

RTC48 Temperature Controller Quick Start Guide

03/2013

Important Information

Read these instructions carefully and look at the equipment to become familiar with the device before trying to install, operate, or maintain it. The following special messages may appear throughout this documentation or on the equipment to warn of potential hazards or to call attention to information that clarifies or simplifies a procedure.

⚠ DANGER

DANGER indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.

⚠ WARNING

WARNING indicates a potentially hazardous situation which, if not avoided, can result in death or serious injury.

⚠ CAUTION

CAUTION indicates a potentially hazardous situation which, if not avoided, can result in minor or moderate injury and equipment damage.

1. Controller References and Characteristics

The following table shows the controller references with the characteristics of each:

Part Number	Power Supply	Input	Output 1	Output 2	Modbus	Alarm = 1 (for Alarm 1) = 2 (for Alarm 1 + 2)		
RTC48PUN1RNHU	110...240 Vac	Universal input	Relay	-	-	1		
RTC48PUN1SNHU			SSR	-	-	1		
RTC48PUNCRNHU			Relay	-	RS485	1		
RTC48PUNCSNHU			SSR	-	RS485	1		
RTC48PUN1RRHU			Relay	Relay	-	1		
RTC48PUN1SRHU			SSR	Relay	-	1		
RTC48PUN2RNHU			Relay	-	-	2		
RTC48PUN2SNHU			SSR	-	-	2		
RTC48PUNCRRHU			Relay	Relay	RS485	1		
RTC48PUNCSRHU			SSR	Relay	RS485	1		
RTC48PUN1RSHU			Relay	SSR	-	1		
RTC48PUN1SSHU			SSR	SSR	-	1		
RTC48PUNCRSHU			Relay	SSR	RS485	1		
RTC48PUNCSSHU			SSR	SSR	RS485	1		
RTC48PUN1RNLU			24V ac/dc	Universal input	Relay	-	-	1
RTC48PUN1SNLU					SSR	-	-	1
RTC48PUNCRNLU					Relay	-	RS485	1
RTC48PUNCSNLU					SSR	-	RS485	1
RTC48PUN1RRLU	Relay	Relay			-	1		
RTC48PUN1SRLU	SSR	Relay			-	1		
RTC48PUN2RNLU	Relay	-			-	2		
RTC48PUN2SNLU	SSR	-			-	2		
RTC48PUNCRRLU	Relay	Relay	RS485	1				

Part Number	Power Supply	Input	Output 1	Output 2	Modbus	Alarm = 1 (for Alarm 1) = 2 (for Alarm 1 + 2)
RTC48PUNCSRLU	24V ac/dc		SSR	Relay	RS485	1
RTC48PUN1RSLU			Relay	SSR	-	1
RTC48PUN1SSLU			SSR	SSR	-	1
RTC48PUNCRSLU			Relay	SSR	RS485	1
RTC48PUNCSSLU			SSR	SSR	RS485	1
RTC48PUNCRRHU			Relay	Relay	RS485	1

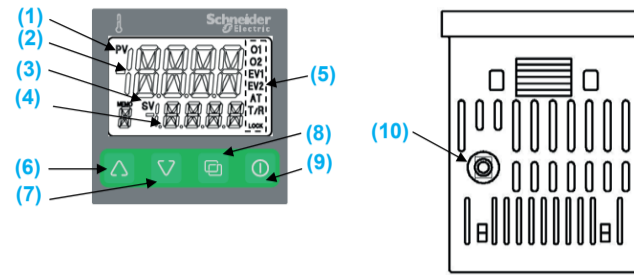
Accessories included

: Quick Start Guide 1 copy, Mounting frame 1 piece, Gasket (Front mounted to the RTC48) 1 piece, and 50 Ω Shunt resistor (DC current input)

Accessories sold separately

: Terminal cover x 2 pieces (RTCCOV), Communication cable (RTCCBL), and Spare parts (RTCACC)

