



ORIGINAL INSTRUCTIONS



Instruction Manual
Air Cooled Rack Mount Thermo-con
HECR-A Series



The intended use of this product used a built-in pump to circulate a liquid such as water, adjusted to a constant temperature by the thermoelectric modules circuit. This circulating liquid cools parts of customer’s machine that generate heat start and stop the product and reset its alarms. Read this manual before using.

1 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.

¹⁾ISO 4414: Pneumatic fluid power — General rules and safety requirements for systems and their components.
ISO 4413: Hydraulic fluid power — General rules and safety requirements for systems and their components
IEC 60204-1: Safety of machinery - Electrical equipment of machines.
Part 1: General requirements
ISO 10218-1: Robots and robotic devices - Safety requirements for industrial robots - Part 1: Robots

- Refer to product catalogue, Operation Manual and Handling Precautions for SMC Products for additional information.
- Keep this manual in a safe place for future reference.
- To ensure safety of personnel and equipment the safety instructions in this manual must be observed, along with other relevant safety practices.

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

Warning

- **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.
- **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.
- **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.

1 Safety Instructions - continued

- **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, combustions 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 specification 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.
- **Always ensure compliance with relevant safety laws and standards.**
- All electrical work must be carried out in a safe manner by a qualified person in compliance with applicable national regulations.

Caution

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.

2 Specifications

2.1 General Description and Intended Use

This product uses a built-in pump to circulate a liquid such as water, adjusted to a constant temperature by a thermoelectric device. This circulating liquid cools parts of customer’s machine that generates heat.

2 Specifications - continued

2.2 Product specifications

Model No.	HECR 002-A	HECR 004-A	HECR 006-A	HECR 006L-A	HECR 008-A	HECR 010-A
Operating temp. range	10 to 60°C (No dew condensation)					
Indication temp. range	-9.9 to 80.0 °C					
Cooling method	Thermoelectric device (Thermo-module) - Air cooled					
Control method	Cooling/Heating automatic shift with PID control					
Ambient Environment	Temperature: 10 to 35°C Humidity: 35 to 80% RH Altitude: up to 1000m Environment: No corrosive gas, solvent such as thinner and flammable gas.					
Storage environment	Temperature: -40 to 70°C (No dew condensation and icing) Humidity: 5 to 95%RH Environment: No corrosive gas, solvent such as thinner and flammable gas.					
Circulating fluid	Water. Ethylene glycol solution up to 20%					
Cooling capacity (Set temperature 25°C and ambient temperature 25°C)	200W (Flow rate 3L/min)	400W (Flow rate 3L/min)	510W (Flow rate 3L/min)		800W (Flow rate 4L/min)	1000W (Flow rate 4L/min)
Temp. accuracy (Circulating fluid OUT is directly connected with IN)	Indication accuracy: ± 0.2 °C					
	Temperature drift: ± 0.2 °C					
	Stability: ± 0.01 to 0.03 °C					
Pump capacity	Refer to performance charts					
Tank capacity	Approx. 1.3L			Approx. 0.4 L	Approx. 1.3 L	
Port size	IN/OUT: Rc 1/4	IN/OUT: Rc 3/8				
Drain port	--				CPC PLCD16004	
Wetted materials	Stainless steel, EPDM, NBR, Ceramic, PPE, PPS, Carbon, Polyethylene, POM					

2 Specifications - continued

Model		HECR 002-A	HECR 004-A	HECR 006-A	HECR 006L-A	HECR 008-A	HECR 010-A
Electrical system	Power supply (±10%)	Single phase AC100 to 240V, 50/60Hz					Single phase AC 200 to 240V, 50/60Hz
	Current consumption	Max. 5A (100V)	Max. 9A (100V)			Max. 10A (100V)	Max. 8A (200V)
		Max. 2.5A (240V)	Max. 4A (240V)			--	
	Inrush current	50A or less					
	Over current protection	10A Circuit Protector	14A Circuit Protector				
	Voltage interruptions	20ms or less					
	Insulation resistance	50MΩ or more (DC500V)					
	Communications	RS232C / RS-485					
	Over voltage category	Category II					
Pollution degree		Pollution degree II					
Limitation of hazardous substance		RoHS compliant products					
Acoustic noise (dBA)		49	54 to 62	55 to 64		54 to 65	
		(Variable fan speed control)					
Main functions		Auto tuning, Offset function, Learning control function, External tuning control function, Temperature sensor fine control function, Setting value memory function, Upper / lower temperature limit alarm function, Output shut off alarm, Communication, Fan speed control (HECR004,006(L),008,010)					
Input operation and indications		Membrane key sheet, LCD display panel (with back light) Output shut off alarm, Upper / lower temperature limit alarm: Relay contact specification DC30V, 1A					
Communications		RS-232C / RS-485 Communications: Setting of target temperature, Reading of the value detected by temperature sensor, Reading of warning status, Setting and of off-set value, Setting and reading of control operation, Setting and reading of PID values, Reading of output ratio. For operation by communication, it is necessary to order the "Communication Manual". Use shielded cable for serial communications.					
Temp. sensor		Resistance thermometer sensor (Pt100Ω, 3-wire, class A, 1mA) (Both internal sensor and external sensor)					
Options		F: With flow switch, low flow rate alarm occurs at less than 0.7L/min N: NPT thread fitting, fluid IN/OUT fittings E: With foot and no rack bracket P: High-pressure pump mounted J: Diagonal opening tank					
Paint colour		White					
Approx. Weight (Dry condition)		14kg	18kg	21kg	20kg	31kg	33kg
Package contents		Thermo-con 1pc Installation and Maintenance Manual 1 pc Power supply connector 1 pc					

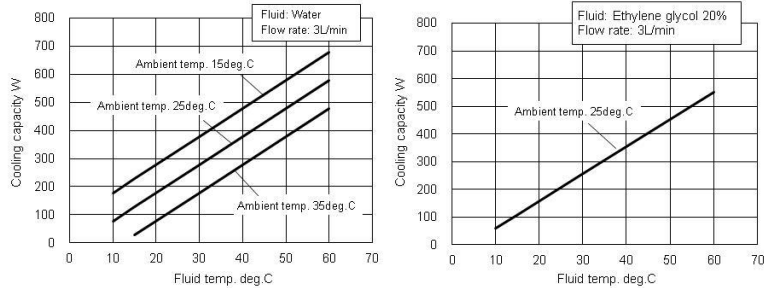
2 Specifications – continued

2.3 Performance Charts

Values on the performance charts are not guaranteed values but representative values. Allow margins for safety when selecting the model.

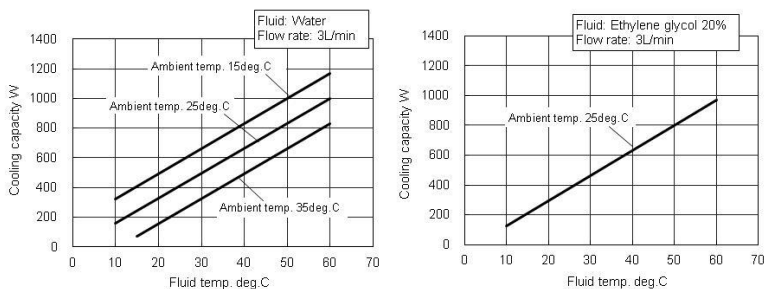
2.3.1 Cooling Capacity

HECR002-A



Cooling capacity decrease about 20W when high pressure pump option selected.

