Thermo-cooler
Series HRGC

How to Order

HRGC 001 – A □ □ – □

Cooling capacity

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

Cooling method

A	Air-cooled refrigerator type
W	Water-cooled refrigerator type

Temperature stability

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

Piping thread type

Nil	Rc
F	G (PT-G conversion fitting is included)
N	NPT (PT-NPT conversion fitting is included)

Option

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

∗ Refer to page 8 for the specifications of each option.

Specifications

HRGC001/002/005

Model			HRGC001		HRGC002		HRGC005	
Cooling method			Air-cooled refrigerator type	Water-cooled refrigerator type	Air-cooled refrigerator type	Water-cooled refrigerator type	Air-cooled refrigerator type	Water-cooled refrigerator type
Refrigerant			R407C (HFC)					
Control method			Refrigerator ON/OFF control or Proportional valve PID control					
Ambient temperature/humidity Note 1)			Temperature: 5 to 40°C, Humidity: 30 to 70%RH					
Circulating fluid system	**Circulating fluid** Note 2)		Clean water					
	Temperature range setting Note 1)	°C	5 to 35					
	Cooling capacity Note 3) **(50/60 Hz)**	kW	0.9/1.1 (at 20°C)	0.9/1.1 (at 20°C)	1.9/2.3 (at 20°C)	1.9/2.3 (at 20°C)	4.5/4.8 (at 20°C)	4.5/4.8 (at 20°C)
	Heating capacity Note 4)	kW	—	—	—	—	—	—
	Temperature stability Note 5)	°C	±1.0 (Refrigerator ON/OFF control), ±0.5 (Proportional valve PID control)					
	Pump capacity Note 6) **(50/60 Hz)**	MPa	0.13/0.18 (at 10 ℓ/min)				0.20/0.24 (at 23 ℓ/min)	
	Rated flow Note 7) **(50/60 Hz)**	ℓ/min	10/10				23/28	
	Tank capacity	ℓ	Approx. 10				Approx. 20	
	Port size		Rc1/2					
	Wetted parts material		Stainless steel, PPE, PVC, Copper brazing (heat exchanger), Bronze					
Facility water system	**Temperature range**	°C	—	5 to 32	—	5 to 32	—	5 to 32
	Pressure range	MPa	—	0.3 to 0.5	—	0.3 to 0.5	—	0.3 to 0.5
	Required flow rate Note 8) **(50/60 Hz)**	ℓ/min	—	10/12	—	10/12	—	27/28
	Port size		—	Rc1/2	—	Rc1/2	—	Rc1/2
	Wetted parts material		Stainless steel, PVC, Copper brazing (heat exchanger), Bronze					
Electrical system	**Power supply**		Single-phase 200 to 230 VAC 50/60 Hz Allowable voltage fluctuation ±10%					
	Applicable circuit breaker capacity Note 9)	A	15		15		30	
	Maximum operating current	A	8.1	7.8	8.6	8.0	17.2	14.1
	Rated power consumption Note 11) **(50/60 Hz)**	kW	0.76/0.82	0.68/0.73	1.13/1.20	0.89/0.98	2.07/2.23	1.76/1.83
	Remote operation signal input		Relay contact input (operates when the switch is closed, stops when the switch is opened)					
	Operation signal output		Relay contact output (switch closed when operating, switch open when stopped, switch open when shut down)					
	Alarm stop signal output		Relay contact output (switch closed when alarm is turned off, switch open when alarm is turned on, switch closed when shut down)					
	Alarm		Refer to page 6.					
Weight Note 10)		kg	75	75	75	75	110	110

Note 1) It should have no condensation.
During seasons or in locations where the ambient temperature is likely to fall below freezing point, consult SMC separately.

Note 2) If clean water is to be used, please use water that conforms to Clean Water Quality Standard of the JRA (Japan Refrigeration and Air Conditioning Industrial Association) (JRA GL-02-1994 cooling water system - circulating type - make-up water).

Note 3) ① Ambient temperature: 32°C, Facility water temperature: 25°C (for water-cooled refrigerator type), ② Circulating fluid temperature: 20°C, ③ Circulating fluid flow rate: Values at circulating fluid rated flow rate.

Note 4) Thermo-cooler specifications do not have heating capability.

Note 5) Temperature at the outlet of the thermo-chiller when the circulating fluid has a rated flow, and the facility water with the circulating fluid supply and return are directly connected. The installation environment, power supply and facility water should be stable within the specified range.

Note 6) Circulating fluid temperature: The capacity of the thermo-cooler outlet port at 20°C.

Note 7) Required flow for cooling capacity or maintaining the temperature stability.
When used below the rated flow, open the standard manual by-pass valve and maintain a circulating fluid flow rate equivalent to the rated flow.

Note 8) Facility water temperature: 25°C, Required flow when a load is applied as shown in the cooling capacity.

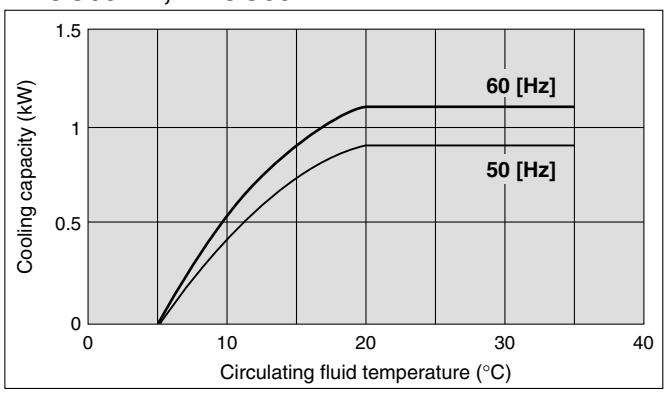
Note 9) Purchase a circuit breaker with current sensitivity of 30 mA separately. (Option [symbol B] is also available. Refer to "How to Order".)

