

Thermo-cooler Series HRG

How to Order



HRG 001 A

Size

001	Cooling method 0.9/1.1 kW (50/60 Hz)
002	Cooling method 1.9/2.3 kW (50/60 Hz)
005	Cooling method 4.5/4.8 kW (50/60 Hz)

Type

A	Air-cooled type
W	Water-cooled type

Option

Nil	None
A	With castor
B	With earth leakage breaker
C	With communications function (RS485)

Refer to page 7 for accessories sold separately and related products.

Temperature stability

Nil	±1.0°C (Refrigerator ON/OFF control)
5	±0.5°C (Proportional valve PID control)

Specifications

Model		HRG001		HRG002		HRG005		
Circulating fluid system		Water-cooled refrigerator type	Air-cooled refrigerator type	Water-cooled refrigerator type	Air-cooled refrigerator type	Water-cooled refrigerator type	Air-cooled refrigerator type	
Fluid (Circulating fluid, Cooling water) <small>Note 1)</small>		Clean water						
Operating ambient temperature range (°C)		5 to 40						
Circulating fluid system	Operating temperature range (°C)	5 to 35						
	Temperature stability (°C) <small>Note 2), Note 4)</small>	±1.0 (Refrigerator ON/OFF control), ±0.5 (Proportional valve PID control)						
	Rated cooling capacity (kW) <small>Note 3), Note 4)</small> 50/60 Hz	0.9/1.1		1.9/2.3		4.5/4.8		
	Circulating pump performance (ℓ/min) <small>Note 5)</small> 50/60 Hz	29/37				33/42		
Tank volume (ℓ)		10				20		
Electricity system	Rated voltage (V)	3 phase 200 VAC/200 to 220 VAC 50/60 Hz						
	Rated power consumption (kW) 50/60 Hz	0.56/0.72	0.66/0.82	1.0/1.25	0.84/1.0	1.45/2.0	1.75/2.35	
	Rated current for operation (A) 50/60 Hz	2.6/2.65	2.85/2.85	5.0/5.5	4.2/4.3	6.3/7.8	8.0/9.5	
	Applicable earth leakage breaker volume (A) <small>Note 6)</small>	5		10		20		
Remote control input signal		Remote control activates by applying 24 VDC, 8 mA (input) and stops by applying 0 VDC.						
Outer output signal for operation, emergency stop		Relay contact output (Contact is closed when operating and open when not operating. Contact is open when the power is turned off.) Relay contact output (Contact is closed when alarm is turned off and open when alarm is turned on. Contact is closed when the power is turned off.)						
Operating refrigerant		HFC407C						
Cooling water system	Operating temperature range (°C)	5 to 32	—	5 to 32	—	5 to 32	—	
	Operating flow rate (ℓ/min)	10	—	15	—	25	—	
	Operating pressure (MPa)	0.2 to 0.5	—	0.2 to 0.5	—	0.2 to 0.5	—	
Product appearance	Port size <small>Note 7)</small>	Circulating fluid outlet	Rc1/2	Rc1/2	Rc1/2	Rc1/2	Rc1/2	
		Circulating fluid return	Rc1/2	Rc1/2	Rc1/2	Rc1/2	Rc1/2	
		Cooling water inlet	Rc1/2	—	Rc1/2	—	Rc1/2	—
		Cooling water outlet	Rc1/2	—	Rc1/2	—	Rc1/2	—
Accessories		Y type strainer 1/2#20	—	Y type strainer 1/2#20	—	Y type strainer 1/2#20 Eye bolt M12 x 4 pcs.	Eye bolt M12 x 4 pcs.	
Paint color		Munsell 10/Y8/0.5 (Urban white, Exterior panel), DIC183 (Blue, Operating panel)						
Product weight (kg) <small>Note 8)</small>		70		75		120		

Note 1) 1. Use clean water with a level equivalent to that of tap water. For details, please observe the "Water quality standard" on the Specific Product Precaution page.

2. Consult with us when using high density ethylene glycol, or highly purified deionized water.

Note 2) When placing an order, select a model with a temperature stability of ±0.5°C type or ±1°C type, depending on the application.

Note 3) Cooling capability when the heat generation amount of an external heat load (customer's equipment) is at the condition listed below.

