

# Simultaneous Heating&Cooling Output PID Temperature Controllers



## TK Series CATALOG

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

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

### Features

- 50ms high-speed sampling rate and  $\pm 0.3\%$  display accuracy
- Simultaneous heating and cooling control function (patent) \*
- Switch between current output and SSR drive output
- SSR drive output (SSRP function) control options: ON/OFF control, cycle control, phase control
- Communication output models available: RS485 (Modbus RTU)
- Parameter configuration via PC (RS485 communication)
  - DAQMaster software included (comprehensive device management software)
  - Communication converter sold separately: SCM-US (USB to serial converter), SCM-381 (RS-232C to RS485 converter), SCM-US481 (USB to RS485 converter)
- User-friendly parameter features
- Heater disconnect alarm function (CT input)
  - Current transformer (CT) sold separately: CSTC-E80LN, CSTC-E200LN, CSTS-E80PP
- SV preset function (up to 4 set values) using digital input terminals
- Available in various DIN sizes: (48×24, 48×48, 72×72, 96×48, 48×96, 96×96 mm)

\*Korea Patent Registration 10-1002582, U.S.A. Patent Registration 8645000, Japan Patent Registration 3184816, China Patent Registration ZL200980111733.X, Vietnam Patent Registration 1-0012131, India Patent Registration 291573, Indonesia Patent Registration IDP0032166

### 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 K 4 ① - ② ③ ④ ⑤**

#### ① Size

- N: DIN W 48 × H 24 mm
- SP: DIN W 48 × H 48 mm (11 pin plug type)
- S: DIN W 48 × H 48 mm
- M: DIN W 72 × H 72 mm
- W: DIN W 96 × H 48 mm
- H: DIN W 48 × H 96 mm
- L: DIN W 96 × H 96 mm

#### ③ Power supply

- 2: 24 VAC ~ 50/60 Hz, 24-48 VDC ==
- 4: 100-240 VAC ~ 50/60 Hz

#### ④ OUT1 Control output

- R: Relay
- S: SSR drive
- C: Selectable current or SSR drive output

#### ② Option in/output

Size: N		
PN	OUT2	Function
1	Normal type <sup>01)</sup>	Alarm 1 + CT input
	Heating & Cooling	Alarm 2
2	Normal type	Alarm 1 + Alarm 2
	Heating & Cooling	Alarm 1 + Digital input 1/2
D	Normal type	Digital input 1/2
	Heating & Cooling	Alarm 1 + Transmission output
R	Normal type	Transmission output
	Heating & Cooling	Alarm output 1 + RS485 communication
T	Normal type	RS485 communication
	Heating & Cooling	RS485 communication

#### ⑤ OUT2 Control output

- N: Normal type [No OUT2 (Heating or Cooling)]
- R: Heating & Cooling type [Relay output]<sup>03)</sup>
- C: Heating & Cooling type [Selectable current or SSR drive output]<sup>04)</sup>

#### Size: SP

PN	Function
1	Alarm 1

#### Size: S, M, W, H, L

PN	Function
1	Alarm 1
2	Alarm 1 + Alarm output 2
R	Alarm 1 + Transmission output
T	Alarm 1 + RS485 communication
A	Alarm 1 + Alarm 2 + Transmission output
B	Alarm 1 + Alarm 2 + RS485 communication
D	Alarm 1 + Alarm 2 + Digital input 1/2 <sup>02)</sup>

01) The CT input model of TK4N can be selected only in the normal type model with alarm output 1. (except TK4SP)

02) Only for TK4S-D, OUT2 output terminal is used as DI-2 input terminal.

03) When operating mode is heating or cooling control, OUT2 can be used as alarm output 3 (except TK4N).





04) When operating mode is heating or cooling control, OUT2 can be used as transmission output 2.

### Software

Download the installation file and the manuals from the Autonics website.

#### ■ DAQMaster

DAQMaster is comprehensive device management program. It is available for parameter setting, monitoring.

