

Autonics

TEMPERATURE CONTROLLER

TC4 Series

INSTRUCTION MANUAL



Thank you for choosing our Autonics product.
Please read the following safety considerations before use.

Safety Considerations

- ※Please observe all safety considerations for safe and proper product operation to avoid hazards.
- ※Safety considerations are categorized as follows.
- Warning** Failure to follow these instructions may result in serious injury or death.
- Caution** Failure to follow these instructions may result in personal injury or product damage.
- ※The symbols used on the product and instruction manual represent the following
- symbol represents caution due to special circumstances in which hazards may occur.

Warning

- Fail-safe device must be installed when using the unit with machinery that may cause serious injury or substantial economic loss.** (e.g. nuclear power control, medical equipment, ships, vehicles, railways, aircraft, combustion apparatus, safety equipment, crime/disaster prevention devices, etc.) Failure to follow this instruction may result in fire, personal injury, or economic loss.
- Install on a device panel to use.** Failure to follow this instruction may result in electric shock or fire.
- Do not connect, repair, or inspect the unit while connected to a power source.** Failure to follow this instruction may result in electric shock or fire.
- Check 'Connections' before wiring.** Failure to follow this instruction may result in fire.
- Do not disassemble or modify the unit.** Failure to follow this instruction may result in electric shock or fire.

Caution

- When connecting the power input and relay output, use AWG 20(0.50mm²) cable or over and tighten the terminal screw with a tightening torque of 0.74~0.90N·m.** When connecting the sensor input and communication cable without dedicated cable, use AWG 28~16 cable and tighten the terminal screw with a tightening torque of 0.74~0.90N·m. Failure to follow this instruction may result in fire or malfunction due to contact failure.
- Use the unit within the rated specifications.** Failure to follow this instruction may result in fire or product damage.
- Use dry cloth to clean the unit, and do not use water or organic solvent.** Failure to follow this instruction may result in electric shock or fire.
- Do not use the unit in the place where flammable/explosive/corrosive gas, humidity, direct sunlight, radiant heat, vibration, impact, or salinity may be present.** Failure to follow this instruction may result in fire or explosion.
- Keep metal chip, dust, and wire residue from flowing into the unit.** Failure to follow this instruction may result in fire or product damage.

Ordering Information

T	C	S	-	1	4	R
Control output			N	Indicator - Without control output		
Power supply			R	Relay output+SSR drive output ^{*1}		
			2	24VAC 50/60Hz, 24-48VDC		
			4	100-240VAC 50/60Hz		
Sub output			N	No alarm output		
			1	Alarm1 output		
			2	Alarm1 + Alarm2 output ^{*2}		
Size			S	DIN W48 × H48mm (terminal block type)		
			SP	DIN W48 × H48mm (11pin plug type) ^{*3}		
			Y	DIN W72 × H36mm		
			M	DIN W72 × H72mm		
			H	DIN W48 × H96mm		
			W	DIN W96 × H48mm		
			L	DIN W96 × H96mm		
Digit			4	9999 (4 Digit)		
Setting type			C	Set by touch switch		
Item			T	Temperature controller		

- ※1: In case of the AC voltage model, SSR drive output method (standard ON/OFF control, cycle control, phase control) is available to select.
- ※2: It is unavailable for TC4SP, TC4Y.
- ※3: Sockets for TC4SP (PG-11, PS-11(N)) are sold separately.
- ※The above specifications are subject to change and some models may be discontinued without notice.
- ※Be sure to follow cautions written in the instruction manual and the technical descriptions (catalog, homepage).

