Peltier-type Chiller

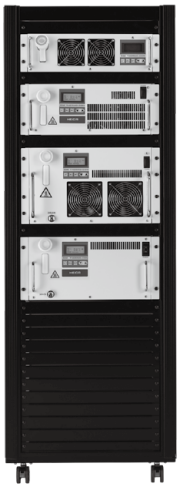
Thermo-con/Rack Mount Type Air-cooled Water-cooled

HECR Series

(UL Standards)

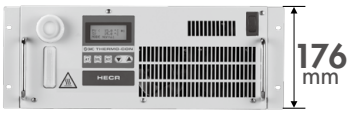
RoHS

Space-saving design with reduced height



Low profile specifications

Air-cooled 510 W



Air-cooled 200 W, 400 W, 510 W

Air-cooled 800 W, 1 kW

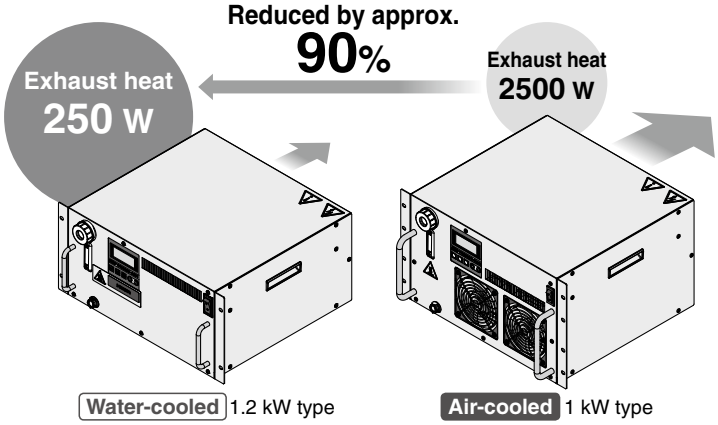
Water-cooled 800 W, 1.2 kW

Mountable in a 19-inch rack

Space can be saved by mounting multiple pieces of equipment together in a single rack.

Water-cooled type (800 W, 1.2 kW)

Reduces the amount of exhaust heat by **90**% Suppresses rises in the ambient temperature



Water-cooled 1.2 kW type

Air-cooled 1 kW type

Temperature stability	Set temperature range	Cooling capacity With heating function
±0.01°C to 0.03°C	10°C to 60°C	200 W, 400 W, 510 W, 800 W, 1 kW, 1.2 kW

Air-cooled

Water-cooled

Can precisely control the temperature of a heat source or process fluid

Precisely control the temperature of the circulating fluid by using the Peltier device.
Refrigerant-free and environmentally friendly.

▸ Low-noise design

48 dB Water-cooled

This product generates less vibration, dust, and noise due to its lack of moving parts, such as a compressor. In particular, the water-cooled type is quieter as it uses no fans. For the air-cooled type (excluding the 200 W) as well, noise is reduced by suppressing the number of fan rotations when the cooling load is low.

Noise level

49 dB	Air-cooled	HECR002
55 dB		HECR004/006(L)*1
54 dB		HECR008/010*2
48 dB	Water-cooled	HECR008/012

*1 200 W load *2 500 W load

▸ Energy-saving design

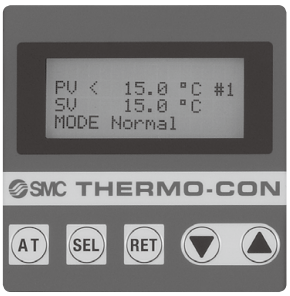
200 W Water-cooled

Power consumption

200 W	Air-cooled	HECR004/006(L)*1
400 W		HECR008/010*2
300 W	Water-cooled	HECR008*2
200 W		HECR012*2

*1 200 W load *2 500 W load

▸ Simple operation



❶ Turn the power ON.
❷ Press the (SEL) key, and adjust the temperature setting with the (▼)(▲) keys.
❸ Press the (RET) key to complete.

Fluid fill port

Fluid can be supplied without removing the product from the rack.

Rack mounting bracket

A floor type is also available. (Option)
The rack mounting brackets and the handles can be removed and rubber feet can be mounted instead. (Refer to page 513 for details.)

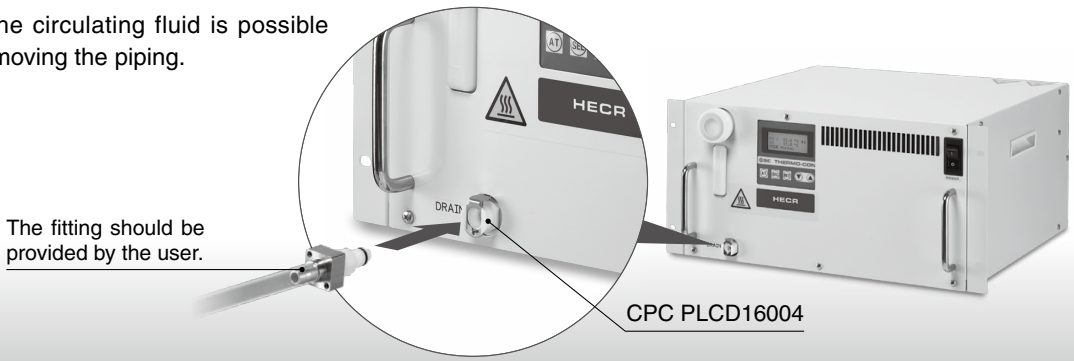
The circulating fluid volume can be checked.

Drain pan

The product comes equipped with a drain pan to avoid any risk of fluid leakage flowing over equipment mounted on lower racks.

▸ Drain port provided on the front (800 W, 1 kW, 1.2 kW type)

Draining the circulating fluid is possible without removing the piping.



Variations

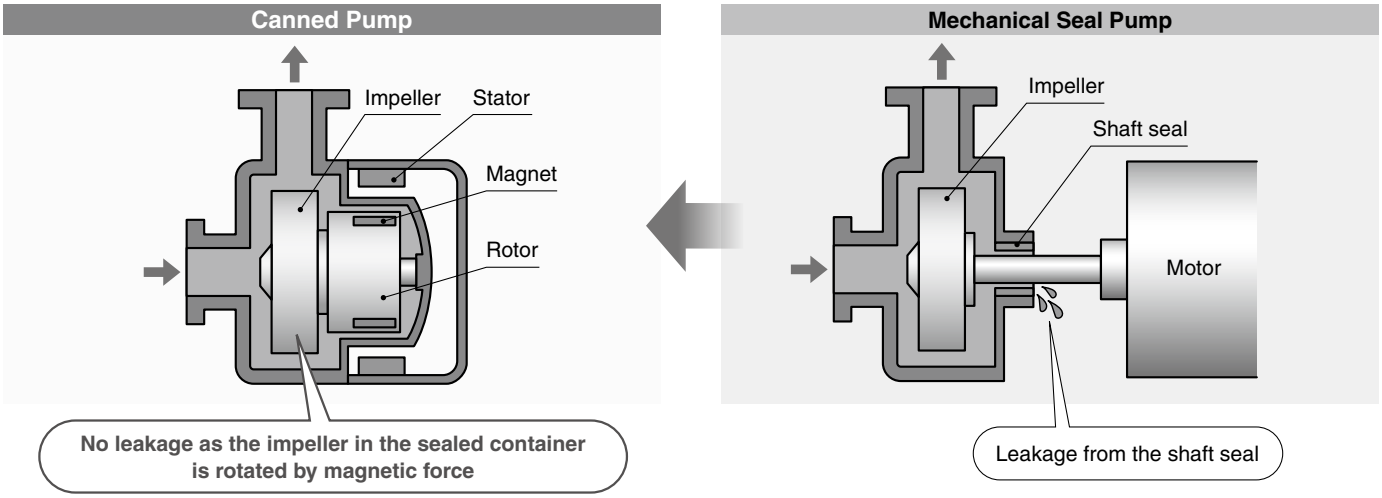
	Series	Cooling capacity	Heating capacity	Cooling method	Temperature stability	Power supply	Circulating fluid	Options (p. 513)	International standards
Air-cooled	**HECR002-A**	200 W	600 W	Peltier-type air-cooled	±0.01 to 0.03°C	Single-phase 100 to 240 VAC (50/60 Hz)	· Tap water · Ethylene glycol 20%	· With feet/Without rack mounting brackets · With flow switch*1 · Diagonal opening tank*1 · High-pressure pump mounted	CE, UKCA, cULus (UL Standards)
	004-A	400 W	1 kW						
	006-A	510 W	1.2 kW						
	New **HECR006L-A**	510 W	1.2 kW						
	HECR008-A	800 W	1.4 kW						
	010-A	1 kW	2 kW			Single-phase 200 to 240 VAC (50/60 Hz)			
Water-cooled	**HECR008-W**	800 W	1.4 kW	Peltier-type water-cooled		Single-phase 100 to 240 VAC (50/60 Hz)			
	012-W	1.2 kW	2 kW			Single-phase 200 to 240 VAC (50/60 Hz)			

*1 Not applicable to HECR006L.

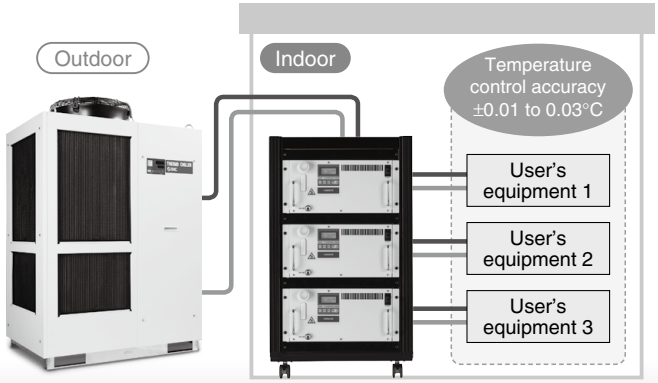
▸ Reduces pump maintenance time (Maintenance-free pump)

A mechanical sealless canned pump is used.

As the circulating fluid of the pump cannot leak externally, checks for pump leakage and maintenance of the shaft seal are not necessary.



▸ Application example for the water-cooled thermo-con



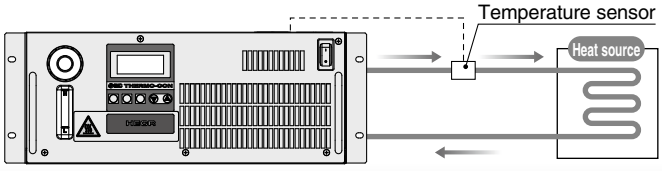
Thermo-chiller for facility water circuit
HRSH Series
HRS100/150 Series

Water-cooled thermo-con
HECR-W

▸ Learning control function

(Temperature control by external temperature sensor)

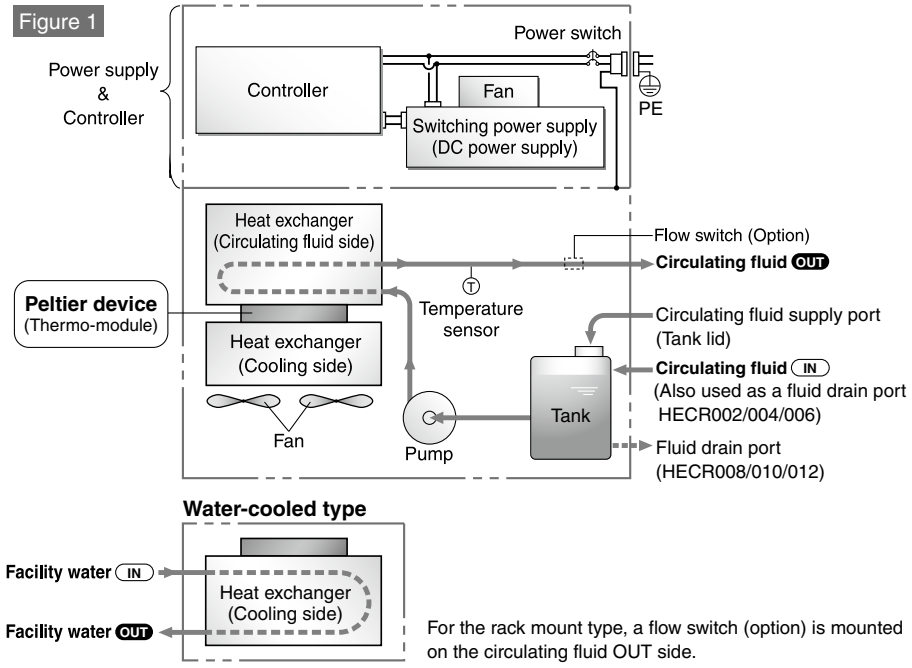
This function adjusts the fluid temperature to the set value with an automatic offset setting. Setting the external temperature sensor at the circulating fluid inlet located just in front of the heat source allows the thermo-con to sample the fluid temperature. This function is effective in automatically adjusting for heat exhaust from piping, etc.



If the external temperature sensor is installed directly on the heat source, the learning control function may not work properly due to a large heat volume or large temperature difference. Be sure to install the sensor at the circulating fluid inlet.

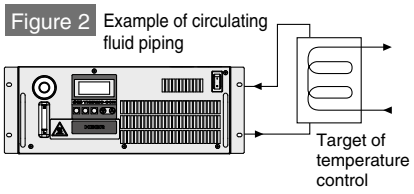
Construction and Principles

Figure 1



For the rack mount type, a flow switch (option) is mounted on the circulating fluid OUT side.

Figure 2 Example of circulating fluid piping



The thermo-con is constructed as shown in Figure 1. It interposes a Peltier device (thermo-module) between the heat exchangers for the circulating fluid and facility water and controls the DC power supply to achieve the target circulating fluid outlet temperature.

The circulating fluid returns to the tank and is transferred by the pump which is built into the thermo-con, then it goes through the heat exchangers and temperature sensor and out from the circulating fluid outlet.

Figure 2 shows an example of circulating fluid piping. The circulating fluid is transferred at a constant temperature by the pump.

CONTENTS

HECR Series

Applications p. 16 **Circulating Fluid/Facility Water Line Equipment** p. 21 **Maintenance Service** p. 23

HECR Series
Model Selection

Guide to Model Selection

1. How much is the temperature in degrees centigrade for the circulating fluid?

Temperature range which can be set with the thermo-con: 10 to 60°C

If a lower temperature (down to –20°C) or higher temperature (up to 90°C) than this range is necessary, select the thermo-chiller HRZ series.

