

Peltier-Type Thermoelectric Bath

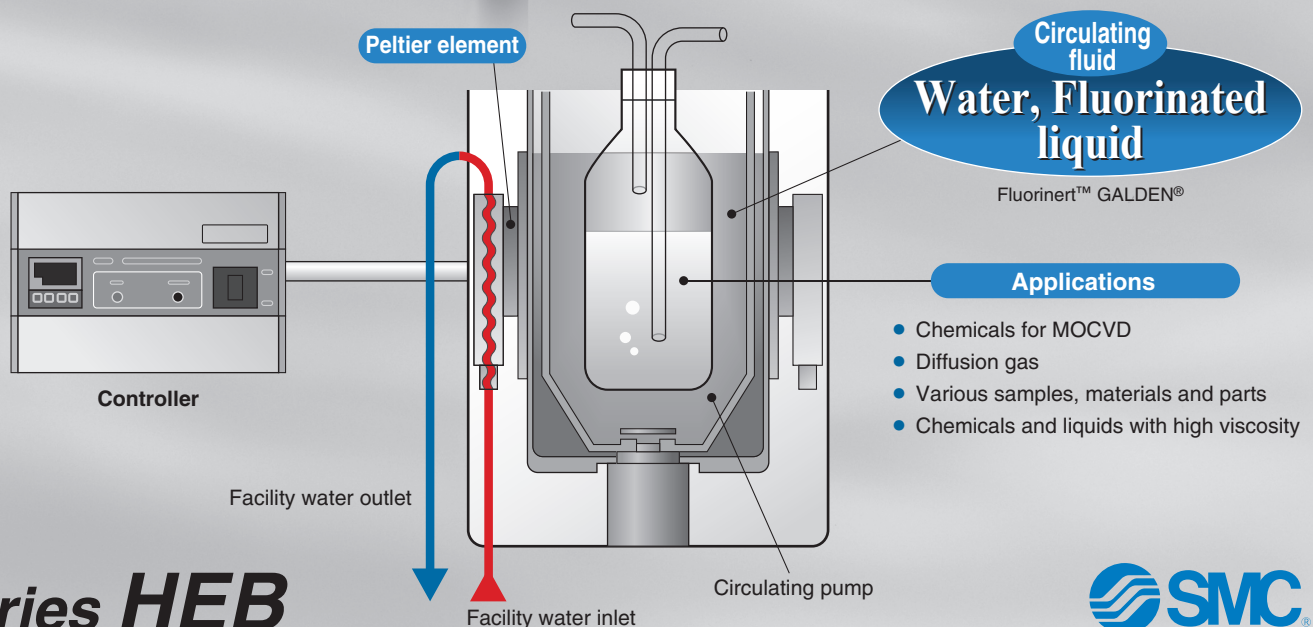


● **Accurately controls the temperature of liquid in the bath.**

Temperature stability: $\pm 0.01^{\circ}\text{C}$

Temperature distribution: $\pm 0.02^{\circ}\text{C}$ in the bath

- Environmentally friendly and refrigerant-free
- Heaterless
- Function to detect abnormal heating and temperature sensor errors comes standard.
- Light and compact
- Greatly reduced vibration and operating noise when compared with the refrigerated type.



Series HEB

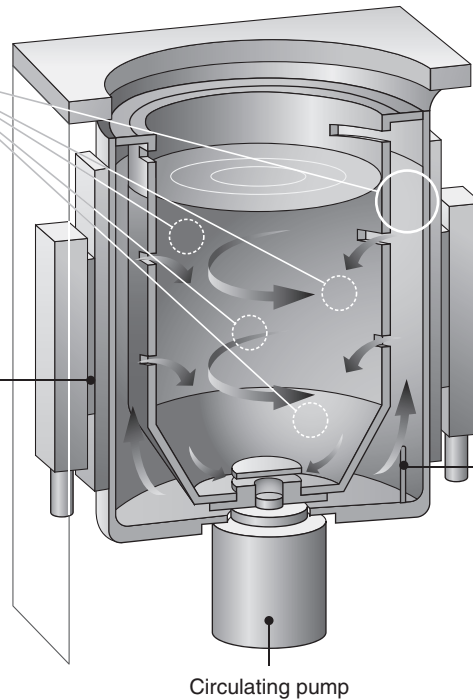


CAT.EUS40-50Aa-UK

Features

Exclusively developed dual tank construction to provide consistent temperature at any position in the bath

Peltier element
(Thermo-module, Thermoelectric device)

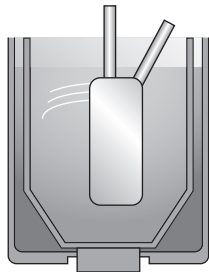


Temperature sensor

- Accurate display by measuring the circulating fluid with a temperature sensor directly