Specifications

Series		TC4 Series						
		TC4S	TC4SP	TC4Y	TC4M	TC4W	TC4H	TC4L
Power supply	AC power	100-240VAC ~ 50/60Hz						
	AC/DC Power	24VAC ~ 50/60Hz, 24-48VDC						
Allowable voltage range		90 to 110% of rated voltage						
Power consumption	AC power	Max. 5VA (100-240VAC 50/60Hz)						
	AC/DC Power	Max. 5VA (24VAC 50/60Hz), Max. 3W (24-48VDC)						
Display method		7Segment (Red), Other display (Green, Yellow, Red LED)						
Character size (W×H)		7.0×15.0mm 7.4×15.0mm 9.5×20.0mm 9.5×20.0mm 7.0×14.6mm 11.0×22.0mm						
Input type	RTD	DPT100Ω, Cu50Ω (Allowable line resistance max.5Ω per a wire)						
	TC	K (CA), J (IC), L (IC)						
Display accuracy ^{*1}	RTD	• At room temperature (23°C±5°C): (PV ±0.5% or ±1°C, select the higher one) ±1digit						
	TC	• Out of room temperature range: (PV ±0.5% or ±2°C, select the higher one) ±1digit						
		※ For TC4SP, add ±1°C by accuracy standard.						
Control output	Relay	250VAC ~ 3A 1a						
	SSR	12VDC ~ ± 2V 20mA Max.						
Alarm output		AL1, AL2 Relay; 250VAC ~ 1A 1a (※TC4SP, TC4Y have AL1 only.)						
Control method		ON/OFF and P, PI, PD, PID control						
Hysteresis		1 to 100°C/°F (0.1 to 50.0°C/°F) variable						
Proportional band (P)		0.1 to 999.9°C/°F						
Integral time (I)		0 to 9999 sec.						
Derivative time (D)		0 to 9999 sec.						
Control period (T)		0.5 to 120.0 sec.						
Manual reset		0.0 to 100.0%						
Sampling period		100ms						
Dielectric strength	AC power	2,000VAC 50/60Hz for 1min. (between input terminal and power terminal)						
	AC/DC Power	1,000VAC 50/60Hz for 1min. (between input terminal and power terminal)						
Vibration		0.75mm amplitude at frequency of 5 to 55Hz in each X, Y, Z direction for 2 hours						
Relay life cycle	Mechanical	OUT: Min. 5,000,000 operations, AL1/2: Min. 5,000,000 operations						
	Electrical	OUT: Min. 200,000 operations (250VAC 3A resistive load), AL1/2: Min. 300,000 operations (250VAC 1A resistive load)						
Insulation resistance		Min. 100MΩ (at 500VDC megger)						
Noise immunity		Square-wave noise by noise simulator (pulse width 1μs) ± 2kV R-phase and S-phase						
Memory retention		Approx. 10 years (When using non-volatile semiconductor memory type)						
Environ -ment	Ambient temp.	-10 to 50°C, Storage: -20 to 60°C						
	Ambient humi.	35 to 85%RH, Storage: 35 to 85%RH						
Insulation type		Double insulation or reinforced insulation (mark: Dielectric strength between the measuring input part and the power part: AC power 2kV, AC/DC Power 1kV)						
Approval								
Weight ^{*2}		Approx. 141g (approx. 94g)	Approx. 123g (approx. 76g)	Approx. 174g (approx. 85g)	Approx. 204g (approx. 133g)	Approx. 194g (approx. 122g)	Approx. 194g (approx. 122g)	Approx. 254g (approx. 155g)

- ※1: Thermocouple L (IC) type, RTD Cu50Ω
- At room temperature (23°C ±5°C): (PV ±0.5% or ±2°C, select the higher one) ±1digit
- Out of room temperature range: (PV ±0.5% or ±3°C, select the higher one) ±1digit
- In case of TC4SP Series, ±1°C will be added.
- ※2: The weight includes packaging. The weight in parentheses is for unit only.
- ※Environment resistance is rated at no freezing or condensation.

Unit Description

1. **Present temperature (PV) display**

- RUN mode: Present temperature (PV) display.
- Parameter setting mode: Parameter or parameter setting valuedisplay.

