

SEMATECH
S2-93, S8-95

SEMI Standard
S2-0703, S8-0701, F47-0200



More energy is substantially saved by using a DC inverter refrigerator and an inverter pump.

New

Inverter type

Power consumption

1.1 kWh/h

Cooling water

2 L/min

- Circulating Fluids types: Fluorinated fluids / Ethylene glycol aqueous solutions / Clean water, Deionised water
- Temperature range setting: **-20 to 40°C / 20 to 90°C / -20 to 90°C**
- Cooling capacity: **1 kW / 2 kW / 4 kW / 8 kW / 10 kW to Max. 15 kW**
- Temperature stability: **±0.1°C**
- Refrigerant: **R404A (HFC) / R134a (HFC)**

Thermo-chiller

(A device for circulating a fluids)
at a constant temperature



Series **HRZ**

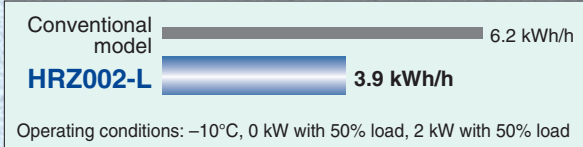

CAT.EUS40-48Bb-UK

Energy saving

Power consumption:

Max 40% reduction (SMC comparison)

In addition to the optimum control of the expansion valve by the original controller, THE power consumption is dramatically reduced by recycling the heat emitted from the cooling water.

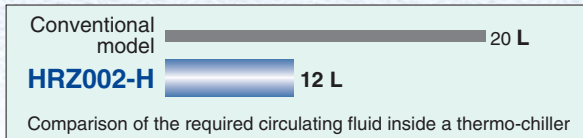


- Reduced running cost
- Contribution to the environmental preservation

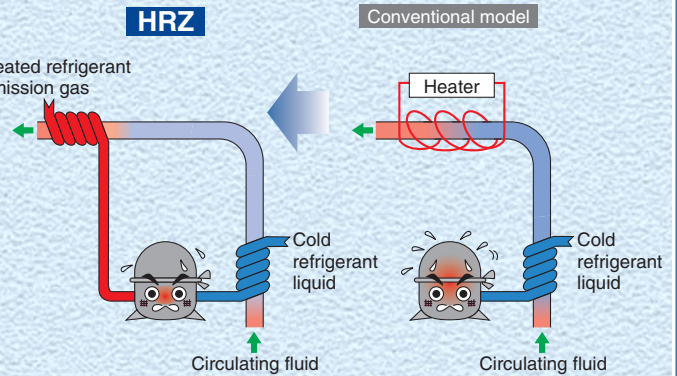
Circulating fluid:

Max 40% reduction (SMC comparison)

The enhanced temperature control technology and the dual tank construction achieved the reduction of the circulating fluid required for operation.



- Reduced initial cost
- Contribution to the environmental preservation

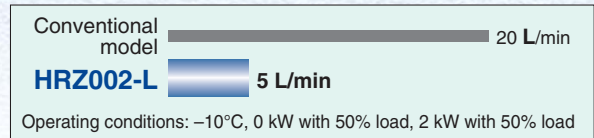


* This illustration is for an image only. For piping systems, refer to "Construction and Principles" on page 6.

Cooling water:

Max 75% reduction (SMC comparison)

The enhanced performance of a heat exchanger, the use of the recycled emitted heat and the reduced power consumption achieved the reduction of the cooling water amount.



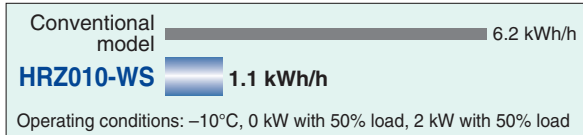
- Reduced facilities investment
- Space saved in the cooling water facilities
- Reduced running cost

Double Inverter Type New

Energy saving is substantially increased by using a DC inverter refrigerator and an inverter pump.

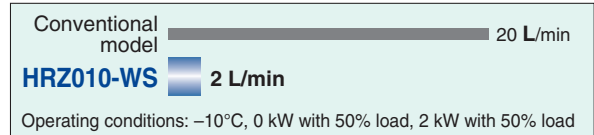
Power consumption:

Max 82% reduction (SMC comparison)



Cooling water:

Max 90% reduction (SMC comparison)



Space saving

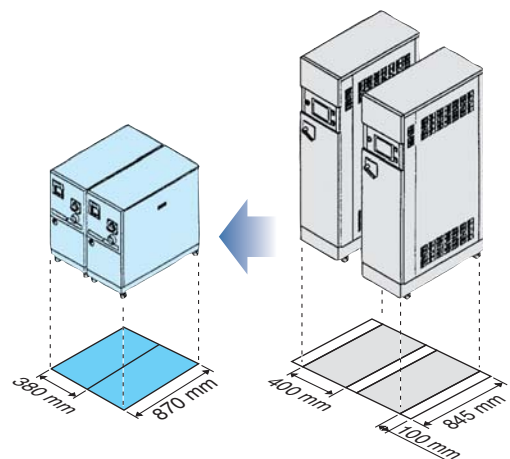
Installation area:

Max 29% reduction (SMC comparison)

By emitting the heat from the back, ventilation slits on the side are unnecessary offering reduced installation space.

Conventional model: Body space: W400 mm x D845 mm
Ventilation space: 100 mm

HRZ008-H: Body space: W380 mm x D870 mm
Ventilation space: 0



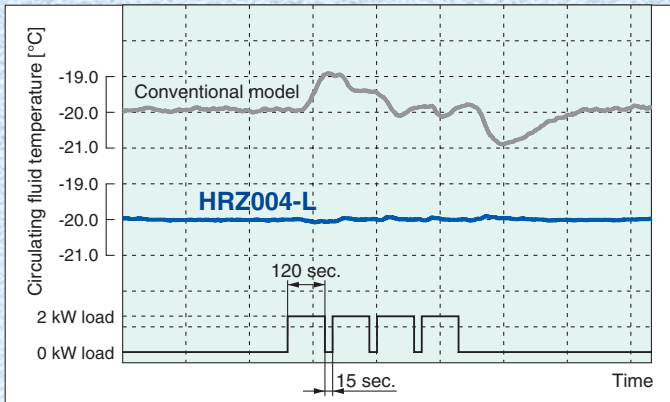
HRZ008-H 0.66 m²

Conventional model 0.93 m²

High performance

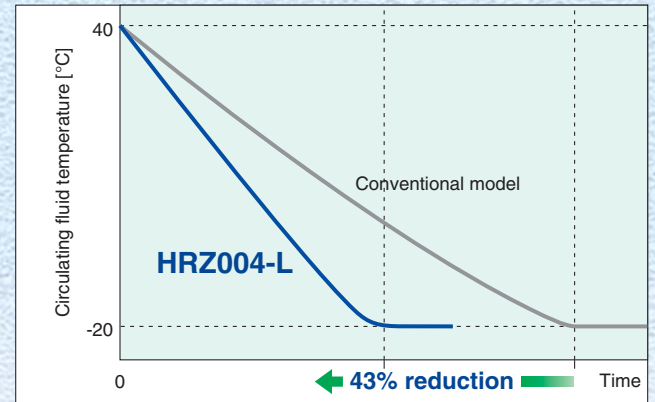
Temperature stability: $\pm 0.1^{\circ}\text{C}$ (when the load is stable)

The enhanced temperature control technology achieved $\pm 0.1^{\circ}\text{C}$ temperature stability when the load is stable.



Cooling time: Max 43% reduction (SMC comparison)

The special temperature control technology achieved the utmost performance, resulting in a reduced cooling time.



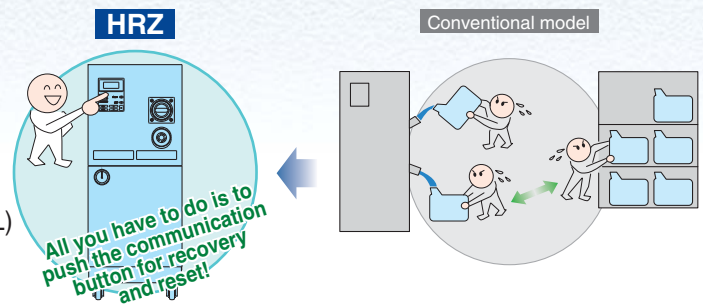
Ease of maintenance

The circulating fluid automatic recovery function

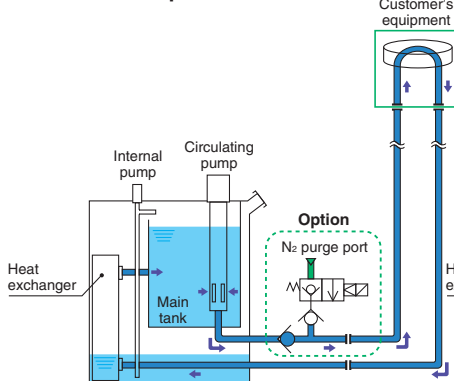
(Refer to "Options" on page 29.)

Circulating fluid inside a thermo-chiller tank can be recovered automatically. (Recovery volume: 15 L to 17 L)

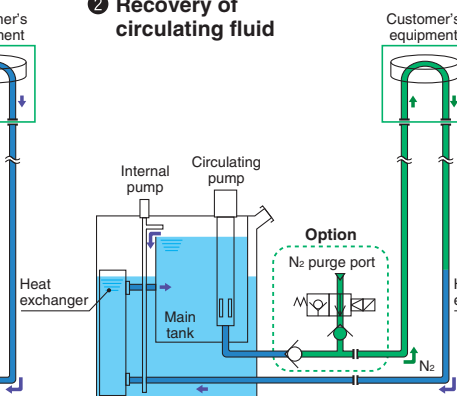
- Reduced maintenance time
- Faster operation
- Reduced circulating liquid loss by evaporation or spill.



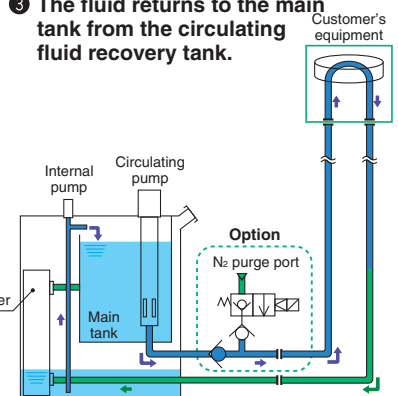
1 Normal operation



2 Recovery of circulating fluid



3 The fluid returns to the main tank from the circulating fluid recovery tank.

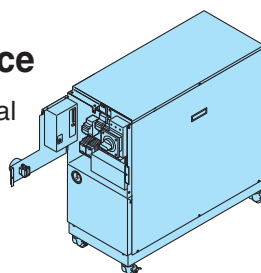


Circulating fluid electrical resistance ratio control function (Refer to "Options" on page 28.)

(DI control kit)

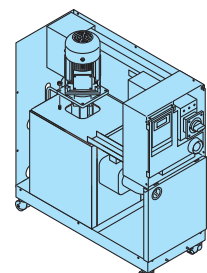
Ease of maintenance

- Checking of the electrical component parts accessible from the front side only



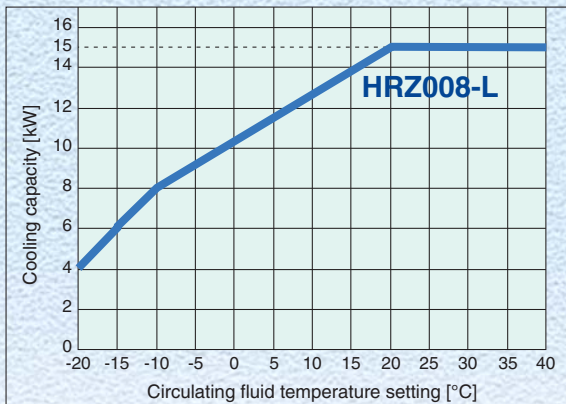
- Possible to replace the maintenance parts (such as a pump) without removing the pipings and discharging the circulating fluid.

- Various alarm displays (Refer to page 25.)



● Cooling capacity: Max 15 kW

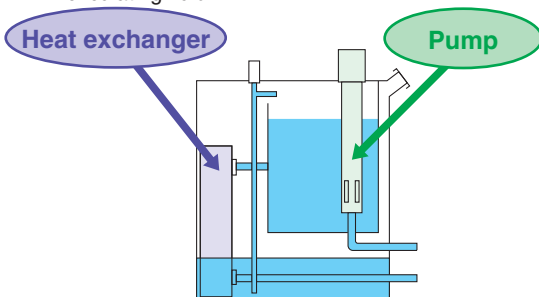
Up to 15 kW cooling capacity achieved.



Leakless

● All in the tank

Housing the pump or the heat exchanger inside the tank has eliminated any external leakage of the circulating fluid.



Communication

- Contact input/output signal
- Serial RS-485 communication
- Analogue communication (Refer to "Options" on page 29.)
- DeviceNet™ communication (Refer to "Options" on page 29.)



● The wetted parts are made of materials which are compatible with the circulating fluids.

(Stainless steel, EPDM, etc.)

- Fluorinated fluids: GALDEN® HT135, HT200
Flourinert™ FC-3283, FC-40
- Ethylene glycol aqueous solution 60%
- Pure water / Clean water

Regarding a fluid other than the above, please contact us.
Flourinert™ is a trademark of 3M. GALDEN® is a registered trademark of Solvay Solexis, Inc.

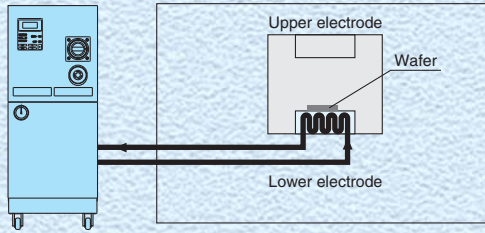
Contents

Features	Page 1 to 3
Application Examples	Page 5
Construction and Principles	Page 6
Model Selection	
• Guide to Model Selection	Page 7
• Calculation of the Required Cooling Capacity.....	Page 8, 9
• Precautions on the Model Selection.....	Page 9
• Circulating Fluid Representative Physical Property Values	Page 10
Fluorinated Fluid Type	
How to Order / Specifications	Page 11
Cooling/Heating Capacity	Page 12
Pump Capacity	Page 13
Ethylene Glycol Type	
How to Order / Specifications	Page 14
Cooling/Heating Capacity	Page 15
Pump Capacity	Page 16
Clean/Pure Water Type	
How to Order / Specifications	Page 17
Cooling/Heating Capacity, Pump Capacity	Page 18
Double Inverter Type	
How to Order / Specifications	Page 19
Cooling/Heating Capacity, Pump Capacity	Page 20
Common Specifications	
Dimensions	Page 21
Communications	Page 23
• Contact Input/Output	Page 23
• Serial RS-485	Page 24
• Connector Position	Page 24
Operation Panel Display	Page 25
Alarm	Page 25
Accessories (Sold Separately)	
• By-pass Piping Set	Page 26
• Anti-quake Bracket	Page 26
• 4 Port Manifold	Page 27
• DI Filter	Page 27
• Insulating Material for DI Filter	Page 27
• 60% Ethylene Glycol Aqueous Solution.....	Page 28
• Concentration Meter.....	Page 28
Options	
• Analogue Communication.....	Page 29
• DeviceNet™ Communication	Page 29
• NPT Fitting.....	Page 29
• DI Control Kit	Page 29
• Circulating Fluid Automatic Recovery	Page 30
Specific Product Precautions	Page 31
Safety Instructions	Back page

Application Examples

Semiconductor

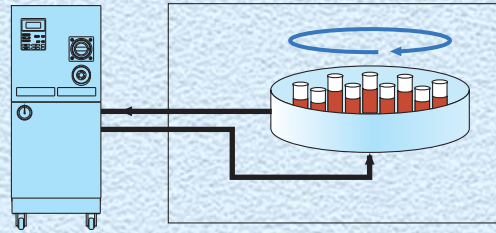
Example: Temperature control of a chamber electrode



- Etching equipment
- Spatter equipment
- Cleaning equipment
- Coating equipment
- Dicing equipment
- Tester, etc.

Medical

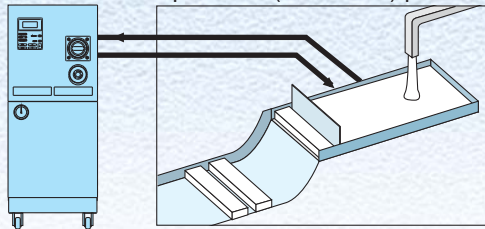
Example: Blood preservation



- X-ray instrument
- MRI
- Blood preservation equipment

Food

Example: Tofu (Bean curd) production

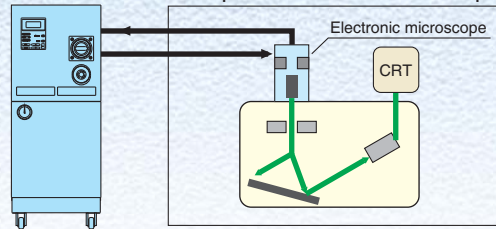


- Bottle-cleaning machine
- Tofu (Bean curd) production equipment
- Noodle-making machine, etc.

