

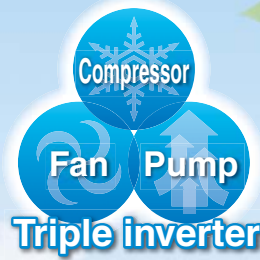
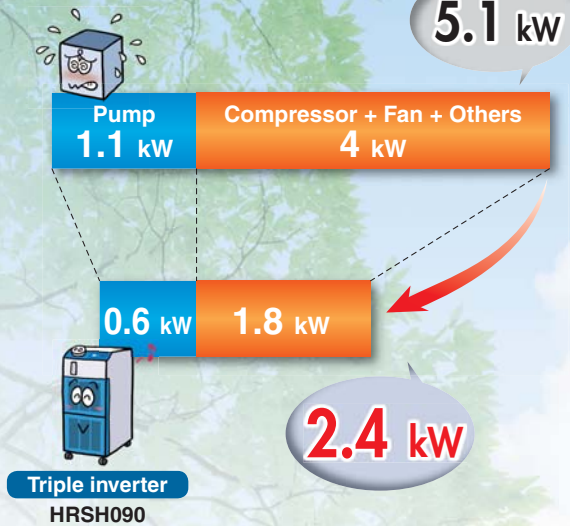
Circulating Fluid Temperature Controller

Thermo-chiller Type inverter



Power consumption reduced by **53 %***1 Outstanding energy saving effect with **the triple inverter!**

Non-inverter chiller



1. DC inverter compressor
2. DC inverter fan
3. Inverter pump

Temperature stability $\pm 0.1\text{ }^{\circ}\text{C}$
(when a load is stable)

Set temperature range $5\text{ }^{\circ}\text{C}$ to $35\text{ }^{\circ}\text{C}$ *

* Except for HRSH090: $5\text{ }^{\circ}\text{C}$ to $40\text{ }^{\circ}\text{C}$

Max. ambient temperature $45\text{ }^{\circ}\text{C}$

Maintenance free pump*

Mechanical seal-less immersion pump is used.
No need to replace the seal → Maintenance hours reduced

* Except for HRSH090

Cooling capacity

9.5 kW, 10 kW, 15 kW, 20 kW, 25 kW, 28 kW

Compact, Space-saving

Outdoor installation, Splashproof type (IPX4) - Large type
Indoor use - Compact type

Low-noise design Operating noise Max. **68 dB**

* Except for HRSH300-A

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

- 3-phase 200 V AC (50 Hz), 3-phase 200 to 230 V AC (60 Hz)
- 3-phase 380 to 415 V AC (50 / 60 Hz)



Series HRSH

*1 Under the conditions shown on page 1

*2 For water-cooled type, a water regulating valve is used for the facility water flow control instead of a fan.



CAT.EUS40-57Ddd-UK

Series HRSH

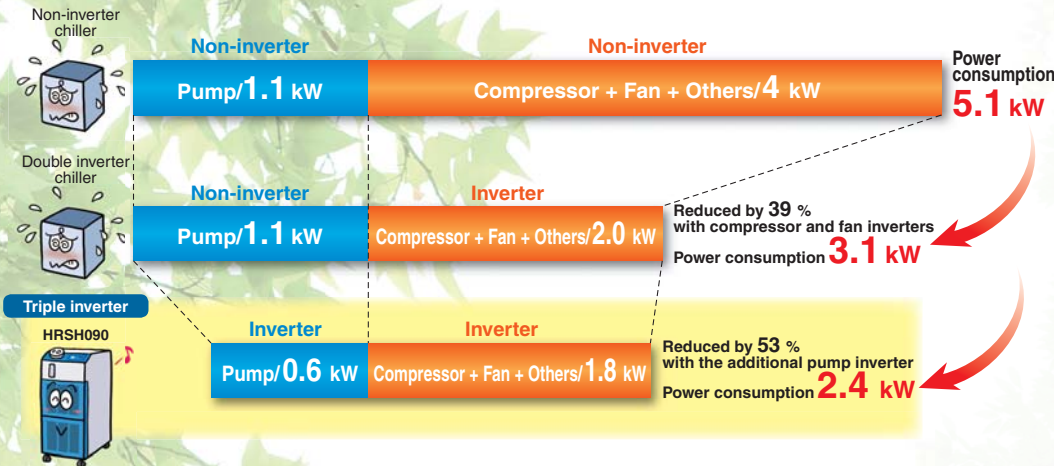
Triple inverter

The inverter respectively controls the number of motor rotations of the compressor, fan and pump depending on the load from the user's equipment.

Power consumption

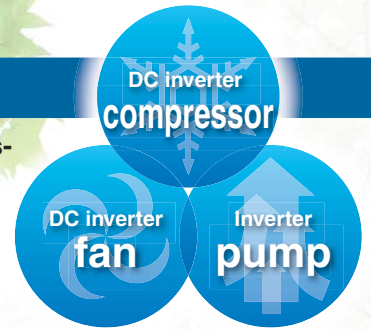
reduced by 53%*
*For HRSH090 thermo-chiller
compared with a non-inverter

With the inverter, it is possible to operate with the same performance even with the power supply of 50 Hz.

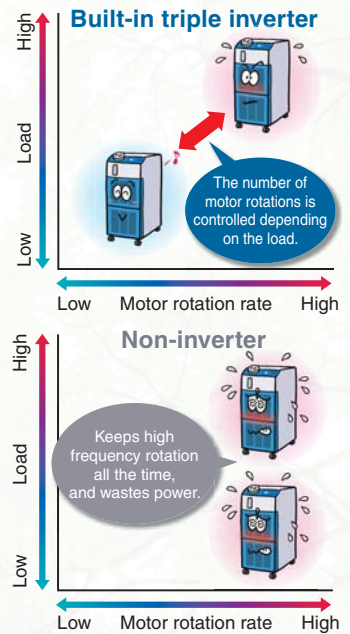


Operating ratio: Ratio of 9.5 kW (with heat load) to 0 kW (without heat load) Operating ratio: 50 %, with heat load of 9.5 kW all the time

- Conditions**
- Common conditions for non-inverter and triple inverter:
 - Ambient temperature: 32 °C
 - Circulating fluid flow rate: 35 L/min@0.3 MPa (60 Hz)
 - Circulating fluid temperature: 20 °C
 - Heat load: 9.5 kW
 - Conditions for non-inverter chiller: Continuous operation of the compressor which can cool down 9.5 kW at 60 Hz. The pump shall be same as that of the HRSH.

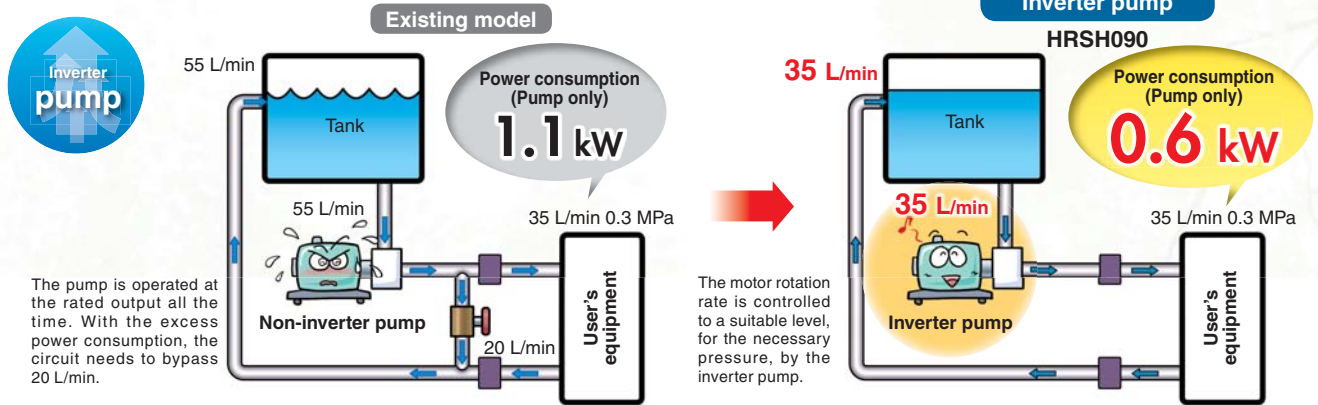


(The water-cooled type is not equipped with a fan)



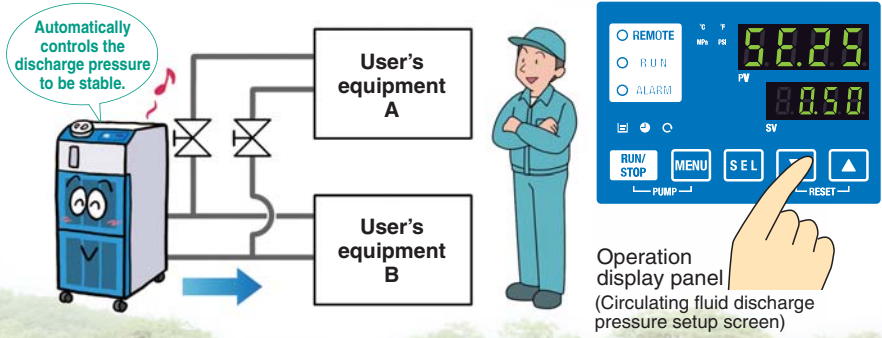
Inverter pump

Power reducing effect of the inverter pump



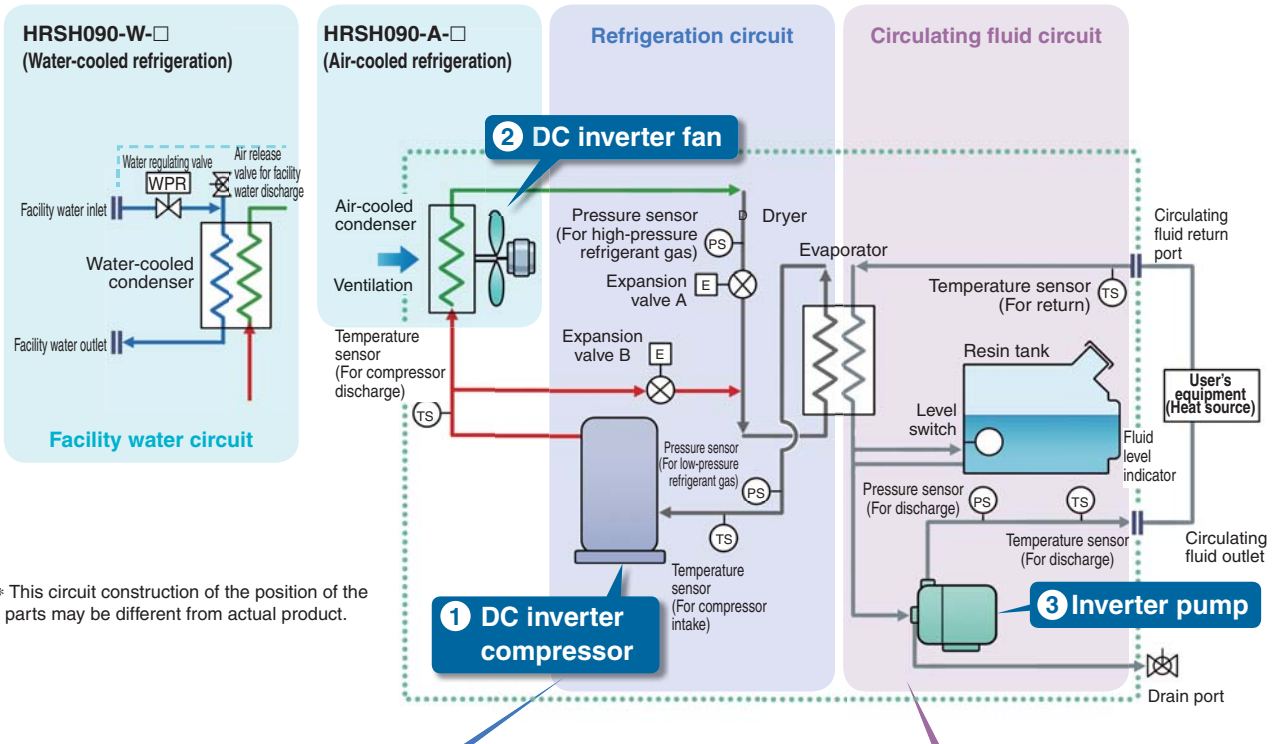
Circulating fluid pressure adjustable

Discharge pressure of the circulating fluid can be set with the operation panel. The inverter pump automatically controls the discharge pressure to the set pressure without adjusting the bypass piping under various piping conditions. Power consumption can be reduced by this control. (Operation to the set pump operating frequency is also possible.)



When the product is used with the flow path switched for maintenance, the pressure adjusting function controls the discharge pressure to be stable. (Secure the specified minimum flow for each branch circuit.)

Circuit diagram-HRSH Compact Type



Refrigeration circuit

- The DC inverter compressor compresses the refrigerant gas, and discharges the high temperature and high pressure refrigerant gas.
- In the case of air-cooled refrigeration, the high temperature and high pressure refrigerant gas is cooled down by an air-cooled condenser with the ventilation of the DC inverter fan, and becomes a liquid. In the case of water-cooled refrigeration, the refrigerant gas is cooled by a water-cooled condenser with the facility water in the facility water circuit, and becomes a liquid.
- The liquefied high pressure refrigerant gas expands and its temperature lowers when it passes through expansion valve A and vaporises by taking heat from the circulating fluid in the evaporator.
- The vaporised refrigerant gas is sucked into the DC inverter compressor and compressed again.
- When heating the circulating fluid, the high pressure and high temperature refrigerant gas is bypassed into the evaporator by expansion valve B, to heat the circulating fluid.

POINT

The combination of inverter control of the compressor and fan (facility water flow control by a water regulating valve is used in water-cooled refrigeration), and the precise control of expansion valves A and B realises energy saving operation without waste and high temperature stability.

Circulating fluid circuit

- The circulating fluid discharged from the inverter pump, is heated or cooled by the user's equipment and returns to the tank.
- The circulating fluid is sent to the evaporator by the inverter pump, and is controlled to a set temperature by the refrigeration circuit, to be discharged to the user's equipment side again by the thermo-chiller.

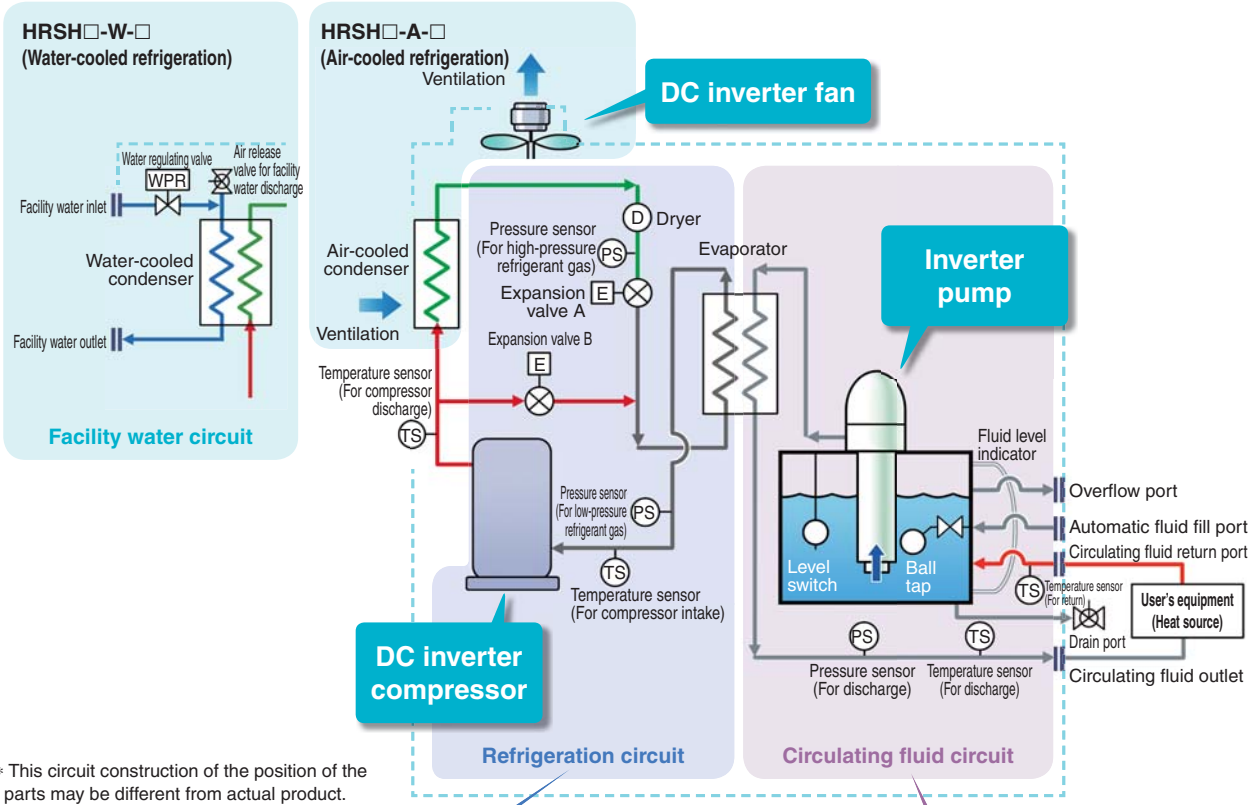
POINT

Adjusting the discharge pressure by pump inverter control eliminates wasteful discharge of the circulating fluid and realises energy saving operation.

POINT

Since the refrigeration circuit is controlled by the signal from 2 temperature sensors (for return and discharge), precise temperature control of the circulating fluid can be performed. Therefore, there is no necessity of absorbing the temperature difference in the circulating fluid with a large tank capacity, and realises high temperature stability even with a small-size tank. Also, contributes to space-saving.

Circuit diagram-HRSH Large Type



Refrigeration circuit

- The DC inverter compressor compresses the refrigerant gas, and discharges the high temperature and high pressure refrigerant gas.
- In the case of air-cooled refrigeration, the high temperature and high pressure refrigerant gas is cooled down by an air-cooled condenser with the ventilation of the DC inverter fan, and becomes a liquid. In the case of water-cooled refrigeration, the refrigerant gas is cooled by a water-cooled condenser with the facility water in the facility water circuit, and becomes a liquid.
- The liquefied high pressure refrigerant gas expands and its temperature lowers when it passes through expansion valve A and vaporises by taking heat from the circulating fluid in the evaporator.
- The vaporised refrigerant gas is sucked into the DC inverter compressor and compressed again.
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POINT

The combination of inverter control of the compressor and fan (facility water flow control by a water regulating valve is used in water-cooled refrigeration), and the precise control of expansion valves A and B realises energy saving operation without waste and high temperature stability.

Circulating fluid circuit

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- The circulating fluid is sent to the evaporator by the inverter pump, and is controlled to a set temperature by the refrigeration circuit, to be discharged to the user's equipment side again by the thermo-chiller.

POINT




Adjusting the discharge pressure by pump inverter control eliminates wasteful discharge of the circulating fluid and realises energy saving operation.

POINT

Since the refrigeration circuit is controlled by the signal from 2 temperature sensors (for return and discharge), precise temperature control of the circulating fluid can be performed. Therefore, there is no necessity of absorbing the temperature difference in the circulating fluid with a large tank capacity, and realises high temperature stability even with a small-size tank. Also, contributes to space-saving.

Variations Cooling capacities ranging from 9.5 kW to 28 kW



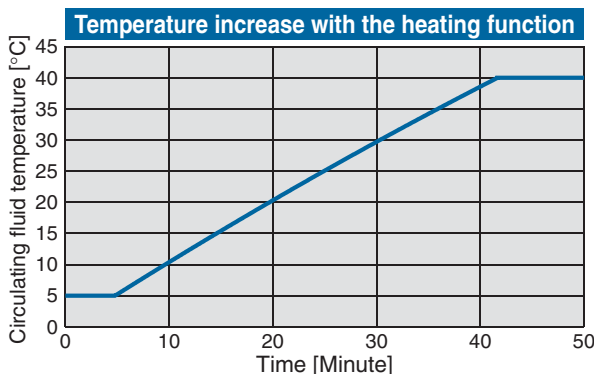
	Model	Cooling method	Cooling capacity	Power supply		Set temperature range	Temperature stability	Optional accessories	
				Option -20	Option -40				
Compact type	 HRSH090-A	Air-cooled refrigeration	9.5 kw	3-phase 200 V AC (50 Hz)	3-phase 380 to 415 V AC (50 / 60 Hz) <small>(Note)</small>	5 to 40 °C	±0.1 °C	- Piping conversion fitting - By-pass piping set	
	HRSH090-W	Water-cooled refrigeration	11.0 kw						
Large type		Air-cooled refrigeration	HRSH100-A			10.5 kw		5 to 35 °C	- Piping conversion fitting - By-pass piping set - Caster adjuster foot kit - Snow protection hood
			HRSH150-A			15.7 kw			
			HRSH200-A			20.5 kw			
			HRSH250-A			25 kw			
			HRSH300-A			28 kw			
		Water-cooled refrigeration	HRSH100-W			11.5 kw			
			HRSH150-W			15.7 kw			
			HRSH200-W			20.6 kw			
	HRSH250-W		24 kw						

Note) Option -40 is not UL compliant.

Temperature stability ±0.1 °C (when a load is stable)

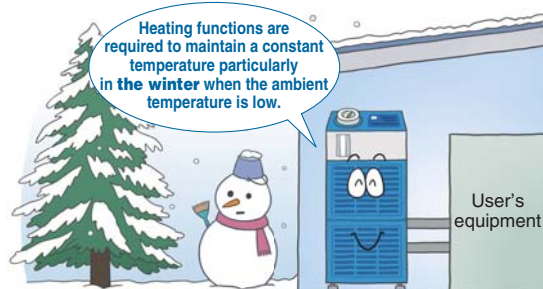
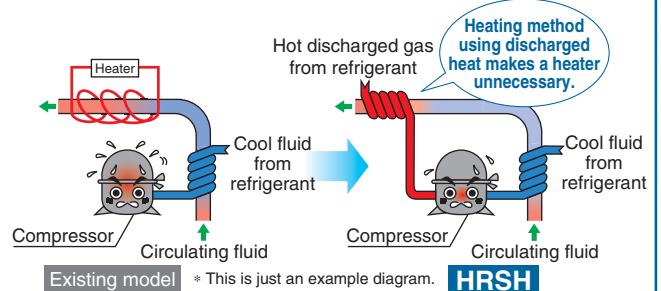
By controlling the DC inverter compressor, DC inverter fan, and electronic expansion valve simultaneously, it maintains the good temperature stability when the heat load fluctuates.

Circulating fluid can be heated without a heater.



* For HRSH090-A-20

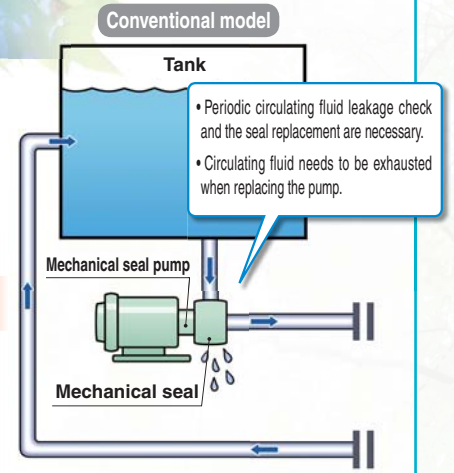
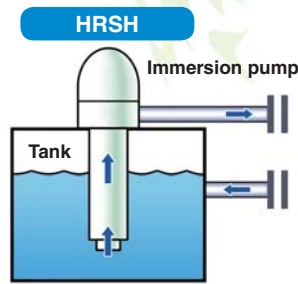
- | | | |
|------------|--|------------------------------|
| Conditions | ● Ambient temperature: 5 °C | ● Power supply: 200 V, 60 Hz |
| | ● Circulating fluid flow: 45 L/min@0.5 MPa | |
| | ● External piping: By-pass piping | |



Reduces the maintenance hours for the pump. (not for HRSH090)

Mechanical seal-less immersion pump is used.

As the pump has no external leakage of the circulating fluid, a periodic check of the pump leakage and replacement of the mechanical seal are not necessary. There is no need to exhaust the circulating fluid when removing the pump.



Compact and lightweight 280 kg (For HRSH250-A-20-S)

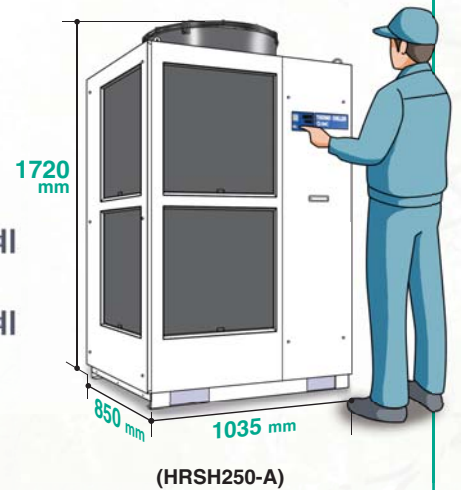
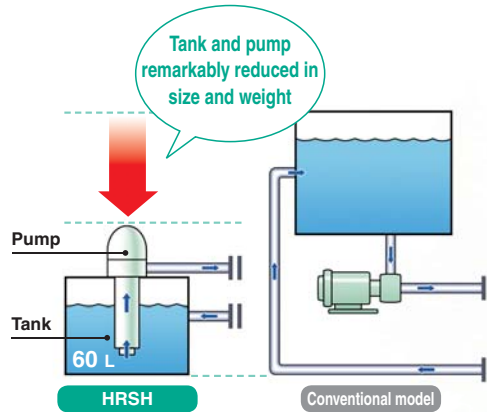
Compact tank 60 L (HRSH250-A)

Temperature followability control reduced the tank capacity required as a buffer.