For HRG001, 002: Ambient temperature 32°C, Circulating fluid temperature 20°C, Cooling water temperature 25°C (for water-cooled refrigerator type), Circulating flow rate 10/10 ℓ/min

For HRG005: Ambient temperature 32°C, Circulating fluid temperature 20°C, Cooling water temperature 25°C (for water-cooled refrigerator type), Circulating flow rate 23/28 ℓ/min

Note 4) Use caution when the heat generation amount is intermittent or unstable due to the customer's equipment being operated ON/OFF because the values on the performance graph may be different.

Note 5) Single pump unit capability (Lifting 10 m). Capability of the thermo-cooler is shown below.

For HRG001, 002: 10/10 ℓ/min (0.14/0.2 MPa) For HRG005: 23/28 ℓ/min (0.2/0.24 MPa)

Note 6) As for the earth leakage breaker, purchase one separately with a sensitive current of 30 mA. (Option (Symbol B) is also available. Refer to How to Order.)

Note 7) Product weight is the dry (empty tank) state.

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Model Selection

In order to select a thermo-cooler model, we need to know the amount of heat generated by the customer's equipment. Referring to the examples below, obtain the heat generation amount and select an appropriate model.

Q : Amount of heat generation kW (1 kW = 860 kcal/h)
γ : Density of circulating fluid or object being cooled kg/m³ (For water 1000)
C : Specific heat of circulating fluid or object being cooled kcal/kg°C (For water 1)
ΔT : Temperature difference between inlet and outlet °C
L : Flow rate m³/h

Table 1

Model	HRG001	HRG002	HRG005
Rated cooling capacity (kW) 50/60 Hz	0.9/1.1	1.9/2.3	4.5/4.8

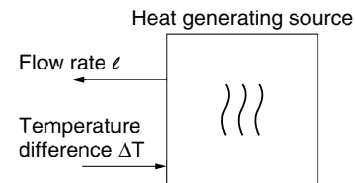
Example 1 A method of obtaining from the temperature difference between the inlet/outlet temperature by means of flowing water in a customer's equipment.

Amount of heat generation Unknown amount of heat generation
 Flow rate 1.5 m³/h (25 ℓ/min)
 Inlet/Outlet temperature difference ΔT 2.0°C

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

$$= \frac{2.0 \times 25 \times 60 \div 1000 \times 1000 \times 1}{860} = 3.5 \text{ kW}$$

Considering a safety factor of 20%, **3.5 x 1.2 = 4.2 kW**
HRG005 is selected from table above

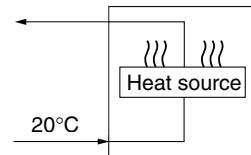


Example 2 Formula used when the heat generation source in a customer's equipment is known.

Amount of heat generation Heat source equivalent to 1.5 kW
 Temperature of circulating fluid 20°C

$$Q = 1.5 \text{ kW}$$

Considering a safety factor of 20%, **1.5 x 1.2 = 1.8 kW**
HRG002 is selected from table above



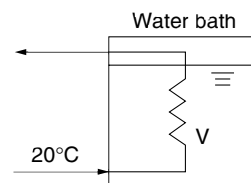
Example 3 Formula when there is no heat generating source in a customer's equipment, and when cooling the object, (ex. water in the water bath) below a certain temperature and period of time.

Total volume of the object being cooled down V 0.06 m³ (60 ℓ)
 Cooling time H 0.5 hours
 Cooling temperature difference ΔT 25°C → 20°C

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

$$= \frac{(25-20) \times 0.06 \times 1000 \times 1}{0.5 \times 860} = 0.7 \text{ kW}$$

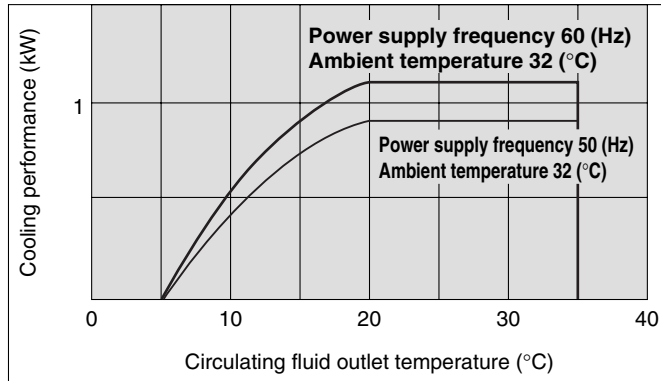
Considering a safety factor of 20%, **0.7 x 1.2 = 0.84 kW**
HRG001 is selected from table above.



