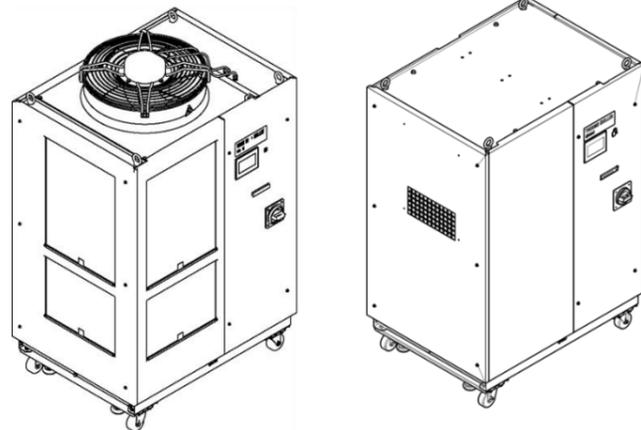




ORIGINAL INSTRUCTIONS

Instruction Manual
Thermo-chiller
HRL*-A*-40 Series**
HRL*-W*-40 Series**



2 Specifications

2.1 Product Specifications

HRL100/200/300/400 - A *- 40

Model	HRL100-A*-40		HRL200-A*-40		HRL300-A*-40		HRL400-A*-40		
	CH1	CH2	CH1	CH2	CH1	CH2	CH1	CH2	
Cooling method	Air-cooled refrigerated								
Refrigerant	R410A (HFC) ; 2088 (GWP)								
Quantity of refrigerant	kg 1.4				2.5		3.7		
Control method	PID control								
Ambient temperature	°C 2 to 45								
Circulating fluid	CH1: Clear Water ¹ , DI Water (pure water) ⁹ CH2: Clear Water ¹ , DI Water (pure water)								
Operating temp. range	°C CH1: 5 to 35 ; CH2: 10 to 40								
Cooling capacity ²	kW 9 1 ⁸		19 1 ⁸		26 1 ⁸		37 1 ⁸		
Heating capacity ³	kW 1.5 1		4 1		6 1		7.5 1		
Temperature stability ⁴	°C CH1: ±0.1 ; CH2: ±0.5								
Pump capacity ¹³	Rated flow rate (outlet pressure)	L/min	45 (0.43 MPa)	10 (0.45 MPa)	45 (0.45 MPa)	10 (0.45 MPa)	125 (0.45 MPa)	10 (0.45 MPa)	
	Max. flow rate	L/min	120	16 ¹²	130	16 ¹²	180	16 ¹²	
	Max. lifting height	m	50	49	55	49	68	49	
Set pressure range ⁵	MPa	0.10 to 0.50	0.10 to 0.49	0.10 to 0.55	0.10 to 0.49	0.10 to 0.68	0.10 to 0.68	0.10 to 0.49	
Minimum operating flow rate ⁶	L/min	20	2	25	2	40	2	40	
Tank capacity ¹⁴	L	42	7	42	7	60	7	60	
By-pass (with valve)	Built-in								
Electric conductivity setting range	µS/cm	0.5 to 45 ⁹	0.5 to 45	0.5 to 45 ⁹	0.5 to 45	0.5 to 45 ⁹	0.5 to 45	0.5 to 45 ⁹	
Particle filter filtration accuracy (Accessory)	µS	5	5	5	5	5	5	5	
Circulating fluid Outlet and Return port ¹⁴	CH1	Rc1 (Symbol F : G1, Symbol N : NPT1)							
	CH2	Rc1/2 (Symbol F : G1/2, Symbol N : NPT1/2)							
	CH1	Rc3/4 (Symbol F : G3/4, Symbol N : NPT3/4)							
	CH2	Rc1/2 (Symbol F : G1/2, Symbol N : NPT1/2)							
Tank drain port ¹⁴	CH1	Stainless steel, Copper (Brazing filler metal for the heat exchanger) ¹⁰ , Brass ¹⁰ , Bronze ¹⁰ , Fluoropolymer, PP, PBT, POM, PU, PC, PVC, EPDM, NBR, Ion-exchange resin ⁹ .							
	CH2	Stainless, Alumina ceramic, Carbon, Fluoropolymer, PP, PBT, POM, PU, PVC, PPS, AS, PS, EPDM, NBR, Ion-exchange resin.							
Wetted material	CH1	Stainless steel, Copper (Brazing filler metal for the heat exchanger) ¹⁰ , Brass ¹⁰ , Bronze ¹⁰ , Fluoropolymer, PP, PBT, POM, PU, PC, PVC, EPDM, NBR, Ion-exchange resin ⁹ .							
	CH2	Stainless, Alumina ceramic, Carbon, Fluoropolymer, PP, PBT, POM, PU, PVC, PPS, AS, PS, EPDM, NBR, Ion-exchange resin.							
Power supply	3-phase 380 to 415VAC (50/60Hz) Allowable voltage range ±10% (No continuous voltage fluctuation) 3-phase 460 to 480VAC (60Hz) Allowable voltage range +4%, -10% (Max. voltage less than 500V and no continuous voltage fluctuation)								
Recommended earth leakage breaker	Rated current	A	20	30	40	40			
	Sensitivity	mA	30						
Rated operating current ⁴	A	8.5	15	19	23				
Rated power consumption ⁴	kW	5.6	9.4	12.3	15.1				
	kVA	5.9	10.2	13.0	16.0				
Noise level (Front 1m / Height 1m) ⁴	dB(A)	75							
Accessories	Operation manual (for installation/operation) (English) Particle filter set for CH1 Particle filter set for CH2 Anchor bracket 2pcs. (including 6 pcs. of M8 bolts) ¹⁷								
Weight (dry condition) ¹¹	kg	Approx. 240	Approx. 260	Approx. 330	Approx. 380				

The intended use of this product used a built-in pump to circulate a liquid such as water, adjusted to a constant temperature by the refrigeration circuit. This circulating liquid cools parts of customer's machine that 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)¹¹, and other safety regulations.

- ¹¹ 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.

