



ORIGINAL INSTRUCTIONS



Refer to Declaration of Conformity for relevant Directives

Instruction Manual

Air Cooled Rack Mount Thermo-con

HECR Series

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 relating to systems.
- ISO 4413: Hydraulic fluid power - - General rules relating to systems.
- IEC 60204-1: Safety of machinery - -Electrical equipment of machines. (Part 1: General requirements)
- ISO 10218-1: Manipulating industrial robots -Safety. etc.

This manual contains essential information for the protection of users and others from possible injury and/or equipment damage.

- Read this manual before using the product, to ensure correct handling, and read the manuals of related apparatus before use.
- 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.

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

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.**

- 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.

1 Safety Instructions - continued

- 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.
- Before machinery/equipment is restarted, take measures to prevent unexpected operation and malfunction.

- Contact SMC beforehand and take special consideration of safety measures if the product is to be used in any of the following conditions.**

- Conditions and environments outside of the given specifications, or use outdoors or in a place exposed to direct sunlight.
 - 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.
 - An application which could have negative effects on people, property, or animals requiring special safety analysis.
 - 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.

2.2 Product Specifications

Model	HECR002-A	HECR008-A	HECR010-A		
Cooling method	Air cooled				
Control method	PID control				
Ambient temperature / Humidity / Altitude ¹⁾	10 to 35°C / 35 to 80%RH (no condensation) / up to 1000m				
Circulating fluid	Water, Ethylene glycol aqueous solution up to 20%				
Operating temp. range (°C)	10 to 60 (No dew condensation)				
Indication temp. range (°C)	-9 to 80.0				
Cooling capacity (W)	200 ¹⁾	800 ¹⁾	1000 ¹⁾		
Accuracy related to Temperature ¹⁾	Indication accuracy (°C)	±0.2			
	Temperature drift (°C)	±0.2			
	Stability (°C)	±0.01 to 0.03			
Pump capacity	Refer to performance charts				
Tank capacity (L)	13				
Port size (IN / OUT)	Rc 1/4	Rc 3/8			
Drain port	-	CPC PLCD 9004			
Wetted material	Stainless steel, Carbon, Ceramic, EPDM, NBR, PPE, PPS, POM, Polyethylene				
Electrical system	Power supply	1 phase AC100 to 240V 50/60Hz Allowable voltage fluctuation ±10%	√	-	
	Current consumption (A)	1 phase AC 200 to 240V 50/60Hz Allowable voltage fluctuation ±10%	-	√	
		100 V AC	5	10	-
		200 V AC	-	-	8
240 V AC	-	4	-		
Inrush current	50A or less				
Over current protection (circuit protector) (A)	10	14			
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				
Acoustic noise (dB)	49	54 - 65 (Variable fan speed control)			
Accessory	Operation manual 1pc; Power supply connector 1pc				
Weight (dry condition) (kg) ²⁾	14	31	33		

Notes:

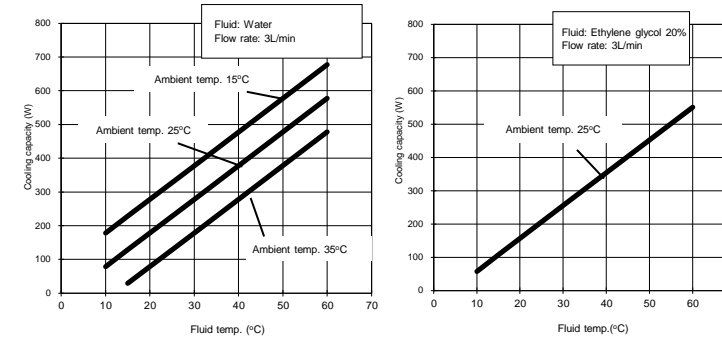
- Environment: No corrosive gas, solvent (example: Thinner, etc.) and flammable gas.
- Set temperature and Ambient at 25°C; Flow rate 3L/min.

