



ORIGINAL INSTRUCTIONS

Instruction Manual



Refer to Declaration of
Conformity for relevant
Directives

Thermoelectric Bath (Water-cooled)

INR-244-733/734/736

INR-244-745/746/747/748/749

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)^{*)}, and other safety regulations.

- *) 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.
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	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.**

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.

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 accurately controls the temperature of a liquid in a bath, adjusted by a thermoelectric device. This can indirectly control temperature of chemical bottles, test tubes, flask, cooling coils (heat exchanger) in a constant temperature bath.

2.2 Product specifications

INR-244- * * *

Model No.		INR-244							
		-733	-745	-736	-747	-734	-746	-748	-749
Control method		Cooling/heating automatic shift PWM control							
Cooling/Heating method		Thermoelectric device							
Operating temp. range (°C) ^{1,5}		0.0 to 60.0							
Temp. stability (°C) ¹		±0.03							
Temp. distribution (°C) ¹		±0.04							
Cooling capacity (W) ⁻²		140				320			
Heating capacity (W) ⁻²		300				700			
Bath Fluid	Application Fluid ^{1,4}	Water (5 to 60°C) Ethylene glycol-water solution must be lower than 50% (0 to 60°C)							
	Bath dimensions (excluding protrusion) (mm) ⁵	W216 x D216 x H250				W300 x D350 x H250		W300 x D350 x H400	
	Usable depth (mm)	220						370	
	Temp. (°C)	10 to 35 (no dew condensation)							
Facility Water	Flow rate (L/min) ⁻³	3 ~ 7							
	Max. operating pressure (MPa)	1							
	Facility Water port size	Rc3/8							
Drain port size		CPC coupling PLCD 16004							
Power supply		AC100 to 240V +/10%, Single phase, 50/60Hz							
		3.5 to 1.5 (A)		5.5 to 2.5 (A)					
Overcurrent protection		Circuit protector (acting as a main power switch) with rated current 10A							
Main functions		Set value memory, Temp. upper/lower deviation limit alarm, Output cutoff alarm							
Serial Communication		RS-485 | RS-232C		RS-485 | RS-232C		RS-485 | RS-232C		RS-485 | RS-232C	
Input operation/ Indication		Membrane key sheet/ 11 segment LED							
Alarm output		Temp. upper/lower deviation limit alarm, Output cutoff alarm Relay contact output: opened when the alarm occurs 125VAC,0.4A / 30VDC,2A (resistive load), 125VAC,0.2A / 30VDC,1A (inductive load)							
Temperature sensor		Resistance thermometer sensor, Pt100Q, 3-Connecting wire.							
Ambient temp./humidity		10 to 35°C, 35 to 80%RH (no dew condensation)							
Ambient air quality		Appropriate environment without corrosive gas, solvent (e.g. thinner) and combustible gas.							

Notes:
*) Differs depending on operating conditions.

2 Specifications - continued

- Notes:
*)2) Determined under the following conditions: water as the Bath liquid, set temperature 25°C, Facility Water temperature 25°C, flow rate 3L/min, ambient temperature 25°C, and sealed from outside air with a lid.
*)3) An appropriate range is from 3 to 7L/min. To prevent damage to the facility water circuit on this product, do not supply a flow over the maximum flow rate of 8L/min.
*)4) When the temperature is set high, the liquid temperature inside of the liquid bath 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.
*)5) (a) Do not use the thermo electric bath under the condition where the bath liquid splashes or leaks out. Otherwise, peripheral equipment as well as the thermo electric bath can break.
(b) When the set temperature is increased from a low value to an ordinary value, sometimes the bath liquid can swell, increase and overflow, which can not only break the thermo electric bath and other equipment, but also cause a serious accident. Take a measures to prevent this situation in advance by decreasing the amount of the bath liquid, etc.