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

Circulating fluids that can be used in the thermo-con: Tap water, Ethylene glycol 20%

When using fluorinated fluids, select the water-cooled thermo-con HEC series.

3. How much cooling capacity required?

Allows a safety factor of 20% over the capacity that is actually required, taking into account the changes in the operating conditions. If a larger capacity than this thermo-con is necessary, select the Peltier-type thermo-con HEC series (refer to the following.) or the refrigerated thermo-chiller HRS/HRZ series.

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

Heat generation amount: 400 W

Cooling capacity = Considering a safety factor of 20%,

400 W x 1.2 = 480 W

Thermo-con/*HEC Series*

High-precision temperature control type for semi-conductor manufacturing equipment, medical equipment, etc.

- **Cooling capacity: 140 W to 1200 W**
- **Temperature stability: ±0.01°C to 0.03°C**

For details, refer to page 518.

Guide to Model Selection

Example 2 | When the heat generation amount in the user's equipment is not known.

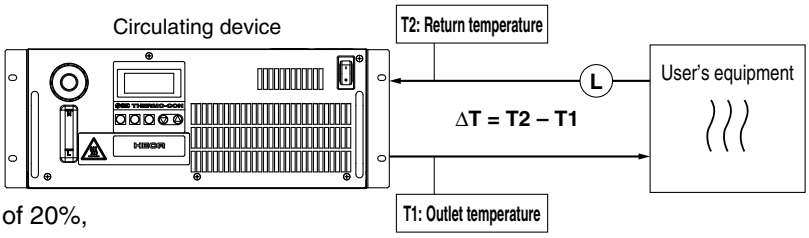
Obtain the temperature difference between inlet and outlet by circulating the fluid inside the user's equipment.

Heat generation amount **Q** : Unknown
Circulating fluid temperature difference Δ**T** (= **T2** – **T1**) : 0.8°C (0.8 K)
Circulating fluid outlet temperature **T1** : 25°C (298.15 K)
Circulating fluid return temperature **T2** : 25.8°C (298.95 K)
Circulating fluid flow rate **L** : 3 L/min
Circulating fluid : Water
Density γ: 1 x 10^3 kg/m^3
Specific heat **C**: 4.2 x 10^3 J/(kg·K)

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

$$= \frac{0.8 \times 3 \times 1 \times 10^3 \times 4.2 \times 10^3}{60 \times 1000}$$

$$= 167\ W$$



Cooling capacity = Considering a safety factor of 20%,

167 W x 1.2 = 200 W

Example 3 | When cooling the object below a certain temperature in certain period of time.

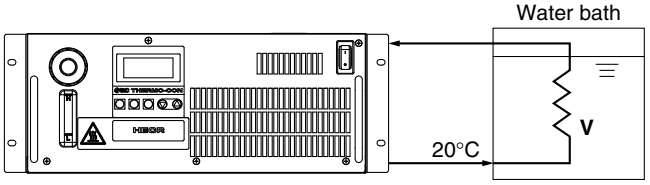
Cooled substance total volume **V** : 2 L
Cooling time **h** : 15 min
Cooling temperature difference Δ**T** : Temperature difference: 10°C (10 K). Cool from 30°C (303 K) to 20°C (293 K).
Circulating fluid : Tap water
Density γ: 1 x 10^3 kg/m^3
Specific heat **C**: 4.2 x 10^3 J/(kg·K)

∗ Refer to the information shown below for the typical physical property values by circulating fluid.

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

$$= \frac{10 \times 2 \times 1 \times 10^3 \times 4.2 \times 10^3}{15 \times 60 \times 1000}$$

$$= 93.3\ W$$



After 15 min, cool 30°C down to 20°C.

Cooling capacity = Considering a safety factor of 20%,

93.3 W x 1.2 = 112 W

Precautions on Model Selection

The flow rate of the circulating fluid depends on the pressure loss of the user's equipment and the length, diameter and resistance created by bends in the circulating fluid piping, etc. Check if the required flow rate of circulating fluid can be obtained before selecting.

Circulating Fluid Typical Physical Property Values

Ethylene Glycol Solution 20%

Temperature [°C]	Density ρ [kg/m^3]	Specific heat C [J/(kg·K)]
10	1.03 x 10^3	3.93 x 10^3
20	1.03 x 10^3	3.95 x 10^3
30	1.02 x 10^3	3.97 x 10^3
40	1.02 x 10^3	3.98 x 10^3
50	1.01 x 10^3	4.00 x 10^3
60	1.01 x 10^3	4.02 x 10^3

Water

Density γ: 1 x 10^3 [kg/m^3] **Specific heat C: 4.2 x 10^3 [J/(kg·K)]**

Thermo-con/ Rack Mount Type

HECR Series **Air-cooled**

(UL Standards)

How to Order

Power supply

5	100 to 240 VAC

Compact type

Cooling capacity

006	510 W

Option

Nil	None
E	With feet/Without rack mounting brackets
P	High-pressure pump mounted

Compact type specifications

HECR 006 L – A 5 □ – □

HECR 002 – A 5 □ – □

Cooling capacity

002	200 W
004	400 W
006	510 W
008	800 W
010	1 kW

Radiating method

A	Air-cooled

Pipe thread

Nil	Rc
N	NPT thread

Option

Nil	None
E	With feet/Without rack mounting brackets
F	With flow switch
J	Diagonal opening tank
P	High-pressure pump mounted

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

Power supply

2	200 to 240 VAC	HECR010
5	100 to 240 VAC	HECR002, 004, 006, 008

Specifications

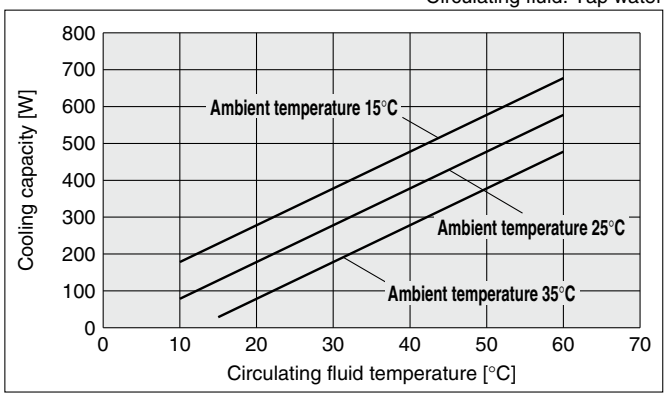
Model		HECR002-A	HECR004-A	HECR006-A	HECR006L-A	HECR008-A	HECR010-A
Cooling method		Thermoelectric device (Thermo-module)					
Radiating method		Forced air cooling					
Control method		Cooling/Heating automatic shift PID control					
Ambient temperature/humidity		10 to 35°C, 35 to 80% RH (No condensation)					
Circulating fluid system	**Circulating fluid**	Tap water, Ethylene glycol 20%					
	Set temperature range	10.0 to 60.0°C (No condensation)					
	Cooling capacity	200 W (Tap water)*1	400 W (Tap water)*1	510 W (Tap water)*1		800 W (Tap water)*2	1 kW (Tap water)*2
	Heating capacity	600 W (Tap water)*1	1 kW (Tap water)*1	1.2 kW (Tap water)*1		1.4 kW (Tap water)*2	2 kW (Tap water)*2
	Temperature stability*3	±0.01 to 0.03°C					
	Pump capacity	Refer to the performance charts. (Pages 502 and 503)					
	Tank capacity	Approx. 1.3 L			Approx. 0.4 L	Approx. 1.3 L	
	Port size	Rc1/4	Rc3/8				
	Fluid contact material	Stainless steel, EPDM, NBR, Ceramics, PPE, Carbon, PP, PE, PPS (High pressure)	Stainless steel, EPDM, NBR, Ceramics, PPE, PPS, Carbon, PP, PE, Nylon, POM (HECR008, 010), PVC (High pressure)				
Electrical system	**Power supply**	Single-phase 100 to 240 VAC ±10%, 50/60 Hz					Single-phase 200 to 240 VAC ±10%, 50/60 Hz
	Overcurrent protector	10 A	14 A				
	Current consumption	5 A (100 V) to 2.5 A (240 V)	9 A (100 V) to 4 A (240 V)			10 A (100 V) to 4 A (240 V)	8 A (200 V)
	Power consumption	440 W*1	850 W*1			900 W*2	1500 W*2
	Alarm	Refer to "Alarm." (Page 512)					
	Communications	RS-232C/RS-485					
Weight		Approx. 14 kg	Approx. 18 kg	Approx. 21 kg	Approx. 20 kg	Approx. 31 kg	Approx. 33 kg
Accessories		Power supply connector, Operation Manual Power supply cable should be ordered as an option (sold separately, page 514) or prepared by the user.					
Safety standards		CE/UKCA marking, UL (NRTL) standards					

*1 Conditions: Set temperature 25°C, Ambient temperature 25°C, Circulating flow rate 3 L/min
*2 Conditions: Set temperature 25°C, Ambient temperature 25°C, Circulating flow rate 4 L/min
*3 The indicated values are with a stable load without turbulence in the operating conditions. It may be out of this range in some other operating conditions.

