

Simultaneous Heating & Cooling
Output PID Temperature Controller

TK4S-14RC

Item no.: 3016144

INSTRUCTION MANUAL

TCD210240AD



Read and understand the instruction manual 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.

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.

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 result in serious injury or death

- 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.
- 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.
- Install on a device panel to use.**
Failure to follow this instruction may result in electric shock.
- 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.
- 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 fire or electric shock.

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

- 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.
- Use the unit within the rated specifications.**
Failure to follow this instruction may result in fire or product damage
- 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.
- 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 varistor 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.
- Do not apply excessive power when connecting or disconnecting the connectors of the product.
- 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.
- Do not overlapping communication line and power line. Use twisted pair wire for communication line and connect ferrite bead at each end of line to reduce the effect of external noise.
- Make a required space around the unit for radiation of heat. For accurate temperature measurement, warm up the unit over 20 min after turning 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

Product Components

- Product (+ bracket)
- Instruction manual

Operating Instructions for download

Use the link www.conrad.com/downloads (alternatively scan the QR code) to download the complete operating instructions (or new/current versions if available). Follow the instructions on the web page.

Specifications

Series		TK4S
Power supply	AC type	100 - 240 VAC~ 50/60 Hz
Permissible voltage range		90 to 110 % of rated voltage
Power consumption	AC type	≤ 8 VA
Unit weight (packaged)		≈ 105 g (≈ 150 g)

Sampling period		50 ms
Input specification		Refer to 'Input Type and Using Range'
Control output	Relay	250 VAC ~ 3 A, 30 VDC --- 3 A 1a
	SSR	11 VDC --- ±2 V, ≤ 20 mA
	Current	DC 4-20 mA or DC 0-20 mA (parameter), Load resistance: ≤ 500 Ω
Alarm output	Relay	AL1: 250 VAC~ 3 A 1a
Display type		7 segment (red, green, yellow), LED type
Control type	Heating, Cooling	ON/OFF, P, PI, PD, PID Control
	Heating & Cooling	
Hysteresis		- Thermocouple, RTD: 1 to 100 (0.1 to 100.0) °C/°F - Analog: 1 to 100 digit
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)		- Relay output, SSR drive output: 0.1 to 120.0 sec - Selectable current or SSR drive output: 1.0 to 120.0 sec
Manual reset		0.0 to 100.0%
Relay life cycle	Mechanical	OUT1/2: ≥ 5,000,000 operations AL1/2: ≥ 20,000,000 operations
	Electrical	≥ 100,000 operations
Dielectric strength		Dependent on the power supply
AC voltage type		Between the charging part and the case: 3,000 VAC ~ 50/60 Hz for 1 minute
Vibration		0.75 mm amplitude at frequency of 5 to 55 Hz 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)
Insulation type		Double insulation or reinforced insulation (mark:  , dielectric strength between the measuring input part and the power part: 2 kV)
Certification		   

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	ℰ℄℄℄℄	-200 to 1,350
		0.1	ℰ℄℄℄℄	-199.9 to 999.9
	J (IC)	1	℄℄℄℄	-200 to 800
		0.1	℄℄℄℄	-199.9 to 800.0
	E (CR)	1	ℰ℄℄℄℄	-200 to 800
		0.1	ℰ℄℄℄℄	-199.9 to 800.0
	T (CC)	1	ℰ℄℄℄℄	-200 to 400
		0.1	ℰ℄℄℄℄	-199.9 to 400.0
	B (PR)	1	℄℄℄℄	0 to 1,800
		1	℄℄℄℄	0 to 1,750
RTD	R (PR)	1	℄℄℄℄	32 to 3,182
		1	℄℄℄℄	32 to 3,182
	S (PR)	1	℄℄℄℄	32 to 3,182
		1	℄℄℄℄	32 to 3,182
	N (NN)	1	℄℄℄℄	-200 to 1,300
		1	℄℄℄℄	-200 to 1,300
	C (TT) ⁰¹⁾	1	℄℄℄℄	0 to 2,300
		1	℄℄℄℄	0 to 2,300
	G (TT) ⁰²⁾	1	℄℄℄℄	32 to 4,172
		1	℄℄℄℄	32 to 4,172
Analog	L (IC)	1	℄℄℄℄	-200 to 900
		0.1	℄℄℄℄	-199.9 to 900.0
	U (CC)	1	℄℄℄℄	-200 to 400
		0.1	℄℄℄℄	-199.9 to 400.0
	Platinel II	1	℄℄℄℄	0 to 1,390
		1	℄℄℄℄	32 to 2,534
	Cu50 Ω	0.1	℄℄℄℄	-199.9 to 200.0
		0.1	℄℄℄℄	-199.9 to 392.0
	Cu100 Ω	0.1	℄℄℄℄	-199.9 to 200.0
		0.1	℄℄℄℄	-199.9 to 392.0