2.3 Performance Graphs

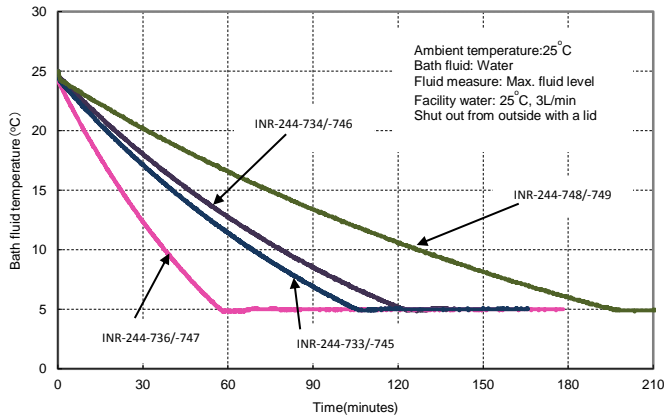


Fig.1 Cooling capacity

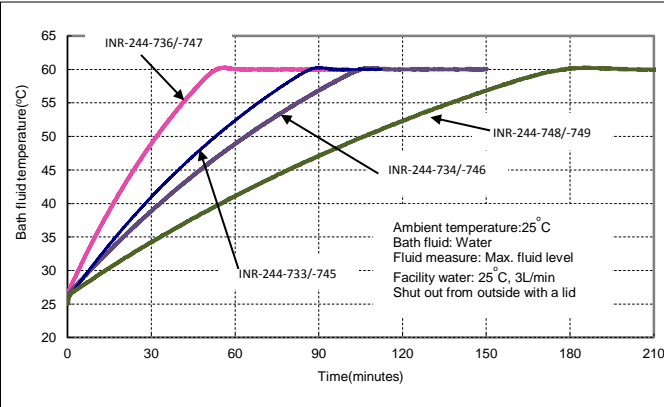


Fig.2 Heating capacity

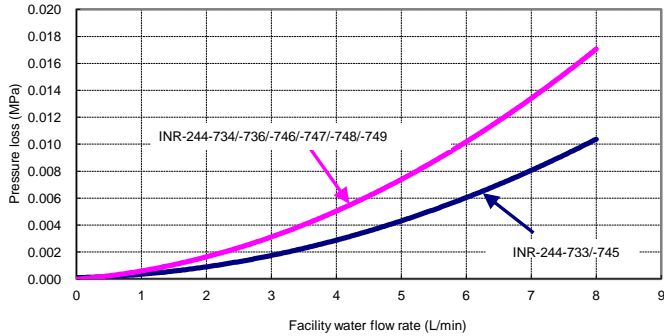
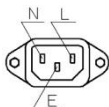
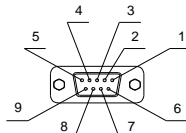
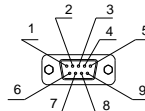


Fig.3 Facility water pressure loss

2 Specification - continued

2.4 Connector Specifications

Item	Pin No.	Specification	Style and Part No.	
Power supply connector (IEC60320,C14)	N	AC100 to 240V		
	L	AC100 to 240V		
	E	PE		
Communication connector	Pin No.	INR-244-733/734/736/748	INR-244-745/746/747/749	 D-SUB 9pin (female) Fixed screw: M2.6
	1	RS-485 T/R(A)	Unused	
	2	RS-485 T/R(B)	RS-232C Rx/D	
	3	Unused	RS-232C Tx/D	
	4	Unused	Unused	
	5	Unused	RS-232C GND	
	6-9	Unused	Unused	
Alarm output connector	1	Temp. High/Low Temp. alarm contact (opened for alarm)		 D-Sub 9 pin (male) Fixed screw: M2.6
	2	Temp. High/Low Temp. Alarm common		
	3-4	Unused		
	5	Output cutoff alarm contact (opened for alarm)		
	6	Output cutoff alarm common		
	7-9	Unused		

2.4.1 Relay contact for alarm connector

Item	Specification
Output type	Relay contact output:Opened when an alarm occurs.
Contact rating	30VDC,2A (resistive load) 30VDC,1A (inductive load)
Minimum load	5VDC,10mA
Mechanical life	5 Million cycles or more
Electrical life	0.2 Million cycles or more