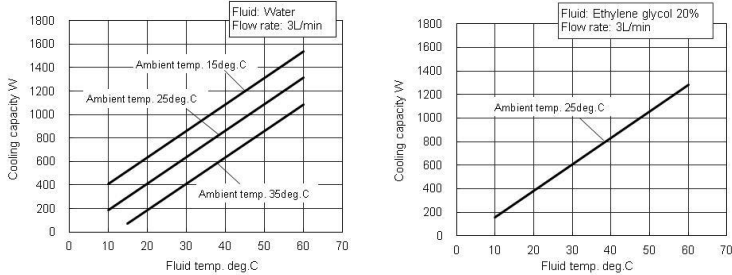
HECR004-A



Cooling capacity decrease about 50W when high pressure pump option selected.

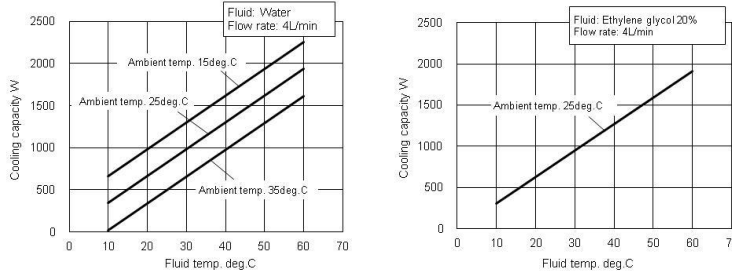
2 Specifications – continued

HECR006(L)-A



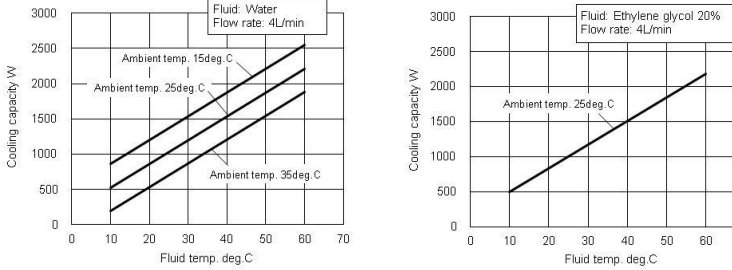
Cooling capacity decrease about 50W when high pressure pump option selected.

HECR008-A



Cooling capacity decrease about 50W when high pressure pump option selected.

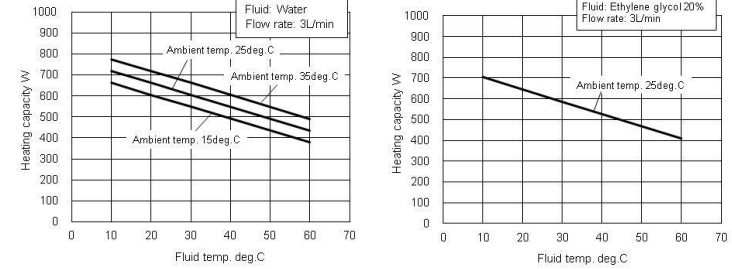
HECR010-A



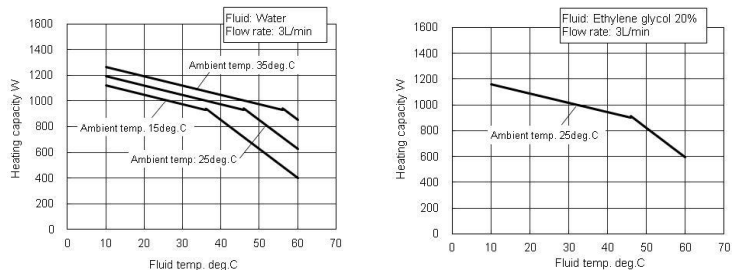
Cooling capacity decrease about 50W when high pressure pump option selected.