01) C (TT): Same as existing W5 (TT) type sensor

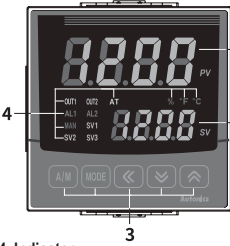
02) G (TT): Same as existing W (TT) type sensor

- Permissible line resistance per line: ≤ 5 Ω

■ Display accuracy

Input type	Using temperature	Display accuracy
Thermo-couple RTD	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

Unit Descriptions

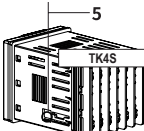


- PV display part (Red)**
 - Run mode: Displays PV (Present value).
 - Setting mode: Displays parameter name.
- SV display part (Green)**
 - Run mode: Displays SV (Setting value).
 - Setting mode: Displays parameter setting value.
- Input key**

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

4. Indicator

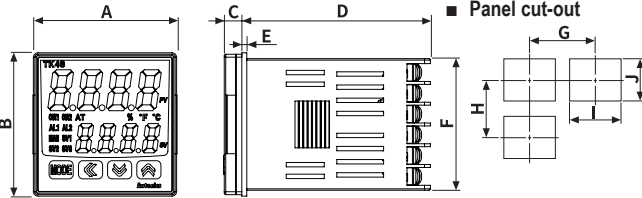
Display	Name	Description
°C, %, °F	Unit	Displays selected unit (parameter)
AT	Auto tuning	Flashes during auto tuning every 1 sec
OUT1/2	Control output	Turns ON when the control output is ON - SSR output (cycle/phase control) MV over 5% ON - Current output Manual control: 0% OFF, over ON Auto control: below 2% OFF, over 3% ON
AL1	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)

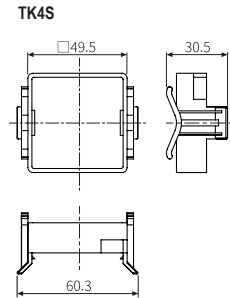
Dimensions

- Unit: mm



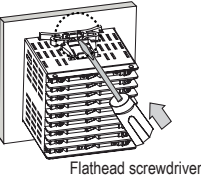
	Body						Panel cut-out			
	A	B	C	D	E	F	G	H	I	J
TK4S	48	48	6	64.5	1.7	45	≥65	≥65	45 ^{+0.6}	45 ^{+0.6}

■ Bracket



Installation Method

TK4S



After mounting the product to panel with bracket, insert the unit into a panel, fasten the bracket by pushing with a flathead screwdriver.

Errors

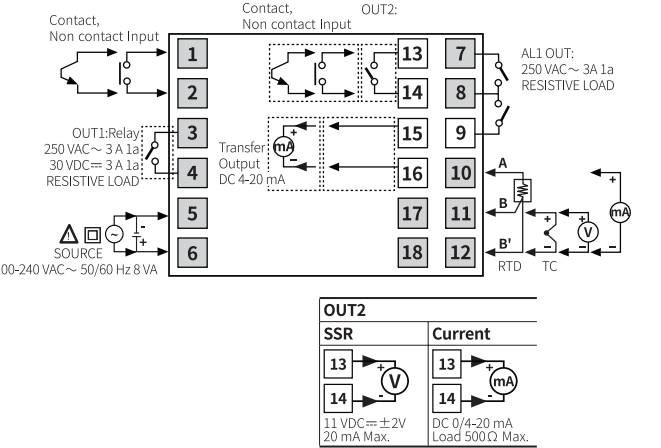
Display	Input	Description	Output	Troubleshooting
o P E n	Temperature sensor	Flashes at 0.5 sec interval when input sensor is disconnected or sensor is not connected.	'Sensor error, MV' parameter setting value	Check input sensor status.
	Analog	Flashes at 0.5 sec interval when input is over F.S. ±10%.	'Sensor error, MV' parameter setting value	Check analog input status.
H H H H	Temperature sensor	Flashes at 0.5 sec intervals if the input value is above the input range. ⁰¹⁾	Heating: 0%, Cooling: 100%	When input is within the rated input range, this display disappears.
	Analog	Flashes at 0.5 sec intervals if the input value is over 5 to 10% of high limit or low limit value.	Normal output	
L L L L	Temperature sensor	Flashes at 0.5 sec. intervals if the input value is below the input range. ⁰¹⁾	Heating: 100%, Cooling: 0%	When input is within the rated input range, this display disappears.
	Analog	Flashes at 0.5 sec intervals if the input value is over 5 to 10% of low limit or high limit value.	Normal output	
E r r	Temperature sensor	Flashes at 0.5 sec intervals if there is error for setting and it returns to the error-before screen.	-	Check setting method.
	Analog			