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

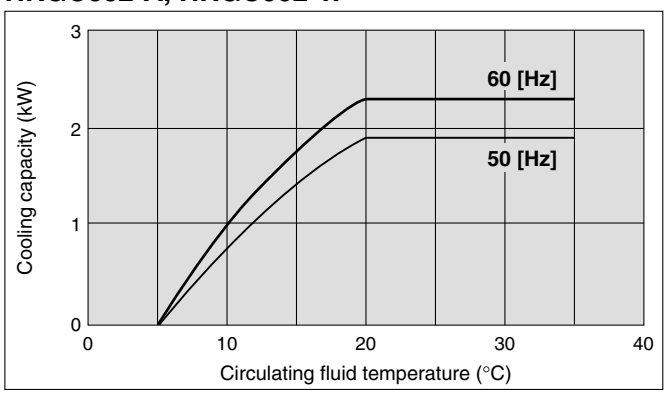
Note 11) In case of refrigerator ON/OFF control. For other conditions, refer to Note 3).

Cooling Capacity

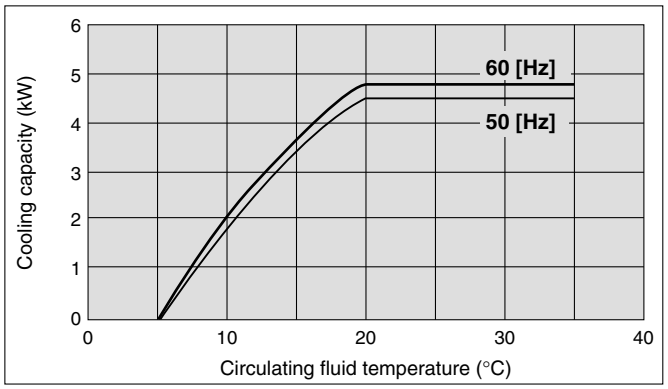
HRGC001-A, HRGC001-W



HRGC002-A, HRGC002-W

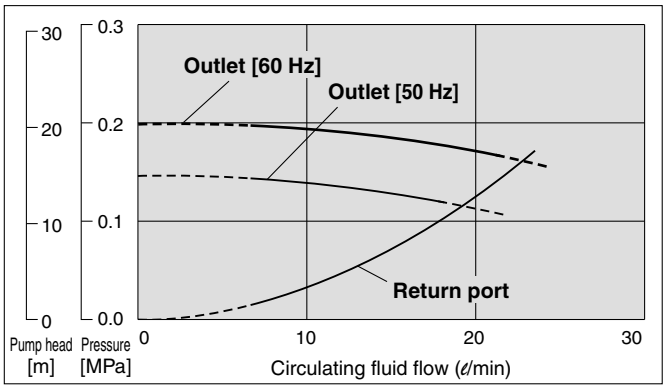


HRGC005-A, HRGC005-W

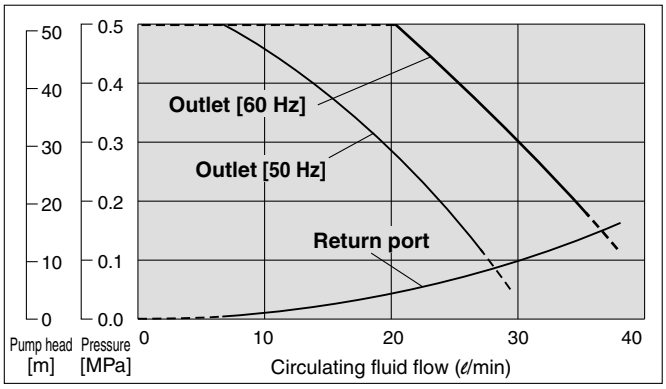


Pump Capacity

HRGC001-A, HRGC001-W
HRGC002-A, HRGC002-W

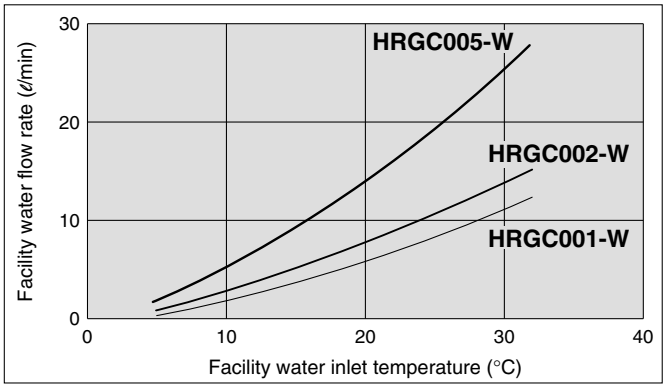


HRGC005-A, HRGC005-W



∗ For all common models, temperature stability will decline in the flow rate range where circulating fluid is deduced (dotted line).