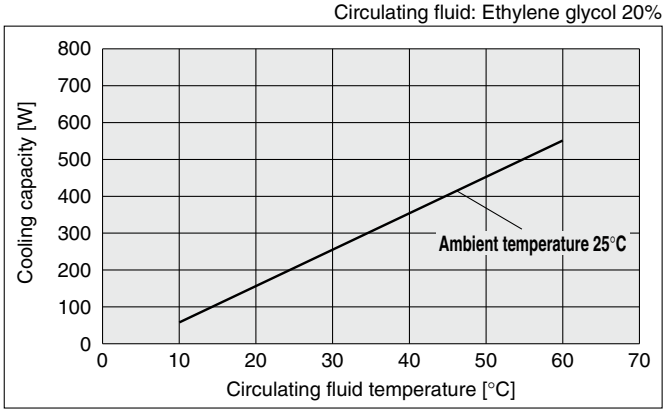
Cooling Capacity

HECR002-A

Circulating fluid: Tap water

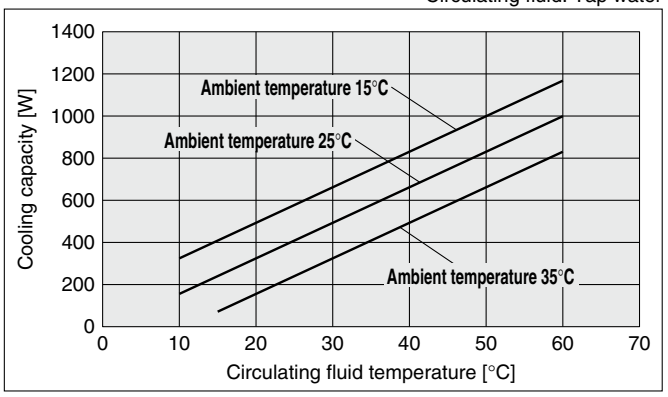


Circulating fluid: Ethylene glycol 20%

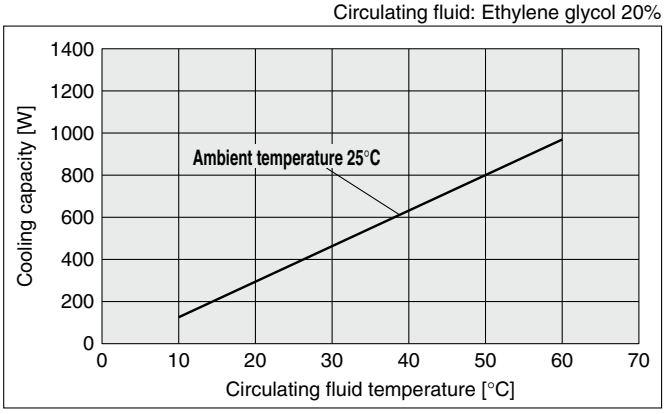


HECR004-A

Circulating fluid: Tap water

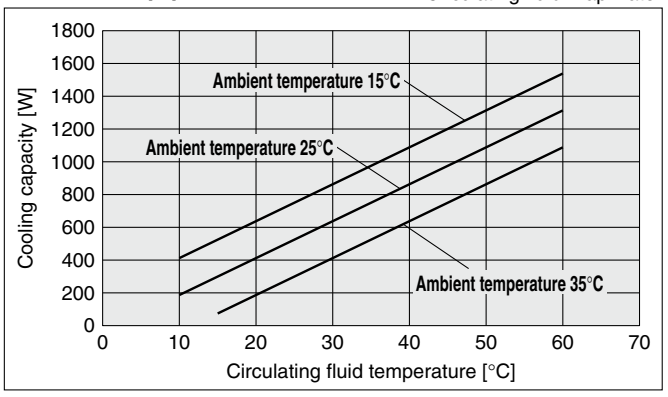


Circulating fluid: Ethylene glycol 20%

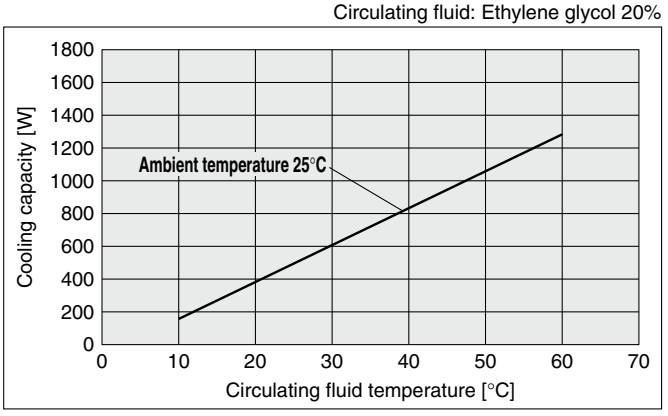


HECR006(L)-A

Circulating fluid: Tap water

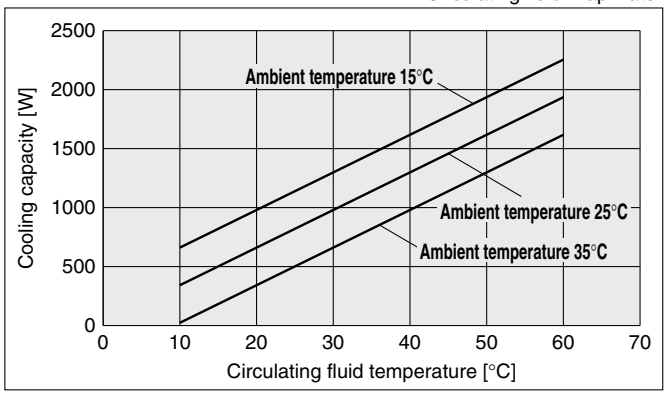


Circulating fluid: Ethylene glycol 20%

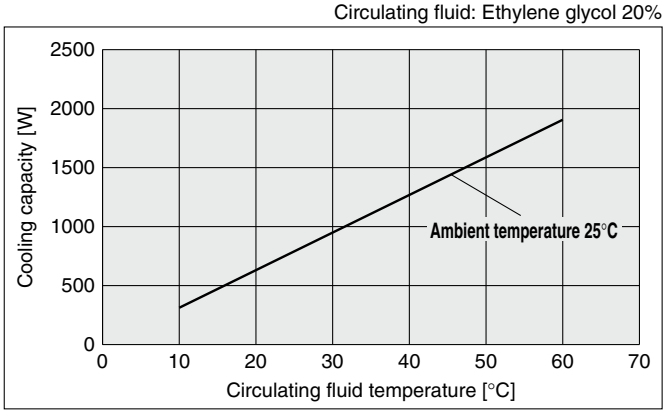


HECR008-A

Circulating fluid: Tap water



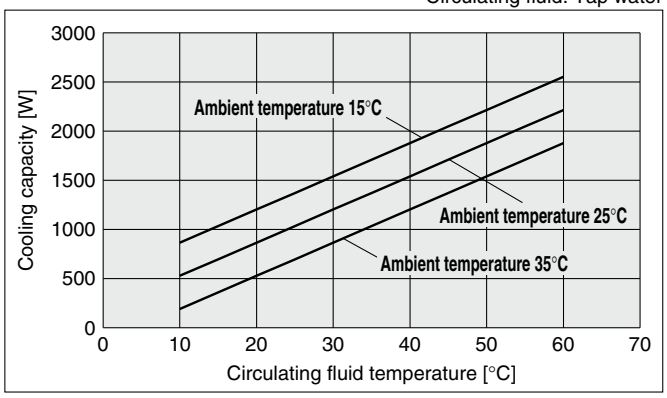
Circulating fluid: Ethylene glycol 20%



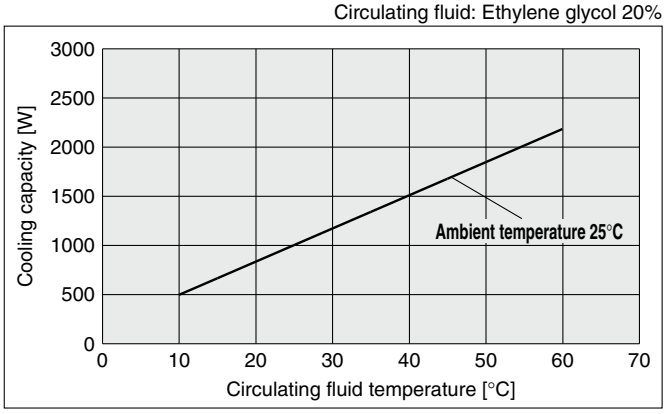
Cooling Capacity

HECR010-A

Circulating fluid: Tap water



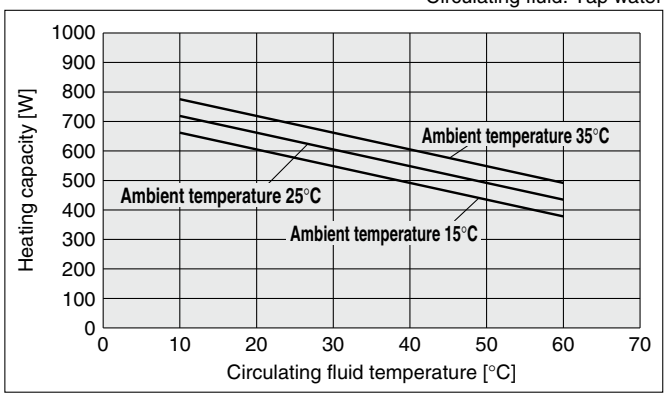
Circulating fluid: Ethylene glycol 20%



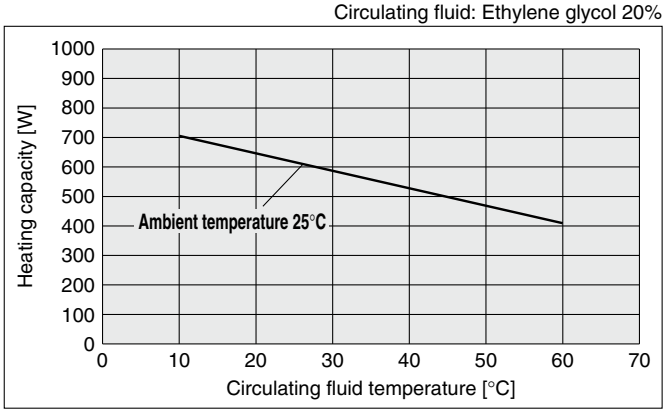
Heating Capacity

HECR002-A

Circulating fluid: Tap water

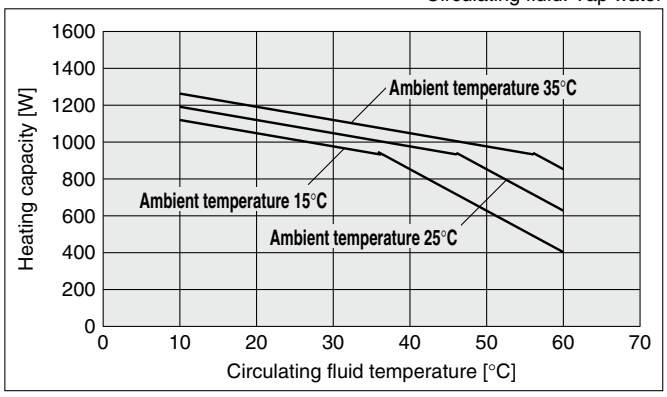


Circulating fluid: Ethylene glycol 20%

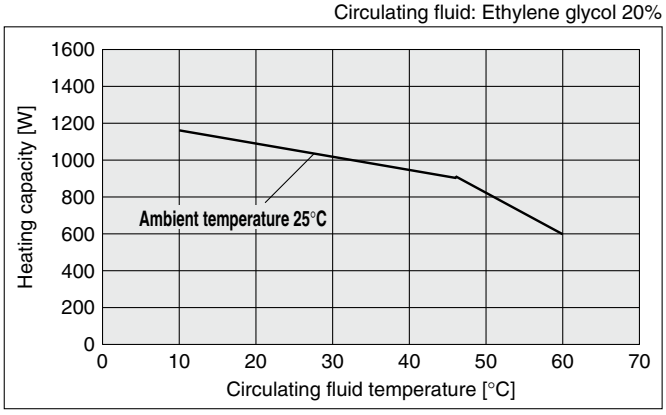


HECR004-A

Circulating fluid: Tap water

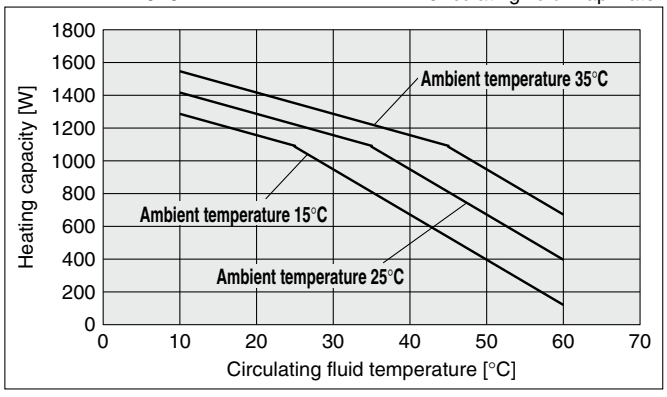


Circulating fluid: Ethylene glycol 20%

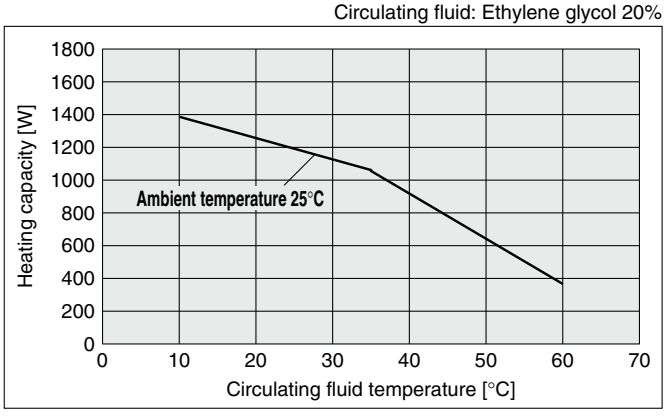


HECR006(L)-A

Circulating fluid: Tap water



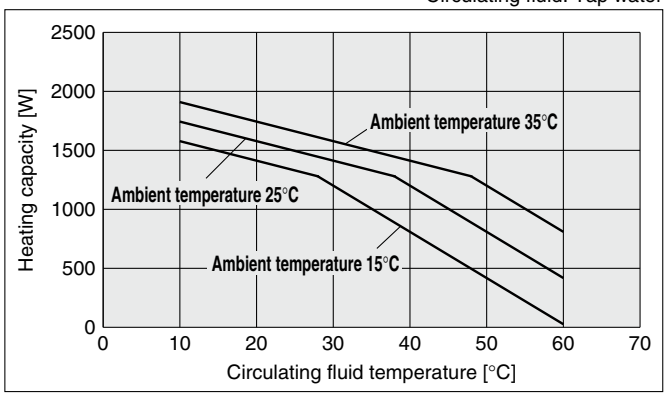
Circulating fluid: Ethylene glycol 20%



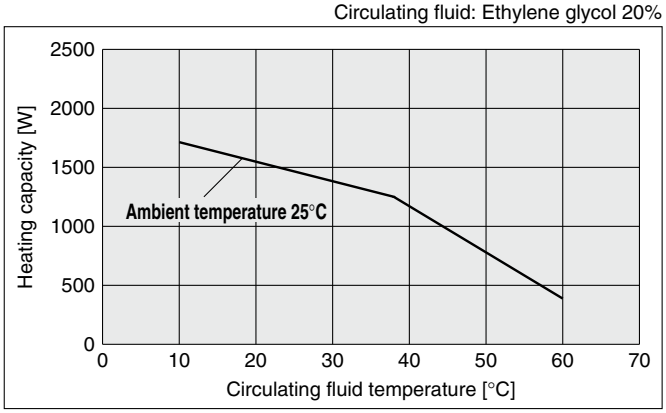
Heating Capacity

HECR008-A

Circulating fluid: Tap water

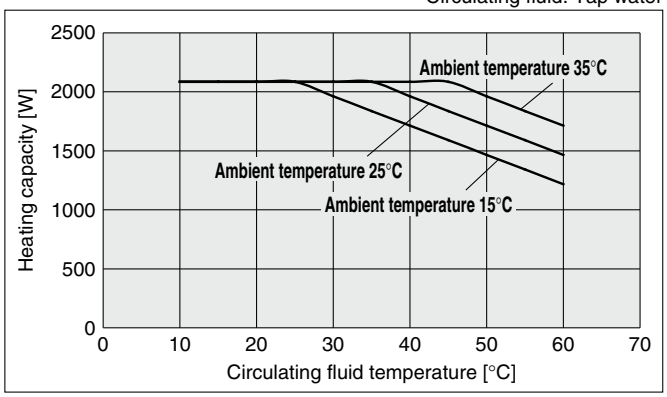


Circulating fluid: Ethylene glycol 20%

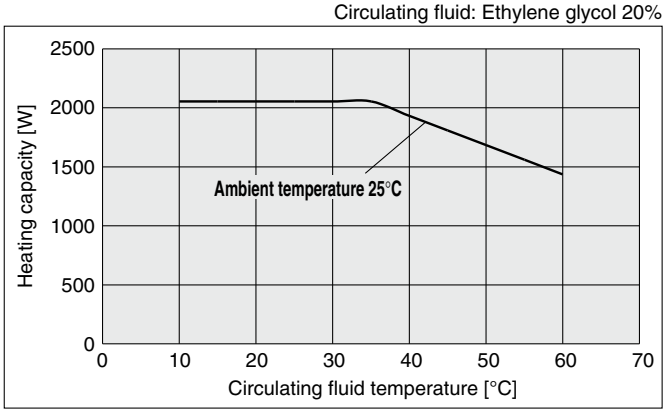


HECR010-A

Circulating fluid: Tap water



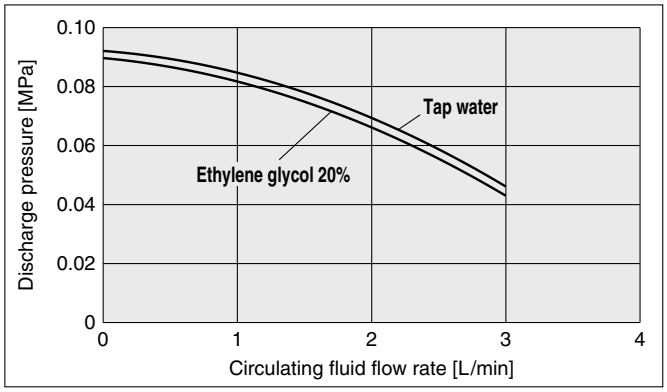
Circulating fluid: Ethylene glycol 20%

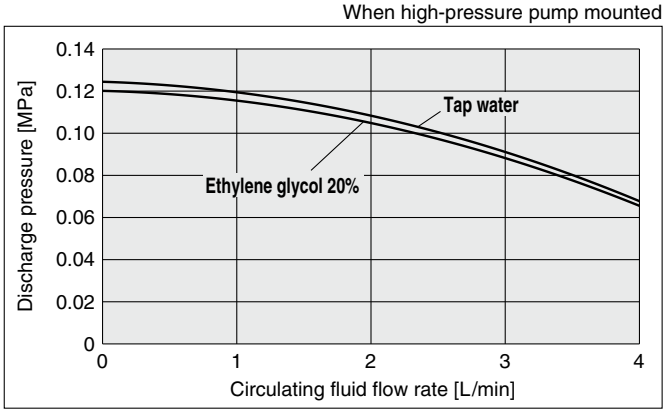


Pump Capacity (Thermo-con Outlet)