Application Examples

Semiconductor



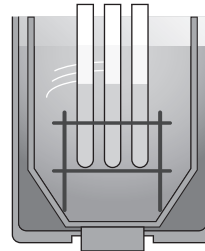
Evaporation of chemicals for MOCVD
Temperature control of diffusion gas

Various tests



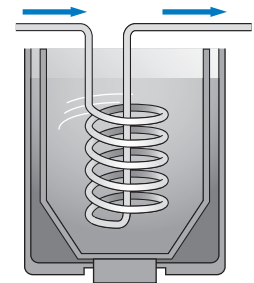
Thermal test with immersion

Physical and chemical analysis



Temperature control of various samples, materials and parts

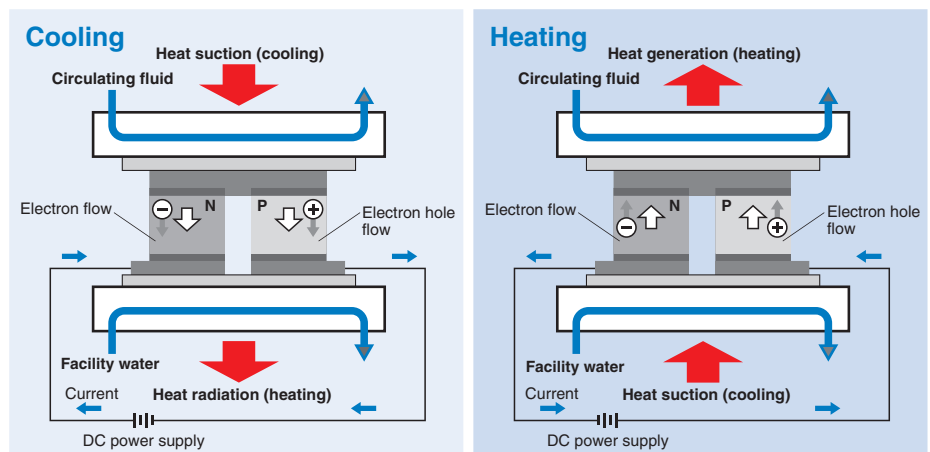
Various chemical processes



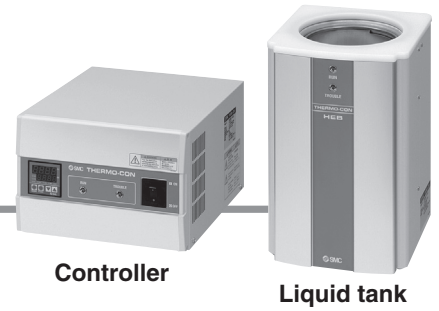
Indirect temperature control of chemicals and liquids with high viscosity

Principle of Peltier Device (Thermo-module, Thermoelectric device)

A Peltier device (thermo-module, thermoelectric device) is a plate type element, inside which P-type semiconductors and N-type semiconductors are located alternately. If direct current is supplied to the Peltier device, heat is transferred inside the device, and one face generates heat and increases temperature while the other face sucked heat and decreases temperature. Therefore, changing the direction of the current supplied to the Peltier device can achieve heating and cooling operation. This method has a fast response and can shift quickly between heating and cooling, so temperature can be controlled very precisely.

