

PHASE-ANGLE VOLTAGE CONTROLLER

VOLTHERMO

1121 / 2131 / 2131U
2132 / 2331 / 2333

INSTRUCTION MANUAL

Thank you for purchasing one of our products.

Before using the product, read this instruction manual. Keep the manual for future reference. It may be helpful later.



The photo shows the VOLTHERMO2333

 **HAKKO ELECTRIC CO., LTD.**

FOR YOUR SAFETY

Your VOLTHERMO controller uses the following symbols to ensure safe use.



This symbol indicates that mishandling the product may lead to an accident resulting in personal injury or death.



This symbol indicates that mishandling the product may lead to an accident resulting in minor injury or damage to property.

WARNING

● Never disassemble or modify the controller.

Never disassemble or modify the VOLTHERMO controller. Failure to heed this warning may result in a fire, electric shock, or failure.



● Connect the input and output electric cables securely.

When connecting the input and output electric cables, tighten to the crimp terminals securely. Failure to heed this warning may result in a fire or electric shock.



● Do not allow foreign matter to enter the controller.

Do not allow liquid or metal enter the controller. Failure to heed this warning may result in a fire, electric shock, or failure.



● Do not use the controller in the presence of a flammable gas.

Do not use your VOLTHERMO controller in the presence of a flammable gas. Failure to heed this warning may result in an explosion or fire.



● Do not use an unauthorized sensor.

Using an unauthorized sensor may result in a fire, electric shock, or failure.



● Do not touch the controller with wet hands.

Never operate the controller with wet hands. Failure to heed this warning may result in an electric shock.



CAUTION

● Power off the controller before connecting the wiring.

Before connecting the sensor and input and output wiring, power off the controller. Failure to heed this warning may result in an electric shock.



● Use the correct power voltage.

Do not use the controller with any power voltage other than the indicated voltage. Failure to heed this warning may result in a fire or electric shock.



● To prevent fire, avoid exposing the controller to the following locations or conditions:

- Flammable or ignitable gas.
- Corrosive gas.
- Atmospheric temperature of 5°C or less.
- Atmospheric temperature of 40°C or more.
- Relative humidity is high. (e.g., bath)
- Steam or water droplets.



● Do not expose the controller to water.

Do not use the controller if it is wet with water. Failure to heed this warning may result in an electric shock or current leakage.



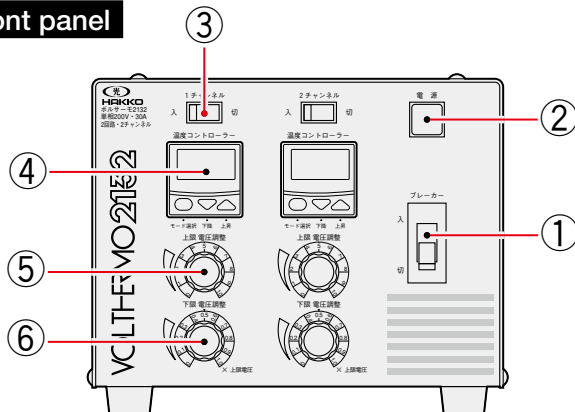
1. OVERVIEW

In addition to a temperature controller, your VOLTHERMO controller includes a built-in voltage control circuit. To control the temperature of an infrared heater, combine your VOLTHERMO controller with the heater to achieve extremely stable temperature control without impairing the capability of the heater.

PRODUCT NAME	VOLTHERMO					
	1121	2131	2132	2331	2333	2131U
Model #	BTC0011	BTC0021	BTC0022	BTC0023	BTC0024	BTC0025
Product code	08914310	08914320	08914330	08914340	08914350	08914360
Power supply	100V (50/60Hz)	Single-phase 200V (50/60Hz)		Three-phase 200V (50/60Hz)		Single-phase 200V (50/60Hz)
Maximum output voltage	Single-phase 90V	Single-phase 180V				
Number of output circuits	1	1	2	3	3	1
Number of channels	1	1	2	1	3	1
Maximum current	20A	30A	30A×2 lines	30A×3 lines		30A
Maximum load	1.8kW	5.4kW	5.4kW×2 lines	5.4kW×3 lines		5.4kW
Temperature setting	0°C (ambient temperature) - 999°C					
Temperature indication accuracy	± (0.5% F.S. + 1 digit)					
Ambient temperature correction accuracy	± 2°C (range of 5°C to 40°C)					
ON/OFF control hysteresis width	5°C					
Sensor	Type-K thermocouple (extra-cost option)					
Usage environment	5°C to 40°C (humidity of 85% or less). Noncondensing.					