2. **Deviation indicator, Auto-tuning indicator**

It shows current temperature (PV) deviation based on set temperature (SV) by LED.

No.	PV deviation temp.	Deviation display
1	Over 2°C	indicator ON
2	Below ±2°C	indicator ON
3	Under -2°C	indicator ON

The deviation indicators (,) flash by every 1 sec. when operating auto tuning.

3. **Set temperature (SV) indicator**

Press any front key once to check or change current set temperature (SV), the set temperature (SV) indicator is ON and preset set value is flashed.

4. **Temperature unit (°C/°F) indicator**

It shows current temperature unit.

5. **Control/alarm output indicator**

- OUT: It will turn ON when control output (Main Control Output) is ON.
- ※In case of CYCLE/PHASE control of SSR drive output, it will turn ON when MV is over 3.0% (only for AC power type)
- AL1/AL2: It will light up when alarm output Alarm1/Alarm2 are on.

6. **MODE key**

Used when entering into parameter group, returning to RUN mode, moving parameter, and saving setting values.

7. **Adjustment**

Used when entering into set value change mode, digit moving and digit up/down.

8. **FUNCTION key**

Press keys for 3 sec. to operate function (RUN/STOP, alarm output cancel, auto-tuning) set in inner parameter [d1 ~ d7].

※Press keys at the same time in set value operation to move digit.

Input Sensor and Temperature Range [°C ~ °F]

Input sensor	Display	Temperature range (°C)	Temperature range (°F)
Thermocouple	K (CA)	-50 to 1200	-58 to 2192
	J (IC)	-30 to 500	-22 to 932
	L (IC)	-40 to 800	-40 to 1472
RTD	DPT100Ω	-100 to 400	-148 to 752
	dPtL	-100.0 to 400.0	-148.0 to 752.0
	Cu5H	-50 to 200	-58 to 392
	Cu5L	-50.0 to 200.0	-58.0 to 392.0

Installation

• TC4S/SP (48 × 48mm) Series

• TC4Y (72 × 36mm) Series

• Other Series

※Mount the product on the panel, fasten bracket by pushing with tools as shown above.
(In case of TC4Y, fasten bolts for bracket.)

Dimensions

• TC4S Series

• TC4SP Series

• TC4Y Series

• TC4M Series

• TC4H Series

• TC4W Series

• TC4L Series

• Bracket

- TC4S/TC4SP Series
- TC4Y Series
- TC4M, TC4W, TC4H, TC4L Series

• Panel cut-out

• Terminal cover (sold separately)

- RSA-COVER (48×48mm)
- RMA-COVER (72×72mm)
- RHA-COVER (46×96mm, 96×48mm)
- RLA-COVER (96×96mm)

Connections

※TC4 Series has selectable control output; Relay output, and SSR drive output. AC/DC power type does not have SSRP function.

• TC4S Series

• TC4SP Series

• TC4Y Series

• TC4H, TC4W, TC4L Series

• TC4M Series

※1: AC power: 100-240VAC 5VA 50/60Hz
AC/DC power: 24VAC 5VA 50/60Hz 24-48VDC 3W

※Use crimp terminals or terminals of size specified below.

Terminal number	a	b	c
1 to N	Min. 3.0mm	Min. 3.0mm	Max. 1.9
	Max. 5.8mm	Max. 5.8mm	Max. 4.0

SSR Drive Output Selection Function (SSRP Function)[55r.n]

- SSRP function is selectable one of standard ON/OFF control, cycle control, phase control by utilizing standard SSR drive output.
- Realizing high accuracy and cost effective temperature control as linear output(cycle control and phase control).
- Select one of standard ON/OFF control [55r.n], cycle control [CYCL], phase control [PHAS] at [55r.n] parameter of Parameter group 2. For cycle control, connect zero cross turn-on SSR or random turn-on SSR. For phase control, connect random turn-on SSR.