Water temperature control for forming tofu by mixing the boiled soybean milk and bittern

Diagnosis

Example: Electronic microscope

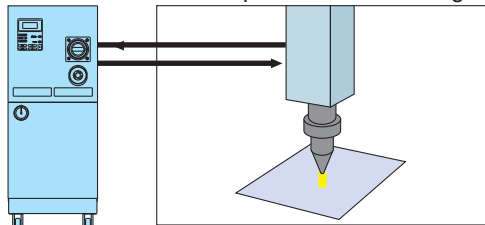


- Electron microscope
- X-ray diagnosis instrument
- Gas chromatography
- Sugar level diagnosis, etc.

Prevents the distortion caused by the heat generated by the electronic gun in an electronic microscope.

Machine tool

Example: Laser machining

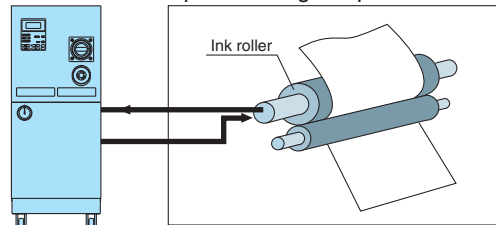


- Wire cutting
- Grinder
- Spot welding, etc.
- Plasma welding
- Laser machining

Temperature-controlling the laser generating tube enables the laser wavelength to be optimised, improving the accuracy of the machined cross sectional area.

Printing

Example: Printing temperature control

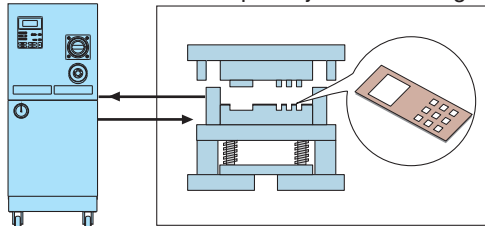


- Offset printing machine
- Automatic developing machine
- UV equipment, etc.

Temperature-controlling the ink roller enables to control the evaporation amount and viscosity of the ink and optimise the tint of colors.

Molding

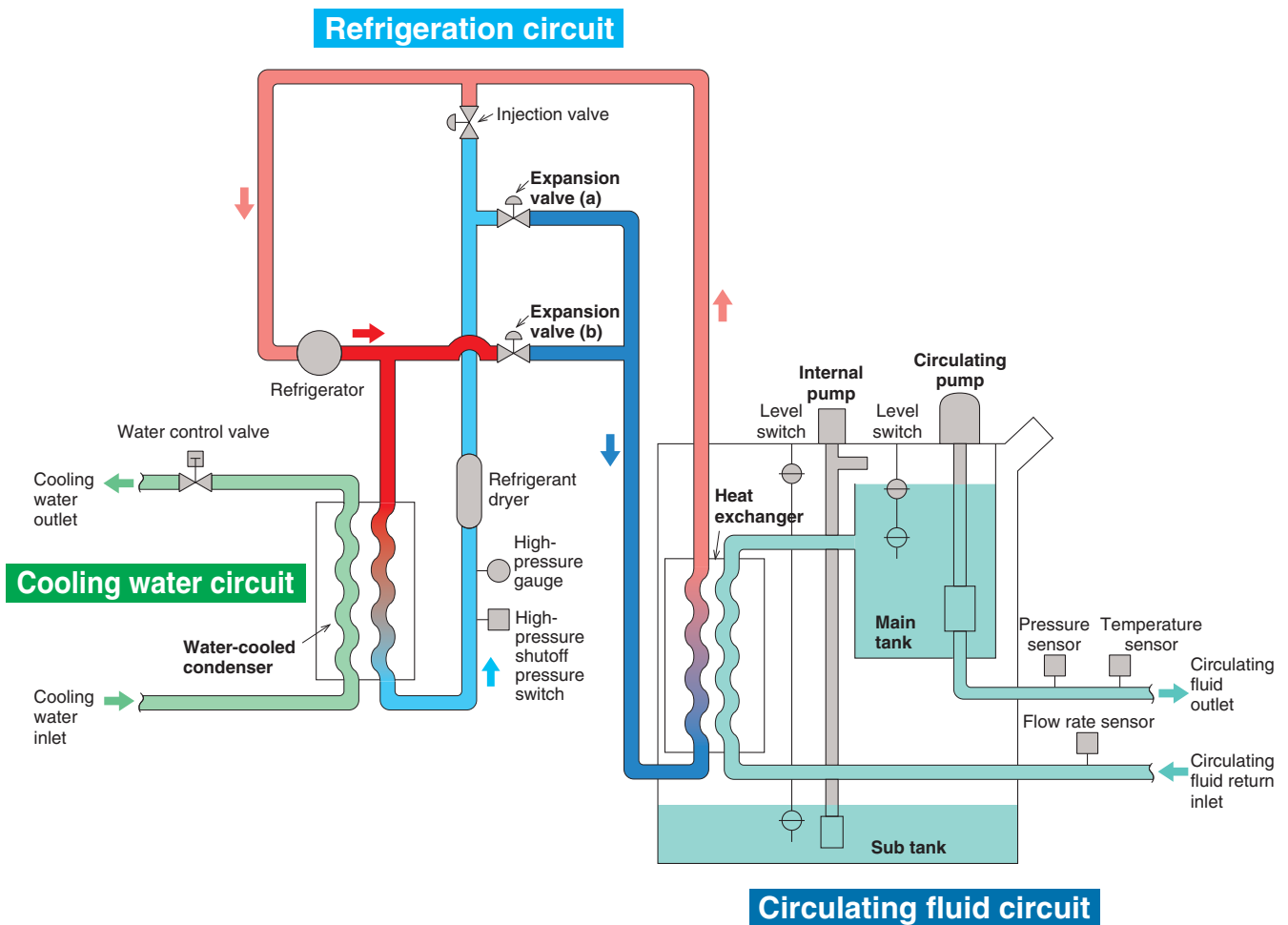
Example: Injection molding



- Plastic molding
- Rubber molding
- Wire cable coating machine
- Injection molding, etc.

Temperature-controlling the mold results in improved product quality.

Construction and Principles



Circulating fluid circuit

With the **circulating pump**, the circulating fluid is discharged to the customer's equipment side. After the circulating fluid heats or cools the customer's equipment side, it returns to the **main tank** via the **heat exchanger**.

A **sub tank** is not used under normal operation. It is used when a circulating fluid is recovered from the customer's equipment side.

The **internal pump** is used to transfer the circulating fluid from the **sub tank** to the **main tank**. (Refer to "Circulating fluid automatic recovery" function on page 2.)

Refrigeration circuit

When the circulating fluid temperature is rising higher than the set temperature, open the **expansion valve (a)** to introduce Freon gas at a lower temperature to the **heat exchanger**. With this, the circulating fluid will be cooled down.

Oppositely, when the circulating fluid is getting lower than the set temperature, open the **expansion valve (b)** and introduce Freon gas at a high temperature without going through the **water-cooled condenser** to the **heat exchanger**. With this heat, the circulating fluid will be heated.

Series HRZ Model Selection

Guide to the Model Selection

1. What is the temperature (in degrees centigrades) of the circulating fluid?

Temperature range that can be set with the thermo-chiller

L : -20°C to 40°C (“L2” (clean water, pure water spec.) can be set from 10°C to 40°C.)

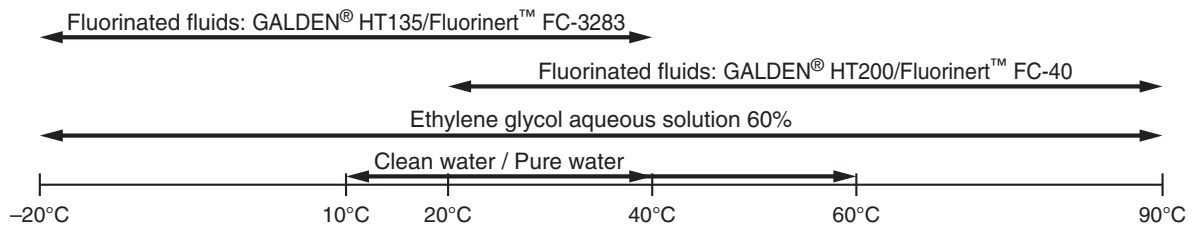
H : 20°C to 90°C

W: -20°C to 90°C (Select “W” only when the temperature ranges “L” or “H” are not applicable. HRZ010-W2S (clean water, pure water spec.) can be set from 10°C to 60°C.

Example) Requirement from the customer: 50°C (→ Temperature range from 20°C to 90°C, “H” type will be appropriate.)

2. What kind of the circulating fluids can be used?

Relationship between the circulating fluid (which can be used with the thermo-chiller) and the temperature



Example) Requirement from the customer: Fluorinated fluids

Based on the results 1. and 2., Cooling capacity relating “Fluorinated fluids” and “Temperature range 20°C to 90°C” is shown on page 12.

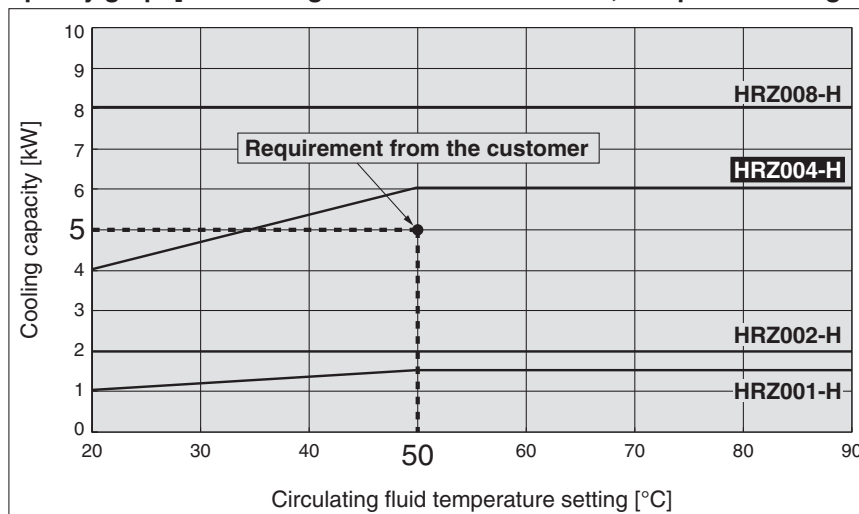
3. What is the kW for the required cooling capacity?

* Calculate the cooling capacity by referring to the following pages.

Example) Requirement from the customer: 5 kW →

Plot the point of intersection between the operating temperature (50°C) and the cooling capacity (5 kW) in the cooling capacity graph.

[Cooling capacity graph] Circulating fluid: Fluorinated fluids, Temperature range: 20 to 90°C



The point plotted in the graph is the requirement from your customer. Select the thermo-chiller models exceeding this point. In this case, select the **HRZ004-H**.

Fluorinert™ is a trademark of 3M. GALDEN® is a registered trademark of Solvay Solexis, Inc.

Calculation of the Required Cooling Capacity

Example 1: In case the amount of heat generated in a customer's equipment is known.

Heat generation source Q: 3.5 kW

Cooling capacity = Considering a safety factor of 20%, $3.5 \times 1.2 = 4.2 \text{ kW}$

Example 2: In case the amount of heat generated in a customer's equipment is unknown.

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

Heat generation amount Q : Unknown
 Circulating fluid temperature difference $\Delta T (= T2 - T1)$: 6.0°C (279.15 K)
 Circulating fluid outlet temperature T1 : 20°C (293.15 K)
 Circulating fluid return temperature T2 : 26°C (299.15 K)
 Circulating fluid flow rate L : 20 L/min
 Circulating fluid : Fluorinated fluid
 Density γ : $1.80 \times 10^3 \text{ kg/m}^3$
 Specific heat C: $0.96 \times 10^3 \text{ J/(kg}\cdot\text{K)}$ (at 20°C)

* Refer to the information shown on page 10 highlighting the representative physical property values for each circulating fluid.

$$Q = \frac{\Delta T \times L \times \gamma \times C}{60 \times 1000}$$

$$= \frac{6.0 \times 20 \times 1.80 \times 10^3 \times 0.96 \times 10^3}{60 \times 1000}$$

$$= 3456 \text{ W} = 3.5 \text{ kW}$$

Cooling capacity = Considering a safety factor of 20%,
 $3.5 \times 1.2 = 4.2 \text{ kW}$

Example of the conventional measurement units (Reference)

Unknown
 6.0°C
 20°C
 26°C
 1.2 m³/h
 Fluorinated fluid
 Density γ : $1.80 \times 10^3 \text{ kg/m}^3$
 Specific heat C: 0.23 kcal/kg·°C (at 20°C)

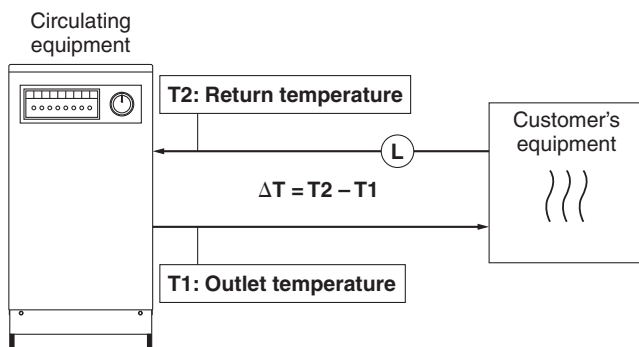
* Refer to the information shown on page 10 highlighting the representative physical property values for each circulating fluid.

$$Q = \frac{\Delta T \times L \times \gamma \times C}{860}$$

$$= \frac{6.0 \times 1.2 \times 1.80 \times 10^3 \times 0.23}{860}$$

$$= 3.5 \text{ kW}$$

Cooling capacity = Considering a safety factor of 20%,
 $3.5 \times 1.2 = 4.2 \text{ kW}$



Model Selection

Calculation of the Required Cooling Capacity

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

Total volume of the object being cooled down V : 60 L
 Cooling time h : 15 min
 Cooling temperature difference ΔT : $\begin{cases} 20^\circ\text{C} (293.15 \text{ K}) \\ (40^\circ\text{C} - 20^\circ\text{C} \rightarrow 20^\circ\text{C}) \end{cases}$
 Circulating fluid : Fluorinated fluid
 Density γ : $1.80 \times 10^3 \text{ kg/m}^3$
 Specific heat C: $0.96 \times 10^3 \text{ J/(kg}\cdot\text{K)}$ (at 20°C)

* Refer to the information shown on page 10 highlighting the representative physical property values for each circulating fluid.

$$Q = \frac{\Delta T \times V \times \gamma \times C}{h \times 60 \times 1000}$$

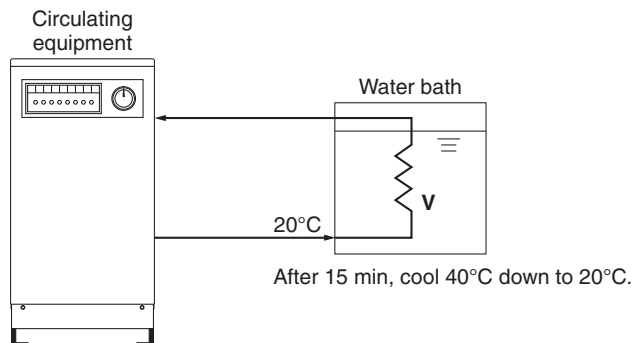
$$= \frac{20 \times 60 \times 1.8 \times 10^3 \times 0.96 \times 10^3}{15 \times 60 \times 1000}$$

$$= 2304 \text{ W} = 2.3 \text{ kW}$$

Cooling capacity = Considering a safety factor of 20%,

$$2.3 \times 1.2 = \mathbf{2.8 \text{ kW (When the circulating fluid temperature is } 20^\circ\text{C.)}}$$

(In this case, selected thermo-chiller model will be either HRZ002-L or HRZ004-H.)



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

Precautions on the Model Selection

1. Heating capacity

When setting the circulating fluid temperature at a higher value than room temperature, the circulating fluid will be heated by the thermo-chiller. Heating capacity varies depending on the HRZ series model. Also, the heating capacity varies depending on the circulating fluid temperature. Consider the heat radiation amount or thermal capacity of the customer's equipment. Confirm beforehand if the required heating capacity is provided, basing on the heating capacity graph for the each model.