2.3.2 Heating Capacity

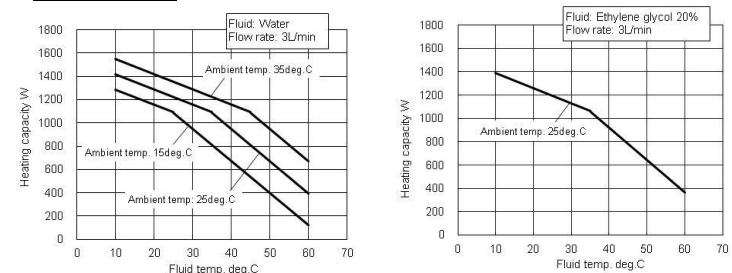
HECR002-A



HECR004-A

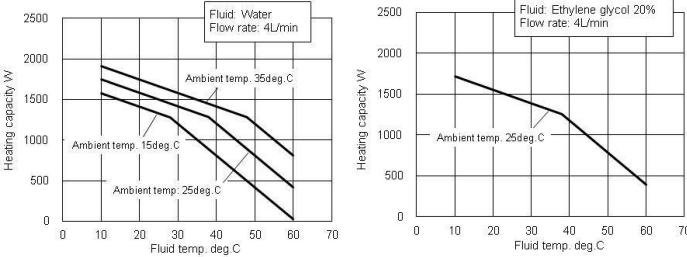


HECR006(L)-A

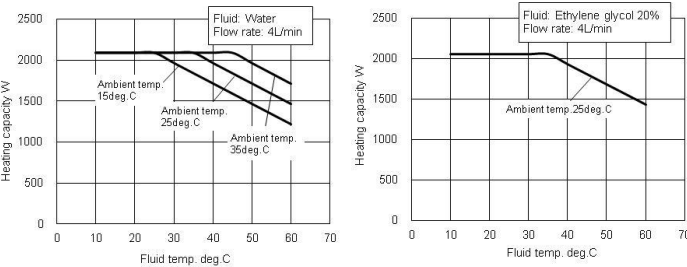


2 Specifications – continued

HECR008-A

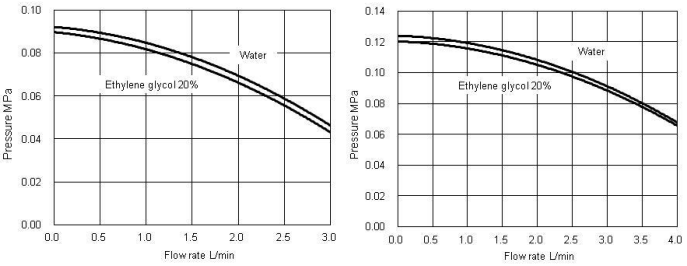


HECR010-A



2.3.3 Pump Capacity

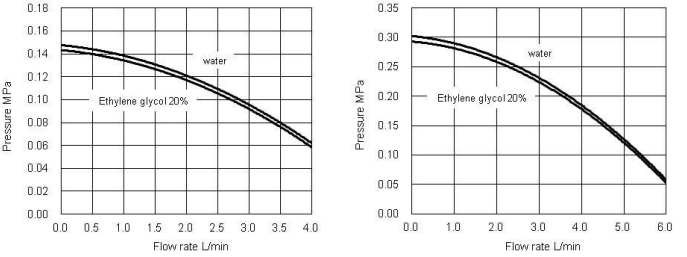
HECR002-A



Normal

High Pressure pump option selected

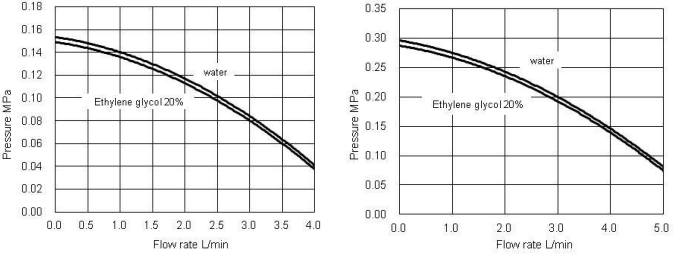
HECR004-A



Normal

High Pressure pump option selected

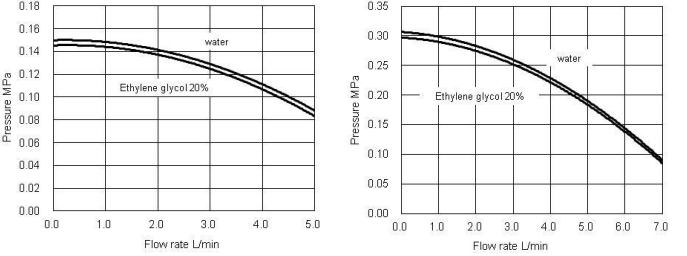
HECR006(L)-A



Normal

High Pressure pump option selected

HECR008-A/HECR010-A



Normal

High Pressure pump option selected

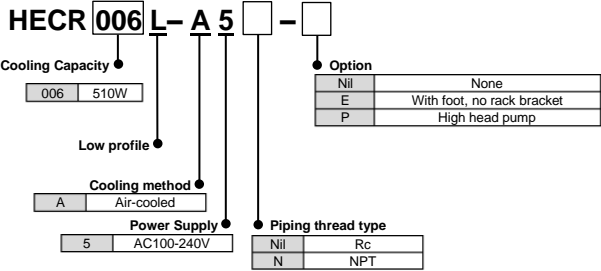
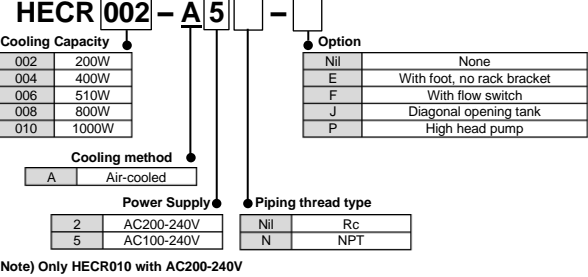
2 Specifications – continued

2.4 Connector Specifications

Description	No.	Signal	Style and Part No.
Power supply connector (IEC60320, C14)		HECR002 HECR004 HECR006(L) HECR008	HECR010
	N	AC100 to 240V	AC200 to 240V
	L	AC100 to 240V	AC200 to 240V
	E	PE	
Communication connector Note: Always use shielded cable connected to this connector.		RS-232C	RS-485
	1	Unused	BUS +
	2	RXD (RD)	Unused
	3	TXD (SD)	Unused
	4	Unused	Unused
	5	SG	SG
	6-8	Unused	Unused
	9	Unused	BUS -
	1-2	Unused	
	3-5	PT-RTD	
Signal · External temperature sensor connector Note: Always use shielded cable connected to this connector.	6	Output Cutoff Alarm a contact (OPEN During Alarm)	
	7	Output Cutoff Alarm Common	
	8	Output Cutoff Alarm b contact (CLOSE During Alarm)	
	9	Temperature Alarm a contact (OPEN During Alarm)	
	10	Temperature Alarm Common	
	11	Temperature Alarm b contact (CLOSE During Alarm)	
	12-14	Unused	
	15	FG	
			N L
			E

2.5 Model number of product

The product can be ordered with the model number configured as shown below.



2.6 Product serial number code

The production serial number code printed on the label indicates the year and month of production as per the following table:

Year	2023	2024	2025	...	2028	2029	2030	...
Month	B	C	D	...	G	H	I	...
Jan	o	Bo	Co	Do	Go	Ho	Io	...
Feb	P	BP	CP	DP	GP	HP	IP	...
Mar	Q	BQ	CQ	DQ	GQ	HQ	IQ	...
Apr	R	BR	CR	DR	GR	HR	IR	...
May	S	BS	CS	DS	GS	HS	IS	...
Jun	T	BT	CT	DT	GT	HT	IT	...
Jul	U	BU	CU	DU	GU	HU	IU	...
Aug	V	BV	CV	DV	GV	HV	IV	...
Sep	W	BW	CW	DW	GW	HW	IW	...
Oct	X	BX	CX	DX	GX	HX	IX	...
Nov	y	By	Cy	Dy	Gy	Hy	Iy	...
Dec	Z	BZ	CZ	DZ	GZ	HZ	IZ	...



Warning

Special products (-X) might have specifications different from those shown in this section. Contact SMC for specific drawings.

3 Special Features

• Auto tuning

This function sets the values necessary for the control system such as PID (proportional band, integral time, derivative time and ratio of cooling/heating gain) automatically.

If the controlled temperature fluctuates constantly after reaching the target temperature, perform auto tuning. Controller calculates optimum control PID and set automatically. Auto tuning may require time depending on the conditions.

- 1) Select "2" in control operation.
- 2) Pressing [AT] key to light "AT" indicator and start auto tuning.
- 3) Pressing [AT] key stops auto tuning. ("AT" indicator turns off)
- 4)"AT" indicator turns off when auto tuning is complete. If not completed after 20min. [ERR19] (AT abnormal) occurs.

• Offset function

This function controls the temperature slide by an offset value from set point temperature. When the circulating fluid travels to the target object, a certain deviation occurs between the temperature just before the object and the set temperature of the product due to the influence of ambient temperature on the piping. In this case, if the deviation is input as the offset value, the temperature of the circulating fluid just before the object can match with the setting value. Internal sensor value for the alarm does not include the offset value. For example, if -0.15 °C is set here, the actual reference temperature for control is lower than the indicated SV by 0.15 °C. Internal sensor value for the alarm does not include the offset value.

• Learning control function

This function lets the product measure the temperature of circulating fluid flowing before temperature target object by an external temperature sensor and adjusts the offset function automatically to the set value at a certain sampling interval. The external temperature sensor needs to be prepared separately by the customer.

- 1) Install an external temperature sensor to the target object.
- 2) Select "3" in control operation.
- 3) Thermo-con controls the external sensor value to the set point.
- 4) When the temperature is not stable, then set the sampling interval larger.