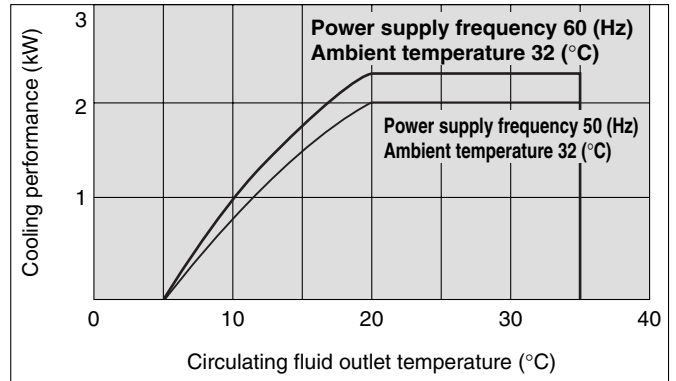
After h hours, cool 25°C down to 20°C.

Cooling Capacity

HRG001

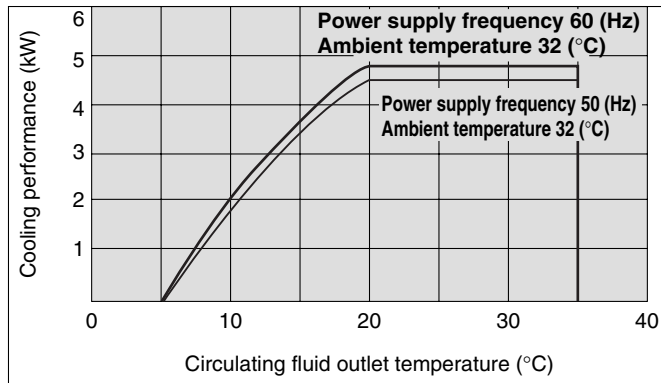


HRG002



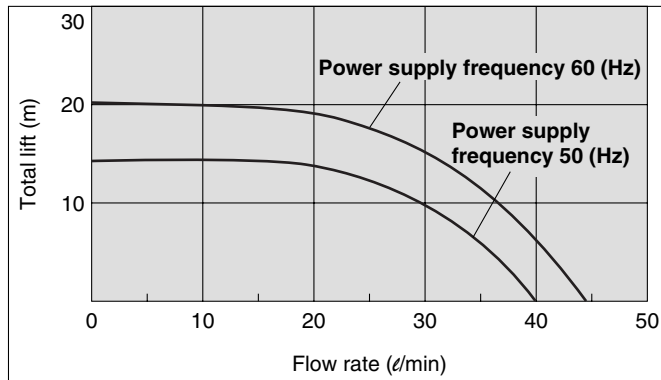
Note) In case of a water-cooled refrigerator type, the cooling water temperature is 25°C.