2 Specifications - continued

- *3 Set temperature and Ambient at 25°C; Flow rate 4L/min.
- *4 Circulating fluid 'OUT' port directly connected to 'IN' port.
- *5 Some product models are heavy (over 14kg). Two persons are required to move and position the product

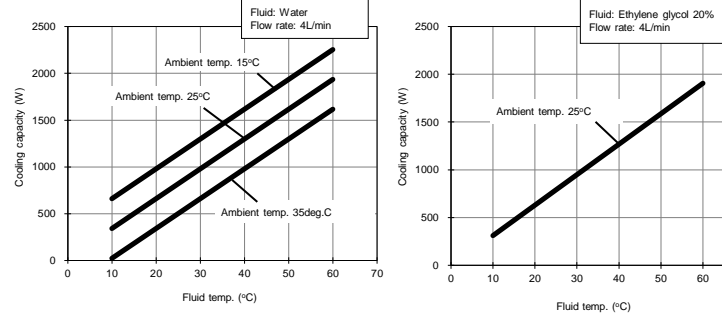
2.3 Cooling Capacity

HECR002-A



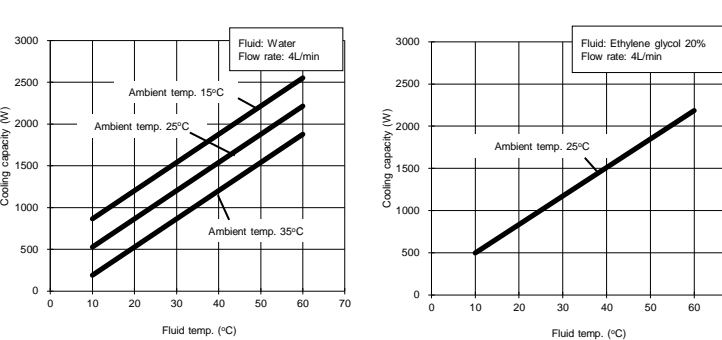
Note: *Cooling capacity decreases 20W when option 'P' (High pressure pump) is selected.

HECR008-A



Note: *Cooling capacity decreases 50W when option 'P' (High pressure pump) is selected.

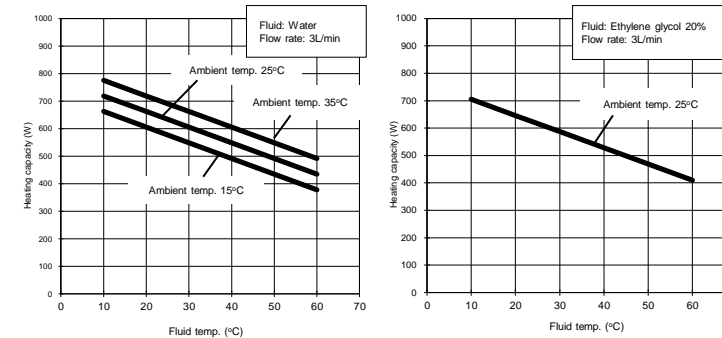
HECR010-A



Note: *Cooling capacity decreases 50W when option 'P' (High pressure pump) is selected.