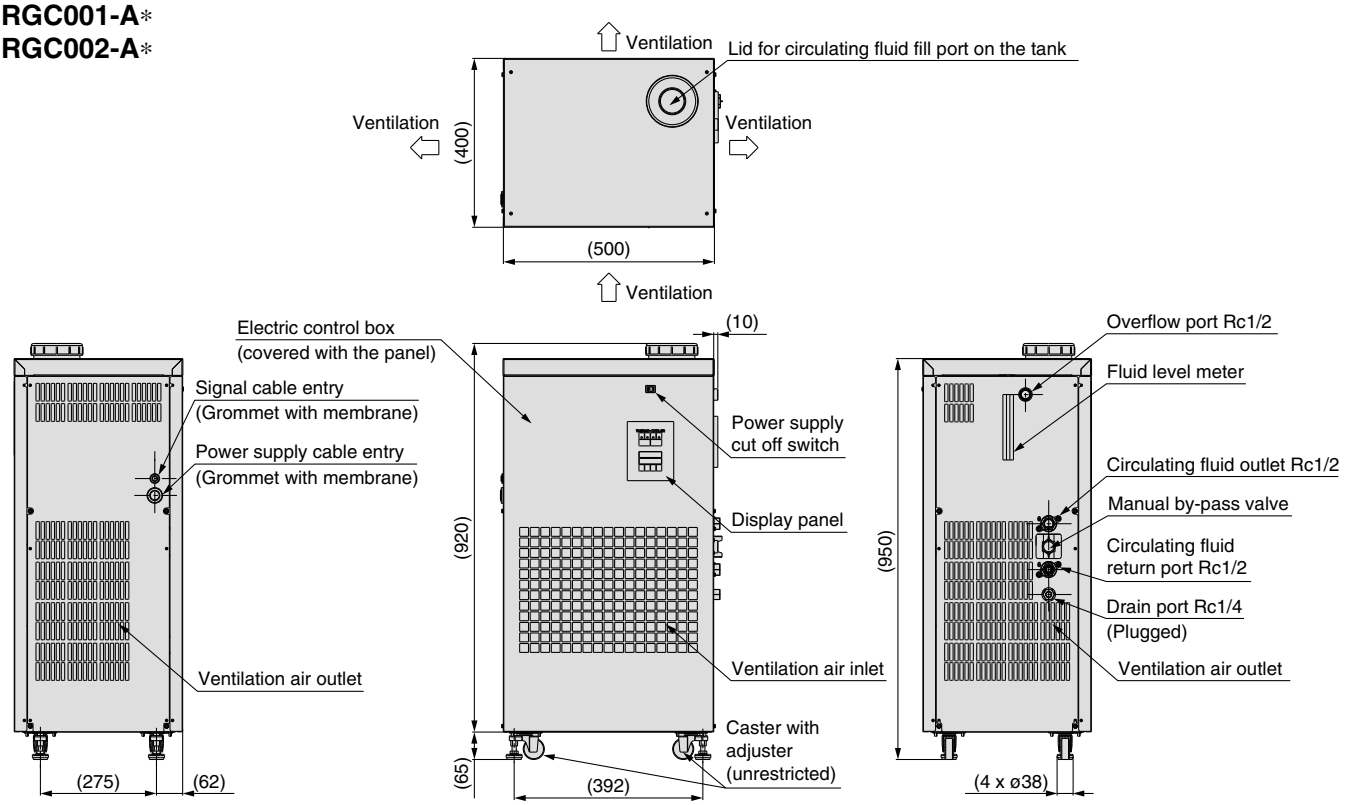
Facility Water Flow Rate



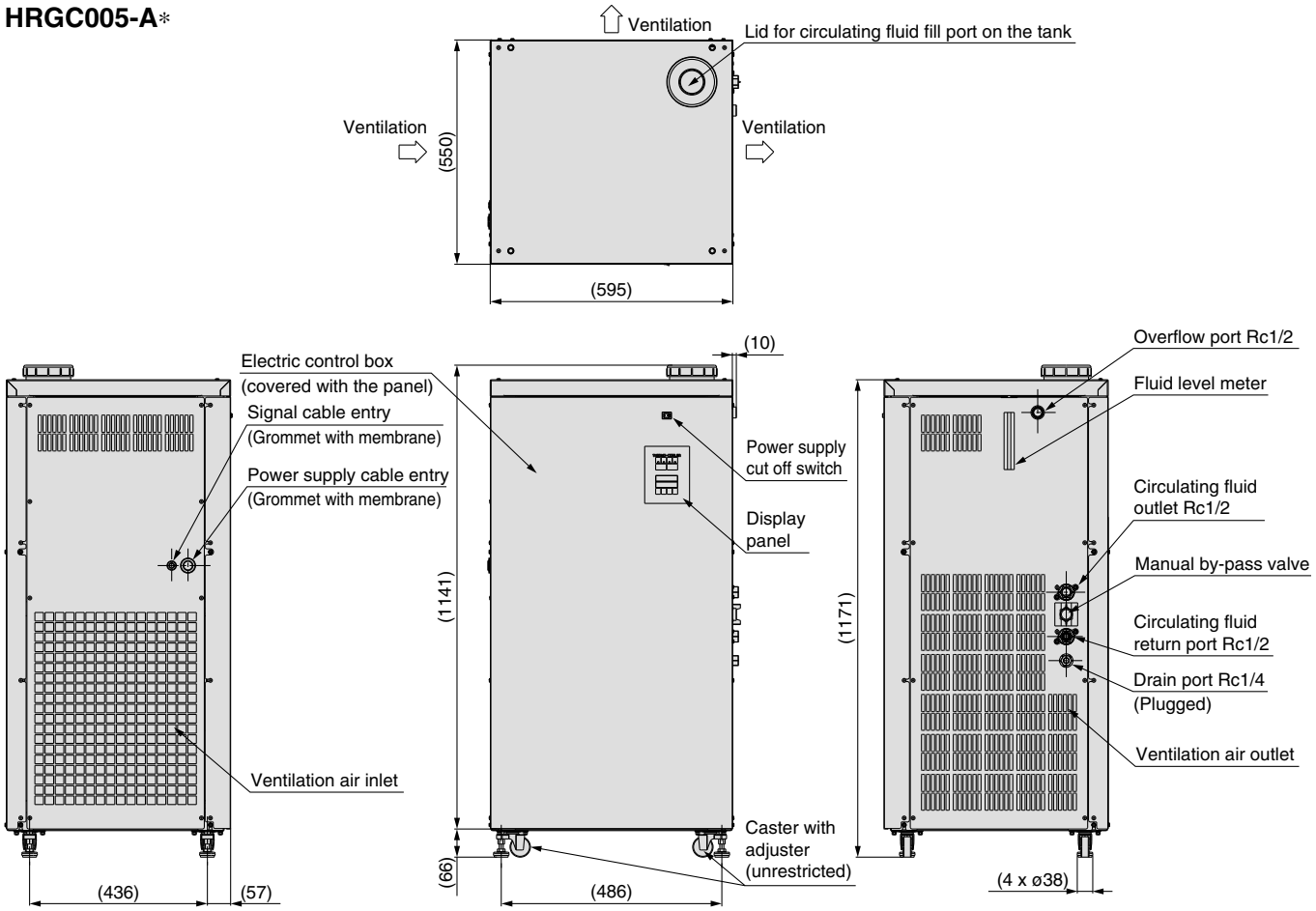
∗ This is the flow rate of facility water at the rated cooling capacity and circulating fluid flow, operating at 60 Hz.

