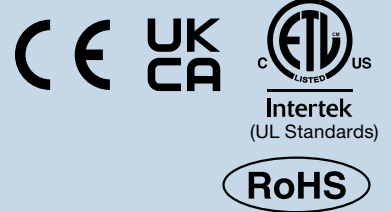


Circulating Fluid Temperature Controller

New

Low GWP Refrigerant Chiller



Thermo-chiller Standard Type

GWP:146\*1

EU refrigerant regulations: GWP150 or more
US refrigerant regulations: GWP700 or more
California, US refrigerant regulations: GWP750 or more

\*1 Regulation (EU) 2024/573, AIM Act 40 CFR Part 84

Environmentally friendly

R454C as refrigerant

Not available for air transport



Lightweight/Compact

Temperature stability ±0.1°C

Same width for all models: 377 mm

Table with 5 columns: Model, Size [mm], Weight (Air-cooled/Water-cooled), Cooling capacity (60 Hz), and Set temperature range. Rows include models HRSF012, HRSF018, HRSF024, HRSF030, and HRSF060.

Compatible with power supplies in Europe, Asia, Oceania, and North, Central, and South America

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

HRSF Series



CAT.ES40-77A

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### Circulating Fluid Temperature Controller

#### **Low GWP Refrigerant Chiller** Thermo-chiller HRSF Series

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# Low GWP Refrigerant Chiller



# Thermo-chiller Standard Type

## Single-phase 200 to 230 VAC

### HRSF Series



### How to Order

#### Air-cooled refrigeration

**HRSF 018 - A - 20 -**

#### Cooling capacity

<b>012</b>	Cooling capacity 1100/1300 W (50/60 Hz)
<b>018</b>	Cooling capacity 1700/1900 W (50/60 Hz)
<b>024</b>	Cooling capacity 2100/2400 W (50/60 Hz)
<b>030</b>	Cooling capacity 2600/3200 W (50/60 Hz)
<b>060</b>	Cooling capacity 4900/5900 W (50/60 Hz)

\* The pump of 060 have a mechanical seal and leakage could occur depending on circulating fluid quality. We recommend you to use the particle filter kit, HRS-PF004, as a preventive measure.

#### Cooling method

<b>A</b>	Air-cooled refrigeration
----------	--------------------------

#### Pipe thread type

<b>Nil</b>	Rc
<b>F</b>	G (with Rc-G conversion fitting set)
<b>N</b>	NPT (with Rc-NPT conversion fitting set)

#### Option

Symbol	Option	Applicable model
<b>Nil</b>	None	
<b>B</b>	With earth leakage breaker	HRSF012/018/024 030/060
<b>J</b>	With automatic fluid fill function	
<b>M</b>	Applicable to DI water piping*1	
<b>T</b>	High-pressure pump mounted*2	HRSF012/018/024/030
<b>G</b>	High-temperature environment specification	HRSF012/018/024

\* When multiple options are combined, indicate symbols in alphabetical order.  
\*1 If using DI water that is 1 MΩ·cm or more (1 μS/cm or less), please select this option.

\*2 The cooling capacity will decrease by about 300 W from the value in the catalog.

The pump has a mechanical seal in it and leakage could occur depending on circulating fluid quality. We recommend you to use the particle filter kit, HRS-PF003, as a preventive measure.

#### Power supply

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

### Specifications \* There are different values from standard specifications. Refer to pages 11 to 13 for details.

Model	HRSF012-A□-20	HRSF018-A□-20	HRSF024-A□-20	HRSF030-A□-20	HRSF060-A□-20	
<b>Cooling method</b>	Air-cooled refrigeration					
<b>Refrigerant</b>	R454C (HFO/HFC, GWP: 146)*13					
<b>Refrigerant charge</b> kg	0.36	0.38	0.38	0.46	0.83	
<b>Control method</b>	PID control					
<b>Ambient temperature/Humidity/Altitude</b> *1, 12	Temperature: 5 to 40°C, High-temperature environment specification (option): 5 to 45°C, Humidity: 30 to 70%, Altitude: less than 3000 m					
<b>Circulating fluid system</b>	<b>Circulating fluid</b> *2	Tap water, 15% ethylene glycol aqueous solution*4				
	<b>Set temperature range</b> *1 °C	5 to 40				
	<b>Cooling capacity (50/60 Hz)*3</b> W	1100/1300	1700/1900	2100/2400	2600/3200	4900/5900
	<b>Heating capacity (50/60 Hz)*3</b> W	530/650			600/640	1000/1300
	<b>Temperature stability</b> *5 °C	±0.1				
	<b>Rated flow (50/60 Hz)*6, 7</b> L/min	7 (0.13 MPa)/7 (0.18 MPa)			23 (0.24 MPa)/28 (0.32 MPa)	
	<b>Maximum flow rate (50/60 Hz)</b> L/min	27/29			34/40	
	<b>Maximum pump head (50/60 Hz)</b> m	14/19			50	
	<b>Output</b> W	200			550	
	<b>Tank capacity</b> L	Approx. 5				
<b>Port size</b>	Rc1/2					
<b>Fluid contact material</b>	Stainless steel, Copper (Heat exchanger brazing), Brass, Alumina ceramic, Carbon, PP, PE, POM, FKM, EPDM, PVC				Stainless steel, Copper (Heat exchanger brazing), Brass, Bronze, Sic, Carbon, PP, PE, POM, FKM, EPDM, PVC	
<b>Electrical system</b>	<b>Power supply</b>	Single-phase 200 to 230 VAC (50/60 Hz) Allowable voltage range ±10%				
	<b>Circuit protector</b> A	10			20	
	<b>Applicable earth leakage breaker capacity</b> *8 A	10			20	
	<b>Rated operating current</b> A	4.6/5.1	4.7/5.2	5.1/5.9	6.5/7.1	9.8/12.5
	<b>Rated power consumption (50/60 Hz)*3</b> kVA	0.9/1.0	0.9/1.0	1.0/1.2	1.3/1.5	2.0/2.5
<b>Noise level (50/60 Hz)*9</b> dB	59/62			62/65		
<b>Accessories</b>	Fitting (for drain outlet) 1 pc.*11, Input/output signal connector 1 pc., Power supply connector 1 pc.*11, Operation Manual (for installation/operation) 1, Quick Manual (with a clear case) 1*11, Alarm code list sticker 1, Ferrite core (for communication) 1 pc., Power supply cable: Option (sold separately) to be ordered or prepared by the customer.					
<b>Weight</b> *10 kg	43			47		
				73		

\*1 No condensation should be present.

\*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). Refer to "Specific Product Precautions" for other usable circulating fluids.

\*3 ① Ambient temperature: 25°C, ② Circulating fluid temperature: 20°C, ③ Circulating fluid at the rated flow, ④ Circulating fluid: Tap water  
Refer to the cooling capacity and heating capacity graphs on pages 4 to 6 for details.

\*4 Use a 15% ethylene glycol aqueous solution if operating in a place where the circulating fluid temperature is 10°C or less.

\*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 minimum 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. (In such a case, use a bypass piping set (sold separately).)

\*8 Purchase an earth leakage breaker with a sensitivity current of 30 mA separately.  
(A product with an optional earth leakage breaker (Option B) is also available.)

\*9 Front: 1 m, height: 1 m, stable with no load, Other conditions → See \*3.

\*10 Weight in the dry state without circulating fluids

\*11 It is not provided for the HRSF060.

\*12 If the product is used at an altitude of 1000 meters or higher, the maximum allowable ambient temperature and the cooling capacity decrease. For details, refer to the operation manual.

\*13 R454C is a slightly flammable refrigerant. Avoid using this product in proximity to open flames.



## How to Order

### Water-cooled refrigeration

# HRSF 018 - W - 20 -

#### Cooling capacity

<b>012</b>	Cooling capacity 1100/1300 W (50/60 Hz)
<b>018</b>	Cooling capacity 1700/1900 W (50/60 Hz)
<b>024</b>	Cooling capacity 2100/2400 W (50/60 Hz)
<b>030</b>	Cooling capacity 2600/3200 W (50/60 Hz)
<b>060</b>	Cooling capacity 4900/5900 W (50/60 Hz)

\* The pump of 060 have a mechanical seal and leakage could occur depending on circulating fluid quality. We recommend you to use the particle filter kit, HRS-PF004, as a preventive measure.

#### Cooling method

<b>W</b>	Water-cooled refrigeration
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#### Pipe thread type

<b>Nil</b>	Rc
<b>F</b>	G (with Rc-G conversion fitting set)
<b>N</b>	NPT (with Rc-NPT conversion fitting set)

#### Power supply

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

#### Option

Symbol	Option	Applicable model
<b>Nil</b>	None	
<b>B</b>	With earth leakage breaker	HRSF012/018/024 030/060
<b>J</b>	With automatic fluid fill function	
<b>M</b>	Applicable to DI water piping*1	
<b>T</b>	High-pressure pump mounted*2	HRSF012/018/024/030

• When multiple options are combined, indicate symbols in alphabetical order.  
\*1 If using DI water that is 1 MΩ·cm or more (1 μS/cm or less), please select this option.

\*2 The cooling capacity will decrease by about 300 W from the value in the catalog.

The pump has a mechanical seal in it and leakage could occur depending on circulating fluid quality. We recommend you to use the particle filter kit, HRS-PF003, as a preventive measure.

## Specifications \* There are different values from standard specifications. Refer to pages 11 to 13 for details.

Model	HRSF012-W□-20	HRSF018-W□-20	HRSF024-W□-20	HRSF030-W□-20	HRSF060-W□-20	
<b>Cooling method</b>	Water-cooled refrigeration					
<b>Refrigerant</b>	R454C (HFO/HFC, GWP: 146)*13					
<b>Refrigerant charge</b> kg	0.33	0.34	0.34	0.41	0.72	
<b>Control method</b>	PID control					
<b>Ambient temperature/Humidity/Altitude</b> *1	Temperature: 5 to 40°C, Humidity: 30 to 70%, Altitude: less than 3000 m					
<b>Circulating fluid system</b>	<b>Circulating fluid</b> *2	Tap water, 15% ethylene glycol aqueous solution*4				
	<b>Set temperature range</b> *1 °C	5 to 40				
	<b>Cooling capacity (50/60 Hz)</b> *3 W	1100/1300	1700/1900	2100/2400	2600/3200	4900/5900
	<b>Heating capacity (50/60 Hz)</b> *3 W	530/650			400/600	1000/1300
	<b>Temperature stability</b> *5 °C	±0.1				
	<b>Rated flow (50/60 Hz)</b> *6,7 L/min	7 (0.13 MPa)/7 (0.18 MPa)			23 (0.24 MPa)/28 (0.32 MPa)	
	<b>Maximum flow rate (50/60 Hz)</b> L/min	27/29		34/40		31/42
	<b>Maximum pump head (50/60 Hz)</b> m	14/19			50	
	<b>Output</b> W	200			550	
	<b>Tank capacity</b> L	Approx. 5				
<b>Port size</b>	Rc1/2					
<b>Fluid contact material</b>	Stainless steel, Copper (Heat exchanger brazing), Brass, Alumina ceramic, Carbon, PP, PE, POM, FKM, EPDM, PVC				Stainless steel, Copper (Heat exchanger brazing), Brass, Bronze, Sic, Carbon, PP, PE, POM, FKM, EPDM, PVC	
<b>Facility water system</b>	<b>Temperature range</b> °C	5 to 40				
	<b>Pressure range</b> MPa	0.3 to 0.5				
	<b>Required flow rate (50/60 Hz)</b> *11 L/min	8	12	14	15	17
	<b>Inlet-outlet pressure differential of facility water</b> MPa	0.3 or more				
<b>Port size</b>	Rc3/8				Rc1/2	
<b>Fluid contact material</b>	Stainless steel, Copper (Heat exchanger brazing), Bronze, NBR					
<b>Electrical system</b>	<b>Power supply</b>	Single-phase 200 to 230 VAC (50/60 Hz) Allowable voltage range ±10%				
	<b>Circuit protector</b> A	10				20
	<b>Applicable earth leakage breaker capacity</b> *8 A	10				20
	<b>Rated operating current</b> A	4.6/5.1	4.7/5.2	5.1/5.9	5.8/6.2	9.0/12.0
	<b>Rated power consumption (50/60 Hz)</b> *3 kVA	0.9/1.0	0.9/1.0	1.0/1.2	1.2/1.4	1.8/2.4
	<b>Noise level (50/60 Hz)</b> *9 dB	59/62		62/65		66/68
<b>Accessories</b>	Fitting (for drain outlet) 1 pc.*12, Input/output signal connector 1 pc., Power supply connector 1 pc.*12, Operation Manual (for installation/operation) 1, Quick Manual (with a clear case) 1*12, Alarm code list sticker 1, Ferrite core (for communication) 1 pc., Power supply cable: Option (sold separately) to be ordered or prepared by the customer.					
<b>Weight</b> *10 kg	43		46		67	

\*1 No condensation should be present.

\*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). Refer to "Specific Product Precautions" for other usable circulating fluids.

\*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 Facility water temperature: 25°C Refer to the cooling capacity and heating capacity graphs on pages 4 to 6 for details.

\*4 Use a 15% ethylene glycol aqueous solution if operating in a place where the circulating fluid temperature is 10°C or less.

\*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 minimum 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. (In such a case, use a bypass piping set (sold separately).)

\*8 Purchase an earth leakage breaker with a sensitivity current of 30 mA separately.

(A product with an optional earth leakage breaker (Option B) is also available.)

\*9 Front: 1 m, height: 1 m, stable with no load. Other conditions → See \*3.

\*10 Weight in the dry state without circulating fluids

\*11 The required flow rate when the cooling capacity load is applied at a circulating fluid temperature of 20°C, and circulating fluid rated flow and facility water temperature of 25°C The actual flow rate of facility water will fluctuate according to your operating conditions.

\*12 It is not provided for the HRSF060.

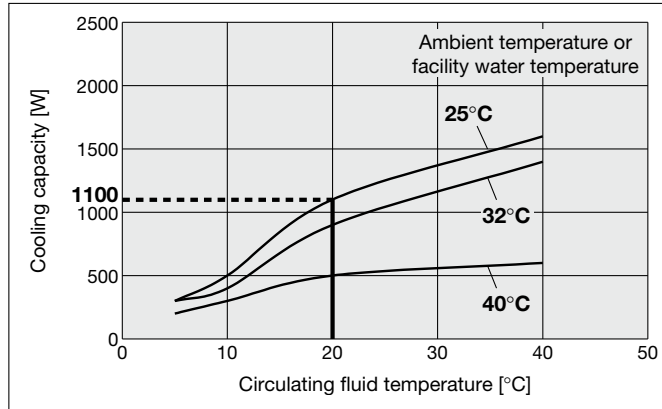
\*13 R454C is a slightly flammable refrigerant. Avoid using this product in proximity to open flames.



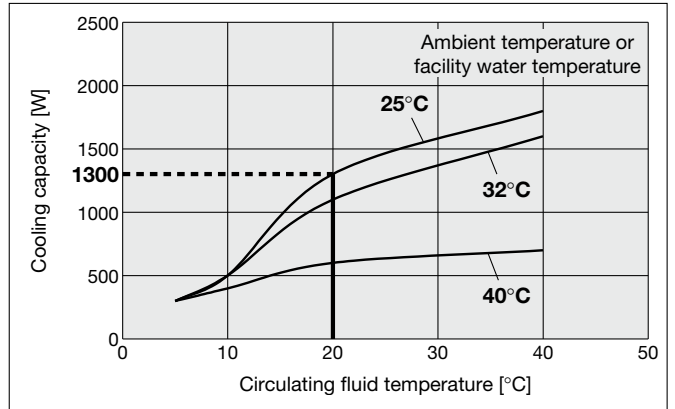
\* If the product is used at an altitude of 1000 meters or higher, the maximum allowable ambient temperature and the cooling capacity decrease. For details, refer to the operation manual.  
 \* For models with a high-pressure pump mounted (-T), the cooling capacity will decrease by about 300 W from each graph.