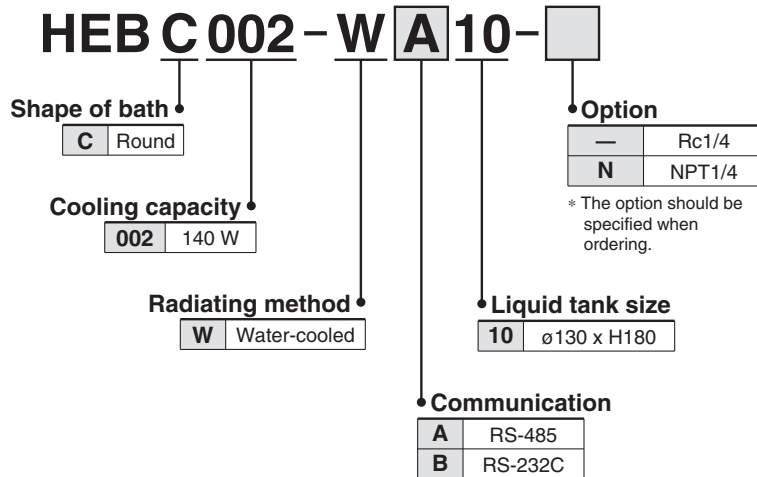


Peltier-Type Thermoelectric Bath Series *HEB*

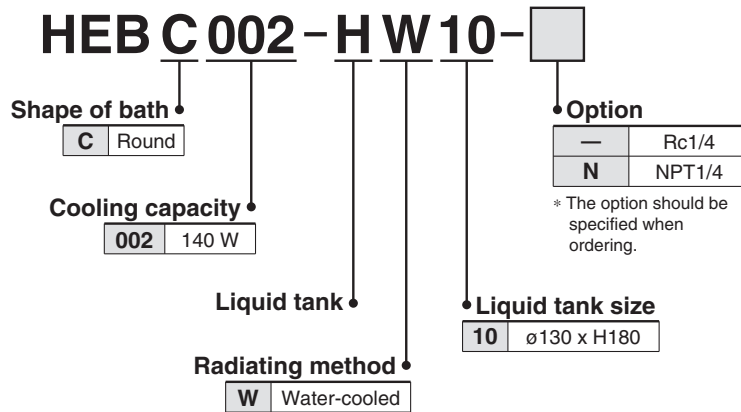


How to Order

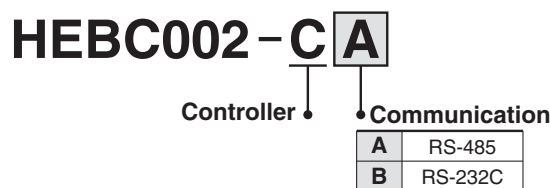
Combination (Controller + Liquid tank)



Liquid tank



Controller



Series HEB

Specifications (For details, please consult our "Product Specifications" information.)

Model		HEBC002-WA10	HEBC002-WB10
Cooling method		Peltier device (Thermo-module, Thermoelectric device)	
Radiating method		Liquid tank: Water-cooled, Controller: Forcible air-cooled	
Control method		Cooling/Heating automatic shift PID control	
Ambient temperature/humidity		10 to 35°C, 35 to 80%RH	
Circulating fluid system	Application fluid <small>Note 1)</small>	Clear water, Fluorinated liquid (Fluorinert™ FC-3283, GALDEN® HT135, HT200)	
	Set temperature range <small>Note 1) Note 5)</small>	-15.0 to 60.0°C (5 to 60°C for water)	
	Cooling capacity <small>Note 2)</small>	140 W (Water)	
	Heating capacity <small>Note 2)</small>	300 W (Water)	
	Temperature stability <small>Note 3)</small>	±0.01°C	
	Temperature distribution <small>Note 3)</small>	±0.02°C	
	Tank dimensions	Internal diameter ø130 x Liquid level 188 mm	
Facility water system	Temperature	10 to 35°C (no condensation)	
	Pressure range	Within 0.5 MPa	
	Flow rate <small>Note 4)</small>	3 to 5 L/min	
	Port size	IN/OUT: Rc1/4	
	Wetted parts material	Stainless steel 303, Stainless steel 304, FEP, A6063 (anodised)	
Electrical system	Power supply	Single-phase 100 to 240 VAC, 50/60 Hz	
	Overcurrent protector	10 A	
	Current consumption	4 A (100 VAC) to 2 A (240 VAC)	
	Alarm (With alarm output connector)	1) Overheating of liquid tank (which activates the thermostat) 2) Controller output voltage reduction 3) Controller fan rotation stopped	
Communications		RS-485	RS-232C
Weight		Liquid tank: Approx. 8.5 kg Controller: Approx. 6.5 kg	
Accessories		Power cable (2 m), DC cable, Signal cable (3 m each)	
Safety standards		CE/UKCA marking, UL (NRTL) standard	

Note 1) GALDEN® is a trademark of Solvay Solexis and Fluorinert™ is a trademark of 3M. For other fluids, please contact SMC.

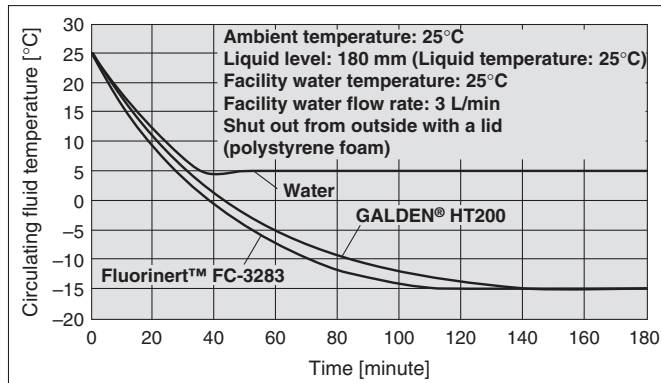
Note 2) Determined under the following conditions: water as the circulating fluid, set temperature 25°C, facility water temperature 25°C, flow rate 3 L/min, ambient temperature 25°C, and sealed from outside air with a lid.

Note 3) Differs depending on the operating conditions.