HRL100/200 - W *- 40

Model	HRL100-W*-40		HRL200-A*-40	
	CH1	CH2	CH1	CH2
Cooling method	Water-cooled refrigerated			
Refrigerant	R410A (HFC) ; 2088 (GWP)			
Quantity of refrigerant	kg 1.8		1.8	
Control method	PID control			
Ambient temperature	°C 2 to 45			
Circulating fluid	CH1: Clear Water ¹ , DI Water (pure water) ⁹ CH2: Clear Water ¹ , DI Water (pure water)			
Operating temp. range	°C CH1: 5 to 35 ; CH2: 10 to 40			
Cooling capacity ²	kW 10 1 ⁸		21.5 1 ⁸	
Heating capacity ³	kW 1.5 1.0		4.0 1.0	
Temperature stability ⁴	°C CH1: ±0.1 ; CH2: ±0.5			
Pump capacity ¹³	Rated flow rate (outlet pressure)	L/min	45 (0.43 MPa)	10 (0.45 MPa)
	Max. flow rate	L/min	120	16 ¹²
	Max. lifting height	m	50	49
Set pressure range ⁵	MPa	0.10 to 0.50	0.10 to 0.49	0.10 to 0.55
Minimum operating flow rate ⁶	L/min	20	2	25
Tank capacity	L	42	7	42
By-pass (with valve)	Built-in			
Electric conductivity setting range	µS/cm	0.5 to 45 ⁹	0.5 to 45	0.5 to 45 ⁹
Particle filter filtration accuracy (Accessory)	µS	5	5	5
Circulating fluid Outlet and Return port ¹⁴	CH1	Rc1 (Symbol F : G1, Symbol N : NPT1)		
	CH2	Rc1/2 (Symbol F : G1/2, Symbol N : NPT1/2)		
	CH1	Rc3/4 (Symbol F : G3/4, Symbol N : NPT3/4)		
	CH2	Rc1/2 (Symbol F : G1/2, Symbol N : NPT1/2)		
Tank drain port	CH1	Stainless steel, Copper (Brazing filler metal for the heat exchanger) ¹⁰ , Brass ¹⁰ , Bronze ¹⁰ , Fluoropolymer, PP, PBT, POM, PU, PC, PVC, EPDM, NBR, Ion-exchange resin ⁹ .		
	CH2	Stainless, Alumina ceramic, Carbon, Fluoropolymer, PP, PBT, POM, PU, PVC, PPS, AS, PS, EPDM, NBR, Ion-exchange resin.		
Wetted material	CH1	Stainless steel, Copper (Brazing filler metal for the heat exchanger) ¹⁰ , Brass ¹⁰ , Bronze ¹⁰ , Fluoropolymer, PP, PBT, POM, PU, PC, PVC, EPDM, NBR, Ion-exchange resin ⁹ .		
	CH2	Stainless, Alumina ceramic, Carbon, Fluoropolymer, PP, PBT, POM, PU, PVC, PPS, AS, PS, EPDM, NBR, Ion-exchange resin.		
Temperature range	°C	5 to 35		
Pressure range	MPa	0.3 to 0.5		
Required flow	L/min	25	50	
Inlet-outlet pressure differential	MPa	0.3 more		
Port size	Rc1			
Wetted material	Stainless steel, Copper (Brazing filler metal for the heat exchanger) ¹⁰ , Brass ¹⁰ , Bronze ¹⁰ , PTFE, NBR, EPDM			
Power supply	3-phase 380 to 415VAC (50/60Hz) Allowable voltage range ±10% (No continuous voltage fluctuation) 3-phase 460 to 480VAC (60Hz) Allowable voltage range +4%, -10% (Max. voltage less than 500V and no continuous voltage fluctuation)			
Recommended earth leakage breaker	Rated current	A	30	30
	Sensitivity	mA	30	
Rated operating current ⁴	A	12.7	13.3	
Rated power consumption ⁴	kW	7.9	8.6	
	kVA	8.8	9.2	
Noise level (Front 1m / Height 1m) ⁴	dB(A)	72		
Accessories	Operation manual (English) Particle filter set for CH1 Particle filter set for CH2 Anchor bracket 2pcs. (including 6 pcs. of M8 bolts) ¹⁷			
Weight (dry condition) ¹¹	kg	Approx. 250	Approx. 250	

2 Specification (continued)

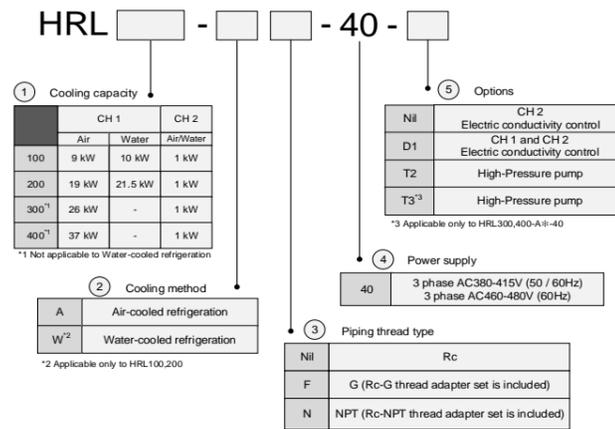
Notes:
¹ Use fluid for circulating fluid that conforms to: Clean water: Water Quality Standards of the Japan Refrigeration and Air Conditioning Industrial Association (JRA GL-02-1994)
² (1) Ambient/facility water temperature: 32°C, (2) Circulating fluid: Clean water, (3) Circulating fluid temperature: CH1 20°C / CH2 25°C, (4) Circulating fluid flow rate: Rated flow rate, (5) Power supply: 400 VAC. For option T2 or T3 * CH2 High-Pressure Pump mounted* (For water-cooled T2 only). For details refer to the operation manual 'Chapter 6 Option'.
³ (1) Ambient/facility water temperature: 32°C, (2) Circulating fluid: Clean water, (3) Circulating fluid flow rate: Rated flow rate, (4) Power supply: 400 VAC.
⁴ (1) Ambient/facility water temperature: 32°C, (2) Circulating fluid: Clean water, (3) Circulating fluid temperature: CH1 20°C / CH2 25°C, (4) Load: Refer to the specified cooling capacity, (5) Circulating fluid flow rate: Rated flow rate, (6) Power supply: 400 VAC, (7) Piping length: Minimum.
⁵ With the pressure control mode that controls the pressure automatically with the inverter. If the pressure control mode is not necessary, use the flow control function or the pump output setting function.
⁶ Required flow rate to maintain the cooling capacity. When the flow rate is lower than the rated flow, use a by-pass piping set. For option T2 or T3 * CH2 High-Pressure Pump mounted* (For water-cooled T2 only). For details refer to the operation manual 'Chapter 6 - Option'.
⁷ The anchor brackets (including M8 bolt x 6pcs.) are used for fixation with the skid when this product is packed. The anchor bolts are not attached.
⁸ Up to 1.5kW. However, when 1.5kW heat load is applied, the cooling capacity of CH1 will decrease by 0.5kW.
⁹ Option D1 "with electrical conductivity control function" only.
¹⁰ In the case of option D1 "with electrical conductivity control function", it is not included.
¹¹ The weight will increase by:
 > 1kg: Option D1 "CH1 and CH2 Electrical conductivity control" when selected
 > 1kg: Option T2 "High-Pressure pump" when selected
 > 18kg: Option T3 "High-Pressure pump" when selected (only applicable HRL300-A-40)
 > 15kg: Option T3 "High-Pressure pump" when selected (only applicable HRL400-A-40)
¹² The usable flow rate range is varied depending on the Pump control mode. For details refer to the operation manual 'Chapter 9.5 Pump Capacity curves Fig.9-26'.
¹³ In the case of option T2 or T3 "CH2 High-Pressure Pump Mounted" (For water-cooled T2 only). For details refer to the operation manual 'Chapter 6 Option'.
¹⁴ In the case of option T3 "CH2 High-Pressure Pump Mounted". For details refer to the operation manual 'Chapter 6 Option'.