2. Pump capacity

<Circulating fluid flow>

The pump capacity varies depending on the model selected from the HRZ series. Also, circulating fluid flow varies depending on the circulating fluid discharge pressure. Consider the installation height difference between our thermo-chiller and the customer's equipment, and the piping resistance, piping size, or piping curves in the equipment. Confirm beforehand if the required flow is achieved using the pump capacity curves for each model.

<Circulating fluid discharge pressure>

The circulating fluid discharge pressure has the possibility to increase up to the maximum pressure in the pump capacity curves for each model. Confirm beforehand if the circulating fluid pipings or the circulating fluid circuit in the customer's equipment are fully durable against this pressure.

Example of the conventional measurement units (Reference)

0.06 m³
 0.25 h
 20°C
 Fluorinated fluid
 Density γ : $1.80 \times 10^3 \text{ kg/m}^3$
 Specific heat C: $0.23 \text{ kcal/kg}\cdot^\circ\text{C}$ (at 20°C)

* Refer to the information shown on page 10 highlighting the representative physical property values for each circulating fluid.

$$Q = \frac{\Delta T \times V \times \gamma \times C}{h \times 860}$$

$$= \frac{20 \times 0.06 \times 1.8 \times 10^3 \times 0.23}{0.25 \times 860}$$

$$= 2.3 \text{ kW}$$

Cooling capacity = Considering a safety factor of 20%,

$$2.3 \times 1.2 = \mathbf{2.8 \text{ kW (When the circulating fluid temperature is } 20^\circ\text{C.)}}$$

(In this case, the selected thermo-chiller model will be either HRZ002-L or HRZ004-H.)

* Shown below are the representative values.
For more details, please contact the circulating fluid manufacturers.

Circulating Fluids Representative Physical Property Values

Fluorinated Fluids

Physical property value Temperature	Density γ	Specific heat C	
	[kg/m ³] [g/L]	[J/(kg·K)]	([kcal/kg·°C])
-10°C	1.87 x 10 ³	0.87 x 10 ³	(0.21)
20°C	1.80 x 10 ³	0.96 x 10 ³	(0.23)
50°C	1.74 x 10 ³	1.05 x 10 ³	(0.25)
80°C	1.67 x 10 ³	1.14 x 10 ³	(0.27)

Ethylene Glycol Aqueous Solution 60%

Physical property value Temperature	Density γ	Specific heat C	
	[kg/m ³] [g/L]	[J/(kg·K)]	([kcal/kg·°C])
-10°C	1.10 x 10 ³	3.02 x 10 ³	(0.72)
20°C	1.08 x 10 ³	3.15 x 10 ³	(0.75)
50°C	1.06 x 10 ³	3.27 x 10 ³	(0.78)
80°C	1.04 x 10 ³	3.40 x 10 ³	(0.81)

Water

Density γ : 1 x 10³ [kg/m³] [g/L]

Specific heat C: 4.2 x 10³ [J/(kg·K)] (1.0 [kcal/kg·°C])

Thermo-chiller **Fluorinated Fluid Type**

Series **HRZ**



SEMI

How to Order

Fluorinated Fluid Type HRZ **001** - **L** - **□**

Cooling capacity

Symbol	Cooling capacity
001	1 kW
002	2 kW
004	4 kW
008	8 kW

Option (Refer to page 27 and 28.)

Symbol	Option
—	None
C	Analogue communication
D	DeviceNet™ communication
Z	Circulating fluid automatic recovery
N	NPT fitting

Temperature range setting

Symbol	Temperature range setting	1 kW	2 kW	4 kW	8 kW
L	-20 to 40°C	●	●	●	●
H	20 to 90°C	●	●	●	●
W	-20 to 90°C	—	●	—	●

Specifications (For details, please consult our "Product Specifications" information.)

Model	HRZ001-L	HRZ002-L	HRZ004-L	HRZ008-L	HRZ001-H	HRZ002-H	HRZ004-H	HRZ008-H	HRZ002-W	HRZ008-W	
Cooling method	Water-cooled refrigerator type										
Refrigerant	R404A (HFC)										
Control system	PID control										
Ambient temp./humidity ^{Note 1)}	Temperature: 10 to 35°C, Humidity: 30 to 70%RH										
Circulating fluid system	Circulating fluid ^{Note 2)}	Fluorinert™ FC-3283/GALDEN® HT135				Fluorinert™ FC-40/GALDEN® HT200				<ul style="list-style-type: none"> -20 to 40°C: Fluorinert™ FC-3283/GALDEN® HT135 20 to 90°C: Fluorinert™ FC-40/GALDEN® HT200 	
	Temp. range setting ^{Note 1)} [°C]	-20 to 40				20 to 90				-20 to 90	
	Cooling capacity ^{Note 3)} [kW]	1.0 (at -10°C)	2.0 (at -10°C)	4.0 (at -10°C)	8.0 (at -10°C)	1.0 (at 20°C)	2.0 (at 20°C)	4.0 (at 20°C)	8.0 (at 20°C)	2.0 (at 20°C)	8.0 (at 20°C)
	Heating capacity ^{Note 3)} [kW]	2.8 (at -10°C)	3.2 (at -10°C)	3.6 (at -10°C)	5.9 (at -10°C)	2.3 (at 20°C)	2.6 (at 20°C)	2.8 (at 20°C)	3.0 (at 20°C)	2.3 (at 20°C)	3.3 (at 20°C)
	Temp. stability ^{Note 4)} [°C]	±0.1									
	Pump capacity ^{Note 5)} (50/60 Hz) [MPa]	0.45/0.65 (at 20 L/min)			0.65/0.95 (at 30 L/min)	0.40/0.60 (at 20 L/min)		0.45/0.65 (at 20 L/min)			
	Rated flow ^{Note 6)} [L/min]	20			30	20					
	Main tank capacity ^{Note 7)} [L]	Approx. 15			Approx. 22	Approx. 12		Approx. 15			
	Sub-tank capacity ^{Note 8)} [L]	Approx. 16			Approx. 17	Approx. 15		Approx. 16			
	Port size	Rc 3/4									
Wetted parts material	Stainless steel, EPDM, Copper brazing (Heat exchanger), PPS, Silicon, Fluororesin										
Cooling water system	Temperature range [°C]	10 to 25									
	Pressure range [MPa]	0.3 to 0.7									
	Required flow rate ^{Note 9)} (50/60 Hz) [L/min]	5/5	6/6	15/22	18/23	3/4	5/6	9/10	13/14	6/7	13/14
	Port size	Rc 1/2									
Wetted parts material	Stainless steel, EPDM, Copper brazing (Heat exchanger), Silicon, Brass										
Electrical system	Power supply	3-phase 200 VAC 50 Hz, 3-phase 200 to 208 VAC 60 Hz Allowable voltage fluctuation ±10%									
	Breaker capacity [A]	30			60	20		30			
	Rated current [A]	20		25	46	14		23			
	Alarm	Refer to page 24.									
	Communications	Contact input/output (D-sub connector, 25-pin) and Serial RS-485 (D-sub connector, 9-pin) (Refer to page 22, 23.)									
Weight ^{Note 10)} [kg]	170		175	275	145		170				
Safety standards	UL, CE marking, SEMI (S2-0703, S8-0701, F47-0200), SEMATECH (S2-93, S8-95)										

Note 1) It should have no condensation.

Note 2) Fluorinert™ is a trademark of 3M and GALDEN® is a registered trademark of Solvay Solexis, Inc. Regarding a fluid other than the above, please contact us.

Note 3) (1) Cooling water temperature: 25°C, (2) Circulating fluid flow rate: Values at a circulating fluid rated flow rate. Values common for 50/60 Hz.

Note 4) The indicated values are for a stable load without turbulence in the operating conditions. It may be out of this range in some other operating conditions.

Note 5) Circulating fluid temperature: The capacity of the outlet of a thermo-chiller at 20°C.

Note 6) Required flow for a cooling capacity or maintaining the temperature stability. When used below the rated flow, use the individually sold, "By-pass piping set" (Refer to page 26).

Note 7) Minimum volume required for operating only the thermo-chiller. (Circulating fluid temperature: 20°C, including the thermo-chiller's internal pipings or the heat exchanger)

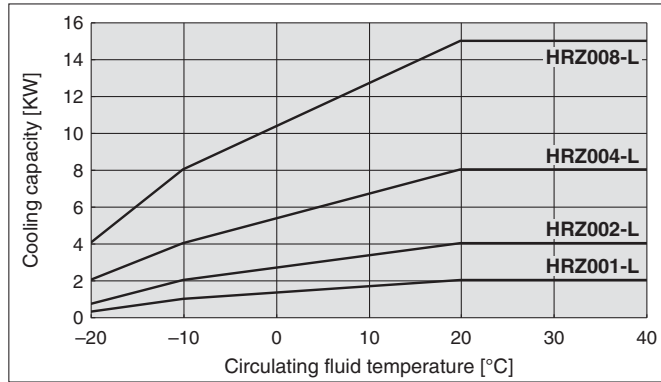
Note 8) Preliminary space volume without the main tank capacity. Available for collecting the circulating fluid inside an external piping or for preliminary injection.

Note 9) Cooling water temperature: 25°C, Required flow when a load is applied as shown in the cooling capacity.

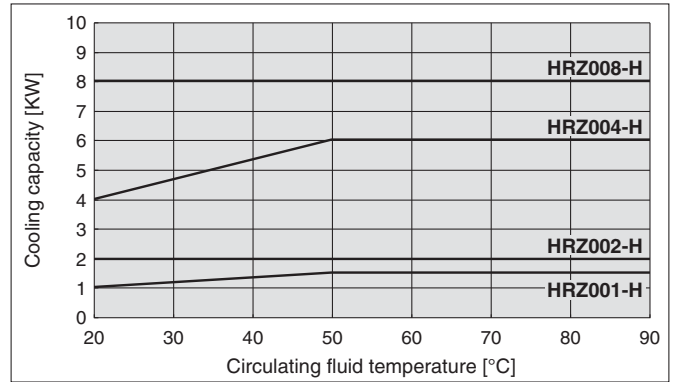
Note 10) Weight in the dry state, without circulating fluids.

Cooling Capacity

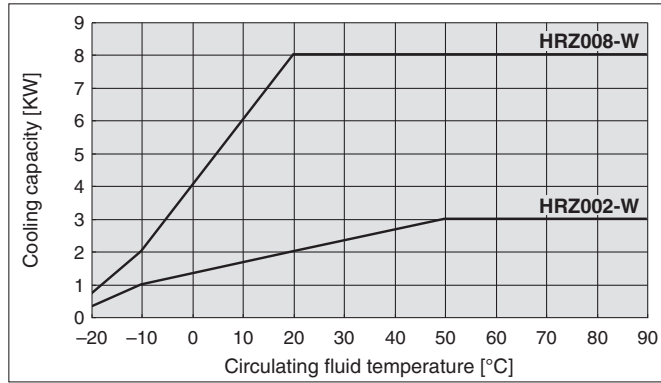
HRZ001-L/002-L/004-L/008-L



HRZ001-H/002-H/004-H/008-H

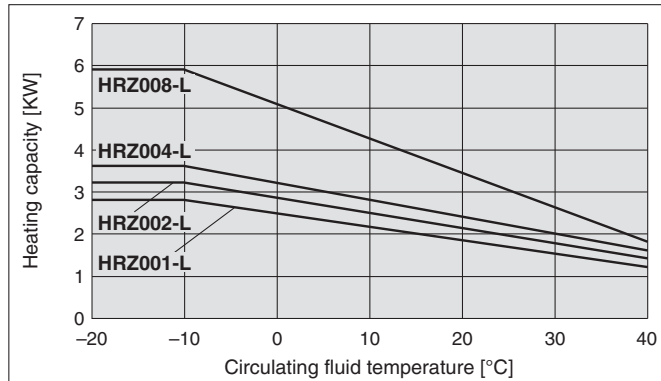


HRZ002-W/008-W

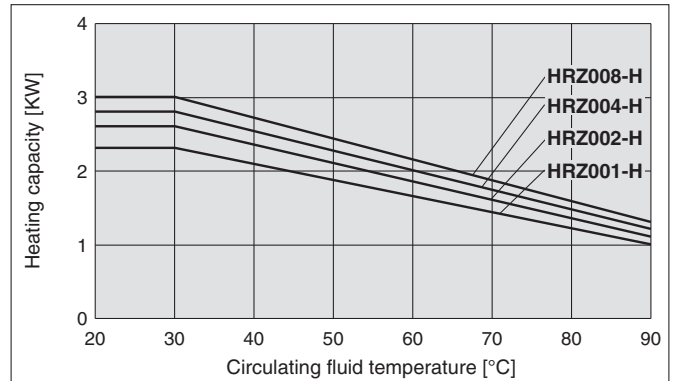


Heating Capacity

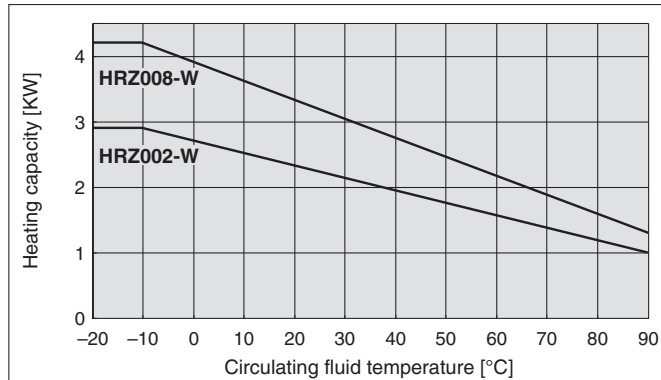
HRZ001-L/002-L/004-L/008-L



HRZ001-H/002-H/004-H/008-H



HRZ002-W/008-W



Fluorinated Fluid Type

Ethylene Glycol Type

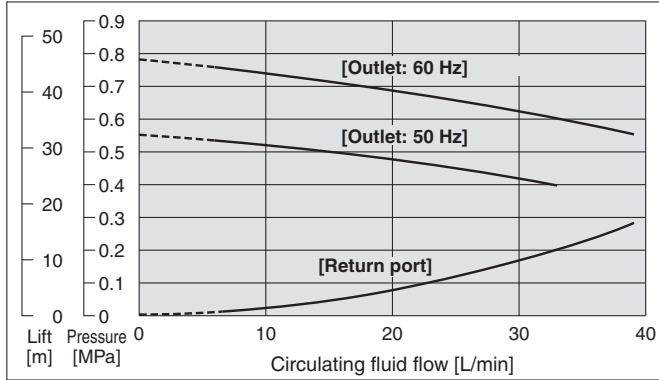
Clean/Deionised Water Type

Double Inverter Type

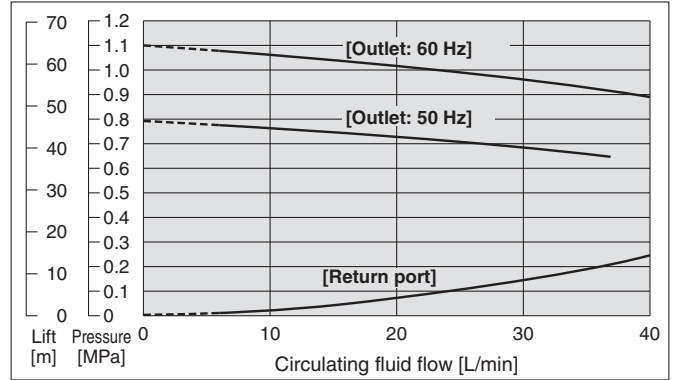
Series HRZ

Pump Capacity (Thermo-chiller outlet)

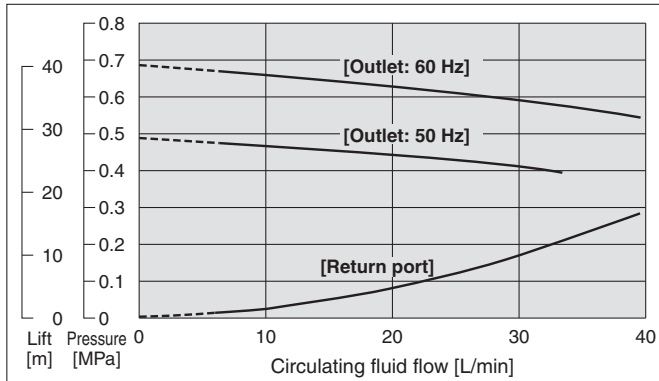
HRZ001-L/002-L/004-L



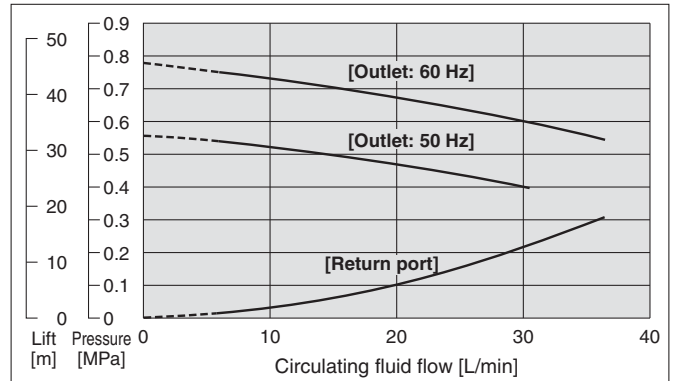
HRZ008-L



HRZ001-H/002-H



HRZ004-H/008-H HRZ002-W/008-W



* When the circulating fluid flow is below 6 L /min, the built-in operation stop alarm will be activated.
It is not possible to run the equipment. (common for all models)

Thermo-chiller **Ethylene Glycol Type**

Series **HRZ**



SEMI

How to Order

Ethylene Glycol Type

HRZ 001 - L 1 -

Cooling capacity

Symbol	Cooling capacity
001	1 kW
002	2 kW
004	4 kW
008	8 kW

Temperature range setting

Symbol	Temperature range setting	1 kW	2 kW	4 kW	8 kW
L	-20 to 40°C	●	●	●	●
H	20 to 90°C	●	●	●	●
W	-20 to 90°C	—	●	—	●

Option (Refer to page 27 and 28.)