Aluminium air-cooled condenser

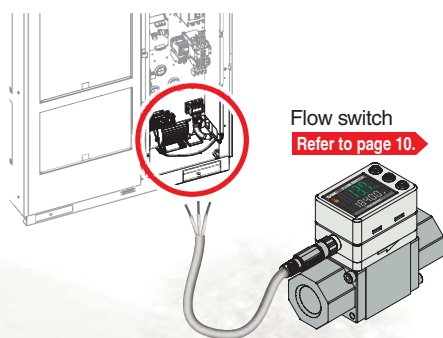
High heat transfer efficiency, lightweight

The integrated tank and pump saves space. (not for HRSH090)



	Model	Height [mm]	Width [mm]	Depth [mm]	Weight [kg]
Air-cooled refrigeration	HRSH090-A	1080	377	970	130
	HRSH100-A	1420	954	715	180
	HRSH150/200-A	1420	954	715	215
	HRSH250/300-A	1720	1035	850	280
Water-cooled refrigeration	HRSH090-W	1080	377	970	121
	HRSH100-W	1235	687	715	150
	HRSH150/200/250-W	1235	687	715	180

Power supply (24 V DC) available



Power can be supplied from the terminal block of the thermo-chiller to external switches etc.

IPX4

IP (International Protection) is the industrial standard for "Degrees of protection provided by outer defensive enclosures of electric equipment (IP Code)" according to IEC 60529 and JIS C 0920.

IPX4: No harmful influence by water splash is acceptable from every direction.

Can be installed outdoors.



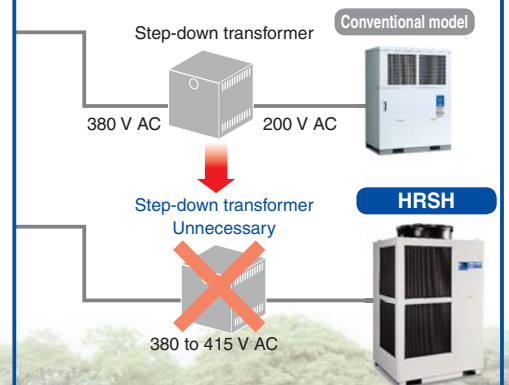
*Not applicable for size HRSH090

Globally compatible power supplies

(Europe, Asia, Oceania, Central and South America)

Power supply Applicable to 200 to 230 V AC, or 380 to 415 V AC

Transformers are unnecessary even when used overseas.



Improved maintenance performance

Simple operation with large digital display

Easy operation by 3 steps: **1** **RUN STOP** Key To Start **2** **▲ ▼** Keys Adjust the temperature **3** **RUN STOP** Key To Stop

Front side access

(Except for HRSH090)

All the electrical components can be checked from the front side for an easier maintenance work.

Fluid fill port for the circulating fluid is available.

(as an option for HRSH100/150/200/250)

Fluid fill port is equipped in the upper part of the tank in addition to the automatic fluid fill port for a tap water piping connection.

Tool-less inspection and cleaning of air-cooled condenser

Dustproof filter can be removed with no tools.

Shaped for easy supply of circulating fluid

(Only HRSH090)

The angled supply port facilitates the supply of circulating fluid.

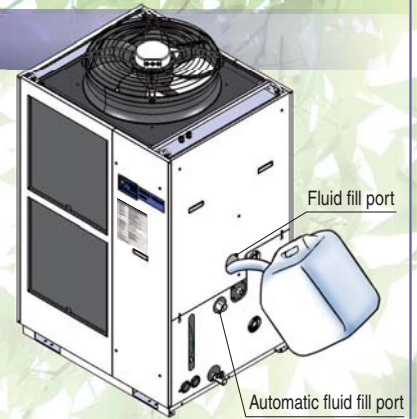
Easy cleaning of the tank

(Only HRSH090)

An opening with a cap is included separately from the water inlet. Opening diameter: $\varnothing 110$

Easy check of the circulating fluid

(Only HRSH090)



Convenient Functions (Refer to the Operation Manual for details.)

■ Timer operation function

Timer for ON and OFF can be set in units of 0.5 h up to 99.5 h.

Ex.) Can set to stop on Saturday and Sunday and restart on Monday morning.

Ex. SE.02 "ON timer"

Timer The time remaining can be checked.



■ Unit conversion function

Temperature and pressure units can be changed.

Orange indicator lights up.



■ Power failure auto-restart function

Automatic restart from stoppage due to power failure etc. is possible without pressing the **RUN/STOP** key and remote operation.

■ Anti-freezing operation function

If the temperature approaches freezing point, e.g. in winter at night, the pump operates automatically and the heat generated by the pump warms the circulating fluid, preventing freezing.

■ Key-lock function

Can be set in advance to protect the set values from being changed by pressing keys by mistake.

■ Function to output a signal for completion of preparation

Notifies by communication when the temperature reaches the pre-set temperature range.

■ Independent operation of the pump

The pump can be operated independently while chiller is powered off. You can check piping leak and remove the air.

Electric conductivity control set (Optional accessories)

(With DI filter + Solenoid valve kit for control)

The electric conductivity of the circulating fluid can be set with the controller monitor arbitrarily.

Set control range: 5.0 to 45.0 $\mu\text{S/cm}$

With caster adjuster-foot

(Option)

Selt Diagnosis and Check Display

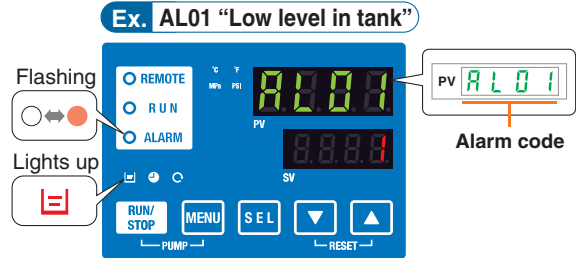
Display of 35 types of alarm codes ▶ For details, refer to page 13.

Operation is monitored all the time by the integrated sensor. Should any error occur, the self diagnosis result is displayed by the applicable alarm code from 35 types. This makes it easier to identify the cause of the alarm. Can be used before requesting service.

Changeable alarm set values

Setting item	Set value
Circulating fluid discharge temperature rise	5 to 55 °C
Circulating fluid discharge temperature drop	1 to 39 °C
Circulating fluid discharge pressure rise	0.05 to 0.6 MPa*
Circulating fluid discharge pressure drop	0.05 to 0.6 MPa*

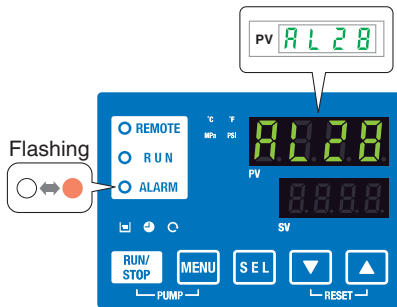
* Set values vary depending on the model.



Alarm codes notify of checking times. Notifies when to check the pump and fan motor. Helpful for facility maintenance.

* The fan motor is not used in water-cooled refrigeration.

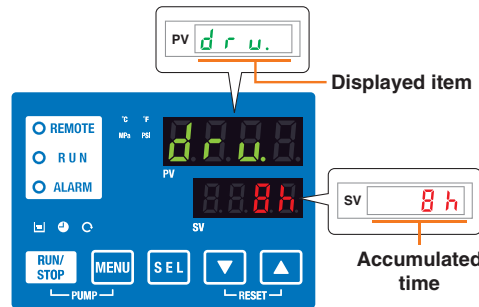
Ex. AL28 "Pump maintenance"



Check display

The internal temperature, pressure and operating time of the product are displayed.

Ex. drv. "Accumulated operating time"



	Displayed item
Temperature	Circulating fluid outlet temperature
	Circulating fluid return temperature
	Compressor gas temperature
Pressure	Circulating fluid outlet pressure
	Compressor gas discharge pressure
	Compressor gas return pressure
Operating time	Accumulated operating time
	Accumulated operating time of pump
	Accumulated operating time of fan
	Accumulated operating time of compressor
	Accumulated operation time of dustproof filter
Flow rate	Circulating fluid flow rate**

* Displayed only for air-cooled refrigeration.
** Is not a measurement value use it for reference.

Convenient functions ▶ Details ▶ Page 30

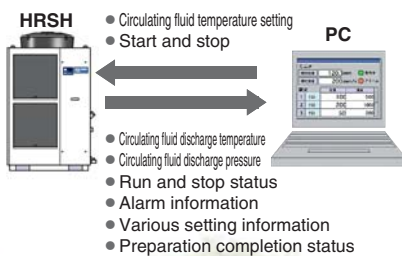
Timer function, Anti-freezing function, Power failure auto-restart function, Warming-up function, Key-lock function

Communication function

The serial communication (RS232C/RS485) and contact I/Os (2 inputs and 3 outputs) are equipped as standard. Communication with the user's equipment and system construction are possible, depending on the application. A 24 V DC output can be also provided, and is available for a flow switch (SMC's PF3W, etc.).

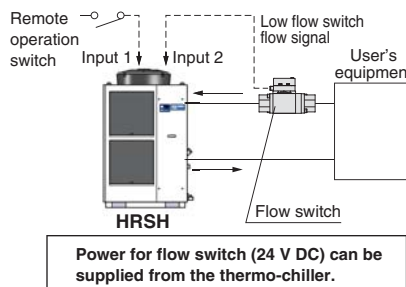
Ex.1 Remote signal I/O through serial communication

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



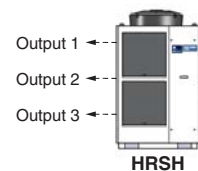
Ex.2 Remote operation signal input

One of the contact inputs is used for remote operation and the other is used for a flow switch to monitor the flow, and their warning outputs are taken in.



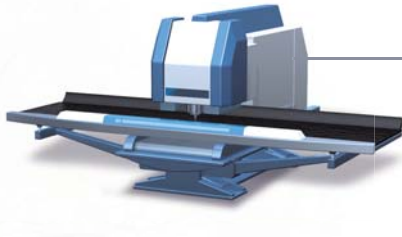
Ex.3 Alarm and operation status (start, stop, etc.) signal output

The alarm and status generated in the product are assigned to 3 output signals based on their contents, and can be output.



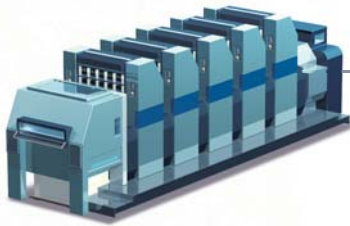
- Output setting example
 - Output 1: Temperature rise
 - Output 2: Pressure rise
 - Output 3: Operation status (start, stop, etc.)

Applications



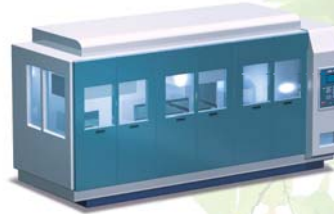
Laser beam machine/Laser welding machine

Cooling of the laser oscillation part and power source



Printing machine

Temperature control of the ink roller



Cleaning machine

Temperature control of cleaning solution

Injection molding



Arc welding machine

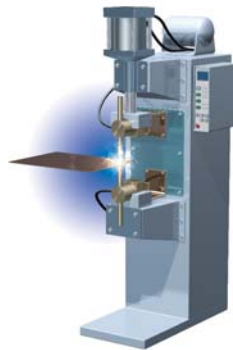


Cooling of the power source



Resistance welding machine (Spot welding)

Cooling of the welding head electrodes, transformers and transistors (thyristors)



High frequency induction heating equipment

Cooling of the heating coils, high frequency power source and around inverters

High frequency inverter



Heating coil

Makes cooling water easily available, anytime, anywhere.

When...

There is no cooling tower.
Tap water is being used.



Even without a cooling tower, an air-cooled refrigerated chiller can be used to easily supply cooling water.



Dripping stops

Less tap water used!



When...

There is a cooling tower, but high temperatures in summer or low (freezing) temperatures in winter make cooling water temperatures unstable.



Cooling water at a consistent temperature can be supplied regardless of the season.



Series HRSH

Global Supply Network

SMC has a comprehensive network in the global market.






We now have a presence of more than 400 branch offices and distributors in 78 countries world wide such as Asia, Oceania, North/Central/South America, and Europe. With this global network, we are able to provide a global supply of our substantial range of products with the best service.



SMC Thermo-chiller Variations

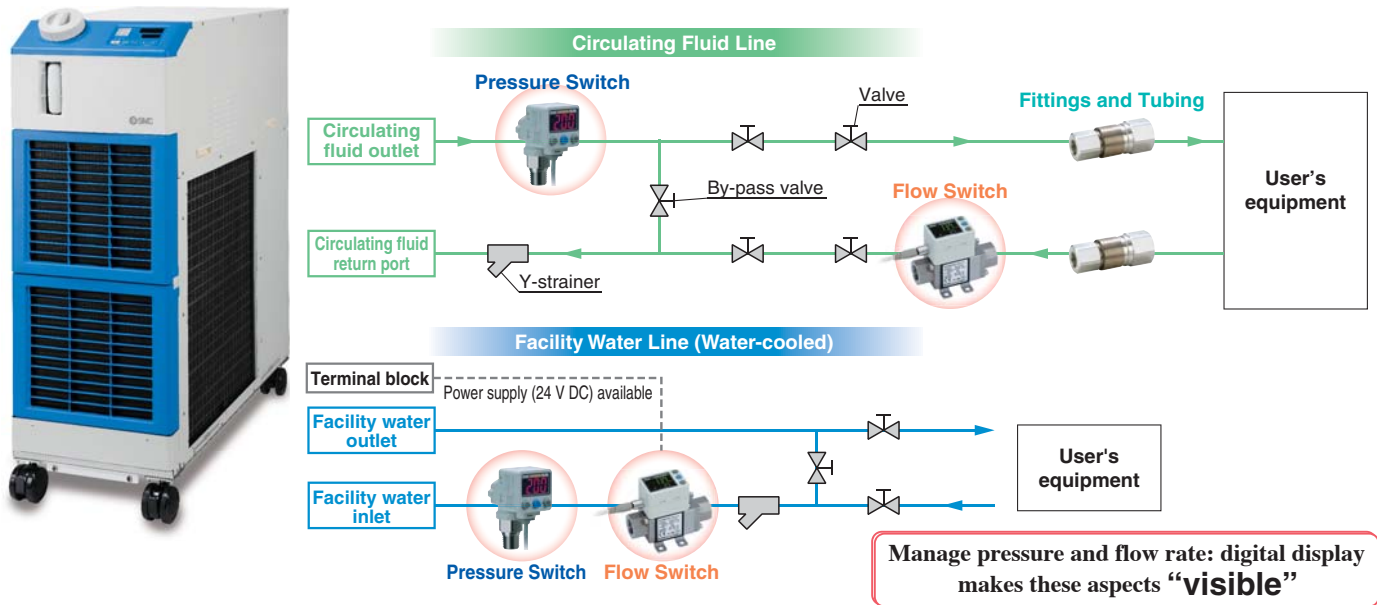
Lots of variations are available in response to the users' requirements.

As of October 2016

Series	Temperature stability [°C]	Set temperature range [°C]	Approximate cooling capacity [kW]											Environment	Power supply			
			1.2	1.8	2.4	3	5	6	9	10	15	20	25			28		
 HRSE Basic type	±2.0	10 to 30	●	●	●												Indoor use	Single-phase 230 V AC (50 / 60 Hz)
 HRS Standard type	±0.1	5 to 40	●	●	●	●	●	●									Indoor use	Single-phase 100 to 115 V AC (50 / 60 Hz)*
	±0.5	5 to 35							●									Single-phase 200 to 230 V AC (50 / 60 Hz)
 HRS100/150 Standard type	±1.0	5 to 35								●	●						Outdoor installation IPX4	3-phase 380 to 415 V AC (50 / 60 Hz)
 HRSH090 Inverter type	±0.1	5 to 40								●							Indoor use	3-phase 200 V AC (50 Hz) 3-phase 200 to 230 V AC (60 Hz) 3-phase 380 to 415 V AC (50 / 60 Hz)
 HRSH Inverter type	±0.1	5 to 35									●	●	●	●	●		Outdoor installation IPX4	3-phase 200 V AC (50 Hz) 3-phase 200 to 230 V AC (60 Hz) 3-phase 380 to 415 V AC (50 / 60 Hz)

* Only available for lower cooling capacities.

Circulating Fluid/Facility Water Line Equipment



Flow Switch: Monitors flow rate and temperature of the circulating fluid.

Refer to the website www.smc.eu for details.

3-colour Display Digital Flow Switch for Water **PF3W**
Integrated with temperature sensor
PVC Piping



3-colour Display Electromagnetic Type Digital Flow Switch **LFE**



Digital Flow Switch for Deionized Water and Chemical Liquids **PF2D**
4-Channel Flow Monitor **PF2□200**



Pressure Switch: Monitors pressure of the circulating fluid.

Refer to the website www.smc.eu for details.

2-colour Display High-Precision Digital Pressure Switch **ISE80**



Pressure Sensor for General Fluids **PSE56□**
Pressure Sensor Controller **PSE200,300**

Fittings and Tubing

Refer to the website www.smc.eu for details.

S Coupler **KK**



S Coupler/Stainless Steel (Stainless Steel 304) **KKA**



Tubing **T□**



Metal One-touch Fittings **KQB2**



Stainless Steel 316 One-touch Fittings **KQG2**



Stainless Steel 316 Insert Fittings **KFG2**



Fluoropolymer Fittings **LQ**



Series	Material
T	Nylon
TU	Polyurethane
TH	FEP (Fluoropolymer)
TD	Modified PTFE (Soft fluoropolymer)
TL	Super PFA
TLM	PFA

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Series HRSH



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● Thermo-chiller Series HRSH **Inverter Type** **Large Type**

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With automatic fluid fill function	Page 33
Applicable to deionised water piping.....	Page 33

● Optional Accessories

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② By-pass Piping Set	Page 35
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④ Electric Conductivity Control Set	Page 36
⑤ Particle Filter Set	Page 37
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● Cooling Capacity Calculation

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Circulating Fluid Typical Physical Property Values	Page 40

Specific Product Precautions	Page 41
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Thermo-chiller Inverter Type Compact Type

Air-cooled 200 V Type

Series HRSH090



How to Order

HRSH 090 - A [] - 20 - [] S

Cooling capacity

090	9.5 kW
-----	--------

Cooling method

A	Air-cooled refrigeration
---	--------------------------

Pipe thread type

—	Rc
F	G (with Rc-G conversion fitting)
N	NPT (with Rc-NPT conversion fitting)

Power supply

20	3-phase 200 V AC (50 Hz) 3-phase 200 to 230 V AC (60 Hz)
----	---

CE/UL Compliant
 Note) Equipped with earth leakage breaker with a breaker handle.

Option

—	None
M	Applicable to deionised water piping
J	Automatic water supply

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

Specifications

Model		HRSH090-A□-20-□S	
Cooling method		Air-cooled refrigeration	
Refrigerant		R410A (HFC) (GWP1975)	
Control method		PID control	
Ambient temperature/humidity <small>Note 1), 8)</small> [°C/%]		5 to 45/30 to 70 %	
Circulating fluid system	Circulating fluid <small>Note 2)</small>	Tap water, 15 % Ethylene glycol aqueous solution, Deionised water	
	Set temperature range <small>Note 1)</small> [°C]	5 to 40	
	Cooling capacity <small>Note 3), 8)</small> [kW]	9.5	
	Heating capacity <small>Note 4)</small> [kW]	2.5	
	Temperature stability <small>Note 5)</small> [°C]	±0.1	
	Pump capacity	Rated flow (Outlet) [l/min]	45 (0.5 MPa)
		Maximum flow rate [l/min]	60
		Maximum pump head [m]	50
	Settable pressure range <small>Note 6)</small> [MPa]	0.1 to 0.5	
	Minimum operating flow rate <small>Note 7)</small> [l/min]	20	
Tank capacity [L]	18		
Circulating fluid outlet, circulating fluid return port		Rc 1 (Symbol F: G 1, Symbol N: NPT 1)	
Tank drain port		Rc 1/4 (Symbol F: G 1/4, Symbol N: NPT 1/4)	
Fluid contact material		Stainless steel, Copper (Heat exchanger brazing), Brass, Bronze, Carbon, Ceramic, PE, PVC, POM, PTFE, NBR, EPDM, FKM, PP	
Electrical system	Power supply		
	3-phase 200 V AC (50 Hz), 3-phase 200 to 230 V AC (60 Hz) Allowable voltage range ±10 % (No continuous voltage fluctuation)		
	Applicable earth leakage breaker	Rated current [A]	30
		Sensitivity of leak current [mA]	30
	Rated operating current <small>Note 5)</small> [A]		15
Rated power consumption <small>Note 5)</small> [kW (kVA)]		4.6 (5.2)	
Noise level (Front 1 m/Height 1 m) <small>Note 5)</small> [dB (A)]		66	
Accessories		Alarm code list stickers 2 pcs. (English 1 pc./Japanese 1 pc.), Operation Manual (for installation/operation) 2 pcs. (English 1 pc./Japanese 1 pc.), Y-strainer (40 meshes) 25A, Barrel nipple 25A, Anchor bolt fixing brackets 2 pcs. (including 4 M10 bolts) <small>Note 10)</small>	
Weight (dry state)	kg	Approx. 130	

Note 1) Use a 15 % ethylene glycol aqueous solution if operating in a place where the ambient temperature and/or circulating fluid temperature is 10 °C or less.
 Note 2) Use fluid in condition below as the circulating fluid.
 Tap water: Standard of The Japan Refrigeration And Air Conditioning Industry Association (JRA GL-02-1994)
 15 % ethylene glycol aqueous solution: diluted by tap water in condition above without any additives such as antiseptics.
 Deionised water: Electric conductivity 1 μS/cm or higher (Electric resistivity 1 MΩ·cm or lower)
 Note 3) ① Ambient temperature: 32 °C, ② Circulating fluid: Tap water, ③ Circulating fluid temperature: 20 °C, ④ Circulating fluid flow rate: Rated flow, ⑤ Power supply: 200/400 V AC
 Note 4) ① Ambient temperature: 32 °C, ② Circulating fluid: Tap water, ③ Circulating fluid flow rate: Rated flow, ④ Power supply: 200/400 V AC
 Note 5) ① Ambient temperature: 32 °C, ② Circulating fluid: Tap water, ③ Circulating fluid temperature: 20 °C, ④ Load: Same as the cooling capacity,
 ⑤ Circulating fluid flow rate: Rated flow, ⑥ Power supply: 200/400 V AC, ⑦ Piping length: Shortest
 Note 6) With the pressure control mode by inverter. When the pressure control mode is not used, the pump power frequency set mode can be used.
 Note 7) Fluid flow rate to maintain the cooling capacity. If the actual flow rate is lower than this, install a bypass piping.
 Note 8) If the product is used at altitude of 1000 m or higher, refer to "Operating Environment/Storage Environment" (page 27) Item 14 "*" For altitude of 1000 m or higher".
 Note 9) The anchor bolt fixing brackets (including 4 M10 bolts) are used for fixing to wooden skids when packaging the thermo-chiller. No anchor bolt is included.

Thermo-chiller Inverter Type Compact Type

Water-cooled 200 V Type

Series **HRSH090**



How to Order

HRSH 090 - W [] - 20 - [] S

Cooling capacity

090	11.0 kW
-----	---------

Cooling method

W	Water-cooled refrigeration
---	----------------------------

Pipe thread type

—	Rc
F	G (with Rc-G conversion fitting)
N	NPT (with Rc-NPT conversion fitting)

CE/UL Compliant
 Note) Equipped with earth leakage breaker with a breaker handle.

Option

—	None
M	Applicable to deionised water piping
J	Automatic water supply

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

Power supply

20	3-phase 200 V AC (50 Hz) 3-phase 200 to 230 V AC (60 Hz)
----	---

Specifications

Model		HRSH090-W[]-20-[]S		
Cooling method		Water-cooled refrigeration		
Refrigerant		R410A (HFC) (GWP1975)		
Control method		PID control		
Ambient temperature/humidity <small>Note 1), 8)</small> [°C/%]		5 to 45/30 to 70 %		
Circulating fluid system	Circulating fluid <small>Note 2)</small>	Tap water, 15 % Ethylene glycol aqueous solution, Deionised water		
	Set temperature range <small>Note 1)</small> [°C]	5 to 40		
	Cooling capacity <small>Note 3), 8)</small> [kW]	11.0		
	Heating capacity <small>Note 4)</small> [kW]	2.5		
	Temperature stability <small>Note 5)</small> [°C]	±0.1		
	Pump capacity	Rated flow (Outlet) [l/min]	45 (0.5 MPa)	
		Maximum flow rate [l/min]	60	
		Maximum pump head [m]	50	
	Settable pressure range <small>Note 6)</small> [MPa]	0.1 to 0.5		
	Minimum operating flow rate <small>Note 7)</small> [l/min]	20		
	Tank capacity [L]	18		
Circulating fluid outlet, circulating fluid return port		Rc 1 (Symbol F: G 1, Symbol N: NPT 1)		
Tank drain port		Rc 1/4 (Symbol F: G 1/4, Symbol N: NPT 1/4)		
Fluid contact material		Stainless steel, Copper (Heat exchanger brazing), Brass, Bronze, Carbon, Ceramic, PE, PVC, POM, PTFE, NBR, EPDM, FKM, PP		
Facility water system	Temperature range [°C]	5 to 40		
	Pressure range [MPa]	0.3 to 0.5		
	Required flow [l/min]	25		
	Facility water pressure differential [MPa]	0.3 or more		
	Facility water inlet/outlet	Rc 1/2		
Fluid contact material		Stainless steel, Copper (Heat exchanger brazing), Bronze, Brass, PTFE, NBR, EPDM		
Electrical system	Power supply		3-phase 200 V AC (50 Hz), 3-phase 200 to 230 V AC (60 Hz) Allowable voltage range ±10 % (No continuous voltage fluctuation)	
	Applicable earth leakage breaker	Rated current [A]	30	
		Sensitivity of leak current [mA]	30	
	Rated operating current <small>Note 5)</small> [A]		12	
	Rated power consumption <small>Note 5)</small> [kW (kVA)]		3.8 (4.0)	
Noise level (Front 1 m/Height 1 m) <small>Note 5)</small> [dB (A)]		65		
Accessories		Alarm code list stickers 2 pcs. (English 1 pc./Japanese 1 pc.), Operation Manual (for installation/operation) 2 pcs. (English 1 pc./Japanese 1 pc.), Y-strainer (40 meshes) 25A, Barrel nipple 25A, Anchor bolt fixing brackets 2 pcs. (including 4 M10 bolts) <small>Note 9)</small>		
Weight (dry state) [kg]		Approx. 121		

Note 1) Use a 15 % ethylene glycol aqueous solution if operating in a place where the ambient temperature and/or circulating fluid temperature is 10 °C or less.
 Note 2) Use fluid in condition below as the circulating fluid.
 Tap water: Standard of The Japan Refrigeration And Air Conditioning Industry Association (JRA GL-02-1994)
 15 % ethylene glycol aqueous solution: diluted by tap water in condition above without any additives such as antiseptics.
 Deionised water: Electric conductivity 1 μS/cm or higher (Electric resistivity 1 MΩ·cm or lower)
 Note 3) ① Ambient temperature: 32 °C, ② Circulating fluid: Tap water, ③ Circulating fluid temperature: 20 °C, ④ Circulating fluid flow rate: Rated flow, ⑤ Power supply: 200/400 V AC
 Note 4) ① Ambient temperature: 32 °C, ② Circulating fluid: Tap water, ③ Circulating fluid flow rate: Rated flow, ④ Power supply: 200/400 V AC
 Note 5) ① Ambient temperature: 32 °C, ② Circulating fluid: Tap water, ③ Circulating fluid temperature: 20 °C, ④ Load: Same as the cooling capacity, ⑤ Circulating fluid flow rate: Rated flow, ⑥ Power supply: 200/400 V AC, ⑦ Piping length: Shortest
 Note 6) With the pressure control mode by inverter. When the pressure control mode is not used, the pump power frequency set mode can be used.
 Note 7) Fluid flow rate to maintain the cooling capacity. If the actual flow rate is lower than this, install a bypass piping.
 Note 8) If the product is used at altitude of 1000 m or higher, refer to "Operating Environment/Storage Environment" (page 27) Item 14 "*" For altitude of 1000 m or higher".
 Note 9) The anchor bolt fixing brackets (including 4 M10 bolts) are used for fixing to wooden skids when packaging the thermo-chiller. No anchor bolt is included.