01) Be careful that when H H H H / L L L L error occurs, the control output may occur by recognizing the maximum or minimum input depending on the control type.

Connections

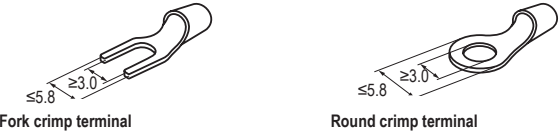
- Shaded terminals are standard model.
- Digital input is not electrically insulated from internal circuits, so it should be insulated when connecting other circuits.

TK4S



Crimp Terminal Specifications

- Unit: mm, use the crimp terminal of the following shape.

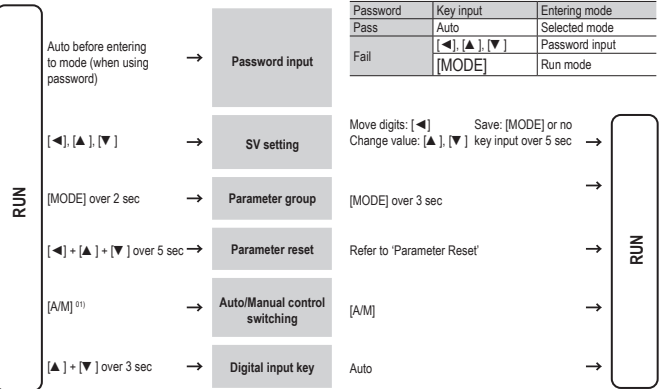


Initial Display When Power is ON

When power is supplied, after all display will flash for 1 sec, model name is displayed sequentially. After input sensor type will flash twice, enter into RUN mode.

	1. All display	2. Model	3. Input specification	4. Run mode
PV display part	B.B.B.B	h P Y	h P Y	o P E n
SV display part	B.B.B.B	14 r n	h P R.H	0

Mode Setting



01) In case of TK4S model, short press of [MODE] key replaces [A/M] key function.

Parameter Reset

- Press the [◀] + [▲] + [▼] keys for over 5 sec. in run mode, INIT turns ON.
- Change the setting value as YES by pressing the [▲], [▼] keys.
- Press the [MODE] key to reset all parameter values as default and to return to run mode.

Parameter Setting

- Some parameters are activated/deactivated depending on the model or setting of other parameters.
- The 'Parameter mask' feature hides unnecessary or inactive parameters, and the 'User parameter group' feature quickly and easily sets up certain parameters that are frequently used.
- Refer to the user manual for the details.

Disposal

This symbol must appear on any electrical and electronic equipment placed on the EU market. This symbol indicates that this device should not be disposed of as unsorted municipal waste at the end of its service life. Owners of WEEE (Waste from Electrical and Electronic Equipment) shall dispose of it separately from unsorted municipal waste. Spent batteries and accumulators, which are not enclosed by the WEEE, as well as lamps that can be removed from the WEEE in a non-destructive manner, must be removed by end users from the WEEE in a non-destructive manner before it is handed over to a collection point.

Distributors of electrical and electronic equipment are legally obliged to provide free take-back of waste. Conrad provides the following return options free of charge (more details on our website):

- in our Conrad offices
- at the Conrad collection points
- at the collection points of public waste management authorities or the collection points set up by manufacturers or distributors within the meaning of the ElektroG

End users are responsible for deleting personal data from the WEEE to be disposed of. It should be noted that different obligations about the return or recycling of WEEE may apply in countries outside of Germany.