**Cooling Capacity**

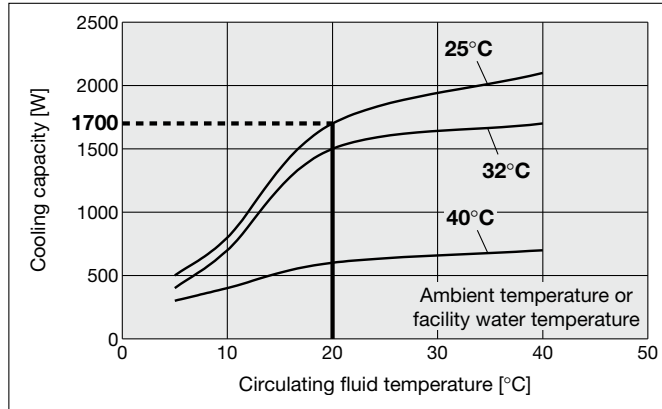
**HRSF012-A-20, HRSF012-W-20** (Single-phase 200 to 230 VAC) (50 Hz)



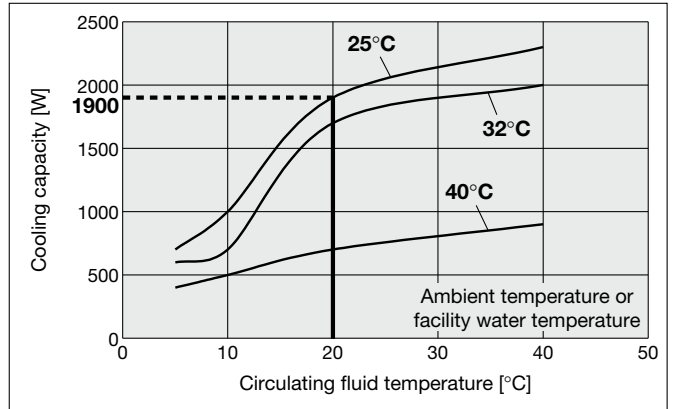
(60 Hz)



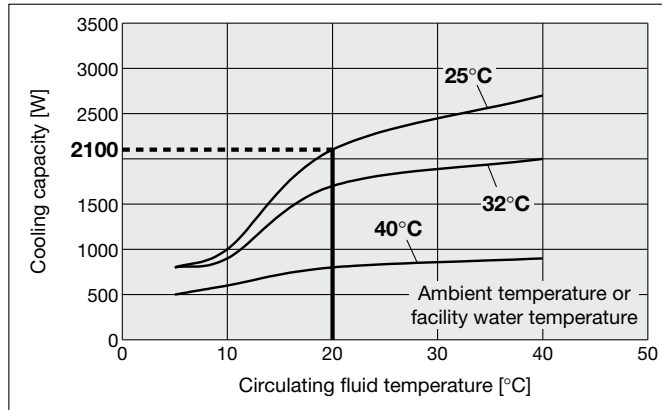
**HRSF018-A-20, HRSF018-W-20** (Single-phase 200 to 230 VAC) (50 Hz)



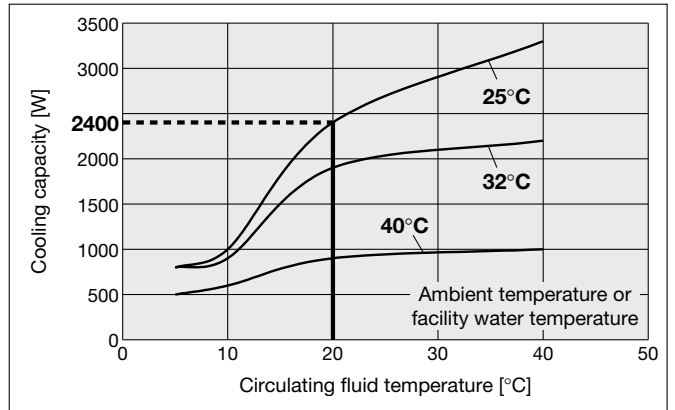
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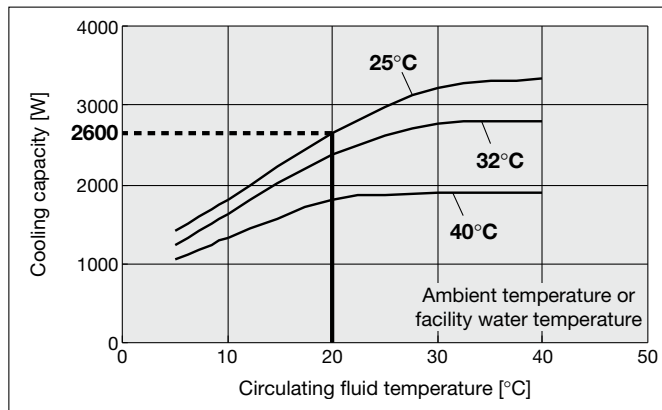
**HRSF024-A-20, HRSF024-W-20** (Single-phase 200 to 230 VAC) (50 Hz)



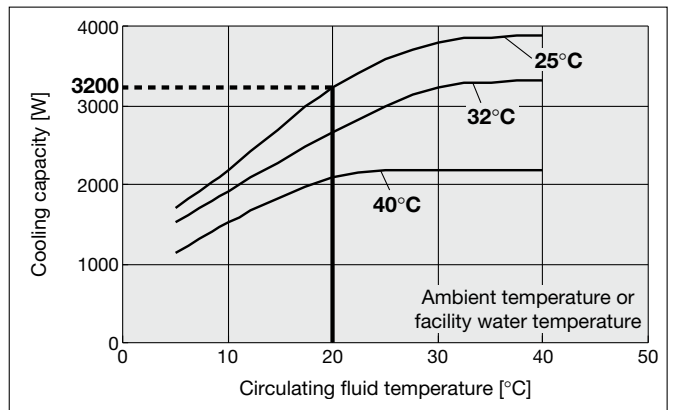
(60 Hz)



**HRSF030-A-20, HRSF030-W-20** (Single-phase 200 to 230 VAC) (50 Hz)



(60 Hz)

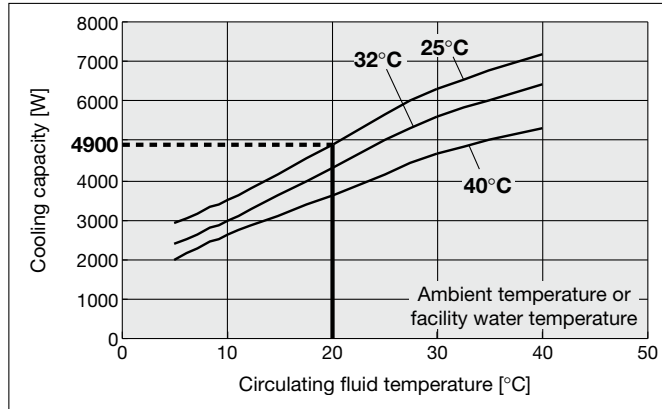


# HRSF Series Standard Type

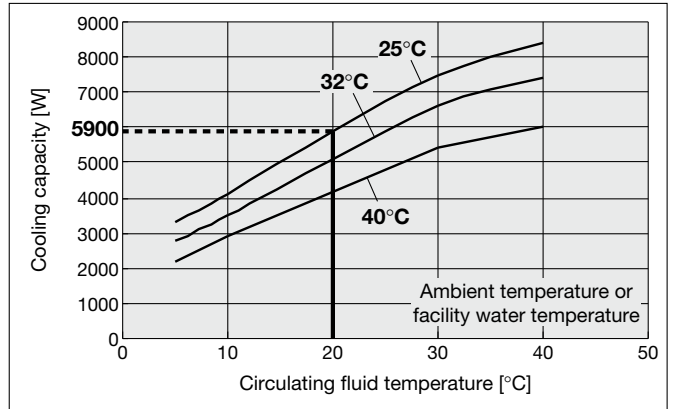
- \* If the product is used at an altitude of 1000 meters or higher, the maximum allowable ambient temperature and the cooling capacity decrease. For details, refer to the operation manual.
- \* For models with a high-pressure pump mounted (-T), the cooling capacity will decrease by about 300 W from each graph.

## Cooling Capacity

**HRSF060-A-20, HRSF060-W-20** (Single-phase 200 to 230 VAC) (50 Hz)

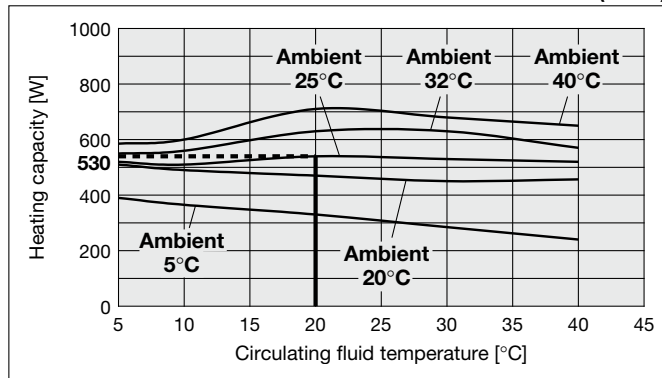


(60 Hz)

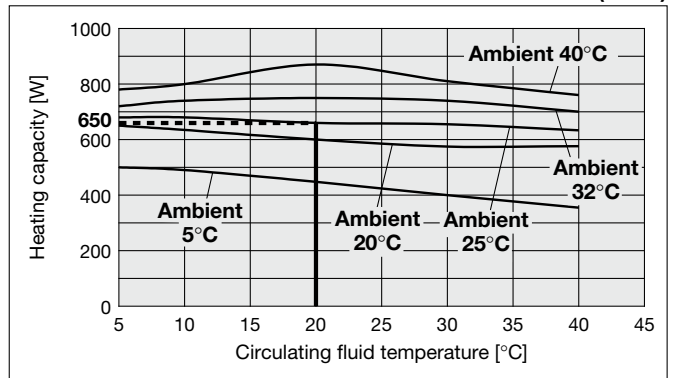


## Heating Capacity

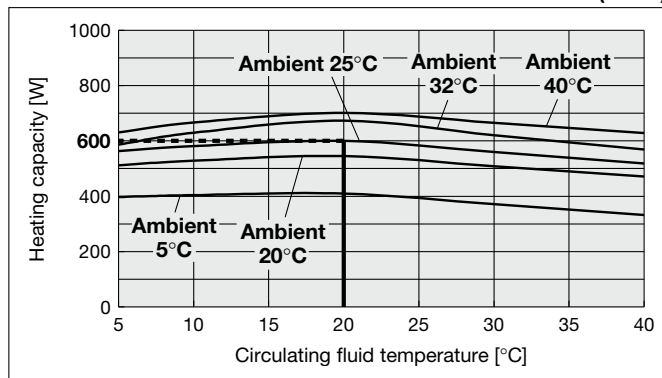
**HRSF<sup>012</sup><sub>018</sub>-A-W-20** (Single-phase 200 to 230 VAC) (50 Hz)



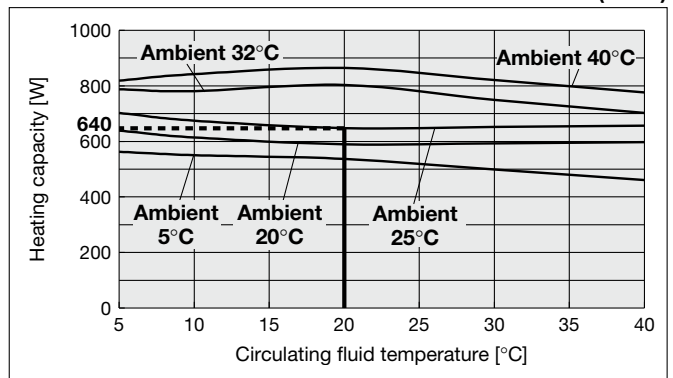
(60 Hz)



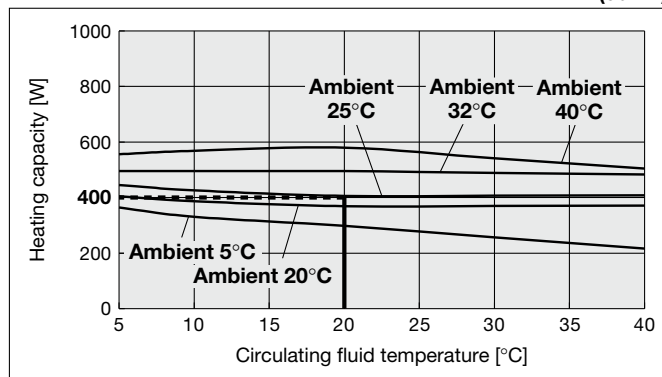
**HRSF030-A-20** (Single-phase 200 to 230 VAC) (50 Hz)



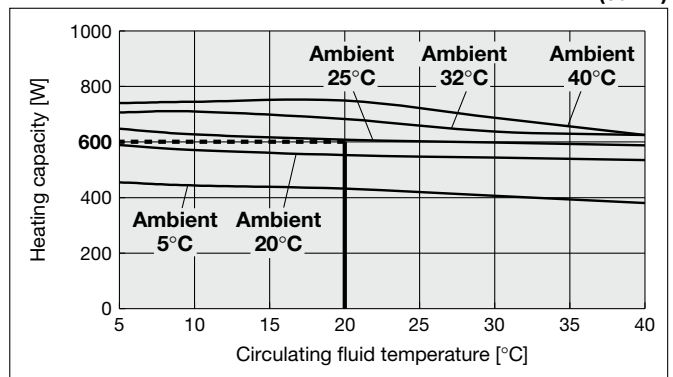
(60 Hz)



**HRSF030-W-20** (Single-phase 200 to 230 VAC) (50 Hz)

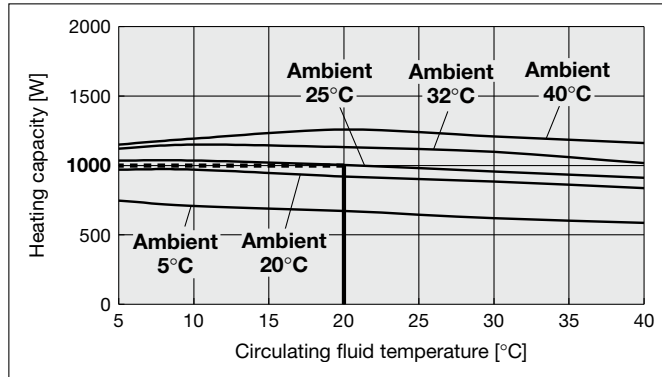


(60 Hz)

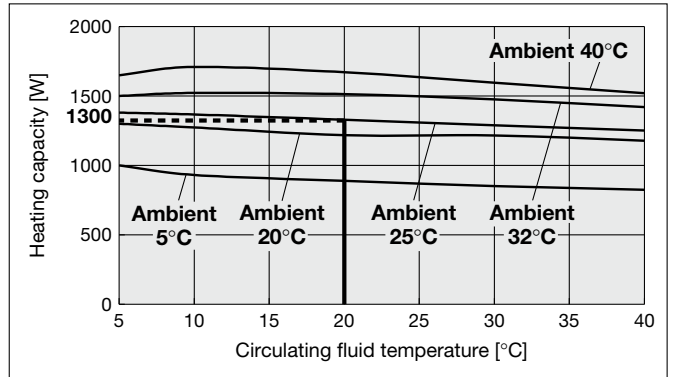


**Heating Capacity**

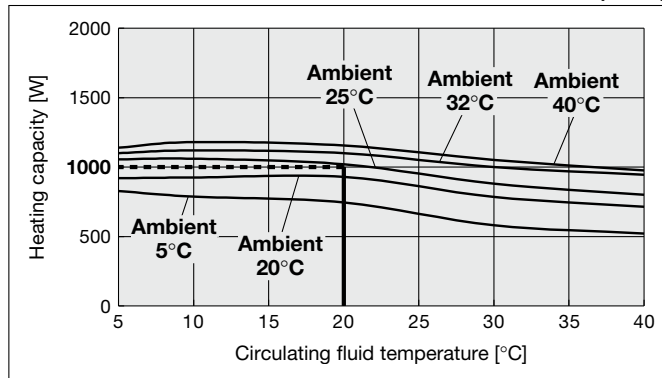
**HRSF060-A-20** (Single-phase 200 to 230 VAC) (50 Hz)



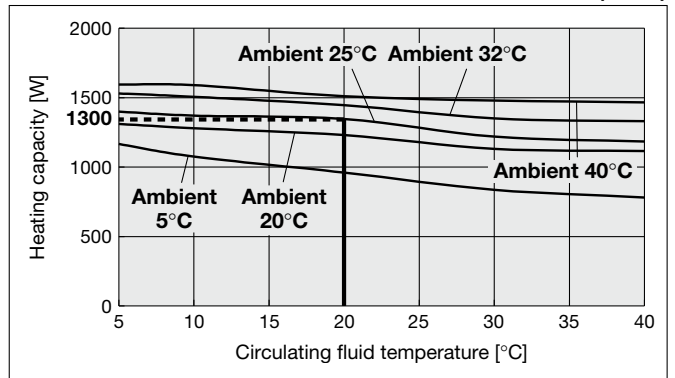
(60 Hz)



**HRSF060-W-20** (Single-phase 200 to 230 VAC) (50 Hz)

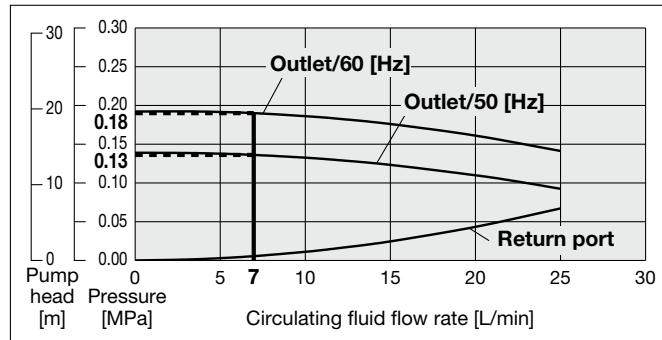


(60 Hz)

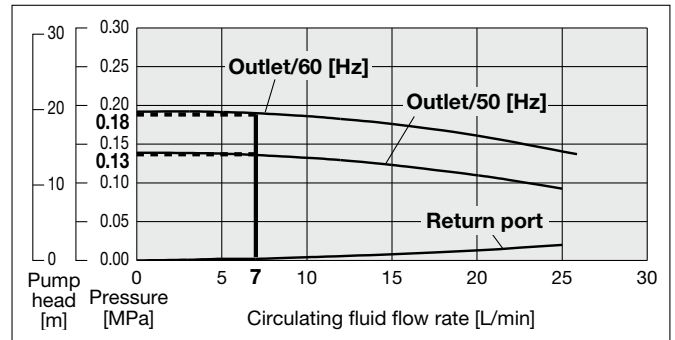


## Pump Capacity

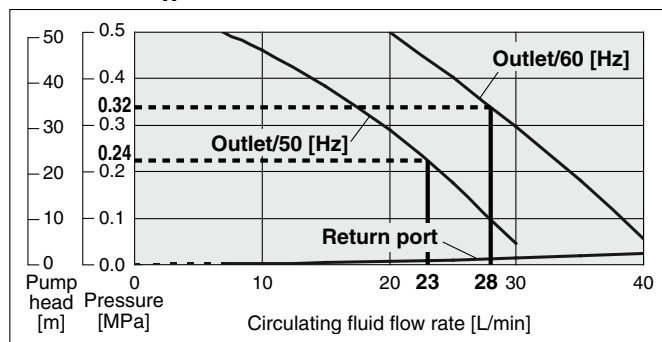
**HRSF<sup>012</sup><sub>018</sub>-<sup>A</sup><sub>024</sub>-W-20** (Single-phase 200 to 230 VAC)



**HRSF030-<sup>A</sup><sub>W</sub>-20** (Single-phase 200 to 230 VAC)

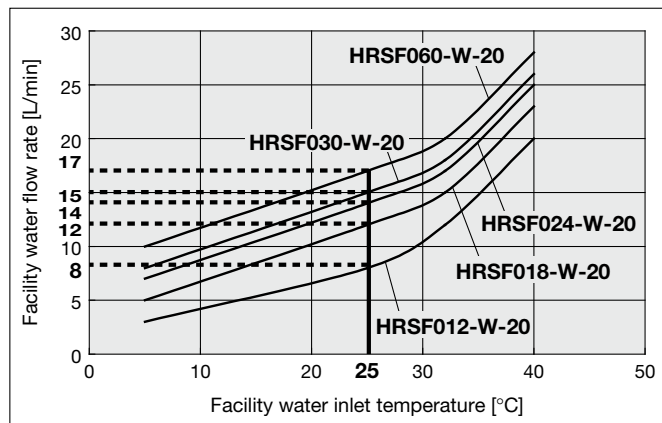


**HRSF060-<sup>A</sup><sub>W</sub>-20** (Single-phase 200 to 230 VAC)



## Required Facility Water Flow Rate

**HRSF012-W-20, HRSF018-W-20, HRSF024-W-20  
HRSF030-W-20, HRSF060-W-20**

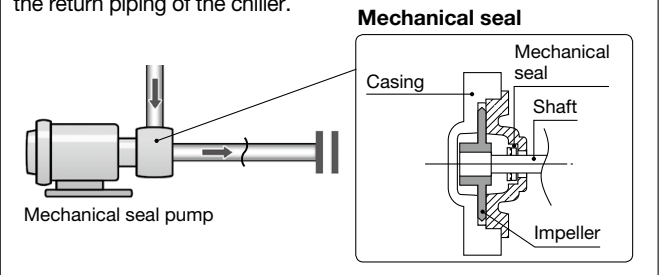


\* This is the facility water flow rate at the circulating fluid rated flow and the cooling capacity listed in the "Cooling Capacity" specifications.

