

Peltier-Type

# Thermoelectric Bath

● Accurately controls the temperature of liquid in the bath.

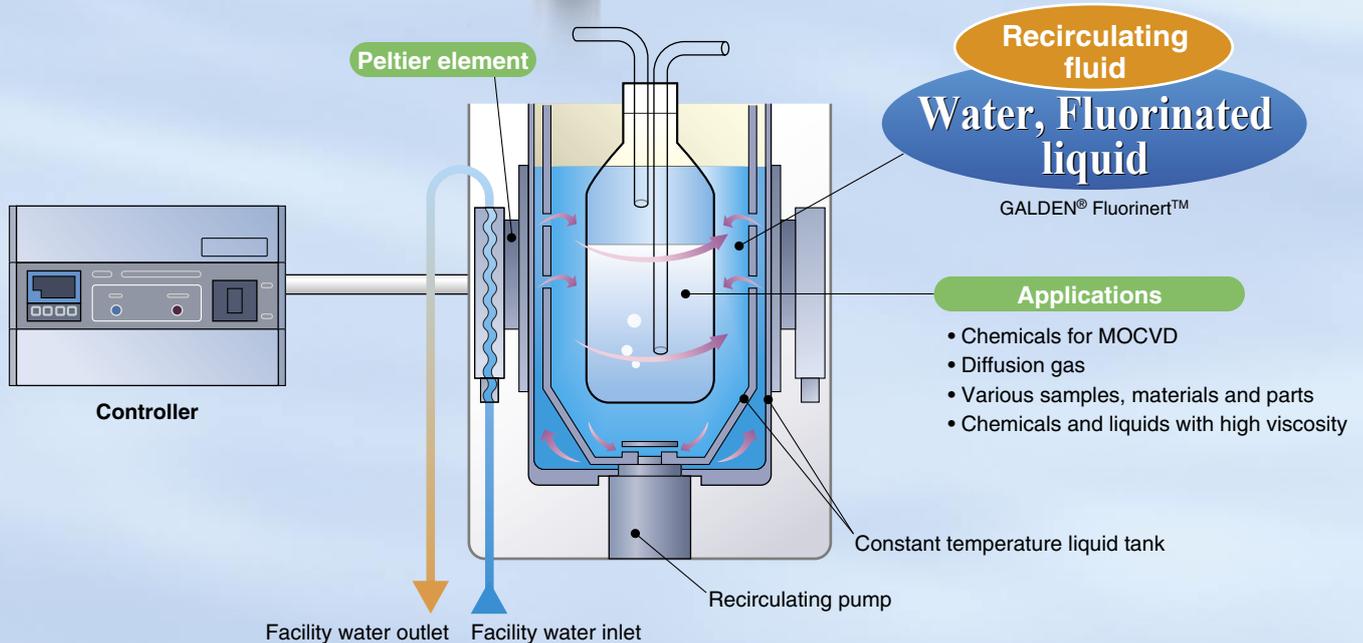
Temperature stability:  $\pm 0.01^{\circ}\text{C}$

Achieves a temperature distribution of  $\pm 0.02^{\circ}\text{C}$  in the bath.



W250 x H180 x D340

W200 x H332 x D207



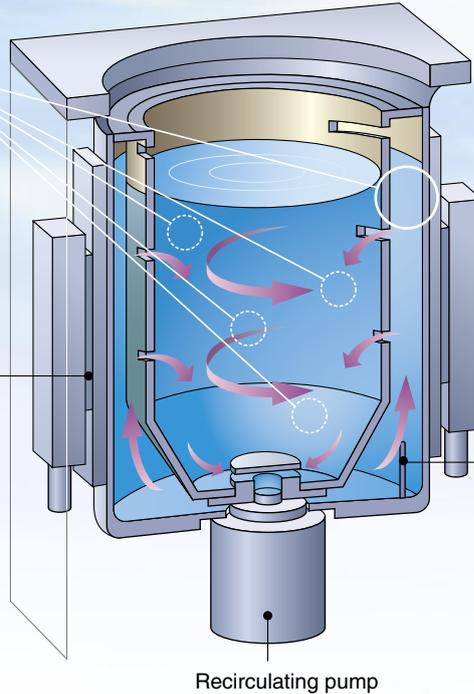
Series **HEB**

  
CAT.ES40-50A

# Features

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

**Peltier element**  
(Thermo-module, Thermoelectric device)

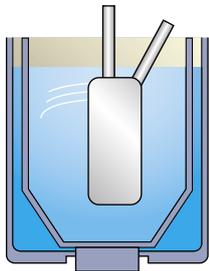


**Temperature sensor**

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

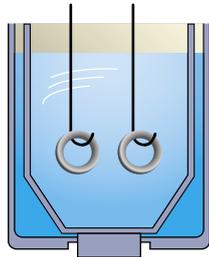
# Applications

**Semiconductor manufacturing**



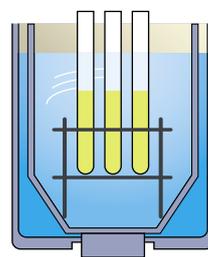
Evaporation of chemicals for MOCVD  
Temperature control of diffusion gas