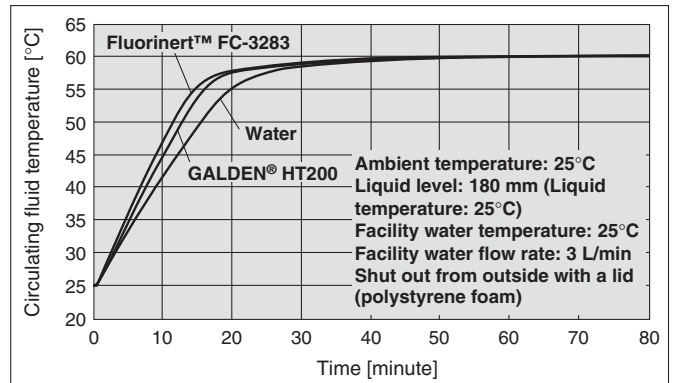
Note 4) An appropriate range is from 3 to 5 L/min. To prevent damage to the radiating system, do not supply a flow over the maximum flow rate of 8 L/min.

Note 5) When the temperature is set high, the liquid temperature inside of the liquid tank and the temperature inside of the thermostat could differ greatly depending on the heating mode at start-up, and the thermostat could then begin operating and stop the output. Confirm that there is no problem by carrying out an operating test beforehand.

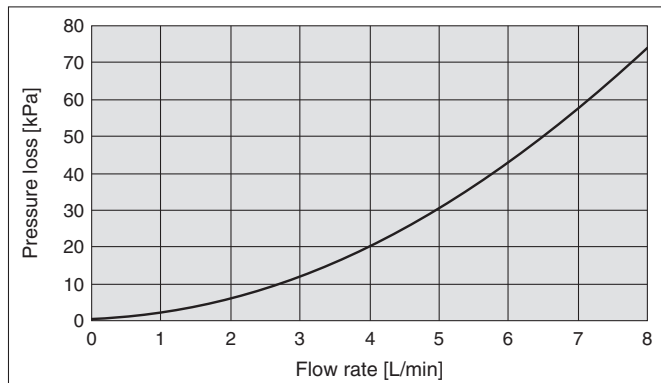
Cooling Capacity



Heating Capacity

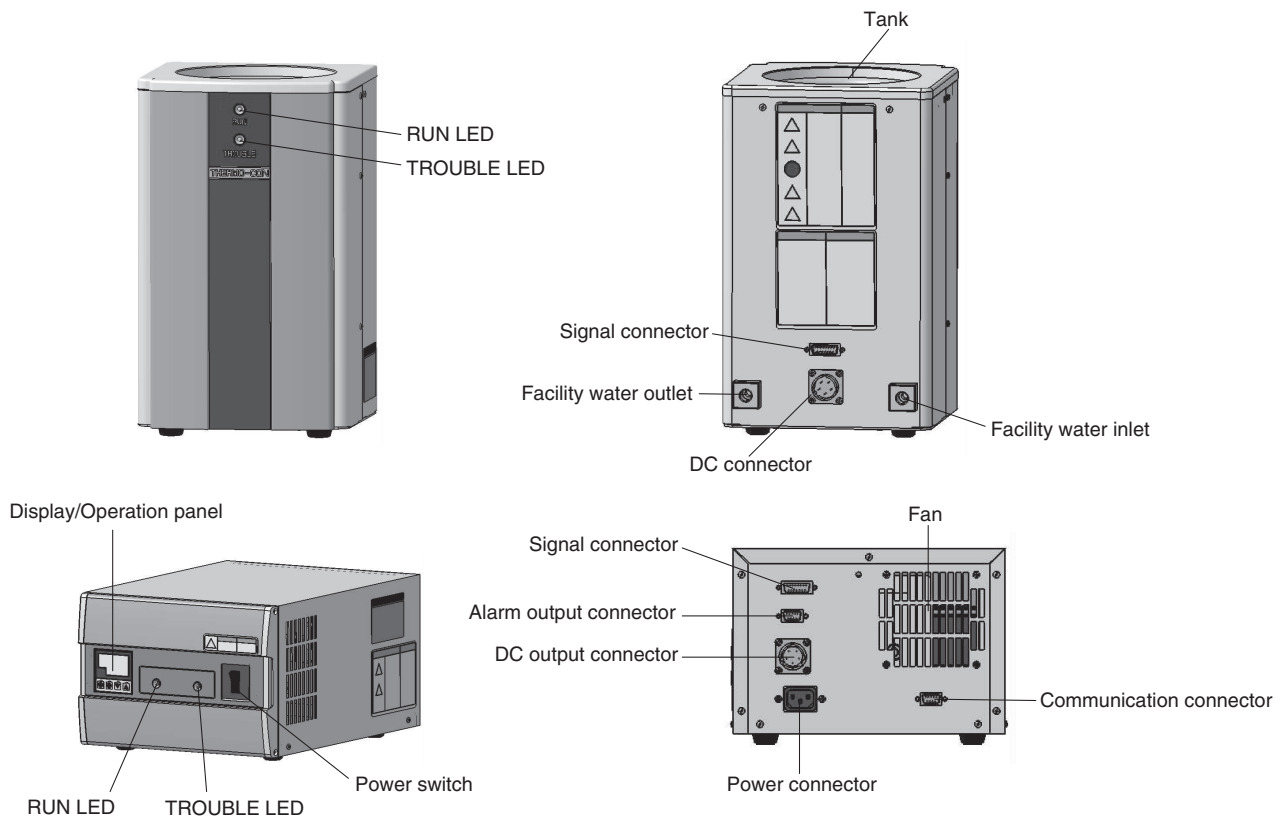


Pressure Loss in Facility Water Circuit



The values shown on the performance chart are not guaranteed, but typical. Allow margins for safety when selecting the model.