## Caution

### Mechanical Seal Pump

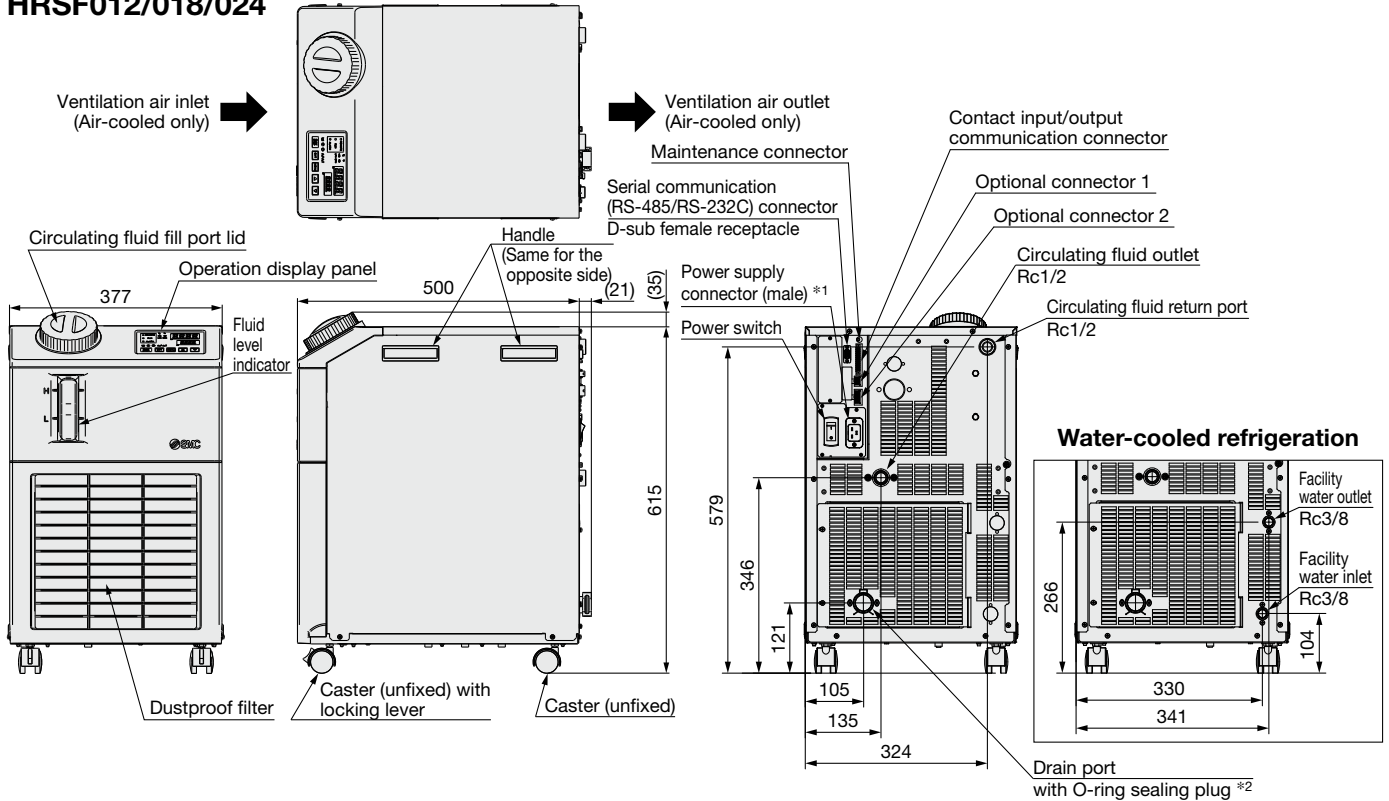
The pump used for the thermo-chiller HRSF060 series uses a mechanical seal with the fixed ring and rotary ring used for the shaft seal part. If foreign matter enter the gap between the seals, this may cause a trouble such as leakage from the seal part or pump lock. Therefore, it is strongly recommended to install the particle filter in the return piping of the chiller.





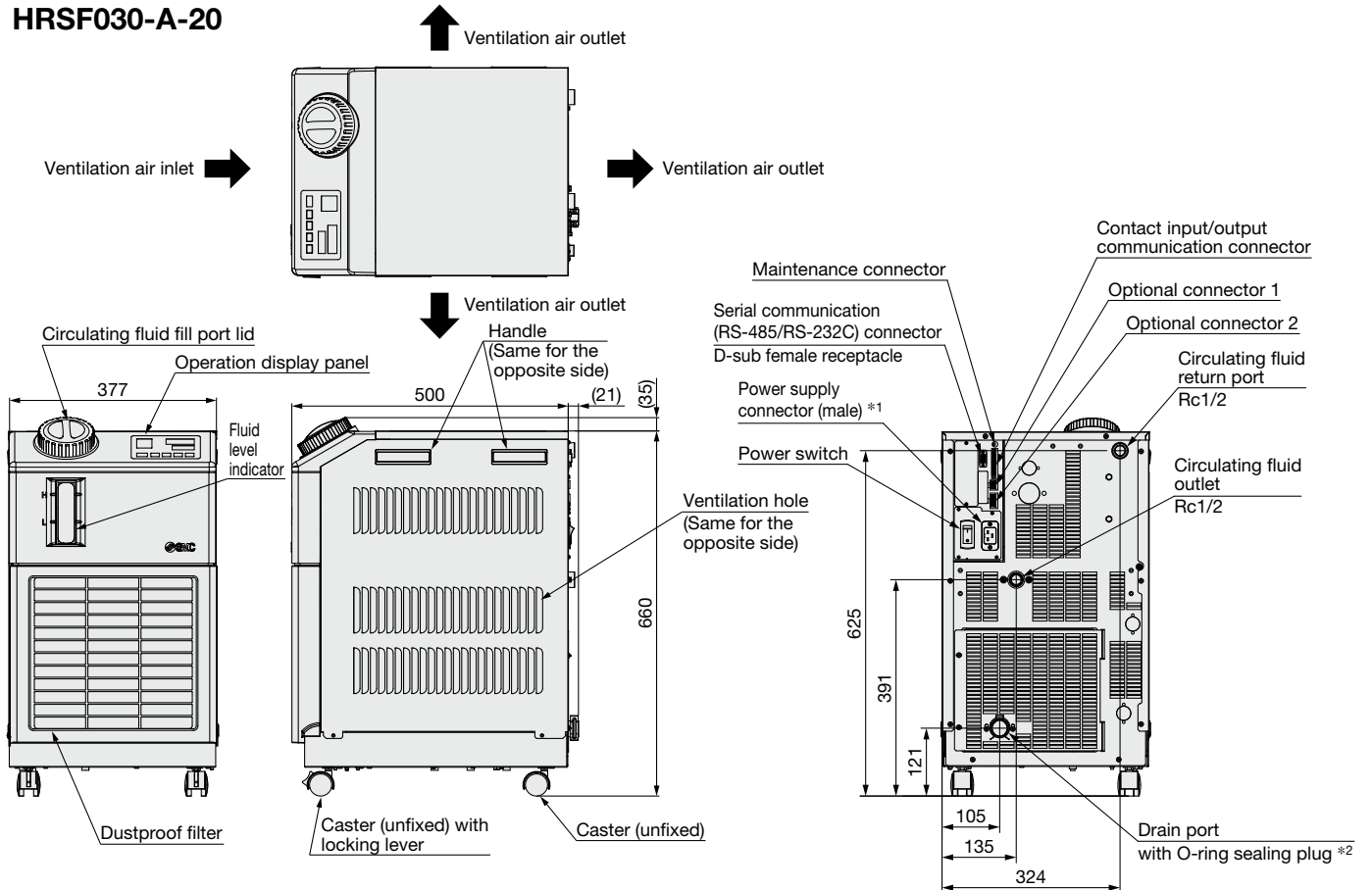
**Dimensions**

**HRSF012/018/024**



\*1 The power supply cable is not provided. (The power supply connector is provided.)  
 \*2 The conversion fitting (R3/8 male thread) is provided.

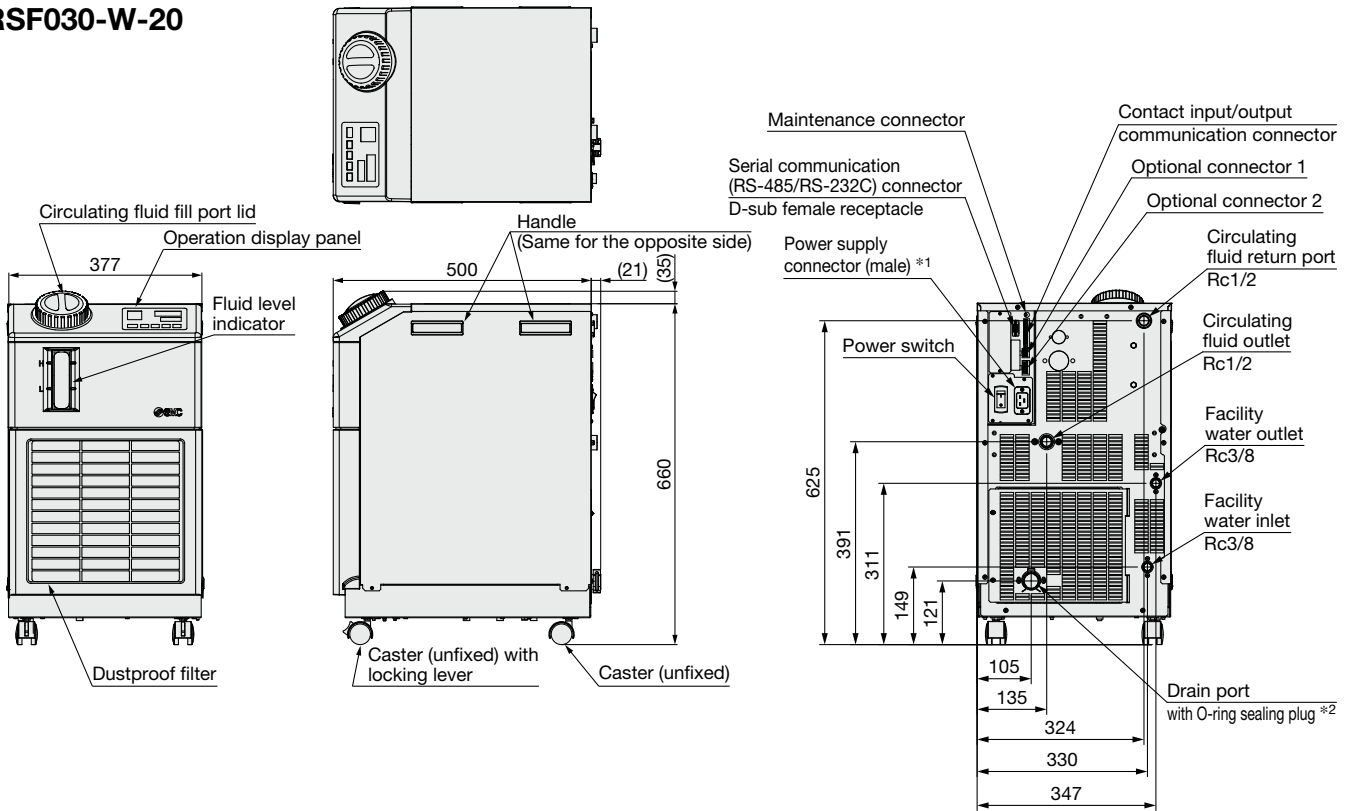
**HRSF030-A-20**



\*1 The power supply cable is not provided. (The power supply connector is provided.)  
 \*2 The conversion fitting (R3/8 male thread) is provided.

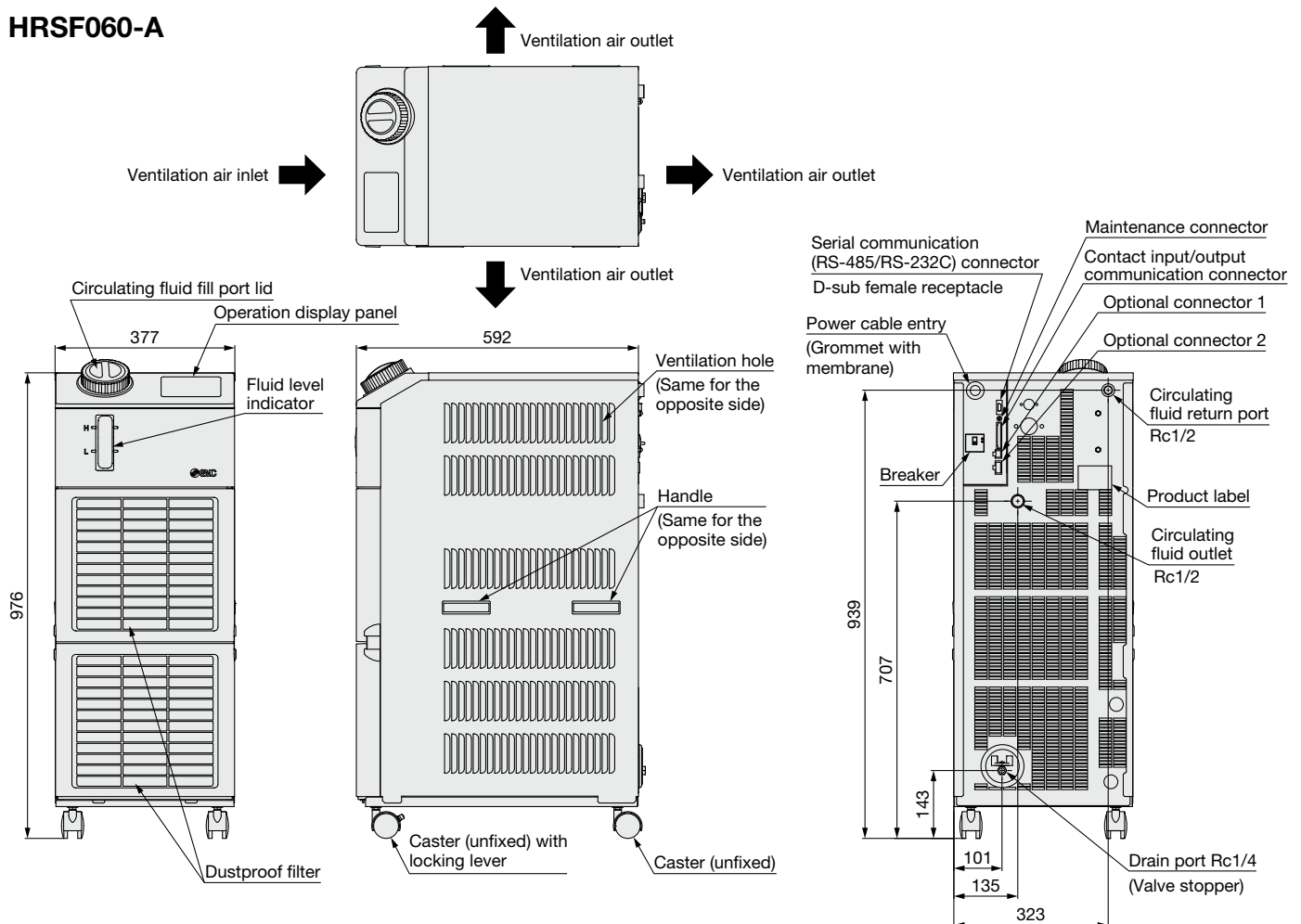
## Dimensions

### HRSF030-W-20



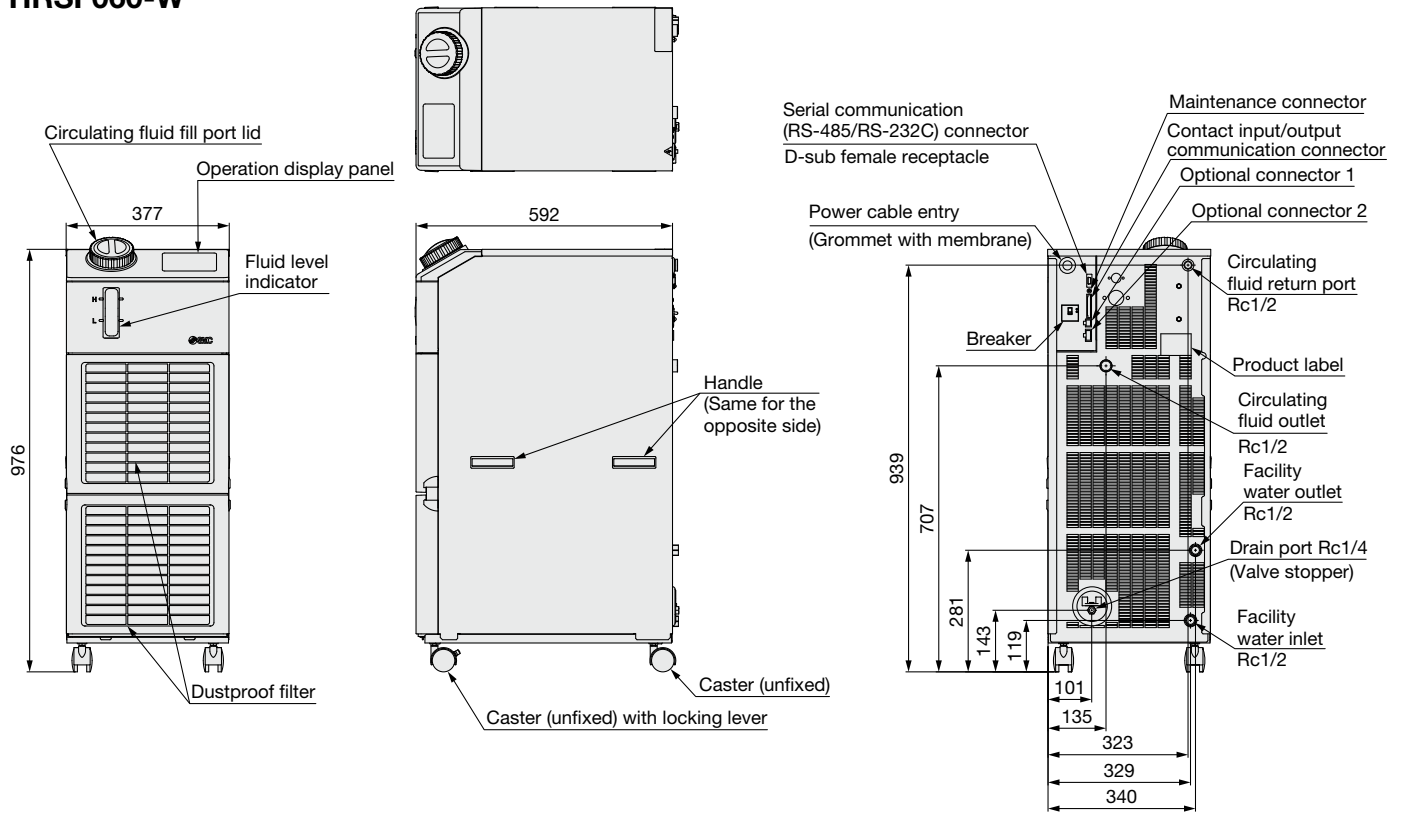
\*1 The power supply cable is not provided. (The power supply connector is provided.)  
 \*2 The conversion fitting (R3/8 male thread) is provided.