Thermo-chiller Inverter Type Compact Type

Air-cooled 400 V Type

Series HRSH



How to Order

HRSH 090 - A F - 40 - □

Cooling capacity

090	9.5 kW
-----	--------

Cooling method

A	Air-cooled refrigeration
---	--------------------------

Pipe thread type

—	Rc
F	G (with Rc-G conversion fitting)
N	NPT (with Rc-NPT conversion fitting)

Option

—	None
M	Applicable to deionised water piping
J	Automatic water supply

Power supply

40	3-phase 380 to 415 V AC (50 / 60 Hz)
----	--------------------------------------

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

Specifications

Model		HRSH090-A□-40-□		
Cooling method		Air-cooled refrigeration		
Refrigerant		R410A (HFC): GWP2088		
Control method		PID control		
Ambient temperature/humidity ^{Note 1)} [°C/%]		5 to 45/30 to 70 %		
Circulating fluid system	Circulating fluid ^{Note 2)}	Tap water, 15 % Ethylene glycol aqueous solution, Deionised water		
	Set temperature range ^{Note 1)} [°C]	5 to 40		
	Cooling capacity ^{Note 3)} [kW]	9.5		
	Heating capacity ^{Note 4)} [kW]	2.5		
	Temperature stability ^{Note 5)} [°C]	±0.1		
	Pump capacity	Rated flow (Outlet) [l/min]	45 (0.5 MPa)	
		Maximum flow rate [l/min]	60	
		Maximum pump head [m]	50	
	Settable pressure range ^{Note 6)} [MPa]	0.1 to 0.5		
	Minimum operating flow rate ^{Note 7)} [l/min]	20		
	Tank capacity [L]	18		
	Circulating fluid outlet, circulating fluid return port		Rc 1 (Symbol F: G 1, Symbol N: NPT 1)	
	Tank drain port		Rc 1/4 (Symbol F: G 1/4, Symbol N: NPT 1/4)	
Fluid contact material	Metal	Stainless steel, Copper (Heat exchanger brazing), Brass (Pump, Y-strainer), Carbon, SiC		
	Resin	PE, PVC, POM, PTFE, NBR, EPDM, FKM		
Electrical system	Power supply		3-phase 380 to 415 V AC (50 / 60 Hz) Allowable voltage range ±10 % (No continuous voltage fluctuation)	
	Applicable earth leakage breaker ^{Note 8)}	Rated current [A]	20	
		Sensitivity of leak current [mA]	30	
	Rated operating current ^{Note 5)} [A]		8	
	Rated power consumption ^{Note 5)} [kW (kVA)]		5.0 (5.6)	
Noise level (Front 1 m/Height 1 m) ^{Note 5)} [dB (A)]		66		
Accessories		Alarm code list stickers 2 pcs. (English 1 pc./Japanese 1 pc.), Operation Manual (for installation/operation) 2 pcs. (English 1 pc./Japanese 1 pc.), Y-strainer (40 meshes) 25A, Barrel nipple 25A, Anchor bolt fixing brackets 2 pcs. (including 4 M10 bolts) ^{Note 8)}		
Weight (dry state) [kg]		Approx. 130		

Note 1) Use a 15 % ethylene glycol aqueous solution if operating in a place where the ambient temperature and/or circulating fluid temperature is 10 °C or less.
 Note 2) Use fluid in condition below as the circulating fluid.
 Tap water: Standard of The Japan Refrigeration And Air Conditioning Industry Association (JRA GL-02-1994)
 15 % ethylene glycol aqueous solution: diluted by tap water in condition above without any additives such as antiseptics.
 Deionised water: Electric conductivity 1 μS/cm or higher (Electric resistivity 1 MΩ·cm or lower)
 Note 3) ① Ambient temperature: 32 °C, ② Circulating fluid: Tap water, ③ Circulating fluid temperature: 20 °C, ④ Circulating fluid flow rate: Rated flow, ⑤ Power supply: 200/400 V AC
 Note 4) ① Ambient temperature: 32 °C, ② Circulating fluid: Tap water, ③ Circulating fluid flow rate: Rated flow, ④ Power supply: 200/400 V AC
 Note 5) ① Ambient temperature: 32 °C, ② Circulating fluid: Tap water, ③ Circulating fluid temperature: 20 °C, ④ Load: Same as the cooling capacity,
 ⑤ Circulating fluid flow rate: Rated flow, ⑥ Power supply: 200/400 V AC, ⑦ Piping length: Shortest
 Note 6) With the pressure control mode by inverter. When the pressure control mode is not used, the pump power frequency set mode can be used.
 Note 7) Fluid flow rate to maintain the cooling capacity. If the actual flow rate is lower than this, install a by-pass piping.
 Note 8) The anchor bolt fixing brackets (including 4 M10 bolts) are used for fixing to wooden skids when packaging the thermo-chiller. No anchor bolt is included.

Thermo-chiller Inverter Type Compact Type

Water-cooled 400 V Type

Series HRSH



How to Order

HRSH 090 - W F - 40 - □

Cooling capacity

090	11.0 kW
-----	---------

Cooling method

W	Water-cooled refrigeration
---	----------------------------

Pipe thread type

—	Rc
F	G (with Rc-G conversion fitting)
N	NPT (with Rc-NPT conversion fitting)

Option

—	None
M	Applicable to deionised water piping
J	Automatic water supply

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

Power supply

40	3-phase 380 to 415 V AC (50 / 60 Hz)
----	--------------------------------------

Specifications

Model		HRSH090-W□-40-□		
Cooling method		Water-cooled refrigeration		
Refrigerant		R410A (HFC): GWP2088		
Control method		PID control		
Ambient temperature/Altitude <small>Note 1), Note 8)</small> [°C]		Temperature: 5 to 45, Altitude: less than 3000 m		
Circulating fluid system	Circulating fluid <small>Note 2)</small>	Tap water, 15 % Ethylene glycol aqueous solution		
	Set temperature range <small>Note 1)</small> [°C]	5 to 40		
	Cooling capacity <small>Note 3), Note 8)</small> [kW]	11.0		
	Heating capacity <small>Note 4)</small> [kW]	2.5		
	Temperature stability <small>Note 5)</small> [°C]	±0.1		
	Pump capacity	Rated flow (Outlet) [l/min]	45 (0.5 MPa)	
		Maximum flow rate [l/min]	60	
		Maximum pump head [m]	50	
	Settable pressure range <small>Note 6)</small> [MPa]	0.1 to 0.5		
	Minimum operating flow rate <small>Note 7)</small> [l/min]	20		
	Tank capacity [L]	18		
	Circulating fluid outlet, circulating fluid return port		Rc 1 (Symbol F: G 1, Symbol N: NPT 1)	
	Tank drain port		Rc 1/4 (Symbol F: G 1/4, Symbol N: NPT 1/4)	
Fluid contact material	Metal	Stainless steel, Copper (Heat exchanger brazing), Brass (Y-strainer), Carbon, Ceramic		
	Resin	PTFE, FKM, EPDM, PVC, NBR, POM, PE		
Facility water system	Temperature range [°C]	5 to 40		
	Pressure range [MPa]	0.3 to 0.5		
	Required flow [l/min]	25		
	Facility water pressure differential [MPa]	0.3 or more		
	Facility water inlet/outlet	Rc 1/2 (Symbol F: G 1/2, Symbol N: NPT 1/2)		
Fluid contact material	Metal	Stainless steel, Copper (Heat exchanger brazing), Bronze, Brass		
	Resin	PTFE, NBR, EPDM		
Electrical system	Power supply		3-phase 380 to 415 V AC (50 / 60 Hz), Allowable voltage range ±10 % (No continuous voltage fluctuation)	
	Applicable earth leakage breaker	Rated current [A]	20	
		Sensitivity of leak current [mA]	30	
	Rated operating current <small>Note 5)</small> [A]	6.8		
	Rated power consumption <small>Note 5)</small> [kW (kVA)]	4.0 (4.7)		
Noise level (Front 1 m/Height 1 m) <small>Note 5)</small> [dB (A)]	65			
Accessories		Alarm code list stickers 2 pcs. (English 1 pc./Japanese 1 pc.), Operation Manual (for installation/operation) 2 pcs. (English 1 pc./Japanese 1 pc.), Y-strainer (40 meshes) 25A, Barrel nipple 25A		
Weight (dry state) [kg]	Approx. 121			

Note 1) Use a 15 % ethylene glycol aqueous solution if operating in a place where the ambient temperature and/or circulating fluid temperature is 10 °C or less.

Note 2) Use fluid in condition below as the circulating fluid.

Tap water: Standard of The Japan Refrigeration And Air Conditioning Industry Association (JRA GL-02-1994)

15 % ethylene glycol aqueous solution: diluted by tap water in condition above without any additives such as antiseptics.

Deionised water: Electric conductivity 1 μS/cm or higher (Electric resistivity 1 MΩ·cm or lower)

Note 3) ① Facility water temperature: 32 °C, ② Circulating fluid: Tap water, ③ Circulating fluid temperature: 20 °C, ④ Circulating fluid flow rate: Rated flow, ⑤ Power supply: 400 V AC

Note 4) ① Facility water temperature: 32 °C, ② Circulating fluid: Tap water, ③ Circulating fluid flow rate: Rated flow, ④ Power supply: 400 V AC

Note 5) ① Facility water temperature: 32 °C, ② Circulating fluid: Tap water, ③ Circulating fluid temperature: 20 °C, ④ Load: Same as the cooling capacity, ⑤ Circulating fluid flow rate: Rated flow, ⑥ Power supply: 400 V AC, ⑦ Piping length: Shortest

Note 6) With the pressure control mode by inverter. When the pressure control mode is not used, the pump power frequency set mode can be used.

Note 7) Fluid flow rate to maintain the cooling capacity and the temperature stability. If the actual flow rate is lower than this, please install a by-pass piping.

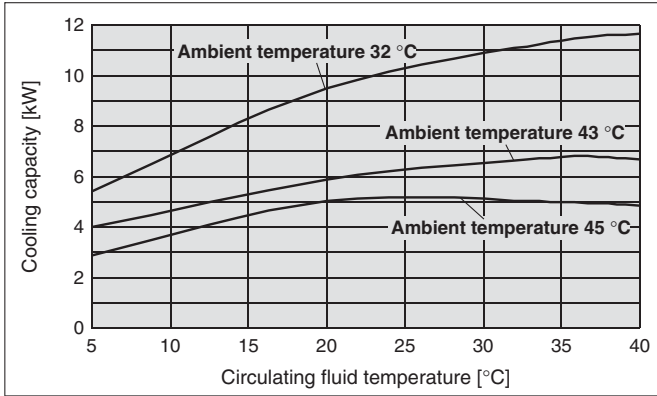
Note 8) If the product is used at altitude of 1000 m or higher, refer to "Operating Environment/Storage Environment" (page 39) Item 14 "*" For altitude of 1000 m or higher".

Series **HRSH** Inverter Type

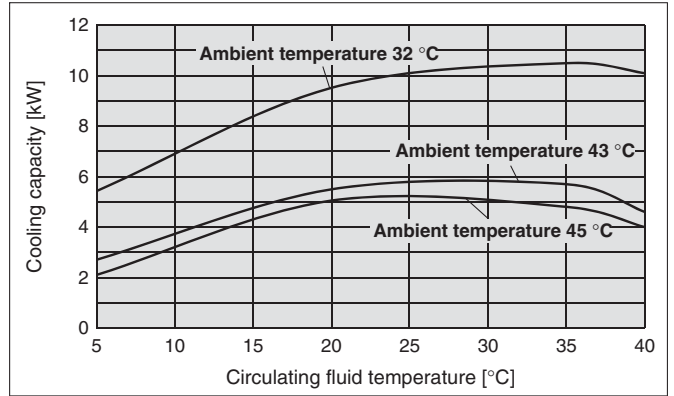
Cooling Capacity

* If the product is used at altitude of 1000 m or higher, refer to "Operating Environment/Storage Environment" (page 39) Item 14 ** For altitude of 1000 m or higher.

HRSH090-A□-20-□S

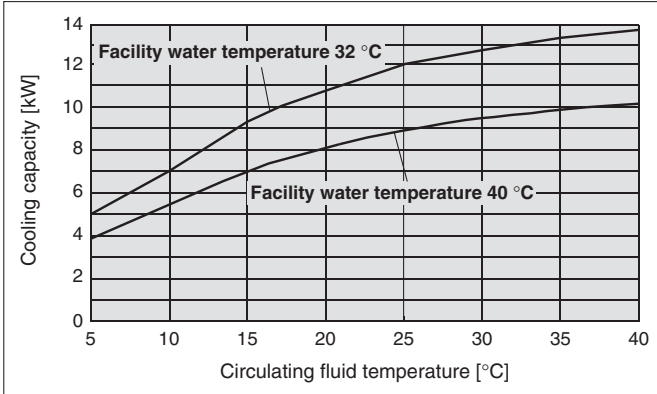


HRSH090-A□-40-□



HRSH090-W□-20-□S

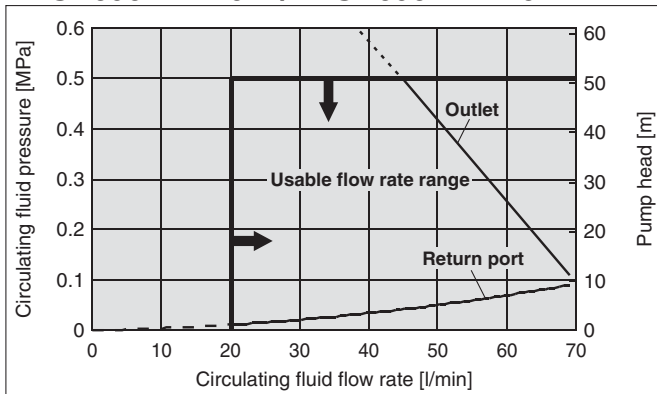
HRSH090-W□-40-□



Pump Capacity

HRSH090-A□-20-□S/HRSH090-W□-20-□S

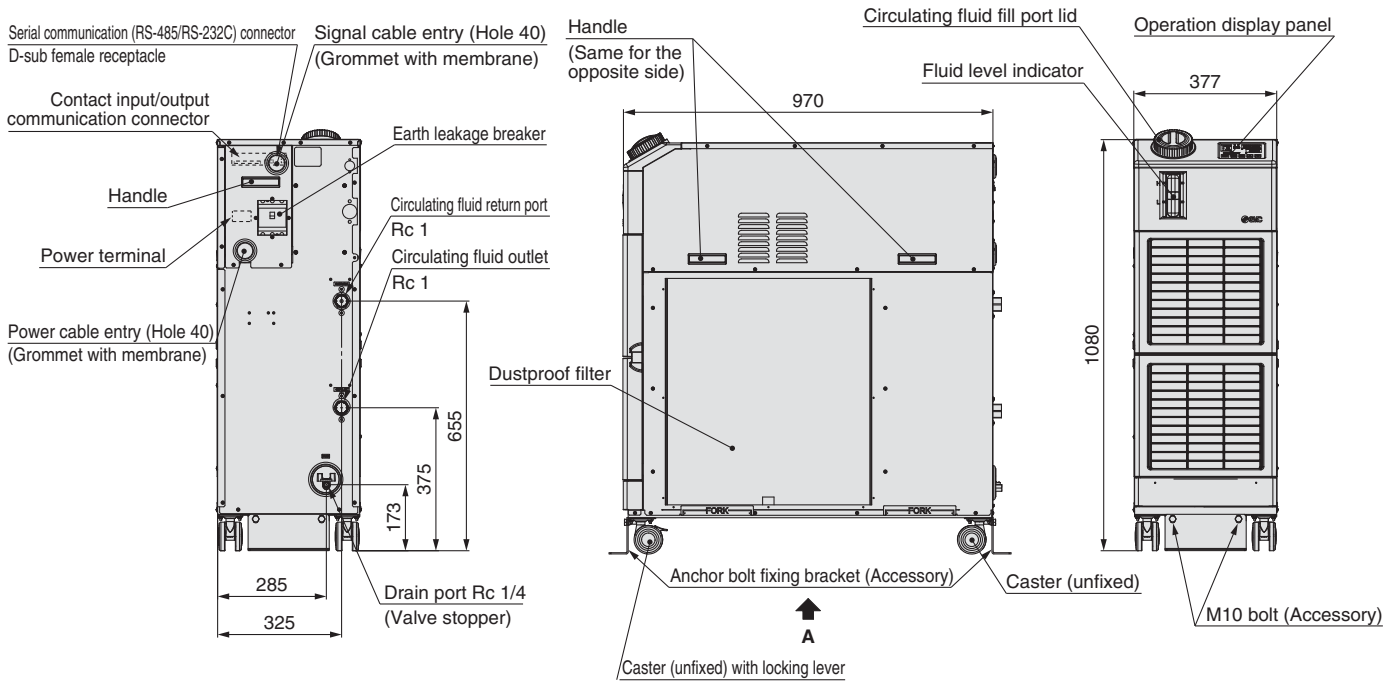
HRSH090-A□-40-□/HRSH090-W□-40-□



Dimensions

HRSH090-A-20-□S (Air-cooled 200 V type)

HRSH090-A-40-□ (Air-cooled 400 V type)

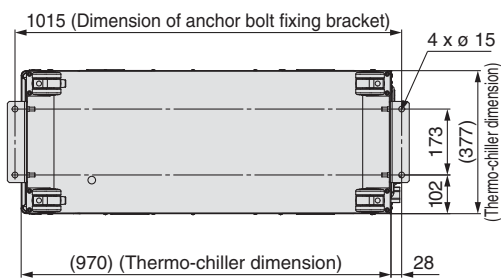


↑ Ventilation air outlet



↑ Ventilation air inlet

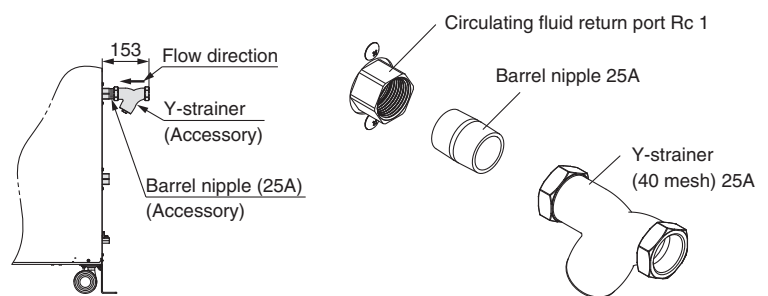
Anchor bolt fixing position



View A

Y-strainer mounting view

* Mount it by yourself on the circulating fluid return port.

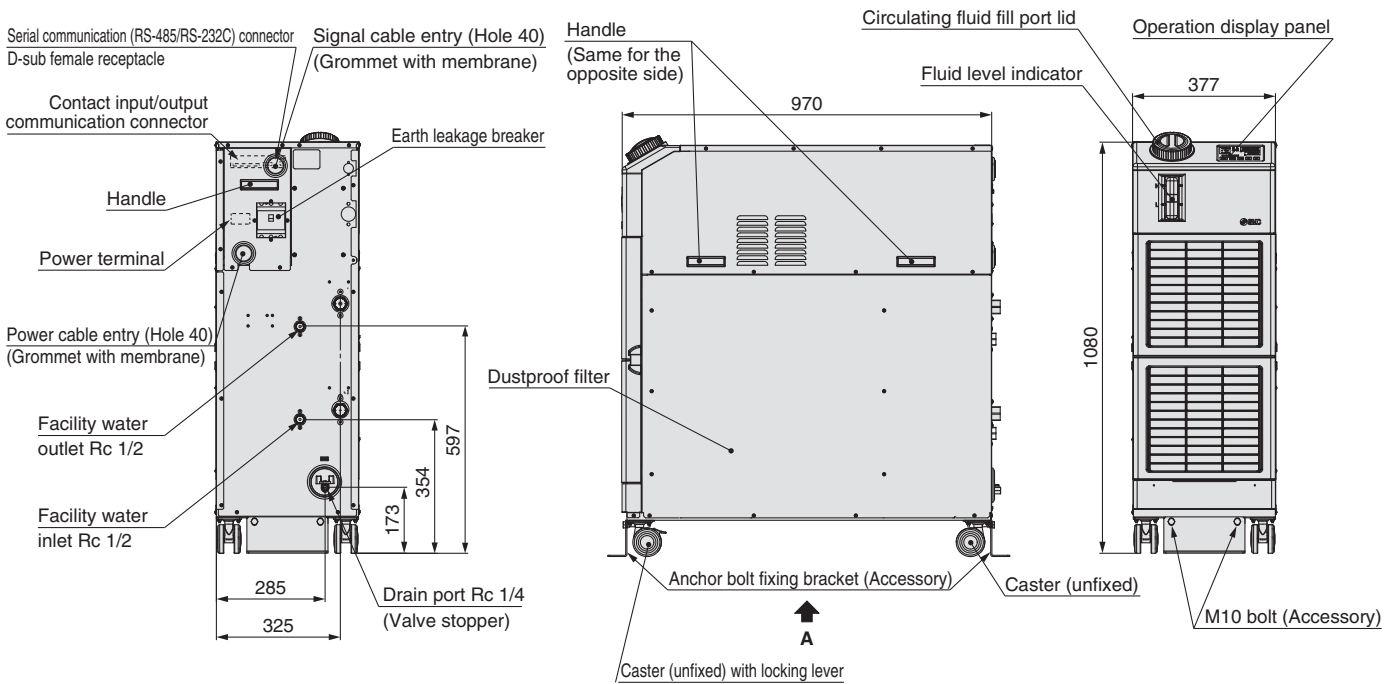


Series HRSH Inverter Type

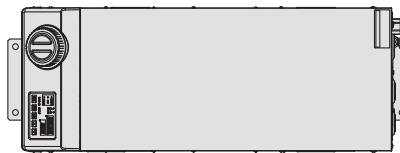
Dimensions

HRSH090-W-20-□S (Water-cooled 200 V type)

HRSH090-W-40-□ (Water-cooled 400 V type)

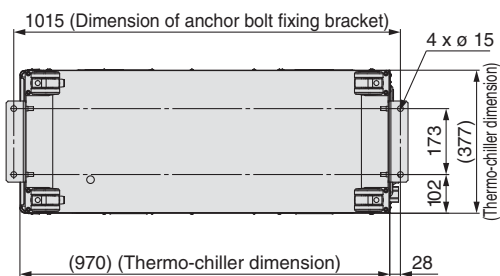


↑ Ventilation air outlet



↑ Ventilation air inlet

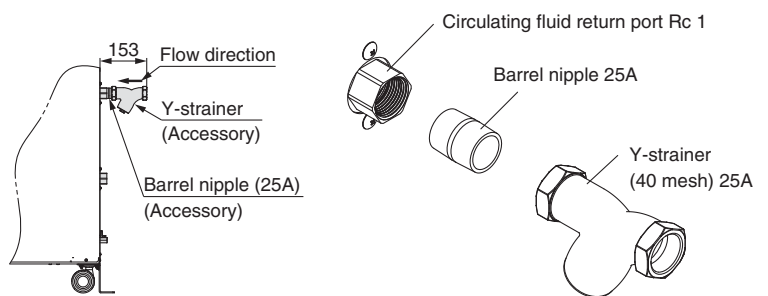
Anchor bolt fixing position



View A

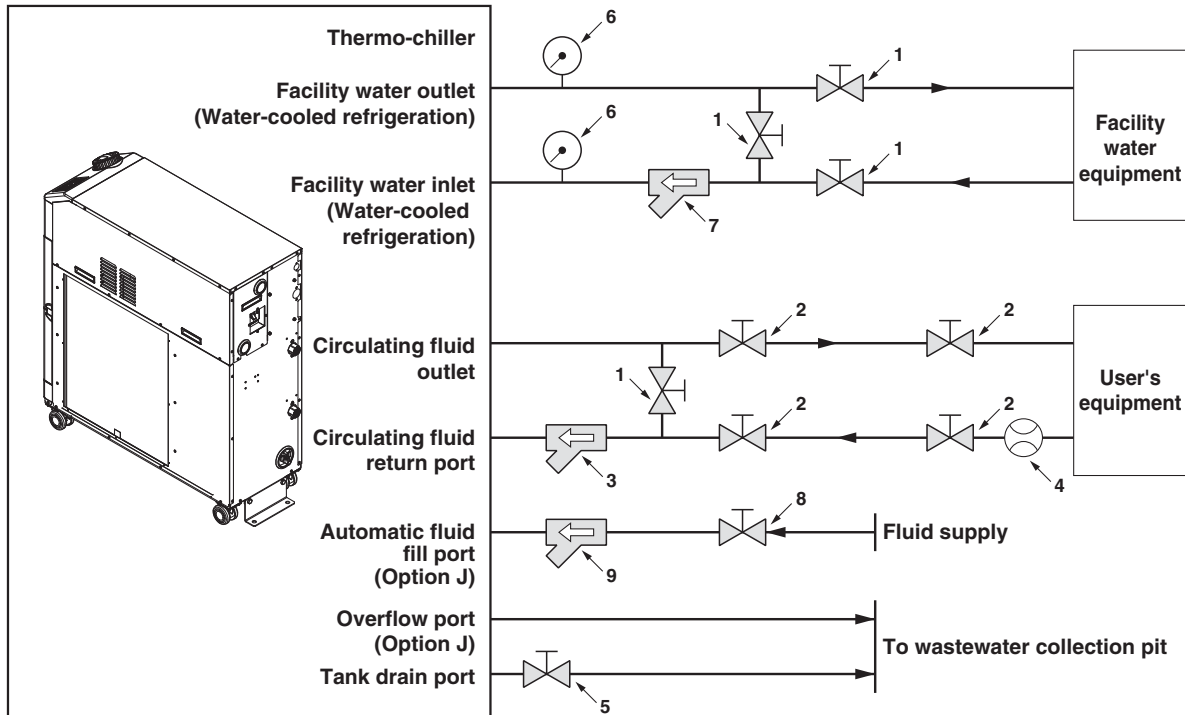
Y-strainer mounting view

* Mount it by yourself on the circulating fluid return port.