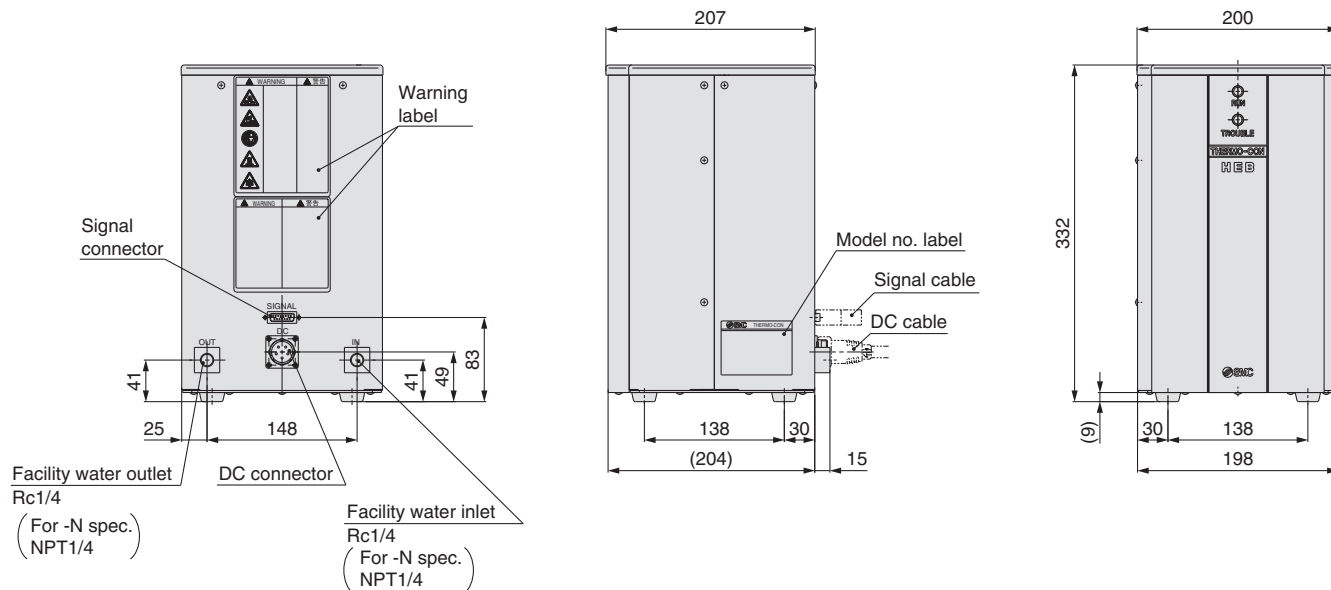
Parts Description



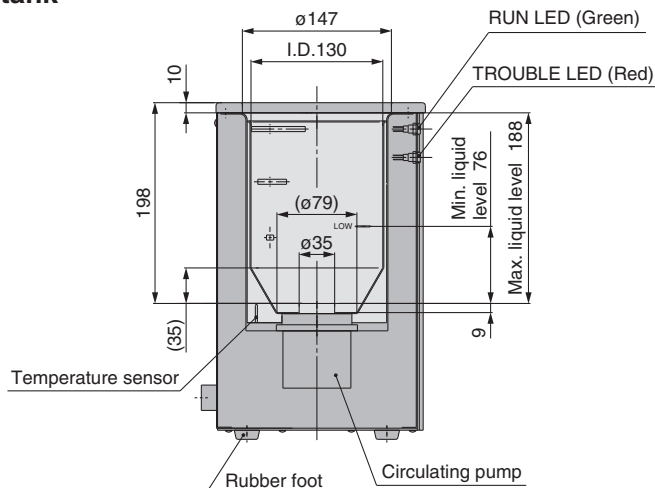
Series HEB

Dimensions

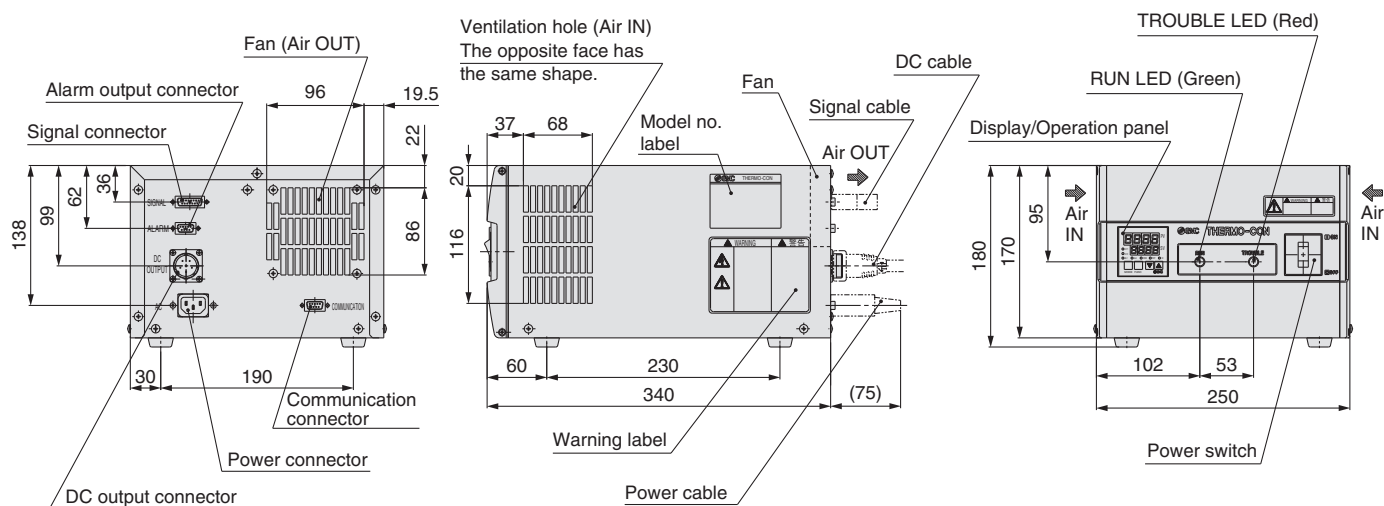
Liquid tank



Internal dimensions of liquid tank



Controller

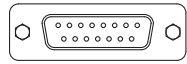
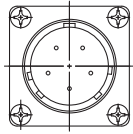


Connectors

Water Bath and Controller Connection

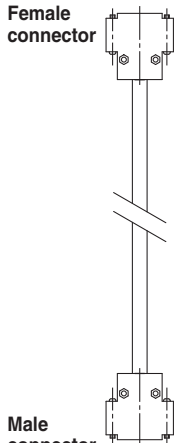
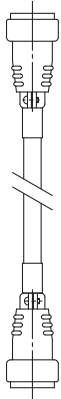
■ Connector for water baths

DC connector (male connector) Nanaboshi Electric Mfg. Co., Ltd.: NJC-245-RM UL CSA	Signal connector (male connector) Hirose Electric Co., Ltd.: CDA-15P Holding screw M2.6
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■ Connection cable

DC cable Nanaboshi Electric Mfg. Co., Ltd.: NJC-245-PF UL CSA Female connector	Signal cable Hirose Electric Co., Ltd.: CDA-15S Holding screw M2.6 Female connector
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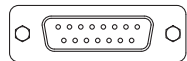
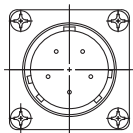
Male connector
Nanaboshi Electric Mfg. Co., Ltd.:
NJC-245-PM UL CSA

Male connector
Hirose Electric Co., Ltd.:
CDA-15P
Holding screw M2.6



■ Connector for controllers

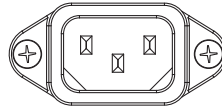
DC connector (female connector) Nanaboshi Electric Mfg. Co., Ltd.: NJC-245-RF UL CSA	Signal connector (female connector) Hirose Electric Co., Ltd.: CDA-15S Holding screw M2.6
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Power Cable Connection

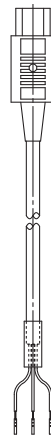
■ Connector for controllers

Power connector IEC 60320 C-14 or equivalent Male connector



■ Power cable

Connector side IEC 60320 C-13 or equivalent Female connector
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AWG14

	Signal contents
Black 1	100 to 240 VAC (L)
Black 2	100 to 240 VAC (N)
Green/Yellow	PE

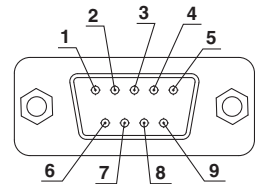
Connector for External Equipment

Connectors that fit with a communication connector and an alarm output connector should be prepared by customer.