### HRSF060-A



**Dimensions**

**HRSF060-W**



# HRSF Series Options

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

## B Option symbol

### With Earth Leakage Breaker

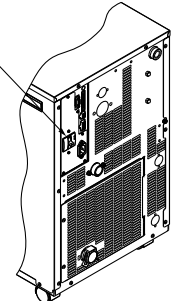
HRSF  -   -   - **B**

● With earth leakage breaker

Earth leakage breaker

In the event of a short circuit, overcurrent or overheating, the earth leakage breaker will automatically shut off the power supply.

Applicable model	HRSF012/018/024/030- <input type="text"/> - <input type="text"/> - <b>B</b>	HRSF060- <input type="text"/> - <input type="text"/> - <b>B</b>
Rated current sensitivity [mA]	30	30
Rated shutdown current [A]	10	20
Short circuit display method	Mechanical button	



## J Option symbol

### With Automatic Fluid Fill Function

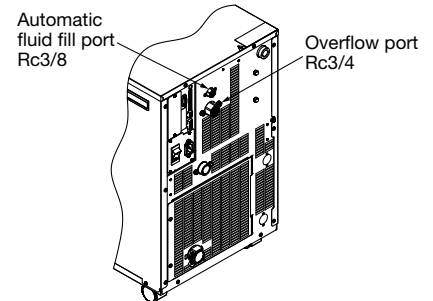
HRSF  -   -   - **J**

● With automatic fluid fill function

By installing this at the automatic fluid fill port, the circulating fluid can be automatically supplied to the product using a built-in solenoid valve for a fluid fill while the circulating fluid is decreasing.

Applicable model	HRSF012/018/024/030/060- <input type="text"/> - <input type="text"/> - <b>J</b>
Fluid fill method	Built-in solenoid valve for automatic fluid fill
Fluid fill pressure [MPa]	0.2 to 0.5

\* When the option, with automatic fluid fill function, is selected, the weight increases by 1 kg.



## M Option symbol

### Applicable to DI Water Piping

HRSF  -   -   - **M**

● Applicable to DI water piping

Contact material of the circulating fluid circuit is made from non-copper materials. Select this when using DI water with a conductivity of 1 MΩ·cm or more (1 μs/cm or less).

Applicable model	HRSF012/018/024/030- <input type="text"/> - <input type="text"/> - <b>M</b>	HRSF060- <input type="text"/> - <input type="text"/> - <b>M</b>
Contact material for circulating fluid	Stainless steel (including heat exchanger brazing), Alumina ceramic, Carbon, PP, PE, POM, FKM, EPDM, PVC	Stainless steel (including heat exchanger brazing), Sic, Carbon, PP, PE, POM, FKM, EPDM, PVC

\* No change in external dimensions

## T Option symbol

### High-Pressure Pump Mounted

HRSF  -   -   - **T /MT**

● 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 HRSF060 cannot be selected.

Applicable model		HRSF012/018/024/030- <input type="text"/> - <input type="text"/> - <b>T</b>	HRSF012/018/024/030- <input type="text"/> - <input type="text"/> - <b>MT</b> *1
Pump	Rated flow (50/60 Hz)*2,3	L/min 10 (0.44 MPa)/14 (0.40 MPa)	10 (0.32 MPa)/14 (0.32 MPa)
	Maximum flow rate (50/60 Hz)	L/min	18/22
	Maximum pump head (50/60 Hz)	m	70
	Output	W	550
Circuit protector	A	15 (10 A for standard)	
Recommended earth leakage breaker capacity	A	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)	

\*1 -MT: Applicable to DI water piping + High-pressure pump

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

\*3 The required minimum flow rate for maintaining the cooling capacity or temperature stability

\*4 Cooling capacity will decrease as pump power increases.

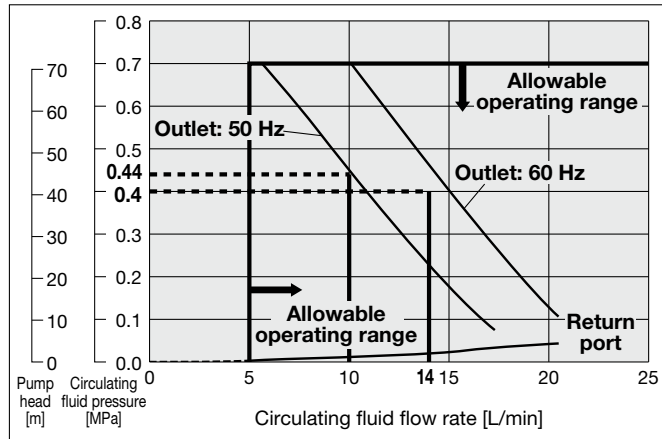
\* When the option, high-pressure pump mounted, is selected, the weight increases by 6 kg.

\* No change in external dimensions

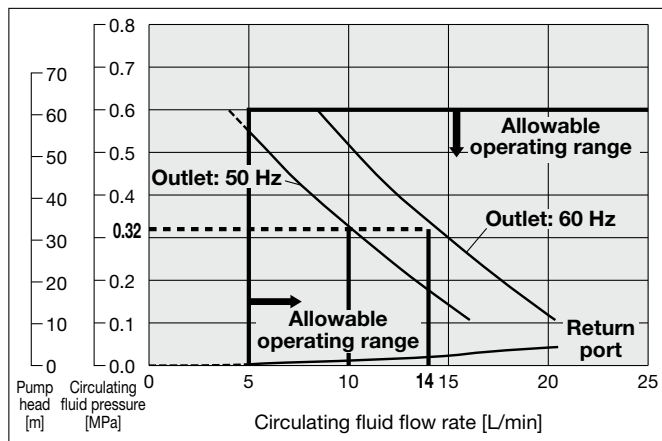


**Pump Capacity**

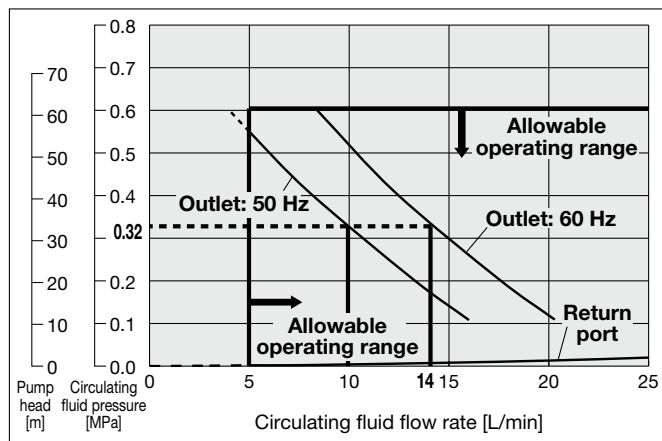
**HRSF012/018/024-□□-20-T**



**HRSF012/018/024-□□-20-MT**



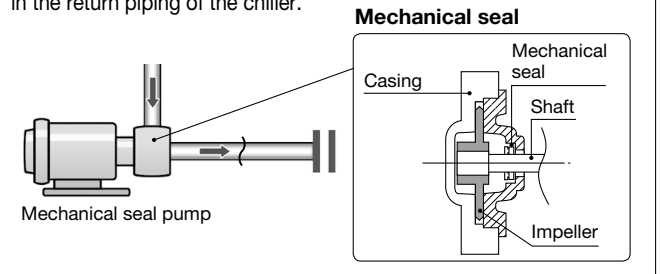
**HRSF030-□□-20-MT**



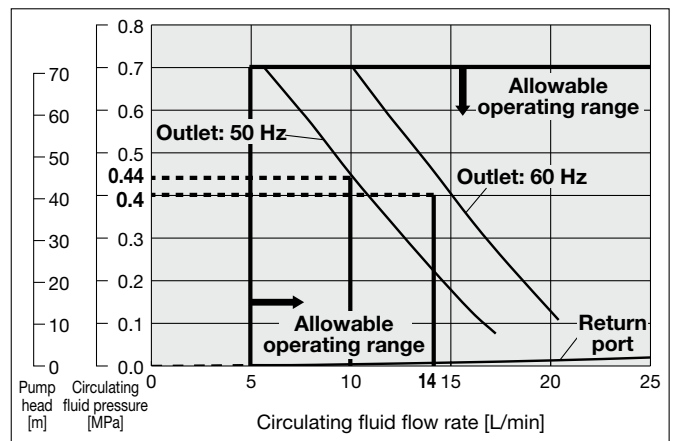
**⚠ Caution**

**Mechanical Seal Pump**

The pump used for the Option T/MT of the thermo-chiller HRSF012 to 030 uses a mechanical seal with the fixed ring and rotary ring used for the shaft seal part. If foreign matter enter the gap between the seals, this may cause a trouble such as leakage from the seal part or pump lock. Therefore, it is strongly recommended to install the particle filter in the return piping of the chiller.



**HRSF030-□□-20-T**



# HRSF Series

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

## G Option symbol High-Temperature Environment Specification

HRSF  - A  -20- G

High-temperature environment specification

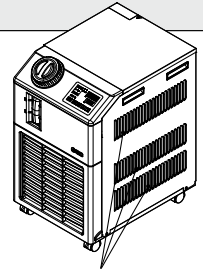
Applicable model	HRSF012/018/024-A <input type="checkbox"/> -20-G
Cooling method	Air-cooled refrigeration
Power supply	Single-phase 200 to 230 VAC (50/60 Hz)

\* No change in external dimensions

\* The HRSF030/060 cannot be selected.

This product makes use at ambient temperatures of up to 45°C possible. Also increases cooling capacity at ambient temperature of 32°C. (Cooling capacity is equal to standard products at ambient temperatures of less than 32°C.)

\* Ventilation slots are added to thermo-chiller side panels. For this reason, please provide 300 mm of ventilation space next to the side panels (do not install with sides touching walls).



Ventilation slots are added to side panels (on both sides).

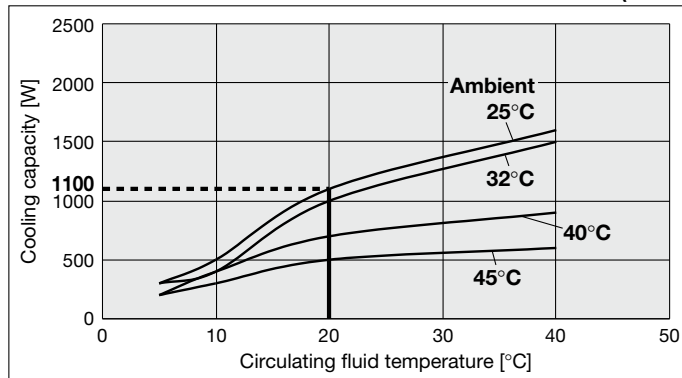
\* If the product is used at an altitude of 1000 meters or higher, the maximum allowable ambient temperature and the cooling capacity decrease. For details, refer to the operation manual.

\* For models with a high-pressure pump mounted (-T), the cooling capacity will decrease by about 300 W from each graph.

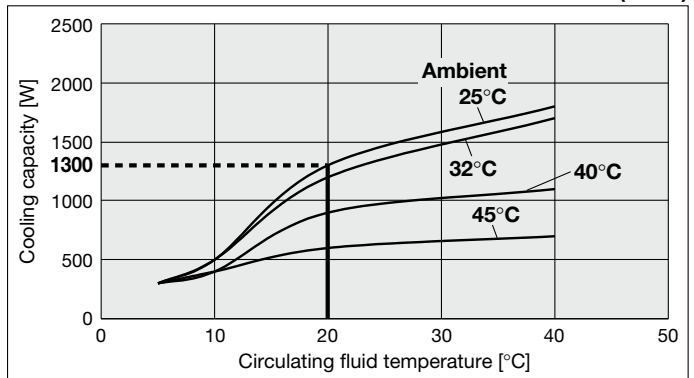
## Cooling Capacity

HRSF012-A-20-G

(50 Hz)

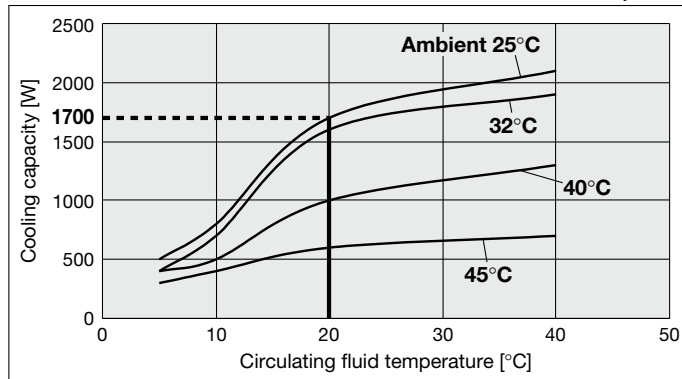


(60 Hz)

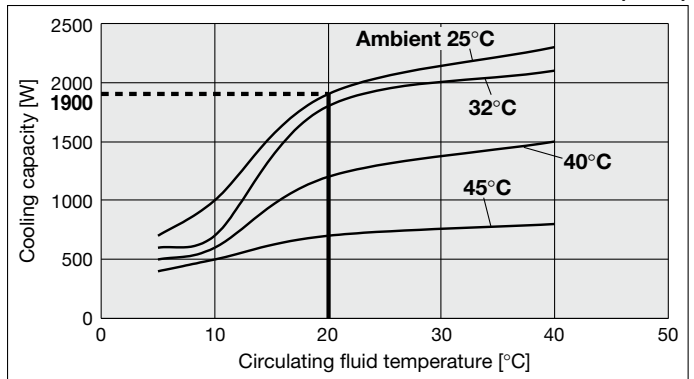


HRSF018-A-20-G

(50 Hz)

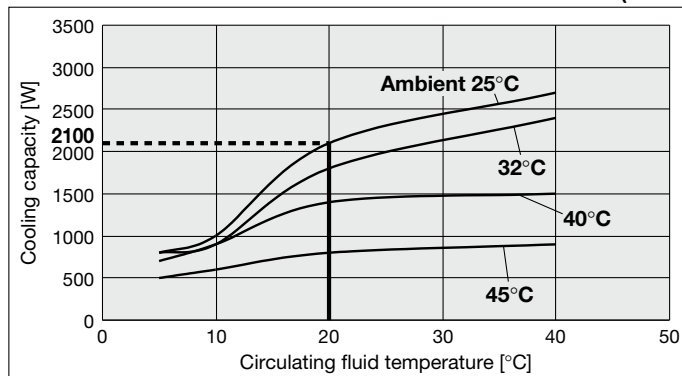


(60 Hz)

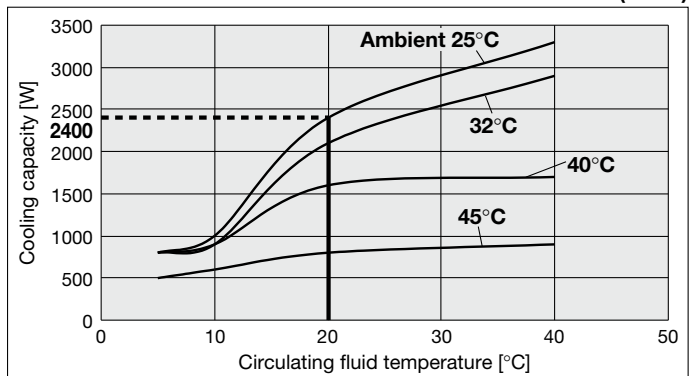


HRSF024-A-20-G

(50 Hz)



(60 Hz)



# HRSF Series

## Optional Accessories

### Applicable Model List (Air-cooled Refrigeration)

● Optional accessories applicable to this model  
★ Optional accessories recommended to be used for this model

No.	Description	Part no.	HRSF012-A-20 HRSF018-A-20	HRSF024-A-20	HRSF030-A-20	HRSF060-A-20	Option		Page	
							(for -J)	(for -T)		
①	Anti-quake bracket	HRS-TK001	●	●	●	—	—	—	16	
		HRS-TK002	—	—	—	●	—	—		
②	Piping conversion fitting (for air-cooled refrigeration)	G thread conversion fitting set	HRS-EP001	●	●	●	—	—	16	
		NPT thread conversion fitting set	HRS-EP002	●	●	●	—	—		
		G thread conversion fitting set	HRS-EP009	—	—	—	●	—		
		NPT thread conversion fitting set	HRS-EP010	—	—	—	●	—		
③	Piping conversion fitting* <sup>1</sup> (for automatic fluid fill port)	G thread conversion fitting set	HRS-EP005	—	—	—	●	—	17	
		NPT thread conversion fitting set	HRS-EP006	—	—	—	●	—		
	Piping conversion fitting* <sup>2</sup> (for drain outlet)	G thread conversion fitting set	HRS-EP007	—	—	—	—	●		
		NPT thread conversion fitting set	HRS-EP008	—	—	—	—	●		
④	Concentration meter	HRZ-BR002	●	●	●	●	●	●	18	
⑤	Bypass piping set	HRS-BP001	●	●	●	—	—	—	18	
		HRS-BP004	—	—	—	●	—	—		
⑥	Power supply cable	For single-phase 200 VAC type	HRR-CA001	●	●	●	—* <sup>3</sup>	—	19	
		For single-phase 200 VAC type	HRS-CA004	—	—	—	●	—		
	Retaining clip	HRR-S0074	●	●	●	—	—	—		
⑦	DI filter set	HRS-DP001	●	●	●	●	—	—	20	
		HRS-DP002	●	●	●	●	—	—		
⑧	Electric resistance sensor set	HRS-DI001	●	●	●	●	—	—	21	
	Electric resistance control set	With control function/bypass	HRS-DI003	●	●	●	—	—		
		With bypass	HRS-DI004	●	●	●	—	—		
		With control function	HRS-DI005	●	●	●	●	—		
⑨	Electric conductivity sensor set	HRS-DI008	●	●	●	●	—	—	22	
	Electric conductivity control set	With control function/bypass	HRS-DI009	●	●	●	—	—		
		With control function	HRS-DI011	●	●	●	●	—		
⑩	Particle filter set	(#5) OUT side	HRS-PF001	●	●	●	●	—	23	
		(#10) OUT side	HRS-PF002	—	—	—	●	—		
		(#5) IN side	HRS-PF003	●	●	●	★	—		★
		(#10) IN side	HRS-PF004	—	—	—	★	—		★
⑪	Drain pan set	With water leakage sensor	HRS-WL001	●	●	●	—	—	24	
			HRS-WL002	—	—	—	●	—		
⑫	Connector cover	HRS-BK001	●	●	●	—	—	—	25	
		HRS-BK002	—	—	—	●	—	—		
⑬	Analog gateway unit	HRS-CV001	●	●	●	●	—	—	25	
⑭	Replacement type dustproof filter set	HRS-FL001	●	●	—	—	—	—	25	
	Replacement type dustproof filter	HRS-FL002	●	●	—	—	—	—		
⑮	Filter for circulating fluid fill port	HRS-PF007	●	●	●	●	●	●	26	

\*1 When Option J is selected.