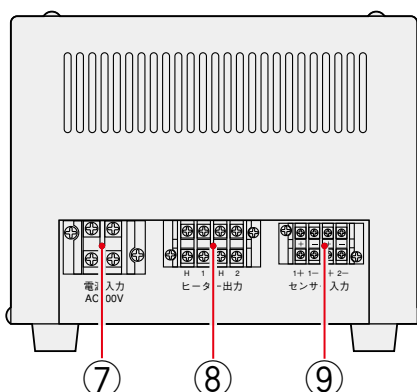
2. EXTERIOR FEATURES

Front panel



- ① Power circuit breaker *1
- ② Line indicator *1
- ③ Channel switch *2
- ④ Temperature controller
- ⑤ Upper-limit voltage adjustment dial
- ⑥ Lower-limit voltage adjustment dial
- ⑦ Input power connection terminal block *3
- ⑧ Heater connection terminal block *3
- ⑨ Sensor connection terminal block *3

Rear panel



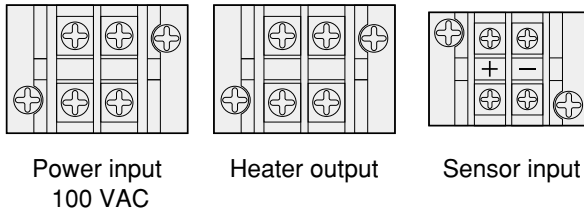
- * 1 : Not provided for the 2131U
- * 2 : Not provided for the 1121 or 2131
- * 3 : The numbers for the terminal blocks depend on the model.

The model shown is the VOLTHERMO2132

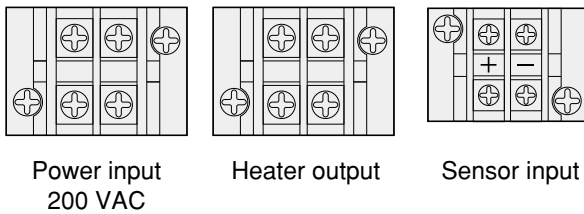
3. CONNECT THE WIRING

- (1) Connect the power cable and the wiring for the heater and temperature sensor (thermocouple) to the terminal blocks on the rear panel of the main unit.
- (2) The power cable must be connected to the input terminals on the power input terminal block.
- (3) The wiring for the heater must be connected to the heater outputs (two circuits for 2-channel models or three circuits for 3-channel models).
- (4) When connecting the wiring of the thermocouple to the + and - terminals on the sensor terminal block, ensure correct polarity.

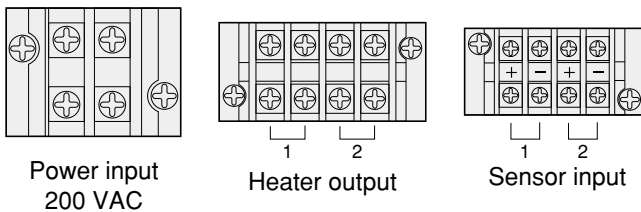
**VOLTHERMO
1121**



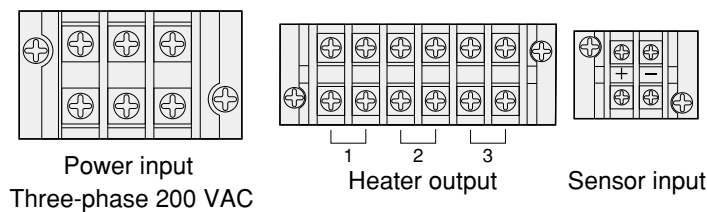
**VOLTHERMO
2131**



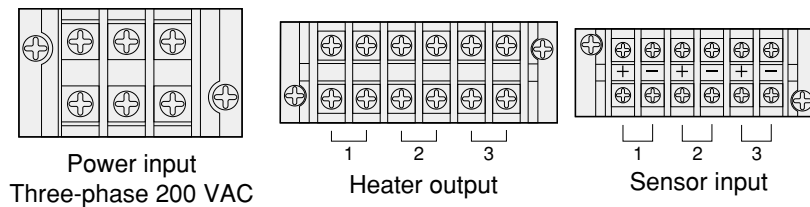
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2132**