Specifications					
Series		TK4N	TK4SP	TK4S	TK4M
Power supply	AC type	100 - 240 VAC ~ 50/60 Hz ± 10%			
	AC/DC type	-	24 VAC ~ 50/60 Hz ± 10%, 24-48 VDC = ± 10%		
Power consumption	AC type	≤ 6 VA			
	AC/DC type	-	AC: ≤ 8 VA, DC ≤ 5W		
Unit weight (packaged)		≈ 70 g (≈ 140 g)	≈ 85 g (≈ 130 g)	≈ 105 g (≈ 150 g)	≈ 140 g (≈ 210 g)
	Series		TK4W	TK4H	TK4L
Power supply	AC type	100 - 240 VAC ~ 50/60 Hz ± 10%			
	AC/DC type	24 VAC ~ 50/60 Hz ± 10%, 24-48 VDC = ± 10%			
Power consumption	AC type	≤ 8 VA			
	AC/DC type	AC: ≤ 8 VA, DC ≤ 5W			
Unit weight (packaged)		≈ 141 g (≈ 211 g)	≈ 141 g (≈ 211 g)	≈ 198 g (≈ 294 g)	
	Sampling period	50 ms			
Input specification	Refer to 'Input Type and Using Range'				
Option input	CT input	<ul style="list-style-type: none"> <li>• 0.0-50.0 A (primary current measurement range)</li> <li>• CT ratio: 1/1,000</li> <li>• Measurement accuracy: ± 5% F.S. ± 1 digit</li> </ul>			
	Digital input	<ul style="list-style-type: none"> <li>• Contact - ON: ≤ 2 kΩ, OFF: ≥ 90 kΩ</li> <li>• Non contact - residual voltage ≤ 1.0 V, leakage current ≤ 0.1 mA</li> <li>• Outflow current: ≈ 0.5 mA per input</li> </ul>			
Control output	Relay	250 VAC ~ 3 A, 30 VDC = 3 A 1a			
	SSR	11 VDC = ± 2 V, ≤ 20 mA			
Alarm output	Relay	AL1, AL2: 250 VAC ~ 3 A 1a • TK4N-AL2: 250 VAC ~ 0.5 A 1a (≤ 125 VA)			
	Current	DC 4-20 mA or DC 0-20 mA (parameter), Load resistance: ≤ 500 Ω			
Option output	Transmission	DC 4 - 20 mA (Load resistance: ≤ 500 Ω, Output accuracy: ± 0.3% F.S.)			
	RS485 comm.	Modbus RTU			
Display type	7 segment (red, green, yellow), LED type				
Control type	Heating, Cooling	ON/OFF, P, PI, PD, PID Control			
	Heating & Cooling				
Hysteresis	<ul style="list-style-type: none"> <li>• Thermocouple, RTD: 1 to 100 (0.1 to 100.0) °C/°F</li> <li>• Analog: 1 to 100 digit</li> </ul>				
Proportional band (P)	0.1 to 999.9 °C/°F (0.1 to 999.9%)				
Integral time (I)	0 to 9,999 sec				
Derivative time (D)	0 to 9,999 sec				
Control cycle (T)	<ul style="list-style-type: none"> <li>• Relay output, SSR drive output: 0.1 to 120.0 sec</li> <li>• Selectable current or SSR drive output: 1.0 to 120.0 sec</li> </ul>				
Manual reset	0.0 to 100.0%				
Relay life cycle	Mechanical	OUT1/2: ≥ 5,000,000 operations AL1/2: ≥ 20,000,000 operations (TK4H/W/L: ≥ 5,000,000 operations)			
	Electrical	≥ 100,000 operations			
Dielectric strength	Between power source terminal and input terminal: 2,000 VAC ~ 50/60 Hz for 1 min				
Vibration	0.75 mm amplitude at frequency of 5 to 55 Hz (for 1 min) in each X, Y, Z direction for 2 hours				
Insulation resistance	≥ 100 MΩ (500 VDC = megger)				
Noise immunity	± 2 kV square shaped noise by noise simulator (pulse width: 1 μs) 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)				
Protection structure	IP65 (Front panel, IEC standards) • TK4SP: IP50 (Front panel, IEC standards)				
Insulation type	Double insulation or reinforced insulation (mark:  , dielectric strength between the measuring input part and the power part: 2 kV)				
Accessory	Bracket, Terminal protection cover (TK4N)				
Approval	  				

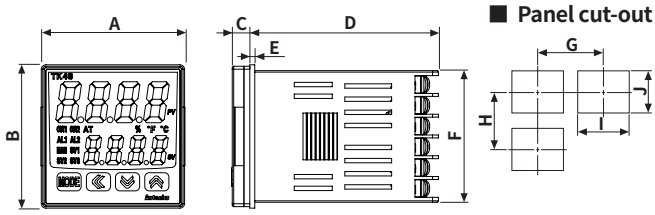
## Communication Interface

■ RS485	
Comm. protocol	Modbus RTU
Connection type	RS485
Application standard	EIA RS485 compliance with
Maximum connection	31 units (address: 01 to 99)
Synchronous method	Asynchronous
Comm. Method	Two-wire half duplex
Comm. effective range	≤ 800 m
Comm. speed	2,400 / 4,800 / 9,600 (default) / 19,200 / 38,400 bps (parameter)
Response time	5 to 99 ms (default: 20 ms)
Start bit	1 bit (fixed)
Data bit	8 bit (fixed)
Parity bit	None (default), Odd, Even
Stop bit	1 bit, 2 bit (default)
EEPROM life cycle	≈ 1,000,000 operations (Erase / Write)

