



Autonics TC Series TC4Y-N4R Single Display PID Temperature Controllers Instruction Manual

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Autonics TC Series TC4Y-N4R Single Display PID Temperature Controllers Instruction Manual



Read and understand the instruction manual and manual thoroughly before using the product.

For your safety, read and follow the below safety considerations before using.

For your safety, read and follow the considerations written in the instruction manual, other manuals and Autonics website.

Keep this instruction manual in a place where you can find easily.

The specifications, dimensions, etc are subject to change without notice for product improvement. Some models may be discontinued without notice.

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Safety Considerations

- Observe all 'Safety Considerations' for safe and proper operation to avoid hazards.
- symbol indicates caution due to special circumstances in which hazards may occur.



Warning Failure to follow instructions may resulting serious injury or death

1. **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 personal injury, economic loss or fire.
2. **Do not use the unit in the place where flammable/explosive/corrosive gas, high humidity, direct sunlight, radiant heat, vibration, impact or salinity may be present.**
Failure to follow this instruction may result in explosion or fire.
3. **Install on a device panel to use.**
Failure to follow this instruction may result in fire or electric shock.
4. **Do not connect, repair, or inspect the unit while connected to a power source.**
Failure to follow this instruction may result in fire or electric shock.
5. **Check 'Connections' before wiring.**
Failure to follow this instruction may result in fire.
6. **Do not disassemble or modify the unit.**
Failure to follow this instruction may resulting fire or electric shock.



Caution Failure to follow instructions may result in injury or product damage

1. **When connecting the power input and relay output, use AWG 20 (0.50 mm²) cable or over and tighten the terminal screw with a tightening torque of 0.74 to 0.90 N m. When connecting the sensor input and**

communication cable without dedicated cable, use AWG 28 to 16 cable and tighten the terminal screw with a tightening torque of 0.74 to 0.90 N m.

Failure to follow this instruction may result in fire or malfunction due to contact failure.

2. Use the unit within the rated specifications.

Failure to follow this instruction may result in fire or product damage

3. Use a dry cloth to clean the unit, and do not use water or organic solvent.

Failure to follow this instruction may result in fire or electric shock.

4. Keep the product away from metal chip, dust, and wire residue which flow into the unit.

Failure to follow this instruction may result in fire or product damage.

Cautions during Use

- Follow instructions in 'Cautions during Use'. Otherwise, it may cause unexpected accidents.
- Check the polarity of the terminals before wiring the temperature sensor. For RTD temperature sensor, wire it as 3-wire type, using cables in same thickness and length. For thermocouple (TC) temperature sensor, use the designated compensation wire for extending wire.
- Keep away from high voltage lines or power lines to prevent inductive noise. In case installing power line and input signal line closely, use line filter or visitor at power line and shielded wire at input signal line. Do not use near the equipment which generates strong magnetic force or high frequency noise.
- Install a power switch or circuit breaker in the easily accessible place for supplying or disconnecting the power.
- Do not use the unit for other purpose (e.g. voltmeter, ammeter), but temperature controller.
- When changing the input sensor, turn off the power first before changing. After changing the input sensor, modify the value of the corresponding parameter.
- 24 VAC, 24-48 VDC power supply should be insulated and limited voltage/current or Class 2, SELV power supply device.
- Make a required space around the unit for radiation of heat. For accurate temperature measurement, warm up the unit over 20 min after burning on the power.
- Make sure that power supply voltage reaches to the rated voltage within 2 sec after supplying power.
- Do not wire to terminals which are not used.
- This unit may be used in the following environments.
 - Indoors (in the environment condition rated in 'Specifications')
 - Altitude Max. 2,000 m
 - Pollution degree 2
 - Installation category II

Ordering Information

This is only for reference, the actual product does not support all combinations. For selecting the specified model, follow the Autonics website.

T	C	4	①	-	②	③	④
---	---	---	---	---	---	---	---

1. Size

S: DIN W 48× H 48 mm

SP: DIN W 48× H 48 mm (11 pin plug type)

Y: DIN W 72× H 36 mm

M: DIN W 72× H 72 mm

H: DIN W 48× H 96 mm

W: DIN W 96× H 48 mm

L: DIN W 96× H 96 mm

2. Alarm output

N:No alarm

1. 1 alarm
2. 2 alarm

3. Power supply

2: 24VAC 50/60Hz, 24-48 VDC

4: 100-240 VAC 50/60 Hz

4. Control output

N: Indicator – without control output

R:Relay + SSR drive

Product Components

- Product
- Bracket
- Instruction manual

Sold Separately

- 11 pin socket: PG-11, PS-11 (N)
- Terminal protection cover: RSA / RMA / RHA / RLA Cover

Specifications

Series		TC4□-□2□	TC4□-□4□
Power supply		24 VAC 50/60 Hz ±10%24-48 VDC ±10%	100 – 240 VAC 50/60 Hz ±10%
Power consumption		AC: ≤ 5 VA, DC: ≤ 3 W	≤ 5 VA
Sampling period		100 ms	
Input specification		Refer to 'Input Type and Using Range'.	
Control output	Relay	250 VAC 3 A, 30 VDC 3 A, 1a	
	SSR	12 VDC ±2 V, ≤ 20 mA	