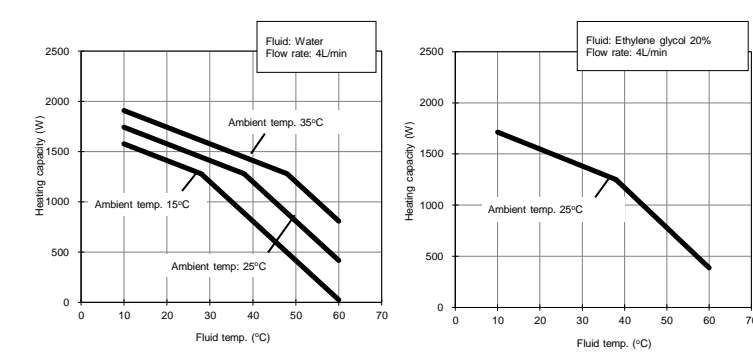
2.4 Heating Capacity

HECR002-A

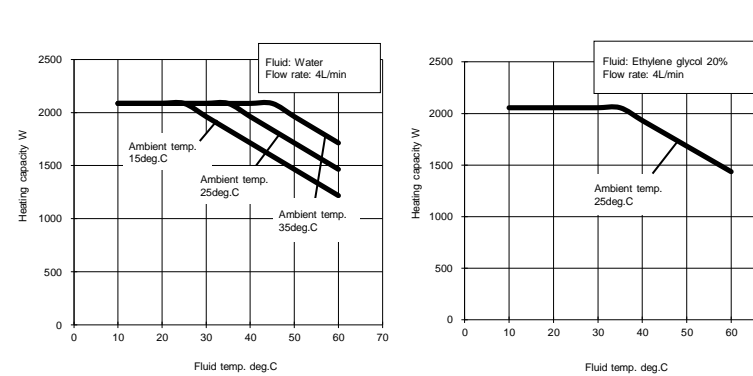


2 Specifications - continued

HECR008-A

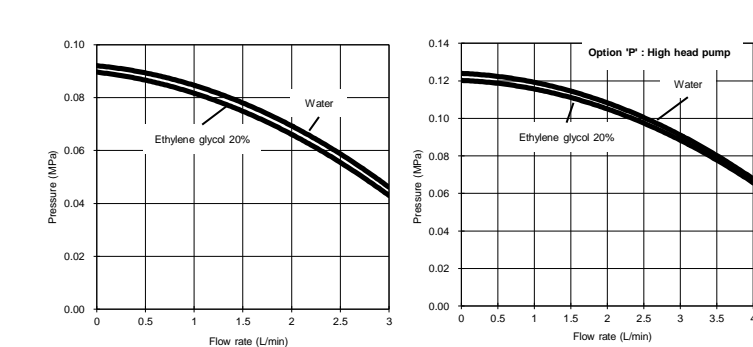


HECR010-A

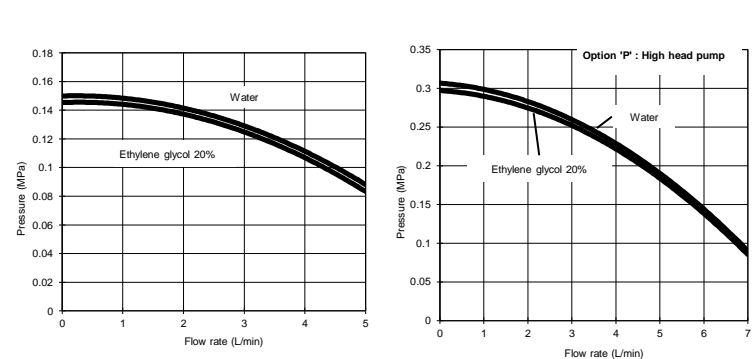


2.5 Pump Capacity

HECR002-A



HECR008/010-A



2 Specifications - continued

2.6 Connector Specifications

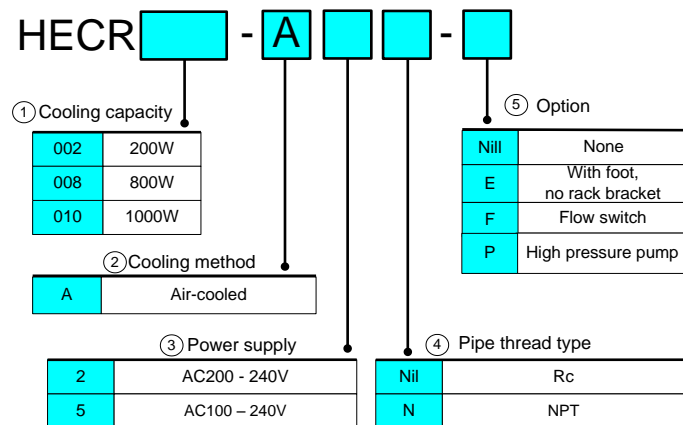
Description	No.	Signal	Style and Part No.
Power supply connector (IEC60320,C14)	N	HECR002 AC100 to 240V	HECR010 AC200 to 240V
	L	AC100 to 240V	AC200 to 240V
	E	PE	
Communication connector Note: Always use shielded cable connected to this connector.		RS-232C	RS-485
	1	Unused	BUS +
	2	RXD (RD)	Unused
	3	TXD (SD)	Unused
	4	Unused	Unused
	5	SG	SG
	6-8	Unused	Unused
	9	Unused	BUS -
	1-2	Unused	
Signal-External temperature sensor connector Note: Always use shielded cable connected to this connector.	3-5	PT-RTD	
	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	