HECR002-A

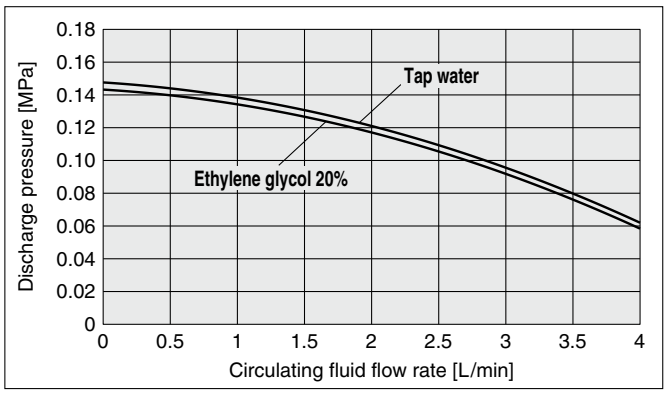
When high-pressure pump mounted

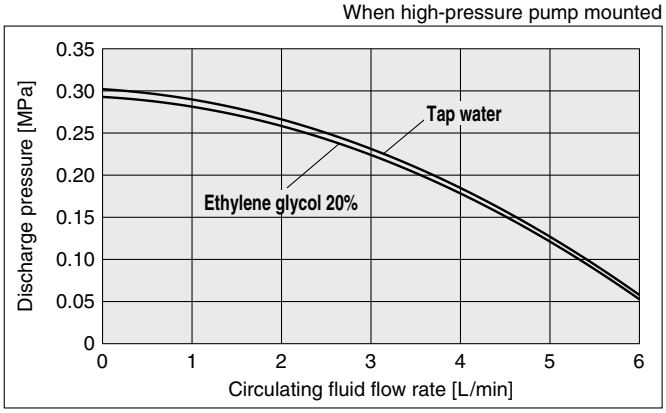




HECR004-A

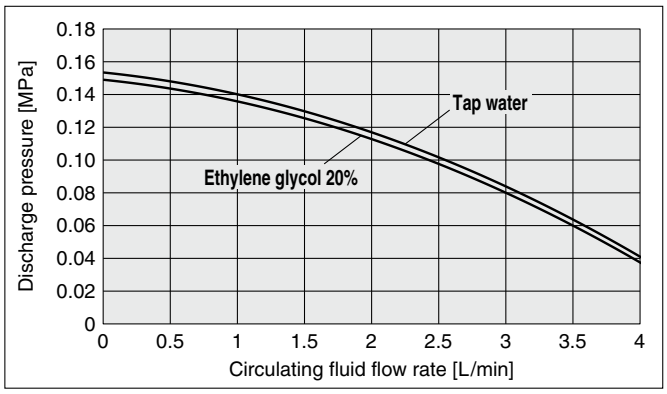
When high-pressure pump mounted



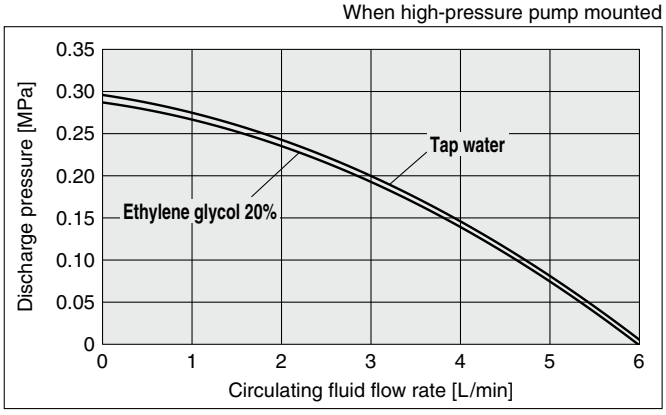


Pump Capacity (Thermo-con Outlet)

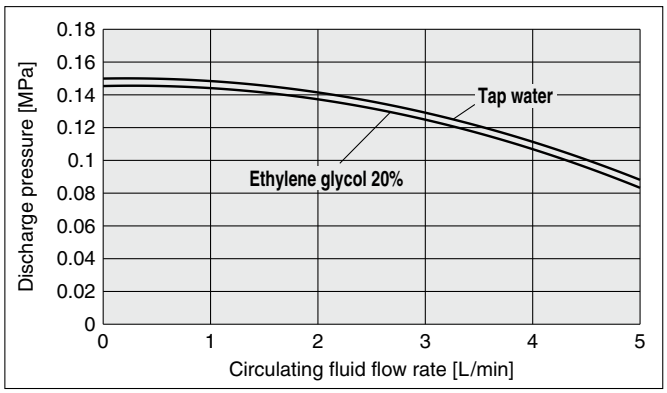
HECR006(L)-A



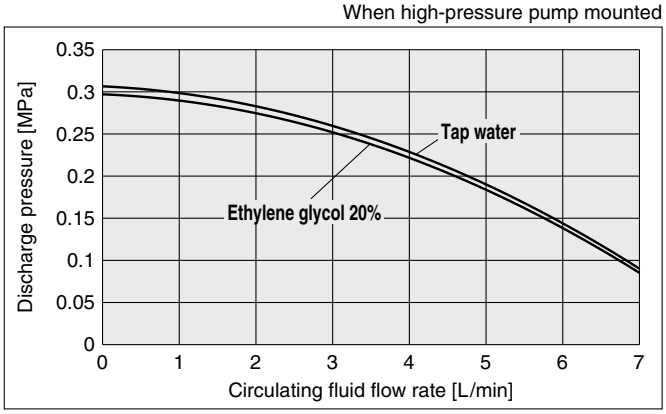
When high-pressure pump mounted



HECR008-A/010-A

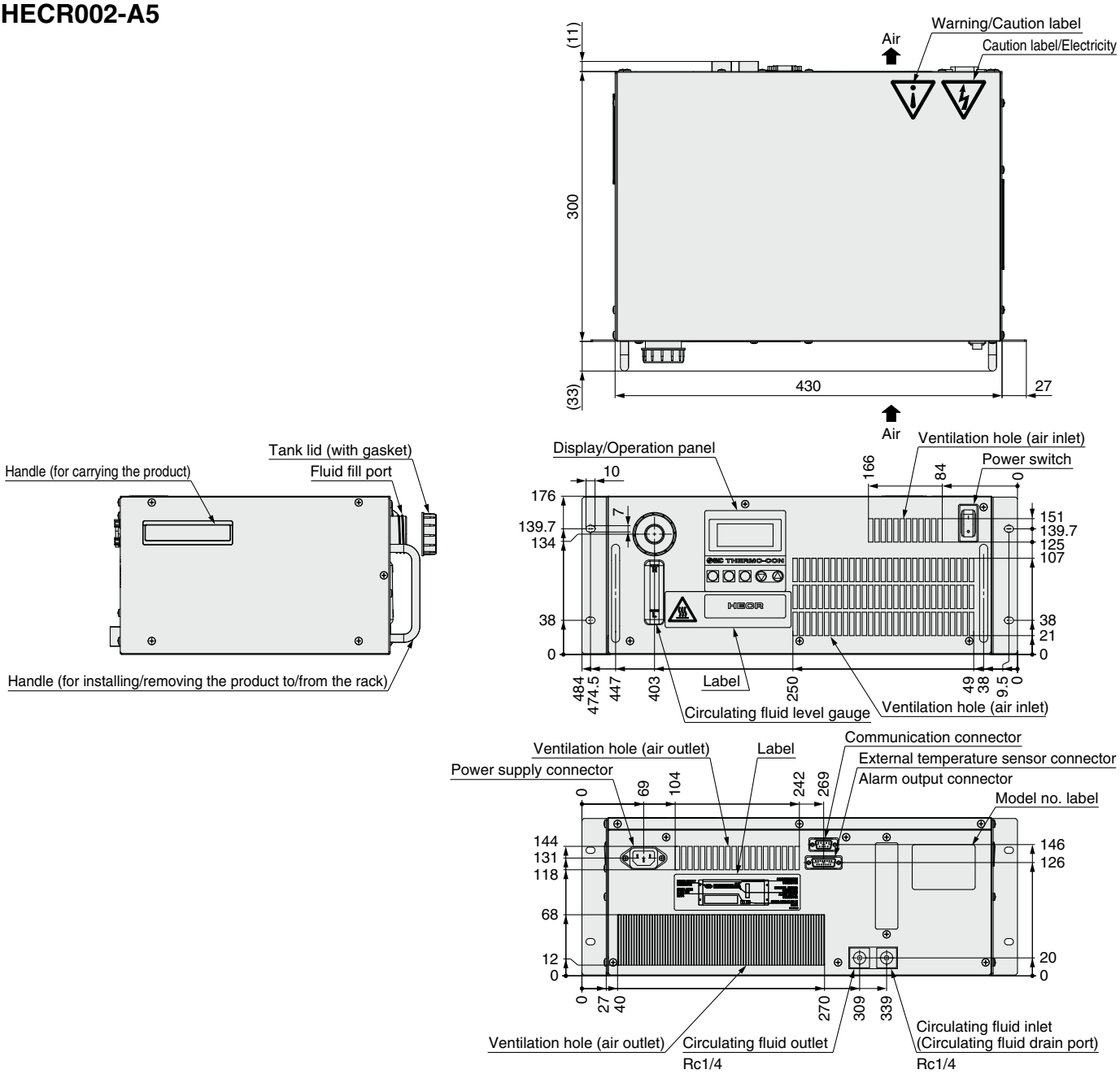


When high-pressure pump mounted



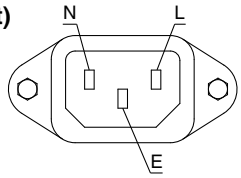
Dimensions

HECR002-A5



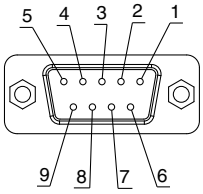
1. Power supply connector
IEC60320 C14 (or equivalent)

Pin no.	Signal contents
N	100-240 VAC
L	100-240 VAC
E	PE



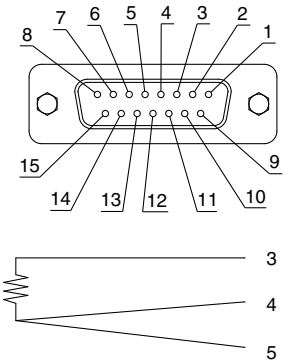
2. Communication connector
D-sub 9 pin (socket)
Holding screw: M2.6

Pin no.	Signal contents	
	RS-232C	RS-485
1	Unused	BUS+
2	RD	Unused
3	SD	Unused
4	Unused	Unused
5	SG	SG
6-8	Unused	Unused
9	Unused	BUS–



3. External temperature sensor connector/Alarm output connector
D-sub 15 pin (socket)
Holding screw: M2.6

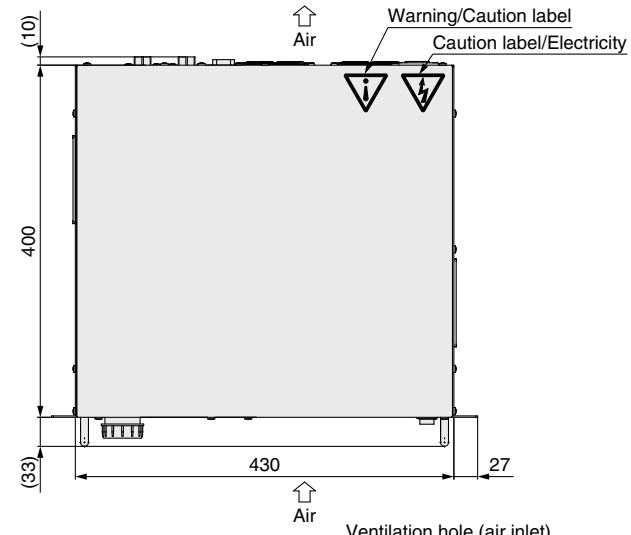
Pin no.	Signal contents
1-2	Unused
3	Terminal A of resistance temperature detector
4	Terminal B of resistance temperature detector
5	Terminal B of resistance temperature detector
6	Contact a for output cutoff alarm (open when alarm occurs)
7	Common for output cutoff alarm
8	Contact b for output cutoff alarm (closed when alarm occurs)
9	Contact a for upper/lower temp. limit alarm (open when alarm occurs)
10	Common for upper/lower temp. limit alarm
11	Contact b for upper/lower temp. limit alarm (closed when alarm occurs)
12-14	Unused
15	FG

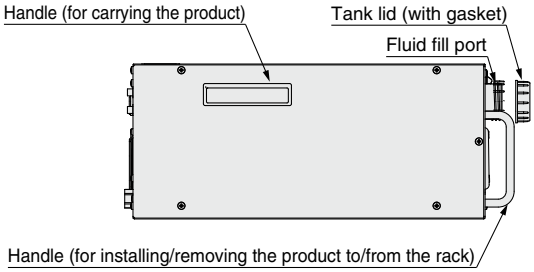


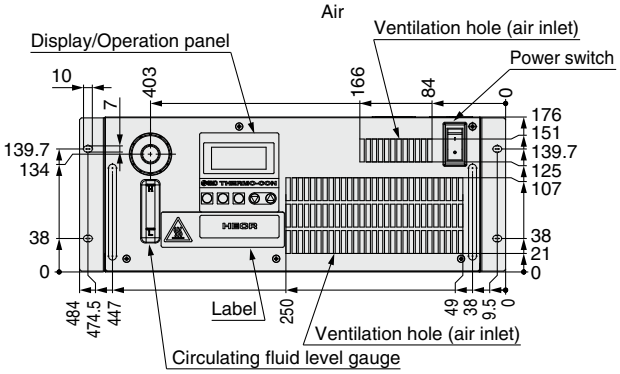
Connection diagram of resistance temperature detector