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:

Year	2022	2023	2024	2025	2026	2027	2028	...
Month	A	B	C	D	E	F	G	...
Jan	o	Bo	Co	Do	Eo	Fo	Go	...
Feb	P	AP	BP	CP	DP	EP	GP	...
Mar	Q	AQ	BQ	CQ	DQ	EQ	GQ	...
Apr	R	AR	BR	CR	DR	ER	GR	...
May	S	AS	BS	CS	DS	ES	GS	...
Jun	T	AT	BT	CT	DT	ET	GT	...
Jul	U	AU	BU	CU	DU	EU	GU	...
Aug	V	AV	BV	CV	DV	EV	GV	...
Sep	W	AW	BW	CW	DW	EW	GW	...
Oct	X	AX	BX	CX	DX	EX	GX	...
Nov	y	Ay	By	Cy	Dy	Ey	Gy	...
Dec	Z	AZ	BZ	CZ	DZ	EZ	GZ	...

3 How to Order



4 Name of Parts and Accessories

4.1 Accessories

- Check the enclosed accessories with the delivered Thermo-chiller.

1	Operation manual (English)		1pc
2	Particle filter set (for CH1)*		1 set
3	Particle filter set (for CH2)*		1 set

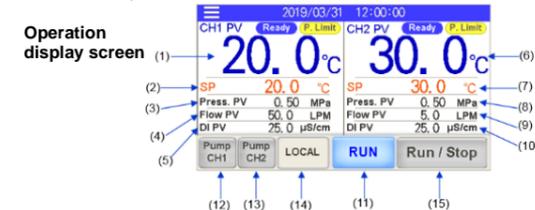
4 Name of Parts and Accessories (continued)

4	HRL***-A/WF-*** G thread adapter set HRL***-A/WN-*** NPT thread adapter set		1 set
5	Anchor brackets*		2pcs
6	DI Filter*		1pc

* These accessories are not explained in this manual. For details, read the Operation Manual attached.

4.2 Main Parts

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



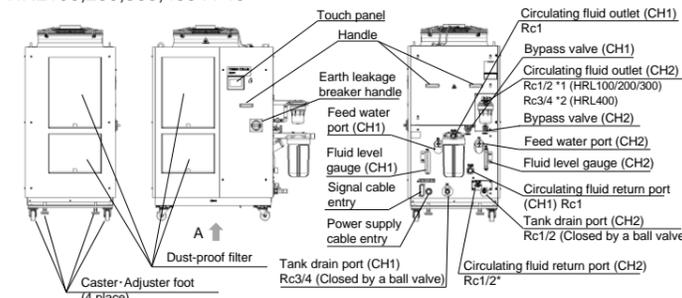
No	Category	Channel Number	Item	Description
1	Display	CH 1	Circulating fluid Temperature	Indicates the current temperature.
2			Circulating fluid: Set temperature	Indicates the set temperature.
3			Circulating fluid: Discharge pressure	Indicates the discharge pressure.
4			Circulating fluid: Flow rate	Indicates flow rate with or without by-pass circuit. This is not measured by a flow meter and should be used as a reference value.
5			Circulating fluid: Electric conductivity	Indicates electric conductivity. Only when option 'D1' is selected.

6	Display	CH 2	Circulating fluid Temperature	Indicates the current temperature.	
7			Circulating fluid: Set temperature	Indicates the set temperature.	
8			Circulating fluid: Discharge pressure	Indicates the discharge pressure.	
9			Circulating fluid: Flow rate	Indicates flow rate measured by a flow meter. This does not indicate flow rate in a by-pass circuit.	
10			Circulating fluid: Electric conductivity	Indicates electric conductivity.	
11	Button	Common	Operation condition display	Indicates the run and stop status of the product.	
12			CH 1	Pump operation only	CH 1 pump only continues operating while the button is pressed.
13			CH 2	Pump operation only	CH 2 pump only continues operating while the button is pressed.
14			Operation mode*	To select an operation mode from the touch panel: ('LOCAL' mode), Contact input ('DIO' mode) or serial communication ('SERIAL' mode).	
15	Common	Common	Run / Stop	To run or stop the product.	

*Operation modes not explained in this manual. For details, read the Operation Manual attached.

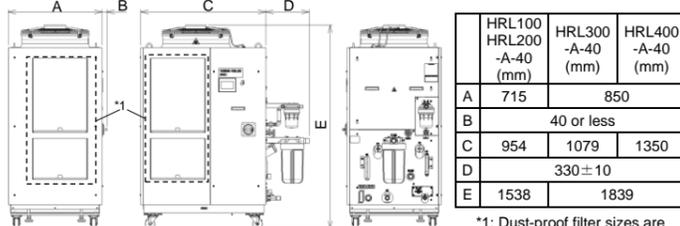
4.3 Name of parts and Outline Dimension

HRL100,200,300,400-A-40



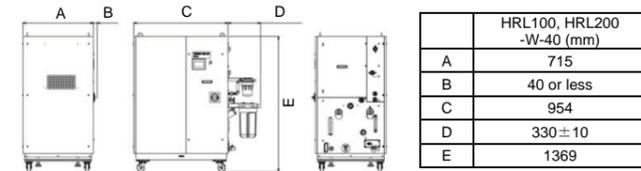
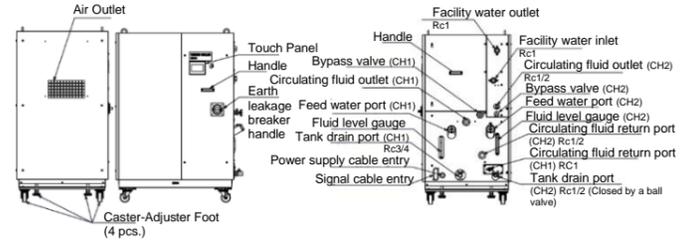
¹¹ In case of HRL300,400-A-40-T3, the layout is different. Refer to Operation Manual 'Chapter 6 Option' for details.
¹² The connection diameter when piping the particle filter is Rc1/2.