2.7 Production Serial Number Code

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

Year	2015	2016	2017	...	2021	2022	2023	...
Month	T	U	V	...	Z	A	B	...
Jan	o	To	Uo	Vo	...	Zo	Ao	Bo
Feb	P	TP	UP	VP	...	ZP	AP	BP
Mar	Q	TQ	UQ	VQ	...	ZQ	AQ	BQ
Apr	R	TR	UR	VR	...	ZR	AR	BR
May	S	TS	US	VS	...	ZS	AS	BS
Jun	T	TT	UT	VT	...	ZT	AT	BT
Jul	U	TU	UU	VU	...	ZU	AU	BU
Aug	V	TV	UV	VV	...	ZV	AV	BV
Sep	W	TW	UW	VW	...	ZW	AW	BW
Oct	X	TX	UX	VX	...	ZX	AX	BX
Nov	y	Ty	Uy	Vy	...	Zy	Ay	By
Dec	Z	TZ	UZ	VZ	...	ZZ	AZ	BZ

3 How to Order



4 Name and Function of Parts

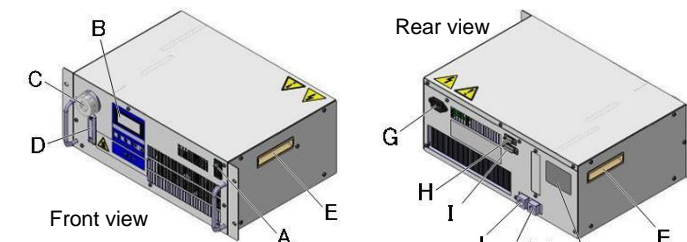
4.1 Main Parts

The names of the parts used in this manual are as follows:

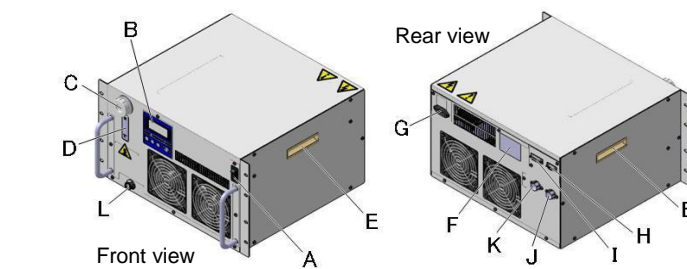
Main Body

Ref.	Description	Ref.	Description
A	Power switch	G	Power supply connector
B	Operation display panel	H	Communication connector
C	Reservoir cap	I	External/Alarm output connector
D	Level gauge	J	Circulating fluid 'OUT'
E	Handle	K	Circulating fluid 'IN'
F	Model label	L	Drain port