Dimensions: Air-cooled Refrigerator Type

HRGC001-A∗
HRGC002-A∗

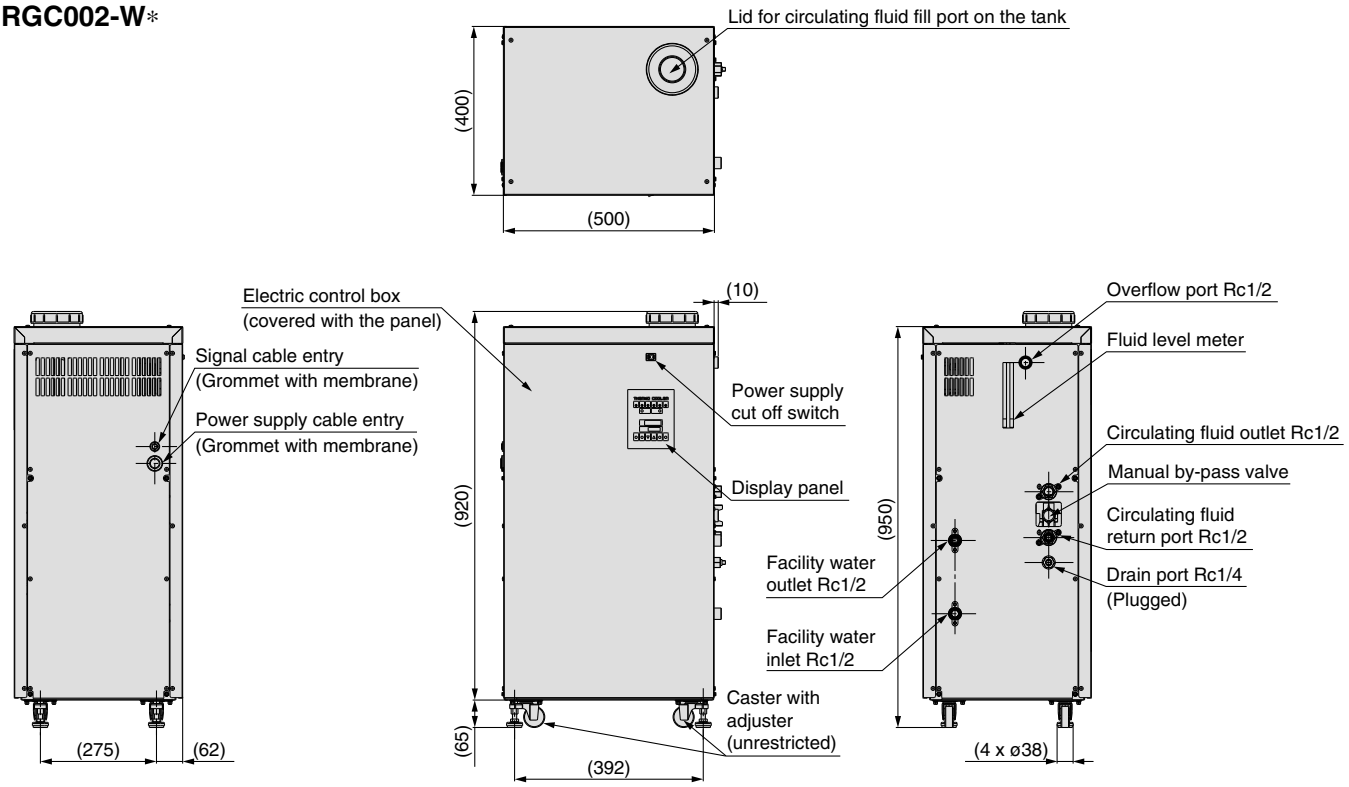


HRGC005-A∗

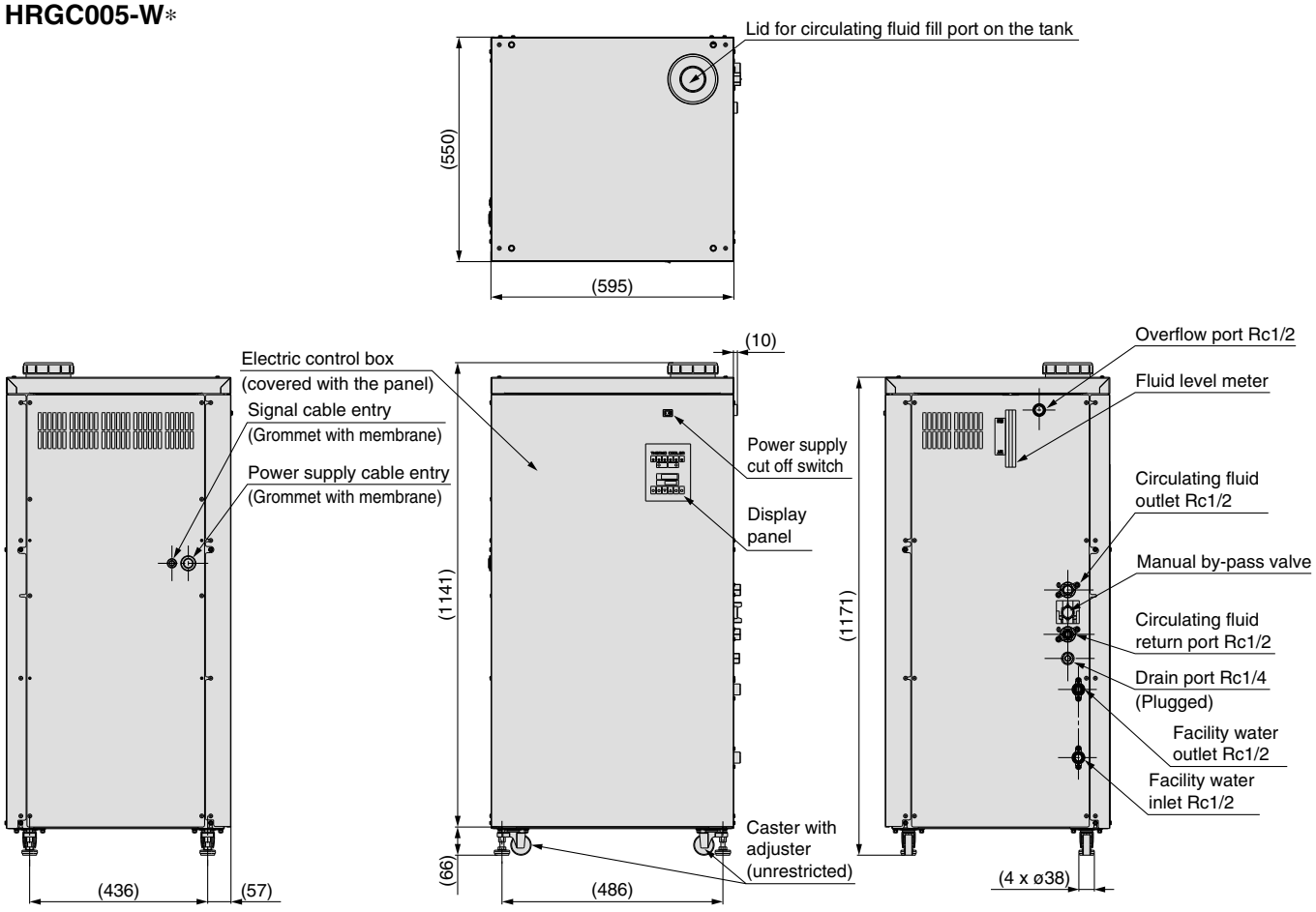


Dimensions: Water-cooled Refrigerator Type

HRGC001-W∗
HRGC002-W∗