• External tuning control function

This function makes the temperature of circulating fluid consistent to the external (ambient) temperature all times. This function lets the product measure the temperature from a temperature sensor mounted in the customer preferred location, then it adjusts the temperature of the fluid automatically to the temperature detected by the sensor.

The separate temperature sensor needs to be prepared separately by the customer.

- 1) Install an external temperature sensor to the room.
- 2) Select "4" in control operation.
- 3) Thermo-con controls the fluid temperature to the ambient temperature.
- 4) When the temperature is not stable, then set the sampling interval larger.

• Temperature sensor fine control function

This is a function to finely control the measurement temperature of the control sensor within the range of -9.99 to 9.99 °C separate from offset function. Control sensor can be corrected by inputting difference (calibration value) between temperature of standard and that of control sensor.

For example, if -0.15 °C is set here, the actual reference temperature for control is lower than the indicated SV by 0.15 °C.

Internal sensor value for alarm = Internal sensor value – Fine control value

• Setting value memory function

Even if the power is turned off the set values are saved and will be restored at power on.

• Upper / Lower temperature limit alarm function

This function raises an alarm when temperature of the circulating fluid is out of allowable upper and lower range. When the alarm is raised, WRN is indicated on LCD. If circulating fluid temperature returns to within allowable upper/ lower range, this alarm is automatically cancelled. The allowable upper and lower range of temperature can be set between 0.1 and 10 °C.

• Output shut off alarm function

The product has a self-check function that can detect faults with the product and interrupts the output to the thermo modules, stopping operation (However, operation continues with ERR 15 and ERR 18). This function gives an alarm if a critical error happens, the display shows ERR and an alarm number. At the same time, the warning output connector gives an output through a relay contact. This warning cannot be removed unless the power is cycled. When the power is being cycled leave at least 3 seconds between turning the power off and turning the power back on.

• Fan speed control (HECR004, HECR006(L), HECR008, HECR010)

Fan speed is controlled automatically in accordance with the heat load.

4 Installation

4.1 Installation



Caution

- Do not install the product unless the safety instructions have been read and understood.
- Pay special attention to the safety of all personnel when installing and transporting the product.
- Do not install the product unless the safety instructions have been read and understood.
- The product is heavy, be careful when installing or moving the product.
- Always transport the product using both handles.
- Leakage from the product may damage peripheral equipment. Install a drain pan under the product to capture leakage. Furthermore, mount devices like a leak sensor on the installed drain pan to detect leakage so that it can alert operators around the area.
- Install the product above 0.6m from the floor.
- The Installer / End User is responsible for carrying out a noise risk assessment on the equipment after installation and taking appropriate measures as required.

4.2 Environment



Caution

- Do not use in an environment where corrosive gases, chemicals, salt water or steam are present.
- The product should be installed upright and on a stable base.
- Do not use in an explosive atmosphere.
- Do not expose to direct sunlight. Use a suitable protective cover.
- Do not install in a location subject to vibration or impact in excess of the product's specifications.
- Do not mount in a location exposed to radiant heat that would result in temperatures in excess of the product's specifications.
- Do not install the product in a location where the air inlet and air outlet vents are blocked. Also do not use the product in a sealed enclosure.
- Do not use the product where it can be exposed to strong electrical or magnetic emissions.
- Do not mount the product in a location where it is exposed to noise sources (such as discharging equipment, large relay and thyristor).
- Do not mount the product in a location with an altitude of more than 1000 meters.
- Do not mount the product where it is exposed to materials such as silicone, which may generate harmful gas.
- Install the product in a location where the ambient temperature range is between 10 to 35°C and the relative humidity range is between 35 to 80%. No dew condensation is allowed on the unit.

4.3 Mounting

- When mounting the product to a cabinet, use a design which shall hold the weight at the bottom. Ensure safety with transportation test if the product is to be installed on a transportation device such as a trailer.
- Mount the product using the fixing holes in the front of the product. Use M5, M6 screws (bolts) or equivalent to the fix the product.
- Be sure to correctly tighten all screws to the required torque. (M5:3.0Nm, M6:5.2Nm)

4.4 Piping



Caution

- Before connecting piping make sure to clean up chips, cutting oil, dust etc.
 - When installing piping or fittings, ensure sealant material does not enter inside the port. When using seal tape, leave 1.5 to 2 threads exposed on the end of the pipe/fitting.
 - Tighten fittings to the specified tightening torque. (Rc1/4:12 to 14 N·m, Rc3/8:15 to 20N·m).
 - Ensure that the power source and the power supply of the product is turned off (or the power plug must come off)
 - Ensure the flow rate of the circulating fluid is as high as possible to maintain the temperature stability. Therefore, the length of the external piping should be minimized and internal diameter should be as large as possible. Piping must have sufficient strength for the maximum discharge pressure of the circulating circuit.
 - Likewise, if a tube is bent or multiple elbow fittings are used, the piping resistance will increase and the flow rate will decrease. If the flow rate falls, the temperature stability will decrease.
 - If installing a tank externally, only a sealed tank should be used. Do not use an open tank.
- Ensure that the INLET and OUTLET for circulating fluid is connected correctly. If any valves are used ensure that they do not restrict the flow, otherwise low flow may cause an alarm.

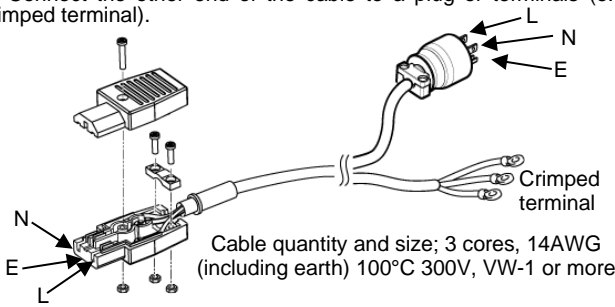
4 Installation (continued)

4.5 Wiring

- Ensure that the power source and the power supply of the product is turned off before connecting the various connectors and power supply cable.
- Supply disconnecting device according to IEC60974-1 and IEC60947-3 for the product must be provided in the end system.
- Do not install the disconnecting device in the place where the operation is difficult. And also the switch of the disconnecting device must comply with the direction of the switch specified by IEC60447.

Caution

- Preparation and wiring of power supply cable
1) Strip the sheath from both ends of the cable.
2) Disassemble the power supply connector. Crimp one end of the cable to L, N, E inside of the connector, then reassemble the power supply connector.
3) Connect the other end of the cable to a plug or terminals (e.g., crimped terminal).



- Ensure that there is enough space between the power supply cable and the communication cable of the product and power cables of other equipment.
- Ensure the power supply and ground connections are made correctly.
- Be sure to provide the grounding. The PE line of the power supply cable is available for grounding. Do not connect the ground in common with the ones for equipment that generates strong electromagnetic noise or high frequency.