HECR002-A

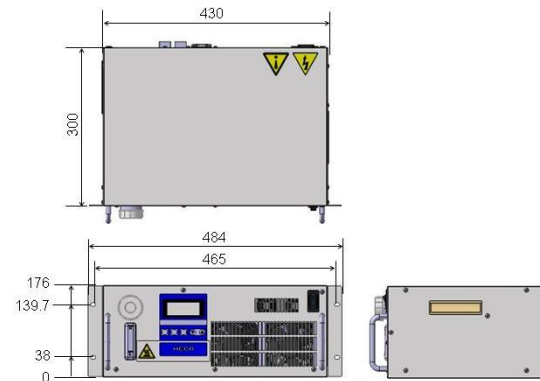


HECR008/010-A

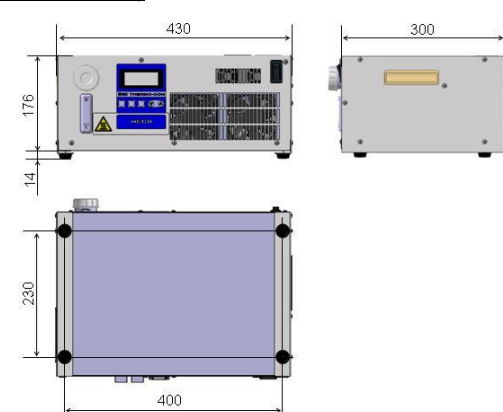


4.2 Dimensions

HECR002

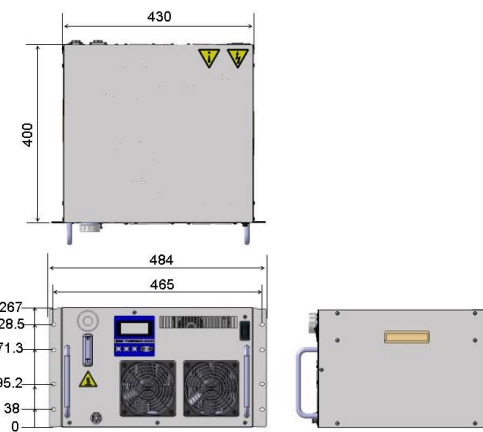


HECR002 (Option E: With Foot)

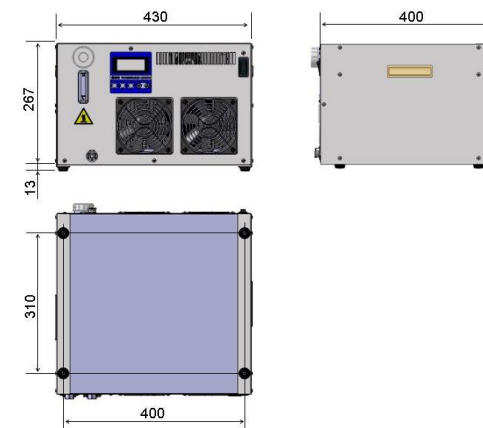


4 Name and Function of Parts - continued

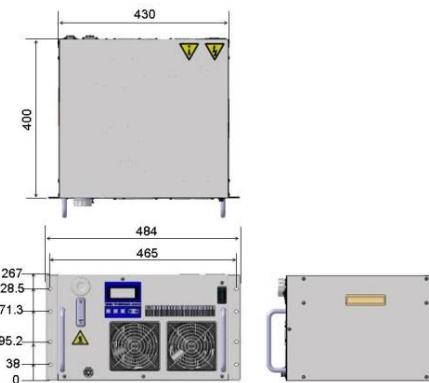
HECR008



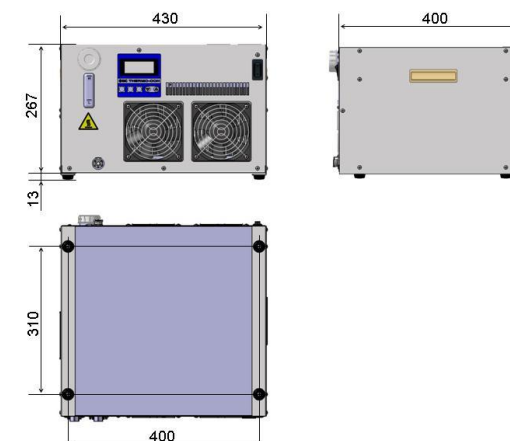
HECR008 (Option E: With Foot)



HECR010



HECR010 (option E: With Foot)



5 Transportation, Transfer and Moving

5.1 Moving by forklift or by persons

Caution

- Transportation, installation, and maintenance including dangerous work must be done by trained personnel with sufficient knowledge and experience of the equipment and the system.