\*2 When Option T or the HRSF060 is selected.

\*3 For the HRSF060 models: To be prepared by the customer.

# HRSF Series

## Applicable Model List (Water-cooled Refrigeration)

● Optional accessories applicable to this model

★ Optional accessories recommended to be used for this model

No.	Description	Part no.	HRSF012-W-20 HRSF018-W-20	HRSF024-W-20	HRSF030-W-20	HRSF060-W-20	Option		Page	
							(for -J)	(for -T)		
①	Anti-quake bracket	HRS-TK001	●	●	●	—	—	—	16	
		HRS-TK002	—	—	—	●	—	—		
②	Piping conversion fitting (for water-cooled refrigeration)	G thread conversion fitting set	HRS-EP003	●	●	●	—	—	17	
		NPT thread conversion fitting set	HRS-EP004	●	●	●	—	—		
		G thread conversion fitting set	HRS-EP011	—	—	—	●	—		
		NPT thread conversion fitting set	HRS-EP012	—	—	—	●	—		
③	Piping conversion fitting*1 (for automatic fluid fill port)	G thread conversion fitting set	HRS-EP005	—	—	—	●	●	17	
		NPT thread conversion fitting set	HRS-EP006	—	—	—	●	●		
	Piping conversion fitting*2 (for drain outlet)	G thread conversion fitting set	HRS-EP007	—	—	—	—	●		
		NPT thread conversion fitting set	HRS-EP008	—	—	—	—	●		
④	Concentration meter	HRZ-BR002	●	●	●	●	●	●	18	
⑤	Bypass piping set	HRS-BP001	●	●	●	—	—	—	18	
		HRS-BP004	—	—	—	●	—	—		
⑥	Power supply cable	For single-phase 200 VAC type	HRR-CA001	●	●	●	—*3	—	19	
		For single-phase 200 VAC type	HRS-CA004	—	—	—	●	—		
	Retaining clip	HRR-S0074	●	●	●	—	—	—		
⑦	DI filter set	HRS-DP001	●	●	●	●	—	—	20	
		HRS-DP002	●	●	●	●	—	—		
⑧	Electric resistance sensor set	HRS-DI001	●	●	●	●	—	—	21	
	Electric resistance control set	With control function/bypass	HRS-DI003	●	●	●	—	—		
		With bypass	HRS-DI004	●	●	●	—	—		
		With control function	HRS-DI005	●	●	●	●	—		
⑨	Electric conductivity sensor set	HRS-DI008	●	●	●	●	—	—	22	
	Electric conductivity control set	With control function/bypass	HRS-DI009	●	●	●	—	—		
		With control function	HRS-DI011	●	●	●	●	—		
⑩	Particle filter set	(#5) OUT side	HRS-PF001	●	●	●	●	—	23	
		(#10) OUT side	HRS-PF002	—	—	—	●	—		
		(#5) IN side	HRS-PF003	●	●	●	★	—		★
		(#10) IN side	HRS-PF004	—	—	—	★	—		★
⑪	Drain pan set	With water leakage sensor	HRS-WL001	●	●	●	—	—	24	
			HRS-WL002	—	—	—	●	—		
⑫	Connector cover	HRS-BK001	●	●	●	—	—	—	25	
		HRS-BK002	—	—	—	●	—	—		
⑬	Analog gateway unit	HRS-CV001	●	●	●	●	—	—	25	
⑭	Replacement type dustproof filter set	—	—	—	—	—	—	—	—	
	Replacement type dustproof filter	—	—	—	—	—	—	—		
⑮	Filter for circulating fluid fill port	HRS-PF007	●	●	●	●	●	●	26	

\*1 When Option J is selected.

\*2 When Option T or the HRSF060 is selected.

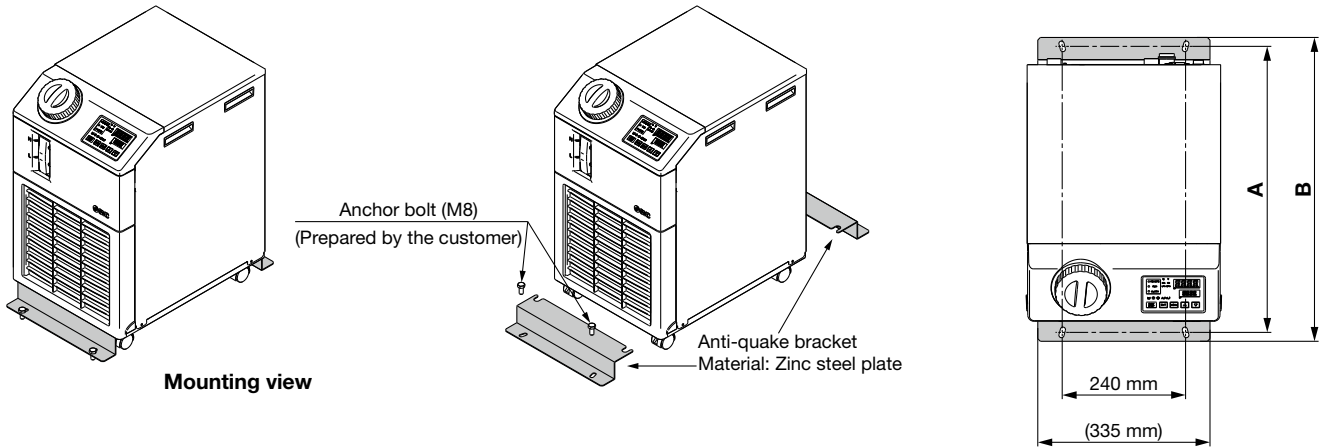
\*3 For the HRSF060 models: To be prepared by the customer.



## ① Anti-quake Bracket

This bracket can be used to reduce product damage in the case of an earthquake. An anchor bolt (M8) suitable for the flooring material should be prepared separately by the customer. (Anti-quake bracket thickness: 1.6 mm)

[mm]			
Part no. (per unit)	Applicable model	A	B
<b>HRS-TK001</b>	HRSF012-□□-□	555	(590)
	HRSF018-□□-□		
	HRSF024-□□-□		
	HRSF030-□□-□	546	(581)
<b>HRS-TK002</b>	HRSF060-□□-□	664	(698)



## ② Piping Conversion Fitting (For Air-cooled Refrigeration)

### ■ Conversion fitting for circulating fluid + Conversion fitting for drain outlet HRSF012-A□-□, HRSF018-A□-□, HRSF024-A□-□, HRSF030-A□-□

This fitting changes the port size for circulating fluid from Rc1/2 to G1/2 or NPT1/2, and for drain from Rc3/8 to G3/8 or NPT3/8. 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 no.	Applicable model
<b>HRS-EP001</b>	G thread conversion fitting set
<b>HRS-EP002</b>	HRSF012-A-□
	HRSF018-A-□
<b>HRS-EP002</b>	HRSF024-A-□
	HRSF030-A-□

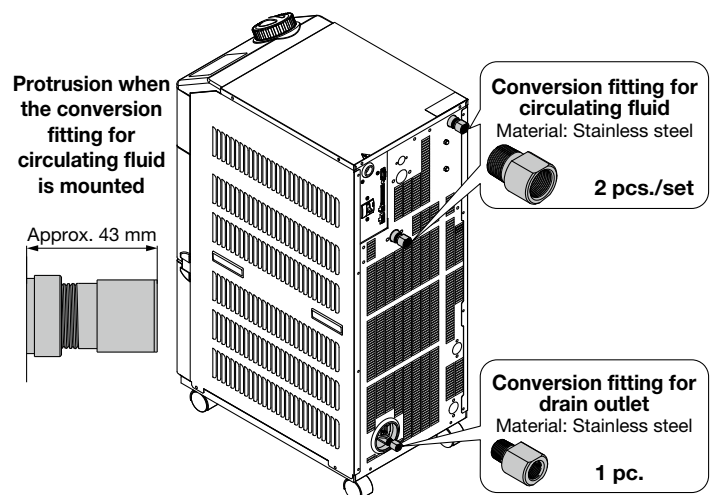
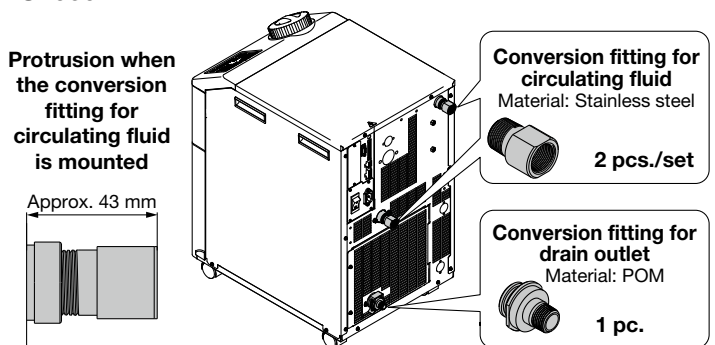
When the options, with automatic fluid fill function "-J", or high-pressure pump mounted "-T" are selected, purchase ③ piping conversion fitting (for option), too.

### HRSF060-A□-□

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 no.	Applicable model
<b>HRS-EP009</b>	G thread conversion fitting set
<b>HRS-EP010</b>	NPT thread conversion fitting set

When the option, with automatic fluid fill function "-J", is selected, purchase ③ piping conversion fitting (for option), too.



# HRSF Series

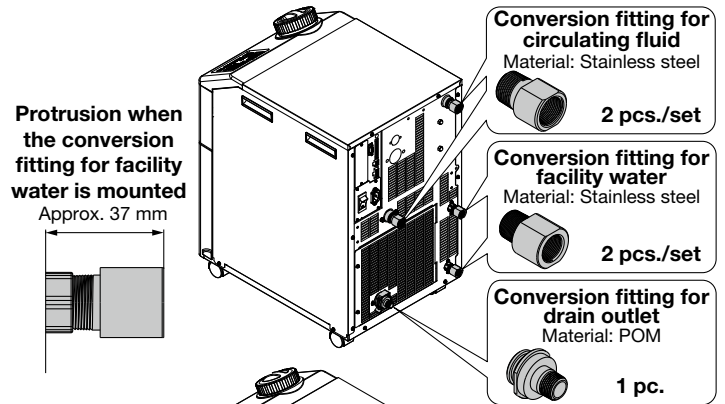
## ② Piping Conversion Fitting (For Water-cooled Refrigeration)

### ■ Conversion fitting for circulating fluid + Conversion fitting for facility water + Conversion fitting for drain outlet HRSF012-W□-□, HRSF018-W□-□, HRSF024-W□-□, HRSF030-W□-□

This fitting changes the port size for circulating fluid from Rc1/2 to G1/2 or NPT1/2, for facility water from Rc3/8 to G3/8 or NPT3/8, and for drain from Rc3/8 to G3/8 or NPT3/8. 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 no.	Applicable model
<b>HRS-EP003</b>	G thread conversion fitting set
<b>HRS-EP004</b>	NPT thread conversion fitting set

When the options, with automatic fluid fill function "-J", or high-pressure pump mounted "-T" are selected, purchase ③ piping conversion fitting (for option), too.



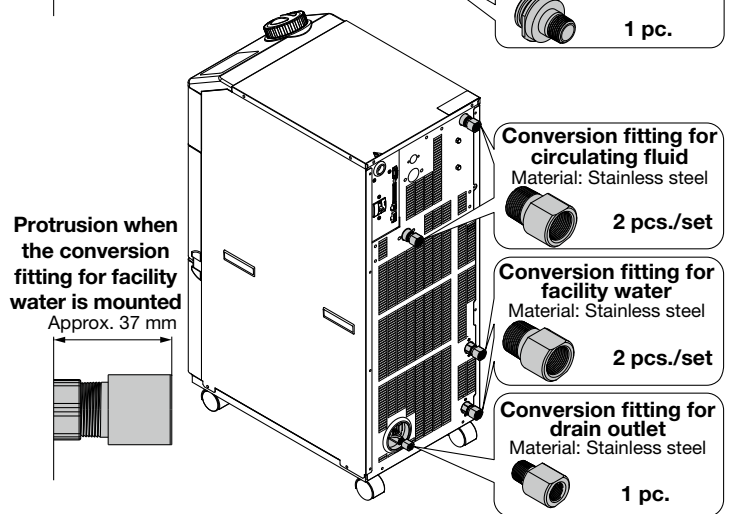
### HRSF060-W□-□

This fitting changes the port size for circulating fluid or facility water 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 no.	Applicable model
<b>HRS-EP011</b>	G thread conversion fitting set
<b>HRS-EP012</b>	NPT thread conversion fitting set

When the option, with automatic fluid fill function "-J", is selected, purchase ③ piping conversion fitting (for option), too.



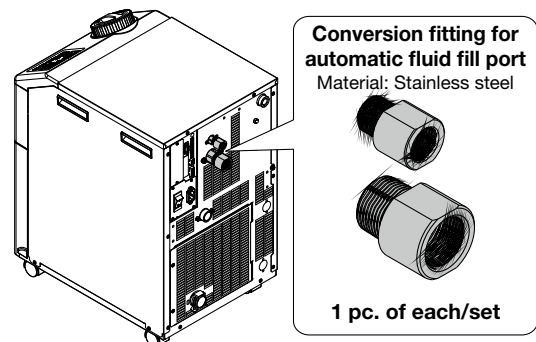
## ③ Piping Conversion Fitting (For Option)

### ■ Conversion fitting for automatic fluid fill port

This fitting changes the port size for the option, with automatic fluid fill function "-J" from Rc3/8, Rc3/4 to G3/8, G3/4 or NPT3/8, NPT3/4.

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.

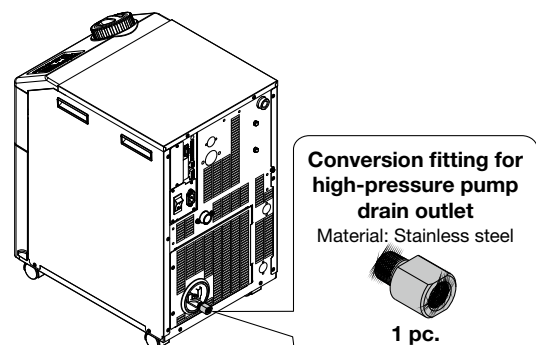
Part no.	Applicable model
<b>HRS-EP005</b>	G thread conversion fitting set
<b>HRS-EP006</b>	NPT thread conversion fitting set



### ■ Conversion fitting for drain outlet

This fitting changes the port size for drain outlet for the option, high-pressure pump mounted "-T" 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 no.	Applicable model
<b>HRS-EP007</b>	G thread conversion fitting
<b>HRS-EP008</b>	NPT thread conversion fitting

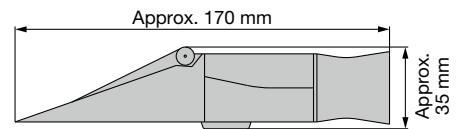


\*1 It is not necessary to purchase this when you purchase the HRS-EP009 to 012 since it is included in the product.

#### ④ Concentration Meter

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

Part no.	Applicable model
<b>HRZ-BR002</b>	HRSF012-□□-□
	HRSF018-□□-□
	HRSF024-□□-□
	HRSF030-□□-□
	HRSF060-□□-□



#### ⑤ Bypass Piping Set

When the circulating fluid goes below the rated flow (7 L/min for the HRSF012, 018, 024, 030 and 23/28 L/min for the HRSF060), cooling capacity will be reduced and the temperature stability will be badly affected. In such a case, use the bypass piping set. A high-pressure pump is also available.