2.5 Production Serial 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 Name and Function of Parts

3.1 Main Parts

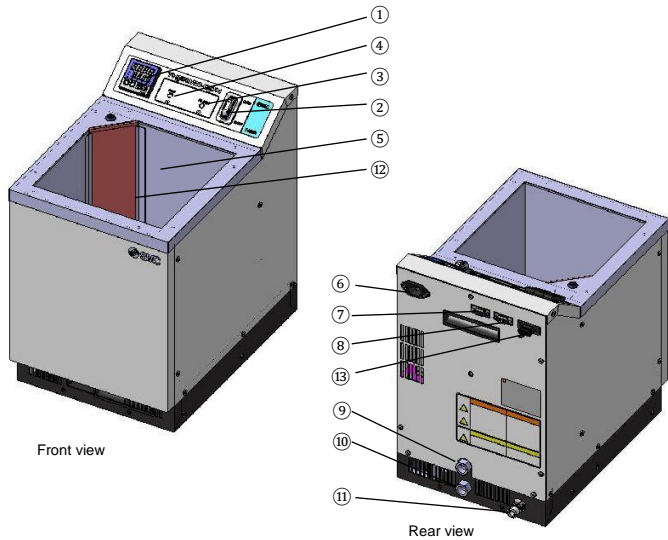
- The names of the parts used in this manual are as follows:

Main Body

No.	Description	Function
1	Operation and display panel	Various displays are shown and settings are input.
2	Main power switch (Circuit protector)	Main power ON/OFF of product.
3	ALARM LED (Red)	Lights up when an alarm occurred.
4	RUN LED (Green)	Lights up while the product is running.
5	Bath	Vessel to store the bath liquid.
6	Power supply connector (AC)	IEC 60320 C14 connector.
7	Communication connector	Connector for serial communication: - RS-485(-733/-734/-736/-748) - RS-232C(-745/-746/-747/-749)
8	Alarm output connector	Connector for contact signals for alarms.

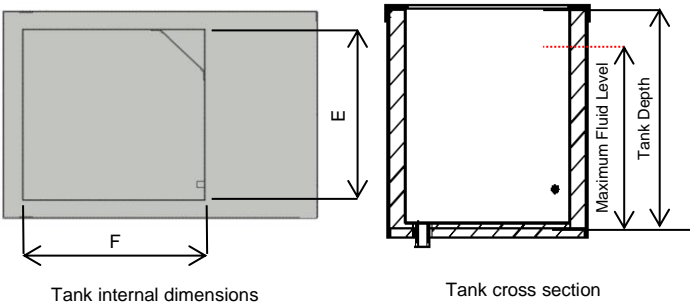
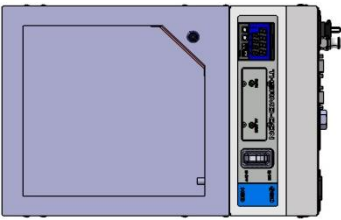
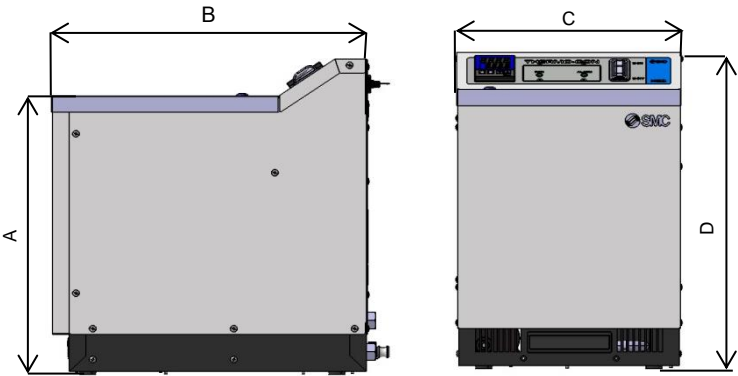
3 Name and Function of Parts - continued

No.	Description	Function
9	Facility Water outlet port	Facility Water outlet port connection (Rc3/8)
10	Facility Water inlet port	Facility Water inlet port connection (Rc3/8)
11	Drain port	CPC coupling PLCD 16004
12	Strainer	Prevents clogging the pump suction port.
13	Level switch connector	Use to connect level switch (Option)



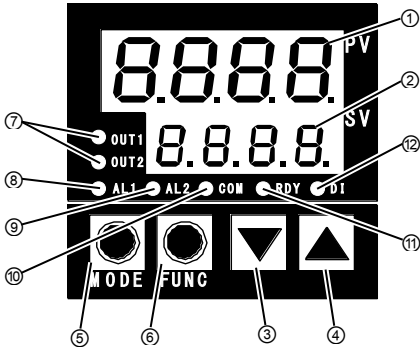
3.2 Outline Dimensions

Model	Dimensions							
	A	B	C	D	E	F	Tank Depth	Maximum Fluid Level
INR-244-733/736/745/747	353	375	266	400	216	216	250	220
INR-244-734/746	353	510	350	400	300	350	250	220
INR-244-748/749	503	510	350	550	300	350	400	370