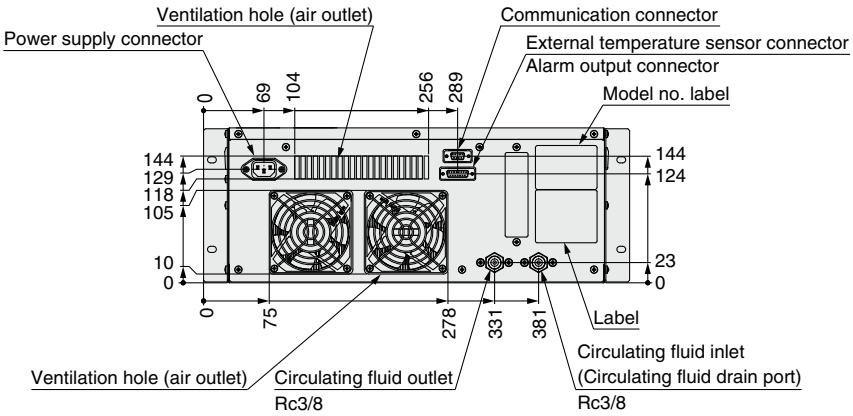
Dimensions

HECR004-A5



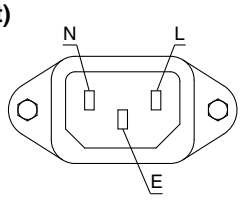






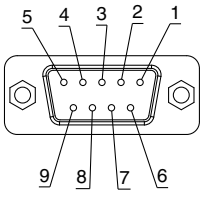
1. Power supply connector
IEC60320 C14 (or equivalent)

Pin no.	Signal contents
N	100-240 VAC
L	100-240 VAC
E	PE



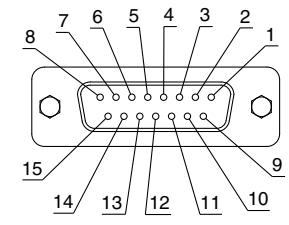
2. Communication connector
D-sub 9 pin (socket)
Holding screw: M2.6

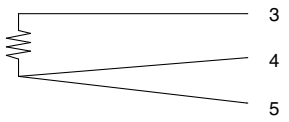
Pin no.	Signal contents	
	RS-232C	RS-485
1	Unused	BUS+
2	RD	Unused
3	SD	Unused
4	Unused	Unused
5	SG	SG
6-8	Unused	Unused
9	Unused	BUS–



3. External temperature sensor connector/Alarm output connector
D-sub 15 pin (socket)
Holding screw: M2.6

Pin no.	Signal contents
1-2	Unused
3	Terminal A of resistance temperature detector
4	Terminal B of resistance temperature detector
5	Terminal B of resistance temperature detector
6	Contact a for output cutoff alarm (open when alarm occurs)
7	Common for output cutoff alarm
8	Contact b for output cutoff alarm (closed when alarm occurs)
9	Contact a for upper/lower temp. limit alarm (open when alarm occurs)
10	Common for upper/lower temp. limit alarm
11	Contact b for upper/lower temp. limit alarm (closed when alarm occurs)
12-14	Unused
15	FG

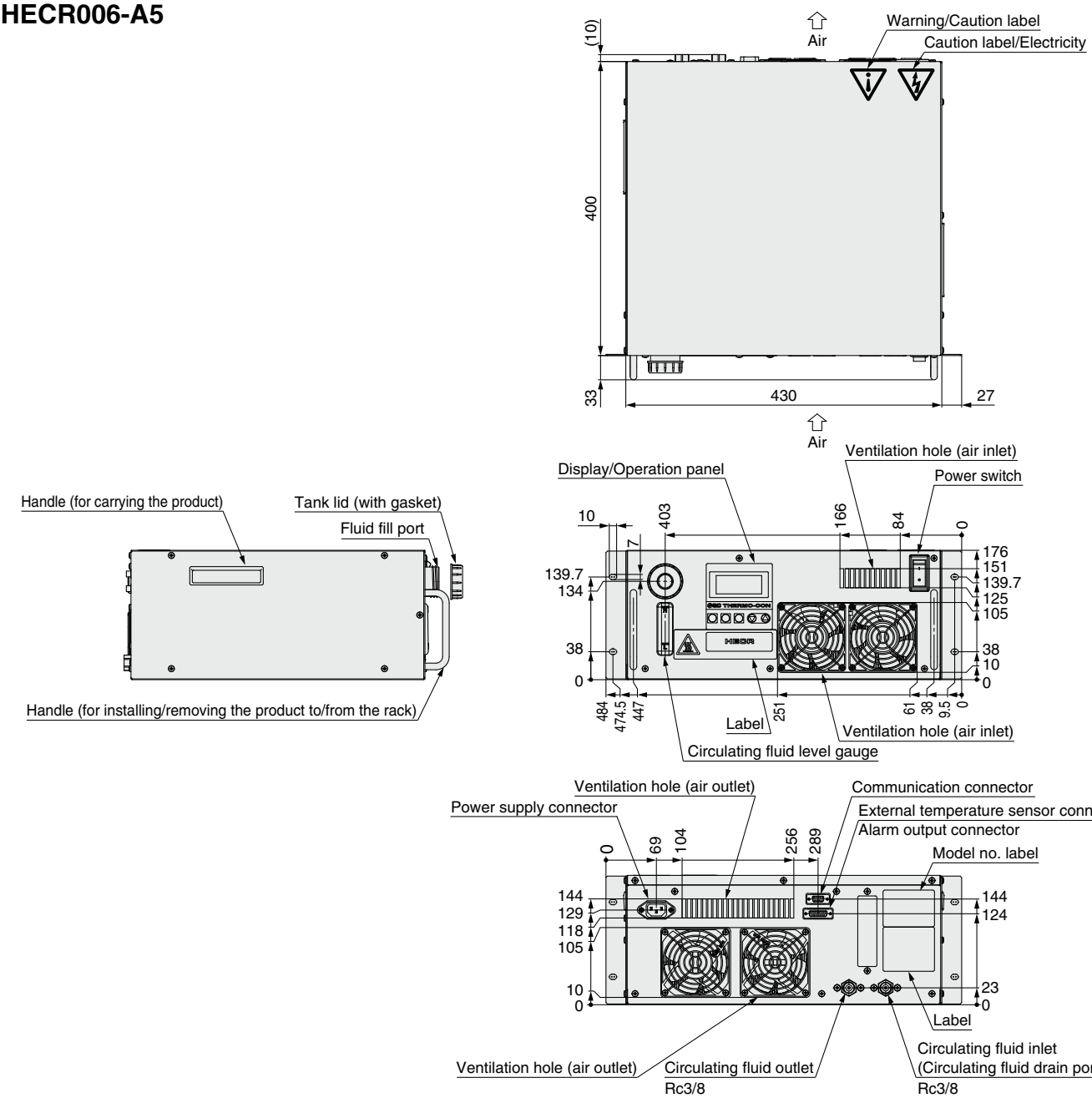




Connection diagram of resistance temperature detector

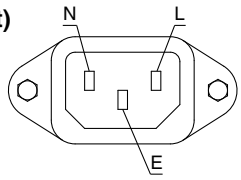
Dimensions

HECR006-A5



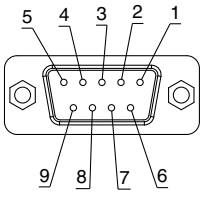
1. Power supply connector
IEC60320 C14 (or equivalent)

Pin no.	Signal contents
N	100-240 VAC
L	100-240 VAC
E	PE



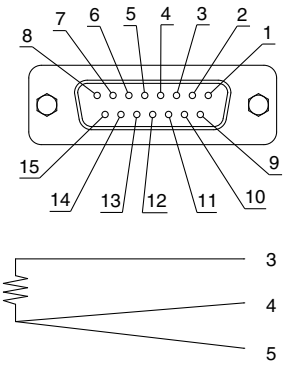
2. Communication connector
D-sub 9 pin (socket)
Holding screw: M2.6

Pin no.	Signal contents	
	RS-232C	RS-485
1	Unused	BUS+
2	RD	Unused
3	SD	Unused
4	Unused	Unused
5	SG	SG
6-8	Unused	Unused
9	Unused	BUS–



3. External temperature sensor connector/Alarm output connector
D-sub 15 pin (socket)
Holding screw: M2.6

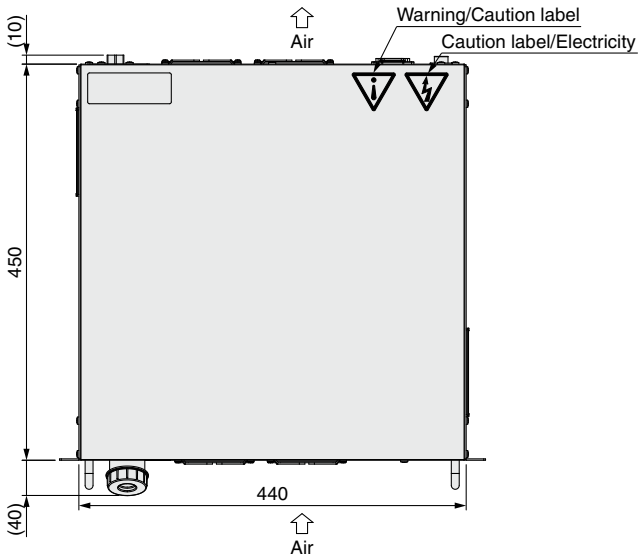
Pin no.	Signal contents
1-2	Unused
3	Terminal A of resistance temperature detector
4	Terminal B of resistance temperature detector
5	Terminal B of resistance temperature detector
6	Contact a for output cutoff alarm (open when alarm occurs)
7	Common for output cutoff alarm
8	Contact b for output cutoff alarm (closed when alarm occurs)
9	Contact a for upper/lower temp. limit alarm (open when alarm occurs)
10	Common for upper/lower temp. limit alarm
11	Contact b for upper/lower temp. limit alarm (closed when alarm occurs)
12-14	Unused
15	FG

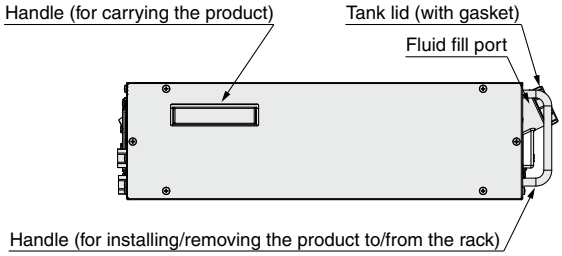


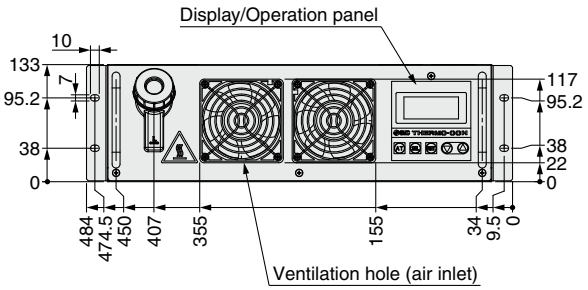
Connection diagram of resistance temperature detector

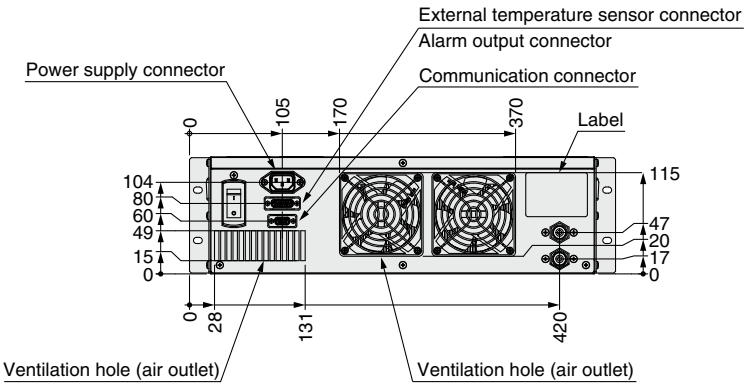
Dimensions

HECR006L-A5



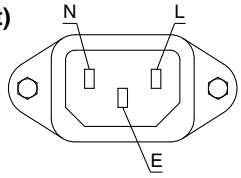






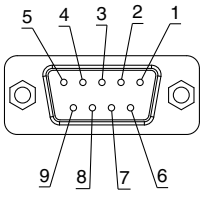
1. Power supply connector
IEC60320 C14 (or equivalent)

Pin no.	Signal contents
N	100-240 VAC
L	100-240 VAC
E	PE



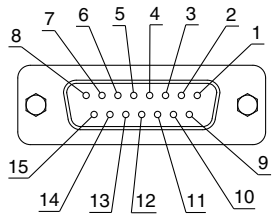
2. Communication connector
D-sub 9 pin (socket)
Holding screw: M2.6

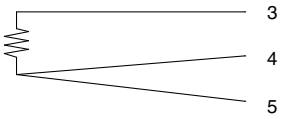
Pin no.	Signal contents	
	RS-232C	RS-485
1	Unused	BUS+
2	RD	Unused
3	SD	Unused
4	Unused	Unused
5	SG	SG
6-8	Unused	Unused
9	Unused	BUS–



3. External temperature sensor connector/Alarm output connector
D-sub 15 pin (socket)
Holding screw: M2.6

Pin no.	Signal contents
1-2	Unused
3	Terminal A of resistance temperature detector
4	Terminal B of resistance temperature detector
5	Terminal B of resistance temperature detector
6	Contact a for output cutoff alarm (open when alarm occurs)
7	Common for output cutoff alarm
8	Contact b for output cutoff alarm (closed when alarm occurs)
9	Contact a for upper/lower temp. limit alarm (open when alarm occurs)
10	Common for upper/lower temp. limit alarm
11	Contact b for upper/lower temp. limit alarm (closed when alarm occurs)
12-14	Unused
15	FG