Alarm output		250 VAC 1 A 1a	
Display type		7 Segment (red, green, yellow), LED type	
Control type	Heating, Cooling	ON/OFF, P, PI, PD, PID Control	
Hysteresis		1 to 100 (0.1 to 50.0) °C/°F	
Proportional band (P)		0.1 to 999.9 °C/°F	
Integral time (I)		0 to 9,999 sec	
Derivative time (D)		0 to 9,999 sec	
Control cycle (T)		0.5 to 120.0 sec	
Manual reset		0.0 to 100.0%	
Relay life cycle	Mechanical	OUT1/2, AL1/2: ≥ 5,000,000 operations	
	Electrical	OUT1/2: ≥ 200,000 operations (load resistance: 250 VAC 3A) AL1/2: ≥ 300,000 operations (load resistance: 250 VAC 1 A)	
Dielectric strength		Between input terminal and power terminal: 1,000 VAC 50/60 Hz for 1 min	Between input terminal and power terminal: 2,000 VAC 50/60 Hz 1 min
Vibration		0.75 mm amplitude at frequency 5 to 55Hz (for 1 min) in each X, Y, Z direction for 2 hours	
Insulation resistance		≥ 100 MΩ (500 VDC megger)	
Noise immunity		Square shaped noise (pulse width: 1 μs) by noise simulator ±2 kV R-phase, S-phase	
Memory retention		≈ 10 years (non-volatile semiconductor memory type)	
Ambient temperature		-10 to 50 °C, storage: -20 to 60 °C (no freezing or condensation)	
Ambient humidity		35 to 85%RH, storage: 35 to 85%RH (no freezing or condensation)	
Insulation type		Mark: □, double or reinforced insulation (dielectric strength between the measuring input part and the power part: 1 kV)	Mark: □, double or reinforced insulation (dielectric strength between the measuring input part and the power part: 2 kV)
Approval			
		• TC4S: ≈ 94 g (≈ 141 g)	• TC4SP: ≈ 76 g (≈ 123 g)

Unit weight (packaged)	• TC4Y: ≈ 85 g (≈ 174 g)	• TC4M: ≈ 133 g (≈ 204 g)
	• TC4W: ≈ 122 g (≈ 194 g)	• TC4H: ≈ 122 g (≈ 194 g)
	• TC4L: ≈ 155 g (≈ 254 g)	

Input Type and Using Range

Input type		Decimal point	Display	Using range (°C)			Using range (°F)		
Thermo-couple	K (CA)	1	KC 	-50	to	1,200	-58	to	2,192
	J (IC)	1	JIC	-30	to	500	-22	to	932
	L (IC)	1	LIC	-40	to	800	-40	to	1,472
RTD	Cu50 Ω	1	CU	-50	to	200	-58	to	392
		0.1	CU L	-50.0	to	200.0	-58.0	to	392.0
	DPt100 Ω	1	DPt 	-100	to	400	-148	to	752
		0.1	DPtL	-100.0	to	400.0	-148.0	to	752.0

Display accuracy

Input type	Using temperature	Display accuracy
Thermo-couple RTD	At room temperature(23°C ± 5 °C)	(PV $\pm 0.5\%$ or ± 1 °C higher one) ± 1 -digit Thermocouple L, RTD Cu50 Ω:(PV $\pm 0.5\%$ or ± 2 °C higher one) ± 1-digit
	Out of room temperature range	(PV $\pm 0.5\%$ or ± 2 °C higher one) ± 1 -digit Thermocouple L, RTD Cu50 Ω:(PV $\pm 0.5\%$ or ± 3 °C higher one) ± 1digit

- In case of TC4SP Series, $\pm 1^\circ\text{C}$ will be added.

- If the input specification is set to 'decimal point 0.1' display, add $\pm 1^{\circ}\text{C}$ by accuracy standard.

Unit Descriptions

1. Temperature Display part (Red)
 - Run mode: Displays PV (Present value).
 - Setting mode :Displays parameter name,
2. indicator
3. Input key

Display	Name
[MODE]	Mode key
[◀], [▼], [▲]	Setting value control key

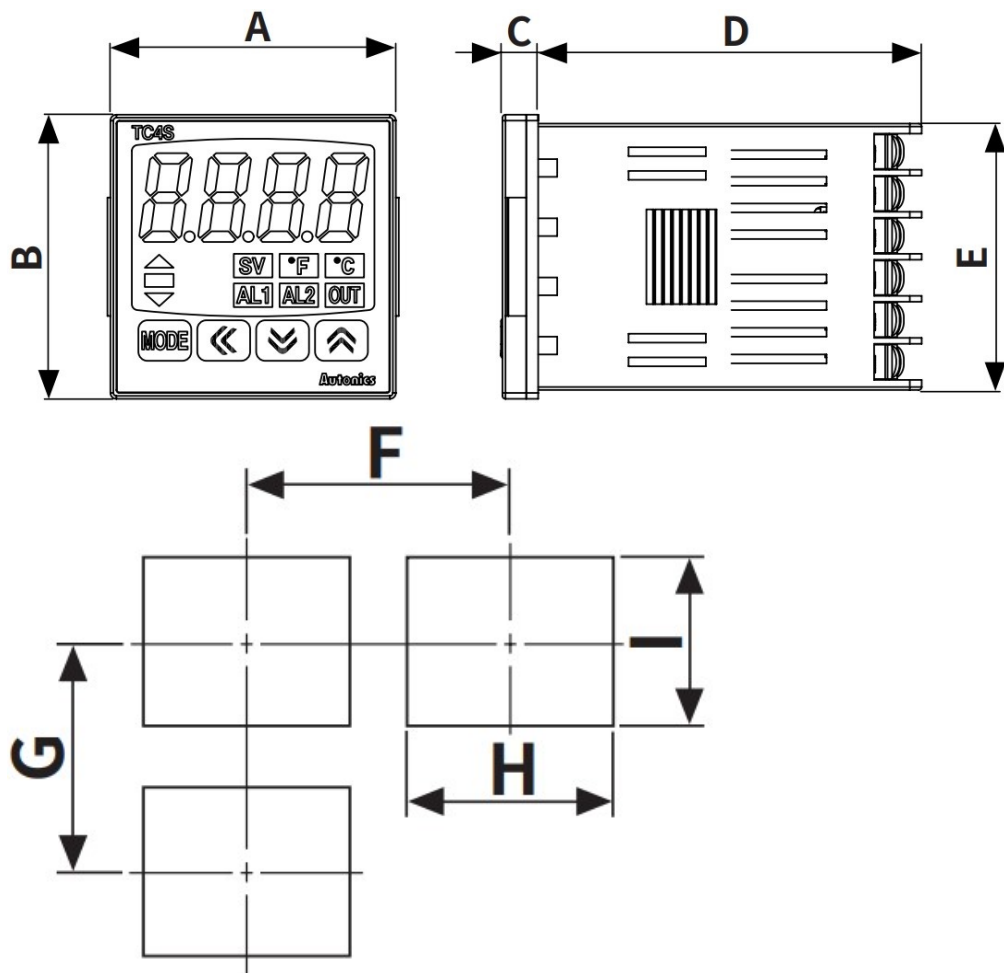
Display	Name	Description
▲■▼	Deviation	Displays PV deviation based on SV (Setting value) by LED. ▲ : ON when deviation is over 2°C ■ : ON when deviation is within $\pm 2^{\circ}\text{C}$ ▼ : ON when deviation is under 2°C Flashes during auto tuning every 1 sec
SV	Setting value	Turns ON when SV is displayed on temperature display part.
$^{\circ}\text{C}$, $^{\circ}\text{F}$	Temperature unit	Displays selected unit (parameter).
AL1/2	Alarm output	Turns ON when each alarm output is ON.
OUT	Control output	Turns ON when control output is ON. • CYCLE/PHASE control of SSR drive output: Turns ON when MV is over 3.0%. (only for AC power model)