3 Name and Function of Parts - continued

3.3 Operational display panel



No.	Description	Detail
①	LCD1	Displays monitoring temp.,or mode indication.
②	LCD2	Displays target temp.,or set value/mode
③	[▼] key (DOWN key)	Used to change set values
④	[▲] key (UP key)	Used to change set values
⑤	[MODE] key	Used to change screens.
⑥	[FUNC] key	Used to shift digits of SV
⑦	Output LED	OUT1: Lights up during heating. OUT2: Lights up during cooling.
⑧	AL1 LED	Lights up when High / Low Temp. alarm occurs.
⑨	AL2 LED	Unused
⑩	Communication LED	Flashes during communication. It remains on when the communication is not used.
⑪	RDY LED	Lights up when temperature control is stopped.
⑫	DI LED	Unused

4 Transportation

4.1 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:

- 1) When lifting the product, lift carefully by the base to prevent dropping or tipping over.
- 2) Do not lift by the fittings or piping.
- 3) Never lay this equipment on its side to move it. Pushing it over onto its side will damage the product

5 Function Details

5.1.1 High/Low temperature function

This function generates an alarm when the measured temperature deviates from the set temperature by an amount outside of that defined as the high or low limit deviation. In that case, the **AL1** LED of the controller lights up and the alarm is generated via relay contact to a pin for the High/Low Temp. alarm of the alarm output connector. After the measured temperature returns to within the high or low deviation, the alarm will be reset automatically. In its initial setting, the alarm comes on immediately after the power supply is turned on when the temperature at that time deviates from the set temperature by an amount outside of the high or low deviation limit.

5 Function Details - continued

5.1.2 Offset function

The temperature sensor can be calibrated by inputting offset (calibration value) between the temperatures of a standard thermometer and the temperature sensor in the product.

5.1.3 Set value memory (EEPROM backup)

Caution

- Any set value input via the communication function is not stored. If they need to be stored, use a storage command.
- The overwrite limit is approx. 0.1 million times. If the setting is performed via the communication function, pay attention to how many times the overwrite has been done.

5.1.4 Alaram stop function

The product stops operation when a serious abnormality occurs. The ALARM LED lights up and the alarm signal is output via relay contact from the alarm output connector. The alarm can be reset by turning ON/OFF the AC Power.

The alarm occurs typically caused by following case:-

- ① Overheating of Liquid Tank (Thermostat is activated).
- ② Lowering of Controller output voltage.
- ③ Lowering Bath Liquid level.

5.1.5 Controller alarm

When an error in the controller occurs, the product stops operation and display following error code. The error can be reset by the AC power ON/OFF. In case it cannot be reset by the AC power ON/OFF, it must require the product repair.

Table1: Indication of alarms on operation and display panel

Indicator	Alarm Description
	Shown when a temperature sensor is opened.
	Shown when a temperature sensor is short circuited.
	Shown when the Controller has a memory error.
	Shown when the Controller has an A/D conversion error.

5.1.6 Serial communication function

This product has a serial communication function conforming to communication protocol.

The contents of then serial communication on this product are as follows: -

- 1) Setting and reading of target temperature.
- 2) Reading of measured temperature.
- 3) Setting and reading of offset value.
- 4) Storage command of set value (Any set value input via the communication function is stored in the volatile memory. If they need to be stored in non-volatile memory, use a storage request command.)

6 Installation

6.1 Installation

Warning

- Do not install the product unless the safety instructions have been read and understood.
- Keep enough open space to access any AC power switch and cable connections.
- Keep enough ventilation for fluid vapour.
- This product should be installed on a vibration-free stable level place.
- The mounting orientation of this product is horizontal.
- Place the product in a flat area which can handle its weight and take measures to prevent the tipping of the product. If installed improperly, the product might leak water or topple, resulting in injury.

6.2 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.
- 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 2000m.
- 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.

6.3 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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6.4 Clean Room Installation

Caution

This product uses a fan and generates dust. When set-up and operated in a clean room, take appropriate preliminary measures for dust. Before piping make sure to clean up chips, cutting oil, dust etc.

