Circulating Fluid Temperature Controller Thermo-chiller/Rack Mount Type

Air-cooled Refrigeration Water-cooled Refrigeration

A 5.1 kW (60 Hz) cooling capacity option has been added.

Operable without the need to remove the unit from the rack

Front access Simple to control, service, and maintain with all filters and drainage accessible via the front panel

Multiple chillers can be mounted to a 19-inch rack. *1 Refer to page 1 for details on 19-inch racks

Space saving



Cooling capacity 1.1/1.2/1.8/2.4/3.0/5.1 kW (60 Hz) Temperature stability +0.1°C

HRR050-W Water-cooled

Single-phase 100 VAC (50/60 Hz)/115 VAC (60 Hz) Single-phase 200 to 230 VAC (50/60 Hz)

New 532 mm Equivalent to 12U (EIA standards*1)

HRR Series

Global power supply

Equivalent to 16U (EIA standards*1)



221

Equivalent to 5U

Equivalent to 7U

Equivalent to 9U (EIA standards*1)

New

710

mm

. (EIA standards*1)

(EIA standards*1)

mm

310 mm

399 mm

(UL Standards) * Pending for the HRR010/050 RoHS

HRR050-A Air-cooled







Footprint can be reduced by **53%** by installing the product in a 19-inch rack (EIA standards^{*1}).





Setting and Adjustment

A bypass valve and flow sensor are built in (standard).

Flow rate and pressure adjustment can be seen on the displayed panel.

- $\ast~$ Option Z does not come with a bypass valve or flow sensor.
- * Option Z1 does not come with a flow sensor.

Color LCD screen



Current value (displayed in white): Discharge temperature, pressure, flow rate, etc.

Set value (displayed in green): Set temperature, etc.

Angled inlet allows for the easy supply of circulating fluid

Close

Open

Easy to check

Flow rate

sensor





(With feet/Without rack mounting brackets)



35% reduction



Caster Adjuster-foot Kit Optional Accessories p 38

Applicable for installation in locations other than 19-inch racks This is a set of unfixed casters and adjuster feet stop.



Temperature stability: ±0.1°C

A precision temperature control method which utilizes expansion valves and temperature sensors allowed for the realization of a product with a high temperature stability of ± 0.1 °C.



Refrigeration circuit

- The compressor compresses the refrigerant gas and discharges high-temperature, high-pressure refrigerant gas.
- In the case of air-cooled refrigeration, the high-temperature, high-pressure refrigerant gas is cooled down by fan ventilation in the air-cooled condenser, where it is then liquefied. In the case of water-cooled refrigeration, the refrigerant gas is cooled by the facility water in the facility water circuit in the water-cooled condenser, where it is then liquefied.
- The liquefied high-pressure refrigerant gas expands and its temperature lowers when it
 passes through expansion valve A, where it vaporizes after receiving heat from the
 circulating fluid in the evaporator.
- The vaporized refrigerant gas is sucked into the compressor and compressed again.
- When heating the circulating fluid, the high-pressure, high-temperature refrigerant gas is bypassed into the evaporator by expansion valve B to heat the circulating fluid.

Point The combination of the precise control of expansion valve A for cooling and expansion valve B for heating allows for high temperature stability.

Circulating fluid circuit

- After the circulating fluid discharged from the pump is heated or cooled by the user's equipment, it returns to the thermo-chiller.
- The circulating fluid is controlled to remain at a set temperature by the refrigeration circuit. It will then be discharged to the user's equipment side again by the thermo-chiller.

Since the refrigeration circuit is controlled by the signals from

2 temperature sensors (for return and discharge), precise temperature control of the circulating fluid can be achieved. Therefore, there is no need for a tank with a large capacity to absorb the circulating fluid temperature difference, as high temperature stability can be achieved even with a small-size tank. This also contributes to space saving.

Facility water circuit

• The water-regulating valve opens and closes to keep the refrigerant gas pressure consistent. The facility water flow rate is controlled by the water-regulating valve.

Air-cooled Refrigeration

HRR050-A





Point

Self-diagnosis function and alarm code display

Display of 24 types of alarm codes (For details ➡ ■29) Operation is monitored at all times by the integrated sensor. The applicable alarm code (24 types) is displayed after self-diagnosis.

Changeable alarm set values

Setting item	Set range*1
Circulating fluid discharge temperature rise	5 to 45°C
Circulating fluid discharge temperature drop	1 to 35°C
Circulating fluid discharge pressure rise	0.05 to 0.5 MPa
Circulating fluid flow rate reduction	2.0 to 15.0 LPM



*1 Set values vary depending on the model.

Menu for maintenance schedule

When it is time for periodical checks of the pumps, fan motor, dustproof filter, etc., a maintenance code will be generated as a reminder. Helpful for facility maintenance

Ex.) MT01 "Pump maintenance notice"



Displaying screen for operating conditions

Thermo-chiller internal temperature, pressure, etc., can be displayed.



With heating function

As the heating method uses discharged heat, a heater is unnecessary. The heating function is effective in maintaining a constant temperature, particularly in the winter when the ambient temperature is low.





Communication functions

Serial communication (RS-232C/RS-485) and contact input/output signals (2 inputs and 3 outputs) are equipped as standard. This allows for communication with the user's equipment and system construction, depending on the application.



Remote operation is enabled (to start and stop operation) through serial communication.



Variations

Model		Cooling capacity [W] (50/60 Hz)	Heating capacity [W] (50/60 Hz)	Cooling method	Temperature stability	Power supply	Circulating fluid	Option (pp. 32 to 35)	Optional accessories (pp. 36 to 38)	International standards	
		950/1100	250/300	Air-cooled refrigeration		Single-phase Single-phase			Particle filter element for replacement	CE	
		1000/1100	200/200	 Water- cooled refrigeration 	l 	(50/60 Hz)			 Anti-quake bracket*⁴ 	(Pending for UL Standards)	
	HRR012	1000/1200	· 400/500 (100 V type)			 Single-phase 100 VAC (50/60 Hz)/ 115 VAC (60 Hz) 		· With electric	Concentration meter Particle filter element for replacement DI filter replacement cartridge Anti-guake		
	HRR018	1600/1800	· 450/500 (200 V type)	Air-cooled refrigeration Water-		 Single-phase 200 to 230 VAC (50/60 Hz) 		conductivity control function, Applicable to DI water piping • Applicable to DI water piping • High-pressure pump mounted*1 • Inverter pump mounted*2		C E MET _{us}	
	HRR024	2000/2400	550/700	cooled refrigeration	±0.1°C		Tap water 15% ethylene glycol aqueous solution			(UL Standards) (Air-cooled: Option U (Water-cooled: Standard)	
	HRR030	2500/3000									
		4600/5100	1000/1200	· Air-cooled refrigeration	· Air-cooled refrigeration		- Single-phase 200 to 230 VAC (50/60 Hz)		With feet/Without rack mounting brackets Removed parts*3	bracket*4 • Piping conversion fitting • Power supply cable	CE
		5000/5900	1000/1200	· Water- cooled refrigeration					 Caster adjuster-foot kit*⁴ 	(Pending for UL Standards)	

*1 Applicable to the HRR012 to 030 *2 Only applicable to the HRR010 *3 Applicable to the HRR010 to 050

*4 Only applicable to the option: with feet/without rack mounting brackets



Contact input/output

communication connector

00000000

D-sub 15-pin female (socket) type

Inverter specification mechanical sealless pump (HRR010 option)

- As the pump has no external leakage of the circulating fluid, a periodic leakage check and replacement of the mechanical seal are not necessary.
- Circulating fluid pressure adjustable (Pressure adjustment via bypass piping is not required.)
- There is no pump capacity difference between the 50 Hz and the 60 Hz.

Power supply (24 VDC) available

Power can be supplied from the contact input/output communication connector to external switches, etc.

Application Examples



∕⁄∂SMC



Global Supply Network

SMC has a comprehensive network in the global market.

We now have a presence of more than 560 branch offices and distributors in 83 countries and regions worldwide. With this global network, we are able to provide a global supply of our substantial range of products and high-quality customer service. We also provide full support to local factories, foreign manufacturing companies, and Japanese companies in each country.



Circulating Fluid/Facility Water Line Equipment

For details, refer to the SMC website.



For details, refer to the SMC website.



CONTENTS



Thermo-chiller/Rack Mount Type HRR Series

HRR010 How to Order

	Air-cooled Refrigeration (Single-phase 200 to 230 VAC) p. 9
	Water-cooled Refrigeration (Single-phase 200 to 230 VAC) p. 9
Sp	ecifications
	Air-cooled Refrigeration (Single-phase 200 to 230 VAC) p. 10
	Water-cooled Refrigeration (Single-phase 200 to 230 VAC) p. 11
HI	RR012/018
Ho	w to Order
	Air-cooled Refrigeration (Single-phase 100/115 VAC) p. 12
	Water-cooled Refrigeration (Single-phase 100/115 VAC)

Specifications

γP	Jechicalions	
	Air-cooled Refrigeration (Single-phase 100/115 VAC) p.	13
	Water-cooled Refrigeration (Single-phase 100/115 VAC)p.	13

HRR012/018/024/030

How to Order

Air-cooled Refrigeration (Single-phase 200 to 230 VAC) p. 14
Water-cooled Refrigeration (Single-phase 200 to 230 VAC)
Specifications
Air-cooled Refrigeration (Single-phase 200 to 230 VAC) p. 15
Water-cooled Refrigeration (Single-phase 200 to 230 VAC)
HBB050
How to Order
Air-cooled Refrigeration (Single-phase 200 to 230 VAC) p. 17
Water-cooled Refrigeration (Single-phase 200 to 230 VAC)
Specifications
Air-cooled Refrigeration (Single-phase 200 to 230 VAC) p. 18
Water-cooled Refrigeration (Single-phase 200 to 230 VAC)
Cooling Capacitypp. 20, 21
Heating Capacity pp. 22, 23
Pump Capacityp. 24

Required Facility Water Flow Rate p. 24 Dimensions

	Air-cooled Refrigeration	pp. 25, 26, 28
	Water-cooled Refrigeration	pp. 25, 27, 28
Op	peration Display Panel	p. 29
Al	arm	p. 29
Co	ommunication Functions	pp. 30, 31
•0	ptions	
W	ith Electric Conductivity Contro	I Function,
Ap	pplicable to DI Water Piping	p. 32
Ap	pplicable to DI Water Piping	p. 32
In	verter Pump Mounted	p. 33
Hi	igh-Pressure Pump Mounted ····	p. 34

With Feet/Without Rack Mounting Brackets p. 35

Removed Parts.....p. 35

Optional Accessories

①Concentration Meterp. 3	36
2 Particle Filter Element for Replacement p. 3	36
③DI Filter Replacement Cartridgep. 3	36
④ Anti-quake Bracket p. 3	36
(5) Piping Conversion Fitting (For Air-cooled Refrigeration)p. 3	37
$\textcircled{6}$ Piping Conversion Fitting (For Water-cooled Refrigeration) \cdots p. 3	37
⑦ Power Supply Cablep. 3	37
⑧Caster Adjuster-foot Kitp. 3	38

Cooling Capacity Calculation

Required Cooling Capacity Calculation pp. 39, 40
Precautions on Cooling Capacity Calculationp. 40
Circulating Fluid Typical Physical Property Values p. 40

Specific Product Precautions------pp. 41 to 45



Thermo-chiller/Rack Mount Type Single-phase 200 to 230 VAC RoHS **HRR010**





When multiple options are combined, indicate symbols in alphabetical order.

Inverter pump mounted

20 Single-phase 200 to 230 VAC (50/60 Hz)



T1

Specifications: 200 to 230 VAC Air-cooled Refrigeration

_					
Model			HRR010-A-20		
Cooling method			Air-cooled refrigeration		
Re	efrigerant		R410A (HFC)		
Re	efrigerant charge	[kg]	0.22		
Co	ontrol method		PID control		
Ar	nbient temperature/Humidity/Altitu	Ide ^{*1, 14}	Temperature: 5 to 40°C, Humidity: 30 to 70%, Altitude: less than 3000 m		
	Circulating fluid*2		Tap water, 15% ethylene glycol aqueous solution		
	Set temperature range*1	[° C]	15 to 35		
	Cooling capacity (50/60 Hz)*3	[W]	950/1100		
	Heating capacity (50/60 Hz)*4	[W]	250/300		
	Temperature stability ^{*5}	[°C]	±0.1		
stem	Pump capacity (50/60 Hz)*6	[MPa]	0.09 (at 5 L/min)/0.11 (at 5 L/min) For Option T1: 0.35 (at 5 L/min)/0.35 (at 5 L/min)		
s X	Rated flow (50/60 Hz)*7	[L/min]	5/5 For Option T1: 5/5		
Ыġ	Flow display range*20	[L/min]	2 to 16		
l€	Electric conductivity display range	[µ S/cm]	0.1 to 48 (Only for Option DM)		
in c	Electric conductivity setting range	[µ S/cm]	0.5 to 45 (Only for Option DM)		
llat	Particle filter nominal filtration rating*1	⁹ [μ m]	35		
irc	Bypass valve ^{*19}		Installed		
Ö	Tank capacity	[L]	Approx. 3		
	Outlet, Return port size		Rc1/2		
	Drain port size		Rc1/4, With cap		
	Leakage protection		Drain pan (With water leakage sensor ^{*19})		
	Fluid contact material		Stainless steel, Copper (Heat exchanger brazing) ^{*12} , Alumina ceramic, Carbon, PP, PE, PPE, POM, PET, PA, FKM, EPDM, NBR, PVC, PPS, Fluoropolymer ^{*13} , Ion exchange resin ^{*13}		
	Power supply		Single-phase 200 to 230 VAC, 50/60 Hz, Allowable voltage range $\pm 10\%^{*15}$		
	Circuit protector	[A]	10		
tem	Applicable earth leakage breaker capacity*8		Rated current: 10 A Sensitivity current: 30 mA		
sys	Cable quantity x Size (Including grounding	g cable)*16	3 cores x 14 AWG (3 cores x 2.0 mm ²)		
a			2.5/3.0		
trio	Rated operating current	[A]	For Option T1		
e	(30/00 112)		4.3/4.7		
ш	-		0.48/0.60 (0.51/0.61)		
	Rated power consumption	[kW (kVA)]	For Option T1		
	(30/00 112)		0.73/0.80 (0.85/0.94)		
Communication function			Contact input/output, Serial RS-485/RS-232C		
No	bise level (50/60 Hz) ^{*9}	[dB(A)]	59/59		
Di	mensions ^{*10}	[mm]	W 483 x D 550 x H 221		
Ac	ccessories ^{*18}		Power supply connector, Operation manual, Particle filter element*19		
W	eight*11	[kg]	29		

- *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 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).
- *3 ① Ambient temperature: 25°C, ② Circulating fluid temperature: 20°C, ③ Circulating fluid at the rated flow, ④ Circulating fluid: Tap water, ⑤ Power supply: 200 VAC, ⑥ Piping length: Shortest For models with an inverter pump mounted (Option T1), the cooling capacity will decrease by 300 W.
- *4 ① Ambient temperature: 25°C, ② Circulating fluid temperature: 20°C,
 ③ Circulating fluid at the rated flow, ④ Circulating fluid: Tap water, ⑤
 Power supply: 200 VAC, ⑥ Piping length: Shortest
- *5 Temperature at the thermo-chiller outlet when the circulating fluid flow is at the rated flow and the circulating fluid outlet and return port are directly connected The installation environment and power supply are within the specification

range and stable.