Errors

Display	Description	Troubleshooting
OPEN	Flashes when input sensor is disconnected or sensor is not connected.	Check input sensor status.
	Flashes when PV is higher than input range.	When input is within the rated input range, this display disappears.
LLLL	Flashes when PV is lower than input range.	

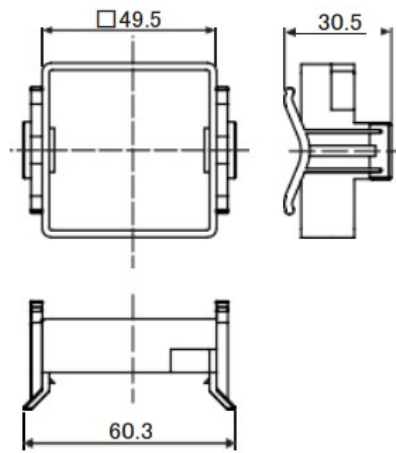
Dimensions

- Unit: mm, For the detailed drawings, follow the Autonics website.
- Below is based on TC4S Series.



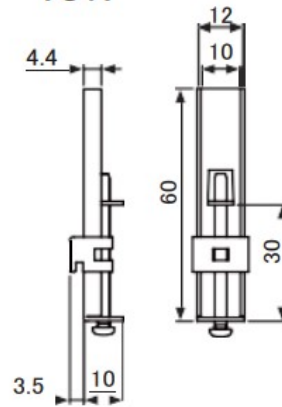
Series	Body					Panel cut-out			
	A	B	C	D	E	F	G	H	I
TC4S	48	48	6	64.5	45	≥ 65	≥ 65	45+0.60	45+0.60
TC4SP	48	48	6	72.2	45	≥ 65	≥ 65	45+0.60	45+0.60
TC4Y	72	36	7	77	30	≥ 91	≥ 40	68+0.70	31.5+0.5 0
TC4W	96	48	6	64.5	44.7	≥ 115	≥ 65	92+0.80	45+0.60
TC4M	72	72	6	64.5	67.5	≥ 90	≥ 90	68+0.70	68+0.70
TC4H	48	96	6	64.5	91.5	≥ 65	≥ 115	45+0.60	92+0.80
TC4L	96	96	6	64.5	91.5	≥ 115	≥ 115	92+0.80	92+0.80