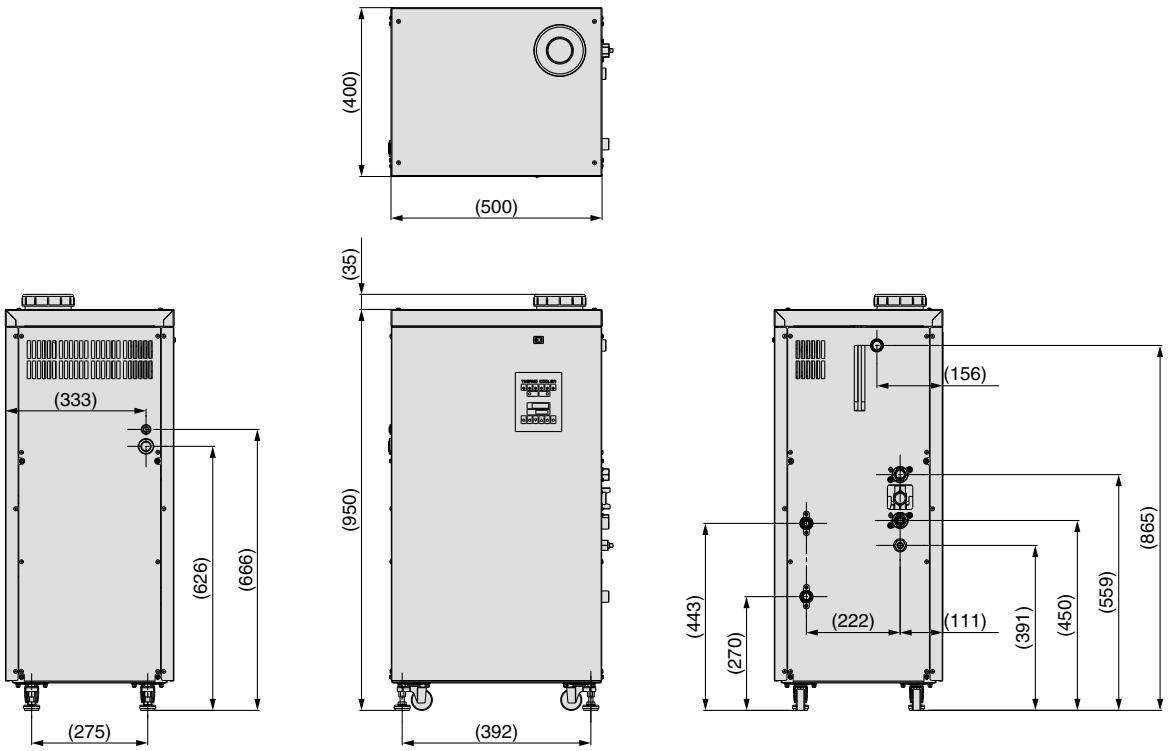


HRGC005-W∗



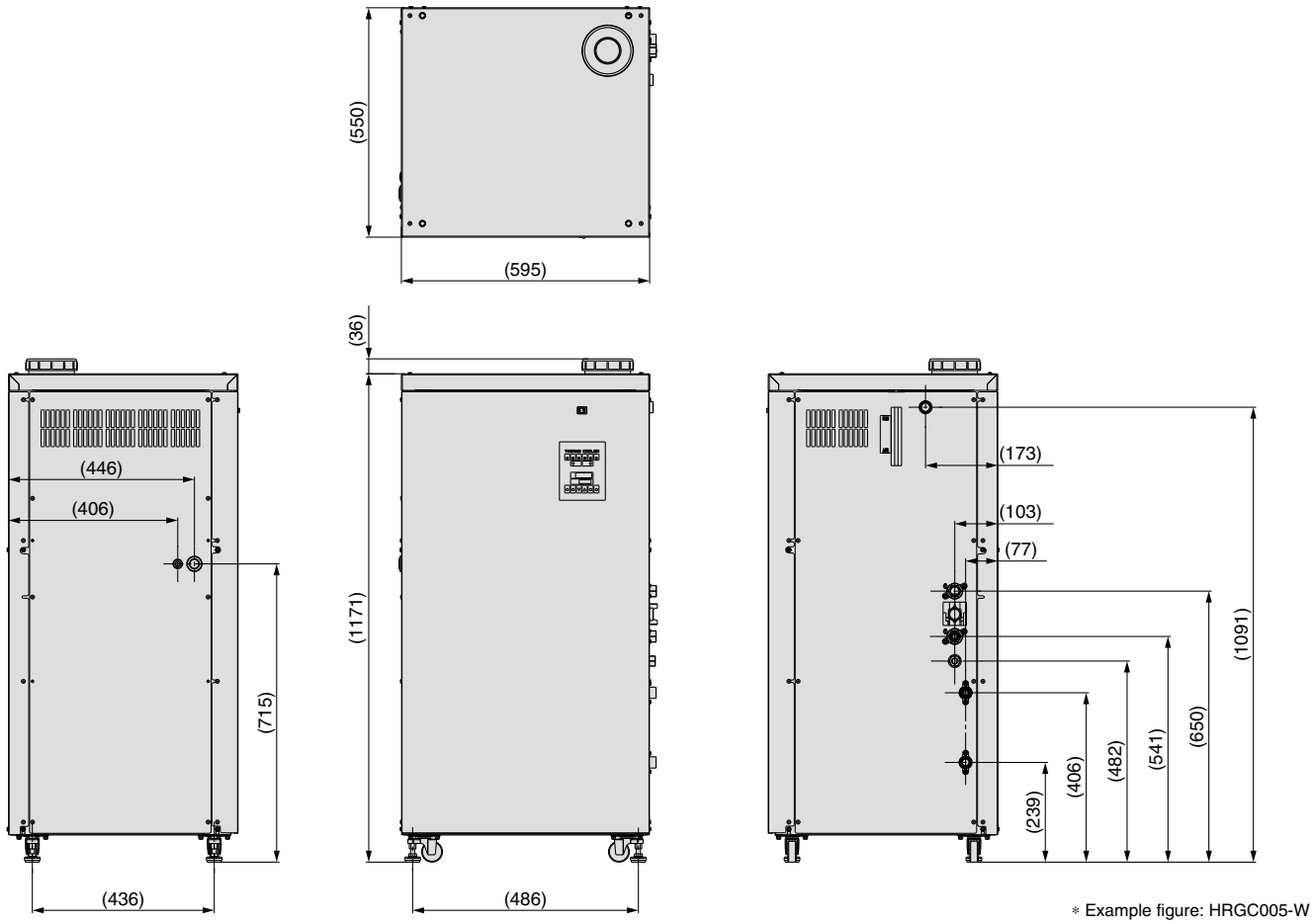
Piping Connection and Installation Dimensions

HRGC001/002



∗ Example figure: HRGC001-W

HRGC005

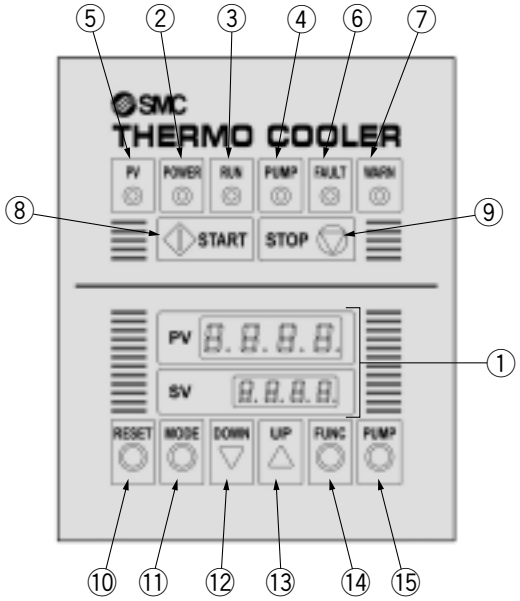


∗ Example figure: HRGC005-W

Operation Panel Display

HRGC001/002/C005

The basic operation of the thermo-chiller is shown on the front operation display panel.
This operation display panel is common to all models.