Recommended External Piping Flow

External piping circuit is recommended as shown below.



No.	Description	Size
1	Valve	Rc 1/2
2	Valve	Rc 1
3	Y-strainer (#40) (Accessory)	Rc 1
4	Flow meter	Refer to page 10 for flow switch. (PF3W711/511)
5	Valve (Part of thermo-chiller)	Rc 1/4
6	Pressure gauge	0 to 1 MPa
7	Y-strainer (#40) or filter	Rc 1/2
8	Valve	Rc 3/8
9	Y-strainer (#40) or filter	Rc 3/8

Cable Specifications

Power supply and signal cable should be prepared by user.

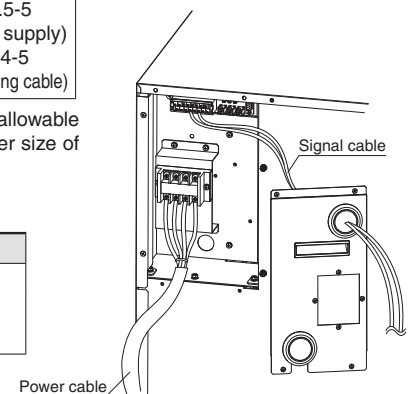
Power Cable Specifications

Applicable model	Rated value for thermo-chiller			Power cable examples	
	Power supply	Applicable breaker rated current	Terminal block screw diameter	Cable size	Crimp terminal on the thermo-chiller side
HRSH090-□□-20	3-phase 200 V AC (50 Hz)	30 A	M5	4 cores x 55 mm ² (4 cores x AWG90) (including grounding cable)	R5.5-5
	3-phase 200 to 230 V AC (60 Hz)				
HRSH090-□□-40	3-phase 380 to 415 V AC (50 / 60 Hz)	20 A	M5	3 x 5.5 mm ² (3 x AWG10) (Power supply) 1 x 14 mm ² (1 x AWG6) (Grounding cable)	R5.5-5 (Power supply) R14-5 (Grounding cable)

Note) An example of the cable specifications is when two kinds of vinyl insulated wires with a continuous allowable operating temperature of 70 °C at 600 V, are used at an ambient temperature of 30 °C. Select the proper size of cable according to an actual condition.

Signal Cable Specifications

Terminal specifications		Cable specifications
Terminal block screw diameter	Recommended crimp terminal	
M3	Y-shape crimp terminal 1.25Y-3	0.75 mm ² (AWG18) Shielded cable



Thermo-chiller Inverter Type Large Type

Air-cooled 200 V Type

Series HRSH



How to Order

HRSH **250** - **A** **F** - **20** - **S**

Cooling capacity

100	10.5 kW
150	15.7 kW
200	20.5 kW
250	25 kW
300	28 kW

Cooling method

A	Air-cooled refrigeration
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Pipe thread type

—	Rc
F	G (with Rc-G conversion fitting)
N	NPT (with Rc-NPT conversion fitting)

Power supply

20	3-phase 200 V AC (50 Hz) 3-phase 200 to 230 V AC (60 Hz)
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CE/UL Compliant

Note) Equipped with earth leakage breaker with a breaker handle.

Option

—	None
A	With caster adjuster-foot kit
K ^{Note)}	With fluid fill port

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

Note) This is a manual fluid fill port that is different from the automatic fluid fill port. Fluid can be supplied manually into the tank without removing the side panel.

(Fluid can be supplied manually for the model without the symbol K if the side panel is removed.)

Specifications

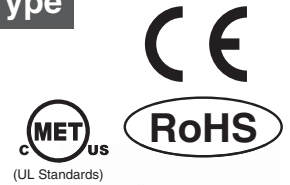
Model	HRSH100-A□-20-□S	HRSH150-A□-20-□S	HRSH200-A□-20-□S	HRSH250-A□-20-□S	HRSH300-A□-20-□S	
Cooling method	Air-cooled refrigeration					
Refrigerant	R410A (HFC): GWP2088					
Control method	PID control					
Ambient temperature/Altitude ^{Note 1), Note 8)} [°C]	Temperature: -20 to 45, Altitude: less than 3000 m					
Circulating fluid system	Circulating fluid ^{Note 2)}	Tap water, 15 to 40 % Ethylene glycol aqueous solution, Deionised water				
	Set temperature range ^{Note 1)} [°C]	5 to 35				
	Cooling capacity ^{Note 3), Note 8)} [kW]	10.5	15.7	20.5	25	28
	Heating capacity ^{Note 4)} [kW]	2.5	3	5.5	7.5	
	Temperature stability ^{Note 5)} [°C]	±0.1				
	Pump capacity	Rated flow (Outlet) [l/min]	45 (0.43 MPa)	45 (0.45 MPa)		125 (0.5 MPa)
		Maximum flow rate [l/min]	120	130	180	
		Maximum pump head [m]	50			80
	Settable pressure range ^{Note 6)} [MPa]	0.1 to 0.5			0.1 to 0.8	
	Minimum operating flow rate ^{Note 7)} [l/min]	20	25		40	
	Tank capacity [L]	25	42		60	
	Circulating fluid outlet, circulating fluid return port	Rc 1 (Symbol F: G 1, Symbol N: NPT 1)				
	Tank drain port	Rc 3/4 (Symbol F: G 3/4, Symbol N: NPT 3/4)				
Automatic fluid fill system (Standard)	Supply side pressure range [MPa]	0.2 to 0.5				
	Supply side fluid temperature [°C]	5 to 35				
	Automatic fluid fill port	Rc 1/2 (Symbol F: G 1/2, Symbol N: NPT 1/2)				
Overflow port	Rc 1 (Symbol F: G 1, Symbol N: NPT 1)					
Fluid contact material	Metal	Stainless steel, Copper (Heat exchanger brazing), Brass (Y-strainer)				
	Resin	PTFE, PU, FKM, EPDM, PVC, NBR, POM, PE, NR				
Electrical system	Power supply	3-phase 200 V AC (50 Hz), 3-phase 200 to 230 V AC (60 Hz) Allowable voltage range ±10 % (No continuous voltage fluctuation)				
	Rated operating current ^{Note 5)} A	14	17	25	34	36
	Rated power consumption ^{Note 5)} [kW (kVA)]	4.5 (4.9)	5.8 (6)	8.4 (8.7)	10.4 (11.6)	11.1 (12.2)
	Noise level (Front 1 m/Height 1 m) ^{Note 5)} [dB (A)]	68				71
Waterproof specification	IPX4					
Accessories	Alarm code list stickers 2 pcs. (English 1 pc./Japanese 1 pc.), Operation Manual (for installation/operation) 2 pcs. (English 1 pc./Japanese 1 pc.), Y-strainer (40 meshes) 25A, Barrel nipple 25A, Anchor bolt fixing brackets 2 pcs. (including 6 M8 bolts) ^{Note 9)}					
Weight (dry state) [kg]	Approx. 180	Approx. 215		Approx. 280		

- Note 1) Use a 15 % ethylene glycol aqueous solution if operating in a place where the ambient temperature is from -5 to 10 °C and/or circulating fluid temperature is 10 °C or less. Use a 40 % ethylene glycol aqueous solution if operating in a place where the ambient temperature is from -20 to 5 °C.
- Note 2) Use fluid in condition below as the circulating fluid.
Tap water: Standard of The Japan Refrigeration And Air Conditioning Industry Association (JRA GL-02-1994)
15 to 40 % ethylene glycol aqueous solution: diluted by tap water in condition above without any additives such as antiseptics.
Deionised water: Electric conductivity 1 μS/cm or higher (Electric resistivity 1 MΩ·cm or lower)
- Note 3) ① Ambient temperature: 32 °C, ② Circulating fluid: Tap water, ③ Circulating fluid temperature: 20 °C, ④ Circulating fluid flow rate: Rated flow, ⑤ Power supply: 200 V AC
- Note 4) ① Ambient temperature: 32 °C, ② Circulating fluid: Tap water, ③ Circulating fluid flow rate: Rated flow, ④ Power supply: 200 V AC
- Note 5) ① Ambient temperature: 32 °C, ② Circulating fluid: Tap water, ③ Circulating fluid temperature: 20 °C, ④ Load: Same as the cooling capacity, ⑤ Circulating fluid flow rate: Rated flow, ⑥ Power supply: 200 V AC, ⑦ Piping length: Shortest
- Note 6) With the pressure control mode by inverter. When the pressure control mode is not used, the pump power frequency set mode can be used.
- Note 7) Fluid flow rate to maintain the cooling capacity and the temperature stability. If the actual flow rate is lower than this, please install a by-pass piping.
- Note 8) If the product is used at altitude of 1000 m or higher, refer to "Operating Environment/Storage Environment" (page 39) Item 14 "※ For altitude of 1000 m or higher".
- Note 9) The anchor bolt fixing brackets (including 6 M8 bolts) are used for fixing to wooden skids when packaging the thermo-chiller. No anchor bolt is included.

Thermo-chiller Inverter Type Large Type

Water-cooled 200 V Type

Series HRSH



How to Order

HRSH 250-W F-20-□ S

Cooling capacity

100	11.5 kW
150	15.7 kW
200	20.6 kW
250	24 kW

Cooling method

W	Water-cooled refrigeration
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Pipe thread type

—	Rc
F	G (with Rc-G conversion fitting)
N	NPT (with Rc-NPT conversion fitting)

Power supply

20	3-phase 200 V AC (50 Hz) 3-phase 200 to 230 V AC (60 Hz)
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CE/UL Compliant
Note) Equipped with earth leakage breaker with a breaker handle.

Option

—	None
A	With caster adjuster-foot kit
K Note)	With fluid fill port

•When multiple options are combined, indicate symbols in alphabetical order.
Note) This is a manual fluid fill port that is different from the automatic fluid fill port. Fluid can be supplied manually into the tank without removing the side panel.
(Fluid can be supplied manually for the model without the symbol K if the side panel is removed.)

Specifications

Model	HRSH100-W□-20-□S	HRSH150-W□-20-□S	HRSH200-W□-20-□S	HRSH250-W□-20-□S	
Cooling method	Water-cooled refrigeration				
Refrigerant	R410A (HFC): GWP2088				
Control method	PID control				
Ambient temperature/Altitude Note 1), Note 8) [°C]	Temperature: 2 to 45, Altitude: less than 3000 m				
Circulating fluid Note 2)	Tap water, 15 % Ethylene glycol aqueous solution, Deionised water				
Set temperature range Note 1) [°C]	5 to 35				
Cooling capacity Note 3), Note 8) [kW]	11.5	15.7	20.6	24	
Heating capacity Note 4) [kW]	2.5	3.5	4.0	7.2	
Temperature stability Note 5) [°C]	±0.1				
Circulating fluid system	Pump capacity	45 (0.43 MPa)		45 (0.45 MPa)	
	Rated flow (Outlet) [l/min]	120		130	
	Maximum flow rate [l/min]	50		50	
	Maximum pump head [m]	0.1 to 0.5		0.1 to 0.5	
	Settable pressure range Note 6) [MPa]	25		25	
	Minimum operating flow rate Note 7) [l/min]	42		42	
	Tank capacity [L]	Rc 1 (Symbol F: G 1, Symbol N: NPT 1) Rc 3/4 (Symbol F: G 3/4, Symbol N: NPT 3/4)		Rc 1 (Symbol F: G 1, Symbol N: NPT 1) Rc 3/4 (Symbol F: G 3/4, Symbol N: NPT 3/4)	
Circulating fluid outlet, circulating fluid return port	Rc 1 (Symbol F: G 1, Symbol N: NPT 1)		Rc 1 (Symbol F: G 1, Symbol N: NPT 1)		
Tank drain port	Rc 1 (Symbol F: G 1, Symbol N: NPT 1)		Rc 1 (Symbol F: G 1, Symbol N: NPT 1)		
Automatic fluid fill system (Standard)	Supply side pressure range [MPa]	0.2 to 0.5		0.2 to 0.5	
	Supply side fluid temperature [°C]	5 to 35		5 to 35	
	Automatic fluid fill port	Rc 1/2 (Symbol F: G 1/2, Symbol N: NPT 1/2)		Rc 1/2 (Symbol F: G 1/2, Symbol N: NPT 1/2)	
Overflow port	Rc 1 (Symbol F: G 1, Symbol N: NPT 1)		Rc 1 (Symbol F: G 1, Symbol N: NPT 1)		
Fluid contact material	Metal	Stainless steel, Copper (Heat exchanger brazing), Brass (Y-strainer)		Stainless steel, Copper (Heat exchanger brazing), Brass, Y-strainer	
	Resin	PTFE, PU, FKM, EPDM, PVC, NBR, POM, PE, NR		PTFE, PU, FKM, EPDM, PVC, NBR, POM, PE, NR	
Facility water system	Supply side pressure range [MPa]	0.3 to 0.5		0.3 to 0.5	
	Supply side temperature range [°C]	5 to 40		5 to 40	
	Required flow [l/min]	25	30	50	55
	Facility water pressure differential [MPa]	0.3 or more		0.3 or more	
	Facility water inlet/outlet	Rc 1 (Symbol F: G 1, Symbol N: NPT 1)		Rc 1 (Symbol F: G 1, Symbol N: NPT 1)	
Fluid contact material	Metal	Stainless steel, Copper (Heat exchanger brazing), Brass, Bronze		Stainless steel, Copper (Heat exchanger brazing), Brass, Bronze	
	Resin	PTFE, EPDM, NBR		PTFE, EPDM, NBR	
Electrical system	Power supply	3-phase 200 V AC (50 Hz), 3-phase 200 to 230 V AC (60 Hz), Allowable voltage range ±10 % (No continuous voltage fluctuation)			
	Rated operating current Note 5) [A]	14	17	21	25
	Rated power consumption Note 5) [kW (kVA)]	4.2 (4.7)	5.3 (5.8)	6.6 (7.0)	8.0 (8.4)
	Noise level (Front 1 m/Height 1 m) Note 5) [dB (A)]	61	60	60	61
Waterproof specification	IPX4				
Accessories	Alarm code list stickers 2 pcs. (English 1 pc./Japanese 1 pc.), Operation Manual (for installation/operation) 2 pcs. (English 1 pc./Japanese 1 pc.), Y-strainer (40 meshes) 25A, Barrel nipple 25A, Anchor bolt fixing brackets 2 pcs. (including 6 M8 bolts) Note 9)				
Weight (dry state) [kg]	Approx. 150		Approx. 180		

Note 1) Use a 15 % ethylene glycol aqueous solution if operating in a place where the ambient temperature and/or circulating fluid temperature is 10 °C or less.

Note 2) Use fluid in condition below as the circulating fluid.

Tap water: Standard of The Japan Refrigeration And Air Conditioning Industry Association (JRA GL-02-1994)

15 % ethylene glycol aqueous solution: diluted by tap water in condition above without any additives such as antiseptics. Deionised water: Electric conductivity 1 μS/cm or higher (Electric resistivity 1 MΩ·cm or lower)

Note 3) ① Facility water temperature: 32 °C, ② Circulating fluid: Tap water, ③ Circulating fluid temperature: 20 °C, ④ Circulating fluid flow rate: Rated flow, ⑤ Power supply: 200 V AC

Note 4) ① Facility water temperature: 32 °C, ② Circulating fluid: Tap water, ③ Circulating fluid flow rate: Rated flow, ④ Power supply: 200 V AC

Note 5) ① Facility water temperature: 32 °C, ② Circulating fluid: Tap water, ③ Circulating fluid temperature: 20 °C, ④ Load: Same as the cooling capacity, ⑤ Circulating fluid flow rate:

Rated flow, ⑥ Power supply: 200 V AC, ⑦ Piping length: Shortest

Note 6) With the pressure control mode by inverter. When the pressure control mode is not used, the pump power frequency set mode can be used.

Note 7) Fluid flow rate to maintain the cooling capacity and the temperature stability. If the actual flow rate is lower than this, please install a by-pass piping.

Note 8) If the product is used at altitude of 1000 m or higher, refer to "Operating Environment/Storage Environment" (page 39) Item 14 "For altitude of 1000 m or higher".

Note 9) The anchor bolt fixing brackets (including 6 M8 bolts) are used for fixing to wooden skids when packaging the thermo-chiller. No anchor bolt is included.

Thermo-chiller Inverter Type Large Type

Air-cooled 400 V Type

Series HRSH



How to Order

HRSH **250** - **A** **F** - **40** -

Cooling capacity

100	10.5 kW
150	15.7 kW
200	20.5 kW
250	25 kW
300	28 kW

Cooling method

A	Air-cooled refrigeration
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Pipe thread type

—	Rc
F	G (with Rc-G conversion fitting)
N	NPT (with Rc-NPT conversion fitting)

Power supply

40	3-phase 380 to 415 V AC (50 / 60 Hz)
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Option

—	None
A	With caster adjuster-foot kit
K (Note)	With fluid fill port

Note) This is a manual fluid fill port that is different from the automatic fluid fill port. Fluid can be supplied manually into the tank without removing the side panel. (Fluid can be supplied manually for the model without the symbol K if the side panel is removed.)

Specifications

Model	HRSH100-A□-40-□	HRSH150-A□-40-□	HRSH200-A□-40-□	HRSH250-A□-40-□	HRSH300-A□-40-□	
Cooling method	Air-cooled refrigeration					
Refrigerant	R410A (HFC): GWP2088					
Control method	PID control					
Ambient temperature/Altitude (Note 1), (Note 8) [°C]	Temperature: -20 to 45, Altitude: less than 3000 m					
Circulating fluid system	Circulating fluid (Note 2)					
	Tap water, 15 to 40 % Ethylene glycol aqueous solution, Deionised water					
	Set temperature range (Note 1) [°C]	5 to 35				
	Cooling capacity (Note 3), (Note 8) [kW]	10.5	15.7	20.5	25	28
	Heating capacity (Note 4) [kW]	2.5	3	5.5	7.5	
	Temperature stability (Note 5) [°C]	±0.1				
	Pump capacity	Rated flow (Outlet) [l/min]	45 (0.43 MPa)			125 (0.5 MPa)
		Maximum flow rate [l/min]	120	130		180
		Maximum pump head [m]	50			80
	Settable pressure range (Note 6) [MPa]	0.1 to 0.5			0.1 to 0.8	
	Minimum operating flow rate (Note 7) [l/min]	20	25		40	40
	Tank capacity [L]	25	42		60	60
	Circulating fluid outlet, circulating fluid return port	Rc 1 (Symbol F: G 1, Symbol N: NPT 1)				
	Tank drain port	Rc 3/4 (Symbol F: G 3/4, Symbol N: NPT 3/4)				
Automatic fluid fill system (Standard)	Supply side pressure range [MPa]	0.2 to 0.5				
	Supply side fluid temperature [°C]	5 to 35				
	Automatic fluid fill port	Rc 1/2 (Symbol F: G 1/2, Symbol N: NPT 1/2)				
Overflow port	Rc 1 (Symbol F: G 1, Symbol N: NPT 1)					
Fluid contact material	Metal	Stainless steel, Copper (Heat exchanger brazing), Brass (Y-strainer)				
	Resin	PTFE, PU, FKM, EPDM, PVC, NBR, POM, PE, NR				
Electrical system	Power supply	3-phase 380 to 415 V AC (50 / 60 Hz) Allowable voltage range ±10 % (No continuous voltage fluctuation)				
	Earth leakage breaker	Rated current [A]	20	30		
		Sensitivity of leak current [mA]	30			
	Rated operating current (Note 5) [A]	7.4	9.3	12.8	16	18
	Rated power consumption (Note 5) [kW (kVA)]	4.6 (5.1)	5.8 (6.4)	8.2 (8.9)	10.1 (11.1)	10.8 (12.3)
Noise level (Front 1 m/Height 1 m) (Note 5) [dB (A)]	68					
Waterproof specification	IPX4					
Accessories	Alarm code list stickers 2 pcs. (English 1 pc./Japanese 1 pc.), Operation Manual (for installation/operation) 2 pcs. (English 1 pc./Japanese 1 pc.), Y-strainer (40 meshes) 25A, Barrel nipple 25A, Anchor bolt fixing brackets 2 pcs. (including 6 M8 bolts) (Note 9)					
Weight (dry state) [kg]	Approx. 180	Approx. 215		Approx. 280		

- Note 1) Use a 15 % ethylene glycol aqueous solution if operating in a place where the ambient temperature is from -5 to 10 °C and/or circulating fluid temperature is 10 °C or less. Use a 40 % ethylene glycol aqueous solution if operating in a place where the ambient temperature is from -20 to 5 °C.
- Note 2) Use fluid in condition below as the circulating fluid.
Tap water: Standard of The Japan Refrigeration And Air Conditioning Industry Association (JRA GL-02-1994)
15 to 40 % ethylene glycol aqueous solution: diluted by tap water in condition above without any additives such as antiseptics.
Deionised water: Electric conductivity 1 μS/cm or higher (Electric resistivity 1 MΩ·cm or lower)
- Note 3) ① Ambient temperature: 32 °C, ② Circulating fluid: Tap water, ③ Circulating fluid temperature: 20 °C, ④ Circulating fluid flow rate: Rated flow, ⑤ Power supply: 400 V AC
- Note 4) ① Ambient temperature: 32 °C, ② Circulating fluid: Tap water, ③ Circulating fluid flow rate: Rated flow, ④ Power supply: 400 V AC
- Note 5) ① Ambient temperature: 32 °C, ② Circulating fluid: Tap water, ③ Circulating fluid temperature: 20 °C, ④ Load: Same as the cooling capacity, ⑤ Circulating fluid flow rate: Rated flow, ⑥ Power supply: 400 V AC, ⑦ Piping length: Shortest
- Note 6) With the pressure control mode by inverter. When the pressure control mode is not used, the pump power frequency set mode can be used.
- Note 7) Fluid flow rate to maintain the cooling capacity and the temperature stability. If the actual flow rate is lower than this, please install a by-pass piping.
- Note 8) If the product is used at altitude of 1000 m or higher, refer to "Operating Environment/Storage Environment" (page 39) Item 14 * For altitude of 1000 m or higher*.
- Note 9) The anchor bolt fixing brackets (including 6 M8 bolts) are used for fixing to wooden skids when packaging the thermo-chiller. No anchor bolt is included.

Thermo-chiller Inverter Type Large Type

Water-cooled 400 V Type

Series HRSH



How to Order

HRSH 250 - W F - 40 - []

Cooling capacity

100	11.5 kW
150	15.7 kW
200	20.6 kW
250	24 kW

Cooling method

W	Water-cooled refrigeration
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Pipe thread type

—	Rc
F	G (with Rc-G conversion fitting)
N	NPT (with Rc-NPT conversion fitting)

Option

—	None
A	With caster adjuster-foot kit
K (Note)	With fluid fill port

Power supply

40	3-phase 380 to 415 V AC (50 / 60 Hz)
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Note) This is a manual fluid fill port that is different from the automatic fluid fill port. Fluid can be supplied manually into the tank without removing the side panel. (Fluid can be supplied manually for the model without the symbol K if the side panel is removed.)