TC4S/TC4SP

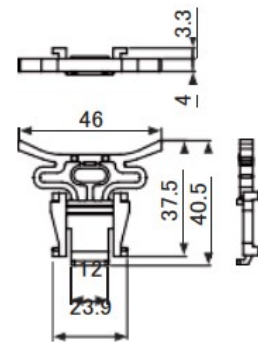


Bracket

TC4Y



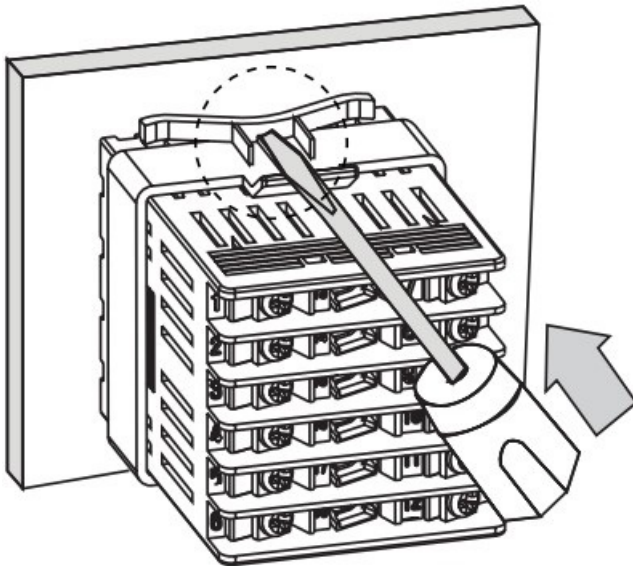
Other series



Installation Method

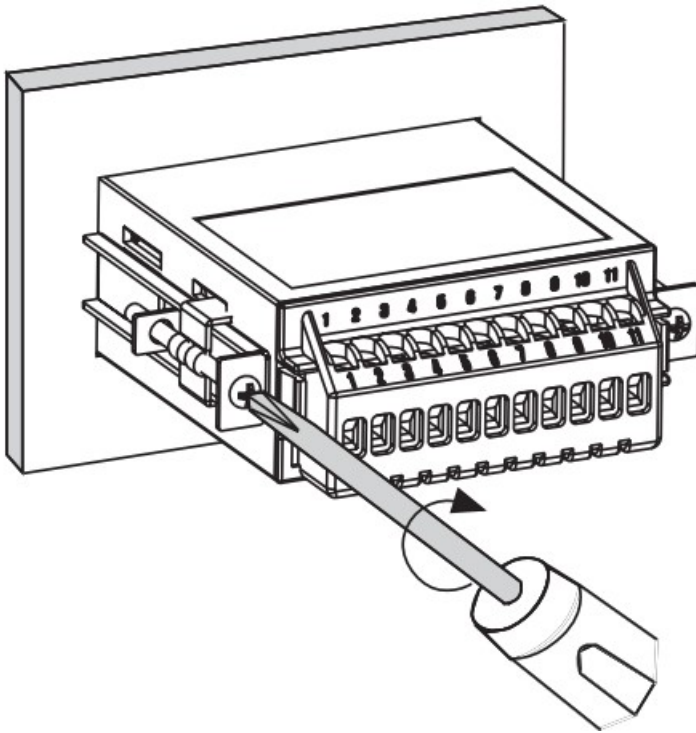
TC4S

Flathead screwdriver



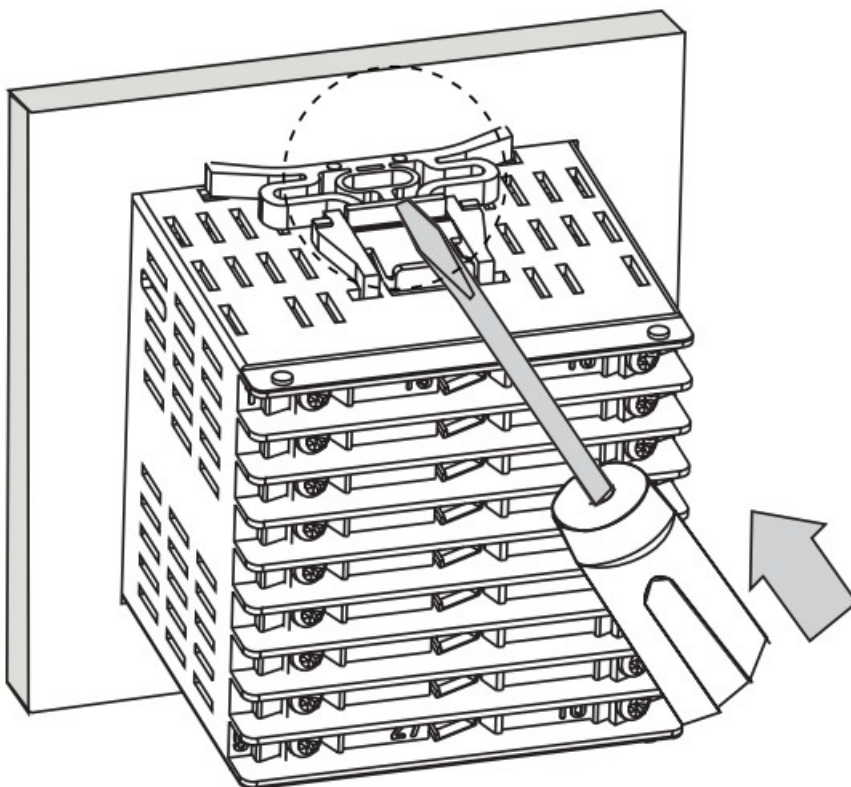
TC4Y

Crosshead screwdriver



Other series

Flathead screwdriver



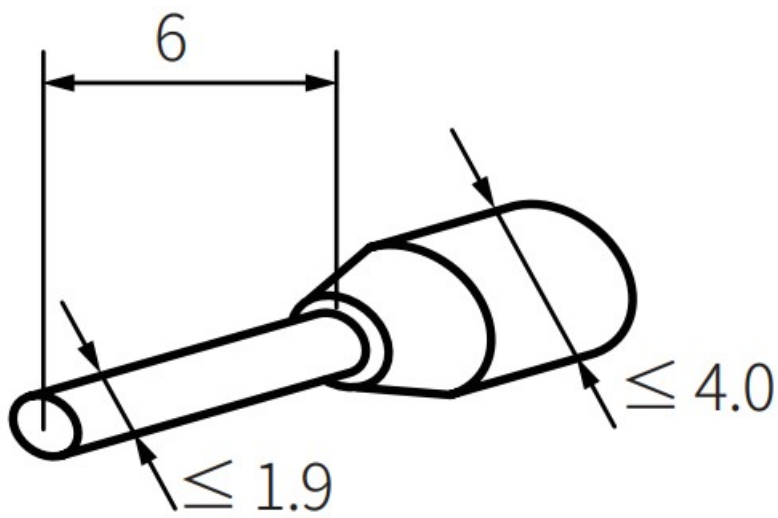
Mount the product to panel with bracket, push ditto arrow direction by using screw driver.

In case of TC4Y Series, fasten the bolts.