Part no.	Applicable model
<b>HRS-BP001</b>	HRSF012-□□-□
	HRSF018-□□-□
	HRSF024-□□-□
	HRSF030-□□-□

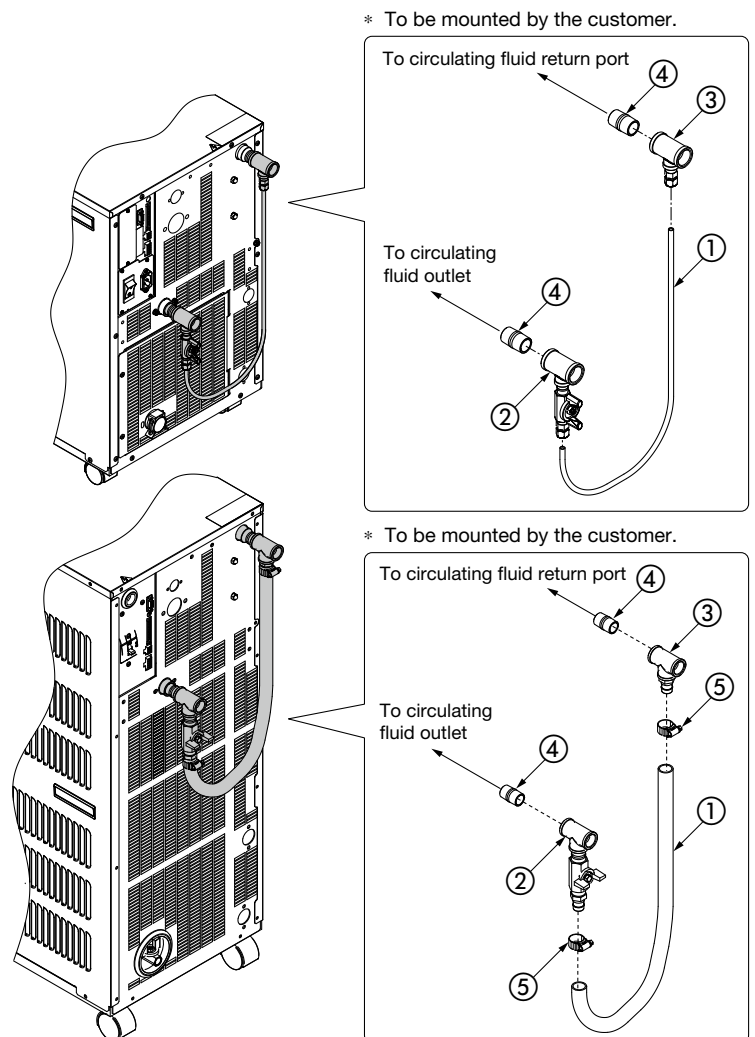
##### Parts List

No.	Description	Fluid contact material	Qty.
①	Bypass tube (Part no.: TL0806)	PFA	1 (Approx. 700 mm)
②	Outlet piping (With ball valve)	Stainless steel	1
③	Return port piping	Stainless steel	1
④	Nipple (Size: 1/2)	Stainless steel	2

Part no.	Applicable model
<b>HRS-BP004</b>	HRSF060-□□-□

##### Parts List

No.	Description	Fluid contact material	Qty.
①	Hose	PVC	1 (Approx. 700 mm)
②	Outlet piping (With ball valve)	Stainless steel	1
③	Return port piping	Stainless steel	1
④	Nipple (Size: 1/2)	Stainless steel	2
⑤	Hose band	—	2



# HRSF Series

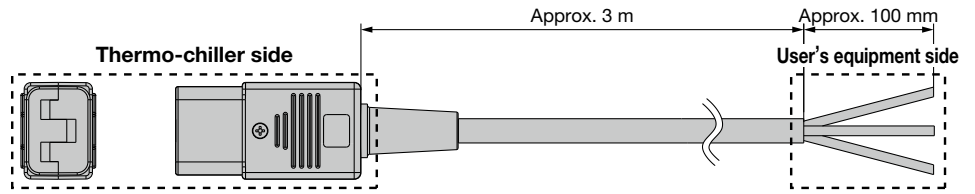
## ⑥ Power Supply Cable

### ■ For single-phase 200 VAC type

\* Not applicable for the 100 V type.

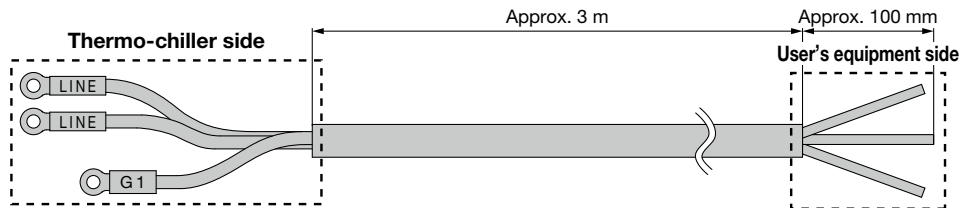
Part no.	Applicable model
<b>HRR-CA001</b>	HRSF012-□□-20
	HRSF018-□□-20
	HRSF024-□□-20
	HRSF030-□□-20

\* Applicable to retaining clip.



Part no.	Applicable model
<b>HRS-CA004</b>	HRSF060-□□-20

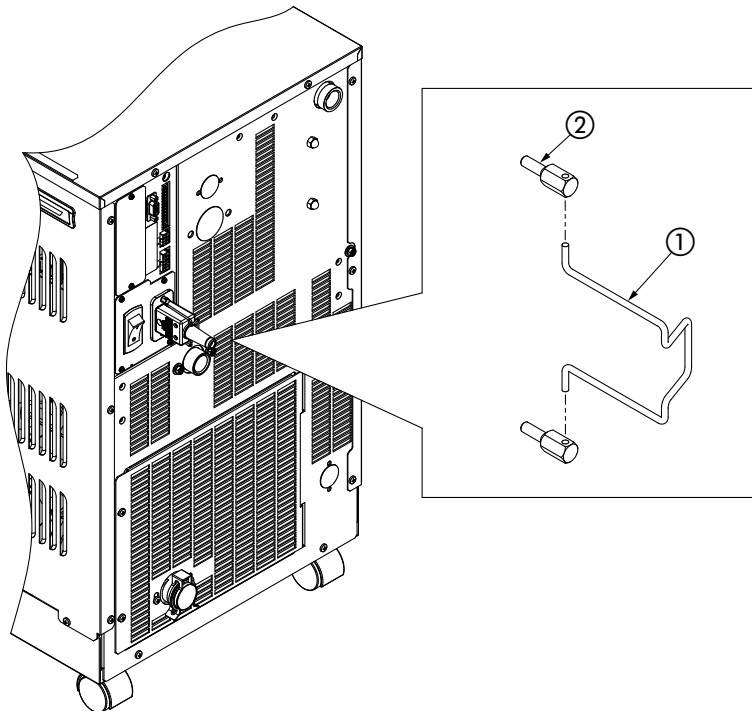
\* Not applicable to retaining clip.



### ■ Retaining clip

Holds the connector on the thermo-chiller side in position.

Part no.	Applicable power supply cable
<b>HRR-S0074</b>	HRR-CA001
	Power supply connector for accessory



### Parts List

No.	Description
①	Retaining clip
②	Holding screw



## ⑦ DI Filter Set

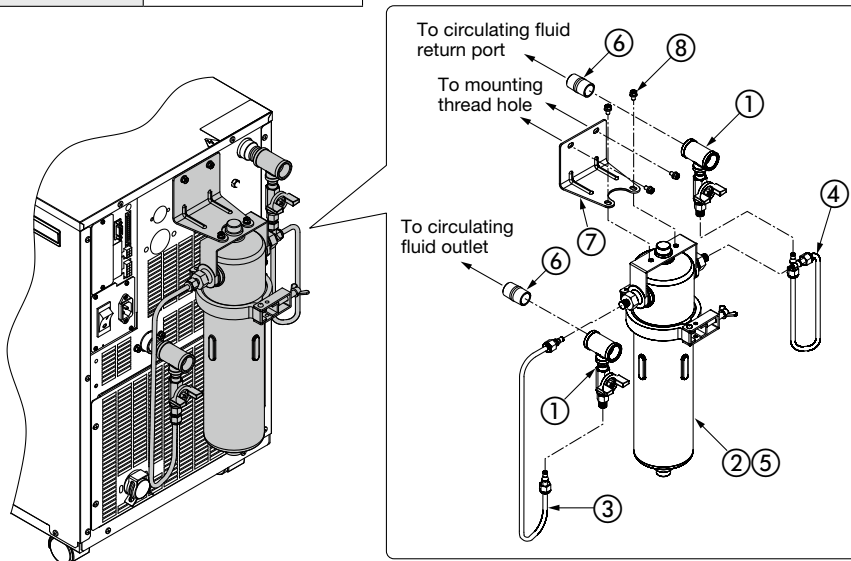
It is possible to retain the level of electric resistance and electric conductivity by flowing the circulating through the ion replacement resin (DI filter). The set parts are in order to install DI filter to bypass circuit and flow the fixed rate of the circulating fluid to DI filter. It is not to control the value of electric resistance and electric conductivity. (Replacement cartridge: HRS-DF001)

### ■ Stainless steel type

Suitable for locations with dusty atmospheres.

Part no.	Applicable model
<b>HRS-DP001</b>	HRSF012-□□-□
	HRSF018-□□-□
	HRSF024-□□-□
	HRSF030-□□-□
	HRSF060-□□-□

\* Cannot be installed in combination with particle filter set (HRS-PF001 to PF004).



### Parts List

No.	Description	Fluid contact material	Qty.
①	Branch line	Stainless steel	2
②	DI filter vessel	Stainless steel	1
③	DI filter inlet tube	PFA, POM	1
④	DI filter outlet tube	PFA, POM	1
⑤	DI filter cartridge (Part no.: HRS-DF001)*1	PP, PE	1
⑥	Nipple (Size: 1/2)	Stainless steel	2
⑦	Mounting bracket	—	1
⑧	Mounting screw (M6 screw, M5 screw)	—	2 pcs. each

\*1 The product should be replaced when it can no longer preserve the electrical resistivity/electrical conductivity set values.

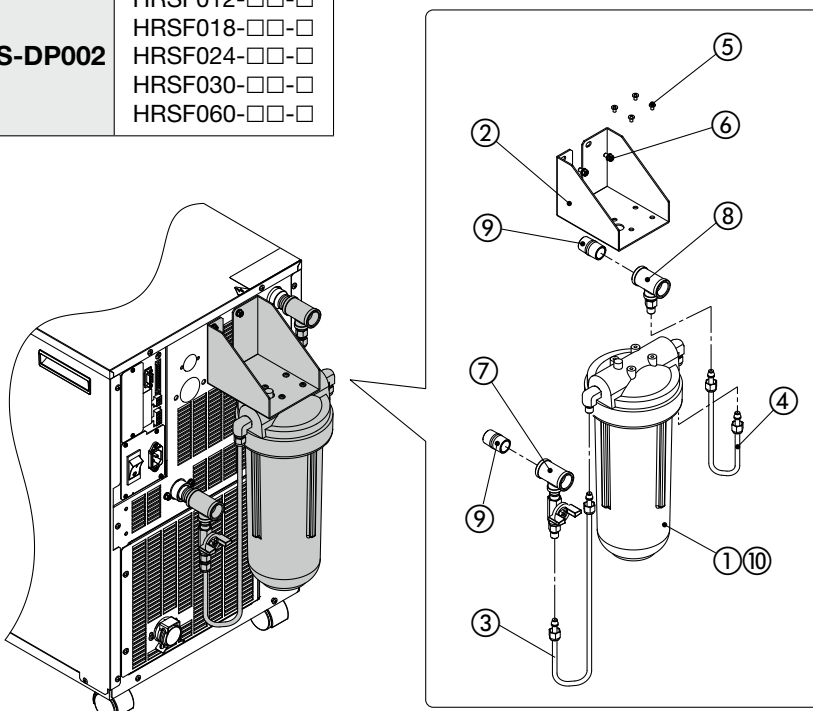
### ■ Resin type

Lightweight and compact

Can be installed in combination with the HRS-PF001, PF002.

Part no.	Applicable model
<b>HRS-DP002</b>	HRSF012-□□-□
	HRSF018-□□-□
	HRSF024-□□-□
	HRSF030-□□-□
	HRSF060-□□-□

\* Cannot be installed in combination with particle filter set (HRS-PF003, PF004).



### Parts List

No.	Description	Fluid contact material	Qty.
①	DI filter vessel	PC, PP	1
②	Mounting bracket	—	1
③	DI filter inlet tube	PFA, POM	1
④	DI filter outlet tube	PFA, POM	1
⑤	Tapping screw	—	4
⑥	Mounting screw (M5 screw)	—	2
⑦	Branch line for inlet	Stainless steel	1
⑧	Branch line for outlet	Stainless steel	1
⑨	Nipple (Size: 1/2)	Stainless steel	2
⑩	DI filter cartridge (Part no.: HRS-DF001)*1	PP, PE	1

\*1 The product should be replaced when it can no longer preserve the electrical resistivity/electrical conductivity set values.

# HRSF Series

**Option M needs to be selected at the time of purchase.**  
(When the electrical resistivity of the circulating fluid is 1 MΩ·cm or higher)

## ⑧ Electric Resistance Sensor Set / Electric Resistance Control Set

This product can be used to display, maintain, and control the electric resistivity of the circulating fluid (DI water). The function differs according to the model (Refer to the table below). Refer to the Operation Manual for details.

Part no.	Applicable model
<b>HRS-DI001</b> <b>HRS-DI005</b>	HRSF012-□□-□
	HRSF018-□□-□
	HRSF024-□□-□
	HRSF030-□□-□
<b>HRS-DI003</b> <b>HRS-DI004</b>	HRSF012-□□-□
	HRSF018-□□-□
	HRSF024-□□-□
	HRSF030-□□-□

### List of Function

Optional accessories	Description	Electric resistivity display*1, *2	Electric resistivity maintenance	Electric resistivity control	Bypass*3
HRS-DI001	Electric resistance sensor set	○	×	×	×
HRS-DI003	Electric resistance control set	○	○	○	○
HRS-DI004	Electric resistance sensor set	○	○	×	○
HRS-DI005	Electric resistance control set	○	○	○	×

\*1 Display range is 0 to 4.5 MΩ·cm.

\*2 Readout using serial communications (RS-485/RS-232C) can be performed.

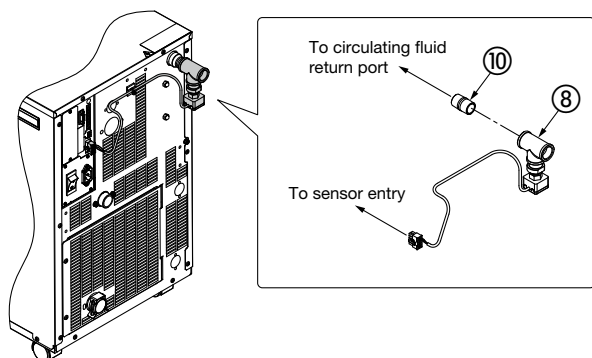
\*3 This function is dedicated for the HRS-BP001 and cannot be used for the HRSF060.

### Specifications

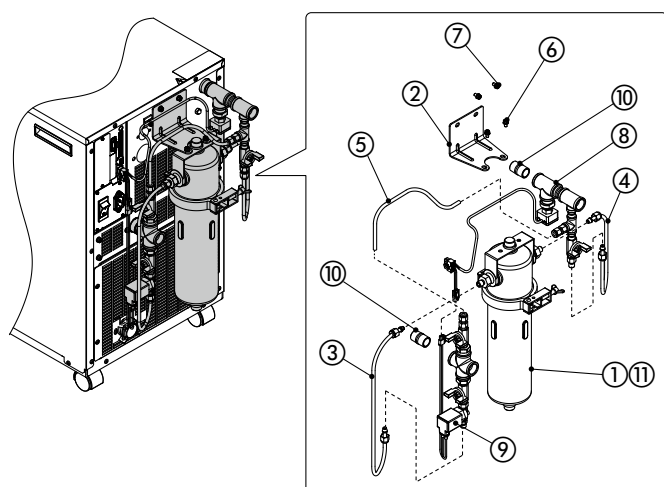
	Electric resistance sensor set	Electric resistance control set
Measurement range of electric resistivity	0 to 4.5 MΩ·cm	
Set range of electric resistivity target	—	0.2 to 4.0 MΩ·cm
Set range of electric resistivity hysteresis	—	0.1 to 0.9 MΩ·cm
Operating temperature range (Circulating fluid temperature)	5 to 60°C	
Operating pressure range	0.5 MPa or less	
Current consumption*1	100 mA or less	400 mA or less
Installation environment	Indoors	

\*1 The allowable current of HRSF 24 VDC devices will be reduced.

### [Mounting example: HRSF012-A-20-M + HRS-DI001]



### [Mounting example: HRSF012-A-20-M + HRS-DI003]



### Parts List

No.	Description	Fluid contact material	Qty.			
			DI001	DI003	DI004	DI005
①	DI filter vessel	Stainless steel	—	1	1	—
		PC, PP	—	—	—	1
②	Mounting bracket	—	—	1	1	1
③	DI filter inlet tube	PFA, POM	—	1	1	1
④	DI filter outlet tube	PFA, POM	—	1	1	1
⑤	Bypass tube	PFA	—	1	1	—
⑥	Mounting screw (M6 screw)	—	—	2	2	—
⑦	Mounting screw (M5 screw)	—	—	2	2	6
⑧	Electric resistance sensor	Stainless steel, PPS	1	1	1	1
⑨	Solenoid valve for control	Stainless steel, EPDM	—	1	—	1
⑩	Nipple (Size: 1/2)	Stainless steel	1	2	2	2
⑪	DI filter cartridge (Part no.: HRS-DF001)*1	PP, PE	—	1	1	1

\*1 The product should be replaced when it can no longer preserve the electrical resistivity set value.

## ⑨ Electric Conductivity Sensor Set / Electric Conductivity Control Set

This product can be used to display, maintain, and control the electric conductivity of the circulating fluid (DI water). The function differs according to the model (Refer to the table below). Refer to the Operation Manual for details.

Part no.	Applicable model
<b>HRS-DI008</b> <b>HRS-DI011</b>	HRSF012-□□-□
	HRSF018-□□-□
	HRSF024-□□-□
	HRSF030-□□-□
<b>HRS-DI009</b>	HRSF012-□□-□
	HRSF018-□□-□
	HRSF024-□□-□
	HRSF030-□□-□

### List of Function

Optional accessories	Description	Electric conductivity display*1, *2	Electric conductivity maintenance	Electric conductivity control	Bypass*3
HRS-DI008	Electric conductivity sensor set	○	×	×	×
HRS-DI009	Electric conductivity control set	○	○	○	○
HRS-DI011	Electric conductivity control set	○	○	○	×

\*1 Display range is 2 to 48  $\mu\text{S}/\text{cm}$ .