4 Name of Parts and Accessories (continued)



*1: Dust-proof filter sizes are different for each model size

HRL100,200-W-40



5 Transportation, Transfer and Moving

5.1 Moving by forklift and slinging or by casters

Warning

- The product is a heavy object (Refer to 2.1 Product specification for weights).
- Moving by forklift and slinging should be done by persons who have required licenses.
- Moving the product by casters should be done by 2 persons or more.

6 Installation

6.1 Installation

Warning

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

6.2 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.

6 Installation (continued)

6.3 Environment

Warning

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

6.4 Mounting

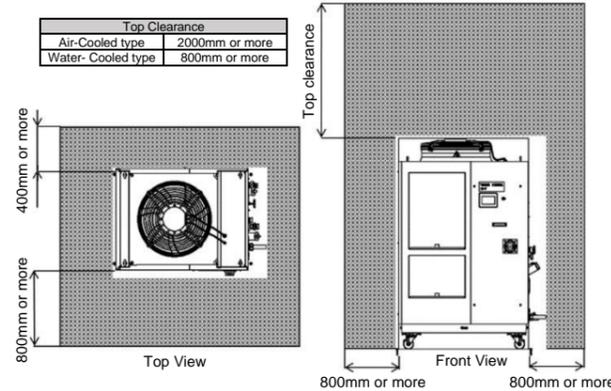
Warning

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

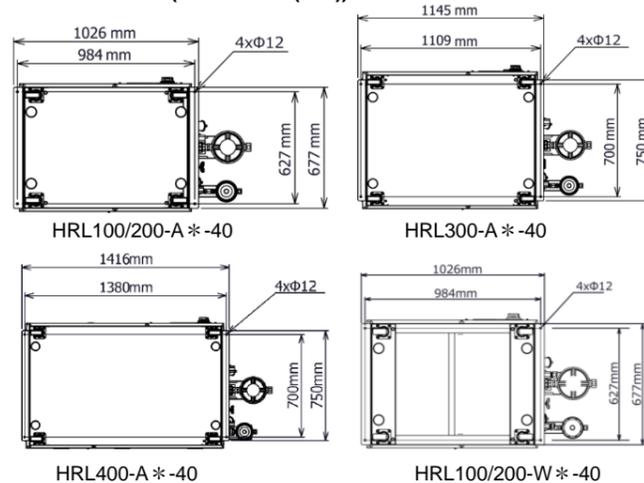
Caution

- Have enough space for ventilation for the product. Otherwise may cause a lack of cooling capacity or/and stoppage of the product.
- Have enough space for maintenance.
- Install the product on a vibration free floor.
- Prepare M10 anchor bolts that are suitable to the floor that the product will be installed. Refer to '6.6 Anchor bolts' for outline dimensions for the position of the anchor bolts.

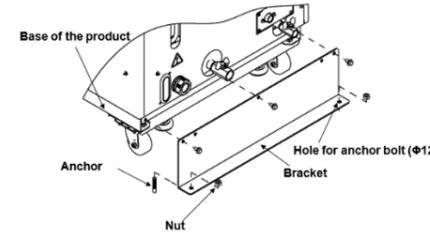
6.5 Recommended installation Space



6.6 Anchor bolts (dimensions (mm))



6 Installation (continued)

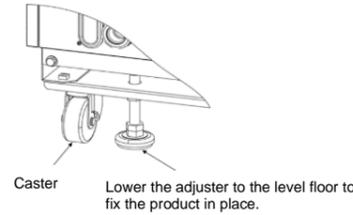


- Install this product according to the anchor bolts installed on the level floor.
- Fasten the nuts to the anchor bolts.
- Make sure that there is no looseness on all the anchor bolts and nuts.

6.6.1 Use the adjuster-foot

Caution

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



6.7 Piping

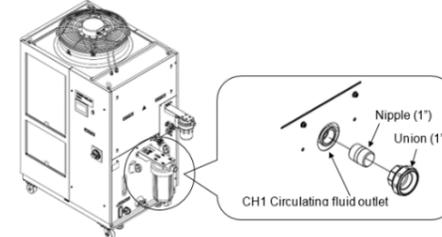
Caution

- Before piping make sure to clean up chips, cutting oil, dust etc.
- The piping should be selected with due consideration of temperature and pressure.
- Do not generate a rapid change of pressure by water hammer etc. The product and piping might be damaged.
- Hold the piping port firmly with specific wrench when tightening.

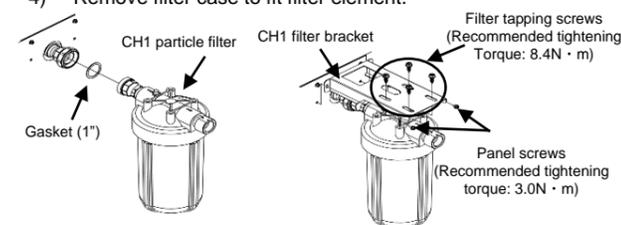
6.7.1 Installation of particle filters:

6.7.1.1 Installation of CH1 Particle Filter.

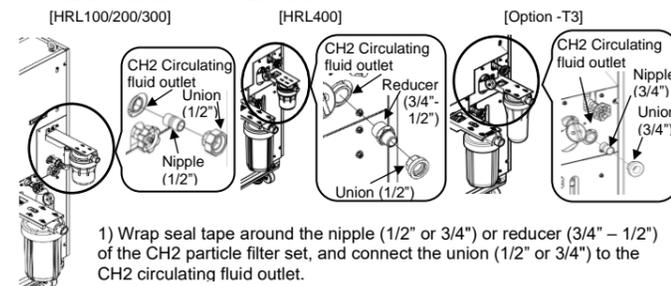
- Wrap seal tape around the nipple (1") of the CH1 particle filter set, and connect the union (1") to the CH1 circulating fluid outlet.



- Insert the gasket (1") and install CH1 particle filter.
- Install CH1 filter bracket.
- Remove filter case to fit filter element.



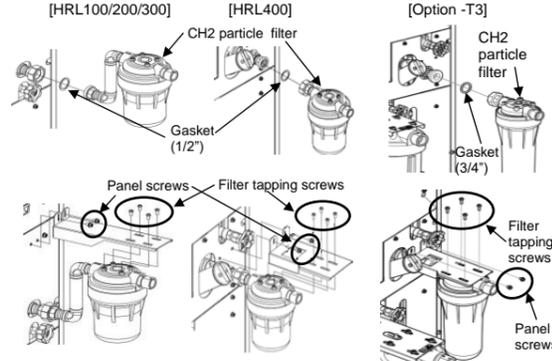
6.7.1.2 Installation of CH2 Particle Filter.