Specifications

Model	HRSH100-W□-40-□	HRSH150-W□-40-□	HRSH200-W□-40-□	HRSH250-W□-40-□	
Cooling method	Water-cooled refrigeration				
Refrigerant	R410A (HFC): GWP2088				
Control method	PID control				
Ambient temperature/Altitude (Note 1), (Note 8) [°C]	Temperature: 2 to 45, Altitude: less than 3000 m				
Circulating fluid (Note 2)	Tap water, 15 % Ethylene glycol aqueous solution, Deionised water				
Set temperature range (Note 1) [°C]	5 to 35				
Cooling capacity (Note 3), (Note 8) [kW]	11.5	15.7	20.6	24	
Heating capacity (Note 4) [kW]	2.5	3.5	4.0	7.2	
Temperature stability (Note 5) [°C]	±0.1				
Pump capacity	Rated flow (Outlet) [l/min]	45 (0.43 MPa)	45 (0.45 MPa)		
	Maximum flow rate [l/min]	120	130		
	Maximum pump head [m]	50			
Settable pressure range (Note 6) [MPa]	0.1 to 0.5				
Minimum operating flow rate (Note 7) [l/min]	20	25		42	
Tank capacity [L]	25	42		55	
Circulating fluid outlet, circulating fluid return port	Rc 1 (Symbol F: G 1, Symbol N: NPT 1)				
Tank drain port	Rc 3/4 (Symbol F: G 3/4, Symbol N: NPT 3/4)				
Automatic fluid fill system (Standard)	Supply side pressure range [MPa]	0.2 to 0.5			
	Supply side fluid temperature [°C]	5 to 35			
	Automatic fluid fill port	Rc 1/2 (Symbol F: G 1/2, Symbol N: NPT 1/2)			
Overflow port	Rc 1 (Symbol F: G 1, Symbol N: NPT 1)				
Fluid contact material	Metal	Stainless steel, Copper (Heat exchanger brazing), Brass (Y-strainer)			
	Resin	PTFE, PU, FKM, EPDM, PVC, NBR, POM, PE, NR			
Facility water system	Temperature range [°C]	5 to 40			
	Pressure range [MPa]	0.3 to 0.5			
	Required flow [l/min]	25	30	50	55
	Facility water pressure differential [MPa]	0.3 or more			
	Facility water inlet/outlet	Rc 1 (Symbol F: G 1, Symbol N: NPT 1)			
Fluid contact material	Metal	Stainless steel, Copper (Heat exchanger brazing), Bronze, Brass			
	Resin	PTFE, NBR, EPDM			
Electrical system	Power supply	3-phase 380 to 415 V AC (50 / 60 Hz), Allowable voltage range ±10 % (No continuous voltage fluctuation)			
	Applicable earth leakage breaker	Rated current [A]	20	30	
		Sensitivity of leak current [mA]	30		
	Rated operating current (Note 5) [A]	7.3	8.8	10.6	12.8
Rated power consumption (Note 5) [kW (kVA)]	4.4 (5.0)	5.3 (6.1)	6.6 (7.4)	8.2 (8.9)	
Noise level (Front 1 m/Height 1 m) (Note 5) [dB (A)]	61	60		61	
Waterproof specification	IPX4				
Accessories	Alarm code list stickers 2 pcs. (English 1 pc./Japanese 1 pc.), Operation Manual (for installation/operation) 2 pcs. (English 1 pc./Japanese 1 pc.), Y-strainer (40 meshes) 25A, Barrel nipple 25A, Anchor bolt fixing brackets 2 pcs. (including 6 M8 bolts) (Note 9)				
Weight (dry state) [kg]	Approx. 150		Approx. 180		

Note 1) Use a 15 % ethylene glycol aqueous solution if operating in a place where the ambient temperature and/or circulating fluid temperature is 10 °C or less.

Note 2) Use fluid in condition below as the circulating fluid.

Tap water: Standard of The Japan Refrigeration And Air Conditioning Industry Association (JRA GL-02-1994)

15 % ethylene glycol aqueous solution: diluted by tap water in condition above without any additives such as antiseptics.

Deionised water: Electric conductivity 1 μS/cm or higher (Electric resistivity 1 MΩ·cm or lower)

Note 3) ① Facility water temperature: 32 °C, ② Circulating fluid: Tap water, ③ Circulating fluid temperature: 20 °C, ④ Circulating fluid flow rate: Rated flow, ⑤ Power supply: 400 V AC

Note 4) ① Facility water temperature: 32 °C, ② Circulating fluid: Tap water, ③ Circulating fluid flow rate: Rated flow, ④ Power supply: 400 V AC

Note 5) ① Facility water temperature: 32 °C, ② Circulating fluid: Tap water, ③ Circulating fluid temperature: 20 °C, ④ Load: Same as the cooling capacity, ⑤ Circulating fluid flow rate: Rated flow, ⑥ Power supply: 400 V AC, ⑦ Piping length: Shortest

Note 6) With the pressure control mode by inverter. When the pressure control mode is not used, the pump power frequency set mode can be used.

Note 7) Fluid flow rate to maintain the cooling capacity and the temperature stability. If the actual flow rate is lower than this, please install a by-pass piping.

Note 8) If the product is used at altitude of 1000 m or higher, refer to "Operating Environment/Storage Environment" (page 39) Item 14 "※ For altitude of 1000 m or higher".

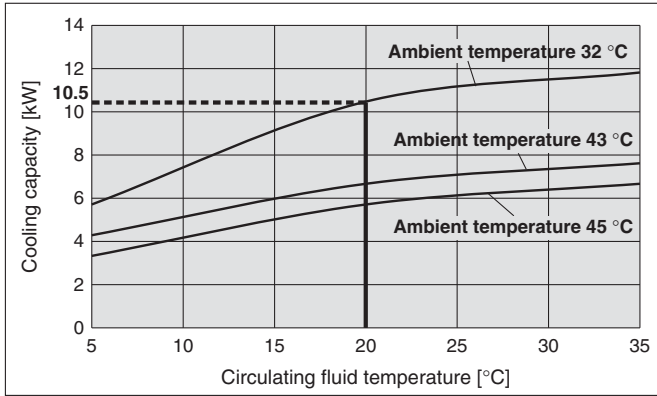
Note 9) The anchor bolt fixing brackets (including 6 M8 bolts) are used for fixing to wooden skids when packaging the thermo-chiller. No anchor bolt is included.

Series **HRSH** Inverter Type

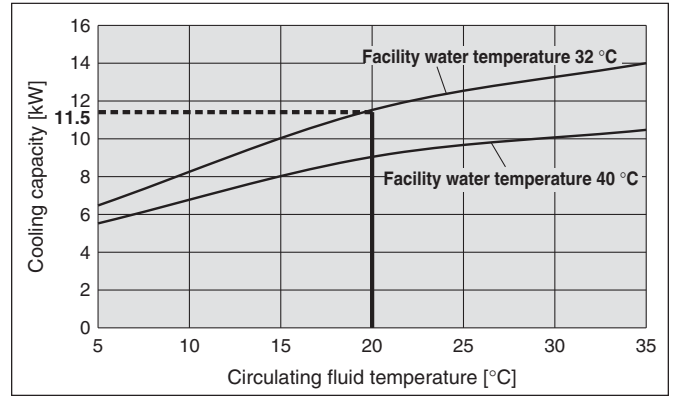
Cooling Capacity

* If the product is used at altitude of 1000 m or higher, refer to "Operating Environment/Storage Environment" (page 39) Item 13 * For altitude of 1000 m or higher".

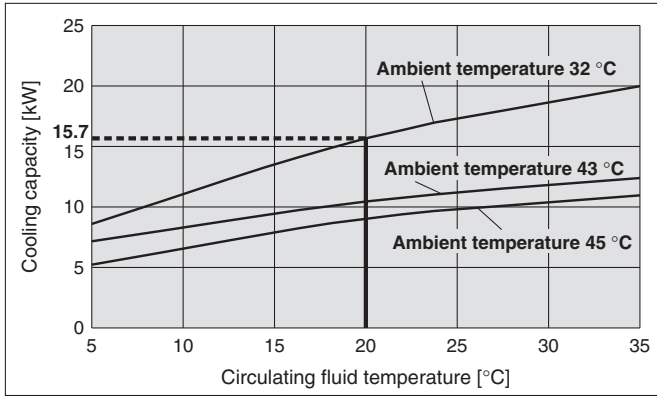
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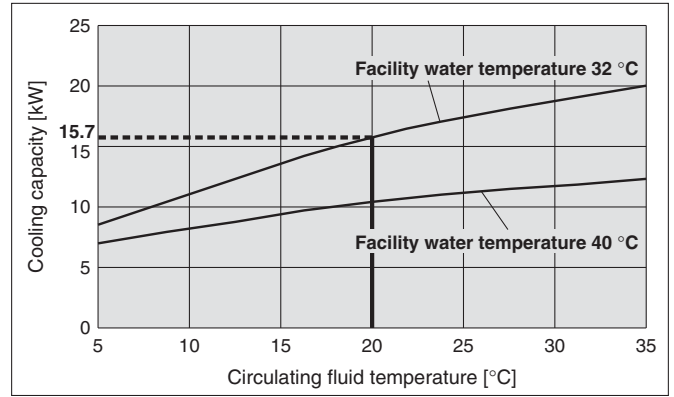
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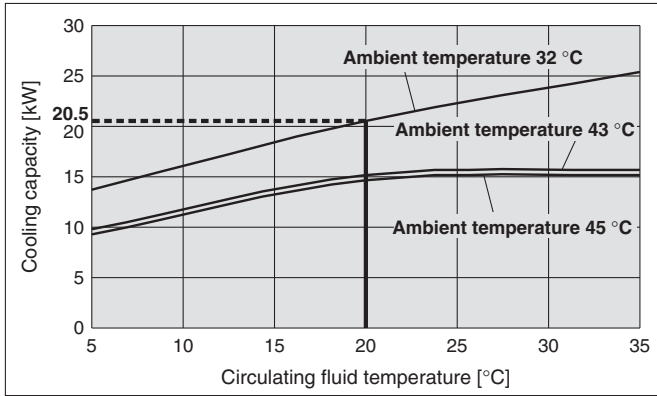
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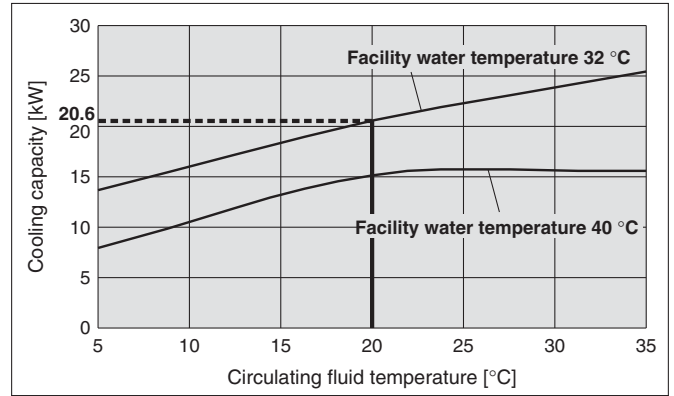
HRSH150-W□-20-□S / HRSH150-W□-40-□



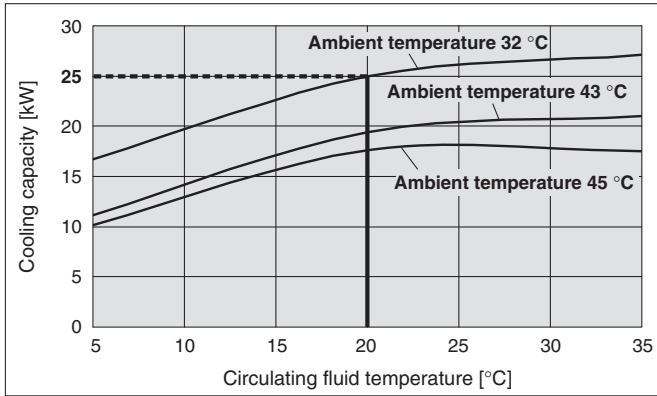
HRSH200-A□-20-□S / HRSH200-A□-40-□



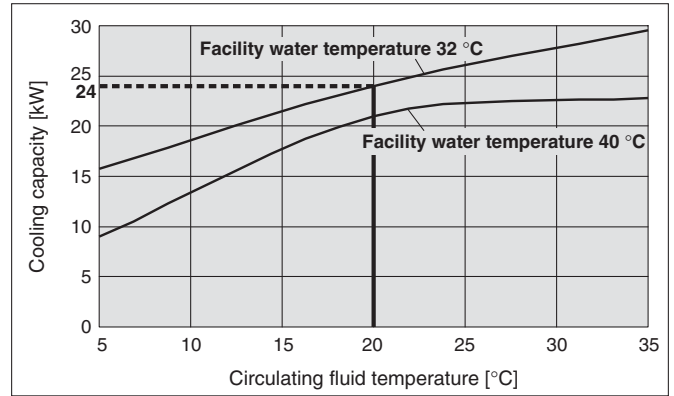
HRSH200-W□-20-□S / HRSH200-W□-40-□



HRSH250-A□-20-□S / HRSH250-A□-40-□



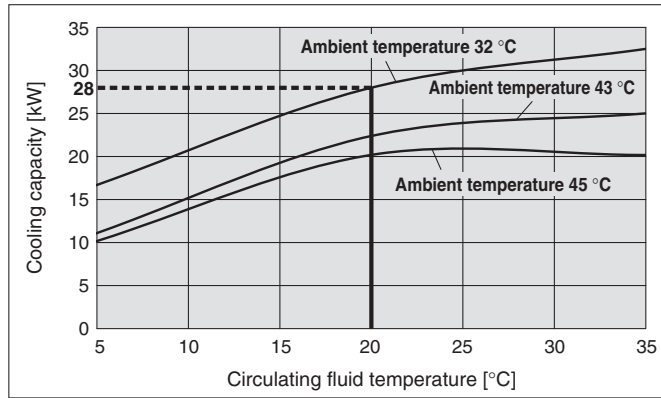
HRSH250-W□-20-□S / HRSH250-W□-40-□



Cooling Capacity

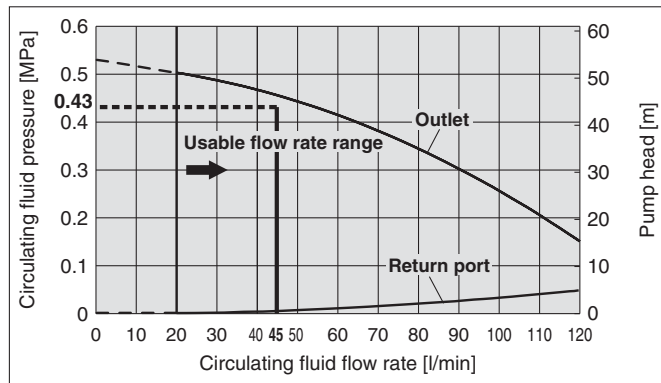
* If the product is used at altitude of 1000 m or higher, refer to "Operating Environment/Storage Environment" (page 39) Item 13 ** For altitude of 1000 m or higher".

HRSH300-A□-20/40-□

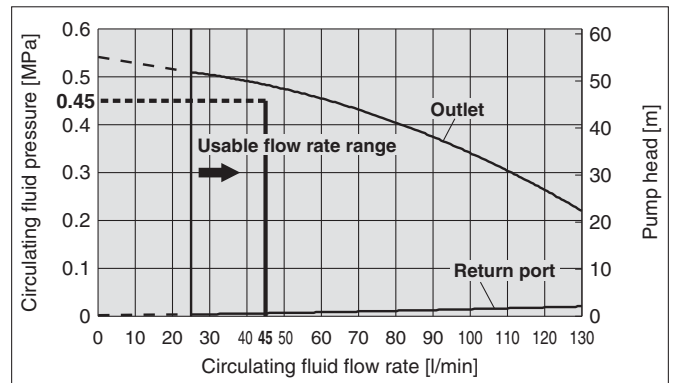


Pump Capacity

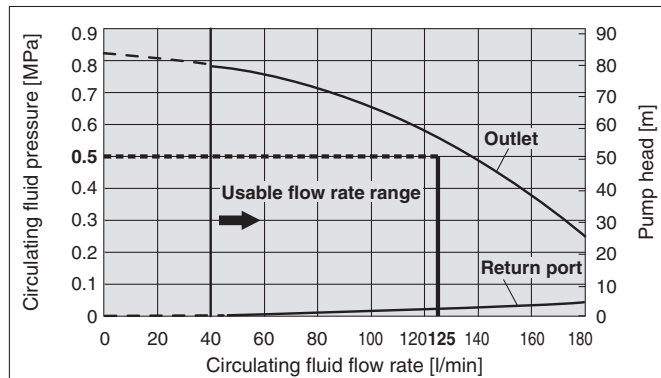
**HRSH100-A□-20-□S / HRSH100-A□-40-□
HRSH100-W□-20-□S / HRSH100-W□-40-□**



**HRSH150-A□-20-□S / HRSH150-A□-40-□
HRSH150-W□-20-□S / HRSH150-W□-40-□
HRSH200-A□-20-□S / HRSH200-A□-40-□
HRSH200-W□-20-□S / HRSH200-W□-40-□
HRSH250-W□-20-□S / HRSH250-W□-40-□**



**HRSH250-A□-20-□S / HRSH250-A□-40-□
HRSH300-A□-20-□S / HRSH300-A□-40-□**

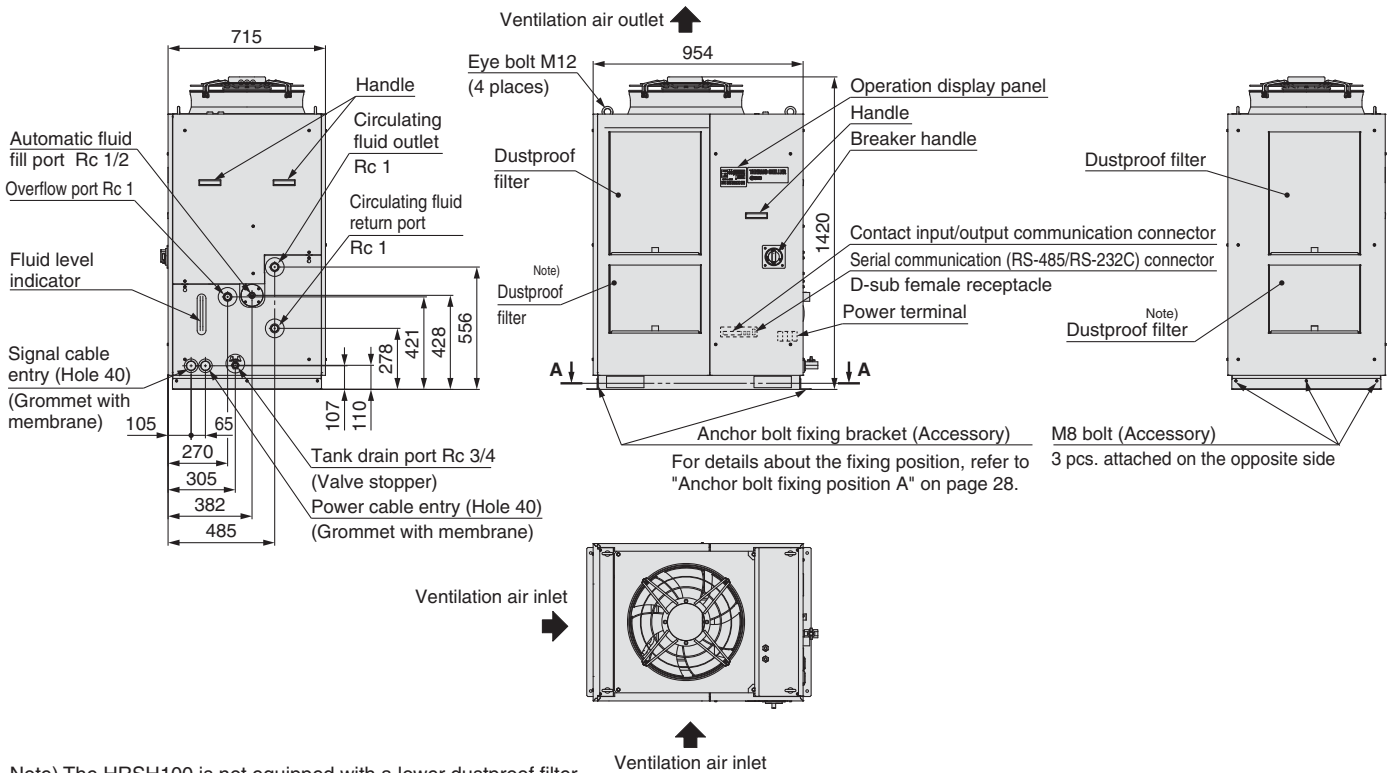


Series **HRSH** Inverter Type

Dimensions

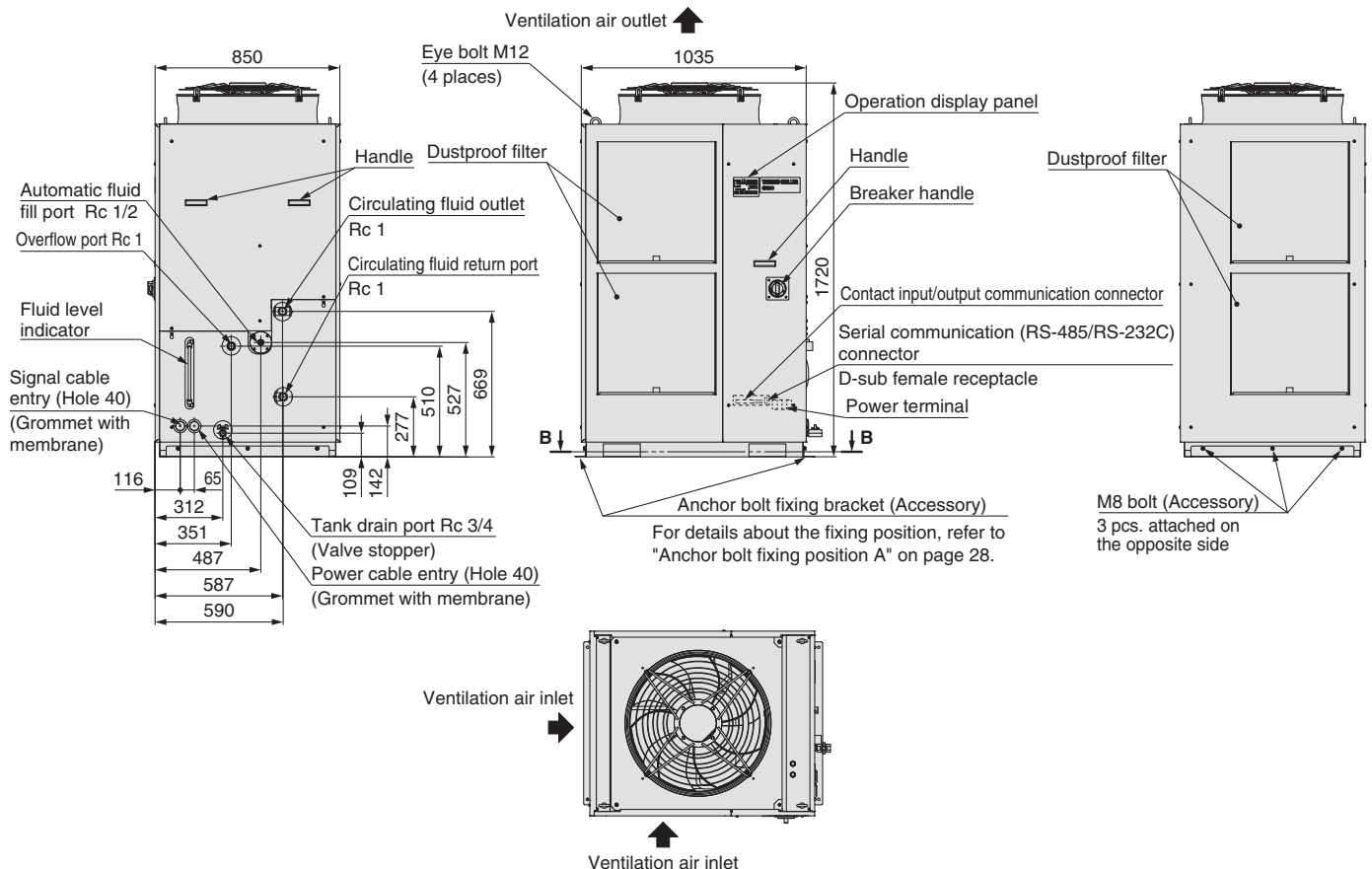
HRSH100/150/200-A-20-S (Air-cooled 200 V type)

HRSH100/150/200-A-40 (Air-cooled 400 V type)



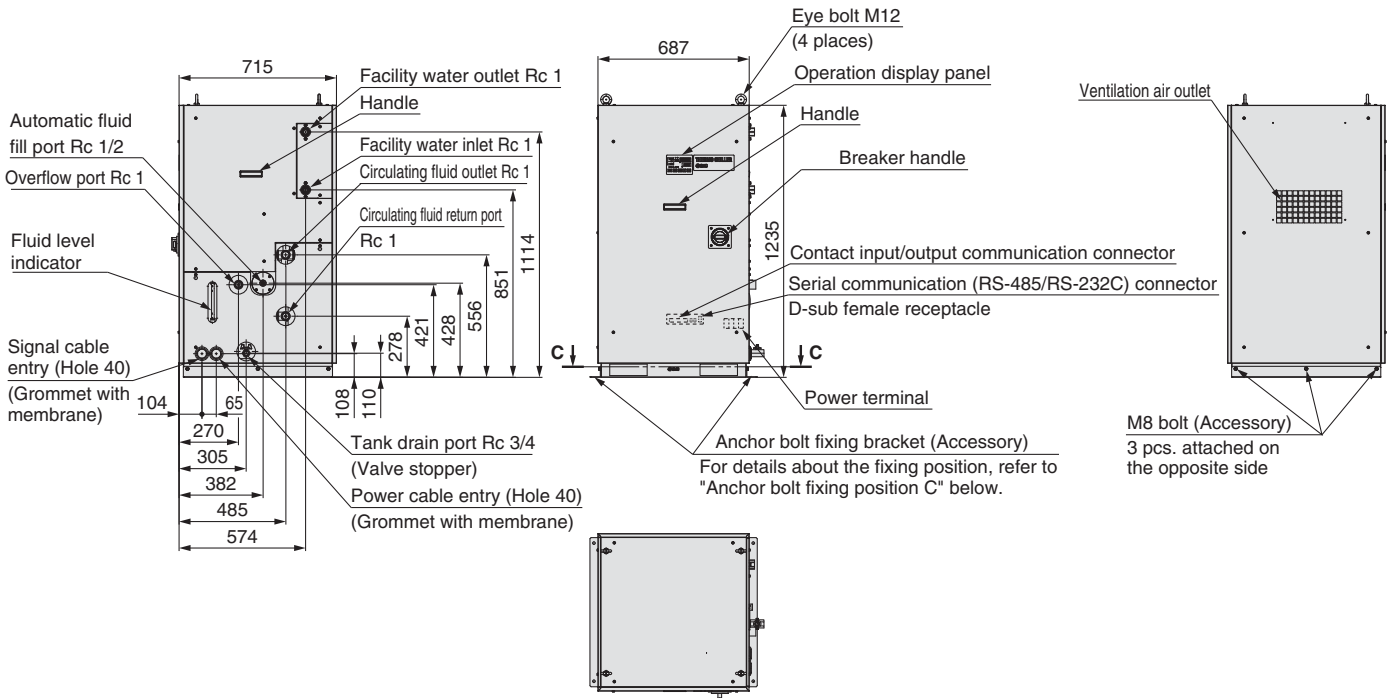
HRSH250/300-A-20-S (Air-cooled 200 V type)