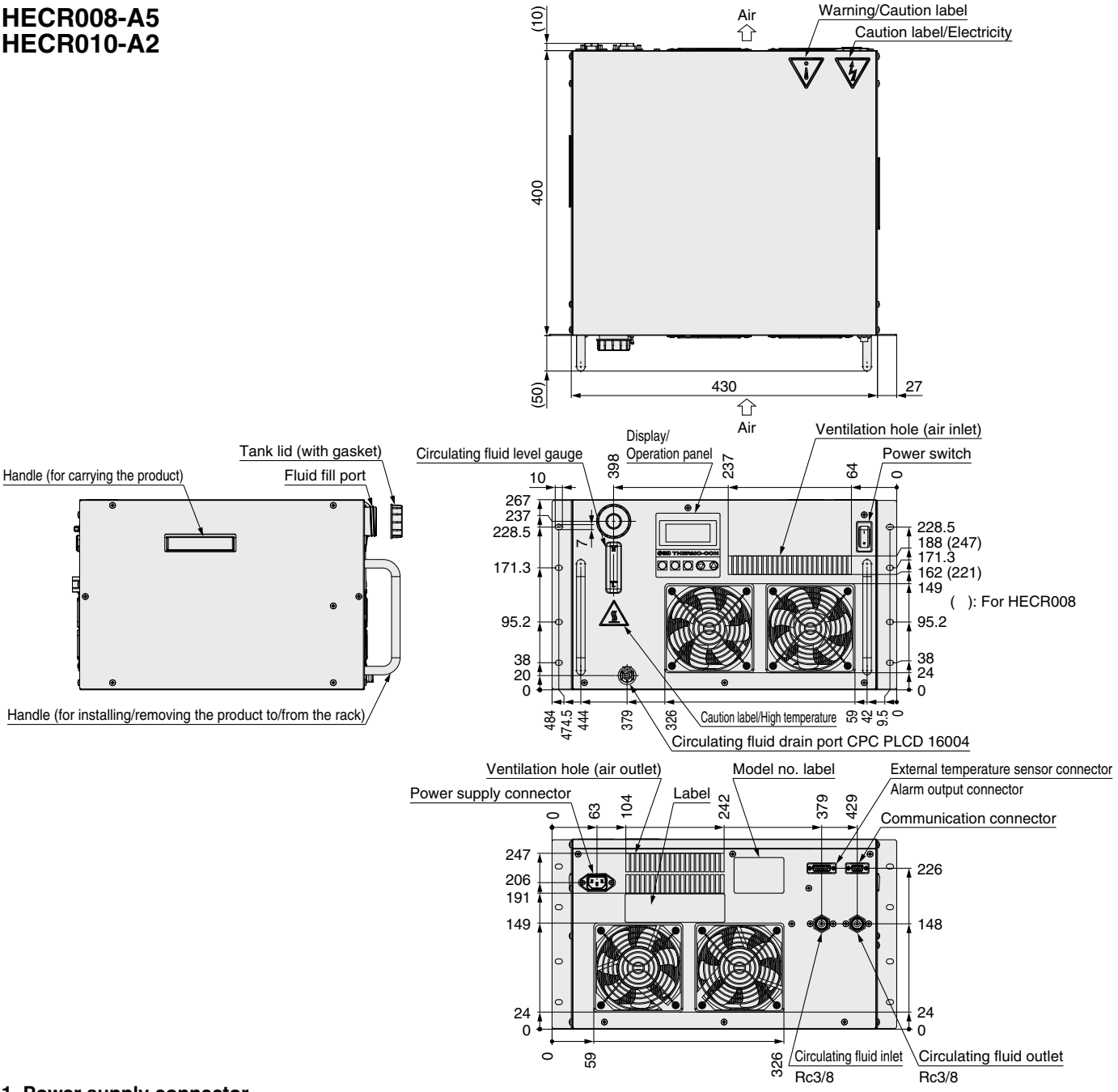




Connection diagram of resistance temperature detector

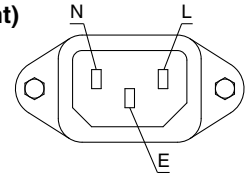
Dimensions

HECR008-A5
HECR010-A2



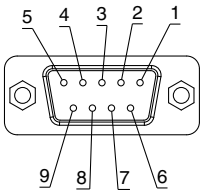
1. Power supply connector
IEC60320 C14 (or equivalent)

Pin no.	Signal contents	
	HECR008	**HECR010**
N	100-240 VAC	200-240 VAC
L	100-240 VAC	200-240 VAC
E	PE	PE



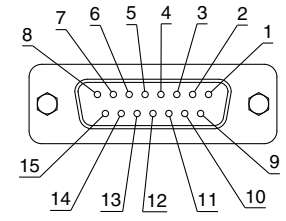
2. Communication connector
D-sub 9 pin (socket)
Holding screw: M2.6

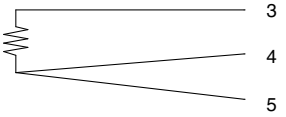
Pin no.	Signal contents	
	RS-232C	RS-485
1	Unused	BUS+
2	RD	Unused
3	SD	Unused
4	Unused	Unused
5	SG	SG
6-8	Unused	Unused
9	Unused	BUS–



3. External temperature sensor connector/Alarm output connector
D-sub 15 pin (socket)
Holding screw: M2.6

Pin no.	Signal contents
1-2	Unused
3	Terminal A of resistance temperature detector
4	Terminal B of resistance temperature detector
5	Terminal B of resistance temperature detector
6	Contact a for output cutoff alarm (open when alarm occurs)
7	Common for output cutoff alarm
8	Contact b for output cutoff alarm (closed when alarm occurs)
9	Contact a for upper/lower temp. limit alarm (open when alarm occurs)
10	Common for upper/lower temp. limit alarm
11	Contact b for upper/lower temp. limit alarm (closed when alarm occurs)
12-14	Unused
15	FG





Connection diagram of resistance temperature detector

Thermo-con/ Rack Mount Type

HECR Series Water-cooled

(UL Standards)

How to Order

HECR 008 – W 5 □ – □

Cooling capacity

008	800 W
012	1.2 kW

Radiating method

W	Water-cooled

Power supply

2	200 to 240 VAC	HECR012
5	100 to 240 VAC	HECR008

Pipe thread

Nil	Rc
N	NPT thread

Option

Nil	None
E	With feet/Without rack mounting brackets
F	With flow switch
J	Diagonal opening tank
P	High-pressure pump mounted

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

Specifications

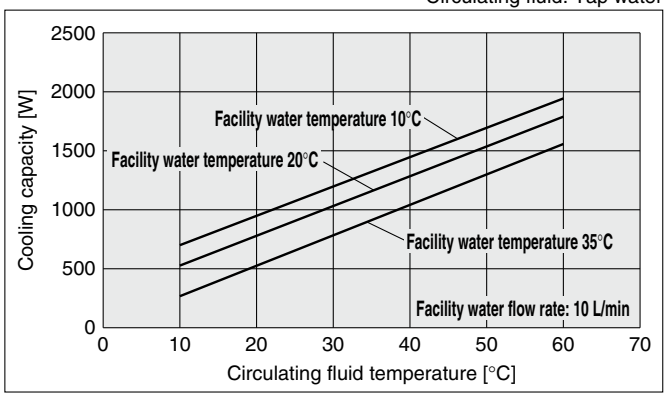
Model		HECR008-W	HECR012-W
Cooling method		Thermoelectric device (Thermo-module)	
Radiating method		Water-cooled	
Control method		Cooling/Heating automatic shift PID control	
Ambient temperature/humidity		10 to 35°C, 35 to 80% RH (No condensation)	
Circulating fluid system	**Circulating fluid**	Tap water, Ethylene glycol 20%	
	Set temperature range	10.0 to 60.0°C (No condensation)	
	Cooling capacity	800 W (Tap water)*1	1.2 kW (Tap water)*1
	Heating capacity	1.4 kW (Tap water)*1	2 kW (Tap water)*1
	Temperature stability*2	±0.01 to 0.03°C	
	Pump capacity	Refer to the performance charts. (Page 510)	
	Tank capacity	Approx. 1.3 L	
	Port size	Rc3/8	
	Fluid contact material	Stainless steel, EPDM, NBR, Ceramics, PPE, PPS, Carbon, PP, PE, Nylon, POM, PVC	
Facility water system	**Temperature range**	10 to 35°C (No condensation)	
	Pressure range	Within 1 MPa	
	Required flow rate*3	10 to 15 L/min	
	Port size	Rc3/8	
	Fluid contact material	Stainless steel 304	
Electrical system	**Power supply**	Single-phase 100 to 240 VAC ±10%, 50/60 Hz	Single-phase 200 to 240 VAC ±10%, 50/60 Hz
	Overcurrent protector	14 A	
	Current consumption	10 A (100 V) to 4 A (240 V)	7 A (200 V) to 6 A (240 V)
	Power consumption	900 W	1200 W
	Alarm	Refer to “Alarm.” (Page 512)	
	Communications	RS-232C/RS-485	
Weight		Approx. 20 kg	Approx. 21 kg
Accessories		Power supply connector, Operation Manual Power supply cable should be ordered as an option (sold separately, page 514) or prepared by the user.	
Safety standards		CE/UKCA marking, UL (NRTL) standards	

*1 Conditions: Circulating fluid set temperature 20°C, Flow rate 3 L/min, Facility water temperature 20°C, Flow rate 10 L/min, Ambient temperature 25°C
*2 The indicated values are with a stable load without turbulence in the operating conditions. It may be out of this range in some other operating conditions.
*3 The flow rate beyond the proper range may deteriorate performance or generate noise, causing the piping to break.