Temperature controller (TC4Series)

SSR voltage output (12VDC)

SSR module

Power 100-240VAC 50/60Hz

※When selecting cycle or phase control mode, the power supply for a load and a temperature controller must be same.

※In case of selecting cycle [CYCL] or phase [PHAS] control mode for PID control, control cycle [t] is not allowed to set.

※For AC/DC power model (TC4□-□2R), this parameter [55r.n] is not displayed and it is available only standard control by relay or SSR.

1)Standard ON/OFF control [55r.n]

A mode to control the load in the same way as Relay output type.
(ON: output level 100%, OFF: output level 0%)

2)Cycle control [CYCL]

A mode to control the load by repeating output ON / OFF according to the rate of output within setting cycle.
Having improved ON / OFF noise feature by Zero Cross type.

3)Phase control [PHAS]

A mode to control the load by controlling the phase within AC half cycle. Serial control is available.
Random turn-on SSR must be used for this mode.

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DUAL INDICATOR TEMPERATURE CONTROLLER

TCN4 SERIES

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- Caution** Failure to follow these instructions may result in personal injury or product damage.
- ※The symbols used on the product and instruction manual represent the following
- ⚠ symbol represents caution due to special circumstances in which hazards may occur.

Warning

- Fail-safe device must be installed when using the unit with machinery that may cause serious injury or substantial economic loss.** (e.g. nuclear power control, medical equipment, ships, vehicles, railways, aircraft, combustion apparatus, safety equipment, crime/disaster prevention devices, etc.)
Failure to follow this instruction may result in fire, personal injury, or economic loss.
- Install on a device panel to use.**
Failure to follow this instruction may result in electric shock or fire.
- Do not connect, repair, or inspect the unit while connected to a power source.**
Failure to follow this instruction may result in electric shock or fire.
- Check 'Connections' before wiring.**
Failure to follow this instruction may result in fire.
- Do not disassemble or modify the unit.**
Failure to follow this instruction may result in electric shock or fire.

Caution

- When connecting the power input and relay output, use AWG 20(0.50mm²) cable or over and tighten the terminal screw with a tightening torque of 0.74~0.90N·m.**
When connecting the sensor input and communication cable without dedicated cable, use AWG 28~16 cable and tighten the terminal screw with a tightening torque of 0.74~0.90N·m.
Failure to follow this instruction may result in fire or malfunction due to contact failure.
- Use the unit within the rated specifications.**
Failure to follow this instruction may result in fire or product damage.
- Use dry cloth to clean the unit, and do not use water or organic solvent.**
Failure to follow this instruction may result in electric shock or fire.
- Do not use the unit in the place where flammable/explosive/corrosive gas, humidity, direct sunlight, radiant heat, vibration, impact, or salinity may be present.**
Failure to follow this instruction may result in fire or explosion.
- Keep metal chip, dust, and wire residue from flowing into the unit.**
Failure to follow this instruction may result in fire or product damage.

Ordering Information

TCN4S-24R-P			
T	CN	4	S-24R-P
		Wiring method	No-mark Bolt wiring method
		Control output	P Connector plug connection method ^{※1}
		Power supply	R Relay contact + SSR drive output ^{※2}
		Sub output	2 24VAC 50/60Hz, 24-48VDC
		Size	4 100-240VAC 50/60Hz
		Digit	2 Alarm1 + Alarm2 output
		Setting type	S DIN W48 × H48mm
		Item	M DIN W72 × H72mm
			H DIN W48 × H96mm
			L DIN W96 × H96mm
			4 9999 (4 digit)
			CN Dual display type, set by touch switch
			T Temperature controller


※1: Only for TCN4S model.

※2: In case of the AC voltage model, SSR drive output method (standard ON/OFF control, cycle control, phase control) is available to select.

※The above specifications are subject to change and some models may be discontinued without notice.

※Be sure to follow cautions written in the instruction manual and the technical descriptions (catalog, homepage).