2. Display of RTC48



Item	Name	Function
1	PV indicator	Lights when Process Values (PV) are indicated in the PV/SV display mode.
2	PV display	Indicates the PV or displays the name of the parameters during the setting mode.
3	SV indicator	Lights when Setting value (SV) are indicated in the PV/SV display mode.
4	SV display	Indicates the SV, Manipulated Variable (MV), or each set value during the setting mode.
5	Action indicators	O1 (OUT1): Lights when control output (OUT1) is ON.
		O2 (OUT2): Lights when control output (OUT2) (when OUT2 model applicable) is ON.
		EV1: Lights when Alarm 1 output is ON.
		EV2: Lights when Alarm 2 output is ON (when Alarm 2 model is applicable).
		AT: Flashes while AT (auto-tuning) or auto-reset is performing.
		T/R: Lights during serial communication (when communication model is applicable).
6	Increase key	Increases the numeric value.
7	Decrease key	Decreases the numeric value.
8	Page key	Selects the setting mode, or registers the setting value. To register the SV, press this key.
9	OUT/OFF key	Switches control output ON/OFF or Auto/Manual control.
10	Console connector	By connecting to the USB communication cable (RTCCBL, sold separately), you can conduct the following operations from the external computer using the loader software Zello Temperature Control Soft: <ul style="list-style-type: none"> • Reading and setting of SV, PID, various set values • Reading of PV and action status • Function change • Monitoring the trend of PV, SV, and MV

3. Main Specifications

Name	Description
Supply voltage	100...240 Vac 50/60 Hz, 24V ac/dc 50/60 Hz
Allowable voltage fluctuation	100...240 Vac: 85...264 Vac, 24V ac/dc: 20...28V ac/dc
Accuracy (Setting and Indication)	Thermocouple Within ± 0.2% of each input span ± 1 digit, or within ± 2 °C (4 °F), whichever is greater However R, S input, 0...200 °C (0...400 °F): Within ± 6 °C (12 °F) K, J, E, T, N input, less than 0 °C (32 °F): Accuracy is not guaranteed Within ± 0.4% of input span ± 1 digit
	RTD Within ± 0.1% of each input span ± 1 digit, or within ± 1 °C (2 °F), whichever is greater
	DC current, voltage Within ± 0.2% of each input span ± 1 digit
Control output (OUT1)	Relay contact Control capacity: 3 A, 250 Vac (resistive load) 1A 250 Vac (inductive load cos φ = 0.4), Electrical life: 100,000 cycles
	Non-contact voltage (for SSR drive) 12 Vdc ± 15%, Max. 40 mA DC (short circuit protected)
Alarm 1, Alarm 2	Relay contact 1a, Control capacity 3A 250 Vac (resistive load), Electrical life: 100,000 cycles
Control output (OUT2)	Relay contact 1a, Control capacity: 3 A, 250 Vac (resistive load), Electrical life: 100,000 cycles Non-contact voltage (for SSR drive): 12 Vdc ± 15%, Max. 40 mA DC (short circuit protected)
Power consumption	Approx. 8 VA
Ambient temperature	0...50 °C (32...122 °F)
Ambient humidity	35...85% RH (No icing and condensation)
Weight	Approx. 120 g (4.23 oz)

4. Dimensions and Installation of RTC48

Installation Precautions

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

Do not install the controller where:

- Ambient temperature is outside the range of 0 °C...50 °C (32 °F...122 °F) while in operation.
- Ambient humidity is more than 85% RH while in operation.
- Condensation can occur.
- Corrosive or combustible gases are present.
- There is vibration or shock higher than the specified value.
- Exposure to water oil, chemicals, steam or vapor.
- Exposure to dust, salty air, or air containing high concentrations of metal particles.
- Subject to electromagnetic interference from static electricity, magnetism, and external electromagnetic interference sources.
- Exposure to direct sunshine.
- Heat accumulation due to solar radiation.

Failure to follow these instructions can result in death or serious injury.