HRSH250/300-A-40 (Air-cooled 400 V type)

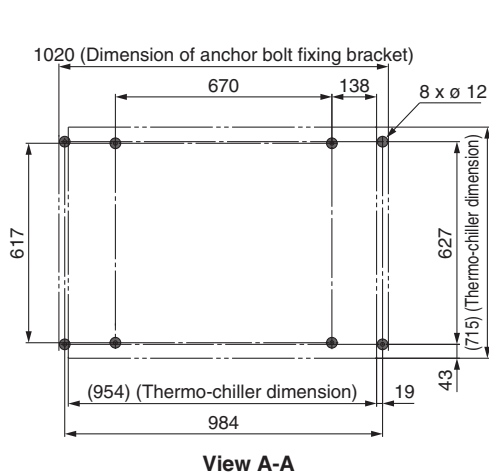


Dimensions

HRSH100/150/200/250-W-20-S (Water-cooled 200 V type)
HRSH100/150/200/250-W-40 (Water-cooled 400 V type)

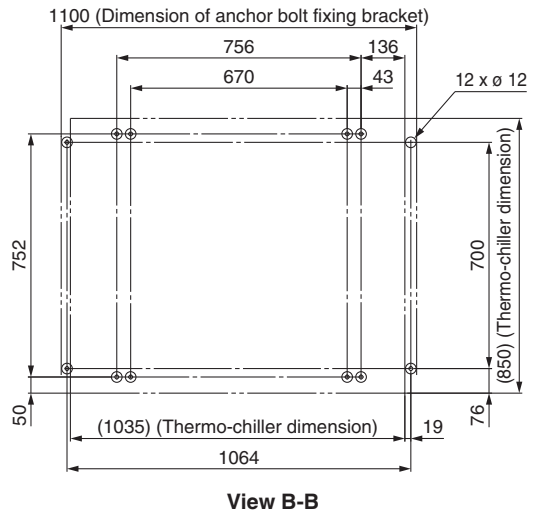


Anchor bolt fixing position A



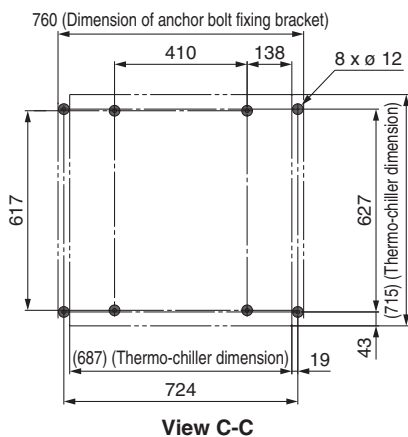
View A-A

Anchor bolt fixing position B



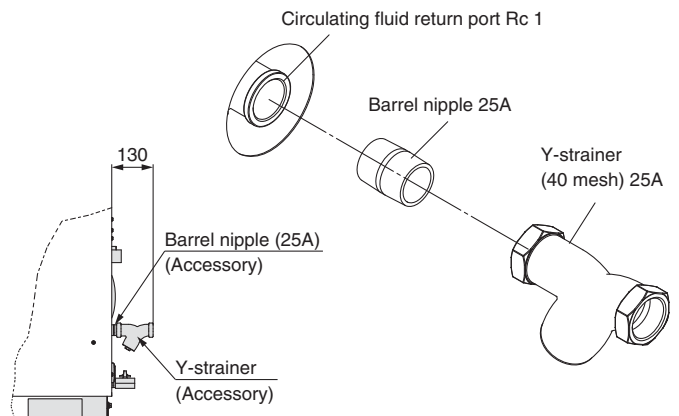
View B-B

Anchor bolt fixing position C



View C-C

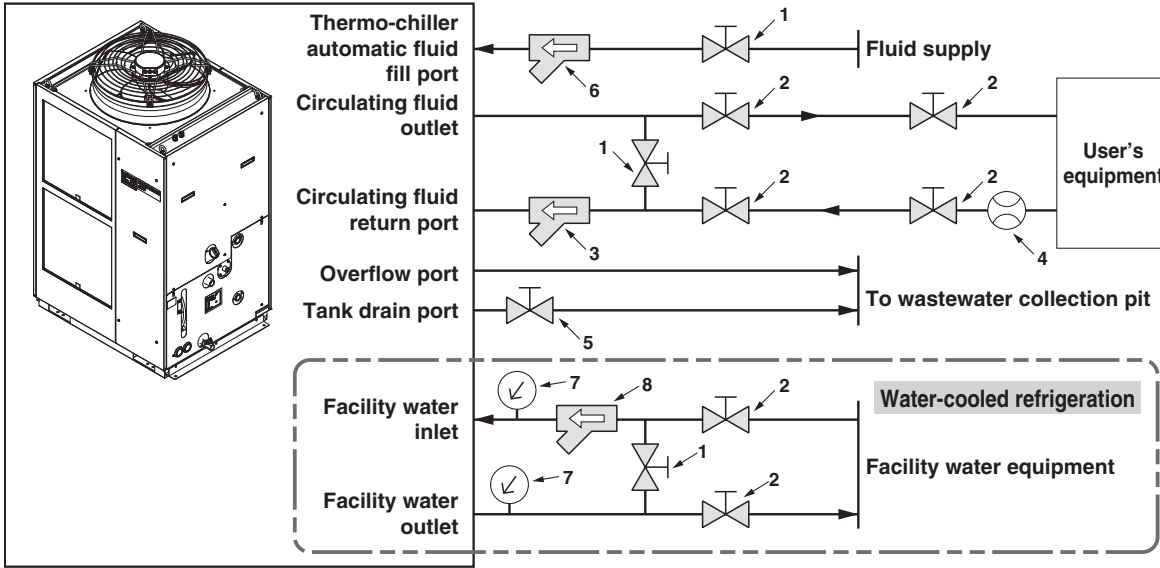
Accessory: Y-strainer mounting view



Series HRSH Inverter Type

Recommended External Piping Flow

External piping circuit is recommended as shown below.



* Ensure that the overflow port is connected to the wastewater collection pit in order to avoid damage to the tank of the thermo-chiller.

No.	Description	Size
1	Valve	Rc 1/2
2	Valve	Rc 1
3	Y-strainer (#40) (Accessory)	Rc 1
4	Flow meter	Prepare a flow meter with an appropriate flow range.
5	Valve (Part of thermo-chiller)	Rc 3/4
6	Y-strainer (#40)	Rc 1/2
7	Pressure gauge	0 to 1.0 MPa
8	Y-strainer (#40)	Rc 1

Cable Specifications

Power supply and signal cable should be prepared by user.

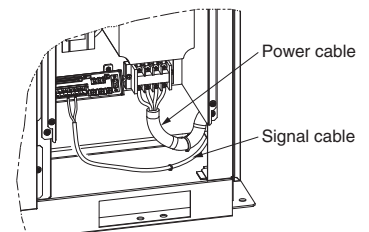
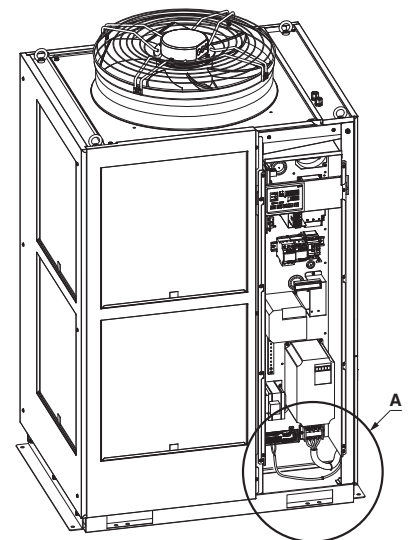
Power Cable Specifications

Applicable model	Rated value for thermo-chiller			Power cable examples	
	Power supply	Applicable breaker rated current	Terminal block thread size	Cable size	Crimp terminal on the thermo-chiller side
HRSH100-□□-20S HRSH150-□□-20S	3-phase 200 V AC (50 Hz) 3-phase 200 to 230 V AC (60 Hz)	30 A	M5	4 cores x 5.5 mm ² (4 cores x AWG10) (Including grounding cable)	R5.5-5
HRSH200-□□-20S		40 A		4 cores x 8 mm ² (4 cores x AWG8) (Including grounding cable)	R8-5
HRSH250-□□-20S		50 A		4 cores x 8 mm ² (4 cores x AWG8) (Including grounding cable)	R8-5
HRSH100-□□-40 HRSH150-□□-40 HRSH200-□□-40 HRSH250-□□-40	3-phase 380 to 415 V AC (50 / 60 Hz)	20 A 30 A		3 x 5.5 mm ² (3 x AWG10) (Power supply) 1 x 14 mm ² (1 x AWG6) (Grounding cable)	R5.5-5 (Power supply) R14-5 (Grounding cable)

Note) An example of the cable specifications is when two kinds of vinyl insulated wires with a continuous allowable operating temperature of 70 °C at 600 V, are used at an ambient temperature of 30 °C. Select the proper size of cable according to an actual condition.

Signal Cable Specifications

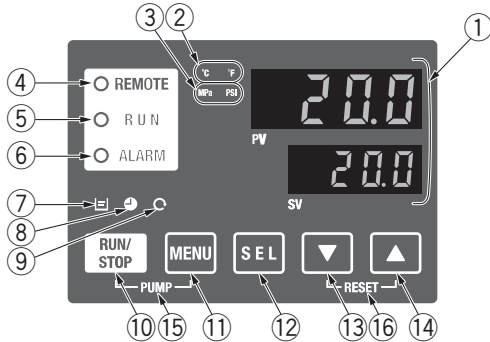
Terminal specifications		Cable specifications
Terminal block screw diameter	Recommended crimp terminal	0.75 mm ² (AWG18) Shielded cable
M3	Y-shape crimp terminal 1.25Y-3	



Partially enlarged view A

Operation Display Panel

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



No.	Description	Function
①	Digital display (7-segment and 4 digits)	PV Displays the circulating fluid current discharge temperature and pressure and alarm codes and other menu items (codes).
		SV Displays the circulating fluid discharge temperature and the set values of other menus.
②	[°C] [°F] lamp	Equipped with a unit conversion function. Displays the unit of displayed temperature (default setting: °C).
③	[MPa] [PSI] lamp	Equipped with a unit conversion function. Displays the unit of displayed pressure (default setting: MPa).
④	[REMOTE] lamp	Enables remote operation (start and stop) by communication. Lights up during remote operation.
⑤	[RUN] lamp	Lights up when the product is started, and goes off when it is stopped. Flashes during stand-by for stop or anti-freezing function, or independent operation of the pump.
⑥	[ALARM] lamp	Flashes with buzzer when alarm occurs.
⑦	[L] lamp	Lights up when the surface of the fluid level indicator falls below the L level.
⑧	[C] lamp	Equipped with a timer for start and stop. Lights up when this function is operated.
⑨	[P] lamp	Equipped with a power failure auto-restart function, which restarts the product automatically after stopped due to a power failure. Lights up when this function is operated.
⑩	[RUN/STOP] key	Makes the product start or stop.
⑪	[MENU] key	Shifts the main menu (display screen of circulating fluid discharge temperature and pressure) and other menus (for monitoring and entry of set values).
⑫	[SEL] key	Changes the item in menu and enters the set value.
⑬	[▼] key	Decreases the set value.
⑭	[▲] key	Increases the set value.
⑮	[PUMP] key	Press the [MENU] and [RUN/STOP] keys simultaneously. The pump starts running independently to make the product ready for start-up (release the air).
⑯	[RESET] key	Press the [▼] and [▲] keys simultaneously. The alarm buzzer is stopped and the [ALARM] lamp is reset.

Alarm

This unit has 42 types of alarms as standard, and displays each of them by its alarm code on the PV screen with the [ALARM] lamp ([LOW LEVEL] lamp) lit up on the operation display panel. The alarm can be read out through communication.

Code	Alarm message
AL01	Low level in tank
AL02	High circulating fluid discharge temp.
AL03	Circulating fluid discharge temp. rise
AL04	Circulating fluid discharge temp. drop
AL05	High circulating fluid return temp.
AL06	High circulating fluid discharge pressure ^{Note 1)}
AL07	Abnormal pump operation ^{Note 1)}
AL08	Circulating fluid discharge pressure rise
AL09	Circulating fluid discharge pressure drop
AL10	High compressor intake temp.
AL11	Low compressor intake temp.
AL12	Low super heat temp.
AL13	High compressor discharge pressure
AL15	Refrigeration circuit pressure (high pressure side) drop
AL16	Refrigeration circuit pressure (low pressure side) rise
AL17	Refrigeration circuit pressure (low pressure side) drop

Code	Alarm message
AL18	Compressor running failure
AL19	Communication error
AL20	Memory error
AL21	DC line fuse cut
AL22	Circulating fluid discharge temp. sensor failure
AL23	Circulating fluid return temp. sensor failure
AL24	Compressor intake temp. sensor failure
AL25	Circulating fluid discharge pressure sensor failure
AL26	Compressor discharge pressure sensor failure
AL27	Compressor intake pressure sensor failure
AL28	Pump maintenance
AL29	Fan maintenance ^{Note 1)}
AL30	Compressor maintenance
AL31	Contact input 1 signal detection
AL32	Contact input 2 signal detection
AL37	Compressor discharge temp. sensor failure

Code	Alarm message
AL38	Compressor discharge temp. rise
AL39	Internal unit fan stoppage
AL40	Dustproof filter maintenance ^{Note 2)}
AL41	Power stoppage
AL42	Compressor waiting
AL43	Fan breaker trip ^{Note 2)}
AL44	Fan inverter error ^{Note 2)}
AL45	Compressor breaker trip ^{Notes 3,4)}
AL46	Compressor inverter error
AL47	Pump breaker trip ^{Notes 3,4)}
AL48	Pump inverter error
AL49	Air exhaust fan stoppage ^{Note 5)}

Note 1) Does only occur on HRSH090.
 Note 2) Does not occur on the product of water-cooled refrigeration type.
 Note 3) Does not occur on the product of power supply specification '20'.
 Note 4) Does not occur on HRSH090.
 Note 5) Does not occur on the product of air-cooled refrigeration type.
 * For details, read the Operation Manual.

List of Function

No.	Function	Outline
1	Main display	Displays the current and set temperature of the circulating fluid, discharge pressure of the circulating fluid. Changes the circulating fluid set temperature.
2	Alarm display menu	Indicates alarm number when an alarm occurs.
3	Inspection monitor menu	Product temperature, pressure and accumulated operating time can be checked as daily inspection. Use these for daily inspection.
4	Key-lock	Keys can be locked so that set values cannot be changed by operator error.
5	Timer for operation start/stop	Timer is used to set the operation start/stop.
6	Signal for the completion of preparation	A signal is output when the circulating fluid temperature reaches the set temperature, when using contact input/output and serial communication.
7	Offset function	Use this function when there is a temperature offset between the discharge temperature of the thermo-chiller and user's equipment.
8	Reset after power failure	Start operation automatically after the power supply is turned on.
9	Key click sound setting	Operation panel key sound can be set on/off.
10	Changing temp. unit	Temperature unit can be changed. Centigrade [°C] ↔ Fahrenheit [°F]
11	Changing pressure unit	Pressure unit can be changed. MPa ↔ PSI
12	Data reset	Functions can be reset to the default settings (settings when shipped from the factory).
13	Accumulation time reset	Reset function when the pump, the fan or the compressor is replaced. Reset the accumulated time here.
14	Pump operation mode set	The fluid supply mode of the pump can be changed Pressure control mode ↔ Frequency set mode
15	Anti-freezing function	Circulating fluid is protected from freezing during winter or at night. Set beforehand if there is a risk of freezing.
16	Warming-up function	When circulating fluid temperature rising time at starting needs shortening during winter or at night, set beforehand.
17	Anti-snow coverage function	If there will be a possibility of the snow coverage due to the change of the installation environment (season, weather), set beforehand. ^{Note)}
18	Alarm buzzer sound setting	Alarm sound can be set to on/off.
19	Alarm customizing	Operation during alarm condition and threshold values can be changed depending on the alarm type.
20	Communication	This function is used for contact input/output or serial communication.

Note) Does not occur on HRSH090.

For details, refer to the Operation Manual. Please download it via our website, <http://www.smc.eu>

Communication Function

Contact Input/Output

Item	Specifications												
Connector type	M3 terminal block												
Input signal	Insulation method	Photocoupler											
	Rated input voltage	24 V DC											
	Operating voltage range	21.6 to 26.4 V DC											
	Rated input current	5 mA TYP											
	Input impedance	4.7 kΩ											
Contact output signal	Rated load voltage	48 V AC or less/30 V DC or less											
	Maximum load current	500 mA AC/DC (resistance load)											
	Minimum load current	5 V DC 10 mA											
Output voltage	24 V DC ±10 % 500 mA MAX (No inductive load)												
Circuit diagram	<table border="1"> <thead> <tr> <th>Signal description</th> <th>Default setting</th> </tr> </thead> <tbody> <tr> <td>Contact input signal 2</td> <td>—</td> </tr> <tr> <td>Contact input signal 1</td> <td>Run/stop signal input</td> </tr> <tr> <td>Contact output signal 3</td> <td>Alarm status signal output</td> </tr> <tr> <td>Contact output signal 2</td> <td>Remote status signal output</td> </tr> <tr> <td>Contact output signal 1</td> <td>Operation status signal output</td> </tr> </tbody> </table>	Signal description	Default setting	Contact input signal 2	—	Contact input signal 1	Run/stop signal input	Contact output signal 3	Alarm status signal output	Contact output signal 2	Remote status signal output	Contact output signal 1	Operation status signal output
Signal description	Default setting												
Contact input signal 2	—												
Contact input signal 1	Run/stop signal input												
Contact output signal 3	Alarm status signal output												
Contact output signal 2	Remote status signal output												
Contact output signal 1	Operation status signal output												

* The pin numbers and output signals can be set by user. For details, refer to "Operation Manual, Communication function".

Serial Communication

The serial communication (RS-485/RS-232C) enables the following items to be written and read out. For details, refer to "Operation Manual, Communication function".

Writing
Run/Stop
Circulating fluid temperature setting (SV)

Readout
Circulating fluid present temperature
Circulating fluid discharge pressure
Status information
Alarm occurrence information

Item	Specifications
Connector type	D-sub 9-pin, Female connector
Protocol	Modicon Modbus compliant/Simple communication protocol
Standards	EIA standard RS-485
Circuit diagram	

* The terminal resistance of RS-485 (120 Ω) can be switched by the operation display panel. For details, refer to "Operation Manual, Communication function". Do not connect other than in the way shown above, as it can result in failure.

Please download the Operation Manual via our website, <http://www.smc.eu>

Series HRSH Options

Note) Select the option when ordering the thermo-chiller because the option cannot be added after purchasing the unit.

K Option symbol

With Fluid Fill Port

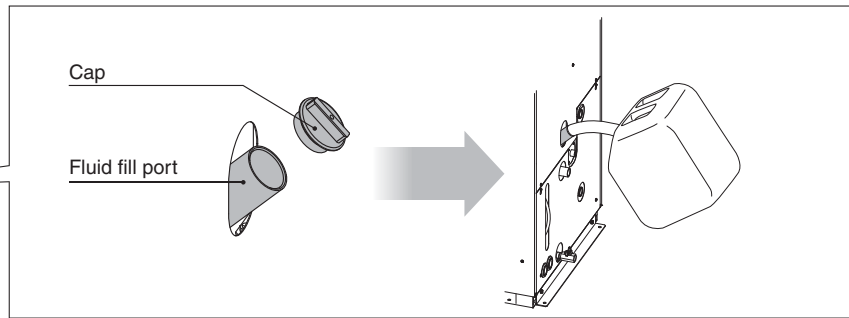
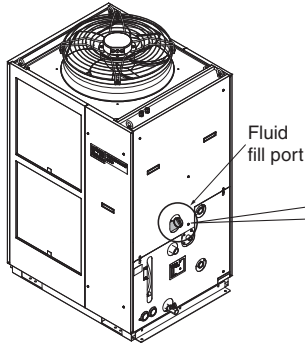
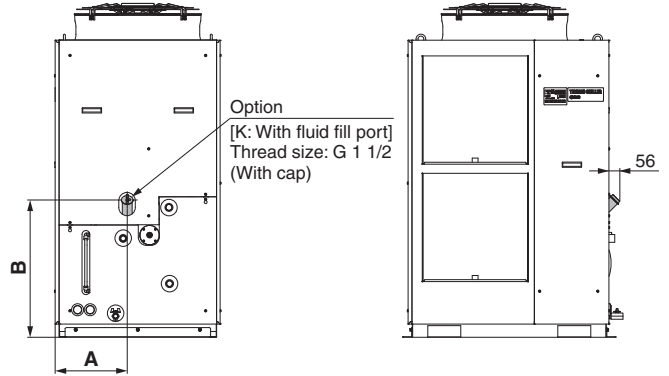
HRSH□-□□-□-**K**

● With fluid fill port

When the automatic fluid fill in port is not used, fluid can be supplied manually without removing the panel.

Applicable model	Dimension [mm]	
	A	B
HRSH100-□□-20-KS HRSH100-□□-40-K HRSH150-□□-20-KS HRSH150-□□-40-K HRSH200-□□-20-KS HRSH200-□□-40-K HRSH250-W□-20-KS HRSH250-W□-40-K	271	609
HRSH250-A□-20-KS HRSH250-A□-40-K HRSH300-A□-20-KS HRSH300-A□-40-K	372	708

Note) Not for HRSH090.



A Option symbol

Caster Adjuster-foot Kit

This is a set of unfixed casters and adjuster feet stop.
When installed by user, it is necessary to lift the thermo-chiller by a forklift or sling work.
Carefully read the procedure manual included with this kit before performing the installation.

Part no.	Applicable model	Dimension [mm]				
		A	B	C		
HRS-KS001	HRSH250-A□-20-AS HRSH250-A□-40-A HRSH300-A□-20-AS HRSH300-A□-40-A	916	536	1838		
	HRS-KS002	HRSH100-A□-20-AS HRSH100-A□-40-A HRSH150-A□-20-AS HRSH150-A□-40-A HRSH200-A□-20-AS HRSH200-A□-40-A	830	401	1538	
		HRSH100-W□-20-AS HRSH100-W□-40-A HRSH150-W□-20-AS HRSH150-W□-40-A HRSH200-W□-20-AS HRSH200-W□-40-A HRSH250-W□-20-AS HRSH250-W□-40-A	570			1353

Note) Not for HRSH090.

Parts List

Description
Procedure manual
Caster adjuster-foot bracket (2 pcs.)
Fixing bolt (M8) (8 pcs.)

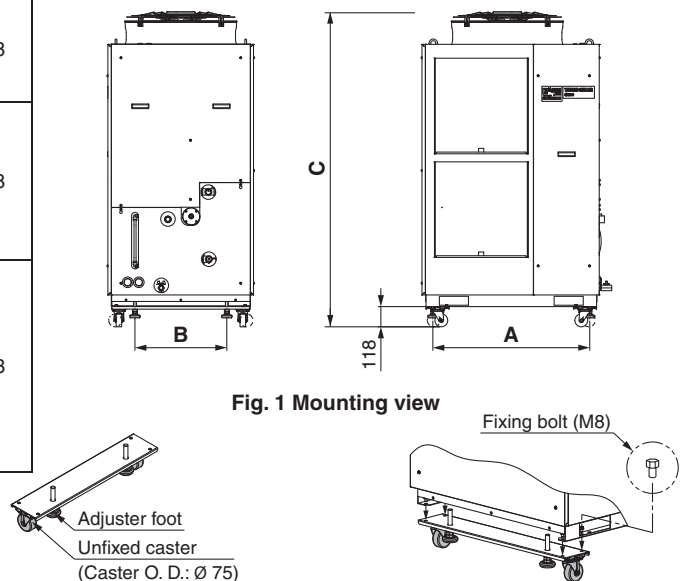


Fig. 2 Caster adjuster-foot bracket (2 pcs.)

Fig. 3 Fixing bolt (8 pcs.)

Series **HRSH** Inverter Type

J Option symbol With Automatic Fluid Fill Function

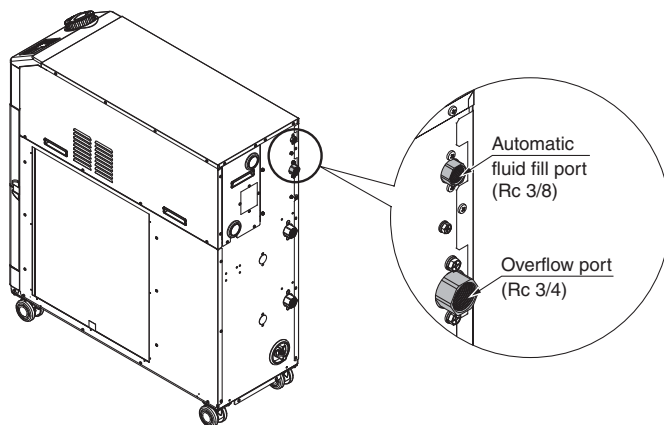
HRSH090-□□-40-J

HRSH090-□□-20-JS

• 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 water fill while the circulating fluid is decreasing.

Applicable model	HRSH090-□□-40-J / HRSH090-□□-20-JS
Fluid fill method	Built-in solenoid valve for automatic water fill
Fluid fill pressure [MPa]	0.2 to 0.5
Feed water temperature [°C]	5 to 40



M Option symbol Applicable to Deionised Water Piping

HRSH090-□□-40-M

HRSH090-□□-20-MS

• Applicable to deionised water piping

Applicable model	HRSH090-□□-40-M / HRSH090-□□-20-MS
Contact material for circulating fluid	Stainless steel (including heat exchanger brazing), SiC, Carbon, PP, PE, POM, FKM, NBR, EPDM, PVC, PTFE

* No change in external dimensions.

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

Optional Accessories

① Piping Conversion Fitting

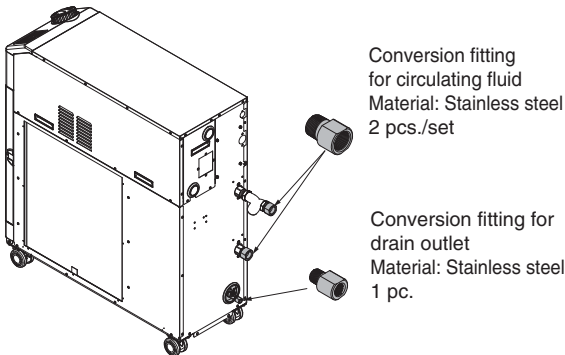
This is a fitting to change the port from Rc to G or NPT.