Caution

- When an external temperature sensor is connected, connect the sensor with a shield cable. Use a platinum resistant temperature sensor (Pt100ohm, 3-wiring type, class A, 1mA).
- Connect the host to this unit with a twisted pair shield cable when

- applying communication function or external sensor and alarm output function.
- When using the Communication connector and Signal/External temperature sensor, connect the circuit separated from the mains circuit by reinforced insulation.
- Ensure that external instruments connecting to this product provide the enclosure complied with UL61010-1 and use the cable which provide flame resistance (over VW-1).

4.6 Filling the product

1. Ensure that the power source and the power supply of the product is turned off (or the power plug must come off).
2. Remove the reservoir cap. (When setting the product again, confirm the level of fluid does not exceed the "H" mark)
3. If using Ethylene Glycol, refer to the suppliers Material Safety Data Sheet (MSDS) and wear Personal Protective Equipment (PPE) as appropriate.
4. Fill the circulating fluid into the reservoir. Stop filling once the level of fluid reaches the "H" mark.
5. Turn on the power switch to fill the piping with the fluid.
6. When the piping is filled with the circulating fluid, the level of the reservoir decreases and low fluid level alarm (ERR20) arises accordingly. Then, turn off the power supply once again.
7. Repeat the step from 4 to 6 until ERR20 alarm doesn't appear anymore.
8. Then, replace the cap on the reservoir and tighten it securely.
9. Keep the fluid level between H and L of the level indicator.

Danger

- Never touch the power switch with wet hands to avoid electrical shock.

Caution

- Do not touch the surface when the set temperature is high. Temperature of the tank and the chassis near the tank could be high.
- Fluid other than water or Ethylene Glycol (up to 20%) should not be used as circulating fluid. Using such fluid may lead to leakage or damage of the pump.
- Operation of the pump with a large amount of air left in the piping for prolonged period may damage the pump. Remove air from piping before starting operation.
- If the power switch is turned on without circulating fluid, the pump could be damaged.
- Take care not to spill water over the product when supplying water to the reservoir. When a spill is made, wipe it off immediately and only supply power after it has dried. If this procedure is neglected, it may cause damage to the product.

4 Installation (continued)

- If a fluid with low conductivity such as DI water is used as circulating fluid, it can cause static electricity due to friction and damage the product.
- Take measures to minimize the static electricity from circulating fluid.
- If the product is operating for a long time with large temperature fluctuations after reaching the set temperature, the product may be damaged. Please set the PID values by using the auto-tuning function.

5 Operation

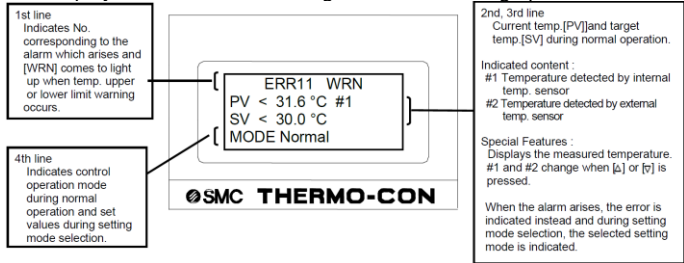
5.1 Power Up

When power is turned on, the software version is indicated on display panel for approx. 1 second.

5.2 Operation

The product begins operation immediately after the power is turned on. The pump and heat exchanger will be running and the product will begin temperature control.

The display can show the following information during operation.



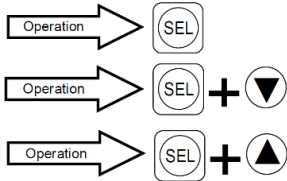
5.3 Settings

Three different levels of settings are available depending on the content, which needs to be set.

Level 1: Used in normal operation e.g., setting of target temperature and offset.
Level 2: Used at maintenance and initial setting for setting of controller/PID.
Level 3: Used at initial setting for the communication function.

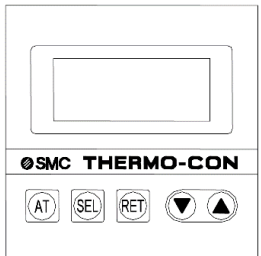
The key functions are as follows:
[SEL]: Used to show the item that needs to be changed in selected mode level.

[▽△]: Used to change the value of the item selected.
[RET]: Used to fix the value changed by [▽△] key.
Press again to return to current temperature indication.



[AT]: Used to start auto tuning in auto tuning mode (This function works when the control operation mode is 2 in level setting 1)
When pressed during auto tuning, the auto tuning is stopped.

- When no input is made within 1 minute regardless of setting mode, the display returns to the current temperature indication.
- The data input is written to FRAM and memorized after the power supply is turned off.
- To return all the setting values to default: Turn on the power supply while pressing [SEL] and [RET] keys.



5.3.1. Level 1 – Settings

No.	Modes	Setting contents	Setting range (Min. increment)	Default
1	Target Temp. (No indication on display)	Sets target temp. for control.	10.0 to 60.0°C (0.1°C)	25.0
2	Control Operation	Selects control operation mode from those shown below. 0: Pump stop (No control) 1: Normal operation 2: AT (auto tuning) 3: Learn (learning control) 4: External (external tune control) 5: SeriRem (Serial remote) 5: Serial remote is displayed when choose the Modbus communication.	0,1,2,3,4,5	1
3	External Sensor Sampling Cycle	Sets sampling cycle for learning control or external tune control.	10 to 999sec	60
4	Offset Value	Indicates the offset value of the circulating fluid temperature used as reference value by the controller (SV + Offset).	-9.99 to 9.99°C	0.00
5	Allowable Upper Temp. Range	Sets upper limit of temp. range which causes a warning to occur.	0.1 to 10.0°C (0.1°C)	1.5
6	Allowable Lower Temp. Range	Sets lower limit of temp. range which causes a warning to occur.	0.1 to 10.0°C (0.1°C)	1.5
7	High Temp. Cutoff	Sets upper limit of temp. measured by the internal temp. sensor and stops operation of the product.	11.0 to 70.0°C (0.1°C)	70.0
8	Low Temp. Cutoff	Sets lower limit of temp. measured by the internal temp. sensor and stops operation of the product.	0.0 to 59.0°C (0.1°C)	0.0

5 Operation – continued

5.3.2. Level 2 – Settings

No.	Modes	Setting contents	Setting range (Min. increment)	Default
1	Fine Control of Internal Sensor	Sets the fine adjusting value to calibrate the internal temp. sensor.	-9.99 to 9.99°C (0.01°C)	0.00 (*)
2	Fine Control of External Sensor	Sets the fine adjusting value to calibrate the external temp. sensor available optionally.	-9.99 to 9.99°C (0.01°C)	0.00
3	PB Range	Sets PB (Proportional Band) range used for PID control.	0.3 to 9.9°C (0.1°C)	6.0
4	I Constant	Sets integral time used for PID control.	1 to 999sec (1 sec)	18
5	D Constant	Sets differential time used for PID control. When 0 is set, differential operation is not made.	0.0 to 99.9sec (0.1 sec)	0.0
6	Heating/Cooling Ratio	Sets output ratio of cooling to heating to compensate difference of gain between them.	10 to 999% (1%)	300
7	Overload Judging Temp. Range	Sets the temp. range for judgment of overload (accompanying abnormal output alarm ERR15).	0.1 to 9.9°C (0.1sec)	0.2
8	Overload Judging Time	Sets time for judgment of overload (accompanying abnormal output alarm ERR15). When 0 is set, the alarm doesn't arise.	0 to 99min (1min)	10
9	Output Ratio	Shows output ratio of thermos module by 1%. The prefix symbol "-" stands for cooling and no prefix stands for heating.	-100 to 100% (1%)	-
10	Upper/Lower Temp. Alarm Sequence	Determines whether temp. upper/lower limit alarm is output when power is turned on. On: Output Off: Not output	On, Off	Off