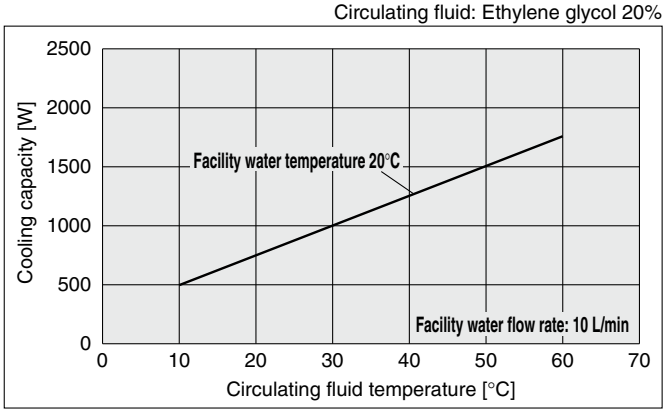
Cooling Capacity

HECR008-W

Circulating fluid: Tap water

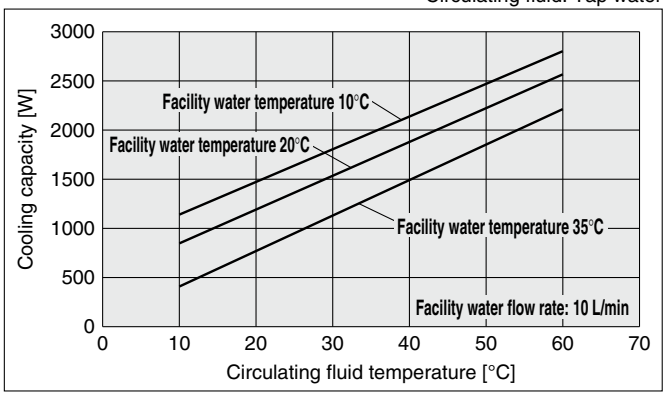


Circulating fluid: Ethylene glycol 20%

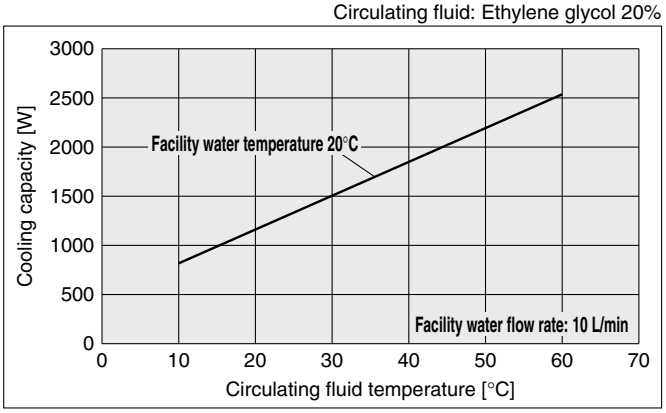


HECR012-W

Circulating fluid: Tap water



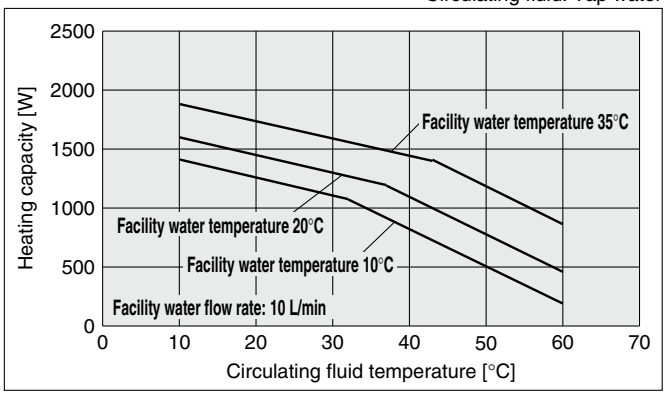
Circulating fluid: Ethylene glycol 20%



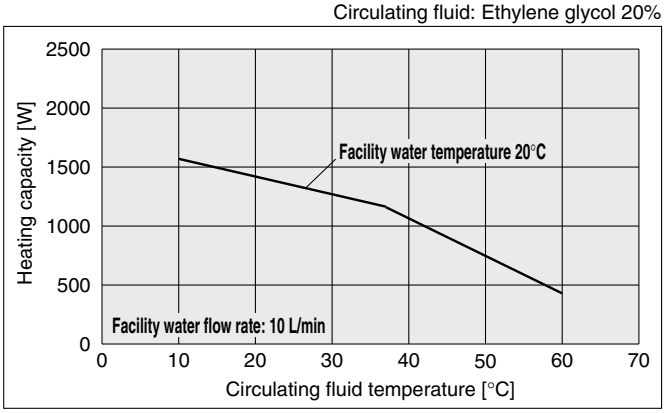
Heating Capacity

HECR008-W

Circulating fluid: Tap water

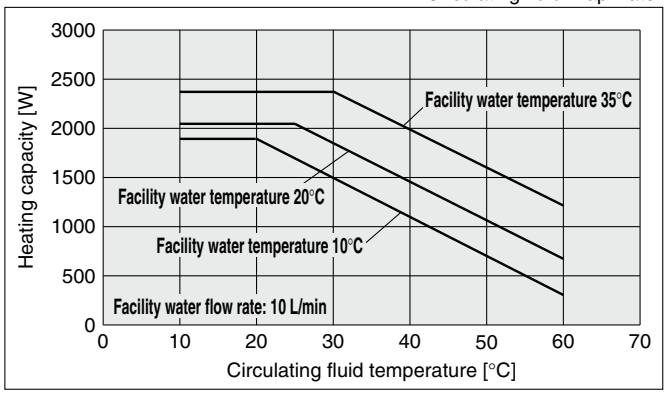


Circulating fluid: Ethylene glycol 20%

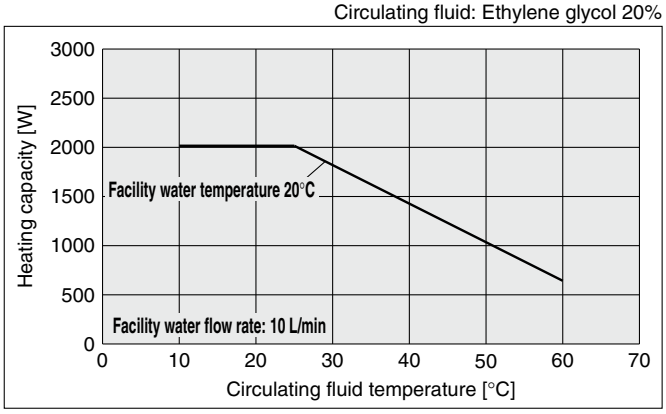


HECR012-W

Circulating fluid: Tap water

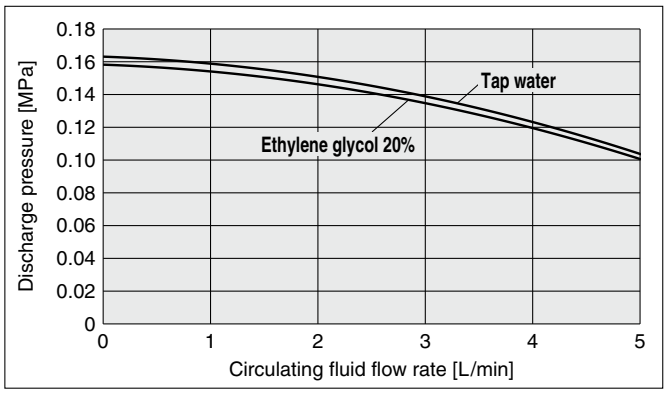


Circulating fluid: Ethylene glycol 20%

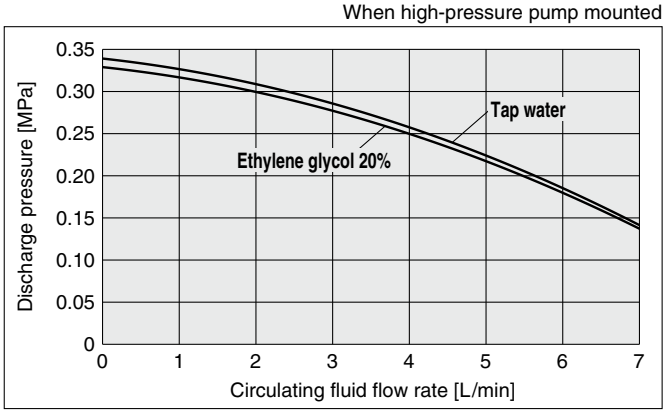


Pump Capacity (Thermo-con Outlet)

HECR008-W/012-W

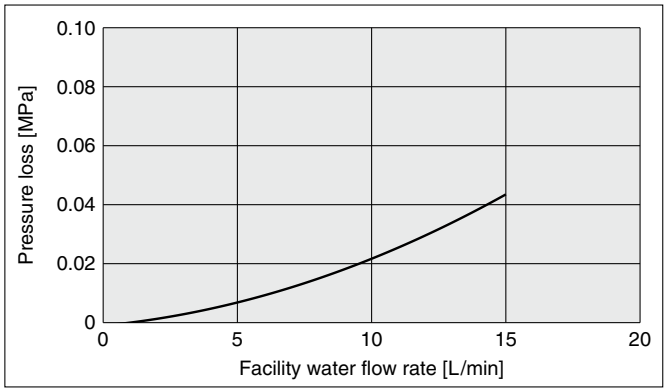


When high-pressure pump mounted

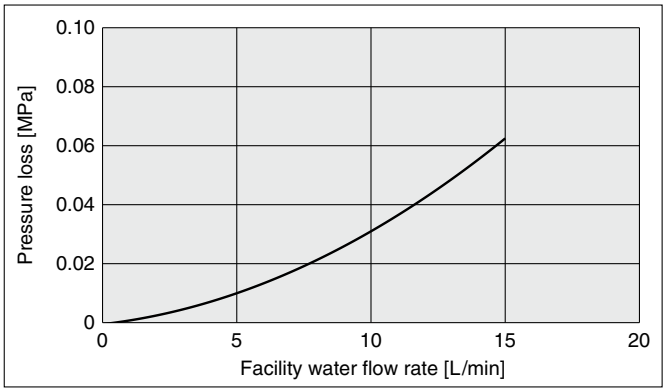


Pressure Loss in Facility Water Circuit

HECR008-W

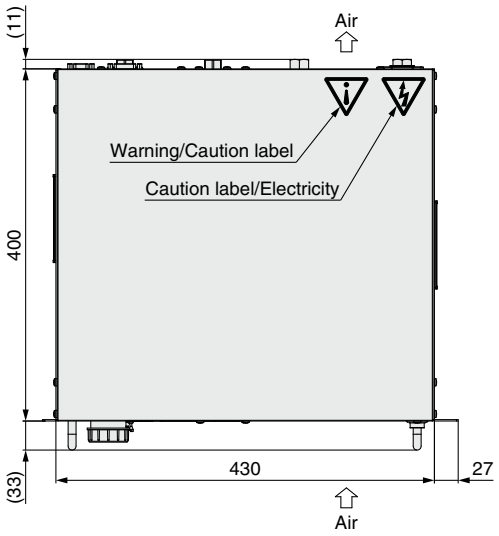


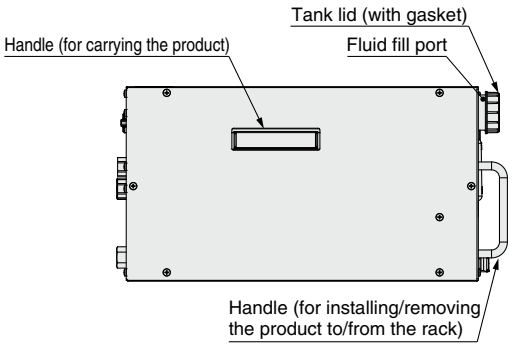
HECR012-W

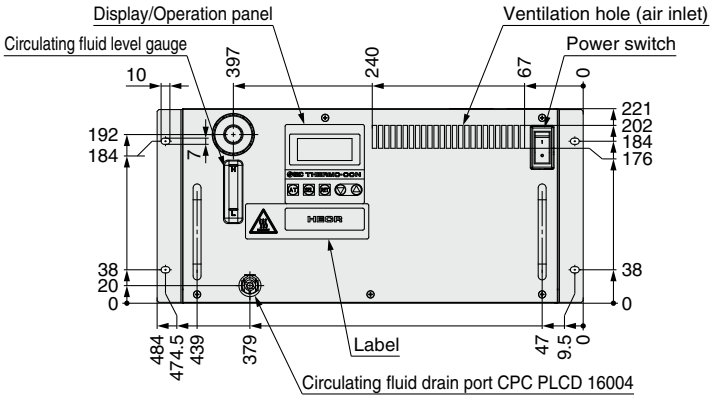


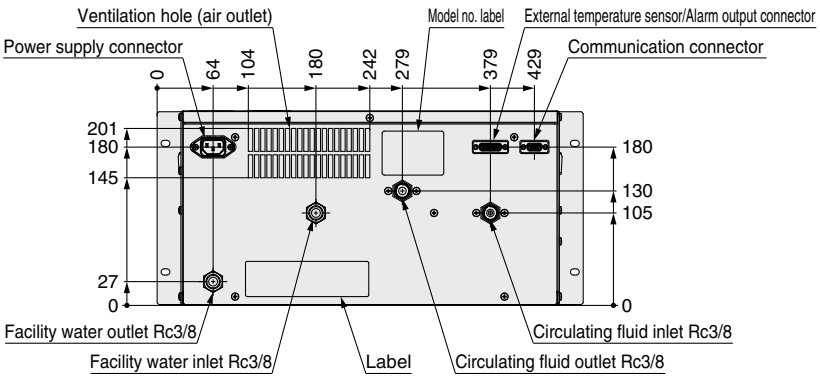
Dimensions

HECR008-W5
HECR012-W2



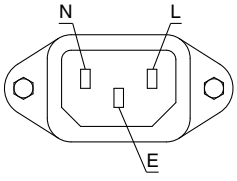






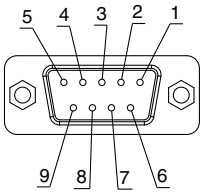
1. Power supply connector
IEC60320 C14 (or equivalent)

Pin no.	Signal contents	
	HECR008	**HECR012**
N	100-240 VAC	200-240 VAC
L	100-240 VAC	200-240 VAC
E	PE	PE



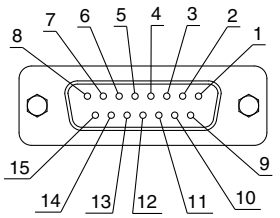
2. Communication connector
D-sub 9 pin (socket)
Holding screw: M2.6

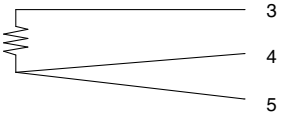
Pin no.	Signal contents	
	RS-232C	RS-485
1	Unused	BUS+
2	RD	Unused
3	SD	Unused
4	Unused	Unused
5	SG	SG
6-8	Unused	Unused
9	Unused	BUS–



3. External temperature sensor connector/Alarm output connector
D-sub 15 pin (socket)
Holding screw: M2.6

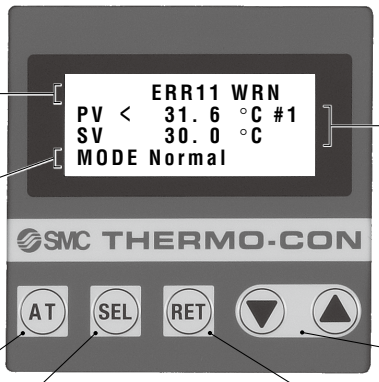
Pin no.	Signal contents
1-2	Unused
3	Terminal A of resistance temperature detector
4	Terminal B of resistance temperature detector
5	Terminal B of resistance temperature detector
6	Contact a for output cutoff alarm (open when alarm occurs)
7	Common for output cutoff alarm
8	Contact b for output cutoff alarm (closed when alarm occurs)
9	Contact a for upper/lower temp. limit alarm (open when alarm occurs)
10	Common for upper/lower temp. limit alarm
11	Contact b for upper/lower temp. limit alarm (closed when alarm occurs)
12-14	Unused
15	FG





Connection diagram of resistance temperature detector

Operation Display Panel



1st line
Indicates the no. corresponding to the alarm which has been triggered
[WRN] lights up when the upper or lower temperature limit warning occurs

4th line
Indicates the control operation mode during normal operation and the set values during setting mode selection

AT key
Used to start and stop auto tuning

SEL key
Used to change setting mode

2nd, 3rd line
Indicates the present temperature [PV] and target temperature [SV] during normal operation
When the alarm is triggered, the error is indicated instead, and during setting mode selection, the selected setting mode is indicated.

▽△ key
Used to change the set value in each setting mode

RET key
Used to fix the set value or return to the present temperature status indication

Alarm

This unit is equipped as standard with a function allowing for the display of 14 kinds of alarms on the LCD, and it can be read out by serial communication. Also, it can generate relay output for an upper/lower temperature limit alarm and output cutoff alarm.

Alarm

Alarm code	Alarm description	Operation status	Main reason
WRN	Upper/Lower temp. limit alarm	Continue	The temperature has exceeded the upper/lower limit range for the target temperature.
ERR01	System error 1	Stop	The internal cable of the thermo-con has been broken due to abnormal vibration or dropping of the product.
ERR02	System error 2	Stop	EEPROM data has been lost due to high-level noise.
ERR03	Back-up data error	Stop	The EEPROM data of the controller has been destroyed due to high-level noise.
ERR11	DC power supply failure	Stop	The DC power supply has failed (due to a fan stoppage or an abnormally high temperature) or the thermo-module has been short-circuited.
ERR12	Internal temp. sensor high temp. error	Stop	The internal temperature sensor has exceeded the high temperature cutoff setting.
ERR13	Internal temp. sensor low temp. error	Stop	The internal temperature sensor has exceeded the low temperature cutoff setting.
ERR14	Thermostat alarm	Stop	The thermostat has been activated due to radiator fin clog, insufficient flow of the facility water, high temperature, fan/pump failure, etc.
ERR15	Abnormal output alarm	Continue	The temperature cannot be changed even at 100% output due to an overload or disconnection of the thermo-module.
ERR16	Low flow rate alarm (Option)	Stop	The flow rate of the circulating fluid has dropped.
ERR17	Internal temp. sensor disconnection alarm	Stop	The internal temperature sensor has been disconnected or short-circuited.
ERR18	External temp. sensor disconnection alarm	Continue	The external temperature sensor has been disconnected or short-circuited. (Only detected when in learning control or external tune control)
ERR19	Abnormal auto tuning alarm	Stop	Auto tuning has not been completed within 20 minutes.
ERR20	Low fluid level alarm	Stop	The amount of circulating fluid in the tank has dropped.

Maintenance

The maintenance of this unit can only be performed by returning it to be repaired at one of SMC's sites. As a rule, SMC will not conduct on-site maintenance.

HECR Series Air-cooled Water-cooled
Options

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

E Option symbol

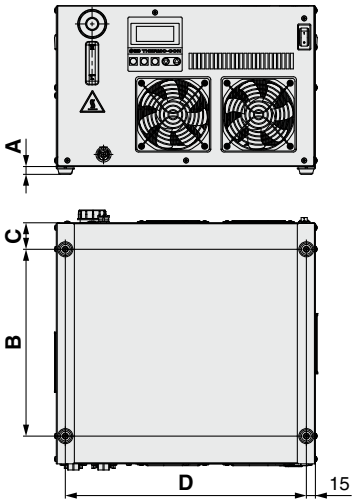
With Feet/Without Rack Mounting Brackets

HECR□-□□□-E

With feet/Without rack mounting brackets

Rack mounting brackets and handles on the front side are removed as they are not necessary when the product is not mounted in a rack. This option has rubber feet for installing the product on the floor.

Applicable model	Dimensions [mm]			
	A	B	C	D
HECR002-A5□-E	14	230	35	400
HECR004-A5□-E		310	45	
HECR006-A5□-E				
HECR006L-A5□-E		360		410
HECR008-A5□-E	13	310	44	400
HECR010-A2□-E				
HECR008-W5□-E			46	
HECR012-W2□-E				



F Option symbol

With Flow Switch

HECR□-□□□-F

With flow switch

This is an ON/OFF switch detecting low levels of the circulating fluid.
When the fluid volume is 1 L/min or less, “ERR16” is displayed and the thermo-con stops.
The flow switch is built into the thermo-con.