HRSH090

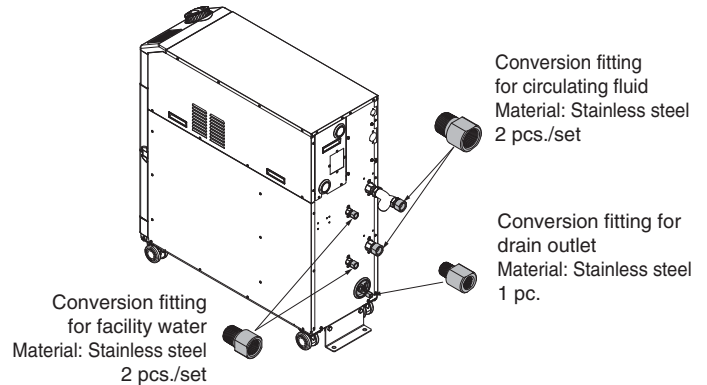
- Circulating fluid outlet, Circulating fluid return port Rc 1 → NPT 1 or G 1
- Drain port Rc 1/4 → NPT 1/4 or G 1/4

(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.	Contents	Applicable model
HRS-EP018	NPT thread conversion fitting set	HRSH090-A-40
HRS-EP019	G thread conversion fitting set	HRSH090-A-20-S



Part no.	Contents	Applicable model
HRS-EP022	NPT thread conversion fitting set	HRSH090-W-40
HRS-EP023	G thread conversion fitting set	HRSH090-W-20-S



When option J (With automatic fluid fill function) is included, use the following part numbers.

- Automatic fluid fill port Rc 3/8 → NPT 3/8 or G 3/8
- Overflow port Rc 3/4 → NPT 3/4 or G 3/4

* The conversion fittings for circulating fluid outlet/return port, drain port, facility water inlet/outlet (for water-cooled refrigeration) are also included.

Part no.	Contents	Applicable model
HRS-EP020	NPT thread conversion fitting set	HRSH090-A-40-J
HRS-EP021	G thread conversion fitting set	HRSH090-A-20-JS

Part no.	Contents	Applicable model
HRS-EP024	NPT thread conversion fitting set	HRSH090-W-40-J
HRS-EP025	G thread conversion fitting set	HRSH090-W-20-JS

HRSH100/150/200/250

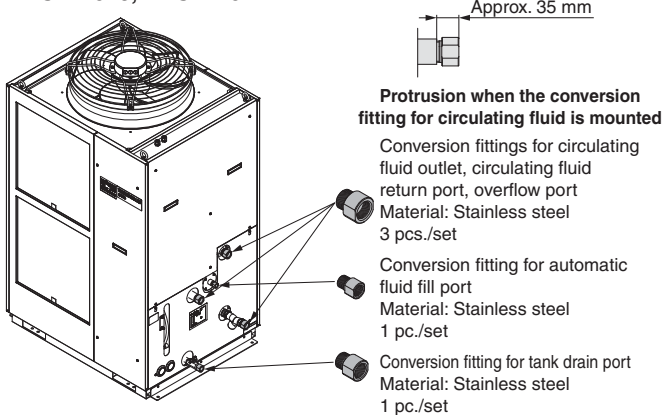
- Circulating fluid outlet, Circulating fluid return port, Overflow port Rc 1 → NPT 1 or G 1
- Drain port Rc 3/4 → NPT 3/4 or G 3/4
- Automatic fluid fill port Rc 1/2 → NPT 1/2 or G 1/2
- Facility water inlet, Facility water outlet Rc 1 → NPT 1 or G 1 (for HRS-EP015 or HRS-EP016)

(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.)

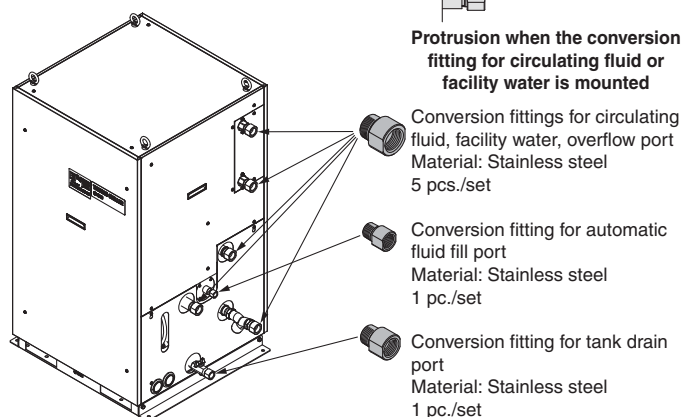
Part no.	Contents	Applicable model
HRS-EP013	NPT thread conversion fitting set	HRSH100-A-20-□S
		HRSH100-A-40-□
		HRSH150-A-20-□S
		HRSH150-A-40-□
		HRSH200-A-20-□S
HRS-EP014	G thread conversion fitting set	HRSH200-A-40-□
		HRSH250-A-20-□S
		HRSH250-A-40-□
		HRSH300-A-20-□S
		HRSH300-A-40-□

Part no.	Contents	Applicable model
HRS-EP015	NPT thread conversion fitting set	HRSH100-W-20-□S
		HRSH100-W-40-□
		HRSH150-W-20-□S
		HRSH150-W-40-□
HES-EP016	G thread conversion fitting set	HRSH200-W-20-□S
		HRSH200-W-40-□
		HRSH250-W-20-□S
		HRSH250-W-40-□

HRS-EP013, HRS-EP014



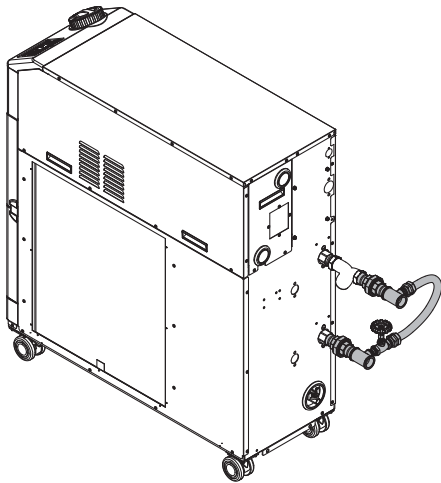
HRS-EP015, HRS-EP016



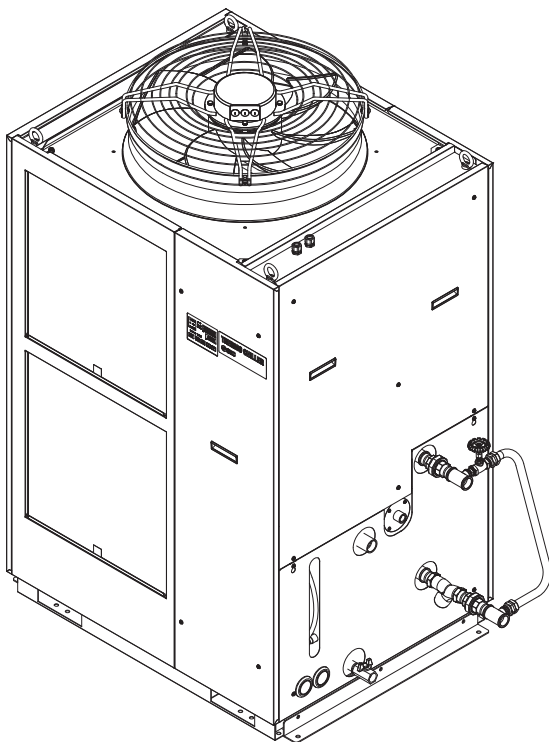
② By-pass Piping Set

When the circulating fluid goes below the minimum operating flow rate (as shown below), cooling capacity will be reduced and the temperature stability will be badly affected. Use the by-pass piping set to ensure a circulating fluid flow rate of the minimum operating flow rate or more.

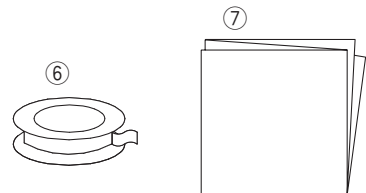
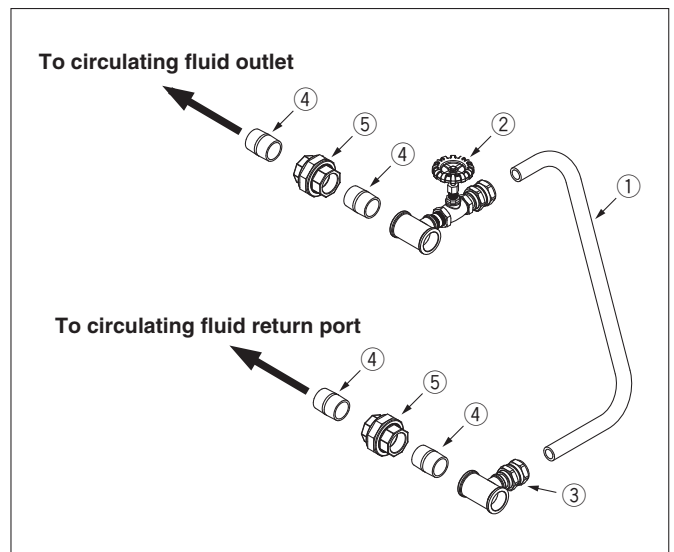
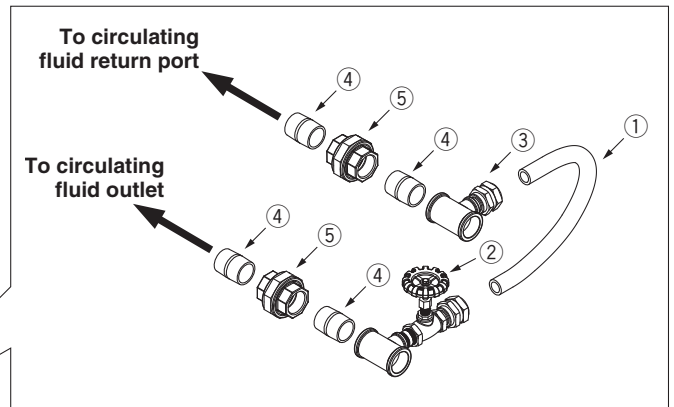
Part no.	Applicable model	Minimum operating flow rate [l/min]
HRS-BP005	HRSH090-□□-□	20
	HRSH100-□□-20-S	
	HRSH100-□□-40	
	HRSH150-□□-20-S	25
	HRSH150-□□-40	
	HRSH200-□□-20-S	
	HRSH200-□□-40	
	HRSH250-W□-20-S	
	HRSH250-W□-40	
	HRSH250-A□-20-S	40
	HRSH250-A□-40	
	HRSH300-A□-20-S	
HRSH300-A□-40		



HRSH090-A-40



(The figure shows the HRSH250-A-20S)



Parts List

No.	Description
①	Hose (I.D.: 15 mm, Length: 700 mm)
②	Outlet piping assembly (With globe valve)
③	Return piping assembly
④	Barrel nipple (Size: 1 inch) (2 pcs.)
⑤	Union (Size: 1 inch) (2 pcs.)
⑥	Sealant tape
⑦	Operation Manual

③ Caster Adjuster-foot Kit

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

When installed by user, it is necessary to lift the thermo-chiller by a forklift or sling work.

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

Part no.	Applicable model
HRS-KS001	HRSH250-A□-□ HRSH300-A□-□
HRS-KS002	HRSH100-A□-□ HRSH150-A□-□ HRSH200-A□-□ HRSH100-W□-□ HRSH150-W□-□ HRSH200-W□-□ HRSH250-W□-□

Parts List

Description
Procedure manual
Caster adjuster-foot bracket (2 pcs.)
Fixing bolt (M8) (8 pcs.)

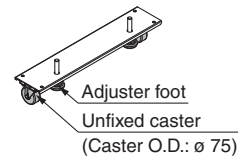


Fig. 2 Caster adjuster-foot bracket (2 pcs.)

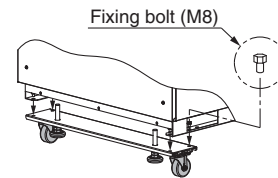


Fig. 3 Fixing bolt (8 pcs.)

④ Electric Conductivity Control Set

The set indicates and controls the electric conductivity of the circulating fluid. Refer to the Operation Manual for details.

Part no.	Applicable model
HRS-DI007	HRSH090-□□-□
HRS-DI006	HRSH100-□□-□ HRSH150-□□-□ HRSH200-□□-□ HRSH250-□□-□ HRSH300-□□-□

Measurement range of electric conductivity	2.0 to 48.0 $\mu\text{S/cm}$
Set range of electric conductivity target	5.0 to 45.0 $\mu\text{S/cm}$
Set range of electric conductivity hysteresis	2.0 to 10.0 $\mu\text{S/cm}$
Operating temperature range (Circulating fluid temperature)	5 to 60 $^{\circ}\text{C}$
Power consumption	400 mA or less
Installation environment	Indoors

⑤ Particle Filter Set

Removes foreign matter in the circulating fluid. This set cannot be directly connected to the thermo-chiller. Install it in the user's piping system. Refer to the Operation Manual for details.

Particle Filter Set

HRS-PF005-H

Accessory

Symbol	Accessory
—	None
H	With handle

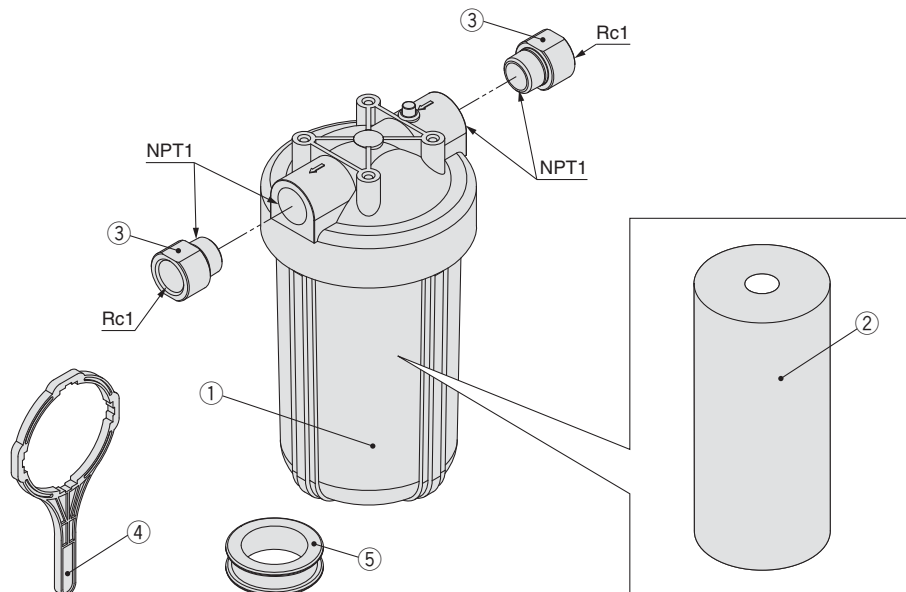
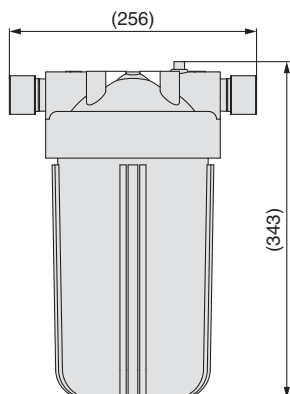
Fluid	Tap water
Max. operating pressure	0.65 MPa
Operating temperature range	5 to 35 °C
Nominal filtration accuracy	5 μm
Installation environment	Indoors

Parts List

No.	Description	Material	Q'ty	Note
①	Body	PC, PP	1	—
②	Element	PP	1	—
③	Extension piece	Stainless steel	2	Conversion from NPT to Rc
④	Handle	—	1	When -H is selected
⑤	Sealant tape	PTFE	1	—

Replacement Element

HRS-PF006



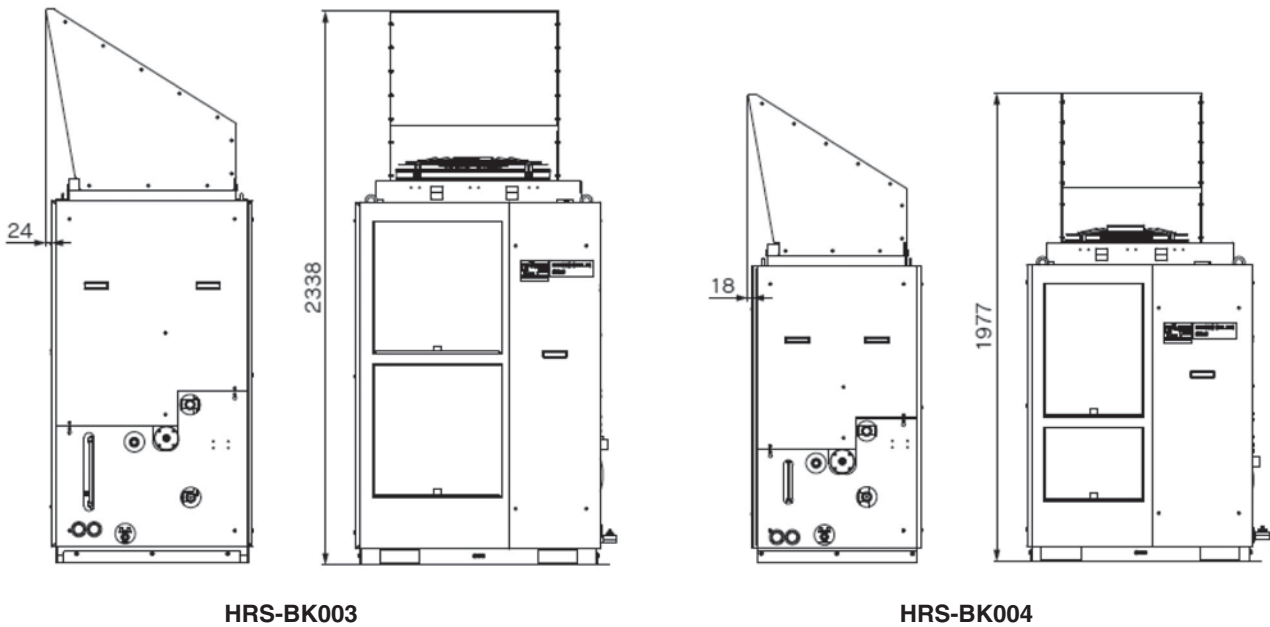
⑥ Snow Protection Hood

A stainless-steel hood, for air cooled thermo-chillers, that protects the fan and the chiller from snow (not applicable to size HRSH090).

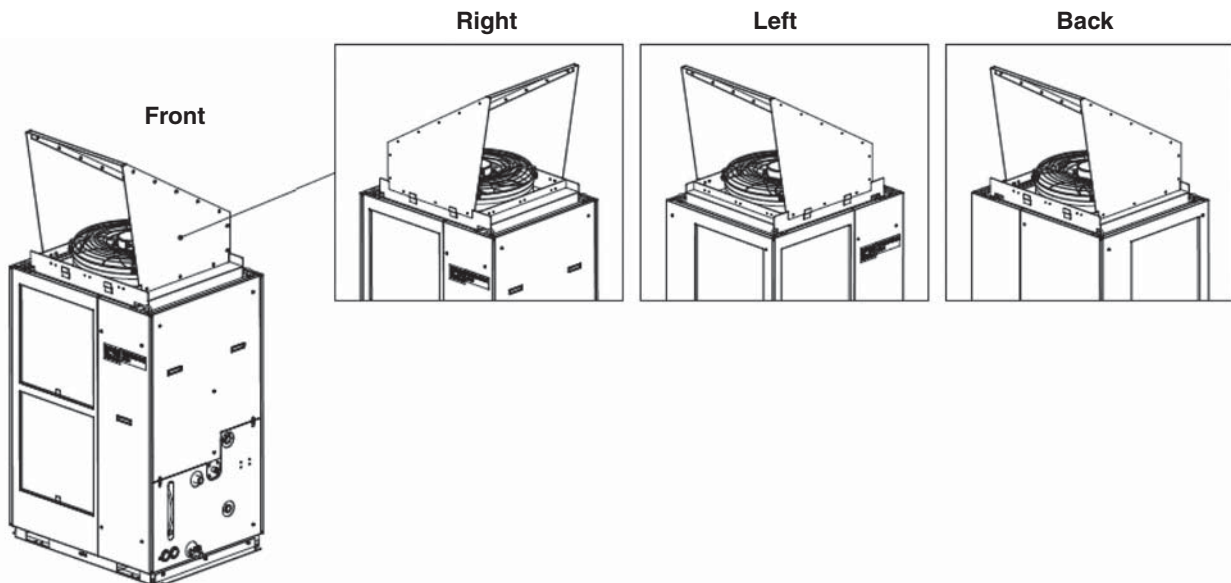
Four types of ventilation direction can be selected depending on the mounting direction of the hood.

Part no.	Applicable model
HRS-BK004	HRSH100-A□-20-□S
	HRSH100-A□-40-□
	HRSH150-A□-20-□S
	HRSH150-A□-40-□
	HRSH200-A□-20-□S
HRS-BK003	HRSH250-A□-20-□S
	HRSH250-A□-40-□
	HRSH300-A□-20-□S
	HRSH300-A□-40-□

Dimensions



Mounting direction



Series HRSH Cooling Capacity Calculation

Required Cooling Capacity Calculation

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

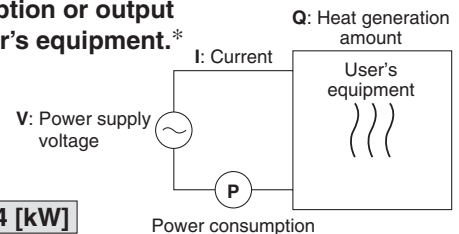
The heat generation amount can be determined based on the power consumption or output of the heat generating area — i.e. the area requiring cooling — within the user's equipment.*

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

Power consumption P: 20 [kW]

$$Q = P = 20 \text{ [kW]}$$

Cooling capacity = Considering a safety factor of 20 %, $20 \text{ [kW]} \times 1.2 = 24 \text{ [kW]}$



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

Power supply output VI: 20 [kVA]

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

In this example, using a power factor of 0.85:

$$= 20 \text{ [kVA]} \times 0.85 = 17 \text{ [kW]}$$

Cooling capacity = Considering a safety factor of 20 %, $17 \text{ [kW]} \times 1.2 = 20.4 \text{ [kW]}$

- ③ Derive the heat generation amount from the output.

Output (shaft power etc.) W: 13 [kW]

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

In this example, using an efficiency of 0.7:

$$= \frac{13}{0.7} = 18.6 \text{ [kW]}$$

Cooling capacity = Considering a safety factor of 20 %, $18.6 \text{ [kW]} \times 1.2 = 22.3 \text{ [kW]}$

* The above examples 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.

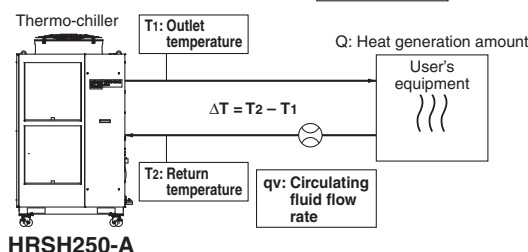
Heat generation amount by user's equipment Q : Unknown [W] (J/s)
 Circulating fluid : Tap water*
 Circulating fluid mass flow rate qm : (= ρ × qv ÷ 60) [kg/s]
 Circulating fluid density ρ : 1 [kg/L]
 Circulating fluid (volume) flow rate qv : 70 [l/min]
 Circulating fluid specific heat C : 4.186 × 10³ [J/(kg·K)]
 Circulating fluid outlet temperature T₁ : 293 [K] (20 [°C])
 Circulating fluid return temperature T₂ : 297 [K] (24 [°C])
 Circulating fluid temperature difference ΔT : 4 [K] (= T₂ - T₁)
 Conversion factor: minutes to seconds (SI units) : 60 [s/min]

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

$$= \frac{\rho \times qv \times C \times \Delta T}{60} = \frac{1 \times 70 \times 4.186 \times 10^3 \times 4.0}{60}$$

$$= 19535 \text{ [J/s]} \approx 19535 \text{ [W]} = 19.5 \text{ [kW]}$$

Cooling capacity = Considering a safety factor of 20 %, $19.5 \text{ [kW]} \times 1.2 = 23.4 \text{ [kW]}$



Example of conventional measurement units (Reference)

Heat generation amount by user's equipment Q : Unknown [cal/h] → [W]
 Circulating fluid : Tap water*
 Circulating fluid weight flow rate qm : (= ρ × qv × 60) [kgf/h]
 Circulating fluid weight volume ratio γ : 1 [kgf/L]
 Circulating fluid (volume) flow rate qv : 70 [l/min]
 Circulating fluid specific heat C : 1.0 × 10³ [cal/(kgf·°C)]
 Circulating fluid outlet temperature T₁ : 20 [°C]
 Circulating fluid return temperature T₂ : 24 [°C]
 Circulating fluid temperature difference ΔT : 4 [°C] (= T₂ - T₁)
 Conversion factor: hours to minutes : 60 [min/h]
 Conversion factor: kcal/h to kW : 860 [(cal/h)/W]

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

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

$$= \frac{1 \times 70 \times 60 \times 1.0 \times 10^3 \times 4.0}{860}$$

$$= \frac{16800000 \text{ [cal/h]}}{860}$$

$$\approx 19534 \text{ [W]} = 19.5 \text{ [kW]}$$

Cooling capacity = Considering a safety factor of 20 %, $19.5 \text{ [kW]} \times 1.2 = 23.4 \text{ [kW]}$

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 ρ : 1 [kg/L]
 Cooled substance total volume **V** : 300 [L]
 Cooled substance specific heat **C** : 4.186×10^3 [J/(kg·K)]
 Cooled substance temperature when cooling begins **T₀** : 305 [K] (32 [°C])
 Cooled substance temperature after t hour **T_t** : 293 [K] (20 [°C])
 Cooling temperature difference ΔT : 12 [K] (= $T_0 - T_t$)
 Cooling time Δt : 900 [s] (= 15 [min])

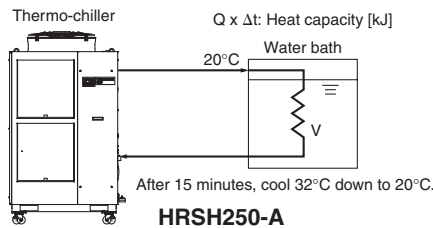
* Refer to the following for the typical physical property values by circulating fluid.