- Wrap seal tape around the nipple (1/2" or 3/4") or reducer (3/4" - 1/2") of the CH2 particle filter set, and connect the union (1/2" or 3/4") to the CH2 circulating fluid outlet.

6 Installation (continued)

- Attach the CH2 particle filter. Insert the gasket (1/2" or 3/4") and install it.



- Attach the CH2 filter bracket.

Tightening torque	Panel screw	3.0 N·m	3.0 N·m
	Filter tapping screw	2.0 N·m	3.0 to 5.0 N·m

6.7.2 Piping Port Size

CH No.	Description	Port size	Recommended tightening torque	Recommended piping specification	
CH1	Circulating fluid outlet port	Chiller side	Rc1 1" union	36 to 38N·m 178 to 185N·m	--
		Filter side	Rc1"	36 to 38N·m	1.0 MPa or more
	Circulating fluid return port		Rc1"	36 to 38N·m	1.0 MPa or more
	Tank drain port		Rc3/4"	28 to 30N·m	--
CH2	Circulating fluid outlet port	Chiller side	Rc1/2 [HRL100/200/300] Reducer(3/4"-1/2") [HRL400] 1/2" union	20 to 25N·m 20 to 25N·m 64 to 70N·m 28 to 30N·m	--
		Option: T3	Rc3/4 3/4" union ³	106 to 115N·m	--
	Filter side	Rc1/2"	20 to 25N·m	0.8 MPa or more	
	Option: T3	Rc3/4"	28 to 30N·m	--	
	Circulating fluid return port		Rc1/2"	20 to 25N·m	0.8 MPa or more
	Option: T3	Rc3/4"	28 to 30N·m	--	
	Tank drain port		Rc1/2"	20 to 25N·m	--
	Option: T3	Rc1/4"	8 to 12N·m	--	
-	Facility water inlet ¹	Rc1	36 to 38N·m	1.0 MPa or more	
-	Facility water outlet ⁴	Rc1	36 to 38N·m	1.0 MPa or more	

*1: When the piping thread type "F (G thread)" or "N (NPT thread)" is selected, it becomes "G thread" or "NPT thread".

*2: When the piping screw type "F (G thread)" or "N (NPT thread)" is selected, a conversion joint is included.

*3: In case option T3 "CH2 High-Pressure Pump Mounted" is selected, refer to the operation manual, Chapter 6.

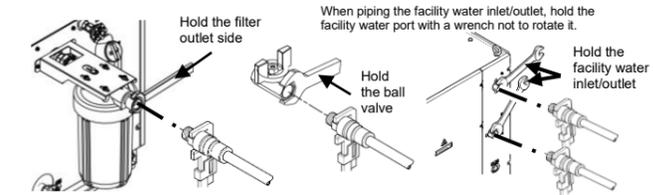
*4: For water-cooled type.

6.7.3 Connecting to the Circulating fluid port and Drain Port.

Caution

Without using a wrench to hold either the circulating fluid outlet's filter side fitting or the drain port's ball valve, the fitting or the ball valve may rotate. This could cause fluid leakage and/or product malfunction. Ensure the filter side fitting and ball valve of the drain port is held securely.

- Circulating fluid port: To pipe to the circulating fluid outlet, hold the filter outlet side fitting with a wrench. Do not rotate the wrench.
- Drain port: To pipe the pump drain port, hold the ball valve of the drain port with a wrench. Do not rotate the wrench.



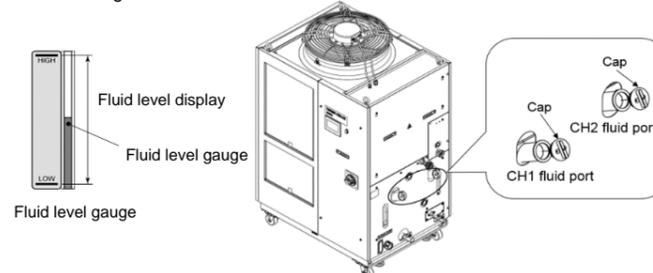
6.7.4 Installation of the DI filter.

Is not explained in this manual. Please refer to the Operation Manual "8.4.2 Replacing the DI filter".

6.8 Filling of Circulating Fluid

Caution

- When deionized water is used the conductivity should be 1μS/cm or higher (Electrical resistivity: 1MΩ·cm or lower).
- Confirm that the fluid level is between "High" and "Low" level of the fluid level gauge for CH1 and CH2.
- Check drain port is closed by the valve to prevent the supply circulating fluid from draining out.



6 Installation (continued)

6.9 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 the person who has knowledge and experience.
- Check the power supply. Operation with voltages, capacities, frequencies and cable sizes other than those specified can cause heat, fire and electrical shock.
- Wire with an applicable cable size and terminal.
- Be sure to shut off the user's power supply. Wiring with the product energized is strictly prohibited.

Caution

- Use an individual socket or earth leakage breaker.
- Be sure to provide grounding. Incomplete grounding can cause failure and electrical shock.
- When panel is removed or mount, be sure to wear protective shoes and gloves to prevent injury with the edge of the panel.

6.9.1 Preliminary Preparation for Wiring

Prepare the power supply shown in the following table. For the connection between the product and power supply, use the power supply cable and earth leakage breaker shown below. An earth leakage breaker must be mounted to a position where the breaker is easily accessible and close to the thermo-chiller.

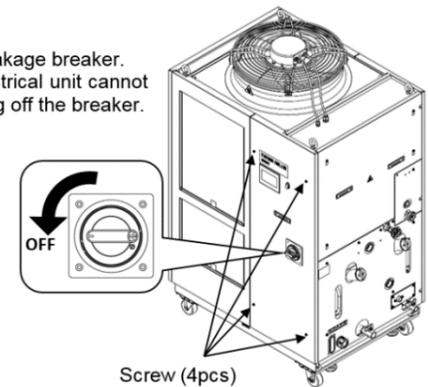
Model	Power supply voltage	Terminal block screw diameter	Proposed crimp terminal	Cable specification *1	Earth leakage breaker	
					Rated current [A]	Sensitivity of leak current [mA]
HRL100-A+-40	3 phase 380-415 VAC 50/60 Hz	M5	R5.5-5	4 cores x 5.5mm ² (4 cores x AWG10) *including ground	20	30
HRL200-A+-40					30	
HRL100/200- W*-40					30	
HRL300/400- A+-40	3 phase 460-480 VAC 60 Hz		R8-5	4 cores x 8mm ² (4 cores x AWG8) *including ground	40	

*1: Continuous allowable operating temperature of 70 °C, with an operating voltage of 600 V and two kinds of plastic insulated wires at an ambient temperature of 30 °C. Please select the proper size cables according to the actual condition.