- *6 The capacity at the thermo-chiller outlet when the circulating fluid temperature is 20°C
- *7 The required 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.

*8 Purchase an earth leakage breaker with a sensitivity current of 30 mA and a power supply of 200 VAC separately.

- *9 Front: 1 m, height: 1 m, stable with no load, Other conditions → See *4.
 *10 Dimensions between panels, not including the dimensions of protrusion When Option Y (With feet/Without rack mounting brackets) is selected, refer to page 35.
- *11 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 weight will increase by 2 kg when Option T1 (Inverter pump mounted) is selected.

*12 Option M (Applicable to DI water piping) does not contain copper.
*13 For Option DM (With electric conductivity control function, Applicable

- to DI water piping)
- *14 If the product is used at an altitude of 1000 m or higher, refer to "For altitudes of 1000 m or higher" on page 42.
- *15 No continuous voltage fluctuation
- *16 To be prepared by the customer

*17 ① Ambient temperature: 25°C, ② Circulating fluid temperature: 20°C, ③ Circulating fluid at the rated flow, ④ Circulating fluid: Tap water, ⑤ Power supply: 200 VAC, ⑥ Piping length: Shortest, ⑦ With the rated cooling load applied

*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 P, a G thread conversion fitting set is included. For pipe thread type N, an NPT thread conversion fitting set is included.

- *19 Not included for Option Z (Removed parts)
 *20 Not included for Options Z and Z1 (Removed reference)
- *20 Not included for Options Z and Z1 (Removed parts)

Specifications: 200 to 230 VAC Water-cooled Refrigeration

	Model		HBB010-W-20		
Cooling method			Water-cooled refrigeration		
Be	frigerant		B410A (HEC)		
Re	frigerant charge	[ka]	0.15		
Co	ontrol method	1	PID control		
Ar	nbient temperature/Humidity/Altitu	de * ^{1, 15}	Temperature: 5 to 40°C. Humidity: 30 to 70%. Altitude: less than 3000 m		
Circulating fluid*2			Tap water, 15% ethylene glycol agueous solution		
	Set temperature range ^{*1}	[°C]	15 to 35		
	Cooling capacity (50/60 Hz)*3	[W]	1000/1100		
	Heating capacity (50/60 Hz)*4	[W]	200/200		
	Temperature stability ^{*5}		+0.1		
F			0.09 (at 5 L/min)/0.11 (at 5 L/min)		
ster	Pump capacity (50/60 Hz)*6	[MPa]	For Option T1: 0.35 (at 5 L/min)/0.35 (at 5 L/min)		
sys	Rated flow (50/60 Hz)*7	[L/min]	5/5 For Option T1: 5/5		
<u>o</u>	Flow display range ^{*21}	[L/min]	2 to 16		
f,	Electric conductivity display range	[uS/cm]	0.1 to 48 (Only for Option DM)		
bu	Electric conductivity setting range	[uS/cm]	0.5 to 45 (Only for Option DM)		
lati	Particle filter nominal filtration rating*20	[µm]	35		
D.	Bypass valve ^{*20}		Installed		
ö	Tank capacity	[L]	Approx. 3		
	Outlet, Return port size		Rc1/2		
	Drain port size		Rc1/4, With cap		
	Leakage protection		Drain pan (With water leakage sensor*20)		
	Fluid contact material		Stainless steel, Copper (Heat exchanger brazing) ^{*12} , Alumina ceramic, Carbon, PP, PE, PPE, POM, PET, PA, FKM, EPDM, NBR, PVC, PPS, Fluoropolymer ^{*13} , Ion exchange resin ^{*13}		
E	Temperature range	[°C]	5 to 35		
yste	Pressure range	[MPa]	0.3 to 0.5		
ers	Required flow rate*14	[L/min]	6		
wat	Inlet-outlet pressure differential of facility water	[MPa]	0.3 or more		
∎́	Port size		Rc3/8		
Fac	Fluid contact material		Stainless steel, Copper (Heat exchanger brazing), Bronze, Brass, Synthetic rubber		
	Power supply		Single-phase 200 to 230 VAC, 50/60 Hz, Allowable voltage range $\pm 10\%^{*16}$		
	Circuit protector	[A]	10		
stem	Applicable earth leakage breaker capacity ^{*8}		Rated current: 10 A Sensitivity current: 30 mA		
sys	Cable quantity x Size (Including grounding	cable)*17	3 cores x 14 AWG (3 cores x 2.0 mm ²)		
ā	Detect encycling engrant		2.4/3.0		
Ľ.	Kated operating current (50/60 Hz)*18	[A]	For Option T1		
ec	(30/00 112)		4.2/4.6		
ш	Poted power concumption		0.47/0.59 (0.50/0.60)		
	(50/60 Hz)* ¹⁸	[kW (kVA)]	For Option T1		
	(00/00 112)		0.72/0.78 (0.84/0.93)		
Communication function			Contact input/output, Serial RS-485/RS-232C		
No	bise level (50/60 Hz) ^{*9}	[dB(A)]	57/58		
Di	mensions ^{*10}	[mm]	W 483 x D 550 x H 221		
Ac	cessories*19		Power supply connector, Operation manual, Particle filter element*20		
W	eight*11	[kg]	27		

- *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 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 tipe make-up water). (JRA GL-02-1994 cooling water system circulating type make-up water). () Facility water temperature: 25°C, (2) Circulating fluid temperature: 20°C, (3) Circulating fluid at the rated flow, (4) Circulating fluid: Tap water, (5) Power supply: 200 VAC, (6) Piping length: Shortest *3 For models with an inverter pump mounted (Option T1), the cooling ca-
- active with all inverter pains induced (option 11), the cooling data pacity will decrease by 300 W.
 (1) Ambient temperature: 25°C, (2) Facility water temperature: 25°C, (3) Circulating fluid temperature: 20°C, (4) Circulating fluid at the rated flow, (5) Circulating fluid: Tap water, (6) Power supply: 200 VAC, (7) Piping *4 length: Shortest
- *5 Temperature at the thermo-chiller outlet when the circulating fluid flow is at the rated flow and the circulating fluid outlet and return port are directly connected The installation environment and power supply are within the specification range and stable.
- *6 The capacity at the thermo-chiller outlet when the circulating fluid tem-Perature is 20°C *7 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.
- *8 Purchase an earth leakage breaker with a sensitivity current of 30 mA and a power supply of 200 VAC separately.
- *9 Front: 1 m, height: 1 m, stable with no load, Other conditions \rightarrow See *4.

11

- *10 Dimensions between panels, not including the dimensions of protrusion When Option Y (With feet/Without rack mounting brackets) is selected, refer to page 35. Weight in the dry state without circulating fluids and facility water (for *11
- water-cooled refrigeration) The weight will increase by 1 kg when Option DM (With electric con-
- ductivity control function, Applicable to DI water piping) is selected. The weight will increase by 2 kg when Option T1 (Inverter pump mounted) is selected.
- Option M (Applicable to DI water piping) does not contain copper.
- *13 For Option DM (With electric conductivity control function, Applicable to DI water piping)
- *14 The required flow rate when the cooling capacity load is applied under the conditions in *3
- *15 If the product is used at an altitude of 1000 m or higher, refer to "For altitudes of 1000 m or higher" on page 42.
- *16 No continuous voltage fluctuation
- *17 To be prepared by the customer *18 ① Facility water temperature: 25°C, ② Circulating fluid temperature: 20°C, 3 Circulating fluid at the rated flow, 4 Circulating fluid: Tap water, 5 Power supply: 200 VAC, 6 Piping length: Shortest, 7 With the rated cooling load applied
- *19 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. *20 Not included for Option Z (Removed parts)
- *21 Not included for Options Z and Z1 (Removed parts)

Thermo-chiller/Rack Mount Type Single-phase 100/115 VAC (RoHS) HRR012/018



 When multiple options are combined, indicate symbols in alphabetical order.

Specifications: 100/115 VAC

	Model		HRR012-A-10	HRR018-A-10	HRR012-W-10	HRR018-W-10	
Cooling method			Air-cooled	refrigeration	Water-coolec	I refrigeration	
Refrigerant				R410A	(HFC)		
Refrigerant charge [kg]			0.36	0.36	0.25	0.25	
Control method				PID c	ontrol		
An	bient temperature/Humidity/Altitu	de* ^{1, 14}	Temperat	ture: 5 to 40°C. Humidity: 3	0 to 70%. Altitude: less tha	n 3000 m	
Circulating fluid*2			Tap water, 15% ethylene glycol aqueous solution				
	Set temperature range*1	[°C]		5 to	35		
	Cooling capacity (50/60 Hz)*3		1000/1200	1600/1800	1000/1200	1600/1800	
	Heating capacity (50/60 Hz)*4	rw1	4	00	50	0	
	Temperature stability ^{*5}	[°C]	+0.1				
em	Pump capacity (50/60 Hz)*6	[MPa]	0.13 (at 7 L/min)/0.18 (at 7 L/min)				
/st				For Options I, MI: 0.36 (at	7 L/min)/0.42 (at 10 L/min))	
ŝ	Rated flow (50/60 Hz)*/	[L/min]		7/7 For Optic	ons T, MT: 7/10		
i,	Flow display range ^{*21}	[L/min]		2 to	0 16		
j fl	Electric conductivity display range	[µ S/cm]		0.1 to 48 (Only	for Option DM)		
Ľ.	Electric conductivity setting range	[µ S/cm]		0.5 to 45 (Only	for Option DM)		
llat	Particle filter nominal filtration rating*20	⁾ [µm]			5		
ยี	Bypass valve ^{*20}			Insta	alled		
ü	Tank capacity	[L]	Approx. 4				
	Outlet, Return port size		Rc1/2				
	Drain port size		Rc1/4, With cap				
	Leakage protection		Drain pan (With water leakage sensor)*20				
	Fluid contact material		Stainless steel, Copper (Heat exchanger brazing)*11, Bronze*17, SiC, Alumina ceramic, Carbor PP, PE, POM, PA, FKM, EPDM, PVC, PPS, AS, Fluoropolymer*12, Ion exchange resin*12				
Ę	Temperature range	[°C]			5 to	9 40	
yste	Pressure range	[MPa]			0.3 t	o 0.5	
fer	Required flow rate (50/60 Hz)*13	[L/min]			8	12	
Wa	Inlet-outlet pressure differential of facility water	[MPa]	-		0.3 or	more	
Į	Port size				Rc3/8		
Fac	Fluid contact material				Stainless steel, Copper (Heat exchanger brazing), Bronze, Synthetic rubber		
	Power supply		Single-phase 100 VAC (50/60 Hz), 115 VAC (60 Hz)				
_	Circuit protector	[A]		1	5		
fen	Applicable earth leakage breaker ca	apacity*8		Bated current: 15 A Se	ensitivity current: 30 mA		
ys.	Cable quantity x Size (Including grounding	cable)* ¹⁶		3 cores x 14 AWG	$(3 \text{ cores x } 2.0 \text{ mm}^2)$		
al s	Cable quality x 0120 (melading grounding	joubioj	8 9/8 9	9 1/9 6	8 5/8 5	8 7/8 7	
<u>j</u>	Rated operating current*18	[4]	0.0/0.0	For Optic	ons T MT	0.170.1	
ščti	(50/60 Hz)	101	10 7/10 7	11 0/11 0	10 5/10 5	10.8/10.8	
ш			0.8/0.9 (1.0/1.0)	0 9/1 1 (1 1/1 1)	0.7/0.8 (0.9/0.9)	0.8/0.9 (1.0/1.0)	
	Rated power consumption*18	[kW (kVA)]	0.0/0.0 (1.0/1.0)	Eor Optic	0.0.0 (0.0/0.0)	0.0/0.0 (1.0/1.0)	
	(50/60 Hz)		0 9/1 1 (1 1/1 1)	1 0/1 3 (1 2/1 3)	0 9/1 0 (1 1/1 0)	1 1/1 1 (1 2/1 1)	
Communication function			0.0/1.1 (1.1/1.1)	Contact input/output S	erial BS-485/BS-2320		
No	ise level (50/60 Hz) ^{*9}	[dB]	59/60	59/60	59/60	59/60	
Δ.	$ceseories^{*19}$		Power supply coppo	ctor Particle filter element	and maintenance handlo*2	²⁰ Operation manual	
W-	sight*10	[ka]					
vve	ayır	[•9]	4		4		

- *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. Use 15% ethylene glycol aqueous solution when operating at a temperature of 10°C or less.
 *2 If tap water is used, use water that is compliant with the Water Quality of the solution of the solut
- Standards of the Japan Refrigeration and Air Conditioning Industry Asso-ciation (JRA GL-02-1994 cooling water system circulating type make-
- (a) Ambient temperature: 25°C, (2) Facility water temperature: 25°C, (3)
 (5) Circulating fluid temperature: 20°C, (4) Circulating fluid at the rated flow, (5) Circulating fluid: Tap water, (6) Power supply: 100 VAC, (7) Piping length: Shortest *3
- For models with a high-pressure pump mounted (Options T, MT), the cooling capacity will decrease by 300 W. ① Ambient temperature: 25°C, ② Facility water temperature: 25°C, ③ Circulating fluid temperature: 20°C, ④ Circulating fluid at the rated flow, ⑤ Circulating fluid: Tap water, ⑥ Power supply: 100 VAC, ⑦ Piping *4 length: Shortest
- *5 Temperature at the thermo-chiller outlet when the circulating fluid flow is at the rated flow and the circulating fluid outlet and return port are directly connected The installation environment and power supply are within the specification range and stable.
- *6 The capacity at the thermo-chiller outlet when the circulating fluid temperature is 20°C
 *7 The required 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.