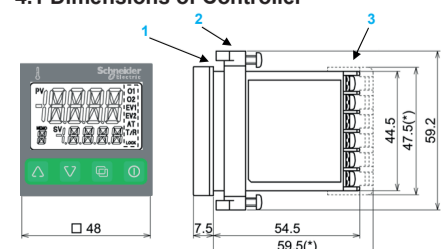
⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

- Do not allow the openings around the controller to be blocked, heat dissipation ability will be reduced.
- Do not allow the ventilation openings on top of the terminal block to be blocked.

Failure to follow these instructions can result in death or serious injury.

4.1 Dimensions of Controller



Item	Description
1	Gasket
2	Mounting frame
3	Terminal cover (sold separately)

(*) When Terminal cover (sold separately) is used

4.2 Panel Cut-out and Wiring

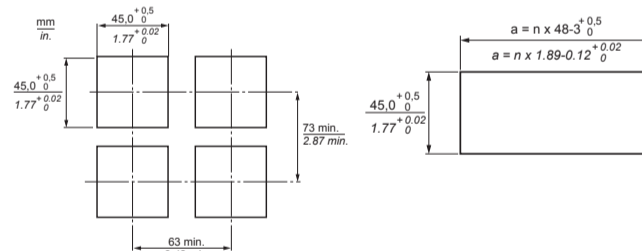
⚠ CAUTION

UNINTENDED EQUIPMENT OPERATION

To ensure protection against dust and water (IP66):

- Use the appropriate panel cut out.
- Use the appropriate gasket and panel mounting adapter provided.
- Assemble the product according to installation guide.

Failure to follow these instructions can result in minor or moderate injury.



Lead wire solderless terminal

Use a solderless terminal with an insulation sleeve in which an M3 screw fits as shown below.

The torque should be 0.63 N·m (5.57 lb-in)

φ3.2mm

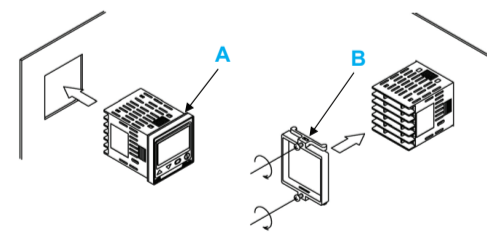
5.8mm or less

3.2mm

5.8mm or less

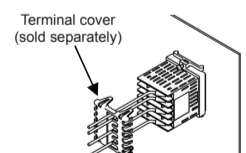
4.3 How to Mount the RTC48

Mount the controller vertically to the flat, rigid panel to ensure it adheres to the Drip-proof/Dust-proof specification (IP66). Mountable panel thickness: 1...5 mm.



When using a terminal cover

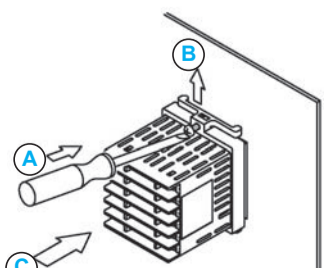
When using a terminal cover (sold separately), pass terminal wires numbered 7 to 12 into the holes of the terminal cover.



Step	Action
1	Insert the controller from the front side of the panel, using the gasket (A).
2	Insert the mounting frame (B) until it comes into contact with the panel, and fasten with the screw. Tighten screws with one rotation upon the screw tips touching the panel. The torque is 0.05 to 0.06 N·m.

4.4 How to Remove the Mounting Adapter and Unit

Step	Action
A	Turn the power to the unit OFF, and disconnect all wires before removing the mounting frame.
B	Insert a flat blade screwdriver between the screw frame and unit.
C	Slowly push the frame upward using the screwdriver, while pushing the unit toward the panel.
D	Repeat step (B) and slowly push the frame downward using the screwdriver for the other side. You can remove the frame little by little by repeating these steps.



5. Wiring Diagram of RTC48

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION OR ARC FLASH

- Disconnect all power from the controller.
- Always use a properly rated voltage sensing device to confirm power is off.
- Use only the specified voltage when operating the controller.