**Various tests**



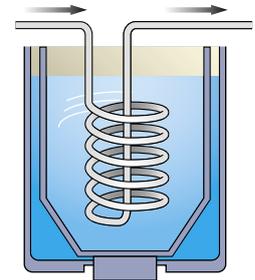
Thermal test with immersion

**Physical and chemical analysis**



Temperature control of various samples, materials and parts

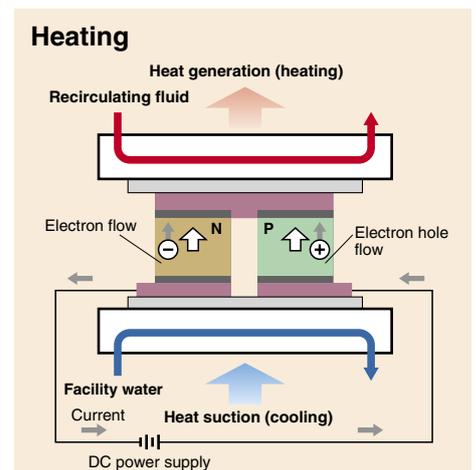
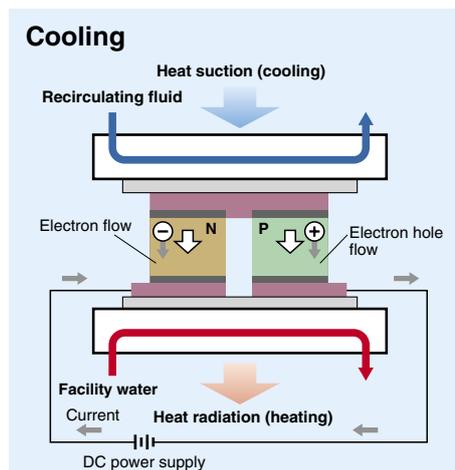
**Various chemical processes**



Indirect temperature control of chemicals and liquids with high viscosity

# Principle of Peltier Element (Thermo-module/Thermoelectric device)

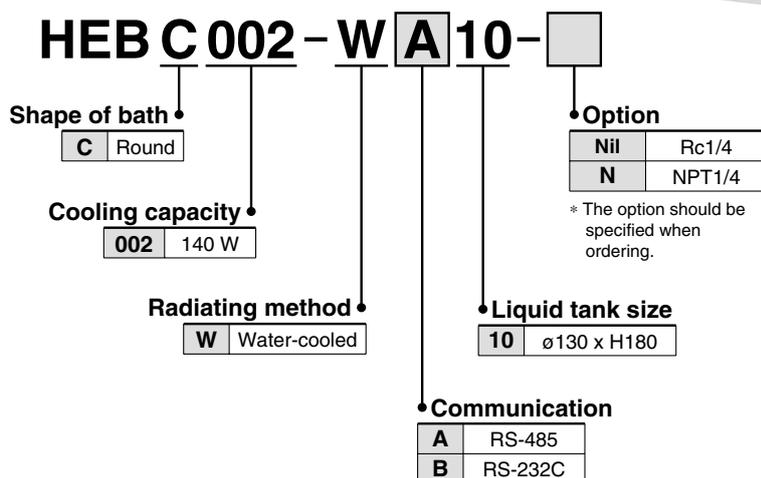
A Peltier element (thermo-module/thermoelectric device) is a plate type element, inside which P type semiconductors and N type semiconductors are located alternately. If direct current is supplied to the Peltier element, heat is transferred inside the element, and one face generates heat and increases temperature while the other face sucked heat and decreases temperature. Therefore, changing the direction of the current supplied to the Peltier element 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



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

Model		HEBC002-WA10	HEBC002-WB10
<b>Cooling/Heating method</b>		Peltier element (Thermo-module, Thermoelectric device)	
<b>Radiating method</b>		Liquid tank: Water-cooled, Controller: Forcible air-cooled	
<b>Control method</b>		Cooling/Heating automatic shift PID control	
<b>Ambient temperature/humidity</b>		10 to 35°C, 35 to 80%RH	
<b>Recirculating fluid system</b>	<b>Application fluid</b> <small>Note 1)</small>	Water, Fluorinated liquid (GALDEN® HT135, HT200, Fluorinert™ FC-3283)	
	<b>Set temperature range</b> <small>Note 1) Note 5)</small>	-15.0 to 60.0°C (5 to 60°C for water)	
	<b>Cooling capacity</b> <small>Note 2)</small>	140 W (Water)	
	<b>Heating capacity</b> <small>Note 2)</small>	300 W (Water)	
	<b>Temperature stability</b> <small>Note 3)</small>	±0.01°C	
	<b>Temperature distribution</b> <small>Note 3)</small>	±0.02°C	
<b>Tank dimension</b>		Internal diameter $\phi$ 130 x Liquid level 188 mm	
<b>Facility water system</b>	<b>Temperature</b>	10 to 35°C (no condensation)	
	<b>Max. operating pressure</b>	0.5 MPa or less	
	<b>Flow rate</b> <small>Note 4)</small>	3 to 5 $\ell$ /min	
	<b>Port size</b>	IN/OUT: Rc1/4	
	<b>Wetted material</b>	Stainless steel 303, Stainless steel 304, FEP, A6063 (anodized)	
<b>Electrical system</b>	<b>Power supply</b>	Single phase, 100 to 240 VAC, 50/60 Hz	
	<b>Overcurrent protector</b>	10A	
	<b>Current consumption</b>	4A (100 VAC) to 2A (240 VAC)	
	<b>Alarm (With alarm output connector)</b>	1) Overheating of liquid tank (which activates the thermostat) 2) Controller output voltage reduction 3) Controller fan rotation stopped	
<b>Communication</b>		RS-485	RS-232C
<b>Mass</b>		Liquid tank: Approx. 8.5 kg (Empty) Controller: Approx. 6.5 kg	
<b>Cable</b>		Power supply cable (2 m), DC cable, Signal cable (3 m each)	