\*2 Readout using serial communications (RS-485/RS-232C) can be performed.

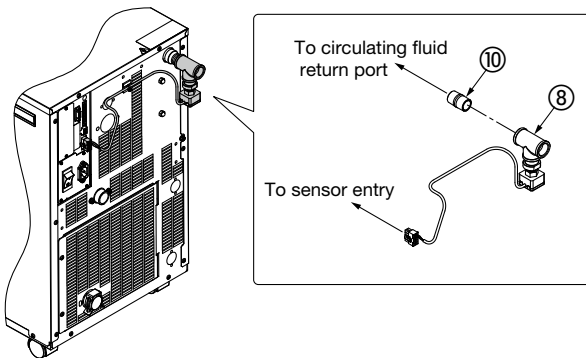
\*3 This function is dedicated for the HRS-BP001 and cannot be used for the HRSF060.

### Specifications

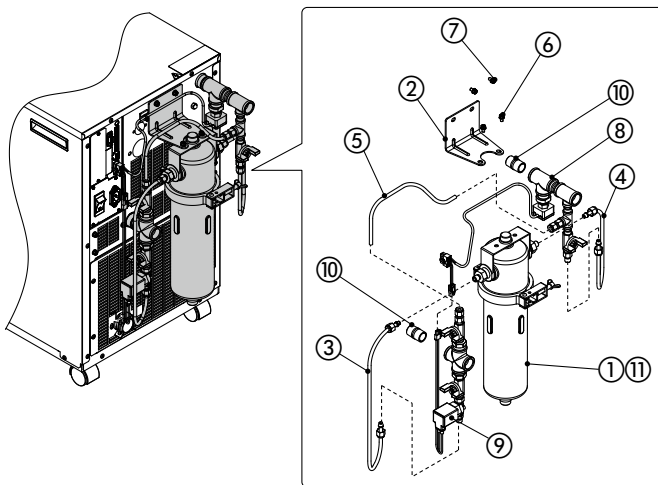
	Electric conductivity sensor set	Electric conductivity control set
Measurement range of electric conductivity	2.0 to 48.0 $\mu\text{S}/\text{cm}$	
Set range of electric conductivity target	—	5.0 to 45.0 $\mu\text{S}/\text{cm}$
Set range of electric conductivity hysteresis	—	2.0 to 10.0 $\mu\text{S}/\text{cm}$
Operating temperature range (Circulating fluid temperature)	5 to 60°C	
Operating pressure range	0.5 MPa or less	
Current consumption*1	100 mA or less	400 mA or less
Installation environment	Indoors	

\*1 The allowable current of HRSF 24 VDC devices will be reduced.

#### [Mounting example: HRSF012-A-20 + HRS-DI008]



#### [Mounting example: HRSF012-A-20 + HRS-DI009]



### Parts List

No.	Description	Fluid contact material	Qty.		
			DI008	DI009	DI011
①	DI filter vessel	Stainless steel	—	1	—
		PC, PP	—	—	1
②	Mounting bracket	—	1	1	
③	DI filter inlet tube	PFA, POM	—	1	1
④	DI filter outlet tube	PFA, POM	—	1	1
⑤	Bypass tube	PFA	—	1	—
⑥	Mounting screw (M6 screw)	—	—	2	—
⑦	Mounting screw (M5 screw)	—	—	2	6
⑧	Electric conductivity sensor	Stainless steel, PPS	1	1	1
⑨	Solenoid valve for control	Stainless steel, EPDM	—	1	1
⑩	Nipple (Size: 1/2)	Stainless steel	1	2	2
⑪	DI filter cartridge (Part no.: HRS-DF001)*1	PP, PE	—	1	1

\*1 The product should be replaced when it can no longer preserve the electrical conductivity set value.

# HRSF Series

## ⑩ Particle Filter Set

This set can be used to remove foreign matter from the circulating fluid.

HRS-PF001-**W075**-**H**

PF002  
PF003  
PF004

### ● Filtration

Symbol	Nominal filtration accuracy [μm]	Element part no. for PF001/ PF003 (individual part)	Element part no. for PF002/ PF004 (individual part)
Nil	Without element	—	—
W005	5	EJ202S-005X11	EJ302S-005X11
W075	75	EJ202S-075X11	EJ302S-075X11

### ● Accessory

Symbol	Accessory
Nil	None
H	With handle

### ■ For circulating fluid outlet [Used to protect your tool]

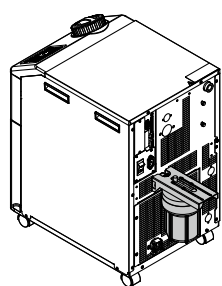
Part no.	Applicable model
<b>HRS-PF001</b> (Element length L = 125 mm)	HRSF012-□□-□ HRSF030-□□-□ HRSF018-□□-□ HRSF060-□□-□ HRSF024-□□-□
<b>HRS-PF002</b> (Element length L = 250 mm)	HRSF060-□□-□

### ■ For circulating fluid return port [Used to protect thermo-chiller]

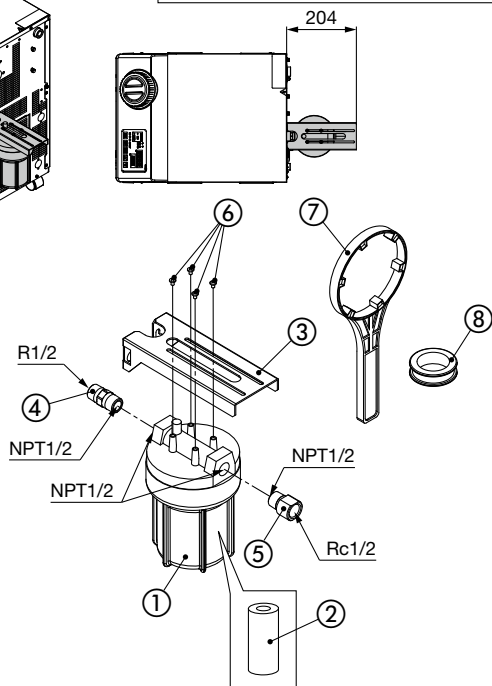
If foreign matter such as scales in the piping enter the circulating fluid, this may cause the pump to malfunction. Therefore, it is strongly recommended to install the particle filter set.

Part no.	Applicable model
<b>HRS-PF003</b> (Element length L = 125 mm)	HRSF012-□□-□ HRSF030-□□-□ HRSF018-□□-□ HRSF060-□□-□ HRSF024-□□-□
<b>HRS-PF004</b> (Element length L = 250 mm)	HRSF060-□□-□

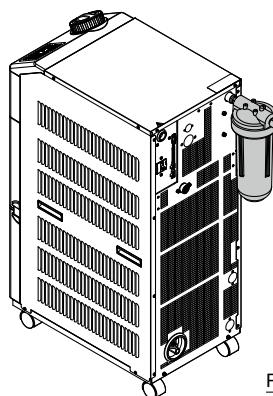
#### Mounting view



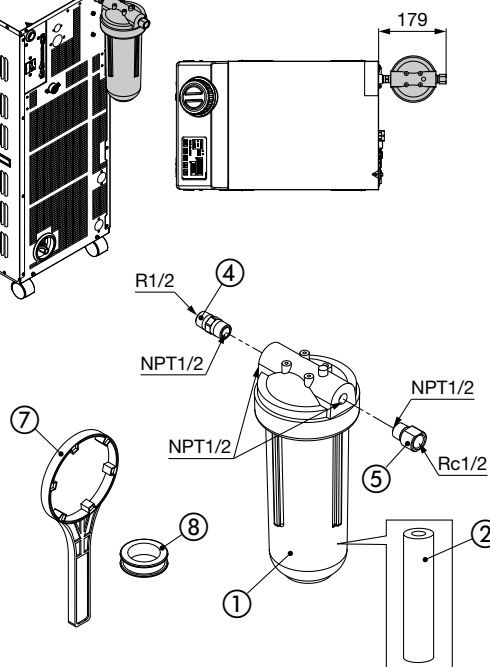
The following reference drawing shows the HRS-PF001 mounted on the HRSF012 to 024.  
For details, refer to the dimensions or the Operation Manual.



#### Mounting view



The following reference drawing shows the HRS-PF004 mounted on the HRSF060.  
For details, refer to the dimensions or the Operation Manual.



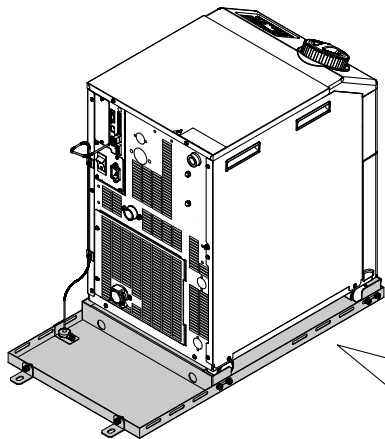
### Parts List

No.	Model	Description	Fluid contact material	Qty.	Note
①	—	Body	PP	1	—
②	EJ202S-005X11	Element (Length L = 125 mm)	PP/PE	1	For HRS-PF001/003 The product should be replaced when the pressure drop reaches 0.1 MPa.
	EJ202S-075X11	Element (Length L = 125 mm)		1	
	EJ302S-005X11	Element (Length L = 250 mm)		1	
	EJ302S-075X11	Element (Length L = 250 mm)		1	
③	—	Particle filter bracket	—	1	For HRS-PF001/002
④	—	Nipple	Stainless steel	1	Conversion from R to NPT
⑤	—	Extension piece	Stainless steel	1	Conversion from NPT to Rc
⑥	—	Tapping screw	—	4	—
⑦	—	Handle	—	1	When -H is selected
⑧	—	Sealant tape	PTFE	1	—

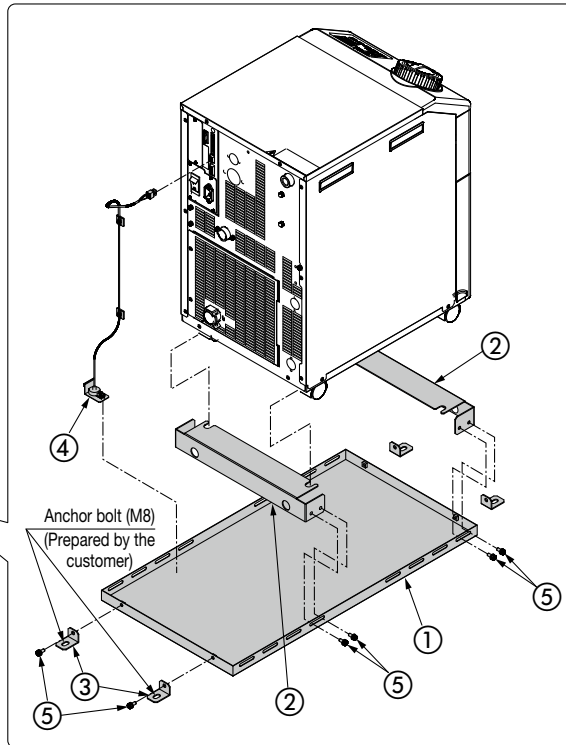
⑪ **Drain Pan Set (With Water Leakage Sensor)**

Drain pan for the thermo-chiller. Liquid leakage from the thermo-chiller can be detected by mounting the attached water leakage sensor. Anchor bolt (M8) suitable for the flooring material should be prepared separately by the customer. The current consumption of this product is 25 mA. (Therefore, the allowable current of HRSF 24 VDC devices will be reduced by 25 mA.)

Part no.	Applicable model
<b>HRS-WL001</b>	HRSF012-□□-□
	HRSF018-□□-□
	HRSF024-□□-□
	HRSF030-□□-□



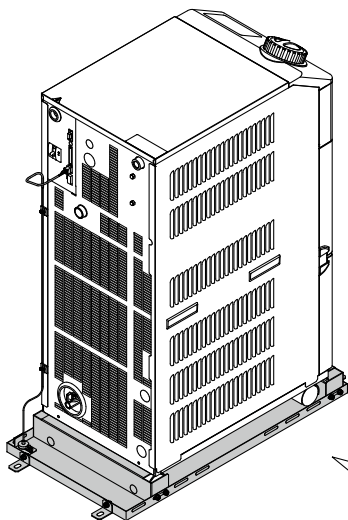
**HRSF012/018/024/030**



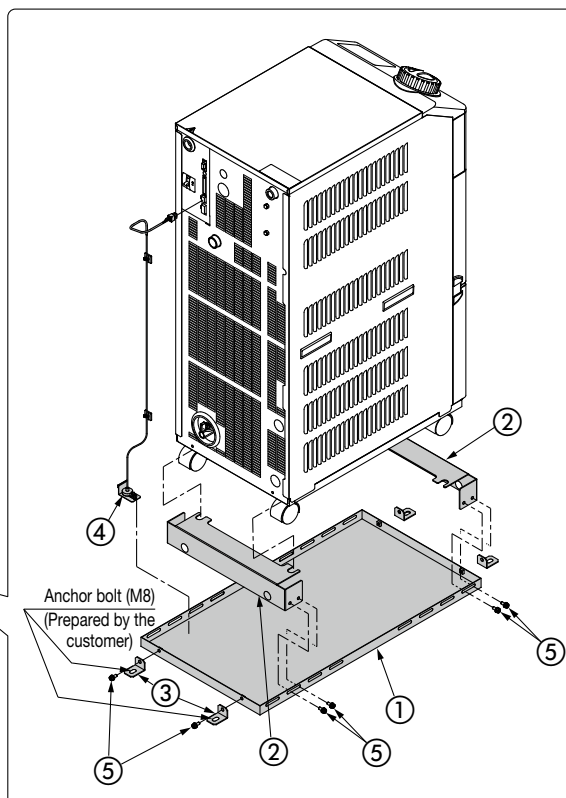
**Parts List**

No.	Description
①	Drain pan
②	Thermo-chiller fixing bracket (2 pcs.)
③	Drain pan fixing bracket (4 pcs.)
④	Water leakage sensor
⑤	Bracket fixing screw (M6 screw, 12 pcs.)

Part no.	Applicable model
<b>HRS-WL002</b>	HRSF060-□□-□



**HRSF060**



**Parts List**

No.	Description
①	Drain pan
②	Thermo-chiller fixing bracket (2 pcs.)
③	Drain pan fixing bracket (4 pcs.)
④	Water leakage sensor
⑤	Bracket fixing screw (M6 screw, 12 pcs.)

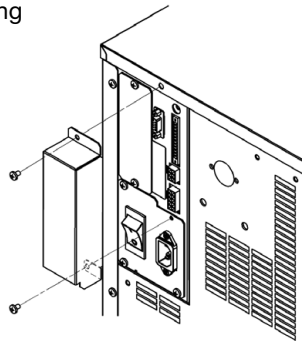


# HRSF Series

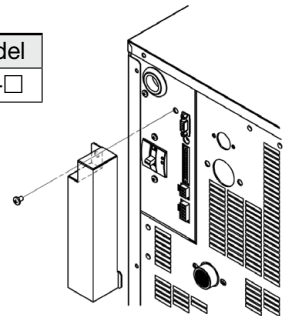
## ⑫ Connector Cover

This product can be used for protecting the connector on the rear side.

Part no.	Applicable model
<b>HRS-BK001</b>	HRSF012-□□-□
	HRSF018-□□-□
	HRSF024-□□-□
	HRSF030-□□-□



Part no.	Applicable model
<b>HRS-BK002</b>	HRSF060-□□-□



## ⑬ Analog Gateway Unit

This is an expansion unit for adding analog communication functions.

“Analog communication, contact input/output” functions can be used. The current consumption of this product is 200 mA. (Therefore, the allowable current of HRSF 24 VDC devices will be reduced by 200 mA.)

### ● Analog communication

The set circulating fluid temperature can be changed by entering the analog voltage.

Converts the current circulating fluid temperature and current electric resistance value (\*1) to an analog voltage for output.

\*1 Displayed when optional “Electric resistance sensor set/HRS-DI001, DI004, and DI008” are used.

### ● Contact input/output

The Run/Stop of the thermo-chiller HRSF series can be operated by a contact signal.

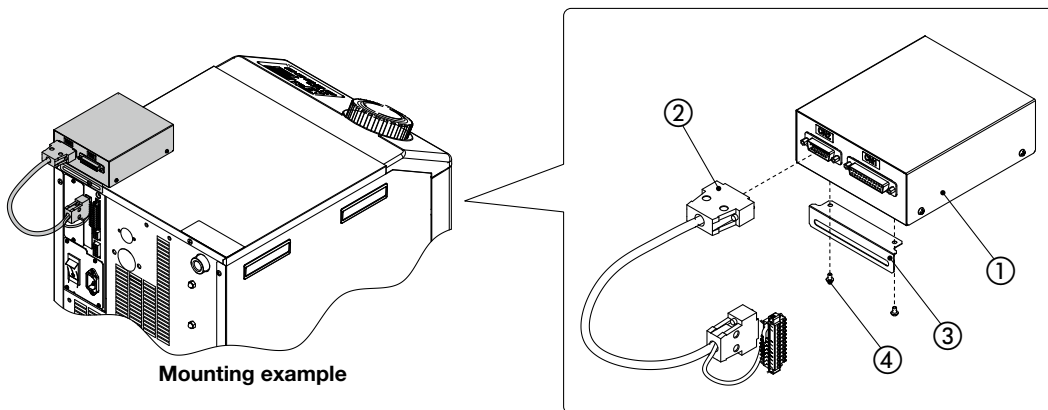
The contact signal of the operation status, alarm occurrence status and the TEMP READY status can also be output.

Part no.	Applicable model
<b>HRS-CV001</b>	HRSF012-□□-□
	HRSF018-□□-□
	HRSF024-□□-□
	HRSF030-□□-□
	HRSF060-□□-□

### Parts List

No.	Description
①	Analog gateway box
②	Connection cable
③	Mounting bracket
④	Mounting screw (M3, 2 pcs.)

When this product is used, the “contact input/output” and “serial communication” functions standardly equipped in the thermo-chiller HRSF series cannot be used.