Warning

- The instructions below must be followed because the equipment is heavy and potentially dangerous to transport.
- The product must be transported by more than one person or use of mechanical aids (example: plate truck).
- When transporting the product, always follow the instructions:
 - When lifting the product, lift carefully by the base to prevent dropping or tipping over.
 - Do not lift by the fittings or piping.
 - Never lay this equipment on its side to move it. Pushing it over onto its side will damage the product

6 Special Features

6.1.1 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.

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

6.1.2 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.

6.1.3 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.

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

6.1.4 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 adjust 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.

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

6 Special Features - continued

6.1.5 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)

6.1.6 Setting value memory function

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

6.1.7 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.

6.1.8 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.

6.1.9 Fan speed control (HECR008, HECR010)

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

7 Installation

7.1 Installation

Warning


- Do not install the product unless the safety instructions have been read and understood.
 - Always transport the product using both handles.
 - The product should be installed upright on stable based.
- 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.

7.2 Types of Hazard Labels


Warning

- The product has various potential hazards and they are marked with warning labels. Continued.

Warning related to Electricity

	This symbol stands for a possible risk of electric shock.
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Warning related to High Temperatures

	This symbol stands for a possible risk of hot surface
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7.3 Environment

Warning

- Do not use in an environment where the product is directly exposed to water, oil, corrosive gases, chemicals, and, salt water or steam.
- 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 in an explosive atmosphere.

7 Installation - continued

- Do not mount the product in a location where it can be exposed to prolonged sunlight. Use a protective cover.
- Do not mount the product in a location where it is subject to strong vibrations and/or shock. Check the product specifications.
- 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 1000m.
- 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.
- Do not mount the product in a location exposed to radiant heat.

7.4 Mounting

Warning

- The Installer / End User is responsible for carrying out a noise risk assessment on the equipment after installation and taking appropriate measures as required.

Caution

- 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).

7.5 Piping

- 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.

Caution

- 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.
- 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.
- Be sure to correctly tighten the fitting fittings to the required torque (Rc1/4:12 to 14 N·m, Rc3/8:15 to 20N·m).

7.6 Electrical wiring

Warning

- The electrical wiring should be installed and wired in accordance with local laws and regulations of each country and by the person who has knowledge and experience.
- Be sure to shut off the user's power supply. Wiring with the product energized is strictly prohibited.
- Be sure to provide grounding. Incomplete grounding can cause failure and electrical shock.
- Do not connect the earth to a water pipe, gas pipe or lightning rod.
- Check the power supply. Operation with voltage, capacities and frequencies other than those specified can caused heat, fire and electrical shock.

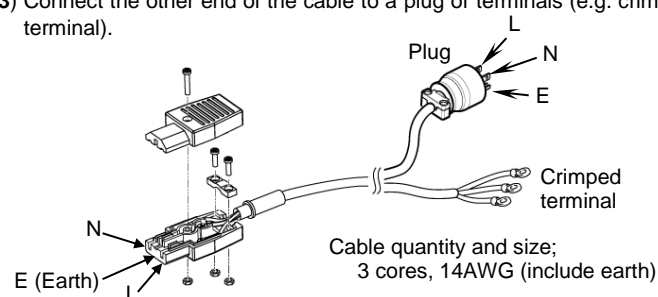
7.6.1 Wiring procedure

- Preparation and wiring of power supply cable

- Strip the sheath from both ends of the cable.

7 Installation - continued

- 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.
- 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.
- 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 provides flame resistance (over VW-1).

7.7 Filling the product

- Ensure that the power source and the power supply of the product are turned off (or the power plug must come off).
- Remove the reservoir cap.
- If using Ethylene Glycol, refer to the suppliers Material Safety Data Sheet (MSDS) and wear Personal Protective Equipment (PPE) as appropriate.
- Fill the circulating fluid into the reservoir. Stop filling once the level of fluid reaches the "H" mark.
- Turn on the power switch to fill the piping with the fluid.
- 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.
- Repeat the step from 4 to 6 until ERR20 alarm doesn't appear anymore.
- Then, replace the cap on the reservoir and tighten it securely
- 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.