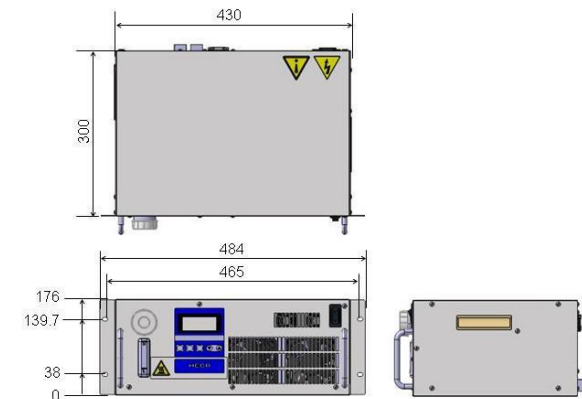
*There is the possibility that the value is inputted at the time of pre-shipment inspection is different from the default value.

5.3.3. Level 3 – Settings

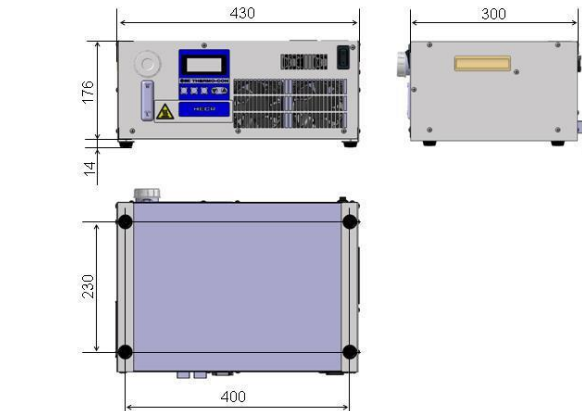
No.	Modes	Setting contents	Setting range (Min. increment)	Default
1	Serial communications	RS-232C / RS-485	RS-232C, RS-485	RS-232C
2	Termination Resistor	Sets the termination resistor (120Ω) for RS 485 communication.	On, Off	Off
3	Communication Protocol	Set the Communication protocol. SMC CMD: same as existing HEC communication. Modbus: Modbus communication.	SMC CMD, Modbus	SMC CMD
4	Unit Number	Sets the unit No, used. This is applicable only when multiple Thermos-cons are used. (Unit number 1 to F is valid when the Modbus communication is used).	0 to F (Hexadecimal)	0
5	Baud Rate	Sets the baud rate for communication.	600, 1200, 2400, 4600, 9600, 19200b/s	1200
6	Parity Bit	Sets parity bit for communication. None (No parity), Odd, Even.	None, Odd, Even	None
7	Data Length	Sets data length for communication.	7, 8 bits	8
8	Stop Bit	Sets stop bit for communication.	1, 2 bits	1

6 Outline Dimensions

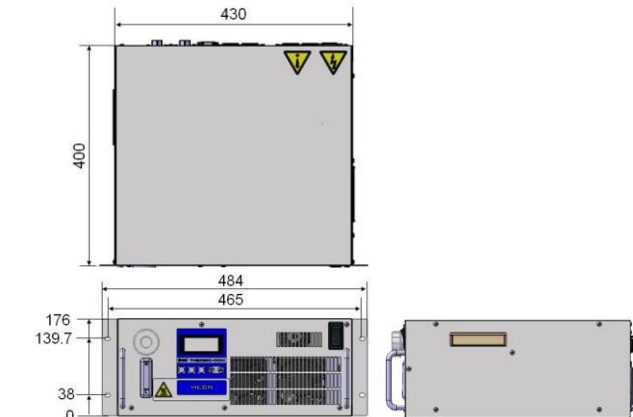
HECR002



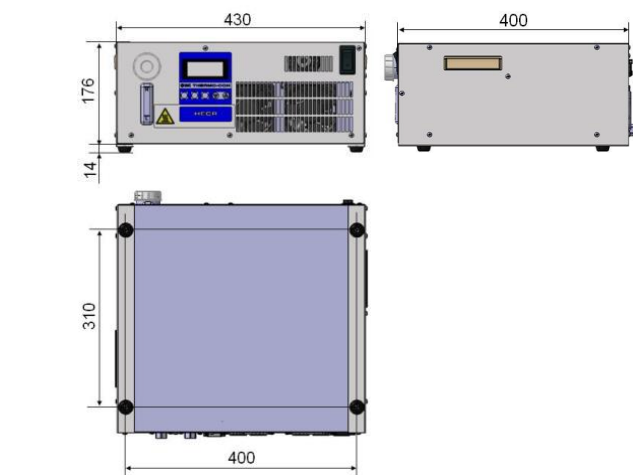
HECR002 (Option E)



HECR004

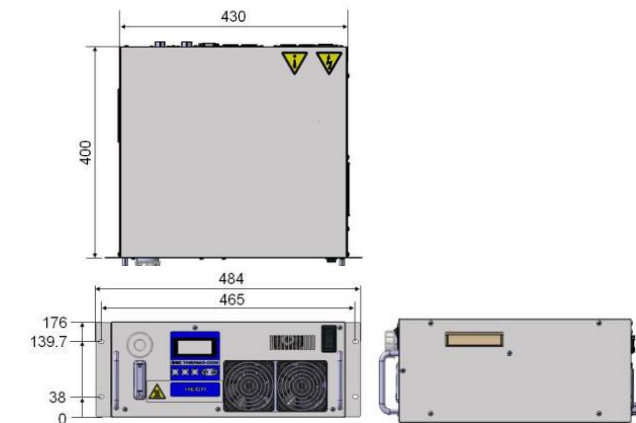


HECR004 (Option E)