*8 Purchase an earth leakage breaker with a sensitivity current of 30 mA and a power supply of 100 VAC separately.

Front: 1 m, height: 1 m, stable with no load, Other conditions \rightarrow See *4. Weight in the dry state without circulating fluids and facility water (for water-*10

- The weight will increase by 1 kg when Option DM (With electric conductivity control function, Applicable to DI water piping) is selected. The weight will increase by 5 kg when Options T (High-pressure pump mounted) or MT (Applicable to DI water piping + High-pressure pump mounted) are selected.
- The weight will decrease by 1 kg for Option Z (Removed parts). Options M (Applicable to DI water piping) and MT (Applicable to DI water
- piping + High-pressure pump mounted) do not contain copper or bronze. *12 For Option DM (With electric conductivity control function, Applicable
- to DI water piping) *13 The required flow rate when the cooling capacity load is applied under
- the conditions in *3 *14 If the product is used at an altitude of 1000 m or higher, refer to "For al-*15 No continuous voltage fluctuation

- *15 No continuous voitage fluctuation
 *16 To be prepared by the customer
 *17 Option T (High-pressure pump mounted) contains this material.
 *18 1 Ambient temperature: 25°C, ② Facility water temperature: 25°C, ③ Circulating fluid temperature: 20°C, ④ Circulating fluid at the rated flow,
 ⑤ Circulating fluid: Tap water, ⑥ Power supply: 100 VAC, ⑦ Piping length: Shortest, ⑧ With the rated cooling load applied
 *19 For Option DM (With electric conductivity control function, Applicable to Duwnter bing).
- to D water piping), a D 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.
 X20 Not included for Option Z (Removed parts)
 X21 Not included for Option Z (Removed parts)
- *21 Not included for Options Z and Z1 (Removed parts)

Thermo-chiller/Rack Mount Type Single-phase 200 to 230 VAC RoHS HRR012/018/024/030



How to Order



When multiple options are combined, indicate symbols in alphabetical order.

Power supply 20 Single-phase 200 to 230 VAC (50/60 Hz)

Specifications: 200 to 230 VAC Air-cooled Refrigeration

	Model		HRR012-A-20	HRR018-A-20	HRR024-A-20	HRR030-A-20	
Сс	ooling method		Air-cooled refrigeration				
Refrigerant			R410A (HFC)				
Re	efrigerant charge	[kg]	0.38 0.47				
Сс	ontrol method			PID c	ontrol		
Ar	nbient temperature/Humidity/Altitu	ude ^{*1, 13}	Temperat	Temperature: 5 to 40°C, Humidity: 30 to 70%, Altitude: less than 3000 m			
Circulating fluid*2			Tap water, 15% ethylene glycol aqueous solution				
	Set temperature range*1	[°C]		5 to	35		
	Cooling capacity (50/60 Hz)*3	[W]	1000/1200	1600/1800	2000/2400	2500/3000	
	Heating capacity (50/60 Hz)*4	[W]	450/	/500	550/	/700	
	Temperature stability ^{*5}	[° C]		±0	.1		
tem	Pump capacity (50/60 Hz)* ⁶	[MPa]		0.13 (at 7 L/min)/0.18 (at 7 L/min) For Option T: 0.42 (at 10 L/min)/0.4 (at 14 L/min) For Option MT: 0.32 (at 10 L/min)/0.32 (at 14 L/min)			
sys	Rated flow (50/60 Hz)*7	[L/min]		7/7 For Option	s T, MT: 10/14		
lid	Flow display range ^{*20}	[L/min]		2 to	16		
١ <u>۴</u>	Electric conductivity display range	[µ S/cm]		0.1 to 48 (Only	for Option DM)		
ing	Electric conductivity setting range	[µ S/cm]		0.5 to 45 (Only for Option DM)			
llat	Particle filter nominal filtration rating*1	⁹ [μ m]		5	5		
Circu	Bypass valve*19		Installed				
	Tank capacity	[L]		Appr	ox. 4		
	Outlet, Return port size			Rc	1/2		
	Drain port size			Rc1/4, V	Vith cap		
	Leakage protection		Drain pan (With water leakage sensor ^{*19})				
	Fluid contact material		Stainless steel, Copper (Heat exchanger brazing) ^{*11} , Bronze ^{*16} , SiC, Alumina ceramic, Carbon, PP, PE, POM, PA, FKM, EPDM, PVC, PPS, AS, Fluoropolymer ^{*12} , Ion exchange resin ^{*12}				
	Power supply		Single-pha	se 200 to 230 VAC, 50/60	Hz, Allowable voltage rang	e ±10%* ¹⁴	
	Circuit protector	[A]	10 For Options T, MT: 15				
stem	Applicable earth leakage breaker c	apacity ^{*8}	Rated current: 10 A For Options T, MT: 15 A Sensitivity current: 30 mA				
sys	Cable quantity x Size (Including groundin	g cable)*15		3 cores x 14 AWG (3 cores x 2.0 mm ²)		
Sal	Poted operating ourrent		3.6/4.0	3.6/4.3	5.2/5.8	5.5/6.2	
îric	(50/60 Hz)*17	[A]		For Optio	ns T, MT		
<u>e</u>	(00,001)		4.7/6.2	4.7/6.5	6.3/8.0	6.5/8.3	
	Poted newer concumption		0.6/0.8 (0.7/0.8)	0.7/0.9 (0.7/0.9)	0.9/1.2 (1.1/1.2)	1.0/1.2 (1.1/1.3)	
	(50/60 Hz)* ¹⁷	[kW (kVA)]		For Optic	ns T, MT		
	(,		0.9/1.2 (0.9/1.2)	0.9/1.3 (1.0/1.3)	1.2/1.6 (1.3/1.6)	1.3/1.6 (1.3/1.7)	
Communication function				Contact input/output, S	erial RS-485/RS-232C		
No	bise level (50/60 Hz) ^{*9}	[dB]	59/60	59/60	61/64	61/64	
Ac	cessories ^{*18}		Power supply connector, Particle filter element and maintenance handle*19, Operation manual			⁹ , Operation manual	
Weight ^{*10} [kg]			4	0	46		

- *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. Use 15% ethylene glycol aqueous solution when operating at a temperature of 10°C or less.
- *2 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).
- *3 ① Ambient temperature: 25°C, ② Circulating fluid temperature: 20°C, ③ Circulating fluid at the rated flow, ④ Circulating fluid: Tap water, ⑤ Power supply: 200 VAC, ⑥ Piping length: Shortest For models with a high-pressure pump mounted (Options T, MT), the cooling canacity will decrease by 300 W
- *4 ① Ambient temperature: 25°C, ② Circulating fluid temperature: 20°C,
 ③ Circulating fluid at the rated flow, ④ Circulating fluid: Tap water, ⑤ Power supply: 200 VAC, ⑥ Piping length: Shortest
- *5 Temperature at the thermo-chiller outlet when the circulating fluid flow is at the rated flow and the circulating fluid outlet and return port are directly connected
 - The installation environment and power supply are within the specification range and stable.
- *6 The capacity at the thermo-chiller outlet when the circulating fluid temperature is 20°C
- *7 The required 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.
- *8 Purchase an earth leakage breaker with a sensitivity current of 30 mA and a power supply of 200 VAC separately.

*9 Front: 1 m, height: 1 m, stable with no load, Other conditions → See *4.
 *10 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 weight will increase by 5 kg when Options T (High-pressure pump mounted) or MT (Applicable to DI water piping + High-pressure pump mounted) are selected.

- The weight will decrease by 1 kg for Option Z (Removed parts)
- 11 Options M (Applicable to DI water piping) and MT (Applicable to DI water piping + High-pressure pump mounted) do not contain copper or bronze.
- *12 For Option DM (With electric conductivity control function, Applicable to DI water piping)
- *13 If the product is used at an altitude of 1000 m or higher, refer to "For altitudes of 1000 m or higher" on page 42.
- *14 No continuous voltage fluctuation
- *15 To be prepared by the customer
- *16 Option T (High-pressure pump mounted) contains this material.
- *17 ① Ambient temperature: 25°C, ② Circulating fluid temperature: 20°C, ③ Circulating fluid at the rated flow, ④ Circulating fluid: Tap water, ⑤ Power supply: 200 VAC, ⑥ Piping length: Shortest, ⑦ With the rated cooling load applied
- *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.
- For pipe thread type N, an NPT thread conversion fitting set is included *19 Not included for Option Z (Removed parts)
- *20 Not included for Options Z and Z1 (Removed parts)



Specifications: 200 to 230 VAC Water-cooled Refrigeration

Model			HRR012-W-20	HRR018-W-20	HRR024-W-20	HRR030-W-20			
Co	ooling method		Water-cooled refrigeration						
Re	frigerant			R410A	(HFC)				
Refrigerant charge [kg]			0.	25	0.	40			
Control method			PID control						
Ambient temperature/Humidity/Altitude*1, 14			Temperat	ure: 5 to 40°C, Humidity: 3	0 to 70%, Altitude: less tha	n 3000 m			
	Circulating fluid*2			Tap water, 15% ethylene glycol aqueous solution					
	Set temperature range*1	[° C]	5 to 35						
	Cooling capacity (50/60 Hz)*3	[W]	1000/1200	1600/1800	2000/2400	2500/3000			
	Heating capacity (50/60 Hz)*4	[W]	450	/500	550	/700			
	Temperature stability ^{*5}	[° C]		<u>±(</u>).1				
stem	Pump capacity (50/60 Hz) ^{*6}	[MPa]		0.13 (at 7 L/min) For Option T: 0.42 (at 10 For Option MT: 0.32 (at 1	/0.18 (at 7 L/min)) L/min)/0.4 (at 14 L/min) 0 L/min)/0.32 (at 14 L/min)				
sy	Rated flow (50/60 Hz)*7	[L/min]		7/7 For Option	ns T, MT: 10/14				
рі Г	Flow display range ^{*21}	[L/min]		2 to	0 16				
Ę	Electric conductivity display range	[µ S/cm]		0.1 to 48 (Only	for Option DM)				
ing	Electric conductivity setting range	[µ S/cm]		0.5 to 45 (Only	for Option DM)				
lat	Particle filter nominal filtration rating*20	⁾ [μ m]			5				
2	Bypass valve ^{*20}		Installed						
ö	Tank capacity	[L]	Approx. 4						
	Outlet, Return port size		Rc1/2						
	Drain port size		Rc1/4, With cap						
	Leakage protection		Drain pan (With water leakage sensor ^{*20})						
	Fluid contact material		Stainless steel, Copper (Heat exchanger brazing) ^{*11} , Bronze ^{*17} , SiC, Alumina ceramic, Carbon, PP, PE, POM, PA, FKM, EPDM, PVC, PPS, AS, Fluoropolymer ^{*12} , Ion exchange resin ^{*12}						
E	Temperature range	[°C]	5 to 40						
syste	Pressure range	[MPa]		0.3 t	o 0.5				
fer	Required flow rate (50/60 Hz)*13	[L/min]	8	12	14	15			
Wa	Inlet-outlet pressure differential of facility water	[MPa]	0.3 or more						
l≣t.	Port size		Rc3/8						
Fac	Fluid contact material		Stainless steel	, Copper (Heat exchanger	brazing), Bronze, Brass, S	ynthetic rubber			
	Power supply		Single-phase 200 to 230 VAC, 50/60 Hz, Allowable voltage range $\pm 10\%^{*15}$						
	Circuit protector	[A]	10 For Options T, MT: 15						
stem	Applicable earth leakage breaker ca	apacity ^{*8}	Rated current: 10 A For Options T, MT: 15 A Sensitivity current: 30 mA						
sÿ	Cable quantity x Size (Including grounding	cable) ^{*16}		3 cores x 14 AWG	(3 cores x 2.0 mm ²)				
g			3.2/3.6	3.3/3.6	4.9/5.1	4.9/5.2			
Ĭ,	(50/60 Hz)* ¹⁸	[A]		For Option	ons T, MT	·			
<u>e</u>			4.3/5.8	4.4/5.8	6.0/7.3	6.0/7.4			
ш	Bated power consumption		0.6/0.7 (0.7/0.7)	0.6/0.7 (0.7/0.7)	0.8/1.0 (1.0/1.0)	0.8/1.0 (1.0/1.0)			
	(50/60 Hz)* ¹⁸	[kW (kVA)]		For Opti	ons T, MT				
	. ,		0.9/1.1 (0.9/1.2)	0.9/1.1 (0.9/1.2)	1.1/1.2 (1.4/1.4)	1.1/1.2 (1.4/1.4)			
Communication function				Contact input/output, S	Serial RS-485/RS-232C	0.1/0.1			
No	bise level (50/60 Hz)**	[dB]	59/60	59/60	61/64	61/64			
Ac			Power supply conne	ctor, Particle filter element	and maintenance handle*	^o , Operation manual			
We	eight* ¹⁰	[kg]	4	1	4	5			

*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. Use 15% ethylene glycol aqueous solution when operating at a temperature of 10°C or less.