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

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

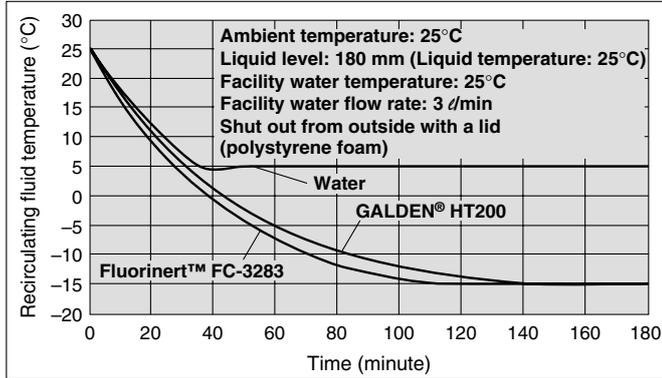
Note 3) Differs depending on operating conditions.

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

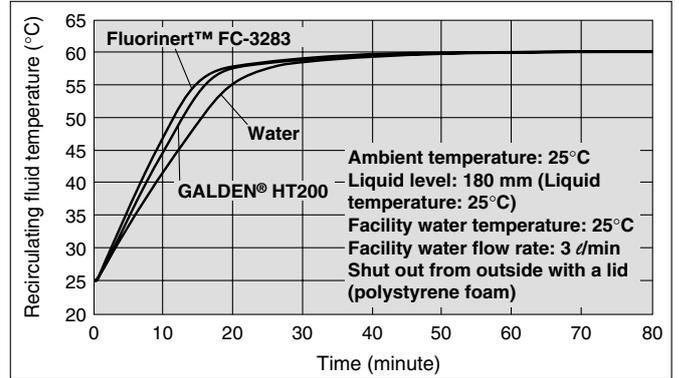
Note 5) When the temperature is set high, the liquid temperature inside of the liquid tank and the temperature inside of the thermostat could differ greatly depending on the heating mode at start-up, and the thermostat could then begin operating and stop the output.