Specification

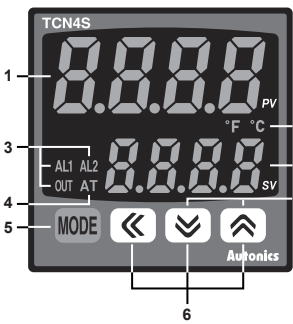
Series		TCN4S	TCN4M	TCN4H	TCN4L
Power supply	AC Power	100-240VAC~ 50/60Hz			
	AC/DC Power	24VAC~ 50/60Hz, 24-48VDC=			
Allowable voltage range		90 to 110% of rated voltage			
Power consumption	AC Power	Max. 5VA(100-240VAC 50/60Hz)			
	AC/DC Power	Max. 5V(24VAC 50/60Hz), Max. 3W(24-48VDC)			
Display method		7 segment (PV: red, SV: green), other display part(green, red) LED method			
Character size	PV(W×H)	7.0×15.0mm	9.5×20.0mm	7.0×14.6mm	11.0×22.0mm
	SV(W×H)	5.0×9.5mm	7.5×15.0mm	6.0×12.0mm	7.0×14.0mm
Input type	RTD	DIN Pt100Q, Cu50Q (Allowable line resistance max.5Ω per a wire)			
	TC	K(CA), J(IC), L(IC), T(CC), R(PR), S(PR)			
Display accuracy ^{※1}	RTD	At room temperature(23°C ± 5°C): (PV ± 0.5% or ±1°C, select the higher one) ± 1 digit			
	TC	Out of room temperature range: (PV± 0.5% or ±2°C, select the higher one)± 1 digit For TCN4S-□-P, add ±1°C by accuracy standard.			
Control output	Relay	250VAC~ 3A 1a			
	SSR	12VDC=±2V 20mA Max.			
Alarm output		AL1, AL2 Relay: 250VAC~ 1A 1a			
Control method		ON/OFF control, P, PI, PD, PID control			
Hysteresis		1 to 100°C/°F (0.1 to 50.0°C/°F)			
Proportional band(P)		0.1 to 999.9°C/°F			
Integral time(I)		0 to 9999 sec.			
Derivative time(D)		0 to 9999 sec.			
Control period(T)		0.5 to 120.0 sec.			
Manual reset		0.0 to 100.0%			
Sampling period		100ms			
Dielectric strength	AC power	2000VAC 50/60Hz 1min.(between input terminal and power terminal)			
	AC/DC power	1000VAC 50/60Hz 1min.(between input terminal and power terminal)			
Vibration		0.75mm amplitude at frequency of 5 to 55Hz in each X, Y, Z direction for 2 hours			
Relay life cycle	Mechanical	OUT: Over 5,000,000 times, AL1/2: Over 5,000,000 times			
	Electrical	OUT: Over 200,000 times(250VAC 3A resistive load) AL1/2: Over 300,000 times(250VAC 1A resistive load)			
Insulation resistance		Min. 100MΩ(at 500VDC megger)			
Noise		Square-wave noise by noise simulator(pulse width 1μs) ±2KV R-phase and S-phase			
Memory retention		Approx. 10 years (when using non-volatile semiconductor memory type)			
Environment	Ambient temp.	-10 to 50°C, Storage: -20 to 60°C			
	Ambient humi.	35 to 85%RH, Storage: 35 to 85%RH			
Insulation type		Double insulation or reinforced insulation (mark: □, dielectric strength between the measuring input part and the power part : AC power 2kV, AC/DC power 1kV)			
Approval		CE, 			
Weight ^{※2}		Approx. 147g (approx. 100g)	Approx. 203g (approx. 133g)	Approx. 194g (approx. 124g)	Approx. 275g (approx. 179g)

※1: ○ At room temperature(23°C±5°C)