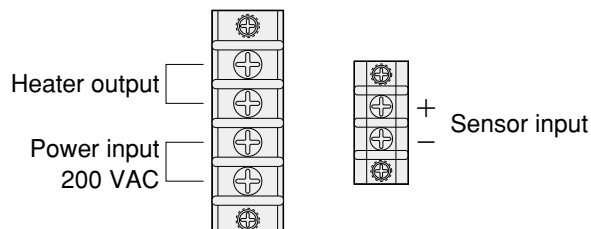
**VOLTHERMO
2331**



**VOLTHERMO
2333**



**VOLTHERMO
2131U**



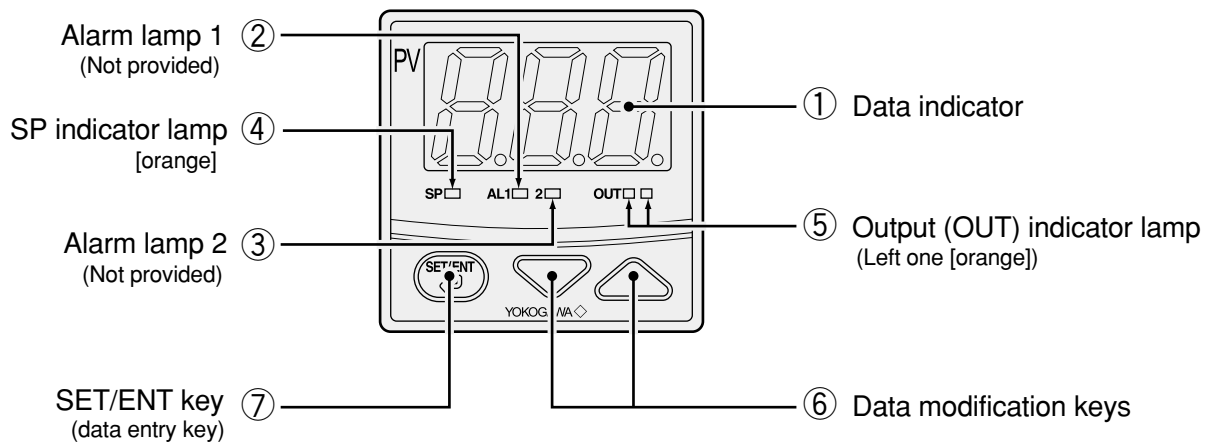
CAUTION









Use electric wires and round terminals appropriate for the load of the heater and use an appropriate tool to crimp the wires.

The wiring must be connected correctly as indicated on the terminal blocks on the rear panel of the main unit.

4. USING THE TEMPERATURE CONTROLLER

Exterior Features and Functions



	DESIGNATION	FUNCTION
①	Data indicator [red]	<ul style="list-style-type: none"> The operation screen displays the measured value (PV) or target value(SP) (PV/SP). The parameter setting screen displays the parameter symbols and settings. If a problem occurs, the appropriate error code is displayed.
②	Alarm lamp 1	<ul style="list-style-type: none"> Not provided
③	Alarm lamp 2	
④	SP indicator lamp [orange]	<ul style="list-style-type: none"> The lamp stays on when the SP is indicated or is being modified. The lamp blinks (slowly, once a second) when a parameter symbol is indicated. The lamp blinks (relatively quickly) when a parameter setting is being modified.
⑤	Output (OUT) indicator lamp Left one [orange]	<ul style="list-style-type: none"> The lamp stays on when control output is being produced.
⑥	Data modification keys Hereafter, they are simply represented as  and  .  is the Up key and  is the Down key	<ul style="list-style-type: none"> When the operation screen displays PV, the  key switches to the SP. Allows modification of the SP and the parameter settings. The  and  keys decrease and increase the value, respectively. Holding down each key increases the speed of changes in stages.
⑦	SET/ENT key (data entry key) Hereafter, it is simply represented as  .	<ul style="list-style-type: none"> Switches the operation screen display between PV and SP. The data modification key enters the modified value. Switches the display between the operation and parameter setting screens. On the operation screen, you can hold down the key for longer than 3 seconds to move to the operation parameter-setting screen.

5. OPERATING THE CONTROLLER

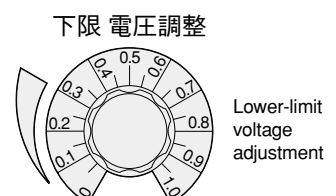
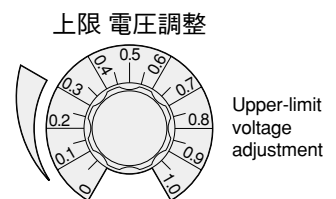


Before operating the controller, ensure again that the power supply and heater are appropriate for the VOLTHERMO controller and that the wiring is connected properly.