*2 If tap water is used, use water that is compliant with the Water Quality Stand-ards of the Japan Refrigeration and Air Conditioning Industry Association

- ards of the Japan Herrigeration and Air Conditioning Industry Association (JRA GL-02-1994 cooling water system circulating type make-up water). (1) Facility water temperature: 25°C, (2) Circulating fluid temperature: 20°C, (3) Circulating fluid at the rated flow, (4) Circulating fluid: Tap water, (5) Power supply: 200 VAC, (6) Piping length: Shortest For models with a high-pressure pump mounted (Options T, MT), the cooling capacity will decrease by 300 W. (1) Ambient temperature: 25°C, (2) Facility water temperature: 25°C, (3) Circulating fluid temperature: 20°C, (4) Circulating fluid at the rated flow, (5) Circulating fluid: Tap water, (6) Power supply: 200 VAC, (7) Piping length: Shortest *3
- length: Shortest
- 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 *5 The installation environment and power supply are within the specification range and stable.
- *6 The capacity at the thermo-chiller outlet when the circulating fluid temperature is 20°C
 *7 The required flow rate for maintaining the cooling capacity or temperature
- stabilitv The specification of the cooling capacity and the temperature stability
- may not be satisfied if the flow rate is lower than the rated flow. *8 Purchase an earth leakage breaker with a sensitivity current of 30 mA
- and a power supply of 200 VAC separately. *9 Front: 1 m, height: 1 m, stable with no load, Other conditions \rightarrow See *4.

*10 Weight in the dry state without circulating fluids and facility water (for water-cooled refrigeration) The weight will increase by 1 kg when Option DM (With electric conductivity control function, Applicable to DI water piping) is selected. The weight will increase by 5 kg when Options T (High-pressure pump mounted) or MT (Applicable to DI water piping + High-pressure pump

mounted) are selected.
The weight will decrease by 1 kg for Option Z (Removed parts)
*11 Options M (Applicable to DI water piping) and MT (Applicable to DI water piping + High-pressure pump mounted) do not contain copper or bronze.
*12 For Option DM (With electric conductivity control function, Applicable to DI water piping)

- *12 For Option DM (With electric conductivity control function, Applicable to D water piping)
 *13 The required flow rate when the cooling capacity load is applied under
- the conditions in *3 *14 If the product is used at an altitude of 1000 m or higher, refer to "For altitudes of 1000 m or higher" on page 42. *15 No continuous voltage fluctuation
- To be prepared by the customer *16
- 17 Option T (High-pressure pump mounted) contains this material.
 *18 ① Facility water temperature: 25°C, ② Circulating fluid temperature: 20°C, ③ Circulating fluid at the rated flow, ④ Circulating fluid: Tap water, ⑤ Power supply: 200 VAC, ⑥ Piping length: Shortest, ⑦ With the rated cooling load applied
 *19 For Option DM (With electric conductivity control function, Applicable to Duwater noing) a D filtre is included.
- *19 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.
 *20 Not included for Option Z (Removed parts)
 *21 Not included for Options Z and Z1 (Removed parts)

Thermo-chiller/Rack Mount Type Single-phase 200 to 230 VAC (RoHS) HRR050





· When multiple options are combined, indicate symbols in alphabetical order.

17



Specifications: 200 to 230 VAC Air-cooled Refrigeration

Model			HRR050-A-20-(DM)U(YZ)
Co	oling method		Air-cooled refrigeration
Befrigerant			B410A (HFC)
Re	frigerant charge	[ka]	0.72
Co	ontrol method	1	PID control
Ar	nbient temperature/Humidity/Altitu	de*1, 13	Temperature: 5 to 40°C. Humidity: 30 to 70%. Altitude: less than 3000 m
	Circulating fluid*2		Tap water, 15% ethylene glycol aqueous solution
	Set temperature range ^{*1}	[°C]	5 to 35
	Cooling capacity (50/60 Hz)*3	[W]	4600/5100
	Heating capacity (50/60 Hz)*3	[W]	1000/1200
	Temperature stability ^{*4}	[°C]	±0.1
E	Pump capacity (50/60 Hz)*5	[MPa]	0.34 (at 15 L/min)/0.34 (at 23 L/min)
/ste	Rated flow (50/60 Hz)*6	[L/min]	15/23
l S D	Flow display range ^{*19}	[L/min]	5 to 40
lui,	Electric conductivity display range	[µS/cm]	0.1 to 48 (Only for Option DM)
1 g	Electric conductivity setting range	[µS/cm]	0.5 to 45 (Only for Option DM)
atir	Particle filter nominal filtration rating*18	³ [μm]	5
cul	Bypass valve ^{*18}		Installed
ö	Tank capacity	[L]	Approx. 5
	Outlet, Return port size		Rc1/2
	Drain port size		Rc1/4, With cap
	Leakage protection		Drain pan (With water leakage sensor ^{*18})
	Fluid contact material		Stainless steel, Copper (Heat exchanger brazing) ^{*11} , Bronze ^{*11} , SiC, Alumina ceramic, Carbon, PP, PE, POM, PA, FKM, EPDM, PVC, PPS, AS, Fluoropolymer ^{*12} , Ion exchange resin ^{*12}
	Power supply		Single-phase 200 to 230 VAC, 50/60 Hz, Allowable voltage range $\pm 10\%^{*14}$
ء	Circuit protector	[A]	20
syster	Applicable earth leakage breaker ca	apacity*7	Rated current: 20 A Sensitivity current: 30 mA
<u>n</u>	Cable quantity x Size (Including grounding	cable)*15	3 cores x 12 AWG (3 cores x 3.5 mm ²)
lectric	Rated operating current (50/60 Hz)*16	[A]	9.3/11.8
ш	Rated power consumption (50/60 Hz) ^{*16}	[kW (kVA)]	1.9/2.4 (1.9/2.5)
Communication function			Contact input/output, Serial RS-485/RS-232C
Noise level (50/60 Hz)*8 [dB(A)]		[dB(A)]	63/67
Dimensions ^{*9} [mm]		[mm]	W 483 x D 550 x H 710
Ac	Accessories*17		Power supply connector, Maintenance handle for particle filter ^{*18} , Operation manual, Particle filter element ^{*18}
Weight ^{*10} [kg]		[kg]	74

- *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 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).
- *3 ① Ambient temperature: 25°C, ② Circulating fluid temperature: 20°C,
 ⑤ Circulating fluid at the rated flow, ⑥ Circulating fluid: Tap water, ⑦
 Power supply: 200 VAC, ⑧ Piping length: Shortest
- *4 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.

- *5 The capacity at the thermo-chiller outlet when the circulating fluid temperature is 20°C
- *6 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.

- *7 Purchase an earth leakage breaker with a sensitivity current of 30 mA and a power supply of 200 VAC separately.
- *8 Front: 1 m, height: 1 m, stable with no load, Other conditions \rightarrow See *3.
- *9 Dimensions between panels, not including the dimensions of protrusion When Option Y (With feet/Without rack mounting brackets) is selected, refer to page 35.

- *10 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 weight will decrease by 2 kg for Option Z (Removed parts).
- *11 Options M (Applicable to DI water piping) and DM (With electric conductivity control function, Applicable to DI water piping) do not contain copper or bronze.
- *12 For Option DM (With electric conductivity control function, Applicable to DI water piping)
- *13 If the product is used at an altitude of 1000 m or higher, refer to "For altitudes of 1000 m or higher" on page 42.
- *14 No continuous voltage fluctuation
- *15 To be prepared by the customer
- *16 ① Ambient temperature: 25°C, ② Circulating fluid temperature: 20°C, ③ Circulating fluid at the rated flow, ④ Circulating fluid: Tap water, ⑤ Power supply: 200 VAC, ⑥ Piping length: Shortest, ⑦ With the rated cooling load applied
- *17 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.
- *18 Not included for Option Z (Removed parts)
- *19 Not included for Options Z and Z1 (Removed parts)

Specifications: 200 to 230 VAC Water-cooled Refrigeration

Model			HRR050-W-20-(DM)11/Y7)	
Cooling method			Water-cooled refrigeration	
Be	frigerant		B410A (HEC)	
Befrigerant charge [kg]		[ka]	0 59	
Co	ontrol method	[1.9]	PID control	
An	nbient temperature/Humidity/Altitu	de* ^{1, 14}	Temperature: 5 to 40°C Humidity: 30 to 70% Altitude: less than 3000 m	
	Circulating fluid*2		Tap water, 15% ethylene glycol aqueous solution	
	Set temperature range ^{*1}	[°C]	5 to 35	
	Cooling capacity (50/60 Hz)*3		5000/5900	
	Heating capacity (50/60 Hz)*3	rw1	1000/1200	
	Temperature stability ^{*4}		+0.1	
e	Pump capacity (50/60 Hz)*5	[MPa]	0.34 (at 15 L/min)/0.34 (at 23 L/min)	
yst	Rated flow (50/60 Hz)*6	[L/min]	15/23	
ŝ	Flow display range ^{*20}	[L/min]	5 to 40	
ī	Electric conductivity display range	[uS/cm]	0.1 to 48 (Only for Option DM)	
g f	Electric conductivity setting range	[uS/cm]	0.5 to 45 (Only for Option DM)	
tin	Particle filter nominal filtration rating*19	[[um]	5	
ula	Bypass valve ^{*19}		Installed	
<u>i</u>	Tank capacity	[L]	Approx. 5	
0	Outlet, Return port size		Rc1/2	
	Drain port size		Rc1/4, With cap	
	Leakage protection		Drain pan (With water leakage sensor*19)	
	Fluid contact material		Stainless steel, Copper (Heat exchanger brazing)*11, Bronze*11, SiC, Alumina ceramic, Carbon, PP, PE,	
	Fluid contact material		POM, PA, FKM, EPDM, PVC, PPS, AS, Fluoropolymer*12, Ion exchange resin*12	
em	Temperature range	[°C]	5 to 40	
syst	Pressure range	[MPa]	0.3 to 0.5	
ter	Required flow rate ^{*13}	[L/min]	16	
v a	Inlet-outlet pressure differential of facility water	[MPa]	0.3 or more	
l€	Port size		Rc3/8	
Fac	Fluid contact material		Stainless steel, Copper (Heat exchanger brazing), Bronze, Brass, Synthetic rubber	
	Power supply		Single-phase 200 to 230 VAC, 50/60 Hz, Allowable voltage range $\pm 10\%^{*15}$	
ε	Circuit protector	[A]	20	
ste	Applicable earth leakage breaker ca	nacity*7	Rated current: 20 A	
s		ipaony	Sensitivity current: 30 mA	
cal	Cable quantity x Size (Including grounding	cable)*16	3 cores x 12 AWG (3 cores x 3.5 mm ²)	
Ë	Rated operating current	۲ ۵ ٦	8 5/11 0	
e	(50/60 Hz)*1/	[¹]	0.0/11.0	
ш	Rated power consumption	[kW (kVA)]	1.7/2.2	
	(50/60 Hz)*1/	[(1.7/2.3)	
Communication function			Contact input/output, Serial RS-485/RS-232C	
Noise level (50/60 Hz) ^{*6} [dB(A)]			63/67	
Dimensions ^{*9} [mm]			W 483 x D 550 x H 532	
Accessories ^{*18}			Power supply connector, Maintenance handle for particle filter*19, Operation manual,	
	* 10			
Weight ^{*10} [kg]		[kg]	64	

*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 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).
- *3 ① Facility water temperature: 25°C, ② Circulating fluid temperature: 20°C, ③ Circulating fluid at the rated flow, ④ Circulating fluid: Tap water, ⑤ Power supply: 200 VAC, ⑥ Piping length: Shortest
- *4 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.
- *5 The capacity at the thermo-chiller outlet when the circulating fluid temperature is 20°C
- *6 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.
- *7 Purchase an earth leakage breaker with a sensitivity current of 30 mA and a power supply of 200 VAC separately.
- *8 Front: 1 m, height: 1 m, stable with no load, Other conditions \rightarrow See *3.
- *9 Dimensions between panels, not including the dimensions of protrusion When Option Y (With feet/Without rack mounting brackets) is selected, refer to page 35.

*10 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 weight will decrease by 2 kg for Option Z (Removed parts).

- *11 Option M (Applicable to DI water piping) does not contain copper or bronze.
- *12 For Option DM (With electric conductivity control function, Applicable to DI water piping)
- $\ast 13$ The required flow rate when the cooling capacity load is applied under the conditions in $\ast 3$
- *14 If the product is used at an altitude of 1000 m or higher, refer to "For altitudes of 1000 m or higher" on page 42.
- *15 No continuous voltage fluctuation
- *16 To be prepared by the customer
- *17 ① Facility water temperature: 25°C, ② Circulating fluid temperature: 20°C, ③ Circulating fluid at the rated flow, ④ Circulating fluid: Tap water, ⑤ Power supply: 200 VAC, ⑥ Piping length: Shortest, ⑦ With the rated cooling load applied
- *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 Not included for Option Z (Removed parts)
- *20 Not included for Options Z and Z1 (Removed parts)

Thermo-chiller/Rack Mount Type HRR Series

* If the product is used at an altitude of 1000 m or higher, refer to "Operating Environment/Storage Environment" (page 42) Item 14 "For altitudes of 1000 m or higher." For models with an inverter pump mounted (-T1) and models with a high-pressure pump mounted (-T, -MT), the cooling capacity will decrease by about 300 W from each graph.



[50 Hz]

SMC











If the product is used at an altitude of 1000 m or higher, refer to "Operating Environment/Storage Environment" (page 42) Item 14 "For altitudes of 1000 m or higher."
 For models with a high-pressure pump mounted (-T, -MT), the cooling capacity will decrease by about 300 W from each graph.





















Heating Capacity



SMC

22

Heating Capacity



Pump Capacity

HRR010-A-20, HRR010-W-20



HRR050-A-20, HRR050-W-20





Required Facility Water Flow Rate

HRR010-W-20



* This is the required facility water flow rate at the circulating fluid rated flow and the cooling capacity listed in the "Cooling Capacity" specifications.

HRR050-W-20



* This is the facility water flow rate at the circulating fluid rated flow and the cooling capacity listed on pages 20 and 21.



* This is the required facility water flow rate at the circulating fluid rated flow and the cooling capacity listed in the "Cooling Capacity" specifications.