No.	Description	Function	
①	**Digital display PV/SV**	PV	Displays the temperature of circulating fluid. Displays the alarm no. when an alarm occurs.
		SV	Displays the set temperature of the circulating fluid.
②	**[POWER] indicator light**	Lights up when the power supply is turned on.	
③	**[RUN] indicator light**	Lights up when the [START] key is pressed.	
④	**[PUMP] indicator light**	Lights up when the pump is started.	
⑤	**[PV] indicator light**	Lights up when the temperature of the circulating fluid is displayed.	
⑥	**[FAULT] indicator light**	Lights up when the fault error to stop the thermo-chiller occurs.	
⑦	**[WARN] indicator light**	Lights up when the warning error that does not stop the thermo-chiller occurs.	
⑧	**[START] key**	Starts to operate the thermo-chiller.	
⑨	**[STOP] key**	Stops the thermo-chiller.	
⑩	**[RESET] key**	Resets the alarm.	
⑪	**[MODE] key**	Changes settings such as the offset function, etc.	
⑫	**[DOWN] key**	Decreases the set temperature.	
⑬	**[UP] key**	Increases the set temperature.	
⑭	**[FUNC] key**	Changes the display between the circulating fluid temperature and optional functions.	
⑮	**[PUMP] key**	Operates the pump independently while pressed.	

Alarm/Alarm Indicators and Explanations of Alarms

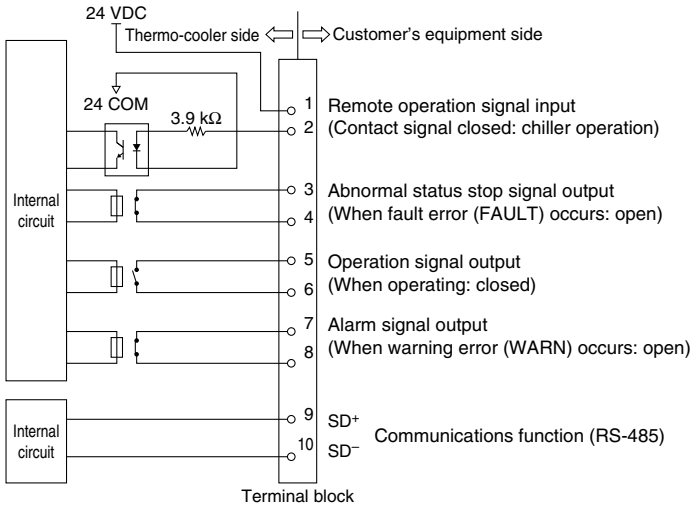
The 7 basic temperature controller alarms are displayed on the PV of the operation display panel with their alarm numbers, the fault error (FAULT) light (red LED) and warning error (WARN) light (yellow LED).
When an alarm occurs, eliminate the cause by improving the operating conditions, etc. and restart the thermo-chiller.

■ Explanations of Alarms for HRGC001/002/005

Display light	Alarm	Operation condition	Main reason
[FAULT]	Low level of fluid in tank	Stop	Level switch activated because fluid level in tank fell below LOW.
	Rise in coolant pressure	Stop	Pressure switch activated because inadequate heat dissipation caused refrigerant pressure to rise.
	Circulating fluid temperature abnormally high	Stop	Temperature sensor activated because circulating fluid temperature became too high. (fixed at 40°C)
	Overload of pump	Stop	Circulation pump overload relay activated.
	Overload of refrigerator	Stop	Refrigerator overload relay activated.

Contact Input/Output Function

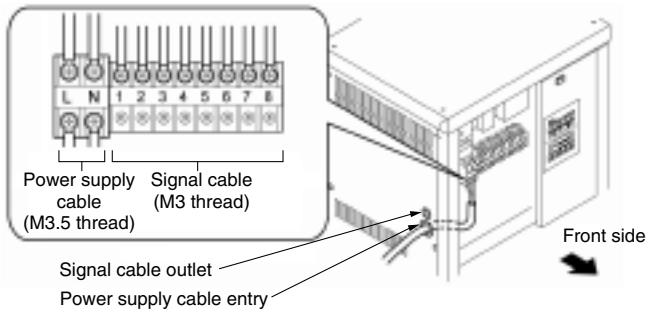
The thermo-cooler is standard-equipped with terminals that allow remote start/stop, and enable output of an operation signal, abnormal status stop signal or alarm signal. These should be used for synchronizing startup and shutdown with your other equipment, or when adding new patrol lights or buzzers. However, the contact output volume is limited, so please add patrol lights and/or buzzers for special relays (for amplification) if they are necessary.

Item		Specifications		
		HRGC001	**HRGC002**	**HRGC005**
Connector format		M3 terminal block		
Remote operation signal input	Signal type	Relay contact input (Remote start when the contact signal is closed, Remote stop when the contact signal is open.)		
	Input voltage range	24 VDC±10% (Power supply is provided on the thermo-chiller side.)		
	Input current	Max. 35 mA		
	Terminal number	1 (24 VDC), 2 (24 VCOM)		
Abnormal status stop signal output	Signal type	Relay contact output (When fault error (FAULT) occurs: open)		
	Contact capacity	250 VAC, 1 A (Resistance load)		
	Terminal number	3, 4		
Operation signal output	Signal type	Relay contact output (When operating: closed)		
	Contact capacity	250 VAC, 1 A (Resistance load)		
	Terminal number	5, 6		
Alarm signal output	Signal type	Relay contact output (When warning error (WARN) occurs: open)		
	Contact capacity	250 VAC, 1 A (Resistance load)		
	Terminal number	7, 8		
Communications function (RS-485)	Communication standard	EIA standard RS-485 compliant		
	Information orientation	Half duplex		
	Synchronization method	Asynchronous communication		
	Terminal number	9, 10		
Circuit diagram				

Note) Serial communication is optional. Refer to “Options” on page 8.