Failure to follow these instructions will result in death or serious injury.

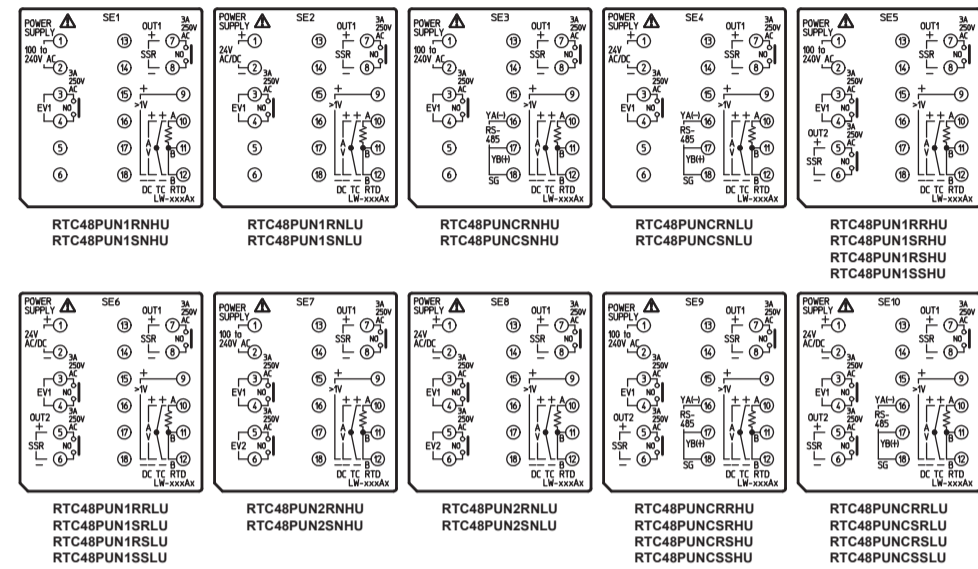
⚠ CAUTION

UNINTENDED EQUIPMENT OPERATION

To ensure protection against dust and water (IP66):

