop	FLT	AL27	FORCE⇒STOP	Isolated operation of the pump is stopped(press “RUN/STOP” key for 5 seconds)
AL28	Notice for maintenance	OFF*3	AL28	MANT⇒ALARM	Notice for maintenance, perform maintenance for part for which alarm is generated.
AL29	Communication error	WRN*3	AL29	COMM⇒ERROR	No request message from the host computer. Try to send request message again.

8 Troubleshooting - continued

Alarm No.	Description	Initial value	Display Unit		Cause/Remedy (Press the reset key after eliminating the cause.)
			Upper stage (White)	Lower Stage (Green)	
AL30	Compressor circuit error	FLT	AL30	REF⇒ERROR⇒0000	Error occurred in the refrigerated circuit. Ask for service.
AL31	Sensor error	FLT	AL31	SENS⇒ERROR ⇒0000	An error occurred in a sensor. Ask for service.
AL32	Controller error	FLT	AL32	CTRL⇒ERROR ⇒0000	An error occurred in the controller. Ask for service.

*1 400V type only.
*2 Not generated for options Z.
*3 Select from OFF/ WRN/ FLT.
*4 Water-cooled type only.
*5 Air-cooled type only.
*6 Select from WRN/ FLT.
*7 Not generated for options Z and Z1.
*8 Option DM (With electric conductivity control function, Applicable to DI water piping) only. Alarm is automatically released when the electric conductivity returns within the range.
*9 Air-cooled type only. Select from OFF/ WRN.
*10 Not generated for 200V type options Z and Z1.

9 Limitations of Use

9.1 Limited warranty and Disclaimer/Compliance Requirements

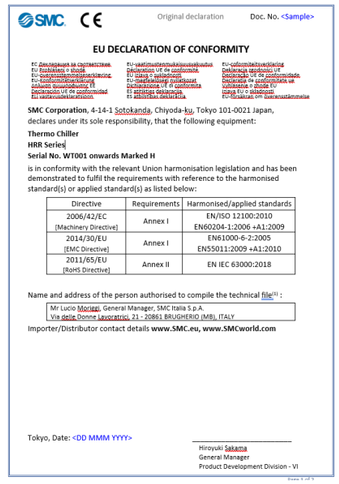
Refer to Handling Precautions for SMC Products.

10 Product disposal

This product should 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.

11 Declaration of conformity

Below is a sample Declaration of Conformity (DoC) used for this product. An actual DoC will be supplied with each product.



SMC CE — Original declaration — Doc. No. <Sample>

EU DECLARATION OF CONFORMITY

SMC Corporation, 4-14-1 Sotokanda, Chiyoda-ku, Tokyo 101-0021 Japan, declares under its sole responsibility, that the following equipment:

Thermo Chiller
HRR Series
Serial No. WT001 onwards Marked H

is in conformity with the relevant Union harmonisation legislation and has been demonstrated to fulfil the requirements with reference to the harmonised standard(s) or applied standard(s) as listed below:

Directive	Requirements	Harmonised/applied standards
2006/42/EC [Machinery Directive]	Annex I	EN/ISO 12100:2010 EN60204-1:2006 +A1:2009
2014/30/EU [EMC Directive]	Annex I	EN61000-6-2:2005 EN55011:2009 +A1:2010
2011/65/EU [RoHS Directive]	Annex II	EN IEC 63000:2018

Name and address of the person authorised to compile the technical file[1] :
Mr Lucio Moriggi, General Manager, SMC Italia S.p.A.
Via delle Donne Lavoratrici, 21 - 20861 BRUGHERIO (MB), ITALY

Importer/Distributor contact details **www.SMC.eu, www.SMCworld.com**

Tokyo, Date: <DD MMM YYYY>

Hiroyuki Sakama
General Manager
Product Development Division - VI

12 Contacts

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

SMC Corporation

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Specifications are subject to change without prior notice from the manufacturer.

Template DKP50047-F-085M