■ Alarm output connector

Hirose Electric Co., Ltd.: CDE-9P
Holding screw M2.6
Fitting connector: CDE-9S or equivalent

Pin No.	Signal contents
1	Contact for upper/lower temperature limit deviation alarm (open when alarm occurs)
2	Upper/lower temperature limit deviation alarm common
3-4	Unused
5	Contact for output cut-off alarm (open when alarm occurs)
6	Common for output cut-off alarm
7-9	Unused

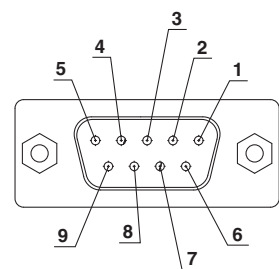


Alarm output connector
D-sub 9 pin (male type)

■ Communication connector

Hirose Electric Co., Ltd.: CDE-9S
Holding screw M2.6
Fitting connector: CDE-9P or equivalent

Pin No.	Signal contents	
	HEBC002-WA10	HEBC002-WB10
1	RS-485 T/R (A)	Unused
2	RS-485 T/R (B)	RS-232C RX
3	Unused	RS-232C TX
4	Unused	Unused
5	Unused	RS-232C SG
6-9	Unused	Unused



Communication connector
D-sub 9 pin (female type)

Maintenance

Maintenance of this unit is performed in the form of return to and repair at SMC's site. As a rule, SMC will not conduct on-site maintenance. Separately, the following parts have a limited life and need to be replaced before the life ends.

Parts Life Expectation

Description	Expected life	Possible failure
Circulating pump	3 to 5 years	The circulating fluid cannot be fed due to worn bearing and/or insufficient capacity of electrolytic capacitor, which results in temperature controlling failure.
Fan	5 to 10 years	The capacity of the fan lowers due to the end of lubricating performance of the bearing, which results in increase of internal temperature of the Controller. The overheat protective function at the inside of the power supply starts, the output stops and the display goes off.
DC power supply	5 to 10 years	Abnormal voltage is generated and the display goes off due to insufficient capacity of electrolytic capacitor.



Series HEB

Specific Product Precautions 1

Be sure to read this before handling. Refer to back cover for Safety Instructions, "Handling Precautions for SMC Products" (M-E03-3) and "Operation Manual" for Temperature Control Equipment Precautions. The Operation Manual can be downloaded from the SMC website: <http://www.smc.eu>

System Design

Warning

1. The catalogue shows the specifications of the Thermoelectric Bath.

1. Check detailed specifications in the separate "Product Specifications", and evaluate the compatibility of the Thermoelectric Bath with customer's system.
2. The Thermoelectric Bath is equipped with a protective circuit independently, but the whole system should be designed by the customer to ensure safety.

Handling

Warning

1. Thoroughly read the Operation Manual.

Read the Operation Manual completely before operation, and keep this manual available whenever necessary.

Operating Environment/Storage Environment

Warning

1. Avoid using the Thermoelectric Bath in an environment where it could be splashed by fluids (including mist) such as water, salt water, oil, chemicals, or solvents.

2. The Thermoelectric Bath is not designed for clean room usage.

It generates dust from the pump inside the tank and the cooling fan in the controller.

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

Use the Thermoelectric Bath in a place free from low molecular siloxane.

4. Reserve a space of 50 mm or more at the ventilation hole of the controller.

Radiation Air

Caution

1. The ventilation hole 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.

If radiation is prevented, the internal power supply will overheat, causing the protective circuit to be activated and stopping the Thermoelectric Bath.

3. If more than one Thermoelectric Bath is used, consider their arrangement so that the downstream sides of the Thermoelectric Bath suck radiation air from the upstream sides.

Circulating Fluid

Caution

1. Do not use fluids other than those described in the specification.

Otherwise, the pump will be overloaded and may break. If such a fluid is used, please contact SMC beforehand.

2. The Thermoelectric Bath must not be operated without circulating fluid.

The pump breaks by empty driving.

3. The circulating fluid may evaporate, lowering the level in the tank.

Significant reduction of the fluid level can break the circulating pump as well as causing the performance to deteriorate. Use with appropriate liquid level at all times.

Circulating Fluid

Caution

4. The pump can be broken by foreign objects entering the circulating pump.

Control to prevent any foreign object from entering the fluid. If the fluid is fluorinated liquid and it is set to a temperature below freezing point, steam from the atmosphere will form ice (frost) when entering the fluid. Be sure to remove this ice (frost) regularly.

5. If water is used for the circulating fluid, set its temperature to over or more 5°C to prevent it from being frozen.

6. Clear Water (as Circulating Water) Quality Standards

Facility Water Quality Standard

The Japan Refrigeration and Air Conditioning Industry Association

JRA GL-02-1994 "Cooling water system - Circulation type - Make-up water"

	Item	Unit	Standard value	Influence	
				Corrosion	Scale generation
Standard item	pH (at 25°C)	—	6.0 to 8.0	○	○
	Electrical conductivity (25°C)	[μS/cm]	100* to 300*	○	○
	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		○
Reference item	Ionic state silica (SiO ₂)	[mg/L]	30 or less		○
	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	○	

* 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.