- (1) Position the breaker switch to the ON indication to make the controller ready to operate. Then, the green line lamp comes on (except for the 2131U), and the indicator for the temperature controller illuminates. (If your VOLTHERMO controller is provided with two or three channels, then position the channel switch to the ON indication. The indicator illuminates, and the VOLTHERMO controller is ready to operate.)
- (2) Press the data entry key on the temperature controller once to switch the display to the target temperature (SP). Use the up key or down key to set the desired temperature. Then, press the data entry key . The VOLTHERMO controller goes into operation mode. Each time you press the data entry key , the display switches between the measured value (PV) and target value (SP).
- (3) The VOLTHERMO controller turns on and off to control the heater temperature. The hysteresis width (temperature width) is factory set to about 5°C.

6. ADJUSTING THE VOLTAGE

- (1) Use the upper-limit voltage adjustment dial to set the upper-limit output voltage within the range from 0% to 90% (the dial is calibrated from 0 to 1.0) of the input power source.
- (2) Use the lower-limit voltage adjustment dial to set the lower-limit voltage as a percentage relative to the value set with the upper-limit voltage adjustment dial. Set it within a range from 0% to 100% (the dial is calibrated from 0 to 1.0).
- (3) When the temperature controller is turned on, the upper-limit voltage is used. When the controller is turned off, the lower-limit voltage is used. Using the adjustment dials, set the upper- and lower-limit voltages so that the temperature difference between the ON and OFF voltages is small.
- (4) For safety, set the lower-limit voltage adjustment dial to Marking 0.5 as a guideline. Do not set it to Marking 1.0 (the controller does not control the temperature). If the set temperature is reached within the estimated time, then the value set with the upper-limit voltage adjustment dial is optimal. If it is not reached within the estimated time, then increase the dial value. If it is reached before the estimated time, then decrease the dial value.
- (5) When the temperature controller starts controlling the temperature with the set temperature, use the lower-limit voltage adjustment dial to make adjustments so that the temperature difference between the heater ON and OFF modes is small. (If the temperature difference is large, then decrease the value of the lower-limit voltage adjustment dial.)
- (6) If the temperature difference between the ON and OFF modes is small, then the set value is optimal.

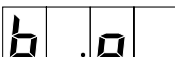


7. FOR SAFETY

© The VOLTHERMO controller is designed with an emphasis on safety because it is used in combination with a heater. Please understand the mechanism of the VOLTHERMO controller to ensure safe use.

- The VOLTHERMO controller is a temperature controller specifically designed for the infrared heaters from Hakko.
- For the connections, use wires with a thickness greater than or equal to the specified thickness for each type of wire.
- To connect wiring to the input and output terminals, use crimp terminals to crimp the wires.
- Before connecting the wiring, ensure that the controller is turned off. Otherwise, you may receive an electric shock.
- The VOLTHERMO controller is not waterproof. Do not expose the unit to water, oil, or other liquids. Do not use the controller under the following conditions:
In the presence of flammable/ignitable gas or corrosive gas, steam, or water droplets or when the relative humidity is high.
- Use the VOLTHERMO controller only in a location that satisfies the requirements for the usage environment (temperature of 5°C to 40°C and relative humidity not higher than 85%). The controller must be installed in a well-ventilated location (the controller uses an SSR, which produces heat).
- Before using the VOLTHERMO controller, make sure that the input power source is correct. Use only the proper input voltage and allowable current. Do not use the controller with the cover removed. Never modify the controller.
- The temperature controller is set to operate in the ON/OFF control mode. Do not place it in PID control mode.

8. CAUSES AND REMEDIES FOR PROBLEMS

PROBLEMS	CAUSES	REMEDIES
When the VOLTHERMO controller is powered on, the line lamp does not come on.	The power cable is not connected.	Ensure that the power cable is connected.
	Failure of the line lamp.	Replace the lamp (contact your distributor for service)
The temperature controller does not control the temperature.	The lower-limit voltage adjustment dial is set to Marking 1.0.	Choose a smaller value.
	Failure of the temperature controller.	Contact your distributor for service.
	Failure of the voltage-controlled circuit.	
The temperature is too high.	The voltage adjustment dials are improperly set.	Decrease the settings of the upper- and lower-limit voltage adjustment dials.
The temperature is too low.	The setting of the lower-limit voltage adjustment dial is low.	Increase the dial setting.
The temperature does not rise.	The controller is not connected to the heater.	Ensure that it is connected to the heater.
	The heater capacity is too small for the object.	Check the heater capacity.
	The setting of the upper-limit voltage adjustment dial is small.	Increase the dial setting.
Indication of the temperature controller 	The polarity of the thermocouple is reversed.	Ensure correct polarity.
	The thermocouple contains a broken wire.	Replace the thermocouple.

AFTER-SALE SERVICE

● For Inquiry

If you have any questions about our products, contact with your distributors, or the Sales Head Office of HAKKO CO., LTD. The addresses and phone numbers are as follows.

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