Dimensions



*1 Without bypass valve for Option Z (Removed parts)

* For Option Y (With feet/Without rack mounting brackets), refer to page 35.

Water-cooled Refrigeration



*1 Without bypass valve for Option Z (Removed parts)

* For Option Y (With feet/Without rack mounting brackets), refer to page 35.

Dimensions



HRR024-A, HRR030-A



Dimensions



HRR024-W, HRR030-W



Dimensions



*1 Without bypass valve for Option Z (Removed parts)

* For Option Y (With feet/Without rack mounting brackets), refer to page 35.

Operation Display Panel

The basic operation of this unit is controlled through the operation panel on the front of the product.



No.	Description	Function
1	Digital display (7-segment, 5 digits)	Displays the current circulating fluid discharge temperature, pressure, flow rate, alarm codes, and other set values
2	Digital display (11-segment, 5 digits)	Displays the circulating fluid discharge temperature and the set values of other menu items
3	[°C] 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
$\overline{)}$	[SEC] lamp	Lights up when seconds are displayed on the digital display
8	[%] lamp	Lights up when the pump output set value is displayed on the digital display
9	[RUN] lamp	Lights up during operation, and goes off when it is stopped
10	[ALM] lamp	Lights up when the FLT alarm occurs (This product will stop.)
11	[WRN] lamp	Lights up when the WRN alarm occurs (This product will continue operation.)
12	[님] lamp	Lights up when "AL.01 Low level in tank abnormal" or "AL.02 Low level in tank" alarm is generated
13	Digital display (11-segment, 1 digit)	"X" is displayed when maintenance notification is generated.
14	[RMT] lamp	Lights up during remote operation by communication function
15	[KEYLOCK] lamp	Lights up when key lock setting is active
16	[RUN/STOP] key	Press and hold for 1 second to start or stop.
17	[MENU] key	Switching of each menu and cancellation of setting values
18	[ENT] key	Switch to setting mode and set values.
19	[▲] key	Move item upward or increase the set value.
20	[▼] key	Move item downward or decrease the set value.
21	[RESET] key	Reset the alarm.

Alarm

Various alarms are displayed with the ALM indicator and the alarm code in the white upper section of the operation display. These alarms can also be output through communication protocols.

۸I...

A		1	Display unit		
code	Alarm message	value	Upper section (White)	Lower section (Green)	
AL01	Low level in tank abnormal	FLT	AL01	$LOW \Rightarrow LEVEL \Rightarrow FLT$	
AL02	Low level in tank	WRN	AL02	$LOW \Rightarrow LEVEL \Rightarrow WRN$	
AL04	Water leakage*6	WRN*1	AL04	WATER ⇒ LEAK	
AL09	Circulating fluid discharge pressure rise	FLT*2	AL09	$HIGH \Rightarrow PRESS$	
AL10	Flow rate reduction*7	WRN*1	AL10	$LOW \Rightarrow FLOW \Rightarrow WRN$	
AL11	Outside ambient temperature range*3	OFF*1	AL11	$AMB \Rightarrow TEMP \Rightarrow OUT$	
AL12	Electric conductivity rise*4	WRN*5	AL12	$DI \Rightarrow ERROR$	
AL13	NOT TEMP READY	OFF*1	AL13	$TEMP \Rightarrow READY \Rightarrow ERROR$	
AL14	Circulating fluid temperature range rise	OFF*1	AL14	TEMP ⇒ OUT.HI	
AL15	Circulating fluid temperature range drop	OFF*1	AL15	$TEMP \Rightarrow OUT.LO$	
AL17	Flow rate failure*7	FLT*1	AL17	$LOW \Rightarrow FLOW \Rightarrow FLT$	
AL18	High circulating fluid discharge temp.	FLT	AL18	$TEMP \Rightarrow FLT$	
AL19	High circulating fluid return temp.	FLT	AL19	$RET \Rightarrow TEMP \Rightarrow FLT$	

AL21High circulating fluid discharge pressureFLTAL21HIGH \Rightarrow PRESS \Rightarrow FLTAL22Low circulating fluid discharge pressureFLTAL22LOW \Rightarrow PRESS \Rightarrow FLTAL24Memory abnormalFLTAL24MEM \Rightarrow ERRORAL25Contact input 1 signal detectionFLT*1AL25INP1 \Rightarrow ERRORAL26Contact input 2 signal detectionFLT*1AL26INP2 \Rightarrow ERRORAL27Forced stopFLTAL27FORCE \Rightarrow STOPAL28Maintenance noticeOFF*1AL28MANT \Rightarrow ALARMAL29Communication errorWRN*1AL29COMM \Rightarrow ERRORAL30Refrigerant circuit abnormalFLTAL30REF \Rightarrow ERROR \Rightarrow 0000AL31Sensor abnormalFLTAL32CTRL \Rightarrow ERROR \Rightarrow 0000AL32Controller abnormalFLTAL32CTRL \Rightarrow ERROR \Rightarrow 0000	code	Alarm message	value	Upper section (White)	Lower section (Green)
AL22Low circulating fluid discharge pressureFLTAL22LOW \Rightarrow PRESS \Rightarrow FLTAL24Memory abnormalFLTAL24MEM \Rightarrow ERRORAL25Contact input 1 signal detectionFLT*1AL25INP1 \Rightarrow ERRORAL26Contact input 2 signal detectionFLT*1AL26INP2 \Rightarrow ERRORAL27Forced stopFLTAL27FORCE \Rightarrow STOPAL28Maintenance noticeOFF*1AL28MANT \Rightarrow ALARMAL29Communication errorWRN*1AL29COMM \Rightarrow ERRORAL30Refrigerant circuit abnormalFLTAL30REF \Rightarrow ERROR \Rightarrow 0000AL31Sensor abnormalFLTAL32CTRL \Rightarrow ERROR \Rightarrow 0000AL32Controller abnormalFLTAL32CTRL \Rightarrow ERROR \Rightarrow 0000	AL21	High circulating fluid discharge pressure	FLT	AL21	$HIGH \Rightarrow PRESS \Rightarrow FLT$
AL24Memory abnormalFLTAL24MEM \Rightarrow ERRORAL25Contact input 1 signal detectionFLT*1AL25INP1 \Rightarrow ERRORAL26Contact input 2 signal detectionFLT*1AL26INP2 \Rightarrow ERRORAL27Forced stopFLTAL27FORCE \Rightarrow STOPAL28Maintenance noticeOFF*1AL28MANT \Rightarrow ALARMAL29Communication errorWRN*1AL29COMM \Rightarrow ERRORAL30Refrigerant circuit abnormalFLTAL30REF \Rightarrow ERROR \Rightarrow 0000AL31Sensor abnormalFLTAL31SENS \Rightarrow ERROR \Rightarrow 0000AL32Controller abnormalFLTAL32CTRL \Rightarrow ERROR \Rightarrow 0000	AL22	Low circulating fluid discharge pressure	FLT	AL22	$LOW \Rightarrow PRESS \Rightarrow FLT$
AL25 Contact input 1 signal detection FLT*1 AL25 INP1 ⇒ ERROR AL26 Contact input 2 signal detection FLT*1 AL26 INP2 ⇒ ERROR AL27 Forced stop FLT AL27 FORCE ⇒ STOP AL28 Maintenance notice OFF*1 AL28 MANT ⇒ ALARM AL29 Communication error WRN*1 AL29 COMM ⇒ ERROR AL30 Refrigerant circuit abnormal FLT AL30 REF ⇒ ERROR ⇒ 0000 AL31 Sensor abnormal FLT AL31 SENS ⇒ ERROR ⇒ 0000 AL32 Controller abnormal FLT AL32 CTRL ⇒ ERROR ⇒ 0000	AL24	Memory abnormal	FLT	AL24	$MEM \Rightarrow ERROR$
AL26 Contact input 2 signal detection FLT*1 AL26 INP2 ⇒ ERROR AL27 Forced stop FLT AL27 FORCE ⇒ STOP AL28 Maintenance notice OFF*1 AL28 MANT ⇒ ALARM AL29 Communication error WRN*1 AL29 COMM ⇒ ERROR AL30 Refrigerant circuit abnormal FLT AL30 REF ⇒ ERROR ⇒ 0000 AL31 Sensor abnormal FLT AL31 SENS ⇒ ERROR ⇒ 0000 AL32 Controller abnormal FLT AL32 CTRL ⇒ ERROR ⇒ 0000	AL25	Contact input 1 signal detection	FLT*1	AL25	$INP1 \Rightarrow ERROR$
AL27Forced stopFLTAL27FORCE \Rightarrow STOPAL28Maintenance noticeOFF*1AL28MANT \Rightarrow ALARMAL29Communication errorWRN*1AL29COMM \Rightarrow ERRORAL30Refrigerant circuit abnormalFLTAL30REF \Rightarrow ERROR \Rightarrow 0000AL31Sensor abnormalFLTAL31SENS \Rightarrow ERROR \Rightarrow 0000AL32Controller abnormalFLTAL32CTRL \Rightarrow ERROR \Rightarrow 0000	AL26	Contact input 2 signal detection	FLT*1	AL26	$INP2 \Rightarrow ERROR$
AL28Maintenance noticeOFF*1AL28MANT \Rightarrow ALARMAL29Communication errorWRN*1AL29COMM \Rightarrow ERRORAL30Refrigerant circuit abnormalFLTAL30REF \Rightarrow ERROR \Rightarrow 0000AL31Sensor abnormalFLTAL31SENS \Rightarrow ERROR \Rightarrow 0000AL32Controller abnormalFLTAL32CTRL \Rightarrow ERROR \Rightarrow 0000	AL27	Forced stop	FLT	AL27	$FORCE \Rightarrow STOP$
AL29Communication errorWRN*1AL29COMM \Rightarrow ERRORAL30Refrigerant circuit abnormalFLTAL30REF \Rightarrow ERROR \Rightarrow 0000AL31Sensor abnormalFLTAL31SENS \Rightarrow ERROR \Rightarrow 0000AL32Controller abnormalFLTAL32CTRL \Rightarrow ERROR \Rightarrow 0000	AL28	Maintenance notice	OFF*1	AL28	$MANT \Rightarrow ALARM$
AL30Refrigerant circuit abnormalFLTAL30REF \Rightarrow ERROR \Rightarrow 0000AL31Sensor abnormalFLTAL31SENS \Rightarrow ERROR \Rightarrow 0000AL32Controller abnormalFLTAL32CTRL \Rightarrow ERROR \Rightarrow 0000	AL29	Communication error	WRN*1	AL29	$COMM \Rightarrow ERROR$
AL31Sensor abnormalFLTAL31SENS \Rightarrow ERROR \Rightarrow 0000AL32Controller abnormalFLTAL32CTRL \Rightarrow ERROR \Rightarrow 0000	AL30	Refrigerant circuit abnormal	FLT	AL30	$REF \Rightarrow ERROR \Rightarrow 0000$
AL32 Controller abnormal FLT AL32 $CTRL \Rightarrow ERROR \Rightarrow 0000$	AL31	Sensor abnormal	FLT	AL31	$SENS \Rightarrow ERROR \Rightarrow 0000$
	AL32	Controller abnormal	FLT	AL32	$CTRL \Rightarrow ERROR \Rightarrow 0000$

Initial

Display unit

*1 Selectable from OFF/WRN/FLT

OFF: Disables the alarm function

WRN: Operation of this product will continue when the alarm occurs.

· FLT: Operation of this product will stop when the alarm occurs.

*2 Selectable from WRN/FLT

*3 Only air-cooled refrigeration type can be set.

29



*4 Option DM (With electric conductivity control function, Applicable to DI water piping) only. When entering the range, the alarm is released automatically.
 *5 Selectable from OFF/WRN

*6 Not generated for Option Z

*7 Not generated for Options Z and Z1

Communication Functions

For details, refer to the "Operation Manual" on the SMC website.

Contact Input/Output Communication Specifications

Item		Specifications		
	Insulation method	Photocoupler		
	Rated input voltage	24 VDC		
Contact input signal 1, 2	Operating voltage range	21.6 to 26.4 VDC	Run/Stop signal External switch signal	
	Rated input current	5 mA TYP		
	Input impedance	4.7 kΩ		
	Rated load voltage	48 VAC or less/30 VDC or less	· Run status signal	
Contact output signal 1, 2, 3	Maximum load current	500 mA AC/DC (Resistance load)	Alarm status signal Signal for completion of preparation	
	Minimum load current	5 VDC 10 mA	(TEMP READY), etc.	
24 VDC Ou	tput voltage	24 VDC ±10% 500 mA MAX*1 (No inductive load)		

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

Contact Input/Output Pin Nos.

Pin no. Application		Division	Initial value (Default setting)
1 24 VDC output 0		Output	—
2	24 VDC output	Output	—
3	24 VDC output	Output	—
4	Contact input signal 1	Input	OFF
5	Common of contact output signal 1	Output	—
6	Common of contact output signal 2	Output	—
7	Common of contact output signal 3	Output	—
8	Unusable	—	—
9	24 COM output	Output	—
10	24 COM output	Output	—
11	Common of contact input signal	Output	—
12	Contact input signal 2	Input	OFF
13	Contact output signal 1	Output	Run status signal (N.O. type)
14	Contact output signal 2	Output	Remote status signal (N.O. type)
15	Contact output signal 3	Output	Alarm signal (N.C. type)



Contact input/output signal connector

Communication Functions

For details, refer to the "Operation Manual" on the SMC website.

Serial Communication

The serial communication (RS-485/RS-232C) enables the following items to be written and read out.

Writing		Readout		-	
winning	11	neauout		1	
Run/Stop	H	Circulating fluid discharge temperature	Status information	i -	
Circulating fluid temperature setting	! !	Circulating fluid flow rate	Alarm occurrence information	1	
	ÌÌ	Circulating fluid discharge pressure		Ì	
		Electric conductivity*1		¦ *1	When using the
	11			1	Option DM





Communication connector

HRR Series Options

 Options have to be selected when ordering the thermo-chiller.
 It is not possible to add them after purchasing the unit.