Parameter 1 group

Parameter	Display	Default
Control output RUN/STOP	r - S	r U n
Multi SV selection	S u - n	S u - 0
Heater current monitoring	C h - R	0.0
Alarm output1 low limit	R L L L	155.0
Alarm output1 high limit	R L L H	155.0
Multi SV 0	S u - 0	0000
Multi SV 1	S u - 1	0000
Multi SV 2	S u - 2	0000
Multi SV 3	S u - 3	0000

Parameter 2 group

Parameter	Display	Default
Auto tuning RUN/STOP	R t	o F F
Heating proportional band	H - P	0 10.0
Cooling proportional band	C - P	0 10.0
Heating integral time	H - I	0000
Cooling integral time	C - I	0000
Heating derivative time	H - d	0000
Cooling derivative time	C - d	0000
Dead overlap band	d b	0000
Manual reset	r E S t	050.0
Heating hysteresis	H.H.Y.S	002
Heating OFF offset	H o S t	000
Cooling hysteresis	C.H.Y.S	002
Cooling OFF offset	C o S t	000
MV low limit	L - n u	-100.0
MV high limit	H - n u	100.0
RAMP up change rate	r R n U	000
RAMP down change rate	r R n d	000
RAMP time unit	r.U.n.t	n I n

Parameter 3 group

Parameter	Display	Default
Input specification	I n - t	h P R.H
Temperature unit	U n i t	o C
Analog low limit	L - r G	0000
Analog high limit	H - r G	100.0
Scaling decimal point	d o t	0.0
Low limit scale	L - S C	000.0
High limit scale	H - S C	100.0
Display unit	d.U.n.t	o P o
Input correction	i n - b	0000
Input digital filter	n R u F	000.1
SV low limit	L - S u	-200
SV high limit	H - S u	1350
Control output mode	o - F t	H E R t (Normal type) H - C (Heating& Cooling type)
Control type	C - n d	P i d (Normal type) P P (Heating& Cooling-type)
Auto tuning mode	R t.t	t U n i
OUT1 control output selection	o U t 1	C U r r
OUT2 control output selection	o U t 2	C U r r
OUT2 current output range	o 2.n.R	4-20
Heating control cycle	H - t	020.0 (Relay) 002.0 (SSR)
Cooling control cycle	C - t	

Parameter 4 group

Parameter	Display	Default
Alarm output1 Operation mode	R L - I	d u C C
Alarm output1 Option	R L L t	R L - R
Alarm output1 Hysteresis	R L.H.Y	001
Alarm output1 contact type	R L.n	n o
Alarm output1 ON delay time	R L o n	0000
Alarm output1 OFF delay time	R L o F	0000
LBA time	L b R t	0000
LBA band	L b R b	002 (003)
Analog Transmission output1 Mode	R a.n.I	P u
Transmission output1 low limit	F S L I	-200
Transmission output1 high limit	F S H I	1350
Analog Transmission output2 Mode	R a.n.2	P u
Transmission output2 low limit	F S L 2	-200
Transmission output2 high limit	F S H 2	1350
Communication address	R d r S	01
Communication speed	b P S	96
Comm. parity bit	P r t Y	n o n E
Comm. stop bit	S t P	2
Response time	r S U t	20
Comm. write	C o n W	E n R

Parameter 5 group

Parameter	Display	Default
Multi SV number	n b.S.u	1
Digital input key	d I - h	S t o P
Digital input1 Terminal Function	d I - 1	o F F
Digital input2 Terminal Function	d I - 2	o F F
Manual control, initial MV	I t.n.u	R U t o
Manual control, preset MV	P r.n.u	000.0
Sensor error MV	E r.n.u	000.0
Control stop MV	S t.n.u	000.0
Control stop alarm output	S t.R.L	C o n t
User level	U S E r	S t n d
SV setting lock	L C.S.u	o F F
Parameter 1 group lock	L C.P.1	o F F
Parameter 2 group lock	L C.P.2	o F F
Parameter 3 group lock	L C.P.3	o F F
Parameter 4 group lock	L C.P.4	o F F
Parameter 5 group lock	L C.P.5	o F F
Password setting	P W d	0000