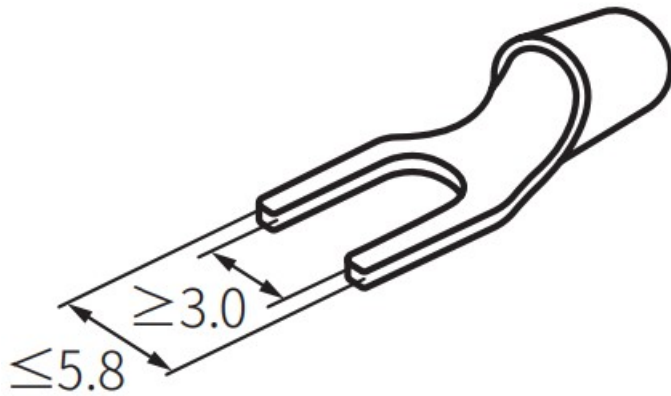
Crimp Terminal Specifications

- Unit: mm, Use the crimp terminal of follow shape

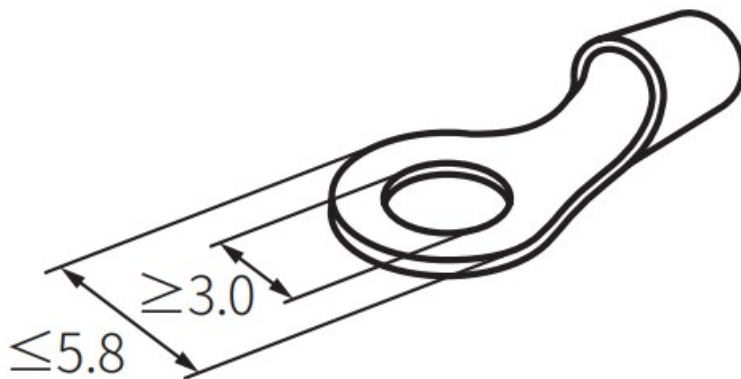
Wire ferrule



Fork crimp terminal

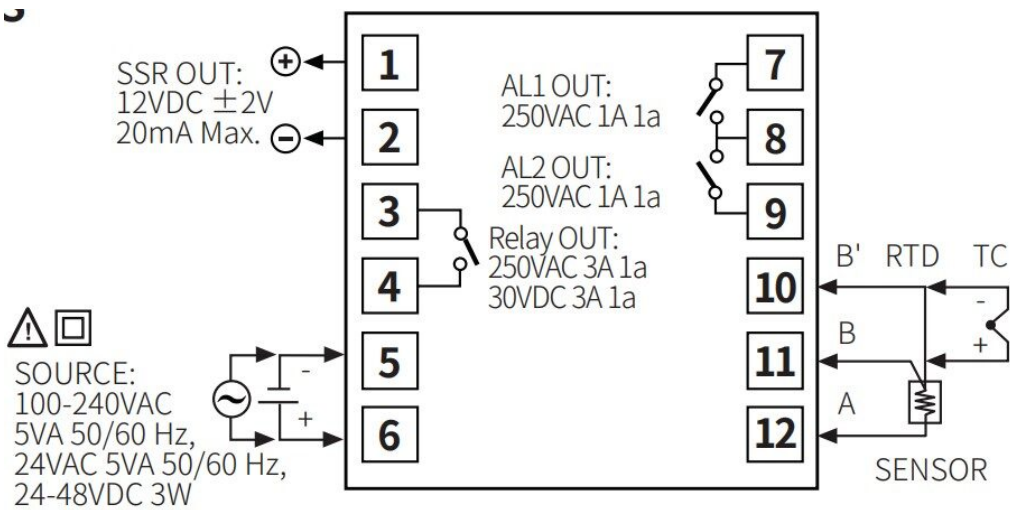


Round crimp terminal

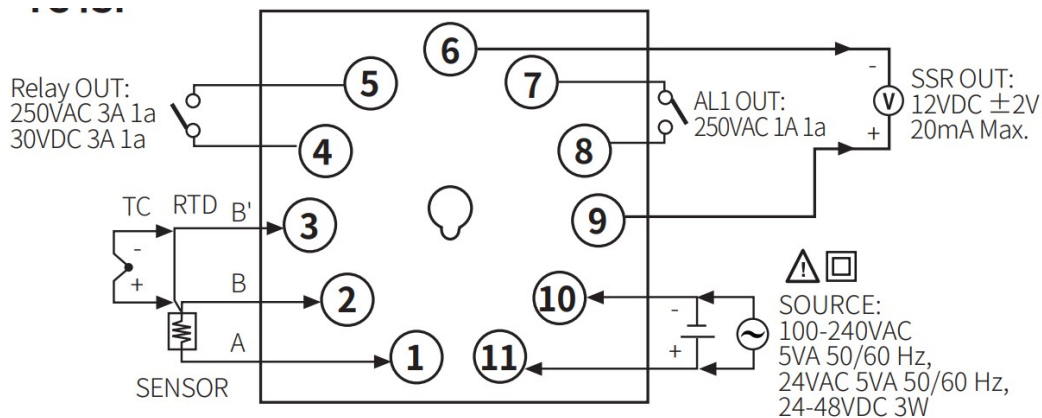


Connections

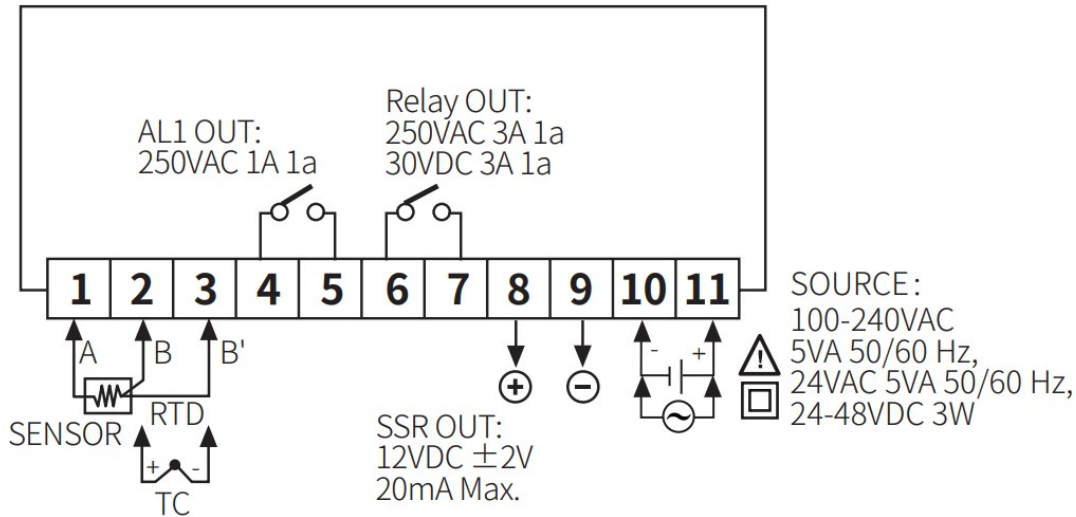
- TC4S



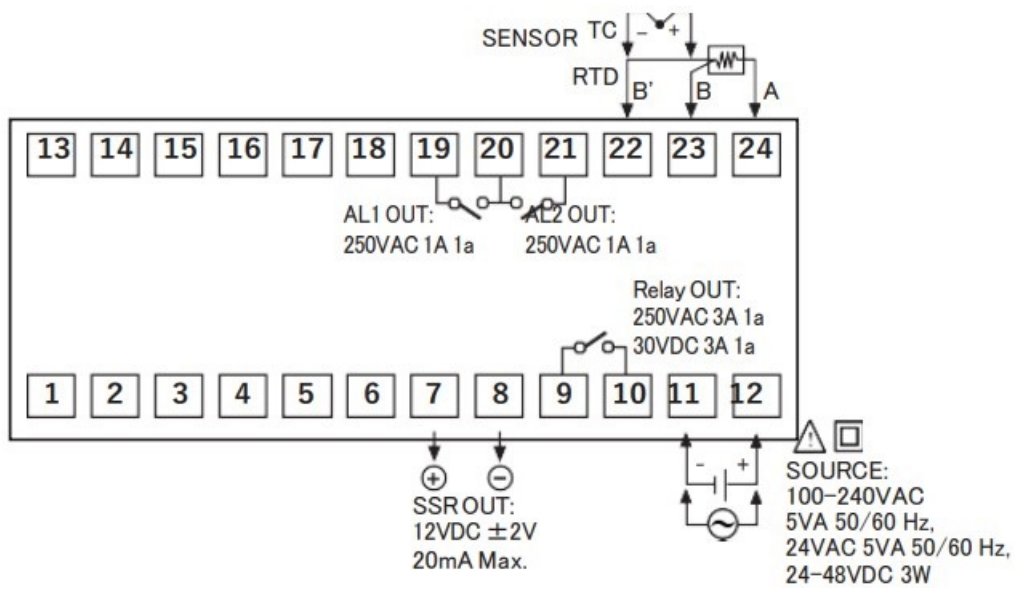
• TC4SP



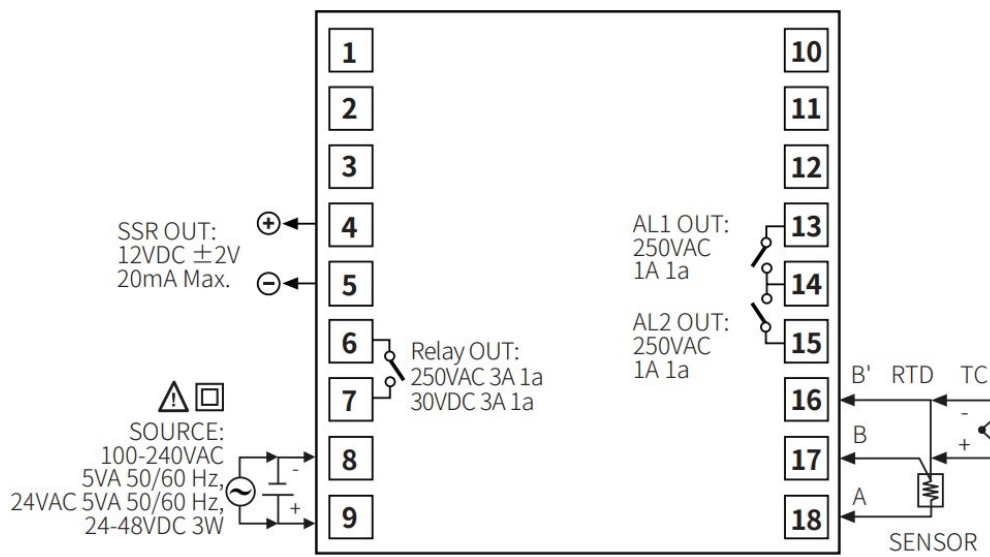
• TC4Y



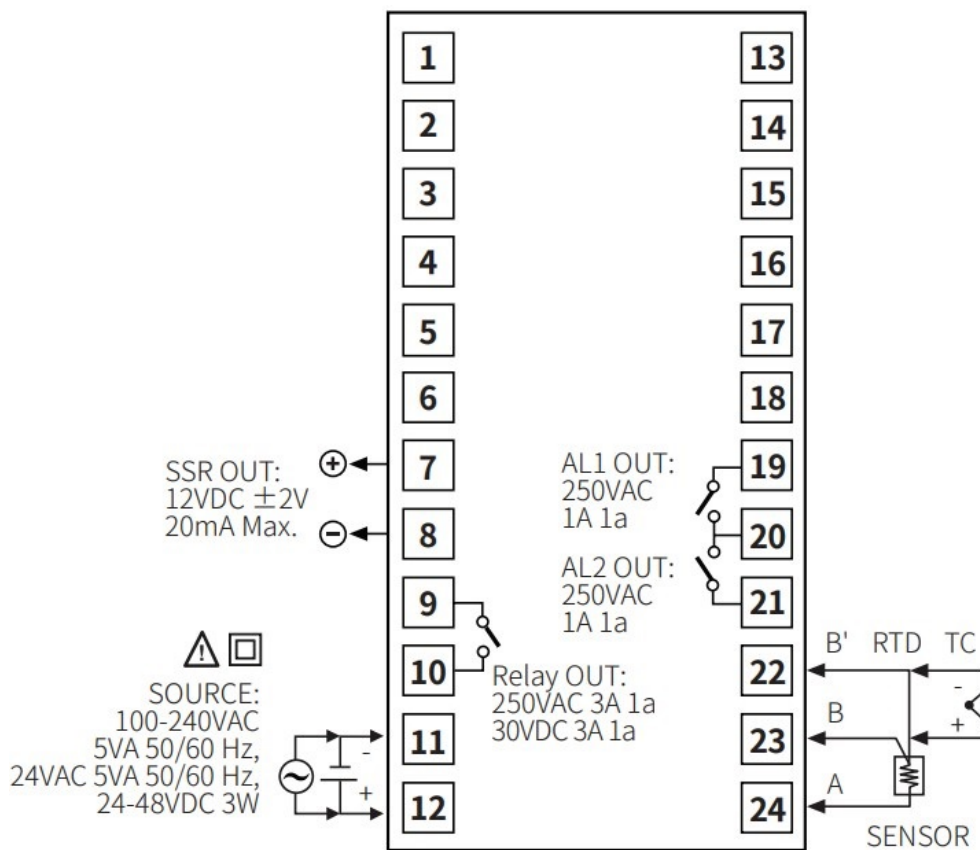
• TC4W



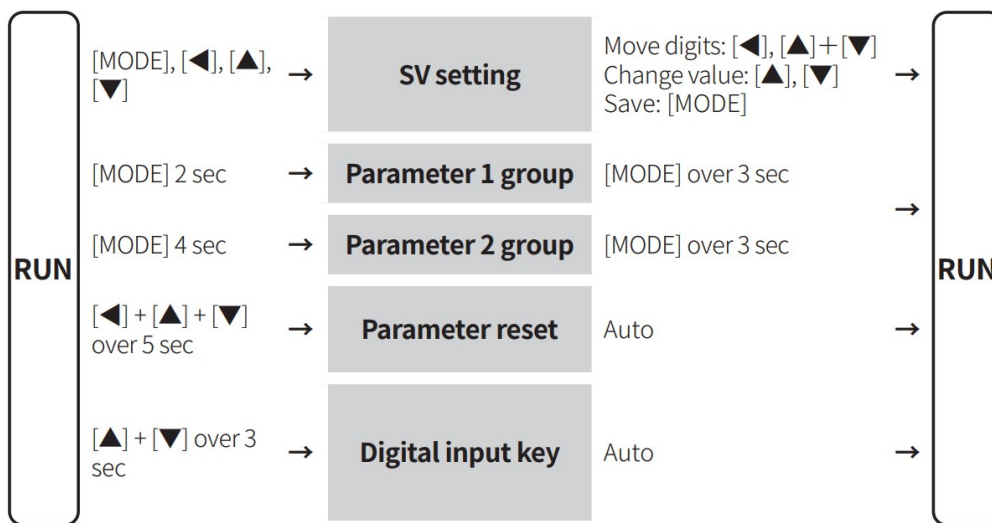
- TC4M



- TC4H/L



Mode Setting



Parameter Setting

- Some parameters are activated/deactivated depending on the model or setting of other parameters. Refer to the description of each item.
- The setting range in parentheses is for using the decimal point display in the input specification.
- If there is no key input for more than 30 seconds in each parameter, it returns to RUN mode.
- When pressing the [MODE] key within 1 second after returning to the operation mode from the parameter group, it will enter the parameter group before returning.
- [MODE] key: Saves the current parameter setting value and moves to the next parameter. [◀] key: Moves the column when changing the set value [▲], [▼] keys: Selects the parameter / Changes the set value