HRG005

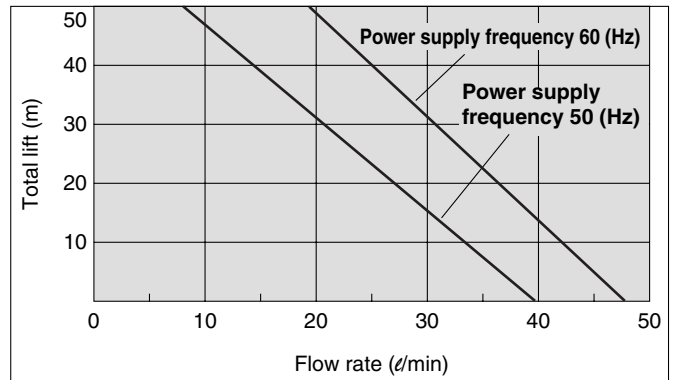


Pump Capacity

HRG001/HRG002

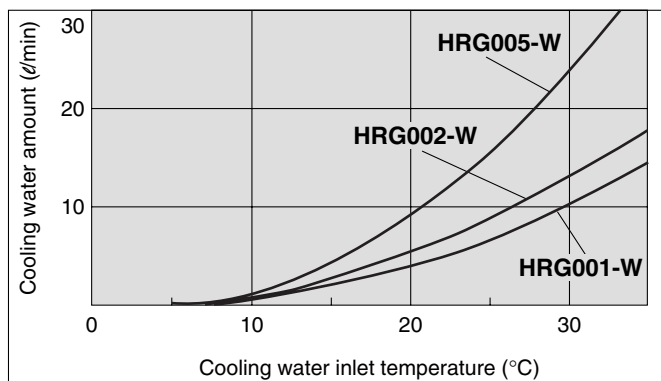


HRG005



Cooling Water Amount

HRG001-W/HRG002-W/HRG005-W