# Series HEB

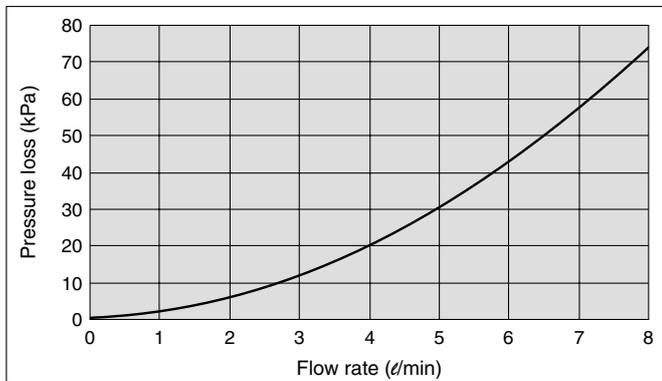
## Cooling Capacity



## Heating Capacity

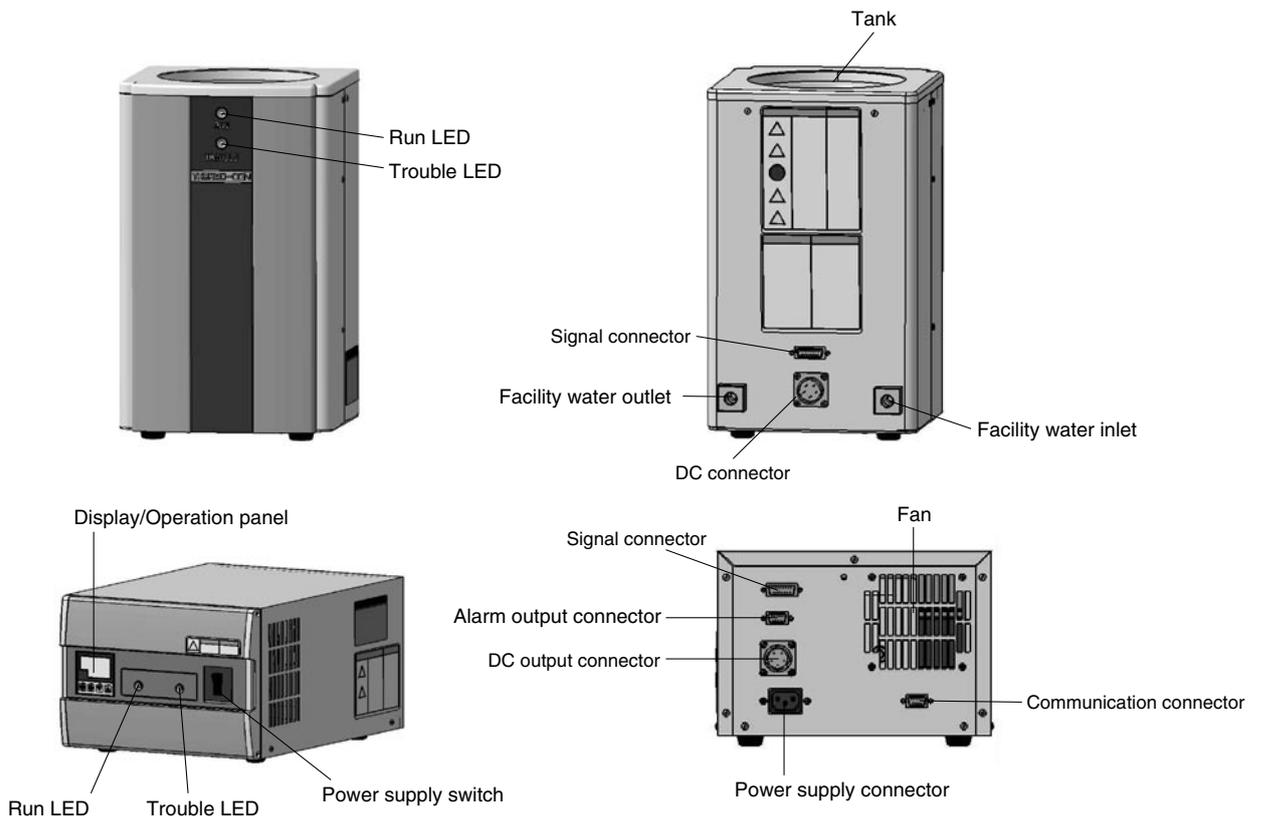


## Pressure Loss in Facility Water Circuit



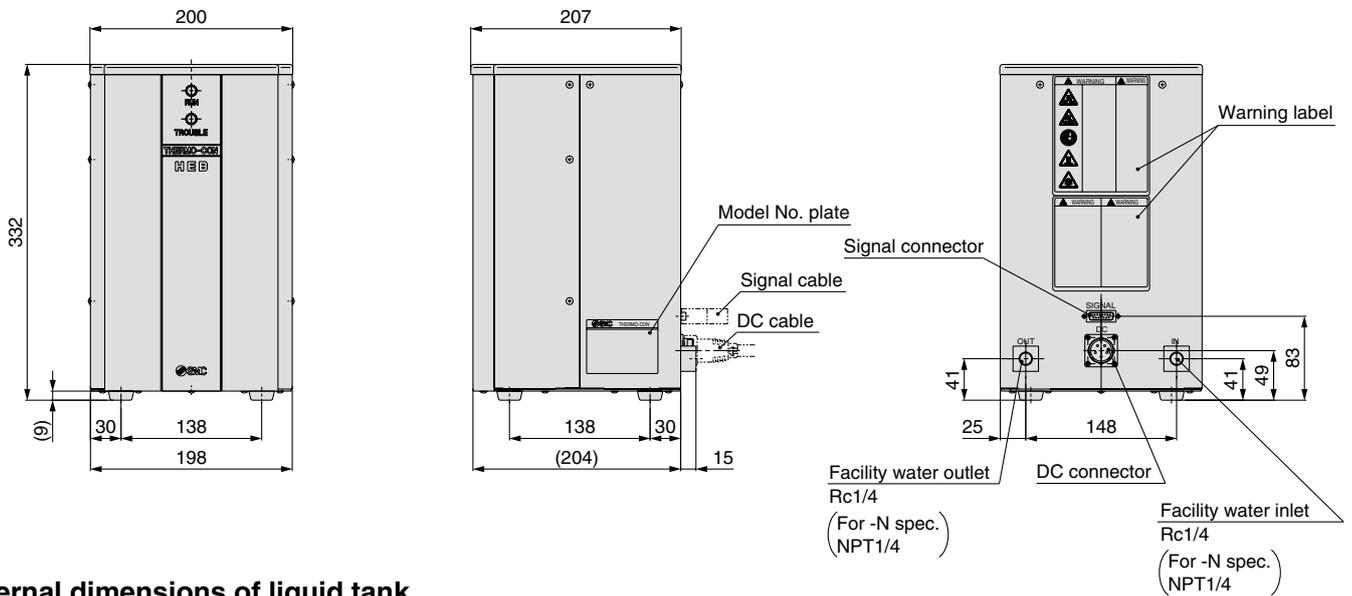
The values shown on the performance chart are representative and not guaranteed. Allow a margin for safety to device when choosing the product.