6 Installation - continued

6.5 Pollution Degree

Caution

This product is suitable for environments with a pollution degree of 1 or 2.

The pollution degree is a classification from 1 to 4 degrees depending on the pollution present in the air.

Table2: Pollution degree classification

Degree 1	There is no pollution or only dry and nonconductive pollution occurs. An example of an environment of this degree is a clean room or a place using an air cleaner.
Degree 2	Normally, only nonconductive pollution occurs. The pollution may become conductive temporarily because of dew condensation. An example of an environment of this degree is a place where electric equipment can operate normally, such as a working office or a control panel.
Degree 3	Conductive pollution or dry and nonconductive pollution which can become conductive when dew condensation occurs. An example of an environment of this degree is a factory.
Degree 4	Conductive pollution that holds its conductivity due to conductive dust, rain or snow. An example of an environment of this degree is the outdoors.

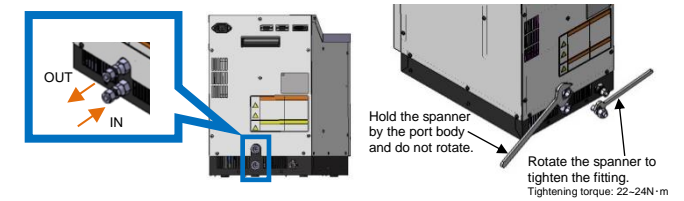
6.6 Mounting

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.
- Select a hard flat and level surface suitable to support the weight of the product and which will reduce the effect of vibration.
 - Install the product so the operation panel is easily visible, and, accessible for electrical and fluid connections can be easily made at the rear.

6.7 Installation of Facility Water Piping

- Connect fittings to the ports marked “IN” and “OUT” on the product to provide piping for the inlet and outlet for facility water, respectively. Ensure piping is not bent to the point where it is kinked which may prevent facility water flow.
- When installing fittings in the facility water inlet/outlet port, use the thread sealing tape or other methods to prevent leakage.
- To avoid applying fixing force to the facility water inlet/outlet port directly, fix the fittings to the port while holding the port with a wrench steady. (Recommended tightening torque: 22~24N·m)



6.8 Wiring of the Power Supply Cable

Warning

- The electrical facilities should be installed and wired in accordance with local laws and regulations of each country and by the person who has knowledge and experience.
- Check the power supply. Operation with voltages, capacities, frequencies and cable sizes other than those specified can cause heat, fire and electrical shock.
- Wire with an applicable cable size and terminal.
- Be sure to shut off the user's power supply. Wiring with the product energized is strictly prohibited.

Caution

- Use an individual socket or earth leakage breaker.
- Be sure to provide grounding. Incomplete grounding can cause failure and electrical shock.

6 Installation - continued

6.9 Wiring

Warning

- The electrical facilities should be installed and wired in accordance with local laws and regulations of each country and by the person who has knowledge and experience.
- IEC protection class of the product is Class I. Resistance for ground must be 100ohm or less. Grounding can be provided via the PE line of the power supply cable.
- Do not use the same ground being used by equipment that generates strong electrical magnetic noise or high frequencies.
- Check the power supply. Operation with voltages, capacities, frequencies and cable sizes other than those specified can cause heat, fire and electrical shock.

Caution

- Use an individual socket or earth leakage breaker.
- Be sure to provide grounding. Incomplete grounding can cause failure and electrical shock.

6.9.1 Power Source Specification

Table 3: Electrical power supply specification

Model	Power supply voltage ^{*1}	Rated current [A]	Sensitivity of leak current [mA]
INR-244-733/745	1-phase AC 100~240V (50/60Hz)	3.5 (100VAC)	30
INR-244- 734/736/746/747/748/749		1.5 (240VAC)	
		5.5 (100VAC)	
		2.5 (240VAC)	

Note: ^{*1}) Over voltage category I or II

6.9.2 Cable and power supply connector

The power cable and connector are to be prepared by others.

Table 4: Cable and Connector specification

Cable and Connector	Specifications (for your system)
Cable	3 wires (14AWG), includes ground
Power supply connector	IEC60320 (C-13 equivalent) 10A cable mount female connector

6.9.3 Preparation and wiring of power supply cable

- Strip the sheath from both ends of the cable, referring to the following table.
- 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).