- Recommended parameter setting sequence: Parameter 2 group → Parameter 1 group → SV setting mode ■
Parameter 1 group
- Only appears at control output model

Parameter		Display	Default	Setting range	Condition
1-1	AL1 alarm temperature	L [▲]	250	Deviation alarm: -F.S. to F.S. °C/°F Absolute value alarm: Within input range	2-12/14AL1/2 alarm operation: AM1 to AM6
1-2	AL2 alarm temperature	L2	250	[2 alarm output model] Same as 1-1 AL1 alarm temperature	
1-3	Auto tuning	T	OFF	OFF: Stop, ON: Execution	2-8 Control type: PID
1-4	Proportional band	P	0.0	0.1 to 999.9 °C/°F	
1-5	Integral time	I	0000	0 (OFF) to 9999 sec	
1-6	Derivative time	D	0000	0 (OFF) to 9999 sec	
1-7	Manual reset	REST	0.5	0.0 to 100.0%	2-8 Control type: PID & 1-5 Integralt time: 0
1-8	Hysteresis	YS	0.02	1 to 100 (0.1 to 50.0) °C/°F	2-8 Control type: ONOFF

Parameter 2 group

In case of indicator model, only appears 2-1 to 4 / 2-19 parameters

Parameter		Display	Default	Setting range	Condition
2-1	Input specification ⁰¹⁾	IN-T	KC [▲]	Refer to 'Input Type and Using Range'.	—
2-2	Temperature unit ⁰¹⁾	UNIT	°C	°C, °F	—
2-3	Input correction	IN-B	0000	-999 to 999 (-199.9 to 999.9) °C/°F	—
2-4	Input digital filter	M F	0.0 [▲]	0.1 to 120.0 sec	—
2-5	SV low limit ⁰²⁾	L-SV	-0.50	Within 2-1 Input specification: Using range, L-SV ≤ H-SV - 1-digit °C/°F H-SV ≥ L-SV + 1-digit °C/°F	—
2-6	SV high limit ⁰²⁾	-SV	200		—