Applicable model
HECR002-A5□-F
HECR004-A5□-F
HECR006-A5□-F
HECR008-A5□-F
HECR010-A2□-F
HECR008-W5□-F
HECR012-W2□-F

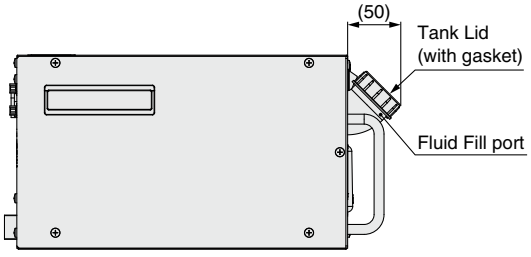
J Option symbol

Diagonal opening tank

HECR□-□□□-J

Diagonal opening tank

The diagonal opening option makes circulating fluids easier to fill in the tank.



HECR Series Air-cooled Water-cooled
Options

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

P **Option symbol**

High-Pressure Pump Mounted

HECR□-□□□-P

High-pressure pump mounted

Possible to choose a high-pressure pump in accordance with user's piping resistance. Cooling capacity will decrease by approx. 20 W (HECR002) or approx. 50 W (HECR004/006(L)/008/010/012) by heat generated in the pump.

Applicable model
HECR002-A5□-P
HECR004-A5□-P
HECR006(L)-A5□-P
HECR008-A5□-P
HECR010-A2□-P
HECR008-W5□-P
HECR012-W2□-P

Optional Accessories

Power Supply Cable

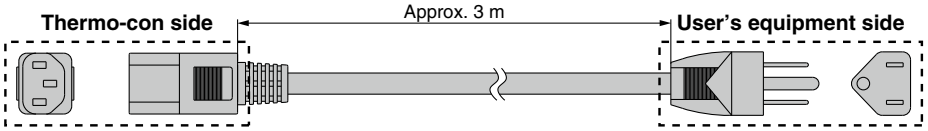
⚠ The power supply cable can only be used for the applicable models shown below. Do not use it for other products.

■ For single-phase 100/115 VAC type

∗ Not applicable for the 200 V type

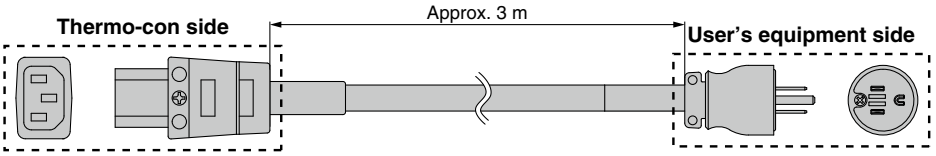
Part no.	Applicable model
HRS-CA001	HECR002 HECR004 HECR006 HECR008

∗ Not applicable to the retaining clip



Part no.	Applicable model
HRS-CA003	HECR002 HECR004 HECR006 HECR008

∗ Applicable to the retaining clip

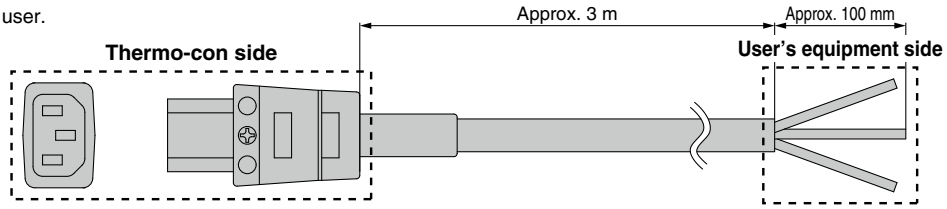


■ For single-phase 200 VAC type

∗ Also applicable for the 100 VAC type, but the connector for the user's equipment needs to be prepared by the user.

Part no.	Applicable model
HRS-CA002	HECR002 HECR004 HECR006 HECR008 HECR010 HECR012

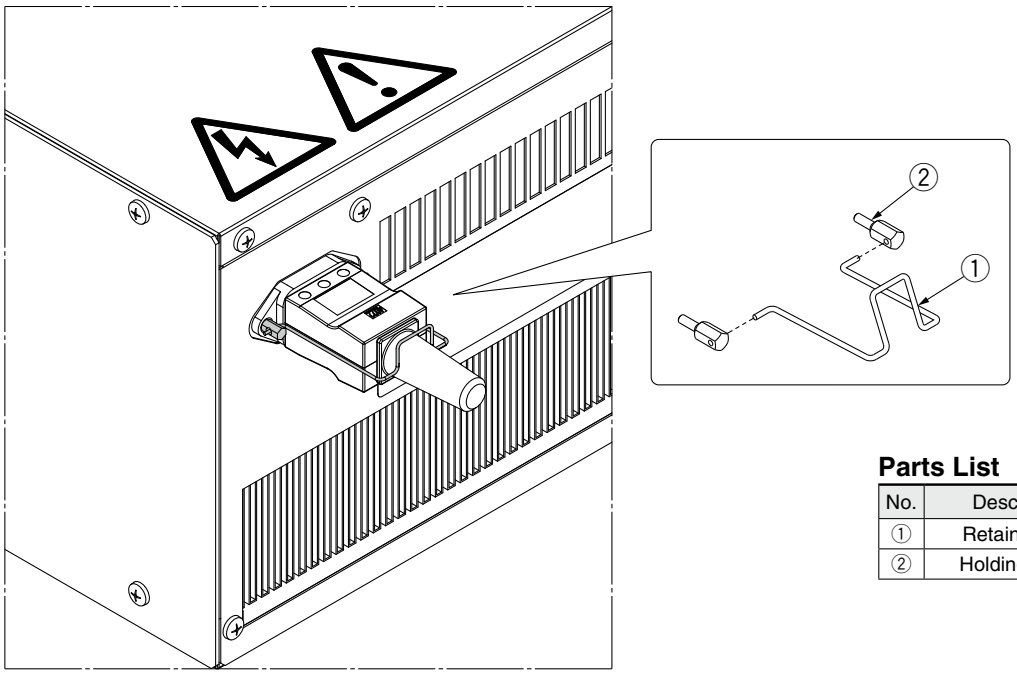
∗ Applicable to the retaining clip



■ Retaining clip

Holds the connector on the thermo-con side in position

Part no.	Applicable power supply cable model
HRS-S0074	HRS-CA002 HRS-CA003 Power supply connector for accessory



Parts List

No.	Description
①	Retaining clip
②	Holding screw

HECR Series
Specific Product Precautions 1

Be sure to read this before handling the products. Refer to page 605 for safety instructions and pages 606 to 609 for temperature control equipment precautions.

Design

⚠Warning

1. This catalog shows the specifications of the thermo-con.

1. Check the detailed specifications in the separate "Product Specifications", and evaluate the compatibility of the thermo-con with user's system.
2. Although a protection circuit as a single unit is installed, the user is requested to carry out a safety design for the whole system.

Handling

⚠Warning

1. Thoroughly read the operation manual.

Read the operation manual completely before operation, and keep the manual where it can be referred to as necessary.

2. If the set temperature is repeatedly changed by 10°C or more, the thermo-con may fail in short periods of time.

Operating Environment/Storage Environment

⚠Warning

1. Keep within the specified ambient temperature and humidity range.

Also, if the set temperature is too low, condensation may form on the inside of the thermo-con or the surface of piping even within the specified ambient temperature range. Dew condensation can cause failure, and so must be avoided by considering operating conditions.

2. The thermo-con is not designed for clean room usage.

The pump and fan generate dust.

3. Low molecular siloxane can damage the contact of the relay.

Use the thermo-con in a place free from low molecular siloxane.

Transportation/Movement/Installation

⚠Caution

1. Avoid strong vibration and/or impact.

The product is precision equipment. Do not apply vibration or impact during transportation.

2. Caution when moving a heavy object.

This product is heavy. Use adequate caution to avoid injury when picking up and setting down the product, and dropping accidents should be avoided.

3. Installation

When installing the product into a rack, it should be designed that the product weight is held with the bottom surface of the product. Use the handles on the front side of the product when installing/removing the product to/from the rack.

Radiation Air

⚠Caution

1. The inlet for radiation air must not be exposed to particles and dust as far as possible.

2. Do not let the inlet and outlet for radiation air get closed.

3. If more than one thermo-con is used, consider their arrangement so that the downstream sides of the thermo-cons suck radiation air from the upstream sides.

Otherwise, the performance at the downstream sides may deteriorate. Also, the set temperature may not be achieved depending on the value of the set temperature and the load. In such a case, take countermeasures such as changing the direction of the thermo-cons to prevent the deterioration of performance.

4. Filters are not built in. Mount them as necessary.

5. The table below summarizes the flow rate of the radiation air and heat generation (maximum values).

Model	Air flow [m³/min]	Heat generation [W]
HECR002-A	2	600
HECR004-A	5	1300
HECR006(L)-A	5	1400
HECR008-A	7	1700
HECR010-A	7	2500
HECR008-W	0.2	200
HECR012-W	0.4	250

Facility Water

⚠Caution

1. If the temperature of the facility water is too low, it can cause formation of dew condensation inside the heat exchanger.

Supply facility water with a temperature over the atmospheric dew point to avoid the formation of dew condensation.

2. If the facility water piping is connected to multiple machines, the facility water exchanges heat at the upstream side and its temperature will become higher as it goes downstream.

Limit the number of connected thermo-cons to two per facility water system, and if more than two thermo-cons are to be connected, increase the number of systems.

■ Required facility water system

<Heat radiation amount/Facility water specifications>

Model	Heat radiation [kW]	Facility water specifications
HECR008-W	Approx. 2	Refer to "Facility water system" in the specifications.
HECR012-W	Approx. 3	

Circulating Fluid

⚠Caution

1. Use a fluid that is listed in the specifications.

2. Deionized water (with an electric conductivity of approximately 1 μS/cm) can be used, but may lose its electric conductivity.

Also, if a facility supplying deionized water is used, the thermo-con may be damaged by static electricity.

HECR Series
Specific Product Precautions 2

Be sure to read this before handling the products. Refer to page 605 for safety instructions and pages 606 to 609 for temperature control equipment precautions.

Circulating Fluid

⚠Caution

3. If deionized water is used, bacteria and algae may grow within a short period.

If the thermo-con is operated with bacteria and algae present, its cooling capacity or the capacity of the pump may deteriorate. Replace all deionized water regularly according to the conditions (once a month as a guide).

4. If using a fluid other than those listed in the specifications, please contact SMC beforehand.

5. The maximum operating pressure of the resin tank is 0.1 MPa.

If this pressure is exceeded, leakage from the tank in the thermo-con may result.

6. Select a pipe with a length and diameter which allows a flow rate of 0.5 L/min or more (HECR002-A) or 1 L/min or more (HECR004-A/006(L)-A/008-A/010-A) for the circulating fluid. Also, allow a flow rate of 3 L/min or more for the HECR008-W/012-W.

If the flow rate is less than these values, the thermo-con will not be able to provide precise control, and the repeated cooling and heating operations may cause it to fail.

7. A magnet driven pump is used as the circulating pump.

Fluids which contain metal powders such as iron powder cannot be used.

8. The thermo-con must not be operated without circulating fluid.

The pump can break due to idling.

9. If the tank lid is opened after the supply of circulating fluid, the circulating fluid may spill out depending on the condition of the external piping.

10. If an external tank is used, the circulating fluid may spill out from the internal tank lid depending on where the external tank is installed.

Confirm that the internal tank has no leakage if using an external tank.

11. If there is a point where fluid is released to atmosphere externally (tank or piping), minimize the piping resistance at the circulating fluid return side.

If the piping resistance is too large, the piping may be crushed or the built-in circulator tank may be deformed or cracked because the pressure in the piping for return will become negative. The built-in circulator tank is made of resin (PE). Therefore, the tank may be crushed if the pressure is negative. Special attention must be paid if the flow rate of the circulating fluid is high. To avoid a negative pressure of –0.02 MPa or below, the piping return should be as thick and short as possible to minimize piping resistance. It is also effective to restrict the flow rate of circulating fluid or remove the gasket of the internal tank for the release to atmosphere.

12. Fluorinated fluid falls outside of the specifications.

If it is used in the thermo-con, static electricity will be generated by the flow of fluid. This static electricity may be discharged to the board of the thermo-con, causing damage, operation failure, or loss of data such as set temperatures.
Also, as the specific gravity of the fluorinated fluid is 1.5 to 1.8 times that of water, the pump will be overloaded, which also causes fluorinated fluid to fall outside the specifications. Therefore, if fluorinated fluid is to be used, please contact SMC and we will introduce you to a suitable special product (water-cooled type).

⚠Caution

13. Avoid operation with cavitation or bubbles due to low fluid level in the tank. This may shorten the pump life.

14. If tap water is used, it should satisfy the quality standards shown below.

Tap Water (as a Circulating Fluid) Quality Standards

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

	Item	Unit	Standard value	Influence	
				Corrosion	Scale generation
Standard item	pH (at 25°C)	—	6.0 to 8.0	○	○
	Electric conductivity (25°C)	[μS/cm]	100*1 to 300*1	○	○
	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		○
	Ionic state silica (SiO_2)	[mg/L]	30 or less		○
Reference item	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	○	

*1 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.

15. The tank capacity is approximately 1 liter at the High level and approximately 0.4 liters at the Low level. When the fluid level goes below the Low level, "ERR20" (Low fluid level alarm) will be triggered.

Maintenance

⚠Warning

1. Prevention of electric shocks and fire

Do not operate the switch with wet hands. Also, do not operate the thermo-con when water is present on its exterior surface.

2. Action in the case of error

If any error such as an abnormal sound, smoke, or bad odor occurs, cut off the power at once, and stop supplying and conveying fluid. Please contact SMC or a sales distributor to repair the thermo-con.

3. Regular inspection

Check the following items at least once a month. The inspection must be done by an operator who has sufficient knowledge and experience.

a) Check the displayed contents.
b) Check the temperature, vibration level, and for abnormal sounds in the body of the thermo-con.
c) Check the voltage and current of the power supply system.
d) Check the circulating fluid for leakage, contamination, and the presence of foreign matter. Replace the fluid when necessary.
e) Check the flow condition and temperature of the radiated air.