## Parts Description

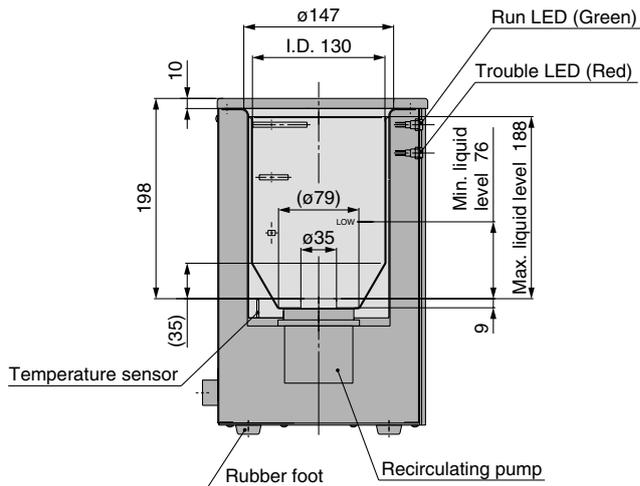


## Dimensions

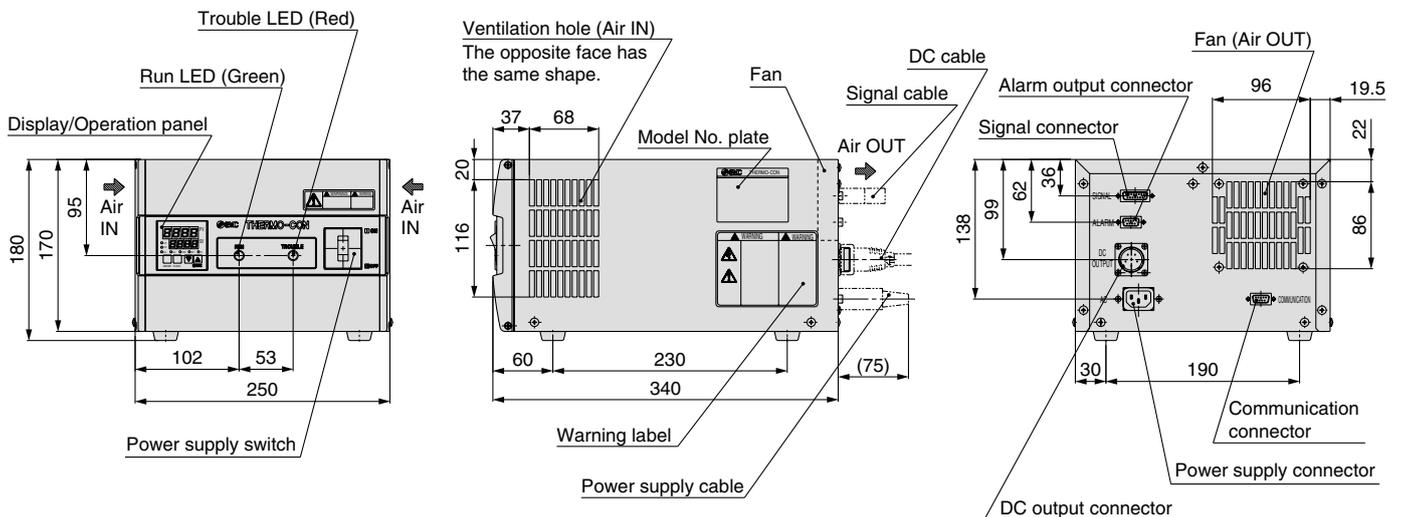
### Liquid tank



### Internal dimensions of liquid tank



### Controller



# Series HEB

## Maintenance

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Maintenance of the Thermoelectric Bath is performed only 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
Recirculating pump	3 to 5 years	The recirculating 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.





# 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), Japan Industrial Standards (JIS)\*1) and other safety regulations\*2).

- \* 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 10218-1992: Manipulating industrial robots -Safety.  
JIS B 8370: General rules for pneumatic equipment.  
JIS B 8361: General rules for hydraulic equipment.  
JIS B 9960-1: Safety of machinery – Electrical equipment of machines. (Part 1: General requirements)  
JIS B 8433-1993: Manipulating industrial robots - Safety.  
etc.
- \* 2) Labor Safety and Sanitation Law, etc.

 **Caution:** Operator error could result in injury or equipment damage.

 **Warning:** Operator error could result in serious injury or loss of life.

 **Danger :** In extreme conditions, there is a possibility of serious injury or loss of life.

## 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 catalog 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 catalog.

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.



# Safety Instructions

## 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.

## 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.\*3)**

**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 catalog for the particular products.**

**\* 3) 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

**When the product is exported, strictly follow the laws required by the Ministry of Economy, Trade and Industry (Foreign Exchange and Foreign Trade Control Law).**



# Temperature Control Equipment Precautions 1

Be sure to read this before handling. Refer to the back of pages 1 and 2 for Safety Instructions and the back of pages 7 and 8 for Specific Product Precautions.

## Selection

### Warning

#### 1. Confirm the specifications.

Fully understand the applications, environment, fluids and other operating conditions. Use this product within the specified range shown in this catalog. Using outside the specified range can cause injury, damage, or malfunction. When in doubt, contact SMC beforehand.

#### 2. Secure the performance margin.

When you consider the product's cooling/heating capacity or flow characteristics, allowance must be made because there are heat loss from the piping, etc. or pressure drop.

## Operating Environment / Storage Environment

### Warning

#### 1. Observe the operating ambient temperature range.

The operating ambient temperature range must be within the specification range shown in this catalog. Use caution because using beyond the range will lead to damage, breakage or malfunction.