Input Type and Using Range						
The setting range of some parameters is limited when using the decimal point display.						
Input type	Decimal point	Display	Using range (°C)	Using range (°F)		
Thermo-couple	K (CA)	1	℄℄RH	-200 to 1,350	-328 to 2,463	
		0.1	℄℄RL	-199.9 to 999.9	-199.9 to 999.9	
	J (IC)	1	℄℄EH	-200 to 800	-328 to 1,472	
		0.1	℄℄EL	-199.9 to 800.0	-199.9 to 999.9	
	E (CR)	1	℄℄rH	-200 to 800	-328 to 1,472	
		0.1	℄℄rL	-199.9 to 800.0	-199.9 to 999.9	
	T (CC)	1	℄℄EH	-200 to 400	-328 to 752	
		0.1	℄℄EL	-199.9 to 400.0	-199.9 to 752.0	
	RTD	B (PR)	1	b Pr	0 to 1,800	32 to 3,272
		R (PR)	1	r Pr	0 to 1,750	32 to 3,182
		S (PR)	1	s Pr	0 to 1,750	32 to 3,182
		N (NN)	1	n nn	-200 to 1,300	-328 to 2,372
C (TT) <sup>01)</sup>		1	℄ ℄t	0 to 2,300	32 to 4,172	
G (TT) <sup>02)</sup>		1	℄ ℄t	0 to 2,300	32 to 4,172	
Analog	L (IC)	1	℄ ℄EH	-200 to 900	-328 to 1,652	
		0.1	℄ ℄EL	-199.9 to 900.0	-199.9 to 999.9	
	U (CC)	1	℄℄EH	-200 to 400	-328 to 752	
		0.1	℄℄EL	-199.9 to 400.0	-199.9 to 752.0	
	RTD	Platinel II	1	PL I	0 to 1,390	32 to 2,534
		Cu50 Ω	0.1	℄ ℄ 5	-199.9 to 200.0	-199.9 to 392.0
		Cu100 Ω	0.1	℄ ℄ 10	-199.9 to 200.0	-199.9 to 392.0
		JPt100 Ω	1	℄℄tH	-200 to 650	-328 to 1,202
			0.1	℄℄tL	-199.9 to 650.0	-199.9 to 999.9
		DPt50 Ω	0.1	℄℄t 5	-199.9 to 600.0	-199.9 to 999.9
	Analog	DPt100 Ω	1	℄℄tH	-200 to 650	-328 to 1,202
			0.1	℄℄tL	-199.9 to 650.0	-199.9 to 999.9
Nickel120 Ω		1	n i 12	-80 to 200	-112 to 392	
		0 to 10V	-	Ru 1	0 to 10 V	
0 to 5V		-	Ru 2	0 to 5 V		
1 to 5V		-	Ru 3	1 to 5 V		
0 to 100 mV	-	Ru u 1	0 to 100 mV			
0 to 20 mA	-	Ru R 1	0 to 20 mA			
4 to 20 mA	-	Ru R 2	4 to 20 mA			
Input type	Using temperature	Display accuracy				
Thermo-couple	At room temperature (23°C ± 5°C)	(PV ± 0.3% or ± 1 °C higher one) ± 1-digit • Thermocouple K, J, T, N, E below -100 °C and L, U, PLII, RTD Cu50 Ω, DPt50 Ω: (PV ± 0.3% or ± 2 °C higher one) ± 1-digit • Thermocouple C, G and R, S below 200 °C: (PV ± 0.3% or ± 3 °C higher one) ± 1-digit • Thermocouple B below 400 °C: There is no accuracy standards				
	Out of room temperature range	(PV ± 0.5% or ± 2 °C higher one) ± 1-digit • RTD Cu50 Ω, DPt50 Ω: (PV ± 0.5% or ± 3 °C higher one) ± 1-digit • Thermocouple R, S, B, C, G: (PV ± 0.5% or ± 5 °C higher one) ± 1-digit • Other sensors: ≤ ± 5 °C (≤ -100 °C)				
Analog	At room temperature (23°C ± 5°C)	± 0.3% F.S. ± 1-digit				
	Out of room temperature range	± 0.5% F.S. ± 1-digit				
• In case of TK4SP Series, ± 1 °C will be added to the degree standard.						