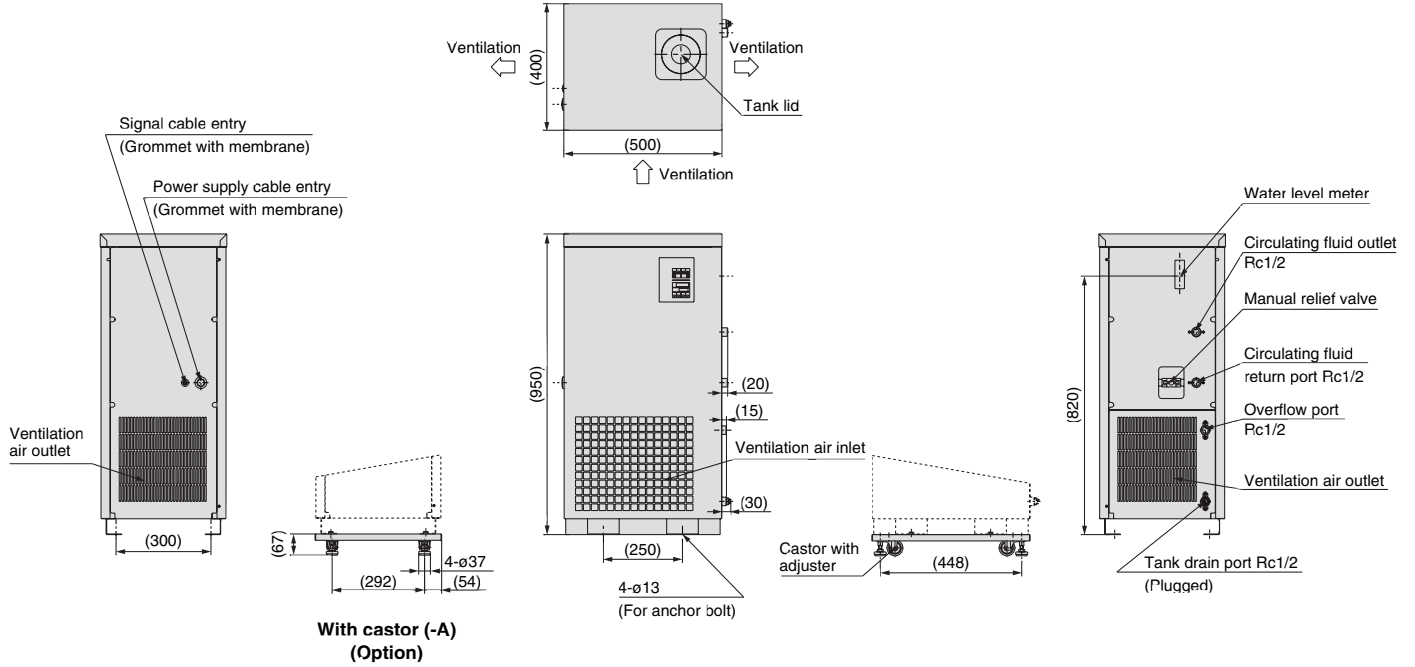


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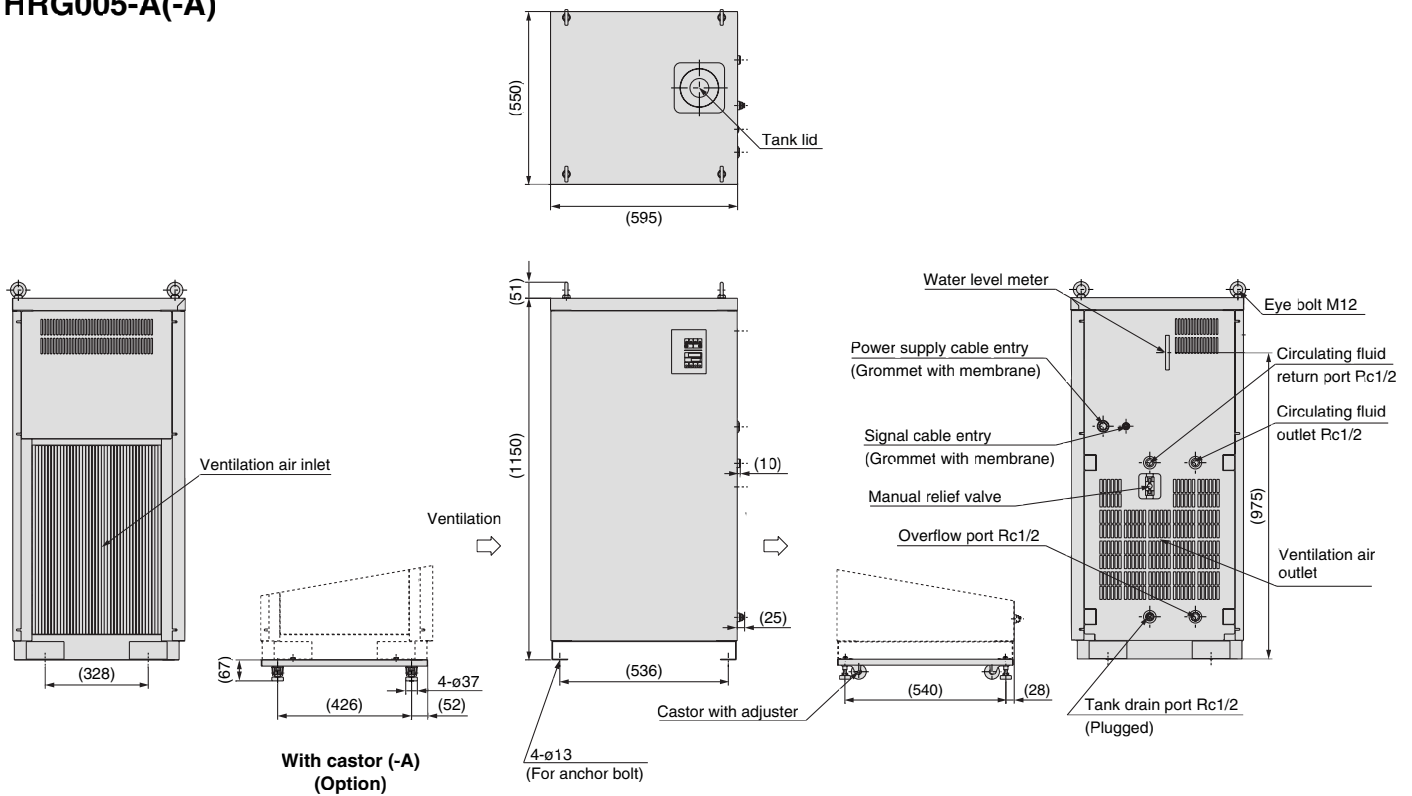
Dimensions Air-cooled Refrigerator Type

HRG001-A(-A)

HRG002-A(-A)