#### 2. Avoid using and storing in the following environment because it will lead to a malfunction.

1. In locations where water, steam, brine, and oil may splash on the product.
2. In locations where a large amount of particles are airborne.
3. In locations with an atmosphere of corrosive or explosive gases, solvents, or chemicals.  
(This product is not explosion proof.)
4. In locations which receive direct sunlight or radiated heat.  
(Protect from direct sunshine to avoid the resin from deteriorating by ultraviolet rays or increasing the temperature.)
5. In locations where temperature substantially changes.
6. In locations where there is a heat source nearby and the ventilation is poor.  
(Insulate the heat source or ventilate well to avoid damages caused by the heat or temperature increase, such as softening.)
7. In locations where condensation occurs.
8. In locations where strong magnetic noise occurs.  
(In locations where strong electric fields, strong magnetic fields and surge voltage occur.)
9. In locations where static electricity occurs, or conditions which make the product discharge static electricity.
10. In locations where high frequency occurs.
11. In locations where damage is likely to occur due to lightning.
12. In locations where impacts or vibrations occur.
13. In conditions where a massive force strong enough to deform the product is applied or a weight from a heavy object is applied.
14. Locations more than 1000 m in altitude (except for storage, transportation).

## Fluid

### Warning

#### 1. Type of fluids

1. The fluids must be used within the specified range shown in this catalog.  
Consult with SMC when using the product with other fluids.
2. When foreign matter may be mixed with a fluid, install a filter.

## Transportation / Transfer / Movement

### Warning

#### 1. Product transfer should be performed by a knowledgeable and experienced person.

Especially, transferring a heavy object is dangerous. Use adequate caution to prevent falling down or dropping accidents from occurring.

#### 2. Avoid transporting in the following environment because it will lead to breakage.

1. In conditions where strong shock and vibrations occur.
2. In operating and storage environments other than those specified.

#### 3. Caution when transferring a heavy object

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

#### 4. Before moving this product, remove operating fluid, facility water from the inside of this product.

## Mounting / Installation

### Warning

#### 1. Installation should be performed by a knowledgeable and experienced person.

Especially, installation of a heavy object is dangerous. This product is heavy. Use adequate caution to avoid falling and dropping accidents from occurring.

### Caution

#### 1. Provide enough space for ventilation and maintenance.

Provide enough space for the ventilation requirement of each equipment, otherwise a cooling malfunction or operation stoppage may occur. Also, provide space required for maintenance.

#### 2. Confirm the mounting orientation.

Mount and install horizontally.



# Temperature Control Equipment Precautions 2

Be sure to read this before handling. Refer to the back of pages 1 and 2 for Safety Instructions and the back of pages 7 and 8 for Specific Product Precautions.

## Piping

### Warning

#### 1. Piping must be designed taking the whole system into consideration.

For this product and future equipment, design of the piping system should be performed by a knowledgeable and experienced person.

#### 2. Work performed on the piping should be done by a knowledgeable and experienced person.

If work performed on the piping is done by a less knowledgeable and inexperienced person, it will likely lead to operating fluid leakage, etc.

#### 3. Observe the tightening torque for screws.

When installing fitting, etc., follow the given torque levels below.

**Tightening Torque for Piping**

Connecting thread	Applicable tightening torque N·m
Rc1/8	7 to 9
Rc1/4	12 to 14
Rc3/8	22 to 24
Rc1/2	28 to 30
Rc3/4	28 to 30
Rc1	36 to 38

#### 4. Confirm the leakage of fluid.

Be sure to confirm that the hose or tubing is not pulled out and that there is no leakage in the fitted parts.

### Caution

#### 1. Before piping

Confirm that chips, cutting oil, dust etc., in contact with piping is cleaned up or air blown (flushing) before piping.

#### 2. Use caution regarding the flowing direction of the fluid.

When installing piping to a product, do not mistake the flow direction of supply port, etc. Check "IN" and "OUT" or labels and the operating manual before connection.

#### 3. Sealant tape

When installing piping or fitting into a port, ensure that sealant material does not enter the port internally. When using sealant tape, leave 1.5 to 2 threads exposed on the end of pipe/fitting.

#### 4. Take countermeasures against condensation.

Depending on the operating condition, condensation may occur on the piping. In such a case, take countermeasures such as installing insulation material, etc.



# Temperature Control Equipment Precautions 3

Be sure to read this before handling. Refer to the back of pages 1 and 2 for Safety Instructions and the back of pages 7 and 8 for Specific Product Precautions.

## Electrical Wiring

### Warning

#### 1. Electrical wiring job should be performed by a knowledgeable and experienced person.

Power supply facilities and wiring works should be implemented in accordance with the electric facilities technical standards and provisions and conducted correctly.

#### 2. Mounting a dedicated circuit breaker.

As a countermeasure against current leakage, install a ground fault circuit interrupter (GFCI) in the main power supply.

#### 3. Confirmation of power supply

If this product is used with voltages other than specified, it will likely lead to a fire or an electrical shock. Before wiring, confirm the voltage, capacity, and frequency.

Confirm that the voltage fluctuation is within  $\pm 10\%$  of the specified value.

#### 4. Grounding

Be sure to ground (frame ground) with class D grounding. (grounding resistance of 100  $\Omega$  or less)

Can be grounded with the PE line of the power supply cable. Also, do not use together with equipment that generates a strong electrical magnetic noise or high frequency noise.

#### 5. Wiring cable should be handled with care.

Do not bend, twist or pull the cord or cable.

#### 6. Wire with an applicable cable size and terminal.

In the event of attaching a power supply cable, use a cable and terminal size which is suitable for the electrical current of each product.