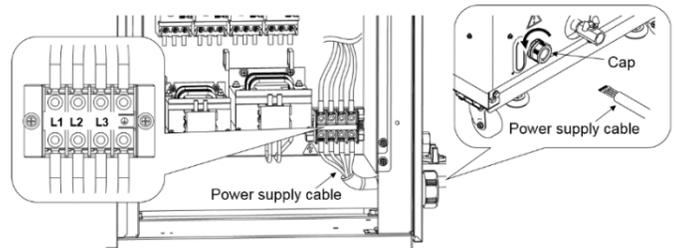
6.9.2 Wiring of Power Supply

- Turn off the breaker handle.
- Remove 4 screws to remove the front panel.
- Hold the handle and pull up the front panel of the electrical unit, and remove.

Note: Turn off the earth leakage breaker. The front panel of the electrical unit cannot be removed without turning off the breaker.



- Loosen the power cable outlet cap and insert the power cable.
- Connect the power supply cable and ground cable as shown below:



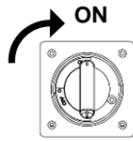
- Connect an over current protection to the power cable connected to the equipment to avoid hazard.

7 Start, Stop and Temperature Settings

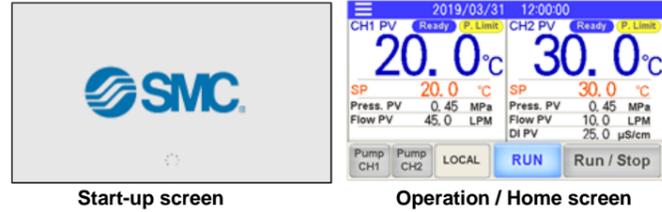
7.1 Preliminary Preparation for Start-up

7.1.1 Supply of Power

- Turn on the breaker handle.



- The 'Startup' screen first appears on the touch panel and then switches to the 'Operation / Home' screen.



7.1.2 Preparation of circulating fluid

- Touch [Pump CH1] button or [Pump CH2] button on the touch panel. Pump operates independently while pressing the [Pump CH1 / Pump CH2] button. [Pump CH1 / Pump CH2] button (blue) lights up during independent pump operation. The circulating fluid is then supplied to user's device and the piping to bleed the air inside the piping.
- If the fluid level in the tank drops, an alarm is activated and "AL02 CH1 Low Level WRN" or "AL04 CH2 Low Level WRN" is displayed on the screen.
- Supply circulating fluid in the range between HIGH and LOW to turn off the alarm. After supplying the circulating fluid, press [Alarm Reset] button to turn off the alarm. The displayed alarm will be turned off.
- Touch [Menu] (menu key) to display the menu. When [Home] button is pressed, the home screen will be displayed.

7.1.3 Temperature Setting

- Press the [SP] value on the touch panel (home screen) to display numeric keys to set the circulating fluid set temperature. Enter the set temperature for CH1 and CH2.

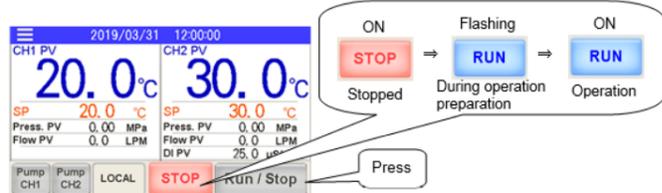


7.2 Start of the Product

- Press [Run / Stop] button on the home screen.

CH1 and CH2 will start the operation.

The operating condition display switches from [STOP] to [RUN] and flashes during the operation preparation. The display turns on [RUN] when it starts operating.



7 Start, Stop and Temperature Settings (continued)

7.3 Stop of the Product

- Press [Run / Stop] button on the home screen.

CH1 and CH2 will stop the operation.

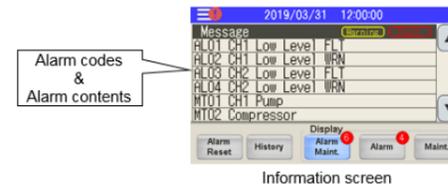
The operating condition display switches from [RUN] to [STOP] and flashes during the operation preparation. The display turns on [STOP] when it starts operating.



8 Alarms

The product makes notification in the order shown below when any alarm is generated.

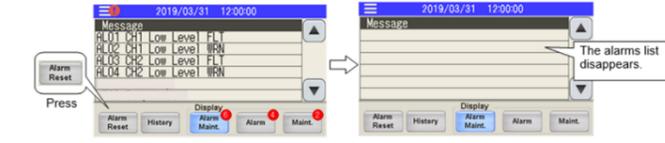
- The screen automatically moves to the "Information" screen and displays alarm codes with their contents. (Refer Operation manual section "5.4.4 Information screen" for the operation method of "Information" screen.)



- When an alarm occurs, this product operates in two ways depending on the content of the alarm:
 - Operation continuation alarm: When an alarm occurs, this product continues to operate. The alarm content will display "WRN".
 - Operation stop alarm: When an alarm occurs, this product stops. The alarm content will display "FLT".

8.1 Reset of alarm

- Press the button [Alarm Reset].
- The alarm is reset.



Caution

- Before resetting the alarm, read the "Causes and Remedies" of "10.1 Troubleshooting" and eliminate the cause as explained. Otherwise, the same alarm may be repeated.

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 plug. It might cause electric shock.
- Do not splash water directly on the product and do not wash with water. It might cause electric shock and fire, etc.
- Do not touch the fins directly when cleaning the dustproof filter. It might cause injury.
- Remount all panels removed for inspection or cleaning. As this might cause injury or electric shock if the product is operated without the panels.

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.

9 Maintenance (continued)

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.
- When using tap water ensure that it satisfies the water standard shown in the Operation Manual.
- When deionized water is used, the conductivity should be 1.0 μS/cm or higher (Electrical resistivity: 1 MΩ·cm or lower).

9.3 Daily Check

Caution

- Check each item of "Daily checklist", and if any error is seen, stop the operation of the product and turn off the user's power supply, and service the product.