Option symbol

With Electric Conductivity Control Function, Applicable to DI Water Piping

With electric conductivity control function, Applicable to DI water piping

By entering the set value of electric conductivity and hysteresis, flow of circulating fluid to the DI filter is controlled by the solenoid valve to control electric conductivity. Contact material of the circulating fluid circuit is made from non-copper materials. (For details, refer to Option M.)

Applicable model	HRR010/012/018/024/030/050-□□-□-DM
Measurement range of electric conductivity	0.1 to 48.0 μS/cm
Set range of target electric conductivity	0.5 to 45.0 μS/cm*1
Set range of electric conductivity hysteresis	0.1 to 10.0 µS/cm

*1 Default setting is set to "Electric conductivity set value: 25.0 μ S/cm" and "Hysteresis: 5.0 μ S/cm."

Example of operation of electric conductivity control

· Electric conductivity target value : 25.0 [µS/cm]

· Electric conductivity control hysteresis: 5.0 [µS/cm]



Applicable to DI Water Piping

HRR _____M

Applicable to DI water piping

Contact material of the circulating fluid circuit is made from non-copper materials.

· Available DI water is electric conductivity: 0.4 μS/cm or more. (Electric resistivity: 2.5 MΩ·cm or less)

. This Option M does not have electric resistance/electric conductivity control function. If this function is necessary, Option DM should be selected.

Applicable model	HRR010/012/018/024/030/050-□□-□-M
Contact material for circulating fluid	Stainless steel (including heat exchanger brazing), Alumina ceramic, SiC, Carbon, PP, PE, POM, PA, FKM, EPDM, PVC, PPS, AS

* No change in external dimensions

Inverter Pump Mounted

HRR010-00-<u>71</u>

Inverter pump mounted

Possible to choose an inverter pump in accordance with user's piping resistance

Cooling capacity will decrease by heat generated in the pump.

 \cdot The inverter pump does not use a mechanical seal.

• The 50 Hz and the 60 Hz inverter pumps have the same capacity. (There is no pump capacity difference between the 50 Hz and the 60 Hz.)

Applicable model			HRR010-□□-20-T1
	Rated flow (Same for both the 50 Hz and the 60 Hz) $^{+1, 2}$	L/min	5 (0.35 MPa)
Pump	Maximum pump head (Same for both the 50 Hz and the 60 Hz)	m	35
	Output W		400
Circuit protector		Α	10
Recommended earth leakage breaker capacity		Α	10
Cooling capacity*3		w	The cooling capacity reduces about 300 W from the value in the catalog. (due to an increase in the heat generation of the pump)

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

*2 Required minimum flow rate for maintaining the cooling capacity or temperature stability

*3 Cooling capacity will decrease as pump power increases.

* When the option, inverter pump mounted, is selected, the product weight increases by 2 kg.

* No change in external dimensions of this product

Pump Capacity

HRR010-A/W-20-T1



Option symbol **High-Pressure Pump Mounted**

]□−□−T/MT HRR

High-pressure pump mounted

Possible to choose a high-pressure pump in accordance with user's piping resistance

Cooling capacity will decrease by heat generated in the pump.

The high-pressure pump uses a mechanical seal.

The thermo-chiller indicates maintenance notification when driving time is passed a recommended preventive maintenance hours.

Please contact to service center to ask for maintenance of the pump and mechanical seal.

Applicable model			HRR012/018-□□-10-T/MT*1	HRR012/018/024/03020-T	HRR012/018/024/03020-MT*1
	Rated flow (50/60 Hz)*2, 3	L/min	7 (0.36 MPa)/10 (0.42 MPa)	10 (0.42 MPa)/14 (0.40 MPa)	10 (0.32 MPa)/14 (0.32 MPa)
Pump	Maximum pump head (50/60 Hz)	m	50	50	50
	Output	W	350	550	
Circuit protector		Α	15	15 (10 A for standard)	
Recommended earth leakage breaker capacity		Α	15		
Cooling capacity*4		W	The cooling capacity reduces about 300 W from the value in the catalog. (due to an increase in the heat generation of the pump)		lue in the catalog. he pump)

Option MT: Applicable to DI water piping + High-pressure pump mounted

*2 The capacity at the thermo-chiller outlet when the circulating fluid temperature is 20°C

*3 Required minimum flow rate for maintaining the cooling capacity or temperature stability

*4 Cooling capacity will decrease as pump power increases.
 * When the option, high-pressure pump mounted, is selected, the product weight increases by 5 kg.

* No change in external dimensions of this product

Pump Capacity

HRR012/018-00-10-T/MT



HRR012/018/024/030-0-20-T



HRR012/018/024/030-0-20-MT





Z	Bypass valve, Retaining clip*1
Z1	Flow sensor, Retaining clip*1

*1 Only for the HRR010 to 030

HRR Series Optional Accessories

① Concentration Meter

This meter can be used to control the concentration of ethylene glycol aqueous solution regularly.

Part number	Applicable model
	HRR012/018-□□-10
	HRR010/012/018/024/030/050-□□-20



2 Particle Filter Element for Replacement

Element for the maintenance of the particle filter for circulating fluid

Part number	Applicable model	
HRR-PF001	HRR010-□□-20	
EJ202S-005X11	HRR012/018-□□-10 HRR012/018/024/030-□□-20	
EJ302S-005X11	HRR050-□□-20	



3 DI Filter Replacement Cartridge

DI filter cartridge for replacement for Option DM [Electric conductivity control type, DI water piping type]

Part number	Applicable model	
HRR-DF001	HRR012/018-□□-10-DM□ HRR010/012/018/024/030-□□-20-DM□	
HRR-DF002	HRR050-□□-20-DM□	



(4) Anti-quake Bracket

Bracket for earthquakes

Prepare the anchor bolts (M8) which are suited to the floor material by the customer. (Anti-quake bracket material: Stainless steel, thickness: 1.5 mm)





5 Piping Conversion Fitting (For Air-cooled Refrigeration)

Conversion fitting for circulating fluid + Conversion fitting for drain outlet

This fitting changes the port size for circulating fluid from Rc1/2 to G1/2 or NPT1/2, and for drain from Rc1/4 to G1/4 or NPT1/4. It is not necessary to purchase this when pipe thread type F or N is selected in "How to Order" since it is included in the product.



6 Piping Conversion Fitting (For Water-cooled Refrigeration)

Conversion fitting for circulating fluid + Conversion fitting for drain outlet

This fitting changes the port size for circulating fluid from Rc1/2 to G1/2 or NPT1/2, and for drain from Rc1/4 to G1/4 or NPT1/4. It is not necessary to purchase this when pipe thread type F or N is selected in "How to Order" since it is included in the product.

	Part number	Applicable model
HRR-EP003	G thread conversion fitting set	HRR012/018-W-10
HRR-EP004	NPT thread conversion fitting set	HRR010/012/018/024/030/050-W-20





Power Supply Cable



SMC

8 Caster Adjuster-foot Kit

This is a set of unfixed casters and adjuster feet stop.

This kit can only be used for Option Y of the thermo-chiller HRR series.

Do not mount this kit on other products.

Carefully read the procedure manual included with this kit before performing the installation.

Part number	Applicable model A dimension [mm		Weight [kg]	
	HRR010-□-20-□UY	330		
	HRR012/018-□-10-□UY	417		
	HRR012/018-□-20-□Y	417	Approx 7	
UUU-V2001	HRR024/030-□-20-□Y	506	Approx. 7	
	HRR050-A-20-□UY	815		
	HRR050-W-20-□UY	637		



Mounting view (HRR012/018-A-□)







Parts List

Description	Qty.
Caster adjuster-foot base	1
Anti-quake bracket A	2
Anti-quake bracket B	2
Hexagon nut (M8)	4
Hexagon bolt (M8)	8
Mounting procedure manual	1

HRR Series Cooling Capacity Calculation

Required Cooling Capacity Calculation

Example 1: When the heat generation amount in the user's equipment is known.

The heat generation amount can be determined based on the power consumption or output of the heat generating area — i.e. the area requiring cooling — within the user's equipment.*1

(1) Derive the heat generation amount from the power consumption.

Power consumption P: 1000 [W]

Q = P = 1000 [W]

Cooling capacity = Considering a safety factor of 20%, 1000 [W] x 1.2 = 1200 [W]

② Derive the heat generation amount from the power supply output.
Power supply output VI: 1.0 [kVA]

 $\mathbf{Q} = \mathbf{P} = \mathbf{V} \mathbf{x} \mathbf{I} \mathbf{x}$ Power factor

In this example, using a power factor of 0.85:

Cooling capacity = Considering a safety factor of 20%, **850** $[W] \times 1.2 = 1020$ [W]

850 [W] x 1.2 = 1020 [W]

3 Derive the heat generation amount from the output.

Output (shaft power, etc.) W: 800 [W]

$$Q = P = \frac{W}{Efficiency}$$

In this example, using an efficiency of 0.7:

Cooling capacity = Considering a safety factor of 20%, 1143 [W] x 1.2 = $\boxed{1372 [W]}$

*1 The examples above calculate the heat generation amount based on the power consumption. The actual heat generation amount may differ due to the structure of the user's equipment. Be sure to check it carefully.

Example 2: When the heat generation amount in the user's equipment is not known.

Obtain the temperature difference between inlet and outlet by circulating the circulating fluid inside the user's equipment.

near generation amount by user's equipment a	
Circulating fluid	: Tap water*1
Circulating fluid mass flow rate qm	: (= $\rho x \mathbf{q} \mathbf{v} \div 60$) [kg/s]
Circulating fluid density ρ	: 1 [kg/dm³]
Circulating fluid (volume) flow rate qv	: 10 [dm³/min]
Circulating fluid specific heat C	: 4.2 x 10 ³ [J/(kg·K)]
Circulating fluid outlet temperature T1	: 293 [K] (20 [°C])
Circulating fluid return temperature T2	: 295 [K] (22 [°C])
Circulating fluid temperature difference ΔT	: 2.0 [K] (= T ₂ - T ₁)
Conversion factor: minutes to seconds (SI units)	: 60 [s/min]

*1 Refer to page 40 for the typical physical property value of tap water or other circulating fluids.

$$\mathbf{Q} = \mathbf{qm} \mathbf{x} \mathbf{C} \mathbf{x} (\mathbf{T}_2 - \mathbf{T}_1)$$

$$= \frac{\rho \ x \ q_{V} \ x \ C \ x \ \Delta T}{60} = \frac{1 \ x \ 10 \ x \ 4.2 \ x \ 10^{3} \ x \ 2.0}{60}$$

Cooling capacity = Considering a safety factor of 20%,



Example of conventional units (Reference) Heat generation amount by user's equipment \mathbf{Q} : Unknown [cal/h] \rightarrow [W] Circulating fluid : Tap water*1 Circulating fluid weight flow rate qm : (= ρ x **q**v x 60) [kgf/h] : 1 [kgf/L] Circulating fluid weight volume ratio y Circulating fluid (volume) flow rate qv : 10 [L/min] : 1.0 x 10³ [cal/(kgf.°C)] Circulating fluid specific heat C Circulating fluid outlet temperature T1 : 20 [°C] Circulating fluid return temperature T2 : 22 [°C] Circulating fluid temperature difference ΔT : 2.0 [°C] (= T₂ - T₁) Conversion factor: hours to minutes : 60 [min/h] Conversion factor: kcal/h to kW : 860 [(cal/h)/W] qm x C x (T2 – T1) Q = 860 γ x qv x 60 x C x Δ T 860 1 x 10 x 60 x 1.0 x 10³ x 2.0 860 1200000 [cal/h] 860 ≈ 1400 [W]

Cooling capacity = Considering a safety factor of 20%, 1400 [W] x 1.2 = 1680 [W]

* Calculation example for the temperature and flow rate based on customer's piping condition

For calculating the required cooling capacity based on the displayed value of temperature and flow rate in the chiller, fully close the bypass valve.

39

Required Cooling Capacity Calculation

Example 3: When there is no heat generation, and when cooling the object below a certain temperature and period of time.

Heat quantity by cooled substance (per unit time) Q: Unknown [W] ([J/s])	Example of conventional units (Reference)
Cooled substance : Water	List must be a state to the formula formula formula for the formula formula for the formula formula for the formula formula formula for the formula
Cooled substance mass \mathbf{m} : (= $\rho \times \mathbf{V}$) [kg]	Heat quantity by cooled substance (per unit time) Q: Unknown [cal/n] \rightarrow [W]
Cooled substance density ρ : 1 [kg/dm ³]	Cooled substance : Water
Cooled substance total volume V : 20 [dm ³]	Cooled substance weight m : $(= \rho \times \mathbf{V})$ [kgf]
Cooled substance specific heat C : 4.2 x 10 ³ [J/(kg·K)]	Cooled substance weight volume ratio γ : 1 [kgf/L]
Cooled substance temperature when cooling begins To: 305 [K] (32 [°C])	Cooled substance total volume V : 20 [L]
Cooled substance temperature after t hour Tt : 293 [K] (20 [°C])	Cooled substance specific heat C : $1.0 \times 10^3 \text{ [cal/(kgf.^{\circ}C)]}$
Cooling temperature difference ΔT : 12 [K] (= To – Tt)	Cooled substance temperature when
Cooling time $\Delta \mathbf{t}$: 900 [s] (= 15 [min])	cooling begins To : 32 [°C]
	Cooled substance temperature after t hour Tt : 20 [°C]
* Refer to the following for the typical physical property values by circulating fluid.	Cooling temperature difference ΔT : 12 [°C] (= To – Tt)
$\mathbf{m} \mathbf{x} \mathbf{C} \mathbf{x} (\mathbf{T}_0 - \mathbf{T}_1) = \mathbf{x} \mathbf{V} \mathbf{x} \mathbf{C} \mathbf{x} \mathbf{A} \mathbf{T}$	Cooling time Δt : 15 [min]
$\mathbf{Q} = \frac{\mathbf{m} \times \mathbf{O} \times (10 - 10)}{10} = \frac{\mathbf{p} \times \mathbf{V} \times \mathbf{O} \times \Delta \mathbf{I}}{10}$	Conversion factor: hours to minutes : 60 [min/h]
$\Delta \mathbf{t}$ $\Delta \mathbf{t}$	Conversion factor: kcal/h to kW : 860 [(cal/h)/W]
1 x 20 x 4.2 x 10 ³ x 12	
=900 = 1120 [J/S] ≈ 1120 [W]	
	$\mathbf{Q} = \frac{\mathbf{m} \mathbf{x} \mathbf{C} \mathbf{x} (10 - 10)}{\mathbf{Y} \mathbf{x} \mathbf{V} \mathbf{x} 60 \mathbf{x} \mathbf{C} \mathbf{x} \Delta 1}$
Cooling capacity = Considering a safety factor of 20%,	$\Delta t \mathbf{x} 860$ $\Delta t \mathbf{x} 860$
$1120 \text{ [W]} \times 1.2 = 1344 \text{ [W]}$	
$1120 [W] \times 1.2 = 1344 [W]$	<u>1 x 20 x 60 x 1.0 x 10³ x 12</u>
	- 15 x 860
Water beth	
	≈ 1120 [W]

Cooling capacity = Considering a safety factor of 20%,

1120 [W] x 1.2 = 1344 [W]

After 15 minutes, cool 32°C down to 20°C.