—	None
C	Analogue communication
D	DeviceNet™ communication
Y	DI control kit
Z	Circulating fluid automatic recovery
N	NPT fitting

Ethylene glycol type

Specifications (For details, please consult our "Product Specifications" information.)

Model	HRZ001-L1	HRZ002-L1	HRZ004-L1	HRZ008-L1	HRZ001-H1	HRZ002-H1	HRZ004-H1	HRZ008-H1	HRZ002-W1	HRZ008-W1
Cooling method	Water-cooled refrigerator type									
Refrigerant	R404A (HFC)									
Control system	PID control									
Ambient temp./humidity ^{Note 1)}	Temperature: 10 to 35°C, Humidity: 30 to 70%RH									
Circulating fluid ^{Note 2)}	Ethylene glycol aqueous solution: 60%									
Temp. range setting ^{Note 1) [°C]}	-20 to 40				20 to 90				-20 to 90	
Cooling capacity ^{Note 3) [kW]}	1.0 (at -10°C)	2.0 (at -10°C)	4.0 (at -10°C)	8.0 (at -10°C)	1.0 (at 20°C)	2.0 (at 20°C)	4.0 (at 20°C)	8.0 (at 20°C)	2.0 (at 20°C)	8.0 (at 20°C)
Heating capacity ^{Note 3) [kW]}	2.5 (at -10°C)	2.9 (at -10°C)	3.4 (at -10°C)	6.1 (at -10°C)	1.8 (at 20°C)	2.1 (at 20°C)	2.5 (at 20°C)	3.0 (at 20°C)	2.2 (at 20°C)	3.3 (at 20°C)
Temp. stability ^{Note 4) [°C]}	±0.1									
Pump capacity ^{Note 5) (50/60 Hz) [MPa]}	0.25/0.40 (at 20 L/min)				0.25/0.35 (at 20 L/min)			0.25/0.40 (at 20 L/min)		
Rated flow ^{Note 6) [L/min]}	20									
Main tank capacity ^{Note 7) [L]}	Approx. 15			Approx. 22		Approx. 12			Approx. 15	
Sub-tank capacity ^{Note 8) [L]}	Approx. 16			Approx. 17		Approx. 15			Approx. 16	
Port size	Rc 3/4									
Wetted parts material	Stainless steel, EPDM, Copper brazing (Heat exchanger), PPS, Silicon, Fluororesin									
Temperature range [°C]	10 to 25									
Pressure range [MPa]	0.3 to 0.7									
Required flow rate ^{Note 9) (50/60 Hz) [L/min]}	5/5	6/6	15/22	18/23	3/4	5/6	9/10	13/14	5/7	13/14
Port size	Rc 1/2									
Wetted parts material	Stainless steel, EPDM, Copper brazing (Heat exchanger), Silicon, Brass									
Power supply	3-phase 200 VAC 50 Hz, 3-phase 200 to 208 VAC 60 Hz Allowable voltage fluctuation ±10%									
Breaker capacity [A]	30			60		20			30	
Rated current [A]	19		26		46		14			23
Alarm	Refer to page 24.									
Communications	Contact input/output (D-sub connector, 25-pin) and Serial RS-485 (D-sub connector, 9-pin) (Refer to page 22, 23.)									
Weight ^{Note 10) [kg]}	170		175		275		145			170
Safety standards	UL, CE marking, SEMI (S2-0703, S8-0701, F47-0200), SEMATECH (S2-93, S8-95)									

Note 1) It should have no condensation.

Note 2) Dilute pure ethylene glycol in clean water. Additives such as antiseptics cannot be used.

Note 3) (1) Cooling water temperature: 25°C, (2) Circulating fluid flow rate: Values at a circulating fluid rated flow rate. Values common for 50/60 Hz.

Note 4) The indicated values are for a stable load without turbulence in the operating conditions. It may be out of this range when a DI control kit (Option symbol: Y) is used or in some other operating conditions.

Note 5) Circulating fluid temperature: The capacity of the outlet of a thermo-chiller at 20°C.

Note 6) Required flow for a cooling capacity or maintaining the temperature stability. When used below the rated flow, use the individually sold, "By-pass piping set" (Refer to page 26).

Note 7) Minimum volume required for operating only the thermo-chiller. (Circulating fluid temperature: 20°C, including the thermo-chiller's internal pipings or heat exchanger)

Note 8) Preliminary space volume without the main tank capacity. Available for collecting the circulating fluid inside an external piping or for preliminary injection.

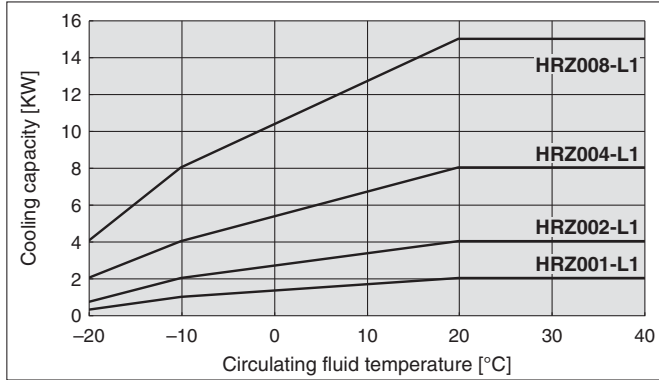
Note 9) Cooling water temperature: 25°C, Required flow when a load is applied as shown in the cooling capacity.

Note 10) Weight in the dry state, without circulating fluids.

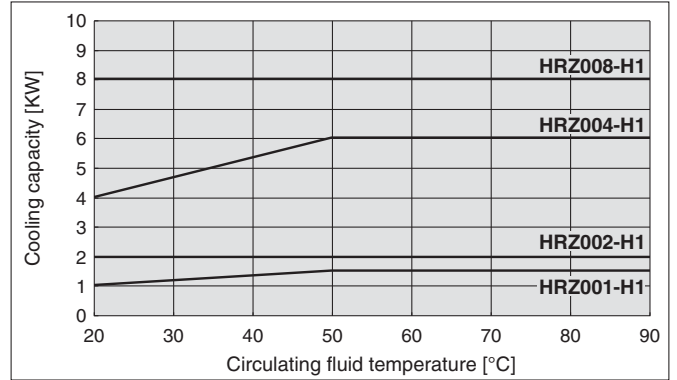
Series HRZ

Cooling Capacity

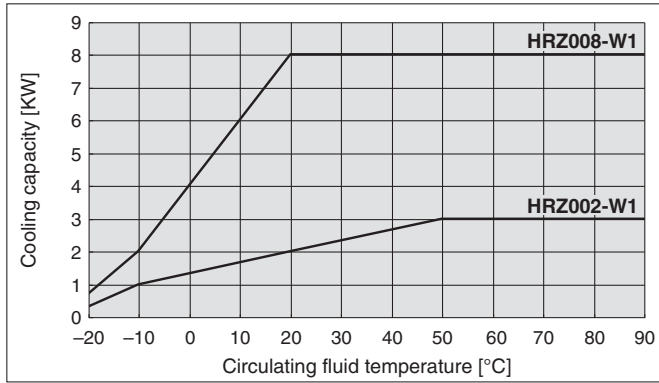
HRZ001-L1/002-L1/004-L1/008-L1



HRZ001-H1/002-H1/004-H1/008-H1

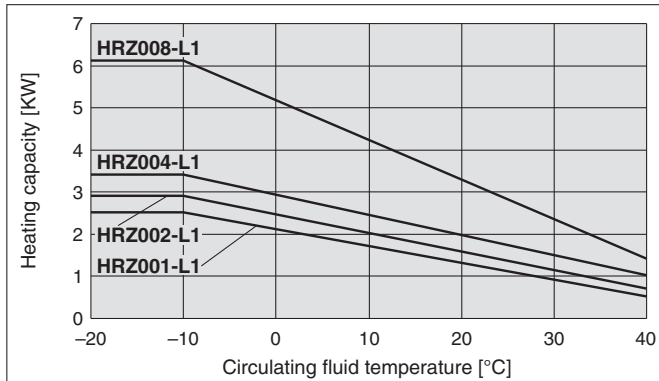


HRZ002-W1/008-W1

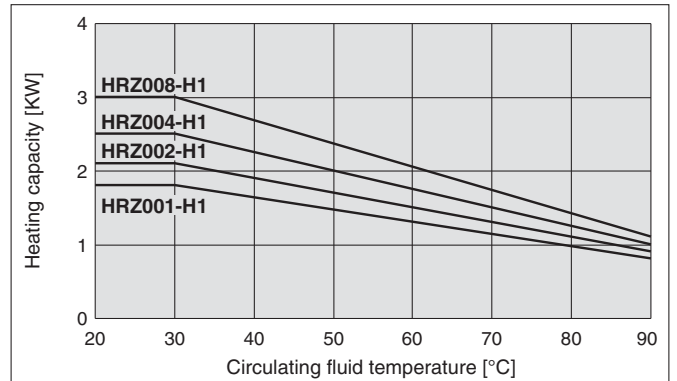


Heating Capacity

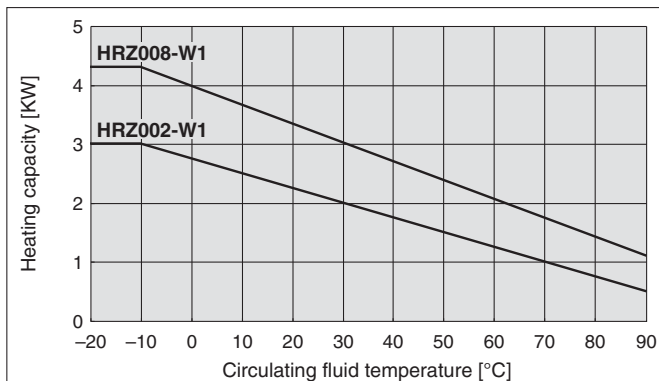
HRZ001-L1/002-L1/004-L1/008-L1



HRZ001-H1/002-H1/004-H1/008-H1



HRZ002-W1/008-W1

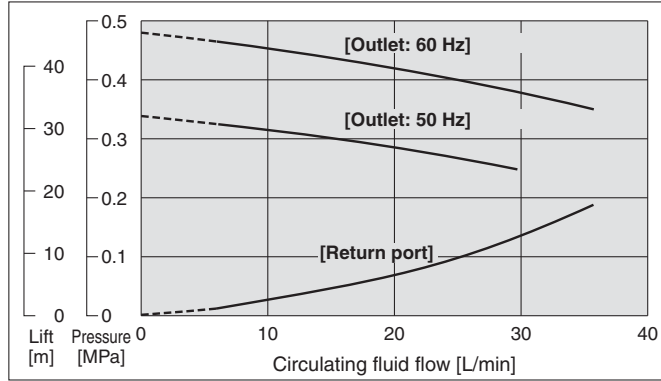


Pump Capacity (Thermo-chiller outlet)

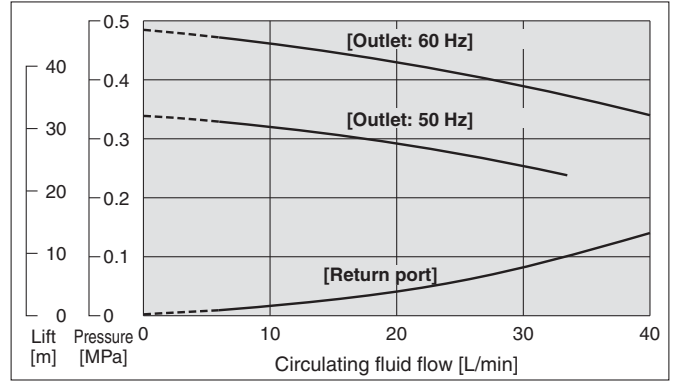
HRZ001-L1/002-L1/004-L1

HRZ004-H1/008-H1

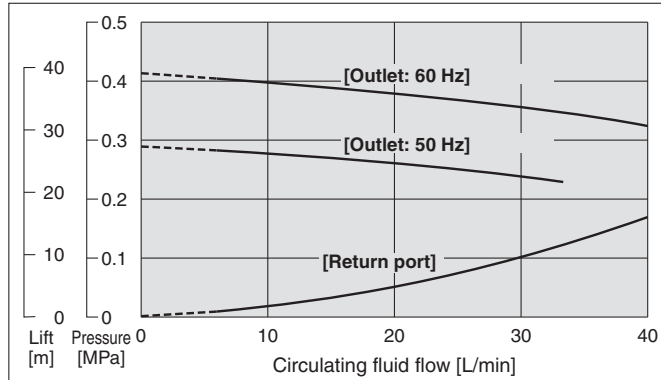
HRZ002-W1/008-W1



HRZ008-L1



HRZ001-H1/002-H1



* When the circulating fluid flow is below 6 L /min, the built-in operation stop alarm will be activated. It is not possible to run the equipment. (common for all models)

Fluorinated Fluid Type

Ethylene Glycol Type

Clean/Deionised Water Type

Double Inverter Type

Thermo-chiller Clean/Deionised Water Type

Series HRZ



SEMI

How to Order

Clean/Deionised Water Type

HRZ 001 - L 2 - []

Cooling capacity

Symbol	Cooling capacity
001	1 kW
002	2 kW
004	4 kW
008	8 kW

Option (Refer to pages 27 and 28.)

—	None
C	Analogue communication
D	DeviceNet™ communication
N	NPT fitting
Y	DI control kit
Z	Circulating fluid automatic recovery

Temperature range setting

Symbol	Temperature range setting	1 kW	2 kW	4 kW	8 kW
L	10 to 40°C	●	●	●	●

Clean/Deionised water type

Specifications (For details, please consult our "Product Specifications" information.)

Model	HRZ001-L2	HRZ002-L2	HRZ004-L2	HRZ008-L2	
Cooling method	Water-cooled refrigeration				
Refrigerant	R134a (HFC)				
Control system	PID control				
Ambient temperature/humidity ^{Note 1)}	Temperature: 10 to 35°C, Humidity: 30 to 70%RH				
Circulating fluid system	Circulating fluid ^{Note 2)}	Clear water, Deionized water			
	Temperature range setting ^{Note 1)} [°C]	10 to 40			
	Cooling capacity ^{Note 3)} [kW]	1.0 (at 20°C)	2.0 (at 20°C)	4.0 (at 20°C)	8.0 (at 20°C)
	Heating capacity ^{Note 3)} [kW]	0.90 (at 20°C)	0.98 (at 20°C)	1.15 (at 20°C)	1.25 (at 20°C)
	Temperature stability ^{Note 4)} [°C]	±0.1			
	Pump capacity ^{Note 5)} (50/60 Hz) [MPa]	0.25/0.38 (at 20 L/min)			
	Rated flow ^{Note 6)} [L/min]	20			
	Main tank capacity ^{Note 7)} [L]	Approx. 15			
	Sub-tank capacity ^{Note 8)} [L]	Approx. 16			
	Port size	Rc3/4			
Wetted parts material	Stainless steel, EPDM, Copper brazing (Heat exchanger), PPS, Silicone, Fluororesin				
Cooling water system	Temperature range [°C]	10 to 25			
	Pressure range [MPa]	0.3 to 0.7			
	Required flow rate ^{Note 9)} (50/60 Hz) [L/min]	5/5	6/6	15/22	18/23
	Port size	Rc1/2			
Wetted parts material	Stainless steel, EPDM, Copper brazing (Heat exchanger), Silicone, Brass				
Electrical system	Power supply	3-phase 200 VAC 50 Hz, 3-phase 200 to 208 VAC 60 Hz Allowable voltage fluctuation ±10%			
	Breaker capacity [A]	30			
	Rated current [A]	19			
	Alarm	Refer to page 24.			
	Communications	Contact input/output (D-sub 25 pin) and Serial RS-485 (D-sub 9 pin) (Refer to pages 22 and 23.)			
Weight ^{Note 10)} [kg]	170				
Safety standards	UL, CE marking, SEMI (S2-0703, S8-0701, F47-0200), SEMATECH (S2-93, S8-95)				

Note 1) It should have no condensation.