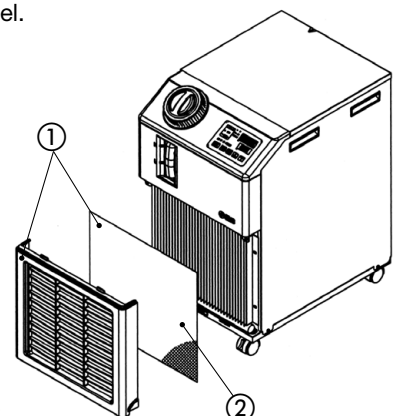
## ⑭ Replacement Type Dustproof Filter Set

A disposable dustproof filter is mounted instead of the dustproof net on the front panel.

Part no.	Applicable model
<b>HRS-FL001</b>	HRSF012-A□-□
	HRSF018-A□-□
	HRSF024-A□-□

### Parts List

No.	Description	Part no.	Note
①	Replacement type dustproof filter set	HRS-FL001	A front panel with hook-and-loop fastener for holding the filter, 5 filters are included. (No dustproof net is included.)
②	Replacement type dustproof filter	HRS-FL002	5 filters per set Size: 300 x 370



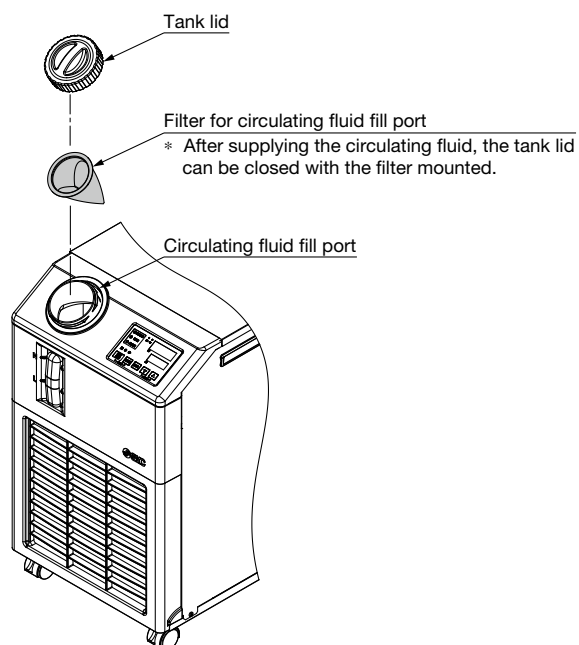


⑮ **Filter for Circulating Fluid Fill Port**

Prevents foreign matter from entering the tank when supplying the circulating fluid. Can be used just by fitting into the circulating fluid fill port.

■ **Filter for circulating fluid fill port**  
**HRS-PF007**

Material	Stainless steel 304, Stainless steel 316
Mesh size	200



# 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

Q: Heat generation amount

- ① Derive the heat generation amount from the power consumption.

Power consumption P: 1000 [W]

$$Q = P = 1000 \text{ [W]}$$

Cooling capacity = Considering a safety factor of 20%,

$$1000 \text{ [W]} \times 1.2 = \boxed{1200 \text{ [W]}}$$

- ② Derive the heat generation amount from the power supply output.

Power supply output VI: 1.0 [kVA]

$$Q = P = V \times I \times \text{Power factor}$$

In this example, using a power factor of 0.85:

$$= 1.0 \text{ [kVA]} \times 0.85 = 0.85 \text{ [kW]} = 850 \text{ [W]}$$

Cooling capacity = Considering a safety factor of 20%,

$$850 \text{ [W]} \times 1.2 = \boxed{1020 \text{ [W]}}$$

- ③ Derive the heat generation amount from the output.

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

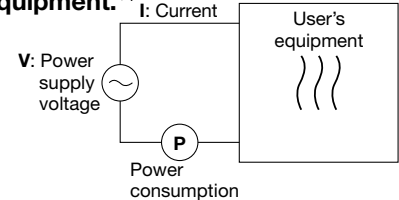
$$Q = P = \frac{W}{\text{Efficiency}}$$

In this example, using an efficiency of 0.7:

$$= \frac{800}{0.7} = 1143 \text{ [W]}$$

Cooling capacity = Considering a safety factor of 20%,

$$1143 \text{ [W]} \times 1.2 = \boxed{1372 \text{ [W]}}$$



\*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.

Heat generation amount by user's equipment Q: Unknown [W] ((J/s))

- Circulating fluid : Tap water\*1
- Circulating fluid mass flow rate  $q_m$  : ( $= \rho \times q_v \div 60$ ) [kg/s]
- Circulating fluid density  $\rho$  : 1 [kg/dm<sup>3</sup>]
- Circulating fluid (volume) flow rate  $q_v$  : 10 [dm<sup>3</sup>/min]
- Circulating fluid specific heat C :  $4.2 \times 10^3$  [J/(kg·K)]
- Circulating fluid outlet temperature T<sub>1</sub> : 293 [K] (20 [°C])
- Circulating fluid return temperature T<sub>2</sub> : 295 [K] (22 [°C])
- Circulating fluid temperature difference  $\Delta T$  : 2.0 [K] ( $= T_2 - T_1$ )
- Conversion factor: minutes to seconds (SI units): 60 [s/min]

\*1 Refer to page 28 for the typical physical property value of tap water or other circulating fluids.

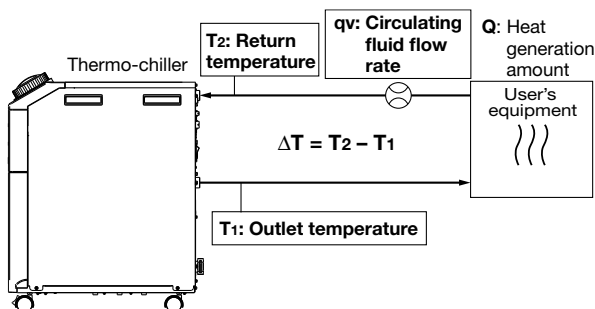
$$Q = q_m \times C \times (T_2 - T_1)$$

$$= \frac{\rho \times q_v \times C \times \Delta T}{60} = \frac{1 \times 10 \times 4.2 \times 10^3 \times 2.0}{60}$$

$$= 1400 \text{ [J/s]} \approx 1400 \text{ [W]}$$

Cooling capacity = Considering a safety factor of 20%,

$$1400 \text{ [W]} \times 1.2 = \boxed{1680 \text{ [W]}}$$



#### Example of conventional units (Reference)

- Heat generation amount by user's equipment Q: Unknown [cal/h] → [W]
- Circulating fluid : Tap water\*1
- Circulating fluid weight flow rate  $q_m$  : ( $= \rho \times q_v \times 60$ ) [kgf/h]
- Circulating fluid weight volume ratio  $\gamma$  : 1 [kgf/L]
- Circulating fluid (volume) flow rate  $q_v$  : 10 [L/min]
- Circulating fluid specific heat C :  $1.0 \times 10^3$  [cal/(kgf·°C)]
- Circulating fluid outlet temperature T<sub>1</sub> : 20 [°C]
- Circulating fluid return temperature T<sub>2</sub> : 22 [°C]
- Circulating fluid temperature difference  $\Delta T$ : 2.0 [°C] ( $= T_2 - T_1$ )
- Conversion factor: hours to minutes : 60 [min/h]
- Conversion factor: kcal/h to kW : 860 [(cal/h)/W]

$$Q = \frac{q_m \times C \times (T_2 - T_1)}{860}$$

$$= \frac{\gamma \times q_v \times 60 \times C \times \Delta T}{860}$$

$$= \frac{1 \times 10 \times 60 \times 1.0 \times 10^3 \times 2.0}{860}$$

$$= \frac{1200000 \text{ [cal/h]}}{860}$$

$$\approx 1400 \text{ [W]}$$

Cooling capacity = Considering a safety factor of 20%,

$$1400 \text{ [W]} \times 1.2 = \boxed{1680 \text{ [W]}}$$

## 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)]  
 Cooled substance : Water  
 Cooled substance mass **m** : (=  $\rho \times V$ ) [kg]  
 Cooled substance density  $\rho$  : 1 [kg/L]  
 Cooled substance total volume **V** : 20 [dm<sup>3</sup>]  
 Cooled substance specific heat **C** :  $4.2 \times 10^3$  [J/(kg·K)]  
 Cooled substance temperature when cooling begins **T<sub>0</sub>** : 305 [K] (32 [°C])  
 Cooled substance temperature after t hour **T<sub>t</sub>** : 293 [K] (20 [°C])  
 Cooling temperature difference  $\Delta T$  : 12 [K] (=  $T_0 - T_t$ )  
 Cooling time  $\Delta t$  : 900 [s] (= 15 [min])

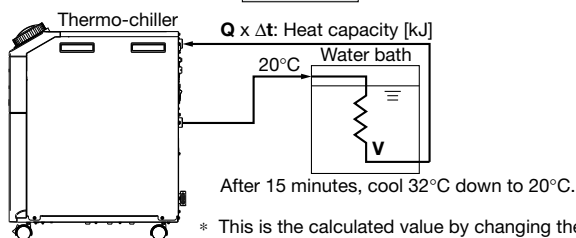
\* Refer to the following for the typical physical property values by circulating fluid.

$$Q = \frac{m \times C \times (T_0 - T_t)}{\Delta t} = \frac{\rho \times V \times C \times \Delta T}{\Delta t}$$

$$= \frac{1 \times 20 \times 4.2 \times 10^3 \times 12}{900} = 1120 \text{ [J/s]} \approx 1120 \text{ [W]}$$

Cooling capacity = Considering a safety factor of 20%,

$$1120 \text{ [W]} \times 1.2 = \boxed{1344 \text{ [W]}}$$



#### Example of conventional units (Reference)

Heat quantity by cooled substance (per unit time) **Q**: Unknown [cal/h] → [W]  
 Cooled substance : Water  
 Cooled substance weight **m** : (=  $\rho \times V$ ) [kgf]  
 Cooled substance weight volume ratio  $\gamma$  : 1 [kgf/L]  
 Cooled substance total volume **V** : 20 [L]  
 Cooled substance specific heat **C** :  $1.0 \times 10^3$  [cal/(kgf·°C)]  
 Cooled substance temperature when cooling begins **T<sub>0</sub>** : 32 [°C]  
 Cooled substance temperature after t hour **T<sub>t</sub>** : 20 [°C]  
 Cooling temperature difference  $\Delta T$  : 12 [°C] (=  $T_0 - T_t$ )  
 Cooling time  $\Delta t$  : 15 [min]  
 Conversion factor: hours to minutes : 60 [min/h]  
 Conversion factor: kcal/h to kW : 860 [(cal/h)/W]

$$Q = \frac{m \times C \times (T_0 - T_t)}{\Delta t \times 860} = \frac{\gamma \times V \times 60 \times C \times \Delta T}{\Delta t \times 860}$$

$$= \frac{1 \times 20 \times 60 \times 1.0 \times 10^3 \times 12}{15 \times 860}$$

$$\approx 1120 \text{ [W]}$$

Cooling capacity = Considering a safety factor of 20%,

$$1120 \text{ [W]} \times 1.2 = \boxed{1344 \text{ [W]}}$$

## 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.

Density  $\rho$ : 1 [kg/L] (or, using conventional units, weight volume ratio  $\gamma = 1$  [kgf/L])  
 Specific heat **C**:  $4.19 \times 10^3$  [J/(kg·K)] (or, using conventional units,  $1 \times 10^3$  [cal/(kgf·°C)])

### 2. Values for density and specific heat change slightly according to temperature shown below. Use this as a reference.

#### Water

Physical property value Temperature	Density $\rho$ [kg/L]	Specific heat C [J/(kg·K)]	Conventional units	
			Weight volume ratio $\gamma$ [kgf/L]	Specific heat C [cal/(kgf·°C)]
5°C	1.00	$4.2 \times 10^3$	1.00	$1 \times 10^3$
10°C	1.00	$4.19 \times 10^3$	1.00	$1 \times 10^3$
15°C	1.00	$4.19 \times 10^3$	1.00	$1 \times 10^3$
20°C	1.00	$4.18 \times 10^3$	1.00	$1 \times 10^3$
25°C	1.00	$4.18 \times 10^3$	1.00	$1 \times 10^3$
30°C	1.00	$4.18 \times 10^3$	1.00	$1 \times 10^3$
35°C	0.99	$4.18 \times 10^3$	0.99	$1 \times 10^3$
40°C	0.99	$4.18 \times 10^3$	0.99	$1 \times 10^3$

#### 15% Ethylene Glycol Aqueous Solution

Physical property value Temperature	Density $\rho$ [kg/L]	Specific heat C [J/(kg·K)]	Conventional units	
			Weight volume ratio $\gamma$ [kgf/L]	Specific heat C [cal/(kgf·°C)]
5°C	1.02	$3.91 \times 10^3$	1.02	$0.93 \times 10^3$
10°C	1.02	$3.91 \times 10^3$	1.02	$0.93 \times 10^3$
15°C	1.02	$3.91 \times 10^3$	1.02	$0.93 \times 10^3$
20°C	1.01	$3.91 \times 10^3$	1.01	$0.93 \times 10^3$
25°C	1.01	$3.91 \times 10^3$	1.01	$0.93 \times 10^3$
30°C	1.01	$3.91 \times 10^3$	1.01	$0.94 \times 10^3$
35°C	1.01	$3.91 \times 10^3$	1.01	$0.94 \times 10^3$
40°C	1.01	$3.92 \times 10^3$	1.01	$0.94 \times 10^3$

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



# HRSF Series Specific Product Precautions 1

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

### Warning

- This catalog shows the specifications of a single unit.**
  - Check the specifications of the single unit (contents of this catalog) and thoroughly consider the adaptability between the user's system and this unit.
  - 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.
- 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.
- 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.
- 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. In particular, when the option T (High-pressure pump mounted) or HRS050/060 is used, it is strongly recommended to install the particle filter.
- This product uses a slightly flammable refrigerant (R454C). Avoid using this product in proximity to open flames.**  
**Ensure compliance with local laws and regulations regarding the use and application of this product.**



## Transportation / Carriage / Movement

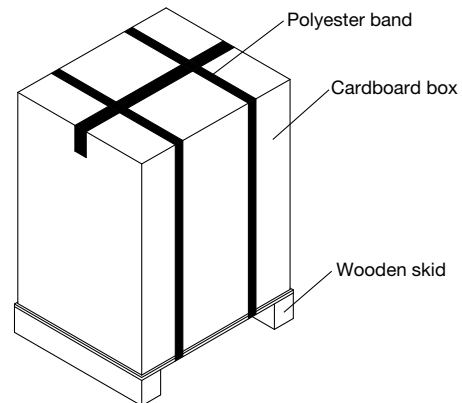
### Warning

- This product cannot be transported by air as this product uses a slightly flammable refrigerant (R454C).**
- This product is heavy. Pay attention to safety and the position of the product when it is transported, carried, and moved.**
- Read the operation manual carefully before moving the product after unpacking.**

### Caution

- 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]
HRSF012-□□-20 HRSF018-□□-20 HRSF024-□□-20	52	Height 790 x Width 470 x Depth 580
HRSF030-A□-20 HRSF030-W□-20	56 55	Height 830 x Width 470 x Depth 580
HRSF060-A□-20 HRSF060-W□-20	84 78	Height 1160 x Width 450 x Depth 670

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

Option symbol	Description	Additional weight
-B	With earth leakage breaker	No additional weight
-J	With automatic fluid fill function	+1 kg
-M	Applicable to DI water piping	No additional weight
-T	High-pressure pump mounted	+6 kg
-G	High-temperature environment specification	No additional weight

### Caution

If this product is to be transported after delivery, please use the original packaging the product was delivered in. If other packaging is to be used, carefully package the product so as to prevent the product from incurring any damage during transport.



# HRSF Series

## Specific Product Precautions 2

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>

### ■ The circulating fluids listed below have been tested for thermo-chiller compatibility.

No.	Fluid	Manufacturer	Concentration
1	Dowcal™ 100 Heat Transfer Fluid	The Dow Chemical Company	Dilute to 30% in 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
  - 2) Handling and maintenance
  - 3) Safety data sheets
  - 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.

### ■ Refrigerant with GWP reference

Refrigerant	Global Warming Potential (GWP)		
	Regulation (EU) 2024/573, AIM Act 40 CFR Part 84	Fluorocarbon Emissions Control Act (Japan)	
		GWP value labeled on products	GWP value to be used for reporting the calculated amount of leakage
R134a	1,430	1,430	1,300
R404A	3,922	3,920	3,940
R407C	1,774	1,770	1,620
R410A	2,088	2,090	1,920
R448A	1,386	1,390	1,270
R454C	146	145	146

- \*1 This product is hermetically sealed and contains fluorinated greenhouse gases.
- \*2 For refrigerant type used in this product, refer to the product specifications.

## Temperature Control Equipment

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.

### Safety Instructions

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

### 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.
2. 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.

### 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.
  1. The product was incorrectly installed or connected with other equipment.
  2. 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.
  5. The failure was caused by operation different from that shown in the 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**
  1. Expenses for daily and regular checks
  2. Expenses for repairs performed by other companies
  3. 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.

### Warning

#### 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 assembly, operation and maintenance of machines or equipment including our products must be performed by an operator who is appropriately trained and experienced.

#### 3. SMC products cannot be used beyond their specifications. They are not developed, designed, and manufactured to be used under the following conditions or environments. Use under such conditions or environments is not allowed.

1. Conditions and environments outside of the given specifications, or use outdoors or in a place exposed to direct sunlight.
2. Use for nuclear power, railways, aviation, space equipment, ships, vehicles, military application, equipment affecting human life, body, and property, combustion equipment, entertainment equipment, emergency shut-off circuits, press clutches, brake circuits, safety equipment, etc., and use for applications that do not conform to standard specifications such as catalogs and operation manuals.
3. Use for interlock circuits, except for use with double interlock such as installing a mechanical protection function in case of failure. Please periodically inspect the product to confirm that the product is operating properly.


### Caution

**SMC develops, designs, and manufactures products to be used for automatic control equipment, and provides them for peaceful use in manufacturing industries.**

**Use in non-manufacturing industries is not allowed.**

Products SMC manufactures and sells cannot be used for the purpose of transactions or certification specified in the Measurement Act of each country.

The new Measurement Act prohibits use of any unit other than SI units in Japan.

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