Table 5 power supply connector

Power Source Specification		
	AWG14(L)	AC100-240V
	AWG14(N)	AC100-240V
	AWG14(E)	Earth

6.10 Filling of Bath Fluid

6.10.1 Preparation of Bath Fluid

Caution

- Do not use tap water or hard water. As this will cause the internal pump to failure and the performance deterioration by generation of scale.
- If using Ethylene Glycol (EG), refer to the suppliers Material Safety Data Sheet (MSDS) and wear Personal Protective Equipment (PPE) as appropriate.
- High concentration EG can cause temperature control error or system failure.

6 Installation - continued

Table 6: Bath fluids

Bath fluid	Working temp. range	Remarks
Water	5 ~ 60°C	Use distilled water or clean water.
Ethylene glycol aqueous solution	0 ~ 60°C	Concentration of EG must be lower than 50%

6.10.1.1 Bath capacity

Table 7: Bath capacity

Model	Bath Capacity (Approx.)
INR-244-733/736/745/747	10.2 Litres (2.7 gal)
INR-244-734/746	23.1 Litres (6.1 gal)
INR-244-748/749	38.8 Litres (10.2 gal)

6.11 Filling the Bath

- Make sure the drain port plugged.
- Fill the bath with the fluid to a maximum level of 30 mm below the top of the tank.

Caution

- Do not operate the unit without bath fluid, as this will damage the internal pump.
- Do not use in such a manner that the bath fluid will overflow or splashes during operation.

7 Operation

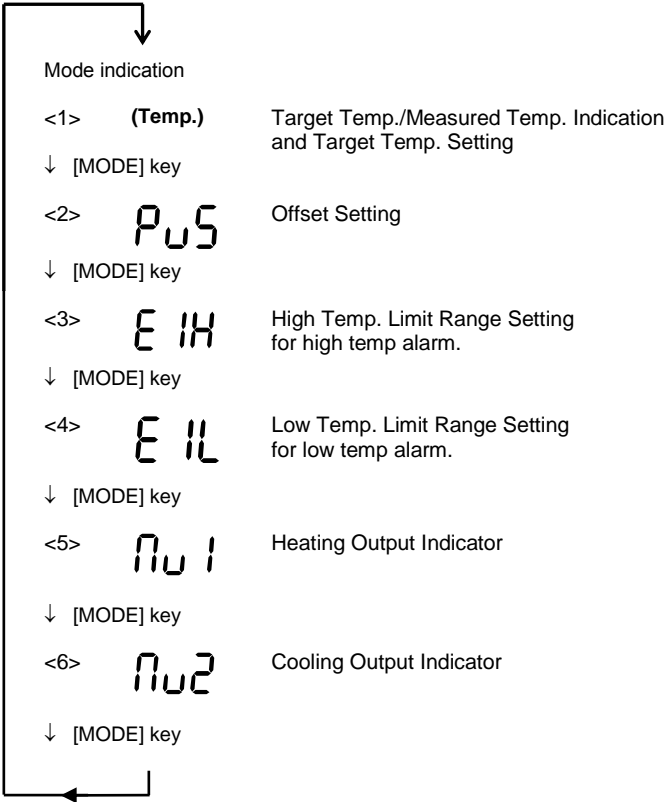
7.1 Turning ON Power

Caution

If an alarm occurs after the power supply is turned on, check the indicated content of the alarm and turn off the power supply to find the cause so that appropriate measures can be taken.

- Make sure that Main Power Switch is OFF. Turn ON the power breaker on primary side (tool side)
- Turn ON Main Power Switch.
- Controller will indicate the current bath fluid temperature after approx. 6 sec.

When the power supply is turned on, the product is in operation mode. The target temperature is shown as well as the current measured temperature. Each presses of the [MODE] key changes the operation mode display as follows: -



7 Operation - continued

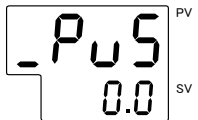
7.2 Detail of Operation Mode

<1> Target Temp. / Measured Temp. Indication and Target Temp. Setting.