Note 2) If clean water or pure water is used, it should be in accordance with the Water Quality Standard of The Japan Refrigeration and Air Conditioning Industry Association (JRA GL-02-1994/cooling water system - circulation type - make-up water). The minimum electrical conductivity of the pure water used as the fluid should be 0.5 µs/cm (or the electrical resistivity 2 MΩ·cm at maximum).

Note 3) (1) Cooling water temperature: 25°C, (2) Circulating fluid flow rate: Values at a circulating fluid rated flow rate. Values common for 50/60 Hz.

Note 4) The indicated values are for a stable load without turbulence in the operating conditions. It may be out of this range when a DI control kit (Option symbol: Y) is used or in some other operating conditions.

Note 5) Circulating fluid temperature: The capacity of the outlet of a thermo-chiller at 20°C.

Note 6) Required flow for a cooling capacity or maintaining the temperature stability. When used below the rated flow, use the individually sold, "By-pass piping set" (Refer to page 26).

Note 7) Minimum volume required for operating only the thermo-chiller. (Circulating fluid temperature: 20°C, including the thermo-chiller's internal pipings or heat exchanger)

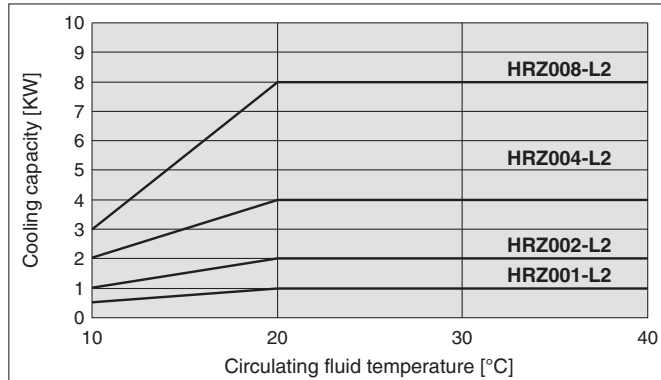
Note 8) Preliminary space volume without the main tank capacity. Available for collecting the circulating fluid inside an external piping or for preliminary injection.

Note 9) Cooling water temperature: 25°C, Required flow when a load is applied as shown in the cooling capacity.

Note 10) Weight in the dry state, without circulating fluids.

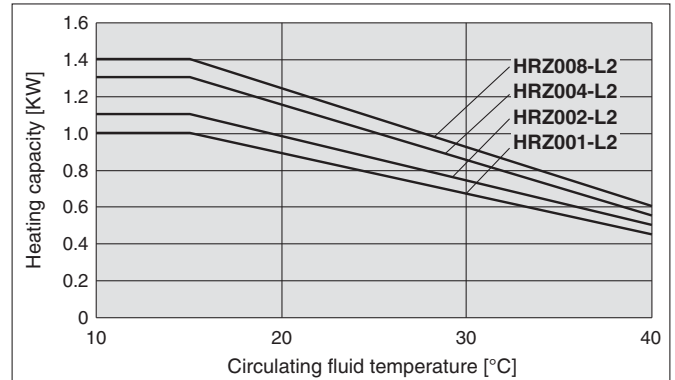
Cooling Capacity

HRZ001-L2/002-L2/004-L2/008-L2



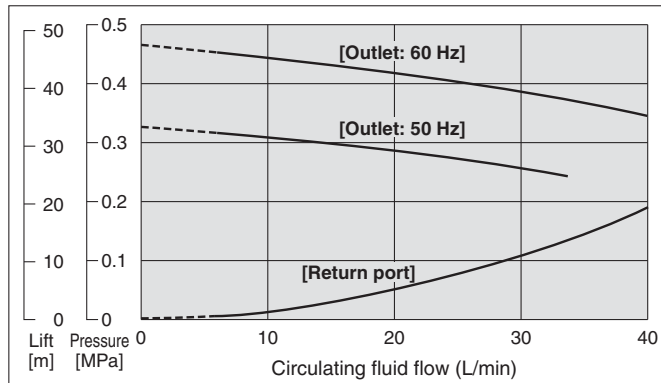
Heating Capacity

HRZ001-L2/002-L2/004-L2/008-L2



Pump Capacity (Thermo-chiller outlet)

HRZ001-L2/002-L2/004-L2/008-L2



* When the circulating fluid flow is below 6 L /min, the built-in operation stop alarm will be activated. It is not possible to run the equipment. (common for all models)

Fluorinated Fluid Type

Ethylene Glycol Type

Clean/Deionised Water Type

Double Inverter Type

Thermo-chiller Double Inverter Type

Series **HRZ**



SEMI

How to Order

Double Inverter Type HRZ **010** - W S -

Cooling capacity

Symbol	Cooling capacity
010	10 kW

Circulating fluid type

Symbol	Circulating fluid type	Temperature range setting
—	Fluorinated fluids	-20 to 90°C
1	Ethylene glycol aqueous solution	-20 to 90°C
2	Clean/Pure water	10 to 60°C

Option (Refer to page 27 and 28.)

—	None
C	Analogue communication
D	DeviceNet™ communication
N	NPT fitting
Y*	DI control kit
Z	Circulating fluid automatic recovery

* Not equipped to the fluorinated fluid type.

Specifications

Double inverter type

Model	HRZ010-WS	HRZ010-W1S	HRZ010-W2S	
Cooling method	Water-cooled refrigerator type			
Refrigerant	R404A (HFC)			
Control system	PID control			
Ambient temperature/humidity <small>Note 1)</small>	Temperature: 10 to 35°C, Humidity: 30 to 70%RH			
Circulating fluid system	Circulating fluid <small>Note 2)</small>	<ul style="list-style-type: none"> -20 to 40°C: Fluorinert™ FC-3283/GALDEN® HT135 20 to 90°C: Fluorinert™ FC-40/GALDEN® HT200 	Ethylene glycol aqueous solution: 60%	Clean water, Pure water
	Temperature range setting <small>Note 1)</small> [°C]	-20 to 90		
	Cooling capacity <small>Note 3)</small> [kW]	10 (at 20°C)	10 (at 20°C)	9 (at 20°C)
	Heating capacity <small>Note 3)</small> [kW]	5.0 (at 20°C)	4.5 (at 20°C)	2.5 (at 20°C)
	Temperature stability <small>Note 4)</small> [°C]	0.1 (In case the circulating fluid discharge port and the return port are directly connected)		
	Pump capacity <small>Note 5)</small> [MPa]	Max. 0.72 (at 20 L/min)	Max. 0.40 (at 20 L/min)	Max. 0.38 (at 20 L/min)
	Rated flow <small>Note 6)</small> [L/min]	20		
	Flow range <small>Note 7)</small> [L/min]	10 to 40 (With flow control function by inverter)		
	Main tank capacity <small>Note 8)</small> [L]	Approx. 15		
	Sub-tank capacity <small>Note 9)</small> [L]	Approx. 16		
Port size	Rc 3/4			
Wetted parts material	Stainless steel, EPDM, Copper brazing (Heat exchanger), PPS, Silicon, Fluororesin			
Cooling water system	Temperature range [°C]	10 to 30		10 to 25
	Pressure range [MPa]	0.3 to 0.7		
	Required flow rate <small>Note 10)</small> (50/60 Hz) [L/min]	15/15		
	Port size	Rc 1/2		
Wetted parts material	Stainless steel, EPDM, Copper brazing (Heat exchanger), PPS, Silicon, Brass			
Electrical system	Power supply	3-phase 200 VAC 50 Hz, 3-phase 200 to 208 VAC 60 Hz Allowable voltage fluctuation ±10%		
	Breaker capacity [A]	30		
	Rated current [A]	26	25	25
	Alarm	Refer to page 24.		
	Communications	Contact input/output (D-sub connector, 25-pin) and Serial RS-485 (D-sub connector, 25-pin) (Refer to page 22, 23.)		
Weight <small>Note 11)</small> [kg]	165			
Safety standards	UL, CE marking, SEMI (S2-0703, S8-0701, F47-0200), SEMATECH (S2-93, S8-95)			

Note 1) It should have no condensation.

Note 2) Fluorinert™ is a trademark of 3M and GALDEN® is a registered trademark of Solvay Solexis, Inc. Dilute pure ethylene glycol in clean water. Additives such as antiseptics cannot be used. If clean water or pure water is used, it should be in accordance with the Water Quality Standard of The Japan Refrigeration and Air Conditioning Industry Association (JRA GL-02-1994/cooling water system - circulation type - make-up water). The minimum electrical conductivity of the pure water used as the fluid should be 0.5 µs/cm (or the electrical resistivity 2 MΩ·cm at maximum).

Note 3) (1) Cooling water temperature: 25°C, (2) Circulating fluid flow rate: Values at a circulating fluid rated flow rate. Values common for 50/60 Hz.

Note 4) The indicated values are for a stable load without turbulence in the operating conditions. It may be out of this range when a DI control kit (Option symbol: Y) is used or in some other operating conditions.

Note 5) Circulating fluid temperature: The capacity of the outlet of a thermo-chiller at 20°C.

Note 6) Required flow for a cooling capacity or maintaining the temperature stability. When used below the rated flow, use the individually sold, "By-pass piping set" (Refer to page 26).

Note 7) May not be able to control with the set value depending on the piping specification in the customer side.

Note 8) Minimum volume required for operating only the thermo-chiller. (Circulating fluid temperature: 20°C, including the thermo-chiller's internal pipings or heat exchanger)

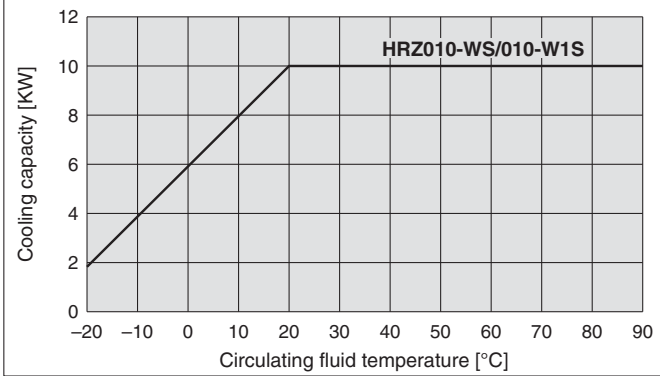
Note 9) Preliminary space volume without the main tank capacity. Available for collecting the circulating fluid inside an external piping or for preliminary injection.

Note 10) Cooling water temperature: 25°C, Required flow when a load is applied as shown in the cooling capacity.

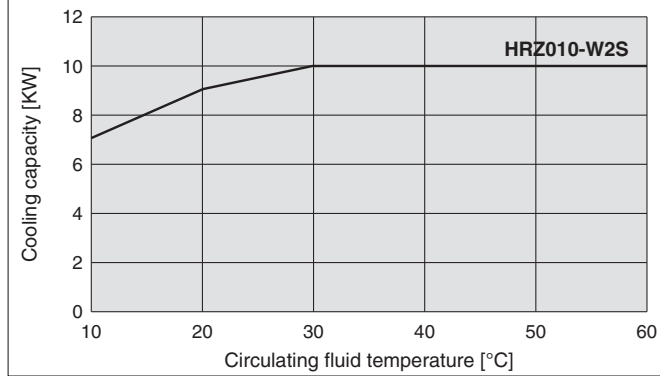
Note 11) Weight in the dry state, without circulating fluids.

Cooling Capacity

HRZ010-WS/010-W1S

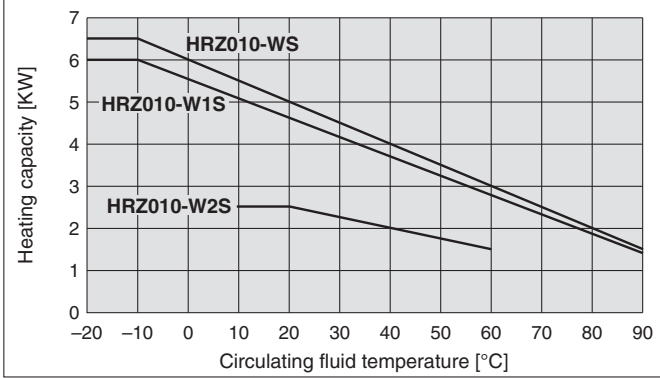


HRZ010-W2S



Heating Capacity

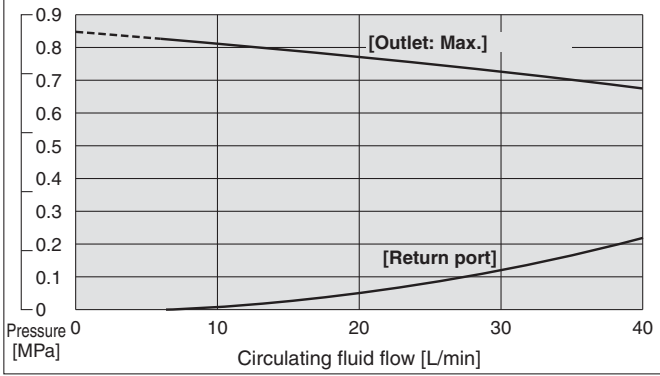
HRZ010-WS/010-W1S/010-W2S



* When pump inverter is operating at frequency of 60 Hz (maximum).

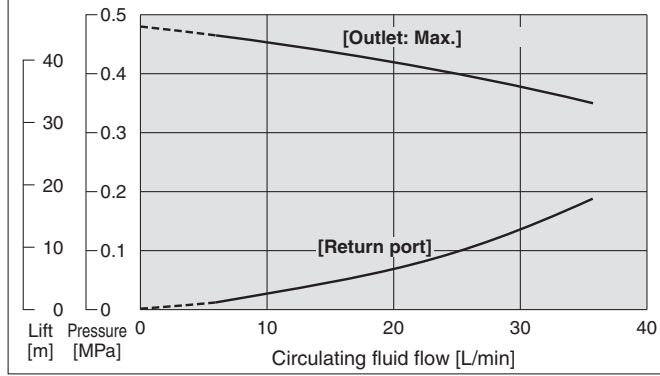
Pump Capacity (Thermo-chiller outlet)

HRZ010-WS

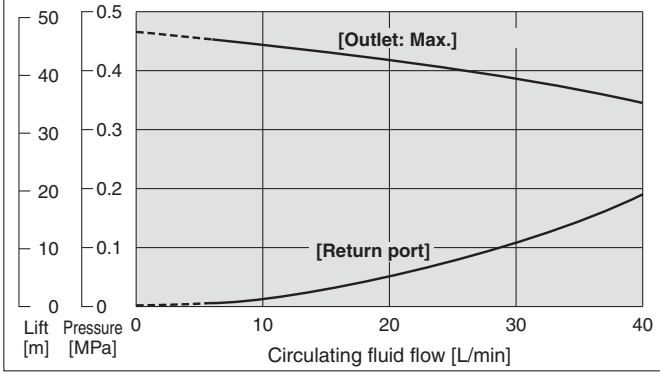


* The pump capacity of HRZ010-W1S is same as that of HRZ001-L1 group on page 16.
 * The pump capacity of HRZ010-W2S is same as on page 18.