- Below 200°C of thermocouple R(PR), S(PR) is (PV ±0.5% or ±3°C, select the higher one) ±1 digit
- Over 200°C of thermocouple R(PR), S(PR) is (PV ±0.5% or ±2°C, select the higher one) ±1 digit
- Thermocouple L (IC), RTD Cu50Ω is (PV ±0.5% or ±2°C, select the higher one) ±1 digit
- Out of room temperature range
- Below 200°C of thermocouple R(PR), S(PR) is (PV ±1.0% or ±6°C, select the higher one) ±1 digit
- Over 200°C of thermocouple R(PR), S(PR) is (PV ±0.5% or ±5°C, select the higher one) ±1 digit
- Thermocouple L(IC), RTD Cu50Ω is (PV ±0.5% or ±3°C, select the higher one) ±1 digit
- For TCN4S-□-P, add ±1°C by accuracy standard.

※2: The weight includes packaging. The weight in parentheses is for unit only.
※ Environment resistance is rated at no freezing or condensation.

Unit Description



- Present temperature (PV) display (Red)**
1) RUN mode: Present temperature (PV) display
2) Parameter setting mode: Parameter display
- Set temperature (SV) display (Green)**
1) RUN mode: Set temperature (SV) display
2) Parameter setting mode : Parameter setting value display
- Control/Alarm output display indicator**
1) OUT: It turns ON when the control output is ON.
During SSR drive output type in CYCLE/ PHASE control, this indicator turns ON when MV is over 3.0%.
2) AL1/AL2: It turns ON when the alarm output is ON.
- Auto tuning indicator**
AT indicator flashes by every 1 sec during operating auto tuning.
- MODE key**
Used when entering into parameter groups, returning to RUN mode, moving parameter, and saving setting values.

- Adjustment**
Used when entering into set value change mode, digit moving and digit up/down.

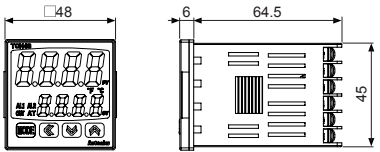
- Digital input key**
Press + keys for 3 sec. to operate the set function (RUN/STOP, alarm output reset, auto tuning) in digital input key [di - t].
- Temperature unit (°C/°F) indicator**
It shows current temperature unit.

Input Sensor and Temperature Range

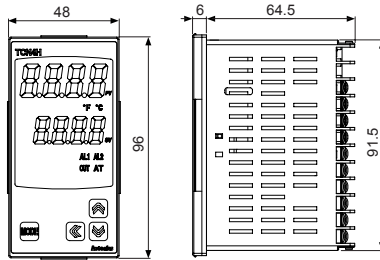
Input sensor	Display	Temperature range(°C)	Temperature range(°F)
Thermocouple	K(CA)	℄C RH -50 to 1200	-58 to 2192
	℄C RL	-50.0 to 999.9	-58.0 to 999.9
	J℄ CL	-30 to 800	-22 to 1472
	J℄ CL	-30.0 to 800.0	-22.0 to 999.9
	L℄ CL	-40 to 800	-40 to 1472
	L℄ CL	-40.0 to 800.0	-40 to 999.9
	℄C CL	-50 to 400	-58 to 752
	℄C CL	-50.0 to 400.0	-58.0 to 752.0
	R(PR)	0 to 1700	32 to 3092
	S(PR)	0 to 1700	32 to 3092
	dPEH	-100 to 400	-148 to 752
	dPEL	-100.0 to 400.0	-148.0 to 752.0
RTD	CU5H	-50 to 200	-58 to 392
	CU5L	-50.0 to 200.0	-58.0 to 392.0