Forcibly mounting with an unsuitable size cable will likely result in a fire.

#### 7. Avoid wiring the signal line and power line in parallel.

Since there may be a possibility of malfunction from noise, avoid parallel wiring between the temperature sensor line, communications line, signal line of alarm line, etc. and the power line and high voltage line. Also, do not place them in the same wiring tube.

## Facility Water Supply

(Water-cooled)

### Warning

#### 1. Be sure to supply the facility water.

1. Prohibition of water-cut operation, very little flow rate of water operation.

Do not operate under the condition that there is no facility water or where there is very little flow rate of water is flowing. In this kind of operation, facility water temperature may become extremely higher. It is dangerous enough the material of hose may soften and burst when the piping supplying the facility water is connected with hose.

2. Actions to be taken when an emergency stop occurs due to extremely high temperature.

In case a stop occurs due to extremely high temperature resulting from a decrease in the facility water flow rate, do not immediately flow facility water. It is dangerous enough the material of hose may soften and burst when the piping supplying the facility water is connected with hose.

First, naturally let it cool down, and removing the cause of the flow rate reduction. Secondly, make sure that there is no leakage again.

### Caution

#### 1. Facility water quality

1. Use the facility water within the specified range. When using with other fluid than facility water, consult with SMC.
2. When it is likely that foreign matter may enter the fluid, install a filter (20 mesh or equivalent).

#### Facility Water Quality Standards

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

	Item	Standard value
Standard item	pH (at 25°C)	6.5 to 8.2
	Electrical conductivity (25°C)	100* to 800 [ $\mu$ S/cm]
	Chloride ion	200 [mg/L] or less
	Sulfuric acid ion	200 [mg/L] or less
	Acid consumption amount (at pH4.8)	100 [mg/L] or less
	Total hardness	200 [mg/L] or less
	Calcium hardness	150 [mg/L] or less
Reference item	Ionic state silica	50 [mg/L] or less
	Iron	1.0 [mg/L] or less
	Copper	0.3 [mg/L] or less
	Sulfide ion	Should not be detected.
	Ammonium ion	1.0 [mg/L] or less
	Residual chlorine	0.3 [mg/L] or less
	Free carbon	4.0 [mg/L] or less

\* Electrical conductivity should be 100 [ $\mu$ S/cm] or more.



# Temperature Control Equipment Precautions 4

Be sure to read this before handling. Refer to the back of pages 1 and 2 for Safety Instructions and the back of pages 7 and 8 for Specific Product Precautions.

## Operation

### Warning

#### 1. Handle and operate after the safety of this product and the whole system are confirmed.

For this product and incidental equipment, operate this product by a knowledgeable and experienced person.

#### 2. Before operation, confirm the safety of mounting, installation, piping and electric wiring conditions.

1. Confirm that the mounting and installation conditions are safe.
2. Confirm that the constant temperature fluid is filled and that the fluid level is within the display range.
3. Confirm whether the valve is open or closed and that the hose and resin tube are not twisted.  
It is dangerous when the valve in the piping is closed because the constant temperature fluid and the facility water will not flow and the fluid pressure will increase.
4. Confirm the flow direction of the fluid.  
Make sure that the flow direction of the fluid (Inlet/Outlet direction) is connected correctly.
5. Confirm that the electrical wiring condition is safe.  
Incorrect wiring will lead to a malfunction or breakage of the product. Confirm that there is no error in wiring before operation.
6. When using the product with a 3-phase power supply, confirm the connection.  
If the phase order is incorrect, the pump, etc. will run in reverse, or the phase-reversal relay will activate and the product will not operate.  
In this case, after cutting off the main power supply, reverse 2 wires out of the 3 wires and connect them in the correct phase order.

#### 3. Do not remove the external panel during energization or operation.

If removed, there are the dangers of electrical shock, burn, frostbite, injury from a rotating object.

#### 4. Avoid operating with a lower flow.

Avoid operating with a lower flow because the temperature control may become unstable or the service life of the pump may shorten.

#### 5. Confirm the safety during the operation.

During the operation, if an emergency is detected, stop this product immediately and cut the power supply breaker.

#### 6. When not used for long periods of time, confirm the safety once again prior to beginning its operation.

## Maintenance

### Warning

#### 1. Maintenance should be performed according to the procedure indicated in the operating manual.

Improper handling can cause damage and malfunction of equipment and machinery.

#### 2. Maintenance operations

Improper handling of compressed air is dangerous. Therefore, in addition to observing the product specifications, replacement of elements and other maintenance activities should be performed by personnel having sufficient knowledge and experience pertaining to equipment.

#### 3. Pre-maintenance inspection

When removing this product, turn off the electric power, and be certain to shut off the supply pressure and exhaust the compressed air in the system. Proceed only after confirming that all pressure has been released to the atmosphere.

#### 4. Post maintenance inspection

After installation or repair, reconnect compressed air and electricity and conduct appropriate inspections to confirm proper operation. If there is an audible air leakage, or if the equipment does not operate properly, stop operation and confirm that the equipment is installed correctly.

#### 5. Modification prohibited

Do not modify or reconstruct the unit.

#### 6. Stopping for long periods of time

When not using for long periods of time, remove the operating fluid (constant temperature fluid, facility water) and cut the main power supply.