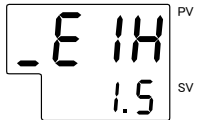
Function	Sets target temperature. Set with [▲] or [▼] key
	Indicates current temperature on PV and target temperature on SV.
Setting range	0 to 60.0°C
Initial value	25.0°C

<2> Offset Setting



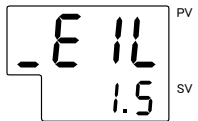
Function	Sets the offset (compensating) value of the PV. Set with [▲] or [▼] key Example. If 0.5 is set, the temperature is actually controlled to a value that is lower by 0.5 °C.
Setting range	-1.0 to 1.0 °C (Please use it in this setting range.)
Initial value	Refer to the controller correction value of Inspection Record.

<3> High temperature limit range setting



Function	Sets the high temperature limit value. Set with [▲] or [▼] key Input the differential from target temp. for high temp. alarm. AL1 LED lights up and the alarm signal output when alarm.
Setting range	0 to 10.0 °C
Initial value	1.5 °C

<4> Low temperature limit range setting



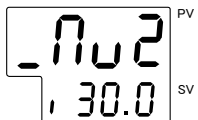
Function	Sets the lower temperature limit value. Set with [▲] or [▼] key Input the differential from target temp. for low temp. alarm. AL1 LED lights up and the alarm signal output when alarm.
Setting range	0 to 10.0 °C
Initial value	1.5 °C

<5> Heating Output Indicator



Function	Indicates the heating ratio
Display range	0 to 100%

<6> Cooling Output Indicator



Function	Indicates the cooling ratio
Display range	0 to 100%

8 Troubleshooting

8.1 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.

8.2 Alarms

8.2.1 Alarms Indications

(Lit) 7seg. LED	Content of alarm	Alarm Output Signal	High / Low temp. alarm	LED (Display)	Unit Status	Reset
Normal status	High temp. alarm Occurs when the bath fluid temp is higher than the alarm set point.	Contact opened	ON	AL1	Normal operation	Automatic
Normal status	Low temp. alarm Occurs when the bath fluid temp is Lower than the alarm set point.	Contact opened	ON	AL1	Normal operation	Automatic
Normal status	Low DC power supply voltage (Power supply failure) Occurs when the internal power supply has trouble.	Contact opened	-	ALARM	Control stop 1	Restart the power supply
Normal status	Thermostat alarm Occurs when temp of heat exchanger is abnormally high.	Contact opened	-	ALARM	Control stop 1	Restart the power supply

8 Troubleshooting - continued

Code	Cause	Countermeasure
ALARM LED (red) light up.	High-level electric noise has been applied to the power supply line, ground line and/or signal line.	Move the product to an environment with less noise and restart. If no failure occurs, the noise caused the alarm.
	The power supply voltage to the product not correct.	Confirm that the power supply voltage is 100 to 240VAC.
	The Bath fluid is excessively heated	Confirm that the Bath liquid is not excessively heated.
		Confirm that the Bath liquid level is not too low.
	The facility water is cutoff or its flow rate is not enough.	Supply the appropriate flow rate of facility water.
	Level switch*	Water level in the bath is low. Increase the water level.
		Foreign matter is caught in the float, causing operation failure of the float. Clean the tank to remove the foreign matter or replace the level switch.
		Contact failure of the thermostat and the level switch connector. If you still have an error after pulling the connector out and plugging it back in, replace the level switch or send the product to SMC for repair.
		Level switch is not mounted vertically. Float does not move. If the mounting surface is not horizontal, send the product to SMC for repair.
		Level switch failure If you raise the float and supply power, and you still have an error, replace the level switch.
	Thermostat	Facility water flow rate is out of specification range. (3-7L/min) Correct the facility water flow rate within the specification range.
		Facility water flow temperature is out of specification range. (10-35°C) Correct the facility water temperature within the specification range.
		Ambient temperature is too high. (out of 10-35°C) (out of 35-85%) Correct the ambient temperature within the specification range.
		Thermostat of circuit failure If you still have an error even after correcting the above, send the product to SMC for repair.

9 Maintenance

9.1 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 bath 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.

9.2 Regular Maintenance

- Check the strainer for clogging in regular intervals.
- Check the concentration of the bath fluid in regular intervals. (Concentration of Ethylene glycol must be lower than 50%)
- Replace the bath fluid in regular intervals.