This is the calculated value by changing the fluid temperature only. Thus, it varies substantially depending on the water bath or piping shape.

Precautions on Cooling Capacity Calculation

1. Heating capacity

When the circulating fluid temperature is set above room temperature, it needs to be heated by the thermo-chiller. The heating capacity depends on the circulating fluid temperature. Consider the radiation rate and heat capacity of the user's equipment and check beforehand if the required heating capacity is provided.

2. Pump capacity

<Circulating fluid flow rate>

Circulating fluid flow rate varies depending on the circulating fluid discharge pressure. Consider the installation height difference between the thermo-chiller and the user's equipment, and the piping resistance such as circulating fluid pipings, or piping size, or piping curves in the machine. Check beforehand if the required flow is achieved, using the pump capacity curves.

<Circulating fluid discharge pressure>

Circulating fluid discharge pressure has the possibility to increase up to the maximum pressure in the pump capacity curves. Check beforehand if the circulating fluid pipings or circulating fluid circuit of the user's equipment are fully durable against this pressure.

Circulating Fluid Typical Physical Property Values

1. This catalog uses the following values for density and specific heat in calculating the required cooling capacity.

- $\begin{array}{l} \rho: 1 \; [kg/dm^3] \; (or, using conventional units, weight volume ratio $\gamma = 1 \; [kgf/L]$) \\ \hline c: 4.19 \; x \; 10^3 \; [J/(kg\cdot K)] \; (or, using conventional units, 1 \; x \; 10^3 \; [cal/(kgf\cdot^cC)]$) \\ \end{array}$ Density
- Specific heat

2. Values for density and specific heat change slightly according to temperature shown below. Use this as a reference. Water 15% Ethylene Glycol Aqueous Solution

Physical property value	Density ρ	Specific heat C	Conventional units			
Temperature	[kg/dm ³] [J/(kg·K)]	Weight volume ratio γ [kgf/L]	Specific heat C [cal/(kgf.°C)]			
5°C	1.00	4.2 x 10 ³	1.00	1 x 10 ³		
10°C	1.00	4.19 x 10 ³	1.00	1 x 10 ³		
15°C	1.00	4.19 x 10 ³	1.00	1 x 10 ³		
20°C	1.00	4.18 x 10 ³	1.00	1 x 10 ³		
25°C	1.00	4.18 x 10 ³	1.00	1 x 10 ³		
30°C	1.00	4.18 x 10 ³	1.00	1 x 10 ³		
35°C	0.99	4.18 x 10 ³	0.99	1 x 10 ³		
40°C	0.99	4.18 x 10 ³	0.99	1 x 10 ³		

Physical property value	Density ρ Specific heat [kg/dm ³] [J/(kg·K)]	Specific heat C	Conventional units	
Temperature		[J/(kg⋅K)]	Weight volume ratio γ [kgf/L]	Specific heat C [cal/(kgf.°C)]
5°C	1.02	3.91 x 10 ³	1.02	0.93 x 10 ³
10°C	1.02	3.91 x 10 ³	1.02	0.93 x 10 ³
15°C	1.02	3.91 x 10 ³	1.02	0.93 x 10 ³
20°C	1.01	3.91 x 10 ³	1.01	0.93 x 10 ³
25°C	1.01	3.91 x 10 ³	1.01	0.93 x 10 ³
30°C	1.01	3.91 x 10 ³	1.01	0.94 x 10 ³
35°C	1.01	3.91 x 10 ³	1.01	0.94 x 10 ³
40°C	1.01	3.92 x 10 ³	1.01	0.94 x 10 ³

* Shown above are reference values. Contact circulating fluid supplier for details.





Be sure to read this before handling the products. Refer to the back cover for safety instructions. For temperature control equipment precautions, refer to the "Handling Precautions for SMC Products" and the "Operation Manual" on the SMC website: https://www.smcworld.com

Design

\land Warning

1. This catalog shows the specifications of a single unit.

- 1) Check the specifications of the single unit (contents of this catalog) and thoroughly consider the adaptability between the user's system and this unit.
- 2) Although a protection circuit as a single unit is installed, prepare a drain pan, water leakage sensor, discharge air facility, and emergency stop equipment, depending on the user's operating conditions. Also, the user is requested to carry out a safety design for the whole system.

2. When attempting to cool areas that are open to the atmosphere (tanks, pipes), plan your piping system accordingly.

When cooling open-air external tanks, arrange the piping so that there are coil pipes for cooling inside the tanks and to carry back the entire flow volume of circulating fluid that is released.

3. Use non-corrosive material for circulating fluid contact parts.

The recommended circulating fluid is tap water or 15% ethylene glycol aqueous solution. Using corrosive materials such as aluminum or iron for fluid contact parts such as piping may cause clogging or leakage in the circulating fluid circuit. Therefore, take sufficient care when selecting fluid contact part materials such as piping.

4. Design the piping so that no foreign matter enters the chiller.

If foreign matter, such as scales in the piping, enters the circulating fluid, this may cause the pump to malfunction.

Selection

\land Warning

1. Model selection

When selecting a thermo-chiller model, the amount of heat generation from the user's equipment must be known. Obtain this value, referring to "Cooling Capacity Calculation" on pages 39 and 40 before selecting a model.

Handling

\land Warning

1. Thoroughly read the operation manual.

Read the operation manual completely before operation. Also, keep the manual where it can be referred to as necessary.

Transportation / Carriage / Movement

\land Warning

- 1. This product is heavy. Pay attention to safety and the position of the product when it is transported, carried, and moved.
- 2. Read the operation manual carefully before moving the product after unpacking.

\land Caution

1. Never put the product down on its side as this may cause failure.

The product will be delivered in the packaging shown below.



Model	Weight [kg]*1	Dimensions [mm]
HRR010-A	43	Height 495 x Width 610 x Dopth 920
HRR010-W	41	Height 465 X Width 610 X Depth 820
HRR012-A HRR018-A	54	Hoight 575 y Width 610 y Dopth 820
HRR012-W HRR018-W	55	
HRR024-A HRR030-A	61	Height 665 y Width 610 y Dopth 820
HRR024-W HRR030-W	60	
HRR050-A	91	Height 975 x Width 610 x Depth 820
HRR050-W	80	Height 800 x Width 610 x Depth 820

*1 For models with an option, the weight increases as shown below.

Option	Description	Additional weight
-DM	With electric conductivity control function, Applicable to DI water piping	+1 kg
-M	Applicable to DI water piping	Not changed
-T1	Inverter pump mounted	+2 kg
-Т	High-pressure pump mounted	+5 kg
-U	Compliant with UL Standards	Not changed
-Y	With feet/Without rack mounting brackets	Not changed
-Z	Without either a flow sensor, water leakage sensor, particle filter, bypass valve or retaining clip	–1 kg* ²
-Z1	Without either a flow sensor or retaining clip	Not changed

*2 Excludes the HRR010. For the HRR050: -2 kg

SMC



Be sure to read this before handling the products. Refer to the back cover for safety instructions. For temperature control equipment precautions, refer to the "Handling Precautions for SMC Products" and the "Operation Manual" on the SMC website: https://www.smcworld.com

Operating Environment / Storage Environment

\land Warning

1. Do not use in the following environment as it will lead to a breakdown.

- 1) Outdoors
- 2) In locations where water, water vapor, salt water, and oil may splash on the product
- 3) In locations where there are dust and particles
- In locations where corrosive gases, organic solvents, chemical fluids, or flammable gases are present (This product is not explosion proof.)
- 5) In locations where the ambient temperature exceeds the limits as mentioned below

During transportation/storage: 0 to 50°C (But as long as water or circulating fluid are not left inside the pipings) During operation: 5 to 40°C

6) In locations where the ambient humidity is out of the following range or where condensation occurs

During transportation/storage: 15 to 85% During operation: 30 to 70%

- 7) In locations which receive direct sunlight or radiated heat
- 8) In locations where there is a heat source nearby and the ventilation is poor
- 9) In locations where temperature substantially changes
- In locations where strong magnetic noise occurs (In locations where strong electric fields, strong magnetic fields, and surge voltage occur)
- 11) In locations where static electricity occurs, or conditions which make the product discharge static electricity
- 12) In locations where high frequency occurs
- 13) In locations where damage is likely to occur due to lightning
- 14) In locations at an altitude of 3000 m or higher (Excluding: storage and transportation)
 - For altitudes of 1000 m or higher
 - Because of lower air density, the heat radiation efficiencies of the devices in the product will be lower in the location at an altitude of 1000 m or higher. Therefore, the maximum ambient temperature to use and the cooling capacity will lower according to the descriptions in the table below.

Select the thermo-chiller considering the descriptions.

- ① Upper limit of ambient temperature: Use the product in ambient temperature of the described value or lower at each altitude.
- ② Cooling capacity coefficient: The product's cooling capacity will lower to one that multiplied by the described value at each altitude.

Altitude [m]	①Upper limit of ambient temperature [°C] 40°C products	② Cooling capacity coefficient
Less than 1000 m	40	1.00
Less than 1500 m	38	0.85
Less than 2000 m	36	0.80
Less than 2500 m	34	0.75
Less than 3000 m	32	0.70

- 15) In locations where strong impacts or vibrations occur
- 16) In locations where a massive force strong enough to deform the product is applied or the weight from a heavy object is applied
- 17) In locations where there is not sufficient space for maintenance

2. Install in an environment where the unit will not come into direct contact with rain or snow.

These models are for indoor use only.

Do not install outdoors where rain or snow may fall on them.

3. Conduct ventilation and cooling to discharge heat. (Air-cooled refrigeration)

The heat which is cooled down through air-cooled condenser is discharged.

When using in a room which is shut tightly, ambient temperature will exceed the specification range stipulated in this catalog, which will activate the safety detector and stop the operation. In order to avoid this situation, discharge the heat outside of a room by ventilation or cooling facilities.

4. The product is not designed for clean room usage. It generates particles internally.



Be sure to read this before handling the products. Refer to the back cover for safety instructions. For temperature control equipment precautions, refer to the "Handling Precautions for SMC Products" and the "Operation Manual" on the SMC website: https://www.smcworld.com

Mounting / Installation

MWarning

- 1. Do not use the product outdoors.
- 2. Do not place heavy objects on top of this product, or step on it.

The external panel can be deformed and danger can result.

ACaution

- 1. Make sure that the rack and the rack rail can support the weight of the product.
- 2. Refer to the operation manual for this product, and secure an installation space that is necessary for the maintenance and ventilation.

<Air-cooled refrigeration>

- The air-cooled type product exhausts heat using the fan that is mounted to the product. If the product is operated with insufficient ventilation, ambient temperature may exceed 40°C, and this will affect the performance and life of the product. To prevent this ensure that suitable ventilation is available (see below).
- 2. For installation indoors, ventilation ports and a ventilation fan should be equipped as needed.



<Heat radiation amount/Required ventilation rate>

	•		
Heat radiation	Required ventilation rate [m ³ /min]		
amount	Differential temp. of 3°C between inside	Differential temp. of 6°C between inside	
[kW]	and outside of installation area	and outside of installation area	
Approx. 2	40	20	
Approx. 2	40	20	
Approx. 4	70	40	
Approx. 5	90	50	
Approx. 6	100	60	
Approx. 10	140	70	
	Heat radiation amount [kW] Approx. 2 Approx. 2 Approx. 4 Approx. 5 Approx. 6 Approx. 10	Heat radiation amount [kW]Required ventilat Differential temp. of 3°C between inside and outside of installation areaApprox. 240Approx. 240Approx. 470Approx. 590Approx. 6100Approx. 10140	

Piping

▲Caution

1. Regarding the circulating fluid pipings, consider carefully the suitability for shutoff pressure, temperature and circulating fluid.

If the operating performance is not sufficient, the pipings may burst during operation. Also, using corrosive materials such as aluminum or iron for fluid contact parts such as piping may cause clogging or leakage in the circulating fluid and facility water circuits. Provide protection against corrosion when you use the product.

2. Select the piping port size which can exceed the rated flow.

For the rated flow, refer to the pump capacity table.

- 3. When tightening at the circulating fluid inlet and outlet, drain port or overflow port of this product, use a pipe wrench to clamp the connection ports.
- 4. This product series are constant-temperature fluid circulating machines with built-in tanks.

Do not install equipment on your system side such as pumps that forcibly return the circulating fluid to the unit. Also, if you attach an external tank that is open to the air, it may become impossible to circulate the circulating fluid. Proceed with caution.

Electrical Wiring

Warning

1. Grounding should never be connected to a water line, gas line or lightning rod.

A Caution

- 1. Communication cable should be prepared by the customer.
- 2. Provide a stable power supply which is not affected by surge or distortion.

If the voltage increase ratio (dV/dt) at the zero cross should exceed 40 V/200 $\mu sec.,$ it may result in malfunction.





Be sure to read this before handling the products. Refer to the back cover for safety instructions. For temperature control equipment precautions, refer to the "Handling Precautions for SMC Products" and the "Operation Manual" on the SMC website: https://www.smcworld.com

Circulating Fluid

A Caution

- 1. Avoid oil or other foreign matter entering the circulating fluid.
- 2. When water is used as a circulating fluid, use tap water that conforms to the appropriate water quality standards. Use tap water that conforms to the standards shown below (including water used for dilution of ethylene glycol aqueous solution).