## Dimensions

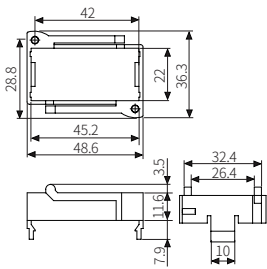
- Unit: mm, For the detailed drawings, follow the Autonics website.
- Below is based on TK4S Series.



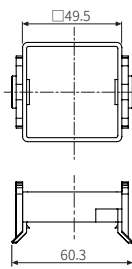
	Body						Panel cut-out			
	A	B	C	D	E	F	G	H	I	J
TK4N	48	24	3	91.8	-	21.8	≥ 55	≥ 37	45 <sup>+0.6</sup> <sub>0</sub>	22.2 <sup>+0.3</sup> <sub>0</sub>
TK4S	48	48	6	64.5	1.7	45	≥ 65	≥ 65	45 <sup>+0.6</sup> <sub>0</sub>	45 <sup>+0.6</sup> <sub>0</sub>
TK4SP	48	48	6	72.2	-	44.8	≥ 65	≥ 65	45 <sup>+0.6</sup> <sub>0</sub>	45 <sup>+0.6</sup> <sub>0</sub>
TK4M	72	72	6	64.5	1.7	67.5	≥ 90	≥ 90	68 <sup>+0.7</sup> <sub>0</sub>	68 <sup>+0.7</sup> <sub>0</sub>
TK4W	96	48	6	64.5	1.5	44.7	≥ 115	≥ 65	92 <sup>+0.8</sup> <sub>0</sub>	45 <sup>+0.6</sup> <sub>0</sub>
TK4H	48	96	6	64.5	1.5	91.5	≥ 65	≥ 115	45 <sup>+0.6</sup> <sub>0</sub>	92 <sup>+0.8</sup> <sub>0</sub>
TK4L	96	96	6	64.5	1.5	91.5	≥ 115	≥ 115	92 <sup>+0.8</sup> <sub>0</sub>	92 <sup>+0.8</sup> <sub>0</sub>

## Bracket

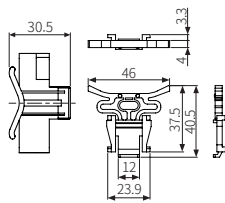
### TK4N



### TK4S/SP

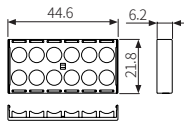


### Other series

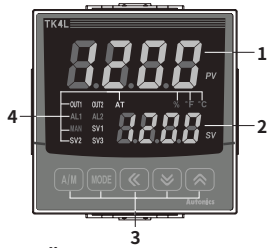


## Terminal protection cover

### TK4N



## Unit Descriptions



### 1. PV display part (Red)

- Run mode: Displays PV (Present value).
- Setting mode: Displays parameter name.

### 2. SV display part (Green)

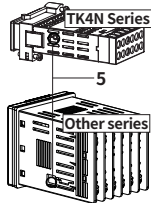
- Run mode: Displays SV (Setting value).
- Setting mode: Displays parameter setting value.

### 3. Input key

Display	Name
[A/M]	Control switching key
[MODE]	Mode key
[◀], [▼], [▲]	Setting value control key

### 4. Indicator

Display	Name	Description
°C, %, °F	Unit	Displays selected unit (parameter)
AT	Auto tuning	Flashes during auto tuning every 1 sec
OUT1/2	Control output	Turns ON when the control output is ON • SSR output (cycle/phase control) • MV over 5% ON • Current output Manual control: 0% OFF, over ON Auto control: below 2% OFF, over 3% ON
AL1/2	Alarm output	Turns ON when the alarm output is ON
MAN	Manual control	Turns ON during manual control
SV1/2/3	Multi SV	The SV indicator is ON which is currently displayed. (When using multi SV function)



**5. PC loader port:**  
For connecting communication converter (SCM series).

• For the details about old model, refer to the user manual. Download the manuals from the Autonics website.

## Sold Separately

- 11 pin socket: PG-11, PS-11 (N)
- Current transformer (CT)
- Terminal protection cover: RSA / RMA / RHA / RLA Cover
- Communication converter: SCM Series