Facility Water

Caution

1. The maximum operating pressure of facility water is 0.5 MPa.

If this value is exceeded, the internal piping of the tank can break, causing leakage of facility water.

2. Do not supply a flow rate of 8 L/min or more which can break the facility water piping.

3. Appropriate range of the flow rate of the facility water is 3 to 5 L/min.

Flow rate higher than this range will not slightly affect the cooling and heating capacity. However, a flow rate below 3 L/min will reduce the cooling and heating capacity significantly.

Communication

Caution

1. The set value can be written to EEPROM, but only up to approx. 100,000 times.

In particular, pay attention to how many of times the writing is performed using the communication function.



Series *HEB*

Specific Product Precautions 2

Be sure to read this before handling. Refer to back cover for Safety Instructions, “Handling Precautions for SMC Products” (M-E03-3) and “Operation Manual ” for Temperature Control Equipment Precautions. The Operation Manual can be downloaded from the SMC website: <http://www.smc.eu>

Maintenance

Warning

1. Prevention of electric shock and fire

Do not operate the switch with wet hands. Also, do not operate the Thermoelectric Bath with water or fluid left on it.

2. Action in the case of error

If any error such as abnormal sounds, smoke, or bad smell occurs, cut off the power at once, and stop supplying facility water. Please contact SMC or a sales distributor to repair the Thermoelectric Bath.

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 of displayed contents.
- b) Check of temperature, vibration and abnormal sounds in the body of the Thermoelectric Bath.
- c) Check of the voltage and current of the power supply system.
- d) Check for leakage and contamination of the circulating fluid and intrusion of foreign objects to it.
- e) Check radiation air flow condition and temperature.
- f) Check for leakage, quality change, flow rate and temperature of facility water.

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.

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.

- 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.

Warning

1. 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.

2. 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.

3. 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.

4. 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, combustion 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 specifications 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.

Caution

1. 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.

Limited warranty and Disclaimer/Compliance Requirements

The product used is subject to the following “Limited warranty and Disclaimer” and “Compliance Requirements”. Read and accept them before using the product.

Limited warranty and Disclaimer

1. The warranty period of the product is 1 year in service or 1.5 years after the product is delivered, whichever is first. ²⁾ Also, the product may have specified durability, running distance or replacement parts. Please consult your nearest sales branch.
 2. For any failure or damage reported within the warranty period which is clearly our responsibility, a replacement product or necessary parts will be provided. This limited warranty applies only to our product independently, and not to any other damage incurred due to the failure of the product.
 3. Prior to using SMC products, please read and understand the warranty terms and disclaimers noted in the specified catalogue for the particular products.
- 2) Vacuum pads are excluded from this 1 year warranty.
A vacuum pad is a consumable part, so it is warranted for a year after it is delivered. Also, even within the warranty period, the wear of a product due to the use of the vacuum pad or failure due to the deterioration of rubber material are not covered by the limited warranty.

Compliance Requirements

1. The use of SMC products with production equipment for the manufacture of weapons of mass destruction (WMD) or any other weapon is strictly prohibited.
2. The exports of SMC products or technology from one country to another are governed by the relevant security laws and regulations of the countries involved in the transaction. Prior to the shipment of a SMC product to another country, assure that all local rules governing that export are known and followed.

Caution

SMC products are not intended for use as instruments for legal metrology.

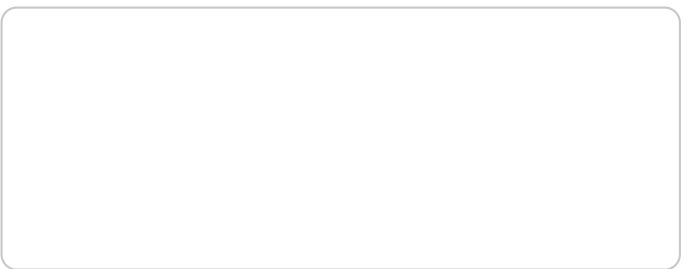
Measurement instruments that SMC manufactures or sells have not been qualified by type approval tests relevant to the metrology (measurement) laws of each country.
Therefore, SMC products cannot be used for business or certification ordained by the metrology (measurement) laws of each country.

Safety Instructions

Be sure to read “Handling Precautions for SMC Products” (M-E03-3) before using.

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Czech Republic	+420 541424611	www.smc.cz	office@smc.cz
Denmark	+45 70252900	www.smc.dk.com	smc@smcdk.com
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Finland	+358 207513513	www.smc.fi	smcfi@smc.fi
France	+33 (0)164761000	www.smc-france.fr	supportclient@smc-france.fr
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Hungary	+36 23513000	www.smc.hu	office@smc.hu
Ireland	+353 (0)14039000	www.smcautomation.ie	sales@smcautomation.ie
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