7 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.

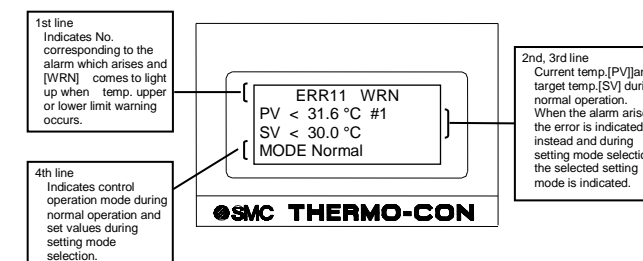
8 Operation

8.1 Operation

When power is turned on, the software version is indicated on display panel for approx. 1 second. The pump and heat exchanger will be running and the product will begin temperature control.




8.2 Power Up

The display can show the following information during operation.



8.3 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.

Caution

After shutting down the power supply, ensure a time interval at least 3 seconds between 'ON' and 'OFF'. Restarting the product within that interval may cause it to malfunction.

8.3.1 Setting: Level 1

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 (1sec)	60

8 Operation - continued

No.	Modes	Setting contents	Setting range (Min. increment)	Default
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 (0.01°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

8.3.2 Setting: Level 2

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 (1sec)	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 (0.1sec)	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. Rang	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

No.	Modes	Setting contents	Setting range (Min. increment)	Default
9	Output Ratio	Shows output ratio of thermo 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 or not temp. upper/lower limit alarm is output when power is turned on. On : Output Off : Not output	On, Off	Off

8.3.3 Setting: Level 3

No.	Modes	Setting contents	Setting range	Default
1	Serial communications	RS-232C / RS-485	RS-232C, RS-485	RS-232C
2	Termination resistor	Sets the termination resistor (120 Ω) 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 Thermo-cons are used. (Unit number 1 to F is valid when used the Modbus communication)	0 to F (Hex decimal)	0
5	Baud Rate	Sets baud rate for communication.	600, 1200, 2400, 4800, 9600, 19200b/s	1200
6	Parity Bit	Sets parity bit for communication. None : No parity Odd : Odd Even : Even	None, Odd, Even	None
7	Data Length	Sets data length for communication.	7Bits, 8Bits	8
8	Stop Bit	Sets stop bit for communication.	1Bit, 2Bits	1

9 Troubleshooting

9.1 Troubleshooting

The troubleshooting method depends on which alarm has been generated.

Warning

In the event of an unexpected problem or malfunction, switch off the product and investigate the cause. If the cause of the problem cannot be determined, do not use the product, but contact SMC for assistance.

9.2 How to reset the alarm

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	
ERR03	Back-up data error	Initialization of FRAM or stop and restart of power supply In the case the alarm can't be reset by above manner, repair is required.
WRN	Temp. upper/lower limit alarm	The unit continues controlling and recovers normal condition at any time.
Others		Remove a possible cause and restart. In the case the alarm can't be reset by above manner, repair is required.

9.3 Alarm code and Troubleshooting

Code	Description	Operation status	Reason for alarm setting	Cause / Measure
WRN	Temp. upper/lower limit	Continue	Fluid temperature is out of limit range.	Product is reaching target temperature. Wait for the temperature to stabilize, then the 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, repair is required.
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.

Code	Description	Operation status	Reason for alarm setting	Cause / Measure
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 reduce. The fan at the power supply stops.	Check the power voltage: HECR002: 100V to 240V HECR008: 100V to 240V HECR010: 200V to 240V Remove foreign objects that might stop the fan.
ERR12	Internal temp. sensor High temp. failure	Stop	Internal temp. sensor value exceeds the high temp. cutoff temperature. Flow rate of circulating fluid is zero.	Check the set value for high temp. cutoff temperature and confirm the temperature really reaches this value. 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. Flow rate of circulating fluid is zero.	Check the set value for low temp. cutoff temp. and confirm the temperature really reaches this value. 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.
ERR15	Abnormal output alarm	Continue	Cooling or heating capacity overload. Volume of circulating fluid is too large	No temperature decrease when 100% cooling output. No temperature increase when 100% heating output. 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 8.3.2)