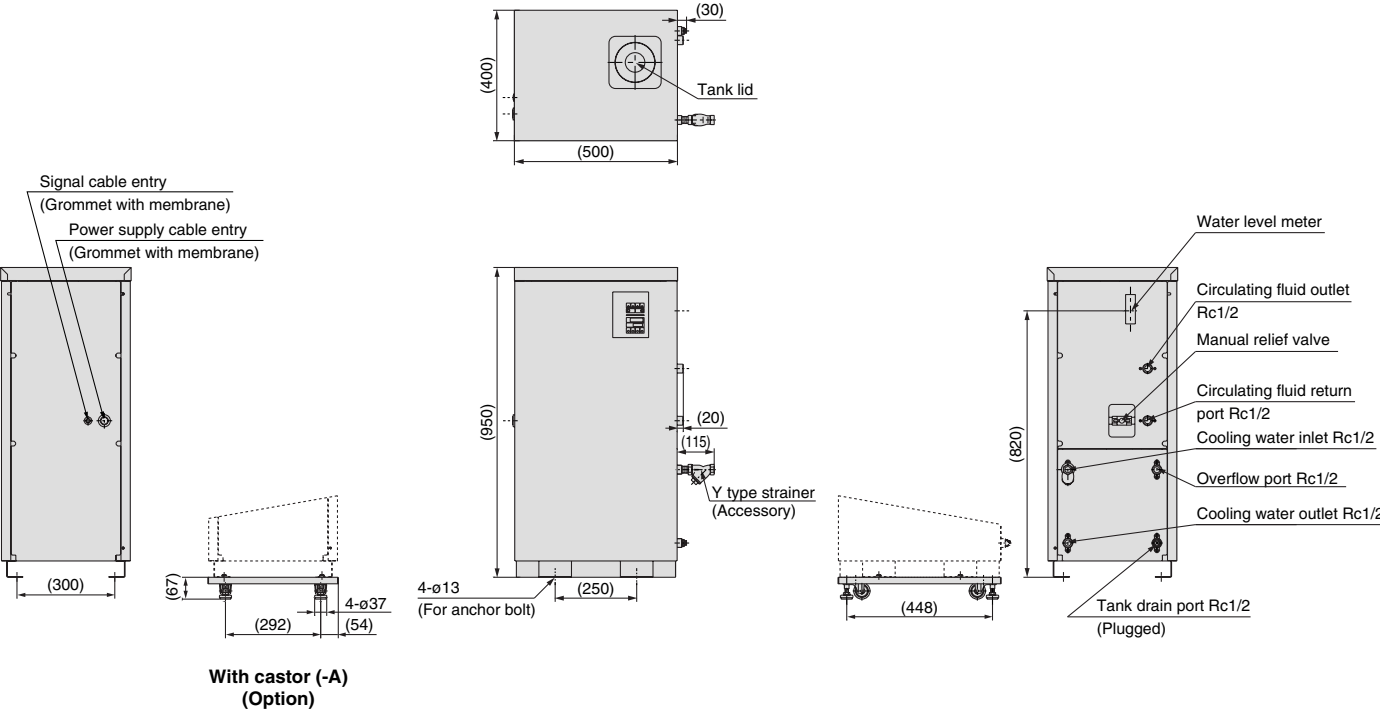


HRG005-A(-A)