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

$$= \frac{1 \times 300 \times 4.186 \times 10^3 \times 12}{900} = 16744 \text{ [J/s]} \approx 16.7 \text{ [kW]}$$

Cooling capacity = Considering a safety factor of 20 %,

$$16.7 \text{ [kW]} \times 1.2 = \mathbf{20 \text{ [kW]}}$$



Example of conventional measurement 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 γ : 1 [kgf/L]
 Cooled substance total volume **V** : 300 [L]
 Cooled substance specific heat **C** : 1.0×10^3 [cal/(kgf·°C)]
 Cooled substance temperature when cooling begins **T₀** : 32 [°C]
 Cooled substance temperature after t hour **T_t** : 20 [°C]
 Cooling temperature difference ΔT : 12 [°C] (= $T_0 - T_t$)
 Cooling time Δt : 15 [min]
 Conversion factor: hours to minutes : 60 [min/h]
 Conversion factor: kcal/h to kW : 860 [(cal/h)/W]

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

$$= \frac{1 \times 300 \times 60 \times 1.0 \times 10^3 \times 12}{15 \times 860}$$

$$\approx 16744 \text{ [W]} = 16.7 \text{ [kW]}$$

Cooling capacity = Considering a safety factor of 20 %,
 $16.7 \text{ [kW]} \times 1.2 = \mathbf{20 \text{ [kW]}}$

Note) 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 catalogue uses the following values for density and specific heat in calculating the required cooling capacity.

Density ρ : 1 [kg/L] (or, using conventional unit system, weight volume ratio $\gamma = 1$ [kgf/L])

Specific heat **C**: 4.19×10^3 [J/(kg·K)] (or, using conventional unit system, 1×10^3 [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 ρ [kg/L]	Specific heat C [J/(kg·K)]	Conventional unit system	
			Weight volume ratio γ [kgf/L]	Specific heat C [cal/(kgf·°C)]
5 °C	1.00	4.2×10^3	1.00	1×10^3
10 °C	1.00	4.19×10^3	1.00	1×10^3
15 °C	1.00	4.19×10^3	1.00	1×10^3
20 °C	1.00	4.18×10^3	1.00	1×10^3
25 °C	1.00	4.18×10^3	1.00	1×10^3
30 °C	1.00	4.18×10^3	1.00	1×10^3
35 °C	0.99	4.18×10^3	0.99	1×10^3
40 °C	0.99	4.18×10^3	0.99	1×10^3

15 % Ethylene Glycol Aqueous Solution

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

Note) The above shown are reference values. Contact circulating fluid supplier for details.



Series HRSH

Specific Product Precautions 1

Be sure to read this before handling. Refer to back cover for Safety Instructions. For Temperature Control Equipment Precautions, refer to “Handling Precautions for SMC Products” and the Operation Manual on SMC website, <http://www.smc.eu>

Design

Warning

- This catalogue shows the specifications of a single unit.**
 - Confirm the specifications of the single unit (contents of this catalogue) and thoroughly consider the adaptability between the user's system and this unit.
 - Although the 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 condition. Also, the user is requested to carry out the 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 fluid contact of circulating fluid and facility water.**
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.

Selection

Warning

Model selection

For selecting a model of thermo-chiller, it is required to know the heat generation amount of the user's equipment. Obtain the heat generation amount, referring to “Cooling Capacity Calculation” on pages 37 and 38 before selecting a model.

Handling

Warning

Thoroughly read the Operation Manual.

Read the Operation Manual completely before operation, and keep this manual available whenever necessary.

Operating Environment/Storage Environment

Warning

- Do not use in the following environment as it will lead to a breakdown.**
 - Outdoors (for HRSH090).
 - In locations where water vapour, salt water, and oil may splash on the product.
 - 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.)
 - In locations where the ambient temperature exceeds the limits as mentioned below.
During transportation/storage: -15 °C to 50 °C (But as long as water or circulating fluid are not left inside the pipings)
During operation of air cooling type: -20 °C to 45 °C
During operation of water cooling type: 2 °C to 45 °C
(However, use a 15 % ethylene glycol aqueous solution if operating in a place where the ambient temperature is from -5 to 10 °C or circulating fluid temperature is 10 °C or less. Use a 40 % ethylene glycol aqueous solution if operating in a place where the ambient temperature is from -20 to 5 °C.)
 - In locations where condensation may occur.
 - In locations which receive direct sunlight or radiated heat.
 - In locations where there is a heat source nearby and the ventilation is poor.
 - 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.)
 - In locations where static electricity occurs, or conditions which make the product discharge static electricity.
 - In locations where high frequency occurs.
 - In locations where damage is likely to occur due to lightning.
 - In locations at altitude of 3000 m or higher (Except during storage and transportation)
* For altitude 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 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.
 - Upper limit of ambient temperature: Use the product in ambient temperature of the described value or lower at each altitude.
 - Cooling capacity coefficient: The product's cooling capacity will lower to one that multiplied by the described value at each altitude.

Altitude [m]	① Upper limit of ambient temperature [°C]	② Cooling capacity coefficient
Less than 1000 m	45	1.00
Less than 1500 m	42	0.85
Less than 2000 m	38	0.80
Less than 2500 m	35	0.75
Less than 3000 m	32	0.70
 - In locations where strong impacts or vibrations occur.
 - In locations where a massive force strong enough to deform the product is applied or a weight from a heavy object is applied.
 - In locations where there is not sufficient space for maintenance.
 - In locations where liquid that exceeds the conditions required for the degrees of protection IPX4 may splash on the product.
 - Bevelled place (for HRSH090).

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



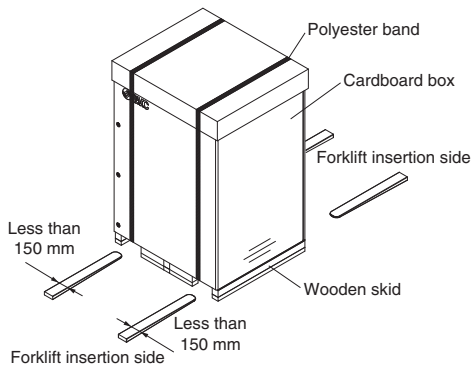
Series HRSH Specific Product Precautions 2

Be sure to read this before handling. Refer to back cover for Safety Instructions. For Temperature Control Equipment Precautions, refer to “Handling Precautions for SMC Products” and the Operation Manual on SMC website, <http://www.smc.eu>

Transportation/Carriage/Movement

Warning

1. This product is heavy. Pay attention to safety and position of the product when it is transported, carried and moved.
2. Read the Operation Manual carefully to move the product after unpacking.
3. This product will require an acceptance with the product not unloaded from the truck, and the user will need to unload the product by himself. Please prepare a forklift. The product will be delivered in the packaging shown below.

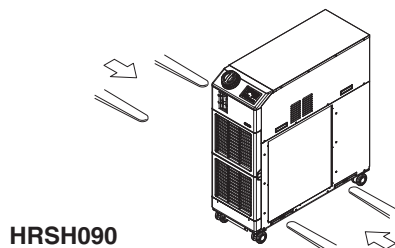


<Weight and dimensions including packaging>

Model	Weight [kg]	Dimensions [mm]
HRSH090-A□-40	158	Height 1290 x Width 470 x Depth 1180
HRSH090-W□-40		
HRSH100-A□-□S	221	Height 1585 x Width 1185 x Depth 955
HRSH150-A□-□S		
HRSH200-A□-□S	256	Height 1585 x Width 1185 x Depth 955
HRSH250-A□-□S		
HRSH100-W□-□S	185	Height 1895 x Width 1230 x Depth 1040
HRSH150-W□-□S		
HRSH200-W□-□S	215	Height 1485 x Width 925 x Depth 955
HRSH250-W□-□S		
HRSH100-A□-A□S	233	Height 1710 x Width 1185 x Depth 955
HRSH150-A□-A□S		
HRSH200-A□-A□S	268	Height 1710 x Width 1185 x Depth 955
HRSH250-A□-A□S		
HRSH300-A□-A□S	344	Height 2020 x Width 1230 x Depth 1040
HRSH100-W□-A□S		
HRSH150-W□-A□S	197	Height 1610 x Width 925 x Depth 955
HRSH200-W□-A□S		
HRSH250-W□-A□S	227	Height 1610 x Width 925 x Depth 955
HRSH250-W□-A□S		

2. Moving with forklift

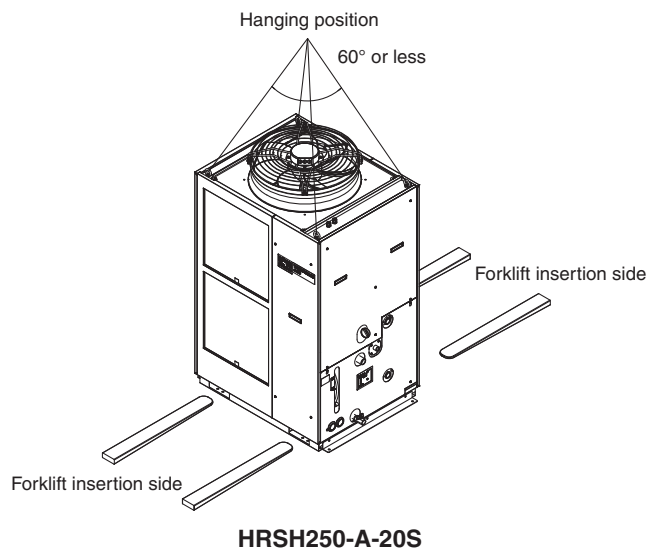
- 1) A licensed driver should drive the forklift.
- 2) The proper place to insert the tines of the forklift differs depending on the model of cooler. Insert the fork to the place specified on the label. The fork should reach through to the other side of the product.
- 3) Be careful not to bump the fork to the cover panel or piping ports.



HRSH090

3. Hanging transportation

- 1) Crane manipulation and slinging work should be done by an eligible person.
- 2) Do not grip the piping on the right side or the handles of the panel.
- 3) When hanging by the eye bolts, be sure to use a 4-point hanging method. For the hanging angle, use caution regarding the position of the centre of gravity and hold it within 60°.



HRSH250-A-20S

(When using optional accessories/Caster adjuster-foot kit HRS-KS001 or KS002)

4. Moving with casters

- 1) This is a heavy product, so make sure not is lifted log at least two people to avoid falling.
- 2) Do not grip the piping port on the right side or the handles of the panel.
- 3) Do not pass over bumps, etc, with the casters.
- 4) When transporting using a forklift, be sure not to let it hit the casters or adjusters, and drive the fork all the way through until it comes out the other side.

Mounting/Installation

Warning

1. Do not use the HRSH090 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.

Caution

1. Install on a rigid floor which can withstand this product's weight.
2. Secure with bolts, anchor bolts, etc.



Series HRSH Specific Product Precautions 3

Be sure to read this before handling. Refer to back cover for Safety Instructions. For Temperature Control Equipment Precautions, refer to “Handling Precautions for SMC Products” and the Operation Manual on SMC website, <http://www.smc.eu>

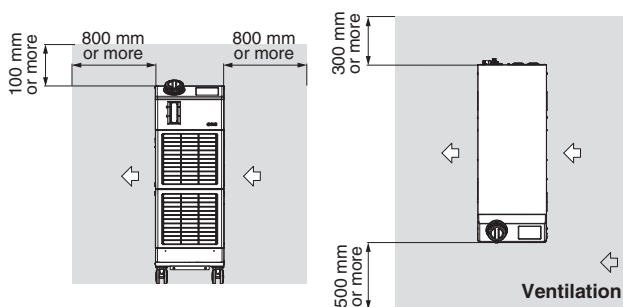
Mounting/Installation

Caution

3. Refer to the Operation Manual for this product, and secure an installation space that is necessary for the maintenance and ventilation.

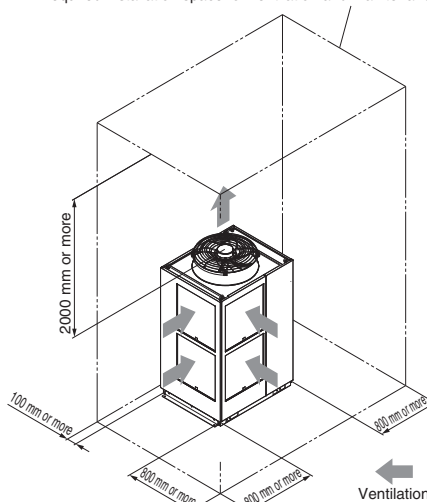
<Air-cooled refrigeration>

1. 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 45 °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.



HRSH090

Required installation space for ventilation and maintenance



HRSH250-A

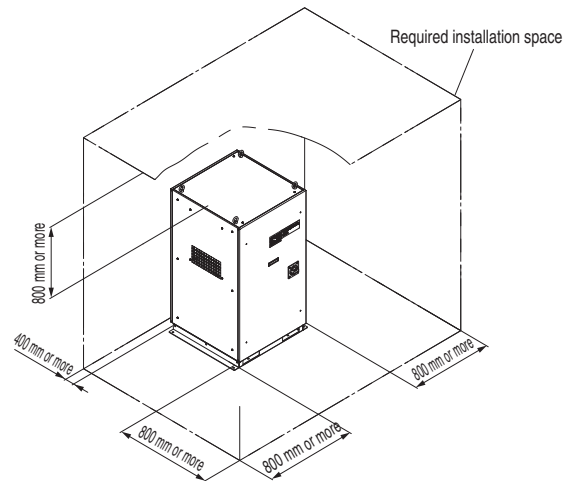
3. If it is impossible to exhaust heat from the installation area indoors, or when the installation area is conditioned, provide a duct for heat exhaustion to the air outlet port of this product for ventilation. Do not mount the inlet of the duct (flange) directly to the air vent of the product, and keep a space larger than the diameter of the duct. Additionally, consider the resistance of the duct when making the air vent port for the duct.

<Heat radiation amount/Required ventilation rate>

Model	Heat radiation amount [kW]	Required ventilation rate [m ³ /min]	
		Differential temp. of 3 °C between inside and outside of installation area	Differential temp. of 6 °C between inside and outside of installation area
HRSH090-A□-40	Approx. 18	305	155
HRSH100-A□-□	Approx. 18	305	155
HRSH150-A□-□	Approx. 29	490	245
HRSH200-A□-□	Approx. 35	590	295
HRSH250-A□-□	Approx. 44	730	365
HRSH300-A□-□	Approx. 45	760	380

<Water-cooled refrigeration>

When installing the product, keep the space for maintenance as shown below.



Piping

Caution

1. Regarding the circulating fluid and facility water pipings, consider carefully the suitability for temperature, circulating fluid and facility water.

If the operating performance is not sufficient, the pipings may burst during operation. Using corrosive materials such as aluminium 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 drain port of this product, use a pipe wrench to clamp the connection ports.

4. Supply water pressure to the automatic fluid fill port of this product should be 0.2 to 0.5 MPa.

This product has a built-in ball (float) tap. If you attach it to the faucet of a sink etc. it will automatically supply water to the rated fluid level of the tank (halfway between HIGH and LOW.) If the water supply pressure is too high, the pipes may burst during use. Proceed with caution.

5. Ensure that piping is connected to the overflow port so that the circulating fluid can be exhausted to the drainage pit when the fluid level in the tank increases.

6. For the circulating fluid piping connection, install a drain pan and wastewater collection pit just in case the circulating fluid may leak.

7. 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.



Series HRSH Specific Product Precautions 4

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Electrical Wiring

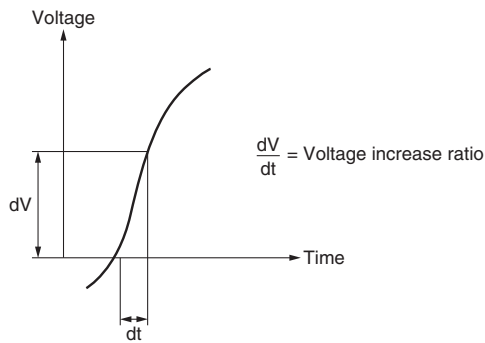
Warning

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

Caution

1. Power supply and communication cables should be prepared by user.
2. Provide a stable power supply which is not affected by surge or distortion.

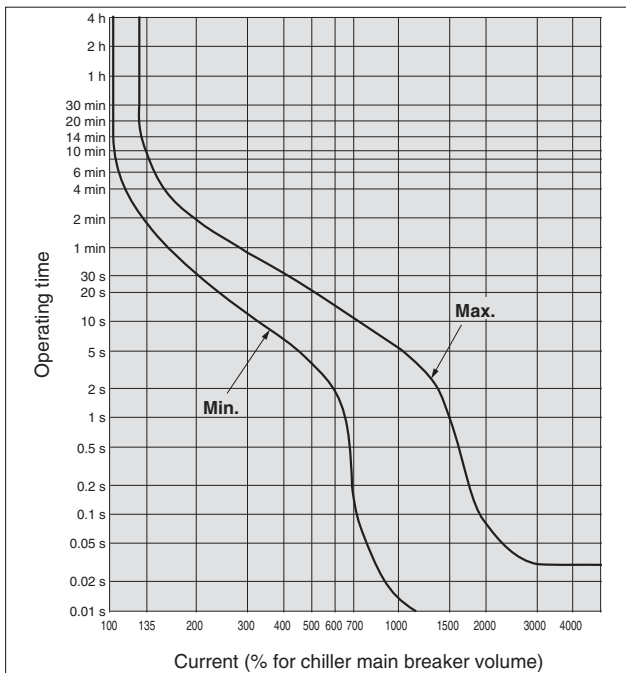
If the voltage increase ratio (dV/dt) at the zero cross should exceed $40 \text{ V}/200 \mu\text{sec.}$, it may result in malfunction.



<For 400 V>

3. This product is installed with a breaker with the following operating characteristics.

For the user's equipment (inlet side), use a breaker whose operating time is equal to or longer than the breaker of this product. If a breaker with shorter operating time is connected, the user's equipment could be cut off due to the inrush current of the motor of this product.



Circulating Fluid

Caution

1. Avoid oil or other foreign objects 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 Circulating Fluid) Quality Standards

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

Item	Unit	Standard value	Influence		
			Corrosion	Scale generation	
Standard item	pH (at 25 °C)	—	6.0 to 8.0	○ ○	
	Electric conductivity (25 °C)	[$\mu\text{S}/\text{cm}$]	100* to 300*	○ ○	
	Chloride ion (Cl^-)	[mg/L]	50 or less	○	
	Sulfuric acid ion (SO_4^{2-})	[mg/L]	50 or less	○	
	Acid consumption amount (at pH4.8)	[mg/L]	50 or less	○	
	Total hardness	[mg/L]	70 or less	○ ○	
	Calcium hardness (CaCO_3)	[mg/L]	50 or less	○	
Reference item	Ionic state silica (SiO_2)	[mg/L]	30 or less	○	
	Iron (Fe)	[mg/L]	0.3 or less	○ ○	
	Copper (Cu)	[mg/L]	0.1 or less	○	
	Sulfide ion (S_2^-)	[mg/L]	Should not be detected.	○	
	Ammonium ion (NH_4^+)	[mg/L]	0.1 or less	○	
	Residual chlorine (Cl)	[mg/L]	0.3 or less	○	
	Free carbon (CO_2)	[mg/L]	4.0 or less	○	

* In the case of [$\text{M}\Omega\text{-cm}$], it will be 0.003 to 0.01.

○: 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 40 %.
Overly high concentrations can cause a pump overload.
Utilisation of ethylene glycol aqueous solution of 40 % might reduce cooling capacity at 20 %.
Low concentrations, however, can lead to freezing when circulating fluid temperature is $10 \text{ }^\circ\text{C}$ or lower and cause the thermo-chiller to break down.
5. When deionised water is used, the electric conductivity should be $1 \mu\text{S}/\text{cm}$ or higher (Electric resistivity: $1 \text{ M}\Omega\text{-cm}$ or lower).

Facility Water Supply

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
HRSH090-W□-40	Approx. 20	Refer to "Facility water system" in the specifications on pages 16, 22 and 24.
HRSH100-W□-□	Approx. 20	
HRSH150-W□-□	Approx. 27	
HRSH200-W□-□	Approx. 34	
HRSH250-W□-□	Approx. 40	



Series HRSH Specific Product Precautions 5

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Facility Water Supply

Warning

2. When using tap water as facility water, use water that conforms to the appropriate water quality standards. Use 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 – Make-up water”

	Item	Unit	Standard value	Influence	
				Corrosion	Scale generation
Standard item	pH (at 25 °C)	—	6.5 to 8.2	○	○
	Electric conductivity (25 °C)	[μS/cm]	100* to 800*	○	○
	Chloride ion (Cl ⁻)	[mg/L]	200 or less	○	
	Sulfuric acid ion (SO ₄ ²⁻)	[mg/L]	200 or less	○	
	Acid consumption amount (at pH4.8)	[mg/L]	100 or less		○
	Total hardness	[mg/L]	200 or less		○
	Calcium hardness (CaCO ₃)	[mg/L]	150 or less		○
Reference item	Ionic state silica (SiO ₂)	[mg/L]	50 or less		○
	Iron (Fe)	[mg/L]	1.0 or less	○	○
	Copper (Cu)	[mg/L]	0.3 or less	○	
	Sulfide ion (S ₂ ⁻)	[mg/L]	Should not be detected.	○	
	Ammonium ion (NH ₄ ⁺)	[mg/L]	1.0 or less	○	
	Residual chlorine (Cl)	[mg/L]	0.3 or less	○	
	Free carbon (CO ₂)	[mg/L]	4.0 or less	○	

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

○: 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. Set the supply pressure between 0.3 to 0.5 MPa. Ensure a pressure difference at the facility water inlet/outlet of 0.3 MPa or more.

If the supply pressure is high, it will cause water leakage. If the supply pressure and pressure difference at the facility water inlet/outlet is low, it will cause an insufficient flow rate of the facility water, and poor temperature control.

Operation

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.

Pump can be operated independently.

2. Confirmation during operation

- Check the circulating fluid temperature.

The operating temperature range of the circulating fluid is between 5 and 35 °C. (5 to 40 °C for HRSH090)

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. After stopping operation, disconnect the power supply from the user’s equipment.

Operation Restart Time

Caution

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.

Protection Circuit

Caution

If operating in the below conditions, 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 (check the ambient temperature in the specifications).
- Ventilation hole is clogged with dust or dirt.

Maintenance

Caution

<Periodical inspection every one month>

Clean the ventilation hole.

If the dustproof filter of water-cooled type product 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>

Inspect the circulating fluid.

1. When using tap water or deionized water

- Replacement of circulating fluid

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

- Tank cleaning (same as the HRS series)

Consider whether dirt, slime or foreign objects may be present in the circulating fluid inside the tank, and carry out regular cleanings of the tank.

2. When using ethylene glycol aqueous solution

Use a concentration meter to confirm that the concentration does not exceed 40 %.

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 and facility water freezing when the product is stopped, release the circulating fluid and facility water in advance.




When the chiller needs to be switched off, please make sure that circulating fluid is discharged completely from both chiller and application. Please charge it at room temperature when the chiller needs to be switched on.

2. Consult a professional.

This product has an “anti-freezing function”, “warming-up function”, and “anti-snow coverage function”. Read the Operation Manual carefully, and if any additional anti-freezing function (e.g. tape heater) is needed, ask for it from the vendor.

Safety Instructions

These safety instructions are intended to prevent hazardous situations and/or equipment damage. These instructions indicate the level of potential hazard with the labels of “Caution,” “Warning” or “Danger.” They are all important notes for safety and must be followed in addition to International Standards (ISO/IEC)*1), and other safety regulations.

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

- *1) ISO 4414: Pneumatic fluid power – General rules relating to systems.
- ISO 4413: Hydraulic fluid power – General rules relating to systems.
- IEC 60204-1: Safety of machinery – Electrical equipment of machines. (Part 1: General requirements)
- ISO 10218-1: Manipulating industrial robots - Safety. etc.

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 catalogue 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. Do not service or attempt to remove product and machinery/equipment until safety is confirmed.**
 1. The inspection and maintenance of machinery/equipment should only be performed after measures to prevent falling or runaway of the driven objects have been confirmed.
 2. When the product is to be removed, confirm that the safety measures as mentioned above are implemented and the power from any appropriate source is cut, and read and understand the specific product precautions of all relevant products carefully.
 3. Before machinery/equipment is restarted, take measures to prevent unexpected operation and malfunction.
- 4. Contact SMC beforehand and take special consideration of safety measures if the product is to be used in any of the following conditions.**
 1. Conditions and environments outside of the given specifications, or use outdoors or in a place exposed to direct sunlight.
 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 catalogue.
 3. An application which could have negative effects on people, property, or animals requiring special safety analysis.
 4. Use in an interlock circuit, which requires the provision of double interlock for possible failure by using a mechanical protective function, and periodical checks to confirm proper operation.

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. The warranty period of the product is 1 year in service or 1.5 years after the product is delivered, whichever is first.*2)
Also, the product may have specified durability, running distance or replacement parts. Please consult your nearest sales branch.
2. For any failure or damage reported within the warranty period which is clearly our responsibility, a replacement product or necessary parts will be provided. This limited warranty applies only to our product independently, and not to any other damage incurred due to the failure of the product.
3. Prior to using SMC products, please read and understand the warranty terms and disclaimers noted in the specified catalogue for the particular products.

*2) Vacuum pads are excluded from this 1 year warranty.

A vacuum pad is a consumable part, so it is warranted for a year after it is delivered. Also, even within the warranty period, the wear of a product due to the use of the vacuum pad or failure due to the deterioration of rubber material are not covered by the limited warranty.

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.

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.

Caution

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.

Safety Instructions

Be sure to read “Handling Precautions for SMC Products” (M-E03-3) before using.

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