Input and output signal connection location

Remove the front panel connect a signal cable to the terminal block inside the electrical component enclosure.



Other Features

Anti-freezing function

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

Series HRGC
Options

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

B Option symbol
With Circuit Breaker

HRGC□□□-□□-B

B: With circuit breaker

In the event of a short circuit, overcurrent or overheating, the circuit breaker will automatically shut off the power supply.
The power supply can be switched on or off easily from the main unit.

Applicable model	HRGC001-□□-B	HRGC002-□□-B	HRGC005-□□-B
Pole number	2		
Rated current sensitivity (mA)	30		
Rated shutdown current (A)	15		30
Short circuit display method	Mechanical button		

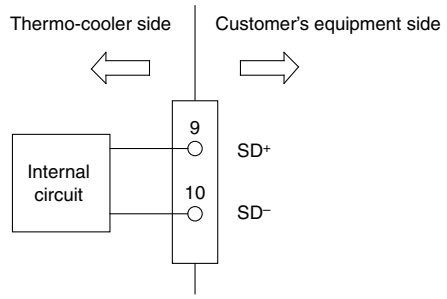
Breaker mounting location
Remove the front panel. The circuit breaker is mounted inside the electrical component enclosure.

C Option symbol
With Communications Function (RS-485)

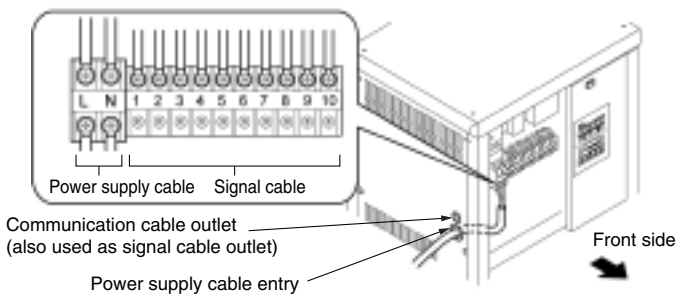
HRGC□□□-□□-C

C: With communications function (RS-485)

With a host PC programmed in accordance with your manufacturing processor method, the communications function allows you to set (write) or monitor (read) the circulating fluid temperature.
<Writing>
Circulating fluid temperature setting (SV)
<Readout>
Circulating fluid present temperature (PV)
Circulating fluid temperature setting (SV)

Applicable model	HRGC001-□□-C	HRGC002-□□-C	HRGC005-□□-C
Connector number	9 (SD^+), 10 (SD^-)		
Connector format (thermo-cooler side)	M3 terminal block		
Standards	EIA standard RS-485 compliant		
Protocol	Special protocol: For details, Refer to the Communications Specifications document.		
Circuit configuration diagram			

Communication connection location
Remove the front panel, and connect your communication cable to the terminal block mounted inside the electrical component enclosure.



Series HRGC
Optional Accessories

Note) Please order separately. Necessary to be fitted by the customer.

Specifications

Description	Description	Specifications	Applicable thermo-coolers
Dustproof filter set 	Prevents performance degradation when using air-cooled refrigerator thermo-coolers in dusty or contaminated environments.	Maximum ambient temperature 40°C	HRGC001-A□ to 005-A

How to Order

[Dustproof filter set]

HRGC-FL ☐

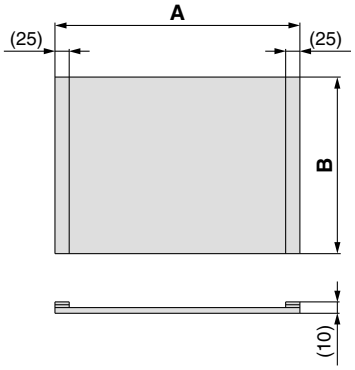
Applicable thermo-coolers

Symbol	Applicable thermo-coolers	Quantity per set
001	HRGC001-A□ HRGC002-A□	1
005	HRGC005-A□	1

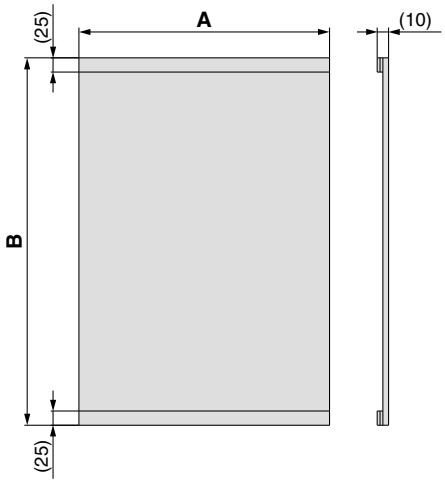
Dimensions

[Dustproof filter set]

HRGC-FL001



HRGC-FL005



(mm)

Part no.	A	B	C	Quantity per set
HRGC-FL001	475	310	10	1
HRGC-FL005	430	530	10	1

Mounting Example

[Dustproof filter set]

① This dustproof filter is secured with hook-and-loop tape. This is sewed onto the male side of the surface fastener, and has adhesive tape backing for fixing to the female side.
② Remove the paper covering of the adhesive tape and affix the loop tape to the external panel of the ventilation hole on the thermo-cooler.
③ Simply press the hook tape on to the loop tape to mount the dustproof filter.