9.2.1 Draining the Bath Fluid



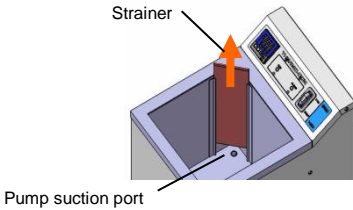
Caution

- Draining without stopping the product might cause dry run of the internal pump.
- Take care not to splash the bath liquid on the inside of the product and the connectors when draining. If water splashes on the connector or the product body, wipe them off and allow them to dry sufficiently to prevent electrical shock, a short circuit, or ignition.
- Please confirm the bath light is at safe temperature when you drain the liquid.

- 1) Stop the product (cut the power supply).
- 2) Prepare suitable fitting (recommend fitting: PLCD16004) to drain the fluid.

9.2.2 Check the strainer and clean the bath

- 1) Remove the debris that the strainer has captured.
- 2) Clean the bath.
- 3) Confirm there is no debris in the pump suction port.
- 4) The strainer can be set in the bath at time during operation.



9.2.3 Checked fluid surface waving

- Fluid surface must be waving when the product is running because the fluid is been stirred by the internal pump.

(Lit) 7seg. LED	Content of alarm	Alarm Output Singal	High / Low temp. alarm	LED (Display)	Unit Status	Reset
Err0	Memory error Occurs when there is an issue on the EEPROM of the controller.	-	-	-	Control stop 2	Replace the controller
Err1	Controller error Occurs when there is an issue on the controller.	-	-	-	Control stop 2	Replace the controller
	High temp. sensor value Occurs when the temperature sensor breaks (or the signal cable is not connected)	Contact opened	ON	AL1	Control stop 2	Restart the power supply
	Low temp. sensor value Occurs when the temperature sensor is short- circuited.	Contact opened	ON	AL1	Control stop 2	Restart the power supply

Note: -
- Control stop 1: Temperature control and pump are stopped.
- Control stop 2: Only temperature control is stopped.

Code	Cause	Countermeasure
Err0	The EEPROM of Controller is broken due to high-level electric noise.	If the trouble cannot be solved even after cycling the power supply, contact SMC for repair.
	The writing time to the EEPROM exceeds 0.1 million.	
Err1	The EEPROM of the controller is broken due to high-level electric noise.	If the trouble cannot be solved even after cycling the power supply, contact SMC for repair.
	The temperature sensor is broken (or the cable is disconnected).	Check if the cable is disconnected. If the trouble cannot be solved even after no disconnection is confirmed, confirm there is no broken wire. If the wire is broken, contact SMC for repair.
	The temperature sensor is short-circuited.	Confirm that the temp. sensor and its cable are short-circuited. If they are short-circuited, contact SMC for repair.
The operation and display panel does not light up, or the display disappears.	The internal temp of this product is too high, and the DC power supply is not working properly.	Check that the air vents are not plugged.
	Malfunction of the DC power supply	If the trouble cannot be solved even after the product is restarted 3 or 4 min. after, contact SMC for repair.
	The circuit protector of this product or GFCI which is installed on primary side of the unit has been tripped.	Confirm that an instantaneous power supply cutoff has not occurred at frequent rate. Confirm that a ground leakage has not occurred. If the trouble cannot be solved even after the product is restarted, contact SMC for repair.

Note: *Level switch (sold separately)

10 Declaration of Conformity

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

Sample Doc.

SMC Corporation
4-14-1 Soto-Kanda, Chiyoda-ku, Tokyo 101-0021 Japan

Declares under our sole responsibility that the following equipment:

Thermo Electric Bath
INR-244-733/734/736/745/746/747/748/749
Serial No.: *U001 to *Z999

Conforms with the following directive(s) and harmonized standards:

Directive	Harmonized standards
EMC Directive	2004/108/EC EN 61000-6-2: 2005 EN 61000-6-4: 2007 + A1:2011
Low Voltage Directive	2006/95/EC EN 61010-1: 2010

Name and address of the person authorised to compile the technical file:

Mr. G. Berakoetxea, Executive Officer, SMC Europe S.A.
SMC España, S.A. Zuazobidea 14, 01015 Vitoria-Gasteiz

Importer/Distributor in EU and EFTA

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Tokyo, *th July 20**

Hiroyuki Sakama
General Manager
Product Development Division – VI

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SMC Corporation

URL : http:// www.smworld.com (Global) http:// www.smceu.com (Europe)

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