Dimensions

TCN4S Series

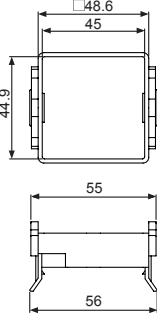


TCN4H Series

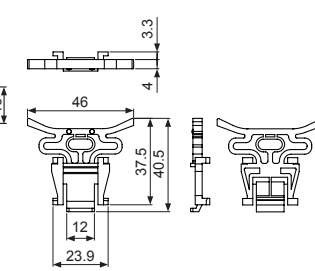


Bracket

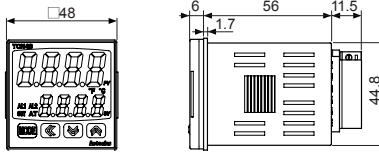
TCN4S Series



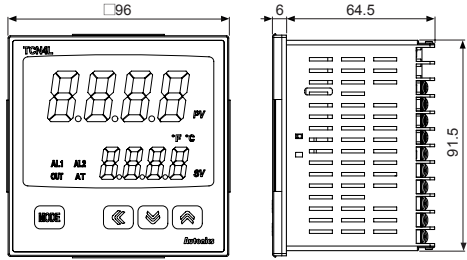
TCN4M, TCN4H, TCN4L Series



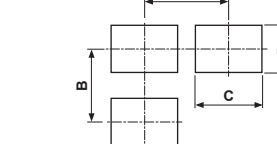
TCN4S-□-P



TCN4L Series

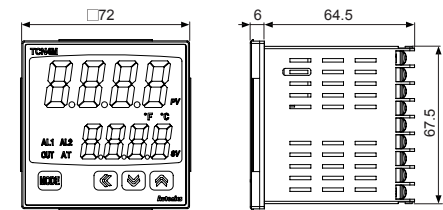


Panel cut-out



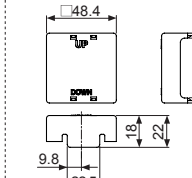
Size	A	B	C	D
Series				
TCN4S	Min. 65	Min. 65	45 [※]	45 [※]
TCN4M	Min. 90	Min. 90	68 [※]	68 [※]
TCN4H	Min. 65	Min. 115	45 [※]	92 [※]
TCN4L	Min. 115	Min. 115	92 [※]	92 [※]

TCN4M Series

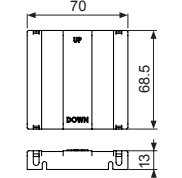


Terminal cover(sold separately)

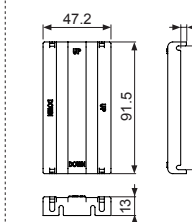
RSA-COVER(48×48mm)



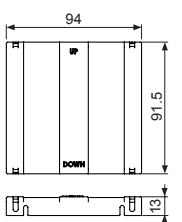
RMA-COVER(72×72mm)



RHA-COVER(48×96mm)

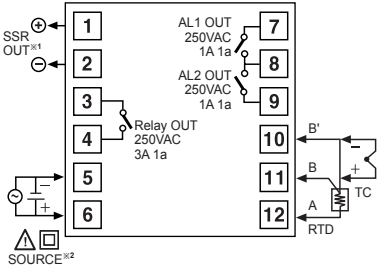


RLA-COVER(96×96mm)