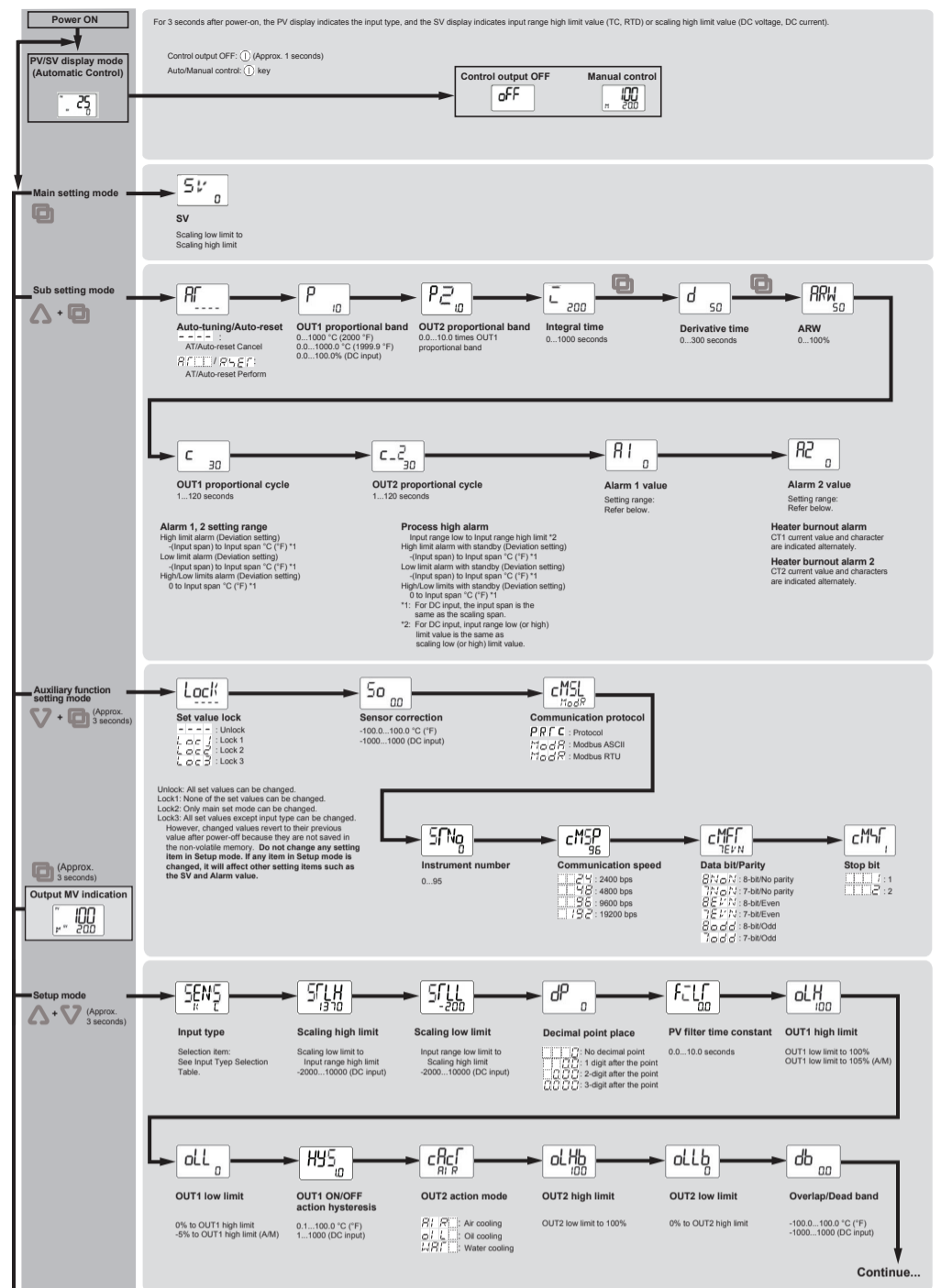
- The terminal block of this instrument is designed to be wired from the left side. The lead wire must be inserted from the left side of the terminal, and fastened with the terminal screw. The torque should be 0.63 N·m (5.57 lb-in).
- This instrument does not have a built-in power switch, circuit breaker, or fuse. It is necessary to install them near the controller. (Recommended fuse: Time-lag fuse, rated voltage 250 Vac, rated current 2A).
- For a 24V ac/dc power source, do not confuse polarity when using direct current (DC).
- Use a thermocouple and compensating lead wire according to the sensor input specifications of this controller.
- Use the 3-wire RTD according to the sensor input specifications of this controller.
- (+) side input terminal number of 0...5 Vdc, 1...5 Vdc, 0...10 Vdc differs from that of 0...1 Vdc.
- (+) side input terminal number of 0...5 Vdc, 1...5 Vdc, 0...10 Vdc: 9
- (+) side input terminal number of 0...1 Vdc: 10.
- When using a relay contact output type, externally use a relay according to the capacity of the load to protect the built-in relay contact.
- When wiring, keep input wires (thermocouple, RTD, and so on.) away from AC sources or load wires to avoid external interference.

Failure to follow these instructions can result in minor or moderate injury.