Tap Water (as a Circulating Fluid) Quality Standards

The Japan Refrigeration and Air Conditioning Industry Association JRA GL-02-1994 "Cooling water system – Circulation type – Make-up water"

				Influ	ence
	Item		Standard value	Corrosion	Scale generation
	pH (at 25°C)	—	6.0 to 8.0	0	0
_	Electric conductivity (25°C)	[µS/cm]	100*1 to 300*1	0	0
ten	Chloride ion (CI⁻)	[mg/L]	50 or less	0	
2	Sulfuric acid ion (SO ₄ ^{2–})	[mg/L]	50 or less	0	
da	Acid consumption amount (at pH4.8)	[mg/L]	50 or less		0
itar	Total hardness	[mg/L]	70 or less		0
0)	Calcium hardness (CaCO ₃)	[mg/L]	50 or less		0
	Ionic state silica (SiO ₂)	[mg/L]	30 or less		0
F	Iron (Fe)	[mg/L]	0.3 or less	0	0
ite	Copper (Cu)	[mg/L]	0.1 or less	0	
Ge	Sulfide ion (S ₂ -)	[mg/L]	Should not be detected	0	
ren	Ammonium ion (NH ₄ +)	[mg/L]	0.1 or less	0	
efe	Residual chlorine (Cl)	[mg/L]	0.3 or less	0	
Ē	Free carbon (CO ₂)	[mg/L]	4.0 or less	0	

*1 In the case of [M Ω ·cm], it will be 0.003 to 0.01.

• O: Factors that have an effect on corrosion or scale generation

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

- 3. Use an ethylene glycol aqueous solution that does not contain additives such as preservatives.
- 4. When using ethylene glycol aqueous solution, maintain a maximum concentration of 15%.

Overly high concentrations can cause a pump overload. Low concentrations, however, can lead to freezing when circulating fluid temperature is 10°C or lower and cause the thermo-chiller to break down.

5. A magnet pump or mechanical seal pump is used as the circulating pump for the circulating fluid.

It is particularly impossible to use liquid including metallic powder such as iron powder.

6. The circulating fluids listed below have been tested for thermo-chiller compatibility. (Excludes the HRR010)

No.	Fluid	Manufacturer	Concentration
4	Dowcal [™] 100 Heat	The Dow Chemical	Dilute to 30% in
1	Transfer Fluid	Company	water
2	ControXid 1642	Oelheld GmbH	Ready to use
3	Hexid A4	Applied Thermal Control Limited	Ready to use
4	Coolflow IGE	Hydratech Division of Liquitherm Technologies Group Ltd	Dilute to 25% in water
5	NALCO [®] CCL105	Nalco Water, an Ecolab Company	Ready to use

• The chiller cooling capacity and pump capacity performance may change with using the fluids listed. Customers should verify the performances with the fluid and decide to use the fluid.

- Check the compatibility with the piping and the wetted parts of the customer's equipment before use.
 Check with the circulating fluid manufacturer for the following.
- 1) Countries and regions where it can be obtained and used
 3) Safety data sheets

 2) Handling and maintenance
 4) Specifications and physical properties
- Concentration has to be value listed or less. Overly high concentrations can cause a pump overload. Low concentrations, however, can lead to freezing when circulating fluid temperature is 10°C or lower and cause the thermo-chiller to break down.

Using the fluid listed for a long time, the chiller heat exchanger performance may be reduced due to
additive deposits. It is recommended to regularly flush the inside of the piping and chiller with clean water.

In the case of a mechanical seal pump, additive deposits may appear on the outside, it is not a malfunction.

Facility Water Supply

\land Warning

<Water-cooled refrigeration>

1. The water-cooled refrigeration type thermo-chiller radiates heat to the facility water.

Prepare the facility water system that satisfies the heat radiation and the facility water specifications below.

Required facility water system

<Heat radiation amount/Facility water specifications>

Model	Heat radiation [kW]	Facility water specifications
HRR010-W	Approx. 2	
HRR012-W	Approx. 2	Defende
HRR018-W	Approx. 4	Heter to
HRR024-W	Approx. 5	in the specifications
HRR030-W	Approx. 6	in the specifications.
HRR050-W	Approx. 10	

2. When using tap water as facility water, use tap water that conforms to the appropriate water quality standards. Use tap water that conforms to the standards shown below.

<Tap Water (as Facility Water) Quality Standards>

The Japan Refrigeration and Air Conditioning Industry Association JRA GL-02-1994 "Cooling water system – Circulation type – Circulating water"

	ltere	Unit	Chanderd value	Influence	
	nem		Standard value	Corrosion	Scale generation
	pH (at 25°C)	—	6.5 to 8.2	0	0
	Electric conductivity (25°C)	[µS/cm]	100*1 to 800*1	0	0
tem	Chloride ion (CI-)	[mg/L]	200 or less	0	
Ē	Sulfuric acid ion (SO42-)	[mg/L]	200 or less	0	
lda	Acid consumption amount (at pH4.8)	[mg/L]	100 or less		0
Stal	Total hardness	[mg/L]	200 or less		0
	Calcium hardness (CaCO ₃)	[mg/L]	150 or less		0
	Ionic state silica (SiO ₂)	[mg/L]	50 or less		0
_	Iron (Fe)	[mg/L]	1.0 or less	0	0
iten	Copper (Cu)	[mg/L]	0.3 or less	0	
Ge	Sulfide ion (S2-)	[mg/L]	Should not be detected	0	
srer	Ammonium ion (NH ₄ +)	[mg/L]	1.0 or less	0	
Refe	Residual chlorine (Cl)	[mg/L]	0.3 or less	0	
1	Free carbon (CO ₂)	[mg/L]	4.0 or less	0	

*1 In the case of [M Ω ·cm], it will be 0.001 to 0.01.

 \bullet $\bigcirc:$ Factors that have an effect on corrosion or scale generation

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

3. Supply pressure of 0.5 MPa or less.

If the supply pressure is high, it will cause water leakage.

4. Be sure to prepare your utilities so that the pressure of the thermo-chiller facility water outlet is at 0 MPa (atmospheric pressure) or more.

If the facility water outlet pressure becomes negative, the internal facility water piping may collapse, and proper flow control of facility water will be impossible.

Using deionized water as facility water may cause problems such as clogging in the piping due to metal ion.

5. Do not use fluid that includes metallic powders and other foreign materials.

It can cause issues: clogging of the circulating fluid circuit or leakage.



Be sure to read this before handling the products. Refer to the back cover for safety instructions. For temperature control equipment precautions, refer to the "Handling Precautions for SMC Products" and the "Operation Manual" on the SMC website: https://www.smcworld.com

Operation

\land Warning

1. Confirmation before operation

1) The fluid level of a tank should be within the specified range of "HIGH" and "LOW."

When exceeding the specified level, the circulating fluid will overflow.

2) Remove the air.

Conduct a trial operation, looking at the fluid level.

Since the fluid level will go down when the air is removed from the user's piping system, supply water once again when the fluid level is reduced. When there is no reduction in the fluid level, the job of removing the air is completed.

2. Confirmation during operation

· Check the circulating fluid temperature.

The operating temperature range of the circulating fluid is between 5 and 35°C.

When the amount of heat generated from the user's equipment is greater than the product's capability, the circulating fluid temperature may exceed this range. Use caution regarding this matter.

3. Emergency stop method

· When an abnormality is confirmed, stop the machine immediately. When operation is stopped by the RUN/STOP key, turn off the power switch.

Operation Restart Time/Operation and Suspension Frequency

A Caution

1. Wait five minutes or more before restarting operation after it has been stopped. If the operation is restarted within five minutes, the protection circuit may activate and the operation may not start properly.

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

Protection Circuit

A Caution

1. If operating in the conditions below, the protection circuit will activate and an operation may not be performed or will stop.

- · Power supply voltage is not within the rated voltage range of ±10%.
- In case the water level inside the tank is reduced abnormally.
- · Circulating fluid temperature is too high.
- · Compared to the cooling capacity, the heat generation amount of the user's equipment is too high.
- Ambient temperature is too high. (40°C or more)
- · Refrigerant pressure is too high.
- · Ventilation grille is clogged with dust or dirt.

Maintenance

A Caution

<Periodical inspection every one month>

1. Clean the ventilation grille.

If the dustproof filter becomes clogged with dust or debris, a decline in cooling performance can result. In order to avoid deforming or damaging the dustproof filter, clean it with a long-haired brush or air gun.

<Periodical inspection every three months>

1. Inspect the circulating fluid.

1) When using tap water

· Replacement of tap water

Failure to replace the tap water can lead to the development of bacteria or algae. Replace it regularly depending on your usage conditions.

2) When using ethylene glycol aqueous solution Use a concentration meter to confirm that the concentration does not exceed 15%.

Dilute or add as needed to adjust the concentration.

<Periodical inspection during the winter season>

1. Make water-removal arrangements beforehand.

If there is a risk of the circulating fluid freezing when the product is stopped, release the circulating fluid in advance.

2. Consult a professional.

For additional methods to prevent freezing (such as commercially available tape heaters, etc.), consult a professional for advice.

Refrigerant with GWP reference

	Global warming potential (GWP)			
Refrigerant	Regulation (EU) No 517/2014 (Based on the IPCC AR4)	Revised Fluorocarbons Recovery and Destruction Law (Japanese law)		
R134a	1,430	1,430		
R404A	3,922	3,920		
R407C	1,774	1,770		
R410A	2,088	2,090		

* This product is hermetically sealed and contains fluorinated greenhouse gases (HFC). When this product is sold on the market in the EU after January 1, 2017, it needs to be compliant with the quota system of the F-Gas Regulation in the EU.

See specification table for refrigerant used in the product.





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), and other safety regulations.

I I.

н

н

I. I.

I. I.

ы,

▲ Caution:	Caution indicates a hazard with a low level of risk which, if not avoided, could result in minor or moderate injury.
A 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.

MWarning

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

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

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

The product specified here may become unsafe if handled incorrectly. The installation, operation, and maintenance of the product must be performed by an operator who is appropriately trained and experienced and who has a thorough understanding of the precautions in the operation manual and maintenance materials.

- 3. Contact SMC beforehand and take special consideration of safety measures if the product is to be used in any of the following conditions.
 - 1. Use of the product under conditions and environments outside of the specifications described in the catalog or operation manual.
 - 2. Installation on equipment in conjunction with atomic energy, railways, air navigation, space, shipping, vehicles, military, medical treatment, combustion and recreation, or equipment in contact with food and beverages, emergency stop circuits, clutch and brake circuits in press applications, safety equipment or other applications unsuitable for the standard specifications described in the product catalog
 - 3. An application which could have negative effects on people, property, or animals requiring special safety analysis.

Caution

1. The product is provided for use in manufacturing industries. The product herein described is basically provided for peaceful use in manufacturing industries.

If considering using the product in other industries, consult SMC beforehand and exchange specifications or a contract if necessary.

If anything is unclear, contact your nearest sales branch.

Compliance Requirements

- 1. The use of SMC products with production equipment for the manufacture of weapons of mass destruction (WMD) or any other weapon is strictly prohibited.
- The exports of SMC products or technology from one country to another are governed by the relevant security laws and regulations of the countries involved in the transaction. Prior to the shipment of a SMC product to another country, assure that all local rules governing that export are known and followed.

SMC products are not intended for use as instruments for legal metrology. Measurement instruments that SMC manufactures or sells have not been qualified by type approval tests relevant to the metrology (measurement) laws of each country. Therefore, SMC products cannot be used for business or certification ordained by the metrology (measurement) laws of each country.

Limited warranty and Disclaimer/ **Compliance Requirements**

The product used is subject to the following "Limited warranty and Disclaimer" and 'Compliance Requirements". Read and accept them before using the product.

Limited warranty and Disclaimer

1. Period

The warranty period of the product is 1 year in service or 1.5 years after the product is delivered, whichever is first.

2. Scope

For any failure reported within the warranty period which is clearly our responsibility, replacement parts will be provided. In that case, removed parts shall become the property of SMC.

This guarantee applies only to our product independently, and not to any other damage incurred due to the failure of the product.

3. Content

- The following situations are out of scope of this warranty
- The product was incorrectly installed or connected with other equipment.
- The product was modified or altered in construction. 3. The failure was a secondary failure of the product caused by the failure of equipment connected to the product.
- 4. The failure was caused by a natural disaster such as an earthquake, typhoon, or flood, or by an accident or fire
- The failure was caused by operation different from that shown in the 5. Operation Manual or outside of the specifications
- 6. The checks and maintenance specified (daily checks and regular checks) were not performed.
- 7. The failure was caused by the use of circulating fluid or facility water other than those specified
- 8. The failure occurred naturally over time (such as discoloration of a painted or plated face).
- 9. The failure does not affect the functioning of the product (such as new sounds, noises and vibrations)
- 10. The failure was due to the "Installation Environment" specified in the Operation Manual.

4. Disclaimer

- Expenses for daily and regular checks
 Expenses for repairs performed by other companies
- Expenses for transfer, installation and removal of the product 4 Expenses for replacement of parts other than those in this product, or for
- the supply of liquids 5. Inconvenience and loss due to product failure (such as telephone bills,
- compensation for workplace closure, and commercial losses) For warranted repair, please contact the supplier you purchased this product from.

YΧ

Revision History Edition B * Single-phase 100 VAC (50/60 Hz) and 110 VAC (60 Hz) power supplies Edition D * The HRR050 (air-cooled type, water-cooled type) has been added. have been added. * A caster adjuster-foot kit has been added as an optional accessory. * Number of pages has been increased from 44 to 48. The circulating fluid temperature, flow rate, and electric conductivity setting/display range have been expanded. Number of pages has been increased from 32 to 36. XY Edition C * The HRR010 (air-cooled type, water-cooled type) has been added. * Number of pages has been increased from 36 to 44. Y٧

A Safety Instructions Be sure to read the "Handling Precautions for SMC Products" (M-E03-3) and "Operation Manual" before use.