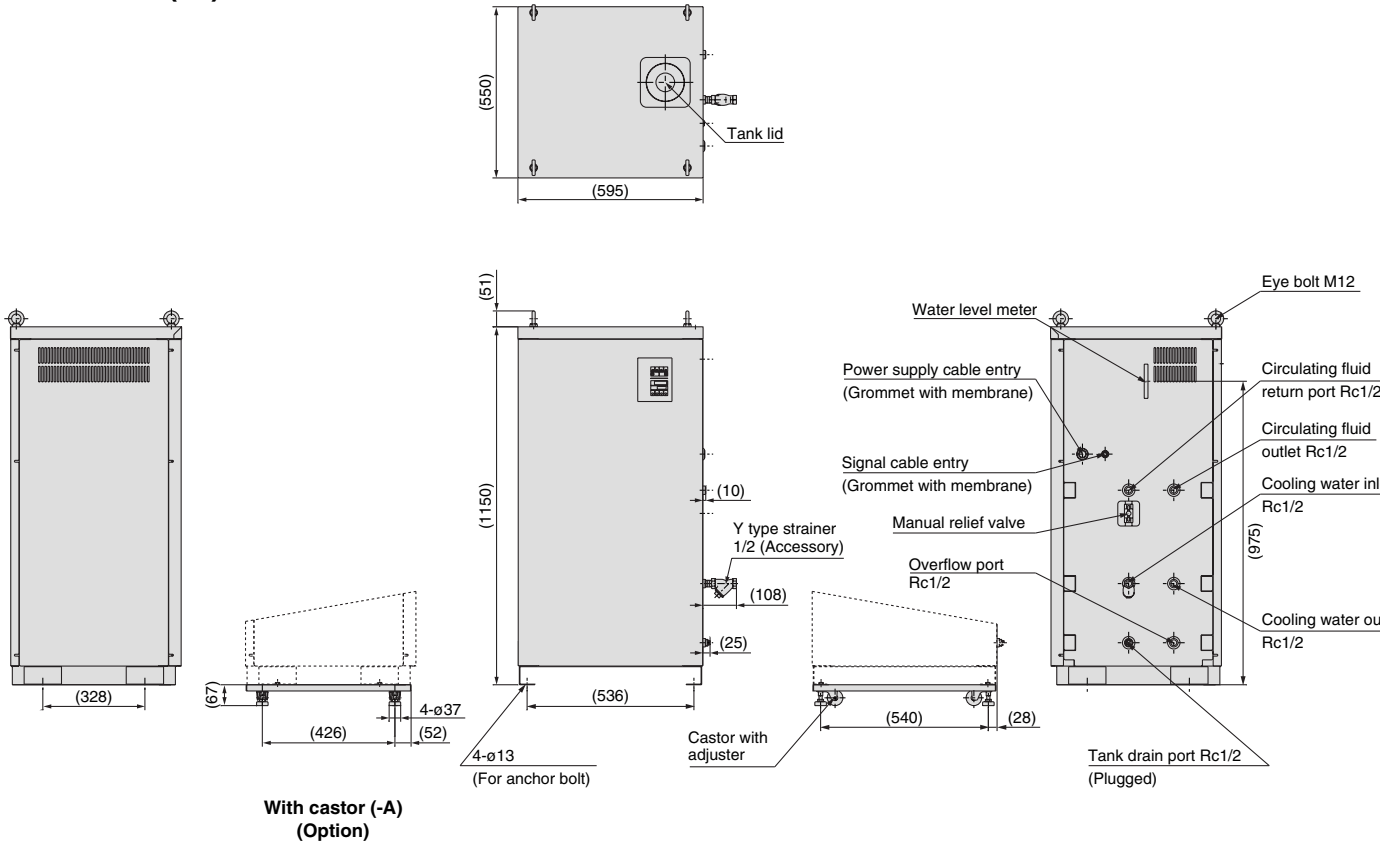


Dimensions: Water-cooled Refrigerator Type

HRG001-W(-A)
HRG002-W(-A)

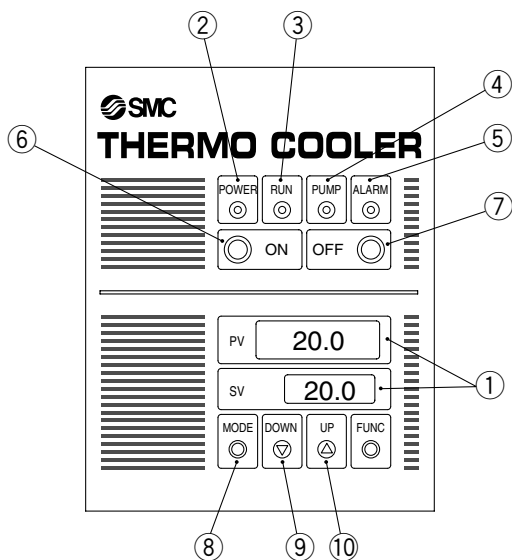


HRG005-W(-A)



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Operation Panel Display



The operation panel is common to all models.

No.	Description	Function
1	Digital display PV	Displays the temperature of the circulating fluid. 4-digit green display.
	Digital display SV	Displays the temperature set value of the circulating fluid. 4-digit red display.
2	(POWER) indicator light	Illuminates when the power is applied.
3	(RUN) indicator light	Illuminates when the (ON) switch is activated.
4	(PUMP) indicator light	
5	(ALARM) indicator light	Displays the difference alarms at a given time.
6	(ON) switch	Starts the operation.
7	(OFF) switch	Stops the operation.
8	(MODE) key	Switches between PV and SV operations.
9	(DOWN) key	Decreases the value on the display.
10	(UP) key	Increases the value on the display.

Alarm Function

- Reduction of water level in tank
- Prevention of reverse electrical current to the pump and refrigerator
- Overload of pump and refrigerator
- High temperature when transferring water
- Refrigerant pressure increase (HRG□□□-W)