Daily checklist

Item	Description of checking	
Installation condition	Check the installation conditions of the product.	Check that there is no heavy object on the product or excessive force applying to the piping.
		Temperature should be within the specification range of the product.
		Make sure the ventilation grilles are not obstructed. (For air-cooled type)
Fluid leakage	Check the connected part of piping	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.
Touch panel	Check the indications on the display.	The display on the screen is clear.
Circulating fluid temperature	Check on the touch panel.	There should be no problem during operation.
Circulating fluid discharge pressure	Check on the touch panel.	There should be no problem during operation.
Circulating fluid flow rate	Check on the touch panel.	There should be no problem during operation. If flow rate becomes low, check for clogging in the particle filters.
Operating conditions	Check the operation condition.	There should be no abnormality with noise, vibration, smell, or generation of smoke.
Facility water (for-watercooled type)	Check the facility water condition.	Check that the temperature, pressure and flow rate are within specification ranges.

9.4 Monthly Check

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

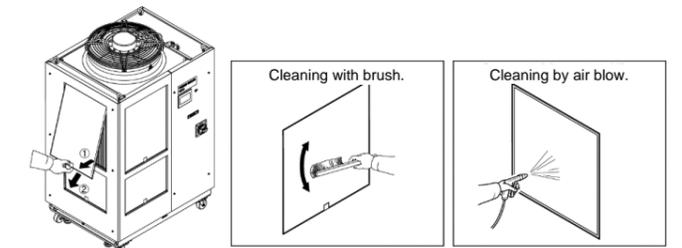
Cleaning of air vent (Air-cooled type)

Caution

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

9.4.1 Removal of the Dustproof Filter (For air-cooled type)

- The dust-proof filters are installed on the front and left side of the product. In total there are two or four filters with the same shape.
- The dustproof filters can be removed as shown in the below drawing. Care should be taken not to deform or scratch the air-cooled condenser.



9.4.2 Cleaning of Filter

- Clean the dust filter with a long bristled brush or by air purging.
- Mount the dustproof filter in reverse order of removal.

9 Maintenance (continued)

9.5 Inspection every 3 Months

Item	Description of checking	
Power Supply	Check the power supply voltage.	Make sure the supply voltage is within the specification range.
Circulation fluid	Replace the circulating fluid (tap water) periodically.	<ul style="list-style-type: none"> 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. Refer to operation manual section Table 8.1-1 Quality criteria for clean water (tap water). It is recommended to replace the circulating fluid every 3 months when periodic maintenance is performed.
Facility water (For water-cooled type)	Check the water quality	<ul style="list-style-type: none"> 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 operation manual section Table 8.1-1 Quality criteria for clean water (tap water)

9.5.1 Replacement of Circulating Fluid

- Replace the existing circulating fluid with new circulating fluid periodically. Otherwise algae or decompose may occur.
- Do not use any chlorinated detergents and cleansers.

9.6 Inspection every 6 months

- Option T3: Refer to operation manual section 8.2.4.

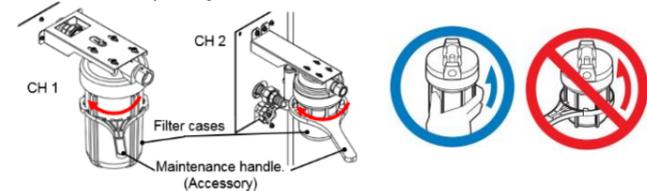
9.7 Draining of the Circulating Fluid

Warning

- Before draining the circulating fluid, stop the user's equipment and release the residual pressure.

- Turn OFF the breaker of the user's power supply.
- Open the supply port cap.
- Open the ball valve of the pump drain port and drain the circulating fluid.

- Use the maintenance handle, to remove the filter cases for CH1 and CH2. Drain fluid and remove element from cases. When reusing the removed element, dry it and store it separately.



- Attach the filter cases by hand.
- Make sure that the circulating fluid has been sufficiently drained from the product, customer's facilities and piping. Perform an air purge (pressure less than 0.1 MPa, approximately 1 minute) from the circulating fluid outlet of the product. Purge both CH1 and CH2, circulating fluid is drained from the drain port.
- Close the ball valve after draining the circulating fluid.
- Close the supply cap.

9.8 Replacing the DI filter

Is not explained in this manual. Please refer to the Operation Manual section 8.4.2 Replacing the DI filter.

9.9 Consumable Parts

Part No.	Description	Qty	Remark
HRS-S0213	Dust-proof filter (Lower)	1 pc.	HRL200-A: 2 pcs. are used per unit
HRS-S0214	Dust-proof filter (Upper)	1 pc.	HRL100-A: 2 pcs. are used per unit HRL200-A: 2 pcs. are used per unit
HRS-S0185	Dust-proof filter	1 pc.	HRL300-A: 4 pcs. are used per unit
HRS-S0153	Dust-proof filter	1 pc.	HRL400-A: 4 pcs. are used per unit
HRS-PF006	Particle filter element	1 pc.	Common to each model: For CH1
EJ202S-005X11	Particle filter element	1 pc.	Common to each model: For CH2
EJ302S-005X11	Particle filter element	1 pc.	For option T3: For CH2
HRR-DF001	DI filter replacement cartridge	1 pc.	Common to each model: For CH2
HRR-DF002	DI filter replacement cartridge	1 pc.	Common to each model: For CH1 (Option D1 only)

10 Troubleshooting

10.1 Troubleshooting

The troubleshooting method depends on which alarm has been generated. Refer to the "Alarm code list and Troubleshooting".

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.

Alarm Code list and Troubleshooting

Alarm Code	Alarm Description		Default Setting		Cause/Remedy (Press the reset key after eliminating the cause.)
	Sub Code	Operation	Threshold	Threshold	
AL01	CH1 Low Level FLT	FLT			The circulating fluid level of CH1 has decreased. Refilling circulating fluid.
AL02	CH1 Low Level WRN	WRN			
AL03	CH2 Low Level FLT	FLT			The circulating fluid level of CH2 has decreased. Refilling circulating fluid.
AL04	CH2 Low Level WRN	WRN			
AL06 ⁵	Fan Inverter	FLT			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).
AL07 ⁶	Internal Cooling Fan	WRN			Air exhaust fan failure. Ask for service for the air exhaust fan.
AL09	CH1 High Temp. FLT	FLT	55°C		Check that the ambient temperature and heat load satisfy the specifications and that the circulating fluid flow rate is more than the minimum flow rate.
AL10	CH1 High Temp.	OFF ¹	45°C ³		• Please review the setting value.
AL11	CH1 Low Temp.	OFF ¹	5°C ³		• Check the effect of ambient temperature.
AL12	CH1 TEMP READY ALARM	OFF ¹	±1°C ³		• Please review the setting value.
AL13	CH2 High Temp. FLT	FLT	50°C		• Check that the ambient temperature and heat load satisfy the specifications and that the circulating fluid flow rate is more than the minimum flow rate.
AL14	CH2 High Temp.	OFF ¹	45°C ³		• Please review the setting value.
AL15	CH2 Low Temp.	OFF ¹	5°C ³		• Check the effect of ambient temperature.
AL16	CH2 TEMP READY ALARM	OFF ¹	±1°C ³		• Please review the setting value.