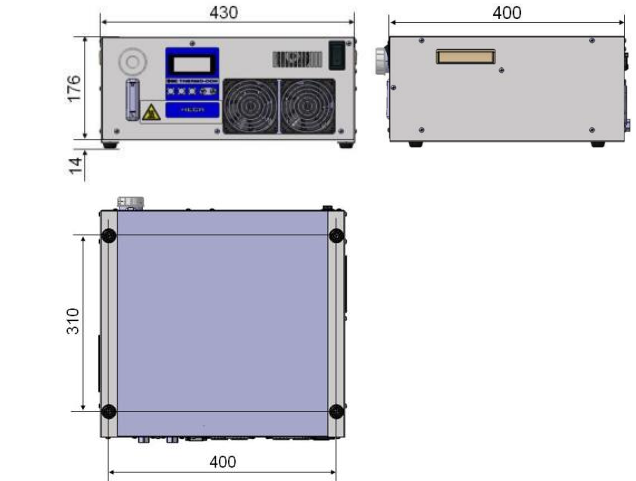


6 Outline Dimensions - continued

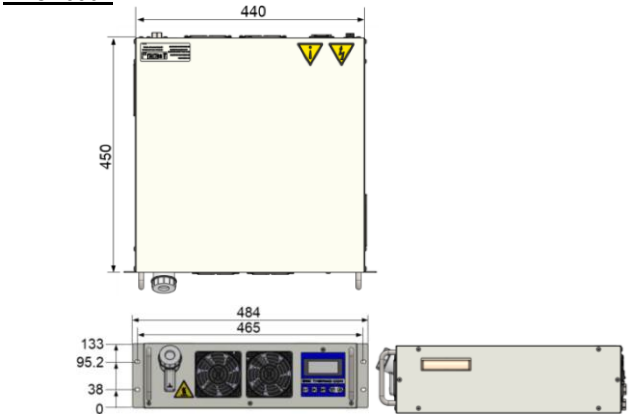
HECR006



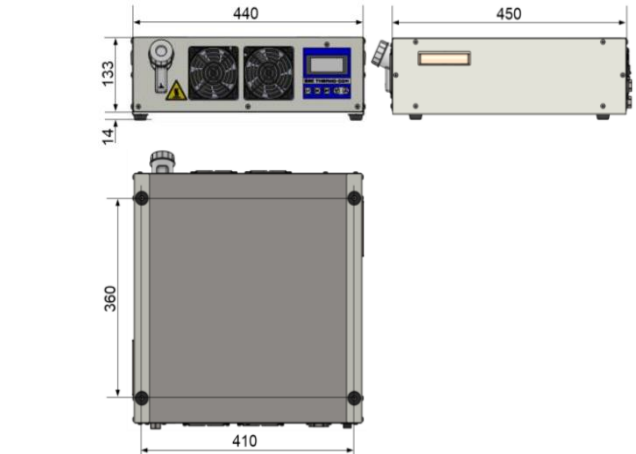
HECR006 (Option E)



HECR006L

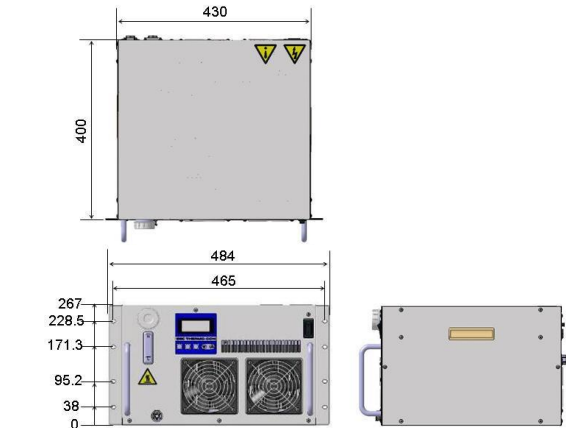


HECR006L (Option E)

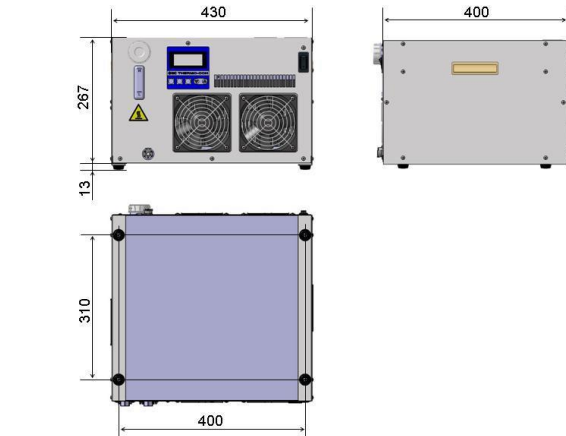


6 Outline Dimensions - continued

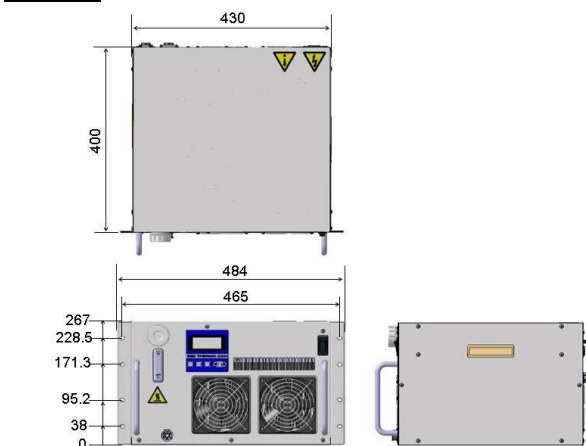
HECR008



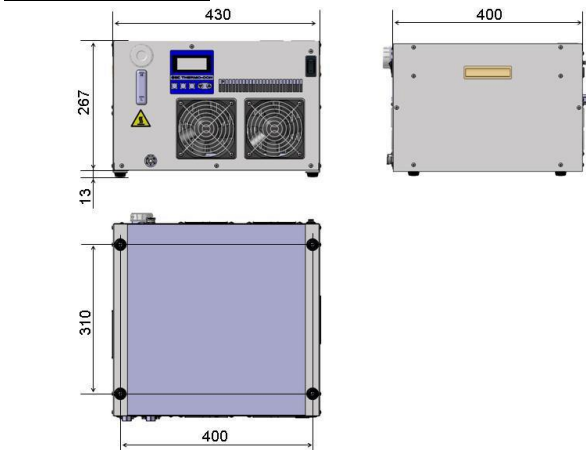
HECR008 (Option E)



HECR010

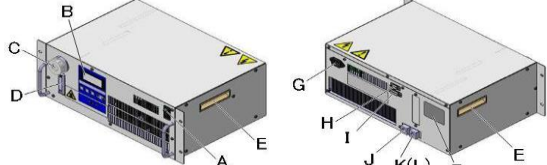


HECR010 (Option E)

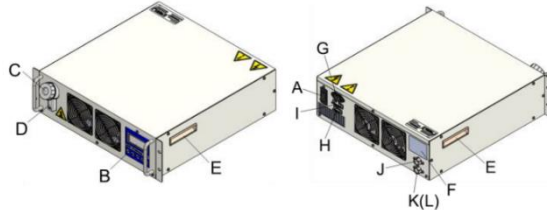


7 Key Parts

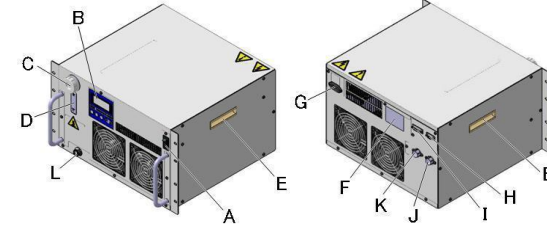
HECR002/HECR004/HECR006



HECR006L



HECR008/010



A	Power Switch	G	Power Supply Connector
B	Display/Operation Panel	H	Communication Connector
C	Reservoir Cap	I	External Sensor/Alarm Output Connector
D	Level Gauge	J	Circulating Fluid OUT
E	Handle	K	Circulating Fluid IN
F	Model No. Label	L	Drain Port

8 Maintenance

8.1 General maintenance

- Caution**
- Replace the circulating fluid regularly to avoid any problems due to algae or contamination.
 - It is recommended to prepare spare units to minimise downtime due to those repair and maintenance services.