9 Troubleshooting - continued

Code	Description	Operation status	Reason for alarm setting	Cause / Measure
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.
ERR17	Internal temp. sensor disconnect on 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 disconnect on 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. Overloaded during auto tuning mode	Adjust PID value (proportional band, integral time and derivative time) of setting mode Level 2 by hand. Avoid overload.
ERR20	Low fluid level alarm	Stop	Fluid level of tank is not enough. Fluid is leaking.	Refill tank with fluid. 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. PID parameters are set incorrectly.	Keep the flow rate 0.5L/min(HECR002)/ 1L/min(HECR008,HECR010) or more. If the temperature cannot be stable at default value, perform auto tuning.

10 Maintenance

10.1 General Maintenance

Warning

- The repair and maintenance service of this unit are performed only at SMC factory. SMC does not provide on-site repair or maintenance service in a

national or overseas situation.

- It is recommended to prepare spare units to minimize downtime due to those repair and maintenance services.
- Drain the fluid from the product when it is returned for the repair and maintenance service. If the fluid is left inside, an accident and damage can result during transportation.
- Do not make any modifications.
- Do not disassemble the product, unless required by installation instructions.
- If fluid other than water is used, wash the circulating fluid circuit with water or DI water before returning the product to SMC. Products that have not been washed may not be accepted at the factory.
- Do not operate switches, etc. with wet hands and do not touch the electrical parts such as the power supply plug. It might cause electric shock.
- Do not splash water directly on the product and do not wash with water. It might cause electric shock and fire, etc.

Caution

- 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, turn on power to the equipment and perform appropriate functional and leakage tests to make sure the equipment is installed correctly.

10.2 Daily Check

Replace the circulating fluid regularly to avoid any problems due to algae or contamination.

- 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.

10 Maintenance - continued

Caution

- 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.

10.3 Drain circulating fluid

HECR002

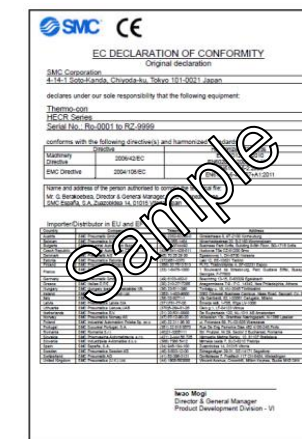
- Drain the circulating fluid from the Fluid IN. Loosen the reservoir cap to help draining. (Do not remove the cap)
- To drain from the piping, blow air (0.1MPa, about 1 minute) from Fluid OUT to Fluid IN. Close the reservoir cap while blowing.

HECR008 / HECR010

- Drain the circulating fluid from the drain port. 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 drain port. Close the reservoir cap and Fluid IN while blowing.

11 Declaration of Conformity

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



12 Contacts

Country	Company	Address
Austria	SMC Pneumatik GmbH (Austria)	Girakstrasse 8, AT-2100 Korneuburg
Belgium	SMC Pneumatics N.V./S.A.	Nijverheidsstraat 20, B-2160 Wommelgem
Bulgaria	SMC Industrial Automation Bulgaria EOOD	Business Park Sofia, Building 8-6th Floor, BG-1715 Sofia
Czech Republic	SMC Industrial Automation CZ s.r.o.	Hudcova 78a CZ-61200 Brno
Denmark	SMC Pneumatik A/S	Egeskovvej 1, DK-8700 Horsens
Estonia	SMC Pneumatics Estonia OÜ	Laki 12, EE-10621 Tallinn
Finland	SMC Pneumatikka Finland Oy	PL72, Tiistiniittyntie 4, SF-02231 Espoo
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SMC Corporation

URL : <http://www.smworld.com> (Global) <http://www.smceu.com> (Europe)
Specifications are subject to change without prior notice from the manufacturer.
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