#### 7. Removal of product

Take the stop/inspection measures and confirm that there is no danger before the product is removed.  
In the event of removing the product, discharge the used fluid and clean the inside of the piping.  
When a dangerous fluid or polluted fluid is left, it is likely that the polluted area will be enlarged or an accident will occur.

#### 8. Disposal of product

When the product is disposed, it must be in compliance the ordinance or rules of the local municipality.  
Please ask for help from a professional industrial waste disposal company.  
In particularly, in case of a refrigerated type product, entrust a company to collect the Freon®, etc.  
In that case, the customer may be requested to submit a certificate that is showing the type of operating fluid and whether any quantity is left.  
These procedures are the responsibility of the customer.

#### 9. Preparation of a backup product

In order to keep the downtime of a customer's system to a minimum, please kindly prepare a backup product, when necessary.



# Series HEB Specific Product Precautions 1

Be sure to read this before handling. Refer to the back of pages 1 and 2 for Safety Instructions and the back of page 3 through to 6 for Temperature Control Equipment Precautions.

## System Design

### ⚠ Warning

- 1. The catalog 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 the 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. Completely read the operating manual.**

Read the operating 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 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.**

## Recirculating 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, contact SMC beforehand.
- 2. The Thermoelectric Bath must not be operated without recirculating fluid.**

The pump breaks by empty driving.
- 3. The recirculating fluid may evaporate, lowering the level in the tank.**

Significant reduction of the fluid level can break the recirculating pump as well as causing the performance to deteriorate. Use with appropriate liquid level at all times.
- 4. The pump can be broken by foreign matter entering the recirculating pump.**

Control to prevent any foreign matter 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 recirculating fluid, set its temperature to over or more 5°C to prevent it from being frozen.**

## 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 about 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 the back of pages 1 and 2 for Safety Instructions and the back of page 3 through to 6 for Temperature Control Equipment Precautions.

### 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 case of error**

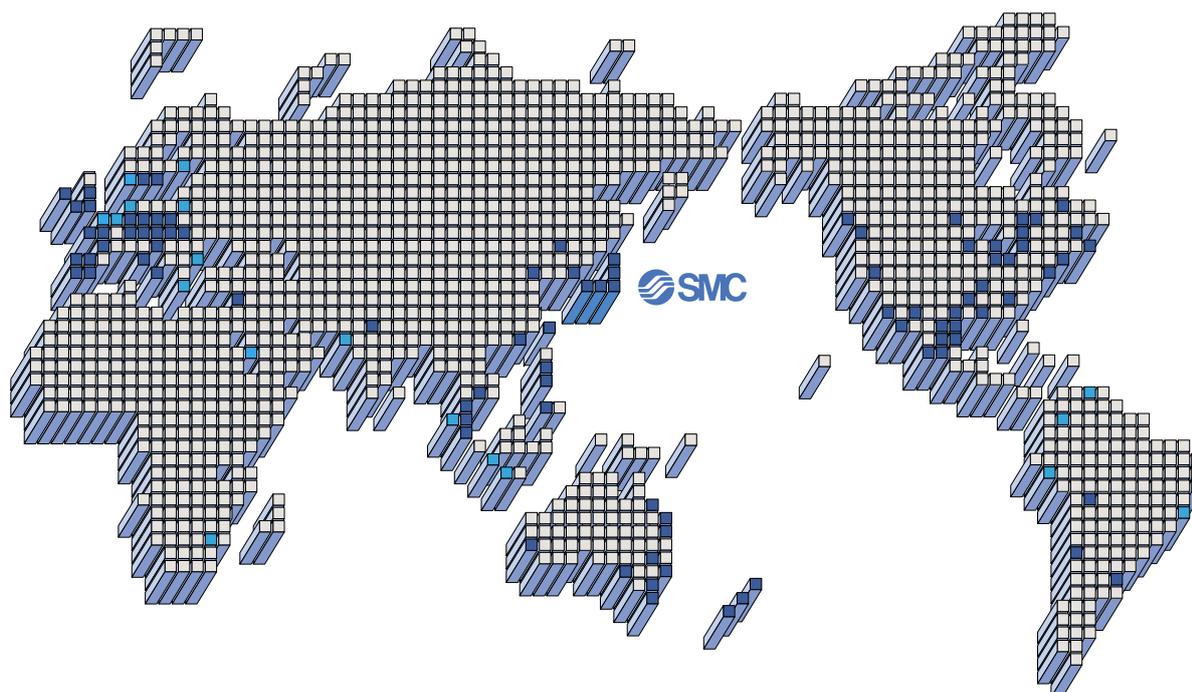
If any error such as abnormal sounds, smoke, or bad smell occurs, cut off the power at once, and stop supplying facility water. Ask SMC or a sales distributor to repair the Thermoelectric Bath.

##### **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 recirculating fluid and intrusion of foreign matter to it.
- e) Check radiation air flow condition and temperature.
- f) Check for leakage, quality change, flow rate and temperature of facility water.

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## SMC Corporation

Akihabara UDX 15F,  
4-14-1, Sotokanda, Chiyoda-ku, Tokyo 101-0021, JAPAN

Phone: 03-5207-8249 Fax: 03-5298-5362

URL <http://www.smcworld.com>

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