<Drain circulating fluid>

- Drain circulating fluid from the Fluid IN for HECR002/HECR004/HECR006(L) or from the Drain port for the HECR008 / HECR010. Loosen the reservoir cap to help draining. (Do not remove the cap)
- To drain from the piping, blow air (0.1MPa, about 1 minute) from Fluid OUT to Fluid IN. Close the reservoir cap while blowing.
- Not following proper maintenance procedures could cause the product to malfunction and lead to equipment damage.
- Before performing maintenance, turn off the power supply.
- After installation and maintenance, apply power to the equipment and perform appropriate functional and leakage tests to make sure the equipment is installed correctly.
- If any electrical connections are disturbed during maintenance, ensure they are reconnected correctly and safety checks are carried out as required to ensure continued compliance with applicable national regulations.
- Do not make any modification to the product.
- Do not disassemble the product, unless required by installation or maintenance instructions.

8.2 Daily Check

- Caution**
- Indication of display panel: Check temperature condition and confirm whether or not an alarm has occurred.
 - Confirm that the heat sink and panel are free from dust. A large amount of dust may impair the performance.
 - Confirm there is no leakage of circulating fluid and check the condition of the piping (e.g., no tight bends or crushed pipes).
 - Confirm there is no abnormal sound, smell or heating from the product.
 - When cleaning the panel or heat sink use a vacuum cleaner to remove the dust. Do not use water or steam since it leads to rusting of the frame.

Code	Description	Manner of Reset
ERR01	System Error 1	Restart the power supply. In the case the alarm can't be reset by above manner, repair is required
ERR02	System Error 2	Initialisation of FRAM or stop and restart of power supply. In the case the alarm can't be reset by above manner, repair is required.
ERR03	Back-Up Data Error	The unit continues controlling and recovers normal condition at any time.
WRN	Temp. Upper/Lower Limit Alarm	Remove a possible cause and restart. In the case the alarm can't be reset by above manner, repair is required.
	Others	

Code	Description	Operation Status	Reason for Alarm	Cause/Measure
WRN	Temp. Upper/Lower Limit	Continue	Fluid temp. is out of limit range.	Product is reaching target temperature. Wait for the temperature to stabilise, then WRN should disappear.
ERR01	System Error 1	Stop	The wire inside the Thermo-con was broken due to vibration during transport.	In the case the alarm can't be reset by above manner, required.

8 Maintenance – continued

Code	Description	Operation Status	Reason for Alarm	Cause/Measure
ERR02	System Error 2	Stop	The FRAM data was destroyed by high-level noise.	Move the product to an environment with little noise, turn ON the power supply. If there is no alarm, it was caused by noise. Please consult with SMC.
ERR03	Back-up data error	Stop	The memory data was destroyed by high-level noise.	Move the product to an environment with little noise, turn ON the power supply. If there is no alarm, it was caused by noise. Please consult with SMC.
ERR11	DC power supply failure	Stop	DC output voltage of product is reduced.	Check the power voltage. HECR002: 100 to 240VAC HECR004: 100 to 240VAC HECR006(L): 100 to 240VAC HECR008: 100 to 240VAC HECR010: 200 to 240VAC
			The fans at the power supply stops.	Remove foreign matters which might stop the fan.
ERR12	Internal temp. sensor High temp. failure	Stop	Internal temp. sensor value exceeds the high temp. cutoff temperature.	Check the set value for high temp. cutoff temperature and confirm the temperature really reaches this value.
			Flow rate of circulating fluid is zero.	If the flow rate of the circulating fluid is zero, the temperature of circulating fluid can't be detected and might increase. Confirm the flow of circulating fluid is not stopped by valves etc.
ERR13	Internal temp. sensor Low temp. failure	Stop	Internal temp. sensor value is lower than low temp. cutoff temperature.	Check the set value for low temp. cutoff temp. and confirm the temperature really reaches this value.
			Flow rate of circulating fluid is zero.	If the flow rate of the circulating fluid is zero, the temperature of circulating fluid can't be detected and might decrease. Confirm the flow of circulating fluid is not stopped by valves etc.
ERR14	Thermostat alarm	Stop	Flow rate is zero.	If flow rate of circulating fluid is zero, the temperature of circulating fluid cannot be measured and the temperature of heat exchanger may increase. Ensure the circulating fluid is allowed to flow.
			The pump breaks.	
ERR15	Abnormal output alarm	Continue	Cooling or heating capacity overload.	No temperature decrease when 100% cooling output. No temperature increase when 100% heating output.
			Volume of circulating fluid is too large.	If the volume of circulating fluid system is too large, the change of temperature takes a long time. In this case, change overload judging time setting to avoid this alarm. (Refer to 5.3.2)
ERR16	Low circulating flow rate alarm (Option)	Stop	The flow rate of the circulating fluid is 1 L/min. or less	Investigate why the flow rate of the circulating fluid is low and take countermeasures.

Code	Description	Operation Status	Reason for Alarm	Cause/Measure
ERR17	Internal temp. sensor disconnection alarm	Stop	High level noise entered the temp. sensor line.	Check whether unstable temperature is caused by noise. Please consult SMC if it is caused by noise.
ERR18	External temp. sensor disconnection alarm	Continue	The external temp. sensor is not mounted.	For learning control or external tune control, be sure to mount the external temp. sensor.
ERR19	Abnormal auto tuning alarm	Stop	Capacity of circulating fluid is too large.	Adjust PID value (proportional band, integral time and derivative time) of setting mode Level 2 by hand.
			Overloaded during auto tuning mode	Avoid overload.
ERR20	Low fluid level alarm	Stop	Fluid level of tank is not enough.	Refill tank with fluid.
			Fluid is leaking.	Check all fluid connections connected with the product.
	Temperature rises and falls ± 1 to 2°C gradually about the set point temperature	-	Flow rate of circulating fluid is low.	Keep the flow rate 0.5L/min (HECR002)/ 1L/min (HECR004,HECR006(L),HECR008, HECR010) or more.
			PID parameters are set incorrectly.	If the temperature cannot be stable at default value, perform auto tuning.

9 Product Disposal

This product shall not be disposed of as municipal waste. Check your local regulations and guidelines to dispose this product correctly, in order to reduce the impact on human health and the environment.

10 Declaration of Conformity

Below is a sample Declaration of Conformity (DoC) used for this product. An actual DoC will be supplied with each product.



11 Contacts

Refer to www.smcworld.com or www.smc.eu for your local distributor/importer.

SMC Corporation

URL : <https://www.smcworld.com> (Global) <https://www.smc.eu> (Europe)
SMC Corporation, 4-14-1, Sotokanda, Chiyoda-ku, Tokyo 101-0021, Japan
Specifications are subject to change without prior notice from the manufacturer.
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