2-7	Control output mode	O-FT	E T	HEAT: Heating, COOL: Cooling	—

2-8	Control type ⁰³⁾	C-MD	PID	PID, ONOF: ON/OFF	—
2-9	Control output	OUT	RLY	RLY: relay, SSR	—
2-10	SSR drive output type	SSrM	STND	[AC voltage model]STND: standard, CYCL: cycle, PHAS:phase	2-9 Controloutput: S SR
2-11	Control cycle	T	02)0	0.5 to 120.0 sec	2-9 Controloutput: RLY2-10 SSR drive output type: STND
			00 0		2-9 Controloutput: SSR2-10 SSR drive output type: STND
2-12	AL1 alarm operation ⁰⁴⁾	L- 	M!  □□□■	□□□ AM0: OffAM1: Deviation high limit alarm AM2: Deviation low limit alarmAM3: Deviation high, low limit alarm AM4: Deviation high, low reverse alarm AM5: Absolute value high limit alarm AM6: Absolute value low limit alarm SBA: Sensor break alarmLBA: Loop break alarm (LBA)	—
2-13	AL1 alarm option			A: Standard alarmC: Standby sequence 1E: Standbysequence 2 B: Alarm latchD: Alarm latch and standby sequence 1F: Alarm latch and standby sequence 2	—
				• Enter to option setting: Press [] keyin 2-12 AL-1 alarm operation.	
2-14	AL2 alarm operation ⁰⁴⁾	L-2	M	[2 alarm output model]Same as 2-12/13 AL1 alarm operation/option	—
2-15	AL2 alarm option				
2-16	Alarm output hysteresis	YS	000 	1 to 100 (0.1 to 50.0) °C/°F	2-12/14AL1/2 alarm operation: A M1 to 6
2-17	LBA time	LBaT	0000	0 (OFF) to 9,999 sec or auto (auto tuning)	2-12/14AL1/2 alarm operation: L BA