HRZ010-W1S



HRZ010-W2S



* When the circulating fluid flow is below 6 L /min, the built-in operation stop alarm will be activated. It is not possible to run the equipment. (common for all models)
 * With flow control function by inverter

Fluorinated Fluid Type

Ethylene Glycol Type

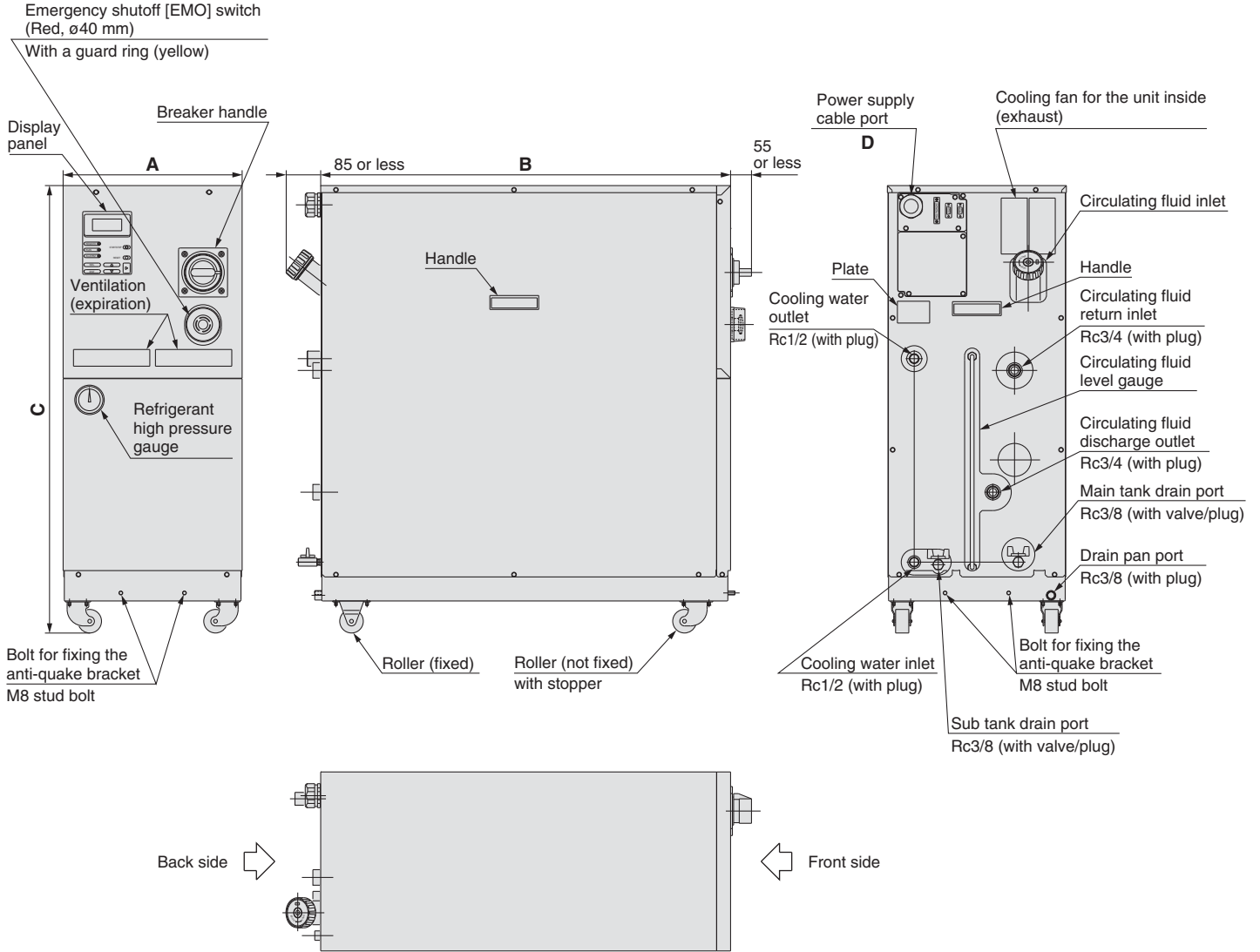
Clean/Deionised Water Type

Double Inverter Type

Series HRZ

Common Specifications

Dimensions

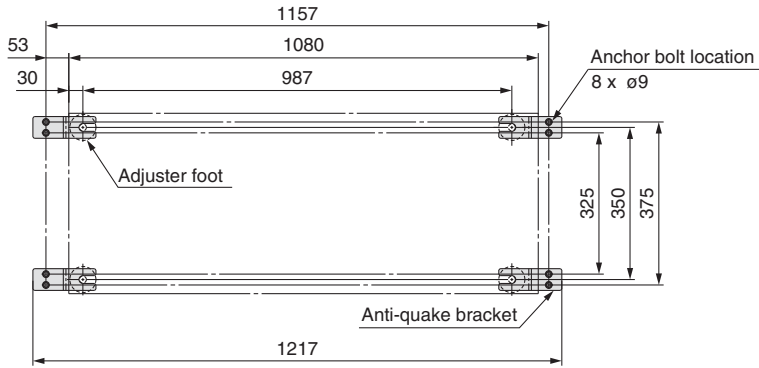
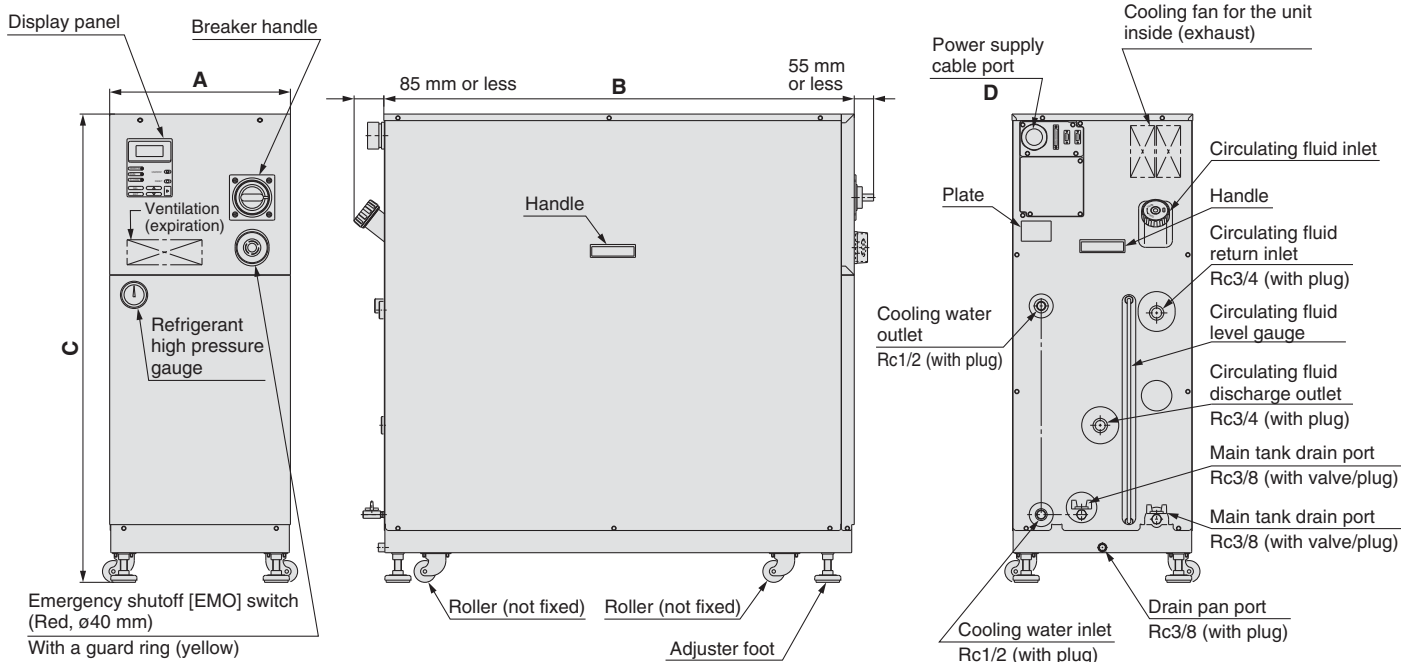


[mm]

Model			A	B	C	D
Fluorinated fluid type	Ethylene glycol type	Clean/Pure water type				
HRZ001-H HRZ002-H	HRZ001-H1 HRZ002-H1	—	380	870	860	$\phi 18.5$ to 20.5
HRZ001-L HRZ002-L, W HRZ004-L, H HRZ008-H, W HRZ010-WS	HRZ001-L1 HRZ002-L1, W1 HRZ004-L1, H1 HRZ008-H1, W1 HRZ010-W1S	HRZ001-L2 HRZ002-L2 HRZ004-L2 HRZ008-L2 HRZ010-W2S	380	870	950	$\phi 18.5$ to 20.5

(Dimensional tolerance of A, B and C: ± 10 mm)

Dimensions



Anti-quake bracket mounting position (Dimensional tolerance: 5 mm)

* Anchor bolts (M8, 8 pcs.) suitable for the customer's floor material.

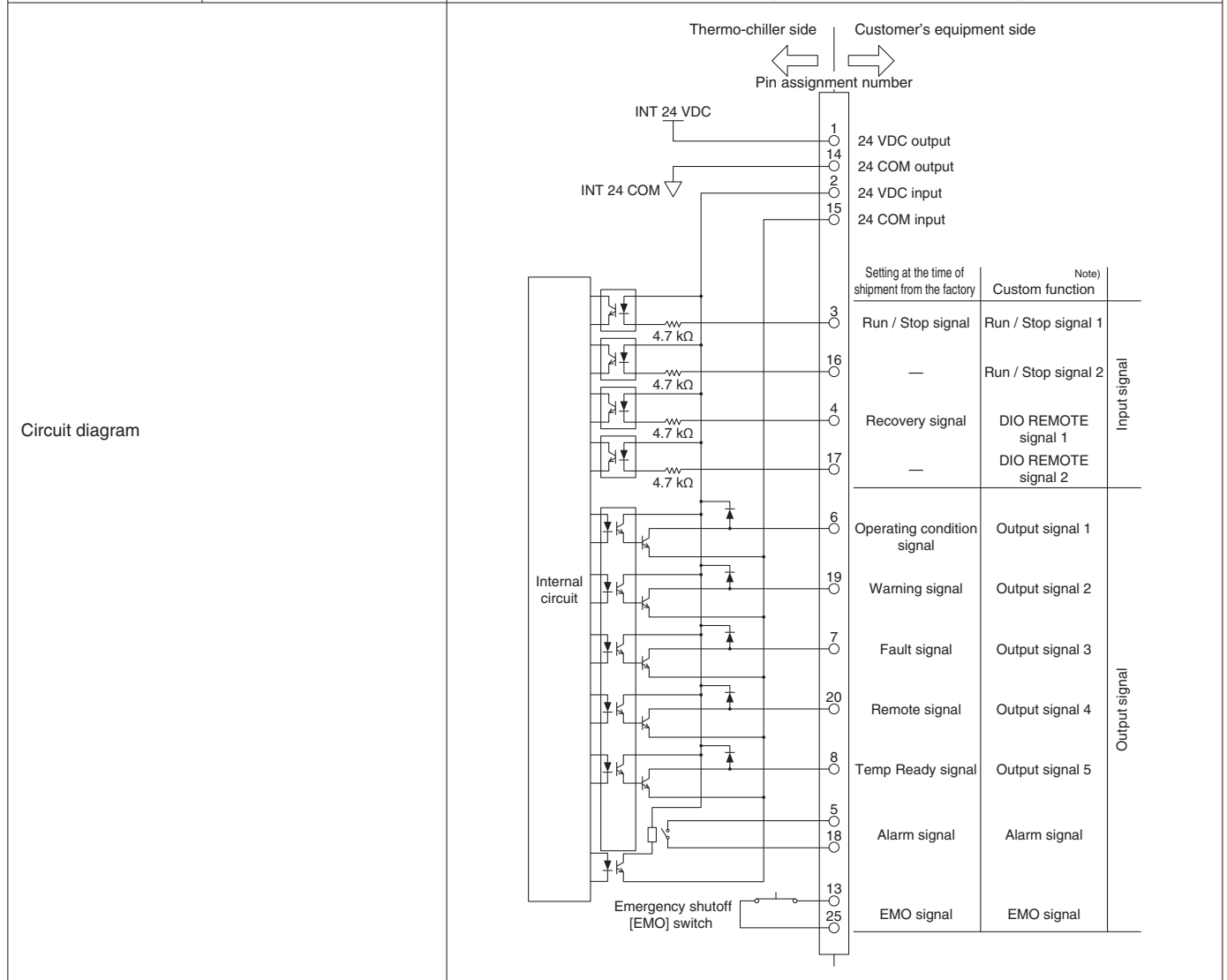
Model		A	B	C	D
Fluorinated fluid type	Ethylene glycol type				
HRZ008-L	HRZ008-L1	415	1080	1075	ø35.0 to 38.0

(Dimensional tolerance of A, B and C: ±10 mm)

Communications (For details, please consult our "Communication Specifications" information.)

Contact Input/Output

Item		Specifications
Connector no.		P1 (Refer to next page for connector location)
Connector type (on this product side)		D-sub 25P type, Female connector
Fixing bolt size		M2.6 x 0.45
Input signal	Insulation method	Photocoupler
	Rated input voltage	24 VDC
	Operating voltage range	21.6 VDC to 26.4 VDC
	Rated input current	5 mA TYP
	Input impedance	4.7 kΩ
Open collector output signal	Insulation method	Photocoupler
	Rated load voltage	24 VDC
	Operating load voltage range	21.6 VDC to 26.4 VDC
	Maximum load current	80 mA
	Leakage current	0.1 mA or less
	Surge protection	Diode
Contact output signal (Alarm signal)	Rated load voltage	48 VAC or less / 24 VDC or less
	Maximum load current	AC/DC 500 mA (resistance load)
Contact output signal (EMO signal)	Rated load voltage	48 VAC or less / 24 VDC or less
	Maximum load current	AC/DC 800 mA (resistance load / inductive load)



Note) The custom function is equipped for contact input/output. Using the custom function enables the customer to set the signal type for contact input/output or pin assignment numbers. For details, please consult "Communication Specifications" information.

Communications (For details, please consult our "Communication Specifications" information.)

Serial RS-485

The serial RS-485 enables the following items to be written and read out.

<Writing>

- Run / Stop
- Circulating fluid temperature setting
- Circulating fluid automatic recovery start / stop

<Readout>

- Circulating fluid current temperature
- Circulating fluid flow
- Circulating fluid discharge pressure
- Circulating fluid electric resistance ratio*2
- Alarm occurrence information
- Status (operating condition) information

*1 Only when the circulating fluid automatic recovery function (Option "Z") is selected.
 *2 Only when the DI control kit (Option "Y") is selected.

Item	Specifications
Connector no.	P2
Connector type (on this product side)	D-sub 9P type, Female connector
Fixing bolt size	M2.6 x 0.45
Standard	EIA RS485
Protocol	Modicon Modbus

Circuit diagram

Thermo-chiller side ←

→ Customer's equipment side

2 ○ SD+

7 ○ SD-

5 ○ SG

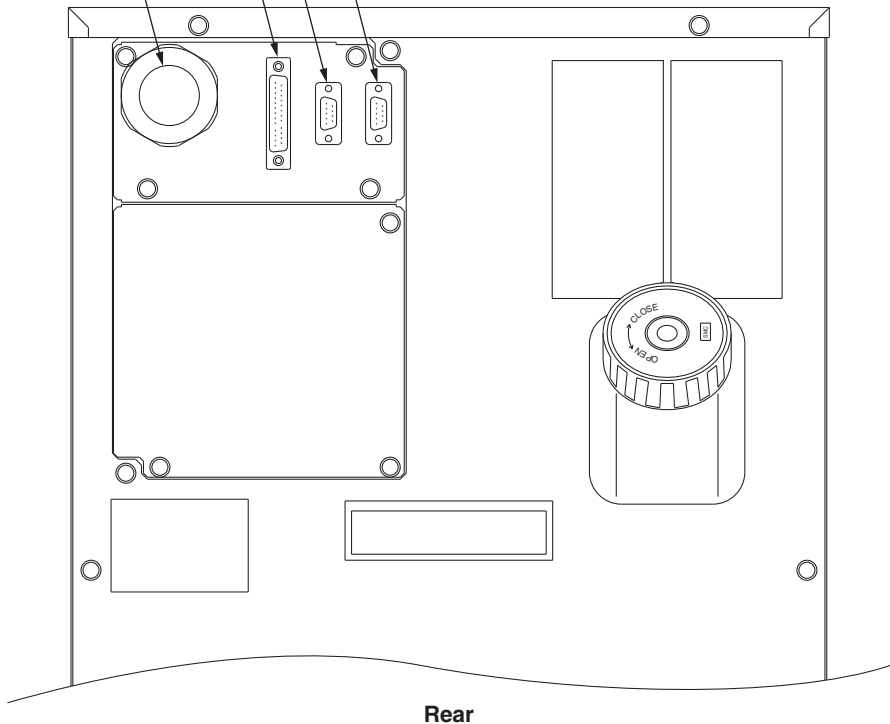
Connector location

P3: Not used as the maintenance port
 D-sub9 (Male receptacle)

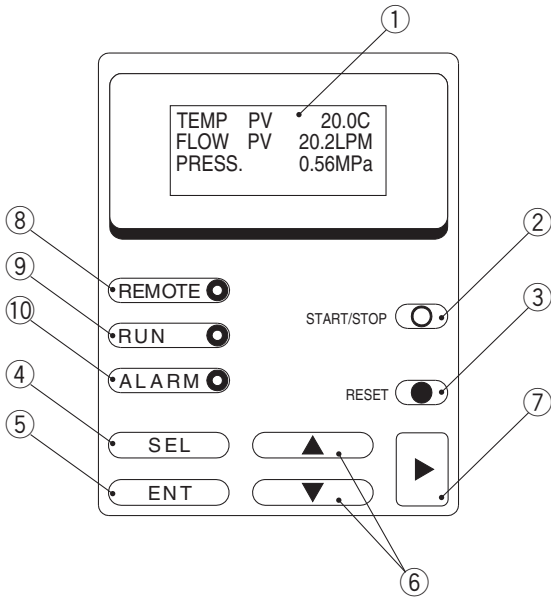
P2: Serial RS-485
 D-sub9 (Female receptacle)

P1: Contact input/output
 D-sub25 (Female receptacle)

Power supply cable port



Operation Panel Display



No.	Description	Function
①	LCD screen	Operating condition of this unit / Circulating fluid discharge temperature / Circulating fluid flow / Circulating fluid discharge pressure / Setting value / Alarm message, etc. are displayed.
②	[START/STOP] key	Starts / Stops the operation.
③	[RESET] key	Stops the alarm buzzing. / Resets the alarm.
④	[SEL] key	Switches the display.
⑤	[ENT] key	Decides the settings.
⑥	[▲] [▼] key	Moves the cursor and changes the setting values.
⑦	[▶] key	Moves the cursor.
⑧	[REMOTE] indicator light	Lights up when the unit is in the remote status.
⑨	[RUN] indicator light	Lights up when the unit is in the operating status.
⑩	[ALARM] indicator light	Lights up when the unit is alarming.