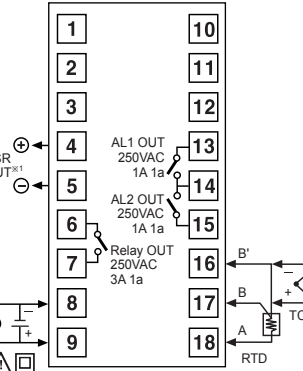


Connections

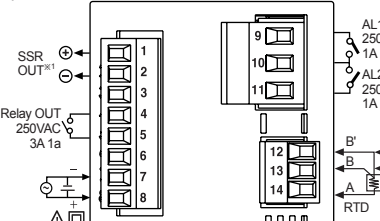
1)TCN4S Series



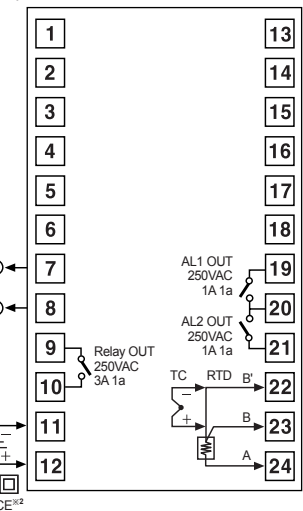
3)TCN4M Series



2)TCN4S-□-P



4)TCN4H/L Series



※TCN4 Series has selectable control output; Relay output, and SSR drive output. AC/DC voltage type does not have SSRP function.

※1: 12VDC±2V 20mA Max.

※2: AC voltage type: 100-240VAC 5VA 50/60Hz
AC/DC voltage type: 24VAC 5VA 50/60Hz
24-48VDC 3W

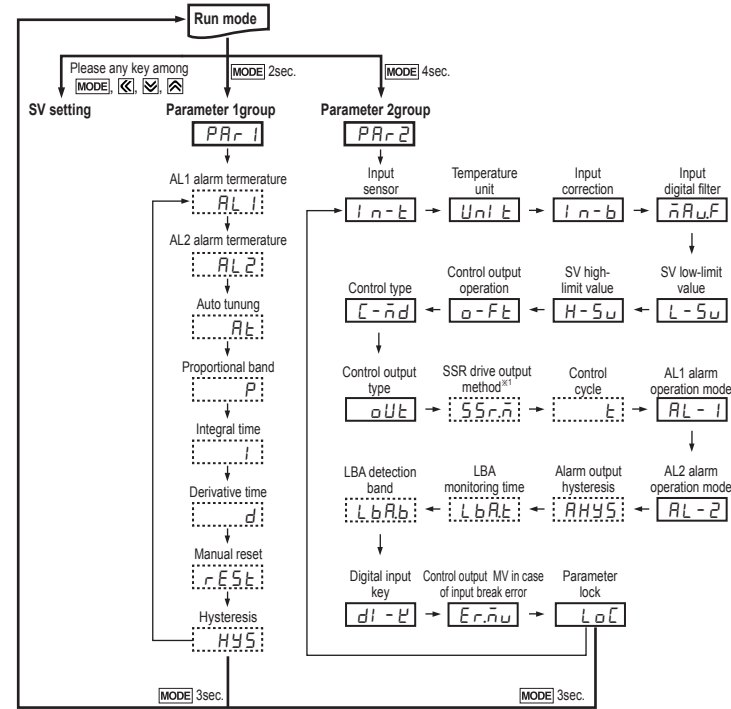
※Use crimp terminals or terminals of size specified below. (unit: mm)

Terminal number	a	b	c
1 to 8	6	Max. 1.7	Max. 3.7
9 to 11	6 to 8	Max. 2.1	Max. 4.2
12 to 14	6 to 8	Max. 1.5	Max. 3.5

	a	b
<Crimp terminal>		
<Round>	Min. 3.0	Min. 3.0
<Forked>	Min. 5.8	Min. 5.8

Parameter Groups

1. All Parameter



- ※ Press **[MODE]** key over 3 sec in any parameter group, it saves the set value and returns to RUN mode. (Exception: Press **[MODE]** key once in SV setting group, it returns to RUN mode).
- ※ If no key entered for 30 sec., it returns to RUN mode automatically and the set value of parameter is not be saved.
- ※ Press **[MODE]** key again within 1 sec. after returning to RUN mode, it advances of the first parameter of previous parameter group.
- ※ Press **[MODE]** key to move next parameter.
- ※ Parameter marked in [] might not be displayed depending on other parameter settings.
- ※ Set parameter as 'Parameter 2 group → Parameter 1 group → Setting group of set value' order considering parameter relation of each setting group.
- ※1: It is not displayed for AC/DC power model (TCN4-□-22R).