2-18	LBA band	LBaB	002	0 (OFF) to 999 (0.0 to 999.9) °C/°F or auto (auto tuning)	2-12/14AL1/2 alarm operation: LBA & 2-17 LBA time: 0
2-19	Digital input key	DI-K	STOP	STOP: Stop control output, AL.RE: Alarm reset, AT*: Auto tuning execution, OFF	*2-8 Control type: PID
2-20	Sensor error MV	ErMV	00)0	0.0: OFF, 100.0: ON	2-8 Control type: ONOF
				0.0 to 100.0%	2-8 Control type: PID
2-21	Lock	LOC	OFF	OFFLOC1: Parameter 2 group lock LOC2: Parameter 1/2 Group lock LOC3: Parameter 1/2 Group, SV setting lock	—
				[Indicator model]OFFLOC1: Parameter 2 group lock	
Parameter		Display	Default	Setting range	Condition
2-1	Input specification ⁰¹⁾	IN-T	KC	Refer to 'Input Type and Using Range'.	—
2-2	Temperature unit ⁰¹⁾	UNIT	?C	°C, °F	—
2-3	Input correction	IN-B	0000	-999 to 999 (-199.9 to 999.9) °C/°F	—
2-4	Input digital filter	M F	00)	0.1 to 120.0 sec	—
2-5	SV low limit ⁰²⁾	L-SV	-050	Within 2-1 Input specification: Using range, L-SV ≤ H-SV – 1-digit °C/°F H-SV ≥ L-SV + 1-digit °C/°F	—
2-6	SV high limit ⁰²⁾	-SV	200		—
2-7	Control output mode	O-FT	E T	HEAT: Heating, COOL: Cooling	—
2-8	Control type ⁰³⁾	C-MD	PID	PID, ONOF: ON/OFF	—
2-9	Control output	OUT	RLY	RLY: relay, SSR	—

2-10	SSR drive output type	SSrM	STND	[AC voltage model]STND: standard, CYCL: cycle, PHAS:phase		2-9 Controloutput: SSR
2-11	Control cycle	T	02)0	0.5 to 120.0 sec		2-11Controloutput: RLY2-12 SSR drive output type: STND
			00 0			2-11Controloutput: SSR2-12 SSR drive output type: STND
2-12	AL1 alarm operation ⁰⁴⁾	L- 	M!  	□□□ AM0: OffAM1: Deviation high limit alarm AM2: Deviation low limit alarmAM3: Deviation high, low limit alarm AM4: Deviation high, low reverse alarm AM5: Absolute value high limit alarm AM6: Absolute value low limit alarm SBA: Sensor break alarmLBA: Loop break alarm (LBA)		—
2-13	AL1 alarm option			■A: Standard alarmC: Standby sequence 1E: Standby sequence 2	B: Alarm latchD: Alarm latch and standby sequence 1F: Alarm latch and standby sequence 2	—
				• Enter to option setting: Press [◀] key in 2-12 AL-1 alarm operation.		
2-14	AL2 alarm operation ⁰⁴⁾	L-2	M	[2 alarm output model]Same as 2-12/13 AL1 alarm operation/option		—
2-15	AL2 alarm option					
2-16	Alarm output hysteresis	YS	000 	1 to 100 (0.1 to 50.0) °C/°F		2-12/14AL1/2 alarm operation: AM1 to 6
2-17	LBA time	LBaT	0000	0 (OFF) to 9,999 sec or auto (auto tuning)		2-12/14AL1/2 alarm operation: LBA
2-18	LBA band	LBaB	002	0 (OFF) to 999 (0.0 to 999.9) °C/°F or auto (auto tuning)		2-12/14AL1/2 alarm operation: LBA & 2-17 LBAtime: 0

2-19	Digital inputkey	DI-K	STOP	STOP: Stop control output, AL.RE: Alarm reset, AT*: Auto tuning execution, OFF	*2-8 Control type: PID
2-20	Sensor error MV	ErMV	00)0	0.0: OFF, 100.0: ON	2-8 Control type: ONOF
				0.0 to 100.0%	2-8 Control type: PID
2-21	Lock	LOC	OFF	OFFLOC1: Parameter 2 group lock LOC2: Parameter 1/2 Group lockLOC3: Parameter 1/2 Group, SV settinglock	
				[Indicator model] OFF LOC1: Parameter 2 group lock	

1. Below parameters are initialized when the setting value is changed

- Parameter 1 group:AL1/2 alarm temperature
- Parameter 2 group: Input correction, SV high/low limit, Alarm output hysteresis, Blaine, Laban
- SV setting mode: SV

2. IASIS lower/higher than low/high limit when the value is changed, SV is changed to the low/high limit value. If

2-1 Input specification is changed, the value is changed to Min./Max. value of Input specification.

1. When changing the value from PID to ONOF, each value of following parameter is changed. 2-19 Digital input key: OFF, 2-20 Sensor error MV: 0.0 (When setting value is lower than 100.0)
2. 1-1/2 AL1, AL2 alarm temperature setting values are initialized when the setting value is changed.

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Documents / Resources

	Autonics TC Series TC4Y-N4R Single Display PID Temperature Controllers [pdf] Instruction Manual TC Series TC4Y-N4R Single Display PID Temperature Controllers, TC Series, TC4Y-N4R Single Display PID Temperature Controllers, PID Temperature Controllers, Temperature Controllers
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References

- [A autonics.com](http://www.autonics.com)