Alarm

This unit can display 28 kinds of alarm messages as standard. Also, it can read out the serial RS-485 communication.

Alarm no.	Alarm message	Operating condition	Main reason
01	Water Leak Detect FLT	Stop	Liquid deposits in the base of this unit.
02	Incorrect Phase Error FLT	Stop	The power supply to this unit is incorrect.
03	RFGT High Press FLT	Stop	Pressure in the refrigeration circuit has exceeded the limitation.
04	CPRSR Overheat FLT	Stop	Temperature inside the refrigerator has increased.
05	Reservoir Low Level FLT	Stop	The amount of circulating fluid is running low.
06	Reservoir Low Level WRN	Continue	The amount of circulating fluid is running low.
07	Reservoir High Level WRN	Continue	The tank has been filled in excess.
08	Temp. Fuse Cutout FLT	Stop	Temperature of the circulating fluid tank is raised.
09	Reservoir High Temp. FLT	Stop	Temperature of the circulating fluid has exceeded the limitation.
11	Reservoir High Temp. WRN	Continue	Temperature of the circulating fluid has exceeded the limitation set by the customer.
12	Return Low Flow FLT	Stop	The circulating fluid flow has gone below 6 L/min.
13	Return Low Flow WRN	Continue	The circulating fluid flow has gone below the limitation set by the customer.
14	Heater Breaker Trip FLT	Stop	Protection device for the electrical circuit of the heater is activated.
15	Pump Breaker Trip FLT	Stop	Protection device for the electrical circuit of the circulating pump is activated.
16	CPRSR Breaker Trip FLT	Stop	Protection device for the electrical circuit of the refrigerator is activated.
17	Interlock Fuse Cutout FLT	Stop	Overcurrent is flown to the control circuit.
18	DC Power Fuse Cutout WRN	Continue	Overcurrent has flown to the (optional) solenoid valve.
19	FAN Motor Stop WRN	Continue	Cooling fan inside the refrigerator has stopped.
20	Internal Pump Time Out WRN	Continue	The internal pump continuously runs for more than a certain period of time.
21	Controller Error FLT	Stop	The error occurred in the control systems.
22	Memory Data Error FLT	Stop	The data stored in the controller of this unit went wrong.
23	Communication Error WRN	Continue	The serial communications between this unit and customer's system has been suspended.
24	DI Low Level WRN	Continue	DI level of the circulating fluid has gone below the limitation set by the customer. (Option)
25	Pump Inverter Error FLT	Stop	An error has occurred in the circulating pump inverter. The alarm is only for HRZ010-W□S.
26	DNET Comm. Error WRN	Continue	The DeviceNet communications between this unit and customer's system have been suspended. (Only for DeviceNet communication specification - Option symbol D.)
27	DNET Comm. Error FLT	Stop	An error has occurred in the DeviceNet communication system of this unit. (Only for DeviceNet communication specification - Option symbol D.)
28	CPRSR INV Error FLT	Stop	An error has occurred in the refrigerator inverter. The alarm is only for HRZ010-W□S.

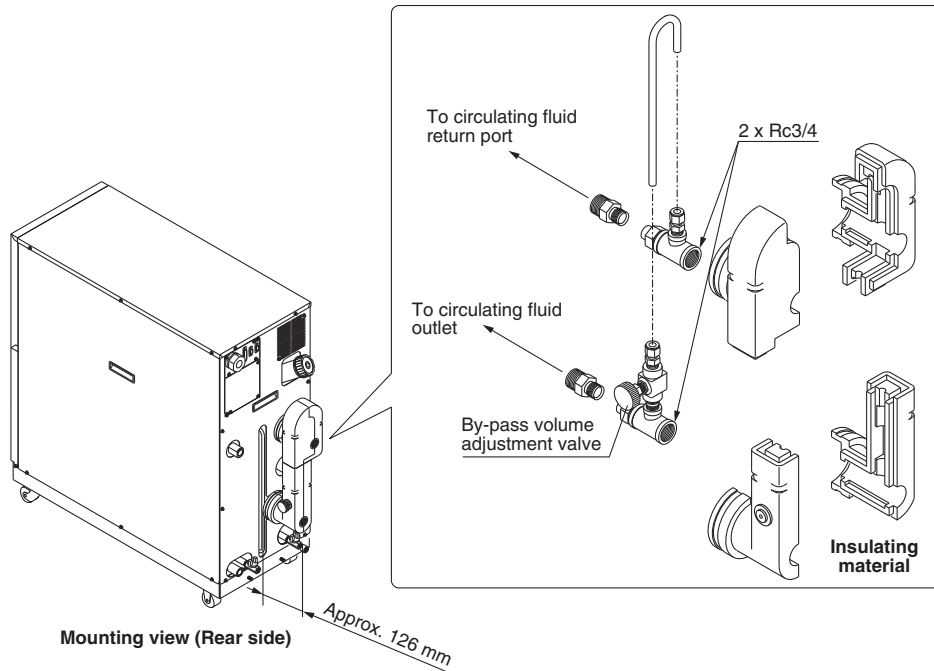
Series HRZ

Accessories (Sold Separately)

By-pass Piping Set

Note) Necessary to be fitted by the customer.

When the circulating fluid goes below the rated flow, cooling capacity will be reduced and the temperature stability will be badly affected. In such a case, use the by-pass piping set.



Part no.	Applicable model
HRZ-BP001	HRZ001-H/HRZ001-H1
	HRZ002-H/HRZ002-H1
HRZ-BP002	HRZ001-L/HRZ001-L1
	HRZ001-L2
	HRZ002-L/HRZ002-L1
	HRZ002-L2
	HRZ004-L/HRZ004-L1
	HRZ004-L2
	HRZ008-L2
	HRZ004-H/HRZ004-H1
	HRZ008-H/HRZ008-H1
	HRZ002-W/HRZ002-W1
	HRZ008-W/HRZ008-W1
HRZ010-WS	
HRZ010-W1S	
HRZ010-W2S	
HRZ-BP008	HRZ008-L/HRZ008-L1

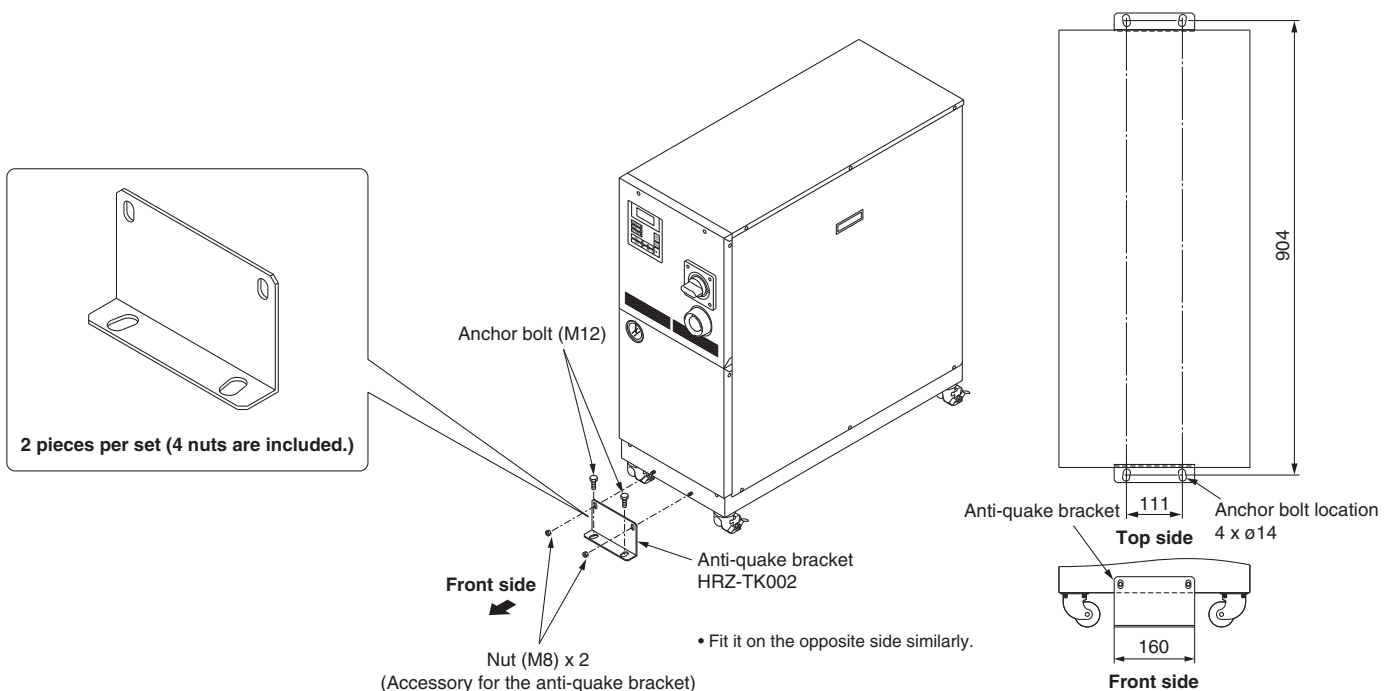
Anti-quake Bracket

Bracket for earthquakes
Prepare the anchor bolts (M12) which are suited for the floor material.

Part no.	Applicable models
HRZ-TK002	HRZ001-L□/HRZ002-L□/HRZ004-L□
	HRZ001-H□/HRZ002-H□
	HRZ004-H□/HRZ008-H□
	HRZ002-W□/HRZ008-W□/HRZ010-W□S

Note 1) 2 pieces per set (for 1 unit) (HRZ-TK002)

Note 2) Anti-quake bracket is attached as standard. (HRZ008-L, HRZ008-L1)

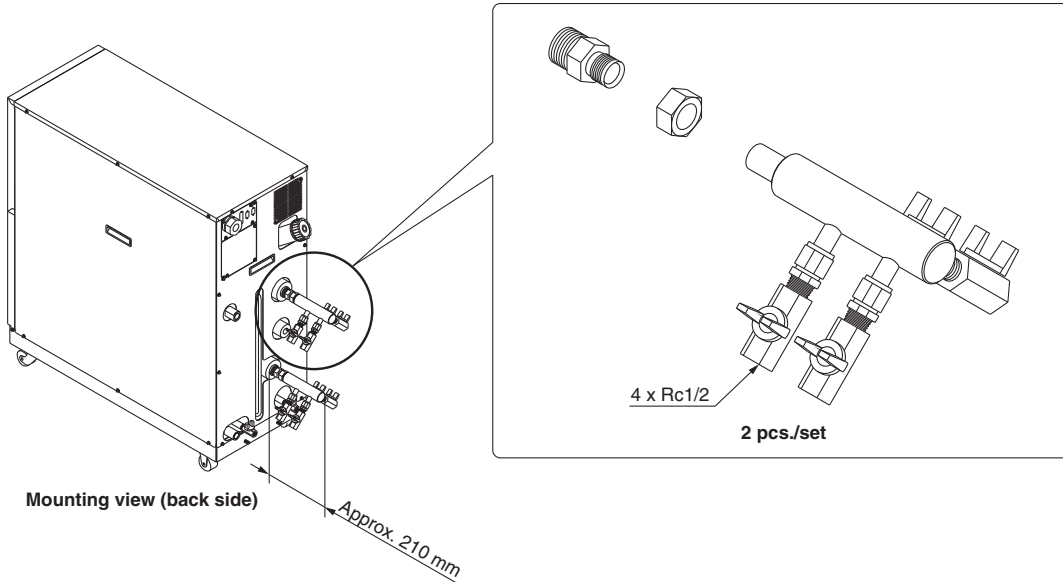


Series HRZ

4 Port Manifold

4-branching the circulating fluid enables 4 temperature controls at the maximum with the 1 unit thermo-chiller.

Part no.	Applicable models
HRZ-MA001	Common for all models

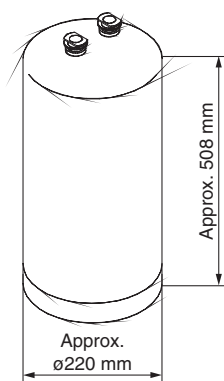


DI Filter

This is the ion replacement resin to maintain the resistance ratio of the circulating fluid. Customers who select the DI control kit (Option "Y") need to purchase the DI filter separately.

Part no.	Applicable models
HRZ-DF001	Common for all models with the DI control kit as an option. (Option "Y")

Note) The DI filters are consumable. The product life cycles vary according to the status (electric resistance ratio set value circulating fluid temperature, piping, volume, etc.)

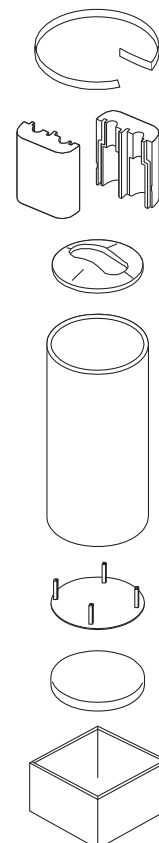


Weight: Approx. 20 kg

Insulating Material for DI Filter

When the DI filter is used at a high temperature, we recommend that you use this insulating material to protect the radiated heat from the DI filter or possible burns. We also recommend that you use it to prevent heat absorption from the DI filter and to avoid condensation forming.

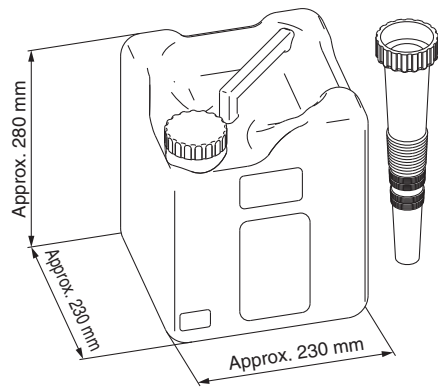
Part no.	Applicable models
HRZ-DF002	Common for all models with the DI control kit as an option (Option "Y")



60% Ethylene Glycol Aqueous Solution

This solution can be used as a circulating fluid for ethylene glycol-type Thermo-chillers. (Capacity: 10 L)

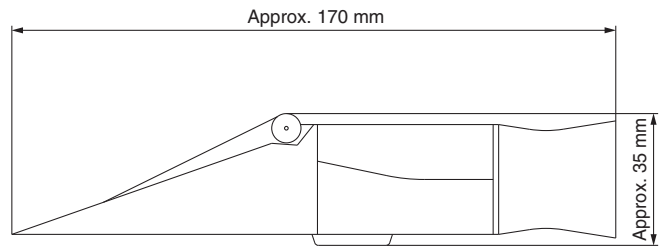
Part no.	Applicable model
HRZ-BR001	Common for all ethylene glycol-type models



Concentration Meter

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

Part no.	Applicable model
HRZ-BR002	Common for all ethylene glycol-type models



Series HRZ Options

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

C Option symbol

Analogue Communication

HRZ - - C
Analogue communication

In addition to the standard contact input/output signal communication and the serial RS-485 communication, analogue communication function can be added.