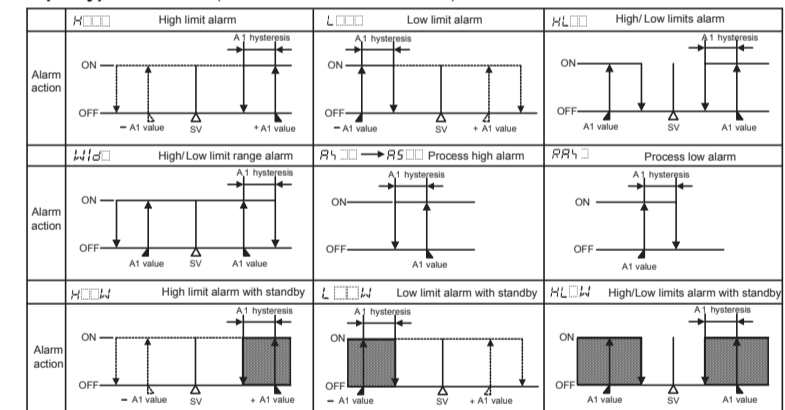
Symbols	Description
EV1	Alarm 1 output
EV2	Alarm 2 output
O2	Control output (OUT2)
O1	Control output (OUT1)
DC	DC current, DC voltage input (For DC voltage input, + side terminal number differs depending on the voltage input.) For DC current input, connect 50 Ω shunt resistor externally.
TC	Thermocouple input
RTD	Resistance temperature detector input
RS485	Serial communication
SSR	Solid State Relay

6. Operation Flowchart



8. Alarm Type Selection

Input type selection (Default OFF: No alarm action)



Standby functions.

A1 = Alarm 1. For Alarm 2, read A2 for A1.

9. Basic Setting

After the unit is mounted to the control panel and wiring is completed, operate the unit following the procedures below.

Step	Action
1	Power ON RTC48.
2	Set up the unit (Refer to Operation Flowchart). Setup should occur before using the controller, to set the input type (Refer to Input Type Selection), Alarm type (Refer to Alarm Type Selection), Direct/Reverse control, and so on in the Setup mode. If the specification is the same as the default value of RTC48, it is not necessary to set up the controller.
3	Turn the load circuit power ON. Control action starts.

9.1 Changing SV

The following steps explain how to set the SV to 100 °C (212 °F)

Step	Action	Remarks
1	Press the key in the PV/SV display mode.	The display unit proceeds to Main Setting mode.
2	Use the keys to set the SV.	-
3	Press the key to register the SV.	The display unit reverts to PV/SV display mode.
4	The control starts so as to keep measuring the temperature at 100 °C (212 °F)	-

9.2 Auto-tuning Perform/Cancel Mode (PID Control)

The following steps explain how to auto-tune the perform/cancel mode.

Step	Action	Remarks
1	Press the key while pressing the key in the PV/SV display mode.	The display unit proceeds to Sub setting mode.
2	Use the key to select AT Perform or use the key to select AT OFF.	-
3	Press the key to confirm the setting.	The display unit reverts to PV/SV display mode.
4	While AT is performing, the AT indicator flashes, and it goes off if AT is cancelled.	-

7. Input Type Selection

Input type selection [SENS] (Default: K, -200...137 °C)

Key	Symbol	Range	Unit	Key	Symbol	Range	Unit
	K	-200...1370	°C		K	-320...2500	°F
	K	-200.0...400.0	°C		K	-320.0...750.0	°F
	J	-200...1000	°C		J	-320...1800	°F
	R	0...1760	°C		R	0...3200	°F
	S	0...1760	°C		S	0...3200	°F
	B	0...1820	°C		B	0...3300	°F
	E	-200...800	°C		E	-320...1500	°F
	T	-200.0...400.0	°C		T	-320.0...750.0	°F
	N	-200...1300	°C		N	-320...2300	°F
	PL- II	0...1390	°C		PL- II	0...2500	°F
	C(W/Re 5-26)	0...2315	°C		C(W/Re 5-26)	0...4200	°F
	Pt100	-200.0...850.0	°C		Pt100	-320.0...1500.0	°F
	JPt100	-200.0...500.0	°C		JPt100	-320.0...900.0	°F
	Pt100	-200...850	°C		Pt100	-320...1500	°F
	JPt100	-200...500	°C		JPt100	-320.0...900.0	°F
	4...20 mA	-2000...10000 (Connect 50 Ω shunt resistor)					
	0...20 mA						
	0...1 Vdc						
	0...5 Vdc						
	1...5 Vdc						
	0...10 Vdc						