Alarm Code	Alarm Description		Default Setting		Cause/Remedy (Press the reset key after eliminating the cause.)
	Sub Code	Operation	Threshold	Threshold	
AL17	CH1 HX In High Temp. FLT	FLT		60°C	• Check that the circulating fluid flow rate is more than the minimum flow rate.
AL18	CH1 Press. Sensor	FLT ¹		--	• Check that the heat load is within the specified range.
AL19	CH1 High Press.	FLT ¹	0.50 MPa ³		• Short-circuit or broken wire of the pressure sensor. Ask for the service.
AL20	CH1 Low Press.	FLT ¹	0.03 MPa ³		• Check that there is no bending, collapse, or clogging with the external piping.
AL21	CH2 Press. Sensor	FLT ¹		--	• Check that there is no clogging of the particle filter.
AL22	CH2 High Press. Error	FLT	0.50 MPa		Restart the thermo-chiller and check if the pump runs.
AL23	CH2 High Press.	FLT ¹	0.50 MPa ³		• Check that there is no bending, collapse, or clogging with the external piping.
AL24	CH2 Low Press.	FLT ¹	0.03 MPa ³		• Check that there is no clogging of the particle filter.
AL25	CH2 Low Press. Error	FLT	0.03 MPa		Restart the thermo-chiller and check if the pump runs.
AL26	CH2 Flow Sensor	FLT ¹		--	(Check the flow rate display value.)
AL27	CH2 High Electric conductivity	WRN ²	45.0µS/cm ³		Short-circuit or broken wire of the flow rate sensor. Ask for the service.
AL28 ⁴	CH1 High Electric conductivity	WRN ²	45.0µS/cm ³		Replace CH2 DI filter.
AL30	Digital input 1	FLT ¹		--	Replace CH1 DI filter.
AL31	Digital input 2	FLT ¹		--	Contact input has been detected.
AL33	CH2 Low Flow FLT	FLT		Less than 2.0LPM - T2 < 5.0 LPM - T3 < 10.0 LPM	Display flow rate. Threshold or less. Check piping no bending closed external valve, clogging of filter.
AL34	Communication	WRN ¹		--	No request message from the host computer. Try to send the request message again.
AL35	Ambient Temp.	OFF ²		2-C / 45-C	Check the environment.
AL36	Maintenance				"Maintenance reminder" Please maintain the corresponding part.
	1 CH1 Pump maintenance.			20,000h	
	2 Compressor maintenance.			30,000h	
	3 Fan maintenance ⁵			30,000h	
	4 Dust-proof filter maintenance ⁵			500h ³	
	5 CH2 DI filter maintenance.			500h ³	
	6 CH2 Pump maintenance.			20,000h	
	7 Battery maintenance.				
	8 Maintenance of CH1 circulating fluid discharge pressure sensor.			Abnormal occurrence	
	9 Maintenance of CH2 circulating fluid discharge pressure sensor.				
	10 Maintenance of CH2 circulating fluid flow sensor.				
11 CH1 DI filter maintenance ⁴			500h ³		

10 Troubleshooting (continued)

Alarm Code	Alarm Description		Default Setting		Cause/Remedy (Press the reset key after eliminating the cause.)	
	Sub Code	Operation	Threshold	Threshold		
AL37	Refrigeration Circuit				Refrigerant circuit failed.	
	1 High compressor intake temp.			60°C		
	2 Low compressor intake temp.			0°C		
	3 Super heat temp.			0°C		
	5 Refrigeration circuit high press. rise					
	6 Refrigeration circuit high press. drop					
	8 Refrigeration circuit low press. drop					
	9 Refrigeration circuit low press. rise					
	11 Compressor running failure			--		
	12 Compressor discharge temp. rise					
	Sensor					
	1 CH1 Circulating fluid temp. sensor.					• Short-circuit or broken wire of the sensor.
2 CH1 Heat exchanger inlet temp. sensor.						
3 Compressor discharge temp. sensor.						
4 Compressor intake temp. sensor.						
5 CH2 Heat exchanger outlet temp. sensor.						
6 Ambient temp. sensor.						
9 Refrigeration circuit high press. sensor						
10 Refrigeration circuit low press. sensor						
12 CH2 DI sensor						
13 CH2 Circulating fluid temp. sensor						
15 CH1 DI sensor ⁴						
Controller						
1 EEPROM error				Controller failed. Shut off the power and restart the product. If it does not return to normal, ask for service.		
2 Internal communication error						
3 FRAM error						
5 Ref. memory error						
6 Cir. memory error						
AL40	Compressor Inverter	FLT			--	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).

Alarm Code	Alarm Description		Default Setting		Cause/Remedy (Press the reset key after eliminating the cause.)
	Sub Code	Operation	Threshold	Threshold	
AL41	Compressor Inverter Comm.	FLT		--	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).
AL42	CH1 Pump Inverter	FLT		--	
AL43	CH1 Pump Inverter Comm.	FLT		--	
AL44	CH2 Pump Inverter	FLT		--	
AL45	CH2 Pump Inverter Comm.	FLT		--	

Note:

- *1 : Selectable from "OFF" / "WRN" / "FLT"
- *2 : Selectable from "OFF" / "WRN"
- *3 : The setting value can be changed.
- *4 : In the case of option D1 "CH1 with electrical conductivity control" can be set.
- *5 : Only for air-cooled type
- *6 : Only for water-cooled type

10.2 Other Errors

The causes and remedies for failures that are not indicated by alarm numbers are shown in the following table:

Content of Failure	Cause	Remedy
Touch panel displays nothing.	The breaker of the user's power supply or/and the breaker is not turned ON.	Turn ON the breaker.
	The breaker of this product is broken.	Replace the breaker.
	No power supply. (e.g. Breaker(s) in the power supplying route has not been turned ON.)	Supply the power.
The product does not operate after pressing the [Run / Stop] button.	The breaker for the user's facility or the optional breaker has tripped due to short-circuit or leakage of electricity.	Repair the short-circuited part or the electricity leaking part.
	The DC power supply has been turned.	Replace the DC power.
	Communication setting has been turned ON.	Check the setting of the operation mode.

11 Limitations of Use

11.1 Limited warranty and Disclaimer/Compliance Requirements

Refer to Handling Precautions for SMC Products.

Caution

Refer to 'Section 2. Specifications' for the product limitations of use.

12 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.

13 Declaration of Conformity

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