The analogue communication function enables to write and read out the following items.

<Writing>	<Readout>
Circulating fluid temperature setting	Circulating fluid present temperature
	Electrical resistivity*

* Only when the DI control kit (option Y) is selected.

Scaling voltage - circulating fluid temperature can be set arbitrarily by the customer.

For details, please consult our "Communication Specifications" information.

D Option symbol

DeviceNet™ Communication

HRZ - - D
DeviceNet™ communication



In addition to the standard contact input/output signal communication and the serial RS-485 communication, DeviceNet function can be added. DeviceNet™ function enables to write and read out the following items.

<Writing>	<Readout>
Run/Stop	Circulating fluid present temperature
Circulating fluid temperature setting	Circulating fluid flow
Circulating fluid automatic recovery start/stop*1	Circulating fluid discharge pressure
	Electrical resistivity*2
	Alarm occurrence information
	Status (operating condition) information

*1 Only when the circulating fluid automatic recovery function (option Z) is selected.

*2 Only when the DI control kit (option Y) is selected.

For details, please consult our "Communication Specifications" information.

N Option symbol

NPT Fitting

HRZ - - N
NPT fitting

An adapter is included to change the connection parts of circulating fluid piping and facility water piping to NPT thread type. The adapter must be installed by the customer.

Y Option symbol

DI Control Kit

HRZ - - Y
DI control kit

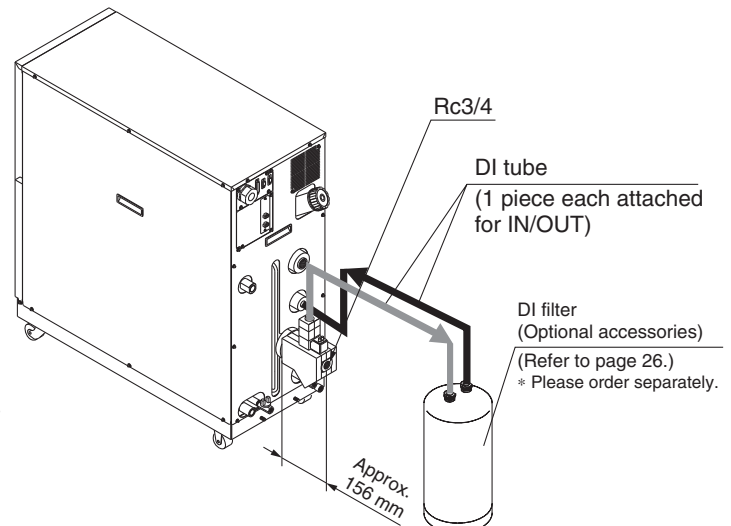
Select this option if you want to maintain the electric resistance ratio (DI level) of the circulating fluid at a certain level. However, some components have to be fitted by the customer. For details, refer to specification table for this option.

Please note that this is not applicable to the fluorinated liquid type.

Applicable model	HRZ00□-L1-Y HRZ00□-H1-Y HRZ00□-W1-Y HRZ010-W1S-Y		HRZ00□-L2-Y HRZ010-W2S-Y	
	Allowable circulating fluid	—	60% ethylene glycol aqueous solution	Deionised water
DI level display range	MΩ·cm	0 to 20		
DI level set range	MΩ·cm	0 to 2.0 (Note)		
DI level reduction alarm set range	MΩ·cm	0 to 2.0		

Note) The DI filter is needed to control the DI level. (SMC Part No.: HRZ-DF001)

Please purchase additionally because the DI filter is not included in this option. Also, if necessary, additionally purchase the insulating material for the DI filter. (SMC Part No.: HRZ-DF002)



* Install the DI filter outside the thermo-chiller for piping. Secure the space for installing the DI filter on the rear side of the Thermo-chiller.

* It may go outside of the temperature stability range of $\pm 0.1^\circ\text{C}$ when this option is used in some operating conditions.



Series HRZ

Specific Product Precautions 1

Be sure to read this before handling. Refer to back cover for Safety Instructions, "Handling Precautions for SMC Products" (M-E03-3) and "Operation Manual" for Temperature Control Equipment Precautions. The Operation Manual can be downloaded from the SMC website: <http://www.smc.eu>

Design

Warning

- This catalogue shows the specification of a single unit.
 - For details, please consult our "Product Specifications" and thoroughly consider the adaptability between the customer's system and this unit.
 - Although the protection circuit as a single unit is installed, the customer is requested to carry out the safety design for the whole system.

Selection

Caution

- Model selection**
In order to select the correct thermo-chiller model, the amount of thermal generation from the customer's system, the operating circulating fluid and its circulating flow are required. Select a model by referring to the guideline to model selection of this catalogue.
- Option selection**
Options have to be selected when ordering the thermo-chiller. It is not possible to add them after purchasing the unit.

Handling

Warning

- Thoroughly read the operation manual.**
Read the operation manual completely before operation and keep a copy on-site for future reference.

Operating Environment / Storage Environment

Caution

- Do not use in the following environment because it will lead to a breakdown.**
 - Environments like those described in the Temperature Control Equipment Precautions.
 - Locations where spatter will adhere when welding.
 - Locations where it is likely that the leakage of flammable gas may occur.
 - Locations where the ambient temperature exceeds the limits mentioned below.
 - During operation 10°C to 35°C
 - During storage 0°C to 50°C (but as long as water or circulating fluids are not left inside the pipings)
 - Locations where the ambient relative humidity exceeds the limits mentioned below.
 - During operation 30% to 70%
 - During storage 15% to 85%
 - (inside the operation facilities) Locations where there is not sufficient space for maintenance.
 - In locations where the ambient pressure exceeds the atmospheric pressure.

- The thermo-chiller does not have clean room specification. It generates dust from the pump inside the unit and the cooling fan in the refrigera-**

Circulating Fluid

Caution

- Avoid oil or foreign objects entering the circulating fluid.**

Circulating Fluid

- Use ethylene glycol which does not contain additives such as antiseptics.**
- Density of the ethylene glycol aqueous solution should be 60% or less. If the density is too high, the pump will be overloaded, resulting in occurrence of "Pump Breaker Trip FLT". Also, if the density is too low, the unit will freeze at lower temperatures, resulting in product failure.**
- Avoid water moisture entering the fluorinated fluid. Otherwise, the unit will freeze, resulting in product failure.**
- Use clean water (used for diluting ethylene glycol) which must meet the water quality standards as mentioned below.**

Circulating Water (Clean Water) Quality Standards

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

	Item	Unit	Standard value	Influence	
				Corrosion	Scale generation
Standard item	pH (at 25°C)	—	6.0 to 8.0	○	○
	Electrical conductivity (25°C)	[μS/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 [MΩ·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.

Transportation / Transfer / Movement

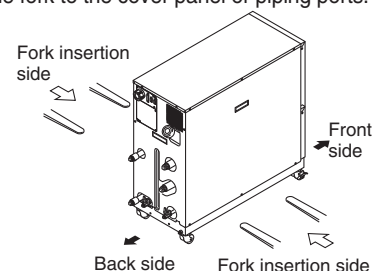
Warning

1. Transportation by forklift

- It is not possible to hang this product.
- The fork insertion position is either on the left side face or right side face of the unit. Be careful not to bump the fork against a roller or adjuster foot and be sure to put through the fork to the opposite side.
- Be careful not to bump the fork to the cover panel or piping ports.

2. Transportation by roller

- This product is heavy. Be sure to move the unit using more than 2 persons.
- Do not grab the pipings or panel at the back of the unit.





Series HRZ

Specific Product Precautions 2

Be sure to read this before handling. Refer to back cover for Safety Instructions, "Handling Precautions for SMC Products" (M-E03-3) and "Operation Manual" for Temperature Control Equipment Precautions. The Operation Manual can be downloaded from the SMC website: <http://www.smc.eu>

Mounting / Installation

⚠ Caution

1. Avoid using this product outdoors.
2. Install on a rigid floor which can withstand this product's weight.
3. Please install a suitable anchor bolt for the anti-quake bracket taking into consideration the customer's floor material.
4. Avoid placing heavy objects on this product.

Piping

⚠ Caution

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

If the operating performance specifications are regularly exceeded, the pipings may burst during operation.

2. The surface of the circulating fluid pipings should be covered with the insulating materials which can effectively confine the heat.

Absorbing the heat from the surface of pipings may reduce the cooling capacity performance and the heating capacity may be shortened due to heat radiation.

3. When using a fluorinated liquid as the circulating fluid, do not use pipe tape.

Liquid leakage may occur around the pipe tape. For sealing, we recommend to use the following sealant: SMC Part No., HRZ-S0003 (Silicon sealant)

4. For the circulating fluid pipings, use clean pipings which have no dust, oil or water moisture inside, and blow with air prior to undertaking any piping works.

If any dust, oil or water moisture enters the circulating fluid circuit, inferior cooling performance or equipment failure due to frozen water may occur, resulting in bubbles in the circulating fluid inside the tank.

5. The reciprocating total volume of the circulating fluid pipings must be less than the volume of the sub-tank.

Otherwise, when the equipment is stopped, the built-in alarm may activate or the circulating fluid may leak from the tank. Refer to the specifications table for the sub-tank volume.

6. Select the circulating fluid pipings which can exceed the required rated flow.

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

7. For the circulating fluid piping connection, install a drain pan in case the circulating fluid may leak.

8. Do not return the circulating fluid to the unit by installing a pump in the customer's system.

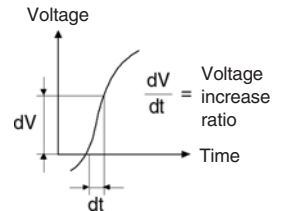
Electrical Wiring

⚠ Caution

1. Power supply and signal cable should be prepared by the customer.

2. Provide a stable power supply which is not affected by surge or distortion.

If the voltage increase ratio (dV/dt) at the zero cross exceeds 40 V/200 μsec., it may result in malfunction.



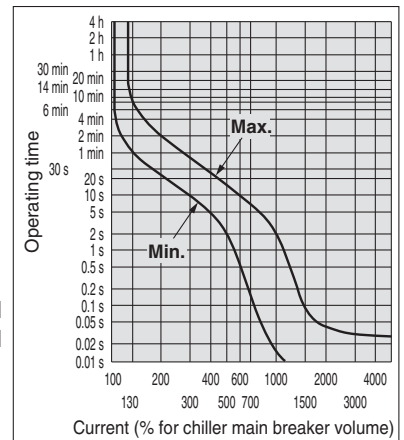
3. This product is installed with a circuit breaker with the following operating characteristics.

For the customer's equipment (primary 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 customer's equipment could be cut off due to the inrush current of the motor of this product.

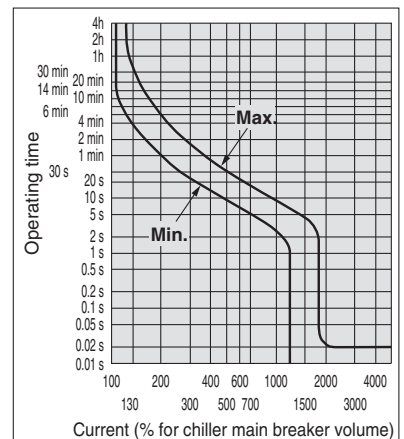
Breaker operating characteristics

Applicable models

- | | |
|-----------|-----------|
| HRZ001-L | HRZ001-H |
| HRZ002-L | HRZ002-H |
| HRZ004-L | HRZ004-H |
| HRZ001-L1 | HRZ008-H |
| HRZ002-L1 | HRZ001-H1 |
| HRZ004-L1 | HRZ002-H1 |
| HRZ001-L2 | HRZ004-H1 |
| HRZ002-L2 | HRZ008-H1 |
| HRZ004-L2 | HRZ002-W |
| HRZ008-L2 | HRZ008-W |
| | HRZ002-W1 |
| | HRZ008-W1 |



- | |
|------------|
| HRZ008-L |
| HRZ008-L1 |
| HRZ010-WS |
| HRZ010-W1S |
| HRZ010-W2S |





Series HRZ

Specific Product Precautions 3

Be sure to read this before handling. Refer to back cover for Safety Instructions, "Handling Precautions for SMC Products" (M-E03-3) and "Operation Manual" for Temperature Control Equipment Precautions. The Operation Manual can be downloaded from the SMC website: <http://www.smc.eu>

Operation

Caution

1. Confirmation before operation

1. The circulating fluid should be within the specified range of "HIGH" and "LOW".
2. Be sure to tighten the cap for the circulating fluid port until the click sound is heard.

2. Emergency stop method

In the case of an emergency, press down the EMO switch which is fitted on the front face of this product.

Operation Restart Time

Caution

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

Maintenance

Warning

1. Do not operate the switch with wet hands or touch electrical parts such as electrical plugs. This will lead to an electrical shock.
2. Do not splash water directly on this product for cleaning. This will lead to an electrical shock or a fire.
3. When the panel is removed for the purpose of inspection or cleaning, mount the panel after works are done.

If the panel is still open, or running the equipment with the panel removed, it may cause an injury or electric shock.




Caution

1. In order to prevent a sudden failure of the unit, replace the parts every 36 months.
2. Perform an inspection of the circulating fluid every 3 months.
 1. In case of fluorinated fluids:
Discharge the circulating liquid and avoid any dirty objects, water moisture, or foreign objects entering the system.
 2. In case of ethylene glycol aqueous solution:
Density must be 60%.
 3. In case of clean water, pure water:
Replacement is recommended.
3. Check the water quality of cooling water every 3 months.

Regarding the water quality standards for cooling water, refer to "Temperature Control Equipment Precautions".

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.

SMC Corporation (Europe)

Austria	☎ +43 (0)2262622800	www.smc.at	office@smc.at	Lithuania	☎ +370 5 2308118	www.smclt.lt	info@smclt.lt
Belgium	☎ +32 (0)33551464	www.smcpnematics.be	info@smcpneumatics.be	Netherlands	☎ +31 (0)205318888	www.smcpnematics.nl	info@smcpneumatics.nl
Bulgaria	☎ +359 (0)2807670	www.smc.bg	office@smc.bg	Norway	☎ +47 67129020	www.smc-norge.no	post@smc-norge.no
Croatia	☎ +385 (0)13707288	www.smc.hr	office@smc.hr	Poland	☎ +48 (0)222119616	www.smc.pl	office@smc.pl
Czech Republic	☎ +420 541424611	www.smc.cz	office@smc.cz	Portugal	☎ +351 226166570	www.smc.eu	postpt@smc.smces.es
Denmark	☎ +45 70252900	www.smcdk.com	smc@smcdk.com	Romania	☎ +40 213205111	www.smcromania.ro	smcromania@smcromania.ro
Estonia	☎ +372 6510370	www.smcpnematics.ee	smc@smcpneumatics.ee	Russia	☎ +7 8127185445	www.smc-pneumatik.ru	info@smc-pneumatik.ru
Finland	☎ +358 207513513	www.smc.fi	smc@smc.fi	Slovakia	☎ +421 (0)413213212	www.smc.sk	office@smc.sk
France	☎ +33 (0)164761000	www.smc-france.fr	promotion@smc-france.fr	Slovenia	☎ +386 (0)73885412	www.smc.si	office@smc.si
Germany	☎ +49 (0)61034020	www.smc.de	info@smc.de	Spain	☎ +34 902184100	www.smc.eu	post@smc.smces.es
Greece	☎ +30 210 2717265	www.smchellas.gr	sales@smchellas.gr	Sweden	☎ +46 (0)86031200	www.smc.nu	post@smc.nu
Hungary	☎ +36 23511390	www.smc.hu	office@smc.hu	Switzerland	☎ +41 (0)523963131	www.smc.ch	info@smc.ch
Ireland	☎ +353 (0)14039000	www.smcpnematics.ie	sales@smcpneumatics.ie	Turkey	☎ +90 212 489 0 440	www.smcpnomatik.com.tr	info@smcpnomatik.com.tr
Italy	☎ +39 0292711	www.smcitalia.it	mailbox@smcitalia.it	UK	☎ +44 (0)845 121 5122	www.smcpnematics.co.uk	sales@smcpneumatics.co.uk
Latvia	☎ +371 67817700	www.smc.lv	info@smclv.lv				

SMC CORPORATION Akihbara UDX 15F, 4-14-1, Sotokanda, Chiyoda-ku, Tokyo 101-0021, JAPAN Phone: 03-5207-8249 FAX: 03-5298-5362